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FeSBE 2022 Abstracts/Resumos

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Área Temática: DOHAD | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 MATERNAL CONSUMPTION OF HIGH-FAT DIET PROMOTES ALTERATION OF THE CARDIAC AT2 RECEPTOR EXPRESSION OF THE ADULTHOOD OFFSPRING OF RATS

Previously, our research group observed that the maternal consumption of high-fat diet (HFD) promoted systolic dysfunction in female and male offspring at 180 days of age. The cardiac renin angiotensin system expression (cardiac RAS) seems to promote pro- and antihypertrophic processes. This study aimed to investigate protein expression of components cardiac RAS and correlate with alters at the cardiac function of the adulthood offspring (Protocol no 17/2014). Wistar rats received a control (9% lipid) or high fat (29% lipid) diet before and during pregnancy and lactation, wich originated C and HFD offspring respectively. Both offspring received only control diet from weaning to 180 days of age, and their cardiac function was evaluated by echocardiogram. The offspring were euthanized by the guillotine method. The left ventricle (LV) was used to evaluate the protein expression of renin, angiotensinogen, ACE1, and AT1, AT2 and β 1-ADR receptors using Western Blotting technique. The ejection fraction (Female 25%; Male 20%) and systolic volume (F22%; M28%) were reduced. Besides, the relative wall thickness was used as a index for cardiac hypertrophy, which was reduced only in male HFD offspring (31%). The expression of renin, angiotensinogen, ACE1, receptors AT1 and β 1-ADR was not altered. The cardiac AT2 receptor expression increased in female (49%) and reduced in male (47%) HFD offspring. Maternal consumption of HFD promotes systolic dysfunction in the adult offspring, but only males have cardiac remodeling indicative. It is suggested that the alteration at the cardiac AT2 receptor expression in females could be a protective effect, and the reduction of this receptor in males is involved with possibly process of cardiac remodeling

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Área Temática: DOHAD | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 THE USE OF INFRARED SPECTROSCOPY TO CLASSIFY PATIENTS WITH ALTERED D-DIMER VALUES

D-dimer is a biomarker produced from fibrin degradation and is related to the activation of the coagulation and fibrinolysis cascade. Fourier transform infrared spectroscopy (FTIR) has been investigated as a potential technique to detect biomarkers and distinguish biochemical profiles. In this study, FTIR was used for quantification and classification of Ddimer in blood plasma samples. Blood samples from 59 patients, 34 men (57.6%) and 25 women (42.4%), with a mean age of 58.1 ± 19.3 were collected. Spectra acquisition was performed using a Bruker Optics spectrometer (4000 to 400 cm^{-1}). Matlab software was used for pre-processing and multivariate analysis. Principal Component Analysis (PCA), Supervised Partial Least Squares Analysis (PLS), Genetic Algorithms and Linear Discriminant Analysis (GA-LDA) were performed in the Fingerprint spectral region ($800\text{-}1800 \text{ cm}^{-1}$). Reasoned opinion (0993920.1.0000.5071 and 31411420.9.0000.8207). There was no separation between groups with D-dimer value $\leq 0.5 \text{ ug/ml}$ and $> 0.5 \text{ ug/ml}$, by PCA analysis. The PLS method was not effective in determining the value of D-dimer in plasma samples. However, the GA-LDA method was effective in classifying patients according to D-dimer values ($\leq 0.5 \text{ ug/ml}$ and $> 0.5 \text{ ug/ml}$) with 93.5% specificity and 100% of sensitivity in the training set and 100% of specificity and sensitivity in the test set. Furthermore, this same method selected the most important biological spectral regions in the classification model, such as nucleic acids, amino acids, proteins, lipids, phosphates and amide regions. Therefore, although there is no indication of a relationship between the spectral data and the reference value for the concentration of D-dimer in the samples evaluated, the use of the FTI-R proved to be a potential method to assist in the classification of patients with d values -altered dimers and, later, the application of this method to assist in the clinical diagnosis of patients.

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Área Temática: DOHAD | Ciência de Animais de Laboratório

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**FeSBE2022 ADULT OFFSPRING EXPOSED TO THE HYPERGLYCEMIC
INTRAUTERINE ENVIRONMENT AND TREATED WITH MICRONUTRIENT
MIXTURE DURING PREGNANCY: MATERNAL AND FETAL REPERCUSSIONS**

During pregnancy, diabetes can alter the offspring's health, which might be extended throughout generations. The inadequate consumption of micronutrients in pregnant women with gestational diabetes (GDM) had a prevalence of more than 90%. The objective was to verify if the treatment with a mixture of vitamin D, calcium, and magnesium reduces maternal glycemia, and improves fetal and placental outcomes of pregnant female pups (born to mildly diabetic mothers). The local ethical committee (Protocol 1218/2017) approved all protocols. Parental Sprague Dawley rats with mild diabetes and non-diabetic rats were mated to obtain offspring. In adulthood, these female offspring (daughters) were also mated. The pregnant rats were treated with a mixture (Vitamin D, calcium, magnesium, and zinc) and distributed into: OC—offspring from control mothers; OC/VitD—offspring from control mothers treated with a mixture of micronutrients; OD— offspring from diabetic mothers; OD/vitD—offspring from diabetic mothers treated with the mixture. At end of pregnancy of rat daughters, blood samples for serum leptin and adiponectin analysis, and the laparotomy was performed for weighing of gravid uterus, ovaries, fetuses, and placentas for maternal reproductive performance evaluation. A confidence interval of 95% ($p < 0.05$) was considered. Increased levels of serum Vitamin D were verified in dams and newborns compared to the untreated groups, but the newborns presented no glycemic reduction. The OD/VitD dams had a higher rate of small fetuses for gestational age (SGA) (46.3% vs OC/VitD=4.6%), serum levels of adiponectin, and rate of losses before implantation (37.6% vs OC/VitD=3.6%), lower placental efficiency and number of alive fetuses compared to the OC/VitD. The impaired findings might be related to excessive calcium in the mixture. Thus, the micronutrient mixture improves the fetal programming-induced hyperglycemia of the pregnant daughters, but damages maternal reproductive and fetal outcomes.

Keywords: fetal programming, hyperglycemia, vitamin D, pregnancy, low birth weight.

Financial Support: São Paulo Research Foundation (FAPESP - Grant number 2016/25207-5), and Coordination for the Improvement of Higher Education Personnel (CAPES/Brazil).

ID: 11273

Área Temática: DOHAD | Ciência de Animais de Laboratório

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FeSBE2022 EFFECTS OF MATERNAL PROTEIN RESTRICTION ON THE MORPHO- PHYSIOLOGY OF THE COLON OF MALE RAT OFFSPRING.

The intrauterine environment is critical for offspring's prenatal and postnatal development. A maternal low protein diet (LPD) is associated with several disorders in the offspring, including gastrointestinal diseases. The literature has shown that maternal LPD affects the colon's permeability receptors, inflammatory response, and oxidative stress in offspring; however, the molecular mechanisms involved in this condition need to be elucidated. Here, we aimed to investigate the effects of maternal LPD on colon morphophysiology in offspring rats exposed to maternal LPD. Sprague Dawley rats were distributed into 2 groups: Rats born to mothers fed a normoprotein diet (17%) or a hypoprotein diet (6%) during gestation and lactation (CEUA N°5119280121). At PND21, colons were collected and analyzed for morphological, protein expression, antioxidant enzyme activity, and inflammatory mediators. The GEPIA 2.0 platform was also utilized to access patient databases for rectal (COAD) and colon cancer (READ) ($\text{Log}_2\text{FC} < 1.2$; $q\text{value} < 0.01$). The differentially expressed genes were enriched with KOBAS platform (KEGG, Reactome, PANTHER pathways) and the differentially expressed genes (DEGs) were analyzed for protein-protein interaction using the STRING database. The results demonstrated recruitment of inflammatory cells and reduction of IL10 cytokine and decreased activity of GSH and SOD. In silico analyses identified 728 DEGs (328 up and 400 down), which enriched molecular pathways related to oxidative stress and inflammatory response. Thus, maternal LPD alters inflammatory response and oxidative stress parameters in the colon of young offspring. These data can help to understand the relationship between maternal malnutrition and the developmental origins of gastrointestinal diseases in offspring.

ID: 11142

Área Temática: DOHAD | Ciência de Animais de Laboratório

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FeSBE2022 EVALUATION OF LIVER AUTOPHAGY REGULATION OF ADULT RATS EXPOSED TO INTRAUTERINE HYPERGLYCEMIA AND SUBMITTED TO THE HIGH-FAT DIET AFTER WEANING

Autophagy is an essential process of lysosomal degradation. Nonetheless, changes in this process in the fetal programming of the offspring from diabetic mothers, and exposed to another insult are still unclear. The objective was to evaluate the modulation of hepatic autophagy in adult offspring from diabetic rats submitted or not to the high-fat diet (HFD) in the postnatal period. The Animal Experimentation Ethics Committee approved all procedures (1341/2019). Sprague–Dawley female rats received citrate buffer (Control-C) or Streptozotocin (a beta cell-cytotoxic drug to induce diabetes-D) on postnatal day 5. These adult rats were mated to obtain female offspring (O) [from control (OC) or diabetic dams (OD)], who were fed a standard diet (SD) or HFD from weaning to adulthood (n=6 rats/group): OC/SD, OC/HFD, OD/SD, and OD/HFD. On day 115 of life, the oral glucose tolerance test (OGTT) was performed. After anesthesia, the liver of the rats in four experimental groups was removed. Our results showed that OC/HFD, OD/SD, and OD/HFD groups had glucose intolerance in adulthood, OC/HFD and OD/HFD rats presented oxidative stress and higher pro-inflammatory markers, and OD/SD group demonstrated increased hepatic proteins expression, such as p-AMPK, LC3 II/LC3 I, p62 and cleaved caspase-3, and lower LAMP-2 and BCL-2 expression. The HFD reduced hepatic autophagy and elevated BAX/BCL-2 ratio compared to OC/SD rats. Furthermore, both insults (hyperglycemic intrauterine and postnatal HFD) inhibit cellular autophagy and contribute to metabolic dysfunction associated with fatty liver disease. Thus, the maternal hyperglycemia-induced fetal programming caused deregulated hepatic autophagy and cell death.

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ID: 10824

Área Temática: DOHAD | Ciência de Animais de Laboratório

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FeSBE2022 IMPACT OF MATERNAL HYPERGLYCEMIA ON INSULIN SIGNALING AND MITOCHONDRIAL PHENOTYPE OF SKELETAL MUSCLE OF ADULT FEMALE DIABETIC RATS

Maternal diabetes harms offspring phenotype, which might contribute to impaired glucose metabolism in adulthood. Nonetheless, the mechanisms are still unclear. The purpose of this study was to investigate whether exposure to the hyperglycemic intrauterine environment during pregnancy induces systemic insulin resistance, and disturbs metabolic signaling of skeletal muscle in the offspring's adulthood. Sprague–Dawley female rats (150–250 g) received citrate buffer (Control—C) or 70 mg/Kg of Streptozotocin (a beta cell-cytotoxic drug to induce diabetes—D) on postnatal day 5. In adulthood (100 days of life), these rats were mated to obtain female offspring and the composition of two experimental groups: Female offspring from non-diabetic mothers (FOC) and females from diabetic mothers (FOD) (n= 10 rats/group). In 150 days of life, the oral glucose tolerance test (OGTT) was performed. Following the rats were anesthetized and euthanized to collect blood samples for evaluation of serum biochemical profiles and soleus muscle samples for Western blotting and ultrastructure analysis. The Animal Experimentation Ethics Committee approved all procedures in this study (1326/2019). $P < 0.05$ was considered as the statistical significance limit. Maternal diabetes caused programmed metabolic changes in the adult female pups confirmed by glucose intolerance, insulin resistance state, dyslipidemia, and higher body weight. The FOD group also had a lower expression of protein related to metabolic homeostasis and insulin signaling and mitochondrial fission in the skeletal muscle. Furthermore, the ultrastructure analysis of the soleus muscle of FOD rats evidenced disorganized sarcomeres, mitochondrial aberrant morphology, and dilation in the cisterns of the sarcoplasmic reticulum. These results reveal that the adaptation to the maternal hyperglycemic environment includes a diminished response to insulin signaling and a disturbed mitochondrial metabolism in skeletal muscle.

Keywords: Skeletal muscle; insulin resistance; hyperglycemia; mitochondria; fetal programming, rat.

Financial Support: São Paulo Research Foundation (FAPESP - Grant number 2016/25207-5), and Coordination for the Improvement of Higher Education Personnel (CAPES/Brazil).

ID: 10888

Área Temática: DOHAD | Ciência de Animais de Laboratório

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FeSBE2022 MATERNAL DIABETES EFFECTS ON BLOOD PRESSURE, RENAL FUNCTION, AND GLUCOSE TOLERANCE IN RAT MALE PROGENY

Background/Aims: Amendments during embryo/fetal development have been associated with arterial hypertension and impaired renal function in gestational undernutrition models. Maternal diabetes by drug-induced was related to pancreatic dysfunction and peripheral insulin resistance, which could result in a sizeable phenotypic variation of progeny. So far, the fetal programming in diabetes mellitus is unknown. The present study characterized male offspring's blood pressure levels, renal function, and oral glucose tolerance obtained from severe diabetic mothers. **Methods:** Beta-cytotoxic agent (STZ, 40 mg/kg) induced diabetes in female Sprague Dawley rats. Blood glucose 300mg/dL confirmed diabetic state. Male pups from non-diabetic dams were designed to control offspring (OC), and progeny from uncontrolled diabetic dams as diabetes offspring (OD). In adulthood, body weight and blood pressure were weekly measured through tail plethysmography from 16 to 24 week-old. Also, the renal parameters as urinary protein excretion, creatinine, and lithium clearance were evaluated at 24-wk of age in OC (n=10) and OD (n=13); Data were expressed as mean \pm SD and analyzed by unpaired t-test. **Results:** Male OD offspring bodyweight was reduced with catch-up growth phenomena and normal masses from weaning end to 24 weeks of life. A significant decrease in gonadal and visceral adipose tissue was observed as well as the adiposity tissue index in OD progeny compared to OC offspring. Beyond the 8th week, OD exhibited increased systolic blood pressure, maintained until the 24th week of age. The diastolic blood pressure, heart rate, and cardiac index were unchanged. The plasma sodium, potassium, lithium, and urinary flow rates did not significantly differ between groups during the renal sodium handling studies. The glomerular filtration rates, estimated by CCr, were significantly higher in OD (299.0 ± 165.7 l/min/100 g b.w.) compared to OC (105.8 ± 83.56 l/min/100 g body weight, $p=0.0024$). The FENa⁺ was significantly lower in the OD ($1,478 \pm 2,098$) than the OC age-matched progeny ($5,327 \pm 4,450\%$, $p=0.0461$). The decreased FENa⁺ occurred in parallel with a significant reduction in FEPNa⁺ (OD: $3,064 \pm 1,506\%$ vs. OC: $16,73 \pm 10,06\%$, $p=0,0001$). The decreased FENa⁺ in the OD was also accompanied by unchanged FEPPNa⁺ (OD: $2,121 \pm 1,371\%$ vs. OC: $3,439 \pm 3,244\%$, $p=0,1179$), and decreased FEK⁺. We also observed a significant difference in the oral glucose tolerance test, characterized by increased area under the curve (AUC) at 24 wk-old OD. **Conclusions:** Original findings in maternal diabetic progeny, characterized by supposing glucose intolerance, elevated urinary sodium reabsorption, and high blood pressure, presented the occurrence of catch-up growth after exposure to severe gestational hyperglycemia. The current data may represent an increased risk factor for developing insulin secretion disorder, metabolic syndrome, and cardiovascular disease.

ID: 11065

Área Temática: DOHAD | Ciência de Animais de Laboratório

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**FeSBE2022 MITOCHONDRIAL FUNCTION AND APOPTOSIS IN OVARIES OF
ADULT RATS EXPOSED TO MATERNAL HYPERGLYCEMIA AND SUBMITTED
TO A HIGH-FAT DIET AFTER WEANING**

Diabetes and obesity can impair reproductive function in both women and laboratory animals. Then, it is relevant to verify whether these changes persist into the next generation. This study evaluated the influence of the hyperglycemic intrauterine milieu and post-weaning exposure of a high-fat diet on hormone secretion, mitochondrial function, and apoptosis in ovarian cells of adult offspring born to diabetic rat mothers. The local ethical committee approved all protocols. Female rats received citrate buffer (Control–C) or streptozotocin (a beta-cytotoxic drug to induce diabetes–D) on postnatal day 5. The adult rats were mated to obtain female offspring (O) that were distributed in the groups (n=6/group) by the diet (standard diet–SD or high-fat diet–HFD) from weaning to adulthood: OC/SD and OC/HFD represent offspring from control mothers that received SD or HFD, OD/SD, and OD/HFD represent offspring from diabetic mothers that received SD or HFD, respectively. In adulthood, the Oral Glucose Tolerance Test (OGTT) and AUC were performed, and then the rats were euthanized to collect blood samples for hormonal analysis. The ovaries were collected for analysis of proteins related to mitochondrial function and apoptosis. $P < 0.05$ was considered as the statistical significance limit. The OC/HFD, OD/SD, and OD/HFD groups had higher AUC and a higher rate of diabetic rats in the OD/HFD group (40%) than OC/SD (0%). Serum progesterone levels were lower in all groups in relation to OC/SD ($p < 0.0001$). There was a lower expression of MF1 and MFN2 in the OD/SD and OD/HFD groups, confirming mitochondrial dysfunction, and impaired proliferation and apoptosis process in ovarian cells. The association between maternal diabetes and a post-weaning high-fat diet caused greater glucose intolerance and the proportion of diabetic offspring in adulthood. Thus, the fetal programming is responsible for the impairment of hormone secretion, mitochondrial function, and oxidative stress in the ovaries.

Keywords: fetal programming, hyperglycemia, diet, mitochondria, ovary, rats.

Financial Support: São Paulo Research Foundation (FAPESP - Grant number 2016/25207-5), and Coordination for the Improvement of Higher Education Personnel (CAPES/Brazil).

ID: 10823

Área Temática: DOHAD | Ciência de Animais de Laboratório

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FeSBE2022 PHASEOLUS VULGARIS L. AS FUNCTIONAL FOOD IMPROVES CENTRAL INSULIN RESISTANCE IN OBESE RATS PROGRAMMED BY EARLY OVERFEEDING

Perinatal insults such as early overfeeding may induce obesity in adulthood. We aimed to evaluate the effect of white bean (*Phaseolus vulgaris* L. PV) as dietary supplementation on glucose homeostasis and hypothalamic inflammation in early overfed rats. At postnatal 3, litters were adjusted to 8 (control, CONT) or 3 rats per mother (small litter, SL). At 22 days-old, pups were weaned and fed standard diet (CONT-SD and SL-SD) or standard diet supplemented with 2.5% PV (CONT-PV and SL-PV). At adulthood, rats underwent glucose tolerance test (ipGTT) and intracerebroventricular (icv) insulin injection (10-3mmol/L), then body weight and naso-anal length were measured to calculate the Lee index. After euthanasia, hypothalamus was collected to quantify inflammatory markers. The study was approved by the Ethics committee (23108.089573/2020-23). Compared to CONT-SD rats, SL-SD rats showed higher body weight (15%, $P<0.01$) and Lee index (5.6%, $P<0.05$), as well hyperglycemia (19%, $P<0.01$), glucose intolerance (29%, $P<0.01$) and increased hypothalamic inflammatory markers (TNF- α , 55%; IL-6, 94% and IL-1 β , 43%, $P<0.01$, without change in IL-10. Compared to SL-SD rats, SL-PV rats showed reduced body weight (9.5%, $P<0.01$) and Lee index (4.7%, $P<0.05$), and normoglycemia and reduction in the hypothalamic TNF- α (30%, $P<0.01$), IL-6 (27%, $P<0.05$) and IL-1 β (33%, $P<0.05$), without alteration in IL-10. In relation to CONT-SD rats, SL-SD were hyperphagic (16%, $P<0.05$); while SL-PV were normophagic, displaying a reduction of 18% in food intake when compared to SL-SD ($P<0.05$). The icv insulin injection led CONT-SD, CONT-PV and SL-PV rats to intake less food during the first 4h of the test (30%, 47%, and 31%, $P<0.01$, respectively), with no changes it in the SL-SD rats ($P>0.05$). We conclude that early overfeeding programs an obese phenotype with glucose intolerance, hypothalamic inflammation and insulin resistance, which are improved by chronic dietary supplementation with PV.

Keywords: hypothalamic inflammation, obesity, functional foods.

ID: 10917

Área Temática: DOHAD | Dor e Inflamação

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FeSBE2022 STRESS MODEL TRIGGER MIGRAINE-LIKE BEHAVIORS IN MICE

Migraine is a pain disorder characterized by atypical neurological symptoms that occur in the absence of tissue injury. The migraine attacks are elicited by a variety of agents, such as stress induction and others. Stress is the most common trigger reported in migraine patients, and sound stress seems to be a relevant mediator of headache induction in patient. Thus, the mechanisms involved in the stress induction of migraine-related pain need to be studied to reach a better treatment for this painful disease. Here, we initially characterized the periorbital/hind paw mechanical allodynia, grimacing pain behavior after the induction of unpredictable sound stress in male and female mice. This study characterized the nociception after the induction of unpredictable sound stress in mice. C57BL/6 mice (20-30 g) were exposed to unpredictable sound stress for 3 days. After 1, 7, and 14 days of the last stress session mice developed hind paw, periorbital mechanical allodynia, and grimacing pain behavior. The protocols employed in our study were approved by the Institutional Committee for Animal Care and Use of the Federal University of Santa Maria (UFSM; #9818180820). Here, we detected these nociceptive parameters after unpredictable sound stress induction, with a nociceptive peak at 7 days after stress induction. Recently, using the model of repeated restraint stress in mice, showed periorbital mechanical allodynia and grimacing pain behavior in mice. Similar to this previous study, we also observed that nociception was not detected after 14 days of stress induction, either for mechanical allodynia or grimacing pain behavior. Thus, we characterize a new model of migraine-like pain induced by unpredictable sound stress induction. This is an interesting model, because migraine patients are more sensible to sound, and studies described that sound could be a stress factor to induce migraine pain attacks.

ID: 11159

Área Temática: DOHAD | Imunologia

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FeSBE2022 IMPACT OF THE PRESENCE ANTI-SARS-COV-2 IGA IN THE COLOSTRUM OF WOMEN INFECTED BY COVID-19 DURING THE PREGNANCY IN NEONATAL CLINICAL OUTCOMES: A CROSS-SECTIONAL STUDY

Researchers have shown the presence of anti-SARSCoV-2 antibodies in human milk from women infected by or vaccinated against COVID-19. However, the role of SARS-CoV-2 antibodies in neonatal protection is unclear. To describe the presence of anti-SARS-CoV-2 IgA and IgG in the blood and colostrum of women with COVID-19 infection during pregnancy and associate the presence of anti-SARS-CoV-2 IgA in colostrum with the clinical symptoms of their newborns. Methods: A cross-sectional study was developed with 165 women with COVID-19 infection during pregnancy and their newborns. Data collected: women's clinical symptoms during COVID-19 infection, gestational age, and newborn's clinical symptoms (presence of fever, dyspnea, hypotonia, cyanosis, jaundice, vomiting, abdominal distention, and difficulty in breastfeeding). Maternal blood and colostrum samples were collected postpartum to determine the levels of IgA and IgG anti-SARS-CoV-2. Results: The median interval between COVID-19 diagnosis and delivery was 37.5 days (IQ = 12.0, 73.0 days). Clinical symptoms during hospitalization were observed in 55 newborns (33.3%), and two (1.6%) tested RT-PCR positive for COVID-19. Positive colostrum for anti-SARS-CoV-2 IgA was found in 117 (70.9%) women. The presence of anti-SARS-CoV-2 IgA in colostrum was associated independently with lower clinical symptoms in their newborns (OR = 0.42; 95% CI 0.202 to 0.84; p = 0.015). Conclusions for Practice: The presence of anti-SARS-CoV-2 IgA in colostrum was detected in more than two-thirds of the women evaluated and was associated with a lower frequency of clinical symptoms in their newborns.

ID: 11031

Área Temática: DOHAD | Medicina Regenerativa e Biologia do Desenvolvimento

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**FeSBE2022 MATERNAL EXPOSURE TO MIXED PHTHALATES CAUSES DECREASE
IN GENE EXPRESSION AND IN TESTICULAR CELL COUNT OF ADULT MALE
RATS: TRANSGENERATIONAL EFFECT**

Phthalates are chemical act as endocrine disruptors in the body, used as plasticizers. Assess whether maternal gestational and lactational exposure to different concentrations of a phthalate mixture into testicular cell in adult rats Pregnant Sprague-Dawley adult rats were randomly divided into 4 groups: control, treated with 20µg/Kg, 200µg/Kg and 200mg/Kg of a phthalate mixture via gavage treated during GD10 to PND21 and euthanized at PND22 and PND120 (Protocol 1040/CEUA UNESP). Results showed a decrease in all genes expression marked at all phthalate doses. This decrease was also found in Sertoli cell count at doses of 20µg and 200µg, while a decrease in Leydig cells was observed at doses of 200µg and 200mg. Conclude that the dose of 200µg of the phthalate mixture was more harmful in a late effect of tissue damage accumulation.

ID: 10868

Área Temática: DOHAD | Medicina Regenerativa e Biologia do Desenvolvimento

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FeSBE2022 THREE-DIMENSIONAL CULTURED DISSOCIATED MESENCHYMAL STROMAL CELLS MITIGATE CF-DNA IN AN IN VITRO NEUTROPHIL EXTRACELLULAR TRAPS MODEL INDUCED BY LIPOPOLYSACCHARIDE

Excessive release of neutrophil extracellular traps (NETs) promotes tissue damage in sepsis. Mesenchymal stromal cells (MSCs) are a promising therapy to mitigate immune dysfunctions. Culture conditions under two-dimensional (2D) or three-dimensional (3D) conditions can influence MSCs behavior. The aim of this study is to evaluate the ability of MSCs, under 2D or 3D cultivation, to reduce NETs formation. C57BL/6 male mice (25-30g/ 6-12 weeks) were used (CEUA180/19). Neutrophils were isolated from peritoneal lavage fluid. Five groups were evaluated for in vitro study: neutrophils (NE), neutrophils with LPS (NE+LPS), neutrophils with LPS incubated with 2D MSCs (NE+LPS+MSC2D), or with 3D dissociated MSCs (NE+LPS+MSC3Dd) or with 3D aggregated MSCs (NE+LPS+MSC3Da). The incubation time was 2h in all groups. The proportion of neutrophils/MSCs was 10:1. Picogreen assay was used for quantification of cell-free DNA (cf-DNA) in a 20 µg/mL lipopolysaccharide (LPS) model. Cf-DNA was significantly higher in NE+LPS group compared to NE (52.87 ± 2.3 vs 35.46 ± 1.8 , respectively, $p < 0.001$), indicating LPS was a good inductor of NETs. 2D MSCs treatment did not mitigate cf-DNA compared to NE+LPS (57.95 ± 11.23 vs 52.87 ± 2.3 , respectively, $p = 0.30$). However, 3D dissociated MSCs treatment was able to decrease cf-DNA in comparison to NE+LPS (45.33 ± 1.7 vs 52.87 ± 2.3 , respectively, $p < 0.0001$). In contrast, 3D aggregated MSCs treatment demonstrated a significant increase of cf-DNA compared to NE+LPS (58.17 ± 3.8 vs 52.87 ± 2.3 , respectively, $p < 0.02$). In conclusion, compared to 2D cultivation, 3D cultured dissociated MSCs seems to be more efficient on mitigating the NET formation in an in vitro LPS model.

ID: 11220

Área Temática: DOHAD | Neurobiologia

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FeSBE2022 BIOINFORMATIC IDENTIFICATION OF POTENTIAL HYPOTHALAMIC MICRORNAS IMPACTING APPETITE CONTROL AND OBESITY DEVELOPMENT IN OFFSPRING OF MATERNAL OBESITY

Offspring of obese dams have impaired hypothalamic neuronal circuits mediated by the neuroregulatory bHLH factors and orexigenic/anorexigenic neuropeptides. We aimed to investigate whether the molecular alterations in the hypothalamus that predisposes hyperphagia and weight gain in young offspring of obese dams occur as early as the intrauterine period, and whether they have a potential to be regulated by microRNAs. Female C57BL/6 mice fed control or a high-fat diet and were mated with control male mice. At the 20th embryonic day (e20), the hypothalamus of the male fetuses was collected. In a different cohort, dams were allowed to give birth and the milk intake of the male offspring was measured during lactation. Student's T Test were performed to comparison of the two groups. Bioinformatic analysis was performed using miRWalk (2.0). Hypothalamic Mash1 (Acsl1), Neurogenin 3 (Ngn3), Pomc, Cart and Agrp did not differ between offspring of control (CT) or obese (HF) dams at e20. However, HF offspring have higher hypothalamic Hes1 and NPY. HF offspring were hyperphagic, as evident by higher milk intake during the suckling period. Bioinformatic analysis revealed several microRNAs predicted to regulate both Hes1 and Npy. Some of those predicted microRNAs (miR-1224-5p, miR-762, miR-504-3p, and miR-1894-3p) have known functions on neuronal cells that include glucose metabolism, apoptosis, neuroexcitation and cell proliferation and differentiation. In addition, novel neuronal miR-695, miR-486a-3p, miR-6973a-5p, miR-7018-5p, miR-7047-5p, and miR-7050-5p were detected. Thus, the early intrauterine impairment of the hypothalamic neuronal circuits in offspring of obese dams likely contribute to hyperphagia and obesity. The mechanism may be mediated by epigenetic factors and modulation of these predicted microRNAs may offer an opportunity to regulate Hes1 and Npy levels and thereby prevent programmed hyperphagia and obesity in maternal obese offspring.

ID: 11131

Área Temática: DOHAD | Neurobiologia

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FeSBE2022 EARLY OBESITY-INDUCED DEPRESSIVE-LIKE BEHAVIORS AND ALTERED GFAP EXPRESSION IN THE PREFRONTAL CORTEX

Childhood obesity and depression grow every day and can bring countless consequences. This study aimed to evaluate the influence of early obesity induced by small litter on depressive-like behaviors in addition to the expression of the glial fibrillary acidic protein (GFAP) because of a relationship between obesity, depression, and neuroinflammation. The small litter protocol was performed by considering: a small litter (SL) with 4 puppies (2M and 2 F) and a normal litter (NL) with 12 puppies (6 M and 6 F). The maternal care of the dams between postpartum days 2 and 5 (DPP2-DPP5) was evaluated. In the behavioral tests with the offspring (DPP 33-36), open field, social play behavior and the forced swimming tests (DPP35-36) were performed (n=8). Subsequently, GFAP expression was quantified by western blotting. Results were analyzed using Student's t-test or two-way ANOVA followed by Tukey's post-test. Approved CEUA number 036/2021. It was observed that there was an increased in maternal parameter of licking (4.68 to 9.71%; $p<0.05$) and decreased the non-maternal parameter of outside the nest and not exploring (23.47 to 3.16%; $p<0.001$) in SL vs NL group. There was an accentuated weight gain from PND25 (males 9.35 to 32.51g; $p<0.0001$ and females 2.54 to 25.70g) which remained until PND36 (males 129.8 to 154.0g; $p<0.001$ and females 116.9 to 140.9g; $p<0.001$) in SL vs NL group. In the social play behavior test, a reduction in the interaction time was observed in the SL animals, both in males (224.4 to 161.9s; $p<0.05$) and in females (229.0 to 139.0s; $p<0.001$) vs NL group. In the forced swimming test, male animals from SL showed longer immobility time (95.2 to 164.7s; $p<0.05$) vs NL group. There was also an increase in GFAP expression in the prefrontal cortex in male (102.1 to 133.8%; $p<0.05$) of SL vs NL group. In conclusion, litter reduction induced development of depressive-like symptoms more accentuated in males, possibly due higher GFAP expression in the prefrontal cortex

ID: 10974

Área Temática: DOHAD | Neurobiologia

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FeSBE2022 EFFECTS OF NEONATAL TREATMENT WITH KAEMPFEROL ON THE DEVELOPMENT OF LOCOMOTOR ACTIVITY AND MOTOR COORDINATION IN A CEREBRAL PALSY MODEL.

Cerebral Palsy (CP) is characterized by a set of permanent changes in the brain during a critical period of development. These changes cause delays in the maturation of the nervous system affecting physical development. Due to its anti-inflammatory and neuroprotective properties, kaempferol, a natural flavonoid, has been studied in neurological disorders. However, few studies accessed the effects of this compound in conditions of perinatal brain damage. This study aims to evaluate the effects of neonatal treatment with kaempferol on the development of locomotor activity and coordination in an animal model of CP. The project was approved by the Ethics Committee in Animal Use of UFPE process nº 0052/2018. After birth, Wistar rats were randomly allocated according to neonatal kaempferol exposure and/or the model of CP. (C: Control + vehicle; K: Control + Kaempferol; CP: Cerebral Palsy + vehicle; CPK: Cerebral Palsy + Kaempferol). The CP model consisted of exposure to anoxia immediately after birth and one day after birth, followed by sensorimotor restriction of the hindlimb for 28 days. Neonatal treatment with kaempferol was performed intraperitoneally at a dose of 1mg/kg from p2 to p21. The body length of animals was assessed during the neonatal period. The assessment of locomotor activity was carried out in an open field, for 5 minutes, at postnatal day (P) P8, 14, 17, 21, and 28. The assessment of motor coordination was carried out at P33. The CP animals, compared to the control group, showed reduced body growth and locomotor development. Regarding the development of the locomotor activity, the CPK group had an improvement in the distance covered in the open field compared to the control during the experiment. Animals from the CPK group showed better performance in the coordination test when compared to animals in the CP control group. Neonatal treatment with kaempferol attenuated the impact of CP on body growth, locomotor activity, and motor coordination in rats.

ID: 11104

Área Temática: DOHAD | Neurobiologia

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**FeSBE2022 EVALUATION OF INFLAMMATORY PROTEIN LEVELS FOLLOWING
NEONATAL INFLAMMATORY SENSITIZATION AND NEONATAL ASPHYXIA.**

Cases of extreme prematurity are characterized by the births before the 24 week and are more fatal to neonates. Inflammation and neonatal asphyxia are among the most common complications. Asphyxia combined with neonatal inflammation potentiates brain injuries and exacerbates the damage caused by neonatal asphyxia alone, it reflects severe cases of neurodevelopmental diseases, such as autism spectrum disorder, schizophrenia, and cerebral palsy. The animal models that associate neonatal complications are called inflammatory double-hit models, followed by inflammatory factors alterations. However, the pathophysiological mechanisms of the inflammatory double-hit in the developing brain are poorly understood. We aim to evaluate the protein levels of TLR4, NFkB p65 and p50, TNFa, Arg1, and GFAP by western blot in a rat model of double inflammatory hit, which associates neonatal low-dose LPS injection and asphyxia. First, P1 Wistar rats were injected with a low dose (0.05 mg/kg) of LPS, after 3 hours the animals were submitted to neonatal asphyxia through a neonatal anoxia model, which consisted of the exposure of the neonate to 100% of N₂ gas, for 25 min (CEUA 8306100221). 24 h after the stimulus, we observed that neonates' body weight from the normoxia group was higher, compared to asphyxia and inflammation+asphyxia groups. Moreover, from all groups, only one animal from the asphyxia group died after anoxia. Considering the cortical protein levels, by two-way ANOVA, no changes were observed in the levels of TLR4 (p=0.42), NFkB p50 (p=0.89), TNFa (p=0.82), Arg1 (p=0.25), or GFAP (p=0.74) between the experimental groups. A p=0.040 was observed between NFkB p65 interactions, but this difference was not detected by Sidak multiple comparison analysis (N=8/group). Results indicate that 24h after might be an early time point to observe an alteration in the protein level. Thus, future experiments will be performed 96h after the stimulus, such as degenerative markers.

ID: 11341

Área Temática: DOHAD | Neurobiologia

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FeSBE2022 FOOD RESTRICTION IS IMPORTANT FOR MEMORY TASKS AND ALTERS HIPPOCAMPAL NEUROGENESIS

Food restriction during pregnancy and lactation is an important insult during development that might induce programming, which may affect memory and learning later in life. However, animals may show different behavioral effects when subjected to food restriction in adulthood, but the effect on both periods is unknown. Therefore the aim of this study was to evaluate the memory, learning and neurogenesis in the hippocampus of adult Wistar rats submitted or not to food restriction, that were born from food-restricted dams during pregnancy and lactation. Matings of Wistar rats (*Rattus norvegicus*) were made to obtain offspring, whose males were the object of study (CEUA N° 8789260620). The pregnant females were divided into two groups: control programming (CP), standard ad libitum diet; and restricted programming (RP), 50% diet restriction in relation to CP. The male offspring was then subdivided into: control feeding (CF) group, ad libitum standard diet throughout life; and the restricted feeding (RF) group, 30% diet restriction compared to the CF group from postnatal days 60 to 100. Thus, the four experimental groups were formed: CP-CF, CP-RF, RP-CF, and RP-RF. Animals memory was evaluated through Barnes maze. The neurogenesis was evaluated through immunoreactivity to the doublecortin protein in the hippocampus. The animals were submitted to transcardiac perfusion at 100 days (N=5 per group, and final weight between 350 and 500 g). About neurogenesis, there were significant differences regarding programming, between the groups RP-RF and CP-CF. In acquisition phase of Barnes Maze, a significant effect of diet and programming was found in relation to input latency and distance traveled, but only programming was significant about percentage of time spent in the quadrant. A programming effect was also detected on the number of errors made on the day of the retention test. In conclusion, food restriction changed neurogenesis and is important to Barnes Maze performance.

ID: 11241

Área Temática: DOHAD | Neurobiologia

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FeSBE2022 STANDARDIZATION OF NEONATAL ANOXIA MODEL IN C57BL/6 MICE UTILIZING AN ADAPTED APGAR SCALE

Perinatal asphyxia is the deprivation of oxygen supply and is considered one of the most common neonatal complications, affecting 60% of premature children and possibly leading to neurological sequelae or death. There are several models of oxygen deprivation that propose elucidating the mechanisms associated with asphyxia, including the model of neonatal anoxia developed by Takada et al., which is non-invasive and incorporates relevant aspects of anoxic pathophysiology in humans. Thus, this project aimed to adapt to mice (*Mus musculus*) the model of neonatal anoxia previously standardized in Wistar rats by Takada et al. The already validated model consists of exposing neonate rats to 100% nitrogen gas for 25 minutes at 37°C in a semi-hermetic chamber, this way, for its adaptation, neonate mice of the C57BL/6 strain from 3 to 4 days of life (1,8-2,5 g of weight) were used and tests were made with 12 different combinations of exposure time (11 to 17 minutes) and gaseous nitrogen flow (9 to 14 L/min). After the anoxic stimulus, an assessment of the animals' situation was made through an adapted APGAR scale and an evaluation of cortical and hippocampal neurodegeneration by Fluoro-Jade C 24h after anoxia is still in process (CEUA: 3980261118). The APGAR scale is a methodology applied to human newborns worldwide as a way of assessing their birth conditions by assigning a score (0 to 10) in the first and fifth minute after birth. Based on the mortality rate (below 10%) and the prognosis obtained by the medium APGAR scale (critically low in the 1st minute with 0,8 and relatively low in the 5th with 2,9), the chosen combination was 12 minutes of exposure with a flow of 10 L/min (n=10). The current results recapitulate data evidenced in rats submitted to the model previously standardized, suggesting that it can be adequately used in C57BL/6 mice and allowing the application of important methodologies for the elucidation of the mechanisms associated with perinatal asphyxia.

ID: 11095

Área Temática: DOHAD | Neurobiologia

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FeSBE2022 WERE ANXIETY SYMPTOMS AND CHANGES IN SLEEP QUALITY IN COLLEGE STUDENTS WORSENERD DURING THE COVID-19 PANDEMIC?

The COVID-19 pandemic has brought challenges to college students, who have dealt with academic demands and varying moods and sleep profiles. The aim was to evaluate the sleep quality and anxiety symptoms in college students at different moments during the pandemic. The data were collected using an electronic form at two moments: from June to August 2020 (M1); and from June to August 2021 (M2). College students of both sexes, aged 18 to 35 years, living in the northeast region of Brazil were included. The form had information to characterize the sample and the validated instruments: Pittsburgh Sleep Quality Index (PSQI) and State-Trait Anxiety Inventory (STAI), with aspects indicating anxiety presence (AP) and absence (AA). The Shapiro-Wilk test was used to investigate the normality of the data, the Wilcoxon test for paired analysis between M1 and M2 and the Spearman correlation test to verify the relationship between the variables, with a significance level of $p < 0.05$. The study was approved by the UFPE Research Ethics Committee (nº: 32360720.4.0000.5208). 1362 college students answered the questionnaire in M1 and 817 in M2, but only 318 students were included, because they answered in both moments. In M1, the main age was 21.8 ± 3.4 years old, 72% were female and 91.8% were single. There was no difference between the moments ($p > 0.05$). In M1 and M2, students exhibited poor sleep quality (7 points) and a high degree of anxiety state (M1=52.5; M2=51 points) and trait (M1=51; M2=50 points). Assessing only the AP aspects for trait anxiety, there was a reduction in symptoms in M2 (median=31) when compared to M1 (median=33; $p < 0.05$). There was a moderate correlation of sleep quality with anxiety trait (M1 and M2: $r = 0.49$; $p < 0.001$) and state (M1: $r = 0.54$; M2: $r = 0.51$; $p < 0.001$). The data indicate that the poor sleep quality remained and the anxiety symptoms were elevated in both moments of the pandemic. Such aspects were related, and the pandemic did not worsen this profile

ID: 11208

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 **MIR206 DECREASES THE VIABILITY AND MIGRATION POTENTIAL OF PROSTATIC CELLS: EPIDOHAD APPROACH**

One of the most commonly used models for DOHAD studies is submitted rodents to a maternal low protein diet (LPD). Studies show that LPD is responsible for epigenetic alterations in the offspring throughout life, such as miRNAs, that are capable of inhibiting prostate development and increasing the incidence of prostate cancer (PCa) in latter in live. Our research group has been studying the mechanisms involved in this process. Therefore, the aim was to analyze the functional role of miR-206 in prostate cells, previous data showed upregulation in the ventral prostate (VP) of animals at postnatal day (PND) 21 and downregulation in PND 540. Thus, we used NGS data from miRNA (GSE180674) and mRNA (GSE180673) from VP Sprague-Dawley rats of the CTR (control, 17% protein diet) and GLLP group (LPD during pregnancy and lactation, 6% diet) in the DPN 21 (CEUA approved protocol 1178). From this database, we identified the predicted targets of miR206 that were differentially expressed (DE) in the VP of the animals to be validated. Molecular pathways and ontological terms associated with predicted targets were investigated using Enrichr ($p > 0.05$). Validation was performed in benign prostate cells (PNT2 lineage) by functional assays that mimic miR-206 expression, as well as by cell viability and migration assays. The results showed that miR-206 deregulated targets in our samples were able to predict worse prognosis for patients with human PCa (Hazard ratio: 9.31, and p : 0.0013), as miR-206-associated networks regulated carcinogenesis, cycle control, cell proliferation, and angiogenesis. Moreover, increased expression of miR-206 in cells led to a decrease in cell viability (25%) and migration potential (12%). Based on these results, we hypothesize that the increased expression of miR-206 in animals in PND 21 is related to the delay in the development of prostate structure and related to the occurrence of PCa with aging.

ID: 11151

Área Temática: DOHAD | Nutrição e Metabolismo

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Instituição: UNIFESP

FeSBE2022 ASSOCIATION OF MATERNAL WEIGHT AND LEPTIN LEVELS IN INFANTS UNDER 2 YEARS OLD.

The nutritional status of the pregnant woman and her baby are critical factors in assessing the risk of NCD in later life, and may also influence adipokines levels during the first two years of the child's life. This study aimed to describe leptin levels in infants up to 2 years old and possible associations with maternal pregestational nutritional status, gestational weight gain, gestational age adequacy, birth weight, current nutritional status, and adiponectin levels. A cross-sectional study evaluated 144 infants (45.8% male), 6 to 24 months of age (corrected to 40 weeks for preterm infants), of which 81 (56.2%) were preterm (gestational age 26 to 36 weeks) and 36 (25.0%) were small for gestational age. These infants were evaluated at two time points: at birth and under 2 years of age. Data collected: pre-pregnancy maternal body mass index, weight gain during gestation, gestational age, birth weight, and current anthropometric indicators. Laboratory tests: leptin and adiponectin levels (ELISA, Roche). In the preterm group, the mean age, birth weight and gestational age were 12.3 ± 5.3 months; 1701 ± 587 grams (655 to 2885 grams) and 32.3 ± 3.15 weeks (26.0 to 36 6/7 weeks). In stepwise method linear regression (after multicollinearity evaluation), it was observed that leptin levels were independently influenced by age ($\beta = -0.032$, 95% CI -0.048 to -0.017), pre-pregnancy BMI ($\beta = -0.020$; 95% CI -0.033 to -0.007) and gestational weight gain ($\beta = 0.014$, 95% CI 0.03 to 0.024) after adjustment for sex (male), gestational age (weeks), weight-for-gestational-age (WAG) classification, adiponectin, birth weight, and weight-for-stature z score at 2 years old. In this study, no difference was observed in leptin levels between preterm infants and term infants of similar age. Leptin levels in infants under two years of age were influenced in a different way by maternal nutritional status before and during pregnancy.

ID: 11171

Área Temática: DOHAD | Nutrição e Metabolismo

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**FeSBE2022 ASSOCIATION OF SERUM AND ERYTHROCYTE ZINC LEVELS WITH
BREASTFEEDING AND COMPLEMENTARY FEEDING IN PRETERM AND TERM
INFANTS**

Zinc is an important nutrient involved in cell division, growth, and immune system function. Most studies evaluating the nutritional status related to zinc and prematurity were conducted with hospitalized preterm infants. These studies show controversial results regarding the prevalence of deficiency, clinical implications, and the effect of zinc supplementation on mortality, infectious diseases, and growth in these groups. This study aimed to compare serum and erythrocyte zinc levels in a group of preterm and term infants after nine months of age, and related the zinc levels to dietary intake and anthropometric indicators in both groups. This cross-sectional study compared 43 preterm infants (24 to 33 weeks) aged 9-24 months to 47 term healthy infants. Outcome measures: anthropometric indicators and dietary intake. Blood sample for serum and erythrocyte zinc levels (ICP-MS, Inductively Coupled Plasma Mass Spectrometry). There was no difference between the groups regarding the mean of serum and erythrocyte zinc. Variables associated with higher serum zinc levels were breastfeeding at evaluation ($\beta = 20.11 \mu\text{g/dL}$, 95% CI 9.62 to 30.60, $p < 0.001$) and the later introduction of solid foods ($\beta = 6.6 \mu\text{g/dL}$, 95% CI 5.3-11.4, $p < 0.001$). Breastfeeding was also associated with higher erythrocyte zinc levels. The zinc levels were adequate in both groups, there was no association with anthropometric indicators or dietary intake and were slightly influenced by breastfeeding and time of solid food introduction.

ID: 11224

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 DOWNHILL EXERCISE MODULATES FOOD CONSUMPTION, A POSSIBLE MECHANISM REGULATED BY THE HYPOTHALAMUS SEROTONIN TRANSPORTER AND IL-10.

Exploring the relationship between metabolism and central nervous system inflammation is essential for understanding how exercise can influence food consumption in mice. Thus, this study evaluated the effect of a single bout of downhill exercise on the mice's food ingestion before and after treadmill aerobic training. We euthanized sedentarily and trained (#7086050321; 4 groups of C57BL, n=9 per group 10 to 12 weeks old, weight: ± 30 mg) male mice before and three days after an acute bout of downhill running (-160 of treadmill inclination. 18 bouts of 5 min at 16 m.min. With 2 min of rest/interval between bouts). The aerobic train consisted of four weeks of progressive aerobic training (30, 40, 50, and 60 minutes), five days/week at 12m.min of speedy without inclination. The serum and hypothalamus were harvested and submitted to the non-target metabolomics, western blot, ELISA, and enzymatic assays. Our main results demonstrated that training and the acute bout of downhill exercise could manipulate the metabolism of mice due to the alteration of the peripheral glucose metabolism ($P=0,02$; with false discovery ratio =0,04). Three days after the acute bout of downhill exercise, the sedentary group did not decrease glucose (area under the curve: before: 22005 ± 1911 vs. After: 22670 ± 1842) but decreased its food ingestion (Before: $9,4 \pm 0,5$ g vs. After: $8,1 \pm 1,8$ g with $P=0,001$). In trained mice, this food consumption was reversed; after the acute bout of exercise, there was an increase in glucose (AUC: before: 19260 ± 1453 vs. After 24368 ± 2850 $P=0,018$) and food consumption (Before: $8,3 \pm 0,7$ g vs. After $10,9 \pm 0,9$ g $P=0,001$). After the downhill exercise, the trained group increased hypothalamic IL-10 (Before: $1,5 \pm 0,6$ pg/mg vs. After: $2,9 \pm 1,3$ pg/mg $P=0,038$) and serotonin transporter expression. (Before: $82,1 \pm 35,5\%$ vs. After: $110,6 \pm 21,8\%$ $P=0,06$). In conclusion, these results indicate that aerobic training can alter mice's food consumption after downhill exercise, and this mechanism may be related to peripheral glucose metabolism and hypothalamic IL-10 production.

ID: 10832

Área Temática: DOHAD | Nutrição e Metabolismo

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**FeSBE2022 EARLY OVER- AND UNDERNUTRITION ARE INVERSELY
CORRELATED WITH NEURONAL ACTIVATION IN HYPOTHALAMIC NUCLEI.**

Changes in nutritional supply during early life plays an important role in the development of hypothalamic circuits. Within the context of the Developmental Origin of Health and Disease, the manipulation of litter size has been important to study the programming theory and neonatal nutrition short- and long-term effects. The aim of this study was to investigate the effects of neonatal over- and undernutrition on body weight and neuronal activity in parvocellular subdivision (PaPo) of the paraventricular nucleus of the hypothalamus (PVN) and in nuclei ventromedial (VMH) and dorsomedial (DMH) of hypothalamus of adult male Wistar rats. Pups were raised in small (SL, 3 pups per dam), normal (NL, 10 pups per dam) or large litter (LL, 16 pups per dam). They were weighted at birth and every 5 days until post-natal day (PND) 60, when, following brain perfusion, brain slices were collected for evaluation of c-Fos expression in hypothalamic nuclei (Ethics Committee for Animal Use of the State University of Londrina - UEL, Protocol 18310.2019.03). Overnourished animals showed increased body weight since pre-weaning period until PND 60 and increased body weight gain at weaning and on PND 60. Neonatal undernutrition resulted in decreased body weight since PND 25 until PDN 60 and decreased body weight gain on PNDs 21 and 60 in comparison to NL group. Higher and lower body weight after early over- and undernutrition, respectively, were inversely correlated with activation of PaPo neurons, known to be involved in autonomic regulation. Thus, it seems that divergent body weight observed in SL and LL animals is consequence of disrupted CNS and autonomic connections induced by nutritional changes early in postnatal development. SL group also showed association between higher body weight and lower activity in the VMH and DMH, suggesting that SL animals display hypothalamic hyporesponsiveness, seen in the PaPo, VMH and DMH, which may contribute to altered control of energy expenditure.

ID: 11254

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 EFFECT OF MATERNAL OBESITY ON THE ENDOCANNABINOID SYSTEM, HYPOTHALAMUS-PITUITARY-ADRENAL AXIS AND BEHAVIOR OF ADOLESCENT RAT OFFSPRING.

Maternal exposure to socio-environmental factors during periods of great ontogenetic plasticity are able to metabolically program the offspring, increasing the susceptibility to chronic diseases and behavioral alterations throughout life. We demonstrated that a maternal high-fat diet modulates the endocannabinoid system (ECS) of rat offspring. The ECS consists of the lipid ligands anandamide (AEA) and 2-arachidonoylglycerol (2-AG), the cannabinoid receptors CB1 and CB2 and several metabolizing enzymes. The ECS decreases the activity of the hypothalamus-pituitary-adrenal (HPA) axis. The present study aimed to investigate whether a maternal obesogenic diet modulates the ECS in the HPA axis and in the cortico-limbic system of the offspring, associated with altered behavior in adolescence. Wistar female rats were divided into 2 groups: control diet (C; 10% fat) or obesogenic diet (OD; 40% fat and 20% sucrose). The diets were offered for 9 weeks before mating and during pregnancy and lactation. From weaning (postnatal day 21) to adolescence, offspring were fed a control diet. During adolescence (postnatal days 30-40), behavioral tests were performed to identify anxious/depressive profiles in the offspring (Elevated Plus Maze, Open Field and Forced Swim). Blood and brain samples were collected for western blot (ECS proteins) and milliplex (hormones) analyses, respectively (CEUA 129/01). Maternal OD induced anxiety-like behavior only in the female offspring ($p < 0.05$), but did not change the ECS in the limbic system, hippocampus or amygdala of the offspring. Maternal OD did not alter the serum levels of ACTH or corticosterone in the lactating rats or in their offspring. We conclude that the results did not confirm our hypothesis regarding a major contribution of the ECS regulating the HPA axis and behavior of the offspring programmed by maternal OD, and other mechanisms may underlie the anxiety-like behavior of female offspring.

ID: 10831

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 EXPOSURE TO INTRAUTERINE DIABETES AND POST-NATAL HIGH-FAT DIET CONSUMPTION: EFFECT ON ENDOCRINE PANCREAS OF ADULT RAT OFFSPRING

An unfavorable intrauterine environment and the influence of environmental factors after birth can increase the risk for the disease onset in adult offspring. Our objective was to evaluate the pancreatic endocrine cells and leptin receptor of adult offspring (born to diabetic rats) fed with high-fat diet. This study was authorized by the local animal ethical committee (Protocol No. 1218/2017). Sprague Dawley female pups from diabetic rat mothers (180-200g) were exposed to a high-fat diet (DHL) from weaning to adulthood (120 days) for experimental groups into: 1) offspring of non-diabetic dams fed with standard diet (FOConSD), 2) offspring of non-diabetic dams fed with high-fat diet (FOConHFD), 3) offspring of diabetic dams fed with SD (FOMDSD), 4) offspring of diabetic dams fed with HFD (FOMDHFD). All adult rats were submitted to the oral glucose tolerance test (OGTT) and, on day 120 of life, the rats were euthanized to collect the pancreas for immunohistochemical analysis. $P < 0.05$ was considered a significant limit. The FOConHFD and FOMDSD groups showed higher percentage of cells immunostained for insulin (FOConHFD= 60%; FOMDSD= 59% vs FOConSD – 56%) and lower percentage of cells (FOConHFD= 9%; FOMDSD= 39% vs FOConSD= 54%) and labeling intensity for somatostatin. The FOMDHFD group (58%) showed higher percentage of cells immunostained for insulin (FOConSD= 56%) and higher percentage of cells (FOMDHFD= 40% vs FOConSD= 21%) and labeling intensity for glucagon. The daughters of diabetic dams, regardless of the diet, had lower leptin receptor immunostaining than the control. There was higher area under the curve (AUC) in the FOConHFD (18%), FOMDSD (31%), and FOMDHFD groups (37%) than the control group. Thus, the association between maternal diabetes and/or exposure to a high-fat diet promotes changes in the pancreatic hormonal triad and leptin receptor in the endocrine pancreas of adult offspring, contributing to the development of glucose intolerance in adulthood.

Keywords: diabetes, high-fat diet, pancreas; fetal programming, rat.

Financial Support: São Paulo Research Foundation (FAPESP - Grant number 2016/25207-5), and Coordination for the Improvement of Higher Education Personnel (CAPES/Brazil).

ID: 11292

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 GESTATIONAL OBESITY NEGATIVELY INFLUENCES FETAL FATTY-ACIDS PROFILE AND POST-BIRTH WEIGHT GAIN

It is well established that maternal diet-induced obesity during pregnancy can increase the risk of overweight in offspring, and can also compromise the regulation of food intake by inducing inflammatory processes in the hypothalamus. This study aimed to investigate the influence of maternal obesity on fetal fatty-acids profile and its contribution to offspring weight gain. C57BL/6 females (5 wk-old, 10g) were fed Control (n=27) or High Fat (HF, n=23) diets during pre-pregnancy, gestation (3 wks) and lactation. Maternal blood glucose, total cholesterol and serum fatty acids (GC-MS, CT=8 HF=9) were analyzed. Fetal body weight and serum and hypothalamic fatty-acids (GC-MS, n=6-10/group) were evaluated. During lactation, the offspring weight was measured (CEUA Protocol N. 5639-1/20). Student's t test, Mann Whitney, or correlation test ($p \leq 0.05$) were used. HF pre-pregnancy females had higher fasting blood glucose ($p=0.0003$) and serum cholesterol ($p=0.0444$). During pregnancy, higher adiposity ($p < 0.0001$), increased linoleic acid (C18:2,n6) and omega-6 (n6) serum levels were observed in HF dams ($p < 0.0001$). Maternal n6 was positively correlated with adiposity ($p=0.0016$). An increase in serum n6 was observed in male ($p=0.0008$) and female ($p < 0.0001$) HF fetuses, and an increase in hypothalamic C20:2 (n6) of HF female ($p=0.0221$). Fetal serum n6 was positively correlated with maternal adiposity ($p=0.0002$). During lactation, the HF offspring showed greater weight gain. Pregnancy and lactation are critical for development, and fatty acid composition is of great importance during those periods. The literature indicates that increased C18:2,n6 can impact inflammation, adipogenesis and appetite. This may be an explanation for the increased weight of offspring from HF dams. Thus, Maternal obesity leads to increased fetal n6 and body weight during lactation, which can predisposes offspring to obesity in later life.

ID: 11158

Área Temática: DOHAD | Nutrição e Metabolismo

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Instituição: FMABC

FeSBE2022 IMPACT OF MATERNAL 25(OH)D LEVELS AND VITAMIN D RECEPTOR (VDR) SINGLE NUCLEOTIDE VARIANTS ON 25(OH)D TRANSFER FROM MOTHERS TO THEIR TERM AND PRETERM NEWBORNS

Most vitamin D's biological activities are mediated by its receptor, which is encoded by the VDR gene (vitamin D receptor, Gene ID 7421, MIM 601769) at 12q13.11. It is a member of the steroid hormone receptor family that mediates the action of vitamin D by regulating the transcription of multiple genes. This study aimed to evaluate the association between maternal VDR single nucleotide variants on 25(OH)D transfer between mothers and their preterm and term newborns. A cross-sectional study carried out in a single center with 141 pairs of mothers and their newborns, 40 of which were preterm pairs (< 32 weeks and/or 1500 g) and 101 full-term pairs. Data collected: maternal 25(OH)D levels at delivery and in umbilical cord, and VDR genotyping for the TaqI (A>G, rs731236), BsmI (C>T, rs1544410), ApaI (G>T, rs11168271), and FokI (A>G, rs2228570). Serum levels of 25(OH)D in maternal (20.7±11.8 ng/dL vs 26.4±9.7 ng/dL; p = 0.004) and in umbilical cord (27.1±13, 4 ng/dL vs 31.7±11.7 ng/dL; p = 0.056) were lower in the preterm group compared to full term. The frequency of VDR SNV genotypes were TaqI/CC (18.4% vs 11.3%, r = 0.176, p = 0.145), BsmI/AA (34.8% vs 32.6%, r = 0.743, p < 0.001), ApaI/AA (19.1% vs 22.7%, r = 0.50, p = 0.004), and FokI/CC (44.0% vs 40.4%, r = 0.568, p < 0.001) for mothers and their newborns, respectively. Maternal 25(OH)D levels were inversely and independently associated with the mean difference between 25(OH)D levels between newborns and mothers ($\beta = -0.150$; 95% CI -0.291 a - 0.008; p = 0.038). Genetic variants for VDR were not associated with the transfer of 25(OH)D between mothers and their preterm and term newborns at delivery. In turn, maternal 25(OH)D levels were inversely and independently associated with 25(OH)D transfer in their newborns. This fact seems to suggest that there is an adjustment in the intrauterine transfer of 25(OH)D to newborns that needs to be better understood through future studies.

ID: 10986

Área Temática: DOHAD | Nutrição e Metabolismo

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Instituição: UERJ

FeSBE2022 IMPACT OF PERINATAL CAFFEINE EXPOSURE IN THE FOOD BEHAVIOR OF WISTAR MALE AND FEMALE OFFSPRING

Caffeine can cross the placental and mammary barriers, affecting the offspring behavior from heavy caffeine users. Here, we studied the impact of low maternal caffeine intake (250mg/day) on food behavior of offspring. For this, pregnant rats received orally caffeine (25mg/kg/day) or vehicle during gestation (GEST), lactation (LACT) or both period (G+L). At birth, litters were adjusted to 8 pups by dam, and the food intake during development as well as the palatable food or caffeine preferences (12-24 h) at different ages were evaluated in offspring of both sexes using one way ANOVA (Newman-Keuls post-test) (CEUA protocol: 026/2019). Maternal caffeine intake during gestation reduced body weight of GEST female offspring (-6%; $p<0.05$) at birth, but not at weaning. Perinatal caffeine exposure did not change the evolution of body weight and food intake throughout life. At PND45, GEST and G+L male offspring showed higher preference to high-fat diet (+19% and +27%; respectively, $p<0.05$), without changes in the female offspring. At PND180, only the LACT male offspring showed higher food preference to high fat diet (+12%; $p<0.05$). Perinatal caffeine exposure promoted higher sucrose preference in all male groups (GEST:+22%; LACT:+17%; G+L:+25%; $p<0.05$), and only in the LACT female offspring (-4%; $p<0.05$). All male groups exhibited aversive behavior to caffeine offer at adolescence and adulthood, while female offspring showed higher preference to caffeine at adolescence (LACT: +40%; $p<0.05$) and adulthood (G+L: +99%; $p<0.05$). Therefore, maternal low caffeine intake affects the eating behavior in a sex-dependent manner, suggesting changes in the hedonic hunger mainly in the male offspring.

ID: 11150

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 IMPACT OF UMBILICAL CORD VITAMIN D LEVELS ON THE GROWTH OF PRETERM NEWBORNS UP TO 12 MONTHS CORRECTED AGE

Vitamin D deficiency is a global public health issue. More than half of pregnant women are affected by vitamin D insufficiency/deficiency. Studies suggest an association between low vitamin D concentrations during pregnancy with intrauterine growth restriction and prematurity. This study aimed to describe and relate the growth of preterm newborns, with less than 34 weeks, from birth to 12 months of corrected age with levels of 25(OH)D in the umbilical cord. Method: A cohort study with 63 preterm infants evaluated at birth, at hospital discharge, at 1, 3, 6 and 12 months of corrected age was carried out. At delivery, information on maternal health and anthropometry of the preterm infants were collected, and umbilical cord and maternal blood samples were collected for dosage of 25(OH)D levels. Follow-up after hospital discharge: weight, length, head circumference and breastfeeding. Among the preterm infants, 34 were male (54.0%), the mean birth weight and gestational age were 1251.9 ± 362.1 grams and 29.8 ± 2.5 weeks, respectively. It was observed that 17 (27%) and 13 (20.6%) were born weighing less than 1000 grams and small for gestational age. The mortality, hospital discharge without serious morbidities and in exclusive breastfeeding was 9 (14.2%), 42 (66.2%) and 33 (61.1%), respectively. The median length of stay in hospital was 73.4 (46.0;106.0) days. The levels of 25(OH)D in the cord blood of preterm newborns were 14% higher than in the maternal ones, 24.8 ± 13.3 ng/mL and 21.0 ± 10.2 ng/mL ($p < 0.001$) and had moderate correlation ($r = 0.548$; $p < 0.001$) among themselves. Anthropometric indicators of preterm infants from birth to 12 months of corrected age are shown in Graph 1. 25(OH)D levels did not influence anthropometric indicators from birth to 12 months of corrected age. The levels of 25(OH)D in the cord of preterm infants did not influence the anthropometric indicators from birth to the first year of life. The 25(OH)D levels in the umbilical cord were higher and were moderately related to maternal levels.

ID: 10629

Área Temática: DOHAD | Nutrição e Metabolismo

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**FeSBE2022 LATE PREGNANCY MATERNAL NARINGIN SUPPLEMENTATION
INDUCED A REDOX ADAPTIVE RESPONSE IN THE OFFSPRING'S
HIPPOCAMPUS DURING THE PERINATAL PERIOD**

The regular dietary consumption of polyphenols has long been demonstrated to improve cognitive function and neuroprotection in disease models, which has stimulated the use of polyphenol-rich supplements as a treatment approach in such cases. However, in general, the polyphenol-rich supplements' doses are higher than the amounts consumed in the diet, and their consumption during pregnancy has been associated with metabolic modulation in the offspring. Therefore, we aimed to investigate whether maternal naringin supplementation during the third week of pregnancy could induce redox adaptations in the offspring's hippocampus. Pregnant Wistar rats were divided into control (distilled water) and naringin (100 mg/kg/day by oral gavage) groups. Naringin supplementation was administered to dams during the third week of pregnancy, from gestational day 15 to 21. On postnatal days 1, 7, and 21, female and male offspring were euthanized, and the hippocampus was dissected. Data were analyzed by the two-way ANOVA followed by Sydak's post-test. The project was approved by a local ethics commission (CEUA-UFRGS n° 35332). The late pregnancy maternal naringin supplementation induced redox alterations in all postnatal ages evaluated. On postnatal day 1, the offspring born from naringin-supplemented dams showed reduced GSH content and increased GPx activity. Similarly, on postnatal day 7, the naringin offspring retained the same GSH and GPx alterations in addition to the upregulated GLO1 activity and reduced SOD/GPx ratio. However, once the hippocampus was evaluated on postnatal day 21, most of the previous alterations were not detected anymore, and the GLO1 activity was found to be reduced. Our findings demonstrated that maternal naringin supplementation during the third week of pregnancy altered the offspring's redox homeostasis even during postnatal development. On postnatal days 1 and 7, the antioxidant enzymes GPx and GLO1 were stimulated by the maternal naringin supplementation while its cofactor, GSH, was reduced. Such findings suggested that naringin triggered mild stress during the last week of pregnancy and that such mild stress was capable to induce a hormetic effect in the pups' redox network by upregulating the antioxidant defenses, mostly during the perinatal period. However, such adaptive alterations were not observed on postnatal day 21, suggesting they might not persist in the long-term postnatal development. In conclusion, our findings demonstrate that caution needs to be taken when considering naringin supplementation during pregnancy and evidence the need to further clarify the underlying mechanism inducing such redox alterations and how these alterations might impact the offspring's neurodevelopment.

ID: 11255

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 LITTER SIZE REDUCTION AND INSULIN RESISTANCE: EFFECTS OF METABOLIC IMPRINTING ON SUPEROXIDE DISMUTASE ACTIVITY

Some periods throughout life are important for predisposition to chronic diseases and metabolic changes, among them, the early life phase is prominent and nutrition can influence it. Litter size reduction is used to investigate this metabolic imprinting in the postnatal period, as it favors overfeeding (OF), but the results are conflicting. OF is linked to overweight and altered energy balance, which can result in insulin resistance (IR), predispose lipid deposition in the liver, causing hepatic steatosis (HS). Both OF and IR are related to the production of reactive oxygen species (ROS), which can result from antioxidant depletion and, in the case of redox imbalance, can generate oxidative stress and the progression of HS. Thus, we sought to clarify whether the metabolic imprinting generated by the model can alter antioxidant function after 8 weeks of high sugar diet (HSD). To establish the model, 24 newborn Wistar male rats were randomly assigned into two groups: control litter (NC) (n=12, 8 animals/mother) and the small litter (NR) (n=18, 4 animals/mother). After 21 days, the newly weaned animals were again divided into four groups according to diet: standard (STD), or condensed milk-based palatable formulation (HSD). The STD-NC (n=6); STD-NR (n=6); HSD-NC (n=6) and HSD-NR (n=6) groups received the diet for 8 weeks and then were euthanized under anesthesia. Blood and liver were removed, weighed and stored. The influence of litter size and post-weaning diet on superoxide dismutase (SOD) activity was assessed for normality, followed by two-way ANOVA with Bonferroni post-hoc. The activity of SOD was influenced by the interaction between the variables, and, although no difference was observed in the post-hoc analysis, the results suggest that the protective factor for HS progression is related to the antioxidant action. Further analyses need to be performed to elucidate the effects of metabolic imprinting on the antioxidant status and thus relate it to the evolution of HS to confirm our hypothesis.

ID: 10987

Área Temática: DOHAD | Nutrição e Metabolismo

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Instituição: UERJ

FeSBE2022 **LOW PROTEIN DIET DURING LACTATION PROGRAMS LIVER METABOLISM IN ADULT MALE AND FEMALE RATS**

The liver is an essential regulator of energy metabolism, and its function can be disrupted by nutritional alterations. The hypothesis of the present study is that liver mitochondrial redox balance, endoplasmic reticulum (ER) response, macroautophagy and lipid inclusion are altered in a programming model by protein restriction (PR) during lactation in a sex-dependent manner. Therefore, 6-month-old male and female Wistar offspring from PR (8% protein diet during lactation) and control dams (23% protein diet) were investigated using western blotting. Animal design was approved (CEUA/024/2019) and Two-Way ANOVA was used to statistical analyses. Adult PR offspring of both sexes had lower body weight than controls (Male: -6%, $P=0.002$; Female: -9%, $P<0.001$). Maternal PR programs the offspring to lower visceral fat mass (Male: -15%, $P=0.002$; Female: -14%, $P=0.043$), normophagia and absence of hepatic steatosis. Regarding liver antioxidant enzymes, Superoxide dismutase-2 and Catalase were reduced only in PR males (-36%, $P=0.006$; -37%, $P=0.006$, respectively). Glutathione peroxidase-1/2 and 4-hydroxynonenal (marker of lipid oxidative damage) were similar between groups. Concerning ER response and macroautophagy, maternal PR causes lower C/EBP homologous protein in males (-21%, $P=0.021$) and females (-37%, $P=0.035$). Only PR females showed lower phosphorylated eukaryotic initiation factor-2 α (-47%, $P=0.030$), X-box binding protein-1s (-47%, $P=0.022$) and sequestome-1 (-49%, $P=0.035$). Maternal PR diet during lactation did not program hepatic lipid accumulation in the adult progeny. However, it programs the response to ER and/or mitochondrial stress, and the effect of a reduction in the repair pathways of the ER homeostasis seems more severe in females, an adaptive mechanism that can compromising maintenance of normal liver function.

ID: 10967

Área Temática: DOHAD | Nutrição e Metabolismo

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**FeSBE2022 MATERNAL OBESOGENIC DIET NEGATIVELY MODULATES
BRAINSTEM IN MALE OFFSPRINGS**

Nutritional insults during the critical period of development can generate changes in phenotype in response to environmental conditions, reverberating into adulthood. Studies show that a high-fat diet during this period generates a framework of oxidative stress that is involved in the genesis of several diseases. The aim was evaluating the oxidative balance in the brainstem of rats that were submitted to a maternal obesogenic diet. Female Wistar rats, age 90-120 days, weight 220-250g, were divided after pregnancy into a control group (n=8) that received a presence vivarium diet and an obesogenic group (n=8) that received a high-fat diet and high carbohydrate content. The diet was offered during pregnancy and lactation, at 21 days the males were weaned and at 60 days the animals were euthanized, and the brainstem collected. The study was approved by the Ethics Committee on the Use of Animals (CEUA) of the UFPE Biosciences Center (n° 0061/2019). Results were presented as mean \pm SEM considering the statistical significance as $p < 0.05$. Statistical analyzes were performed using the Graphpad prism program, version 6.0 for windows. Our data showed an increase in lipid peroxidation in the obesogenic group compared to the control (Ct: 12.88 ± 1.65 ; Ob: 24.23 ± 1.76 ; N=5; $p = 0.0015$) and protein oxidation (Ct: 17.82 ± 1.17 ; Ob: 25.45 ± 2.97 ; N=5; $p = 0.0438$). SOD activity (Ct: 33.99 ± 3.24 ; Ob: 24.16 ± 2.21 ; N=5; $p = 0.0356$) and CAT (Ct: 1.55 ± 0.19 ; Ob: 0.62 ± 0.05 ; N=5; $p = 0.0013$) were decreased in the obesogenic group compared to the control. GST activity and REDOX status (GSH/GSSG) showed no difference between groups. Taken together the data indicates that an obesogenic diet during developmental period induces a negative effect in the brainstem of the offspring, potentiating neurodegenerative diseases in adulthood.

ID: 11077

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 OBESITY INDUCED BY LITTER REDUCTION ALTERS TESTICULAR HISTOPATHOLOGY AND SERTOLI CELL COUNT OF PERIPUBERTAL RATS

According to the Ministry of Health, in Brazil the number of children under 10 years old with obesity has already reached 3.1 million. In addition, the WHO pointed out that 9.4% of obese children in the country were girls, while 12.4% were boys. At this age, obesity can disturb the healthy development of this individual, triggering chronic diseases and fertility problems. That presupposed, the objective of this study was to evaluate the effects of obesity induced during the lactational period on the reproductive parameters of Wistar rats in the peripubertal age. For this, 20 Wistar rats were divided into two groups: Normal Litter (NL)-10 pups per mother and Small Litter (SL)-3 pups per mother. On Post-Natal Day 21 (PND) the males are separated from the mother and kept so until the day of euthanasia on PND60. The right testes were removed for further analysis. The protocol was approved by the Ethics Committee on Animal Use of State University of Londrina (OF CIRC CEUA n° 87/2020). Body and testicular weight, Sertoli cell count and histopathology of the seminiferous tubules were analyzed. In the SL group, it was possible to analyze that there was an increase in body weight (284.5 ± 4.5) and testicular weight (1.46 ± 0.03) when compared to the NL group (258.6 ± 4.3 ; 1.36 ± 0.02 respectively) showing that the litter reduction method was sufficient to induce obesity in the animals. The data showed that there was a decrease in the number of Sertoli cells in the SL ($25.5 \pm 0.5n=5$) group compared to the NL ($18.4 \pm 0.4n=5$). The histopathological analysis of the SL group ($89.5 \pm 0.4n=5$) showed a statistical difference when compared to the control group ($79.0 \pm 1.5n=5$), with vacuoles and rounded cells in the lumen being the most present alterations. From the results obtained, it was possible to analyze that obesity induced was sufficient to cause changes in weight and in the testicular histopathology. Evidencing that the litter reduction method is capable of harming the reproductive health of males.

Key-words: Male Infertility; Pediatric Obesity; Puberty; Spermatozoa; Testicle

ID: 11013

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 PROTEIN RESTRICTION DURING PERIPUBERTY DOES NOT ALTER OXIDATIVE PROFILE IN THE ADULT MALE REPRODUCTIVE SYSTEM

Malnutrition is a condition caused by the excess or the absence of one or more micronutrients in a diet and affects people of every country in the world. It is known that protein restriction during puberty causes rats to exhibit inappropriate answers from the autonomous nervous system, leading to long-term consequences. Knowing of the importance of peripuberty as a critical period for the organ development of the male reproductive system, the aim of the present study was to evaluate the late effects of a low protein consumption during the peripubertal period into the oxidative profile of the testis, epididymis, and sperm cells in adult rats. For that, 20 male Wistar rats were distributed into 2 groups, a Low-Protein diet (LP) and a normoproteic (NP) group. Rats in LP group received a low-protein diet (4%) and the ones in NP group received a normoproteic diet (23%) from PND 30 to PND 60. After the dietary period, rats went through a dietary recuperation, in which they were fed ad libitum with a normoproteic diet from PND 60 to PND 120. At the end of recuperation period, the animals were anesthetized with thiopental and euthanized by heart puncture. Sperm cells from the left epididymal cauda, the right testis and epididymis were collected and destined to the analysis of the oxidative profile. The experimental protocol followed the ethical principles and was approved by the Ethics Committee on Animal Use (CEUA) of State University of Londrina (OF. CIRC. CEUA. n 144/2019) and State University of Maringá (Protocol n 477 – CEUA). An increase in MDA levels in the epididymal caput and an increase in SOD activity in the epididymal cauda were observed in animals which the diet was restricted. The other parameters were not altered by a low protein diet. Given these partial results, we can infer that a low protein diet during the peripubertal period did not cause oxidative stress in sperm cells and in the reproductive organs, testis, and epididymis, in adult male Wistar rats.

ID: 11026

Área Temática: DOHAD | Nutrição e Metabolismo

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FeSBE2022 STUDY OF THE ROLE OF THE ENZYME CYP3A13, A MEMBER OF THE CYTOCHROME P450 SUPERFAMILY, IN THE DEVELOPMENT OF NON-ALCOHOLIC FATTY HEPATIC DISEASE (NAFLD)

Non-alcoholic fatty liver disease (NAFLD) is considered the hepatic manifestation of metabolic syndrome and has reached alarming rates, being considered the most common liver disorder on the planet. NAFLD is a multifactorial disease, being associated with insulin resistance, type 2 diabetes mellitus (DM2), obesity, dyslipidemia and intestinal microbiota. In the present study, we built a lentiviral tool controlled by the Tight inducible promoter in order to investigate the role of the CYP3A13 enzyme, a member of the cytochrome p450 superfamily (CYP450), in AML-12 cells previously expressing the TET3G system, under steatosis conditions. Objective: To analyze the possible role of CYP3A13 in the development of HE and its metabolic alterations, through overexpression by the inducible TetOn system, in AML-12 lineage hepatocytes. Methods: A lentiviral tool controlled by the Tight inducible promoter was constructed carrying the molecular marker GFP and expressing the murine gene CYP3A13, under doxycycline stimulation. AML-12 cells previously expressing the 3G protein of the TetOn system received pLENTI Tight CYP3A13 IRES eGFP by lipofectamine assay, and were selected for 11 days with geneticin and blasticidin. Assays mimicking dyslipidemia were performed. Changes in gene expression were analyzed by RT-qPCR and the cells stained with Oil Red O (ORO) to verify the accumulation of neutral triglycerides. Results: Lipid accumulation can be assessed through reesterification of fatty acids by staining with ORO. Overexpression of the CYP3A13 enzyme has no effect on oleate metabolism. Discussion: According to the results obtained, there was no expression variation in genes that regulate lipid metabolism with the induction of oleic acid, protective pathways against NAFLD were not stimulated. Conclusion: The tool built is functional for studies involving the CYP3A13 enzyme, however other metabolic pathways need investigation.

ID: 11135

Área Temática: DOHAD | Respostas de Treinamento Físico

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**FeSBE2022 MUSCLE HYPERTROPHY AND WEIGHT GAIN IN YOUNG RATS
SUBMITTED TO PHYSICAL TRAINING ON THE LADDER WITH LOAD, AT
DIFFERENT INTENSITIES**

Physical exercise (PE) is associated with the prevention of eating disorders such as obesity. Care regarding the intensity of exercise in children and adolescents should be considered. The aim of this study was to analyze the systematic practice of PE at different intensities in young rodents, on weight gain and hypertrophy of soleus muscle fibers. Sample of 24 male Wistar rats (*Rattus norvegicus*, var. albinus), with 21 days of life allocated in three groups (water and diet ad libitum): control (CG n=8), high intensity (HI n=8) and medium intensity (MD n=8). After 1 week of adaptation, a training protocol was performed in the HI and MD groups, 5 x/week for 4 weeks, with the weight load adjusted at the animal's tail. CG had free access on the ladder, spontaneously, without load or physical training. HI and MD groups performed 8 climbs, with progressive loads of 50%, 75%, 90% and 100% of body weight each day, considering 80-95% and 60-70% of maximum heart rate, respectively. Weight was recorded daily. Euthanasia was performed at the end of the training protocol, using inhaled isoflurane. The soleus muscle was sectioned crosswise for histological processing and Hematoxylin-Eosin staining. Microphotographs of the slides at 40X magnification, for measurement of the area, in Image J software. The variables had normal distribution, and their means were compared by one-way ANOVA and Tukey post-test ($p < 0.05$). The HI group had mean muscle areas larger than CG and MD [14240 (5437) vs 27641 (8404) and 17817 (3742) μm^2]. There was statistical significance in the comparison between CG and HI ($p = 0.008$) and CG and MD ($p = 0.019$), but not between HI and MD ($p = 0.4895$). For weight gain, there was no statistical significance in the comparison between groups ($p > 0.05$). The exercised animals had similar mean weight gain, despite medium and high intensity training. Exercise was the stimulus that triggered anabolic signaling pathways, a fact that may have influenced the similar weight gain between CG, HI, and MD, reinforcing that exercise alone does not lead to weight loss without differentiated feeding.

ID: 11223

Área Temática: DOHAD | Sistema Endócrino

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**FeSBE2022 MATERNAL ZIKV INFECTION ALTERS FETAL-PLACENTAL GROWTH
AND PLACENTAL GLUCOSE TRANSPORT EXPRESSION IN A SEX-SPECIFIC
MANNER**

Maternal Zika virus (ZIKV) infection during pregnancy can be associated with intrauterine growth restriction, and placenta damage. Placental nutrient transport is essential to reach fetal demands and altered expression of nutrient transporters is linked to pregnancy complications. In this study, we hypothesize that maternal exposure to ZIKV affects the expression placental nutrient transporters. C57BL/6 dams (n=15) were infected with a single intravenous injection of ZIKV (ZIKVPE243) low dose (LD) 103 PFU and high dose (HD) 5x10⁷ PFU, or mock control at gestational day (GD) 12.5. At GD 18.5, dams were killed and each fetal-placental unit in the litter was sexed, weighed, and placentas were stored for analysis of the glucose transporters Glut1 and Glut3 and amino-acid transporter Snat2 mRNA expression by qPCR. In addition, using immunochemistry, the expression of Glut1 was analyzed in the labyrinthine transport zone of the mouse placenta. Data for each sex were analyzed using one-way ANOVA followed by Tukey's test (significant if P<0.05). Experiments were approved by the Animal Care Committee (CEUA-036/16 and A7/20-036-16). Fetal-placental growth in ZIKV-infected dams was significantly reduced in male fetuses (LD: -13.8%, HD: - 20.5%; p=0.002) and placentas (LD: -20,92%, HD: -15,21%; p=0.001) than the ones from the control group. These differences were not observed in females. Glut1 protein expression in female placentas was significantly higher (LD: +18.64%, HD: +19.59%) in the labyrinth zone of placentas from the infected groups (n=4, p<0.047). However, in males, no differences were seen. Female placentas adapted to increase the supply of glucose increasing Glut1 expression and glucose distribution in the placental tissue. Thus, female and male placentas adopt different strategies to cope with the altered metabolic state caused by the ZIKV infection.

ID: 10994

Área Temática: DOHAD | Toxicologia

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**FeSBE2022 ANALYSIS OF THE PROTECTIVE EFFECTS OF DIALLYL DISULFIDE
ON ETHYL CARBAMATE-INDUCED CACO-2 CELLS CYTOTOXICITY**

Ethyl carbamate (EC) is a recognized probable human carcinogen by the IARC, formed as a by-product of fermentation in foods and beverages. Researchers have proposed that EC has been associated to a decline in cell viability. Diallyl disulfide (DADS) is one of the main components extracted from garlic. DADS has been found to be a potent candidate that can prevent cytotoxicity as well as organ toxicity. This study was conducted to investigate the protective effect of DADS on EC-induced cytotoxicity in colorectal adenocarcinoma human cells (Caco-2) as the cell model. Cytotoxicity was screened by resazurin assay in Caco-2 cells, and simultaneous and pre-treatment protocols were tested. These cells were exposed to different treatments: DMEM (negative control), methyl methanesulfonate 300 μ M (positive control), DMSO 0.25% (solvent control), CE, with a concentration range from 10 – 100 mM, and DADS, with a concentration range from 10-120 μ M. Caco-2 cells exposed to the highest concentration of CE showed a statistically significant decreased in cell viability, whereas DADS up to a concentration of 120 μ M was not cytotoxic. Three non-cytotoxic concentrations were chosen to evaluate the protective effect of DADS (10, 20 and 40 μ M) combined with CE (80mM) in pre-treatment or simultaneous treatment protocols. Our data showed that EC could result in cytotoxicity in Caco-2 cells and better protection was observed in the pre-treatment protocol in which Caco-2 cells were exposed to DADS 24 h previously to EC, compared to that found in the simultaneous treatment. DADS may ameliorate EC-induced cytotoxicity by scavenging EC-induced overproduction of reactive oxygen species (ROS) in Caco-2 cells. The results of the present study suggest that DADS may be utilized with potential protective effects on EC-induced toxicity.

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Área Temática: DOHAD | Toxicologia

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**FeSBE2022 BIOCHEMICAL AND HISTOLOGICAL ALTERATION IN ZEBRAFISH
(DANIO RERIO) BRAIN EXPOSED TO THIMEROSAL AND ALUMINUM
HYDROXIDE**

Components of metal-based vaccines, such as thimerosal (TMS) and aluminum (Al), began to generate distrust on the part of the population. Thus, this study evaluated the neurotoxic effects of TMS and Al in zebrafish. Animals (n=160) were divided into four groups [control (Sal), TMS (7.5mg/kg), Al (175.0mg/kg) and TMS+Al (7.5mg TMS/kg+175.0mg Al/kg)] and exposed to a single dose of the compounds intraperitoneally. After the exposure (24h or 21 days), the fish were anesthetized and the brain was removed for biochemical and histological analysis. Results were considered statistically significant when $p < 0.05$. This project was approved by the CEUA of the Pequeno Príncipe Hospital Complex (#058-2020). Exposure only to TMS caused an inhibition in the brain AChE activity; and the exposure to TMS+Al caused an increase in the enzyme activity [$F(3.23)=20.15; p < 0.0001$] 24h after the exposure when compared to the control group. Interestingly, 21 days after the exposure, both TMS groups (TMS and TMS+Al) presented an inhibition in the brain AChE activity [$F(3.33)=5.030; p = 0.0056$] when compared to the control group. Fish exposed to TMS+Al had an increase in the brain injury index 24h after the exposure [$H(4)=8.362; p = 0.0391$]; the main alteration was leukocyte infiltration. Curiously, 21 days after the exposure the fish exposed to TMS (TMS and TMS+Al groups) had an increase in the brain injury index [$H(4)=26.89; p < 0.0001$]; the main alterations were leukocyte infiltration, hemorrhage, neuropil disorganization, and necrosis. In conclusion, biochemical and histological changes were observed in the brain of zebrafish exposed to the TMS or Al, with more serious toxicological effects 21 days after the exposure. Thus, we emphasize the need for further studies to better understand the possible adverse effects of these metal-based vaccine components.

ID: 11001

Área Temática: DOHAD | Toxicologia

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**FeSBE2022 CHLORPYRIFOS CAUSES SPERMATIC CHANGES IN WISTAR RATS
AFTER EXPOSURE DURING PERIPUBERTY**

With the exponential growth of food exports, there was a massive increase in the use of pesticides. Of which, chlorpyrifos, an insecticide of the organophosphate class, stands out. Previous studies have shown that chlorpyrifos impairs sperm parameters in adult animals, however, there is not much data on exposure to this insecticide during the peripubertal phase, in which the maturation of the development of reproductive organs occurs. Thus, the aim of the present study was to assess whether exposure to chlorpyrifos during this critical period of postnatal development of the male reproductive system can impair sperm parameters in rats. For this, Wistar rats were divided into three experimental groups (n=10/group): control, CPS5 and CPS15. The animals in the CPS5 and CPS15 groups received (via gavage) 5 mg/Kg and 15 mg/Kg, respectively, of chlorpyrifos diluted in corn oil for 40 days (DPN 25–DPN 65). The control group received only the vehicle. On DPN 66, the animals were euthanized by cardiac puncture. Their right testes and epididymis were destined to sperm count analysis. Spermatozoa from the vas deferens was used for the analysis of sperm motility and morphology, mitochondrial activity and acrosome integrity. The procedures in this study were approved by the Ethics Committee on the Use of Animals of the State University of Londrina (OF. CIRC. CEUA No.034/2021, protocol No.013.2021). Exposure to chlorpyrifos did not impair sperm motility, but caused a decrease in daily sperm production. A decrease in sperm with the mitochondrial sheath fully stained was also observed in the CPS15 group. In addition, an increase in morphologically abnormal spermatozoa and a decrease in the number of sperm whose acrosome were fully intact were observed in animals from both groups exposed to the pesticide. It is concluded that exposure to chlorpyrifos during peripuberty and at the two doses used, impairs sperm production and causes changes to the sperm parameters evaluated.

ID: 11020

Área Temática: DOHAD | Toxicologia

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FeSBE2022 DECREASED SPERM QUALITY IN MALE MICE EXPOSED TO ROSUVASTATIN SINCE PREPUBERTY IMPAIRED POST-IMPLANTATION DEVELOPMENT AFTER NATURAL MATING

The increased obesity in the population has resulted in augmented frequency of dyslipidemia in childhood, adolescence, and adulthood. Statins are the most used drugs to control dyslipidemia and are widely used for prevention of cardiovascular diseases. Among statins, rosuvastatin has shown greater efficacy in its treatment. This study aimed to evaluate sperm quality and reproductive performance of male mice exposed to rosuvastatin from prepuberty to adulthood. Thirty male mice were divided into three groups that received saline, 1.5 or 5.5 mg/kg/day of rosuvastatin, orally, from postnatal day (PND) 23 to 80 (protocol number CEUA/UFSC 1688170919). On PND 70, males were mated with females to assess reproductive performance and fetal parameters. On PND 80, the males were euthanized to assess the sperm parameters, such as sperm motility, vitality, morphology, and qualitative evaluation of the sperm chromatin compaction. Oneway ANOVA or Kruskal-Wallis tests were used with Tukey's or Dunn's post-hoc tests, respectively, and differences were considered significant when $p < 0.05$. Sperm chromatin compaction was diminished in lower dose exposed group; however, sperm head and tail abnormalities were similar among the groups. There was an increase in the sperm proximal cytoplasmic droplets in both exposed groups, with a diminished frequency in sperm medial and distal cytoplasmic droplets. Sperm vitality and motility were reduced in the statin-treated groups in a dose-dependent manner. The rate of post-implantation loss increased in both exposed groups, although the other reproductive performance parameters were unaltered in the exposed groups. There was an increase of 113.72% in the frequency of congenital anomalies or early developmental milestones in the offspring of males exposed to the lowest dose. In summary, the results indicate a reduction in sperm quality and a paternal reproductive toxicity, compromising the embryo development of their offspring after implantation.

ID: 11027

Área Temática: DOHAD | Toxicologia

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FeSBE2022 EARLY TRIBUTYL TIN (TBT) EXPOSURE CAUSES LONG-TERM BIOMETRIC AND SEX HORMONES ALTERATIONS IN WISTAR MALE AND FEMALE OFFSPRING

The TBT compound causes a phenomenon known as imposex, the irreversible emergence of male sexual characteristics in gastropod females, which impacts the ecological balance. In addition, TBT directly impairs the sexual development of mammals. The ingestion of marine foods is a potential route of contamination by TBT in the general population, which can affect women in reproductive age. We aimed to investigate whether exposure to TBT during pregnancy and lactation can cause long-term dysfunctions in both sexes offspring. Experimental design was approved by the Ethics Committee (CEUA 010/2019). Data were analyzed by Student t test. Wistar rats (200-300g) were mated (2 females: 1 male). At 7th gestational day, dams received vehicle (0.1% ethanol; Control group) or TBT (1000ng/kg of body weight, bw) (n=8/group). We evaluated biometric and biochemical parameters of male and female offspring at adolescence (45-day-old) and adulthood (180-day-old). TBT male offspring presented lower lean mass (Control 163.3 ± 3.7 vs TBT 148.6 ± 3.9 %; $p=0.02$) at adolescence, while the females showed this reduction at adulthood (Control 163.7 ± 4.8 vs TBT 179.1 ± 4.4 %; $p=0.04$). TBT early exposure reduced both testosterone (-70%; $p=0.001$) and estradiol (-40%; $p=0.003$) plasma level only in male adolescent offspring. At adulthood, TBT male offspring had lower weight of fat (-21%; $p=0.02$) and brown adipose tissue (-27%; $p=0.04$) and an increase in prostate weight (2fold, $p=0.002$). Although without biometric changes in adulthood, females showed an altered estrous cycle pattern, with diestrus being the predominant phase. Our results indicate that not only direct exposure to TBT causes reproductive dysfunction, but also indirect exposure via utero and milk, at long term. These data can help as an experimental basis to understand the impact in populations that frequently use sources contaminated with TBT.

ID: 11251

Área Temática: DOHAD | Toxicologia

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FeSBE2022 EXPOSURE TO SUPRAPHYSIOLOGICAL LEVELS OF MN DURING INTRAUTERINE AND INFANTILE PERIODS: EVALUATION OF SERTOLI CELLS FUNCTION AND MALE REPRODUCTIVE HEALTH IN THE LONG-TERM.

Manganese (Mn) is an essential micronutrient for the development of the animal organism, but in supraphysiological doses it can be harmful. The present study aims to assess the risks of exposure to supraphysiological levels of Mn during intrauterine and infantile periods on testicular parameters of male rats, focusing on the function of Sertoli cells and reproductive health in the long-term. Experimental doses were 90mg/kg and 9mg/Kg, according to the "Acute Toxicity Test". Pregnant Wistar rats were assigned into 3 groups, treated from gestational day 13 to lactation day 15, by gavage: G1(distilled water, n=6); G2 (MnCl₂ at 9mg/Kg/day, n=8); G3 (MnCl₂ at 90mg/Kg/day, n=9). At PND15, PND50 and PND90, male puppies were euthanized (n=8-10/group)(ethics committee approval n°6104311018). At PND15, the histopathological evaluation of the testis showed an increase in vacuoles and acidophilic cells in seminiferous epithelium of G3, in addition to increased oxidative damage to the genetic material of the germ cells and Sertoli cells of G2 and G3. The immunostaining for connexin 43 protein, that indicates Sertoli cells integrity, revealed a decrease in the label in G2 and G3. At PND50, histopathology showed a significant increase in acidophilic germ cells in G2 and G3, while immunohistochemistry analysis for 8-OHdG indicated an increase in oxidative damage to genetic material of germ cells. There were no changes in the Sertoli cells, showing a reestablishment of them after the period without exposure to Mn. On PND 90, changes were observed in the testis of G2 and G3, such as epithelial degeneration and detachment, as well as reduction in the height of seminiferous epithelium and diameter of the seminiferous tubules. So far, we can conclude that exposure to high doses of Mn during the intrauterine and lactational period can cause permanent damages to testicular structures and function, suggesting longterm impacts on male reproductive health.

ID: 11276

Área Temática: DOHAD | Toxicologia

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FeSBE2022 FRESHWATER SHRIMP LARVAE OF MACROBRACHIUM ROSENBERGII ARE SENSITIVE TO SETTLEABLE ATMOSPHERIC PARTICULATE MATTER CONTAMINATION

Steel complexes have been identified as responsible for the emission of atmospheric particulate matter (APM). The APM can reach water bodies by airwater cross-contamination, which is not monitored by Brazilian legislation. The settleable atmospheric particulate matter (SePM) from the region of Vitoria (ES) has a large number of metal compounds; which is susceptible to bioaccumulation and biomagnification through trophic chain. Recent investigation observed that SePM can cause sublethal damage to adult aquatic organisms and we suggest that problems may cause relevant ecological impacts on aquatic populations if it affects vulnerable phases of organism development. This study evaluated the sensitivity of *Macrobrachium rosenbergii* larvae to environmentally relevant concentrations of SePM (0.01; 0.1; 1 mg/ml - produced by the iron processing industrial complex near Vitória-BR). We evaluated larval survival after 24, 48, 72, and 96 hours of exposure. Acute tests were performed in 6-well polyethylene microplates with 8 replicates per treatment. Each replicate contained 5 larvae in 10 ml of solution. We observed that shrimp larvae are sensitive to SePM. There was an inverse relationship between exposure time and survival at all levels of SePM. This relationship can be described by the following quadratic equations: 0.01 mg/ml, $y=0,0054x^2-1,4062x+101,88$ $R^2=0,6589$; 0.1 mg/ml, $y=0,007x^2-1,3207x+96,161$ $R^2=0,5509$; 1.0 mg/ml, $y=0,0168x^2-2,4818x+94,5$ $R^2=0,7964$. Regardless of exposure time, control group (without SePM) survival was $87.5\pm 13.36\%$, while the larvae survival were $41.41\pm 21.89\%$, $46.06\pm 21.38\%$ and $16.88\pm 11.53\%$ when exposed to 0.01, 0.10 and 1 mg/ml SePM, respectively. Therefore, despite sublethal for adult animals, these SePM levels are lethal in more sensitive stages of development, especially in higher concentrations; which projects relevant ecological impact. We suggest that SePM damage is still poorly known and its risks potentially underestimated.

Keywords: Steel industry; Metals/Metalloids; Nanoparticles; Crustaceans; Survival; Environmental risks

ID: 11000

Área Temática: DOHAD | Toxicologia

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FeSBE2022 INGESTION OF CYANTRANILIPROLE DURING PREGNANCY AND LACTATION DOES NOT AFFECT POSTNATAL DEVELOPMENT AND ONSET OF PUBERTY IN MALE AND FEMALE OFFSPRING OF WISTAR RATS

Brazil has been the largest consumer of pesticides in the world since 2008. Given the great toxicity of pesticides and the great controversies generated due to their harmful effects on human health and the environment, new insecticidal molecules with fewer side effects are constantly released. A new group of these molecules are the diamides, including cyantraniliprole, a systemic insecticide, acting by contact and ingestion modulating calcium channels. Calcium is a universal messenger that acts in cell signaling, development and fertility processes, essential for life. Due to the lack of previous studies on the possible effects of ingestion of cyantraniliprole during pregnancy on the intrauterine development of male and female offspring, the aim of this study was to verify whether oral ingestion of cyantraniliprole during pregnancy and lactation can cause malformations or alterations in the development of the offspring of Wistar rats. The study was approved according to the OF. CIRC. CEUA no. 20/20. Pregnant Wistar rats were randomly assigned to two groups (n=10): Treated with cyantraniliprole, in which rats received 10 mg/kg/day of cyantraniliprole (Benevia®) diluted in distilled water; and control, in which the rats received distilled water in the same volume. In both groups, administration was performed by gavage, from the 5th day of pregnancy diagnosis until PND21. The parameters of the development of male and female offspring (external ear splitting, eruption of incisor teeth, eye opening, appearance of fur, and nipple retention) were analyzed along with the onset of puberty (foreskin detachment for males, vaginal opening and first estrus for females). No significant changes in the postnatal development of the offspring were found. In conclusion, the ingestion of 10 mg/kg of cyantraniliprole during pregnancy and lactation periods does not cause changes in postnatal development and in the onset of puberty in male and female offspring of Wistar rats.

ID: 11079

Área Temática: DOHAD | Toxicologia

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FeSBE2022 MALATHION IMPAIRS UTERINE INTEGRITY THROUGH ALTERATIONS IN OXIDATIVE PROFILE AND UPREGULATION OF GENES INVOLVED IN CELL PROLIFERATION

Malathion is an organophosphate pesticide widely used in agricultural and veterinary practices and in the control of the *Aedes* mosquitos in epidemics caused by the dengue virus. Children and teenagers growing up in these regions are exposed to this compound in a key period for their sexual development and maturation: puberty. Knowing of the importance of this developmental period and of the toxic potential of malathion, the aim of this study is to evaluate the effects of exposition to this compound during the juvenile and peripubertal periods into uterine development and assess the possible mechanisms involved in damage. For that, 30 female Wistar rats were distributed into 3 experimental groups: M10 and M50 received 10 and 50 mg/kg of malathion diluted in saline 0,9% via gavage from PND 22 to 60. Animals in control group received only the vehicle. At PND 61, animals were anaesthetized and euthanized, the uteri were harvested, weighted, and destined to histopathological analysis and evaluation of the oxidative profile and gene expression by RT-qPCR. The experimental protocol followed the ethical principles, and it was approved by the Ethics Committee on Animal Use (CEUA) of State University of Londrina (OF. CIRC. CEUA. n 01/2020). A morphometric analysis showed an enlargement in the endometrium in M10, a diminution in the perimetrium and glandular epithelium in M50, and enlargement in the luminal epithelium in M10 and M50. Regarding the oxidative profile, a diminution of malondialdehyde levels in M50 was observed, as well as an increase in glutathione S-transferase and decrease of superoxide dismutase antioxidant enzymes activities in M10 and M50. RT-qPCR results showed upregulation in ER- α , β -catenin, BCL-2, Slug and TP53 genes in M10 and M50. These results indicates that malathion impaired uterine integrity through modification in the oxidative profile and expression of genes involved in the regulation of cell proliferation.

ID: 11034

Área Temática: DOHAD | Toxicologia

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Instituição: Universidade do Estado do Rio de Janeiro

FeSBE2022 MATERNAL EXPOSURE TO DIFFERENT DOSES OF ACEPHATE PESTICIDE INDUCES LIFELONG CHANGES IN OFFSPRING OF BOTH SEXES

Agriculture expansion has generated an increase in the production of chemicals that can be dispersed through the air, soil or water, representing risks to human health. Acephate (ACE), an organophosphate pesticide has a potential risk factor for the development of gestational diabetes and type 2 diabetes in the offspring. We investigated the maternal exposure to ACE during gestation and lactation in the offspring development. For this, the ACE exposure started at gestational day 7 by intragastric gavage, at high or low dose (4.5mg or 0.45/ kg of bw) and pregnant rats of the Control group received water (n=7/group). We evaluated the body weight of dams and offspring of both sexes at birth and weaning. The experimental design was approved by the Ethics Committee (004/2020) and values were analyzed by Dunnett's test. ACE4.5 induced an increase in dam's glycemia (+13%, p=0.01) in the 1st day of exposure and a reduction in body weight (bw) at the end of gestation (-8%, p=0.04). ACE4.5 offspring at birth, had low bw (Males: -12%, p=0.03; Females: -17%, p=0.007), which were maintained at weaning (Males: -25%, p=0.0002; Females: -23%, p=0.0009). Female of ACE0.45 group also presented low bw at weaning (-8%, p=0.01). At adolescence and adulthood, male offspring from both groups displayed glucose intolerance. From weaning until 8-week-old, ACE4.5 offspring of both sexes presented decreased food intake. Although the evolution of food intake is restored to control levels, the animals remained with a reduced body weight throughout life. As low birth weight and postnatal growth failure are considered imprinting factors to developmental origins of disease, we suggest that ACE is not safe during critical stages of development, even in low doses.

ID: 11030

Área Temática: DOHAD | Toxicologia

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FeSBE2022 MATERNAL EXPOSURE TO LOW DOSE OF TRIBUTYLTIN (TBT) CHANGES BIOMETRIC AND HORMONAL PARAMETERS AND INDUCES PANCREAS DAMAGE IN DAMS AND FEMALE OFFSPRING AT WEANING

TBT is a biocide widely used as an antifouling in boat paints. The leaching of this compound is a factor of contamination to water and food, especially marine fish. TBT is an endocrine disruptor, which is known to interact with hormonal pathways and can induce gonadal dysfunction and glycemic dyshomeostasis; however, the effects caused by maternal exposure to TBT are scarce. Our aim was to investigate maternal exposure to low dose of TBT during pregnancy and lactation on the female offspring metabolism. On the 7th day of gestation, the pregnant rats were exposed by gavage to vehicle (0.1% ethanol; Control group; CON or TBT at a dose of 100ng/kg of body weight (bw), TBT group (n=8/group). Morphometric parameters and plasma profile from dams and female offspring at birth and weaning were evaluated. Analyses of the fragments of pancreas were performed by Transmission Electron Microscopy (TEM). Animal procedure was approved (protocol 010/2019). Student t test was used to statistical analyses. In dams, TBT exposure induces an increase in body fat at the end of pregnancy (+38% vs CON; p=0.007). At birth, female offspring presented reduced bw (CON 6.7±0.093; TBT 6.2±0.10 g; p=0.003) and nasoanal length (CON 4.97±0.03; TBT 4.55±0.03 cm; p<0.0001). TBT exposure alters milk composition at weaning, increasing protein content (+22%, p<0.03) and cholesterol (+73%; p=0.01). Female offspring have delayed eye opening during development and, at weaning, showed decreased insulin (CON 1.626±0.2973; TBT 0.9125±0.05429 ng/ml; p=0.03) and leptin plasma level (CON 1.78±0.32; TBT 0.973±0.10; ng/ml p=0.04). In TEM analyses, pancreas from both dams and female offspring showed degraded mitochondria and endoplasmic reticulum with dilated cistern regions, indicating a reticulum stress process. Thus, maternal exposure to TBT at a low dose affects both mothers and offspring which can suggest the development of future chronic diseases, as diabetes.

ID: 11039

Área Temática: DOHAD | Toxicologia

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FeSBE2022 MATERNAL EXPOSURE TO LOW DOSES OF GLYPHOSATE IMPAIRS THE DEVELOPMENT OF THE OFFSPRING FROM BOTH SEXES

Nowadays, the population is increasingly exposed to pesticides due to environmental and food contamination. For this reason, there is a growing interest in studying how and what mechanisms can affect development and trigger diseases. Maternal exposure to organophosphate pesticides, such as glyphosate (GLY) has gained considerable attention in recent years, mainly because its widely use. Our research group hypothesized that low doses of GLY are able to induce alterations in offspring development that contribute to arising chronic diseases at adulthood. Thus, we exposed female Wistar rats, by gavage, to two different doses of GLY during gestation and lactation periods. The pregnant rats were divided in three groups: Control that received filtered water, GLY5, which received glyphosate at a dose of 5mg/kg of body weight (bw) and GLY0.5, which received glyphosate at a dose of 0.5mg/ Kg of bw. Data were analyzed by Dunnett's test. Experimental protocols were approved by the Ethics Committee (CEUA 004/2020). Although the glyphosate doses did not affect the biometric parameters of the dams, GLY0.5 group reduced bw of the male offspring at birth (-13%; p=0.009). Regarding females, GLY5 group (-16%; p=0.007) and GLY0.5 (-11%; p=0.01) showed lower bw on birth. Female offspring also presented an increased by +58% in glycemia (p=0.01). The milk of GLY5 dams had higher triglycerides (+70%; p=0.006). Despite this, the offspring from both sexes of the GLY5 group (Males: -22%; p=0.001; Females: -13%; p=0.01) and females from GLY0.5 group (-11; p=0.01) displayed a reduced body weight at weaning. Therefore, both GLY doses can impact the development of both sexes offspring, including the lowest one, which is described as safe since it does not cause harmful health effects.

ID: 11278

Área Temática: DOHAD | Toxicologia

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**FeSBE2022 NATURAL HERBICIDE SHOWS CYTOTOXICITY, NEUROTOXICITY,
AND ANTIOXIDANT SYSTEM ALTERATIONS ON THE NEUROBLASTOMA CELL
LINE SH-SY5Y**

Weeds have acquired resistance to commonly used herbicides and new products of natural origin have been synthesized to replace these herbicides. However, studies about its toxicity and long-term effects are scarce. This study evaluated the effects of neurotoxicity, cytotoxicity, and alterations in the antioxidant system caused by the natural herbicide (HN) in SH-SY5Y neuroblastoma cells, to elucidate possible health risks. SH-SY5Y cells were exposed to three concentrations of HN (HN1: 0.6; HN2: 1.56 and HN3: 3.12 $\mu\text{L/mL}$), the highest concentration being equivalent to that used in agriculture. Two groups with widely used herbicides (atrazine - 1 $\mu\text{g/L}$ and glyphosate -1 $\mu\text{g/L}$) and a control group were kept in parallel. After 24 and 72h, the cytotoxicity test (PrestoBlueTM), neurotoxicity (acetylcholinesterase -AChE activity), and antioxidant system evaluation (superoxide dismutase - SOD; glutathione peroxidase - GPx; glutathione S-transferase - GST; and reduced glutathione - GSH) were performed. The highest concentration of HN (HN3) caused cytotoxicity, both at 24 and 72h. In 24h, HN3 increased SOD enzyme activity. AChE enzyme activity was increased by HN2 and HN3 concentrations after 24h of exposure. There was also an increase in AChE at 72h, but with exposure to lower HN concentrations. HN2 also caused an increase in GPx and GSH after 24h of exposure. HN1 only caused an increase in GSH concentration after 72h of exposure. The herbicides glyphosate and atrazine did not differ from the control in any of the parameters analyzed. Natural herbicide showed cytotoxicity on SH-SY5Y neural cells only at the highest concentration. The antioxidant system and the acetylcholinesterase activity were induced in exposure to all HN concentrations and at both analyzed times (24 and 72h). These results demonstrate that HN altered cellular homeostasis and the evaluation of other toxicity mechanisms is important to have clarity about the safety and thus, avoid potential health impacts.

ID: 11111

Área Temática: DOHAD | Toxicologia

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FeSBE2022 REPERCUSSIONS OF MATERNAL EXPOSURE TO A COMBINATION OF PHTHALATES ON THE OFFSPRING PROSTATE: MODULATION OF PROTEIN KINASES AND TRANSCRIPTIONAL FACTORS

Phthalates represent a class of molecules detected in different concentrations in urine of pregnant women, maternal-fetal tissue, and breast milk. Previous studies have shown that perinatal exposure to isolated phthalates increased susceptibility to prostatic perturbations. This study aims to investigate proteomic profile and identify important pathways altered in ventral prostate (VP) of rats exposed to a mixture of phthalates in gestational and lactational period. For this, Sprague-Dawley pregnant rats were exposed to different concentrations of phthalates mixture (C: control; vehicle; T1:20 μ g/kg/day and T2:200mg/kg/day). The pregnant females received treatment from gestational day (GD) 10 to postnatal day (PND) 21. Male rats were euthanized on PND22 and PND120. The ventral prostates (VP) were collected for proteomic analysis. The data were analyzed by String® and PiNet® platform. The results showed a great number of downregulated proteins associated with 257 kinases and 66 transcriptional factors. Highlighting to main interactions with our data, 7 protein kinases (ERK2, CDK1, ERK1, MAPK3, MAPK14, JNK1, ABL1) could be modulated by them and react with 10 different transcriptional factors (ZMIZ1, PML, ATF2, SOX2, NFYB, STAT3, STAT5A, IRF1, NELFE, TAF7). The enrichment analysis demonstrated that the interference in those kinases signaling pathways could have repercussion on Prolactin, ErbB, VEGF signaling pathways, pathways associated with cancer and immune system. In conclusion, the exposure of fetuses and newborns to this mixture, containing the most abundant phthalates found in pregnant population, alters VP proteomic profile and important pathways related to prostate homeostasis. In addition, the deregulation of this kinases and transcriptional factors can have an important role in the prostate cancer development.

ID: 11085

Área Temática: DOHAD | Toxicologia

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Instituição: Unicesumar

**FeSBE2022 TRANSGENERATIONAL EFFECT ON EPIDIDYMIS OF MALE RATS
EXPOSED TO A MIXTURE OF PHTHALATES DURING PREGNANCY AND
LACTATION**

Endocrine disruptors, such as phthalates, are chemical compounds that act as antiandrogens in the human body. That understand whether phthalates can modify the epididymal tissue in maternal exposure. Pregnant Sprague-Dawley adult rats were randomly divided into 4 groups: control, treated with 20µg/Kg, 200µg/Kg and 200mg/Kg of a phthalate mixture; via gavage treated during GD10 to PND21 and euthanized at PND22 and PND120 (Protocol 1040/CEUA UNESP). Results showed that epididymal tissue remodeling occurred at all phthalate doses both PND22 and PND120. GPR30 gene expression increased at a dose of 200mg/Kg in PND22 and reduced in PND120 and decrease at GPX3/GSR and IL10/TNFα genes at 200mg/Kg dose in PND120. The epididymal tissue was damaged in immediate and late effect.

ID: 10905

Área Temática: Ê-POSTER | Anatomia

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**FeSBE2022 CHARACTERISTICS OF THE SATELLITE CELLS AT THE
MYOTENDINOUS JUNCTION IN AN EXPERIMENTAL MODEL OF PERIPHERAL
NERVE INJURY**

The myotendinous junction (MTJ) is a region between the muscle and tendon tissue that acts in the transmission of force. Furthermore, it is composed of an interface formed by collagen fibers projections (sarcolemmal invaginations) and sarcolemmal projections (sarcolemmal evaginations). Peripheral nervous system injuries lead to physical alterations that can impair the quality of life and their associated tissue structures. The skeletal striated muscle, in turn, can regenerate itself after injury; this process occurs at the tissue, cellular and molecular levels and results in the recovery of the contractile, vascular, and nervous components. The present study aims to describe the ultrastructural characteristics of the satellite cells at MTJ (soleus muscle) after chronic sciatic nerve injury. Ten adult Wistar rats were used and divided into 2 groups: Control Group (C) and Peripheral Nerve Injury Group (PNI). To perform the peripheral nerve injury the animal's right hind limb was incised and the sciatic nerve was exposed and then constricted, the incision was closed in layers, and each animal was observed during recovery from anesthesia. All procedures adopted in this study were submitted and approved by the Ethics Committee on Animal Research (CEUA – protocol n°5552). The samples were processed for morphological studies through transmission electron microscopy. In Group C, it was possible to distinguish the arrangement of the evaginations and sarcolemmal invaginations and the identification of the satellite cell adjacent to the MTJ interface and internal vesicles that demonstrate their paracrine activity. In the PNI Group, the satellite cells' presence adjacent to the MTJ was observed where the misalignment and degradation of the sarcomeres occurs. We conclude that satellite cells show broad paracrine activity and plasticity at the MTJ and may present perspectives for future molecular analyzes in this important region of the locomotor apparatus.

ID: 10637

Área Temática: Ê-POSTER | Anatomia

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FeSBE2022 EFEITOS DO DESMAME PRECOCE SOBRE A MEMÓRIA E O SISTEMA SEROTONINÉRGICO EM RATOS

Early weaning (EW) is one of the perinatal aggressions capable of promoting neurobehavioral changes that last all overlife. This study aimed to investigate the repercussions that EW promotes in memory tests for localization (OL) and object recognition (OR), in aversive memory (AM), depression-like behavior and in mRNA expression. For 5-HT1A, 5-HT1B and 5-HT2A receptors in the hippocampus. For this, we used Wistar rats of both sexes that composed the EW group of males (MEW, n=20) and females (FEW, n=18), where weaning occurred on the 15th day of life. The control group of males (MC, n=18) and females (FC, n=16), were weaned on the 30th day. The Animal Ethical Committee of the Federal University of Pernambuco (n°0020/2018) approved the experiment. The tests used were the object location test (OLT) followed by the object recognition test (ORT), the latter with or without the use of fluoxetine (i.p. 10mg/kg). Then, the modified cross maze (MCMT) and the tail-suspension test (TST) were performed. Finally, the animals were euthanized using the guillotine and their hippocampi were dissected for analysis by real-time PCR. In short-term memory, MEW had lower object location index (OLI) (23.23 + 30.52) than MC (50.85 + 13.89; p=0.041), and lower between FEW (24.18 + 5.84) and FC (51.2 + 16.35; p=0.017). For long-term memory, on the other hand, OLI was lower in MEW (0.94 + 6.18) than in MC (37.42 + 25.79; p=0.004) and lower in FEW (24.18 + 5.84) compared to FC (51.27 + 16.35). The molecular analyses pointed out that the MEW had a higher expression for 5-HT1A and 5-HT1B receptors and a reduction of 5-HT2A when compared to the MC group. There was an increase in 5-HT1A and 5-HT1B receptors in females and no change in 5-HT2A in the FEW group compared to FC. These results indicate that early weaning differentially affects memory and the expression of 5-HT1A, 5-HT1B, and 5-HT2A receptors in the hippocampus of males and females.

ID: 10638

Área Temática: Ê-POSTER | Anatomia

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**FeSBE2022 EFEITOS DO ESTRESSE POR SEPARAÇÃO MATERNA SOBRE A
IMUNORREATIVIDADE DA PROTEÍNA FOS EM ÁREAS ENCEFÁLICAS QUE
REGULAM O COMPORTAMENTO ALIMENTAR HEDÔNICO**

Feeding behavior is a complex behavior regulated by a variety of biochemical and neurological mechanisms. The reward system is important for its ability to overcome other homeostatic mechanisms for regulating hunger and satiety. Composed of a variety of cortical regions and subcortical structures, the reward system has among its main structures: the Accumbens and Nucleus Striatum. The changes are prone to happen, especially when they take place in early life. In order to examine the effects of early stress on the reward structures of FOS protein immunoreactivity in brain areas, we used Wistar rats of both sexes that composed the experimental group of males (n=8) and females (n=8). The control group of males (n=8) and females (n=8). The experimental and control groups were submitted to early maternal separation stress and then to food stress on the 30th day, with 60 days old and they were measured at 81 days old, subjected to feeding stress for 21 consecutive days using palatable foods. The Animal Ethical Committee of the Federal University of Pernambuco (n°0020/2018) approved the experiment. After that, the rats were sacrificed and their brain tissues collected. Thus, an immunohistochemical reaction against FOS protein was applied to evaluate neuronal activation of the following areas: Striatum, and Accumbens Nucleus. It was observed that the body weights of stressed rats animals had lower body weight compared to the control animals (Control: 351 ± 25 vs Stressed: 316 ± 37 , $p < 0.05$). FOS protein immunoreactivity in the nucleus accumbens was similar between the groups (Control: 3610.1 ± 736.1 vs Stressed: 3295.4 ± 748.5 , $p = 0.6$) and FOS protein immunoreactivity in the striatum nucleus was similar between the groups analyzed (Control: 1531.3 ± 488.4 vs Stressed: 889.1 ± 430.3 , $p = 0.16$). In both, no changes were demonstrated of the FOS protein between the groups. Therefore, maternal separation associated with food stress did not alter neuronal activation in these evaluated areas.

ID: 11114

Área Temática: Ê-POSTER | Anatomia

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FeSBE2022 HOMICIDE OR SUICIDE: FORENSIC OSTEOLOGY STUDY OF INDIGENT SKULLS

Forensic practice and anatomy make it possible to understand the circumstances of people's death. Its application can elucidate questions about anatomical pieces and instigate investigative thinking. Therefore, it is important to examine the possible cause of death from bones donated by the São João del Rei (SJDR) Municipal Cemetery, Minas Gerais, to the clinical anatomy laboratories of the Department of Medicine (DEMED) of the Federal University of SJDR (UFSJ) and to the Presidente Tancredo de Almeida Neves University Center (UNIPTAN/Afya) anatomy laboratory. The research was approved by the Ethics Committee under CAAE number: 60420916.0.0000.5151. In this context, an investigative study was carried out, according to forensic and Terminal Ballistics techniques, on three skulls. Two of the specimens presented wounds compatible with homicide by firearm, having more regular entrance orifices, of smaller diameter, and exit orifices with larger axes and irregularities on their edges. One of these skulls has an entry wound about 1 cm from the region of the left occipitomastoid suture (1.2 cm in diameter), with an exit wound in the region of the frontal tubercle of the frontal bone (axes in 4.1 and 1.9 cm); the other specimen has an oval-shaped entry wound (axes in 1.7 and 1.4 cm) in the medial region of the frontal bone, with an exit on the right lambdoid suture (axes in 2.4 and 1.5 cm). The third skull specimen presents an irregular wound in the region of the left external acoustic meatus (axes of 2.1 and 1.9 cm), compatible with the impact and expansion of gases from the weapon muzzle, while the exit wound is in the upper region of the right parietal bone (1.8 cm in diameter), reinforcing the hypothesis of self-extermination. Thus, the findings on the skulls allow the formulation of hypotheses about their cause of death. However, due to the time of decomposition and the maceration process of the bones, part of the signs used for full confirmation of the hypotheses were lost, making the study difficult.

ID: 10996

Área Temática: Ê-POSTER | Anatomia

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**FeSBE2022 THE SPIX'S YELLOW-TOOTHED CAVY (GALEA SPIXII, WAGLER, 1831)
TONGUE: STRUCTURAL AND ULTRASTRUCTURAL ANALYSIS**

The rodent's tongue varies in shape and morphology of papillae, its functionality is fundamental for feeding, vocalization, and grooming. The Spix's yellow toothed-cavy (*Galea spixii*, Wagler, 1831) is a Caviidae rodent distributed in Caatinga and Cerrado, adapted to warm and dry conditions, and with herbivorous habit. This study aimed to describe the structure and ultrastructure of the mucosa and muscular tissue of the Spix's yellow-toothed cavy tongue. The tongue of six specimens were dissected and analyzed by stereomicroscope, light microscopy, and transmission electron microscopy. SISBio (n° 48585-1) and the Animal Use Ethics Committee of the Federal University of the Semi-Arid Region (n° 20/2021) approved the research. The tongue was divided into apex, body, and root regions. The lingual apex and body presented filiform and fungiform papillae. In the lingual prominence, filiform papillae had a robust aspect, and fungiform were absent. The caudal region of the tongue, near the root, had a pair of vallate papillae characterized as clefts with taste buds. On the lateral surface of the prominence, were present foliate and fungiform papillae. Associated with the vallate and foliate papillae, in the submucosa, were present gland clusters. Ultrastructurally, the epithelium was stratified and had the presence of keratinized, spinous, granulous, and basal layers. The lamina propria was adjacent to the epithelium and it was composed of collagen fibers, and below was the muscular tissue. In conclusion, the Spix's yellow-toothed cavy tongue had structural and ultrastructural similarities in the mucosa composition, and organization of muscular tissue with other rodent species. Although the presence of different papillae morphologies in the lingual prominence as filiform with a robust aspect and fungiform laterally placed continuously to the foliate papillae evidence new anatomical characteristics in the tongue of rodents, and species-specific adaptations.

ID: 11308

Área Temática: Ê-POSTER | *Biociências Nucleares para a Saúde*

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FeSBE2022 EFFECTS OF IONIZING RADIATION, COLCEMID AND CULTURE DURATION ON CELL DIVISION

Biodosimetry estimates the dose received through assessing biological effects caused by ionizing radiation (IR), but it has limitations at high doses (>5 Gy) due to a high degree of chromosomal damage and a low number of metaphases available for analysis. To optimize studies with high doses of IR, our work investigated variations in Colcemid addition time and culture duration in cell cultures of irradiated lymphocytes. Thus, 9 mL of blood from a volunteer (male, age: 29; Ethics Committee No. 46925321.8.0000.5208) was collected and separated into two 2 mL aliquots. One of the aliquots was not irradiated (control) and the other was irradiated (6 Gy) with gamma rays in a Gammacell irradiator with a ^{60}Co source (dose rate: 1.261 kGy.h⁻¹). Lymphocytes were cultured in RPMI 1640 medium, supplemented with 20% fetal bovine serum, 2% phytohemagglutinin and BrdU (30 μM). Colcemid (0.1 $\mu\text{g.mL}^{-1}$) was added 24 h and 45 h after the beginning of the culture. Cultures were incubated at 37 °C and 5% CO₂ for 48 h and 72 h. Cells were treated with KCl hypotonic solution (75 mM), fixated with a methanol:acetic acid (3:1) solution and stained using the FPG technique. Slides were analyzed in triplicate under light microscopy (1,000 cells per slide). Mitotic index (MI) was obtained by the number of first division metaphases divided by the total number of analyzed cells. The non-irradiated culture had the best MI values when Colcemid was added after 24 h (48h: 12% \pm 2.7; 72h: 18% \pm 3.4), while the irradiated cells had no difference between 24 h (48h: 1% \pm 0.6; 72h: 6.3% \pm 3.2) and 45 h (48h: 0.2% \pm 0.2; 72h: 5.7% \pm 0.4). However, when incubated for 72 h both irradiated and non-irradiated cultures showed the best results. We concluded that the extension of incubation can improve the amount of first division metaphases for highly irradiated lymphocytes, but more studies are needed to verify the condensation of chromosomes and determine the best moment to add Colcemid.

ID: 11035

Área Temática: Ê-POSTER | *Biologia Ambiental, Evolução e Biologia Comparada*

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FeSBE2022 BELOW ABSOLUTE ZERO? METABOLIC ADAPTATIONS OF THE SUBTROPICAL TREE FROG BOANA PULCHELLA DURING FREEZING AND THAWING STATES

One of the most fascinating strategies in the amphibian group is the freezing tolerance when the animal changes its metabolism to withstand lower temperatures producing cryoprotectants such as glucose, glycerol, and urea. Few studies describe the capacity of freezing tolerance in subtropical frogs. South America has regions with a cold climate that have records of negative temperatures and snow precipitation where inhabit anurans such as *Boana pulchella* frog. Thus, our study aimed to determine the availability of the energy substrates to understand the metabolic mechanisms that support *B. pulchella* during freezing. Males' frogs (n=20) were captured in Eldorado do Sul, Brazil. The animals were subjected to a winter-acclimatization (5°C; 10:14 L:D) for 2 weeks. After, one group (control, n=6) was euthanased. The other animals were submitted to a temperature decreasing (1° per day) until -2.5°C. After, a group was submitted to -10°C for 20 minutes (freezing, n=7) before euthanasia; another group (thawing, n=7) was submitted to a temperature increase until 5°C. The blood, liver, and muscle were sampled. Plasmatic lactate, glucose, glycerol, urea, and liver and muscle glucose oxidation and glycogen synthesis from glucose were measured. This study was approved by CEUA/UFRGS (#39416) and SISBIO/IBAMA (#75475-1); data were statistically analyzed using One-Way ANOVA, p<0.05. The results showed a decrease in plasmatic urea during the freezing compared to the control group, and a decrease in liver glucose oxidation and glycogen synthesis from glucose during the freezing and thawing. Muscle glycogen synthesis from glucose decreased in thawing compared to the control. The decrease in oxidation and synthesis may be related to the necessary use of energetic substrates and not the storage, the urea decrease can be a strategy to help during osmotic stress. Concluding, *B. pulchella* supports temporary freezing states and probably developed metabolic strategies to cope with this.

ID: 10934

Área Temática: Ê-POSTER | *Biologia Ambiental, Evolução e Biologia Comparada*

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**FeSBE2022 CONTROL OF HEART RATE HYSTERESIS DURING
THERMOREGULATION IN RATTLESNAKES: PRELIMINARY DATA**

Reptiles are ectothermic and regulate their body temperature (T_b) by behavioural and physiological mechanisms. Reptiles modulate heart rate (fH) to affect blood flow and heat exchange, thus at the same T_b, fH is higher during heating than during cooling. This fH hysteresis is a known effect during thermoregulation, but its mechanism remains under debate. This study aimed to investigate the role of parasympathetic modulation in fH hysteresis and T_b control. In this initial study, we used decerebrate rattlesnakes, *Crotalus durissus*, of both sexes (CEUA/UFSCar-6898250820). Such a decerebrate preparation maintains the ability to regulate the T_b and the autonomic modulation of the cardiovascular system. Snakes were instrumented with vascular cannula allowing the calculation of fH during heating and cooling, before and after administering a muscarinic antagonist (atropine, 2mg. kg⁻¹). Implanted intraperitoneal dataloggers recorded T_b. Room temperature control (20°C) and ceramic heating lamps (close to the animal's dorsum) allowed heating and cooling. In control snakes, fH was higher during heating than during cooling. The cardiovascular alterations increased heat exchange, thus the heating rate was higher than the cooling rate. Besides, T_b did not return to the same level at the end of the process. Cholinergic blockade increased fH in the initial condition, but it did not abolish the fH hysteresis. Although the fH and T_b alterations were present, the heating process took longer in atropine-treated snakes. We observed that the cholinergic system is not the primary cardiac modulator during fH modulation for T_b adjustments. However, cholinergic control seems to affect the final rate of heat exchange. The autonomic modulation of the vascular system may have a role in cardiac shunt and affect the final heat exchange in the process. That effector might be addressed in future studies.

ID: 11329

Área Temática: Ê-POSTER | *Biologia Ambiental, Evolução e Biologia Comparada*

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FeSBE2022 CYTOGENETIC STUDY OF WATER FROM THE CENTRAL STREAM OF GUARANTÃ DO NORTE/MT USING THE ALLIUM CEPA L TEST.

In the municipality of Guarantã do Norte/MT there are streams that pass in the urbanized area and the Central Stream is one of the main ones, the focus of study of this project. The objective of this research is to conduct biomonitoring of the waters of the Central Stream, where cytotoxicity effects, mutagenicity, physical-chemical and microbiological analysis were investigated. The cytological tests such as the analysis of the mitotic index (MI) and chromosomal aberrations (CA) were carried out using the *Allium cepa* L test system, with the collection of water samples from the stream at two different points, Point 1 and Point 2, in September, the dry season in the region, The *Allium cepa* L protocol was used as described by Fiskejo (1985) with modifications for the mutagenicity and cytotoxicity tests, *Allium cepa* bulbs were placed in growth for 48h for their development and another 48h for exposure in the collected samples. The mitotic index (MI) was calculated as the ratio of the number of cells in mitosis to the total number of cells observed and multiplying the result by 100. Chromosomal aberrations (CA), along with micronuclei were reported as the total number of cells observed in 5000 cells. For the positive control (CP), 15 µg/L of CuSO₄ was employed, negative control (CN), distilled water was employed. Through One-way ANOVA analysis of variance, statistical data point out that MI underwent significant change at Point 1 (48.38±1.87) and point 2(54.82±1.84) when compared to CN (69.72±1.68), at this point a reduction of mitosis phases occurred which impairs cell development. The physical-chemical and microbiological analyses indicated incidence of *Escherichia coli* Point 1 (1.0x10⁺¹) Point 2 (5.2x10⁺¹), presence of sulfate Point 1 (6.0±0.5) presence of total manganese Point 2 (0.40±0.01) compared to CONAMA parameters, the results indicate that the central stream without adequate treatment affects the quality of life of the local population.

ID: 11230

Área Temática: Ê-POSTER | *Biologia Ambiental, Evolução e Biologia Comparada*

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FeSBE2022 GERMINATION OF LINSEED (*LINUM USITATISSIMUM* L.) EXPOSED TO TWO MEDICAMENTS

The use of human pharmaceuticals increased due to global population expansion. These compounds can be transported to the environment via drug disposal or excretion of metabolites and as a consequence, human pharmaceuticals can be found on soil ecosystems and may disturb their services, for example when these compounds are assimilated by plants. For these reasons, the aim of this work was to evaluate the effect of two of the most consumed drugs in Brazil on linseed germination (*Linum usitatissimum* L.). Firstly, the seeds were washed three times with distilled water and dried for 3 h. The experiment was carried out in a medium containing hydroponic solution to determine the germination index (GI). Leachates of dipyron (500 mg) and omeprazole (40 mg) were prepared with distilled water and then mixed in hydroponic solution to obtain concentrations at 50% and 25%. The assay was carried out in triplicate using Petri dishes contained 10 seeds distributed on a quantitative filter paper (Whatman #1, diameter 90 mm). 8 mL of leachates wetted the paper gently. Distilled water was used as control. The systems were incubated at $22\pm 1^{\circ}\text{C}$ for 5 days without light (Solab, SL-200). Later, the number of germinated seeds in control (S2) and treatment (S1) were counted. The size of roots in control (R2) and treatment (R1) size were measured (considering those > 0.5 mm). The GI was determined by the equation: $\text{GI}(\%) = [(S1 \times R1) / (S2 \times R2)] \times 100$. As a result, seeds exposed to omeprazole showed GI=12,3%, 14,3%, 35,8% at 100%, 50%, 25% leachate concentrations, respectively. Its inhibitory effect on the germination was directly proportional to the concentration. Dipyron was highly toxic, and GI was 0% in all conditions. The tests highlighted the risk of both dipyron and omeprazole to the environment in terms of accumulation which may lead disturbance to trophic chain as well as the environmental health. The data also showed that linseed may be used in ecotoxicological assays with pharmaceuticals.

ID: 11240

Área Temática: Ê-POSTER | *Biologia Ambiental, Evolução e Biologia Comparada*

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**FeSBE2022 IN VITRO ANTIMICROBIAL ACTIVITY OF EXTRACTS OF HYPTIS
MUTABILIS (RICH.) BRIQ. AGAINST BACTERIA OF IMPORTANCE IN
AQUACULTURE**

The genus *Aeromonas* consists of Gram-negative bacteria commonly found in the aquatic environment and in the microbiota of fish. These, when subjected to unfavorable conditions, can trigger aeromonosis and result in economic losses in this sector. The species *Hyptis mutabilis* (Rich.) Briq. (Lamiaceae), known as “cidreira-de-folha”, contains essential oil, which has already demonstrated antimicrobial properties. However, so far, the antimicrobial activity against bacteria pathogenic to fish has not been evaluated. For this reason, the in vitro antimicrobial potential of extracts of *H. mutabilis* against *Aeromonas* spp. was evaluated. The aerial parts were collected, properly identified, dried, grounded and extracted, initially, with hexane in a Soxhlet apparatus and, later, with ethanol. The hexane (HE) and ethanolic (EE) extracts were concentrated in a rotary evaporator under vacuum and the yield was calculated. The broth microdilution assay was performed according to the VET04-A2 protocol (CLSI, 2014). The methodology, bacterial strains of *Aeromonas* spp., control groups and concentration range of extracts were equivalent to that described by Rosa et al. (2019). The HE yield was $2.95 \pm 0.18\%$, while the EE yield was $5.21 \pm 0.33\%$. No bacteriostatic and/or bactericidal action was verified for the extracts (MIC and MBC > 6400 $\mu\text{g/mL}$) against *Aeromonas hydrophila* MF 372509, *A. hydrophila* MF 372510, *A. hydrophila* MH 397689, *A. hydrophila* ATCC 7966 and *A. veronii* MH 397688. The absence of anti-*Aeromonas* activity in vitro for the extracts of *H. mutabilis* corroborates the findings for its essential oil, which inhibited the growth of Gram-negative bacteria only at high concentration (OLIVA et al., 2006). Although the evaluated extracts did not show antimicrobial activity, other studies can be conducted in order to evaluate other pharmacological properties of these compounds.

ID: 11335

Área Temática: Ê-POSTER | *Biologia Ambiental, Evolução e Biologia Comparada*

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FeSBE2022 LOW TEMPERATURE REGULATES MELANOPSIN EXPRESSION IN A TISSUE-DEPENDENT MANNER IN ADULT DANIO RERIO

In teleost as well as in other vertebrates, the photosensitivity seems to be conferred by a receptor family known as melanopsin. In *Danio rerio*, five different genes encoding melanopsin have been described: *opn4x1*, *opn4x2*, *opn4m1*, *opn4m2*, and *opn4m3*. We aimed to investigate how the expression of these melanopsins was modulated by a low temperature. For our aim, 90 day-old adult males were kept for 5 days at 28°C, after which the fish were submitted to 23°C for 6 days, keeping the control group at 28°C. The animals were euthanized in two different times: early light phase (EL) and early dark phase (ED) at 28°C or 23°C (CEUA-IBUSP 331/2018). We investigated the gene expression in the brain and eye as central organs and liver and muscle as peripheral tissues. In the brain, higher transcripts of the expression of *opn4m1*, *opn4m3*, and *opn4x2* in the ED at 28°C was seen. On the other hand, the cold challenged fish, showed a reduction in *opn4m1*, *opn4m2*, *opn4m3*, and *opn4x2* genes in the ED. Interestingly was evidenced an increase in *opn4x1* and *opn4x2* in the EL. In the eye, the control group showed an increased *opn4m1* expression at ED, similar to the brain, while *opn4m3* was reduced at the same temporal point and group. Low temperature decreased *opn4m2* and *opn4m3* transcripts. In the liver, we observed a higher expression of *opn4m1* in the EL at 28°C. Fish maintained at 23°C showed a reduction of *opn4m1*, *opn4m3*, and *opn4x2* genes in the EL. In contrast, *opn4m2* evidenced an increase in EL at low temperatures. The *Xenopus*-like opsins demonstrated differential responses in the ED. In the muscle, *opn4m1* and *opn4m2* were less expressed in the ED at 28°C. In this tissue, low temperature caused a decrease of all opsins evaluated in the EL, as well as a reduction of *opn4m3* and *opn4x2* in the EL. We conclude that melanopsin expression is affected by low temperatures in a time and tissue dependent manner which may trigger alterations in its signaling pathway.

ID: 10937

Área Temática: Ê-POSTER | *Biologia Ambiental, Evolução e Biologia Comparada*

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FeSBE2022 THE ROLE OF VASCULAR CONDUCTANCE AND CARDIAC SHUNT CONTROL ON THE HEAT EXCHANGE IN RATTLESNAKES (CROTALUS DURISSUS)

Ectotherms present behavioural and physiological mechanisms that act on body temperature (T_b) modulation and aerobic metabolism related to such regulation. At high T_b , the systemic conductance (G_{sys}) increases while there is a need to a higher pulmonary perfusion. These alterations are conflicting in an animal with a cardiac shunt since G_{sys} increase induces right-to-left shunt, reducing the arterial oxygen content. On the other hand, a left-to-right shunt increases oxygenation, but it may request a lower G_{sys} . This study aimed to investigate the role of cardiovascular adjustments in facing the change of metabolic demand caused by T_b alteration. Decerebrate rattlesnake preparations, *Crotalus durissus* ($n=7$; CEUA/UFSCar-6898250820), had cannulas and flow probes implanted to record systemic (MAP_{sys}) and pulmonary (MAP_{pul}) arterial pressure; G_{sys} and pulmonary conductance (G_{pul}); and shunt direction ($\dot{Q}_{pul}/\dot{Q}_{sys}$). Implanted intraperitoneal dataloggers recorded T_b . Snakes had T_b randomly changed to 10, 20 and 30°C. T_b increase (10, 20 e 30°C, respectively) raised tissue metabolic demand, and impelled G_{pul} increasing ($0,83\pm 0,43$; $3,44\pm 1,41$; $5,73\pm 1,08$ $ml\cdot min^{-1}\cdot kg^{-1}\cdot KPa^{-1}$). Such an alteration was not accompanied by G_{sys} ($7,77\pm 1,04$; $6,82\pm 1,13$; $6,72\pm 1,42$ $ml\cdot min^{-1}\cdot kg^{-1}\cdot KPa^{-1}$). Despite the increase in lung perfusion, MAP_{pul} remained stable ($2,85\pm 0,17$; $3,19\pm 0,25$; $3,09\pm 0,22$ KPa) while MAP_{sys} increased ($2,95\pm 0,24$; $4,06\pm 0,33$; $4,44\pm 0,31$ KPa). There was a decrease in the right-to-left shunt following T_b raise ($0,06\pm 0,01$; $0,28\pm 0,05$; $0,37\pm 0,07$). Thus, we can conclude that complex vascular alterations accompany T_b changes. The increase in pulmonary perfusion must have been compensated by a cardiac output change, affecting MAP_{sys} . The increase the pulmonary perfusion was the major mechanism to attend the aerobic demand, and that mechanism is distinct from what has been reported in mammals. Such adjustment indicates the use of a cardiac shunt as a modulatory mechanism.

ID: 11212

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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Instituição: *UFES*

FeSBE2022 7-DAY TREATMENT WITH MITOQUINONE PREVENTS MYOCARDIAL CONTRACTILITY DYSFUNCTION AFTER MYOCARDIAL INFARCTION IN RATS

INTRODUCTION: Myocardial infarction (MI) is considered the main cause of heart failure. Long-term outcome after MI can be defined in terms of its impact on the size and shape of the left ventricle. The oxidative stress, in the adjacent non-infarcted myocardium, is believed to play a critical role in the progression of left ventricular remodeling during the weeks following acute MI. At 7 days after MI, the reduction in myocardial contractility is related to Ca²⁺ handling and reactive oxygen species (ROS). **AIM:** The aim of this study was to analyze the effect of 7-day treatment with mitoquinone (MitoQ), an specific mitochondrial antioxidant, on contractile dysfunction after MI in rats. **METHODS:** Male Wistar rats (230 to 250 g) were divided in Control (CT, n=5), Control MitoQ (CTM, n=7), Myocardial Infarction (MI, n=6), Myocardial Infarction MitoQ (MIM, n=7), Sham (S, n=9) e Sham MitoQ (SM, n=8) (CEUA-UFES 16/2021). The MI was surgically induced by the occlusion of the anterior interventricular branch of the left coronary artery. At the end of treatment with MitoQ for 7 days in drinking water (100 µM), the myocardial contractility was measured in isolated papillary muscles at maximal length (L-max) in the presence of different extracellular calcium ([Ca²⁺] 0.62-3.75 mM). **RESULTS:** The MitoQ treatment prevented the contractile dysfunction MI induced (CT: 841.12±5.09g vs MI: 280.21±68,76*g vs MIM: 730.31±80.10g; *p<0.05 vs CT), and reduced myocardial contractility in the CT group (CTM: 492.51±26.45*g, p<0.05 vs CT). MitoQ treatment prevented myocardial contractility dysfunction after MI at all [Ca²⁺] (CaCl₂ 0.62 mM: CT: 411.03± 18.67g vs MI: 223.46 ± 56.52*g vs MIM: 503.00±59.01g; *p<0.05 vs CT) and (CaCl₂ 1,25 mM: CT: 680.38± 6.65g vs MI: 273.19±70.62*g vs MIM: 640.17±60.91g; *p<0.05 vs CT). **CONCLUSION:** The treatment with the mitochondrial specific antioxidante, MitoQ, prevented the contractility dysfunction 7 days after myocardial infarction.

ID: 11346

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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Instituição: *UFF*

FeSBE2022 ALCOHOL CONSUMPTION AMONG MEN AND WOMEN IN THE STATE OF RIO DE JANEIRO DURING THE COVID-19 PANDEMIC

INTRODUCTION: The COVID-19 pandemic brought to the world the need for restrictive measures in order to seek to control the spread of the disease and its severe cases.¹⁻² The lockdown measures predisposed the population to behavioral changes.³⁻⁴ Research carried out in China, the United Kingdom, Germany and Brazil demonstrated an increase in the amount of alcohol consumed during the pandemic period.⁵ In turn, high consumption of alcoholic beverages is a risk factor for cardiovascular diseases such as stroke, for example.⁶ Study carried out in the state of Rio de Janeiro with hypertensive adults showed that the majority indicated not drinking alcohol, but such findings can be influenced in adverse social situations.⁷ **OBJECTIVES:** To assess alcohol consumption among adult Brazilian men and women in the state of Rio de Janeiro. January during the period of the COVID-19 pandemic. **METHODS:** This is an observational, cross-sectional study, with a sample of adults (over 18 years of age) residing in the state of Rio de Janeiro with internet access who responded to the online questionnaire proposed via Google Forms. All volunteers signed the Free and Informed Consent Term (FICT). Data are expressed in percentage (%) and total number of people (n). The study was approved by the institution's CEP (47412721.6.0000.5243). **RESULTS:** 795 responses were obtained, 75% (n=600) were women and 24% (n=195) were men. Regarding alcohol consumption among women, the majority, 27% (n=165), reported an increase in alcohol consumption, and most men, 25% (n=49), reported a reduction in consumption. **DISCUSSION:** According to Ammar (2020), there was a reduction in alcohol consumption during the period of home confinement.⁸ However, this study did not compare the results between men and women to observe possible differences in the two groups. **CONCLUSION:** In the state of Rio de Janeiro, women consumed more alcohol than men during the pandemic period.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 ANTIHYPERTENSIVE AND ANTIOXIDANT ACTION OF EGG WHITE
HYDROLYZATE IN ARTERIES OF DOCA-SALT HYPERTENSIVE RATS**

Egg white hydrolyzate (EWH) is a functional food with antioxidant properties through its bioactive peptides' biological activity. We investigated the effects of EWH on vascular changes in DOCA-salt rats and the mechanisms involved. Male Wistar rats (7 weeks, \pm 220 g) were divided and treated for 8 weeks in: a) SHAM (unephrectomy + H₂O via gavage); b) SHAM+EWH (uninephrectomy + EWH – 1kg/day via gavage); c) DOCA (unephrectomy + acetate and deoxycorticosterone (DOCA) (1st, 2nd - 3 rd and 4th - 8 th week: 20, 12 and 6 mg/kg respectively); d) DOCA+EWH (unephrectomy + DOCA) and EWH – 1kg/ day per gavage, 4th - 8 th week). DOCA and DOCA+EWH animals received daily NaCl (1%) + KCl (0.2%) solution to drink. Systolic blood pressure (SBP) was recorded. Concentration-response curves for acetylcholine (ACh) and sodium nitroprusside (SNP), and the vascular pathways involved in the mesenteric and aortic arteries were investigated. Biochemical and immunofluorescence analyses and in situ superoxide anion production were performed. The EWH co-treatment: a) reduced the levels of SBP produced by the DOCA-salt model, with a 36% drop in SBP values (SHAM: 116.5 ± 1.5 ; SHAM+EWH: 118.1 ± 0.7 DOCA: $194.9 \pm 3.7^*$; DOCA +EWH: $153.9 \pm 5.1^{*#}$; in mmHg, *vs. SHAM, # vs. DOCA); b) prevented vascular dysfunction mediated by ROS reduction (mitochondrial in MRA); c) reduced the participation of NFkB in the relaxation vessels; d) reversed the increased levels of NOX-1, NFkB, and TNF- α ; e) normalized levels of ROS and lipid peroxidation in plasma and vessel, and f) reduced the in situ production of the superoxide anion. EWH showed improvement in vascular dysfunction promoted by DOCA-salt hypertension and indicated a promising strategy in the treatment of hypertension.

ID: 11283

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 CARDIOVASCULAR EFFECTS OF ALPINIA ZERUMBET LEAVES
EXTRACT IN SPONTANEOUSLY HYPERTENSIVE RATS**

Alpinia zerumbet is a plant from West Asia also abundant on the Brazilian coast, where it is known as Colônia. This plant is widely used in folk medicine as an antihypertensive, diuretic, and anxiolytic. This study aimed to investigate the effects of the hydroalcoholic extract obtained from Colônia leaves (AZE) on hypertension, vascular dysfunction and remodeling, as well as oxidative status in spontaneously hypertensive rats (SHR). SHR and Wistar-Kyoto male rats, 90 days old, treated or not with AZE (50mg/kg/day in drinking water) for six weeks were used in this study. Systolic blood pressure (SBP) was checked once a week by tail plethysmography. At the end of treatment, the animals were anesthetized with thiopental (70mg/kg i.p.), blood was collected, the thoracic aorta was isolated for morphological analysis, and the mesenteric arterial bed (MAB) was isolated for the assessment of vascular function. Protein carbonylation levels as well as catalase (CAT), glutathione peroxidase (GPx), and superoxide dismutase (SOD) enzymatic activities were evaluated, in plasma samples, by spectrophotometry. (Protocol:CEUA-IBRAG-UERJ/052/2016). AZE treatment reduced the SBP in SHR (mmHg: SHR+AZE=133±1,6; SHR=199±2,1; n=10; p<0,05). Although the treatment did not improve the MAB vascular dysfunction, it was able to reduce the thickness of the middle layer of the aorta (µm: SHR+AZE=204±2,3; SHR=280±4,2; n=5; p<0,05). Besides that, AZE treatment improved CAT (U/mg ptn: SHR+AZE=0,42±0,08; SHR=0,1±0,02; n=8; p<0,05) and GPx (U/mg ptn: SHR+AZE=0,015±0,003; SHR=0,006±0,001; n=8; p<0,05) activities and decreased protein carbonylation (nmol/mg ptn: SHR+AZE=637±87; SHR=991±73; n=8; p<0,05) in plasma, while did not change SOD activity. The results suggest that AZE reverses hypertension and thoracic aorta remodeling in SHR, which was associated with an improvement of oxidative parameters. However, AZE treatment for six weeks did not improve vascular dysfunction in this model.

ID: 11207

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 CONCENTRATION-RESPONSE CURVE FOR NACL INTAKE IN 2-KIDNEY-1-CLIP HYPERTENSIVE WISTAR MALE RATS

Rats' preference for NaCl is expressed as an "inverted U-shaped" concentration-response curve (CRC) peaked nearly at isotonicity (Breslin et al., 1993). During the early development of 2-kidney-1-clip (2K1C) hypertension, rats show a transient enhancement of the daily hypertonic NaCl intake (Roncari et al., 2018). Thus, CRC might be modified as the 2K1C hypertension develops. The objective of the present work was to determine CRC in 2K1C rats. The protocols were approved by the CEUA-UFC (#2706070721). Male Wistar rats (≈ 150 g) were submitted to unilateral renal stenosis or sham surgery. Between 4th-5th, 8th-9th and 12th-13th post-surgical week (PSW), rats were kept in individual metabolic cages with food, one bottle containing tap water and other containing NaCl dissolved in deionized water at 0, .08, .15, .23 or .3 M, for 3 days each. The daily fluid intake of the last 2 days was averaged. At the end, mean arterial blood pressure (MAP) and heart rate (HR) were measured, rats were euthanized, and the kidneys were removed for determination of the left kidney/right kidney weight ratio (LK:RK). Stenotic rats classified as hypertensive (H-2K1C) group had mean BP > 129 mmHg or $.49 > \text{LK:RK} > .79$; rats that did not attend the criteria were classified as normotensive (N-2K1C) group. Among all NaCl concentrations tested, .23 M NaCl intake by H-2K1C (17 ± 6 ml/100 g bw/24 h; $n = 3$) was higher than N-2K1C (6 ± 2 ml/100 g bw/24 h; $n = 8$) and SHAM (5 ± 2 ml/100 g bw/24 h; $n = 5$) groups only during the 4th-5th PSW ($p < .05$); no difference between groups was observed for other NaCl concentrations or other PSWs. In the 15th PSW, mean MAP in H-2K1C (153 ± 9 mmHg) was higher than N-2K1C (114 ± 4 mmHg) and SHAM (110 ± 5 mmHg) groups ($p < .05$); no difference in HR was observed between groups. The results suggest the existence of a transient right-shift in the CRC (i.e., enhanced palatability specifically for hypertonic NaCl) in 2K1C hypertensive rats.

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ID: 11164

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 DIMINAZENE TREATMENT INHIBITS WATER INTAKE AFTER SODIUM DEPLETION IN SHR MODEL

In previous studies, the treatment with diminazene (DIZE) in different cardiovascular disease models reduces cardiac remodeling, improving baroreflex sensitivity and effectiveness, in addition to facilitating vascular relaxation. However, the literature lacks studies about water, sodium and food intake in animals treated with DIZE. Thus, in the present study, daily and stimulated water, 1.8% NaCl and food intake was investigated in normotensive Holtzman (HTZ) and spontaneously hypertensive (SHR) rats treated with DIZE. Rats (350-480 g) were housed in individual cages and burettes containing water and 1.8% NaCl were offered. The intake of these fluids was monitored daily. After acclimatization, rats were divided into groups controls and treated with DIZE (20 mg/kg of body weight/day) (protocol: CEUA 18/2021 UNESP-FOAr). DIZE does not change daily intake of water and 1.8% NaCl in HTZ rats (water: 7.53 ± 1.09 , vs. 6.74 ± 0.89 and 1.8% NaCl: 0.44 ± 0.16 , vs. 0.82 ± 0.26 mL/100 g b.wt./24 h; n=10) and SHR (water: 13.54 ± 1.47 , vs. 12.66 ± 1.56 and 1.8% NaCl: 9.24 ± 1.58 , vs. 6.74 ± 1.96 mL/100 g b.wt./24 h; n=9). However, DIZE reduced water intake ingested simultaneously with 1.8% NaCl in 24 h sodium depleted SHR at 90 and 120 minutes of the (water: (90') 1.00 ± 0.21 , vs. 0.48 ± 0.18 and (120') 1.50 ± 0.35 , vs. 0.68 ± 0.23 mL/100 g b.wt.; $p < 0.05$), without changing 1.8% NaCl intake. Water and 1.8% NaCl intake was not modified in 24 h sodium depleted HTZ rats treated with DIZE. Furthermore, the treatment with DIZE produced no significant changes in daily urinary volume and urinary sodium concentration or in food intake after 24 h of food deprivation. The results suggest that the treatment with DIZE was able to inhibit water intake in SHR model after furosemide-induced sodium depletion.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 EFFECT OF CHRONIC EXPOSURE TO FINE PARTICULATE MATTER
ON CARDIAC TISSUE OF MICE PREDISPOSED TO SYSTEMIC LUPUS
ERYTHEMATOSUS**

Epidemiological and toxicological studies have shown that the inhalation of particulate matter (PM), one of the main components of air pollution, is associated with the development of cardiovascular diseases (CVD). Long-term exposure to excess MP increases the risk of cardiovascular events and can reduce life expectancy by a few years. Systemic lupus erythematosus (SLE) is a chronic inflammatory disease of an autoimmune nature, characterized by the production of autoantibodies that affects several organs, including the heart. Hormonal, environmental and genetic factors are directly associated with the development of the disease and air pollution has been shown to be an important environmental factor. In this context, air pollution can be a determining factor for the progression of the disease and cardiovascular compromise. This study aims to investigate whether exposure to air pollution promotes increased inflammation and cardiac remodeling in animals with systemic lupus erythematosus. Female mice of the NZBWF1 strain, exposed or not to PM_{2.5}, were used using an environmental particle concentrator. Aspects related to cardiac remodeling, inflammation and cell death in the myocardium of the groups were analyzed. Body weight gain of the groups during the exposure period, cardiac trophism by heart/body weight ratio post euthanasia, relative area of cardiomyocytes and fibrotic area in cardiac tissue were evaluated. The animals that were exposed to PM_{2.5} showed an increase in the area of cardiomyocytes, as well as the relative area of fibrosis, in addition, we observed an increase in the immunostaining of IL-1 and C3 in the cardiac tissue, demonstrating an increase in inflammation. Thus, we suggest that air pollution is capable of promoting cardiac remodeling and increased inflammation in animals that develop SLE.

ID: 11117

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 EFFECT OF THE DIRECT RENIN INHIBITOR, ALISKIREN, IN ANIMALS
SUBMITTED TO THE 2K1C MODEL OF HYPERTENSION: A SYSTEMATIC
REVIEW**

Renovascular hypertension is characterized by a narrowing of the renal artery, which reduces blood flow, with consequent elevation of blood pressure and oxidative stress (OS) due to activation of the renin-angiotensin-aldosterone system (RAAS). The objective of the present study was to verify, through a systematic review, the effects of the drug Aliskiren in animals submitted to experimental renovascular hypertension using the 2 kidneys a clip (2K1C) model proposed by Goldblatt et al in 1934. The bibliographic search was performed in the electronic databases BIREME, SciELO, LILACS, Cochrane, Google Scholar and PubMed, in February 2021. Of the 32 studies identified, only 10 met the inclusion criteria. Through manual analysis, the primary outcome was defined: systolic blood pressure (SBP) and the secondary outcomes: the RAAS and OS. The animals in the 2K1C group developed SBP between 147 and 208 mmHg. In the group treated with Aliskiren (2K1C+A), there was a decrease in SBP in 6 studies, however, in 4 studies whose treatment time and dosage were reduced, SBP remained high and similar to the 2K1C group. In the RAAS components, there was an increase in renin, angiotensin I, angiotensin II and AT1 receptor in the 2K1C group. In the 2K1C+A group all these markers were significantly reduced. The increase in OS biomarkers: superoxide anion, reactive oxygen species, gp91phox, malondialdehyde, iNOS, eNOS and carbonyl protein, as well as the decrease in nitric oxide in the 2K1C group demonstrated the accumulation of oxidative damage from several cellular pathways that can lead to organ functional decline. Treatment attenuated these biomarkers and increased levels or activity of antioxidant enzymes. Taken together, these results showed that the treatment time associated with the dosage of Aliskiren was crucial for the reduction of SBP, however, its beneficial effects in the reduction of RAAS components and OS biomarkers were independent of SBP.

ID: 10838

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 EFFECTS OF AÇAÍ SEED EXTRACT (ASE) IN BROWN ADIPOSE TISSUE
ACTIVATION AND THERMOGENESIS INDUCTION IN HIGH-FAT-FED C57BL/6
MICE**

The rising rates of obesity and overweight represent an urgent public health concern and are a major risk factor for metabolic syndrome. Excess lipids favor energy imbalance, leading to remodeling of adipose tissue and suggesting a directly association with the induction of obesity. Brown adipose tissue (BAT) is related to the dissipation of energy in the form of heat during adaptative thermogenesis, contributing to energy expenditure. The hydroalcoholic extract of the açai seed (ASE) obtained from *Euterpe oleracea* Mart. promotes an anti-obesity effect, whose mechanisms are still poorly understood. Therefore, this work aims to evaluate the effects of treatment with ASE on BAT remodeling and its role in thermogenesis induction. The project was approved by CEUA of IBRAG/UERJ 004/2021. Male C57BL/6 mice were divided into three groups: control (10% lipid diet); HF (60% lipid diet) and HF+ASE (60% lipid diet + 300 mg/kg/day by intragastric gavage). The diet was administered concurrently with the treatment for 12 weeks. Body mass was measured weekly and, blood glucose at the beginning and at the end of the treatment. The expression of markers related to BAT activation, thermogenesis, and fatty acids utilization was evaluated by western blot. The morphological alterations of BAT and white adipose tissue (WAT) were analyzed histologically. ASE prevented the body mass gain, blood glucose, and morphological changes in WAT and BAT in the HF+ASE compared to the HF group. In BAT, ASE treatment prevented the reduced thermogenesis markers pAMPK, pLKB1, SIRT-1, UCP-1, and β 3-AR, and fatty acid utilization markers PLIN1, ATGL, HSL, and CPT-1 observed in the HF group. In conclusion, the treatment with ASE prevented structural changes in the BAT of highfat-fed mice and increased the expression of proteins related to thermogenesis, which may represent a new target in preventing obesity. These findings support ASE as an approach to preventing obesity.

ID: 11177

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 EFFECTS OF AÇAÍ SEED EXTRACT (ASE) ON VASCULAR DYSFUNCTION IN OBESITY

The frequency of obesity in Brazil is growing leading to a rise in the rate of cardiovascular diseases. Previously we have demonstrated that the açai seed hydroalcoholic extract, rich in polyphenols, has anti-hypertensive and anti-obesity effects. The goal of this study is to evaluate if ASE can prevent high-fat diet induced functional and structural alterations in the C57BL/6 mice aorta artery. Male C57BL / 6 mice were distributed into three groups: Control group, fed with a control diet (10% of lipids); High-fat group, fed with a 60% of lipid diet; and the High-fat + ASE group, fed with a 60% of lipid diet and treated with ASE (300 mg/kg/day by intragastric gavage). The diet was administered concurrently with the treatment for 12 weeks. All experimental protocols were approved by the Ethics Committee for the Care and Use of Animals Experiences of the IBRAG (CEUA/034/2015). Body mass and blood pressure were measured weekly and blood glucose every 15 days. The lipid profile was measured at the end of the treatment. The morphological alterations of thoracic aorta were analyzed histologically and the content of fibrosis and inflammatory markers was evaluated by immunohistochemistry. ASE prevented the body mass gain, hyperglycemia, total cholesterol and LDL levels in the HF+ASE compared to the HF group and, HF+ASE group also demonstrated a rise in HDL with lower VLDL and triglyceride levels. HF group showed elevated systolic and diastolic blood pressure, which was prevented by ASE. HF group showed increased media to lumen ratio, collagen (I and III) deposition and fibrosis, while ASE prevented these morphological alterations. Also, ASE prevented the higher levels of inflammatory markers IL-6, TNF- α and MCP-1 in aorta from HF+ASE compared to the HF group. In conclusion, ASE demonstrated notable metabolic protection, and prevented hypertension, vascular hypertrophy and fibrosis in mice fed with high-fat diet, probably acting through an anti-inflammatory mechanism.

ID: 11325

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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Instituição: UERJ

FeSBE2022 EFFECTS OF EUTERPE OLERACEA MART. EXTRACT AND REGULAR PHYSICAL EXERCISE ON VASCULAR RESPONSE AND OXIDATIVE STRESS IN SPONTANEOUSLY HYPERTENSIVE RATS

Hypertension is a risk factor for vascular diseases. Physical activity has been recommended as a non-pharmacological treatment and the açai seed extract (ASE) has antihypertensive and antioxidant properties. Therefore, this work aims to evaluate the effects of treatment with ASE and moderate physical exercise on the vascular function in spontaneously hypertensive rats (SHR) and associate with the oxidative state and physical performance. The project was approved by CEUA 006/2017. 10 male wistar rats (CT) and 40 male SHR divided into SHR, SHR+ASE (200mg/Kg/day by gavage), SHR+TR (physical exercise) and SHR+TR+ASE (physical exercise and ASE). The training (TR) was performed on treadmill for 8 weeks, 5 times a week, for 30 minutes. The intensity was set at 50% of the maximum speed reached in the maximal stress test. Body mass and blood pressure (BP) were measured weekly. Vascular reactivity in the mesenteric arterial bed and aortic ring were evaluated. Lipid peroxidation, antioxidant enzymes and nitrite level were evaluated in plasma and aorta. The expression of Nrf2, Keap1 and NOX4 were evaluated in aorta by western blot. The morphological alterations of aorta were analyzed histologically. Treatment with ASE reduced body mass, BP and aortic wall thickness. The physical performance was increased in SHR+TR+ASE group compared to SHR+TR group. ASE improved vascular response and increased nitrite levels. In addition, it reduced oxidative stress markers and increased the activity of antioxidant enzymes. There was no difference in the expression of proteins analyzed. In conclusion, the treatment with ASE promoted an additional gain in the performance of the animals submitted to training. This beneficial effect can be attributed in part to the reduction of BP and the improved vascular function, which was not promoted by training alone, associated with reduction of oxidative stress, resulting in the improvement of endothelial dysfunction commonly observed in hypertension.

ID: 10873

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 EVALUATION OF REDOX BALANCE AND EXPRESSION OF
EXCITATORY GLUTAMATERGIC AND INHIBITORY GABAERGIC PEPTIDES IN
THE BRAINSTEM OF RATS EXPOSED TO MATERNAL PROTEIN
MALNUTRITION.**

Several papers point out that nutritional insults in the early stages in life, lead to sympathoexcitation in adult offspring. Sympathetic overdrive is a characteristic event of neurogenic hypertension. Oxidative stress can be induced by nutritional insult, but little is known about the relationship with sympathoexcitation. We aim to evaluate the REDOX balance and the expression of excitatory and inhibitory peptides in the brainstem of young rats submitted to maternal protein malnutrition. Two groups of male rats were divided (after weaning, 21 days of age) according to the mother's diet: control (C) with 17% casein and malnourished (M) with 8% casein were sacrificed at 60 days of age. The brainstem was collected for analysis. The procedures followed the recommendations of the CEUA and were approved by the local Committee (0060/2018). The results were analyzed by T-test and expressed as mean \pm SEM considering $p < 0.05$. Our data demonstrated increase in oxidative stress biomarkers in the malnourished group compared to the control (MDA: C: 2.42 ± 0.28 N=5 vs M: 3.21 ± 0.07 N=5; $p = 0.0268$ and Carbonyls: C: 54.30 ± 4.81 N=5 vs M: $71.64 \pm 2,37$ N=5; $p = 0.0120$), decreased in SOD (C: 7.81 ± 0.60 N=5 vs M: 4.50 ± 0.92 N=5; $p = 0.0167$); CAT (C: 1.66 ± 0.11 N=4 vs M: 0.71 ± 0.04 N=6; $p = 0.0001$); Suphydryls (C: 0.108 ± 0.002 N=4 vs M: 0.078 ± 0.003 N=6; $p = 0.0001$). In addition, we observed that malnourished decreases expression of GRIN1 (C: 1.000 ± 0.3530 N=4 vs M: 0.1380 ± 0.0910 N=5; $p = 0.03335$) and GABARAPL1 (C: 1.000 ± 0.1550 N=3 vs M: 0.3420 ± 0.0690 N=3; $p = 0.0179$) respectively, but no differences were observed in other peptides GRIA2 ($p = 0.4674$); GABAR1 ($p = 0.6014$); GABRB2 ($p = 0.8430$) and GAD2 ($p = 0.8991$). Conclusion: Our data suggest that malnutrition leads to oxidative stress and dysregulation of excitatory and inhibitory gene expression in the brainstem, which may alter central sympathoexcitation..

ID: 11228

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 IMPACT OF EXTRACELLULAR VESICLES FROM POST-COVID-19 PATIENTS ON VASCULAR REACTIVITY OF HEALTHY AND MALNOURISHED MICE

Cardiovascular complications can persist during post-COVID-19 condition even a year after infection. Extracellular vesicles (EV) are released in response to cellular damage and allow long-distance cell-cell communication. Increased circulating EV has been reported in post-COVID patients with vascular alterations. Malnutrition is a cardiovascular risk factor that has been reported to aggravate susceptibility to COVID-19. In the present study we investigated the effect of EV isolated from post-severe COVID-19 patients on the vascular function of control and malnourished mice. Blood samples (1 mL) were collected from severe COVID-19 patients at 1 and 6 months after hospital discharge (CEP # 4.076.086/2020). Platelet-free plasma was obtained for EV isolation (20,000 g, 1h). EV was quantified by NanoTracking analysis. The effect of EV (105 and 106 /mL) incubation (30 minutes) was investigated on the vascular relaxation response to acetylcholine and sodium nitroprusside (SNP) in thoracic aorta from post-weaning male C57Bl/6 mice fed a normoprotein (NP, 14% protein) or low-protein (LP, 6% protein) diet for 3 months (CEUA # 5807-1/2021). Statistics: * $p < 0.05$; t-test or ANOVA. Maximal relaxation response (E_{max}) to acetylcholine was reduced in aorta from LP compared to NP (NP=84%±1.9 vs. LP=78%±1.8*). Exposure to EV from 1- or 6-month post-COVID-19 patients increased E_{max} to acetylcholine in aorta of LP (1-month: EV-105=87%±3.1*; EV-106=82%±3.3*; 6-month: EV-105=89%±4.3*; EV-106=92%±4.2*), but not in NP mice. EV did not significantly affect SNP-induced relaxation neither in LP nor in NP groups. The data suggest that EV from 1 and 6 months post-COVID-19 patients impact endothelial relaxation function of malnourished but not healthy mice. Therefore, EV may play a role in vascular alterations during long-COVID syndrome.

ID: 11144

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 IMPLICATION OF PROTEIN RESTRICTION DURING PERI-PUBERTAL PHASE IN THE HEART AND RENIN-ANGIOTENSIN SYSTEM OF ADULT RATS

Protein restriction (LP) in perinatal life induces hypertension related to renin-angiotensin system dysfunction in adulthood, however, the implication of renin angiotensin system in the hypertension induced by peripubertal protein restriction is unknown. This study aims to evaluate whether protein restriction in peri-pubertal phase induces hypertension related to renin-angiotensin system dysfunction and cardiac structural changes. After approval by the committee (n°3353060421), Wistar rats at post-natal days (PN) 30 were fed a low-protein diet (4%) for 30 days and then fed a 20.5% protein diet for 60 days (LP), for dietary recovery. Control animals (NP) consumed a diet with 20.5% protein throughout the protocol. At PN 120 cardiovascular parameters were evaluated. The T-Student test was used for statistical analysis. LP rats showed long-term increased mean arterial pressure ($p=0.047$) but heart rate remained unchanged. LP rats showed attenuated depressor response to the ACE inhibitor (enalapril) compared with control animals ($p = 0.015$). In the angiotensin 2 dose response curve, the LP animals showed an increased pressor response to angiotensin 2 at the low dose (50 ng/Kg) ($p=0.007$), without changing the response at the intermediary dose (200 ng/Kg), and showed a reduction in the pressor response at the high dose (400 ng/Kg) ($p=0.015$). The diameter of cardiomyocytes and interstitial fibrosis was increased in the LP animals ($p=0.044$ and $p=0.028$, respectively) compared with control animals, without changes in the perivascular fibrosis. In the echocardiogram, the left ventricle in diastole and systole, respectively showed an increase in the diameter ($p=0.012$ and $p=0.023$), in the interventricular septum ($p=0.040$ and $p=0.026$) and in the posterior wall ($p=0.08$ and $p=0.028$) of LP animals compared with control animals. Protein restriction in peri-pubertal phase leads to hypertension in adulthood, supported by impairment of the renin-angiotensin system and heart structure.

ID: 11333

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 INCREASED 11 β -HYDROXYSTEROID DEHYDROGENASE-1
EXPRESSION AND CORTICOSTERONE LEVELS IN RESPONSE TO
ISOPROTERENOL IN PERIVASCULAR FAT ADIPOCYTES**

β -adrenoceptor (β -AR) overstimulation is a mechanism involved in the genesis and maintenance of several cardiovascular diseases. In vivo long-term exposure to β -ARagonist isoproterenol (Iso) results in corticosterone-dependent PVAT dysfunction. In the present study we go further into the mechanism by which Iso may affect PVAT by investigating ex vivo and in vitro effect of Iso in PVAT and PVAT-derived adipocytes. We focused on PVAT nitric oxide (NO) and superoxide production, corticosterone levels, and the impact on vascular contractility. PVAT of thoracic aorta from male Wistar rats (CEUA 3523-1A) was isolated. PVAT and PVAT-derived adipocytes were exposed to vehicle (Veh) or Iso (1 μ M) for 24h (37°C; 5% CO₂). NO and superoxide production were evaluated by DAF-2 DA and DHE respectively, corticosterone by kit, and protein expression by immunoblotting. Culture conditioned medium (CCM) from ex vivo incubated PVAT was collected. Student t-test or one-way ANOVA, * p <0.05. Exposure of aorta to the CCM from PVAT incubated ex vivo with Iso increased aorta contraction (E_{max}) to phenylephrine compared with vehicle CCM (E_{max}: Veh-CCM=1.42 \pm 0.23 vs. Iso-CCM= 5.25 \pm 0.39* mN/mm). Ex vivo incubation of PVAT with Iso resulted in increased superoxide (+30%), reduced NO production (-22%), and increased corticosterone levels (1.7x). In line with these results, PVAT-derived adipocytes exposed to Iso in vitro showed increased corticosterone release associated with increased expression of 11 β -HSD1, enzyme responsible for corticosterone de novo synthesis. β 3-AR antagonist SR59230A blocked Iso-induced increase in both adipocyte 11 β -HSD1 expression and PVAT corticosterone levels as well as the increased E_{max} to phenylephrine of aorta in response to Iso-CCM. In conclusion, our results suggest that β -AR regulate adipocytes PVAT function counting for increased corticosterone levels in PVAT via β 3-AR/11 β -HSD1 activation.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 INFLUÊNCIA DO GLICOSAMINOGLICANO E DO EXERCÍCIO FÍSICO
NA TROMBOSE ARTERIAL E REENDOTELIZAÇÃO DA ARTÉRIA CARÓTIDA DE
CAMUNDONGOS APÓS LESÃO INDUZIDA POR CLORETO FERRICO**

The practice of regular physical exercise as non-drug therapy has been widely related to the prevention of cardiovascular diseases and vascular regeneration. Dermatan sulfate (DS) is an antithrombotic glycosaminoglycan, which also has anti-inflammatory activity. Previous studies in our laboratory have shown that DS can act as an inhibitor of vascular stenosis after injury, also indicating its potential anti-inflammatory function. In the present study, we compared the effect of dermatan sulfate in association or not with physical exercise in the initial prevention of arterial thrombosis, in the inflammatory process, and the formation of neointima after arterial injury using the ferric chloride injury model. The inflammatory response and vessel remodeling were determined by quantifying the presence of intercellular adhesion molecule I (ICAM), CD11b, a leukocyte marker molecule, CD34 to verify the presence of endothelial progenitor cells, and CD31 for the presence of endothelial cells in the vessels. The injured vessels were analyzed for the presence of thrombosis and vascular stenosis promoted by neointima. As a result, we could observe that physical exercise associated with dermatan sulfate treatment increased the time of thrombus formation and decreased the presence of inflammatory cells and the formation of neointima, indicating the potential of this glycosaminoglycan to assist in vascular regeneration. Therefore, there is a potentiation of the response when DS is associated with physical exercise, promoting better vessel recovery after the induction of the arterial injury model, and decreasing the inflammatory response induced by the arterial injury. Therefore, the association between exercise and DS immediately after the injury can be considered a therapeutic alternative to the treatment of arterial injuries induced by cardiovascular diseases.

ID: 11313

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 LIRAGLUTIDE REDUCES OXIDATIVE STRESS IN A MODEL OF FEMALE SEX HORMONE DEPRIVATION AND HYPERTENSION

Liraglutide (glucagon-like peptide 1 receptor agonist) has shown renal and cardiac protective effects that have been suggested to be mediated by inhibition of oxidative stress (OS), but are not well understood, including in the context of female sex hormone deprivation. Thus, we investigated the effect of Liraglutide treatment in renal and cardiac OS in spontaneously hypertensive rats (SHR) ovariectomized (OVX). Our hypothesis is that reduces OS in this experimental model. SHR females at 8 weeks of age were OVX and divided in control saline (O) and Liraglutide 0.6mg/kg twice daily (OL), both treated subcutaneously for 30 days. After treatment, OS was measured via Advanced Oxidation Protein Products – (AOPP, results were expressed in $\mu\text{M}/\text{mg}$ protein equivalents) in renal and cardiac tissues and plasmatic total nitrite and nitrate (TNN; assays based on the Griess reaction). The T test was used and the results were considered to be significant at $p < 0.05$; no difference in baseline blood glucose among the groups (O: 94 ± 5 ; OL: 96 ± 8 ; mg/dL). Liraglutide was not able to reduced SBP (O: 172 ± 5 ; OL: 184 ± 10 mmHg). However, it reduced AOPP in renal (O: 16.3 ± 0.7 ; OL: 13.9 ± 0.4 ; $p < 0.05$) and TNN (O: 158 ± 10 ; OL: 128 ± 7 ; N:5; $p < 0.05$) in plasm. These results indicate that Liraglutide can protect kidney and heart tissue and, consequently, the function of these organs, reducing oxidative stress in situations of hypertension and estrogen deficiency. However, in order to suggest the potential therapeutic use Liraglutide in preventing kidney and heart diseases, further studies will be necessary to better understand the biological benefits and to unveil the mechanism of this important protective effect.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 LONG-TERM MALE SEX HORMONE DEFICIENCY DOES NOT MODIFY THE COX/TXA2 PATHWAY-DEPENDENT AORTIC RINGS REACTIVITY

The testosterone cardiovascular effects depend on both genomic and non-genomic actions. Acutely, it has vasodilatory action, however its long-term role on vascular reactivity is not totally known. The hypothesis of this study is that testosterone participates, in the long-term regulation, of vascular reactivity, through a cyclooxygenase/thromboxane (COX/TXA2) dependent pathway. The experimental protocols were approved by the local ethics committee (CEUA-17/2020). Wistar rats (240 to 260g) were divided into: orchidectomized (OQT N=11) and control (SHAM N=11). After 12 weeks, animals were sacrificed and thoracic aortic rings (3-5 mm) were used to study vascular reactivity to phenylephrine (10⁻¹¹ to 10^{-3.5} M) in the presence of Indomethacin 10 µM (non-selective COX inhibitor); NS 398 1 µM (selective COX2 inhibitor); SQ 29,548 1 µM (selective thromboxane receptor blocker) and furegrelate 10 µM (TXA2 synthase inhibitor). Comparison of means ± SEM was performed using Student's t test or one way ANOVA, post hoc Tukey. The maximal response (R_{max}) to phenylephrine was similar between the SHAM and OQT groups (SHAM:118.1±6.29 N=7; OQT:115.9±4.38 N=13). Inhibition of receptors for thromboxane A₂ equally reduced R_{max} in both groups (SQ 29,548; SHAM:67.1±3.20 N=9; OQT:77.12±3.71 N=8). The reactivity of the aortic rings was not modified in the presence of indomethacin, NS 398 and furegrelate in both groups: Indomethacin (SHAM: 99.78±2.82 N=6; OQT:119.4±2.84 N=9); NS 398 (SHAM:101.1±4.07 N=6; OQT:97.12±2.39 N=8) and furegrelate (SHAM:107.9±4.78 N=8; OQT:110.8±3.88 N=11). The results showed that phenylephrine-mediated vasoconstriction was equally dependent on TXA₂ receptors in SHAM and OQT groups. We conclude that testosterone, in the long term, did not modify the vascular reactivity regulation on COX-TXA₂ pathway dependent, in isolated aortic rings of young rats.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 NURSING DIAGNOSES AND CARDIOVASCULAR RISK FACTORS
RELATED TO ORAL HEALTH IN HOMELESS WOMEN IN SÃO PAULO CITY,
BRAZIL**

Introduction: The homeless population in Brazil is minority composed of women, which represent only 14.6% in the city of São Paulo¹, where they are commonly affected by the scarcity in which they live, without health information and lack of access to personal and oral hygiene. We used the nursing diagnoses and possible interventions aiming to produce quality of life and reduction of damage to their health.**Objective:** To evaluate cardiovascular risks to oral health in homeless women in São Paulo, associated with the Taxonomy of International Nursing Diagnoses Nanda I 2018/2019. **Methods:** This is a field research with quantitative method, exploratory and cross-sectional nature, approved by the Institutional Ethics Committee under protocol 036417, CAAE:21519413.40000.5511. Conducted in downtown São Paulo, the research counted among 173 evaluated, it was found 18 women volunteers in street situation between the months of November 2019 to March 2020, having between 18 and 59 years, previously selected by convenience and submitted to a questionnaire, being evaluated sociodemographic data pointing the risk factors for cardiovascular diseases (CVD), measurement of blood pressure (BP) and heart rate (HR), subsequently associated with the International Nursing Taxonomy Nanda I. **Results:** Of the women studied the mean blood pressure (BP) of 128x85mmhg, and Heart Rate (HR) of 91bpm. Being that 18.1% reported having previous history for stroke, 9% for AMI and 76.6% could not inform previous history for AMI. Of these women, 18.1% reported having presented an abscess or edema in the last 6 months. And 27.2% reported toothache or pain in the mucosa region. It was observed that 72.70% of the women answered that yes, they use some illicit substance, 18.1% never used and 9% do not use. Thus, nursing diagnoses were listed during the analysis, using the NANDA I taxonomy, are: Related Ineffective Health Control, Impaired Dentition, and Risk of Impaired Oral Mucous Membrane Integrity. **Conclusion:** However, it is evidenced that oral hygiene has a direct connection with cardiovascular alterations in this population associated with AMI, stroke, and atherosclerosis. Thus, the importance of public politics for the improvement and eradication of this problem was observed, reducing the aggravations of CVD and aiming to improve the quality of life for this often underprivileged part of society.

ID: 11324

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 OUABAIN/NKA/CSRC PATHWAY IS PIVOTAL FOR PERIVASCULAR INNERVATION DYSFUNCTION IN MESENTERIC RESISTANCE ARTERY OF DOCA-SALT HYPERTENSIVE RATS.

We investigated the role of ouabain (OUA)/NKA/cSRC signalosome pathway on perivascular innervation (PVI) of mesenteric resistance arteries (MRAs) from DOCA-salt rats. Ethical approval n. 03/2016. Five-weeks after DOCA-salt treatment, Wistar rats were randomized into two groups: DOCA-salt treated with rostafuroxin (ROSTA, an OUA signalosome antagonist, 1 mg/kg/day gavage, 3 weeks) or vehicle. The statistical analysis: ANOVA, $p < 0.05$ *vs. control (CT); #vs. DOCA-salt. The blood pressure measured by tail-cuff was higher in DOCA-salt (170%*) and reduced by ROSTA (141%#). Electrical field stimulation (EFS)-induced contraction, assessed by wire myograph, in MRA without endothelium was higher in DOCA-salt and partially reduced by ROSTA (%: CT 38 ± 4.22 (n=38) vs. DOCA-salt $80 \pm 4.86^*$ (n=30) vs. ROSTA $59 \pm 4.53^* \#$ (n=30)). Phentolamine (α -adrenergic antagonist) reduced the EFS contraction in all groups, but in a higher extent in DOCA-salt than CT and ROSTA. The P2 antagonist, suramin, did not change EFS contraction in MRA of DOCA-salt, while reduced it in CT and ROSTA. BIBP-3226 and BIIE-0246, NPY antagonists, did not change EFS in MRA of all groups. In contrast to functional studies, immunofluorescence assay showed greater dopamine β -hydroxylase-immunopositive nerves in DOCA-salt and ROSTA MRAs than CT and lower NPY-immunopositive nerves in DOCA-salt, that was restored to CT levels by ROSTA. To evaluate the vasodilatory sensitive innervation, MRAs with endothelium were pre-incubated with sympathetic contraction blocker (guanethidine) and pre-contracted with TxA2 analogue. In this condition, EFS-induced relaxation only in CT MRA; which was abolished by CGRP blocker (Frag8-37). However, CGRP-immunopositive nerves was not different among groups. We conclude that OUA signalosome pathway is pivotal to PVI dysfunction observed in resistance arteries of DOCA-salt rats, through sympathetic vasoconstrictor hyperactivation and impaired sensitive vasodilatory innervation.

ID: 11281

Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 POSTNATAL ENVIRONMENT IS DETERMINANT FOR MESENTERIC RESISTANCE ARTERY REMODELING IN YOUNG SPONTANEOUSLY HYPERTENSIVE RATS

Changes in the postnatal environment can influence hypertension prognosis. After being breastfed by a Wistar mother, adult spontaneously hypertensive rats (SHR), now called SW, shows reduced blood pressure (BP) that correlates to mesenteric resistance artery (MRA) structural remodeling compared to naturally reared SHR (SS). However, the determinant period for those BP and MRA changes is still unknown. The present study aims to characterize MRA structural and mechanical remodeling in young (6 weeks old) cross-fostering rats. Ethical approval n:1946260318. BP of male Wistar rats nursed by Wistar mothers (WW, n:16) or nursed by SHR mothers (WS, n:13), SS (n:15) and SW (n:9) rats was measured by plethysmography. After that, MRA was assessed by pressure myograph and a pressure-response curve (3-140 mmHg) was obtained in the passive condition (calcium-free), where: internal diameter (Di), cross-section area (CSA) and stiffness (β value) were evaluated. Statistical analysis: two-way ANOVA (* $p < 0.05$ vs. WW and # $p < 0.05$ vs. SS). Although still normotensive, SHR strain showed higher BP compared to Wistar, with no postnatal influence (WW: 116.8 ± 0.91 vs. WS: 117.3 ± 0.82 vs. SS: $127.0 \pm 0.82^*$ vs. SW: $127.2 \pm 1.34^*$ mmHg). SS MRA showed reduced Di with no changes in CSA as compared to WW, featuring an inward eutrophic remodeling; interestingly, SW MRA presented augmented Di with no changes in CSA compared to SS, showing an outward eutrophic remodeling (40mmHg, Di: WW: 259.4 ± 14.9 vs. SS: $211.4 \pm 11.3^*$ vs. SW: $238.0 \pm 15.0^{\#}$ μm). In addition, MRA from SS has higher stiffness than WW and no changes were found between SW and SS; however, the β value of SW was like WW, suggesting an environment influence (β : WW: 5.14 ± 0.21 vs. SS: $6.13 \pm 0.31^*$ vs. SW: 5.36 ± 0.27). No structural or mechanical remodeling was observed in WS MRA compared to WW. In conclusion, postnatal changes alone are enough to restore the structural and mechanical MRA remodeling in SHR, without changes in BP, at 6 weeks of age.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 SUCROSE AND SODIUM INTAKE IN 2-KIDNEY-1-CLIP
RENOVASCULAR HYPERTENSIVE RATS**

Renovascular 2-kidney-1-clip hypertensive rats have an overactive renin angiotensin system and increased levels of angiotensin II (ANG II). Repetition of ANG II-dependent natriorexigenic protocol increases sucrose intake in normotensive rats, suggesting that angiotensinergic mechanisms are involved in sucrose intake. Recently we demonstrated that 0.06 M sucrose intake is increased in 2K1C compared to sham rats. Therefore, in the present study we investigated whether a history of intermittent access to 0.3 M sucrose would increase daily 0.3 M NaCl intake in 2K1C rats. The experimental protocol was approved by CEUA-UFC (#4190060721). Male Wistar rats (\approx 150 g, 5 weeks old, n = 6–9/group) received a silver clip in the left renal artery to induce stenosis and hypertension. Sham animals underwent similar surgery, but no clip was placed around the renal artery. Six weeks after surgery, 2K1C and sham rats had intermittent access to 0.3 M sucrose and water for 2 hours for 5 consecutive days. Daily 0.3 M NaCl was recorded from the week before of sucrose intermittent access until the following week. Mean arterial pressure (MAP) was recorded to confirm hypertension. There was no difference in 0.3 M sucrose intake between 2K1C and sham rats (1st – 13.5 ± 1.9 ml/2h, vs. sham: 11.6 ± 3.10 ml/2h; 2nd – 23.0 ± 4.2 ml/2h, vs. sham: 20.8 ± 2.9 ml/2h), 3rd – 20.4 ± 3.4 ml/2 h, vs. sham: 22.0 ± 3.0 ml/2h), 4th – 20.4 ± 3.5 ml/2h, vs. sham: 23.0 ± 3.0 ml/2h) and 5th test – 21.5 ± 3.2 ml/2h, vs. sham: 24.9 ± 31.7 ml/2h; $P > 0.05$]. There was no change in water intake by 2K1C and sham rats throughout the tests ($P > 0.05$). Left kidney/right kidney weight ratio in 2K1C rats was decreased in comparison to sham rats (0.56 ± 0.06 , vs. sham: $0.98 \pm 0,00$; $P < 0.05$). MAP was significantly higher in 2K1C rats (168 ± 27 mmHg, vs. sham: 114 ± 2 mmHg; $P < 0,05$). Therefore, the results suggest that intermittent access to sucrose does not change sodium intake in 2K1C rats.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 THE ANTICONTRACTILE EFFECT OF PERIVASCULAR ADIPOSE TISSUE IS IMPAIRED IN RENOVASCULAR HYPERTENSION.

Perivascular adipose tissue (PVAT) surrounds most blood vessels and actively regulates vascular tone through the release of several vasoactive substances. Under physiological conditions, PVAT exerts an anticontractile effect; however, its role in hypertension is not well understood. Thus, we aim to investigate the vasoactive profile of PVAT in an experimental model of renovascular hypertension, the main cause of secondary hypertension. Under the ethics committee number: 6455090821, male C57BL/6J mice (8 weeks old) were divided into normotensive (Sham-Operated: SO, n=12) and 2-kidney 1-clip (2K1C, n=12) hypertensive groups. Blood pressure was assessed by the tail-cuff method. On the 6th week after surgery, 2nd-order branches of mesenteric resistance arteries (MRA) with (+) or without (-) PVAT were set up in a wire myograph and concentration-response curves to acetylcholine (ACh) and noradrenaline (NOR) were performed. Blood pressure was higher in 2K1C compared to SO mice (SO: 99.65±0.88 vs. 2K1C: 132.41±0.82 mmHg; p<0.05). In PVAT- rings, the ACh-induced maximal response (Emax) was reduced in 2K1C compared to SO (PVAT- SO: 83.41±2.61 vs. 2K1C: 55.69±6.32 % of relaxation; p<0.05), while the NOR-induced Emax did not modify between the groups (PVAT- SO: 2.11±0.16 vs. 2.29±0.15 mN/mm; p>0.05). The presence of PVAT reduced the Emax (18.49%) and potency (pD₂: 24,70%) to NOR in MRA of the SO group, while no changes in Emax and lower pD₂ reduction (8,38 %) to NOR were observed in MRA of 2K1C group. PVAT did not change ACh-induced vasodilation in both normotensive and hypertensive groups, but significantly reduced the Emax of vasodilator response in 2K1C MRA compared to SO mice (PVAT+ SO: 82.96±1.74 vs. 2K1C: 48.11±6.07 % of relaxation; p<0.05). Taken together, our results suggest that PVAT plays a significant dysfunction in resistance arteries of mice with renovascular hypertension.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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**FeSBE2022 THE CHRONIC CONSUMPTION OF INORGANIC NITRATE
AMELIORATES THE VASCULAR FUNCTION IN ELDERLY RATS**

Accumulation of senescent cells causes functional damage that is associated with oxidative stress and vascular endothelial cell dysfunction, contributing to the development of cardiovascular diseases. Thus, the consumption of substances that increase NO bioavailability may lead to beneficial effects. We hypothesized that the treatment with inorganic nitrate can decrease vascular dysfunction caused by aging. The current study aimed to evaluate the effects of chronic consumption of inorganic nitrate on vascular reactivity in both sexes, male and female elderly rats. Wistar rats (CEUA-UFPB: N° 1975060318) were used (body weight: male: 494,3±99,3g; female: 268,6±41,7g) aged 27-33 months, chronically treated with a sodium nitrate solution (10mM) in drinking water from 15 months of age onwards. The rats were divided into 4 groups (n=8): Control Male, Treated Male, Control Female, and Treated Female. After euthanasia, the cranial mesenteric artery was dissected, proceeding to vascular reactivity protocols. The Treated Female group did not have a statistical difference in the effect of endothelium-dependent relaxation compared to the Control Female group (Emax: 86,26±7,61% vs 76,76±6,03%). The group of Treated Male presented a greater response to the acetylcholine than the Control Male (Emax: 106,10±8,13% vs 83,33±4,35%). Therefore, we found that the rings of the treated rats within endothelium had an increase in relaxation (Emax: 96,18±5,96% vs 80,00±3,69%) and a decrease in contractile (Emax: 80,71±6,50% vs 100,01±3,97%) response when compared with the animals that do not receive the intervention (combined gender). Additionally, the effect of sex in the treatment demonstrated that males increased the sensibility of dependent endothelium relaxation compared to treated females (EC50: 7,52±0,31% vs 6,34±0,22%). Therefore, chronic treatment with inorganic nitrate improves endothelial dysfunction in elderly rats.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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Instituição: UNICAMP

FeSBE2022 TUDCA TREATMENT RESTORES AORTIC HIPOCONTRACTILITY IN PROTEIN-RESTRICTED MICE

Introduction: Malnutrition is a risk factor for the development of vascular dysfunction. Vascular smooth muscle cells (VSMC) provide vessel wall structure, regulates vascular tone, and is found in two phenotypes: contractile and synthetic. The smooth muscle 22 α (SM22 α) is an actin filament binding cytoskeletal protein and contribute to maintain the VSMC contractile phenotype and vascular homeostasis. Endoplasmatic reticulum stress (ERS) is a mechanism involved in dysregulated VSMC phenotype. Tauroursodeoxycholic bile acid (TUDCA) is known to inhibits ERS and has been demonstrated to be protective against vascular dysfunction in cardiometabolic diseases. In this study we aimed to evaluate the effects of TUDCA treatment on vascular function and expression of SM22 α and α actin in protein-restricted mice. **Methods:** Post-weaning male C57Bl/6 mice fed a normoprotein (NP, 14% protein) or low protein (LP, 6% protein, isocaloric) diet for 105 days (CEUA 5429-1/2019). In the last 15 days, some LP animals received TUDCA (LPT, 300 mg/kg/day; i.p.) or vehicle. At the end of the treatment, systolic blood pressure (SBP), thoracic aortic contractile response to phenylephrine (PE) and aorta gene expression were evaluated. **Statistics:** * $p < 0.05$; one-way ANOVA. **Results:** SBP was increased in LP compared to NP while TUDCA treatment normalized it (NP=101 \pm 1; LP=110 \pm 2*; LPT=102 \pm 2 mmHg). Aorta from LP mice showed reduced contraction to PE compared to NP and TUDCA prevented it (maximum PE response: NP=1.8 \pm 0.5; LP=1.1 \pm 0.4*; LPT=1.6 \pm 0.5 mN/mm). The aortic gene expression of SM22 α and α -actin was reduced by 37% and 33% respectively in LP mice compared to NP, which was restored by TUDCA. **Conclusion:** TUDCA rescued protein malnutrition-induced aortic hipocontractility associated to impaired gene expression of SM22 α and α -actin. These results suggest TUDCA as a potential treatment for altered aorta contraction and VSMC contractile phenotype in malnutrition.

Keywords: malnutrition, aorta, contractility, TUDCA.

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Área Temática: Ê-POSTER | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 VASCULAR REACTIVITY DEPENDENT ON THE MITOCHONDRIAL OXIDATIVE STRESS AFTER MYOCARDIAL INFARCTION

INTRODUCTION: Myocardial infarction (MI) is followed by an inflammatory process and oxidative stress. Oxidative stress is a condition in which reactive oxygen species (ROS) or free radicals, namely O₂⁻, H₂O₂, and *OH exert toxic effects on cells. The cytosolic sources: NADPH oxidases, xanthine oxidase, cyclooxygenases, and cytochrome P450 enzymes, and the mitochondrial sources, contribute to the intracellular ROS. In this study we investigated the role of mitochondrial ROS on the vascular reactivity in the acute phase after MI. **METHODS:** Male Wistar rats were divided in Myocardial Infarction (MI, n=9), Myocardial Infarction treated with Mitoquinone 100 µM (MitoQ), specific mitochondrial antioxidant, in the drink water during 7 days (MIM, n=9), Sham (Sham, n=5) e Sham MitoQ (SM, n=7) (CEUA-UFES 17/2021). The MI was surgically induced by the occlusion of the anterior interventricular branch of the left coronary artery and 7 days later, the vascular reactivity was evaluated in isolated aortic rings. **RESULTS:** Aortic reactivity to phenylephrine was increased in the MI group (R_{max} Sham: 88.44 ± 2.47 vs. MI: 102.1 ± 2.31, p<0.05). The MitoQ treatment did not prevent the vascular reactivity dysfunction MI-induced (MI: 102.1 ± 2.31 vs. MIM: 108 ± 2.62% KCl 75mM). However, MitoQ reduced the maximum response in the Sham group (SM:61.33 ± 2.06 vs. Sham: 88.44 ± 2.47% KCl 75mM, p<0.05). The NO participation on the vascular reactivity was analyzed using L-NAME 100 µM. L-NAME perfusion similarly increased the R_{max} in the Sham and MI groups (S-L-NAME: 142.3±5.36 vs. MI-L-NAME: 132 ± 7.75 % KCl 75mM). The difference on the R_{max} between MI and Sham, was prevented during treatment with MitoQ in the presence of L-NAME (MIM-L-NAME: 132 ± 3.75 vs. SM-L-NAME: 142.7 ± 9.2% KCl 75mM). **CONCLUSION:** The results demonstrated that the increased aortic reactivity in the early phase after MI, does not seem to be depend on the mitochondrial oxidative stress source.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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FeSBE2022 AN ANALYSIS OF GLUTEN AND ITS DERIVATIVES PRESENCE IN MEDICINES

Celiac disease (CD) is a chronic genetic enteropathy characterized by partial or total atrophy of the microvilli of the mucosa of the small intestine. Patients affected by CD have a restriction in the intake of gluten, since its consumption triggers an inflammatory reaction that attacks the intestinal microvilli. Due to the complications of the disease, patients with this condition use different classes of drugs, which avoid aggravating the pathological condition, since the usual drugs may contain gluten and derivatives in their composition in the form of excipients. Currently, because there is no specific therapy to completely treat and cure the disease, the clinical therapy used so far to treat the disease includes innumerable drugs that are used in all groups of people, such as hypertensive, diabetic, and celiac. The main goal of this study aims to evaluate the presence of gluten and its derivatives to analyze and present the excipients of several classes of drugs, namely: Tablets, Oral solution (Syrups, Oral solution-drops, among others), injectable and topical (Ointments, creams). The information collected was tabulated by the researchers in Microsoft Office Excel version 2018. This project was approved by the Ethics and Research Committee under opinion number 3.581.929. A total of 906 drugs were analyzed, it was possible to verify that 28.5% of the drugs are listed as containing gluten and its derivatives and 71.5% without gluten, among the classes studied, antihypertensives (8.61%) had the highest percentage of drugs with gluten and derivatives. In the literature there is a lack of publication on this topic, so the topic brings innovative characteristics that are of fundamental help and importance for celiac patients with the development of new therapeutic strategies and protocols that are better adapted to the celiac patient, reducing the reactivity of the disease, and minimizing the risks of pharmacotherapy in this audience.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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**FeSBE2022 BUTYRATE PROTECTS MYENTERIC NEURONS LOSS AFTER
EXPERIMENTAL ULCERATIVE COLITIS IN MICE**

The enteric nervous system (ENS) is affected by inflammatory bowel diseases. Butyrate is a short-chain fatty acid, produced by gut microbiota from dietary fibers fermentation, which binds to G protein-coupled receptors, as GPR41 receptor, and contributes to the gut health. This work aimed to study the GPR41 receptor and the effect of Butyrate on mice myenteric neurons after experimental ulcerative colitis (UC). For UC induction, 8 weeks old male C57BL/6 mice weighing 20-26g received intrarectal injection of 100µL of 2,4,6-Trinitrobenzenesulfonic acid (TNBS group). SHAM group received only the vehicle (ethanol 35%). After UC induction, some animals were treated for 7 days with Sodium Butyrate (100 mg/kg, SB group) via gavage, while the other groups received only saline (CEUA-ICB/USP 6507141420). Animals were euthanized 7 days after UC induction. Large intestines were processed for immunofluorescence analysis for GPR41 receptor with neuronal nitric oxide synthase (nNOS) and choline acetyltransferase (ChAT). The number of neurons/ganglia immunoreactive (ir) for GPR41 receptor, nNOS and ChAT were analyzed. The number of GPR41-ir neurons decreased by 30.2% in TNBS group (15.7 ± 0.6 ; n=5), compared to SHAM group (22.5 ± 0.3 ; p<0.05; n=5) and increased by 26.6 % in SB group (21.4 ± 0.4 ; p<0.05; n=5), compared to TNBS group. The number of nNOS-ir neurons decreased by 31.1% in TNBS group (4.2 ± 0.2 ; n=5), compared to SHAM group (6.1 ± 0.4 ; p<0.05; n=5) and increased by 32.3% in SB group (6.2 ± 0.3 ; p<0.05; n=5), compared to TNBS group. The number of ChAT-ir neurons decreased by 28.3% in TNBS group (6.1 ± 0.1 ; n=5), compared to SHAM group (8.6 ± 0.1 ; p<0.05; n=5) and increased by 26.2% in SB group (8.4 ± 0.1 ; p<0.05; n=5), compared to TNBS group. UC caused loss of GPR41-ir, nNOS-ir and ChAT-ir neurons and treatment with Butyrate recovered neuronal loss. Enteric neurons were immunoreactive for GPR41 receptor, so ENS can respond to Butyrate binding, and it may be a target therapeutics for UC.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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**FeSBE2022 CAROTID SINUS NERVE STIMULATION ATTENUATES
EXPERIMENTAL COLITIS IN RATS**

Introduction: Ulcerative colitis is a common intestinal inflammatory disease characterized by abnormal reactions of the immune system and ulcers in the colon. Previous studies have indicated that the baroreflex and the chemoreflex modulate inflammatory responses. However, whether these reflexes attenuate colitis has been poorly examined. **Aim:** The present study examined the effects of electrical activation of the carotid sinus nerve (CSN) on acetic acid-induced ulcerative colitis in rats. **Methods:** Electrodes were implanted around the CSN, and a catheter was inserted into the left femoral artery to, respectively, stimulate the CNS and record the arterial pressure. The effectiveness of the CNS electrical stimulation was confirmed by the observation of hypotensive responses. This maneuver was followed by 4% acetic acid or saline enema. After 24 hours, colons were segmented into distal and proximal parts for macroscopy, histological and biochemical assessment. **Results:** As expected, the electrical stimulation of the CSN was effective to decrease arterial pressure in saline and colitis rats. Moreover, electrical CSN stimulation was effective to reduce colon tissue lesions, colitis indices, and histopathologic parameters. Concerning the colonic cytokine mucosa concentrations, electrical CSN stimulation reduced pro-inflammatory cytokines such as interleukin-1 β , and increased the level of anti-inflammatory interleukin-10 in colitis rats, as compared to rats with colitis but not submitted to CSN stimulation. **Discussion:** Electrical stimulation was beneficial in decreasing macroscopic impairment and colon morphology, when compared with colitis not submitted to CSN stimulation. The increase in IL-10 along with the decrease in IL-1 β suggests another beneficial effect in stimulated colitis. **Conclusion:** The present study sheds light on the fact that CSN stimulation breaks the vicious cycle of local colon inflammation and epithelium dysfunction in colitis.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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FeSBE2022 EVALUATION OF THE EFFECTS OF SUPPLEMENTATION WITH PALM OIL (ELAEIS GUINEENSIS JACK) ON THE PARASITIC LOAD OF HAEMONCHUS SPP. AND THE CONCENTRATION OF IMMUNOGLOBULIN E IN HAIR SHEEP

Supplementation rich in energy offers the essential power that balances and strengthens the animal's metabolic and immunological processes. Parasitic agents in the sheepfolds minimize biological and economic efficiency, causing growth retardation, malnutrition, decreased feed conversion, milk production, diarrhea, anemia, low fertility and death. The objective is to know the behavior of the parasitic load, the concentration of immunoglobulin E (IgE), in hair sheep supplemented with crude African palm oil (ACDP), 20 female Katahdin breed sheep were used. ~3 years old, average weight of 52.8 ± 2.02 Kg, supplemented for 90 days, water and mineralized salt at will and under semi-stable and grazing conditions with *Brachiaria humidicola*. Two treatments were distributed with 10 females each, T1, the ration per animal of balanced commercial supplement (ACB) was (250 g), T2, the ACB (250 g) plus 20 ml of (ACDP) per animal. Samples were taken on days 0 and 90. The parasite load in eggs per gram (epg) was obtained by McMaster, the IgE concentration by solid phase sandwich ELISA. The procedures were approved by CAC-MVZ-05319. The stool diagnosis revealed the presence of *Haemonchus* spp eggs in 93% of the sheep evaluated; ACDP supplementation versus parasite load resulted in a decrease at day 90 between treatments (T1: 395.01 ± 50.09 epg; T2: 250.0 ± 80.9 epg); the behavior of IgE projected a protective effect with a non-significant increase (T1: 50.07 ± 3.72 IU/ml; T2: 54.01 ± 9.90 IU/ml). The correlation coefficient of the variables is equal to 0.034, indicating a weak relationship. The prevalence of infections by digestive strongyles in sheep herds is high, it is proposed that the inclusion of ACDP provides a slight protection and physiological strengthening of IgE and projects a natural anthelmintic action that decreases the levels of *Haemonchus* spp eggs over time.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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FeSBE2022 HEPATOPROTECTIVE AND ANTIOXIDANT EFFECT OF THE ETHANOLIC EXTRACT OF ANADENANTHERA COLUBRINA (VELL.) BRENNAN BARK IN ACETAMINOPHEN-INDUCED ACUTE LIVER INJURY IN MICE

Anadenanthera colubrina, medicinal plant popularly known as “white Angico”, has been used in folk medicine for the treatment respiratory problems, inflammatory diseases, diarrhea, coughing, bronchitis, influenza and toothache. Thus, the objective of this study was to evaluate the effect of ethanolic extract of *A. colubrina* bark (EEAc_b) in acute liver injury induced by acetaminophen (APAP) in mice. The extract was analysed and characterized by HPLC, HPTLC and NMR. The hepatoprotective action of EEAcb pretreatment at doses of 200mg/kg (APAP200) and 400mg/kg (APAP400) for 6 days on APAP-induced acute liver injury has been studied in male Swiss mice (5 animals for group, 35±3g, 6 weeks) by measuring biochemical parameters, in vitro antioxidant, plasma cytokine profile, histopathological and oxidative status in the liver. CEUA: 23076.041497/2015-22. Data were expressed as mean ± SEM and analyzed by ANOVA (p<0.05) using the GraphPad Prisma®. EEAcb was positive for the presence of terpenes, tannins, saponins and alkaloids. HPLC demonstrated flavonoids and polyphenols in the EEAcb. In vitro, EEAcb exhibited antioxidant activity. APAP administration showed hepatic hemorrhage, cellular swelling and sinusoidal congestion, centrilobular regions reveal degeneration and vacuolation, accompanied by inflammatory cells. The hepatic cytoarchitecture was preserved and offered protection against APAP hepatotoxicity. EEAcb prevented the increase in antioxidant enzymes (~50%, p<0,05), MDA levels (5,94±0,25 vs. 7,87±0,52, p<0,05) and prevented AST (133,62±5,21 vs. 225,38±4,33, p<0,05) and ALT (127,89±14,58 vs. 346,41±9,07, p<0,05) from increasing in APAP-induced. Last, EEAcb ameliorated levels of TNF-α (8,62±0,21 vs. 17,65±0,93 in APAP, p<0,05) and IL-6 (13,85±1,05 vs. 26,6±0,26 in APAP, p<0,05). The EEAcb promoted the improvement of the liver function biomarkers, antioxidant defenses and release of serum pro-inflammatory cytokines.

ID: 11269

Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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**FeSBE2022 HIGH-PROTEIN DIET INTENSIFIES THE DISEASE ACTIVITY INDEX IN
A DSS-INDUCED ULCERATIVE COLITIS AND CHANGES ENTERIC MOTOR
NEURONS**

The Ulcerative Colitis (UC) causes colonic inflammation and although the triggers are not well understood, there are evidences that diet can cause or intensify the intestinal inflammation. So, the aim of this study was to evaluate if the high-protein diet intensifies the disease activity index (DAI) and module the colonic myenteric neurons in a dextran sulfate sodium (DSS) induced UC. All procedures were approved by the Ethical Committee for Use of Animals at Universidade Estadual de Londrina (046/2020). Male C57BL/6 mice were distributed into groups feed with standard diet (SD and SD/DSS) and groups feed with high-protein diet (HP and HP/DSS) (n=6/per group). Mice from DSS groups (SD/DSS and HP/DSS) had free access to 3% of DSS diluted in tap water for 7 days to induce UC. After euthanasia, the proximal and distal colon was collected. These were incubated with general marker for neurons(PGP9.5+) and marker for inhibitory motor neurons (nNOS+). The number of neurons was designed to neurons/cm² also 100 neuronal cell body area per animal were measured. All statistical analysis the groups were compared considering 5% as significance level. DAI of all mice exposed to DSS increased progressively during the experiment. On the 7th day, the HP/DSS group presented a higher score than the SD/DSS. The total colon area was shortened in all DSS groups when compared with control groups. Increase of general neurons was observed in distal region of SD/DSS group compared to SD and HP. In proximal colon, atrophy of PGP9.5+ neurons were observed in HP/DSS group when compared with SD/DSS, and, the area of nNOS+ neurons were hypertrophied in SD/DSS and atrophied in HP/DSS when compared with SD and HP groups. In distal colon the hypertrophy of PGP9.5+ and nNOS+ neurons were observed in SD/DSS and HP/DSS when compared to SD and HP. Thus, it is concluded that high-protein diet increased the DAI in DSS-induced UC and caused changes in general and inhibitory myenteric colonic neurons.

ID: 11317

Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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FeSBE2022 HIGH-PROTEIN DIET INTENSIFIES THE DISEASE ACTIVITY INDEX IN A DSS-INDUCED ULCERATIVE COLITIS AND CHANGES ENTERIC MOTOR NEURONS IN ILEUM OF THE MICE

Introduction: Ulcerative colitis (UC) is an inflammatory disease that affects the innervation of the gastrointestinal tract. Several studies indicate that diet is one of the main factors that interfere in the course of the disease, but they are not conclusive. Objective: evaluate the consequences of consuming a high-protein diet on the ileum of mice with UC. Methods: C57BL/6 male mice were divided in groups (n=12/group): two groups of healthy animals fed a standard diet (DP), or high protein diet (HP) and two groups fed UC (after exposure to DSS 3% for 7 days) fed DP (DP/DSS) or HP (HP/DSS). Body mass, stool consistency and presence of blood in the stool were observed daily to determine the disease activity index (DAI). After anesthesia and euthanasia, the ileum was collected for quantitative and morphometric evaluation of the general population (PGP9.5+), subpopulations of submucosal (weakly or strongly immunoreactive Calretinin: Calr+ and Calr++) and myenteric neurons (nitroergic: nNOS+ and estimated cholinergic: nNOS-). Two-way ANOVA and post-Tukey or Kruskal-Wallis test and Dunn's test were used to compare the groups (alpha = 5%). Results and discussion: HP/DSS mice showed higher DAI than DP/DSS mice (P<0.05). Both inflammation and high protein diet did not change the number of enteric neurons (P>0.05). In the myenteric plexus, DP/DSS showed atrophy of nitroergic neurons (PGP9.5/nNOS+) and hypertrophy of estimated cholinergic neurons (PGP9.5+/nNOS-) (P<0.05). In HP/DSS, there was atrophy in both myenteric neuronal subpopulations (P<0.05). Atrophy of estimated cholinergic neurons was also observed in the HP group (p<0.05). In the submucosal plexus, there was atrophy in both populations of submucosal neurons in the HP/DSS group (P<0.05). In the HP group, atrophy was observed only in PGP9.5/Calr- neurons (P<0.05). Conclusion: The high-protein diet can intensify DSS-induced inflammation in the ileum of mice and cause more morphometric changes in enteric neurons.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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FeSBE2022 INVESTIGATION OF THE INVOLVEMENT OF THE CHOLINERGIC SYSTEM IN THE GASTROPROTECTIVE EFFECT OF THE HYDROETHANOLIC EXTRACT OF THE STEM BARKS OF XIMENIA AMERICANA L.

The *Ximenia americana* L. is used in traditional medicine to treat various diseases such as fever, gastritis, and stomach ulcers. The present study aimed to investigate the involvement of the cholinergic system in the gastroprotective effect of the hydroethanolic extract of *Ximenia americana* L. stem bark. Swiss (*Mus musculus*) male and female mice aged 75 days (number=6/group) were divided into three groups and received oral (v.o.) treatment with water (H₂O) (0.1 mL/10 g/v.o.), atropine (0.01 g/kg, v.o.) and EHXA (50 mg/kg, v.o.). One hour later, it's administered a semi-solid color marker (0.05% phenol red in 1.5% carboxycellulose). The animals were euthanized after 30 minutes, the small intestine was removed, and the run distance of the length of the marker was measured in percentage (STICKNEY; NORTHUP, 1959) (CEUA/URCA 157/2021.2). EHXA and atropine treatments reduced intestinal motility by 23.47 and 32.50%, respectively, compared to the negative control group. The Muscarinic receptors are present in the circular muscular layer of the mouse ileum and exert function in gut motility (M1 and M3). From the results, we can conclude that the EHXA presents compounds that an effective activity with participation or involvement of the cholinergic pathway, a promising alternative in treating diseases that affect the gastrointestinal tract.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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FeSBE2022 LONG-TERM EXPOSURE TO CONVENTIONAL AND ELECTRONIC CIGARETTES CAUSES LIVER DAMAGE IN ADULT MALE AND FEMALE MICE

Electronic cigarettes (e-cigs) have rapidly increased in popularity; however, the physical-chemical properties and toxicity of the generated emission remain unclear, mainly in extrapulmonary organs such as the liver. Moreover, little is known about the long-term effects of e-cigs on the development of liver disease and their influence on the different genders. This study evaluated the oxidative effects of long-term exposure to cigarette smoke and e-cigs aerosol on the liver of adult male and female C57BL/6 mice (6-8 weeks old, 25-30 g). This study was approved by UFOP's Ethics Committee on Animals Use (n° 3287111120). 48 animals were divided in 6 groups (n=8): males control group (MCG) and females control group (FCG) exposed to room air; males (MCCG) and females (FCCG) exposed to 12 commercial cigarettes a day for 60 days; males (MECG) and females (FECCG) exposed to e-cig aerosol by 60 days. After exposures, the animals remained in room air for 60 days. 24 hours after, the animals were euthanized and hepatic tissue samples were removed for biochemical analyzes. Biochemical parameters revealed an increase in SOD activity (U/mg ptn) in MECG (144.90±20.90) compared with MCG (119.90±18.70), and in FECCG (350.50±125.00) compared with FCG (205.10±22.18) and FCCG (222.00±13.25). There was an increase in the catalase activity (U/mg ptn) in MECG (30.57±11.66) compared with MCG (14.45±6.59), and in FECCG (93.95±16.88) compared with FCG (44.87±19.11) and FCCG (47.27±10.73). The protein oxidation (nmol/mg ptn) was higher in FECCG (30.38±11.37) compared with FCG (16.18±1.70) and FCCG (18.26±1.44). The lipid peroxidation (nmol/mg ptn) was higher in MECG (0.87±0.10) compared with MCG (0.83±0.08) and MCCG (0.10 [0.95, 1.40]). Same results in the lipid peroxidation were observed when compared FECCG (1.50 [1.30, 4.07]) with FCCG (1.03±0.05). Our data indicated that e-cig aerosol promoted redox damage in the livers of male and female mice, with higher severity in females.

Keywords: electronic cigarettes, oxygen reactive species, oxidative stress, liver inflammation, gender difference.

Funding: CNPq, CAPES, and FAPEMIG.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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FeSBE2022 MATERNAL DEPRIVATION CAUSES CHANGES IN THE MYENTERIC PLEXUS AND IN THE HISTOARCHITECTURE OF THE INTESTINAL WALL OF RATS TREATED WITH DIFFERENT ENANTIOMERS OF KETAMINE

Maternal deprivation is a form of early-life adversity that leads to activation of the hypothalamic-pituitary-adrenal axis, which can impair cerebral, visceromotor, and intestinal function. For this reason, it is considered a model for depression and irritable bowel syndrome. Previous studies have shown that ketamine is able to reverse intestinal damage in ischemia/reperfusion and ulcerative colitis models. The aim of this work was to describe the effects of maternal deprivation and different ketamine enantiomers on myenteric neurons and intestinal wall histoarchitecture in the ileum and colon of rats. Male rats (n=24) were randomly divided into seven experimental groups (n=6 for group): 1. non-deprived+saline; 2. deprived+saline; and another five deprived intervention groups (3. racemic ketamine 10mg/kg; 4. esketamine 10mg/kg; or 5-7. arketamine 5, 10 or 20mg/kg). One hour after drug administration, rats were anesthetized and portions of the ileum and colon were collected for quantitative, histomorphometric, and histopathological analyzes. The protocol was approved by CEUA-ICS-UFBA (IRB 1638100518). We demonstrated that both maternal deprivation and acute treatment with different ketamine enantiomers induced quantitative and morphometric changes in neurons of the myenteric plexus in the ileum and colon of rats compared to the non-deprived group (*p<0.05) and the deprived group treatment with saline (#p<0.05). The maternal deprivation induced a loss of mucosal histoarchitecture in the intestinal wall and increased inflammatory infiltrates in the ileum and colon associated with mastocytosis, lymphocytosis, and collagen remodelling, *p<0.05, **p<0.01, ***p<0.001 compared to non-deprived rats using the Kruskal-Wallis test followed by Dunn's post hoc test. Thus, the results suggest that communication between the central nervous system and the enteric nervous system was impaired by maternal deprivation and therefore damage to the myenteric plexus was responsible for any changes observed in the intestinal wall.

Keywords: myenteric plexus; maternal deprivation; ketamine; intestinal wall

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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Instituição: *USP*

FeSBE2022 STUDY OF THE CASPASE-3 PATHWAY ON CALRETININ MYENTERIC NEURONS AFTER EXPERIMENTAL ULCERATIVE COLITIS IN P2X7 RECEPTOR KNOCKOUT MICE

Inflammatory bowel diseases affect the enteric nervous system, and the P2X7 receptor (P2RX7) triggers neuronal death. The aim is to study the caspase-3 in calretinin myenteric neurons after ulcerative colitis in P2RX7 knockout mice (KO). Forty male C57BL/6 wild type (WT) and KO mice aged 8 weeks were euthanized 24 hours (24h) or 4 days (4d) after TNBS-colitis induction. The groups are (n=5): WT-sham, WT-colitis, KO-sham, and KO-colitis. The immunofluorescence technique was performed in the distal colon to identify neurons immunoreactive to calretinin, P2RX7, and cleaved and total caspase-3. We analyzed the number of neurons/ganglia, neuronal profile area, and caspase-3 fluorescence (CTCF). CEUA/FMVZ-USP 2841270120. Double labeling of calretinin with caspase-3 and P2RX7 was observed in the WT-colitis groups. The calretinin neurons/ganglia decreased by 36.9% and 20.8% in the WT-colitis 24h (2.1 ± 0.2) and 4d (3 ± 0.03) compared to WT-sham 24h (3.3 ± 0.2) and 4d (3.7 ± 0.2) ($p < 0.05$), respectively. There was no difference between the KO groups. The calretinin neuronal profile area increased by 18.7% in the WT-colitis 24h ($312.5 \pm 7.9 \mu\text{m}^2$) compared to WT-sham 24h ($263.3 \pm 10.5 \mu\text{m}^2$) ($p < 0.05$). The nuclear profile area decreased by 10.6% in the WT-colitis 4d ($103.1 \pm 2.5 \mu\text{m}^2$) compared to WT-sham 4d ($115.3 \pm 2.2 \mu\text{m}^2$) ($p < 0.05$). There was no difference between the KO groups. The number of P2RX7 neurons/ganglia decreased by 11.7% and 10.5% in the WT-colitis 24h (19.5 ± 0.3) and 4d (20.3 ± 0.1) compared to WT-sham 24h (22.2 ± 0.2) and 4d (22.7 ± 0.5) ($p < 0.05$), respectively. The cleaved caspase-3 CTCF increased by 24.5% and 15.6% in the WT-colitis 24h (485948.6 ± 14140.7) and 4d (480381.3 ± 11336.1) compared to WT-sham 24h (371370.8 ± 16426.9) and 4d (378364.8 ± 4053.9) ($p < 0.05$), respectively. The total caspase-3 CTCF was no difference. In conclusion, ulcerative colitis affected myenteric neurons in WT, and KO were less affected. Also, the neuronal death may be associated with P2RX7-mediated caspase-3 activation.

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Área Temática: Ê-POSTER | *Biologia e Doenças Gastrointestinais*

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**FeSBE2022 THE STUDY ON THE EFFECTS OF EXPOSURE TO DIFFERENT
INHALATIONAL ANESTHETICS IN DIFFERENT PERIODS IN THE LIVER OF
ADULT MICE**

The volatile anesthetics isoflurane, sevoflurane and desflurane have been widely used for anesthetic induction and maintenance due to their few intraoperative adverse effects and rapid sedation effect. However, there is no confluent information in literature about how these inhaled agents can promote protection or damage to organs such as the liver. This study evaluated the effects of exposure to different inhalational anesthetics in healthy C57BL/6 mice (8-10 weeks old, 25-30 g) at different times. This study was approved by UFOP ethics committee (n° 3476160320). 120 animals were divided into 3 groups (n=40): Isoflurane (ISO), Sevoflurane (SEV), and Desflurane (DES), and exposed to these drugs for 1, 2, and 3 hours at a minimum alveolar concentration of 1, and to room air (CG) (n=10 per group). 24 hours after the exposures the animals were euthanized and had the livers collected. Statistical analyzes were performed using GraphPad Prism and $p < 0.05$ was considered statistically significant. For isoflurane, biochemical parameters revealed a decrease in the activity of superoxide dismutase (SOD) (U/mg PTN) in both ISO2h (182.4 ± 30.0) and ISO3h (184.8 ± 21.2) compared to CG (242.9 ± 47.6). The same result was observed in the activity of catalase (CAT) (U/mg PTN) when compared ISO2h (70.87 ± 7.9) with CG (103.2 ± 22.2) and with ISO1h (92.88 ± 21.2). For sevoflurane, the protein oxidation was higher in SEV3h (15.12 ± 2.6) compared to CG (11.5 ± 2.0). For desflurane, there was an increase in SOD activity in the DES1h (229.3 ± 66.3) and DES2h (239.9 ± 62.9) compared to CG (159.4 ± 22.1), and there was an increase in CAT activity in DES3h (60.48 ± 13.9) compared to CG (41.23 ± 11.7). DES1h (2.56 ± 0.3) showed a higher TBARS concentration compared to CG (1.53 ± 0.5). These results revealed that isoflurane, sevoflurane and desflurane are capable of promoting redox imbalance in the liver tissue of mice with no pre-existing injuries.

Keywords: inhalational anesthetics, liver inflammation, redox imbalance, mice

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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**FeSBE2022 ALBUMIN OVERLOAD INDUCED HYPER O-GLCNACYLATION
INHIBITS MEGALIN-MEDIATED ALBUMIN ENDOCYTOSIS**

Urinary protein loss, a condition called proteinuria, is a hallmark of chronic kidney disease, CKD, progression. Proteinuria reflects protein overload at the proximal tubule epithelial cells, PTECs, possibly participating in CKD progression. Identifying the molecular mechanisms mediating this process is essential for the development of new treatments. Our group has previously demonstrated an association among essential hypertension and tubular proteinuria with development of tubule-interstitial injury. The molecular mechanism involved a hyper O-GlcNAcylation in PTECs, but the trigger of this process is unknown. Here, we aimed to study the possible role of PT albumin overload as a trigger for dysregulated O-GlcNAcylation and its impact in PT albumin endocytosis. LLC-PK1 cells, a well characterized PTECs, were incubated with 20 mg/mL albumin mimicking PT albumin overload. LLC-PK1 cells transfected with megalin constructs tagged with hemagglutinin (mMeg-HA) were used to study the traffic and expression of megalin, a receptor involved in PT albumin endocytosis. Albumin endocytosis was assessed by albumin-FITC uptake. Surface megalin expression was determined by confocal microscopy. Initially, we observed that the incubation of LLC-PK1 cells with Thiamet G (5 μ M), an O-GlcNAcylation enhancer, promoted an inhibition in albumin endocytosis and reduced surface megalin expression. Importantly, 20 mg/mL albumin induced time-dependent hyper O-GlcNAcylation, reduced albumin endocytosis and decreased megalin surface expression. Co-treatment with OSM-1, an inhibitor of O-GlcNAcylation, blocked the deleterious effects of albumin overload. In conclusion, our results indicate that albumin overload impairs PT protein reabsorption through an increase in O-GlcNAcylation. This mechanism may be involved in the progression of proteinuria induced by albumin overload.

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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**FeSBE2022 COMPARISON BETWEEN LOW AND MODERATE TRAINING
PROTOCOL ON REDOX STATUS MARKERS IN FEMALE RATS WITH
CISPLATIN-INDUCED NEPHROTOXICITY.**

Cisplatin (CP)-induced nephrotoxicity is marked by the accumulation of reactive oxygen (ERO) and nitrogen (ERN) species, which lead to oxidative and nitrosative stress. We compared the effects of low (LIT) and moderate (MIT) intensity training on lipid peroxidation, protein carbonylation, nitrite levels, and antioxidant enzyme activity in the kidneys of rats with CP nephrotoxicity. Female wistar rats, aged 10 weeks old and weighing between 190 and 220g, were divided into four groups (n=7): control and sedentary (C+S); CP and sedentary (CP+S); CP and LIT (CP+LIT) and CP and MIT (CP+MIT). At the end of 8 weeks of treadmill running, the rats received an injection of CP (5 mg/kg), and 7 days later, they were euthanized to collect samples of renal tissue. This study was approved by the Ethics Committee in Animal Experimentation of the UFBA/IMS (protocol 056.2018). There were increases in TBARS ($\mu\text{M}/\text{mg}$) and nitrite ($\mu\text{Mol}/\text{mg}$) levels in the CP+S (1.1 ± 0.2 ; 5.3 ± 1.5 , respectively) and CP+LIT (1.0 ± 0.4 ; 4.3 ± 0.3 , respectively) groups in relation to the C+S (0.6 ± 0.2 ; 2.0 ± 0.5 , respectively) ($p<0.05$), however, MIT reduced this levels in CP+MIT (0.7 ± 0.1 ; 3.1 ± 0.6 , respectively) ($p<0.05$). Only the CP+S (5.5 ± 2.2) group showed an increase in carbonyl protein levels compared to the C+S group (2.3 ± 1.4) ($p<0.05$), however, both LIT (3.4 ± 2.1) and MIT (2.2 ± 1.0) were able to prevent this effect ($p<0.05$). All groups treated with CP showed increased activity of catalase and glutathione peroxidase enzymes (U/mg) compared to C+S (0.01 ± 0.0 ; 0.2 ± 0.01 , respectively) ($p<0.05$), however, this effect was more intense in CP+MIT (0.03 ± 0.0 ; 0.6 ± 0.1 , respectively) compared to CP+S (0.02 ± 0.0 ; 0.4 ± 0.03 , respectively) ($p<0.05$). In conclusion, MIT appears to provide superior renoprotection than LIT by reduction of oxidation markers and increase of antioxidant defenses.

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**FeSBE2022 EFFECTS OF CHRONIC CHRYSIN TREATMENT ON THE
CARDIOVASCULAR AND RENAL FUNCTION IN NORMOTENSIVE AND
SPONTANEOUSLY HYPERTENSIVE RATS**

Chrysin is a flavonoid of the flavone class found in the plant and flower extract of *Passiflora caerulea*, passion fruit peel, honey and propolis. Research has shown its therapeutic effects. Chrysin has properties such as antioxidants, antiinflammatory, hepatoprotective, and nephroprotective. Therefore, the objective of this work was to evaluate renal and cardiovascular function in normotensive (W) and spontaneously hypertensive rats (SHR). For the development of work, Chrysin (100mg/kg/day, 0,2mL by gavage) was administered for 10 weeks in male treated rats (WT and SHRT) while control groups (WC and SHRC) received sunflower oil (0,2mL by gavage). Systolic pressure was monitored by tail-cuff methods. Rats were placed in metabolic cages (MC) for 12 hours at the end of treatment. After MC the rats were anesthetized to collect blood samples and tissues. Cardiac function was assessed using the Languerdorf system. After 15-20 min of stabilization, protocols of ischemia (15 min) and reperfusion (30 min) were realized. In isolated heart perfusion were evaluated; perfusion flow (PF), systolic and diastolic intraventricular pressure (SIVP; DIVP), dP/dt positive, dP/dt negative and heart rate (HR) (CEUA 028/2020). Kidney function markers, including blood and urine urea and creatinine, and urine protein were examined. When compared to normotensive rats, SHR had significantly ($p < 0.05$) elevated blood pressure (109 ± 3 ; 110 ± 3 , 190 ± 3 e 185 ± 3 mmHg respectively WC, WT, SHRC and SHRT), increased protein excretion and urine flow and decreased creatinine excretion. SHRT showed an attenuation of creatinine excretion. In isolated heart perfusion, during reperfusion period the SIVP and dP/dt positive were increased in SHR but were no difference in SHRT. Treatment reduced HR in SHRT (207 ± 14 bpm) when compared by WC and SHRC (248 ± 12 and 251 ± 13 bpm). These results showed that chrysin treatment ameliorates some kidney and heart functions. Histochemical analyzes will be performed on the kidney and heart to investigate the effects of chrysin.

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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FeSBE2022 EVALUATION OF THE EXPRESSION OF THE RENIN-ANGIOTENSIN SYSTEM COMPONENTS IN THE KIDNEYS OF THE OFFSPRING FROM DAMS SUBMITTED TO HIGH-FRUCTOSE INTAKE DURING PREGNANCY AND LACTATION

High-fructose intake is related to hypertension and metabolic disorders which during pregnancy may affect fetal development predisposing to diseases. Thus, renal morphology and the expressions of renin and angiotensin-converting enzymes (ACE1 and ACE2), were evaluated in the kidneys of the offspring from rats that had high-fructose intake during pregnancy and lactation (P&L). Female Wistar rats received drinking water (Control - C) or 20% fructose (F) during P&L. After weaning, half of the pups from each group were assigned to receive water (groups: CW and FW), or to receive fructose (groups: CF and FF). At 4 months of age were evaluated: glomerular area (GA), number of glomeruli/field (GC), macrophages (CD68), oxidative stress (8-OHdG) and expressions of renin, ACE1 and ACE2. CEUA:2757270117, results shown as mean±standard error (no. animals), * ≠ CW, p≤0.05 (ANOVA). Groups FW and FF showed increased GA [CW:6975±127 (5/272); CF:6868±115 (5/266); FW:9364±158* (5/189); FF:8686±141* (5/191); µm²] and reduced GC [CW:2.72±0.2 (5); CF:2.66±0.05 (5); FW:1.89±0.04* (5); FF:1.91±0.04* (5)]. CD68 was increased in FW and FF [CW:2.8±0.2 (7/140); CF:3.3±0.2 (7/100); FW:3.5±0.2* (5/140); FF:3.6±0.2* (7/140) cells/field] and also 8-OHdG [CW:3.62±0.36 (5); CF:5.35±0.23* (5); FW:4.80±0.14 (5); FF:6.36±0.34* (5) %area/field]. Renin expression was increased in FW and FF groups [CW: 2.35±0.08 (5); CF:4.60±0.5 (5); FW:15.6±1.40* (5); FF:14.4±0.24* (5) %area/field], ACE1 was increased mainly in outer-medulla UA/µm²/tubule [CW: 34.7±3.6 (7); CF: 69.9±9.4* (5); FW: 49.6±5.1 (6); FF: 59.8±8.4 (5)]; There was no significant differences in ACE2. Fructose overload during P&L caused in the offspring renal morphological changes, macrophage infiltration, increased oxidative stress, and the expression of renin and ACE1 in the fructose groups. These alterations may be related to the development of hypertension and renal dysfunction observed in this experimental model.

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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FeSBE2022 IMPAIRMENT OF AKT-DEPENDENT PROLYLCARBOXYPEPTIDASE STABILITY IN PROXIMAL TUBULES: INVOLVEMENT ON THE SUBCLINICAL ACUTE KIDNEY INJURY

Subclinical acute kidney injury (subAKI) is characterized by tubule-interstitial injury (TII) and albuminuria. These processes involve the modulation of the albumin reabsorption in proximal tubule epithelial cells (PTECs) by increasing in angiotensin II (Ang II) concentration. Interestingly, the role of renal prolylcarboxypeptidase (PRCP), which is responsible to degrade Ang II into Ang-(1-7), in the development of renal injury has been highlighted in the Goldblatt hypertension model. To investigate the role of PRCP in the development of TII in subAKI. Two models were used: 1) murine (C57BL/6 mice) subAKI, produced by intraperitoneal injections of 10 g/kg/day BSA for 10 consecutive days (CEUA-043/18); and 2) LLC-PK1 cells, a porcine PTECs line. The subAKI group presented increased proteinuria and UPCr (urinary proteins:creatinine ratio) associated to the decrease in PRCP expression (n=4). An inverse correlation exists between PRCP expression and proteinuria ($R^2=0.6357$, $P=0.0317$). Alternatively, in LLC-PK1 cells, physiological albumin concentrations (0.01-1.0 mg/mL) increased total and luminal PRCP expression (n=3) as well as its stability (n=3). These effects were abolished by 10⁻⁷M MK-2206, an Akt inhibitor (n=3). PRCP and LAMP1+ colocalized in lysosomes (n=3). When pathophysiological albumin concentration (20 mg/mL) were administered, there was decreased PRCP expression and stability (n=3). Moreover, MK-2206 treatment alone mimicked the inhibitory effect of high albumin concentration on PRCP stability while 10% FBS, an Akt activator, reversed it (n=3). ZPP at 10⁻⁵M, a PRCP inhibitor, increased Ang II (n=3) and decreased albumin endocytosis (n=4) in a similar way to observed in subAKI animal model. Our findings suggest that reduction of cortical PRCP leads to an increase in Ang II that contributes to the development of subAKI. This process is mediated in part by an albumin-modulated Akt pathway in PTECs.

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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FeSBE2022 MALARIA-INDUCED ACUTE KIDNEY INJURY IN BALB/C MICE IS ASSOCIATED WITH PROGRESSIVE GLOMERULAR DYSFUNCTION

Malaria is a disease caused by infection with *Plasmodium* spp. and represents an important global health problem. Malaria-induced acute kidney injury (MAKI) is one of the main consequences in malaria patients being associated to death. However, the mechanisms underlying kidney impairment caused by malaria are still unclear. We aimed to investigate the mechanisms involved in the genesis of renal damage induced by malaria. BALB/C mice ageing 6-7 weeks-old were infected with *Plasmodium berghei* ANKA (CEUA008/18). Mice were allocated in metabolic cages throughout the experiment to collect blood and urine for analysis of renal function and parasitemia. Infected animals showed parasitemia of 9% at the 5th day post-infection (p.i.), which progressively increased to 50% at day 15 and 100 at day 20. On the day 15, we observed a 60% mortality rate which progressed to 100% by day 20 p.i. Urinary flow, proteinuria (mg/24h), urinary proteinuria:creatinine ratio (UPCr) and proximal tubule injury marker urinary γ -glutamyl transferase activity (γ -GT) were not changed in infected mice along the course of the infection. However, on day 12 p.i., increased plasma creatinine (2.3-fold), blood urea nitrogen (2.9-fold) and decreased in creatinine clearance (2.7-fold) were observed. We observed a positive correlation between parasitemia and plasma creatinine ($p = 0.62$, $p = 0.0015$) or BUN ($p = 0.81$, $p < 0.0001$) and an inverse correlation between parasitemia and creatinine clearance ($p = 0.62$, $p = 0.0040$). However, parasitemia was not correlated with proteinuria ($p = 0.4365$), UPCR ($p = 0.6681$) and γ -GT activity ($p = 0.8289$). Our data indicate that kidney damage caused by malaria infection involves a selective glomerular injury. These findings open new perspectives for understanding the genesis of MAKI.

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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FeSBE2022 PROTECTIVE ROLE OF IL-4 RECEPTOR IN ADRIAMYCIN-INDUCED NEPHROPATHY

Chronic kidney disease (CKD) is associated to high-rate mortality and morbidity. Proteinuria is a well-known marker of CKD progression. Some authors have highlighted the role of protein endocytic machinery in the proximal tubule on the development of tubule-interstitial injury (TII) and, consequently, on the progression of CKD. Previous evidence demonstrated the protective role of interleukin-4 receptor (IL-4R) in the development of TII induced by albumin overload. We aimed to study the role of IL-4R in the TII development in the early step of CKD. CKD induced in mice by an intravenous single-dose of adriamycin (ADR, 10 mg/kg) was used (CEUA: IBCCF098-A13/20-045-17). IL-4R α chain knockout mice were used (IL-4R $^{-/-}$) having wild type (WT) BALB/c mice as a control. Four groups were generated: WT (n=3), WT/ADR (n=5), IL-4R $^{-/-}$ (n=3) and IL-4R $^{-/-}$ /ADR (n=3). Two weeks after ADR injection the animals were kept in a metabolic cage for urine and plasma samples collection. After that, mice were euthanized and kidneys were collected for histological approach. All data are presented as mean \pm standard deviation. IL-4R $^{-/-}$ /ADR developed more severe proteinuria than WT/ADR (WT:0,73 \pm 0,78 mg/24h; IL-4R $^{-/-}$:0,12 \pm 0,13mg/24h; WT/ADR:25,23 \pm 15,66mg/24h; IL-4R $^{-/-}$ /ADR:62,52 \pm 17,92 mg/24h). Interestingly, this proteinuria was associated with increased activity in the marker of TII, urinary γ -glutamyltransferase (WT:90,23 \pm 22,73 U/g creatinine; IL-4R $^{-/-}$:31,87 \pm 32,99 U/g creatinine; WT/ADR:140,80 \pm 57,09 U/g creatinine; IL-4R $^{-/-}$ /ADR:273,70 \pm 61,00 U/g creatinine) without changes in plasma creatinine (WT:0,90 \pm 0,18 U/g creatinine; IL4R $^{-/-}$:0,33 \pm 0,57 U/g creatinine; WT/ADR:0,87 \pm 0,22 U/g creatinine; IL-4R $^{-/-}$ /ADR:0,51 \pm 0,41 U/g creatinine), a marker of glomerular function. Moreover, IL-4R $^{-/-}$ /ADR showed glomerular tuft area expansion in comparison with WT/ADR. These findings indicate that absence of IL-4R aggravates the TII and highlight the role of IL-4 as a new therapeutic target for CKD treatment.

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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FeSBE2022 RAPAMYCIN TREATMENT INDUCES TUBULAR PROTEINURIA: ROLE OF MEGALIN-MEDIATED PROTEIN REABSORPTION

Rapamycin is an immunosuppressive drug that inhibits mTORC1 activation. The clinical use of rapamycin in kidney transplanted patients may result in proteinuria. The mechanism underlying this effect is poorly known. Therefore, we aimed to investigate the effect of rapamycin on the renal function. Rapamycin (1.5 mg/Kg) was given by oral gavage to 8-10 weeks-old male Balb/c mice for 7 days (CEUA-045/17). The animals (n=5) were kept in metabolic cage for 24h prior to urine and blood collection. Histological analysis of PAS-stained kidney sections showed no changes of glomerular and tubular morphology, interstitial space, and cellular infiltrate. Glomerular function, measured by plasma creatinine, blood urea nitrogen, and creatinine clearance, was not changed after rapamycin treatment. However, it was observed a significant increase in protein excretion (mg/24h) at day 1 and 3 (6.85 ± 4.75 ; 7.50 ± 4.14 , respectively) in relation to the control (0.76 ± 0.29). The urinary protein-creatinine ratio (UPCr) was higher at day 1 and 3 (5.67 ± 1.75 ; 10.08 ± 4.92 , respectively) in comparison to control (0.93 ± 0.26). The urinary activity of γ -GT, a marker of proximal tubule (PT) injury was increased at both day 1 (192.00 ± 122.80 U/g of creatinine) and day 3 (114.50 ± 73.88 U/g) in relation to control (53.60 ± 36.60 U/g). It was also evidenced a marked decrease of albumin uptake over time, reaching a maximal effect at day 3 (61.55 ± 18.01 %), which was sustained until day 7 (63.81 ± 29.71 % of control). PT expression of megalin was also reduced at day 1 (41.27 ± 24.96 % of control), day 3 (57.56 ± 27.20 % of control), and day 7 (83.15 ± 30.38 %). Further analysis revealed a mis-localization of megalin in PT segments at day 7 in comparison to control. These results suggest that rapamycin induces proteinuria by both decreasing the expression of megalin as well as leading to a sub-apical localization of megalin in PT cells.

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**FeSBE2022 ROLE OF ANGIOTENSIN II-MODULATED PROXIMAL TUBULE
ALBUMIN ENDOCYTOSIS IN THE GENESIS OF ALBUMINURIA AND TUBULAR
INJURY IN IN EARLY STAGE OF DIABETIC KIDNEY DISEASE**

Early stage of diabetic kidney disease (DKD) is characterized by albuminuria, tubular injury and increase in cortical angiotensin II (Ang II) level without changes in glomerular function and structure. These observations highlight the role of tubular segments in the genesis of DKD. However, how these components are interconnected is poorly known. One important clue come from the observation that high glucose (HG) decreased albumin endocytosis in proximal tubule epithelial cells (PTECs). Interestingly, changes in PT albumin endocytosis have been associated to the development of tubular injury. We investigated the involvement of Ang II on the inhibitory effect of HG on the albumin endocytosis in PTECs and its correlation with albuminuria and tubular injury observed in DKD. LLC-PK1 cells, a model of PTECs, were treated with HG (25 mM) during 48h. A streptozotocin (STZ)-induced diabetes animal model was used (CEUA-045/17). Male Wistar rats (8-10 wks-old) received a single intravenous injection of STZ (65 mg/kg) and renal parameters were measured after 8 weeks. The inhibitory effect of HG on the albumin uptake (60%) was partially reversed by 10⁻⁷M losartan, a specific AT1R antagonist (n=6). PD123319 (AT2R antagonist) at 10⁻⁸M or A779 (Mas receptor antagonist) at 10⁻⁷M did not change it (n=6). HG increased the Ang II level (2-fold, n=7). This effect was linked to the increase in the expression of angiotensin-converting enzyme (ACE) and the decrease in prolylcarboxipeptidase (n=3). Using a STZ-induced diabetes animal model, we observed a drop in PT albumin endocytosis correlated to the increase in albuminuria, urinary protein:creatinine ratio and γ -glutamyltransferase activity, marker of PT injury (n=9). Glomerular function was not changed. Our findings suggest that HG activates Ang II/AT1R pathway leading to the decrease in PT albumin endocytosis leading to albuminuria and tubular injury observed in early step of DKD.

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Área Temática: Ê-POSTER | *Biologia e Doenças Renais*

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**FeSBE2022 THE PROTECTIVE ROLE OF EXERCISE TRAINING ON RENAL
OXIDATIVE STRESS AND INFLAMMATION IN AN EXPERIMENTAL MODEL OF
DIABETES.**

Oxidative stress and inflammation are involved in the pathogenesis of diabetic nephropathy. New therapeutic strategies are needed to attenuate and/or prevent the progression of diabetic nephropathy. Thus, this study evaluated the impact of two exercise protocols on oxidative and inflammatory changes induced by type 1 diabetes mellitus (DM1) in the renal tissue of female rats. Thirty female Wistar rats, weighing between 200 and 250 g, were divided into five groups (n=6): sedentary control (SC), trained control (TC), sedentary diabetic (SD), trained diabetic (TD) and previously trained diabetic (PTD). Only the PTD group was submitted to 4 weeks of exercise before the induction of diabetes. After that, diabetes was induced in the SD, TD, and PTD groups with streptozotocin (40mg/kg, iv) and PTD and TD groups were submitted to 8 weeks of exercise. The TC group was also submitted to 8 weeks of exercise after administration of citrate (0.1 M, iv). This study was approved by CEUA/IMS/UFBA (protocol 052/2017). Our data show that both exercise protocols improved TBARS renal levels in the TD and PTD groups (1.2 ± 0.2 ; 1.0 ± 0.2), respectively, compared to SD group (2.2 ± 0.6), $p<0.001$. Renal levels of Superoxide Dismutase were increased in the TD and PTD groups (146.8 ± 43.9 ; 148.8 ± 49.9), respectively, in relation to SD (75.8 ± 20.8), $p<0.05$. However, only exercise performed prior to induction of diabetes increased the activity of Glutathione Peroxidase (1.0 ± 0.13) in relation to SD group (0.65 ± 0.13), ($p<0.01$). Exercise increased renal levels of IL-10 in the TD and PDT groups (0.5 ± 0.38 ; 0.58 ± 0.16) compared to the SD (0.23 ± 0.14), $p<0.05$. Only previous exercise reduced TNF-alfa renal levels in the PTD group (8.5 ± 2.7) compared to SD (15.6 ± 7.5), $p<0.05$. In conclusion, this study demonstrates that the exercise, especially when initiated previously to induction of diabetes, improves inflammation and redox status in female rats with DM1.

ID: 10938

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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**FeSBE2022 CARDIOVASCULAR AND RESPIRATORY PROFILE OF ADENOSINE
A2A RECEPTORS KNOCK-OUT MICE SUBMITTED TO SUSTAINED HYPOXIA.**

Adenosine modulates synaptic transmission and activation of A2A-subtype receptors in the NTS affects cardiovascular and respiratory reflexes. High concentration of this purine in the extracellular fluid and the increased expression of A2A receptors after acute hypoxia suggest a role for these receptors in response to this challenge. To evaluate the role of A2A receptors on autonomic and respiratory responses to hypoxia, we used knock-out mice for A2A receptors and their control in which catheters were used for recording arterial pressure (MAP) and for drug injection (iv). Four days after, mice were submitted to normoxia or sustained hypoxia (SH; FiO₂ 0.1) for 24hrs. At the end of the protocols, cardiovascular and respiratory parameters were recorded and the responses to chemoreflex activation evaluated [potassium cyanide (KCN, iv)]. Sample of arterial blood was collected for blood gases evaluation. The experimental protocols were approved by CEUA (#29/2021). Reductions in MAP and HR after hypoxia were similar in control [(102±5 vs 109±6 mmHg, P=0,0172), (329±31 vs 441±55 bpm, P<0,0001)] and A2A KO mice [(104±5 vs 111±7 mmHg, P=0,0141), (318±59 vs 408±64 bpm, P=0,0006)]. Cardiovascular responses to KCN in both groups were similar in normoxic and SH conditions. The respiratory frequency (fR) under normoxic conditions was higher in A2A KO than in control mice (245±28 vs 191± 31 cpm, P=0,002). After SH the fR (241±25 vs 191±31 cpm, P=0,0029) and pulmonary ventilation (3390±944 vs 2328±641 ml kg⁻¹ min⁻¹, P=0,0052) increased in control but not in A2A KO mice. Arterial pO₂ increased in A2A KO mice, while pCO₂ decreased in both groups after SH. The data shows that adenosine A2A receptors play no major role in the autonomic responses to chemoreflex activation but are relevant in the modulation of the respiratory activity in mice.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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Instituição: UFOP

**FeSBE2022 CIGARETTE SMOKE EXPOSURE AND PROTEIN RESTRICTION
DURING THE GESTATION AFFECTS BIOMETRIC PARAMETERS IN C57BL/6
MICE OFFSPRING**

Studies show that both a low-protein diet and smoking during pregnancy are harmful to the developing and post-natal fetus, causing low birth weight, metabolic changes, renal and cardiovascular impairment. However, there is limited information on how these insults affect lung development. Thus, the aim of our study was to analyze the effects of the association between protein malnutrition and exposure to cigarette smoke during pregnancy on lung development in the offspring of C57BL/6 mice. This project was approved by the Ethics Committee on the use of Animals in the Federal University of Ouro Preto-MG (#2016/05). Pregnant females were fed a standard diet (CG, containing 22% protein); low-protein diet (PRG, containing 6% protein); standard diet associated with exposure to cigarette smoke (CSG); low-protein diet associated with cigarette smoke (RCSG). After carrying out the experimental protocols, the male offspring of each group were evaluated 24 hours after birth. The body mass of the animals was lower in the PRG (0.70 ± 0.017) compared to the CG and CSG (1.22 ± 0.006 ; 1.10 ± 0.011) and in the RCSG (0.63 ± 0.014) compared to the CG, PRG and CSG (1.22 ± 0.006 ; 0.70 ± 0.017 ; 1.10 ± 0.011), with an effect of diet, exposure and interaction of both insults. There was a shorter length observed in PRG (2.14 ± 0.16) and RCSG (2.24 ± 0.29) compared to CG and CSG (3.08 ± 0.08 ; 2.72 ± 0.10). There were effects only of diet and interaction of both insults. There was a lower lung mass in PRG (0.019 ± 0.001) and RCSG (0.016 ± 0.001) compared to CG and the CSG (0.032 ± 0.001 ; 0.026 ± 0.002) interaction of both insults with effect of diet and exposure to CS. Lung density was lower in PRG (0.016 ± 0.001), CSG (0.018 ± 0.001) and RCSG (0.016 ± 0.003) compared to CG (0.022 ± 0.002), with effects of diet, exposure to CS and interaction of both insults. Our results demonstrated an interaction between the diet and the exposure to CS in the development of the C57BL/6 mice offspring/newborn.

Keywords: Fetal Programming; Protein Restriction; Cigarette Smoke; Biometric Parameters; Neonates.

Funding: UFOP; FAPEMIG, CAPES e CNPq.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 DEVELOPMENT OF A WEB SYSTEM AND A SMARTPHONE APPLICATION TO CALCULATE PREDICTIVE PARAMETERS FOR WEANING FROM MECHANICAL VENTILATION

Introduction: Technological resources in health care have contributed to cost and time reduction in clinical intervention because their use enhances human resources in decision making. In weaning from mechanical ventilation (WMV), the gain of time between decision making and clinical intervention is decisive for the patient. Objectives: To develop a webbased calculator and an application (App) for smartphones to accelerate the obtaining of predictive parameters for weaning from mechanical ventilation (PPWMV) and to collect clinical data from medical history. Methods: The App was developed at the Federal University of Juiz de Fora, Brazil. The mathematical formulas used to obtain the PPWMV were based on the literature. The calculations were made based on anamnesis data, arterial gasometry, oxygenation indexes, and ventilatory monitoring parameters. The calculator was initially developed in HyperText Markup Language (HTML), JavaScript (JS), Hypertext Preprocessor (PHP), and Cascading Style Sheets (CSS). Later, the code was readjusted in the form of an application for mobile devices using React Native. In the development of the App, we used the software: Sublime Text 3, XAMPP server, Google Chrome, Internet Explorer, and Mozilla Firefox platforms and frameworks: Laravel (PHP language) and Bootstrap (HTML and CSS languages). Results: A clinical simulation with hypothetical data of a patient in the intensive care unit was used to feed the fields of the Web system and the App. The PPWMV were calculated in Google Chrome, Internet Explorer, and Mozilla Firefox browsers and on Android smartphones. The results were grouped in a single report. Conclusion: The test of the Web or App system for calculating the PPWMV showed great potential for future use in clinical practice, since the calculations through these resources are accurate, and accessible, and the results are centralized in a single interface.

ID: 11337

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 EFEITOS DA EXPOSIÇÃO AO PÓ DE FERRO NA MECÂNICA PULMONAR, INFLAMAÇÃO, ESTRESSE OXIDATIVO E REMODELAMENTO DA MATRIZ EXTRACELULAR EM CAMUNDONGOS COM ENFISEMA INDUZIDO POR ELASTASE.

Background: Chronic exposure to iron powder and other mineral dust may cause harmful effects on exposed populations, especially on COPD patients. Aims: To evaluate the effects of inhaled iron powder, other mineral dust and fine particulate matters on lung mechanics, inflammation, remodeling and oxidative stress in mice that received or not elastase. Methods: The study was approved by the Ethics Committee for Use of Animals (CEUA) of the Clinical Hospital and Faculty of Medicine - University of São Paulo (protocol number 919/17). 36 male mice C57BL were divided in 6 groups: SAL (control-non exposed), ELA (received elastase and non-exposed), SAL L1 and ELA L1 (exposed to iron and other metal powder due to pelletizing iron ore at a mining company for 4 weeks), SAL L2 and ELA L2 (exposed to iron and other metal powder 5km of a mining company for 4 weeks). On 29th day of the protocol we evaluated lung mechanics, inflammation, remodeling, oxidative stress and alveolar wall alterations (linear mean intercept-Lm). Results: There were no differences in all groups in lung mechanics. ELA, ELA L1 and ELA L2 have an increase in Lm compared to the SAL groups ($p<0.05$). There was an increase in total cells and macrophages in ELA L1 and ELA L2 compared to the other groups ($p<0.05$). Exposed groups (ELA L1, ELA L2, SAL L1 and SAL L2) showed an increase in NF- κ B, INOS, MMP-9, MMP-12, TGF- β , TNF- α , MUC5AC, Neutrophils Elastase, IL-1 β , IL-6, IL-10 and IL-17 compared to ELA and SAL ($p<0.05$) and there were low to moderate correlations of these parameters with elastance and resistance of lung tissue ($p<0.05$). Conclusions: Except for lung mechanics, environmental exposure to iron and metal powder contributed to the worsening of inflammation, remodeling and oxidative stress responses in exposed mice with and without emphysema. These alterations were dependent of NF- κ B activation.

ID: 11112

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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Instituição: UFRJ

FeSBE2022 EVALUATION OF THE EXPERIMENTAL MODEL OF PULMONARY ISCHEMIA IN WISTAR RATS

The procedure of lung ischemia-reperfusion is usually done during thoracic surgery for lobectomy or pneumonectomy. During this procedure, both the epithelial and endothelial cells can be exposed to under- and over-physiological airway and vascular pressures that may induce lung damage. Since there is no therapy to prevent such alterations this study aims to characterize the lung ischemia-reperfusion model, mainly at ischemic phase, in order to test therapies to prevent lung damage. Fourteen healthy male Wistar rats were anesthetized, mechanically ventilated and submitted to thoracotomy with sternotomy (CEUA: 005/20). Animals were randomized to two groups: control (CTRL), in which no further procedures were performed; and ischemia (ISQ), in which the left pulmonary hilum was clamped while the right lung remained perfused and ventilated. After 30 minutes, animals were euthanized and both lungs were collected for histological and molecular biology analysis. Plateau pressure was higher in ISQ than CTRL groups ($p=0.001$). Mean alveolar diameter was higher in ISQ than CTRL group ($p=0,047$ for the left lungs and $p=0,017$ for right lungs). In ISQ group, perivascular edema of small vessels was higher in right compared to left lung ($p=0.022$). Ultrastructure analysis revealed collapsed alveoli at the left lung of ISQ group, with a thickened alveolar-capillary membrane and apoptotic endothelial cells. Interleukin-6 and intercellular adhesion molecule (ICAM)-1 were higher at the right lung of ISQ compared to right lung of CTRL groups ($p=0.007$, and $p=0.045$, respectively). In addition, ICAM-1 was higher in right than left lung of ISQ group ($p=0.023$). In conclusion, soon after the ischemic phase of lung ischemia-reperfusion procedure, right lung not submitted to ischemia compared to left lung may be prone to lung damage, likely due to application of over-physiological airway and vascular pressures even for short term.

ID: 11058

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 FUCOSYLATED CHONDROITIN SULFATE DERIVED FROM HOLOTHURIA GRISEA AS TREATMENT FOR EXPERIMENTAL AIRWAY INFLAMMATION

Asthma is characterized by acute airway inflammation, increased mucus production, and bronchoconstriction. We hypothesized that Fucosylated chondroitin sulfate (FucCS) extracted from the body wall of sea cucumber *Holothuria grisea*, which hold glycosaminoglycan with anti-inflammatory properties, may be an alternative drug to treat experimental airway inflammation. FucCS was extracted and purified from *H. grisea* by proteolytic digestion and purification by salting out. This study was approved by the Animal Care and Use Committee of the Health Sciences Center, Federal University of Rio de Janeiro, Rio de Janeiro, Brazil (CEUA: 054/19). 60 male (or female) C57BL/6 mice (6-8weeks) were sensitized intraperitoneally (IP) on days 0 and 14 with ovalbumin (ova, 2.5mg/kg) and aluminum hydroxide (50mg/kg), or saline. On days 15-18 and 21-23 animals were challenged intranasally with ovalbumin (7.5mg/kg). The animals received therapy (IP) with: 1) FucCS (2mg/kg) or saline one hour after each challenge or 2) dexamethasone (2 mg/kg) on days 15, 17, 21 and 23. In the current model of acute airway inflammation, compared to control, total cells in the bronchoalveolar lavage fluid (BALF) were increased (380%, $p=0.0004$) as well as peribronchial inflammation score (+351%, $p=0.006$) and polymorphonuclear cell infiltration (+745%, $p<0.001$). Treatment with FucCS (-34.5%, $p=0.0124$) and dexamethasone (-30.9%, $p=0.0193$) reduced peribronchial inflammation score. Polymorphonuclear cells infiltration was decreased with FucCS treatment (-58.3%, $p<0.001$) and dexamethasone treatment (-56.1%, $p<0.001$). In conclusion, *Holothuria grisea* FucCS reduced lung inflammatory process and may be a promising therapy for acute airway inflammation. Further studies are needed to elucidate the mechanism of action of FucCS in asthma.

ID: 10876

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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Instituição: *UFRJ*

FeSBE2022 GENE THERAPY WITH PEDF DELIVERED BY AAV8 IN MURINE MODEL OF CHRONIC ALLERGIC INFLAMMATION.

Vectors derived from adeno-associated virus (AAV) carrying pigmented epithelium derived factor (PEDF) which has anti-inflammatory and anti-fibrotic activities might be a promising alternative for the treatment of respiratory diseases such as asthma. Therefore, the present study evaluated the effects of gene therapy on the inflammatory process and remodeling of the lung parenchyma in a murine model of asthma. Female C57BL/6 mice (CEUA 016/19) were divided into 2 experimental groups: a) control group (CTRL), challenged with saline solution (0.9% NaCl) intranasally; b) House Dust Mite group (HDM), challenged with 25µg of purified HDM diluted in 25 µl of sterile PBS, intranasally. Animals were then divided into 2 groups according to the following intratracheal treatment with saline (C-SAL and HDM-SAL), or with AAV8-PEDF (1010 vg, C-PEDF, and HDM-PEDF). PEDF gene expression in lung tissue were explored (RT-PCR). The airway hyperresponsiveness and in vivo respiratory mechanics analysis were investigated. In addition, the morphometry and cellularity of the lung parenchyma (optical microscopy), the bronchoconstriction index and the mucus production (Periodic Acid-Schiff Staining) by goblet cells were estimated. Moreover, the content of collagen fibers (Masson's Trichrome Staining Method) in the airways and parenchyma, as well as the expression of smooth muscle α actin (Immunohistochemistry) in the terminal bronchioles and alveolar ducts were quantified. The analysis showed that Y733F-AAV8 vector was efficient in delivering the hPEDF gene to lung cells after in vivo instillation. Gene therapy with PEDF was able to reduce lung inflammation and airway remodeling, improving lung function. These findings suggest that gene therapy with AAV8- PEDF is promising for the treatment of allergic asthma, providing curative means to reverse asthma remodeling and, potentially, other lung diseases with inflammation and fibrosis.

ID: 11339

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 GRADUAL INCREASE IN RESPIRATORY RATE MITIGATES LUNG DAMAGE IN MILD EXPERIMENTAL ACUTE RESPIRATORY DISTRESS SYNDROME

Whether respiratory rate (RR) should be abruptly or gradually increased as a component of a lung protective ventilation strategy has not been determined. We hypothesized that gradual, compared to abrupt, increments in RR mitigate ventilator-induced lung injury (VILI) in mild experimental acute respiratory distress (ARDS). Twenty-four hours after intratracheal administration of *E. coli* lipopolysaccharide, forty-two Wistar rats (CEUA: 015/19) were anesthetized and mechanically ventilated (VT=6ml/kg, PEEP=3cmH₂O) with RR increase patterns and durations as follows: (N=7/group): 1) Control; RR=70bpm for 2h; 2) Abrupt increase of RR for 1h: RR=70bpm during the first hour followed by an abrupt increase, RR=130bpm, during the second hour; 3) Abrupt increase of RR for 2h: RR=130bpm during the first and second hours; 4) Shorter RR adaptation: RR=70bpm during the first 30min followed by a gradual increase (from 70 to 130bpm over 30 min) and RR=130bpm during the second hour; 5) Longer RR adaptation: RR=70bpm, immediately followed by a more gradual increase from 70 to 130bpm reached at 1h, which remained through the second hour. At FINAL, lungs were removed for histological and molecular biology analyses. Nonventilated animals (n=7) were used for comparative purposes. Cumulative diffuse alveolar damage score was more reduced in Shorter and Longer RR adaptation groups than in Abrupt increase of RR for 1h and 2h, 2) Mechanical power and lung heterogeneity score were lower in Longer RR adaptation group compared to Abruptly adjusted groups, and 3) Markers of lung inflammation (interleukin-6) as well as epithelial (Clara cell protein16) and endothelial cell (Vascular cell adhesion protein-1) damage were higher in both Abrupt groups, but not in either adaptation RR group, compared to control. In mild experimental ARDS, a gradual increase in RR toward a higher level, compared to making the same transition abruptly, decreased indications of VILI.

ID: 11270

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 HESPERIDIN PREVENTS ACUTE LUNG INFLAMMATION CAUSED BY MECHANICAL VENTILATION

Mechanical ventilation (MV) is a tool used in critical patient care. Hesperidin is a flavonoid with antioxidant and anti-inflammatory properties. This study aimed to evaluate the effects of long-term hesperidin administration in mice submitted to MV. The procedures were approved by the ethics committee (n° 2017/58). Twenty-five C57BL/6 male mice, aged between 7 to 8 weeks, were divided into 5 groups (n=5): control (CG), mechanical ventilation (MVG), MV+ hesperidin 10 mg/Kg (MVH10), 25 mg/Kg (MVH25) and 50 mg/Kg (MVH50). The animals received the dose of hesperidin for 30 days via orogastric gavage, after which MVG, VMH10, VMH25 and VMH50 groups underwent MV for one hour. In peripheral blood, the leukocyte count (x10³/mm³) was higher in MVG (5.28 ± 0.39) compared to CG (2.46 ± 0,30). MVH10 (3.08 ± 0.89), MVH25 (3.42 ± 0.32) and MVH50 (2.42 ± 0.37) presented lower leukocytes count compared to MVG (5.28 ± 0.39). In addition, neutrophil counts (x10³/mm³) were higher in MVG (3.53 ± 0.17) compared to CG (0.07 ± 0.08). The groups receiving hesperidin had lower neutrophil counts (MVH10: 0.18 ± 0.04; MVH25: 0.23 ± 0.14; MVH50: 0.14 ± 0.05) compared to MVG. In the airways, MV resulted in greater leukocyte (x10⁵/ml) influx in MVG (12.05 ± 1.44) compared to CG (5.10 ± 1.49). Hesperidin administration resulted in lower total leukocyte counts in MVH10 (6.05 ± 1.16), MVH25 (5.3 ± 0.37) and MVH50 (5.4 ± 0.48) groups compared to MVG (12.05 ± 1.44). MV promoted greater lipid peroxidation (nmol/mg protein) (1.57 ± 0.19) and protein oxidation (nmol/mg protein) (34.6 ± 9.26) in the lung compared to CG (0.77 ± 0.23; 16.15 ± 3.51), respectively. Long-term hesperidin administration resulted in lower lipid peroxidation (MVH10: 1.98 ± 0.19; MVH25: 0.86 ± 0.12; MVH50: 0.84 ± 0.17) and protein oxidation (MVH10: 24.38 ± 2.70; MVH25: 14.28 ± 2.13; MVH50: 18.97±2.94) compared to MVG. Hesperidin prevents the deleterious effects of MV by reducing inflammatory cell influx and lung oxidative damage.

Key words: Hesperidin; Mechanical ventilation; Oxidative stress; Inflammation

Funding: UFOP; CAPES; CNPq; FAPEMIG

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 HYPEROXIA INDUCES ANTIOXIDANT ENZYME EXPRESSION IN THE CEREBELLUM OF BALB/C MICE.

Oxygen (O₂) spreads easily in the biological microenvironment and is required in supraphysiological concentrations (hyperoxia) to reverse hypoxemia. In the lungs, long-term hyperoxia induces inflammation apoptosis, necrosis, and pulmonary fibrosis. These events are usually accompanied by an oxidative burst and cellular damage. The rapid spread of O₂ throughout biological tissues has directed investigations to the brain (Oxid Med Cell Longev. 5784146, 2022). Here, we evaluated nitric oxide synthase (iNOS) expression in the cerebellum after hyperoxia. The study was approved by the Ethics Committee (UFOP-No.092/2012). Groups of female BALB/c mice (8 weeks old; 24.53±0.31g) were divided into two groups: 'control (Air room)' and 'O₂ group' (exposed to 100% oxygen for 24h). Histopathological and stereology analyses were performed on tissue stained with Hematoxylin and Eosin. Immunohistochemical analysis was performed for iNOS detection. Expression of iNOS was measured by brown tones density/area (mm²x10⁻⁶). All tissue sections were examined by light microscopy. The data of the O₂ group were presented as the mean ± standard error of the mean / The data of the control group. Continuous data were analyzed by Kruskal Wallis and Unpaired t-test. The significance level was set to 5% (p<0.05). Results: Hyperoxia decreased cell numbers in the Molecular layer (17.72±0.53, p=0.00 / 21.13±0.91). Hyperoxia did not modify cell numbers in the Purkinje layer (3.26±0.18, p=0.54 / 3.43±0.19). Hyperoxia increased iNOS expression in molecular layer (1.77±0.20, p=0.07 / 1.16±0.20). There was no significant difference in iNOS expression in the Granular or Purkinje cells layers (2.05±0.34 and 1,40±0,16, p= 0,44) when compared with the control (1.61±0.069 and 1,06±0.40). Conclusion: We suggest that hyperoxia-induced oxidants enzymatic responses are involved with reactive nitrogen species, especially nitric oxide because after oxygen there was a marked expression of iNOS in the cerebellum.

ID: 11062

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 IMUNOMODULATORY POTENTIAL OF SEVOFLURANO IN RELATION TO PROPOFOL IN SEPSIS MODEL

Sepsis is worldwide health burden. Usually, septic patients are submitted to surgical procedures where anesthetics agents are needed. Our aim is to understand the effects of sevoflurane (SEVO) and propofol (PROP) on lung structural cells, phagocytic capacity macrophages/monocytes, neutrophils migration and inflammatory genes expression, in a sepsis model (CEUA 027/17). Nine Wistar male rats were subjected to cecum ligation and puncture (CLP) for sepsis induction. After 48h, animals were euthanized. Macrophages and neutrophils from blood and bronchoalveolar lavage fluid (BALF) as well as lung epithelial and endothelial cells were primarily extracted. Cells were exposed, for 1h, to: 1) one mean alveolar concentration of SEVO; or 2) 50 μ M of PROP (clinical used concentration); or 3) to saline, control group (CTRL). Macrophages phagocytic capacity and neutrophils migration induced by interleukin (IL)-8 gradient were evaluated. By RTPCR, mRNA levels of IL10, IL6, IL1 β and TGF β were measured in macrophages; IL1 β , TNF α and cell receptors associated to retention (CXCR4) and mobilization (CXCR2) mRNA in neutrophils; Zona ocludens (ZO)1 and surfactant protein (SP)B in epithelial cells and; Toll like receptor (TLR)4 in endothelial cells. Blood monocytes phagocytic capacity and IL-10 were higher in SEVO than PROP group ($p=0.0006$, 0.02 respectively), while presented reduced IL-6 and IL1 β mRNA levels ($p=0.04$, 0.01 respectively). After SEVO exposure, CXCR2 and IL1 β were lower in blood ($p=0.03$, 0.09 , respectively) and BALF ($p=0.02$, 0.001 , respectively) neutrophils, while CXCR4 mRNA levels were higher ($p=0.001$). Both SEVO and PROP increased ZO-1 ($p=0.02$, 0.04 respectively), reduced SP-B in epithelial cells and TLR4 in endothelial cells. In conclusion, during the early phase of sepsis, SEVO enhanced macrophages phagocytic capacity and reduced inflammatory markers compared to PROP, showing, thus more protective effects compared to PROP.

ID: 11303

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 MITOCEPTION: A STRATEGY TO POTENTIATE MESENCHYMAL STROMAL CELLS

Mesenchymal stromal cells (MSCs) were recently described to transfer mitochondria to target cells in lung diseases models, improving cellular bioenergetics and triggering beneficial effects. So, increasing mitochondria content, through mitochondrial artificial transfer (mitoception) could potentiate MSCs therapy improving mitochondrial transfer extension and benefits. This study was approved by the Ethics Committee (CEUA-UFRJ 004/20). Bone-marrow mesenchymal stromal cells (BM MSCs) were obtained from C57BL/6 mice (20-25 g, 8-10 weeks). MSCs-derived mitochondria was co-cultured with adherent MSCs for mitoception [1:1 (Mito1) or 5:1 (Mito5) donor:receiving MSCs ratio]. After 24 hours, mitoception was validated by MitoTracker Green, MitoTracker Red and MitoSOX Red by flow cytometry assay to estimate mitochondrial mass, function and mitochondrial-reactive oxygen species (mROS). mRNA levels of idoleamine (IDO)-1, superoxide dismutase (SOD)2, mitofusin (MFN)1, MFN2, and interleukin (IL)10 were evaluated. Mitoception increases MSCs mitochondrial mass (MSC = 21,17%, Mito1 = 33,55%, Mito5 = 41,05%, MSC vs Mito1 $p=0.0003$, MSC vs Mito5 $p=<0.0001$; Mito1 vs Mito5 $p= 0.0040$) and reduces mROS (MSC = 63,24%, Mito1 = 54,03%, Mito5 = 45,13%, MSC vs Mito5 $p=0.0544$), without changes in mitochondrial function (MSC = 72,60%, Mito1 = 81,65%, Mito5 = 74,20%). However, MSCs biomarkers MFN1, MFN2, and IL10 changed significantly their mRNA expressions (MFN1 [Fold change to MSC (Mito5 = 4.525, $p=0.0159$)], MFN2 [Fold change to MSC (Mito5 = 0.37, $p= 0.0281$], and IL10 [Fold change to MSC (Mito1 = 219.6, $p= 0.0381$; Mito5 = 11.55, $p= 0.0022$)], while IDO1 and SOD2 do not present significative alterations (IDO1 [Fold change to MSC (Mito1 = 0.19, Mito5 = 0.63, $p= 0.352$), SOD2 [Fold change to MSC (Mito1 = 0.673, Mito5 = 0.76, $p= 0.31$)]. New results are still needed to understand whether and how doses of mitoception interfere with mitochondrial function in MSCs.

ID: 11291

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 PARTICULATE MATTER INDUCES LUNG INFLAMMATION IN HEALTHY MICE AND EXACERBATES EXPERIMENTAL ASTHMA MODEL ANIMALS

Exposure to mineral dust may harmful effects in individuals with chronic allergic diseases in winter and summer. To evaluate the impact of environmental exposure to metal dust in two different locals on hyperresponsiveness, inflammatory, remodeling, and oxidative stress responses in asthma models and controls. 72 male mice BALB/c were divided into six groups: SAL (control-non exposed), OVA (ovalbumin-non exposed), SAL-L1 and OVA-L1 (exposed to metal powder due to pelletizing iron ore at a mining company), SAL-L2 and OVA-L2 (exposed to metal powder 5km at a mining company) during two weeks. On the 30thday of the protocol, we evaluated hyperresponsiveness, exhaled nitric oxide(ENO), bronchoalveolar lavage fluid (BALF), inflammation, extracellular matrix remodeling and oxidative stress responses. SAL L1 and SAL L2 groups had an increase of Rrs, Ers, Raw, Gtis, and Htis after methacholine; IL-4, IL-5, IL-10, IL-13, IL-17, and GP91phox; TIMP1, MMP9, MMP12, and TGF β had an increase when compared to SAL ($p<0.05$) in the summer and winter. iNOS and NF- κ B increased in SAL L1 e SAL L2 when compared to SAL, and in OVA-L1 and OVA-L2 increased iNOS compared to OVA($p<0.05$). Environmental exposure to metal powder promoted significant changes in hyperresponsiveness, inflammation, remodeling, and oxidative stress in healthy mice and contributes to exacerbation in of these responses in asthmatic animals.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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**FeSBE2022 POTENTIALIZATION OF THE BIOLOGICAL EFFECTS OF BONE
MARROW-DERIVED MESENCHYMAL STEM CELLS BY IFN- γ IN A MURINE
MODEL OF PNEUMOSEPSIS**

Although fluid replacement and antibiotic therapy are strong recommended in recent sepsis guidelines, they cannot hold tissue damage during sepsis course. Bone marrow-derived mesenchymal stromal cells (BM-MSCs) have immunomodulatory ability which may improve bioenergetic profile of resident cells. Nevertheless, in sepsis scenario, one drawback about BM-MSCs therapy is their lower survival rate and lower biological activity. Thus, the preconditioning of BM-MSCs with specific cytokines linked to adaptive immune response, as interferon-gamma (IFN- γ), may improve their biological activity and hold tissue damage during sepsis. The aim of the present study was to evaluate the effects of preconditioning of IFN- γ on BM-MSCs viability by crescent doses as well as different exposure times (24h and 72h). CEUA 020/19. BM-MSCs were extracted from the femur and tibia of healthy male C57BL/6 mice and preconditioned with IFN- γ at different concentrations (control [PBS], 100, 200, 400, 800 ng/mL) for 24 or 72 hours. Cell viability by MTT and annexin-PI by flow cytometry were evaluated. After 24-h and 72h, IFN- γ exposure did not change cell viability in the range from 100 to 800ng/mL (24-h; 95 to 100% in relation to the control, and 72-h; 87.5 to 95% in relation to the control). After 24h of conditioning, early apoptosis (PBS: 6.7 \pm 1.2%; 100ng/mL: 6.1 \pm 1.6%; 200ng/mL: 7.6 \pm 0.7%; 400ng/mL: 6.7 \pm 0.7%; 800ng/mL: 5.6 \pm 0.9%) and late apoptosis did not differ (PBS: 6.4 \pm 1.2%; 100ng/mL: 8.6 \pm 1.4%; 200ng/mL: 11.3 \pm 1.0%; 400ng/mL: 8.1 \pm 1.9%; 800ng/mL: 15.8 \pm 8.1%). After 72h of conditioning, early apoptosis (PBS: 3.6 \pm 0.3%; 100ng/mL: 3.9 \pm 1.0%; 200ng/mL: 4.9 \pm 0.3%; 400ng/mL: 4.9 \pm 1.6%; 800ng/mL: 4.5 \pm 0.3%) and late apoptosis (PBS: 4.6 \pm 0.3%; 100ng/mL: 7.4 \pm 1.9%; 200ng/mL: 8.8 \pm 2.3%; 400ng/mL: 8.2 \pm 3.8%; 800ng/mL: 7.2 \pm 0.8%) did not differ. Preliminarily, IFN- γ preconditioning of BM-MSC did not induce mitochondrial damage or cell death in BM-MSCs.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 RESPIRATORY RESPONSES TO ACTIVATION OF CENTRAL CHEMORECEPTORS IN IN SITU PREPARATION OF MICE SUBMITTED TO SUSTAINED HYPOXIA

Sustained hypoxia (SH) changes the central chemoreception sensitivity and the respiratory pattern contributing to sympathetic overactivity and hypertension in rats. Herein we evaluated the pattern of respiratory activity during hypercapnic challenges in the in situ working heart-brainstem preparation (WHBP) of mice submitted to SH. C57BL/6J mice (6-8 weeks old) were submitted to normoxia (control) or SH protocol (24h, FiO₂ 0.1). At the end of the protocols, we performed in situ recordings of phrenic (PND), abdominal, (AbN) and cervical vagus (cVN) activities in the WHBP. The percentual of CO₂ in the perfusate was increased from 5% (baseline) to 7% and then 10%. Experimental protocols were approved by the CEUA (#163/2019). The frequency of PN activity was reduced in both hypercapnic challenges in relation to baseline in control group (n=7; 0.64±0.2 vs 0.80±0.3 vs 1.39±0.4Hz, P=0,0001; P=0,0023). Under basal conditions (5% CO₂) PN activity was reduced in the SH (n=8) in relation to control group (0.86±0.2 vs 1.39±0.4Hz, P=0,0020) and the hypercapnic challenges did not affect its activity. The incidence of LateE bursts in the AbN in the SH group was increased in relation to control (57.7±34.3 vs 0±0%, P<0,0001). Both hypercapnic challenges induced AbN active expiratory activity in the control group in relation to baseline (98.4±1.9 vs 77.6±19.0 vs 0.0±0%, P<0,0001). On the other side, only 10% CO₂ increased the AbN active expiratory activity of the SH group (90.6±12.2 vs 57.7±34.3%, P=0,0008). Hypercapnic challenges also increased the duration of expiration in the control group (1.35±0.8 vs 1.37±0.9 vs 0.59±0.2s, P<0,0001) as well as the duration of cVN post-inspiratory activity (0.93±0.6 vs 1.06±0.8 vs 0.43±0.2s, P=0,0244; P=0,0031), but not in the SH group. We conclude that the respiratory responses to hypercapnia in control mice are similar to those induced by SH, suggesting that SH sensitize the central chemoreceptors of mice.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 SMOKING EFFECTS IN BONE TISSUE IN PATIENTS WITH ADVANCED STAGES OF OSTEOARTHRITIS

Clinical studies demonstrate the impact of smoking on the increased in bone tissue fragility, as well as on the development and progression of diseases that cause loss of musculoskeletal tissues, such as osteoarthritis. Previously, we showed in animal models that exposure to cigarette smoke induced structural changes in organic (collagen fibers subtypes I and V) and mineral matrix of bone tissues leading to bone fragility (1,2). Moreover, we demonstrated that this bone fragility occurred by increasing collagen V synthesis and deposition and impairing collagen I fibril. To verify the effects of smoking in bone structure as well as the gene expression for collagen I and V in patients with advanced stages of osteoarthritis we compared current Smokers (with same smoking history) (n=12) with Non Smokers (n=10) that were submitted to total hip replacement surgery. We evaluated in bone homogenate, the expression of COL 5 and COL 1 by RT-PCR and by morphometry, we quantified the bone trabeculae area in bone samples, using morphometric image. Our results showed an increase in gene expression for COL5A1 in smokers compared with non-smokers (p= 0.0043) whereas the gene expression. For COL1A1 was reduced (p= 0.003). The evaluation of bone structure by morphometry showed a reduction in the thickness of the bone trabeculae in Smokers compared with Non-Smokers (p= 0.0042). Our results showed that smoking induced structural changes as well as altered gene expressions for two most important components of organic matrix in patients with advanced stages of osteoarthritis.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 STUDY OF THE EFFECT OF PLANT PROTEASE INHIBITORS IN AN EXPERIMENTAL MODEL OF ASTHMA-COPD IN MICE: COMPARISON WITH CORTICOSTEROID.

Introduction: Plant protease inhibitors have anti-inflammatory activities and represent potential treatment for inflammatory diseases. We investigated the effects of EcTI, BbKI and BbKIm compared to dexamethasone treatment in a model of asthma-COPD (ACO). Aim: To investigate the effects of plant protease inhibitors compared to dexamethasone treatment in an experimental model of ACO. Methods: Male Balb/c mice were divided in control and treatment group. After day 28 of the protocol, we evaluated bronchial hyperresponsiveness, inflammatory, remodeling, oxidative stress markers and mean linear intercept. We used One-Way Analysis of Variance (ANOVA) followed by the Holm-Sidak for statistical analysis and considered significant $p \leq 0.05$. Results: Analyzing positive inflammatory cells, all treatment groups had an attenuation of the response of IL-1- γ , IL-5, IL-6, IL-10, IL-13, TNF- α , IFN- γ . Except IL-4 which only ACO-EcTI and ACO-DX showed relevant attenuation compared to ACO. They also showed decrease in oxidative stress with decrease of treatments in iNOS and Eno positive cells, remodeling with decrease in TGF- β , MMP-9 and MMP-12 positive cells, Transcription factor-KappaB, Qualitative analysis of the mean linear intercept and Methacholine dose response curve. Conclusion: The inhibitors were similar to corticosteroids in controlling lung mechanics, inflammation, remodeling, oxidative stress markers and mean linear intercept in this ACO model.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 THE CONTRIBUTION OF A PLANT PROTEINASE INHIBITOR, ENTEROLOBIUM CONTORTISILIQUM, TO CONTROL INFLAMMATION, REMODELING AND OXIDATIVE STRESS IN MICE WITH ASTHMA-COPD OVERLAP

RATIONALE: Proteinase inhibitor from *Enterolobium contortisiliquum*-(EcTI) has anti-inflammatory activities and may represent a potential treatment for patients with lung diseases as asthma-COPD overlap. We had previously shown an effect of this inhibitor on lung mechanics and inflammation in BALF in a model of ACO. **OBJECTIVE:** To investigate the effects of EcTI treatment in a model of ACO and compare to corticosteroid treatment. **METHODS:** Fifty-six male Balb/c mice were divided in groups: SAL, OVA, ELA, ACO, ACO-ECTI, ACO-DX, ACO-DX-ECTI and at day 29 of the protocol, we evaluated: inflammatory markers (IL-4, IL-5, IL-6, IL-13, TNF- α) remodeling markers (MMP-9, TGF- α , collagen fibers), oxidative stress marker (iNOS) and linear mean intercept (Lm). Data was assessed using One-Way Analysis of Variance (ANOVA) followed by the Holm-Sidak and $p < 0.05$ was considered significant. **RESULTS:** Considering inflammatory, remodeling and oxidative stress markers, the treatment groups ACO-ECTI, ACO-DX and ACO-DX-ECTI decreased the positive cells to IL-5, IL-6, IL-13, MMP-9, TGF- α , iNOS and NF-Kappa-B in airways and alveolar septa compared to ACO ($p < 0.05$). TNF- α decreased only in alveolar septa ($p < 0.05$). The Lm in ACO increased when compared to OVA and ELA and it showed attenuation in tissue injury when compared to the treatment groups ($p < 0.05$). The IL-4 positive cells showed attenuation in ACO-DX and ACO-DX-ECTI when compared to ACO in alveolar septa ($p < 0,05$) and in groups ACO-ECTI, ACO-DX-ECTI when compared to ACO ($p < 0.05$), in airways. There was no difference in the results of collagen fibers in ACO-ECTI, ACO-DXECTI when compared to ACO ($p < 0.05$). **CONCLUSION:** Our results show that ECTI treatment plays an important role in controlling inflammation, remodeling and oxidative stress in the experimental model of asthma-COPD overlap.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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Instituição: *Universidade Federal de Ouro Preto*

FeSBE2022 THE EFFECTS OF EXPOSURE TO DIFFERENT INHALATIONAL ANESTHETICS IN HEALTHY ADULT MICE

The current inhaled anesthetics used in clinical practice for anesthesia and analgesia are isoflurane, sevoflurane, and desflurane. However, the profile of these anesthetics in target organs and tissues, beyond the anesthetic action, is not fully understood. This study evaluated the effects of exposure to different inhaled anesthetics currently used in clinical practice in healthy adult C57BL/6 mice on the pulmonary and systemic inflammatory response at different periods. This study was approved by the UFOP ethics committee (n°3476160320). 120 adult male mice were divided into 3 groups (n = 40): Isoflurane (ISO), Sevoflurane (SEV) and Desflurane (DES) and exposed to these drugs for 1, 2 and 3 hours at minimum alveolar concentration of 1 and ambient air, control group (CG) (n = 10). The animals were euthanized 24 hours after exposition, and bronchoalveolar lavage (BAL), blood and lungs were collected for analyses. For isoflurane, the influx of leukocytes (x10⁵ /mL) and macrophages from BAL was greater in the ISO2h (9.93±1.59); (9.53±1.27) and ISO3h (10.28±1.15); (10.03±1.05) groups compared to CG (7.05±0.92); (6.80±0.84). The number of blood leukocytes (x10³ /mm³) in the ISO3h (1.41±0.45) was lower compared to CG (2.61±0.44), ISO1h (3.14±0.93) and ISO2h (2.52±0.94) groups. Superoxide dismutase levels (U/mg ptn) were higher in ISO1h (33.36 (30.43-50.81)) compared to CG (19.54 (17.13-22.94)). The catalase enzyme (U/m ptn) showed greater activity in the ISO1h (0.53±0.11) and ISO2h (0.53±0.17) groups compared to CG (0.31±0.06). The levels of lipid peroxidation (nmol/mg ptn) were higher in the ISO3h (5.40 [4.68-5.89]) compared to CG (2.12 [1.75-2.57]). For the groups SEV and DES, the influx of peripheral blood leukocyte to the airways and redox imbalance in the lungs were similar to those observed in ISO. This study demonstrated that time is a determinant to promote a local and systemic inflammatory response to different inhalational anesthetics in a healthy murine model.

Keywords: inhalational anesthetics, pulmonary inflammation, redox imbalance, mice.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 THE PRE-TREATMENT OF PRONE POSITION AND EXOGENOUS SURFACTANT IN ADULT RATS UNDER MECHANICAL VENTILATION

Mechanical ventilation (MV) is a life-saving therapy, however, it may cause or aggravate a lung injury. The study of therapeutic options that aim to prevent the lung injury caused by MV are essential, such as the use of prone position. In addition, the administration of exogenous surfactant seems to minimize the inflammatory response and oxidative stress in an experimental model. This study aimed to evaluate the effects of prone position associated with exogenous surfactant in Wistar rats submitted to MV. The experimental procedures were approved by the university's ethics committee under number 1492160320. 30 male Wistar rats, aged between 12 and 14 weeks, were divided into 6 groups (n = 5): control (CG); surfactant (SG); MV in supine position (SPG); MV in prone position (PPG); MV in supine position + surfactant (SPSG); MV in prone position + surfactant (PPSG). SG, SPSG and PPSG received intranasal surfactant 1 hour before the beginning of the experimental procedures. SPG, PPG, SPSG, PPSG were submitted to MV for 1h. At the end of the experiments the animals were euthanized. In the peripheral blood (x10³/mm³) the PPG (3.90; 3.72-5.05) and PPSG (3.40; 2.80-4.87) groups showed higher leukocyte count compared to CG (2.0; 1.92-2.02). The neutrophil count from the animals in SPG (11.10 ± 0.35), PPG (1.51 ± 0.55), PPSG (1.05 ± 0.32) were higher compared to CG (0.13 ± 0.08). In bronchoalveolar lavage (x10⁵/ml), SPG (17.50 ± 1.04) and PPG (17.15 ± 2.79) presented a greater influx of leukocytes to the airways compared to CG (11.85 ± 1.09). In SPG (0.91; 0.34 – 1.38), the influx of lymphocytes was higher compared to CG (0.00; 0.0 – 0.05). In SPSG (2.15; 1.76 – 6.39), the influx of neutrophils was higher compared to CG (0.0; 0.0 – 0.05). The preliminary results show that MV, regardless of the position adopted, promoted increased leukocyte counts. However, further analysis is required to understand the effects of prone position and surfactant in this experimental model.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 THE ROLE OF L-TYPE VOLTAGE-DEPENDENT CA²⁺ CHANNELS IN THE CONTROL OF ELECTROPHYSIOLOGICAL PROPERTIES OF DMV PARASYMPATHETIC RESPIRATORY MOTONEURONS OF RATS.

The Dorsal Motor Nucleus of the Vagus (DMV) modulates several physiological responses by controlling the parasympathetic activity. The DMV parasympathetic respiratory motoneurons (PRMNs) project to lower airways and may contribute to regulate the mucus secretion and smooth muscle tone. L-type voltage-dependent Ca²⁺ channels play pivotal roles in the neuronal excitability. However, how these channels control the electrophysiological properties of DMV PRMNs has not yet been clarified. Using whole cell patch-clamp recordings and retrograde labelling of DMV PRMNs in coronal slices of the brainstem from male Wistar-Hannover rats (3-4 weeks), we investigated the role of L-type voltage-dependent Ca²⁺ channels in the control of DMV PRMNs excitability and action potential waveform. All procedures were approved by the Institutional Ethics Committee (087/2019). Data are expressed as mean \pm SEM. Nifedipine (5 μ M) was used to block the L-type voltage-dependent Ca²⁺ channels. In voltage-clamp, we analyzed the Ca²⁺ currents mediated by L-type voltage-dependent Ca²⁺ channels sensitive to nifedipine (-10 mV: -198.27 ± -22.29 pA). In current clamp, blocking L-type voltage-dependent Ca²⁺ channels increased the excitability of DMV PRMNs (ramp protocol: 16.73 ± 1.71 vs 11.31 ± 1.35 ; $p=0.0003$) and (square pulse protocol: 23.97 ± 2.47 vs 13.86 ± 1.95 ; $p<0.0001$). However, nifedipine did not change the amplitude of action potential (70.68 ± 1.92 vs 65.54 ± 2.62 mV; $p=0.05$), action potential half-width (1.75 ± 0.09 vs 1.80 ± 0.07 ms; $p=0.37$), as well as the amplitude of afterhyperpolarization potential (31.62 ± 1.47 vs 32.52 ± 1.62 mV; $p=0.53$). We conclude that L-type voltage-dependent Ca²⁺ channels control the excitability, but not the action potential waveform, of the DMV PRMNs from rats.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 THE SPHERES WEIGHTS OF HIGH FREQUENCY ORAL OSCILLATION DEVICES: A BENCH STUDY

High frequency oral oscillation (HFOO) alternative devices are used for oscillating the airways, mobilizing and removing secretion. When an airflow is exhaled by Shaker® (HFOO-Shaker), it raises a metallic sphere that falls back under its own weight. Under an expiratory pressure, this sphere creates oscillatory interruptions in the airflow that are transmitted to the airways, thus mobilizing the secretions adhered into the airways. Thus, this study aimed to evaluate the effects of different spheres of the Shaker in a bench study by mechanical ventilation. Therefore, a lung simulation model was set up with a DX3012 DIXTAL ventilator coupled to the Shaker®. The volume-controlled ventilation method was chosen with 0.5L of tidal volume, a respiratory rate of 10 breaths per minute (1 second of inspiration and 5 seconds of expiration), and PEEP set to zero. Data collection was then carried out by modifying the sphere of the device, between the original (28.39 g), a smaller and lighter one (13.78 g) and a larger and heavier one (44.98 g). The results showed that the peak pressure cmH₂O is higher according to the increase in size of the spheres (which are 15.1 for the smaller sphere, 17.8 for the original one, and 20.0 for the bigger one), that the average pressure is lower only in the lighter sphere (being 2.41 for the smaller sphere, 2.89 for the original one, and 2.82 for the bigger one), and for the PEEP values the difference found was a decrease only for the bigger sphere which was 0.5. For the original smaller sphere, the values were 0.80 and 0.79, respectively. The analysis of the airway pressure (Paw, cmH₂O) graph by time(s) allowed us to identify that only the larger sphere generates a smaller number of oscillations. The oscillatory frequency and airway pressure in HFOO-Shaker can be modified with spheres of different weights and this may have important clinical value that should be investigated.

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Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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FeSBE2022 THE TREATMENT OF N-ACETYLCYSTEINE PROTECTS LUNGS IN ADULT MICE EXPOSED TO FORMALDEHYDE

N-acetylcysteine (NAC) has recognized mucolytic, antioxidant and antiinflammatory effects. This study aimed to evaluate the effects of NAC administration in mice exposed to formaldehyde (FA). For this, 48 male C57BL/6 mice, 8 weeks old and weighing ~25 g, were divided into 6 groups: control (CG), exposed to ambient air, vehicle (VG), received saline solution, formaldehyde 1% (FA1%), which was exposed 3 times/day during 5 days, and 3 groups exposed to FA 1% and treated with NAC 100, 150 and 200 mg/kg (FA1%+NAC100, FA1%+NAC150 and FA1%+NAC200). 24 hours after the experimental protocol, the animals were euthanized and the bronchoalveolar lavage fluid (BALF), and lung tissue were collected for the analysis. The count of leukocytes (x10⁵ cells/mL) in BALF was performed. The SOD and CAT activities (U/mg protein) enzymes, GSH/GSSG ratio, levels of TBARS and carbonyl proteins (nmol/mg protein) and inflammatory markers (pg/mL), IL-6, IL-13 and IL-15 were determined in the lung. The procedures were approved by the CEUA, protocol n° 1647031120. In BALF, there was an increase in total leukocyte in FA1% (9.88, 8.0-12.31) compared to CG (2.88, 2.75-3.38). Regarding macrophages, there was an increase in FA1% (9.80, 9.33-12.17) compared to CG (2.85, 2.71-3.25). No difference was found in the number of lymphocytes and neutrophils. Both SOD and CAT activities were increased in FA1% (26.94±4.66; 10.03±1.02) compared to CG (15.43±2.18, 5.38±1.53). However, there was a decreased in the GSH/GSSG ratio in FA1% (0.23, 0.10-0.31) compared to CG (0.49, 0.40-0.76). Regarding oxidative damage, there was an increase in the levels of TBARS and carbonyl proteins in FA1% (0.36±0.05; 48.47±9.49) compared to CG (0.25±0.04; 25.66±7.81). The levels of IL-6, IL-13 and IL-15 were increased in FA1% (1692±268.3; 529.4±112; 968.5±128.6) compared to CG (1254±185.6; 377.5±58.62; 726.9±74.15). The treatment with NAC protected the lungs of adult mice from acute formaldehyde exposure.

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FeSBE2022 THE USE OF MELATONIN FOR THE REDUCTION OF PULMONARY INFLAMMATORY RESPONSE IN EXPERIMENTAL MODELS OF COPD, ASTHMA AND ASTHMA- COPD OVERLAP

Melatonin has an important effect on several inflammatory diseases such as asthma and COPD. Thus, it could be a possible therapeutic target for the treatment of these diseases as well as for asthma-COPD overlap (ACO). We evaluated the therapeutic effect of melatonin in pulmonary hyperresponsiveness to methacholine and inflammatory responses in experimental models of asthma, COPD and ACO. Male Balb/c mice were divided: ELA group received Elastase (15mg/kg-intratracheally). OVA group received ovalbumin (50mg of ovalbumin and 6mg-aluminum hydroxide intraperitoneally and inhalation of ovalbumin/0.9%NaCl). The ACO group was defined according to the ELA and OVA experimental protocols already described. SAL group received saline solution (50µL) and ELA+MEL, OVA+MEL and ACO+MEL groups were submitted to the experimental protocols previously described and received Melatonin (15mg/kg intraperitoneally) for 6 days. After 28 days, we evaluated: exhaled nitric oxide (eNO), bronchoalveolar lavage fluid cells (BALF) and maximal responses to methacholine of resistance of respiratory system (Rrs), elastance of respiratory system (Ers), lung tissue resistance (Gtis), lung tissue elastance (Htis) and airway resistance (Raw). OVA+MEL had a decrease of eNO compared to OVA ($p<0.05$). OVA+MEL and ACO+MEL decreased Rrs compared to OVA and ACO ($p<0.05$). OVA+MEL and ACO+MEL had an attenuation of Ers, Gtis and Htis compared to OVA and to ACO ($p<0.05$). OVA+MEL had a decrease of Raw compared to OVA ($p<0.05$). OVA+MEL and ACO+MEL decreased the total cell count in the BALF compared to OVA and to ACO ($p<0.05$). OVA+MEL and ACO+MEL had a decrease of eosinophils compared to OVA and ACO ($p<0.05$). OVA+MEL had a decrease of lymphocytes compared to OVA ($p<0.05$). OVA+MEL and ACO+MEL had a decrease in macrophages compared to OVA and to ACO ($p<0.05$). Melatonin treatment plays an important experimental role in controlling pulmonary hyperresponsiveness, eNO and airway inflammation, in these experimental models.

ID: 11152

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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Instituição: UFRJ

FeSBE2022 THERAPEUTIC ROLE OF MONONUCLEAR CELLS DERIVED FROM BONE MARROW IN AN EXPERIMENTAL MODEL OF SEPSIS

Sepsis may cause organ dysfunction due to host's immune response to an infection. Although cell therapy has beneficial effects, little is now about its effects on lung and kidney in a temporal analysis. The study was approved (CEUA 116/16) and evaluated the bone marrow derived mononuclear cells (BMDMCs) therapy in polymicrobial sepsis model. Female C57BL/6 mice (~22 weeks) were randomly divided into 1) CLP group, sepsis was induced by cecum ligation and perforation; 2) Sham group, submitted to surgery procedure without CLP. After 1h, CLP group received saline (CLP-Saline) or 106 BMDMCs via jugular vein. After 6h, 12h and 24h, lung and kidney morphology and molecular biology were evaluated. The diffuse alveolar damage (DAD) score was higher at 6h, 12h and 24h in CLP-Saline than Sham group. BMDMCs therapy reduced DAD score at 6h and beyond. Lung mRNA expression of KC (inflammatory marker) was higher in CLP-Saline than Sham group at 6h, 12h and 24h. BMDMCs therapy reduced lung KC mRNA levels at 6h and beyond. In addition, lung mRNA expression of IL-10 (anti-inflammatory marker) was higher CLP-Saline group at 6h but reduced significantly after 12h. On the other hand, BMDMCs therapy maintained lung IL-10 mRNA expression on higher levels at 12h and 24 h. The acute kidney injury score revealed tubular injury at 6h and 12 h due to increased glomerular and interstitial inflammation. BMDMCs therapy reduced tubular injury at 6h and interstitial inflammation at 12h. In addition, the kidney mRNA expression of KIM-1 and IL-18 were higher in CLP-Saline than Sham group at 6h and 12h, respectively. BMDMCs therapy reduced KIM-1 (at 6 h) and IL-18 (at 12h and 24h), suggesting a reduction in renal cell damage. NGAL was also evaluated in kidney tissue. NGAL was higher in tubular epithelial cells in CLP-Saline group, while BMDMCs therapy reduced NGAL expression in all analyzed times. BMDMCs reduced both lung and kidney damage in a distinct time fashion behavior.

ID: 11054

Área Temática: Ê-POSTER | *Biologia e Doenças Respiratórias*

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**FeSBE2022 TREATMENT WITH PLANT-DERIVED BAUHINIA BAUHINIOIDES
KALLIKREIN PROTEINASE INHIBITOR IN AN ASTHMA-COPD OVERLAP
MODEL: IS IT EFFECTIVE?**

Introduction: There is a significant proportion of patients with mixed asthma and chronic obstructive pulmonary disease (COPD) phenotypes (asthma-COPD overlap - ACO). Plant-derived Bauhinia bauhinioides Kallikrein Proteinase inhibitor (BbKI) has been associated to potent anti-inflammatory and antioxidant effects and could be a potential new treatment for ACO. We had previously shown an effect on lung mechanics and inflammation in bronchoalveolar lavage fluid (BALF). **Aims:** To investigate the effects of BbKI treatment in a model of ACO and to compare to corticosteroid treatment. **Methods:** Fifty-six male Balb/c mice were divided into seven groups: SAL, OVA, ELA, ACO, ACO-BbKI, ACO-DX (dexamethasone) and ACO-DX-BbKI (dexamethasone and inhibitor BbKI). We evaluated: exhaled nitric oxide (eNO), inflammatory markers (IL-4, IL-5, IL-6, IL-13, TNF- α), remodeling markers (MMP-9, TGF- β , collagen fibers), oxidative stress marker (iNOS), linear mean intercept (Lm) and signaling pathway NF-Kappa-B. We used One-Way Analysis of Variance (ANOVA) followed by the Holm-Sidak for statistical analysis and considered significant $p < 0.05$. **Results:** After treatment, ACO-BbKI, ACO-DX and ACO-DX-BbKI groups decreased the eNO compared to ACO group ($p < 0.05$); Considering inflammatory, remodeling and oxidative stress markers, the treatment groups ACO-BbKI, ACO-DX and ACO-DX-BbKI decreased the positive cells to IL-5, IL-6, IL-13, MMP-9, TGF- β , collagen fibers, iNOS and NF-KappaB (in airways and alveolar septa) compared to ACO ($p < 0.05$), and TNF- α decreased only in alveolar septa ($p < 0.05$). The Lm in all treatment groups were attenuated compared to ACO ($p < 0.05$). There was no difference on the results on positive cells for IL-4 in the treatment groups compared to ACO. **Conclusion:** BbKI and dexamethasone treatments were similarly effective in reducing inflammation, remodeling and oxidative stress on experimental model of ACO.

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Área Temática: Ê-POSTER | Biomembranas, Transportadores e Sinalização

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**FeSBE2022 ATORVASTATIN REVERTS MCU AND CASPASE-9 OVEREXPRESSION
IN THE CORTEX OF CAFETERIA DIET-FED RATS**

Obesity's excessive accumulation of body fat can cause mitochondrial dysfunction and oxidative stress, ultimately leading to a neurodegenerative process by triggering apoptosis. Calcium is an intracellular messenger, which regulates many neuronal processes, including cell death. Atorvastatin (ATV) is a hypocholesterolemic and hypotriglyceridemic drug that has shown a neuroprotective effect against neurodegenerative diseases, such as obesity. The aim was to evaluate the expression of proteins associated with calcium signaling (Mitochondrial Calcium Uniporter - MCU) and apoptosis (Caspase-9) in the cortex of cafeteria diet-fed (CAF) rats treated with ATV. Male young (21 days old) Wistar rats weighing 45-60 g were divided into four groups: commercial diet-saline (CS), commercial diet-ATV (CA), CAF-saline (CFS), and CAF-ATV (CFA). ATV was administered daily by gavage at doses of 10 mg/kg, the same was applied for 0,9% saline solution. CAF groups received 20% sucrose supplemented water. On the 25th day of the experimental procedure, the animals were euthanized by guillotine and had their cortex dissected in order to assess the protein expression by western blot. This project was approved by the Ethics Committee on the Use of Animals (CEUA-UFSJ), under protocol number 028/2018. The values obtained for the analyzed parameters were (A.U.): 0.444±0.060 (CS), 0.396±0.087 (CA), 0.900±0.086 (CFS), 0.425±0.130 (CFA) - MCU; 0,550±0,027 (CS), 0,630±0,055 (CA), 0,965±0,058 (CFS), 0,557±0,024 (CFA) - Caspase-9. These results indicate that CAF increases calcium ions concentration in the cytoplasm, leading to an excessive influx into mitochondria through MCU, causing damage to the organelle. This process may lead to mitochondrial content extravasation, which culminates in the activation of the apoptosis intrinsic pathway mediated by Caspase-9. Further, a neuroprotective effect was exerted by ATV in CAF groups, and it can be associated with both MCU and Caspase-9 expression decrease.

ID: 10971

Área Temática: Ê-POSTER | Biomembranas, Transportadores e Sinalização

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**FeSBE2022 CAVEOLAE-MEDIATED ENDOCYTOSIS PRECEDES BLOOD BRAIN
BARRIER RUPTURE DURING CEREBRAL MALARIA: POSSIBLE INVOLVEMENT
OF BK/B2R AXIS**

Cerebral malaria (CM) is the major complication of *Plasmodium falciparum* infection. CM could culminate with blood brain barrier (BBB) disruption, however, the molecular mechanisms under this event are unclear. Our group showed that *P. falciparum* infected erythrocytes (Pf-iRBC) conditioned medium promotes loss in BBB integrity via activation of the kallikrein kinin system. We aimed to verify the role of bradykinin (BK) on protein transcytosis in brain endothelial cells during malaria infection. Human brain microvascular endothelial cells (hBMEC) were incubated overnight with Pf-iRBC conditioned medium (CEP-HUCFF 074/10), or BK. Experimental cerebral malaria (ECM) model was used to analyze the integrity of BBB in vivo (008/18). Pf-iRBC conditioned medium increased albumin endocytosis (2.5-fold) in hBMEC (n=2). BK 10⁻⁷ M treatment mimicked the effect of Pf-iRBC conditioned medium in albumin endocytosis (n=2). The effect of BK was abolished by treatment with nystatin 25 µg/mL, a lipid raft inhibitor used to block caveolae-mediated endocytosis, but not by Pit-Stop 2 25 µM, an inhibitor of clathrin-mediated endocytosis (n=2). The pre-treatment of hBMEC with HOE-140 10⁻⁷ M, a bradykinin B2 receptor antagonist (B2R), prevented the effect of BK, showing a B2R participation in this process. Using ECM, we observed the leakage of BSA-FITC (i.v.) in the brain of infected mice (n=4), before the onset of cognitive impairment, assessed by SHIRPA score (n=4), and BBB breakdown, assessed by Evans Blue (n=4). Treatment with Nystatin (8 mg/kg), ameliorated the stability of BBB and cognitive impairment (n=4) in infected mice. Our data showed that BK through B2R induces caveolae-mediated albumin endocytosis in hBMEC. This process seems to precede BBB breakdown according to the findings on the in vivo model. These results, open new perspectives for understanding the pathogenesis of cerebral malaria.

FAPERJ, CAPES, CNPq.

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Área Temática: Ê-POSTER | Biomembranas, Transportadores e Sinalização

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FeSBE2022 PARTICIPATION OF CENTRAL IRISIN IN CARDIORESPIRATORY AND METABOLIC CONTROL OF ADULT RATS

The expression and action of irisin in various tissues demonstrates its important role in the different physiological systems, however, little is known about the participation of irisin in cardiorespiratory and metabolic control. Therefore, the present study evaluated the effect the intracerebroventricular (icv) injection of vehicle or irisin (IR, 0.425 and 1.66 $\mu\text{g}/\mu\text{L}$) in the fourth ventricle on the cardiorespiratory and metabolic control during wakefulness and sleep under room air, hypercapnia (7% CO₂) and hypoxia (10% O₂) in adult male Wistar rats. All protocols were approved by the local ethics committee (CEUA - protocol n° 3337/20). Our data show that the two doses of IR promoted a reduction in basal ventilation (VE) during wakefulness, due to a reduction in respiratory frequency (fR). No difference was observed in metabolic rate (VO₂); however, the treatment with the lower dose reduced the air convection requirement (VE/VO₂). Exposure to high levels of CO₂ resulted in a greater increase VE and tidal volume (VT) in animals treated with higher dose of IR. In addition, this dose promoted a reduction of VO₂ which caused a higher VE/VO₂ under hypercapnia. Both doses of IR attenuated the hypoxia-induced regulated hypothermia. Regarding the cardiovascular parameters, central injection of IR at both doses caused an increase in heart rate (HR) in all conditions during wakefulness and sleep. Our results suggest that IR exerts a tonic inhibitory effect on breathing control and potentiates the hyperventilatory response under hypercapnia by action stimulating VE and inhibiting VO₂ during wakefulness. Further, this myokine is excitatory to HR and attenuates the drop in body temperature under low O₂ conditions.

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Área Temática: Ê-POSTER | Biomembranas, Transportadores e Sinalização

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FeSBE2022 THE EMC PROTEIN COMPLEX IS REQUIRED FOR THE ATTACHMENT OF THE RAS ONCOPROTEIN TO THE CELL MEMBRANE

The Ras proteins are small GTPases that propagate proliferation signals from the plasma membrane to downstream effectors of the mitogen-activated protein kinase (MAPK) pathway. All Ras isoforms (H-Ras, K-Ras and, N-Ras) must undergo post-translational modifications in the endoplasmic reticulum. Notably, the prenylation (lipidation) of Ras is crucial for it to acquire enough hydrophobicity for attachment to the cell membrane. Importantly, the endoplasmic reticulum membrane protein complex (EMC) plays roles in a wide range of cellular functions, including folding of transmembrane proteins and lipid biosynthesis. Mutation and overexpression of EMC genes have also been observed in many cancers, even though their roles in tumorigenesis remain unclear. Thus, we postulated that the EMC protein complex could be involved in the Ras post-translational modification pathway. Here, we report that gene silencing of either EMC1 or EMC3 results in the suppression of the tumoral phenotype induced by RasV12 in the eye of *Drosophila melanogaster*. Similarly, the knockdown of the same EMC subunits in the non-tumorigenic HEK-293T cells impaired the proper H-Ras prenylation, as detected by using the Triton X-114 partitioning assay. Moreover, confocal microscopy imaging revealed a massive intracellular retention of GFP-HRasV12, indicating an interruption of its traffic through the secretory pathway toward the plasma membrane. Accordingly, when the MAPK pathway was inhibited by serum starvation, exogenous expression of GFP-H-RasV12 was sufficient to trigger ERK phosphorylation in control cells, but not in the EMC knocked-down cells. These cells also showed resistance to malignant transformation induced by GFP-H-RasV12, which is observed by the reduction of transformed cell features, such as lamellipodial extensions and focus formation. Therefore, we conclude that the EMC complex is required for H-Ras prenylation, anchorage to the plasma membrane and its oncogenic functions.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 ADMINISTRATION OF RESVERATROL IN EXPERIMENTAL CEREBRAL PALSY: ANALYSIS OF POSTURE AND MUSCLE STRENGTH IN RATS

A Paralisia Cerebral (PC) é a deficiência física mais comum na infância. Essa doença é definida como um grupo de distúrbios que afetam o movimento, a postura e o equilíbrio de um indivíduo. Os achados clínicos, decorrentes de uma lesão no cérebro em desenvolvimento, são permanentes e não progressivos, mas podem mudar com o tempo devido ao tratamento e à plasticidade do sistema nervoso em maturação. Os sintomas de PC incluem irregularidades nos movimentos e na postura, além de distúrbios intelectuais, cognitivos e sensoriais, além de distúrbios comportamentais. Nas crianças com PC, problemas posturais desempenham um papel central na disfunção motora. O desempenho das atividades cotidianas é notavelmente influenciado por tais déficits posturais; a extensão desses déficits, no entanto, varia com o grau da deficiência. Assim, o objetivo deste estudo foi de investigar os efeitos do tratamento neonatal com Resveratrol sobre o desenvolvimento postural e a função motora de ratos submetidos a um modelo de paralisia cerebral. Foram utilizados ratos machos Wistar alocados em quatro grupos: Controle salina (CS, n=17), Controle resveratrol (CR, n=11), PC Salina (PCS, n=15), e PC resveratrol (PCR, n=14). A análise de força muscular foi feita através do teste de força da preensão dos membros anteriores nos dias 22 e 28 de vida pós-natal. A postura foi analisada nas idades de 14, 21 e 28 dias de vida pós-natal. Os parâmetros avaliados foram: alinhamento da cabeça e do tronco na postura horizontal. Na análise da força muscular o grupo CS apresentou maior força em comparação ao grupo PCS, da mesma forma, o grupo PCS demonstrou menor força, quando comparado com o grupo PCR. No P28, os animais do grupo PCS apresentaram uma maior angulação de tronco, comparados ao grupo PCR. Da mesma forma, o grupo CS apresentou uma maior angulação em comparação com o grupo CR. A análise do alinhamento da cabeça mostrou que os animais do PCS apresentaram maior angulação em comparação com o grupo. No P28, o grupo PCS apresentou maior desalinhamento da cabeça comparado com o grupo PCR. Concluiu-se que a administração neonatal de resveratrol foi capaz de provocar efeitos benéficos na força muscular e na postura de animais submetidos a paralisia cerebral.

Keywords: Cerebral Palsy, Animal Models, Phenotypic Plasticity, Posture.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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**FeSBE2022 ATRIAL NATRIURETIC PEPTIDE (ANP) ACTION ON URINARY
BLADDER AND CARDIOVASCULAR PARAMETERS IN FEMALE RATS.TITLE
ATRIAL NATRIURETIC PEPTIDE (ANP) ACTION ON URINARY BLADDER AND
CARDIOVASCULAR PARAMETERS IN FEMALE RATS.**

Different peptides released during hydroelectrolytic imbalances as angiotensin II, vasopressin and oxytocin in the plasma have been shown to exert actions in the urinary bladder. The ANP is released during hypervolemic conditions, nevertheless, it is still unknown if this peptide can affect the urinary bladder (UB) control. This study aimed to investigate the effects of ANP on intravesical pressure (IP) and cardiovascular parameters. Adult female Wistar rats (~250 g, protocol CEUA-FMABC#22/2018) were isoflurane anesthetized and underwent a cannulation of the femoral artery and vein for mean arterial pressure (MAP) and heart rate (HR) recordings, and infusion of drugs, respectively. The UB was cannulated for IP measurement. Doppler flow probe was placed around the left renal arterial for renal blood flow (RBF) recordings. After the baseline MAP, HR, IP and RBF recordings for 15 min, ANP (10 µg/kg) or saline (vehicle) were administrated intravenously (i.v.) or topically (in situ, in a volume of 0.1 mL) onto the UB and the parameters were recorded for additional 30 min. Data are as mean±SEM and submitted to Student's t test (P<0.05). The ANP administrated i.v. (n=6) evoked a significant hypotension (-31±1 vs. -1±1 mmHg), tachycardia (20±9 vs. 5±3 bpm), increase in renal conductance (RC, 57.2±13.1% vs. 1.6±1.4%), and in IP (109.3±17.1% vs. 0.8±3.6%) compared to saline (n=6). The in situ administration of ANP (n=6) on the UB elicited no significant changes in MAP (-7±3 vs. -1±1 mmHg), HR (2±3 vs. 0.3±3 bpm), and RC (4.1±16.8% vs. -0.3±1.0%) in comparison to saline (n=6), nevertheless, yielded a significant increase in IP (16.0±5.8% vs. 0±0% saline). Therefore, the ANP can affect the UB control, increasing the IP, and this effect is not necessarily dependent on increases in urinary volume due to vasodilation in the renal artery and changes in cardiovascular parameters.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 CORTICAL MALFORMATION INTENSIFIED ICTOGENESIS, CORTICAL OSCILLATIONS ABNORMALITIES AND DECREASED ANXIETY-LIKE BEHAVIOR IN THE WISTAR AUDIOGENIC RATS

Wistar Audiogenic Rats (WAR) is an inbred rodent strain susceptible to audiogenic seizures. However, spontaneous epileptic seizures (SES) or EEG abnormalities have not been reported in WAR kindled animals. The same is true for naïve WARs (without sound-induced seizures). An approach to increase epileptogenesis would be to use a second insult. To address this issue we aimed to evaluate the occurrence of SES, the modification in cortical oscillation patterns and behavior in adult naïve WARs exposed to neonatal cortical freeze-lesion (FL) to induce microgyria. The cortical FL was performed at P0 in male Wistar and naïve WARs (Wis-FL and WAR-FL). Sham animals were used as controls (Wistar-S and WAR-S). Video-EEG recordings and behavioral tasks to evaluate occurrence of SES, cortical oscillation patterns and behaviour were performed during adulthood. (Ethical committee approval CEUA UFRGS # 37310). Spike-wave discharges (SWD) associated with behavior arrest were detected not only in WAR-S, but also longer and more frequent in WAR-FL animals. The EEG quantitative analysis revealed a decreased power of cortical delta, theta and beta oscillations in WAR-S, decreased power of cortical fast gamma (FG) oscillations in WARs, independent of microgyria. The WARs, independently of microgyria, had reduced locomotor activity, but only WAR-FL animals had reduced anxiety-like behavior. Naïve WARs display absence-like SWD associated with abnormal cortical oscillation patterns and reduced exploration in novel environment. However, when combined with cortical microgyria, changes in cortical oscillations and SWD absence-like seizures were intensified and anxiety-like behavior was reduced. These findings suggested advantages of WAR-FL model to study epileptogenesis.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 EFFECTS OF DIFFERENT DIETS AND PROBIOTIC SUPPLEMENTATION DURING PREGNANCY ON PLACENTAL MORPHOLOGY AND CYTOKINES AND BIOCHEMICAL PARAMETERS IN MICE

The maternal diet has a direct relation with the development of offspring and health gestational. In this context, our objective was to investigate the effects of interventions in the maternal diet and probiotics (PB) supplementation during pregnancy on morphology, biometry, and inflammatory mediators in the placenta, in addition to maternal serum biochemical parameters. Female mice received standard (CONT), restrictive (RD) by 30% less than control intake, or high-fat (HFD) diets for 16 weeks, during mating and pregnancy, until the 18th gestation day (GD) (CEUA#273/20). During pregnancy, the CONT and HFD groups received by gavage the PB *Lactobacillus rhamnosus* LB1.5, viable counts were $1,3 \times 10^8$ ufc/ml, 3 times a week. On the 18th GD, the females were euthanized, and the trunk blood and placenta were collected. In the blood, serum concentrations of glucose (GLI), total cholesterol (TC), and triglycerides (TRI) were analyzed and in the placenta, its morphology and inflammatory cytokines were analyzed. During gestation the HFD-fed dams showed an increase in body weight gain from the 13th week of treatment when compared to the RD and CONT groups, the HFD group was a significant increase in body weight in the last week of gestation when compared to dams in the RD and CONT+PB groups. There was no significant difference in the number of pups, fetal resorption, viability rate, inflammatory mediators in the placental, GLI, TC and TRI analyzed in the serum of the mothers who received different diets or in the groups with PB supplementation. Regarding placental morphology, HFD and HFD+PB showed increased thickness of the labyrinth zone when compared to CONT+PB. These findings suggest that the diets used in this model, as well as PB supplementation during pregnancy, did not alter the gestational viability rate, inflammatory mediators in the placenta, or the biochemical parameters studied. However, HFD promotes an increase in placental labyrinth zone thickness.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 EFFECTS OF DIFFERENT MATERNAL DIET ON ADIPOSE TISSUE INFLAMMATION AND LIVER TISSUE OXIDATIVE STRESS IN DAMS MICE AND THEIR FEMALE OFFSPRING

The DoHad hypothesis brings the context of a predictive adaptation of the fetus in response to the intrauterine environment. In this context, we investigate the effects of dietary interventions on dams and their offspring, evaluating the morphological characteristics of the liver related to inflammation and oxidative stress, and the inflammatory response of adipose tissue (AT). Female albino mice of the BALB/c strain (60 days old) were randomly divided into three groups according to the diet: standard (CONT), hypercaloric (HD) or restriction (RD). The progeny were weaned at 21 days and divided into two groups (CONT or RD), forming the following groups: CONT/CONT, CONT/RD, RD/CONT, RD/RD, HD/CONT, and HD/RD until the 100 days old (CEUA#388/15). Our results showed that HD-fed dams had fatty liver disease associated with metabolic dysfunction and increased TNF- α concentration when compared to dams in the RD and CONT groups, indicating a pro-inflammatory state. Regarding oxidative stress parameters in liver, we found an increase in malondialdehyde concentrations and catalase (CAT) activity in HD compared to RD and CONT groups. Also, superoxide dismutase (SOD) activity was decreased in RD compared to CONT, and the SOD/CAT concerning RD and HD groups compared to CONT. The maternal diet only promoted an increase in SOD in RD/RD compared to HD/RD among the offspring. These results indicated that the maternal diet can produce pro-inflammatory effects in the progeny. In dams AT, there was a significant increase in the inflammatory infiltrate in the RD group when compared to the CONT. The progeny of the HD/CONT group showed a significant increase in the inflammatory infiltrate concerning the CONT/CONT and RD/CONT groups, maternal diet negatively impacted offspring AT, as evidenced by increased tissue inflammation. In summary both HD and RD, during pregnancy and lactation, alter the liver and AT of dams. However, no liver damage was observed in the progeny during adulthood.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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**FeSBE2022 EFFECTS OF NEONATAL TREATMENT WITH RESVERATROL ON
SOMATIC DEVELOPMENT AND ONTOGENESIS OF REFLEXES IN MODEL OF
CEREBRAL PALSY**

Cerebral Palsy (CP) is characterized by delay in the acquisition of motor skills and impairments in neuromotor development. Currently, the treatment for CP is to manage the sequelae, it is seen that therapies aimed at reducing oxidative stress, interrupting the lesion cascade, are promising in neurological diseases where resveratrol stands out as a neuroprotective strategy. The study aim is investigate the effects of neonatal treatment with resveratrol on neuromotor development of rats submitted to a model of cerebral palsy. The study is of an experimental nature and was approved by the ethics committee in animal experimentation of the Center for Biological Sciences of the Federal University of Pernambuco, Recife – PE, Brazil (CEUA: 0009/2020). Male Wistar rats were randomized into experimental groups: Control+Saline (CS, n=12), Cerebral Palsy+Saline (CPS, n=11), Control+Resveratrol (CR, n=10) and Cerebral Palsy+Resveratrol (CPR, n=12). The CP model associated perinatal anoxia (P0 and P1) with sensorimotor restriction of the hind paws (P2 to P28). Pharmacological manipulation occurred from P3 to P21, where resveratrol 10mg/kg or saline intraperitoneally. Thus, the ponderal evolution, the myrinometric development, the somatic characteristics maturation and reflexes ontogeny were collected. The PC animals had lower body weight ($p<0.05$), lower latero-lateral axis of the skull ($p<0.05$), anteroposterior axis of the skull ($p<0.03$), longitudinal axis ($p<0.05$) and tail length ($p<0.05$) compared to the control (CS). Furthermore, there was a delay in eye opening ($p<0.05$) and in the maturation of the palm grip reflexes ($p<0.0003$), free fall ($p<0.0001$) and negative geotaxis ($p<0.04$) in PC model. Treatment with resveratrol in PC model increased the animals' body weight compared to the PCS group ($p=0.01$), reversed the growth deficit in tail length ($p=0.001$) and in the longitudinal axis at 6 ($p=0.009$), 9 ($p=0.002$) and 12 ($p=0.007$) days of postnatal life compared to the PCS group. PC animals treated with resveratrol also showed reversal of the delay in the disappearance of the free fall reflex ($p<0.03$) and negative geotaxis ($p<0.04$) compared to animals in the PCS group. Treatment with Resveratrol did not influence the maturation of the physical characteristics of the animals. CP model leads to damage to somatic development, the maturation of physical characteristics and the ontogenesis of reflexes in rats, while neonatal treatment with resveratrol was able to reverse short-term developmental damage.

ID: 10984

Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 EFFECTS OF PREDNISONE AT DIFFERENT TREATMENT TIMES ON BIOCHEMICAL PARAMETERS OF WISTAR RATS.

Prednisone is an anti-inflammatory drug widely used for the treatment of several diseases. Moreover, there are numerous adverse effects related to its use, especially in relation to metabolism profile, generating interest in evaluating the influence of the treatment time and the dose used. Thus, the objective of this study was to evaluate the effects of prednisone at different treatment times on biochemical serum markers. For this, 32 male Wistar rats were used, which were divided into 4 groups: P7, P14, P28 and P56, where each group received a daily oral dose of prednisone, 5 mg/Kg/day for respectively: 7, 14, 28 and 56 days. This study was approved by the local Ethics Committee (CEUA) under protocol number 23108.087994/2020-10. On the last day of treatment, a total leukocyte count was performed. The animals were anesthetized and killed by decapitation for serum collection, used for the analysis of biochemical parameters: high density lipoprotein (HDL), triglycerides (TG), total cholesterol (TC), non-HDL cholesterol (n-HDL), proteins total (PT), Albumin, Alanine aminotransferase (ALT) and Aspartate aminotransferase (AST) enzyme activity. Data were considered statistical when $p < 0.05$. There was a decrease in total leukocytes in groups P28 (5.1 ± 3.4) and P56 (5.5 ± 1.6) when compared to P7 (10.1 ± 4.0) and P14 (10.7 ± 2 , two). The biochemical parameters showed the groups P28 (109.9 ± 27.6) and P56 (122.1 ± 45.9) increased CT concentrations in comparison to group P7 (67.4 ± 19.8). Also, the n-HDL was increased in groups P28 (105 ± 27.0) and P56 (105.0 ± 27.0) compared to P7 (59.0 ± 15.7) and there was a decrease in albumin in groups P28 ($4.4 \pm 0, 3$) and P56 (4.4 ± 0.2) in compared to the P14 group (4.9 ± 0.3). We can conclude the extensive treatment with prednisone have potential to modify the lipidic serum profile to hyperlipidemia and leucopenia, worsening the natural defenses of the organismo.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 EFFECTS OF THE ASSOCIATION BETWEEN PERIODONTAL DISEASE AND DIABETES MELLITUS ON PREGNANCY IN RATS AND THEIR OFFSPRING

Periodontitis is among the most prevalent oral diseases; one of its main risk factors is Diabetes mellitus (DM). Both diseases cause negative pregnancy impacts, and their association could cause greater harm to the mother and offspring. The objective of this study was to evaluate the repercussions of diabetes and periodontitis association on rat pregnancy and their newborns. This project was approved by the Ethics Committee for Use of Animals (UFMT - nº 23108.088014/2020-4). Female Wistar rats (n=10; 90 days old; 220 g) were mated to obtain the offspring. Diabetes was induced in females 24 hours after birth, through Streptozotocin injection, and confirmed after 110 days through oral glucose tolerance test (OGTT). The rats were mated, and after confirmation of pregnancy, periodontitis was induced. The rats were then divided into four experimental groups (n=12/group): nondiabetic with and without periodontitis, and diabetic with and without periodontitis. On the 17th day, the OGTT was performed, and on the 21st day, the rats were euthanized to remove organs for weighing. Maternal blood samples were collected for immunological and biochemical evaluation. The hemimandibles were collected for analysis of alveolar bone. The uterus was removed for evaluation of reproductive performance parameters and the newborns were weighed and analyzed for the presence of anomalies. Results showed that the group with DM and periodontitis association presented an increase in blood glucose, degree of alveolar bone loss, relative pancreas weight, high triglycerides, VLDL-cholesterol and ALT concentration, in addition to an increase in pre-implantation losses compared to control group. The newborns in this group showed increased fetal and placental weight, ossification centers and percentage of visceral and skeletal anomalies. Therefore, data shows that maternal diabetes and periodontitis combination causes negative impacts both on maternal parameters and fetal development.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 EVALUATION OF MEMORY ALTERATIONS THROUGHOUT LIFESPAN OF AN ANIMAL MODEL OF DOWN SYNDROME.

The Ts65Dn is the best-established animal model for studying Down syndrome. Previous studies reveal that this animal has learning deficits and progressive memory loss associated with the aging process. However, there is an absence of studies that have evaluated the memory throughout its lifespan. This study aims to evaluate changes in short and long-term memories throughout a lifespan of a Down syndrome animal model. For this, the trisomic Ts65Dn animals and their non-trisomic littermate (females and males were used) were submitted to the Object Recognition test at the ages of 2, 5, 8, 14, 20 and 24 months. This study was approved by the ethical committee of the Faculdade de Medicina da Universidade de São Paulo (n°1391/2019). To perform the test, circular arenas (40x50cm) and Lego-type toys were used. During the training session the animals were exposed to the arena with two identical objects for 5 minutes. After 1 hour, aiming to assess short-term memory, the animals were re-exposed for 5 minutes and one of the already known objects was exchanged for a new object. The next day, the animals returned to the arena and one of the objects was replaced by a new one, this phase also lasted 5 minutes and was intended to assess long-term memory. Comparing the groups (trisomic vs non-trisomic) at each evaluated age, by a Student-T test, we found: 1) Decreased short-term memory index of trisomic animals at 2 months ($t=2,545$; $p=0,0181$) and 5 months ($t=2,885$; $p=0,0108$) compared to non-trisomic animals at respective ages; 2) Decreased long-term memory index of trisomic animals at 5 months of age ($t=2,283$; $p=0,0364$) and at 24 months of age ($t=2,667$; $p=0,0169$) compared to non-trisomic animals at respective ages. These results suggest that the memory of trisomic animals is impaired when compared to non-trisomic animals, what could be related to a delay in neurodevelopment, in young animals, and to an early aging process in old animals.

ID: 11008

Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 FLUOXETINE CHRONIC ADMINISTRATION ENHANCES LOCOMOTOR ACTIVITY AND INCREASES ANXIETY-LIKE BEHAVIOR IN YOUNG-ADULTS RATS FROM BOTH MATERNAL CONTROL AND HIGH FAT DIET

Maternal exposure to a high-fat diet during pregnancy and lactation periods can alter anxiety-related behaviour and the responsiveness of the serotonergic system to pharmacological treatment. This study aimed to evaluate the effects of chronic use of fluoxetine during the post-weaning period on anxiety-related behaviour in male young adult rats exposed to maternal high-fat diet. Twenty-seven female Wistar rats were used. After confirmation of pregnancy, the females were divided into two groups according to the diet received during pregnancy and lactation: Control (CTR=13) and High-fat/high-caloric (HH=14). In the ninth postnatal week, the CTR and HH groups were subdivided into two subgroups, according to the pharmacological manipulation received during seventeen days: saline (i.p.) or fluoxetine (10 mg/kg, i.p.). Considering the two manipulations, four experimental groups were formed: Control – Saline (CTRS, n=14); Control – Fluoxetine (CTRF, n=15); High-fat/high-caloric – Saline (HHS, n=15) and High-fat/high-caloric – Fluoxetine (HHF, n=15). Male pups were evaluated in the open field (OF), staircase (SC) and elevated plus maze (EPM). Maternal high-fat diet had no effect on anxiety-related behaviour. Regarding fluoxetine administration, the CTRF group showed increased distance travelled, decreased immobility time and increased grooming time in open field when compared to the CTRS group. Similarly, the HHF group showed increased distance travelled in elevated plus maze and increased number of rearing in both open field and staircase, when compared to the HHS group. In summary, chronic administration of fluoxetine led to hyperactivity and increased anxiety-related behaviour.

ID: 11210

Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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**FeSBE2022 HYPERPHENYLALANINEMIA-INDUCED DECREASE OF BDNF LEVELS
IN RAT STRIATUM DUE TO INHIBITION OF PLASMIN-REGULATED CLEAVAGE
OF PRO-BDNF**

Hyperphenylalaninemia (HPA) is the hallmark of phenylketonuria (PKU), an inborn error of the metabolism of phenylalanine. Brain injury is a clinical characteristic of PKU patients, although the pathophysiology of this damage is poorly understood. Therefore, the aim of this study was to investigate the levels, immunocontent and expression of brain-derived neurotrophic factor (BDNF), pro-BDNF, p11, tissue-type plasminogen activator (tPA), tropomyosin kinase B (TrkB) receptor, plasminogen-activator inhibitor-1 (PAI-1), and p75 receptor in striatum of rats submitted to acute HPA. Male 30-day-old Wistar rats received a single subcutaneous injection of phenylalanine (5.2 $\mu\text{mol/g}$) and pchlorophenylalanine (0.9 $\mu\text{mol/g}$). Control group received saline solution in the same conditions. One hour after the injection, animals were euthanized, and the striatum was isolated and used for the assays. Animals submitted to HPA presented lower levels of BDNF levels in striatum, compared to control animals. Moreover, pro-BDNF expression and immunocontent, as well as PAI-1, an inhibitor of the plasmin-regulated conversion of pro-BDNF to BDNF, expression was increased in striatum. Considering that alterations of BDNF levels may impair synaptic plasticity, cell survival and memory/learning processes, it is tempting to speculate that our results might be related to the brain damage found in PKU patients.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 IMPLICATIONS OF NEONATAL TREATMENT WITH L-TRYPTOPHAN ASSOCIATED WITH GLUCOSE ON MASTICATORY EFFICIENCY IN YOUNG RATS

Background: Children with cerebral palsy (CP) commonly have feeding difficulties resulting from multiple orofacial changes, including damage to masticatory muscles. Serotonin concentrations in the developing brain may contribute to an improvement in brain plasticity in children with CP and play an important role in the maturation of the craniofacial complex. Hypothesis: neonatal treatment with L- Tryptophan ameliorate masticatory efficiency in rats with cerebral Palsy. Aim: evaluate the effects of neonatal administration of L-tryptophan (L- TRI), a serotonin precursor amino acid, in association or not with glucose on masticatory efficiency in young rats. Methods: This study was approved by the Ethics Committee on Animal Use UFPE, parecer number: 0038 / 2016. 40 Wistar rats were randomly divided in groups were used: Saline (S, n10), LTryptophan + Saline (TS, n=10), Glucose (G, n=10) and L-tryptophan + Glucose (TG, n=10). Animals were kept under standard animal husbandry conditions. We evaluated the different groups: body weight gain, the motor parameters of mastication, muscle typing of the masseter, and mandibular dimensions. Results: The TG group showed a reduction in body weight, higher duration of rhythmic mastication period, and most masticatory cycles. The TS group made more masticatory sequences than the S group and have a lower duration of incision period than the S and G group. Animals of TS e TG groups increased muscle weight and the proportion of type IIA muscle fibers than the S e G. Conclusion: We concluded that treatment with L-tryptophan in association or not to glucose increases the masticatory efficiency in young rats.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 INCREASE IN SPONTANEOUS PHYSICAL ACTIVITY AND VISCERAL FAT REDUCTION IN C57BL/6J MICE AFTER EIGHT WEEKS LIVING IN NORMOBARIC HYPOXIA

It has been suggested that living at high altitudes can increase energy expenditure. However, whether or to what extent exposure to chronic hypoxia is capable of inducing spontaneous physical activity (SPA) is not yet known. SPA refers to activities of daily living, such as fidgeting, spontaneous muscle contractions, maintenance of posture, and ambulation. The energy cost for the SPA appears to represent almost a third of the total daily expenditure. Thus, the present study aimed to investigate the impact of 8 weeks of hypoxia on SPA and visceral fat deposits in male C57BL/6J mice (150 days old, ~30g). Twenty animals were divided into two groups, which lived under normoxic (NOR, n=10) or hypoxic (HYP, n=10) conditions (normobaric in both). HYP mice were housed in a specific tent (CAT, USA), where they were kept 18 hours a day (12pm to 6 am) with an inspired fraction of oxygen of 14.5%, simulating an altitude of 3,000m (Ethical Approval CEUA-#5509-1). Mice SPA was measured gravimetrically from force changes on the cage base. Sensors (load cells) recorded signals at 200 Hz for 18 hours a day throughout the study period for both groups (n=56 daily recordings). At the end of the experiment, the mice were euthanized to determine the VF, normalized by body mass (%bm). SPA in HYP (205.5 ± 3.4 au) was significantly higher than in NOR (180.5 ± 3.2 au), showing that SPA is indeed affected by chronic exposure to hypoxia ($t=5.3$; $P < 0.001$). HYP (1.70 ± 0.2 %bm) had significantly lower VF than NOR mice (2.40 ± 0.2 %bm), supporting that chronic hypoxia may be sufficient to induce energy expenditure ($t= 2, 6$; $P=0.015$). Our findings demonstrate that 8 weeks of hypoxia exposure increases the SPA of mice, and this may lead to reduced VF accumulation. With the growing obesity epidemic, therapeutic approaches to increase SPA have been targeted. These observations provide evidence that chronic exposure to hypoxia can be employed as an approach to stimulating SPA.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 INFLUENCE OF PREDNISONE ON METABOLIC BIOMARKERS OF WISTAR RATS SUBMITTED TO CONTINUOUS EXPOSURE IN METABOLIC CAGE ASSOCIATED WITH ENVIRONMENTAL ENRICHMENT

Prednisone is an anti-inflammatory and immunosuppressive drug and it is also used by population that have free access and low cost. Also, the daily stress condition found in population can worry the use of that medication. Cortisol is a hormone released under stress conditions, corticosterone is released in rodents, both of which have immunosuppressive effects. Therefore, during animal research, it is essential to use methodologies that improve the natural behaviors of animals, such as environmental enrichment (EE), so it is possible to associate EE in a stressful environment metabolic cage with drug treatments that can alter the metabolism profile. The objective of this study was to evaluate the effects of prednisone on biomarkers of Wistar rats subjected to stress. 28 male rats were divided into 4 groups: Cage with vehicle (CV), Cage with Prednisone (CP), Metabolic Cage with vehicle (MCV), Metabolic Cage with prednisone (MCP), treated daily with Syrspend® vehicle or prednisone dissolved in vehicle 5.0mg/Kg/day, according to the group. This study was approved by the Local Ethics Committee (CEUA) under protocol number 23108.087994/2020-10. Body weight, blood glucose, water and food consumption were weekly evaluated. Total leukocyte count was performed on day 0 and day 28. Data were statistically evaluated by multivariate analysis (ANOVA) being considered statistical significance when $p < 0.05$. Regarding the total leukocyte count, there was a decrease in the MCP group when compared to the CV group on the last day: $CV(28) = 11164 \pm 2114$ vs. $MCP(28) = 7764 \pm 1832$; As for blood glucose, the increased values were observed in the CP group on day 0 compared to days 7, 21 and 28, $CP0 = 95.1 \pm 3.8$ vs. $CP7 = 113.0 \pm 5.3$ vs. $CP21 = 117.0 \pm 4.5$ vs. $CP28 = 117.0 \pm 5.8$. It is concluded that the treatment with prednisone interfered in the leukocyte profile, as well as in the glucose metabolism, and should be used with caution, and the EE can weak the collateral effect of this medication.

ID: 10879

Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 INFLUENCE OF MATERNAL DIABETES ON THE REPRODUCTIVE OUTCOMES OF FEMALE RAT OFFSPRING

Diabetes mellitus causes complications that affect embryonic, fetal, and post-natal development. This increases the risk of diseases in adulthood. The oral glucose tolerance test (OGTT) has been important for diagnosing diabetes for decades. This study aimed at evaluating the influence of maternal mild diabetes on the reproductive performance of their adult offspring at full-term pregnancy. The local ethics committee approved all of the study protocols. To obtain the paternal generation, Sprague Dawley rats received a beta-cytotoxic drug (streptozotocin) injection on the post-natal day 5, and the diabetes was confirmed by OGTT in adulthood (day 75 of life). The included rats were mated for obtaining the offspring. After the weaning, the female pups were distributed into 2 groups: OC – female offspring from the control mothers, and OD – offspring rats from the diabetic mother. On day 115 of life, the daughters were also submitted to OGTT. One week later, they were mated with healthy males for analysis of reproductive outcomes. On day 17 of pregnancy, both groups were submitted to an OGTT for evaluation of glucose tolerance, and at full-term pregnancy, the rats were anesthetized for a laparotomy for exposure of the maternal organs. The uterine horns, ovaries, fetuses, and placenta were weighed for fetal weight classification and placental efficiency. $P < 0.05$ was considered the statistical significant limit, and Pearson's correlation was used. There was a significant negative correlation between maternal fasting glycemia by OGTT and alive fetus number ($r = -0.60$; $p < 0.038$) that consequently influenced litter weight, which was also inversely x proportional to fasting glycemia ($r = -0.57$; $p < 0.049$). Thus, maternal fasting glycemia during pregnancy is a relevant biomarker related to the impaired reproductive performance of rat daughters. In addition, these findings show the damaging effects of maternal diabetes-induced fetal programming in adulthood of the successive generation.

Keywords: Diabetes; fetal programming; reproductive performance; pregnancy; rat.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 LEUKOCYTES, NEUTROPHILS, D-DIMER, AND LACTATE DEHYDROGENASE IDENTIFY OVERWEIGHT LUNGS IN COVID-19 PATIENTS AT HOSPITAL ADMISSION: SECONDARY CROSS-SECTIONAL ANALYSIS OF RANDOMIZED CLINICAL TRIAL

COVID-19 patients may show lung weight below or above the expected for their height but it necessarily requires computed tomography (CT) assessment, despite not available worldwide. Data about lung weight could be inferred by using clinical, laboratorial data as well as blood markers, mainly at hospital admission. We hypothesized that overweight lungs can be identified by using available laboratorial data, as well as specific blood markers. Furthermore, we sought to evaluate which variables may predict overweight lungs. Consecutive adult patients (≥ 18 years), requiring supplemental oxygen and admitted to hospital with COVID-19 symptoms were eligible for inclusion from April 20th to October 15th, 2020 in 19 hospitals in Brazil (NCT: 04561219). A series of potential predictors variables, as well as confounders variables were then analyzed, accordingly to the outcome variable, which was defined as excess lung weight. 93 patients were analyzed, 46 patients were classified as underweight ($\leq 0\%$ of excess lung weight) while 47 patients were classified as overweight ($> 0\%$ of excess lung weight). Leukocytes, neutrophils, D-dimer, and LDH, as well as IFNa2 were higher in patients with overweight lungs, while LIF was lower. According to CombiROC analysis, the combinations of D-dimer-LDH-Leukocytes, D-dimer-LDH-Neutrophils, and D-dimer-LDH-Leukocytes-Neutrophils achieved the highest AUC values with high accuracy to detect overweight lungs. The non-adjusted multiple linear regression models showed that male gender, hemoglobin, and leukocytes predicted the excess lung weight with moderate r^2 levels (0.51 to 0.52). Individual ROC curves of leukocytes, neutrophils, D-dimer, LDH identified overweight lungs, but when combined, better identification of overweight lung was achieved. Male gender, hemoglobin, and leukocytes predicted the excess lung weight with moderate r^2 levels (0.51-0.52) according to non-adjusted multiple linear regression model.

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FeSBE2022 PERINATAL MALNUTRITION ALTERS THE MORPHOLOGY OF MUSCLE FIBERS IN RATS WITH CEREBRAL PALSY

Background/aim: One of the most striking consequences of cerebral palsy (CP) is feeding difficulty, commonly resulting from multiple orofacial changes, including damages to masticatory muscles. The nutritional intake during the early stages of life appears to play an important role in the maturation of the craniofacial structures responsible for chewing. So, the aim of this study was to investigate the effect of perinatal undernutrition on the morphology of masticatory muscles in rats submitted to the CP experimental model. Methods: The project was approved by the Ethics Committee on Animal Use UFPE, N: 23076.025165 / 2014-10. A total of 20 male Wistar rats were randomly distributed into four groups: Nourished (NC, n = 5), Nourished - CP (NCP, n = 5); Undernourished (UC, n = 5) and undernourished - CP (UCP, n = 5). Animals of the PC group were subjected to an experimental model based on the combination of perinatal anoxia associated with sensorimotor restriction of the hind paws. On the twenty-ninth day of life, animals were euthanized to remove digastric and masseter muscles for analysis of weight, relative weight, and distribution of the types of muscle fibers. The results were expressed as mean and standard error. To compare the means of the experimental groups, we used the Anova Two-Way test ($p < 0.05$). Results: The relative and muscle weight of digastric and masseter was lower in the UCP group compared to the NCP group. In relation to fibers types proportions, animals in the UCP group showed an increase in the proportion of type IIA fibers in masseter and digastric compared to the NCP group. Furthermore, in the digastric, was observed reduction in type I fibers in the animals UCP group compared to NCP group. Conclusion: Perinatal undernutrition modifies the morphology of masticatory muscles in rats with CP, which may impair the grinding function, indispensable for adequate digestion.

ID: 10998

Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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FeSBE2022 RITALIN® TREATMENT DURING PERI-PUBERTAL PHASE LEADS TO INCREASED INSULIN AND GLUCOSE INTOLERANCE IN ADULT WISTAR RATS.

In recent years, methylphenidate, the active ingredient in the drug Ritalin®, has been increasingly administered to children and adolescents as a treatment for attention deficit hyperactivity disorder (ADHD). Recent studies point to the peri-pubertal phase as a window of susceptibility in the context of DOHaD concept. The aim of this work was to investigate the effect of Ritalin® treatment during peri-pubertal phase on body fat composition and metabolism in adult rats. The experimental protocol was approved by the Research Ethics Committee for Animal use and Experimentation at the State University of Maringa (n. 5343210520). Male Wistar rats received Ritalin® at a dose of 5 mg/kg of body weight from post-natal day (PN) 30 until PN 60 (Rit group), control animals received 0.9% saline in the same volume (Sal group). At PN 60 and PN 120 metabolic parameters were evaluated. Body weight and food intake was not different between groups ($p > 0.4$, $p > 0.6$, respectively). During the insulin tolerance test, the calculated insulin sensitivity (KiTT) was increased by 17.8% in Rit animals at PN 60 compared with control animals ($p < 0.02$) and at 120 days, the Rit animals showed an increase of 33.3% compared with Sal group ($p < 0.008$). During the oral glucose tolerance test, the glucose area under curve was increased in the Rit group at PN60 (+5.1%) and PN120 (+4.2%) compared with the Sal animals. The pancreas islets area was increased by 15.3% in Rit animals at PN 60 compared with Sal group ($p < 0.04$). At PN 120 there was no difference in the pancreas islet area between the groups. Treatment with Ritalin® in peri-natal life induces glucose intolerance in adulthood which may be compensated by an increased insulin sensitivity and increased pancreatic islets area.

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Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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**FeSBE2022 ROLES OF GLYPHOSATE AND 2,4-D HERBICIDES DURING
NONALCOHOLIC FATTY LIVER DISEASE: MORPHOLOGICAL AND
MICROBIOME OUTCOMES**

Nonalcoholic fatty liver disease (NAFLD), which is usually linked to western diet (WD), affects 25% of world's population, and involves the crosstalk of liver steatosis, hypertrophy/inflammation of adipose tissue (AT) and deregulation of gut microbiome. Glyphosate (GLY) and 2,4-D are some of the most applied herbicides worldwide, and their roles on NAFLD have not been investigated. Thus, we evaluated the effects of GLY and/or 2,4-D on NAFLD development. Male C57Bl/6 mice (n=10/group) were submitted to a WD model, receiving a fat-(30% lard, 0.02% cholesterol), and sucrose-rich diet (20%) and high sugar solution (23.1 and 18.9 g/L of fructose and glucose) for 6 months. Simultaneously, animals received GLY (0.05 or 5 mg/kg/day), 2,4-D (0.02 or 2 mg/kg/day) or their combination (0.05+0.02 or 5+2 mg/kg/day) by gavage (5×/week). Doses were based on the Acceptable Daily Intake (ADIs) levels. Liver and epididymal AT samples were collected for histological analysis, while cecal content was obtained for 16S rRNA sequencing. Data were analyzed by Fisher exact test or ANOVA/Kruskal-Wallis (posthoc Tukey, P<0.05). Data are shown as mean±standard deviation, or proportion. Herbicides did not change WD-induced glucose intolerance, obesity, adipocyte hypertrophy, and macrophage infiltration in AT; steatosis, proliferation (Ki-67) and apoptosis (caspase-3) in the liver. Nonetheless, 2,4-D (2 mg) enhanced the percentage of mice with moderate/severe hepatic inflammation and fibrosis (0% vs 50%, both) and CD68+ macrophage infiltration in the liver (363±140 vs 886±186 cells/µm²), and enhanced mast cells infiltration in AT (142±42 vs 245±124 cells/µm²). Only 2,4-D 2 mg enriched pro-inflammatory *Deferribacteres* phylum, and *Mucispirillum* genus (0.3% vs 1.5%). This exposure also depleted beneficial *B. acidifaciens* (0.13% vs 0.01%), while enriched ethanol-producing *B. fragilis* (0% vs 0.18%). 2,4-D exposure promoted liver inflammation and microbiome alterations during NAFLD.

ID: 11005

Área Temática: Ê-POSTER | Ciência de Animais de Laboratório

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**FeSBE2022 TRANSGENERATIONAL EFFECT OF HYPERGLYCEMIA ON THE
GLYCEMIA AND LIPID PROFILE OF GRANDDAUGHTERS FROM DIABETIC
RATS**

Introduction: During pregnancy, Diabetes mellitus causes numerous complications for the mother and the fetus. Studies have demonstrated that these changes negatively affect future generations. **Aim:** To evaluate the glycemia and biochemical profile of adult rats from grandmothers with diabetes. **Methods:** The study protocol was accepted for Ethical Committee of our institution. Female Sprague Dawley rats received streptozotocin (beta cytotoxic drug) during the neonatal period for mild diabetes induction. The non-diabetic females (control) received the citrate buffer (vehicle) in similar conditions. In adulthood, the control and were submitted to an oral glucose tolerance test (OGTT) and control rats presenting glycemia inferior to 140 mg/dL, and streptozotocin-induced rats with glycemia superior to 200 mg/dL were included in the groups. Following, the rats were mated to obtain their female offspring, which were maintained up to adult life. These adult rat offspring were mated to obtain granddaughters of mildly diabetic rats (GD). On day 115 of life, OGTT and area under the curve (AUC) were performed in GD and control (GC) rats. One week later, the rats were mated with normoglycemic males, and in a full-term pregnancy, were anesthetized with an overdose of sodium thiopental and killed to obtain blood samples for the serum triglycerides, total cholesterol, and insulin levels. A minimum confidence limit of 95% ($p < 0.05$) was considered. **Results:** In the OGTT, the GD rats had higher glycemia after 30 minutes after glucose load. In addition, higher AUC (GD: 125 vs GC: 110 mg/dL/min) was verified compared to the GC group, indicating higher circulating glucose levels in the blood. There was no difference in the total cholesterol and insulin levels. **Conclusion:** These findings confirm experimentally the effects of maternal diabetes on biochemical profile of three successive generations.

Financial Support: FAPESP (Process number 2016/25207-5), CNPq Research Fellowship (coordination of Dr. Damasceno DC), and grant of the Ph.D. scholarship by the Coordination for the Improvement of Higher Education Personnel (CAPES – GallegoSouza FQ).

ID: 10538

Área Temática: Ê-POSTER | Diferenciação, crescimento e morte celular

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FeSBE2022 COMPARATIVE ANALYSIS OF THE EFFECTS OF CURCUMA LONGA AND GINKGO BILOBA ON PATELLET AGGREGATION, CELL VIABILITY, MORPHOLOGY AND ENDOTHELIAL CICATRIZATION IN VITRO

Diseases such as atherosclerosis, diabetes, and hypercholesterolemia can interfere with homeostasis and favor clotting, activating the endothelium, which can promote the formation of thrombus, leading to the development of thrombosis. When the endothelium is injured and the subendothelial layer is exposed, clot formation is initiated. In these situations, the activated endothelium expresses and produces pro-coagulant and adhesive proteins, the leukocytes produce cytokines, initiating the inflammatory response, and platelets undergo activation and aggregation. Recently, medicinal plants have gained prominence as a treatment for various cardiovascular and inflammatory diseases. In this context, Curcuma Longa (CL) and Ginkgo Biloba (GB) stand out. In this work, we realized a comparative analysis of the effects of CL and GB extracts on cell viability, morphology, and cicatrization in vitro using HUVEC (Human umbilical cord vascular endothelial cells) treated or not with 10ng/ mL of TNF- α (to initiate the inflammatory process), we also analyzed platelet aggregation in the presence of these drugs. As result, we observed that in cells pre-treated with TNF- α , the concentrations of 50 and 100 μ g/mL of GB significantly increased cell viability, while 2.5 μ g/mL of CL increased viability in TNF- α treated and untreated groups. GB did not change HUVECs morphology. CL at 5 and 10 μ g/mL, induced cellular retraction and cytoplasmic vacuoles, suggesting impairment of cell structure and metabolism. In the cell cicatrization assay, both treatments were able to significantly increase cicatrization. Also, only GB, 25 μ g/mL significantly decreases platelet aggregation. This study demonstrates that the 24 h treatment with GB and CL improved cell viability and only GB altered platelet aggregation, suggesting that these drugs may use as preventive and as a treatment for cardiovascular diseases.

ID: 11234

Área Temática: Ê-POSTER | Diferenciação, crescimento e morte celular

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FeSBE2022 EFFECT OF BIO CERAMICS ON VIABILITY, PROLIFERATION, AND DIFFERENTIATION OF STEM CELLS

Bioceramics (BC) are materials used as implants to recover body parts. These biomaterials have been long known for their ability to regenerate hard tissues, such as bone, with a wide range of applications in the form of particles and coatings. The objective of the present research was to characterize and test the effects of the bioceramics Biosilicate®, hydroxyapatite (HAp), F18 and 45S5 on stem cell viability and osteogenic differentiation. The characterization of the materials was performed by pH evaluation and microphotographs. Stem cells (SC) from human teeth were used (ethical approval CAAE n° 45120921.0.0000.5347). The SC were exposed to the tested materials at 0 to 1.0 mg/mL. Cell viability was evaluated by MTT and differentiation by alkaline phosphatase (ALP). The pH of the biomaterials in culture media remained around 7.6 in the evaluations of 0, 4, 7 and 14 days.. Biosilicate®, HAp and F18 did not affect the stem cell viability on expansion media after 2 days at 0.25, 0.5 or 1.0 mg/mL and the cell viability was reduced by 0.5 and 1.0 mg/ml of 45S5 ($p < 0.01$). In osteogenic media, the viability of cells treated with 0.25 mg/mL 45S5 was reduced after 2 days ($p < 0.05$), and the cell viability after 7 days was similar for the groups of 0.25 mg/ml of biosilicate®, HAp, F18 and 45S5. The ALP quantification was similar in cells treated with 0.25 mg/ml of the BC in osteogenic media and the expansion media at 2 days. At 7 days, the ALP level was statistically superior for 0.25 mg/mL of the BC in comparison with non-differentiated control, except for HAp, which kept lower levels. These results indicate that Biosilicate®, F18, HAp and 45S5 can be considered non-cytotoxic at studied concentrations, and promising for a medicinal application that requires bioactivity and/or biocompatibility for bone regeneration.

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ID: 11245

Área Temática: Ê-POSTER | Diferenciação, crescimento e morte celular

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FeSBE2022 EVALUATION OF CYTOTOXICITY AND ANTIPROLIFERATIVE EFFECTS OF THE FLAVONE CIRSIMARIN IN DU-145 PROSTATE TUMOR CELLS IN 2D AND 3D IN VITRO MODELS

Phytochemicals, compounds of plant origin, stand out as good candidates for chemotherapy. Paclitaxel, vincristine, among others, are examples of phytochemicals used in clinical practice. In the present study, cirsimarin (CIR), a flavonoid extracted from *Scoparia dulcis* Linn, was evaluated for its effects on viability, proliferation, and death induction in prostate tumor cells (DU-145) cultured in 2D and 3D in vitro models. The influence of CIR (1-160 μM) on cell viability was evaluated in 2D culture, by the resazurin assay, after 24 h of treatment. In the 3D culture, cell death assays were performed by triple staining (Hoechst (Ho), fluorescein diacetate (FDA) and propidium iodide (PI)) and the clonogenic assay, after 72 h of treatment. CIR ($\geq 1\mu\text{M}$) reduced cell viability, with an IC₅₀ value of 0.70 μM , the reduction being like the chemotherapy drug docetaxel (100 μM). In 3D model, the DU-145 cells treated for 72 h with CIR (40, 80 and 160 μM) were in initial apoptosis, labeled only with FDA and with apoptotic bodies present (absence of PI labeling). Additionally, CIR (40, 80, and 160 μM) reduced colony formation demonstrating an antiproliferative effect. This is the first work that evaluates the effects of CIR flavone on DU-145 prostate tumor cells. Recently, our research group demonstrated low cytotoxic effect (IC₅₀>320 μM), besides antiproliferative and antimigratory effect in both models. Our results suggest a cytotoxic effect of CIR at low concentrations, with an IC₅₀ value lower than that previously obtained for breast cells in 2D model. As previously observed for MCF-7 cells, CIR also induced cell death by apoptosis and antiproliferative effects (CIR 40, 80, 160 μM) in 3D model, encouraging the performance of new assays to investigate the effects of flavone as a possible anticancer compound.

ID: 10851

Área Temática: Ê-POSTER | Diferenciação, crescimento e morte celular

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**FeSBE2022 THE METHANOLIC EXTRACT OF ANNONA TOMENTOSA R.E. FR.
DECREASED CELL VIABILITY, COLONY FORMATION, AND INTEGRITY OF
SPHEROIDS OF MCF7 CELLS**

The actual treatments used to fight breast cancer may result in many undesirable adverse effects and tumor resistance. This way, natural compounds have become an attractive alternative to cancer treatment for the lack of mild adverse effects and the possibility they bring to decrease the drug doses by combining them with the actual treatments. *Annona tomentosa* is a plant from the Annonaceae family, widely known for its anti-inflammatory, antioxidant, and anticancer properties, however, the biological activities of this plant on cancer are yet to be uncovered. Thus, in the present study, we evaluate the effects of the methanolic extract from the *Annona tomentosa*'s leaves on a 3D culture that better mimics in vivo conditions because they provide cells with the physical environment they need to interact naturally. MCF-7 cells were grown in multicellular tumoral spheroids (MCTS) and the extract was solubilized in phosphate buffer saline mixed with dimethylsulfoxide (solvent group) in equal parts. The positive control group was treated with docetaxel (100 µM). The extract of *Annona tomentosa* was evaluated at 10, 50, 100, 200, 300, 400, and 500 µg/mL. The cell colony formation assay was performed 72 h after the treatments of the spheroids. For the evaluation of the spheroid's integrity and area, they were photographed and treated every 72 h until 216 h. At the end of the integrity assay, the cell viability assay (resazurin) was performed. The *Annona* extract (≥ 50 µg/mL) decreased cell viability (resazurin assay), and colony formation (clonogenic assay). The treatment with concentrations of 100-200 µg/mL of *Annona* extract resulted in bigger and looser spheroids compared to the control groups, indicating that the extract influences cell-to-cell, and cell-to-matrix adhesions. Our results show that the *Annona tomentosa* extract has anticancer potential and that it should be investigated in future experiments.

ID: 10913

Área Temática: Ê-POSTER | Dor e Inflamação

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FeSBE2022 A META-ANALYSIS OF ADVANCED OXIDATIVE PROTEIN PRODUCTS (AOPPs) INVOLVEMENT IN MULTIPLE SCLEROSIS PATHOPHYSIOLOGY

Introduction: Multiple sclerosis (MS) is an autoimmune-mediate disease that damages the central nervous system with pathophysiological features not entirely understood. The increase of reactive oxygen species (ROS) possibly causes myelin and oligodendrocyte degeneration and generates new compounds through oxidative modifications, including advanced oxidative protein products (AOPPs). The AOPPs are oxidative stress biomarkers and inflammatory mediators commonly formed by hypochlorous acid oxidative action on albumin. Considering that AOPPs accumulation produces ROS and induces neurons apoptosis, these may represent a new target for drug development to MS treatment and a possible biomarker to monitor the severity of the disease. **Aims:** Investigate if there is an alteration in the AOPPs levels in MS and its possible involvement in patient disability and analyze whether drugs or compounds used in MS treatment could modify the AOPPs levels. **Methods:** The protocol was registered in PROSPERO (CRD42020203268). Publication bias was evaluated by Egger's, Begg's test, and funnel plots, and the quality of evidence by Newcastle-Ottawa Scale. We used the random-effects model, and the heterogeneity was measured using I². **Results:** The 10 articles included in meta-analyses presented a high quality of evidence. The AOPPs levels were increased in not-treated MS patients, and the increase in disability status was associated with AOPPs accumulation in not-treated MS patients. Additionally, the AOPPs levels were reduced in MS patients after treatment. **Discussion:** Meta-analyses have a high heterogeneity evidenced, and some factors can lead to this heterogeneity, such as clinical or methodological differences among the studies, as the use of serum as a sample in two studies, as differing patient populations, different MS clinical forms, and follow-up time of MS. **Conclusion:** AOPPs seem to play a role in MS pathophysiology and may become a new target for drug development and help MS diagnosis or treatment follow-up.

ID: 11100

Área Temática: Ê-POSTER | Dor e Inflamação

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FeSBE2022 BISEUGENOL, A PHENYLPROPANOID ISOLATED FROM OCOTEA CYMBARUM (LAURACEAE), ATTENUATES INFLAMMATORY ANGIOGENESIS INDUCED BY SPONGE IMPLANTS IN MICE.

New therapeutic agents, derived from natural products have been applied for the treatment of inflammatory diseases, or for the treatment of pathologies where inflammation is an important factor for its development. Several species of the genus *Ocotea* are used in traditional medicine due to their anti-inflammatory and analgesic properties. Thus, in this work we sought to investigate the effects of biseugenol, the main component of the hexane extract from the leaves of *Ocotea cymbarum* (Lauraceae), during a chronic inflammatory process induced by polyester-polyurethane sponge implants in C57BL/6 male mice (CEUA - 049/21). In addition to the inflammatory component, sponge discs also allowed us to evaluate parameters associated with the formation of new blood vessels, a process that, although independent, are related to the chronification of the inflammatory response. Daily treatment with biseugenol (0.1, 1 or 10 µg in 10 µl of 0.5% DMSO) inhibited the synthesis of inflammatory cytokines (TNF- α , CXCL-1 and CCL2) and the neutrophil and macrophage infiltrate into the implants, indirectly evaluated by the activity of myeloperoxidase and N-acetyl- β -D-glycosaminidase enzymes, respectively. In implants treated with biseugenol, we also observed a reduction in angiogenesis, assessed through histological quantification of mean number of blood vessels and the levels of the pro-angiogenic cytokines FGF and VEGF. Except for VEGF levels, all mentioned parameters showed significant reductions after treatment with biseugenol, when compared to the control group (treated only with 0.5% DMSO). Our results demonstrate the anti-inflammatory and anti-angiogenic effects associated with biseugenol administration and its potential therapeutic use for the treatment of a series of pathological conditions, where parameters associated with inflammation and angiogenesis are deregulated, such as tumor development and progression.

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ID: 10528

Área Temática: Ê-POSTER | Dor e Inflamação

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**FeSBE2022 CANNABIDIOL MODULATION OF GFAP AND IBA-1 IN
CORTICOLIMBIC CIRCUIT IN PRE-CLINICAL MODEL OF NEUROPATHIC PAIN**

Introduction: In the general population, the incidence of chronic pain is 6% to 8%, and its impact on quality of life. Cannabidiol (CBD) is considered a promising strategy for treating neuropathic pain. Our objective was to evaluate the possible modulation of the effect of CBD on IBA-1 and GFAP expression using systemic treatment with CBD (3 days) in rats submitted to sciatic nerve constriction (CCI), nociceptive tests (TN), and conditioned place preference (CPP). **Methods:** 80 Wistar rats (220 g) were used (CEUA-USP: 208.1.103.58.5). The rats were submitted to TN and rotarod on day zero, followed by a surgical procedure (CCI or sham-operated, SHAM). The development of neuropathy was followed for three weeks by TN (i-von Frey, hot plate ii and iii -acetone). The rotarod test was performed on the 18th day after the injury. Lidocaine (i.m. injured paw) was used as a positive and paired control in the context of a longer baseline stay. CBD (i.p.) was matched in the least preferred context at baseline. On day 24, rats were submitted to OF 4 hours after drug application. After 24 hours, the rats were exposed to the CPP test without drug application. Immunofluorescence for IBA-1, and GFAP in the anterior cingulate cortex (ACC), complex basolateral amygdala (BLA), and dorsal hippocampus (DH) regions. The two-factor ANOVA test was used, followed by the Tukey test, $P < 0.05$. **Results:** Treatment with CBD for three days at 3mg/kg i.p. showed an anti-allodynic effect ($P < 0.05$) in CCI rats (i, ii and iii, $P < 0.05$). IBA-1, and GFAP expression: ACC, BLA, and DH; condition factor (SHAM or CCI, $P < 0.05$) and treatment factor (Vehicle or CBD, $P < 0.05$). On the expression of FosB in ACC, BLA, and DH regions condition factor and treatment factor ($P < 0.05$). **Conclusion:** In the analyses, CBD 3 mg/kg treatment showed decreased IBA-1 and GFAP in the regions studied. These effects may explain CBD modulation effects on emotional modulation areas of chronic pain.

ID: 11256

Área Temática: Ê-POSTER | Dor e Inflamação

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**FeSBE2022 CYSTATIN-LIKE PROTEIN OF SWEET ORANGE, CSINCPI-2,
ATTENUATES SPONGE-INDUCED INFLAMMATORY PROCESS IN MICE.**

Cystatins are endogenous inhibitors of cysteine peptidases that are found practically in all living organisms. CsinCPI-2 is cystatin from sweet orange (*Citrus sinensis*) with inhibitory activity against human cathepsins B and K, which are cysteine proteases highly expressed in a variety of pathological conditions, usually marked by persistent inflammation and processing of the extracellular matrix. In this work we sought to investigate the effects of recombinant CsinCPI-2 during a chronic inflammatory process induced by polyester-polyurethane sponge implants in C57BL/6 male mice (CEUA – 021/19). A polyether-polyurethane sponge was used as the implanted material to provide the inflammatory environment. One sponge disc per animal was aseptically implanted into the dorsal region and treated with 0.01, 0.1 or 1 µg of the recombinant cystatin or PBS solution day-by-day (n = 10/group). Nine days post-implantation the sponge discs were collected and processed to analyze inflammatory markers, including myeloperoxidase and N-acetyl-β-D-glucosaminidase enzymatic activities (enzymes associated with the content of neutrophils and macrophages, respectively) as well as the levels of inflammatory mediators TNF-α, IL-10, CXCL1 and CCL2/JE/MCP-1. In implants treated with CsinCPI-2, we observed a reduction in inflammatory process, assessed through a reduction in MPO activity, TNF-α, CXCL1 and CCL2/JE/MCP-1 levels. We also found an increase in the levels of the anti-inflammatory cytokine IL-10 in implants treated with recombinant cystatin. Our results demonstrate the anti-inflammatory effects associated with recombinant CsinCPI-2 administration and elucidates its potential therapeutic use for the treatment of chronic inflammation.

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ID: 11267

Área Temática: Ê-POSTER | Dor e Inflamação

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FeSBE2022 EFFECTS OF TRANSCRANIAL DIRECT CURRENT STIMULATION ON PAIN MODULATION AND QUALITY OF LIFE IN WOMEN WITH FIBROMYALGIA: RANDOMIZED, TRIPLE-BLIND CLINICAL TRIAL

Introduction: Fibromyalgia (FM) is a syndrome characterized mainly by pain. It tends to affect more women because of their sexually dimorphic physiology of the dorsal root ganglia. Objectives: To evaluate the effects of 10 sessions of tDCS on the clinical characteristics of women with FM. Methods: Thirty-five patients diagnosed with FM were included, divided into 2 groups, tDCS active and tDCS sham. A tDCS device was used to deliver 2 mA for 13 minutes, a 20-minute break followed by an additional 13 minutes of stimulation per session, for 2 weeks with a 90-day follow-up. The primary outcome included changes in pain and the secondary outcome included changes in quality of life (QoL), the impact of disease (ID), and the correlation between pain and QoL. To assess the effects of tDCS, paired t-tests were used. Comparisons were performed using Tukey's adjustments. A p-value < 0.05 was considered significant. The effect size was calculated using Cohen's d and classified as: insignificant (<0.19), small (0.20 to 0.49), medium (0.50 to 0.79), large (0.80 to 1.29), and very large (>1.30). The spearman correlation between pain and QoL was used. Results: The active tDCS group showed improvement in pain after 10 sessions ($t[33] = -4.309$; $p < 0.001$; Cohen's $d = 1.45$), after 30 days ($t[25.6] = -5.614$; $p < 0.01$; Cohen's $d = -1.87$) and after 90 days ($t[29.5] = -5.599$; $p < 0.001$; Cohen's $d = 1.91$) when compared to sham tDCS. improvement in ID on D10 ($t[33] = -7.562$; $p < 0.001$; Cohen's $d = -2.56$, 95% CI, -3.45 to -1.67), on D30 ($t[33] = -7.682$; $p < 0.001$; Cohen's $d = -2.60$, 95% CI: -3.50 to -1.70) and D90 ($t[33] = -6.834$; $p < 0.001$; Cohen's $d = -2.31$, 95% CI: -3.17 to -1.45) in the active tDCS group and in all QOL domains. There was no strong correlation between the analyzed variables. Conclusion: The results of this study suggest that active tDCS with an intensity of 2 mA for 10 sessions was effective in improving pain and QoL in patients with FM.

ID: 10891

Área Temática: Ê-POSTER | Dor e Inflamação

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FeSBE2022 EVALUATION OF NOCICEPTION OBSERVED IN A TRAUMATIC MUSCLE INJURY MODEL IN RATS.

Muscle pain is the most prevalent type of pain globally, but treatment remains ineffective. Thus, it is relevant to develop trustable animal models to understand the involved pain mechanisms. Therefore, this study evaluated the nociception in rats' traumatic muscle injury model. A single blunt trauma impact on the right gastrocnemius muscle of male Wistar rats (250-350 g) (#6579280218/2018) was used as a model for muscle pain. Animals were divided into four groups (sham/no treatment; sham/diclofenac 1%; injury/no treatment; injury/diclofenac 1%) and the topical treatment with a cream containing 1% monosodium diclofenac (applied at 2, 6, 12, 24, and 46 h after muscle injury; 200 mg/muscle). We evaluated mechanical and cold allodynia, nociceptive score, and locomotor activity at 26 and 48 h after injury. We observed for the first time that traumatic muscle injury caused mechanical and cold allodynia and increased nociceptive score in this model. Besides, the animals showed no alteration in locomotor activity, which shows that this muscle injury model does not compromise animals' motor coordination. NSAIDs may prevent the muscle healing process after acute injury and impair muscle regeneration, leading to weakened muscles. In a previous study, the pretreatment with diclofenac decreases the inflammatory markers in the bloodstream, which interferes with the modulation of secondary muscle injury, and, consequently, causes muscle pain reduction. Paradoxically, other studies have shown that post-exercise diclofenac treatment does not reduce pain neither the mechanical or cold allodynia in an inflammatory pain model. Thus, our study standardized a model of traumatic muscle injury that does not alter the motor coordination in rats. However, it had no antinociceptive effect, suggesting the search for novel compounds effective for nociception reduction. Therefore, novel antinociceptive therapies more effective and safer could be tested in this proposed muscle injury model.

ID: 11252

Área Temática: Ê-POSTER | Dor e Inflamação

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FeSBE2022 EVALUATION OF THE ANTI-INFLAMMATORY ACTION OF TERPINOLENE/ β -CYCLODEXTRIN INCLUSION COMPLEX BY PROSTAGLANDIN (PGE₂)-INDUCED PAW EDEMA ASSAY

Terpinolene (TPO) is the terpene found in many plants with relevant biological activities such as analgesic, antioxidant, and sedative. This study aimed to evaluate TPO/ β -CD in its anti-inflammatory action by prostaglandin-induced paw edema test (PGE₂). Terpinolene has been complexed with β -cyclodextrin (TPO/ β -CD) by the co-evaporation method. For the experimental assays were used Swiss (*Mus musculus*) male and female mice were 75 days old (number=6/group) (CEUA/URCA, 346/2019- 2). Initially, the volume of the hind paws was previously evaluated by plethysmometry. Immediately thereafter, water and TPO/ β -CD (50 mg/kg) was administered orally (0.1ml/10g). After 1 hour, the animals received an intraplantar injection (20 μ L) of prostaglandin E₂ in the right hind paw and (20 μ L) of saline injection in the left paw. Paw volume was evaluated at the times of 15, 30, 45, 60, and 90 minutes (CAMPOS and CALIXTO, 1995). The result showed that TPO/ β -CD treatments reduced the percentage of edema in (each evaluation time: T15: 42.42%, T30: 47.62%, T45: 70%, and T60: 52%) when compared to the negative control group. The role of PGE₂ is essential in the vascular response and the adhesion and chemotactic functions of leukotriene LTB₄, allowing monocytes and neutrophils to be expelled from venules by blood cells, directed to the site of inflammation. Thus, it is suggested that TPO/ β -CD can promote the interference inhibiting the activation of PGE receptors, becoming a promising alternative to the treatment of inflammatory processes.

CAMPOS, M. M.; CALIXTO, J. B. Involvement of B1 and B2 receptors in bradykinin-induced rat paw oedema. *British Journal of Pharmacology*, v. 114, n.5, p. 1005, 1995.

ID: 10524

Área Temática: Ê-POSTER | Dor e Inflamação

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Instituição: USP

FeSBE2022 N-TYPE VOLTAGE-GATED CALCIUM CHANNELS, CAV2.2, ARE INVOLVED IN EXPERIMENTAL PAINFULL HERPETIC NEURALGIA IN MICE

Both herpetic (HN) and post-herpetic neuralgia (PHN) constitute the herpes zoster pain. Cav2.2 is a N-type high voltage-gated calcium channel involved in pain transmission in peripheral and central pathways, also being a target of drugs used for pain treatment. Herein, we aimed to assess the development of hypersensitivity in HN and PHN mice and the involvement of Cav2.2 by the administration of Pregabalin and Ziconotide and evaluation of Cav2.2 levels in the spinal cord. C57BL/6 male mice (8 weeks, 25g-30g, Ethical Committee n°2319150920) were inoculated with Herpes simplex virus (HSV-1 2x10⁷; 50 µl) as described by Silva et al. (J. of Neurosc. 37: 6408, 2017), and were evaluated for mechanical, heat and cold hypersensitivity by von Frey filaments, hot plate and acetone tests, respectively at 9 days post induction (dpi). General behavior was evaluated by rota rod test. Pregabalin (100mg/kg; 100ul i.p.) or Ziconotide (10pmol; 20ul i.t.) were injected and animals evaluated after 30 or 10 min, respectively. Fresh spinal cord samples were collected and Cav2.2 was analyzed by western blotting. Data is presented as mean ± S.E.M. and analyzed using GraphPad Prism by two-way ANOVA followed by Bonferroni post-hoc test. p<0.05). Pregabalin but not ziconotide induced antinociception (PGB- pre PGB: Sham+sal: 1.6±0.54; Sham+PGB: 0.96±0.24; HSV-1 +sal: 0.9±0.23 ; HSV-1 +PGB: 0.7±0.24 ; post PGB Sham+sal: 1.04±0.19 Sham+PGB: 1.80±0.45 HSV-1 +sal: 0.63±0.14; HSV-1 +PGB: 1.98±0.33; *p=0.0467); (ZCNpre ZCN: Sham+sal: 2.695±0; Sham+ ZCN: 1.475±0.68 HSV-1 +sal: 0.48±0.2 ; HSV-1 + ZCN: 0.64±0.12 ; post ZCN Sham+sal: 2.43±0 Sham+ ZCN: 1.15±0.464 HSV-1 +sal: 0.645±0.27; HSV-1 + ZCN: 1.22±0.37; p>0.05). No changes on locomotion were observed (PGB- pre PGB: Sham+sal: 1±0; Sham+PGB: 0±0; HSV-1 +sal: 0±0 ; HSV-1 +PGB: 0±0 ; post PGB Sham+sal: 0±0 Sham+PGB: 0±0 HSV-1 +sal: 0±0; HSV-1 +PGB: 0.33±0.33; p>0.05); (ZCN9dpi pre ZCN: Sham+sal: 0±0 Sham+ ZCN: 0±0 HSV-1 +sal: 0±0 ; HSV-1 + ZCN: 0±0 ; post ZCN Sham+sal: 0±0 Sham+ ZCN: 0±0 HSV-1 +sal: 0±0; HSV1 + ZCN: 0 ±0; p>0.05). Cav2.2 was increased in HN compared to Sham (HSV1: 1.33±0.1 n=9; HSV-1 Inactivated: 1.03±0.08 n=4; Sham 0.8±0.05 n=4; *p=0.01 Sham vs HSV-1). In conclusion our results demonstrate the involvement of Cav2.2. signaling on painfull transmission of HN mice.

ID: 11225

Área Temática: Ê-POSTER | Dor e Inflamação

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Instituição: Unicamp

FeSBE2022 PPAR γ RECEPTORS EXPRESSED ON THE SPINAL CORD DORSAL HORN MODULATE THE PREVENTION OF ACUTE AND PERSISTENT MUSCLE HYPERALGESIA INDUCED BY PHYSICAL EXERCISE

Introduction: The spinal cord dorsal horn is an important site of modulation of the pain process, and the PPAR γ receptors expressed on glial cells have been identified as a potential therapeutic target for treatment of chronic. Swimming exercise prevents the acute and persistent muscle hyperalgesia by modulation of macrophages and inflammatory cytokines via peripheral PPAR γ . Aim: Investigate whether the PPAR γ receptors on the spinal cord dorsal horn is involved in the prevention the persistent muscle hyperalgesia. Methods: Male Swiss mice (2 months old) from CEMIB-UNICAMP (CEUA - 5244-1). Carrageenan (100 μ g) was injected into gastrocnemius muscle to induce acute muscle hyperalgesia and 10 days later, PGE2 (1 μ g) was injected at the same local to reveal the state of persistent muscle hyperalgesia. Muscle hyperalgesia was measured by Randall-Selitto analgesymeter in different time points of acute (1-144h) and chronic pain (1-168h). Swimming exercise was performed in a volume of 50 min/day, 5 days/week, for 3 weeks, before carrageenan. The involvement of PPAR γ receptors was analyzed by the intrathecal injections (L5-L6) of GW9662 (PPAR γ receptor antagonist). Area Under the Curve was used to evaluate the acute and persistent period of muscle hyperalgesia and the statistical analysis was performed by ANOVA with Tukey post hoc test. Significance was set at $p < 0.05$. Results: Swimming reduced acute and persistent ($p < 0.0001$) muscle hyperalgesia. Pretreatment with GW9662 (15 μ g) before carrageenan in swimming exercise group reversed the prevention of the acute and persistent muscle hyperalgesia ($p < 0.0001$). To analyze role of PPAR γ receptors in the maintenance of the persistent stage, the GW9662 (15 μ g) pretreatment also reversed the prevention of the persistent muscle hyperalgesia ($p < 0.0001$). Our results showed that PPAR γ receptors expressed on the spinal cord dorsal horn modulate the prevention of acute and persistent muscle hyperalgesia induced by swimming exercise.

ID: 11265

Área Temática: Ê-POSTER | Dor e Inflamação

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Instituição: UNICAMP

FeSBE2022 SHORT-TERM SWIMMING OR STRENGTH PHYSICAL EXERCISE PERFORMED AFTER AN INFLAMMATORY INSULT PREVENTS THE PERSISTENT MUSCLE HYPERALGESIA

Introduction: Chronic pain is a worldwide health problem that affects thousands of people every year. Recently, we showed that regular swimming exercise performed before an inflammatory insult to gastrocnemius muscle prevents the development of persistent muscle hyperalgesia. Aim: We aimed evaluate whether short-term physical exercise performed after an inflammatory insult prevents persistent muscle hyperalgesia. Methodology: Swiss male mice, 2 months old, obtained from CEMIB/UNICAMP (CEUA - 5295-1). Carrageenan (100 µg) was injected into the gastrocnemius muscle to induce acute muscular hyperalgesia and, 10 days later, PGE2 (1 µg) was injected at the same site to evidence persistent muscle hyperalgesia. Mechanical muscle nociceptive thresholds were quantified by the Randall & Selitto test at different periods (1-168h). The physical exercise started 24 hours after the carrageenan injection. The first consisted of swimming 30-minute sessions per day, for 8 consecutive days, without load or with loads corresponding to 1.5, 3 and 4% of the animal's body weight. The second protocol consisted of strength exercise, with 3 sessions, 24-hour intervals between them and 3 repetitions on a vertical ladder, with the increase in load determined by the test of maximum voluntary load capacity (20, 40 or 60 %). AUC was used to assess the persistent period of muscle hyperalgesia and statistical analysis was performed by ANOVA with Tukey's post hoc test. Significance was set at $p < 0.05$. Results: Swimming exercises with all loads and without load were efficient in preventing persistent muscle hyperalgesia ($p < 0.05$). Loads of 3 and 4% increased behavioral nociceptive responses in saline/PGE2-injected animals ($p < 0.05$). For strength exercises, all loads were efficient in preventing persistent muscle hyperalgesia ($p < 0.05$). Conclusion: Our results showed that both physical exercise protocols were efficient in preventing persistent muscle hyperalgesia.

ID: 11271

Área Temática: Ê-POSTER | Dor e Inflamação

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Instituição: UFRJ - Macaé

FeSBE2022 VITEX POLYGAMA LEAF EXTRACT ALLEVIATES VINCRISTINE-INDUCED NEUROPATHIC PAIN IN MICE: MULTIPLE MECHANISMS ACTION

Neuropathic pain is a public health problem, and pharmacological treatments are inefficient or cause several side effects. Our previous work showed that Vitex polygama extract (VPE) was able to reduce both inflammatory and neuropathic pain. In the present work we studied the possible mechanism of action of VPE. Neuropathic pain was induced in Swiss female mice (30-35g) by intraperitoneal injection (ip.) of vincristine (0,1 mg/kg) for 10 days and thermal hyperalgesia and mechanical allodynia was attested by the hot plate test. VPE were injected (30 mg/kg ip.) 1h before the nociception evaluation. Saline (0,9% NaCl) or morphine (10 mg/kg) were used as negative and positive controls, respectively. To evaluate the possible mechanism of action animals were treated ip. with the classical opioid receptor antagonist (Naloxone, 1 mg/kg), or the muscarinic receptor antagonist (Atropine, 2mg/kg), or the nitric oxide synthase inhibitor (L-Name, 30mg/kg) 1 hour before VPE. All experiments were approved by the UFRJ Animal Care and Use Committee under protocol #MAC051. Vincristine induced pain in animals as observed by the decrease of hind paw raise latency (5.03 ± 0.25 s) when compared with saline treated group (11.95 ± 1.11 s) on the hot plate test. When animals treated with VPE was observed an analgesic effect in all doses used. For purposes of effect comparison treatment with 10 mg/kg of VPE produced a latency of 10.6 ± 1.3 s compared with the 8.75 ± 1.11 s of morphine, 1 hour after treatments. The pharmacological treatments significantly affected the analgesic effect of VPE showing latency times of 3.75 ± 0.95 s for atropine, 8.0 ± 1.89 s for naloxone and 6.5 ± 2.65 s for L-NAME. These data indicate that opioid receptors, muscarinic receptors, and nitric oxide have a paper for the effects of VPE. Thus, we concluded that VPE an anti-nociception effect on vincristine-induced neuropathic pain by a multiple mechanism of action.

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ID: 10955

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

Autores: Luiza L'Apicciarella Marcela Lemos Marina Durand Reinaldo Bestetti

Instituição: UNAERP

FeSBE2022 “WHICH HORMONE IS THIS?”: AN EDUCATIONAL CARD GAME TO REINFORCE ENDOCRINE PHYSIOLOGY LEARNING

In biomedical science courses, the study of endocrine physiology is extremely important since hormones promote the functional integration of the entire organism. Active teaching methodologies, such as gamification, have gained more attention as it promotes greater student engagement. This study aimed to develop an educational card game with a board about endocrine physiology, describing the main characteristics of the water-soluble and lipid-soluble hormones. A literature review was performed to raise ideas to develop the game and to create the content of the cards. The game was based on the flashcard system, created to put into practice the theory of Hermann Ebbinghaus, and in the Brazilian game “Which animals is this?”. As a result, we created an educational card game called “Which hormone is this?” whose aim is to guess the hormone presented in the card by means of tips. This game is composed of two packs of cards divided in water-soluble and lipid-soluble hormones, a board and a roulette. Each card displays a hormone with 6 tips related to its structure, regulation or effects. The roulette is divided in water-soluble and lipid-soluble hormones, to spin and draw the group that the player must get a card. The board game has a path with start and finish in which the players must move their pawns. The player must spin the roulette and draw a card. The opponent player must take the card and read the tips. If the player guesses the hormone with one tip, his pawn advances 4 spaces; with 2-3 tips, advances 3 spaces; with 4-5 tips, advances 2 spaces; with 6 tips, advances 1 space. The game ends when a player arrives at the end of the border path. Thus, it is possible to create a playful and interactive educational game to improve the teaching-learning process of endocrine physiology. However, it requires intense study, work and creativity. The future perspective is to apply this game to undergraduate students.

ID: 11314

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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FeSBE2022 ANIME AND MANGA AS SCIENCE POPULARIZATION INSTRUMENTS: THE POWER OF ASIAN CULTURE AS A GATEWAY TO SCIENTIFIC TOPICS

Science communication is an important approach to making scientific knowledge available to wider audiences. However, to be effective, it should not just aim to explain scientific content in a simplified manner, but also relate to the general public through their interests. Lately, one interest gaining popularity worldwide is Eastern media, such as Asian written and audiovisual productions. Thus, our objective is to use Asian media to discuss scientific topics, in order to popularize science to children, teenagers, and young adults, who are one target audience of these cultural products worldwide. Scientific themes have been addressed in articles about anime, manga, games, and other Eastern productions published by collaborators of “Minuto Otaku”, an online platform focused on debating Asian media through forums, articles, videos and podcasts. These texts are written by authors with diverse scientific and life backgrounds. The articles’ impact was analyzed according to the metrics provided by the platform (reach, clicks, comments, and engagement). Currently, the website contains more than 15 articles uniting popular culture and scientific thematic, emphasizing psychology, philosophy, sociology, and education. Those articles were written based on series of different popularity levels. The mean access rate was 132 users, accounting for less than 0.02% of main page traffic. Although far from the most accessed article on the site (± 50.000 reads), creating this kind of material may still have potential, as the popularization of Asian media productions creates a new space to disseminate science. These cultural products can be approached scientifically, and thus be used to interest the public, which can identify and problematize different subjects within these materials. Further research is needed to assess these articles’ effectiveness in communicating science, comparing metrics from specific themes and utilizing qualitative methods, such as content analysis.

ID: 10869

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UFRGS

FeSBE2022 CLINICAL CASES AS A LEARNING TOOL: A COMPARATIVE APPROACH BETWEEN THE PERCEPTION OF STUDENTS ON EMERGENCY REMOTE TEACHING AND THE RESUMPTION OF FACE-TO-FACE TEACHING

Faced with the pandemic of COVID-19, adaptations had to be implemented in teaching and the classes got through changes. Emergency remote teaching (ERT), for example, was adopted during this time. With the cases' declining, some activities may return to face-to-face teaching (FP). The FP returned for practical Physiology classes, providing an exchange of knowledge through an active methodology and direct contact with colleagues and teachers. Thus, this study aims to bring comparative data on ERT and FP through the learning during practical classes. In both forms, the respiratory physiology classes experienced an active methodology with the use of clinical cases. After the lectures on respiratory physiology, the students (n=85), who signed the informed consent to participate in this research, answered. Afterward, the students were divided into groups, where each received a clinical case that was studied for 60 minutes to be presented to colleagues. Perception questionnaire about the methodology, with 23 questions. The study was approved by the UFRGS Ethics Committee: CEP nº 39182, and data were statistically analyzed using Student's T-test with significance when $p < 0.05$. In the perception questionnaire, 42% of the ERT students agree that the activity can be developed equally in ERT or FP, while only 22% of the FP agree with this statement; 24% of ERT respondents feel more confident in face-to-face presentations, while 48% of FP students prefer face-to-face presentations; 69% of FP students feel motivated to expose their ideas to a large group, compared to ERT, where 27% do not have the same motivation. Thus, we conclude that the students' performance was higher in FP compared to ERT. The active methodology in the online format is an essential tool, but the exchange and interpersonal development are an important catalysts for learning.

ID: 10972

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UNAERP

FeSBE2022 DEVELOPMENT OF THE EDUCATIONAL GAME “INTESTINE, ARE YOU REGULATED?” ABOUT THE NEUROHORMONAL REGULATION OF THE DIGESTIVE SYSTEM

The learning of neurohormonal mechanisms that regulate digestive processes is essential for students to understand the basic functions of this system. The use of educational games is gaining more space as it facilitates the teaching-learning process. The aim of this study was to develop an educational game about the neurohormonal regulation of the digestive system, describing the main characteristics of the hormones and neurotransmitters involved in this regulation. The educational game was created based on the rules of the Brazilian game “What animal is this?” and in the flashcard system. The cards and a playful board were created with the characteristics of the main neurotransmitters and gastrointestinal hormones after an extensive literature review. As a result, a card game called “Intestine, are you regulated?” was developed and its aim is to guess the hormone or neurotransmitter presented in the card by means of tips. Each card displays a gastrointestinal hormone or neurotransmitter with 6 tips related to its structure, regulation or effects. To play this game, firstly, all players must choose a pawn and place it on the “start” spot of the board. Secondly, the player must pick the first card from the pile and give it to the opponent player, who will read the tips. The player throws the die to draw the tip number which will be read. If the player cannot guess the correct substance with only one clue, he must throw the die again and ask for another tip until he gets it right. The number of spaces the pawns will move on depends on how many tips he will use to guess the substance. The game ends when a player gets to the “finish” spot at the board. Therefore, it is possible to develop an enjoyable card game which facilitates the learning of the neurohormonal mechanisms involved in the digestive system regulation. This game can be applied not only for the medical students at the University of Ribeirão Preto, but also for undergraduates from other institutions.

ID: 11165

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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FeSBE2022 DIGITAL EDUCATIONAL GAME FOR REMOTE TEACHING OF NEUROMUSCULAR PHYSIOLOGY: DENTISTRY AND MEDICAL STUDENTS' PERCEPTION

Previously, we have used a printed educational game to help students in understanding and integrating the neuromuscular physiology. The game is based on a puzzle that required the organization, in a table, of tokens indicating neurons, receptors, neurotransmitters, and effects on target organs (Adv. Physiol. Educ. 44: 153, 2020), followed by group discussion of questions. For remote teaching, during the COVID-19 pandemic, its digital version has been developed. The aim of this work is to evaluate the perception of students about the usefulness of the digital game for their learning, without focusing on differences and characteristics of the participating courses. This work was approved by Research Ethics Committees of the participating institutions: Piracicaba Dental School of University of Campinas (CAAE 42980515.0.0000.5418) and University of Araraquara (CAAE 40019820.9.0000.5383). Dentistry (n = 66) and Medicine (n = 49) students gave their consent to participate in the study. After online lectures about synapsis, muscle contraction and autonomic system, the students were divided in groups of 5-6 members in Google Meet break-out rooms and received the link access to the online digital version of the puzzle. It was instructed that only one student from each group accessed the link, shared the computer screen and manipulated the pieces, during discussion in group. The movement of pieces would be done according to a consensus reached by all the group members, in order to promote collaborative learning. Only after filling the table, the group received feedbacks in the computer screen indicating if the solution was or not right. When the students had doubts, they called the lecturer or monitors by using the cell phone application for exchanging messages. For the next stage, the groups received the questions one at a time, to be discussed and answered in the Socrative student app. For analysis of the students' perceptions, after the activity performed with the online digital game, the students were requested to answer if the activity with the educational game was useful for their learning, indicating the answer on a scale from 1 (it was not useful for learning) to 5 (it was necessary for my learning) and justifying their answer. Most students evaluated that the activity with the digital game was useful, answering 5 (70 % - Dentistry, 67 % - Medicine) or 4 (21 % - Dentistry, 29 % - Medicine) in the Likert – type scale. The reasons indicated for this evaluation were similar among the courses: the use of the game helped the students to remember and understand the subjects, to learn with colleagues exchanging ideas and helping each other, in a dynamic and pleasant environment. On the other hand, some students considered the activity as not useful, because it was repetitive, they use to learn better alone or some colleagues were not prepared (9 % - Dentistry, 4 % - Medicine). These results suggest that the digital version of the educational game seems to be an effective teaching strategy since, in the students' perception, there were gains in the teaching-learning process even remotely.

ID: 11032

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UNAERP

**FeSBE2022 EFFICACY OF THE NEUROFISIOGAME (NFG) ON LEARNING
CONSOLIDATION ABOUT MOTOR CONTROL AND MOVEMENT DISORDERS IN
A PBL HYBRID CURRICULUM: A PILOT STUDY**

Many students attributed neurophobia to a teaching gap between basic neuroscience and neurology. Accordingly, active methodology, such as games, has been encouraged as an interactive tool. This study aimed to assess the efficacy of the educational card game NeuroFisioGame (NFG) on learning consolidation about motor control and movement disorders and the students' perception of this method. This game was elaborated by the authors and placed on the online platform "Wordwall". The aim was to correlate the Manifestation Cards to their respective Lesions Cards. This study was conducted in the Medical School of the University of Ribeirão Preto which employs a Problem Based Learning hybrid curriculum. After the tutoring session about the theme, students from 4th stage (n=75) answered 5 multiple-choice questions (MCQs) (pretest). After the theoretical and practical class using the NFG, they answered another 5 different MCQs (post-test). At the end, all students answered a Likert questionnaire to evaluate their perceptions of the game. Ethics Committee approval no. 4.939.358. Students obtained greater scores in the post-test compared to pretest (2 ± 1.2 vs. 4 ± 1.3 , $p < 0.01$). In students' perception, the game was a useful tool and essential for learning (97%), and contributed to reduce learning deficits (98,6%). In addition, 100% of the students agreed that it was dynamic, interactive and fun, 99% liked the game, and 97% would recommend to other professors the use of games in classes. Most of students classified the game level as difficult (49%) or regular (44%). In spite of this, 98.6% considered it challenging which motivated them to study. Although the majority reported extreme or high level of aversion to neuroscience (68%), most of them (87%) believe the game could reduce it. Thus, this pilot study showed that the NFG about "Movement Disorders" is an effective and playful educational strategy which contributes to the learning process and to reduce neurophobia.

ID: 10980

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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**FeSBE2022 EVENT: HOW DO EMOTIONS INFLUENCE THE TEACHING-LEARNING
PROCESS? CONTINUING TRAINING ACTION REPORT**

It is known that emotions have an important role in the learning process. In that regard, the need is perceived, bigger and bigger, to inform and instruct teachers and students about physiological factors and neurophysiological factors that may contribute to or hinder the teaching-learning process. So, in view of this context, the Núcleo de Pesquisa em Ensino de Fisiologia (NuPEF) in Universidade Federal do Pampa (UNIPAMPA), held the event entitled “How do emotions influence the teaching-learning process?” held on February 19, 2022, performed online, through the digital platform Google Meet, with the objective to facilitate the understanding of education professionals or students about how emotions influence the learning promoting discussions about the teaching based on scientific evidence. Thus, 29 people participated in the event reaching teachers and students. The topics covered were: what is emotion and how does it manifest, in view of the physiological processes of the body and its importance, followed by the theme of theories of emotions and how they influence learning. Finally, after a brief closure the participants were invited to evaluate the event through closed questions in the Google Forms. As a result, through the answers it was found that all participants rated the event in a positive way, pointing out as positive aspects the approach of the presenters, the theme in general and the relationship between emotions and learning. When asked if they would participate in a second edition again, all participants claimed that they would participate, and even suggested for the next events to bring invited professionals in relation to themes about emotions and mental health. From that, it is concluded that the theme is extremely important and it is necessary to promote greater knowledge on the part of the population, thus helping in the teaching learning process.

ID: 10943

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UFRJ

**FeSBE2022 FROM THE BENCH TO THE MEDIA: NEUROPHARMACOLOGY
SCIENCE COMMUNICATION BY NEUROFARTÁON OUTREACH PROJECT**

Communicating science is gaining more popularity on academia nowadays. In addition, scientific outreach initiatives have been growing during the COVID-19 pandemic, both as a way to combat the fake news epidemic as well as to approach the scientific community to the population. One of the more impactful ways to do that is through social media. We aimed to use this medium as a way to approach the Laboratory of Neuropharmacology to the population and bring a thematic about addiction and abuse drugs in a understandably way, and help undergrad students of our group to learn how to communicate with the public. Thus, our initiative used Instagram and YouTube for the production of informative posts, reels, and stories; and short classes by undergrad students and lives, respectively. Both social media were analyzed by the metrics provided by them, self-evaluation and audience feedback. Our Instagram has 1000+ follows and 163 publications, overall, we have an average of 1500 reached accounts and 300 engaged users per 90 days, mostly being from our region (Rio de Janeiro), averaging 18 to 34 years old (70%) and mostly women (68,1%). Our YouTube has 251 subscribers, 8,200 total views, and more than 800h of the exhibition. It achieved more than 100,000 impressions with a click rate of 3,5%. Our audience is quite varied with 18-24 years of age (29,7%) and 35-44 years (41,9%), mostly male (56,1%). With the start of the NeurofartáON outreach project we put into practice a culture that we started before the pandemic about scientific communication, we reach mostly to undergrad students but also a portion of the population and have been gaining positive feedback from peers and society. We conclude that this contact of undergrad students in communicating science is quite beneficial to them, mostly to deeper understand their projects and their importance, and, we develop opportunities for post-grad students to help in tutoring them and reaching a wider audience through social media.

ID: 10872

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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FeSBE2022 HIPOGAME: AN EDUCATIONAL GAME VALIDATED TO ASSIST IN THE LEARNING OF THE PHYSIOLOGY OF THE HYPOTHALAMUS- PITUITARY AXIS;

Undergraduate students in the areas of health tend to consider the discipline of physiology as a complex discipline due to the large amount and complexity of the contents. Among the topics covered, the physiology of the hypothalamic-pituitary axis is an important topic for students in this area. Considering the recurring difficulty of students with this content, it is important to seek new tools to facilitate learning, such as the use of educational games. Therefore, the objective of this research was to apply a validated educational game for teaching hypothalamic-pituitary axis physiology for students of health courses. For the application of the game, 36 students from health courses were invited, who were later divided into two groups, one that played the entire game (complete game, n=22) and a group that did not complete all levels of the game. (partial game, n=14) and their satisfaction was analyzed through a questionnaire. The full game group reported enjoying the game ($X^2 = 11.636$, $p= 0.001$), as well as the partial game group ($X^2 = 6.143$, $p= 0.046$). It was also observed that the full game group reported being more motivated ($X^2 = 7.182$, $p= 0.028$) compared to the partial game group ($X^2 = 4.857$, $p= 0.183$). Still, it was observed that the full game group reported considering the game valid for learning ($X^2 = 8.909$, $p= 0.003$), while the partial game group reported considering it less valid for learning ($X^2 = 1.143$, $p= 0.285$). It was also observed that the full game group believed less that the game contributed to learning ($X^2 = 0.182$, $p= 0.670$) compared to the partial game group ($X^2 = 6.143$, $p= 0.046$). Still, the full game group reported that the game design caught their attention ($X^2 = 6.909$, $p= 0.032$), as well as the partial game group ($X^2 = 11.714$, $p= 0.008$). Based on the data presented, we can conclude that the proposed game is characterized as a relevant means to assist in teaching topics on the physiology of the hypothalamic-pituitary axis.

ID: 11203

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UFCSPA

FeSBE2022 IMMUNE SYSTEM PHYSIOLOGY AND COVID-19: EDUCATION AND SCIENTIFIC DISSEMINATION WITH CAREGIVERS OF PEOPLE WITH DISABILITIES

The extension project of the Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA) "Supporting and educating families of people with disabilities (PwD)" was developed in person at Educandário São João Batista (Porto Alegre, RS), a non-profit institution that serves PwD from low-income families. The project addresses health education with these caregivers, including scientific dissemination actions in Human Physiology, now focused on COVID-19, aiming to improve the knowledge of the same. The objective of this work was to describe and reflect on the actions of scientific dissemination in the area of Human Physiology aimed at understanding the functioning of vaccines against COVID-19 with the caregivers families in the pandemic. With the pandemic the project began to work with caregivers remotely, through a WhatsApp group, with the participation of 45 PwD families. Based on the doubts of families, the extension group prepared educational materials containing information on the types, functions and mechanisms of action of vaccines against COVID-19 offered in Brazil. It was highlighted the role of the Physiology of the Immune System in this process, in a colloquial way and easily understood by the lay public. For the elaboration of the materials Canva program, academic books and scientific articles were used. In the process of knowledge exchange, the opinions and prior knowledge of the participants were valued for the construction of new knowledge. Family members considered the material useful, shared it with other groups and demonstrated the importance of the project to them. Still, they reported having liked and clarified their doubts with the material. Moreover, health professionals can provide, through actions such as these, contact of these caregivers with contents developed in the academic scope that directly interferes in the quality of life of whole PwD family. The activity also allowed students to consolidate their knowledge in Physiology.

ID: 11219

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: FAESA Centro Universitário

FeSBE2022 INSTAGRAM AS A SCIENTIFIC DISSEMINATION TOOL ABOUT IRON OVERLOAD AND ITS IMPACT ON HUMAN HEALTH

There is no doubt that the product generated by scientific activity is worthless if it is not known by the greatest possible number of its researchers, but also by the general population. In fact, scientific literacy is a tool for solving problems and connecting science and society. However, to achieve scientific literacy, the community needs broad and easy access to correct information and scientific thinking. In the scientific literature, we have already found indications of the possibility of using social media as a strategy for scientific dissemination in a language accessible to the lay public. In the same way that flag species are widely used to raise awareness among the population as an instrument for environmental preservation, a specific subject or theme can be used to disseminate scientific thinking and research's results. In this way, the profile @sobrecargadeferro.ufes was created on Instagram, which aims to disseminate questions about the research developed by UFES and research groups that investigate iron metabolism and diseases associated with its overload in the body, in addition to demonstrating to the population general need to invest in scientific research. According to data from the platform itself, the profile started in January 2022 has 201 followers, mostly women (74.2%) and adults (67.9% between 25 and 44 years old) concentrated mainly in Espírito Santo/BR, but it is also followed by people in Spain, the United States and Portugal. Although the number of followers is still small by the standards of the social network, some publications reach a higher number of users, such as the video post about Body Iron Indicators, which was watched 3,084 times by 2,967 social network accounts. Based on the reported performance, we conclude that the Instagram profile can represent a university extension and scientific communication strategy capable of effectively reaching the lay public, bringing reliable and true information.

ID: 11074

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: Unipampa

**FeSBE2022 OVERVIEW OF THE PARTICIPATION OF WOMEN IN RESEARCH IN
THE PHYSIOLOGY TEACHING AREA AT THE FEDERAL UNIVERSITY OF THE
PAMPA**

Brazilian research, in the last decades, has been advancing in several aspects, one of them being the fight for gender equality in the scientific career and the increase of research in the teaching area. Considering the importance that research in teaching has in the improvement of effective strategies for teaching and the verification of the under-representation of women in areas of research in teaching and physiology teaching, the aim of this work was to carry out a survey of teaching publications, which encompass the area of physiology teaching, as well as the participation of women in the papers submitted to the International Teaching, Research and Extension Salon of UNIPAMPA (SIEPE). From that 18,811 of papers between the years 2009 to 2021 were analyzed, as results, it was observed that in all editions there is a total of 14.95% of the papers in teaching, being 8.02% related to the teaching of physiology. Furthermore, it was found that of the papers in the teaching line, 64% of them had women as first authors and 61% of them had women as mentors. As for the physiology teaching theme, 65.89% of the papers had women as first authors and 81.40% as mentors. 2016 had the highest number of women as mentors, adding up to 25 of the 28 papers submitted. However, in 2021 there was a reduction in the participation of women in physiology teaching papers submitted to the event. It is concluded that research in physiology teaching and education is still little explored by researchers, with few papers presented at the event. However, although the data show a low number of works in this area, most are developed by women, which results in the gradual growth of female participation in this research area.

ID: 11334

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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FeSBE2022 PERCEPÇÃO DE ESTUDANTES DE FISIOTERAPIA DE UNIVERSIDADES PÚBLICAS E PRIVADAS DO BRASIL SOBRE UTILIZAÇÃO DE ESTRATÉGIAS ATIVAS NO ENSINO REMOTO DURANTE A PANDEMIA DA COVID-19

The COVID-19 pandemic is a major challenge for educational systems. The objective of the present work is to verify the perception of physical therapy students from public and private universities in Brazil about the use of active strategies in remote teaching during the COVID-19 pandemic. This research project was approved by the Research Ethics Committee (CAAE: 51211021.9.0000.5512). Students of undergraduate physiotherapy courses at public and private universities in Brazil, aged over 18, of both sexes, were invited to participate in the study. Responses were obtained by electronic form from the research participants. Responses ranged from totally disagree to totally agree, following the five-point Likert scale. 16 participants participated in the study, 2 men (88.9%) and 14 women (11.1%), aged between 19 and 46 years, from private educational institutions. 8 participants (50%) agree that they are satisfied with remote classes during the COVID-19 pandemic, while 2 (12.5%) do not agree or disagree, and 6 (37.5%) disagree. 15 participants (93.75%) agree that they prefer classes that allow greater student participation rather than lectures only in remote teaching, and 1 (6.3%) disagrees. 16 participants (100.0%) agree that strategies that make students more active in class improve learning when compared to lecture-only classes, in addition to feeling more motivated to participate in remote classes that involve more active teaching strategies. 15 participants (93.75%) agree that they feel more engaged in the study of subjects that have classes/teachers that use with frequency active teaching strategies in remote learning. The results of the present study indicate that, although student satisfaction with remote classes during the COVID-19 pandemic is divided, most students prefer classes with greater participation and all believe that active teaching strategies improve learning, in addition to most feel more engaged with the use of these strategies.

ID: 11168

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UFCSPA

FeSBE2022 PODCAST AS A LEARNING OBJECT IN PHYSIOLOGY TEACHING

Aiming to create Learning Objects (LOs), the research group in Physiology at the Federal University of Health Sciences of Porto Alegre developed Podcasts, during distance learning due to the pandemic. This study aimed to present preliminary results regarding the contribution of Podcasts as LO in Physiology in health courses through student perception of learning. The sample was performed for convenience in the disciplines of Physiology of the Pharmacy and Analytical Toxicology Courses(CAE 51729521.6.0000.5345). In the 2nd semester 21, students who participated in the disciplines and signed the Free and Informed Consent Term were included in the research. Participants listened to four episodes of the Podcast and answered a questionnaire remotely, evaluating the LO at levels from 1 to 5, with 1 being the lowest and 5 the highest regarding its quality, alignment with the learning objective, design, usability and interaction, accessibility, reusability, motivation and adaptability. A self-perception of learning questionnaire was also applied with responses on a Likert scale according to the level of agreement. Preliminary data were tabulated in Excel version 365 and organized in frequency. The LO was evaluated by 16 respondents, obtaining the maximum score by 93.8% of the participants regarding its quality, 75% regarding the alignment with the learning objective, 81.3% regarding the design, 87.5% regarding the usability and interaction, 50% regarding accessibility, 93.8% regarding reusability, 62.5% regarding motivation and 68.8% regarding adaptability; still, 76.5% of the students completely agreed that the LO contributed to their learning and better performance in the discipline and 64.7% mentioned that podcasts are pleasant tools to get in touch with the contents. Preliminary results demonstrate that the use of this teaching resource can be a good learning aid.

ID: 11052

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: unesp

FeSBE2022 SCIENCE IN THE AIR: PURO ACASO PODCAST

There is a growing need to disseminate science in an interesting way to audiences outside the academic world. With this in mind, the Institute of Biosciences from São Paulo State University (Unesp), located in Botucatu (SP, Brazil) created the Agency for Scientific Dissemination and Communication (AgDC). AgDC develops several projects that disseminate scientific topics in popular language through social networks. Faced with the need to reach young audiences in a format that has been gaining more and more interest from them, the members of AgDC with students from UNESP created a podcast, named Puro Acaso (wordplay with “By chance” as in serendipity). This podcast aims to disseminate scientific topics in a clear and casual way, through a recorded conversation with expert guests. The themes that are in evidence in the media are chosen to be discussed, such as themes related to recently launched movies and series. The experts' conversation with the podcast interviewers is recorded, edited and broadcast through both YouTube and Spotify. We launched the first episode based on the success of the movie *Dr. Strange in the Multiverse of Madness*, entitled ‘A Conversation About the Multiverse and Madness’, whose guest was Dr. Joel Mesa, Ph.D. in Physics. The second episode was entitled ‘Genetics: the Magic of Today’, with the guests Jordana Oliveira and Adauto Cardoso, both are Ph.D. in Genetics and dedicated to scientific communication in social media and in high schools. The next episodes will deal with the themes of dinosaur extinction, based on the release of the movie *Jurassic World: Dominion* and we will have a paleontologist as a guest. Animal behavior, ecology, environment and the neuroscience of learning are among our next themes to be explored. Preliminarily, we can conclude that we are disseminating scientific knowledge using an attractive format and a language that is accessible to the lay public, democratizing scientific knowledge and empowering the listeners.

ID: 11076

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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**FeSBE2022 SCIENTIFIC DISSEMINATION ON THE
PHYSIOLOGY/NEUROPHYSIOLOGY OF LEARNING: WHAT HAS INTERESTED
THE PUBLIC DURING THE COVID-19 PANDEMIC?**

University extension activities had to adapt to the limitations imposed by the COVID-19 pandemic. In response, activities such as scientific dissemination began to be better disseminated through social networks. The dissemination of subjects on the Physiology of Learning also followed this form of scientific dissemination and began to attract public attention to different subjects. The objective of this study was to identify which subjects on the Physiology/Neurophysiology of learning most interested the public in a social network during the COVID-19 pandemic. This study was carried out from a scientific dissemination work carried out between February 2021 and March 2022, through an account on the Instagram platform (@nupef. unipampa). During this period, 31 publications were carried out to expose subjects related to the Physiology/Neurophysiology of learning discussed during the meetings of the Nucleus for Research and Teaching of Physiology (NuPEF). The themes included: active methodologies, educational technologies, and academic performance. To evaluate the subjects that most caught the public's attention, an evaluation was made of the five posts that received the most likes, comments, shares, and downloads on the platform. The subject that most interested the public was "Academic procrastination", reaching 117 likes, 6 comments, 4 shares, and 10 downloads; followed by "cortisol, stress and learning", which reached 92 likes, 7 comments, 28 shares, and 7 downloads. The other subjects were "cold stress: lies and thermography", "emotions and teaching approaches" and "learning styles", reaching 223 likes, 13 comments, 13 shares, and 30 downloads. Therefore, this study allowed us to better understand the themes that most arouse public interest, thus reflecting good outcomes in the interaction between the university and the population through social networks.

ID: 11014

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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FeSBE2022 SCIENTISTS OF TOMORROW: WHO CAN BE A SCIENTIST?

High school students are not aware of the applications of science in their daily lives and do not know how to recognize the applications of biotechnology. Furthermore, the figure of the scientist as an ordinary person is not part of the students' imagination. As a reflection, the academic career is hardly seen as one of the possibilities for students to enter after high school. To bring students closer to the academic and scientific reality, undergraduate students of the Universidade Estadual Paulista (Unesp) created an extension project called Scientists of Tomorrow. This extension project aims to demystify the figure of the scientist, show that science is present in everyday life, in addition to presenting the scientific career as a possibility for the future of public high school students. In 2021, students from public schools in the city of Botucatu, SP participated in a monthly class via YouTube. Topics covered included applications of biotechnology, who can be a scientist, women in science, among others. After each class, the students participated in a gymkhana, in order to put the content learned into practice. In 2022, the project has been developed in person at the Pedro Torres State School. Classes on various scientific topics and the gymkhana have been offered once a month. At the end of the year, students will organize a science fair, in which they will have the opportunity to teach the contents learned to other students in the school and to the community. In 2021, 57 students participated in remote activities. The average grade of the groups was 372, with 614 being the highest grade and 215 the lowest. This year, 34 students are participating in the project. Students have shown interest in the topics covered and have been regular in class. Preliminarily, we conclude that we are successfully disseminating scientific knowledge, demystifying the figure of the scientist and offering the prospect of entering the university for public high school students.

ID: 10995

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UFMG

FeSBE2022 STRATEGIES ADOPTED BY UNDERGRADUATE TEACHING ASSISTANTS IN PHYSIOLOGY AND BIOPHYSICS EDUCATION DURING THE COVID-19 PANDEMIC

The COVID-19 pandemic affected almost all aspects of our lives, including the Education sector and the way of teaching and learning. In March 2020, health authorities in Brazil have imposed social isolation and the interruption of on-site activities in schools and universities. In this context, the Federal University of Minas Gerais (UFMG), one of the largest universities in Brazil and Latin America, developed the Emergency Remote Learning (ERL) that allowed the return of classes in an online format and supported students to obtain access to equipment and Internet network. Within this new perspective, the Undergraduate Teaching Assistant (UTA) program of the Department of Physiology and Biophysics (DFIB) has been explored strategies to minimize the impact of the absence of face-to-face classes. Using different available tools in online platforms and social media, such as, Microsoft Teams, Youtube animated video classes, and Instagram, UTA program assisted more than 500 undergraduate students and strongly supported professors during ERL. In just over a year, our video classes on Youtube Channel reached about 40k views. Most of the students reported their questions were fully and quickly solved by UTA program. Collectively, our results indicate that the strategies implemented by the UTA program helped the undergraduate students and professors to adapt to a remote learning format, keeping the quality of the education.

ID: 10924

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: Universidade La Salle

**FeSBE2022 STUDENTS' PERCEPTION ABOUT THE FLIPPED CLASSROOM IN
BIOCHEMISTRY TEACHING**

Biochemistry is considered a complex subject by students, since it requires prior knowledge and demands deeper learning. In response to this reality, the flipped classroom proposes that students understand their needs, actively seek knowledge and build their own learning. Thinking about these proposals, the objective of this study was to identify the students' perception of the inverted classroom in the teaching of Biochemistry. This is a literature review study that used the Pubmed database, with the keywords: "Teaching biochemistry"; "Students perception"; "Flipped classroom". Studies in English (2016-2021) that evaluated the perception of Biochemistry students regarding the flipped classroom were included. After the search, eight articles were found and through inclusion criteria such as containing a questionnaire to assess the student's perception of the inverted classroom, 4 articles were included. In general, the articles showed that the use of the flipped classroom was highly satisfactory for students when compared to the traditional classroom methodology, since these students reported that pre-class activities were of great value for understanding the content during the moment. of class. In this way, it is concluded that the inverted classroom is a good tool for studying biochemistry, according to the students' perceptions.

ID: 10933

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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Instituição: UFF

FeSBE2022 THE IMPORTANCE OF ACADEMIC LEAGUE OF HUMAN PHYSIOLOGY ON DISSEMINATION OF SCIENTIFIC KNOWLEDGE DURING THE PANDEMIC

Academic Leagues are entities that seek theoretical-practical deepening on a topic, which can contribute to promoting health and social transformation in the long term. The Academic League of Human Physiology (LiAFH) of the Fluminense Federal University, composed by undergraduate and graduate students from the health area, aims to disseminate knowledge in human physiology to the academic community and society. During the COVID-19 pandemic, many activities had to be adapted to the online format. The platforms used were: Google Meet, YouTube, Canva and Instagram. We created several contents on LiAFH's instagram (@liafh.uff) in order to address important topics of human physiology and also to combat fake news and disinformation (posting frequency: 2-3 times/week). According to Instagram's insights tool, in 2021 we reached 5.847 people from the 2nd of July to the 29th of September (90 days), an increase of 84.2% over the previous 3 months (3rd of April to the 1st of July). Twenty-eight posts were published on the profile and reached an average of 1.042 people per post. Furthermore, it was possible to verify that 80.6% of the individuals were between 18 and 34 years of age. Another interesting fact was that 80.8% of our audience was made up of women, which explains the great popularity obtained in publications about the endocrine and female reproductive systems. Also, LiAFH organized a virtual symposium called "Two faces of stress", which had 4 speakers and 1.265 participants by LiAFH's page on YouTube. Despite all the difficulties imposed by the pandemic, LiAFH was able to carry out several activities in a virtual way through scientific events and content published on official platforms, reinforcing science popularization and fighting against fake news. As a perspective for 2022, we will intend to still publish new contents in virtual platforms and to return to presential physiology workshops in public schools.

ID: 10939

Área Temática: Ê-POSTER | Educação, História e Filosofia da Ciência, Comunicação Científica

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**FeSBE2022 UNIPAMPA UNDERGRADUATE STUDENTS' PERCEPTIONS ABOUT
THE IMPACT OF EMERGENCY REMOTE TEACHING ON THEIR EMOTIONS
AND LEARNING**

In teaching environments, emotional state plays an important role in students' academic performance. In this context, teaching strategies that provide the experience of positive emotions can stimulate the student in the learning process, and negative emotions, if experienced for prolonged periods, can impair learning. Considering this, the present study aims to investigate the perception of students of the Degree in Physical Education at Unipampa about their emotions and learning before and during emergency remote teaching. The research was carried out with 21 students, with the application of two questionnaires, the positive and negative affect questionnaire (PANAS) and the learning and environment questionnaire (DREEM). Data collection was carried out via the internet and contact with students took place by email. For statistical analysis, the Shapiro Wilk and Wilcoxon tests were used. As a result, there was an increase in negative emotions such as annoyance ($p=0,001$), irritation ($p=0,017$), aggression ($p=0,046$), anguish ($p=0,001$) and fright ($p=0,001$), and there was a decrease in positive emotions such as enthusiasm ($p<0,001$), excitement ($<0,001$), inspiration ($p<0,001$), determination ($p=0,006$), pride ($p=0,004$), strength ($p=0,007$), interest ($p=0,007$), attention ($0,007$) and agility ($p=0,002$) during the period of emergency remote teaching, when compared to the period of face-to-face classes. There were also changes in students' perception of their learning, where comparing face-to-face teaching with remote teaching, students claimed that during remote teaching they were less sure about the objectives of their course ($p=0,006$), felt less encouraged to participate in classes ($p=0,005$) and the teaching style adopted was less stimulating ($p=0,003$). In this sense, it is clear that the change in the format of classes caused changes in the perception of emotions and students' learning during teaching activities.

ID: 10822

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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**FeSBE2022 ASSESSMENT OF LEVETIRACETAM ANTICONVULSANT ON
BIOCHEMICAL AND REDOX PARAMETERS OF SUBMANDIBULAR GLANDS IN
RATS**

The use of anticonvulsants can be associated in some cases with salivary gland dysfunction and deterioration of oral health. In this context, we propose to evaluate the effects of chronic use of the anticonvulsant levetiracetam (LEV, Keppra®, UCB Biopharma LTDA, Limay, France), a specific modulator of synaptic vesicle glycoprotein SV2A, on the redox state of the submandibular glands (SMG). Therefore, male Wistar rats were randomly divided into 3 groups (n=10/group): Control (0.9% saline solution), LEV100 (100 mg/kg) and LEV300 (300 mg/kg). After 21 consecutive days of treatment via intragastric gavage, the animals were euthanized to then proceed to the removal, weighing, and storage of the SMG at -80 °C (CEUA FOA/UNESP n° 0251-2021). For biochemical analyses, supernatants from SMG homogenates were used for spectrophotometric assays: lipid oxidative damage; protein oxidative damage; non-enzymatic antioxidant capacity evaluated by total antioxidant capacity (TAC), reduced glutathione (GSH), and uric acid (UA); enzymatic antioxidant capacity determined by the enzymes superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx). Data were analyzed using 1-factor ANOVA followed by Tukey's test ($\alpha=0.05$). No difference was found between the groups in the SMG weight and index. Both treatments impaired the enzymatic and non-enzymatic antioxidant system, promoting a reduction in SOD activity ($P < 0.01$) and GPx activity (LEV100 $P < 0.05$; LEV300 $P < 0.01$) and a decrease in UA levels ($P < 0.01$) and TAC levels (LEV100 $P < 0.05$; LEV300 $P < 0.01$) compared to the Control group. On the other hand, the LEV300 group reduced lipid ($P < 0.01$) and protein ($P < 0.05$) oxidative damage compared to the Control. Therefore, we can conclude that chronic treatment with LEV impairs the redox state by decreasing enzymatic and non-enzymatic antioxidant defense.

ID: 11316

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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**FeSBE2022 CHRONIC EFFECT OF SODIUM DEOXYCHOLATE USED FOR BODY
CONTOURING ON BODY ADIPOSITY AND METABOLISM IN MALE SWISS MICE**

Mesotherapy with sodium deoxycholate (SD) is a minimally invasive procedure for improving body contouring, but studies are not investigating its safety. Thus, we aimed to evaluate the chronic effect of SD on body adiposity and metabolic profile in mice (Ethics approval CEUA/1011/2017). Three-month-old male Swiss mice received water (C) or fructose 20% (F) ad libitum for 8 weeks. In the next 4 weeks, 100µL saline (Sal) or SD 50µg were administered subcutaneously twice weekly (Groups: C/Sal n=7; C/SD n=7; F/Sal n=6 and; F/SD n=6). Body mass (BM), tissue weight (inguinal white adipose tissue [iWAT] and liver), metabolic blood markers (glucose, lipid, and hepatic), and atherogenic indexes were assessed. Surprisingly, BM variation was not observed. Fructose increased the left iWAT weight (F/Sal x C/Sal), which was diminished by SD (F/SD x F/Sal). The subcutaneous to visceral fat tissue ratio increased in F/Sal x C/Sal, and was further enlarged by SD (F/SD x F/Sal; C/SD x F/Sal). Fructose decreased serum albumin (F/Sal x C/Sal), which was increased by SD (C/SD x F/Sal; F/SD x F/Sal). Fibrotic nodules were noticed in the right iWAT, similar to humans. Neither fructose nor SD changed most blood metabolic markers (total cholesterol, blood and tissue triacylglycerol, Castelli risk indexes I and II, and TyG). Hyperglycemia, glucose intolerance, and insulin resistance (IR) were absent, except for IR in the C/SD group compared to Sal/SD. In conclusion, chronic SD administration did not change body mass and promoted a few side effects on blood metabolism of male Swiss mice.

ID: 11304

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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FeSBE2022 CHRY SIN ATTENUATES PROSTATIC EPITHELIAL HYPERPLASIA IN SPONTANEOUSLY HYPERTENSIVE RATS (SHR): A MORPHOLOGICAL ANALYSIS

The male prostate is a gland of the urogenital system that is susceptible to the development of diseases such as the benign prostatic hyperplasia (BPH). Studies using hypertensive rats (SHR) as an experimental model, in order to understand the development of this disease, have increased. Furthermore, there are studies using flavonoids to understand their beneficial properties in health. Among them, chrysin is found in plant extracts, flowers of *Passiflora caerulea*, passion fruit peel, honey and propolis. Thus, the objective of this work was to evaluate whether this flavonoid inhibits the onset of prostatic hyperplasia in SHR. The project was approved by Ethics Committee for the Use of Animals (CEUA), with the protocol number 028/2020. Male Wistar and SHR rats at 10 weeks of age received 100mg/kg/day of chrysin (TW and TSHR) or 200 µl/day of dilution vehicle (CW and CSHR) during 10 weeks. The prostates were dissected out, properly fixed and processed to morphological analysis. The results of morphometry showed an increase in the height of the epithelium in TW and a decrease in TSHR. Stereology showed an increase in the frequency of both the epithelium and stroma, and a decrease in the lumen in TW, whereas there was a decrease in epithelium frequency in TSHR. The results showed that chrysin differently changes the ventral prostate of male Wistar and SHR rats. In SHR this flavone provided a beneficial effect, with a decrease in the thickness and relative frequency of the epithelial component. Regarding the Wistar strain, an anabolic effect occurred, with significant hypertrophy of the epithelial and non-muscular stromal components. This evidence suggests that chrysin supplementation have a protective effect against the onset and progression of the epithelial hyperplasia. On the other hand, the indiscriminate use of this flavonoid in individuals not affected by the BPH, potentially promotes adverse effects, especially due to its anabolic potential.

ID: 11211

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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FeSBE2022 COMPARARISON OF KETAMINE AND DEXMEDETOMIDINE EFFECTS ON BRAIN AND LUNG DAMAGE IN EXPERIMENTAL ACUTE ISCHEMIC STROKE

Acute ischemic stroke (AIS) is associated with pulmonary complications. Both ketamine (subanesthetic dose) and dexmedetomidine have neuroprotective effects. However, to date, it is unknown whether the effects of ketamine and dexmedetomidine on neuroimmunomodulation during AIS are further extended to the lung. In twenty-four male Wistar rats (weight 390 ± 30 g), AIS was induced by thermocoagulation of pial blood vessels (CEUA-CCS 133/19). After 24-hours, animals were randomized to receive dexmedetomidine (DEX, $0.5\text{-}1\mu\text{g}\cdot\text{kg}^{-1}$ for 10 min, followed by $0.1\text{-}0.5\mu\text{g}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$ for 50 min) and ketamine (KET, $1.5\text{-}6\text{ mg}\cdot\text{kg}^{-1}\cdot\text{h}^{-1}$) and mechanically ventilated for 1 hour. In the third group, no anesthetic agent was administered (STROKE). At the end of the experiment, perilesional brain tissue and lungs were removed for histology. Lung endothelial cells of AIS rats were isolated for molecular biology analysis. A range of gene expression was evaluated both in vivo and in vitro. Mean arterial pressure is controlled overtime. Lung mechanics, arterial oxygenation and apoptosis in perilesional brain tissue did not differ among groups. pHa decreased and PaCO₂ increased in both DEX and KET groups with no significant differences. In perilesional brain tissue TNF- α expression was lower in DEX than STROKE ($p=0.002$), while superoxide dismutase-2 and nuclear factor erythroid 2-related factor 2 expressions were higher in DEX and KET than STROKE. In lungs, cumulative diffuse alveolar damage score was lower in DEX than STROKE group [median (interquartile range) 5.0 (2.5-13.5) vs. 19.5 (18.0-24.0), $p=0.012$]. TNF- α expression was more reduced in DEX compared to KET and STROKE ($p=0.025$ and $p=0.032$, respectively). In vitro, lung endothelial cells showed lower VCAM-1 expression in DEX than KET ($p=0.044$). In the current model of acute focal ischemic stroke, dexmedetomidine was associated with greater protection for the brain and lung, which may be associated with lower endothelial cell damage.

ID: 11080

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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FeSBE2022 DRUG TREATMENT WITH LISDEXAMFETAMINE DIMESYLATE DURING PERIPUBERTY IMPAIRS PROSTATE DEVELOPMENT OF WISTAR RATS

Attention-deficit hyperactivity disorder (ADHD) is the most diagnosed neurobehavioral disorder in children. Its main symptoms are inattention, disorganization, and hyperactivity/impulsivity. Pharmacological treatment for ADHD requires the use of drugs that stimulates the central nervous system, such as lisdexamfetamine dimesylate (LDX). The prostate is a gland responsible to produce seminal fluids, which favors the survival of sperm cells after ejaculation. During peripuberty, a complex process of maturation occurs in the male reproductive system. The aim of this project was to evaluate if drug treatment with LDX during peripuberty can alter prostate development in Wistar rats. For that, 40 male Wistar rats at PND 22 were divided into 2 experimental groups. Animals in LDX group received 1,13mg/kg of LDX diluted in water via gavage for 40 days. For the same period, animals in control group received only water. At PND 66, the animals were anaesthetized with a combination of ketamine and xylazine and euthanized by heart puncture. Prostates were harvested, weighted, and destined to stereological analysis. The experimental protocol followed the ethical principles and was approved by the Ethics Committee on Animal Use (CEUA) of State University of Londrina (OF. CIRC. CEUA. n 82/2019). An enlargement of the epithelial and diminution of the luminal prostate compartments were observed in rats in LDX group. In this experimental condition, treatment with LDX during peripuberty impaired prostate development in Wistar rats.

ID: 11295

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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FeSBE2022 FOOD SUPPLEMENTATION WITH SPIRULINA PLATENSIS PREVENTS CHANGES IN REACTIVITY AND OXIDATIVE STRESS IN THE UTERUS OF WISTAR RATS WITH PRIMARY DYSMENORRHEA

Dysmenorrhea primary (DisP) is characterized by pain and hypercontractility uterine, caused for production of prostanoids and increased oxidative stress OS (RYAN ped clin 6, 2017). Thus, appears the *Spirulina platensis* (SP), algae with antioxidant and spasmolytic potential in rat uterus Wistar (FERREIRA et al., nutr 8, 2021). Was evaluated effects of SP on coupling electromechanical at reactivity and OS in rat uterus Wistar with DisP. Rats Wistar female (170 g / n= 5) were divided us groups control (GC), with DisP (DisP) and DisP supplemented with SP (v.o) at doses 50 (SP50) and 100 (SP100) mg/kg for 8 weeks. For DisP induction, was administered diethylstilbestrol (s.c) and oxytocin (i.p). After, were evaluated studies in vivo and in vitro. The results were expressed as mean and error standard and analyzed by ANOVA. DisP increased the writhing score (119±6.9) when compared to CG (3.0±1.0), in SP50 (98.2±2.6) and SP100 (64.0±3.1) was prevented that effect. In vitro, in contractile induced for KCl at DisP, increased potency and efficacy of KCl (EC₅₀=2.2±0.1; E_{max}=164±7.9%) compared to CG (EC₅₀=1.8±0.1; E_{max}=100%), in SP50 was prevented potency (1.8±0.1) but partially efficacy (128.8±4.7%) in SP100 (1.9±0.1;102.9±1.8%) was prevented fully. In relaxation with nifedipine in DisP, was decreased potency and efficacy (EC₅₀=6.6±0.1;E_{max}=73.5±1.3%) compared to CG (9.5±0.1;100%), in SP50 was prevented partially the potency (EC₅₀=8.1±0.1;100%) in SP100 was fully prevented (pEC₅₀=9.1±0.2;100%). Evaluating the OS, was verified in DisP (6.0 ± 0.1%) increase us MDA levels compared to CG (1.9±0.2%) and this effect prevented only in SP100 (2.5%±0.1). Likewise in CAT, DisP decreased (82.2 ± 2.9%) compared to CG (94.8±1.2%), and this effect prevented only in SP100 (95.7±2.2%). Thus, SP prevents the increase in contraction uterine and stress oxidative in rat uterus with DisP and shows up how one possible alternative for the prevention of DisP. Research approval 2240150621.

ID: 11319

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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**FeSBE2022 INDUCTION OF DIFFERENTIATION IN ANTI- INFLAMMATORY
MACROPHAGES (M2) BY SUPPLEMENTATION WITH HUMAN PLASMA ANTI-
SARS-COV-2 HYPERIMUNE**

Background: Macrophages plays an important role in any type of infectious inflammatory process. The possibility of differentiating into an auxiliary inflammatory or an anti-inflammatory agent makes this cell important in the compromised microenvironment. Severe respiratory disease associated with the new Coronavirus has an acute phase known as cytokine storm. During the second year of the pandemic, the use of hyperimmune plasma of post-covid patients as one of the forms of treatment. Objective: To evaluate the differentiation of the J774 macrophage lineage into M1 or M2 treated with anti-SARS-CoV-2 human hyperimmune plasma. Methods: Hyperimmune plasma was obtained from voluntary donor samples of whole blood, which had, at the time of collection, complete recovery of COVID-19 for more than 30 days and high titers of antiSARS-COV-2 antibodies. Macrophage cells (J774) were maintained under culture conditions. The cells were plated in 6 wells in the amount 4×10^4 /mL and divided into groups with Hyperimmune plasma or FBS alone: A - 100 μ L; B - 300 μ L; C1 - 0 μ L; C2 - 0 μ L. After treatment, RNA extraction was performed following the Animal Tissue kit RNA Purification Kit method and quantified on the GE Healthcare - NanoVue Plus device. THE cDNA synthesis took place from the enzymatic conversion of mRNA by transcriptase reverse, dependent on the RNA extracted from the Macrophage cells, and was performed following instructions from the manufacturer (GoTaq® Probe 2-Step RT-qPCR System kit). Results: The amount of RNA corrected through internal controls 18s, Actb or RPI32 showed that the treatment with Hyperimmune Plasma stimulate the expression of the IL-10 and Mcl1 genes in a superior way to the INos and Arg genes, being compatible with the macrophage M2 antiinflammatory profile. Conclusion: Hyperimmune Plasma containing high titers of anti-SARSCOV-2 led to differentiation of the J774 Macrophage lineage to the M2 profile anti-inflammatory.

ID: 10953

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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FeSBE2022 INTRANASAL ADMINISTRATION OF LAYERED DOUBLE HYDROXIDE NANOPARTICLES COATED WITH LYCOPENE: ANALYSIS OF PULMONARY EFFECTS

Lycopene is the responsible compound for the red color of some fruits and vegetables. Although it is a powerful antioxidant, its manipulation and use are limited by the hydrophobic nature and degradation by light and heat. Recently, the encapsulation of lycopene among layered double hydroxide (Lyc-LDH) nanoparticles was proposed to improve solubility and stability. In our study, we evaluated the effects of the intranasal administration of Lyc-LDH on the inflammatory response and oxidative stress in the lungs of C57BL/6 mice. The procedures were approved by the ethics committee under protocol number 598815019. Fifty male C57BL/6 mice, aged between 7-9 weeks, weighing between 20-25 g, were divided into five groups (n = 10): control group (CG); vehicle group (VG); 10 mg/kg of Lyc-LDH group (LG10); 25 mg/kg of Lyc-LDH group (LG25) and 50 mg/kg of Lyc-LDH group (LG50). The animals received intranasally 50 µl of saline solution or solution containing Lyc-LDH for five consecutive days. Subsequently, all animals were euthanized to perform the analysis. In the bronchoalveolar lavage fluid (x10⁵ /ml), the influx of inflammatory cells was higher in LG25 (7.15 ± 2.41) and LG50 (8.62 ± 2.86) compared to CG (4.00 ± 0.86) and VG (3.85 ± 0.73). The eosinophil count was higher in LG50 (0.02; 0.0 – 0.10) compared to CG (0.00) and VG (0.00). In the peripheral blood, no statistical differences were observed in hemoglobin levels, erythrocytes, platelets, leukocytes, lymphocytes, and neutrophils among the five groups. The LG50 (28.56 ± 1.91) had lower hematocrit compared to CG (32.31 ± 2.09) and VG (32.49 ± 2.08). Monocyte count (x10³ /mm³) was higher in LG50 (0.26 ± 0.17) compared to CG (0.11 ± 0.11) and LG10 (0.10 ± 0.06). Preliminary results demonstrate that intranasal administration of Lyc-LDH, at the highest concentrations, promotes the recruitment of inflammatory cells into the lungs and it causes alterations in the hematological parameters in adult mice.

ID: 11227

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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FeSBE2022 MELASMA TREATMENT IMPROVE THE INDIVIDUAL'S QUALITY OF LIFE: SYSTEMATIC REVIEW AND META-ANALYSIS

Melasma has an impact on the individual's quality of life, negatively affecting their psychological and emotional well-being. Thus, the Melasma Quality of Life (MELASQoL) scale was developed. The MELASQoL questions focus on the most affected dimensions of the patient's life. This study aimed to evaluate the efficacy of different melasma treatments on the improvement of the MELASQoL. A systematic review and meta-analysis were performed following the Preferred Reporting Items for Systematic Reviews and Meta-analysis (PRISMA) guidelines and registered in the Prospective International Register of Systematic Reviews (PROSPERO; #CRD42020214886). Data were systematically collected in the Embase, PubMed, and Scopus databases using the keywords "Melasma" and "Quality of life." The meta-analysis was performed with Review Manager© version 5.4.1. A total of 356 papers were identified, 177 duplicates and 154 were ineligible; resulting in 25 papers selected for systematic review and, of these, 13 were selected for meta-analysis. The papers analyzed a total of 993 individuals, of which 894 were female and 99 were male. Three articles did not inform the sex of the individuals. Before treatment the MELASQoL values vary from 28-70 and after the treatments the MELASQoL values vary from 16-42. A meta-analysis revealed that MELASQoL was -0.94[-1.16,- 0.73;p<0.00001] times lower in the post-treatment period (regardless of treatment). When the analysis was controlled for treatment types, the metaanalysis showed a decrease in MELASQoL after peeling treatment [-0.78(-1.39,-0.17);p=0.01], topical treatment [-0.83(-1.06,-0.60)];p<0.00001], and oral treatment [-1.00(-1.41,-0.58);p<00001]. The study showed that all treatments improved individual's quality of life of patients (based on MELASQoL scale)

ID: 11408

Área Temática: Ê-POSTER | Farmacologia Básica e Clínica

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FeSBE2022 STOCHIOMETRIC DETERMINATION OF THE ANTIOXIDANT ACTIVITY OF B- KARYOPHYLENE

β -caryophyllene [(β -humulene or (-)-trans-caryophyllene)] is a volatile hydrocarbon of unusual structure with a cyclobutene ring transfused into a nine-membered ring, with important roles in sesquiterpene chemistry, are present in different amounts in spices such as pepper (*Piper nigrum* Linn.), cloves (*Eugenia caryophyllata* Thumb.), cinnamon (*Cinnamomum* spp.) and oregano (*Origanum vulgare* Linn.). 2-diphenyl-1-picrylhydrazyl radical (DPPH•) and 2,2'-azinobis-3-ethylbenzothiazoline-6-sulfonic acid (ABTS). The objective of this work is to determine and analyze the cytotoxic effect of β -caryophyllene through tests Briefly, DPPH• and ABTS•+ were dissolved in ethanol to obtain the absorbance at 515 nm and 734 nm is 1.0 ± 0.05 , respectively. Then a reaction mixture of 200 μ L of β -caryophyllene (38.4-614.4 mM) with 1800 μ L of the radical solution, the stock concentration of DPPH• or ABTS•+ was shaken vigorously and the reaction was immediately monitored by spectrophotometry.) and the reaction time are determined by the exponential equation $\cdot\text{Radical} = A e^{-t/a} + B$ where t represents the reaction time. The differential form of the previous equation is obtained and used to express the reaction rate [$r = -d(\text{Radical})/dt$] as a function of reaction time. Furthermore, when the reaction time is equal to 0 minutes, the reaction rate at $t = 0$ (r_0) can be calculated by the equation $-d(\text{Radical})/dt \sim t$. From the reaction rate (r_0) determined at the beginning of the reaction, the rate constant (k) can be calculated by $d \cdot \text{Radical} \cdot r_0 = k \cdot \text{Radical} \cdot 0 \cdot \text{Antioxidant} \cdot 0$. The reaction result ($t \rightarrow \infty$; $\rightarrow - = dt A \infty$) was obtained from the decay of the concentration of free radicals (DPPH• or ABTS•+) to determine the antioxidant efficiency ($\epsilon_{\text{antioxidant}}$) of β -caryophyllene with the formula [$\text{Antioxidant} = A_0 (\text{Radical}) - A (\text{radical})$]. Results are expressed as mean $\pm A_0 (\text{radical})$ EPM (standard error of mean) (GraphPad Prism 6.01). A small decrease in the concentration of DPPH• by β -caryophyllene at concentrations of 38.4, 76.8, 153.6, 307.2 and 614.4 mM resulted in the determination of the reaction rate (r_0) of 0.000038 ($- d [\text{DPPH} \cdot] = 0.00038 e^{-2136(\pm x0.007)}$), 0.000062 ($- d [\text{DPPH} \cdot] = 0.000062 e^{-2738(x \pm 0.73)}$), 0.000066 ($- d [\text{DPPH} \cdot] = 0.000066 e^{-2274(x \pm 0.01)}$), 0.000073 ($- d [\text{DPPH} \cdot] = 0.000073 e^{-2587(\pm x0.005)}$) and 0.000125 ($- d [\text{DPPH} \cdot] = 1.25 e^{-2462(\pm 0.006)}$) mM.s⁻¹ at concentrations of 38.4, 76.8, 153.6, 307.2 and 614.4 mM. In addition, β -caryophyllene showed antioxidant activity against ABTS•+ at concentrations of 38.4, 76.8, 153.6, 307.2 and 614.4 mM with $\epsilon_{\text{antioxidant}}$ of 0.10 \pm 0.002, 0.14 \pm 0.04, 0.16 \pm 0.003, 0.19 \pm 0.002 and 0.26 \pm 0.002 and 0.26 \pm 0.003, respectively. In the DPPH• test, the $\epsilon_{\text{antioxidant}}$ at concentrations of 38.4, 76.8, 153.6, 307.2 and 614.4 was 0.02 \pm 0.001, 0.03 \pm 0.0006, 0.04 \pm 0.001, 0.10 \pm 0.01 and 0.33 \pm 0.03, respectively. We conclude that the antioxidant activity of β -caryophyllene attenuated by the concentrations of DPPH• and ABTS•+ can be perfectly represented by an exponential function.

ID: 10990

Área Temática: Ê-POSTER | *Imunologia*

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**FeSBE2022 CARDIORENAL SYNDROME TYPE 3 (SCR3) INDUCED BY ISCHEMIC
KIDNEY INJURY: PARTICIPATION OF MACROPHAGES AND T AND B
LYMPHOCYTES POPULATIONS**

Renal ischemia/reperfusion (I/R) is the leading cause of acute kidney injury (AKI). In this regard, Cardiorenal Syndrome type 3 (SCR3) is characterized by AKI followed by immune-mediated cardiac changes. The immune system is known to be involved in both the early and chronic stages of cardiac injury. However, the role of immune system cells in the development of SCR3 is not well established. The present study aims to characterize macrophages and T and B lymphocytes populations in cardiac tissue after renal I/R-induced AKI. C57BL/6 mice (male, 8-10 weeks, 20-27g) (CEUA/UFABC protocol: 8644151220) were submitted to unilateral renal I/R protocol with occlusion of the left renal pedicle for 60 min, followed by reperfusion for 3, 8 and 15 days. The identification of immune cell populations was performed by flow cytometry (FACS Canto II and Flow Jo version 10.0.7). Data were expressed as mean \pm SEM and one-way ANOVA followed by Bonferroni post-test was used. Values of $p < 0.05$ were considered statistically significant. With experimental animal model was showed a decrease in renal mass of the left kidney at 15 days of reperfusion demonstrating the onset of AKI. TCD4⁺ and TCD8⁺ lymphocyte infiltration was shown to be increased in the injured kidney after 15 days of reperfusion (19.02 \pm 1.73 I/R15d vs 8.0 \pm 2.43 Sham; 13.54 \pm 5.63 I/R15d vs 5.66 \pm 2.61 Sham, respectively). A significant decrease of approximately 34%, of M1 macrophages was observed in the kidney after 3 days of reperfusion. In the heart, B cells decreased only in the I/R 8d group (38.23 \pm 10.88 I/R8d vs 54.61 \pm 8.76 Sham). The present study concluded that TCD4⁺, TCD8⁺ cells and M1 macrophages are modulated in a tissue-specific manner in the setting of SCR3.

ID: 10911

Área Temática: Ê-POSTER | *Imunologia*

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FeSBE2022 INVOLVEMENT OF THE GLYCOLYTIC PATHWAY ON CELL BIOLOGY OF THYMOCYTES IN VITRO

In the last years, a new area of the Science, called Immunometabolism, relates alterations in metabolic pathways of immune cells with changes in their effector functions. Glycolysis has been shown to be involved in a number of immune processes, such as activation of T cells and secretion of cytokines from them. These cells differentiate into the thymus, a central lymphoid organ, composed of thymocytes (immature T cells) and thymic epithelial cells (TECs). Due to complex interplay between metabolic reprogramming and immunity, regarding thymus, our objective was to evaluate the participation of glycolytic pathway in thymocyte functions in vitro. For this purpose, it was used 4-8 week-old male C57BL/6 mice (CEUA/UFAL nº 47/2016). After euthanasia, thymocytes were obtained by mechanic disruption of thymus and treated with a glucose analog that inhibits glycolysis - 2-deoxy-d-glucose (DG) at 0.5 mM. These cells were maintained in culture for 6h in the presence or absence of DG and a reduction (33%) in cell proliferation was observed (number of viable cells: $1.22 \times 10^6 \pm 0.13$ vs. $0.82 \times 10^6 \pm 0.06$, $p < 0.02$, $n=5$). The functional assays, as adhesion and migration assays, showed that after one-hour of pre-treatment with DG, thymocyte adhesion to laminin or to TECs were not disturbed (same numbers of adhered cells in both experimental groups), however thymocyte migration was decreased in 30% (number of migrating thymocytes: $4.20 \times 10^4 \pm 0.20$ vs. $2.95 \times 10^4 \pm 0.53$, $p < 0.05$, $n=5$). These results demonstrate, for the first time, the importance of glycolysis in the functionality of thymocytes, providing us new insights into the role of intracellular metabolites in the regulation of immune cells. In addition, we can also anticipate therapeutic interventions in thymic disorders, to prevent autoimmune diseases.

ID: 11327

Área Temática: Ê-POSTER | *Imunologia*

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FeSBE2022 ORAL GLUCOSE OVERLOAD AFFECTS MONOCYTE SUBSET DISTRIBUTION AND HLA-DR EXPRESSION IN INSULIN-RESISTANT INDIVIDUALS WITH OBESITY

Non-classical monocytes have been linked to the pro-inflammatory state of several diseases. Our research group observed, in previous studies, an increase in this subpopulation of monocytes in obese individuals. Thus, the objective of this study was to evaluate the effect of oral glucose overload on the distribution and functional profile of monocyte subpopulations in obese, insulin-sensitive and insulin-resistant individuals. Twenty-two obese and 11 eutrophic individuals participated in the study, classified into three groups: eutrophic control (CONT), obesity and preserved insulin sensitivity (OBS) and obesity and insulin resistance (OBR). The OBR group had higher insulin values, 2-hour blood glucose, area under the glucose curve, leptin and lower resistin values. During fasting, obese individuals, regardless of insulin sensitivity, had a higher percentage of nonclassical monocytes. On the other hand, individuals in the OBR group had a lower percentage of classical monocytes and a lower percentage of CD11b⁺ monocytes compared to CONT. The OBS group showed lower expression of HLA-DR by monocytes. In the OBS group, a reduction in the percentage of non-classical monocytes and an increase in the percentage of classic monocytes was observed 1 hour after OGTT. In the OBR group, the same changes were observed 1 hour after OGTT, however, unlike the OBS group, the percentage of classical monocytes remained increased and the percentage of non-classical monocytes reduced 3 hours after OGTT. Oral glucose overload also altered HLA-DR expression preferentially in the OBR group. Lower expression of HLA-DR was observed between 1 and 3 hours after OGTT, in the three subpopulations of monocytes in the OBR group, while in the control group this reduction was observed only for classical monocytes. These data demonstrate that oral glucose overload distinctly affects the distribution of monocyte subpopulations and HLADR expression in individuals with obesity and insulin resistance

ID: 11093

Área Temática: Ê-POSTER | *Imunologia*

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**FeSBE2022 PURINERGIC SIGNALING IN CRYPTOCOCCUS NEOFORMANS
INFECTION: MOLECULAR AND PHARMACOLOGICAL STUDIES.**

Cryptococcosis is a fungal infection usually caused by *Cryptococcus neoformans*. This fungus induces a systemic disease due to its ability to spread and infect other organs in addition to the lungs. So far, there is no efficient treatment or prevention against the disease, requiring the discovery of new therapeutic targets. Purinergic signaling is a signaling pathway activated by extracellular nucleotides and nucleosides. These are described as relevant molecules in initiating and maintaining inflammatory reactions against pathogens. Nevertheless, the role of purinergic signaling in cryptococcosis is unclear. Thus, this work aims to elucidate the implications of purinergic signaling in cryptococcosis. For this, female Balb/c mice (6-8 weeks) were randomly divided into two groups: control (C) and infected group (H99). All experimental groups will be subdivided into four subgroups: saline subgroups 5 and 7 days (C-SAL and H99-SAL), and subgroups Brilliant Blue G (BBG) 5 and 7 days (C-BBG and H99-BBG). On day 0, the H99 group was intratracheally instilled with 1×10^5 *C. neoformans* var. *grubii* H99. On days 1 and 4, BBG was injected intraperitoneally, and on days 5 and 7 euthanasia occurred accordingly to their groups. The relative mRNA levels were assessed by qPCR. Respiratory mechanics and IL-1 β protein levels in the lungs were also investigated in C-Sal and H99 7d groups. Cryptococcosis caused an increase in elastance and pulmonary resistance of the H99 7d group compared to the control. In addition, an increase in the gene expression of pro-inflammatory cytokines (TNF- α , IL-1 β , and IL-6) and IL-1 β levels was observed in infected animals. The mRNA levels for P2X7, P2Y2, and P2Y12 increased in the H99 7d group, demonstrating that the infection stimulates the expression of purinergic receptors. Ongoing experiments with P2 receptor inhibitors will clarify the role of purinergic signaling in *C. neoformans* infection.

ID: 11141

Área Temática: Ê-POSTER | Imunologia

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FeSBE2022 RETROSPECTIVE ANALYSIS ON THE SARS-COV-2 INFECTION PROFILE IN COVID-19 POSITIVE PATIENTS IN VITORIA DA CONQUISTA, NORTHEAST BRAZIL

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is responsible for Coronavirus Disease-2019 (COVID-19), a heterogeneous clinical condition that seems to present different profiles in different people and locations. This study aimed to analyze the disease's response and the epidemiological profile in subjects affected by SARS-CoV-2 from the city of Vitória da Conquista, Bahia, Brazil. The study was developed in accordance with the precepts of Resolution 466/12 of the National Health Council. The procedures were only initiated after approval by the Human Research Ethics Committee (CEPSH) of the Federal University of Bahia, under protocol no. 38544620.9.0000.5556. Retrospectively, 783 patients were divided into three groups based on disease severity: asymptomatic, mild, and moderate/severe. Among the three groups, patients who died were compared with those who survived. We analyzed clinical epidemiological data, gene expression and the virus genomic profile. Pre-existing comorbidity, being male ($p = 0.037$), cardiovascular disease ($p < 0.001$), diabetes ($p = 0.002$), chronic obstructive pulmonary disease (COPD) ($p = 0.001$), and Ct values under 22 ($p < 0.001$), were identified as risk factors of mortality. The analysis of the expression profile of inflammatory pathways showed that the greater the infection severity, the greater the activation of inflammatory pathways, triggering the cytokine storm and downregulating anti-inflammatory pathways. Virus genome analysis revealed the circulation of multiple lineages, such as B.1, B.1.1.28, Alpha, and Gamma suggesting that multiple introductions events occurred thought time. This study's findings allowed the identification of strains and understanding of the local healthy reality. In addition, our data demonstrated that the epidemiological and genomic surveillance together can help public health strategies to guide tempest government's actions.

ID: 11105

Área Temática: Ê-POSTER | Medicina Regenerativa e Biologia do Desenvolvimento

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Instituição: Universidade Federal do Ceará

FeSBE2022 **BIOLOGIC SCAFFOLDS FROM TILAPIA SKIN AS NEW BIOMATERIALS FOR REGENERATIVE MEDICINE**

Scaffolds are biomaterials composed of decellularized extracellular matrix (ECM), widely used in developed countries, to the regeneration of tissues or organs damaged in clinical situations such as injuries, infections or trauma. In Brazil, scaffolds are rarely used due to their high cost and inaccessibility. To produce them, native cells and associated debris are selectively removed from tissues, preserving ECM integrity as much as possible. As collagen is one of the most widely used components in scaffolds, Nile Tilapia skin (TS) appeared as a potential raw biomaterial for their production, because of its high collagen content and similarity to human skin regarding mechanical properties and histological morphology. This study aimed to the development of a TS-based biological scaffold with a preserved structure and composition. Twelve protocols using different ionic and non-ionic surfactants, biological buffers and enzymatic treatments were screened through DAPI, Hematoxylin and Eosin (HE), and picrosirius red staining, to evaluate decellularization, morphological integrity, and collagen preservation, respectively. The *in vitro* cytotoxicity of each scaffold was estimated through the MTT assay. The best protocols were the ones based on Tween 20 (24h), CHAPS (4h) and Triton X-100 (6h), with a decellularization of 100%, $96.35\% \pm 3.65\%$ and $97.83\% \pm 2.17\%$, respectively. Histological analyses revealed no statistical difference in integrity and total collagen content between TS and the scaffolds produced through these protocols. In addition, all protocols were approved in the cytotoxicity test with a cell viability of $86.71\% \pm 2.24\%$, $108.3\% \pm 6.49\%$ and $95.63\% \pm 3.62\%$, respectively, above the 70% minimum level required by the ISO 10993-5. As a conclusion, scaffolds obtained from the protocols based on Tween 20, CHAPS 8 mM and Triton X-100 are potential options for medical use, as they were acellular, non-cytotoxic and with a preserved structure and collagen content.

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ID: 11160

Área Temática: Ê-POSTER | Medicina Regenerativa e Biologia do Desenvolvimento

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FeSBE2022 EFFECTS OF SODIUM BENZOATE ADMINISTRATION ON GESTATIONAL AND BEHAVIORAL PARAMETERS OF MICE

Food preservatives, as sodium benzoate, are commonly used to protect food from microorganisms, but its excessive consumption can cause adverse effects for pregnant and non-pregnant animals. Pregnancy is a process that requires the occurrence of morphophysiological events essential for its success, such as trophoblastic invasion and vascular remodeling. These events are influenced by the uterine Natural Killer cells (uNK), which are immune cells that reach 70% of the lymphocytic representation in the pregnant uterus of mice and humans. The impairment of the aforementioned gestational events can lead to problems in fetal development or in long-term effects for the offspring. Thus, this work aims to evaluate the effects of excessive administration of sodium benzoate to pregnant mice on gestational events, as well as the behavioral effects on the offspring. Therefore, pregnant females, on gestational Day 1 (GD1) received, via orogastric gavage, different doses of the food preservative: 150 mg/kg/day, 300 mg/kg/day or same volume in saline (Control Group). Embryo implantation sites were collected at GD10 for analysis of the pregnant uterus and uNK cells. Sodium benzoate caused a reduction in N-acetyl-D-galactosamine expression in the membrane and granules of uNK cells. It also decreased the number of DBA⁺ uNK cells of immature subtypes in the mesometrial regions distant from the embryo and of mature and senescent subtypes in the mesometrial region closest to the embryo, considerably increasing the number of DBA^{low} uNK cells in all regions. Uterine histological analyzes suggest impairment in the morphology of endometrial blood vessels, which are under morphometric analysis (luminal area, vessel wall thickness, and total vessel area). Other studies are in progress for histological analysis of cardiac, hepatic, and renal tissues of these animals, as well as the behavioral analysis of the offspring.

ID: 11229

Área Temática: Ê-POSTER | Medicina Regenerativa e Biologia do Desenvolvimento

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Instituição: UFRGS

FeSBE2022 EVALUATION OF SIZE AND ZETA POTENTIAL OF DERMAL FILLERS AND THEIR EFFECT ON THE VIABILITY OF FIBROBLASTS

Biodegradable polymer particles are currently being used as regenerative biomaterials in dermal fillers for repairing soft-tissue volume loss. Rennova® Elleva and Sculptra® are dermal fillers with poly(L-lactic acid) (PLLA) particles as the main ingredient. The aim of this study has been to characterize the particles of Rennova® Elleva and Sculptra® and evaluate the metabolic activity of fibroblasts cultivated with these biomaterials. The characterization of the dermal fillers was performed by optical microscopy and zeta potential. The fibroblast (MRC5 cells line) was treated with Rennova® Elleva or Sculptra® in the concentrations of 0.5 or 1.0mg/ml of PLLA. Cell viability was evaluated by MTT assay after 2 days of cultivation of contact with the products and the cells were visualized after live dead assay staining. Rennova® Elleva exhibited an average area of particles \pm standard deviation (SD) of $833\pm 419\mu\text{m}^2$; for Sculptra®, these values were $799\pm 652\mu\text{m}^2$ (no significant difference), and the products showed distinct irregular morphology. The mean \pm SD of the zeta potential was $-40.0\pm 8.4\text{mV}$ for Rennova® Elleva and $-55.5\pm 9.0\text{mV}$ for Sculptra®. The mean and SD values of absorbance of the MTT assay obtained for the control (0mg/ml) after 2 days were 0.187 ± 0.006 . The Rennova® Elleva did not significantly affect the MRC5 viability with the values of 0.207 ± 0.023 for 0.5mg/ml and 0.187 ± 0.023 for 1.0mg/ml. For the Sculptra®, these values were 0.164 ± 0.018 for 0.5mg/ml and 0.157 ± 0.017 for 1.0mg/ml ($p<0.05$), indicating that the Sculptra® at 1.0mg/ml decreased cell viability after 2 days of contact with the MRC5 cells. The characterization results revealed that the particles presented micrometric size with net charge negative and good stability against coalescence. In accordance with ISO 10993-5, viability evaluation demonstrated that the fillers did not present cytotoxicity in the fibroblasts.

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ID: 11120

Área Temática: Ê-POSTER | Medicina Regenerativa e Biologia do Desenvolvimento

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Instituição: UFRJ

FeSBE2022 EXTRACELLULAR VESICLES SECRETED BY ADIPOSE TISSUE-DERIVED MESENCHYMAL STROMAL CELLS IN ACUTE KIDNEY INJURY INDUCED BY SEPSIS

Sepsis is an organ dysfunction caused by an unregulated host response to infection. It presents high mortality and new therapeutic options are still needed. The aim of this study is to investigate the effects of early administration of extracellular vesicles (EV) from adipose tissue mesenchymal stem cells (ADMSC) in animal model of sepsis induced acute kidney injury. Male Wistar rats (12 weeks) were used (CEUA 074/19). Sepsis was induced by cecal ligation and perforation (CLP), then 30 min after surgery, animals were treated with intravenous sterile saline (CLP) or with EV obtained from 106 ADMSC (CLP EV). Sham animals had surgery without CLP; 72 h after the beginning of the experimental protocol, the animals were euthanized, blood, kidney and urine samples were collected. The ADMSC were isolated due to their adhesive properties to plastic and homogeneous in the expression of specific markers of mesenchymal cells with very low or negative expression for all hematopoietic and progenitor cell markers. EV had a heterogeneous size distribution with 100-700 nm in diameter. The CLP VE presented an increase in survival rate (80%), compared to CLP (44.1%). The EV treatment improved the renal function by increasing the glomerular filtration rate and reducing renal tissue damage quantified by the kidney injury score. Thus, we can conclude that the use of EV had a beneficial effect on the renal function of rats submitted to sepsis by the CLP 10 model, when administered early after the surgical procedure.

ID: 11239

Área Temática: Ê-POSTER | Medicina Regenerativa e Biologia do Desenvolvimento

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Instituição: UFRGS

FeSBE2022 GALANTAMINE NANOPARTICLES LEAD TO FUNCTIONAL RECOVERY IN A RAT MODEL OF SPINAL CORD INJURY

Spinal cord injury (SCI) is a debilitating condition with no effective treatment. Inflammation and oxidative stress play an important role in SCI pathophysiology. Previous studies from our group have indicated that galantamine improves recovery after SCI. Biodegradable polymer carriers are a good therapeutic approach due to the ability to sustain the release of the encapsulated drugs. Hence, the aim of this study was to produce galantamine nanoparticles and to evaluate its therapeutic effects after acute and intermediate stages of SCI. Galantamine was mixed in a 4% PLGA solution and electrosprayed to produce the nanoparticles containing galantamine (PG). The material was characterized according to its size, zeta potential and polydispersity index. For the SCI model, Wistar rats were submitted to a contusion injury at the thoracic spinal cord, using MASICS impactor (CEUA 35781). The animals were divided in the following groups: (1) Sham (laminectomy only), (2) only SCI, (3) SCI with intraparenchymal galantamine treatment; (4) SCI with local implant of PLGA particles and (5) SCI with local implant of PG. Animal locomotion was observed weekly for 6 weeks and evaluated using the BBB scale. Three days and six weeks after the injury the animals were euthanized and the spinal cords were collected. The animals treated with PG were the only group that presented a significant improvement in motor function after 42 days. Three days after the injury, the administration of galantamine resulted in a decrease in lipid peroxidation levels, whereas the use of PG improved levels of reactive oxygen species (ROS) and IL-1b, in addition to lipid peroxidation levels. Furthermore, when analyzing the treatment effects 42 days after the injury, galantamine treatment was able to reduce ROS, while PG reduced both ROS and IL-1b. Therefore, PG treatment showed not only inflammatory and oxidant improvements, but also significant functional recovery after SCI. Support: MCTIC; FINEP; CNPq; CAPES; FAPERGS; Stem Cell Research Institute (IPCT).

ID: 10906

Área Temática: Ê-POSTER | Medicina Regenerativa e Biologia do Desenvolvimento

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FeSBE2022 NANOCARRIERS USING NATURAL COMPOUNDS ACCELERATES WOUND HEALING

Wound healing is the capability of regeneration that the body provides to heal the damage. Natural compounds are widely used to treat symptoms and diseases due the low cost and efficacy. Nanocarriers are a new technology to carry materials and improve drug delivery in recent medical treatments. Furthermore, natural compounds associated with nanomedicine can be an alternative to facilitate wound healing. Thus, the current study aims to evaluate the healing activity of natural compounds by using nanocarriers. Male Swiss mice were divided randomly in 3 groups (Control without nanocarrier; nanocompound and vehicle into nanocarrier). Wound of 1cm² on the animal's back received daily 50µl of the formula or vehicle. Wound healing evaluation occurred at the 3^o, 7^o, 10^o, 12^o and 14^o days, using digital capture camera, and analysis was carried out using Image Pro Plus software. Statistical analysis of ANOVA two-way variance was used to evaluate the wound closure and p< 0.0305, respectively). No difference was observed at 14^o day. Our results demonstrate that the nanocompound was able to reduce healing time, which is a crucial factor to reduce exposure to pathogenic factors and restore barrier function. Thus, natural compounds by using nanocarriers may have a beneficial effect on the cicatrization by physiologic pathways, and they are our next steps of investigation.

ID: 11116

Área Temática: Ê-POSTER | Medicina Regenerativa e Biologia do Desenvolvimento

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FeSBE2022 OBESOGENIC DIET CAUSES ALTERED EATING BEHAVIOR IN C57BL/6 MICE

An obesogenic eating pattern correlates with the emergence of eating disorders and other physiological and metabolic disorders. The objective was to identify the feeding behavior of mice fed a westernized diet or control plus condensed milk. Project approved by the Ethics Committee of CB/UFPE under number 0049/2020. Thirty C57BL/6 male mice, 56 days old, weighing 23.48 g (± 1.20 g) were used and kept in a bioterium under controlled temperature and light. They received a control diet (C), control plus condensed milk (CL), western diet plus condensed milk (O) for 8 weeks. The behavior food was analyzed by behavioral satiety sequence (BSS) during 90 minutes after 12 hours of fasting. Feeding frequency, meal duration, feed rate and meal size (g/100g of body weight) were also analyzed. Data were expressed as mean \pm SD, considering a significance of 5%. The one-way ANOVA followed Tukey's post-hoc or Kruskal-Wallis with Dunn's post-hoc was analyzed by the Graphpad 8.0 software. In group O, no satiety point was observed, but, small meal size (C=2.31 \pm 0.46; CL=0.74 \pm 0.38; O=0.06 \pm 0.02g%, $p < 0.000$), slower feed rate (C=0.047 \pm 0.008; CL=0.016 \pm 0.002; O=0.012 \pm 0.013g/min, $p = 0.05$), less feeding frequency or no. access to the feeder (C=9.3 \pm 2.1; CL=8.4 \pm 3.3; O=2.8 \pm 1.0, $p = 0.05$) and low total food intake (C =0.64 \pm 0.11; CL=0.23 \pm 0.13; O=0.05 \pm 0.02, $p = 0.05$) were found. The addition of condensed milk to the control diet did not affect parameters of the microstructure of the BSS, but altered some meal patterns. Differences between CL and O group was found in point of satiety, meal size and meal duration, but similarity in the feed rate. COSTA et al., Biol Rhythm Res, 53:1005,2021 showed that eating behavior can be modulated by factors such as diet composition and fasting. Therefore, we conclude the composition of the diet modifies aspects related to eating behavior and the addition of condensed milk does not change the microstructure of the meal but delays the feed rate and meal duration.

ID: 11217

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: UNICAMP

FeSBE2022 A SHORT-TERM OBESOGENIC DIET INCREASES HYPOTHALAMIC TNFA AND IMPAIRS CHOLINERGIC ANTIINFLAMMATORY HOMEOSTASIS THROUGH MICRORNA MODULATION

The $\alpha 7$ Nicotinic Acetylcholine Receptor ($\alpha 7$ nAChR) is involved with neuronal excitability, neurotransmitters secretion, and anti-inflammatory response, and its downregulation is correlated with hyperphagia and obesity. Thus, we aimed to investigate the molecular mechanisms involved with $\alpha 7$ nAChR downregulation in diet-induced obesity development in mice. Bioinformatic analyses were performed to identify potential microRNAs to control the *Chrna7* gene. Animal procedures were performed following the guidelines of CEUA/UNICAMP (protocol #5715-1/2021). C57BL/6 male mice were fed standard control (CT) or obesogenic (OB) diet for 3 days. A neuronal cell line (mHypo-A) was treated with CT or OB mice serum (2%, 24h), and with insulin, leptin, or TNF α (24h). HEK-293T cell line were transfected with pGL3-*Chrna7*-3'-UTR or pGL3-*Chrna7*-3'-UTR-mut, and co-transfected with miR-A mimic or scramble miR to evaluate luciferase activity. Data were analyzed using Student's T-Test or One-way ANOVA followed by Tukey's post hoc and were considered statistically significant when $p \leq 0.05$. Bioinformatic analysis revealed "miR-A" as a potential *Chrna7* controller, which was also upregulated in the hypothalamus of OB, while the *Chrna7* gene was downregulated. OB were also hyperphagic, had higher body fat, higher serum insulin and leptin, and higher TNF α when compared to CT mice. Neuronal cells treated with OB serum or with TNF α had higher "miR-A" and lower *Chrna7* expression. Luciferase assay confirmed that "miR-A" is able to pair with *Chrna7* to control its levels. Thus, we can conclude that a short-term obesogenic diet impairs the ner miR-A/*Chrna7* axis in mice hypothalamus, probably through TNF α upregulation, which predisposes hyperphagia and obesity development.

ID: 11284

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 ASSESSMENT OF SOCIAL BEHAVIOR AND SENSORIMOTOR GATING IN ADULT RATS SUBMITTED TO NEONATAL ANOXIA

Neonatal anoxia is the lack of oxygenation at birth, promoting several biochemical cascades, culminating in cell death by calcium influx and neuroinflammation. Moreover, anoxia can be a risk factor to neurological disorders such as autism and schizophrenia. It is already reported in neonatal anoxia model a damage in hippocampus and alteration in prefrontal cortex during the development, both structures related to social behavior. The present study aimed to investigate whether neonatal anoxia causes alterations in social behavior. Four litters of Wistar rats were used, from the vivarium of Federal University of ABC, and randomly assigned to control (C) and anoxia (A) groups, (#3352020719 the Ethics Committee for the use of animals). The system used to perform anoxia was described by Takada. For the following tests we used P60 male rats. We performed a social test in a three-chamber apparatus and evaluated the social preference (time spent with another rat or an object(obj)), and social novelty (time spent with a novel (N) or familiar (F)). After the test, we performed a prepulse inhibition (PPI) test to verify if our animals could present schizophrenia-like behavior. The results are described by mean \pm SEM. Both groups spent more time rat in the social preference task (C: obj= 89.28 \pm 21.26; rat=476.86 \pm 21.93; A: obj= 146.57 \pm 24.87, rat=382 \pm 24.09, $p < 0.001$) but the difference in time spent between a conspecific and the object is higher in control groups (C= 387.6 \pm 42.8, A= 235.4 \pm 47.9, $p = 0.035$). In social novelty task, we did not find any difference between the groups (C: F= 342.86 \pm 55.33; N=207.57 \pm 48.2, $p=0.125$; A: F=257.28 \pm 47.19, N= 252.71 \pm 46.38, $p=0.997$). In general terms of sociability, anoxia does not cause impairment. Indeed, in the PPI test, no difference was found (C: 70.88 \pm 6.48, A: 74.01 \pm 5.49, $p=0.44$). We concluded that anoxia did not lead to a deficit in social behavior in the three-chamber task or changes in the PPI test.

ID: 11096

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 ASSOCIATION BETWEEN FEEDING RHYTHM AND VERBAL LEARNING IN COLLEGE STUDENTS DURING THE COVID-19 PANDEMIC.

Eating behavior involves temporal phases that are rhythmic and may be related to cognitive aspects such as learning. During the academic period, college students can have their food rhythm modified and thus alter their academic performance, even more in pandemic moments. Therefore, it was intended to investigate whether feeding rhythm is associated with better performance in verbal memory and learning of the college students during the COVID-19 pandemic period. The study was approved by the Ethics and Research Committee of the Federal University of Pernambuco (protocol: 36741020.3.0000.5208). The research was carried out between August and November 2020. It included college students of both sexes, between 18 and 30 years old, from Campina Grande-PB and Recife-PE. An online food diary was made available for recording 13 sequential days. In the second week, the Rey Auditory-Verbal Learning Test, which assesses memory, was carried out, also online. The statistical tests applied were: Shapiro-Wilk Normality Test and Spearman's Correlation test, considering the significance of $p < 0.05$. Participants were 45 individuals aged 21.7 ± 2.2 years and predominantly female (77.8%). All college students showed rhythmicity in feeding times, with a median of the arbitrary unit of 1.24. There was a predominance of meals (acrophase) around $1:06 \text{ pm} \pm 5\text{h}16\text{min}$. In terms of verbal learning, the score was 18.5 ± 7.2 . Short-term verbal memory corresponded to 10.8 ± 1.9 and long-term verbal memory, 10.8 ± 2.9 points. There was a correlation between feeding time and the verbal memory response both in the short ($r = 0.37$; $p < 0.05$) and long ($r = 0.36$; $p < 0.05$) terms, as well as for verbal learning ($r = 0.35$; $p < 0.05$). The results suggest that college students during the pandemic maintained their feeding rhythm. Even with the later acrophase of feeding times, they did not alter verbal memory and learning.

ID: 10668

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 AXONAL DAMAGE AND MYELIN IMPAIRMENT IN THE INTERNAL CAPSULE FOLLOWING STRIATAL EXCITOTOXIC INJURY

Excitotoxicity is a phenomenon associated with tissue disturbances elicited by the harmful action of excessive concentrations of glutamate and its agonists in nervous system, triggered by morphophysiological disorders (traumatic injury, vascular changes) or neurodegenerative diseases, resulting in structural and physiological changes that ultimately result in cell death. The present study aimed to characterize the axonal and myelin alterations induced by a focal excitotoxic lesion in the rat's internal capsule following a microinjection of N-methyl-D aspartate (NMDA) in the dorsal striatum after 1, 3 and 7 days of lesion. Adult Wistar male rats were injected with 80 nmol of NMDA into the striatum and perfused after the post-lesion days (PLD) specified (n=5 per group). The tissue was processed to immunohistochemistry for axonal lesion (β APP), oligodendrocytes (Tau) and myelin (MBP) (CEPAE/UFPA ID #001/2007). The quantification of the Tau-immunolabeling was made by cell counts using a 1mm² square grid (40x objective) attached to the eyepiece of a Nikon Eclipse 50i microscope across the internal capsule throughout the survival times evaluated (3 sections/animal per group). Average values for all measurements were then compared among the groups using one-way ANOVA, following by Tukey post hoc test with significance level set when $p < 0.05$. Oligodendrocyte damage was pronounced at 3PLD, remaining at 7PLD (PLD1: 7.8 ± 1.79 ; PLD3: 65 ± 4.17 ; PLD7: 29.2 ± 2.76 ; * $p < 0.05$; ANOVA, Tukey post hoc test). Progressive myelin impairment was observed, with a significant rarefaction at 7PLD. A conspicuous pattern of axonal lesion was also identified, mainly at 7PLD. Our results point out that NMDA-induced acute excitotoxic injury in the dorsal striatum caused axonal, oligodendrocyte and myelin sheath damage in the internal capsule, which may be associated with functional disturbances in brain tissue.

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ID: 11089

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: Universidade de São Paulo

FeSBE2022 CHANGES IN MICROGLIA MORPHOLOGY IN THE PARAFACIAL REGION AFTER ACUTE HYPOXIA

Inflammation is defined as a biological response induced by numerous agents and is a fundamental part of the defense against infections and disturbances of homeostasis. Astrocytes and neurons in the parafacial (pF) region have already been shown to be involved in the ventilatory response to hypercapnia and hypoxia. However, there are still no data that elucidate a possible participation of microglia cells in the same respiratory challenge. In the present study, we investigated whether the reduction in O₂ levels (hypoxia) would be able to elicit microglial activation in the pF region, as well as a modification of respiratory activity. Adult male C57BL/6J mice (CEUA: 8256040619) (24 - 34 g) were used. The animals underwent whole-body plethysmography and were divided into two groups: normoxia group (FiO₂ = 0.21, 1h) and hypoxia group (FiO₂ = 0.08, 1h) for subsequent perfusion and immunohistochemical analysis for the microglia marker (Ionized calcium binding adapter molecule 1 - Iba-1). From the fractal analysis of the pF, it was observed that the animals submitted to hypoxia had an increase in density (0.042 ± 0.002 ; normoxia: 0.037 ± 0.001), in the perimeter (2058 ± 65 ; normoxia: 1801 ± 25), in the area (312776 ± 35046 ; normoxia: 217650 ± 11825) and in the fractal dimension (1.542 ± 0.01031 ; normoxia: 1.445 ± 0.01478) of the microglia. An increase was also observed in the branch number/cell ($4 \times 10^8 \pm 1.7 \times 10^8$; normoxia: $3.12 \times 10^8 \pm 3.32 \times 10^7$) and end points/cell (124 ± 8 ; normoxia: 99 ± 7). The morphological parameters of lacunarity (0.362 ± 0.008 ; normoxia: 0.42 ± 0.013) and span ratio (1.3 ± 0.022 ; normoxia: 1.42 ± 0.032) were reduced in animals submitted to hypoxia. On the other hand, the number of cells (11 ± 0.536 ; normoxia: 12 ± 0.664) and circularity (0.813 ± 0.003 ; normoxia: 0.808 ± 0.004) had no significant differences. Our data suggest that hypoxia can alter the morphology of microglial cells and their ramifications in the pF region and may induce greater recruitment of microglial cells in this region with the objective of reestablishing homeostasis.

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ID: 11098

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: UFRB

FeSBE2022 CHRONOTYPE AND VERBAL MEMORY: HAS THIS RELATIONSHIP CHANGED DURING THE COVID-19 PANDEMIC?

The profile of activity rhythm varies between individuals and there may have been changes in mnemonic aspects in the pandemic period, including college students who were affected by changes in teaching modalities due to COVID-19 pandemic. The aim was to evaluate the relationship of the chronotype and the verbal memory and learning of college students during the COVID-19 pandemic. The study was approved by the UFPE Research Ethics Committee (32360720.4.0000.5208) and was carried out in two period: between August and November 2020 (M1); and between July and December 2021 (M2). College students of both sexes, between 18 and 30 years old, residing in the cities of Campina Grande-PB and Recife-PE were included. Rey Auditory-Verbal Learning Test was carried out via Google Meet platform. Subsequently, the subjects filled out an electronic form containing the Horne and Ostberg Morningness-Eveningness Questionnaire. The Shapiro-Wilk test was used to analyze normality and the Kruskal-Wallis test with Dunn's post-hoc test, to evaluate the differences, considering $p < 0.05$). Similarly, there was no difference for the variables of verbal memory and learning ($p > 0.05$). When evaluating the aspects of memory according to the chronotype of the individuals in M1, there was no difference ($p > 0.05$). However, in M2 the evening subjects had worse recognition memory (11.7 ± 2.6) when compared to the intermediate chronotype subjects (13.6 ± 1.3 ; $p = 0.03$). The data states that the verbal memory of the students with the evening chronotype was worse in the second year of the pandemic.

ID: 11287

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: *Universidade Federal de Alfnas*

FeSBE2022 CURCUMIN REVERSES OVARIECTOMY-INDUCED OBJECT RECOGNITION DEFICIT

The drop in estrogen during menopause is related to the development of cognitive deficits and curcumin has been highlighted for presenting a potential bioactive compound that contributes to the improvement of brain functions. The aim of the study was to evaluate the effect of curcumin on the object recognition memory of ovariectomized rats. Wistar rats were used in adulthood, with 09 weeks of life and approximate weight of 200 grams. Approved by CEUA number 0059/2021. The animals underwent ovariectomy (OVX) or control surgery (SHAM) and were allocated into groups of 12 animals each. After 15 days after surgery, OVX+C and SHAM+C rats received curcumin via gavage at a dose of 50mg/Kg, or vehicle (OVX+V and SHAM+V) (n=12; respectively). The duration of treatment with curcumin was 17 days, and on the 15th day the object recognition test was started, where short and long-term memory were evaluated (2 and 24-hour tests respectively), and performed the calculation of the recognition index. The results were analyzed by the TWO-WAY ANOVA test followed by the Bonferroni post-test. As a result, the OVX+V group showed an increase in the time spent exploring the familiar object (21.56s to 46.36s and 23.95s to 39.41s; $p<0.05$) in the 2 and 24-hour test, respectively, when compared to the SHAM+V group. As for the OVX+C animals, there was an increase in the exploration of the new object at 2 and 24h (64.52s to 138.2s and 71.96s to 140.8s; $p<0.01$) compared to the OVX+V. In the object recognition index, the OVX+V group showed a lower recognition index (0.76 to 0.65; $p<0.05$) in the 2h test when compared to the SHAM+V group. The OVX+C group showed a higher recognition index (0.65 to 0.79 and 0.65 to 0.80; $p<0.05$) at 2 and 24h respectively when compared to the OVX+V group. We conclude that ovariectomy induced a decline in short- and long-term memories and that curcumin treatment reversed the memory deficits observed in object recognition tasks in OVX animals.

ID: 11237

Área Temática: Ê-POSTER | Neurobiologia

Autores: Octávio Maia Thiago Moreira Ana Takakura Luiz Oliveira

Instituição: USP

FeSBE2022 DIFFERENT EFFECT OF BREATHING OUTPUT DUE TO SUBSTANCE P INJECTION IN THE PARAFACIAL REGION IN MICE

Ventilation is a process initiated in the central nervous system, essential for maintaining the body's homeostasis, especially to the regulate O₂ and CO₂ levels in blood and tissues. It is well established that central and peripheral chemoreceptors are sensitive to changes in information to respiratory centers to control breathing. Recently, based on functional differences, we subdivided neurons juxtaposed to the facial nucleus into two distinct populations, the parafacial ventral (pFV) and lateral (pFL) regions. Little is known about the composition of these regions as well as the tachykinergic signaling to control breathing output. In the present study, we investigated the respiratory effects elicited by the injection of substance P (SP) in the parafacial region and the role of NK1 receptors in this region in basal respiratory control and in the ventilatory response to hypercapnia. Adult mice (C57B6/J; 20-25g; N= 3-6/group-CEUA: 2781260620) anesthetized with urethane (1.2 g/kg) having their respiratory parameters (amplitude, frequency, and respiratory cycle) evaluated by recording of the electrical activity of the external intercostal muscle (IntEMG) were used. SP injections (1 µM - 30 nL) in the pFV produced a significant increase in the IntEMG frequency (18.3 ± 5.3 , vs. saline: $-1.2 \pm 0.8\%$), IntEMG amplitude (38.3 ± 11.6 vs. saline: $-1.95 \pm 2.5\%$) and IntEMG minute volume (62.4 ± 12.4 vs. saline: $-3.16 \pm 2.75\%$). Injection of SP laterally in the pFL elicited a decrease in IntEMG frequency (-14 ± 2.9 , vs. saline: $0.85 \pm 0.85\%$) and an increase in IntEMG amplitude (28 ± 14 , vs. saline: $3 \pm 3\%$). The changes in breathing elicited by SP either in pFV or pFL was completely blocked after previous injection of NK1 antagonist (GR82334, 100 µM – 30nL). Our partial results suggest that tachykinergic signaling exerts different effects on respiratory rate depending on the site of injections in the parafacial region.

ID: 11323

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: UFRGS

FeSBE2022 EARLY STRESS AND OMEGA 3 SUPPLEMENTATION: A STUDY OF OXIDATIVE STATUS IN THE AMYGDALA

Early-life stress (ELS) may programs neurophysiological funtions, and can result in psychiatric disorders. Ω 3 fats have been proposed as neuroprotective agents. We aim to verify anxiety-like behavior in animals subjected to the maternal separation (MS), receiving or not an Ω -3-enriched diet, evaluating the oxidative status in the amygdala. We used male and female Wistar rats, divided into non-handled and MS (3h/day, at 32°C, during postnatal days 1-10). Procedures were approved by our Research Ethics Committee (CEUA-UFRGS #41511). From weaning, animals received a diet with linseed oil (rich in Ω 3) or soy oil (SO), resulting in 4 groups (NH+SO, MS+SO, NH+ Ω 3, MS+ Ω 3). In adulthood, they were exposed to the elevated plus maze (EPM) (N=8/group). The activities of antioxidant enzymes catalase, glutathione nd superoxide dismutase, as well as reactive oxygen species production, were evaluated in the amygdala (N=4-6/group). Two-way ANOVA (factors SM and diet) was used. In the EPM, MS increased total distance traveled: [F(1,56)=6.214, p=0.016 for males; F(1,55)=4.249, p=0.019 for females]. Time in closed arms showed marginal stress x diet interactions [F(1,55)=3.70, p= 0.060 for males and F(1,55)=3.218, p=0.078 for females]. In females, MS increased stretched attend posture [F(2,55)=8.633, P=0.001]. In the biochemical analyses, we did not detect significant effects or interactions (P >0.05 in all cases). However, we observed that SM males showed some reduction in the activities of antioxidant enzymes, while this was not observed in females. Our perspective is to increase the N to clarify this point. The behavioral data suggest that ELS induces anxiety-like behavior, which is attenuated by Ω 3 diet in some parameters. Although no significant effects were found for the oxidative status, further studies are necessary to conclude whether the amygdala is, in fact, less vulnerable to the interventions used.

ID: 11170

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 EFFECT OF CHRONIC TREATMENT WITH SALBUTAMOL, A BETA 2 NORADRENERGIC AGONIST, ON BEHAVIORAL AND NEUROCHEMICAL CHANGES IN AN EXPERIMENTAL MODEL OF PARKINSONISM

Parkinson's disease (PD), characterized by the death of dopaminergic neurons in the nigrostriatal pathway, has dysfunction of other neuronal pathways associated with its progression. Studies suggest that adrenergic- β 2 agonists may be related to a lower risk for PD. This study evaluated the effect of salbutamol (adrenergic- β 2 agonist) on motor and behavioral changes in an experimental model of reserpine-induced parkinsonism. 26 Wistar rats, aged 4 to 6 months, divided into 4 groups: CTR, SALB, RES, and RES-SALB, treated with salbutamol 5mg/kg or vehicle, s.c., daily for 75 days. After 45 days, they were induced to parkinsonism by 15 injections of reserpine 0.1mg/kg, s.c, one every 48h, until day 75 and were submitted to catalepsy and oral movement (MO) tests. CEUA, nº 4200070621. Data analyzed by ANOVA (mean \pm S.P.M), with $p < 0.05$. In catalepsy, the RES group showed longer time, from day 61 to 77 (means of 63.6 ± 17.9 to 105.2 ± 18.4), compared to the CTR group (means of 12 ± 3.6 to 15.3 ± 3.4), RES-SALB time was longer, from day 65 to 69 (means 56.4 ± 19.6 to 77.3 ± 20.8) and day 77 (67.7 ± 22.1), compared to the SALB group (between days 65 and 69, means 9.9 ± 2.7 to 13.1 ± 3.6 , day 77 - 12.6 ± 3.2). In MO, RES and RES-SALB had a higher number of chews in vacuum on days 63 (RES - 120 ± 42.6 and RES-SALB 146.3 ± 35.5) and 77 (RES - 266.8 ± 114.9 and RES-SALB - 138.1 ± 30.4), compared to the CTR (day 63 - 13 ± 4.8 , day 77 - 22.5 ± 12.2) and SALB (day 63 - 36.3 ± 7.5 , 77 - 21.6 ± 12.3) groups, respectively. Tongue protrusion, also proved different between RES, RES-SALB and their controls, with values for day 63, RES - 6.8 ± 2.1 and RES-SALB - 10.7 ± 3.2 , and on day 77, RES - 8.6 ± 2.2 and RES-SALB - 11.8 ± 2.7 compared to the CTR (day 63 - 0.5 ± 0.5 , day 77 - 1.8 ± 1.2) and SALB (day 63 - 1.4 ± 0.6 , 77 - 0.7 ± 0.6) groups, respectively. These results suggest that chronic salbutamol treatment does not prevent reserpine-induced motor and behavioral damage.

ID: 11090

Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 EFFECT OF MELATONIN ON LEARNING AND MEMORY OF RATS
SUBMITTED TO NEONATAL ANOXIA**

Neonatal anoxia is a worldwide health problem that affects newborns, and can cause different neurological sequelae. To study this condition, we use a global and non-invasive experimental model of neonatal anoxia that simulates clinical conditions of preterm newborns. In this model, we observed alterations in the memory and learning of the animals. Among the possibilities of treatment is melatonin which has antioxidant effects and has demonstrated neuroprotective effects in different models of brain injury. Therefore, this study aims to analyze the influence of melatonin on spatial reference memory and learning in Wistar rats submitted to neonatal anoxia. For the experiment we used *Rattus norvegicus* Wistar. For the experiment we used *Rattus norvegicus* Wistar. The anoxia system is composed of a semi-hermetic polycarbonate chamber coupled to a regulator and a cylinder of N₂ 100%. The chamber temperature is maintained between 35 and 37°C by a hot plate. The neonates, with approximately 30 hours of life and weight between 6-8 grams, were placed inside the chamber for 25 minutes, which was saturated with nitrogen at a flow of 11.5L/minute. After recovery, the animals received treatment with melatonin (i.p.) in three doses after anoxia: 5 min, 24 h, and 48 h (15 mg/kg). At P53, we evaluated memory and spacial learning by the y-maze test and from P65 to P69 by the Barnes maze test (CEUA 5173180719). One-way ANOVA showed no difference between the groups in the y-maze test, but in the Barnes maze test, we found that the anoxia group made fewer errors and had a lower latency to reach the escape box during the sessions. Based on this, we suppose that the anoxia can cause anxiety-like behavior in the animals' which would contribute to our results. Anxiety tests will be performed to verify this behavior and the effect of melatonin.

ID: 11088

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 EMOTIONAL AND NOCICEPTIVE ALTERATIONS ASSOCIATED WITH GENETIC EPILEPSY: SHORT- AND LONG-TERM EFFECTS OF ACUTE AND CHRONIC SEIZURES ON ANXIETY AND POSTICTAL ANALGESIA

Increased anxiety and painful hypersensitivity are among the most common comorbidities in patients with epilepsies, but preclinical studies are still very limited. We used a genetic model of epilepsy, the Wistar Audiogenic Rat (WAR) strain, to investigate the impact of genetic susceptibility to epilepsy on anxiety and nociception, assessing short- and long-term impacts of acute and chronic seizures on anxiety and postictal analgesia. 33 adult male WARs and 7 Wistar rats (2-3 months old) were used (CEUA number: 057/2017). Animals were submitted to tests for nociception (von Frey, acetone, and hot plate) and anxiety (open-field - OF, light-dark box - LDB, and elevated plus maze - EPM). WARs were submitted to acute and chronic seizures (n=13/group). Short- and long-term effects of seizures on anxiety and nociception were assessed (24h and 15 days after). Seizure-free WARs displayed hyperalgesia in all nociceptive tests ($p \leq 0.0006$) and reduced time and frequency of exploration of the open arms of the EPM ($p \leq 0.0297$) when compared to control Wistar. Antiallodynic effects induced by acute and chronic seizures were detected in all tests and these effects were observed 10 min after seizures and lasted up to 3 h. Acute seizures increased anxiogenic-like behaviors in all tests at 24 h and 15 days after seizures (EPM, $p \leq 0.0019$; LDB, $p \leq 0.0237$; OF, $p \leq 0.0271$). Chronic seizures increased anxiogenic-like behaviors in the LDB ($p = 0.0008$) and OF ($p = 0.0038$) tests 24 h after the last seizure, but only the LDB detected anxiogenic behaviors 15 days later ($p = 0.0023$). Epilepsy was associated with increased anxiety in three different tests and hyperalgesia in tests for mechanical and thermal nociception. Acute and chronic seizures induced short- and long-term impairments in anxiety and nociception. Characterization of these neurobehavioral comorbidities in genetic models of epilepsies allows for the study and development of treatments for epilepsy and their comorbidities in the same subject.

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ID: 10860

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 EXTRASYNAPTIC NMDA RECEPTORS MEDIATE GLUTAMATERGIC TONIC CURRENT IN THE NTS NEURONS OF MICE

Introduction: Glutamate, an excitatory aminoacid, can evoke a tonic current due to activation of extrasynaptic NMDA receptors (I NMDA_{tonic}). The strength of I NMDA_{tonic} depends on the activity of glutamate transporters in astrocytes, which remove glutamate from the extracellular space, decreasing its concentration in the extrasynaptic space. Aims: To evaluate whether or not: (1) NTS neurons of mice present I NMDA_{tonic} and (2) I NMDA_{tonic} are involved in the modulation of neuronal activity. Methods: Brainstem slices and the whole-cell patch clamp technique (voltage- and current- clamp) were used to record the synaptic activity of NTS neurons from C57Bl/6 mice (70-80g; CEUA-FMRP-USP: #016/2018). The presence of I NMDA_{tonic} was evaluated by adding Kynurenic acid (2 mM, 5 min) or memantine (30 µM, 10 min) in the bath perfusion. Results: With holding potential at +44mV and memantine, 70% of NTS neurons presented I NMDA_{tonic} [amplitude: $18 \pm 3,8$ pA (n=7)] and 44% them showed I NMDA_{tonic} in the presence of Kynurenic acid [amplitude: 28.7 ± 7.6 pA (n=10)]. The short-term hypoxia model (24h, FiO₂ 0.10) did not affect the amplitude of I NMDA_{tonic} [amplitude: $24.7 \pm 3,2$ pA (n=7)] but increased from 44 to 78% the neurons presenting I NMDA_{tonic}. The electrical stimulation of afferent fibers (TS fibers) in NTS, induces an outward current due to the activation of synaptic NMDA receptor (-holding potential: +44mV). The addition of memantine revealed that part of this current is due to the activation of extra synaptic NMDA receptor [control: $36,38 \pm 6,4$ pA vs memantine: $19 \pm 6,7$ pA, p=0,0414, (n=8)]. However, the number action potentials induced by TS stimuli (5 stimuli, 10 Hz) was not affected by the memantine (p=0.0576, n=7). Conclusion: NTS neurons present I NMDA_{tonic} induced by extrasynaptic NMDA receptor stimulation, and it is also activated by stimulation of afferent fibers. On the other hand, it was not observed any effect of I NMDA_{tonic} on the action potential discharge. The data also shows that SH model increases the number of mice NTS neurons presenting I NMDA_{tonic}.

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Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 FINDINGS ON THE ELECTROPHYSIOLOGICAL ACTIVITY OF THE REPTILIAN CORTEX IN A MNEMONIC TASK

The association of electrophysiological response patterns in different vertebrate groups promotes assimilation between behaviors and responses under stimulus. This proposed we investigated how the reptilian cortex responds to the mnemonic task, on the role of the dorsal and dorso-medial cortex (DC and MDC) at the aversive memory model. Five lizards of *Tropidurus hispidus* were used, authorized by ICMBio/SISBIO n.58575-3 and CEUA/UFS n.1705270620. Stereotactic surgery was performed to implant electrodes for surface contact with cortex. The experimental protocol develops in training and test (24 h later). The task induces memory formation and evaluated 10 min of electrophysiological recording. The signal was analyzed to remove artifact in the 0.5 mV range and filtered in 1-50 Hz range. The spectrum was divided at 6 bands in the signal: from 1-3, 4-7, 8-12, 15-20, 21-30 and 31-40 Hz. The signal analyses of the electrophysiological pattern are dominant at low frequencies of 1-4 Hz and decreases amplitude for frequencies above 4 Hz. The cortex measures higher power normalized for baseline in bands 1, 5 and 6 from the MDC to DC. In band 1 (MDC = 1.6 ± 0.2 , DC = 0.4 ± 0.2 , $t(4) = 5.08$, $p < .01$, $d' = 2.27$), band 5 (MDC = 1.5 ± 0.3 , DC = 0.5 ± 0.3 , $t(4) = 3.22$, $p = .03$, $d' = 1.44$) and band 6 (MDC = 1.6 ± 0.2 , DC = 0.4 ± 0.2 , $t(4) = 5.52$, $p < .01$, $d' = 2.47$), but there was no difference for band 2 ($t(4) = .79$ and $p = .47$), band 3 ($t(4) = .81$ and $p = .46$) and band 4 ($t(4) = .74$ and $p = .5$). In the test for band 1 (MDC = 1.6 ± 0.3 , DC = 0.4 ± 0.3 , $t(4) = 3.72$, $p = .02$, $d' = 1.66$) and band 6 (MDC = 1.6 ± 0.4 , DC = 0.4 ± 0.4 , $t(4) = 2.87$, $p = .04$, $d' = 1.28$), that could indicate an analysis situation and possible mnemonic response. Thus, the coupling strength, in training and test, for DC (MI = 0.002 ± 0.0001) over MDC (MI = 0.0001 ± 0.0001) was upper in the 4-7 Hz band at amplitudes of 23-39 Hz [$t(4) = 6.87$, $p < .01$, $d' = 3.61$]. The data of regions of the cortex play different roles in memory.

ID: 10944

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 GABAERGIC NEURONS IN THE CAUDAL PORTION OF HELL NUCLEUS ACCUMBENS (NACC) ARE INVOLVED IN MICTURITION AND CARDIOVASCULAR CONTROL.

Our previous studies showed that GABAergic inhibition of the rostral shell NAcc evoked hypotension, bradycardia and increase in intravesical pressure (IP), demonstrating a role in the micturition control pathways and cardiovascular regulation. Nevertheless, evidence demonstrated that muscimol, a GABAergic receptor agonist, elicited paradoxical responses of motivated behavior in the rostral and caudal shell NAcc. In this study, we investigated the role of GABAergic neurons in the caudal shell NAcc on IP and cardiovascular parameters. Adult male Wistar rats (~450 g, protocol CEUA-FMABC#09/2020) were implanted with stainless steel guide cannulas bilaterally in the caudal shell NAcc 7 days prior to the experiments. Afterwards, rats were isoflurane anesthetized and underwent a cannulation of the femoral artery and vein for mean arterial pressure (MAP) and heart rate (HR) recordings, and infusion of drugs, respectively. The urinary bladder was cannulated for IP measurement. Doppler flow probe was placed around the left renal arterial for renal blood flow (RBF) recordings. After the baseline MAP, HR, IP and RBF recordings for 15 min, GABA (50 mM, 1 μ L) or saline (vehicle, 1 μ L) was injected bilaterally into the caudal shell NAcc and the variables were measured for additional 30 min. Data are as mean \pm SEM and submitted to Student's t test ($P<0.05$). Results: Bilateral injections of GABA into the caudal shell NAcc ($n=6$) significantly increased IP ($180\pm 3.41\%$ vs. $5\pm 3\%$, saline) and renal conductance ($144.82\pm 18.41\%$ vs. $5.45\pm 0.90\%$, saline), and caused significant fall in MAP (-69 ± 1 mmHg vs. -2 ± 2 mmHg, saline) and HR (-112 ± 3 bpm vs. 1 ± 2 bpm, saline) compared to saline ($n=6$). Our findings suggest that GABAergic neurons in the caudal shell NAcc also participates in the neural pathways of micturition control and exert a possible tonic role in the cardiovascular regulation, similarly to GABAergic neurons in the rostral shell NAcc.

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ID: 11099

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: PLASMAC

FeSBE2022 HAVE THE STRESS PERCEPTION AND DEPRESSIVE SYMPTOMS OF COLLEGE STUDENTS BEEN ALTERED DURING THE PANDEMIC?

During the COVID-19 pandemic, social isolation and the entire pandemic context may have contributed to change the emotions of college students, considering that there were abrupt adjustments in teaching methods and uncertainties for the professional future. Thus, it was evaluated whether there were depressive symptoms and the perception of stress among college students during the first and second years of the pandemic. For this, the research involved college students of both sexes, between 18 and 35 years old (n=318), residing in the northeast region of Brazil. An electronic form was used at two times: between June and August 2020, called M1; and the same period in 2021, M2. It was used the Beck Depression Inventory and the Perceived Stress Scale – 10. Data were expressed as percentage, mean and standard deviation. The Shapiro-Wilk test was used to investigate the normality of the data and the Wilcoxon test for paired analysis between the moments of the research. Data were analyzed using Graphpad Prism 6.0, considering p0.05). It was concluded that the students had depressive symptoms and felt stressed, regardless of the period of the pandemic, indicating that there may be a chronic change in the emotions of college students.

ID: 11201

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 IMPAIRMENT OF MATERNAL CARE BEHAVIOR BY GESTATIONAL LOW-PROTEIN DIET: AN INDISPENSABLE EVALUATION FOR DOHAD MODELS

The gestational low-protein (LP) diet model has provided a wealth of knowledge about the mechanisms of cardiovascular diseases and neuropsychiatry disorders in the DOHAD context. Studies have demonstrated that maternal care is crucial for proper post-natal neurodevelopment of rodent offspring, mostly affecting the regulation of stress responsiveness in adult life. The evaluation of maternal care behavior is essential for the interpretation of different aspects of offspring behavior and possible neurobiological alterations in DOHAD models. This study aimed to evaluate maternal care behavior in female mice submitted to LP diet. Mated C57BL/6J female mice (CEUA 5776-1/2021; 20-23g, 8 weeks old) were submitted to a normal-protein diet (NP; 17% protein; n=7) or LP diet (6% protein; n=7) throughout pregnancy. On the offspring post-natal day 2 to 9 the maternal care behavior was evaluated during two periods: between 9:00-10:30 AM and 2:00-3:30 PM. Each parameter was quantified (NB-nest-building; LG-linking/grooming; AN-arched back nursing; PNpassive nursing; ON-out of the nest; SG-self-grooming; ED-eating and drinking) by 1800 seconds. Pup retrieval was performed in PDN3 for a maximum time of 300 seconds. The data was express by mean±SE. The LP mothers showed a significantly reduced time (s)spent in AN (8485±1736) compared with the NP group (12109±818.7) and spent significantly more time on the behavior of SG (NP:335±99.2; LP:876.7±128.9). In addition, an increase in latency to retrieve the first pup (NP:14.7±2.4;LP:22.3±3.6) and all pups (NP:37±4;LP:56±5.4) by LP mothers was found. No differences in time duration of LG, ON, PN, ED, and NB, were found between experimental groups. No differences in fragmentation and number of LG bouts were found between groups. This study provides evidence that maternal LP diet alters maternal care behavior parameters, which effectively could contribute to the genesis of neural disorders in adult offspring.

ID: 10992

Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 IMPLANTATION OF A HYDROGEL IMPROVES MOTOR RECOVERY
AND NEURONAL REPAIR AFTER SPINAL CORD INJURY IN RATS**

Peptide hydrogels have been widely used in the field of tissue engineering due to their good biocompatibility and nanofibrous structure mimicking that of the extracellular matrix (ECM). In this study, a bimodal hydrogel that is both injectable and presents IKVAV, a peptide sequence from laminin, was implanted in a contusion model of spinal cord injury and the motor and cellular regeneration were analyzed. Male adult Wistar rats were subjected to a spinal cord injury by contusion and divided into three groups: hydrogel, lesion control and sham. 10 µL of a 20 mg/mL Fmoc-DIKVAV hydrogel was injected into the lesion epicenter one hour after the SCI (Porto Alegre, Brazil - CEUA project number 32510). For each group, the tissue repair and motor recovery were evaluated. To quantify the inflammatory response, the glial scar and neural degeneration, flow cytometry analyses were performed. In vitro, the Fmoc-DIKVAV hydrogel exhibited good cytocompatibility for neural precursor cells. The rats injected with Fmoc-DIKVAV showed significantly better motor recovery when compared with the vehicle. A reduced number of astrocytes and increased number of beta 3 tubulin positive neurons were observed in the implanted group. The use of bimodal hydrogels as biomaterials for tissue engineering is promising, enabling enhanced recovery following spinal cord injury.

ID: 11288

Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 MATERNAL IMMUNE ACTIVATION INDUCES INCREASED ANXIETY-
LIKE BEHAVIOR, REDUCED SOCIAL INTERACTION, AND MODULATES
OXYTOCIN RECEPTOR EXPRESSION**

Research studies indicate that fetal exposure to maternal immune activation (MIA) increases the risk of offspring developing neuropsychiatric disorders. In rodents, MIA negatively affects different brain areas, such as the hippocampus (HPC) and prefrontal cortex (PFC), and alters behavior. Oxytocin and its receptor play a crucial role in regulating mammalian social behaviors and anxiety. Thus, we aimed to analyze the effects of MIA on anxiety-like behavior, social interaction, and oxytocin receptor (OXTR) gene expression in the mouse HPC and PFC. To induce MIA, on gestational days 15 and 16, pregnant females (swiss) received intraperitoneal (IP, 100 µg/kg) administration of bacterial lipopolysaccharide (MIA) or saline (CTRL). At DPN 62 the respective male offspring groups were subjected to the open field and social interaction tests (n=8 to 10 per group). 12 hours later, the PFC and HPC were collected for analysis of OXTR gene expression by RT-PCR assay (n=5 per group). Ethics Committee CEUA-UFPE nº 4/21. In the open field test the MIA offspring showed a reduction in time spent in the center (CTRL: 99.5 ± 9.6 vs MIA: 63.9 ± 7.1 ; $p < 0,005$), number of entries in the center (CTRL: 80.7 ± 5.1 vs MIA: 56.27 ± 5.2 ; $p < 0,005$), distance traveled in the center (CTRL: 22.7 ± 1.1 vs MIA: 17.33 ± 1.3 ; $p < 0,005$), rearing behavior (CTRL: 35.6 ± 3.1 vs MIA: 26.8 ± 2.0 ; $p < 0,05$), and increased freezing time (CTRL: 214.3 ± 8.0 vs MIA: 279.1 ± 13.0 ; $p < 0,05$). For the social interaction test the MIA offspring showed a reduction in interaction time (CTRL: 213.6 ± 31.56 vs MIA: 124.2 ± 14.94 ; $p < 0,05$). RT-PCR assay demonstrated that MIA reduced OXTR expression in the PFC (CTRL: 1.0 ± 0.23 vs MIA: 0.089 ± 0.313 ; $p < 0,05$) and HPC (CTRL: 1.0 ± 0.07 vs MIA: 0.48 ± 0.16 ; $p < 0,05$). The results showed that MIA induced increased anxiety-like behavior and reduced social interaction. Furthermore, the behavioral changes may be related to reduced OXTR expression in the PFC and HPC.

ID: 10887

Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 MITOCHONDRIAL ALTERATIONS RESULTING FROM ANIMAL
EXPERIMENTAL MODELS OF OBESITY IN THE CENTRAL NERVOUS SYSTEM:
AN INTEGRATIVE REVIEW**

Obesity is a multifactorial chronic disease caused by excessive accumulation of body fat. This has led to the development of several experimental models capable of replicating the metabolic picture of the disease in animals, including those related to alterations to the Central Nervous System (CNS), which are usually coupled with mitochondrial dysfunction. The aim was to perform an integrative review on the main mitochondrial alterations resulting from experimental rodent models of obesity in the CNS. The search was conducted through PubMed, MedLine and LILACS platforms using obesity, hippocampus, and mitochondria as descriptors. 32 articles were retrieved, from which 13 were selected. The eligibility criteria included experimental studies with rodents (except knockout models) addressing obesity and the respective mitochondrial alterations. The findings revealed the occurrence of oxidative stress, changes in the activity of Krebs cycle enzymes and inhibition of oxidative phosphorylation complexes, impairing ATP production. This leads to ATPase activity dysfunction, limiting cellular electrochemical balance and causing low synaptic density. Also, extravasation of mitochondrial content is permitted by Cyclophilin D overexpression and B-cell lymphoma 2 suppression (promoting pore formation on the mitochondrial membrane), causing cytochrome-C release and caspase-3 activation, triggering apoptosis. All processes described contribute to the disturbance of calcium homeostasis, whether by culminating in a reduced mitochondrial ion retention capacity or by causing an abnormal calcium influx to the cell. Conclusively, mitochondria play an important role in obesity's physiopathology in the CNS, considering that its dysfunction initiates many neurodegenerative processes, namely oxidative stress and apoptosis. Thus, improvement of its function is seen as a compelling neuroprotective strategy for combating the deleterious effects of obesity on the organelle.

ID: 10757

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 MODULATION OF α 7NACHR RECEPTOR BY INFLAMMATORY PROCESSES

Short-term high-fat diet consumption activates inflammatory pathways in the hypothalamus. Nicotinic acetylcholine receptors (nAChRs) are widely expressed in the central nervous system and studies show that α 7nAChR activation leads to signal transduction pathways that result in inhibition of inflammatory cytokine transcription. This mechanism is called the cholinergic anti-inflammatory reflex. A study from our group showed that the consumption of a high-fat diet for three days can reduce the expression of the α 7nAChR receptor and makes the hypothalamus more susceptible to inflammatory damage. The expression and activity of the α 7nAChR receptor depends on several cellular mechanisms, such as methylation, maturation involving chaperone proteins and the ubiquitin-proteasome system. We intend to investigate whether exposure to inflammatory conditions activates cellular mechanisms that act early and lead to reduced expression and/or presence of the α 7nAChR receptor in the cell membrane. In vitro, the microglia cell line BV-2 and the neuronal lineage mHypoA-POMC/GFP were treated with lipopolysaccharide (LPS). Molecular analyses were performed by real-time PCR. After the inflammatory stimulus, we observed a decrease in the expression of the *Chrna7* accompanied by an increase in pro-inflammatory cytokines, an increase in the expression of DNMT1, of the HDAC3, genes related to ubiquitin ligases E1 and E3 and decrease in *Tmen35A* and *Ric3* chaperones. Our results suggest that the action of the DNMT1 enzyme to maintain DNA methylation and HDAC3 to remove the acetyl radical from DNA and prevent transcription may be related to the damage on α 7nAChR receptor through pre-transcriptional mechanisms. There is also the possible involvement of the activation of the post-translational mechanism through the activation of the ubiquitin-proteasome system and through the decrease of chaperones, responsible for the surface expression of the α 7nAChR receptor.

ID: 10667

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 MORPHOLOGICAL ANALYSIS OF CELL CULTURE OF ADULT HUMAN CELLS FROM TRAUMATIZED BRAIN TISSUE

One of the most damaging events that can impair the functioning of the central nervous system is the traumatic brain injury (TBI), resulting in a serious clinical and public health problem. The characterization of tissue alterations resulting from this event in both in vivo and in vitro models is crucial. Studies in human cell culture have only recently been carried out using living tissue, emerging as a very promising line of research. The present study aims to evaluate morphological aspects of human neural cells in culture obtained from traumatized brain tissues collected in emergency surgery procedures (CEP/UERN #2.033.013). Samples obtained from three adult male patients who underwent TBI with extrusion of brain tissue were submitted to cell culture in a standardized medium during 168h. After observation under phase contrast microscopy, morphometric parameters of the neural cells (cell body area, dendritic field length and fractal dimension) were evaluated using ImageJ software, with data obtained after 24, 72 and 168h being compared. Both neurons and glial cells remained viable after 168h in culture, with their morphologies not varying significantly throughout the time points evaluated (neurons: cell bodies' areas: 24h: $5.08 \pm 0.09 \mu\text{m}^2$; 72h: $5.12 \pm 0.09 \mu\text{m}^2$; 168h: $5.18 \pm 0.10 \mu\text{m}^2$; cell bodies' perimeters: 24h: $3.41 \pm 0.05 \mu\text{m}$; 72h: $3.38 \pm 0.04 \mu\text{m}$; 168h: $3.46 \pm 0.03 \mu\text{m}$; fractal dimension: 24h: 0.49 ± 0.04 ; 72h: 0.48 ± 0.03 ; 168h: 0.55 ± 0.03 ; glial cells: cell bodies' areas: 24h: $4.41 \pm 0.05 \mu\text{m}^2$; 72h: $4.38 \pm 0.04 \mu\text{m}^2$; 168h: $4.43 \pm 0.14 \mu\text{m}^2$; cell bodies' perimeters: 24h: $3.25 \pm 0.06 \mu\text{m}$; 72h: $3.33 \pm 0.06 \mu\text{m}$; 168h: $3.42 \pm 0.04 \mu\text{m}$; fractal dimension: 24h: 0.45 ± 0.03 ; 72h: 0.46 ± 0.03 ; 168h: 0.47 ± 0.02 ; $p > 0.05$; Kruskal Wallis test, Dunn's post hoc test). Our results point out the viability of cell culture from traumatized human nervous tissue, carrying perspectives for the use of substances of natural origin that may contribute neuroprotectively to neuronal maintenance in culture.

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Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 NEUROLOGICAL PROTECTION ASPECTS OF KEFIR IN THE PROPHYLAXIS OF NEURODEGENERATIVE DISEASES

Introduction: Neurodegenerative diseases are characterized by the slow and progressive involvement of different areas of the central nervous system. And it is estimated that by 2050, the number of people affected by these diseases worldwide will reach 115.4 million. The main factors involved in the etiology of NP are related to oxidative stress and neuroinflammation, which can be derived from dysbiosis. In any case, kefir, which is basically a fermented product from the action of certain yeasts and bacteria, has anti-inflammatory and antioxidant properties. **Objectives:** Therefore, the objective of this work is to analyze the anti-inflammatory and antioxidant action of kefir described in the literature, and their relationship in the mitigation of factors related to the genesis of these diseases. **Methodology:** The present research consists of a bibliographic review of a descriptive and qualitative nature, carried out through searches of complete works published in the Scielo, PubMed databases and in other informative sources. Through the Descriptors: “kefir grains”; “neurodegenerative diseases”; “Alzheimer's dementia”; “Parkinson's disease” and “oxidative damage”. The research was carried out from March to May 2022. In total, 49 articles were found, of which 10 were selected for the preparation of this study. **DEVELOPMENT:** In view of emerging neuroenterology research on the connections between the gut-brain axis, the importance of the intestinal eubiosis state was highlighted, where the microbiota is predominantly composed of beneficial symbiotic microorganisms. generate metabolites that help in the synthesis of compounds that act on free radicals and pro-inflammatory cytokines, preventing the development of neurodegenerative diseases. **Conclusion:** therefore, in view of the above, the prophylactic action of kefir on neurodegenerative diseases is notorious, as it treats the aspects of origin of these pathologies.

ID: 11007

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 NEUROMOTOR IMPAIRMENT IN YOUNG WISTAR RATS WITH CEREBRAL PALSY

Cerebral palsy (CP) is a neurological condition associated with the most common chronic motor dysfunctions in children, with the highest number of cases in underdeveloped countries, with this, we aimed to verify the motor impairment in young Wistar rats. The study started after approval by the ethics committee (0036/2019). Twenty young male Wistar rats were used, divided into PC (n°10) and control (C) (n°10) groups, catwalk gait at 50 days of life, locomotor activity and motor coordination in bars parallel to the 60 days of life. After the appropriate statistical tests, a statist difference was considered *P<0.05. PC animals suffered severe problems in locomotion. The contact area of the PC animal's paw is reduced, showing a problem in touching the platform with the paw completely. The locomotor activity test also proved that the PC animal has impaired locomotion with reduced distance traveled, average speed, energy expenditure, among other parameters, the parallel bars was another behavioral test that the damage to the PC group was present with greater downtime and consequently less locomotion and also a greater number of mistakes made. Muscle weakness is a common motor impairment in individuals with neurological diseases, among the sequelae presented there is a decrease in gait speed, since there is a change in the compliance of muscle tone and length, posture and voluntary movement, thus explaining all the sequelae found in the experimental model. It is concluded that the experimental model of CP that occurs during the perinatal period is capable of promoting long-term sequels in young adults animals.

ID: 10830

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 NEURONAL ACTIVATION OF CEREBELLUM FUNCTIONAL CIRCUITS IN MOTOR AND NON-MOTOR FUNCTIONS IN MICE

The cerebellum is involved in the control of balance, movement and the acquisition of motor skills. Scientific and technological advances have shown that the cerebellum also participates in non-motor functions, such as emotional control, memory and language. The aim of this study was to investigate the participation of the cerebellum in motor and non-motor functions, and its connection to other brain areas involved in emotional memory and motor learning processes. The current study analyzed the neuronal activation in lobe VI of the cerebellum and other brain structures (e.g., hippocampus, amygdala, prelimbic cortex and infralimbic cortex) after exposure to rotarod and inhibitory avoidance behavioral models to establish possible neuronal circuits for motor and non-motor functions. Sixteen naïve male Swiss albino mice were used. The animals were subjected to three conditions for behavioral evaluation: five animals were exposed to inhibitory avoidance box for 2 days, which is a model used to infer emotional memory; seven animals were exposed to the rotarod for 3 days, which assesses motor learning; and four animals have composed the control group. The animals were euthanized after the last exposure to the apparatus then perfused with paraformaldehyde. Brains were extracted and sectioned for immunofluorescence analysis of c-Fos protein in pre-established structures. Images of the brain structures were obtained, and neuronal activation was analyzed microscopically. For cell counting the ratio between the number of c-Fos positive cells and the total number of cell nuclei represented by DAPI-positive cells was calculated. Analysis of variance (one-way ANOVA) was used to assess differences in the c-Fos/DAPI ratio between the inhibitory avoidance protocol, rotarod and control group. To verify the differences between the inhibitory avoidance protocol, rotarod and control group was used Tukey's post-hoc test. Pearson's correlation coefficient test was used to establish the variables correlation between the areas of interest. The results showed that there was no significant difference in c-Fos expression in lobe VI of the cerebellum between the different conditions. Differences in c-Fos expression were observed in the basolateral amygdala, infralimbic cortex and prelimbic cortex, which are relevant to emotional processes. Pearson's r correlation coefficient test showed a positive correlation between the variables of structures related to emotional processes. We concluded that for strong activation of the cerebellum in the assessment of motor learning and emotional memory, more exposure of the animals to the assessment apparatus may be necessary. Furthermore, we conclude that the animals exhibit strong emotional processes on exposure to the assessment apparatus.

ID: 11236

Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 PARAVENTRICULAR HYPOTHALAMIC NUCLEUS: AXONAL
PROJECTIONS TO THE PARAFACIAL REGION**

The paraventricular hypothalamic nucleus (PVH) contains many neurons that innervate the brainstem, but information regarding their target particularly to the respiratory parafacial region remains incomplete. Here, we investigated an excitatory (VGlut2) or inhibitory (VGat) projection from the PVH to the respiratory parafacial region (pF) in the ventrolateral medulla. Male and female VGlut2-cre or VGat-cre (20-30g, N = 3-4/group) were used (CEUA#9750170720). Colera toxin B (CTB-1%) was injected into the pF by iontophoresis (5 μ A positive current pulses, 7 s duration every 7 s for 10 min). Seven to 10 days after the CTb injection, mice were deeply anesthetized, and finally perfused. Our data showed that $98 \pm 2\%$ of the VGlut2 neurons project to pF while only $2 \pm 1\%$ of the VGat neurons project to pF region. Our findings suggest that the PVH may modulate a range of homeostatic functions, including respiratory activities through the projection to the respiratory parafacial region.

ID: 11063

Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 PATERNAL PROGRAMMING WITH TESTOSTERONE PROPIONATE
AND ITS POSSIBLE PSYCHOBIOLOGICAL IMPACTS ON THE OFFSPRING OF
MICE**

Epidemiological data indicate that millions of people worldwide are anabolic androgenic steroids users. It is known that the individual's interaction with the environment is capable of leading to changes that can last throughout his life and, in turn, can be transmitted to his offspring. In this context, due to the ability to transmit these alterations to offspring, there is a risk of disease onset in adulthood for these individuals. Most research involving the transmission of epigenetic inheritance has focused on maternal origin, and little attention has been paid to paternal insults and their possible relationship to the establishment of inheritance in their offspring. Therefore, the objective of this work was to verify if the paternal exposure to testosterone propionate was able to change the behavioral parameters of the offspring in adulthood, as well as the transcriptional mechanisms involved. Swiss mice were treated twice a week with testosterone propionate (7.5mg/kg) for 5 weeks. The offspring of these animals at 70 days of age were submitted to a battery of behavioral tests of anxiety, memory and sociability. The results showed a reduction in the time spent on the light side in the light-dark box, as well as an increase in the time of closed arm in the elevated plus maze in the offspring submitted to programming. In the Social Interaction test, the programmed offspring spent less time interacting with their conspecific. It was also observed less time spent with the new object to the detriment of the familiar object in the object recognition test. In addition, we can verify a reduction in the transcription of genes related to the GABAergic system in the programmed offspring, such as GAD67 and the $\alpha 2$ subunit of the GABAA receptor. These findings suggest that programming with testosterone propionate alters the GABAergic system, promoting anxiety as well as low mnemonic capacity, in addition to impairing the social behavior of offspring in adulthood.

ID: 11299

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 PHOSPHO-P38 MAPK INCREASES IN COLONIC NEUROMUSCULAR LAYER IN A SHORT-TIME WINDOW AFTER PARKINSON'S DISEASE MICE MODEL INDUCTION

Parkinson's disease is highly heterogeneous and has an intestinal neuroinflammatory component. The enteric nervous system (ENS) colonizes the entire gastrointestinal tract and is affected during PD, presenting pathological lesions and dysfunction. Previous data from our research group demonstrated that the animal model of PD induced by 6-OHDA present, from 1-week postinduction of neurodegeneration, an inflammatory response in the colon and signs of dysfunction. Furthermore, 48h post-induction, we verified an increase in GFAP protein in the neuromuscular layer. In the present research, we studied the content of phosphorylated p38MAPK protein (p-p38MAPK), a protein commonly associated with stress and pro-inflammatory responses. Male C57/BL6 mice, 3 months old, were divided into two groups: 6-OHDA, submitted to stereotaxic surgery and intrastriatal injection of 6-hydroxydopamine; Sham, submitted to the same surgical stress without injection of 6-hydroxydopamine (ethics committee approval CEUA-UFF: n° 6095200219). 48h post-surgery, the groups were euthanized, and the colon was extracted and dissected. P-p38MAPK protein expression in colonic neuromuscular and mucosa layers was evaluated by Western blotting. We detected a significant increase in p-p38MAPK in the neuromuscular layer samples of the 6-OHDA group compared to Sham group (n=3, $p \leq 0.05$). However, there was no difference in labeling for phosphorylated p38MAPK protein in the mucosal layer of the 6-OHDA and the sham groups (n=3, $p \geq 0.05$). The time frame evaluated in this work is relevant due to the pro-inflammatory condition and subsequent intraganglionic glial reactivity already described by our group. The increase in GFAP and p-p38MAPK contents 48h after induction of the model precedes an advanced central neurodegenerative condition. These data demonstrate that the 6-OHDA-induced PD model is effective in producing nonmotor PD signals that involve the gut-brain axis, offering opportunities to investigate the ENS in the early stage.

ID: 10949

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 PHYSICAL EXERCISE PROMOTES RECOGNITION MEMORY PERSISTENCE BY THE ACTIVATION OF THE LOCUS COERULLEUS BUT NOT THE VENTRAL TEGMENTAL AREA IN RATS

Previous findings indicate that one single session of physical exercise (PE) performed after learning improves memory persistence in rats; effect that depends on the activation of dopaminergic and noradrenergic receptors in the hippocampus. Here, we evaluate the requirement of the ventral tegmental area (VTA) and the locus coeruleus (LC) – regions highly involved in the release of dopamine and noradrenaline to the hippocampus – for this PE effect on memory. The Ethics Committee In Animal Experimentation approved the study (029/2021). Adult male Wistar rats (n = 7–10/group) were submitted to novel object recognition (NOR) protocol; after training, some of them practiced one session of PE on a treadmill for 30 min (according to 60-70% of VO₂ max previously measured). After PE, animals received vehicle or muscimol (gabaergic agonist) infusion in the VTA or LC, to inhibit these structures. For control, some animals did not practice PE and received vehicle or muscimol in one of these areas. All animals were tested in the NOR task 24 hours and 14 days later. We use a one-sample ttest to compare the percentage of the total exploration time of each object with a theoretical mean (50%). Results were considered significant when $P < 0.05$. Both VTA and LC inhibition with muscimol without previous PE impair memory consolidation and persistence ($P = 0.6021$; 0.3241 , in 24-h; 0.1679 ; 0.4739 , in 14- day test). PE promoted memory persistence for at least 14 days ($P = 0.0042$; $P = 0.003$, in 14-day test). Inhibition of VTA after PE did not impair its effects on memory consolidation and persistence ($P = 0.0013$; $P = 0.0059$, in 24-h and 14-day tests). In contrast, the effect of PE on memory was avoided with LC inhibition ($P = 0.7031$; $P = 0.7097$, in 24-h and 14-day tests). These results demonstrate that the effect of one session of PE on memory consolidation and persistence depends on the LC but not VTA activation.

ID: 10884

Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 POSSIBLE INTERACTIONS BETWEEN CENTRAL APELIN AND
OVARIAN HORMONES TO CONTROL WATER INTAKE.**

Studies have shown an influence of apelin (APL) in hydroelectrolytic homeostasis, mainly in hypothalamic areas involving the control of water intake. Aging is known for the physiological functional impairment, including the body fluids imbalance due extracellular volume reduction and absence of thirst. Seeking to understand the central APL effects on fluid intake during aging, adult (4 months, ± 250 g) or elderly (≥ 18 months, ± 350 g) female Wistar rats were used. For 12 days, animals received continuous infusion of APL-13 (APL-13, 24nM/day), antagonist APL (ML221, 192nM/day) or vehicle (NaCl 0,15M), through a mini-pump osmotic coupled to a cannula intracerebroventricular (icv). Basal water intake was monitored daily. At 10 th day, they were submitted to water deprivation for 48 hours (WD48), followed by water intake measurements under osmotic stimulation. This study was approved by the Ethics Committee CEUA-UFSC #6374250219. This work showed that elderly rats consume less water than adults ($p < 0,05$) during normal conditions. Both chronic treatments with APL or ML221 were not able to change cumulative water intake in adult or elderly rats. Similarly, elderly rats consume less water than adults after WD48 ($p < 0,05$). Theses effects were not changed by either icv treatments. Furthermore, to investigate a possible interaction between ovarian hormones with APL in the thirst response, another group of adult female rats were submitted to removal of ovaries (ovariectomy, OVX) and acutely treated with APL icv. The results showed that APL was able to increase rats' OVX water intake under osmotic stimulation ($p < 0,05$). Overall, this data suggests that central apelinergic system has a weak influence on thirst behavior under basal or osmotic conditions regardless of age. On the other hand, APL and ovarian hormones may have a central relationship to control water intake infemale adult rats.

ID: 11312

Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 REDUCED MATERNAL CARE INDUCED BY STRESS DURING PREGNANCY.

Chronic stress during pregnancy is correlated with neglect in maternal care and both can lead to neurodevelopmental loss. This study aims evaluate of maternal care that can be relate with neural deficits in the offspring. Pregnant mice(C57BL/6J) were distributed into control (C) and stress (S) groups from the 6th to 21st gestation day. S group was submitted to chronic mild stress such as lights on at night, box tilted at 45° for 7 hours, food and water restriction for 24 hours, a wet box with 200 ml of water in shavings for 8 hours, noise at 1500Hz, 92dB for 1h, stirring for 30 min, containment for 4 hours and forced swim for 1 h in 31°C water. The pups were weighed during the birth and 7, 14, and 21 postnatal days (PDN). The maternal behavior was evaluated from PDN2 to 9 between 9 to 10:30 AM and 2:00 to 3:30 PM. Each maternal behavior was quantified (nestbuilding(NB); linking/grooming(LG); active nurse(AN); passive nurse(PN); out of the nest(ON); selfgrooming(SG); eating and drinking(ED); carrying pups(CP)) by 1800 seconds through the mobile app. Pup retrieval(PR) was done in PDN3 for a maximum time of 300 seconds.CEUA:5774- 1/2021.The variables were analyzed with ANOVA and independent test t, the results were expressed as mean ± standard. The body mass of male pups from S mothers was greater in PDN14 [C 5.9±0.5 n= 24 S 6.4±0.4 n=32] and PDN21 [C 7.6±0.5 n=23 S 7.9±0.5 n=33] and female pups in PDN 21 [C 7.1±0.6 n=22 S 7.5±0,5 n=32] than pups from C group. The mothers from the stress group showed reduced time in NB [C 3943±865 n=9 S 2127±789 n=8], LG [C 1488±270 n=7 S 1180±271 n=9] and retrieval of first pup [C 29±9 n=8 S 15±6 n=8] than C group. S mothers spent more time in the behaviors of SG [C 905±153 n=7 S1602±182 n=6], PN [C 1416±156 n=11 S 2617±1184 n=9] and ON [C 320±83 n=9 S 962±363 n=8] than C group. Both groups spent similar time ED, CP, AN, and PR. Chronic mild stress during pregnancy leads to increased pups body mass and impaired maternal care, considering that changes in gestational and breastfeeding period may be involved in the genesis of neural disorders in the offspring we emphasize the importance this analyzing.

ID: 11242

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: USP

**FeSBE2022 ROLE OF OLFACTORY CHEMORECEPTORS IN THE HYPERCAPNIA
VENTILATORY RESPONSE**

A series of studies have identified upper airway receptors sensitive to changes in CO₂ in the nasal sensory epithelium, innervated by the olfactory nerve in the bullfrog, the tegu lizard, the garter snake, and fish. These receptors are relatively rare, are stimulated by CO₂ levels below or near the animal's end-tidal CO₂ concentration and produce a reflex inhibition of breathing. However, the contribution of olfactory chemoreceptors to breathing control still needs further investigation. Therefore, our proposal is to evaluate the contribution of the olfactory chemoreceptors to baseline breathing and the hypercapnic ventilatory response in urethane-anesthetized mice. Male and female C57BL/6J mice (22-34 g) were used (CEUA #XXXXXXXXX). In intact mice, hypercapnia (3, 6 and 9% CO₂) inhaled through the nasal cavity induced an increase in intercostal muscle activity (IntEMG) (31 ± 6 ; 49 ± 9 e $56 \pm 13\%$ of baseline). After tracheostomy, the increased level of CO₂ in the nasal cavity did not change IntEMG ($p > 0.05$). However, hypercapnia through the trachea produced a higher increase in IntEMG (50 ± 11 ; 78 ± 15 e $102 \pm 21\%$ of baseline). Our data suggest that the olfactory epithelium sensory neurons may also contribute to a presumably inhibitory process of central chemoreception.

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Área Temática: Ê-POSTER | Neurobiologia

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**FeSBE2022 ROLE OF OREXINERGIC SIGNALING IN THE COMMISSURAL
NUCLEUS OF SOLITARY TRACT DURING HYPERCAPNIC VENTILATORY
RESPONSE**

Chemosensitive neurons distributed in different brain regions detect extracellular H⁺ levels and can trigger ventilatory responses to maintain acid-base in the body. The lateral hypothalamus/perifornical area contains orexinergic CO₂/H⁺ sensitive neurons which modulate the hypercapnic ventilatory responses in an arousal state-dependent-manner. The mechanism by which these neurons participate in the hypercapnic chemoreflex involve their interaction with other chemosensitive sites. Since the commissural subnucleus of NTS (NTSc) receives orexinergic projections and has notable participation in ventilatory responses to increase of CO₂ levels, our hypothesis is that orexinergic neurons can influence the function of NTSc during hypercapnic conditions. To test the hypothesis, we measured the pulmonary ventilation (*V*) of Wistar rats (250–320 g) in a plethysmography system during microdialysis orexinergic 1 receptor antagonist (SB-334867; N-(2-metil-6-benzoxazolil)-N'-1,5-naftiridina-4-yl-ureia – 5 mM) into the NTSc. Experiments were performed in normocapnic and hypercapnic conditions (7% CO₂ – 93% de O₂) in the light phase of diurnal cycle of the animals. All procedures were approved by Animal Care and Use Committee for the Institute of Biosciences at Botucatu – Brazil (CEUA – protocol n°. 6766090620). We observed that microdialysis of SB cause significant attenuation in CO₂ ventilatory responses during wakefulness in the light phase (*V* = (2134,80 ± 30,81 versus 1789,46 ± 87,41 mL kg⁻¹min⁻¹ ; n = 02 ; p < 0.05). Thus, our data suggest that orexinergic signaling in the NTSc. *V* . *V* contribute to CO₂ ventilatory response in rats in the light phase of the diurnal cycle.

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Área Temática: Ê-POSTER | Neurobiologia

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FeSBE2022 THE POTENTIAL INFLAMMATORY EFFECT OF ETHANOL ON STRUCTURAL PLASTICITY DURING NEURODEVELOPMENT

Fetal alcohol spectrum disorders (FASD) encompass a set of disorders generated by prenatal exposure to alcohol that can cause morphological changes and plasticity deficits during development. Alcohol consumption during pregnancy, even at low doses, is capable of inducing neuroinflammation through glial reactivity and the release of pro-inflammatory markers. The present study uses the rodent visual system connections as a model to assess the impact of early exposure to low doses of ethanol on the formation of sensory circuits and the consequences of neuroinflammation. Pigmented Lister Hooded rats received 25% ethanol (1g/kg) via intraperitoneal injection on P4, P6, and P8. Structural plasticity changes were evaluated through neuroanatomical tracers and inflammatory markers such as GFAP, iNOS, caspase-3 were evaluated through immunofluorescence and/or Western blot at P10, P14 and P21 (CEUA/UFF 4983140219). The administration of alcohol changed the GFAP content in a time-dependent manner. An increase in astrocytic immunoreactivity at P10 and P14 was observed in the superior colliculus (SC), with an increase in GFAP and iNOS content at P21. Analysis of retinal projections to the SC and lateral geniculate nucleus (LGN) demonstrated that ethanol induced a reduction in labeling density between P10 and 21. In the NGL we observed, at P14, an increase in the ipso/contralateral ratio of the eye-specific terminals. which remained at P21, indicating failure in the refinement of these connections. The absence of difference in caspase-3 content indicates that the administered dose of ethanol did not induce apoptosis. Together, the results support that low doses of ethanol during the early stages of development promotes an inflammatory environment with glial reactivity that impacts the proper neurodevelopment of the neural circuitry.

ID: 11018

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: UFRGS

FeSBE2022 THERAPEUTIC HYPOTHERMIA REDUCES BRAIN INJURY IN A RAT MODEL OF NEONATAL HYPOXIA-ISCHEMIA

Neonatal hypoxia-ischemia (HI) is a major cause of mortality and morbidity in newborns and therapeutic hypothermia (TH) is the only therapy available for the treatment of this condition. However, TH has some limitations and a better understanding of the effects of TH is crucial for the improvement of its clinical use. To assess how TH acts on the brain lesion, in this study (CEUA/HCPA 2019-0420) seven-day-old (P7; 15g) male and female Wistar rats were divided into SHAM, HI and TH groups. HI and TH animals underwent surgical occlusion of the right common carotid artery followed by exposure to a hypoxic atmosphere (8% O₂), while SHAM animals were subjected to a fictitious surgery and kept in normoxia and normothermia. TH (body temperature of 32°C) was conducted for 5 hours in TH group. Animals were euthanized in P9 and brains were collected for histological analysis. The volume of brain lesion and hippocampal cell counting were evaluated in Nissl-stained sections, and neuronal degeneration was assessed using FluoroJade B (FJB) staining. TH reduced the volume of the brain lesion in males ($F(2,12)=1.142$; $p<0.001$). Cell counting showed fewer surviving neurons in both CA1 and dentate gyrus (DG) in males ($F(2,71)=5.636$, $p<0.001$; $F(2,69)=0.869$, $p<0.001$) and females ($F(2,66)=0.496$, $p<0.0001$; $F(2,12)=2.402$, $p=0.002$) from HI group, which was reversed by TH only in CA1 area of females ($F(2,72)=1.977$, $p<0.0001$). TH also reduced the number of FJB+ cells in CA1 in females ($F(2,12)=3.418$, $p<0.001$) and in the DG in males ($F(2,12)=1.400$, $p=0.003$), as compared to HI animals. These results show an attenuation of acute HI brain injury in response to TH, reducing the total volume of lesion and the loss of neurons in the hippocampus. The data also showed evidence of sexual dimorphism in the parameters studied, supporting the need to evaluate males and females separately to allow the design of specific treatments for each sex.

ID: 11101

Área Temática: Ê-POSTER | Neurobiologia

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Instituição: UFMG

**FeSBE2022 TIME OF THE DAY INTERFERES ON MEMORY IMPAIRMENT CAUSED
BY HYPOTHYROIDISM IN FEMALE MICE.**

Hypothyroidism is an endocrine-metabolic disorder very common in the population, mostly prevalent in women and in the elderly. There are evidences that the hypothyroidism impairs memory and may cause desynchronization of biological clocks. However, it remains to be investigated whether the time of the day play a role in the memory deficit caused by hypothyroidism. Thus, our aim was to investigate the effect of hypothyroidism on novel object recognition (NOR) memory in female C57BL/6 mice at distinct times of the day. NOR memory was evaluated at ZTs 2-4 and 14-16, before and after the chemical-induced hypothyroidism. Animals were divided into control (chow and water ad libitum) and hypothyroid group [methimazole (0.01%) + perchlorate (0.1%) in the drink water for 21 days]. Our preliminary data showed no significant difference between ZTs 2-4 and 14-16 in the NOR memory of control animals, which means that animals were able to equally recognize the new objects in both ZTs. Interestingly, after hypothyroidism induction, animals tested at ZTs 2-4 (rest phase) were unable to complete the task. However, the animals showed NOR memory impairment when the test was performed at ZTs 14-16 (active phase) compared to the control group. Altogether, our results showed that the effect of hypothyroidism on NOR depends on the time of the day. Additional experiments are being carried out to better characterize the mechanisms involved in the behavioral and mnemonic effects of hypothyroidism in mice.

ID: 10927

Área Temática: Ê-POSTER | Neuropsicofarmacologia

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FeSBE2022 CANNABINOID RECEPTOR 1 (CB1R) MODULATES NICOTINIC RECEPTORS AND GABAERGIC TRANSPORT ON AVIAN RETINA

Nicotine (Nic) is considered a classical agonist of cholinergic nicotinic receptors (nAChR). These receptors are usually expressed in the retinal layers, playing an important role in GABA circuitry, functioning, and organization. Additionally, CB1R/CB2R have also been localized on retinal development. The synthetic cannabinoid receptor agonist, WIN 55,212-2 (WIN), has been shown to alter GABAergic transmission on avian retina. Our aim is to evaluate if GABA transport is regulated by an acute treatment with Nic as well as if GABA uptake can be modulated with CB1R/CB2R agonist WIN. Embryonic avian retinas were used for [3H]-GABA uptake assays. Retinas were conditioned on saline (Control) or exposed to Nic (Treated), WIN or Mecamylamine (Mec), a nicotinic receptor antagonist. Two-way ANOVA followed by Bonferroni post-test were performed for results with 3 or more groups and unpaired t-test student for results with 2 groups. Data were represented as mean \pm SEM, pmol/mg of protein. Statistical significance was achieved at $p < 0.05$. The project was approved in CEUA#038/19. We observed that GAT-1 and CB1R ontogenesis were present evenly throughout E11-E15 (GAT-1: E11=0.073 \pm 0.004; E12=0.075 \pm 0.013; E13=0.071 \pm 0.004; E14=0.054 \pm 0.002; E15=0.091 \pm 0.003; n=4-3; CB1R: E11=0.05 \pm 0.01; E12=0.13 \pm 0.01; E13=0.15 \pm 0.03; E14=0.31 \pm 0.05; E15=0.22 \pm 0.057; n=3). GABA uptake level was reduced by Nic (50 μ M), Mec (3 μ M) and Nic+Mec (CTRL=0.18 \pm 0.02; Nic=0.11 \pm 0.01; Mec=0.10 \pm 0.01; Nic+Mec=0.11 \pm 0.01; n=6-7). WIN was able to prevent the reduction of GABA uptake induced by Nic (CTRL=0.21 \pm 0.02; Nic=0.11 \pm 0.01; WIN=0.39 \pm 0.03; Nic+WIN=0.33 \pm 0.02; n=5-6). Our results demonstrate that exists a correlated regulation between endocannabinoid and nicotinic systems through modulation of nicotinic receptors by CB1R activation without altering expression of GAT-1 and CB1R.

ID: 11186

Área Temática: Ê-POSTER | Neuropsicofarmacologia

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FeSBE2022 EVALUATION OF THE ASSOCIATION OF CANNABIDIOL AND SODIUM NITROPRUSSIDE IN THE SENSORIMOTOR DISRUPTION INDUCED BY MK-801

Schizophrenia is a psychiatric disorder with no cure, which affects approximately 1% of the young population worldwide. Antipsychotic therapy is not completely effective for the symptomatology of the disorder besides promoting side effects. The sensorimotor disruption in the prepulse inhibition test (PPI) present in patients with schizophrenia is a translational tool important in the search for drugs with an antipsychotic profile. N-methyl-D-aspartate glutamate receptor antagonist MK801 (dizocilpine), impairs PPI reaction. Compounds such as cannabidiol (CBD) and sodium nitroprusside (SNP) revert PPI disruption and show a therapeutic profile in clinical schizophrenia trials. The combination of drugs with an antipsychotic profile and soft outline of side effects may allow the reduction of their concentrations, increasing tolerability, adherence to treatment, and beneficial impact on the variety of symptoms presented in schizophrenia. We evaluated whether the combined treatment with subeffective doses of CBD and SNP prevents the behavioral changes observed in an animal model of schizophrenia induced by MK801. Male Swiss mice (7 weeks, 35- 40g) divided into different pharmacological treatment regimens were subjected to behavioral assays (PPI test and actimeter). One-way ANOVA and Two-way ANOVA were used for statistical analysis, n=6-8 per group (Ethics Committee number: 2021.1.129.58.8). Acute treatment with MK801 (0.5mg/kg) induced disruption in PPI at all prepulse intensities (80, 85, and 90dB) and a decrease in horizontal and vertical movements in the actimeter test. CBD (60mg/kg), SNP (2.5mg/kg) prevented MK801 induced PPI impairment. However, the association of CBD and SNP at sub-effective doses did not prevent the PPI and motor impairment induced by MK801. MK801 and PPI test represent an appropriate tool to investigate new compounds with potential antipsychotic activity. There was no detection of change in the effect with the combination of the described doses.

ID: 10945

Área Temática: Ê-POSTER | Neuropsicofarmacologia

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FeSBE2022 MODULATION OF GABA TRANSPORT AFTER TREATMENT WITH CAFFEINE AND CANNABINOIDS IN CHICK EMBRYOS RETINA

Caffeine (Caff) is a psychostimulant that acts as a non-selective antagonist of adenosine receptors (A1R and A2AR), both expressed in the retina. These receptors play an important role in the modulation of GABAergic system. Our aim is to investigate if a single injection of Caff in ovo at the E11 stage can modify GABA transport in the chick retina at E15 and its interaction with the endocannabinoid system. White Leghorn chicken embryos aged 11 days (E11) were treated with a single injection (in ovo) of Caff (100 μ M) in the air chamber and left until E15. The retinas were dissected for [3H]-GABA uptake and release and Western Blotting. One-way or two-way ANOVA followed by Bonferroni post hoc was performed for results with 3 or more groups and Student's t-test was used for two groups. The results were expressed as mean \pm SEM and statistical significance was reached when $p < 0.05$. All experiments were approved by CEUA #038/19. Our results showed that Caff exposure, sodium absence or NO-711 treatment were able to reduce GABA uptake compared to control group (C:335.3 \pm 28.2; n=7; w/o Na⁺=26.7 \pm 2.8; n=3; 4 °C=20 \pm 6.1; n=3; Caff=195.9 \pm 19.9; NO-711=53.7 \pm 3.7; n=3; Caff + NO711=84.3 \pm 12.5 (fmol/mg/hour); n=3). However, the [3H]-GABA release was increased by caff (C: Basal=1.80 \pm 0.14; Caff=2.97 \pm 0.27; n=8); Additionally, GAT-1 protein density increased after Caff treatment (C:1.00 \pm 0.14; n=8; Caff=1.53 \pm 0.12 GAT-1 / tubulin (% of control); n=7). The Caff-mediated change in GABA release was reverted by CHA, H-89, WIN and NO-711, administered for 15 min before the assay (C: B=2.26 \pm 0.1 Caf=3.2 \pm 0.1; No-711: B=0.8 \pm 0.2 Caf=0.7 \pm 0.2; H-89: B=0.9 \pm 0.2 Caf=0.9 \pm 0.1; CHA: B=0.8 \pm 0.2 Caf=1.6 \pm 0.5; WIN: B=1.0 \pm 0.2 Caf=0.9 \pm 0.2 % of total, n=4). We conclude that Caff can increase GABA release or decrease GABA uptake via GAT-1. Moreover, CB1/CB2R activation reduce GABA release. The Caff effect is mediated by A1R blockage and PKA activation.

ID: 10928

Área Temática: Ê-POSTER | Neuropsicofarmacologia

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Instituição: UFF

**FeSBE2022 NICOTINE INDUCES [3H]-GABA RELEASE VIA NMDA RECEPTORS
ACTIVATION IN THE DEVELOPING AVIAN RETINA**

Nicotine (Nic) activates nicotinic receptors (nAChR) during retinal development, playing an important role in GABA circuitry, functioning, and organization. Our aim is to evaluate if an acute stimulation of nAChR is able to modulate [3H]-GABA transport in chicken embryos retinas staged E12. White Leghorn retinas were used for [3H]-GABA uptake and release assays. They were conditioned on saline (Control) or exposed to Nic (Treated). We evaluated [3H]-GABA uptake without Na⁺, at 4°C or after NO-711 (50µM) exposure 5' before the assay. [3H]-GABA release was performed in both groups with or without MK801 (50µM). One-way ANOVA followed by Bonferroni post-test were performed for results with 3 or more groups and unpaired t-test for results with 2 groups. Data were represented as mean ± SEM, % of the control group or in % of total. Statistical significance was achieved at p < 0.05. The project was approved in CEUA#038/19. We observed that in the absence of Na⁺ ions, low temperature or in the presence of NO-711, [3H]-GABA uptake was blocked (Ctrl=99,83% ± 5,11, without Na⁺=12,76% ± 1,36, 4°C=9,56% ± 2,91, NO-711=25,68% ± 1,77; % of control; p < 0.05, n=4). Further, Nic 50µM was able to inhibit 47% of [3H]-GABA uptake (Ctrl=99,83% ± 5,11, Nic 1µM=103,5% ± 7,83, Nic10µM=109% ± 4,03, Nic50µM=53,83% ± 3,05; % of control; p < 0.05, n=4). However, Nic 50µM enhanced in more than twofold the [3H]-GABA release (Ctrl=0,92 ± 0,10, Nic=2,01 ± 0,11; % of total; p < 0.05, n=4). MK-801 was able to prevent the effect of Nic in [3H]-GABA release, turning it into similar control values (Ctrl=0,92 ± 0,10, MK-801=0,87 ± 0,10, Nic=2,01 ± 0,11, MK-801 + Nic=0,68 ± 0,10; % of total; p < 0.05, n=4). We conclude that GABA uptake is mediated by GAT-1 and this transporter can be modulated by nicotinic receptors. Moreover, we also identified that Nic acute exposure was able to release [3H]-GABA via NMDA receptors activation.

ID: 11253

Área Temática: Ê-POSTER | Neuropsicofarmacologia

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FeSBE2022 SARS-COV-2 PANDEMIC, TOBACCO CONSUME INCREASE AND NEUROCHEMICAL IMPACTS OF NICOTINE EXPOSURE ON LACTATING MICE

Nicotine (NIC) is the main psychoactive component of cigarettes, and its mechanism of action is the activation of nicotinic receptors. In addition, NIC is known to pass to the infant through breast milk. Our aim is to evaluate the effects, during the exposure period and after withdrawal, of the NIC exposure during lactation in Swiss mice, on the dopaminergic pathways of the frontal cortex. Swiss mice were randomly mated since then 60 days postnatal (PN). After birth, female mice were exposed with an 2% saccharine and 0,2mg/mL nicotine (NIC) oral solution until the weaning in P21. Frontal cortex was isolated and the experiments of uptake de [3H]-dopamine, Western Blot, AMPc binding assay and HPLC measurement of endogenous levels of dopamine, L-DOPA and DOPAC were done. Data was processed with GraphPad –Prism 7 as mean and as SEM. Test t was realized to compare 2 experimental groups or a one-way ANOVA, with Bonferroni pos hoc for 3 or more groups. Statistical significance was reached when $p < 0,05$. All experiments were approved by CEUA #035. We observed that at PN22, exposition to NIC increased the levels of [3H]-Dopamine uptake, endogenous levels of DOPAC, as well as the expression of DAT, although there was no difference in the levels of cAMP and on D1 receptor expression. At P30, a reduction in D1 receptor expression, an increase in basal levels of cAMP in the NIC group and an absence of response to exogenous dopamine stimulation were seen. From these initial results, we concluded that maternal exposure to NIC can affect the development of the dopaminergic circuitry of the litter, in a differentiated way, during the duration and abstinence, suggesting that at exposure period, extracellular levels of dopamine are increased, and at withdrawal the increase in cAMP appears occur by another neurotransmitter system yet to be elucidated. We concluded that NIC exposure evoked neurochemical modifications in frontal cortex of mices exposed in both term and withdraw periods.

ID: 10964

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 ANTIOXIDANT THERAPY WITH VITAMIN C IN ADULT RATS
ATTENUATES OXIDATIVE STRESS IN LIVER AND SKELETAL MUSCLES AND
METABOLIC CHANGES INDUCED LACTATION OVERNUTRITION BY LITTER
SIZE REDUCTION.**

Litter size reduction induces lactation overnutrition and obesity from childhood until adulthood. Obesity is associated with oxidative stress (OS), an imbalance between oxidative, as membrane lipid peroxidation (LP) and antioxidant compounds, as the endogenous ones - glutathione (GSH), glutathione s-transferase (GST), catalase (CAT) and enzyme superoxide dismutase (SOD), or exogenous ones, as vitamin C (vitC). Considering that, could OS and metabolic changes caused by lactation overnutrition induced-obesity be attenuated by treatment with vitC? To answer this question, litter size was adjusted: normal litter(NL), with 10 pups, or small litter(SL), with 3. On postnatal day (PND) 60, part of animals was euthanized by decapitation with no previous treatment, and part was treated with vitC (100 mg/day) or tap water(v), by gavage, for 30 days. On PNDs 59/89, glucose tolerance test was performed. On PNDs 60/90, rats were euthanized by decapitation and the blood was collected. The liver, gastrocnemius(GM) and soleus muscle(SM) were removed and stored. A significance level of $p < 0.05$ was considered. CEUA/UEL nº 87.2020; 024.2020. On PND 60, SL animals with no treatment presented increased Lee index, glucose intolerance, OS in the liver (higher LP) and in the SM (higher LP and lower GSH). On PND 90, SLv animals showed glucose intolerance, increased Lee index, plasma triglycerides and HDL, as well as OS in the liver (lower CAT and SOD) and SM (higher LP and lower CAT). Treatment with vitC in adult SL animals reduced glucose intolerance, body weight gain, Lee index, plasma triglycerides, LDL and total cholesterol, OS in the liver (lower LP), GM (higher GST and SOD) and SM (lower LP and higher SOD). Therefore, vitC treatment in adulthood was able to reduce metabolic and oxidative disbalances in key metabolic tissues induced by lactation overnutrition, indicating that OS is likely to mediate metabolic changes observed in adult male rats with obesity by neonatal programming.

ID: 11315

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 ASSOCIATION BETWEEN HEPATIC INDEXES OF NAFLD AND POSTPRANDIAL LIPEMIA IN HUMANS

Non-alcoholic fatty liver disease (NAFLD) patients have an increased risk of cardiometabolic diseases. Moreover, postprandial lipemia (PPL) has a role in atherosclerosis compared to fasting triglycerides (TG), and serum TG assesses it after fat overload. Thus, we investigated the association among hepatic indexes of NAFLD and PPL. Adult men (n=46) and women (n=31) were fasted (10h), and blood was collected. They ingested the Oral Fat Tolerance Test (OFTT) meal (75g fat, 25g CHO, 10g protein), and blood was collected 4h later. Participants were grouped by fasting (fTG) and postprandial TG (ppTG), classified as normal (N) or altered (A): N/N (fTG<150mg/dL; ppTG<220mg/dL), N/A (fTG<150mg/dL; ppTG≥220mg/dL), and A/A (fTG≥150mg/dL; ppTG≥220mg/dL). The TG and glucose product (TyG), lipid accumulation product (LAP), visceral adiposity index (VAI), and fatty liver index (FLI) were assessed. Data are presented as mean±SD. The ANCOVA (controlled for age/sex) and Spearman correlation were applied (GraphPad Prism 8.0, P<0.05). The mean age was 40.2±11.5 years. The N/N group had TyG=4.2±0.18, LAP=24.7±16.6, VAI=1.62±0.7, and FLI=27.37±24.3. All indexes increased in A/A compared to N/N and N/A groups. TyG was +12.8% and +10.5% in A/A, respectively (p<0.0001). LAP (+394.1% and +217.6%, p<0.0001), VAI (+341.8% and +232.9%, p<0.0001) and FLI (+161.1% p<0.0001 and +42.8% p=0.032) followed the same pattern. Only FLI increased in the N/A group vs. N/N (+82.9%, p=0.016). On the other hand, all indexes had positive and moderate-to-strong associated with fTG and ppTG. VAI had the strongest association with fTG (r=0.89, p<0.0001), and LAP with ppTG (r=0.70, p<0.0001). In conclusion, PPL is associated with hepatic indexes of NAFLD. These data reinforce the importance of investigating the interplay between cardiovascular risk and hepatic metabolism, especially in subjects with normal fTG but altered ppTG.

ID: 11084

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 BERGAMOT LEAF EXTRACT (CITRUS BERGAMIA RISSO ET. POITEAU) MODULATES PATHOPHYSIOLOGICAL PROCESSES ASSOCIATED TO NONALCHOLIC FATTY LIVER DISEASE

Non-alcoholic fatty liver disease (NAFLD) is a chronic condition highly associated with obesity, type 2 diabetes and dyslipidemia. In addition, inflammation and oxidative stress are two relevant parameters in the clinical progression of NAFLD. Bergamot leaf extract (BLE) has shown antiinflammatory and antioxidant effects with potential to modulate risk factors for the disease. The aim was to evaluate the BLE effect on pathophysiological processes of NAFLD. Male Wistar Rats (n=40) were randomly divided into two groups: Control diet (C, n=20 animals) and High sugar-fat diet (HSF, n= 20 animals) for 20 weeks (CEUA: 1337/2019). After this period the animals were redistributed into 4 groups: Control (C, n=10 animals), Control + BLE (C+BLE, n=10 animals), High sugar-fat diet (HSF, n=10 animals) and High sugar-fat diet + BLE (HSF+BLE, n=10 animals) for 10 weeks ad libitum. BLE was administered daily by gavage (50mg/kg). Animals were evaluated for risk factors for development and progression of NAFLD: metabolic syndrome, inflammation, oxidative stress and hepatic microvesicular steatosis. Comparison by Two-way ANOVA with Tukey's post hoc; Pearson's correlation among variables; $p < 0.05$. The HSF group presented obesity, hipertrygliceridemia, hyperglycemia, hyperinsulinemia, insulin resistance and inflammation compared to the control group. BLE treated hipertrygliceridemia, hyperinsulinemia, insulin resistance, inflammation and oxidative stress in relation to the HSF group. Correlation analysis was positive and significant between hepatic microvesicular steatosis and adiposity index, tryglicerides, glucose, insulin, insulin resistance and inflammation. Treatment with BLE demonstrated therapeutic potential in the treatment of pathophysiological processes for NAFLD.

ID: 11060

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 BRAZIL NUT OIL SUPPLEMENTATION REDUCED WHITE ADIPOSE
TISSUE HYPERTROPHY IN HYPOTHALAMIC OBESE FEMALE RATS**

The Brazil nut oil (Bno) extract from seed of *Bertholletia excelsa* is a natural nutrient rich in bioactive compounds with positive effects on health, including anti-adiposity actions. However, Bno supplementation effects on white adipose tissue (WAT) is unknown. In the present study we evaluated the effects of chronic Bno-supplementation in adipocytes size of visceral and subcutaneous WAT depots from hypothalamic obese female rats. Hypothalamic obesity was induced in Wistar female rats with monosodium glutamate (MSG; 4g/Kg) from 2nd to 6th post-natal day (PND). Control (CTL) received equimolar saline. At PND30 the MSG and CTL rats were randomly subdivided in Bno-supplemented (1 mL/Kg; 3 times/week for 8 weeks) or non-supplemented (NS; NaCl 0,9%). At PND92 rats were euthanized and WAT perirenal (WAT-P) and inguinal (WAT-I) depot were excised, weighed and submitted to histology analysis. MSG-NS group had higher weight ($p=0.0017$) and adipocytes size ($p<0.0001$) of WAT-P, as well as, WAT-I (weight: $p=0.0017$ and adipocyte size: $p<0.0001$) compared to CTL-NS group. The MSG Bno-supplemented rats showed reduction in adipocyte size in WAT-P and WAT-I depots ($p<0.0001$ and $p=0.0236$, respectively) compared to MSG-NS group. In conclusion our data indicates that Bno chronic supplementation is able to reduce visceral WAT hypertrophy in MSG-obese female rats.

ID: 10904

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 DELETION OF ALPHA-7 NICOTINIC ACETYLCHOLINE RECEPTOR (A7NACHR) EXACERBATES OBESE PHENOTYPE AND HYPOTHALAMIC INFLAMMATION IN HIGH-FAT DIET MODEL MICE

High-fat diets (HFD) are associated with hypothalamic inflammation and metabolic disorders. To minimize damage, mechanisms such as the anti-inflammatory cholinergic pathway are activated. The alpha-7 nicotinic acetylcholine receptor ($\alpha 7nAChR$) is an important component in the cholinergic response. Here we aimed to investigate the role of $\alpha 7nAChR$ in minimizing metabolic damage and hypothalamic inflammation associated with HFD consumption. Knockout $\alpha 7nAChR$ (B6.129S7-Chrna7tm1Bay/J) (Chrna7^{-/-}) and wildtype (WT) (background C57BL/6) male mice, 6 weeks age, \pm 19g weight body, were submitted to a normal diet (ND) or a high fat diet (HFD 45%) for 4 weeks (n=5-7 per group) (CEUA Protocol n° 5386-1/2019). At the end experimental protocol, weight gain and adiposity were collected. Glycemic homeostasis was assessed by glucose tolerance test (GTT), insulin tolerance test (ITT) and fasting glucose. We evaluated serum leptin, insulin, free fatty acids, food intake, locomotion, energy expenditure and respiratory exchanges by indirect calorimetry. The inflammatory response of the hypothalamus was evaluated by analyzing the gene expression of TNF- α , IL1 β , IL-6, IL-10 and CX3CL1. Statistical analyses were compared using Student's t test or Twoway ANOVA and p<0.05 was considered statistically significant. According to our results, Chrna7^{-/-} + HFD exhibited increased body weight gain (p<0.01), GTT (p=0.01) and fasting glucose (p<0.01) compared to WT + HFD and Chrna7^{-/-} + ND mice. Serum leptin, insulin and free fatty acids were not different between WT + HFD and Chrna7^{-/-} + HFD. Chrna7^{-/-} + HFD mice showed increased food intake (p=0.04), higher energy expenditure (p<0.01), lower respiratory exchange ratio (p<0.01) without changes in locomotion. Chrna7^{-/-} + HFD showed increased TNF- α (p=0.02), IL-1 β (p<0.01) and IL-6 (p=0.03) gene expression in the hypothalamus. Together, the data indicate that Chrna7^{-/-} mice are more susceptible to metabolic impairments related to HFD consumption.

ID: 11261

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 DO CHILDREN AGED 7 TO 12 YEARS WITH OBESITY CONSUME MORE
ULTRA-PROCESSED FOODS AND HAVE WORSE MASTICATORY
PERFORMANCE?**

Critical periods of mammalian development are predictors of phenotypic changes. Given the influence of the environment in inducing the phenotype, studies have linked obesity with a specific style of chewing, which could promote increased food consumption. The objective of this study was to evaluate food consumption and chewing performance in overweight and obese children aged 7 to 12 years old. This is a cross-sectional study, carried out 92 children from 7 to 12 years of age, of both sexes, students at a public school in the city of Vitória de Santo Antão, PE. The study was approved by the Research Ethics Committee of the Federal University of Pernambuco (70280017.7.0000.5208). Initially, the anthropometric parameters of weight, height and body mass index were analyzed, and the children were divided into three groups: adequate weight ($n=48$), overweight ($n=26$) and obesity ($n=18$). Subsequently, the analysis of food consumption and the evaluation of masticatory performance were carried out, where the children were filmed while chewing a stuffed cookie. In the analysis of masticatory performance, the parameters of masticatory sequences, masticatory cycles, mastication time, masticatory frequency, meal time and masticatory rate were quantified. In our results, we found that children with obesity have lower consumption of fresh foods (median=3, IQR=4.00-2.00, $p=0.026$), higher consumption of ultra-processed foods (median=4, IQR=4, 00-2.00, $p=0.011$) perform fewer chewing sequences (median=2, IQR=3.00-2.00, $p=0.007$), and eat more quickly (median=58.50, IQR=69.00-48.00, $p=0.026$), than children with adequate weight. Children who chew less and in less time take longer to be satiated with the amount of food ingested, which can lead to ingesting more food. We concluded that children with obesity have lower consumption of in natura foods, higher consumption of ultra-processed foods, perform less mastication sequences and ate faster than children with adequate weight.

ID: 11311

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECT OF BERGAMOT FRUIT EXTRACT ON SYSTOLIC ARTERIAL HYPERTENSION IN OBESE RATS

Obesity is a multifactorial disease triggered mainly by dietary imbalance. Among the several comorbidities associated with it, there is systemic arterial hypertension. Bergamot (*Citrus bergamia*) is a fruit with antioxidant action. The aim was to evaluate the impact of supplementation of Bergamot fruit extract (BFE) in the development of hypertension in rats fed a diet high in sugar and fat (HSF). 48 Wistar rats were distributed in four groups (G). G1: control diet (C); G2: C+BPE (C + B); G3: HSF diet; and G4: HSF diet and BPE (HSF+B). The study period was 20 weeks and the bergamot extract was administered daily by gavage (250mg/Kg). Body weight (BW); the adiposity index (AI) and systolic blood pressure (SBP) by tail-cuff plethysmography were measured and compared by Two-way ANOVA with Tukey's post hoc ($p < 5\%$). HSF diet groups compared to the ones receiving control diet, had increased BW (G1: 474.4 g and G2: 473.5 g vs G3: 531.9 g and G4: 512.0 g; $p < 0,001$), AI (G1: 3.7 % and G2: 3.2 %; vs G3: 8.7 % and G4: 7.7 % $p < 0,001$) and SBP (G1: 120.8 mmHg and G2: 122.0 mmHg vs G3: 145.0 mmHg and G4: 135.4 mmHg; $p < 0,001$), characterizing obesity and hypertension. Supplementation with BFE did not change BW and AI, but controlled SBP values in the HSF+BFE (135.4 mmHg; $p = 0,012$). The increase in BW and AI are mechanisms that lead to an increase in blood pressure. We did not observe an effect of the BFE on these parameters, however, the HSF+BFE group presented lower values in the SBP. This may be related to flavonoids, a polyphenol with great antioxidant properties presents in bergamot, which may have antihypertensive effects through increasing nitric oxide bioavailability, reducing endothelial cell oxidative stress or modulating vascular ion channel activity. Therefore, these data allow us to conclude that the bergamot extract controlled hypertension in animals submitted to the HSF diet. And so, this extract has great potential as a complementary therapy against hypertension.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECT OF CHRONIC CONSUMPTION OF STEVIA SWEETENER (S. REBAUDIANA BERTONI) ON METABOLIC PARAMETERS AND LIVER MITOCHONDRIAL FUNCTION OF OBESE MICE.

Obesity is defined as an excessive body fat accumulation that can be harmful to health. Due to the increased prevalence of obesity, consumption of sweeteners as an alternative to control body weight increased worldwide. However, literature data indicate that non-caloric sweeteners aren't inert compounds. Stevia rebaudiana Bertoni has a high sweetening power, and is used in the production of the natural sweetener stevia. Our objective was to evaluate the effect of the consumption of stevia on the endocrine-metabolic response and liver mitochondrial function of obese adult mice. All experimental procedures were approved by the Ethics Committee for the Care and Use of Experimental Animals of IBRAG/UERJ (CEUA) |007|2019). To induce obesity, Swiss mice litters were reduced to 3 male pups per dam on the 3rd day of postnatal life (OG), to promote overfeeding during lactation. Control litters were adjusted to 9 pups (CG). At 90 days of life, CG and OG were divided into two subgroups, that received water containing 0.3% stevia (CG-ST and OG-ST) or pure water (CG-WT and OG-WT). The animals were euthanized at 180 days of life. We evaluated chow and water consumption, insulin levels, and body composition by nuclear magnetic resonance (NMR). Liver Mitochondrial function was analyzed by high resolution respirometry. MNR analyzes showed higher body weight and fat mass in OG groups at 90 days of life. Stevia wasn't able to reduce weight in OG at 180 days of age. Overfeeding induced hyperglycemia and insulin resistance. OG-ST showed higher insulin levels when compared to OG-WT. We observed that stevia was able to reduce feed consumption in OG-ST, and increased water intake when compared to CG-ST and OG-WT. The analysis of liver fatty acid oxidation data showed increased in the maximum respiratory rate stimulated by ADP in OG-ST when compared to CG-ST. We conclude that the chronic consumption of stevia promotes metabolic changes in obese animals.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECT OF EXTRA VIRGIN OLIVE OIL CONSUMPTION ON METABOLIC PARAMETERS IN OVERWEIGHT/OBESE RATS INDUCED BY A HIGH-FAT DIET

Obesity is characterized as a chronic disease that presents several metabolic changes such as: increased visceral fat deposits, changes in hormone levels and increased production of inflammatory markers. Extra virgin olive oil (EVOO) is an alternative to treat obesity, since it is rich in bioactive compounds that act in reducing body weight and have anti-inflammatory, antioxidant and neuroprotective properties. Objective: To evaluate the effects of the use of EVOO in overweight/obese rats induced by the consumption of a high-fat diet (HFD). Methods: On postnatal day 21, male and female Wistar rats were allocated into 4 groups, according to diet, sex and nutritional strategy used: (1) receiving standard chow; (2) receiving standard chow and EVOO; (3) receiving standard chow + HFD and (4) receiving standard chow + HFD + EVOO. EVOO was administered by oral gavage for 7 weeks at a dose of 1.3mL/kg body weight. Consumption, body weight, murinometric measurements and fasting glucose blood (on postnatal day 60) were monitored. Results: Caloric consumption increased over time, and male rats consumed more than females ($p=0.003$). Animals that received HFD had higher abdominal fat ($p<0.001$) and higher body mass index ($p<0.001$). Furthermore, males fed with HFD increased plasma glucose levels ($p=0.001$). However, animals that received EVOO by oral gavage had lower body weight ($p=0.025$) and weight gain ($p=0.021$). It was also verified that the use of EVOO decreased the abdominal fat content ($p=0.05$) only in males. In addition, the use of EVOO decreased fasting glucose blood in animals fed with HFD ($p=0.05$) and this reduction was more expressive in males. Conclusion: The results suggest that the use of EVOO is able to prevent long-term overweight and obesity-inducing metabolic changes in animals. Interestingly, both HFD and EVOO consumption use seem to have more marked effects on some metabolic parameters in males than in females.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECT OF L-TRYPTOPHAN OVER TASTE BUDS IN THE CIRCUMVALLATE PAPILLA OF EXPERIMENTAL DIABETIC RATS FROM UNDERNOURISHED MOTHERS

Diabetes mellitus is a metabolic illness characterized by chronic hyperglycemia. There have been reported changes on taste perception of these patients. Taste is a vital sense as it prevents consumption of toxic foods and promotes consumption of vital nutrients. The sense of taste is detected in taste cells that are grouped into taste buds, these are located into taste papillae that are specialized structures in oral cavity. It is probed that the taste papillae have serotonin and serotonergic receptors. In this way L-Tryptophan amino acid is a serotonin precursor obtained by food. Diabetes mellitus patients have been probed to had lower levels of serotonin and its production, triggering several problems among are taste perception. There is insufficient information if i.p. administration of L-Tryptophan can improve protection of circumvallate papilla hyperglycemic deterioration. The aim of this work was to prove the effect of i.p. L-Tryptophan over quantity and morphology of circumvallate papilla of experimental diabetes mellitus rats. Wistar rats were induced to diabetes with streptozotocin (55 mg/kg). Subsequently, treatment was carried out for five days with L-tryptophan (100 mg/kg). Glycemia, food intake, water, and body weight were evaluated. Once the treatment was finished, the circumvallate papillae were obtained for analysis. The result showed a decrease in the number of taste corpuscles in rats with DME, however, in DME+L-tryptophan rats a greater number of papillae was observed, as well as a better morphological structure. As for glucose concentration, a marked difference was observed between DME and non-induced groups. These data suggest that serotonin has a protective effect on the taste system in diabetes mellitus at an acute stage of the disease.

Keywords: Serotonin, L-tryptophan, Goblet papilla, Taste corpuscle, Diabetes mellitus.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 EFFECT OF SUPPLEMENTATION WITH FORAGE PLANTS ON THE
CONCENTRATION OF CHOLESTEROL, TRIGLYCERIDES AND WEIGHT GAIN IN
PIGS FROM LEVANTE**

The current viable alternatives to reduce production costs in tropical regions are based on the partial inclusion of forage material in the animal diet, taking advantage of its great diversity. With the objective of evaluating the effect of the inclusion of green forage in the feeding of pigs in the rearing stage on cholesterol (COL), triglycerides (TAG) and weight gain (GP); Thirty-two Large White/Landrace male pigs of ~71.5 days, weight 30.2 ± 3.14 kg distributed in 4 treatments at random and with a sense of equity where the (T1) control group with balanced commercial feed (ACB), (T2) with ACB + 312.5 g/day/animal of Mulberry (*Morus alba*), (T3) with ACB + 312.5 g/day/animal of false sunflower (*Tithonia diversifolia*), (T4) with ACB + 312.5 g/day/animal of Aro (*Trichanthera gigantea*) for 60 days, the extraction of blood samples from the mammary vein at day 0 and 60 of the investigation. The concentration of COL and TAG was carried out according to BioSystems reagents by semi-automated spectrophotometry, for the GP the weight of the animals was taken daily, the following formula $GP = (\text{final weight} - \text{initial weight}) / \text{time}$ was used. The procedures were approved by protocol CAC-MVZ-06620. The inclusion of forage material for COL and TAG, resulted in a balanced lipid profile of the piglets at day 60, with mean concentrations without significant differences for COL (T1: 84.2 mg/dl; T2: 106.6 mg/dl; T3: 103.3 mg/dl). dl; T4: 97.2 mg/dl), for the TAG variable (T1: 68.8 mg/dl; T2: 65.3 mg/dl; T3: 72.8 mg/dl; T4: 82.5 mg /dl). The GP at day 60 of the study for T1: 32.5 Kg; T2: 32.4 Kg; T3: 32.1 Kg; T4: 33.8, the correlation coefficient between GP and COL is equal to 0.077, between GP and TAG is equal to 0.042, indicating a weak relationship. The contribution of Aro (*Trichanthera gigantea*), favors the feed conversion of the ACB, generating a greater weight gain over time, an important factor in pig production.

ID: 11344

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECT OF THE SUPPLEMENTATION WITH THE ESSENTIAL OIL OF FISH OVER THE LIPID PROFILE AND ANTIOXIDANT ACTIVITY IN AN EXPERIMENTAL MODEL OF DYSLIPIDEMIA

Dyslipidemias, characterized by increased concentrations of triglycerides (TG) and low-density lipoprotein cholesterol (LDL-c), and/or decreased concentrations of high-density lipoprotein cholesterol (HDL-c), bear a relation with oxidative stress, inflammation, endothelial dysfunction and atherogenesis. Omega-3 polyunsaturated fatty acids may contribute to the reduction of triglyceridemia and have cardioprotective action due to their anti-inflammatory and antioxidant effects. The present study assessed the effect of the supplementation with fish oil (FO) over the lipid profile and the antioxidant activity in an experimental model of dyslipidemia. 35 Balb/C (*Mus musculus*) mice were used, males, aged between 50 and 60 days, weighing 25-30 g. The project was approved by the Ethics Commission in the use of Animals of the Federal University of Piauí (statement # 446/18). Dyslipidemia was induced by hypercholesterolemia diet (HCD) during 8 weeks. The animals were sorted in three groups treated for 8 weeks: G1 (standard feed and saline solution, 0.3 mL/animal v.o.), G2 (HCD and saline solution, 0.3 mL/animal v.o.) and G3 (HCD and FO, 0.3 mL/animal v.o.). The daily volume of FO resulted in a dose of 57 mg/day of eicosapentaenoic acid and 36 mg/day of docosahexaenoic acid. The following parameters were assessed after the treatment: total cholesterol, HDL-c, LDL-c, cholesterol associated to the very low-density lipoprotein (VLDL-c), TG and activity of the superoxide dismutase enzymes (SOD) and catalase (CAT), as well as concentrations of the non-protein sulfhydryl groups (NPSH) in the liver. There were no significant differences in the components of the lipid profile among the groups. G3 showed NPSH significantly lower than did G2. There was no significant difference in the SOD and CAT between G2 and G3. Thus, supplementation with FO, at the dose and length of treatment used, altered neither the lipid profile nor the activity of antioxidant enzymes.

ID: 10885

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 EFFECT OF B-HYDROXY-B-METHYLBUTYRATE (HMB)
SUPPLEMENTATION ON MITOPHAGY DURING PARTIAL HEPATECTOMY
(PHX) LIVER INDUCED REGENERATION**

The liver is an organ with a high regenerative capacity, which can recover up to 100% of its weight from only 25% of its original mass. Based on this principle, partial hepatectomy (PHx) is a surgical resection from which 70% of the liver is removed to induce the regeneration of the organ without harming the remaining tissue. Adequate energy supply by maintaining liver mitochondrial function is a prerequisite for the progression of regeneration, however, the overload caused by surgery can lead to mitochondrial dysfunction and impaired regeneration. β -Hydroxy- β -methylbutyrate (HMB), a metabolite of leucine, has been targeted as a modulator of cellular pathways associated with mitophagy, an important pathway that ensures the quality of the mitochondrial network during stress. We aimed to investigate the effects of HMB supplementation on mitophagy during the liver PHx-induced regeneration process. To this end, three-month-old male C57BL/6J mice were subjected to oral HMB supplementation for 10 days and subsequently to PHx. After 7 days of regeneration, we observed that PHx induced a significant 40% increase in the body weight/liver weight ratio, being possible to macroscopically visualize a higher content of fibrogenic tissue in these animals. Western blotting analyses also demonstrated an 87% increase in p62 protein content, an accumulation indicating that mitophagy is in reduced flux. On the other hand, animals supplemented for 10 days with HMB did not show these results. Our results seem to indicate that HMB can modulate mitophagy and autophagy pathways, as well as act on the liver regenerative capacity. However, we still need to understand if this relationship between the analyzed pathways impacts positively in the liver regeneration process.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECTS OF ACUTE LEAD EXPOSURE ON THE PRODUCTION OF SHORT-CHAIN FATTY ACIDS BY THE INTESTINAL MICROBIOTA

Food is the main source of non-occupational exposure to lead and the oral route is one of the main routes of exposure of the gut microbiota to this metal, which can change the profile of bacteria and cause harm to the host. The propose of this work is to evaluate the effects of acute exposure to lead on the production of short-chain fatty acids by the intestinal microbiota and we hypothesize that this exposure alters the profile of fatty acids produced. The study was approved by CEUA/UFOP, protocol nº 7611070520. 54 male Wistar rats weighing 270.0 g were used. Upon completing 8 weeks, they were divided into two groups: lead, which received an intraperitoneal injection of lead acetate (25 mg/kg body weight), and control, which received the vehicle. Twenty-four hours after the injection the animals were euthanized. Cecal feces were removed for quantification of short-chain fatty acids by high-performance liquid chromatography. Statistical analyzes were performed using the GraphPad Prism® software. Parametric data were analyzed using Student's t test and non-parametric data using the MannWhitney test ($p < 0.05$). There were no statistical differences in the concentrations of lactic, acetic, propionic, and total short-chain fatty acids in the lead treated group (0.5832 ± 0.270 ; 7.212 ± 1.558 ; 1.052 ± 0.2006 ; 10.65 ± 2.091 mg/g of feces, respectively) when compared to the control group (0.4653 ± 0.1655 ; 7.633 ± 2.110 ; 1.084 ± 0.3001 ; 11.48 ± 2.654 mg/g of feces, respectively). However, the group exposed to lead showed a significant reduction ($p=0.0064$) in the concentration of butyric acid when compared to the control group, 1.604 (1.265 - 1.917) and 2.151 (1.841 - 2.543) mg/g of feces, respectively. The results showed that exposure to lead altered the production of butyric acid by intestinal bacteria, which can cause harm to the health of the host, because this acid acts to protect the intestinal barrier and also inhibits pro-inflammatory cytokines in the intestine.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECTS OF FISH OIL ON CARDIOMETABOLIC ALTERATIONS IN MICE FED A HIGH-FAT, SUCROSE-RICH DIET.

Fish oil (FO) may be an effective supplementary therapy in the treatment of cardiometabolic diseases, due to its composition of n-3 polyunsaturated fatty acids. The aim of this study was to evaluate the outcomes of FO supplementation on cardiometabolic alterations caused by an obesogenic diet. The experimental protocol was approved by the UFF Ethics Committee (no. 2419130220). Three-month-old C57Bl/6 male mice (20-25g) were divided into four groups: C group (control diet for 12 weeks); C-FO group (control diet for 12 weeks and FO for the last four weeks); HFHS group (diet rich in lipids and sucrose for 12 weeks); and HFHS-FO group (diet rich in lipids and sucrose for 12 weeks and FO in the last four weeks). Body mass (BM) and food intake were measured. At the 8th and 12th week, the intraperitoneal insulin tolerance test (IPITT) was performed. At the 12th week, the animals were euthanized for weighing of the liver, genital and inguinal white adipose tissue and brown adipose tissue (BAT). The HFHS group ate less food than the C group, but energy intake was similar. At the 8th week, the HFHS group had a BM 16% higher than the C group. At the 12th week, the HFHS group had a BM 24% higher than the C group, while the HFHSFO group was 21% higher than the C-FO group. In the 8th week IPITT, there was no difference between groups. In the 12th week, the area under the curve was 37% higher in the HFHS group compared to the C-FO. Liver mass was not different among groups. In the HFHS and HFHS-FO groups compared to the C and C-FO groups, the masses of the epididymal and inguinal white adipose tissue were increased. The adiposity index followed the same trend. BAT was 57% higher in the HFHS group compared to the C group. It is concluded that the HFHS diet induced an increase in BM and alterations in the IPITT and BAT. Supplementation was able to reduce BM, adiposity and insulin resistance.

ID: 11318

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECTS OF MATERNAL HIGH-FAT DIETS ON LIPID PROFILE AND EXPRESSION OF MYOGENESIS MARKERS IN OFFSPRING RATS

Maternal nutrition plays a critical role in fetal and postnatal development of offspring. This study aimed evaluate the effects of two different maternal high-fat diets during gestation and lactation periods on lipid profile and expression of myogenesis markers in weaning rats. Female Wistar rats were divided into three groups: Control diet (C, n=10; 19% de protein, 17% fat; 3.6 kcal/g); High-fat/high-caloric diet (HH, n=8; 19% de protein, 51% fat; 4.62 kcal/g); and High-fat/Isocaloric diet (HI, n=9; 19% de protein, 51% fat; 3.64 kcal/g) according to diet received from mating until weaning. At postnatal day 21, male pups were killed, trunk blood was collected to analysis serum profile and gastrocnemius muscle was retrieved for analysis of gene expression by real-time PCR. All experimental procedures were approved by CEUA (n.0063/2018). There was no difference in total cholesterol levels between groups. Pups from HI group had increased levels of triglycerides and non-HDL-cholesterol (vs C); and reduced levels of HDL-cholesterol (vs HH). The quantification of gene expression in the offspring showed lower levels of Myf6/Mrf4 in HH and HI groups (vs C). HI pups had higher expression of Mef2a (vs C) and lower expression of Mef2d (vs C and HH). No differences were observed between groups in expression of Pax7, Myf5, MyoD, MyoG. The expression of Myh7 gene, coding for slow muscle fibers, was higher in HH and HI groups (vs C). No differences were observed in expression of Myh2, Myh4, Myh8 genes. In conclusion, maternal consumption of HI diet impaired lipid profile at early age. In addition, both high-fat diets affected the expression of the myogenesis regulatory factors and had overexpression of the Myh7 gene. This indicates that high-fat maternal diet, independently of caloric content, affects fiber type determination in skeletal muscle.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECTS OF MODERATE PHYSICAL TRAINING ON MORPHOLOGY AND OXIDATIVE METABOLISM IN THE ADIPOSE TISSUE OF JUVENILE RATS AFTER PERINATAL PROTEIN RESTRICTION

The literature demonstrates that low maternal protein intake during development can promote morphological and metabolic changes in adipose tissue. On the other hand, moderate physical exercise has been shown to be effective on general metabolism, but little is known about its effects after protein restriction in early life. Thus, the aim of the study was to investigate the effects of moderate physical training on morphology, oxidative metabolism and energy control in epididymal white adipose tissue of young rats submitted to maternal protein restriction. Pregnant Wistar rats were divided into two groups: control (C-17% casein) and hypoproteic (HP-8% casein). The male offspring were subdivided into untrained (CNT and HPNT) and trained (CT and HPT) groups and at 30 days of age they were submitted to a treadmill exercise program (4 weeks, 5 days/week, 60 min/day at 50% of maximum running capacity) up to 60 days of life. The procedures followed the recommendations of the CEUA and were approved by the Local Committee (0060/2018). Data analysis was performed using the Two-way ANOVA test and expressed as mean \pm SD considering $p < 0.05$, with $n = 4-6$ animals per group. The results indicate that restriction decreased by 27.7% ($p < 0.0001$) the mean area of adipocytes and the amount of adipocytes per area by 45% ($p < 0.0001$) when compared to the control group. Furthermore, it reduced citrate synthase (CS) activity (CNT=45.6 \pm 2.41 vs HPNT=20.5 \pm 1.47; $p < 0.01$) and AMPK protein expression by 55% ($p < 0.0001$). The physical exercise program did not change the morphological characteristics of adipocytes, but increased CS activity by 5 times (HPNT=20.5 \pm 1.47 vs HPT=106.6 \pm 12.65; $p < 0.0001$) and reduced by 55% ($p < 0.0001$) the protein expression of AMPK in normal-nourished animals. Thus, our findings suggest that moderate physical exercise may be an important regulator of oxidative metabolism in young rats submitted to maternal protein restriction.

ID: 10518

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECTS OF NEONATAL ADMINISTRATION OF KAEMPFEROL ON THE SOMATIC GROWTH IN OFFSPRING OF HIGH-FAT DIET DAMS

Pregnancy, lactation and early childhood are called the critical periods for development. The same ones that are characterized by rapid hyperplasia, hypertrophy and cellular differentiation of organs and tissues (GLUCKMAN, HANSON and PINAL, 2005). Experimental studies have shown that obese dams and those exposed to a high-fat diet (HFD) present physiological alterations that include increased body fat. On the other hand, the flavonoid kaempferol have shown various metabolic benefits, such as antidiabetic and anti-obesity effects (ZANG et al., 2015). We aimed to evaluate the effects of maternal exposure to a high-fat diet associated with neonatal administration of kaempferol on somatic growth. 24 female Wistar rats (120-150 days; 220-250g) were mated and distributed according to the diet in: Control (C, n=12; 3.4kca/g; 12%kcal lipids) or Hyperlipidic/Hypercaloric (HH, n=12; 4.6kca/g; 51%kcal lipids). After birth, the animals were divided into experimental groups according to maternal diet and pharmacological manipulation during lactation: Control + Vehicle (CV), Control + Kaempferol (CK), and Hyperlipidic/Hypercaloric + Vehicle (HHV), Hyperlipid/Hypercaloric + Kaempferol (HHK). Kaempferol (K: 1mg/kg.bw) and vehicle (Dimethylsulfoxide 1%) were administered intraperitoneally from the 1st to the 21st postnatal day (PND). The body weight of the pups was evaluated during the 1st, 7th, 14th and 21st postnatal days. After weaning, body weight and longitudinal axis were evaluated weekly until PND63. Lee's Index was evaluated at PND63. Data were expressed as mean \pm EP. The analysis of the normality of the sample was performed using the Shapiro Wilk test and the comparison between the groups by the Two-way ANOVA, followed by the Tukey post-test. Data were analyzed using the GraphPad Prism program. The value of $p < 0.05$ was considered significant. The experimental protocols were approved by CEUA/UFPE n° 0052/2019. At the end of lactation, the body weight of the HHV and HHK pups were higher than the CV and CK pups (PND21: n=9-25; CV= 38.08 \pm 1.00; CK= 38.76 \pm 1.04; HHV= 43.22 \pm 1.94; HHK= 44.52 \pm 1.35, $p < 0.0001$). After weaning, the CV group had higher body weight than HHK group at PND49 (n=9-10; CV= 194.10 \pm 3.78; HHK= 214.80 \pm 3.53, $p < 0.05$). At PND56, the CK group had higher body weight than HHK group (n=9-10; CK= 199.30 \pm 3.03; HHK= 254.00 \pm 3.05, $p < 0.05$). On PND49 and PND56, the longitudinal axis of the CV and CK group were higher in relation to the HHK group (PND49: n=9-19; CV= 19.21 \pm 0.22; CK= 19.06 \pm 0.21; HHK= 20.19 \pm 0.19, $p < 0.01$); (PND56: n= 9-19; CV= 20.28 \pm 0.20; CK= 20.34 \pm 0.17; HHK= 21.46 \pm 0.20, $p < 0.001$). At PND63, the Lee Index was lower in the HHK animals compared to the CV, CK and HHV animals (n=13-17; CV= 0.297 \pm 0.0025; CK= 0.300 \pm 0.0031; HHV= 0.299 \pm 0.0018; HHK= 0.284 \pm 0.0029, $p < 0.001$). The use of the kaempferol during the neonatal period favored the somatic growth post-weaning, without promoting obesity in the offspring from high-fat dams.

Food Funct. 3:834, 2015. Matern Child Nutr. 3:130, 2005.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 EFFECTS OF OBESITY INDUCED BY NEONATAL OVERNUTRITION ON
MASTICATORY MUSCLES AND FOOD CONSUMPTION IN RATS**

Epidemiological studies have obesity to changes in mastication in critical periods of development. Little is known about the mechanisms involved in these changes. The objective of this work was to evaluate the effects of obesity induced by neonatal overnutrition on the masticatory muscles and food consumption of rats. The study, carried out with Wistar rats, was submitted and approved by the Ethics Committee on Animal Experimentation of the Federal University of Pernambuco (0026/2019). Rats were mated at a ratio of 2 females to 1 male and kept under standard vivarium conditions. After the birth of offspring, at 3 days of age, rats were assigned to nursing mothers in groups of 9 pups (control group) or 3 pups (overnutrition group). In male pups, body weight (days 3, 7, 14, 21 and 30), food consumption (days 22 and 30), fat weight (day 30) and masticatory muscle weight (day 30) were analyzed. In our results, the overnourished group had higher body weight, from the fourteenth day of life (median=33.18, IIQ=34.73-30.72, $p<0.001$), higher amounts of inguinal fat (mean±sd=0.855±0.158, $p<0.001$), epididymal (mean±sd=0.120±0.046, $p<0.001$), mesenteric (median=0.879, IIQ=1.142-0.722, $p<0.001$) and retroperitoneal (mean±sd=0.106±0.05, $p=0.017$), as well as higher food consumption at 22 postnatal days (median=0.665, IIQ=0.825-0.490, $p=0.018$). Although, no differences were found in relation to masticatory muscle weight, it is believed that more refined analyses, such as the myofibrillar ATPase technique, are more sensitive in identifying possible changes in the muscles of overnourished animals. Therefore, we concluded that rats with obesity induced by neonatal overnutrition had higher body weight, higher amounts of white adipose tissue and higher food consumption. We hope that the findings of this study will help in the development of effective therapeutic strategies for the control and reduction of obesity.

ID: 10951

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECTS OF PERINATAL PROTEIN RESTRICTION AND PHYSICAL EXERCISE ON THE OXIDATIVE BALANCE IN THE HYPOTHALAMUS OF 60-DAY-OLD RATS

Recent studies shown that adverse conditions during critical periods of development can predispose offspring to chronic diseases in adulthood, with increased oxidative stress in the central nervous system being a possible mechanism for this. Inversely, physical exercise has been used as a tool to counteract such diseases. Thus, our aim is evaluate the effects of a physical training on the oxidative stress in the hypothalamus of rats submitted to maternal protein restriction. For this, we used pregnant Wistar rats were fed with low-protein diet (8% casein) during pregnancy and lactation. At 30 days of life, offspring were divided into 2 groups: low protein sedentary (HS) and low protein trained (HT). The HT group underwent moderate exercise training on a treadmill for 4 weeks, 5 days/week and 60 min/day for 50% of the maximum capacity. At 60 days of age, the rats were sacrificed for collection of the hypothalamus, subject to further analyses. We follow the CEUA recommendations (Process: 2.307601780/2014-15). The results were analyzed by Student t-test and expressed as mean \pm SEM, considering $p < 0.05$ as significant. The HT group showed a reduction in the concentration MDA (HS=27,12 \pm 1,441 N=7; HT=20,33 \pm 2,324 N=6; $p=0.0262$), with tendency in the concentration carbonyl (HS= 5.15 \pm 0.68 N=6; HT= 3.14 \pm 0.55 N=5; $p=0.0512$). There was significant reduction in CAT activity in HT group (HS=480.9 \pm 41.4 N=5; HT=239.1 \pm 25.9 N=4; $p=0.0024$), and no difference in SOD ($p=0.2770$) and GST activity ($p=0.1088$). There was a tendency in total thiols (HS=0.023 \pm 0.002 N=6; HT=0.036 \pm 0.006 N=6; $p=0.0574$), with an increase in the REDOX status (HS=1.88 \pm 0.34 N=6; HT=2.97 \pm 0.15 N=8; $P=0.0074$). Thus, these data suggest that protein restriction tends to increase oxidative stress in the hypothalamus of 60-day-old rats, and that physical exercise seems to be a good strategy to mitigate these deleterious effects.

ID: 11306

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 EFFECTS OF THE PEPTIDE FRACTION OF HARD-TO-COOK BEANS (PHASEOLUS VULGARIS) ON HEPATIC INSULIN RESISTANCE.

Currently, diabetes and cardiovascular diseases have high incidence and prevalence in many countries. Among the several strategies aimed at controlling and managing these diseases, food-derived bioactive peptides emerge as a good alternative. Therefore, this study sought to evaluate the effects of common bean peptides in animals submitted to a high fat (HFD) or standard diet (SD). For this purpose, the project was approved by the CEUA, registered with the nº 5857-1/2021, was used C57 bl/6 male mice of 8 weeks, were chronically administrated with daily doses of a peptide fraction smaller than 3kDa from hardened common bean peptides (Phaseolus Vulgaris) (PV3) through pseudogavage for 60 days, while underwent standard (SD) or high fat diets (HFD). Groups were divided according to diet and treatment: SD; SD + PV3; HFD; HFD + PV3. Fasting blood glucose was assessed in the fourth and ninth weeks of treatment. Glucose (GTT), Insulin (ITT) and Pyruvate Tolerance Tests (PTT) were performed at the ninth week; Food intake was measured in the last week of experiments. In the last experimental day, the animals were euthanized. Protein expression levels through Wester Blotting (WB) and qPCR analyses were performed in liver samples and on insulin-stimulated liver. PV3 reduced body weight gain and prevented the development of insulin resistance induced by HFD (HFD+PV3 group). PV3 increased food consumption only in the HFD+PV3 group without interfering with body weight, in the SD+PV3 group there was no change in this test. It was also noticed that PV3 controlled blood glucose via insulin-related pathways, as revealed by the insulin tolerance test and WB analyses. PV3 interfered with G6PASE/IRs pathway, increased expression the IRs and G6PASE. In conclusion, PV3 controlled glycemia and body weight in mice fed with high fat diet, acting in the prevention of insulin resistance. Such findings further support the search for bean-derived nutraceutical components aimed at treating type 2 diabetes.

ID: 11108

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 EFFECTS OF VOLUNTARY MATERNAL PHYSICAL ACTIVITY ON
HEPATIC ENERGY METABOLISM ENZYMES IN OFFSPRING SUBMITTED TO A
POST-WEANING HYPERLIPIDIC DIET**

Nutritional imbalance and physical inactivity emerge as the main causes of diseases associated with overweight and obesity. Our objective was to evaluate the effects of maternal voluntary physical activity during critical periods of development on the hepatic energy metabolism of offspring submitted to a highfat diet. Pregnant Wistar rats were divided into three groups: inactive, active and very active according to pre-established criteria. At 21 days, the offspring were divided into two groups according to the diet offered, control or hyperlipidic, until 70 days of age. The research was approved by the local ethics committee (23076.017125/2017-47). Data were analyzed by two-way ANOVA test and expressed as mean \pm SD considering $p < 0.05$, with $n = 5-7$ animals per group. The results show an increase in the activity of the PFK enzyme in the offspring of active rats (7.32 ± 0.8 nmol/min/mg of protein, $n = 6$, $p < 0.0001$) and very active (14.35 ± 2.57 nmol/min/mg of protein, $n = 5$, $p < 0.0001$) compared to the control group (3.91 ± 0.29 nmol/min/mg protein, $n = 4$). Increase in G6PDH activity in the offspring of very active rats (76.6 ± 1.8 nmol/min/mg protein, $p < 0.05$) compared to the control group (42.12 ± 3.49 nmol/min/mg protein). Higher β -Had activity in the offspring of very active rats (0.21 ± 0.05 nmol/min/mg of protein, $p < 0.0001$) compared to the control group (0.03 ± 0.009 nmol/min/mg of protein). Reduction in FAS activity in the offspring of active (0.06 ± 0.01 nmol/min/mg protein, $p < 0.0001$) and very active (0.01 ± 0.007 nmol/min/mg protein, $p < 0.0001$) rats compared to the control group (0.12 ± 0.01 nmol/min/mg protein). And increase in citrate synthase activity in the offspring of very active rats (33.35 ± 2.9 nmol/min/mg protein, $p < 0.05$) compared to the control group (20.73 ± 1.01 nmol/min/mg protein). Thus, the results indicate that maternal voluntary physical activity is able to improve the activity of enzymes that act on hepatic energy metabolism in the offspring after a high-fat diet.

ID: 10926

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 EVALUATION OF OXIDATIVE STRESS IN THE HYPOTHALAMUS OF
YOUNG RATS SUBMITTED TO MATERNAL OBESOGENIC DIET DURING
DEVELOPMENT**

The critical period of development is a stage where neural systems are more susceptible to plasticity. Factors such as sedentary lifestyle and poor diet during this period can influence brain development, exerting great influence on the pathophysiology of diseases. This study aimed to evaluate the effects of obesogenic diet during the critical period of development in the hypothalamus of young rats at 30 days of life. This study was approved by the ethics committee (protocol no. 0090/2021). When detecting pregnancy, pregnant rats received during pregnancy and lactation, Presence diet - Control® Group (C) and/or obesogenic diet - Experimental group (O) (rich in fats, carbohydrates and with free access to condensed milk). At 30 days of life they were euthanized and the hypothalamus removed for biochemical analyses. The data were expressed as Mean \pm SEM and statistical analyses used T-test with Graphpad Prism 6.0 software; significance was maintained at 5% ($p < 0.05$). Our data showed an increase in lipid peroxidation in the obese group when compared to the control group (O: 59.30 ± 4.64 ; C: 36.18 ± 2.33 ; $n=10$; $p=0.0011$). Regarding protein oxidation, the obese group presented a higher level compared to the control group (O: 34.95 ± 3.70 ; C: 25.52 ± 2.07 ; $n=10$; $p=0.0420$). SOD, antioxidant enzymatic, showed no significant difference. Catalase activity increased in the obese group (O: 2.02 ± 0.46 ; C: 0.83 ± 0.23 ; $n=10$; $p=0.0318$). When evaluating total thiol levels, we observed an increase in the obese group (O: 0.064 ± 0.001 ; C: 0.054 ± 0.002 ; $n=10$; $p=0.0043$). Our data suggest that the consumption of an obesogenic diet during a critical period of development can lead to oxidative damage in the hypothalamus of the offspring at 30 days of life, and may potentiates neurodegenerative diseases.

Keywords: Obesogenic Diet, Oxidative Stress, Critical Development period

ID: 10837

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 EVALUATION PROFILE OF AMPK, MAPK, SIRT1 AND NRF2
SIGNALING PATHWAYS ON THE ANTIOXIDANT EFFECT OF RESVERATROL IN
AGING**

One of the most studied theories about aging is the Free Radical Theory, where there is an accumulation of the generation of Reactive Oxygen Species (ROS) leading to oxidative stress. Resveratrol (RSV) is a polyphenol that has been shown to act as a potent antioxidant, but little is known about the biochemical mechanisms it activates during aging. Therefore, the aim of this study was to verify the antioxidant profile of RSV (5µM) in leukocytes from donors of different age groups through the analysis of the main enzymes and antioxidant signaling pathways. The project was approved by the UFMG Ethics Committee (CAAE: 33842420.4.0000.5149). Subjects were divided into three groups: 20-39, 40-59 and 60-80 years old. After separating the leukocytes, the luminoldependent chemiluminescence assay was performed to verify the production of ROS and the action of the AMPK, MAPK, SIRT1 and Nrf2 antioxidant pathways (through specific inhibitors). The enzymes Superoxide Dismutase (SOD), Catalase (CAT) and Glutathione Peroxidase (GPx) were dosed using kits. The analysis between age and treatment by Pearson's correlation was performed and the results were expressed as mean ± SD (*p<0.05). There was a reduction in ROS in leukocytes with RSV at all ages, but this effect was smaller in aging. There was an increase in CAT in cells with RSV (20-39 years old) and SOD and GPx (40-80 years old). There was a positive correlation between the action of RSV on the enzymatic activity and the aging of all enzymes. An antioxidant behavior of SIRT1 and AMPK (20-59 years old) was observed in cells stimulated with H₂O₂, with the antioxidant effect of RSV acting by it at these ages. MAPK and Nrf2 were found to be active at all ages, and RSV had an antioxidant effect in all of them. The results so far indicate that the MAPK and Nrf2 pathway are important biochemical mechanisms responsible for the antioxidant effect of RSV, still observed in aging.

ID: 10842

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 FETAL UNDERNUTRITION PROGRAMS OBESITY PHENOTYPE IN
WEANED RATS ASSOCIATED WITH GHRELIN SIGNALING IMPAIREMTN**

Malnutrition in the last third of pregnancy has been associated with low birth weight, causing epigenetic changes in the offspring, which leads to the emergence of metabolic syndromes throughout life. Herein we aimed to evaluate the role of ghrelin in young rats early programmed due to fetal undernutrition. On the 14th day of gestation until delivery, mothers were fed food restricted by 50% of the normal daily amount, while control mothers were fed ad libitum throughout pregnancy and lactation. Litter size was adjusted to eight pups per mother and weaning took place on the 22nd day, when the animals were euthanized, and tissues and blood collected to evaluate biometric, metabolic, and molecular parameters. In addition, the protein expression of the growth hormone secretagogue receptor (GHS-R) in the hypothalamus, as well as the blood levels of acylated-ghrelin, glucose, triglycerides, and total-cholesterol were assessed. All the parameters performed in this study were approved by the Ethics Committee (protocol number 23108.724433/2017-16) and data were statistically analyzed using Student t test. In relation to control rats-offspring, the weaned FR50 rats-offspring presented higher body weight (19%, $P<0.001$), mesenteric (38%, $P<0.05$) and retroperitoneal (72%, $P<0.01$) fat stores. The hypothalamic expression of the GHS-R was around 4-fold in FR50 rats ($P<0.01$), as well the blood values of acylated-ghrelin was increased by 82% ($P<0.05$) when compared to control group. In addition, FR50 rats were hyperglycemic, hypertriglyceridemic and displayed higher total-cholesterol than control rats ($P<0.05$). In conclusion, intrauterine undernutrition imprints change in the blood levels of ghrelin and hypothalamic GHS-R, which may be associated with the obese phenotype and metabolic dysfunction observed in weaned FR50-rats.

ID: 11011

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 FISH OIL SUPPLEMENTATION DURING PREGNANCY REPROGRAMS
MATERNAL HIGH-FAT DIET-INDUCED LIVER ENDOCANNABINOID SYSTEM
CHANGES IN NEONATE RATS**

Maternal high-fat (HF) diet increases the risk of obesity and non-alcoholic fatty liver disease (NAFLD) in the offspring. Both obesity and NAFLD have been associated with increased tonus of the endocannabinoid system (ECS). ECS activity and hepatic lipid metabolism can be modulated by dietary fatty acids, such as omega-3 fatty acids, present in fish oil (FO). However, it is unknown whether FO supplementation in maternal diet would modulate the liver ECS of the offspring. In this study, we used female Wistar rats fed a standard (9% fat) or HF (29% fat) diet 8 weeks prior mating and during pregnancy. A subgroup of HF dams received 3% FO supplementation in the HF diet (35% fat), exclusively during pregnancy. Hepatic ECS was accessed in male and female offspring at birth. Data were analyzed by one-way ANOVA followed by Dunnet test per offspring sex. Maternal HF diet increased liver CB1 content in male offspring ($p < 0.05$), with no change in females. Interestingly, maternal FO supplementation reduced CB1 in both males ($p < 0.05$) and females ($p < 0.05$). Maternal HF diet reduced CB2 content in the liver of female offspring ($p < 0.05$) without changes in males. FO reduced the liver content of the endocannabinoid anandamide in male ($p < 0.05$) and female offspring ($p < 0.05$). HF and FO supplementation reduced the content of the endocannabinoid 2-AG in both sexes ($p < 0.05$), compared to the control group. These results demonstrate that maternal HF diet alters the liver ECS in neonate rats, before the development of obesity. The increase of CB1 only in the liver male offspring may contribute to lipogenesis and the origins of NAFLD previously observed in adulthood. Maternal FO supplementation during pregnancy normalized liver CB1 content in male offspring and reduced endocannabinoid levels, regardless of sex. These results suggest that maternal nutrition at critical stages of development can modulate the offspring's ECS, predisposing or preventing the onset of metabolic diseases.

ID: 10930

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 FLAVOR ACCEPTANCE TEST IN INFANTS SUBMITTED TO AN INTERVENTION PROGRAM OF COMPLEMENTARY FEEDING METHODS

Children's food preferences are influenced by the interaction of different biological, social, genetic and environmental factors. Early feeding experiences, initiation and quality of complementary feeding seem to be crucial in establishing food acceptability and preferences. The aim of the study was to analyze the gustatory acceptance in children submitted to different methods of introduction of complementary feeding in the first years of life. Observational study nested in a randomized clinical trial with 5.5-month-old infants submitted to different complementary feeding approaches (Parent-Led Weaning (PLW), Baby-Led Introduction to SolidS BLISS) and Mixed). The gustatory acceptance test was carried out between 12-30 months of age, at Hospital de Clínicas de Porto Alegre (HCPA), and consisted of offering solutions with each of the predominant basic flavors, in the respective order of supply: lactose for sweet taste, sodium chloride for salty taste, urea for bitter taste, citric acid for sour taste and monosodium glutamate for umami taste. Acceptance was measured in relation to the amount consumed and the infant's hedonic scale at the time of the test, divided into 5 acceptance categories. The project was approved by the HCPA Ethics Committee under number 2019-0540. The preliminary sample consisted of 34 infants. Of these, 8 (23.5%) belonged to the PLW group, 17 (50%) to the BLISS group and 9 (26.5%) to the Mixed group. The average consumption values were 7.93mL, 8.06mL, 8.19mL, 6.51mL and 5.90mL, respectively, showing no statistically significant difference. In the salty flavor, there was a tendency ($p=0.056$) of the BLISS group to present a higher frequency of Neutral reaction (29.4%) and Strong Acceptance (35.3%), compared to the other groups. The study revealed that, although the consumption volume was similar in relation to the feeding introduction methods, the BLISS group seemed to demonstrate more frequently neutral and positive hedonic reactions to the salty taste.

ID: 11087

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 GLUCOCORTICOIDS CONTRIBUTE TO METABOLIC AND LIVER
IMPAIRMENTS INDUCED BY LACTATION OVERNUTRITION IN MALE RATS.**

Lactation overnutrition is a programming agent of energy metabolism, and litter size reduction leads to early development of obesity, which persists until adulthood. Liver metabolism is disrupted by obesity, and increased levels of circulating glucocorticoids are pointed as possible mediator for the development of obesity, since bilateral adrenalectomy (ADX) can reduce obesity in different models of obesity. This study aimed to evaluate the effects of glucocorticoids on metabolic changes and liver lipogenesis and insulin pathway induced by lactation overnutrition. For this, on postnatal day 3 (DPN), 3 pups (small litter - SL) or 10 pups (normal litter - NL) were kept with each female. On PND 60, male Wistar rats underwent bilateral adrenalectomy (ADX) or fictitious surgery (sham), and half of ADX animals received corticosterone (CORT- 25 mg/L) in the drinking fluid. On the 14 th day, animals were euthanized by decapitation for trunk blood collection and liver removal (CEUA:3457.2109.11). SL animals presented enhanced plasma levels of corticosterone, free fatty acids, total and LDL- cholesterol, without changes in triglycerides (TG) and HDL-cholesterol. SL group also showed increased content of liver TG, and expression of fatty acid synthase (FASN), but decreased expression of PI3Kp110 in the liver, compared to NL animals. In SL group, ADX decreased plasma levels of corticosterone, FFA, TG and HDL-cholesterol, liver TG, and liver expression of FASN and IRS2, compared to sham animals. In SL animals, CORT replacement increased plasma levels of TG and HDL-cholesterol, liver TG, and liver expression of FASN, IRS1 and IRS2, compared with ADX animals. In summary, ADX attenuated plasma and liver changes observed after lactation overnutrition, and corticosterone replacement could reverse most of ADX-induced effects. Thus, increased circulating glucocorticoids are likely to play pivotal role to liver and plasma impairments induced by lactation overnutrition in male rats.

Keywords: adrenalectomy, corticosterone, litter size reduction, triglycerides, obesity.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 GLUCONEOGENESIS IS NOT ALTERED IN PERFUSED LIVERS OF YOUNG GOTO-KAKIZAKI RATS

The Goto-Kakizaki (GK) rat is a spontaneous model of T2DM characterized by hyperglycaemia and moderate insulin resistance in muscle and adipose tissue, however, the knowledge about liver glucose production is controversial in this model. This present study aimed to evaluate gluconeogenesis from different precursors and related metabolic parameters in the perfused liver of GK rats. Thus, anthropometric data were followed, and after insulin (ITT) and glucose (GTT) tolerance tests, male GK rats and Wistar control rats (C) at 8 to 10 weeks of age (n= 7-15), weighing 220 to 300 g, fasted for 24 hours, were submitted to in situ liver perfusion. The project of this work was approved by Animal Ethical Committee (Protocol nº 062.2021). The body weight gain (GK 2.78 ± 0.98 g.24h⁻¹ ; C 3.89 ± 1.55 g.24h⁻¹), food intake (GK 10.00 ± 0.24 g.100g⁻¹ .24h¹ ; C 10.37 ± 0.23 g.100g⁻¹ .24h⁻¹), Lee index (GK 0.289 ± 0.001 g 1/3.cm⁻¹ ; C 0.292 ± 0.002 g1/3.cm⁻¹) and lactatemia (GK 2.66 ± 0.15 mg.dl⁻¹ ; C 2.38 ± 0.29 mg.dl⁻¹) were similar in GK and Wistar rats at 8th and 9th weeks of age. Hyperglycaemia basal in 24h-fasted (GK 168.54 ± 2.28 mg.dl⁻¹ ; C 102.13 ± 3.66 mg.dl⁻¹), oral GTT (AUC of GK 10568.73 ± 805.66 ; AUC of C 4137.50 ± 289.57) and ITT (kITT of GK 3.81 ± 0.38 ; kITT of C 4.90 ± 0.37) confirmed peripheral insulin resistance of GK rats, but the glucose output of the liver gluconeogenesis from glycerol (AUC of GK 10.96 ± 1.41 ; AUC of C 7.55 ± 1.03), lactate (AUC of GK 11.23 ± 0.81 ; AUC of C 11.43 ± 1.43) or alanine (AUC of GK 3.49 ± 0.37 ; AUC of C 3.25 ± 0.49) did not contribute to this hyperglycaemia. Hepatic ureia production from alanine (AUC of GK 3.60 ± 1.04 ; AUC of C 3.33 ± 1.58) also is similar in GK and Wistar rats. Soleus (GK 39.03 ± 2.71 mg.100g⁻¹ ; C 50.73 ± 3.17 mg.100g⁻¹) and gastrocnemius (GK 479.91 ± 16.27 mg.100g⁻¹ ; C 580.59 ± 11.79 mg.100g⁻¹) muscle weights were less in GK in relation to Wistar rats, suggesting that the insulin resistance seems to be later in the liver than the muscle in young GK rats.

ID: 10896

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 HIGH-FAT DIET CONSUMPTION ALTERS PATTERNS OF ENERGY EXPENDITURE AND FOOD CONSUMPTION IN FEMALE MICE KNOCKOUT ALPHA-7 NICOTINIC ACETYLCHOLINE RECEPTOR (A7NACHR)

The consumption of high-fat diets (HFD) has been associated with changes in energy expenditure and food intake. An anti-inflammatory cholinergic pathway is activated to minimize damage and reestablish homeostasis by activating cholinergic receptors such as $\alpha 7$ nAChR. The objective of this work was to participate in the investigation of homeostasis related to the consumption of HFD. Female knockout $\alpha 7$ nAChR (Chrna7^{-/-}) and wildtype (WT) mice with 6 weeks age, \pm 16g weight body were subjected to control diet (CD) or HFD for 4 week (n=6-7 per group) (CEUA Protocol n° 5386-1/2019). We measured weekly weight gain and adiposity, evaluated O₂ consumption (VO₂), CO₂ production (VCO₂), respiratory exchange ratio (RER), energy expenditure (Kcal), 24-hour food intake and locomotion. Finally, we analyze the gene expression of hypothalamic neuropeptides such as POMC, CART, NPY and AgrP. Chrna7^{-/-} + HFD female mice increased adipose tissue, food intake, locomotion and energy expenditure. However, it presented a lower value in RER, when compared to its controls WT + HFD, and there were not total differences in the values of VO₂, VCO₂ and in the hypothalamic neurons. The increase in food intake did not reflect on the increase in body weight, possibly due to the increase in locomotion and energy expenditure. Hypothalamic neuropeptides have not changed, probably because they are not involved in these homeostatic changes. The lowest value in RER shows a tendency to consume lipid substitutes. Thus, our results indicate that Chrna7^{-/-} + HFD females showed changes in energy expenditure and food intake data.

ID: 11248

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 IMPACTO DA RESTRIÇÃO PROTEICA MATERNA SOBRE A MORFOFISIOLOGIA DO FÍGADO DE RATOS JOVENS E SENIS

Adverse gestational conditions can lead to irreversible offspring morphofunctional changes, a condition established as the Developmental Origin of Health and Disease (DOHaD). Maternal low protein diet (LPD), a model used for studies on DOHaD, has been associated with an increased incidence of cardiovascular and renal diseases. In this context, it has been shown that the liver, a central organ in the control of metabolism and detoxification, is also affected by exposure to maternal LPD. Thus, this project aims to analysis morphological and oxidative stress parameters on liver rats submitted to maternal LPD. For this, the rats were divided into the following experimental groups: 1- Control (CTR): Rats born to dams who consumed normal diet (17% protein); 2- Gestational and lactational low protein diet (GLLP): Rats born to GLLP dams (6% protein) during pregnancy and lactation. In PND 90 and 540 the animals were anesthetized, weighed, euthanized and the liver was collected. These samples were submitted to morphological and oxidative stress analysis. The GLLP groups had lower initial and final body weight when compared to the CTR group. Their livers also had lower weight, lower amounts of visceral, retroperitoneal and total fat. In the PND 540, the GLLP group continued to present lower final body weight and lower body weight gain. They also had lower liver weight and less retroperitoneal and total fat when compared to the CTR group. The analysis of oxidative stress through the activities of SOD, CAT and GSH enzymes in the animals in PND 90, showed that there were no significant differences between SOD and GSH enzymes. However, there was a significant increase in the activities of CAT enzymes in the GLLP group. In the PND 540 animals, there was a decrease in the SOD enzyme in the GLLP animals, but the GSH and CAT enzymes did not show any significant difference. Thus, it is possible to observe that maternal LPD can negatively impact the liver of the offspring.

ID: 10957

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 INFLUÊNCIA DO CONSUMO DE DIETA RICA EM GORDURA SOBRE O DESENVOLVIMENTO REPRODUTIVO MATERNO E FETAL DE RATOS ADULTOS

The consumption of high-fat diets is increasing worldwide, which contributes to the global expansion of obesity that impairs reproductive outcomes. This study aimed at evaluating how the consumption of a highfat diet can interfere on the reproductive performance of female rat and fetal development. The Ethical Committee for Animal Use of our institution approved all of the protocols used in this investigation. The insult of a high fat diet (HFD) was started in female rats at 30 days of life, and these were distributed into two groups: 1) Rats given diet standard (SD, n=7 animals/group) and 2) Rats received HFD (30% lard; n=7). At 120 days of life, the rats were mated and, on the day 21 of pregnancy the dams were anesthetized, decapitated, and submitted to laparotomy for visceral and periovarian adipose tissue collect and the maternal uterus was exposed. The uterine horns and ovaries were removed for analysis of maternal reproductive performance, and their fetuses and placentas were weighed and analyzed. For all statistical comparisons, Pearson's correlation test was used and a minimum confidence limit of 95% ($P < 0.05$) was considered. The correlation analysis showed that HFD consumption was related to an increased periovarian fat and negatively influenced on reproductive performance, causing lower number of implantations ($r = -0.57/p = 0.019$) and alive fetuses ($r = -0.62/p = 0.009$), consequently lower litter weight ($r = -0.68/p = 0.003$). Furthermore, the higher fat weight was related to a decreased number of fetuses with appropriate weight for gestational age (AGA) ($r = -0.52/p = 0.036$), lower number of alive fetuses ($r = -0.56/p = 0.036$) and litter weight ($r = -0.61/p = 0.019$). Thus, our findings show that the ingestion of a high-fat diet impaired reproductive performance and fetal development of rats.

Keywords: high-fat diet; obesity; fetal development; rats; adipose tissue.

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ID: 10999

Área Temática: Ê-POSTER | *Nutrição e Metabolismo*

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FeSBE2022 INTERESTERIFIED PALM OIL CONSUMPTION BY DAMS CAN PROGRAM RECENTLY WEANED OFFSPRING TO INSULIN RESISTANCE

Exposing parents to lipid overload could induce the development of obesity and its complications in descendants through metabolic programming. The literature has shown that even the consumption of normolipidic diets containing interesterified fat is related to the development of obesity and associated pathological conditions, such as insulin resistance and type 2 diabetes. However, there is still a gap in knowledge about the diet consumption of interesterified fat by dams during important stages of development and its impact on offspring glucose homeostasis. The main of this study was to evaluate whether maternal consumption of a normolipidic interesterified palm oil diet during gestation and lactation is able to induce insulin resistance in young mice offspring. Female mice (C57BL/6J) were fed a control diet containing natural palm oil (PALM) or a modified diet with interesterified palm oil (INTER) for four weeks. They were mated with control male mice and maintained with the same diet during mating, pregnancy, and lactation. On the 21st day of life, the offspring was weaned to control PALM diet until euthanasia on the 30th day of life. Glucose tolerance test, insulin tolerance test, and pyruvate tolerance test were performed after weaning. Soleus skeletal muscle and liver were collected for quantitative real-time PCR and Western Blotting analysis. There were no differences between groups in both male and female offspring regarding biochemical tests. However, preliminary analysis show that insulin resistance molecular markers were altered. There was a reduction of the phosphorylation of protein kinase B (pAkt) in the liver of INTER offspring when compared to PALM group, as well as an increase of the protein tyrosine phosphatase-1B (PTP1B) in the same group. Thus, our preliminary results show that maternal consumption of interesterified fat may induce molecular alterations in the liver of the young offspring, although it did not impact on glucose homeostasis.

ID: 10858

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 LIRAGLUTIDE, A GLP-1 ANALOGUE, DIRECTLY INHIBITS PROTEIN BREAKDOWN IN ISOLATED SKELETAL MUSCLE FROM RODENTS

Previous studies from our laboratory have shown anti-atrophic effects promoted by cyclic AMP (cAMP) signaling in skeletal muscles. Liraglutide (LIRA), an analogue of GLP-1, (Glucagon Like Peptide Type I - incretin hormone) stimulates the insulin release by the pancreas through the cAMP induction and has been widely used for the glycemic control of diabetic patients. However, little is known about its impact on muscle protein balance. The present study aimed to investigate the *in vivo* effect of LIRA (Victoza®) on the mass of different tissues, and its *in vitro* effect on proteolysis in muscles from healthy rodents. For *in vivo* analysis, mice (C57Bl/6, ~25g) and rats (Wistar Hannover, ~70g) were treated with LIRA (200 µg/kg; *i.p.*; 2/day) or saline 0,9% (CTR group), for 10 days. For *in vitro* experiments, soleus (oxidative) and EDL (Extensor digitorum longus, glycolytic) muscles were incubated with their tendons fixed in appropriated supports in the presence or not of LIRA (10⁻⁷M, 10⁻⁶M, and 10⁻⁵M), for 2 h, and the overall proteolysis was estimated by measurements of tyrosine release in the incubation medium. Values were expressed as mean ± SEM (n=6) and the t-student test was used for statistics (p<0.05). CEUA (192/2020). The LIRA treatment reduced the body weight (BW) in rats (108±19,5g vs. 129±3,5g in CTR), the food intake at the first day of treatment in mice (4,6±0,9 vs. 14,3±0,1 g/100g-BW CTR) and the mass of retroperitoneal adipose tissue in both mice and rats (218±21,6 vs. 131±15,2 in CTR and 325±25,59 vs. 114±11,9mg/100g-BW in CTR, respectively). In contrast, the EDL muscle mass was significantly increased in mice (43±2,4 vs. 38±2 mg/100g BW in CTR). Accordingly, LIRA (10⁻⁶M) *in vitro* drastically reduced (~50%) the overall proteolysis in EDL from both species (0.079±0.011 vs. 0.135±0.009 and 0.162±0.007 vs. 0.257±0.01 nmol.Tyrosine.mg⁻¹muscle.2h⁻¹, mice and rats, respectively). These data show that LIRA induces a selective anabolic effect in EDL, much probably due to the reduction of protein catabolism.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 LOW PROTEIN DIET DURING PERI-PUBERTAL LIFE AND ITS IMPLICATION IN BIOMETRIC AND BIOCHEMICAL PARAMETERS IN ADULT RATS

Exposure to a low protein diet (LP) in perinatal life induces biometrics and biochemical dysfunction in adulthood. However, it is not known how this insult in peri-pubertal period affects the biometric and biochemical parameters. This study aims to evaluate long-term biometric and biochemical parameters induced by LP diet during peri-pubertal life in Wistar rats. The research ethics of the State University of Maringa committee approved (n° 4833210519), male Wistar rats were divided into two groups of animals fed a low-protein (4% protein; LP) or control (20.5% protein; NP) diet during peri-pubertal life from postnatal day (PN) 30 to PN 60. Both groups consumed the 20.5% protein diet from PN 60 until PN 120 for dietary recovery. At PN 120, cardiovascular, biometric and biochemical parameters were evaluated. Statistically significant differences were assessed by the T-Student test. During peri-pubertal life, the LP group presented a lower body weight ($P=0.0001$), food intake and water intake ($P=0.021$, $P=0.0001$). In the dietary recovery period, LP animals showed reduced body weight ($P=0.0001$) and water intake ($P=0.0032$) with an increase in food consumption ($P=0.0001$). At PN 120 we had a lower body weight and nasal-anal length ($P=0.0003$; $P=0.0015$). Regarding the biochemical dosages, the LP animals had higher levels of glucose blood concentration ($P=0.0081$), however, with no change in the lipid profile. Protein restriction during peri-pubertal life programs cardiometabolic dysfunctions in adult life.

ID: 11004

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 MALNUTRITION INDUCED BY EXPANDED LITTER MODEL ALTERS POST-NATAL TESTICULAR DEVELOPMENT IN ADULT WISTAR RATS

Nutritional experiences in early life can influence the gene expression of organisms, altering the development of somatic structures, readjusting physiological systems and causing an imbalance in the normal mechanisms of homeostasis, causing metabolic disorders in adulthood, a phenomenon known as metabolic programming. Litters of expanded size result in reduced nutritional intake, simulating malnutrition. The neonatal and prepubertal periods are considered critical for spermatogenesis and for male reproductive activity. Thus, this study aimed to verify the influence of the litter expansion protocol on the development of the male reproductive system in Wistar rats. The protocol was previously approved (n. 18310.2019.03). For the control group (GC) 10 animals and for the large litter group (LL) 16 animals were kept in each litter after birth. On postnatal day 60 (PND 60), the animals were fasted for 16 h and euthanized by decapitation. Testes and epididymis were removed, weighed and stored at -20 °C for sperm count, or placed in fixative for histological processing. Spermatozoa from the vas deferens were collected to determine sperm motility and morphology and mitochondrial activity. There was no change in the spermatozoa morphology and motility, mitochondrial activity and the dynamics of spermatogenesis. Number of spermatids and spermatozoa in the testes of LL animals were lower and daily sperm production was reduced. The LL group had a higher number of abnormal seminiferous tubules and reduced diameter of the seminiferous tubules and height of the germinal epithelium. Sertoli and Leydig cells are also reduced in the seminiferous tubules of LL animals. There was no significant change in the weight of testes and epididymis and in the behavior analysis. In conclusion, the brood expansion model is suitable for fetal programming experiments by malnutrition and the restriction of nutrients in the early stages of life may be responsible for testicular changes in adult life.

ID: 11033

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 MATERNAL CAFFEINE INTAKE DURING GESTATION OR LACTATION DISTURBS THE GLUCOSE HOMEOSTASIS OF FEMALE OFFSPRING

Caffeine is a substance frequently consumed during pregnancy and lactation period, able to reach fetus and baby. In pregnant, high caffeine use affects the offspring metabolism and 300mg/day is considered a safety dose. Here, we tested the impact of low maternal caffeine intake (250mg/day) on glucose metabolism of both sexes offspring. For this, pregnant Wistar rats received intragastric caffeine (25mg/kg/day) or vehicle during gestation (GEST), lactation (LACT) or both period (G+L). At delivery, litter were adjusted to 8 pups by dam. Dams and offspring (different ages) were evaluated using one way ANOVA (Newman-Keuls post-test) (Protocol approved: 26/2019). Caffeine intake during gestation reduced maternal food intake (-18%; $p<0.05$), favoring dams' lower body weight gain (-12%; $p<0.05$) and fat mass (-17%; $p<0.05$) at delivery. These parameters were not affected in all dams group at weaning. At birth, the GEST female offspring exhibited lower body weight (-6%; $p<0.05$), although this difference disappeared at weaning, even without changes of maternal milk macronutrients. At weaning, the G+L female offspring showed normoglycemia and hyperinsulinemia (+100%; $p<0.05$). At adolescence, only the LACT female offspring showed glucose intolerance, with higher glycemia 30 and 120 minutes after glucose overload. At adulthood, GEST and LACT female offspring had glucose intolerance. Maternal caffeine intake did not alter the evaluated parameters in the male offspring. Adult offspring of both sexes showed unchanged serum leptin and insulin. Thus, perinatal caffeine exposure, even at a safe dose, can induce sex-dependent metabolic dysfunction in offspring, such as changes in glycemie homeostasis only in female offspring.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 MATERNAL HIGH-FAT DIET INDUCES SEX-SPECIFIC
ENDOCANNABINOID SYSTEM CHANGES IN THE SMALL INTESTINE OF RAT
OFFSPRING ASSOCIATED WITH DECREASED GUT PERMEABILITY AT
WEANING**

The endocannabinoid system (ECS) in the small intestine regulates energy balance by neuro-immuno-endocrine mechanisms. Endocannabinoids activate the cannabinoid receptors (CB1 and CB2) and are degraded by fatty acid amide hydrolase (FAAH). The CB1 signaling increases food intake while CB2 signaling has immunomodulatory effects. Maternal high-fat diet (HFD) over activates the ECS in the brain and the white adipose tissue throughout life of offspring, which develop obesity. It is unexplored the effect of maternal HFD on the ECS of the small intestine. We investigated the maternal HFD impacts on the ECS signaling of the small intestine associated with the mRNA levels of monocyte chemoattractant protein-1 (Mcp-1) and gut permeability. Progenitor Wistar rats received a control diet (C; 11% fat) or a HFD (40% fat) during 9 weeks before mating and throughout gestation and lactation. The male and female offspring were euthanized at weaning to collect small intestine. A subset of male and female offspring at weaning was orally administrated non-digestible 4-kDa dextran conjugated with fluorescein isothiocyanate (FITC), blood samples were collected for 4-kDa FITC-dextran analyses and the gut permeability assessed. The Animal Care and Use Committee from UFRJ approved all procedures (number 129/21). Data were analyzed by two-way ANOVA followed by Bonferroni test. Maternal HFD induced obesity during lactation (+11.3%, $p < 0.05$) in both offspring sexes at weaning. Maternal HFD increased CB2 (2.2-fold, $p < 0.05$) and decreased FAAH (-45.0%, $p < 0.05$) protein content in male and female offspring, respectively. Maternal HFD increased levels of Mcp1 mRNA only in males (2.4-fold, $p < 0.05$). Maternal HFD decreases gut permeability in both offspring at weaning (-65%, $p < 0.05$). Thus, we speculate that maternal HFD induces local damage, such as inflammation, and the ECS changes might be part of a counter regulatory response, which also could contribute to reduced gut permeability at weaning.

ID: 10521

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 MATERNAL LOW PROTEIN DIET ASSOCIATED WITH POST-WEANING SUGAR CONSUMPTION IN OFFSPRING: EFFECTS ON THE PROTEOMIC PROFILE IN THE LIVER OF YOUNG AND SENILE RATS

Adverse gestational conditions can cause irreversible offspring morphofunctional alterations, a condition known as Developmental Origin of Health and Disease (DOHaD). Maternal low protein diet (LPD), a model of DOHaD studies, has been associated with an increased incidence of cardiovascular and renal diseases and some types of cancer. In addition, postnatal exposure to hypercaloric diets can amplify the damage caused by maternal LPD, increasing to aggravate diseases with aging. In this context, the liver, a central organ with metabolism control, is also affected by exposure to obesogenic diets early in life. Thus, we aim to identify the morphofunctional alterations in the liver of rats submitted to maternal LPD (gestational and lactational) and exposed to postnatal sugar consumption. The experiment was approved by the Ethics Committee of the Botucatu Biosciences Institute (CEUA-951). The Sprague Dawley rats were separated into the following experimental groups (n=6): 1- Control (CTR); 2- Control + sugar (CTR+SUG); 3- Maternal LPD; 4- Maternal LPD + sugar (LPD+SUG), male offspring were used. In PND 90 and 540 the animals were weighed, euthanized and the liver was collected. These were submitted to oxidative stress and metabolic analyzes. In the biometric parameters at PND 90, the LPD and LPD+SUG groups showed lower initial and final body weight compared to the other groups, their liver was also presented with decreased weight and had a small amount of body fat. The LPD+SUG group had the lowest feed consumption, followed by the CTR+SUG group, however they had the highest water consumption. In the PND 540, the LPD+SUG group has the lowest final body weight and weight gain. The LPD and LPD+SUG groups have a lower liver weight than the other groups and less body fat. The Oral Glucose Tolerance Test (OGTT) was also analyzed at both ages. In the OGTT at PND 90, the animals in the LPD group had a lower blood glucose for the time of 60 minutes, while the CTR+SUG group had a higher blood glucose for the time of 120 minutes and had a significant increase in the area under the curve (AUC). The OGTT performed on the animals in the PND 540 did not show significant changes. In PND 90, the activities of SOD, CAT and GSH enzymes showed that there were no significant differences between SOD and GSH enzymes. However, there was a significant increase in the activities of CAT enzymes in the LPD group. In PND 540, there was a decrease in the SOD enzyme in the LPD animals and an increase in the GSH and CAT enzymes in the LPD+SUG animals. There was no significant difference regarding the amounts of glucose, total proteins and triglycerides in the animals of the PND 90. In the animals of the PND 540, only cholesterol showed significant changes. LPD+SUG animals had a significant increase compared to the CTR group. These results indicate that maternal low protein diet associated with sugar consumption was able to alter liver metabolism and enzymatic activities that can negatively impact the development of diseases with aging.

ID: 11272

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 MATERNAL MODERATE, BUT NOT SEVERE, FOOD RESTRICTION DURING LACTATION PROMOTES SEX-SPECIFIC CARDIOVASCULAR CHANGES IN ADULT WISTAR RATS

The DOHaD concept advocates that the development of diseases at adulthood can be associated with conditions that the individual was exposed to in the early stages of life, including lactation, which is an extremely important stage as it is the main source of nutrients for the offspring. This work aimed to evaluate the effects of maternal moderate (MFR) and severe (SFR) food restriction during the lactation on cardiovascular parameters of adult Wistar rats. The nutritional intervention was carried out from the 1st to the 14th day of lactation, after the 14th until weaning all mothers received standard chow ad libitum. The study has a control and normal protein group (NP), dams which received standard chow ad libitum; MFR group, dams which received 50% of the consumption of NP dams; and SFR group, dams which were fed a low-protein feed (4,5% protein). The protocols were approved by the ethics committee of UFG (process n 023/2015). After weaning (PND21), the offspring of all groups received standard chow ad libitum, and were monitored until PND120. At PND120, we observed an increase in mean arterial pressure in males of MFR group (CO 107.2 ± 1.37 ; MFR 136.6 ± 6.79 ; SFR 109.7 ± 5.54 mmHg). In addition, both MFR and SFR males showed a decrease in baroreflex sensitivity in response to phenylephrine (CO -1.81 ± 0.22 ; MFR -1.18 ± 0.16 ; SFR -1.10 ± 0.11) and in sodium nitroprusside injections (CO -4.81 ± 0.52 ; MFR -2.17 ± 0.21 ; SFR -2.17 ± 0.30). Due to pressure changes, MFR males showed cardiomyocyte hypertrophy, and increased interstitial collagen deposition. Meanwhile the females did not show any hemodynamic or morphological alterations. Taken together, our results suggests that maternal moderate food restriction during lactation induced sex-specific cardiac remodeling and worsened baroreflex sensitivity in the male offspring, with no effects on female offspring.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 MATERNAL OBESITY ALTERS INTESTINAL PERMEABILITY AND INTEGRITY MARKERS IN OFFSPRING IN SEX-SPECIFIC MANNER

Maternal obesogenic environment can cause an increase in placental pro-inflammatory cytokines, leading to dysbiosis in the intestinal microbiota of the offspring. Evidence in the literature suggests that dysbiosis in the intestinal microbiota has a fundamental role in the development of obesity and diseases associated with metabolic syndrome, in addition to being related to changes in intestinal permeability. Understanding the role of metabolic programming in intestinal permeability can contribute to advances in the control of obesity cases in the world population. The main of the present study was to investigate the modulation of intestinal permeability and integrity markers in offspring of obese dams and dimorphic response at fetal and weaning ages. Female mice were fed control (10% fat) or HFD (45% fat) prior to and during pregnancy and lactation. Body weight, gene expression of inflammatory cytokines (TNF α , IL-6) and tight junctions components (Claudin 1, ZO-1 and Occludin) in intestinal epithelium by qPCR and Western Blot, gastrointestinal transit time and indirect intestinal permeability through plasma determination of FITC-Dextran were evaluated in control and HFD offspring at embryonary day 20 (e20) and after weaning (d28). Data were compared using Student's unpaired t-test. Our results indicate an increase in gene and protein expression of Claudin 1 in female offspring at e20, but a tendency to reduction in male offspring at the same age. In addition, the male offspring of obese dams at d28 had a longer gastrointestinal transit time, and the intestinal permeability test indicated a greater permeability in male offspring but not in female, which suggest a possible protective role in female offspring of obese dams, triggered by the maternal obesity phenotype. However, more investigations are needed regarding offspring microbiota and inflammatory mechanisms involvement.

ID: 10985

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 MATERNAL OBESOGENIC DIET DURING PREGNANCY AND LACTATION CAN INDUCE HEPATIC OXIDATIVE STRESS IN RATS?

The literature has demonstrated that the consumption of obesogenic diets is associated with metabolic disorders related to hepatic oxidative stress that can result in pathologies, such as non alcoholic fatty liver disease (NAFLD) and hepatic steatosis. Thus, the aim of this study was to evaluate the obesogenic maternal effects, during critical periods of development, on the hepatic oxidative balance from female rats. Pregnant Wistar rats were divided into two groups, Control group (C) (n=10) that received Presence® vivarium diet and the Obesogenic group (OB) (n=10) that received diet with high levels of saturated fatty acids plus the addition of condensed milk during the pregnancy and lactation. After 21 days of lactation, the mothers were euthanized and evaluated: biomarkers of oxidative stress (malondialdehyde-MDA and carbonyls), activity of antioxidant enzymes (catalase-CAT, dismutase superoxide-SOD and glutathione-S-transferase-GST), non-enzymatic antioxidant system (total thiols, reduced glutathione-GSH, oxidized glutathione-GSSG levels) and the cellular REDOX state (ratio GSH/GSSG). Student's T test was used and the results expressed as mean±SEM considering $p < 0.05$ as significant. This study was approved by the ethics committee for the use of animals of the UFPE Biosciences Center (n°0061/2019). Our results showed higher MDA (39.86%, $p = 0.025$) and carbonyl (68.75%, $p = 0.017$) levels and lower total thiols levels (19,12%, $p = 0,009$) in the OB group compared to the control group. SOD activity was lower (17.15%, $p = 0.030$) and there was no difference in CAT and GST activities in the OB group. GSH levels (11.30%, $p = 0.047$) and cellular REDOX state (14.64%, (14.64 %, $p = 0.049$) decreased in the OB group compared to the control group. Our data suggest that the consumption of an obesogenic diet during critical periods of development promotes hepatic oxidative stress in rats, as well as triggers disorders in the cellular REDOX state.

ID: 11297

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 MECHANICAL INSULT-INDUCED LIVER REGENERATION IN MICE WITH DELETION OF THE A7 NICOTINIC CHOLINERGIC RECEPTOR

After severe liver injury, surgical resection via partial hepatectomy (2/3PHx) may be the only curative option to regenerate the organ and restore its immaculate mass and function. During liver regeneration (LR) an essential inflammatory process occurs to activate a variety of signaling pathways, responsible for inducing the transcription of genes involved in cell growth and differentiation. It is known that cholinergic receptors, such as alpha7 nicotinic receptors ($\alpha 7nAChR$), through their connection with the vagus nerve, have been identified as suppressors of the inflammatory response, through a mechanism known as the cholinergic anti-inflammatory pathway. The present study aims to evaluate LR in male and female $\alpha 7nAChR^{-/-}$ obese mice after 2/3PHx, seeking to understand the role of this receptor and its implications for the survival of obese mice after hepatic insult. Whole-body $\alpha 7nAChR$ receptor knockout mice (C57BL/6) were obtained (CEUA 5692-1/2021 protocol) by crossing $\alpha 7nAChR^{-/-}$ and $\alpha 7nAChR^{-/-}$, and Wild Type (WT) mice were obtained by crossing $\alpha 7nAChR^{+/+}$ and $\alpha 7nAChR^{+/+}$ as a control group. They were kept in cages with a light/dark cycle (12h/12h), temperature of $21 \pm 1^{\circ}C$ and fed a hypercaloric diet with 45% fat. After 70 days of life (body weight $24g \pm 2$), the animals were submitted to 2/3PHx and euthanized after 4 hours to evaluate the LR priming phase. Both male and female $\alpha 7nAChR^{-/-}$ showed an initial impairment in LR at 4 hours after surgery, even in non-obesogenic conditions, as they showed reduced STAT3 phosphorylation (51.3 ± 3.5 vs 100 men and 7.22 ± 3.5 vs 100 females), in relation to the WT group, although they showed a decrease in p-JNK in males (56.25 ± 2 vs 100). However, under obesogenic conditions, p-JNK (48 ± 2.5 vs 35 ± 2.3) was increased in male mice, as well as p-STAT3 (100 vs 27 ± 2.3) and JAK2 (100 vs 62 ± 3.3), suggesting that even with changes in inflammatory signaling, the activation of the JAK2-STAT3 pathway seems to be preserved, indicating preservation of the LR.

ID: 11296

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 METABOLIC IMPRINTING INDUCED BY NEONATAL OVERFEEDING
AND ITS EFFECTS ON NLRP3 INFLAMMASOMA ACTIVATION**

The concept of Developmental Origins of Health and Disease (DOHaD) is used to explain the effects of nutrition and other environmental factors on short and long-term health in life. Exclusive and on-demand lactation is associated with several health benefits, such as a reduced risk of obesity and associated conditions. Obese individuals have a chronic low-grade inflammation in which adipose tissue is infiltrated by innate immune cells that recognize molecular patterns associated with pathogens or damage (PAMPs or DAMPs), leading to the activation of the NLRP3 inflammasome, with consequent activation of caspase-1 and cleavage of inflammatory prointerleukins (IL) such as IL-1 β and IL-18. IL-18 influences energy metabolism and insulin sensitivity. These effects suggest a role of the inflammasome as an important metabolic and IR regulator. Given the above, knowing that nutrition in early life is a significant epigenetic modulation factor, we propose to evaluate the effects of neonatal overfeeding (OF) on the priming of the NLRP3 inflammasome. All experimental procedures were approved by the Committee on Ethics in the Use of Animals of UFOP (protocol no. 2245040518). To establish the model, 24 newborn Wistar male rats were randomly assigned into two groups: control litter (NC) (n=12, 8 animals/mother) and the reduced litter (NR) (n=18, 4 animals/mother). After 21 days the blood was collected. Serum IL-18 assessment was performed using the IL-18 Rat ELISA Kit (# KRC2341, Thermo Fischer Scientific, Waltham, MA), following the manufacturer's recommendations. Serum IL18 was influence by litter size, suggesting a role for the inflammasome in this model. Future experiments are needed to verify the hypothesis.

ID: 10834

Área Temática: Ê-POSTER | *Nutrição e Metabolismo*

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**FeSBE2022 NEONATAL OVERNUTRITION, BUT NOT NEONATAL
UNDERNUTRITION, DISRUPTS LPS-INDUCED HYPOPHAGIA AND NEURON
ACTIVATION OF NUCLEUS OF THE SOLITARY TRACT AND
PARAVENTRICULAR NUCLEUS OF HYPOTHALAMUS**

Nutritional status during critical windows in early development may challenge not only metabolic functions, but also physiological responses to immune stress in adulthood, such as the systemic inflammation induced by bacterial lipopolysaccharide (LPS). In this study, the divergent litter size model was used to investigate the long-term effects of neonatal over- and undernutrition on LPS-mediated neuronal activity in adult male Wistar rats. Pups were raised in litters of 3 (neonatal overnutrition/small litter – SL), 10 (control/normal litter – NL) or 16 (undernutrition/large litter – LL) pups per dam. On postnatal day 60, after 16 hours fasting, animals were intraperitoneally treated with LPS (500 µg/Kg) or saline (0.9% NaCl), food intake and neuron activation in the area postrema (AP), nucleus of solitary tract (NTS) and paraventricular nucleus of hypothalamus (PVN), expressed by the number of c-Fos immunoreactive (ir) neurons, were evaluated (procedures were approved by Ethics Committee for Animal Use of the State University of Londrina - UEL, Protocol 18310.2019.03). LPS decreased food intake 2 hours only in NL and LL groups, without effects in SL animals. LPS also increased the number of c-Fos-ir neurons in the AP, NTS, PaV and PaMP subdivisions of PVN in SL, NL and LL animals, compared to respective saline groups. SL rats showed lower neuron activation induced by LPS in the NTS and PaMP subdivision compared to NL ones. Litter size effect was also observed in the PaPo subdivision, as overnourished and undernourished rats exhibited lower and higher neuronal activation, respectively, in this area. Thus, results show lack of hypophagic effect of LPS in SL group, associated with lower neuron activation in the NTS and PaMP, indicating that LPS-induced hypophagia and neuron activation in the NTS and PVN were impaired by neonatal overnutrition. Contrarily, these responses were not disrupted by neonatal undernutrition, which indicates that excess and poor supply of nutrients during lactation display divergent effects in programming LPS signaling in adulthood.

ID: 11289

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 NUTRITIONAL EVALUATION AND LIPODYSTROPHY IN PEOPLE LIVING WITH HIV

The Deficiency Syndrome (AIDS) was recognized in the 1980s, its etiological agent is HIV (Human Immunodeficiency Virus). Antiretroviral therapy (ART) is associated with the appearance of metabolic changes and abnormal redistribution of body fat in people living with HIV (PLHIV), called muscular lipodystrophy syndrome. Adequate nutrition helps to improve the patient's immune system and contributes to a better prognosis of medical treatment, thus improving the quality of life of PLHIV. The objective was to evaluate the nutritional and food profile of people living with HIV affected by muscular lipodystrophy. This is a quantitative, descriptive, cross-sectional study carried out in an outpatient school. Approval was obtained from the CEPH. Food consumption was measured using a 24-hour recall, using the Food Frequency Questionnaire. Anthropometric assessment information was used. NUTWIN® software, 2010 was used to analyze food consumption. Descriptive statistical analysis of the data was performed using measures of central tendency, absolute and relative frequencies, with the aid of the Excel® program, 2016. It is reported that 45 people participated in this study, 53.3% of which were male. feminine. The mean age was 43.3 years and the mean time of treatment with antiretrovirals was 10 years. It was observed that the most common form of lipodystrophy was lipohypertrophy, followed by lipoatrophy, respectively, with 51.1% and 28.9%. In the anthropometric evaluation, there was an average Body Mass Index of 24.7 kg/m², with a eutrophic classification of 44.4%. We conclude that by R-24h, insufficient intake of energy, carbohydrates, lipids, fiber and calcium for both sexes. It is considered essential to promote monitoring and nutritional education to alleviate the metabolic changes caused by lipodystrophy.

ID: 11195

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 OBESITY INDUCED BY LACTATION OVERRNUTRITION INDUCES
EARLY OXIDATIVE STRESS IN SKELETAL MUSCLES OF MALE WISTAR RATS**

Litter size reduction is an experimental model to induce early overnutrition and obesity. In obesity, there is an imbalance between oxidant and antioxidant compounds, which installs the oxidative stress (OS). Lipid peroxidation (LP) accounts to generation of free radicals, which may be counterbalanced by endogenous antioxidant compounds, as glutathione (GSH), glutathione-S-transferase (GST), catalase (CAT), superoxide dismutase (SOD). This study aimed to evaluate OS in the liver and skeletal muscles in post-weaned male rats submitted to lactation overnutrition. For this, 20 male Wistar rats (n=10/group) were used. On postnatal day (PND) 0, litter size manipulation was performed: normal litter (NL), with 10 pups, and small litter (SL), 3 pups. Body weight was measured every 3 days. On PND 21 (weaning day), euthanasia by decapitation was performed. Adipose tissues (AT), liver and soleus (SM) and gastrocnemius muscles (GM) were weighed and stored for measurement of LP, GSH, GST, CAT, SOD. The blood was stored for measurements of glucose, HDL, total cholesterol and triglycerides. SL group presented increased body weight from PND 7 to 21, Lee Index and weights of AT, showing that lactational overnutrition due to litter size reduction leads to overweight/obesity. SL animals showed higher glucose plasma levels were higher and lower triglycerides than in NL animals. SL group presented enhanced glycemia in response to glucose overload and area under curve of GTT, indicating glucose intolerance. In GM of SL animals, there were increase of LP decrease of GSH, suggesting oxidative imbalance in this tissue, without changes in the liver. In SM of SL group, there was reduction of GST and CAT, showing impairment in the antioxidant system in this muscle. Thus, lactation overnutrition induced-obesity and its comorbidities during childhood in male Wistar rats are associated with increased oxidative stress in skeletal muscles, important tissues in the regulation of energy metabolism.

ID: 10517

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 POLYPHENOLS IMPROVE LOCOMOTOR PERFORMANCE IN MALE RATS

Polyphenols constitute a large group of bioactive phytochemicals such as the flavonoid kaempferol and the stilbene resveratrol that confer health benefits, especially with regard to chronic diseases (FRAGA et al., 2019; GALINIÁK et al., 2019). We hypothesized that kaempferol and resveratrol exposure during lactation could improve locomotor performance of young rats. Sixty male Wistar rats were used. After birth, the animals were divided into three experimental groups according to the pharmacological manipulation received during lactation: Vehicle (V, n=20), Kaempferol (K, n=20) and Resveratrol (R, n=20). Polyphenols (K: 1mg/kg.bw; R: 1mg/kg.bw) and vehicle (Dimethylsulfoxide 1%) were administered intraperitoneally from the 1st to the 21st postnatal day (PND). The locomotor activity were evaluated on PND8, PND14, PND17, PND21, PND30, and PND60. Each animal was placed in the open field and recorded for 5 minutes. The movements were directly recorded in a digital format and analyzed by software ANY-maze 6.0. The parameters used to evaluate the locomotor activity were: distance travelled (m), average speed (m/s), average potency (mW), kinetic energy (kcal), time immobile (s), number of stops, time immobile/number of stops (s). Data were expressed as mean \pm EP. The analysis of the normality of the sample was performed using the Shapiro Wilk test and the comparison between the groups by the Two-way ANOVA, followed by the Tukey post-test. Data were analyzed using the GraphPad Prism program. The value of $p < 0.05$ was considered significant. The experimental protocol was approved by the Ethical Committee in Animal Experimentation, Federal University of Pernambuco (protocol n° 0052/2019.) To evaluate the effects of polyphenols at each age, we performed an intergroup analysis. On PND17 and PND21 the resveratrol group showed greater distance travelled compared with the vehicle group (PND17: n= 19; V= 12.10 \pm 1.65 vs. R= 19.16 \pm 2.02, $p < 0.001$); (PND21: n= 19; V= 18.95 \pm 1.15 vs. R= 24.59 \pm 1.99, $p < 0,01$). At PND60, the resveratrol group presented a greater average potency and kinetic energy than vehicle and/or kaempferol group (average potency: n= 18; V= 0.007730 \pm 0.0006; K= 0.007108 \pm 0.0005; R= 0.02204 \pm 0.003, $p < 0.0001$); (kinetic energy: n= 20; K= 1.585 \pm 0.11 vs. R= 1.888 \pm 0.14, $p < 0.05$). For immobile time, the kaempferol group spent less time immobile than the vehicle group from PND14 to PND21 and the resveratrol group only at PND17 (PND14: n= 19; V= 194.80 \pm 11.79 vs. K= 156.60 \pm 14.16, $p < 0.05$); (PND17: n= 19; V= 133.0 \pm 13.25; K= 100.60 \pm 11.50; R= 91.87 \pm 7.71, $p < 0.01$); (PND21: n= 19; V= 108.80 \pm 7.99 vs. R= 71.19 \pm 4.83, $p < 0.05$). The resveratrol group showed less number of stops than vehicle and kaempferol group at PND8 and PND14 (PND8: n= 20; V= 27.10 \pm 1.43; K= 27,56 \pm 1,26; R= 21.39 \pm 2.30, $p < 0,01$); (PND14: n= 20; V= 27.14 \pm 1.50; K= 25.28 \pm 1.57; R= 19.83 \pm 1.32, $p < 0.001$). The resveratrol was able the improve the locomotor performance more than kaempferol during the early and late postnatal period.

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 PPARA AGONIST DURING LACTATION MAY ATTENUATE THE WEIGHT GAIN IN ANIMALS FROM REDUCED LITTER

Some cases of childhood obesity can lead to several diseases in adult life, and can become a concern with the increase in number of cases worldwide. Evidences shows that treatment with a PPAR α agonist during adulthood can attenuate the development of obesity. Looking at lactation as a plastic window for the development of individuals, we hypothesized that neonatal treatment with fenofibrate can prevent obesity induced by litter reduction. The research ethics of the State University of Maringa committee approved this work (n^o4932250919). Wistar pregnant rats were maintained in standard conditions until delivery and during the lactation, free access to food and water. On postnatal day (PN) 1, litter was standardized for 9 male pups per mother (normal litter, NL). At PN3 litter reduction of 3 pups per mother were performed (small litter, SL). Pups from both groups, were submitted to the treatment with a vehicle (V – DMSO 10%, Solutol 15%, H₂O) or fenofibrate (F – 12,5mg/kg in V), from PN1 to PN21 (NL-V n=11; NL-F n=10; SL-V n=12; SL-F n=10). We evaluate the pups at PN1, PN7, PN14 and PN21. The area under curve (AUC) of body weight (BW) evolution show that SL group was significantly heavier than NL at weaning (p<0.0001), and that exposure to PPAR α agonist decreased BW in SL (p<0.001) but not in NL. The levels of β -hydroxybutyrate at PN7 was significantly higher in SL pups compared to NL (p<0,01), also a significant effect of litter was observed at PN14, with no statistical difference due to treatment. No difference was observed in milk intake at PN7 or PN14, at PN21 we observed that NL group had a significant higher milk intake, lower body length and abdominal diameter, compared to SL (p<0,05), showing no difference when treated with fenofibrate. Our data suggest that fenofibrate as a PPAR α agonist may attenuate weight gain in pups from reduced litter, but had no effects in milk intake, length, abdominal diameter or levels of ketones when administrated in early life.

ID: 11015

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 RELATIONSHIP BETWEEN HEPATIC STEATOSIS AND BIOCHEMICAL
AND ANTHROPOMETRIC PARAMETERS IN OBESE CHILDREN AND
ADOLESCENTS**

Hepatic steatosis (HS) or fatty liver is defined as intrahepatic triglycerides of at least 5% of liver weight. Nonalcoholic fatty liver disease (NAFLD) is now the most important cause of chronic liver disease worldwide and is rising among children and adolescents. The early identification of NAFLD in young individuals is crucial to avoid future progression to other irreversible liver diseases and health conditions. The aim of this study was to perform a cross-sectional study with 170 children and adolescents aged between 4 and 15 years (106 (62,4%) with normal body mass index (BMI); 39 (22,9%); overweight; 25 (14,7%) obese) from a public institution in Santo André-Brazil to evaluate presence of HS, acanthosis nigricans (AN) and its association with anthropometric and biochemical parameters. Weight, height and waist circumference and presence of AN - clinical sign of insulin resistance - was verified. HS was evaluated by ultrasound. Biochemical analysis included: lipid profile; glycemia and insulin (HOMA-IR); liver enzymes: AST and ALT. Statistics: Stata 14.0. HS was observed in 14 subjects (9,33%), but only in 3 eutrophics (3,4 %). A strong association between HS and higher BMI was seen ($p = 0,005$). Presence of AN, was detected in 29 subjects (17,05%): 9 (8,49%) eutrophics; 10 (25,6%) overweight; 10 (40,0 %) obese and was associated with higher BMI ($p < 0,001$) and HS ($p = 0,002$). Higher BMI was associated inversely with HDL-c ($p = 0,0007$), with higher ALT/TGP ($p = 0,0024$) and HOMA-IR ($p = 0,0004$). HS showed association with AN ($p = 0,002$), AST ($p = 0,0375$) and HOMA-IR ($p = 0,0005$). The data point to a significant presence of HS and AN in children and adolescents, with a higher frequency in overweight and obese subjects. The periodic monitoring of children and adolescents might prevent the development of liver diseases, diabetes mellitus and other medical conditions in the adulthood. CAAE: 02670518.7.0000.0082

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Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 THE EFFECTS OF CARNOSINE TREATMENT IN HIGH-SUGAR-FAT DIET-INDUCED OBESITY

Obesity is a public health problem that affects a large part of the world population, generating several metabolic changes. Obese individuals are subject to the appearance of comorbidities such as dyslipidemia, hypertension, and insulin resistance. Thus, several strategies for treating these conditions have been studied. One of them is the use of bioactive compounds, such as carnosine (CAR), a dipeptide with antioxidant potential that has shown benefits in metabolic diseases. This work aimed to evaluate the effects of CAR on nutritional and metabolic parameters in rats with diet-induced obesity. Eighteen male Wistar rats were distributed in two groups fed with different diets to induce obesity: normocaloric (Co, n=6) and hypercaloric rich in sugar and fat (HSF, n=12) diets. After 17 weeks, the HSF group showed a significant difference for all studied parameters in comparison to Co. Then, animals were redistributed into experimental groups for treatment evaluation (5 weeks): Co group (n=6), HSF group (n=6) and HSF group + treatment with CAR (HSF+CAR, n=6, 250mg/kg/day, via i.p.). At the end of the experiment, the adiposity index (AI), final weight, and plasma concentrations of triglycerides (TG) and systolic blood pressure (SBP) were analyzed. The data were compared by ANOVA one way, followed by Tukey's post hoc ($p \leq 0.05$). CEUA: n°1322/2019. The HSF+CAR group showed a slight decrease in AI (HSF+CAR: 7.19 ± 2.14 vs. HSF: 8.51 ± 1.02 , $p=0.07$) and final weight (HSF+CAR: 540.08 ± 77.29 vs. HSF: 569.35 ± 37.95 , $p=0.207$), however, presented lower plasma concentrations of TG (HSF+CAR: 122.8 ± 37.82 vs. HSF: 189.3 ± 52.04 , $p \leq 0.05$) and lower significant SBP values (HSF+CAR: 133.58 ± 6.34 vs. HSF: 142.42 ± 16.63 , $p=0.02$) when compared to the HSF group. CAR treatment showed effects on dyslipidemia and hypertension, emerging as a potential treatment adjuvant for attenuating obesity morbidity.

ID: 11215

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 THE MIR-206 NETWORK AS A MODULATOR OF THE EARLY ORIGIN
OF PROSTATE CANCER IN OFFSPRING RATS SUBMITTED TO MATERNAL
MALNUTRITION**

The Developmental Origins of Health and Disease (DOHaD) has provided the framework to assess how early life experiences can shape health and disease throughout the life course. Maternal malnutrition has been described as a key environmental risk factor for the developmental programming of type 2 diabetes, cardiovascular diseases, and some malignancies, including prostate cancer (PCa). However, the molecular mechanisms connecting maternal malnutrition and PCa remain poorly understood. Here, we associated the deregulation of steroidogenesis with the developmental estrogenization and impairment of the ventral prostate (VP) growth in young (21 days old) offspring rats exposed to maternal low protein diet (LPD). Reanalysis of RNA-seq data (GSE180673 and GSE180674) revealed changes in the expression profile of 49 miRNAs and 707 mRNAs in the offspring VP, which enriched molecular pathways related to cell adhesion, activation of matrix metalloproteinases, negative regulation of intracellular estrogen receptor signaling pathway, and miRNA regulation of the p53 pathway in PCa ($p < 0.05$). RT-qPCR analysis validated the deregulation of the miR-206-PLG network in both young and old (540 days old) offspring VP, being miR-206 upregulated on PND 21 and downregulated in older. Functional in vitro studies revealed a potential modulation of the estrogen receptor α (ER α) by miR-206 in PNT2 cells, which was confirmed in the offspring VP of young and old offspring. Together, we demonstrate that early life estrogenization associated with deregulation of miR-206-networks can contribute to the developmental origins of PCa in maternally malnourished offspring. Understanding the molecular mechanisms by which maternal malnutrition affects offspring health opens the discussion regarding the need to improve maternal healthcare during the critical window of vulnerability early in life.

ID: 11091

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 THERAPEUTIC ACTIONS OF AÇAÍ SEED EXTRACT ON METABOLIC AND PANCREATIC CHANGES IN OBESITY EXPERIMENTAL MODEL: A COMPARATIVE STUDY WITH METFORMIN

Currently, obesity is one of the greatest public health challenges as it represents an important risk factor for the occurrence of CNCD. In an excessive nutritional state, common in obesity, hyperglycemia and hyperlipidemia are frequently present, favoring insulin resistance, chronic inflammation and, possibly, type 2 diabetes mellitus. Studies show that açai is a fruit rich in polyphenols and a diet with a high content of the same can have a preventive action in these alterations. The aim of this study is to evaluate the therapeutic effect of the hydroalcoholic extract of açai kernel (ASE), rich in polyphenols, and of Metformin, on the metabolic and histological alterations of the pancreas in C57BL/6 mice fed a high-fat diet. Male 40-day-old C57BL/6 mice were divided into 4 groups and received the following diets: control group (C): standard diet, 10% lipid; high fat group (HF): high fat diet, 60% lipids; high fat group + ASE (HF+ASE): high fat diet + ASE (300mg/Kg/day) and high fat group + Metformin (HF+MET): high fat diet + MET (300mg/Kg/day). All groups received their respective diets for 14 weeks. From the 10th week onwards, the animals in the HF+ASE and HF+MET groups were treated with ASE or Metformin, respectively, by intragastric gavage. Body weight, blood glucose, insulin, adiposity index, plasma lipid profile, liver enzymes and pancreatic steatosis were evaluated. Treatment with ASE and MET reduced body weight, adiposity index and triglycerides, but only ASE was able to reduce total cholesterol. Both treatments reduced blood glucose. The HF group presented liver and heart hypertrophy and both treatments were able to reduce this hypertrophy. The same group had pancreatic steatosis and both treatments were effective in reducing fat deposition, but ASE performed better. These results together suggest a therapeutic effect of ASE presenting anti-obesity, hypoglycemic and hypolipidemic effect, suggesting that ASE can be an important tool for the treatment of obesity and the metabolic alterations present in this model.

ID: 10881

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 TREATMENT WITH METFORMIN DURING ADULTHOOD IS NOT ABLE TO ATTENUATE THE EFFECTS OF SMALL LITTER MODEL

The small litter model develops obesity and metabolic dysfunction. Previous work from our group shows that Metformin (M) treatment during the critical period of lactation, protects against the development of obesity and metabolic dysfunction later in life, so this work hypothesizes that shortterm M treatment in adulthood is not able to inhibit obesity and metabolic dysfunction programmed by the litter reduction model (SL) during lactation. Our work was approved in Animal Ethics Committee N°3220080620. The number of litters was: NLS=6; NL-M=6, SL-S=6 SL-M=6. After delivery, at postnatal day (PN) 3, dams were divided in Normal Litter (NL), 9 pups per dam, and Small Litter (SL), 3 pups. Only male rats were used. At PN70, the animals were subdivided into two groups: Saline (S) and M both groups received daily intraperitoneal injections of 0.9% S or M 100mg/kg of body weight/day for 12 days. At PN 142 animals were euthanatized for tissue collection. All animals had free access to food and water during the whole period. Final body weight, at PN142, approximately after 2 months of the treatment, we observed that SL-S animals were significantly heavier than NL-S animals (NL-S 34870.76±473.24, SL-S 40366.1±558.28 p<0.0001). Puppies in the SL group show increased body weight compared to NL (NL 44.27±1.41, SL 66.23±0.1.72, p<0.0001) at 21 days.

ID: 11094

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 USE OF FTIR IN THE STUDY OF BIOCHEMICAL PROFILE OF OBESE PATIENTS

Obesity is a chronic disease characterized by an excess body fat. The excess adipose tissue contributes to the development of oxidative stress (OS). The Fourier transform infrared spectroscopy (FTIR) has been investigated as a technique in the search for new and predictive biomarkers. The aim of the study was to investigate FTIR spectra from obese patients referred to bariatric surgery. The sample consisted of serum from 9 non-obese (89% women) individuals with body mass index (BMI) < 25kg/m² (CT) and 14 obese patients (93% women) with BMI > 30 kg/m² (OB) enrolled in the Bariatric and Metabolic Surgery Program at the University Hospital of the Federal University of Espírito Santo, Brazil. For each sample, 10 µl of serum were transferred to aluminum plates, left air dried (2 hours) and the spectra were recorded on the Bruker Optics spectrometer (4000 a 400 cm⁻¹). Principal component analysis (PCA) was conducted with different normalization standards (vector normalization, Min-Max, standard normal variate and Amida II). Substantiated opinion n.51519115.7.0000.5071. The mean age was 29.2 ± 8.9 (CT) and 44.6 ± 12.8 (OB). The mean BMI was 22.2 ± 2 (CT) and 44.5 ± 6.5 (OB). Characteristic OS (~1740 and ~2927 cm⁻¹) bands may have the potential to distinguish CT and OB. However, PCA with different normalizations and different regions (full spectrum, high wavenumber and fingerprint) with variance explained from 77 to 92% did not show a clear separation between the two groups. Although the FTIR is being increasingly used in medicine for the diagnosis or screening of some clinical conditions, with our data and the chemometric techniques tested, it has not been possible to identify significant differences between CT and OB. In this context, the next steps of this study comprise investigations with the application of derivatives in the FTIR specters, other methods of pattern recognition and Machine Learning, besides to stratification of the set of patients.

ID: 10890

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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FeSBE2022 USE OF IRON SUPPLEMENT IN PREGNANCY AND HEMOGLOBIN AT 12 MONTHS

Introduction: Iron deficiency anemia (IDA) in children is considered a public health problem. Childhood anemia is associated with decreased cognitive performance and delayed motor and cognitive development. Inadequate diet, and non-use of iron supplementation during pregnancy are determinants of IDA. Objective: To analyze the use of iron supplementation during pregnancy and the blood count in children at 12 months of age. Methods: A cross-sectional study nested within a clinical trial, randomized with mother-infant who received a healthy eating intervention at 5.5 months of age. An online questionnaire was applied at 5.5 months on sociodemographic characteristics and the use of iron supplements during pregnancy. The collection of biological material was performed at 12 months. Continuous variables were described as mean and standard deviation or median and interquartile range. Categorical variables were described by absolute and relative numbers. The student's t-test was used for the analyses. The significance level adopted was $p < 0.05$. The project approved by the ethics committee nº2019-0230. Results: 70 individuals were evaluated. The median maternal age 30 years [30 – 36], years of schooling 17 [13 – 19], and total family income 5000 [3500 – 9000]. 81.4% (57) of the mothers declared themselves to be white and 68.6% (48) reported using iron supplements during pregnancy. The median ferritin was 30.80 [20.46 – 46.09], mean erythrocytes were 4.47 (0.28), hemoglobin 11.9 (0.76), and hematocrit 34.88 (2.33). The hemoglobin of children whose mothers used iron supplements during pregnancy was significantly higher $p = 0.014$. Discussion: IDA in children is a public health problem and should be prevented using iron supplementation during pregnancy. Conclusion: Children born to mothers who used iron supplements had significantly higher hemoglobin values.

ID: 11260

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 WESTERN DIET-FED APOE KNOCKOUT MALE MICE AS AN
EXPERIMENTAL MODEL OF NON-ALCOHOLIC STEATOHEPATITIS**

One of the consequences of the Western lifestyle and high fat diet is Non-Alcoholic Fatty Liver Disease (NAFLD) and its aggressive form, Non-alcoholic Steatohepatitis (NASH), which can progress to cirrhosis and hepatocellular carcinoma (HCC) and is rapidly becoming the leading cause for endstage liver disease or liver transplantation. Currently, rodent NASH models lack significant aspects of the full NASH spectrum, and it represents a major problem for NASH research. Therefore, the aim of this work was to characterize a fast rodent model with all characteristic features of NASH. 8 weeks old male ApoE KO mice were fed with Western Diet (WD), High Fatty Diet (HFD) or Normal Chow (CHOW) for 7 weeks (CEUA number: 5372180319). Whole-body fat was increased by ~2 times in WD ($P<0.01$) mice and HFD mice ($P<0.001$) associated with increased glucose intolerance (WD: $P<0.05$; HFD: $P<0.01$), increased hepatic triglycerides (WD: $P<0.001$; HFD: $P<0.001$) and increased plasma ALT (WD: $P<0.001$; HFD: $P<0.01$) and plasma AST (WD: $P<0.0001$; HFD: $P<0.001$) compared with CHOW mice. WD mice also showed increased galectin-3 expression compared with CHOW ($P<0.01$) or HFD mice ($P<0.05$) and increased plasma cholesterol compared with CHOW mice ($P<0.001$). WD and HFD displayed increased hepatic fibrosis (WD: $P<0.01$; HFD: $P<0.05$) and increased f4/80 expression (WD: $P<0.01$; HFD: $P<0.001$). WD mice also displayed increased levels of plasma MCP-1 ($P<0.05$). The expression of hepatic inflammatory markers was evaluated and WD mice showed increased levels of TNF- α ($P<0.01$), MCP-1 ($P<0.05$), IL-6 ($P<0.05$) and IFN- γ ($P<0.01$). Taken together, these data demonstrated that ApoE KO mice fed with WD is a great model for NASH research, once it presents the fundamentals parameters of the disease, including hepatic steatosis, fibrosis, inflammation, and metabolic syndrome.

ID: 11231

Área Temática: Ê-POSTER | Nutrição e Metabolismo

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**FeSBE2022 A7NACHR KNOCKOUT IN POMC HYPOTHALAMIC NEURONS
PROMOTES IMPAIRS IN THE CENTRAL NEUROPEPTIDES EXPRESSION AND
RESPONSE TO LEPTIN.**

$\alpha 7$ nAChR subunit is a subtype to cholinergic receptor that participates in the anti-inflammatory cholinergic response. However, recently studies have showed that your expression in hypothalamus contributes to energy balance maintenance. In this sense, the $\alpha 7$ nAChR expressed in hypothalamus can modulates food intake through the neuropeptides expression modulation by JAK2-STAT3 pathway. Thus, this study aimed was evaluate the role of $\alpha 7$ nAChR in POMC neurons on neuropeptides expression and anorexigenic response to leptin. Were used male mice knockout to $\alpha 7$ nAChR subunit on POMC neurons that were obtained by Cre-LoxP system (C57BL/6). The body weight (BW) was measured every week. On the 4th and 8th week were measured hypothalamic neuropeptides mRNA expression by the RT-qPCR. On the 8th week some animals were stimulated with leptin or saline solution by intraperitoneal pathway. Cumulative food intake was measured after previously fasting (24h) and subsequent stimulus to leptin (5ug/g BW). Hypothalamic protein content was evaluated after fasting (12h) and subsequent stimulus to leptin (2,5ug/g BW). All procedures described were previously approved by CEUA (nº: 5553-1/2020). The knockout mice were lighter than wild type (WT) to 4th until 5th wks, but showed increased BW gain (35,9±6,3 vs 45,2±4,3). Additionally, the $\alpha 7$ nAChR subunit deletion in the POMC neurons promoted a reduction on the mRNA expression to Carpt (100±26,2 vs 71,8±6,5; 100±66,7 vs 39,3±19,2) in both ages and POMC (100±34,8 vs 49,2±17,6) on the 4th wk. On the other hand, knockout animals present a reduction to food intake 3h and 4 hours after leptin administration, while the WT presented to 1h until 4 hours. The deletion of $\alpha 7$ nAChR promoted the reduction of pFOXO-01 and POMC hypothalamic protein content independently of leptin, but a reduction in pCREB after leptin administration. Thus, $\alpha 7$ nAChR deletion in the POMC neurons impairs the hypothalamic neuropeptides expression and leptin anorexigenic signaling.

ID: 11192

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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**FeSBE2022 AEROBIC RUNNING EXERCISE IMPROVES THE MORPHOLOGY AND
EXPRESSION OF GLUCOCORTICOID IN THE URINARY BLADDER OF WISTAR
RATS**

Diseases of the genitourinary tract are common and affect mainly men over 50 years. The bladder hypertrophy and detrusor smooth muscle cells are caused by sustained pressure overload. The hormonal alterations stimulate inflammatory responses, activating proliferative pathways, boosting epithelial growth, and increasing connective tissue, resulting in urinary changes. However, the benefits of aerobic and anaerobic physical exercise on hormonal modulations, reduction of inflammatory markers, and increase of anti-inflammatory pathways, as well as energy metabolism homeostasis, have already been described in several tissues, but the modulations are not known in the urinary bladder. The aim is to evaluate the effects of physical training protocols anaerobic and aerobic on morphology, GR, and Bcl-2 expression in the urinary bladder of Wistar rats for 4 weeks. 40 male Wistar rats were divided into 5 groups (n=8): control (CT); swimming training (SW) and running training (RT); strength training (ST) and ladder-climbing training (LC). The results it was shown that aerobic exercise performed on the treadmill reduced the expression of GR in the epithelium (95%CI -9.601 to 10.26) and in the muscle (95%CI 0.2691 to 32.07), as well also reduced connective tissue (95%CI 1.498 to 21.43) and mast cells (95%CI -0.9701 to 2.090) in relation to control group. Swimming and climbing training also reduced epithelial and muscle GR expression, but both increased connective tissue volume relative to the control group. The results of quantification of muscle area and BCL-2 expression were not significantly different between groups. The data show that aerobic running exercise is the most appropriate protocol in a short time, as it has a lower percentage of glucocorticoid, which when activated leads to degranulation and activation of mast cells and consequently greater local inflammation, with this the reduction of GR indicates inflammatory prevention, reduction of the onset of bladder diseases such as bladder cancer.

ID: 11320

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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**FeSBE2022 BENEFICIAL EFFECT OF EXERCISE TRAINING ABOUT
INFLAMMATION AND APOPTOSIS ON PANCREATIC RATS WITH TYPE 1
DIABETES IN WISTAR RATS WITH STREPTOZOTOCIN-INDUCED DIABETES**

The mechanisms by which exercise promotes its beneficial effects in the pancreas have not yet been fully elucidated in type 1 diabetes mellitus. This study investigated the effects of exercise on expression of inflammatory and apoptotic markers in the pancreas of diabetic female rats. Thirty female Wistar rats, weighing between 200 and 250 g, divided into 5 groups: C+Se (sedentary control, n=6), C+Ex (trained control, n=6), D+Se (sedentary diabetic, n=6), D+Ex (trained diabetic, n=6) and D+PEX (previously trained diabetic, n=6). Only the D+PEX group was submitted to 4 weeks of exercise before the induction of diabetes by streptozotocin (40 mg/kg, iv). After confirming of diabetes, the D+PEX, D+Ex and C+Ex groups were submitted to 8 weeks of exercise. Pancreatic tissue was collected for studies of immunohistochemical and ELISA. The experimental protocol was analyzed and approved by CEUA (UFBA/IMS) (Protocol nº 052/2017). Exercise reduced TNF- α in the pancreas of D+Ex (98.84 \pm 10.79) and D+PEX (137.9 \pm 43.47) groups compared to the D+Se (817.5 \pm 143.7) group (p<0.05). Exercise also reduced apoptosis by the reduction of the expression of Bad, Bax and caspase-3 in D+Ex (49.57 \pm 2.39; 38.97 \pm 4.96; 37.69 \pm 2.54) and D+PEX (33.15 \pm 4.36; 42.08 \pm 3.38; 23.36 \pm 5.19) groups compared to the D+Se (73.35 \pm 2.39; 106.9 \pm 4.10; 93.00 \pm 1.79), (p<0.05) respective. Moreover, the exercise increase expression Bcl-2 in D+Ex (39.73 \pm 5.08) and D+PEX (34.57 \pm 2.18) groups compared to the D+Se (14.92 \pm 2.89) (p<0.05). Our data demonstrate that moderate exercise promoted beneficial effects in the pancreas by inflammatory process and apoptosis in female rats with type 1 diabetes.

ID: 11179

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 COMPARISON OF LINEAR OR POLARIZED TRAINING EFFECTS ON PHYSICAL PERFORMANCE, BODY COMPOSITION AND REDOX BALANCE OF THE HEART VENTRICLE OF MALE WISTAR RATS.

Different modalities of physical exercise promote beneficial adaptations to the heart. The present study aimed to investigate the effects of physical training on physical performance, body composition, and redox balance. Eighteen male Wistar rats (300-350g; 4 months old) were divided into 3 experimental groups (6/group): Sedentary (SED), Linear Training (LIN), and Polarized Training (POL). Training sessions took place on alternate days for 4 months. At the end of the protocol, the maximum physical capacity (MPC) was evaluated by the maximum treadmill running test. The ventricle was used for the analysis of redox balance and mitochondrial function, and the weight of adipose tissue deposits and carcass were used to determine body composition. This study was approved by the CEUA of the IMS/UFBA (n° 088/2020). Compared to the SED, both training protocols were effective in increasing MPC (SED: 144.5±7.21; LIN:302.0±39.56; POL:312.4±50.61, P<0.05) and lean mass (SED: 216.4±6.95; LIN: 263.5±13.77; POL: 258.1±26.29, P<0.05), as well as, decreasing the adiposity index (SED: 3.54±0.41; LIN: 2.08±0.38; POL: 1.88±0.2, P<0.05). Both training protocols also determined lower levels of TBARS (SED: 7.22±1.37; LIN: 2.45±0.99; POL: 2.03±0.81, P<0.05), nitrites (SED: 8.86±1.70; LIN: 5.95±0.66; POL: 6.55±0.76, P<0.05) and carbonyl proteins (SED:4.95±0.42; LIN: 3.00±0.78; POL: 1.76±0.86, P<0.05), in addition to an increase in activity of GPx (SED: 0.37±0.04; LIN: 0.49±0.05; POL: 0.60±0.04, P<0.05) and citrate synthase (SED: 8.26±2.25; LIN: 12.19±0.32; POL: 13.98±4.21, P<0.05), when compared to SED. Additionally, POL showed a lower concentration of carbonyl proteins and higher GPx activity compared to LIN. Thus, 4 months of training promoted redox balance improvement, reduction of oxidative stress markers, and increased antioxidant defense and mitochondrial function in the cardiac ventricle. In addition, POL training promoted better results for carbonyl proteins and GPx enzyme activity.

ID: 11185

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 DIFFERENTIAL EFFECTS OF HIGH-INTENSITY INTERVAL TRAINING ON EXPRESSION OF INFLAMMATORY CYTOKINES IN WISTAR FEMALE RATS WITH CISPLATIN-INDUCED HEPATOTOXICITY

Cisplatin (CP) is a highly effective antitumor drug, but its lack of selectivity causes diverse cytotoxic effects, including hepatotoxicity. Hepatotoxic effects of cisplatin are associated with an imbalance of inflammatory cytokines. So, the aim was to compare the effects of high-intensity interval training (HIIT) with continuous lowto-moderate-intensity training (LIT) on inflammatory cytokines gene expressions in rats with CP-induced hepatotoxicity. Female Wistar rats with 10 weeks old and 190–220g, were divided into four groups (n=7): control and sedentary (C+S); CP and sedentary (CP+S); CP and LIT (CP+LIT) and CP and HIIT (CP+HIIT). After 8 weeks of treadmill running, the rats received an injection of CP (5 mg/kg), and 7 days later, they were euthanized and the liver was collected for analysis of TNF- α , IL-6, IL-1 β , and IL-10 gene expressions by real-time PCR (fold change). This study was approved by the Ethics Committee in Animal Experimentation of the UFBA/IMSprotocol 056.2018. Our results demonstrate that all CP-treated groups showed increased expression of TNF- α and IL-6 compared to C+S (0.9 \pm 0.4; 1.0 \pm 0.4, respectively) (p<0.05), however, HIIT was able to attenuate this effect in CP+HIIT (1.2 \pm 0.1; 1.5 \pm 0.1, respectively) when compared to CP+S (1.9 \pm 0.2; 2.5 \pm 0.3, respectively) and CP+LIT (1.6 \pm 0.1; 2.1 \pm 0.3, respectively) groups (p<0.05). Only the CP+S (2.2 \pm 0.2) and CP+LIT (1.9 \pm 0.2) groups showed an increase in IL-1 β expression compared to the C+S (0.8 \pm 0.4) group (p<0.05), while HIIT was able to prevent this effect in the CP+HIIT (1.1 \pm 0.1) group compared to the others (p<0.05). All groups CP-treated showed increased expression of IL-10 compared to C+S (1.0 \pm 0.4) (p<0.05), however, this increase was even more expressive in the CP+HIIT (4.1 \pm 0.2) group compared to the others (CP+S: 3.0 \pm 0.4; CP+LIT: 3.2 \pm 0.4) (p<0.05). In conclusion, only HIIT was able to exert hepatoprotective effects, beneficiallymodulating the local expression of inflammatory cytokines in this experimental model.

ID: 10965

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 EFFECT OF HIGH-INTENSITY INTERVAL TRAINING ON THE LIPID PROFILE OF OBESE RATS OF DIFFERENT AGES

An imbalance between caloric intake and energy expenditure results in excessive storage of corporal fat, often resulting in overweight or obesity. This imbalance often produces an altered lipid profile characterized by high triglycerides (TG) and cholesterol (COL) serum levels that increases the risk of cardiovascular disease. Furthermore, evidence indicates that high-intensity interval training (HIIT) can effectively decrease plasma concentrations of TG and COL, mainly by reducing the concentration of TG in very low-density lipoprotein, when compared to conventional continuous moderate-intensity exercise. Therefore, this study aimed to evaluate plasma levels of TG and cholesterol in obese rats of 7 and 9 months of age submitted to HIIT. For this, Middle-aged (7 e 9-month-old) male Wistar rats control or High Fat Diet (HFD) (trained control group and HFD trained group) were submitted to 8 weeks of HIIT treadmill training. This study was previously approved by the Animal Use Ethics Committee of the State University of Maringá n° 5230050620. After the experimental period, the animals were euthanized, and Blood samples were collected from the inferior vein cava and plasma was processed. The data show that HIIT reduced COL levels in the trained-control 9 ($64,880 \pm 7,316$) and HFD-trained 9 ($101,315 \pm 16,142$) groups in relation to their sedentary ($89,211 \pm 10,317$ and $128,460 \pm 18,684$ respectively) and TG in the trained-control groups 9 ($70,083 \pm 3,121$), HFD-trained 9 ($84,429 \pm 12,435$) and just HFD-trained 7 ($80,250 \pm 11,255$) in relation to their sedentary subjects ($88,833 \pm 5,811$, $97,750 \pm 4,907$, $101,667 \pm 4,896$ respectively). In conclusion, HIIT is able to reduce COL and TG levels mainly in the 9-month-old groups, and only TG reduction in the 7-month hfdtrained group. However, blunted results were found, suggesting that age may interfere with the reduction of these parameters.

ID: 10902

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 EFFECTS IN ATRIAL NATRIURETIC PEPTIDE GRANULES OF AQUATIC TRAINING IN MENOPAUSE EXPERIMENTAL MODEL

The atrial natriuretic peptide (ANPs) granules are responsible for vasodilation, natriuresis, and regulation of the renin-angiotensin-aldosterone system. ANPs granules are located in the highest incidence in the anterior surface of the left atrium, one heart chamber. This study aimed to investigate the morphological characteristics of ANPs granules of the left atrium of the menopause model in elderly rats submitted to the aquatic training protocol. Twenty female Wistar rats (18 months old) are divided into 4 four groups: Sedentary (SG); Training (TG); Ovariectomy (OG) and Ovariectomy/Training Group (OTG). For the GO and GOT groups, the surgical procedure of ovariectomy (ovaries removal bilaterally) was performed. For the GT and GOT groups, the aquatic training protocol was performed for 20 sessions for 60 minutes each (Ethic committee for animal use - CEUA n°4259). For morphometric analysis were obtained ANPs granules images through the transmission electron microscopy technique. The morphometric analyzes were performed for the area, perimeter, diameter, and distance variables using ImageJ® software. For statistical analysis, all the data do not pass the normality test and are established as non-parametric data, therefore Kruskal-Wallis test was used with Dunn's post-roc ($p < 0.05$). Morphometric results reveal lower values for the area, perimeter, and diameter of ANPs granules for OG to SG ($p < 0.05$), and higher values of TG compared to the SG ($p < 0.05$). Meanwhile, the OG presented higher values in comparison to the OTG ($p < 0.05$). In the distance between the ANPs granules, lower values were observed in the OG compared to the SG ($p = 0.0212$). While the OG presented higher values in comparison to the OTG ($p < 0.0001$). Were concluded that the menopause model (ovariectomy), physical exercise, and their association, promote adaptations in the morphology of the granules.

ID: 11003

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 EFFECTS OF CHRONIC NORMOBARIC HYPOXIA ON TEMPERATURES OF THE DIFFERENT BODY REGION AFTER EXHAUSTIVE EXERCISE IN RUNNING MICE

Chronic exposure to high altitudes can lead to enhanced aerobic exercise tolerance. However, there is a gap in exercise-induced hyperthermia responses to hypoxia exposure. We investigated the effects of living in normobaric normoxia (NOR) or hypoxia (HYP) on specific body regions temperatures (T, °C) of mice exercising until exhaustion (t_{lim}) at individual critical velocity (CV) intensities (Ethical Approval-CEUA, #5509-1). Thus, male C57BL/6J mice (150 days old, weight ~30g), were separated in NOR (n=10) or HYP (n=10). HYP mice were kept 18 hours a day (from 12pm to 6am) in a tent (CAT, USA), exposed to an inspired O₂ fraction of 14.5% (simulating 3,000m). NOR mice were maintained at all time in normoxia and both group were handling and tested in this condition. After 8 weeks, the mice ran on a treadmill at CV intensity, considered the upper limit of the heavy-intensity domain. Thermal images (FLIR ONE Pro) of the tail (t), head (h) and back (b) were obtained at rest and after exhaustion, determining the mean temperatures. NOR-mice had lower CV than HYPmice (17.7±0.7 and 20.3±0.9 m.min⁻¹, respectively), suggesting, as expected, that hypoxia alone increased aerobic capacity (t=-2.3; P=0.03). There was no difference between NOR (1785.4±206.6s) and HYP (2005.2±273.2s) groups regarding t_{lim} (t=-0.6; P=0.49). In both groups, the T tail at exhaustion (NOR:33.1±0.8; HYP: 32.8±0.6) was significantly higher than at rest (NOR:28.2±0.5; HYP: 28.8±0.6). However, the temperatures of regions h and b increased significantly only in NOR-mice at exhaustion (h: 35.2±0.2; b: 34.5±0.2), when compared at rest (h: 32.8±0.2; b: 32.2±0.1). In contrast, there was no difference in T between rest condition (h: 33.3±0.3; b: 33.0±0.3) and exhaustion (h: 33.7±0.5; b: 33.1±0.4) for HYP-mice. Thus, exhaustive exercise at CV intensity showed differences in T responses among body regions in NOR and HYP environments. More studies will be carried out to elucidate this.

ID: 11115

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 EFFECTS OF DIFFERENT RESISTANCE TRAINING INTENSITIES DURING PREGNANCY ON FETAL GROWTH

Physical exercise during pregnancy can impact maternal health and fetal growth and development, but little is known about the repercussions of resistance training on this period. The aim of this study was to evaluate the effects of different intensities of resistance training (RT) during pregnancy on fetal growth. Female Wistar rats, weighted 180-220g, aged 60-70 days, were divided into five groups: Control (C, n=7), Maximum Load (ML, n=6), Constant-Intensity Training (CIT, n=8), Variable-Intensity Training (VIT, n=7) and Decreasing-Intensity Training (DIT, n=7). Before pregnancy, the resistance training (RT) was performed in ladder climbing (5 sessions/week; 80% of the maximum load carried (MLC)). In pregnancy, the intensity of RT was adjusted by % MLC in weeks of pregnancy, CIT maintained 80%, DIT reduced to 50% only in the third week and VIT reduced intensity to 50% in the first and third week (Ethics approval Protocol: 0059/2018). At 20th day of pregnancy, female rats were killed and all placentas and fetuses were collected for analysis. Fetal growth was assessed by morphometric measurements, fetal growth index and placental efficiency. Data are presented as mean±SEM and analysed by two-way ANOVA and Tukey's post hoc test; p<0.05 considered significant. The DIT promoted a lower fetal weight of male and female compared to CIT and C respectively (DIT, male: 2.69±0.16; female: 2.31±0.20; CIT, male: 3.94±0.33; C, female: 4.11±0.45 in g, p<0.05) and female fetuses showed body length compared to CIT (DIT: 40.16±1.39; CIT: 45.64±1.43 in mm, p<0.05) and lower placental efficiency compared to C, ML and CIT (DIT: 3.84±0.28; C: 6.99±0.75; ML: 5.99±0.34; CIT: 6.28±0.28, P<0.05). These results are probably associated with alterations in the placenta and/or in the fetal blood flow. In conclusion, the training program of the CIT and VIT group seems to be considered safe for fetal growth, while from the DIT group, could adversely affect fetal growth.

ID: 11082

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 EFFECTS OF INSPIRATORY MUSCLES WARM-UP ON THE TEMPERATURE IN DIFFERENT AREAS OF THE BODY AND ON THE NUMBER OF STROKES IN TETHERED SWIMMING

The warm-up is an important strategy to provide many physiological benefits, like increased body temperature and improving performance for subsequent effort. In swimming, the respiratory muscles are highly recruited and it has already been reported in the literature that the inspiratory muscles warm-up (IMWU) can enhance the performance during a short swimming effort. However, there is a gap in the effects of IMWU on the temperature in different areas of the skin and on performance in tethered swimming. Thus, we investigated the effects of IMWU on chest (CT) and face (FT) temperatures skin after a warm-up swim (WU) and 30s all-out (AO30), and the number of strokes (SN) during an AO30 in tethered swimming. Ten young swimmers (n=5 men and n=5 women, 16±0 years, regional level) were submitted to 3 evaluation sessions (CAAE: 39132120.2.0000.5404). Firstly, the measurement of the maximum inspiratory pressure (MIP) and familiarization with the equipments were performed. In the subsequent sessions, the participants were randomly submitted to the AO30 preceded or not by IMWU with a load equivalent to 40% of the MIP. Thermographic (TMG) recordings (FLIR One Pro) and stroke counting were conducted in both sessions. Our results did not reveal the IMWU effects on the SN (without 48±3 and with 49±3) and TMG, as well as the interaction at different moments on the skin temperature in both conditions. Mean results of temperature for CT without or with IMWU, respectively, were 36.3±1.4°C and 36.3±1.6°C at rest, 32.5±2°C and 32.5±1.9°C after WU, 32.5±1.7°C and 32.7±2°C after AO30 (p=0.833). For FT, we observed 36.4±1.6°C and 36.6±1.2°C at rest, 34.4±1.6°C and 34.2±1.5°C after WU and 35.1±1.4°C and 35±0.9°C after AO30 (p=0.990). We concluded that the IMWU using 40% MIP was not able to change the temperature of the CT and FT after WU and AO30, and this respiratory strategy did not modify the stroke number during 30s all-out in tethered swimming.

ID: 11125

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 HISTOMORPHOMETRIC ANALYSIS OF THE CARDIORESPIRATORY TISSUE OF RATS WITH PARKINSON'S DISEASE TRAINED WITH HIGH INTENSITY PHYSICAL EXERCISE

Parkinson's Disease (PD) affects the cardiovascular system causing greater left ventricular mass compared to healthy individuals. The present study aims to analyze the histomorphometric alterations of cardiac tissue and respiratory muscles, in addition to the functional performance of rats with PD submitted to TIAI. We used 70 male Wistar rats, 40 days old, divided into groups with Parkinson's (PA) and Sham (SH); subdivided into groups that performed High Intensity Interval Training Before Surgery (TIAIa); TIAI After Surgery (TIAId) and TIAI Before and After Surgery (TIAIad). Physical exercise was performed before and/or after PD induction. The rats performed the exercise, 5 times a week, for 25 minutes/day, for 4 weeks. The functional performance of the animals was evaluated by of false step and parallel bars tests. For morphometric analysis of the heart, the relative weight of the heart, diameter and thickness of the left ventricle were calculated. The histochemistry of the substantia nigra of the midbrain was performed using the Nissl method. Myocardial, diaphragm, intercostal and rectus abdominis muscles were stained with Hematoxylin and Eosin (HE). The histomorphometric study was performed with the Image J program to analyze the cross-sectional area of the muscles and the number of muscle fibers. Data analysis was performed using the GraphPad Prism 9.3 statistical program, one-way ANOVA test, followed by Tukey's post-hoc test ($p < 0.05$). The analysis of the hind legs showed that the trained animals showed improvement in functional performance compared to the animals in the sedentary group. The relationship between the body weight, heart weight and number of cardiomyocytes showed no significant difference in PA and SH trained animals. It was observed that in the diaphragm, intercostal and rectus abdominis muscles there was no difference in the cross-sectional area between the PA and SH trained groups, but larger areas than the sedentary groups. The TIAI provided hypertrophy of the respiratory muscles and left ventricle of the heart, in addition to improving the functional performance of the hind legs of animals with PD.

ID: 11163

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 IMPACT OF THE RESISTANCE TRAINING IN MUSCLE OXIDANT ENVIRONMENT IN A MODEL OF DIET-INDUCED OBESITY

Physical training reduces obesity by increasing fat oxidation. At high intensities, it leads to an increase in ROS production. NRF2 is a regulator protein of the antioxidant response and redox homeostasis genes, negatively modulating the expression of pro-inflammatory mediators, and acting on lipid metabolism and enzyme regulation genes. We aimed to investigate the effects of resistance training (RT) on NRF2 protein levels in the soleus muscle of rats with obesity induced by a high-calorie diet (HD). The study was approved by the local Ethics Committee in Animal Use. The rats were divided into 4 groups: Sedentary Control (SC), Exercised Control (EC), Obese Control (OC), and Exercised Obese (EO). SC and EC groups were fed with standard chow. OC and OE were fed with standard chow plus a high-calorie cafeteria diet. RT was performed on a ladder with an 80° inclination starting with 50% of the Maximal load (ML), with an increase of load every 2 weeks until 100% of ML for 12 weeks. The rats were anesthetized for euthanasia and removal of the muscle (SM) and blood. Muscle samples were plotted on an SDS-PAGE, and immunoblotting for quantification of NRF2 protein was performed. HD provoked obesity with an increase in the body weight and fat mass ($P < 0.05$ vs SC and EC), elevated glycemia and triglyceridemia ($P < 0.05$ vs SC and EC), and reduced NRF2 protein levels in the SM ($P < 0.05$ vs EC) of the OC rats. On the other hand, RT reduced body weight ($P < 0.05$ vs OC) due to the reduction of the fat mass ($P < 0.05$ vs SC and OC), reduced glycemia, and triglyceridemia. RT provoked an increase in NRF2 protein expression in eutrophic rats ($P < 0.005$ vs SC), without changing NRF2 levels in OE rats. We concluded that RT positively modulates NRF2 expression in eutrophic rats, suggesting improvement of the oxidant environment in the oxidative muscle. However, in diet-induced obese rats, there is likely a greater environmental oxidative stress in the muscle, surpassing the effectiveness of the answer to the RT.

ID: 10952

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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Instituição: Universidade Estadual de Campinas

FeSBE2022 LIGATURE-INDUCED PERIODONTAL DISEASE IN MICE AND THE EFFECT OF VOLUNTARY PHYSICAL ACTIVITY

The emergence of inflammatory conditions by bacterial action may lead to the involvement of periodontal disease (PD) affecting teeth support tissues. On the other hand, increased immune function; cytokine control and anti-inflammatory effect caused by physical activity could positively influence a lower PD propensity. Thus, the objective of the study was to understand the relationship between voluntary physical activity and the evolution of PD in mice, as well the influence of PD on the search behavior for voluntary physical activity. 32 adult/male C57BL6 mice were divided into groups; Control (C); Voluntary Physical Activity (AFV); Periodontal disease (PD) and periodontal disease and voluntary physical activity (PD/AFV) (CEUA Protocol: 058/18). Over the course of 30 days, was analyzed the behavior of mice in the free activity wheel of AFV, PD/AFV groups, however on the 15th day of the protocol PD and PD/AFV groups were induced to PD through the Lique Protocol (wire of nylon allocated around the top second molars). After the period the mice were euthanized and removed the tissues for later analysis, using the real-time polymerase chain reaction (PCR) technique, genes involved in local inflammatory response (IL-1 β , IL-6 and TNF- α cytokines), (RANKL-Kappa B Nuclear Factor Activator Receiver Lagn. The voluntary activity level was measured by the number turns, average speed/minute speed and inactivity periods. Two-way ANOVA was used, followed by Bonferroni Post Hoc test ($p < 0.05$). PD induction was proven by A higher expression of IL-1 β , IL-6 and TNF- α and Rankl. In contrast after induction to PD, the PD/AFV group reduced the average speed and total volume of laps, as well as longer inactivity in the night periods and daytime, when compared to the group AFV. Therefore, it is concluded that AFV has a protective effect against inflammation caused by PD, but the PD reduces voluntary physical activity, probably via modulation of hypothalamic genes.

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ID: 11009

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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Instituição: Universidade Federal da Bahia

FeSBE2022 LINEAR AND POLARIZED AEROBIC TRAINING HAS SIMILAR EFFECTS ON REDOX BALANCE PARAMETERS IN AN ANIMAL MODEL

The practice of physical exercise provides adaptations at the cellular and systemic level that impact on the improvement of metabolic parameters such as increased activity of antioxidant enzymes, promoting benefits in the redox balance, through the neutralization of pro-oxidative markers, such as lipid peroxidation and carbonyl proteins. This study aimed to evaluate the effects of linear and polarized training on redox balance parameters in male Wistar rats. For this, 18 Wistar rats (Age: 4 months, 300-350g) were used, divided into 3 experimental groups (6/group): Sedentary (Sed), Linear Training (LT) and Polarized Training (PT). Approbation CEUA: 088/2020. Lipid peroxidation was evaluated by measuring thiobarbituric acid reactive substances (TBARS), carbonyl protein concentrations, immunostaining of the enzyme glutathione peroxidase (GPx) and the activity of citrate synthase and GPx enzymes in pancreatic tissue. Linear and polarized training determined lower levels of TBARS (SED:3.093±0.6404; TL:0.8802±0.5707; TP:1.146±0.4380, p<0.05) and carbonyl proteins (SED:4.399±1.505; TL:1.609±0.7472; TP:1.200±0.7068, p=0.05), increased activity (SED:0.1243±0.03952; TL:0.4927±0.05489; TP:0.5095±0.04269,p<0.05) and immunostaining (SED:1.543±0.3332; TL:3.392±1.461; TP:3.574±1.318, p<0,05) of the antioxidant enzyme GPx, as well as higher citrate synthase enzymatic activity (SED:1.543±0.3332; TL:3.392±1.461; TP:3.574±1.318, p=0.05). These results suggest that although aerobic exercise is associated with oxidative responses, which affect the formation of TBARS and protein carbonylation, the benefits regarding the activity of antioxidant defenses and mitochondrial function, represented by increased activity and immunostaining of GPx, and activity of citrate synthase, were superior, resulting in an improvement in redox balance, regardless of the training modality, as both promoted an improvement in the parameters of redox balance in the pancreatic parenchyma of the animals.

ID: 11216

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 LPS-INDUCED EXPERIMENTAL PERIODONTITIS AND DECREASES VOLUNTARY PHYSICAL ACTIVITY IN MALE MICE

Periodontal disease is the result of infection and inflammation of periodontal tissue and lipopolysaccharide (LPS) is a component of the outer membrane of gram-negative bacteria and plays a critical role in the pathogenesis of periodontitis (PD). The practice of physical activity is important for maintaining health and capable of assisting in the body's immune/inflammatory response. Here we aimed to investigate the effects of an experimental periodontitis induction with LPS in the voluntary physical activity in mice. Balb/c male mice 8 weeks age, \pm 22 g weight body were randomized into two groups (n=8 per group) (CEUA/UFLA Protocol: 058/18): voluntary physical activity + LPS-induced periodontitis (AFV/LPS) and voluntary physical activity + saline control (AFV/Sal). AFV/LPS and AFV/Sal groups were submitted to a 30-day free access to a running wheel. AFV/LPS group received an injection of LPS (25 μ g/mouse, dissolved in 20 μ L of saline) and AFV/Sal group received saline (20 μ L) into the interproximal gingiva in the midline of the maxillary first molar (maxilla), every three days. At the end experimental protocol, left hemimaxillae were extracted to evaluate the degrees of alveolar bone resorption through histomorphometry (ImageJ). Statistical analyses were compared using Student's t test or two-way ANOVA and p value <0.05 was considered statistically significant. According to our results, there was no difference in weight gain (p=0.755), accumulated weight gain (p=0.741) and food intake (p=0.117) AFV/Sal vs. AFV/LPS. AFV/LPS mice were reduction in the total volume of physical activity compared to its controls AFV/Sal (p=0.001) and increased alveolar bone resorption (p<0.001), an important marker of PD. Together, our data demonstrated that LPS treatment was able to reduce voluntary physical activity and increase alveolar bone resorption, even without changes in body weight and food intake.

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Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 MODERATE AEROBIC EXERCISE IMPROVES ANTIOXIDANT DEFENSES IN FEMALE RATS WITH CISPLATIN-INDUCED HEPATOTOXICITY

The antineoplastic drug cisplatin (CP) is associated with cytotoxic adverse effects, such as hepatotoxicity. Oxidative stress is one of the mechanisms involved in histological and functional changes induced by CP in liver tissue. We compared the impact of low and (LIT) and moderate (MIT) intensity training on hepatic structural and functional alterations, lipid peroxidation, and antioxidant enzyme expressions in female Wistar rats, weight 190-220g and 10 weeks old. Female rats were divided into four groups (n=7): control and sedentary (C+S); CP and sedentary (CP+S); CP and LIT (CP+LIT) and CP and MIT (CP+MIT). At the end of 8 weeks of treadmill running, the rats received an injection of CP (5 mg/kg), and 7 days later, they were euthanized to collect samples of blood and liver tissue. This study was approved by the Ethics Committee in Animal Experimentation of the UFBA/IMS (protocol 056.2018). Histopathological analysis (score) showed more intense microvesicular changes and edema in CP+S (1.9±0.6) compared to the C+S (0.7±0.8) group (p<0.05), while LIT (1.3±0.4) and MIT (1.1±0.5) attenuated these injuries. There were increases in TBARS (µM/mg) and bilirubin (mg/dL) levels only in CP+S (0.6±0.2; 0.08±0.04, respectively) compared to C+S (0.4±0.1; 0.03±0.03, respectively), while both LIT (0.3±0.1; 0.02±0.01, respectively) e MIT (0.4±0.1; 0.02±0.01, respectively) prevented this effect (p<0.05). There was an increase in heme oxygenase-1 (HO-1) immunostaining (%) in CP+S (12.2±3.5) than in the C+S (4.6±1.8) group (p<0.05), but this increase was even more intense in CP+MIT (16.4±6.1) (p<0.05). All groups treated with CP showed increased catalase enzyme activity (U/mg) compared to C+S (7.4±2.5) (p<0.05), however, this effect was more intense in CP+MIT (16.3±1.9) compared to CP+S (11.7±4.0) (p<0.05). In conclusion, MIT appears to provide superior hepatoprotection than LIT by reducing lipid peroxidation and increasing antioxidant enzymes.

ID: 10981

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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Instituição: Universidade Federal da Bahia

FeSBE2022 MODULATION OF MUSCLE GENE EXPRESSION ASSOCIATED WITH INFLAMMATION, OXIDATIVE STRESS, AND PROTEIN METABOLISM IN RESPONSE TO THERAPEUTIC OR LIFELONG TRAINING IN AN AGING AND HIGH-FAT DIET-INDUCED OBESITY RAT MODEL

Aging and obesity are associated with muscle morphofunctional impairment. This study aimed to evaluate the therapeutic and lifelong effects of training on muscle gene expression associated with inflammation, oxidative stress, and protein metabolism in an aging and high-fat diet-induced obesity rat model. thirty-two male Wistar rats (300-350g, initial age=4 months, final age=14 months) were allocated into 4 aging groups (8/group): sedentary (ASed), sedentary + high-fat diet (HFD) (ASed+HFD), therapeutically trained + HFD (ATT+HFD) and lifelong trained + HFD (ALT+HFD). Animals trained in a treadmill, at moderate intensity for 60 min, and in alternate days. The gastrocnemius was used for fiber crosssectional area (CSA) analysis, and expression of pro-inflammatory (TNF- α and IL-6), antiinflammatory (IL-10), antioxidant capacity (NRF2, SOD1, Catalase, GPx1, HO-1, and Klotho), protein synthesis (Akt and PI3K) and proteolysis (MURF1 and Atrogin1) genes. The study was approved by the CEUA of the IMS-UFBA (Protocol: X 079/2020). Comparisons between ASed and ASed+HFD groups were made using Student's t test. Analyzes between ASed+HFD and trained groups were performed using One-Way ANOVA. ASed+HFD, compared to ASed, showed decreased CSA, and downregulation of IL-10, SOD1, Catalase, GPX1, Klotho, Akt and PI3K. In addition, the high-fat diet caused upregulation of TNF- α , IL-6, MURF1, and Atrogin1 gene expression (ASed vs ASed+HFD, $P<0.05$). Both trainings were effective in reversing the alterations in the CSA and gene expression caused by obesity (ASed+HFD vs ATT+HFD and ALT+HFD, $P<0.05$). Furthermore, the ALT+HFD group presented the highest values for CSA, and gene expression of IL-10, GPX1, Klotho, Akt and PI3K (ASed+HFD vs ATT+HFD vs ALT+HFD, $P<0.05$). Thus, both trainings protected the muscle against the reduction in CSA, and improved the inflammation, redox and protein metabolism related genes expression, and the best effects were observed in the lifelong trained group.

ID: 11055

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 NEITHER SHORT-TERM SPRINT INTERVAL TRAINING NOR SUPPLEMENTATION WITH SACCHAROMYCES BOULARDII NOR THEIR COMBINATION IMPROVES MAXIMUM AEROBIC POWER IN HEALTHY INDIVIDUALS

Evidence indicates that sprint interval training (SIT) effectively increases the peak rate of aerobic consumption (VO₂PEAK). In addition, evidence from an animal study indicates that a 10-day supplementation with *Saccharomyces boulardii* (Sb), a yeast probiotic, improves the maximal aerobic speed attained by untrained rats. However, it is still unknown whether Sb supplementation is also effective in humans and has additive effects on training. Therefore, this study investigated the effects of SIT, Sb supplementation, and their combination on the VO₂PEAK of untrained, healthy individuals. Thirty-one participants (24 men and 7 women) were divided into four groups: placebo without training (NT-PLA, n=8), placebo and training (T-PLA, n=8), supplementation without training (NT-Sb, n=8), and supplementation and training (T-Sb, n=7). The participants ingested 19 probiotic capsules (at least 1 x 10⁹ cells of Sb per capsule) or 19 PLA capsules (100 mg of magnesium stearate and 100 mg of lactose); they ingested one capsule per day. The short-term SIT consisted of 6 sessions over two weeks; the participants performed all-out 30-second sprints interspersed with a 4-minute recovery in each session. Before and after the intervention, they were subjected to incremental tests on a cycle ergometer until fatigue. Gas exchange was measured through open-circuit indirect calorimetry. During the training sessions, there were significant increases in the peak power attained in the sprints. At the post-intervention period, the VO₂PEAK was not improved by SIT (absolute change from baseline: T-PLA: 0.3 ± 3.8 vs. NT-PLA: -1.6 ± 3.8 mL O₂.kg⁻¹.min⁻¹), supplementation (NT-Sb: -0.2 ± 3.1 mL O₂.kg⁻¹.min⁻¹), or their combination (T-Sb: 0.3 ± 3.9 mL O₂.kg⁻¹.min⁻¹). In conclusion, neither SIT nor Sb supplementation nor their combination improves VO₂PEAK in healthy individuals under the present conditions. Further, the current findings failed to translate data obtained from rats to human physiology.

ID: 10963

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 OBESITY INTERFERES IN MUSCLE HYPERTROPHY IN MIDDLE-AGED RATS UNDERGOING HIIT TRAINING

The main cause of obesity is an energy imbalance between the intake of excess calories, often from a high-fat diet, and the expenditure of calories. Under obesogenic conditions, lipids accumulate in various tissues and organs, such skeletal muscles. In fact, obesity correlates with increased intramyocellular lipids and may also interfere leading to deregulation of mitochondrial biogenesis and muscular protein synthesis. Taken together, diets with a high amount of fatty acids appear to be important for the development and progression of an excessive loss of muscle mass. Additionally, the High Intensity Interval Training (HIIT), increase the oxidative capacity of skeletal muscles, resulting in increased aerobic capacity. The aim of this study was to evaluate the cross-sectional area (CSA) in the soleus muscle of obese rats submitted to HIIT training. For this, Middle-aged (7 e 9- month-old) male Wistar rats control or High Fat Diet (HFD) (trained control group and HFD trained group) were submitted to 8 weeks of HIIT treadmill training. This study was previously approved by the Animal Use Ethics Committee of the State University of Maringá nº 5230050620. After the experimental period, the animals were euthanized, and soleus muscle where collected and and subjected to routine histological processing. Data obtained by the three-way ANOVA showed a significant difference for the effect of Training, where the trained-control 7 and 9 months (1147 ± 233.6 and 1142 ± 109.9 respectively) and HFD-trained groups of 7 and 9 months (858.1 ± 91.65 and 924 ± 155.7 respectively), had a greater CSA (μm^2) in relation to sedentary control groups 7 and 9 (653 ± 107.8 and 687.3 ± 87.86 respectively) and HFD-sedentary ($622,3\pm 80,32$ and 668.4 ± 90.48 respectively). Furthermore, Diet versus Training effects observed, where the both HFD-trained had a smaller CSA compared to the trained-controls. The HIIT training provided muscle hypertrophy in all trained groups, however obesity can interfere this parameter.

ID: 11180

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 OVERLOAD SWIMMING TRAINING INDUCE ANXIETY BEHAVIOR IN FEMALE RATS

Considering the need to study physical activity as a treatment to obesity on animal models, the overload swimming training (OS) is successfully applied. However, it may not mimic physical activity in the same way it is practiced by humans, as it can be stressful for the rats. The objective of this work was to evaluate if OS could cause anxiety behavior on obese female rats. Female Wistar rats (21 days old, 25-35g, n=11/group, UEPG ethics committee approval n° 349197/2020) were grouped as: Chow-fed sedentary (CS); Chow-fed exercised (CE); Cafeteria Diet-fed sedentary (DS) and Cafeteria Diet-fed exercised (DE). CS and CE groups were fed commercial rat chow and water, but DS and DE had hyper-caloric ultraprocessed food added to the cage grid. Diets started at 31 days of life. One week earlier, CE and DE rats started the OS, (water at 32° C, 45 min/ 5 days/ week/ 60 days), with a load overload of 5% body weight. All rats were then submitted to the elevated plus maze (EPM) and to the open field test (OFT), accessing anxiety-like behavior and motor activity, respectively. Mesenteric, retroperitoneal and periovarian fats were collected after death by thiopental excess, summed and compared as g/100g body weight. Using Two-Way ANOVA/ Tukey's pos-hoc test, data were considered different if $p \leq 0,05$. Compared to CS (100%), CE and DS showed similar behavior on the EPM, but DE rats spent less time on the open arms ($74.8\% \pm 29.2$) than DS ($126.52\% \pm 52.3$). Time spent on enclosed arms was similar, (exercise factor $p= 0,08$, CE: 116.4 ± 11.6 ; DE: $107.8\% \pm 26.7$; DS: $93.5\% \pm 39.1$). There were no differences of ambulation on the OFT, suggesting no motor alterations. OS reduced body fat stocks (RS: 4.2 ± 1.1 g/100g; CS: $9.8 \pm 2,5$; CE: 6.3 ± 2.4 g/100g). These results indicate that the OS reduced obesity markers that were increased by cafeteria diet, but also was anxiogenic. OS may induce a chronic stress that should be considered during the interpretation of its anti-obesity effect.

ID: 11264

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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Instituição: UFBA

FeSBE2022 PREVENTIVE EXERCISE IMPROVES LIVER ENZYME LEVELS AND LIPID PEROXIDATION IN FEMALE RATS WITH TYPE 1 DIABETES MELLITUS.

Type 1 diabetes mellitus (T1DM) induces fibrosis, changes in liver enzymes and structure associated with increased oxidative stress. This study investigated the effects of two moderate exercise protocols on serum liver enzyme levels and oxidative stress in female rats with DM1. Thirty female Wistar rats, weighing between 200 and 250 g, were divided into five groups (n=6/each): sedentary control (SC), trained control (TC), sedentary diabetic (SD), trained diabetic (TD) and previously trained diabetic (PTD). Only the PTD group was submitted to 4 weeks of exercise before the induction of diabetes. After that, diabetes was induced in the SD, TD, and PTD groups with streptozotocin (40mg/kg, iv) and PTD and TD groups were submitted to 8 weeks of exercise. The TC group was also submitted to 8 weeks of exercise after administration of citrate (0.1 M, iv). This study was approved by the CEUA/IMS/UFBA (protocol 052/2017). Our results show that both exercise protocols reduced serum levels of liver ALT (Alanine Aminotransferase) enzymes (64.8 ± 34.02 ; 37.17 ± 32.57) in relation to DS group (286.6 ± 34.02), $p<0.001$, respectively. However, only exercise initiated before diabetes induction prevented the high levels of AST (Aspartate Aminotransferase) (126.8 ± 66.48), GGT (Gama Glutamyl Transferase) (2.200 ± 5.99) and ALP (Alkaline Phosphatase) (112.0 ± 214.9) enzymes in the DPT group compared to DS (343.6 ± 66.48 ; 21.20 ± 5.99 ; 948.0 ± 214.9), $p<0.05$, respectively. The exercise reduced the levels of TBARS in the liver tissue of female rats in the DT (0.738 ± 0.19) and DPT (1.012 ± 0.19) groups in relation to DS group (1.179 ± 0.19), $p<0.05$. In conclusion, this study demonstrates that the exercise, especially when initiated previously to induction of diabetes, improved serum levels of liver enzymes and lipid peroxidation in hepatic tissue of female rats with DM1.

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Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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**FeSBE2022 PROTECTIVE EFFECT OF EXERCISE TRAINING ON REDOX STATUS
IN THE HIPPOCAMPUS OF OVARIECTOMIZED RATS WITH TYPE 1 DIABETES
MELLITUS**

Type 1 diabetes mellitus (T1DM) and postmenopausal period lead to neuropathological changes associated with increased production of reactive oxygen species. The effect of exercise on diabetes-induced changes in redox status has been reported more frequently in T2DM. In addition, there are few studies investigating these effects in ovariectomized rats. Therefore, the present study investigated the effects of moderate intensity exercise on lipid peroxidation, markers of oxidative damage and activity of antioxidant enzymes in the hippocampus of ovariectomized rats with T1DM. Twelve-week-old female Wistar rats, weighing 180-200g, were divided into two groups (n=6/each): Sedentary Diabetic Ovariectomized (DSO) and Trained Diabetic Ovariectomized (DTO). The animals underwent bilateral ovariectomy surgery and T1DM was induced by a single intravenous injection of streptozotocin (40 mg/kg, iv). After confirming of diabetes, the DTO group was submitted to treadmill running for 8 weeks. The experiments were approved by the Ethics Committee on Animal Experimentation of IMS/CAT/UFBA (Protocol 087/2020). The hippocampus was removed for oxidative stress studies. Our data show that exercise improved TBARS levels, total nitrites and protein carbonylation in the hippocampus of the DTO group (1.664 ± 0.1694 ; 1.670 ± 0.2016 ; 1.565 ± 0.1239) in relation to DSO group (8.806 ± 0.4588 ; 5.622 ± 0.7178 ; 2.953 ± 0.4159), $p < 0.001$; $p < 0.01$; $p < 0.05$, respectively. The levels of antioxidant enzymes, CAT, SOD and GSH-Px were statistically increased in DTO animals (1.633 ± 0.3347 ; 8.518 ± 0.7878 ; 0.1490 ± 0.01055) compared to DSO (0.5387 ± 0.1121 ; 6.326 ± 0.4985 ; $0.02814 \pm 0.02814 \pm 0.02814$), $p < 0.05$; $p < 0.05$; $p < 0.001$, respectively. In conclusion, our study demonstrate that the moderate aerobic exercise preserved redox status by increasing antioxidant enzymes and reducing oxidative stress in the hippocampus of ovariectomized rats with DM1.

ID: 10997

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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FeSBE2022 REPERCUSSIONS OF VERTICAL JUMP IN THE NEUROPLASTICITY OF POSTSYNAPTIC CLEFT AND MYOFIBER TYPE

The vertical jump (VJ) is a functional capacity performed in diverse daily, and sports activities. In addition, the VJ is a foundation that requires rapid strength and muscle endurance and promotes locomotor apparatus adaptation when performed in a periodized protocol. The neuromuscular junction (NMJ) is a region of synapses of the peripheral nervous system that allows muscle contraction and has extensive plasticity associated with hypertrophy models. The NMJ is mainly composed of the axon terminal, the muscle fiber, and the perisynaptic Schwann cells. This study aimed to investigate the neuroplasticity of the postsynaptic cleft and myofiber types after a periodized VJ training. Twenty male Wistar rats (90 days old) were allocated to two groups (n = 10): the control group (CG), not submitted to any procedure; and the vertical jump group (VJG), which was submitted to 12 sessions of VJ protocol with 50% overload of animal body mass (Ethics Committee on the Use of Animals - CEUA n° 1096). After the procedures, we quantified the crosssectional area (CSA) and numerical density of different myofibers types of the gastrocnemius muscle (myofibrillar ATPase - histochemistry); and we performed the morphometric analysis of postsynaptic cleft variables (total and stained area and perimeter, dispersion, fragmentation, and numbers of AChR clusters with α -bungarotoxin immunofluorescence technique). For statistical analysis, unpaired t-tests were used with Welch's post-hoc ($p < 0.05$). The myofiber type presents morphometric results of lower type I CSA in VJG ($p < 0.05$); while revealing a higher density of type I and II fibers ($p < 0.05$), as higher numerical volume to CG ($p < 0.05$). The NMJ-postsynaptic cleft presents a lower AChR perimeter ($p < 0.05$), and no alterations in the Endplate area, perimeter, and dispersion ($p > 0.05$). Whereas the VJG demonstrates a lower number of AChR clusters ($p < 0.005$). Also, the Fragmentation index presents a lower value in the VJG ($p < 0.05$). We concluded that the periodized VJ training reveals the switch of type I to type II predominance, with a compact NMJ morphology.

ID: 10915

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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**FeSBE2022 SKELETAL MUSCLE CELL INTERACTIONS BASED ON
TRANSCRIPTOMIC DATA REVEAL KEY PLAYERS IN EXERCISE TRAINING-
INDUCED ANGIOGENESIS**

Exercise training programs induce distinctive adaptive responses in skeletal muscle during aging. However, the determinants of this response are largely unknown. We investigated cell-cell interactions of the vastus lateralis muscle in response to 12 weeks of high-intensity aerobic interval (HIIT) and resistance (RT) training in young and old individuals. First, we analyzed the RNA-Seq dataset GSE97084, available on the Gene Expression Omnibus (<https://www.ncbi.nlm.nih.gov/geo/>) using the BioJupies platform (<https://maayanlab.cloud/biojupies/>). Next, we identified differentially expressed genes ($\text{Log}_2\text{FC} > 1.5$; $\text{FDR} < 0.05$) between pre- and post-exercise in young (HIIT, $n=11$; RT, $n=10$) and old individuals (HIIT, $n=8$; RT, $n=8$). The up-regulated genes were used to predict interactions of the ligands (L) and receptors (R), based on the literature. Positive L-R interactions (L or R with $\text{FDR} < 0.33$) were selected to perform functional enrichment analysis using Enrichr (<https://maayanlab.cloud/Enrichr/>). Finally, we detected which cells express the selected L and R in skeletal muscle using single-cell data from Tabula Sapiens (<https://tabula-sapiens-portal.ds.czbiohub.org/>). We found that COL1A and COL4A1 from satellite and mesenchymal stem cells interact with ITGA1 from capillary endothelium cells and pericytes. Additionally, in both training protocols, extracellular matrix L-R interactions were more significant in young individuals. These COL1A/COL4A1-ITGA1 interactions in the skeletal muscle microenvironment potentially favor endothelial cell differentiation and proliferation. Thus, our findings point to key targets associated with vasculogenesis in response to exercise training in young individuals.

ID: 11162

Área Temática: Ê-POSTER | Respostas de Treinamento Físico

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Instituição: UFSJ

FeSBE2022 THE EFFECT OF HIGH-INTENSITY PHYSICAL EXERCISE ON NEURONAL DENSITY BEFORE AND AFTER INDUCTION OF PARKINSON'S DISEASE IN RATS

Parkinson's disease (PD) affects dopaminergic neurons located in the pars compacta of the substantia nigra. The practice of resistance physical activity is a non-pharmacological intervention that has been tested in the treatment of PD. Thus, the present study aimed to investigate the effects of high-intensity exercise on neuronal density, before and after the induction of Parkinson's Disease in rats. Eighty Wistar rats were used, distributed as follows: 10 animals trained before PD induction (DP-Exa), 10 trained after PD induction (DPExd); 10 trained before and after PD induction (DP-Exad) and 10 sedentary animals (DP-Sed). The same groups were distributed to the group without PD (Sham). High-intensity physical training was performed on the vertical ladder before and/or after PD induction. It was performed for 5 days/week, 30 to 45 minutes, for 4 weeks. PD induction was performed using the electrolytic lesion model in the coordinates: AP equal to -4.9, ML equal to 1.7 and DV equal to 8.1. The animals motor performance was evaluated at the beginning and at the end of training with false step the test, parallel bars test and open field tests. At the end of the experiment, the brain was removed for histochemistry, staining by the Nissl method, and immunohistochemistry by expression of Glial Fibrillary Acid Protein (GFAP) from the substantia nigra and striatum. The histomorphometric study was performed with the Image J program for counting neurons and astrocytes (GFAP). The GraphPad Prism 9.3 program was used, one-way ANOVA test was performed, followed by Tukey's post-hoc ($p < 0.05$). The analysis showed better performance of the animals that trained compared to the sedentary group, in the parallel bars and open field tests. Data on neuron counts in the striatum, substantia nigra and GFAP in the animals of the DPExa, Sham-Exa, DP-Exad and Sham-Exad groups showed a greater number of neurons and greater number of GFAP positive cells, compared to the groups DP-Exd, Sham-Exd, DP-Sed and Sham-Sed. It is concluded that the groups of animals that performed highintensity training before, before and after PD induction had higher densities of neurons and astrocytes.

ID: 11050

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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**FeSBE2022 AN ATTEMPT TO DEVELOP A CANCER-INDUCED CACHEXIA
EXPERIMENTAL MODEL BASED ON NCI-H460 HUMAN NON-SMALL LUNG
TUMOR CELLS.**

Lung cancer is one of the most common types of human cancer in the world, and one of its main characteristics is the loss of muscle mass. Currently, experimental models that mimic non-small carcinoma cells are scarce. Currently, some studies have related the success in reproduce NCI-H460, a human non-small lung tumor lineage, in mice. The objective of this work was to verify the occurrence of cachexia in the NCI-H460 experimental model, inoculated subcutaneously (s.c), in Balb/c mice (CEUA: 18592-2018.87). The groups were divided as follows: I) animals inoculated with 1×10^6 cells; II) animals inoculated with 2×10^6 cells; III) animals inoculated with 3×10^6 cells. Cells were diluted in 100 μ l of PBS in all experimental groups followed by s.c. inoculation in the dorsal region; controls received saline inoculation. All animals were monitored daily, for 16 days, in different cachexia parameters, like: food intake, muscle strength, temperature and body weight, and also in tumor size. Significant results were considered when $p < 0,05$). Regarding the size of the tumor, none of the groups developed a tumor mass. Based on our findings, we can say that there is no tumor development induced by subcutaneous inoculation of NCI-H460 in Balb/c mice, which blocks the assessment of cachexia development in this model. More and consistent studies are needed to understand the development of this tumor, and standardize a model.

ID: 10991

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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FeSBE2022 DOCETAXEL AND METHOTREXATE CONJUGATED TO LIPIDIC LDE NANOPARTICLE, ASSOCIATED WITH AEROBIC PHYSICAL TRAINING MODULATE THE BIOCHEMICAL PROFILE OF RATS WITH PROSTATE CANCER

Prostate cancer (PCa) is the second most common type of cancer in Brazil (65.840 new cases per year), and around the world are 194 thousand cases. Exercise is one of several factors known to lower the risk of developing cancer, as well as improve outcomes in patients already diagnosed. People who exercise after cancer have lower rates of cancer complications, treatment toxicities, relapse, and improved survival (Thomas et al., 2021). Trying other alternative ways to reduce the tumorigenic environment, other studies have already investigated the toxicity of the use of low-density emulsion (LDE) nanoparticle acting as a reducer of atherosclerotic and hepatic lesions, however, it was conveyed to other chemotherapeutic agents. Currently, the front line for the chemotherapy treatment of PCa is with taxanes such as docetaxel (DTX), and the methotrexate (MTX), an antifolate drug used in the treatment of cancer and autoimmune diseases. The responses of aerobic physical training present greater lipid supply responses for its execution, and greater internalization of the LDE. The aim of study is to correlate the adipose tissue findings with metabolic profiles modulated by DTX and MTX associated with aerobic physical training. 60 male rats received 65mg/kg of DMBA carcinogen diluted in sesame oil to induce prostate cancer in Sprague-Dawley rats. The animals received standard ration and water ad libitum during all experimental protocol. Doses of LDE-MTX (1mg/kg), and LDE+DTX (2mg/kg) were applied alone and in association with aerobic physical training. The aerobic physical training was performed at night on the treadmill, 5x/week, for 8 weeks. This study was approved according to the CEUA about protocol number 02/2020. The glucose levels do not differ between the groups, neither initial body weight, and weight gain. The EX group reduced the epididymal more than tumor group ($p=0.007$), similar results were found in EX and LDE+DTX animals that reduced the retroperitoneal fat compared to the tumor group ($p=0.004$; $p=0.007$ respectively). The EX and LDE+DTX protocols decreased the total fat compared to the tumor group ($p=0.009$, $p=0.017$ respectively). The total cholesterol and triacylglycerol did not differ between the treated and tumor groups. On the other hand, the LDE+DTX and EX groups increased the HDL mg/dL levels compared to tumor animals ($p=0.005$, $p=0.025$, respectively), between the treatment and trained animals, we could observe that LDE+DTX raised the HDL levels more than LDE+MTX intervention ($p<0.0001$), and LDE+DTX+EX do not significantly improve in comparison to LDE+DTX of HDL levels ($p=0.0007$). The LDE+DTX+EX, and LDE+MTX+EX groups had low HDL (mg/dL) values compared to EX ($p=0.004$, and $p>0.0001$). In conclusion, we affirm that the DTX, and MTX drugs, improve the metabolic parameters of PCa rats, compared to the control group (only tumor), by increasing the HDL levels, picking up excess blood cholesterol, and being metabolized by aerobic physical exercise.

ID: 11262

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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**FeSBE2022 DOES SULFIREDOXIN PARTICIPATE IN CHEMORESISTANCE OF
ADVANCED STAGES OF PROSTATE CANCER?**

Prostate cancer (PCa) is the second most common cancer in men in the world. The main treatment used in the advanced stages is chemotherapy (e.g., docetaxel), with the disadvantage of side effects and subsequent resistance. Studies suggest that the antioxidant enzyme Sulfiredoxin (SRXN1), which is overexpressed in advanced stages of PCa, helps in tumor chemoresistance. This work aims to analyze the resistance of prostate cells to chemotherapy and silence the precursor gene of SRXN1, evaluating its potential as an adjuvant treatment with docetaxel. We used PNT-2, a non-tumor prostate cell; LNCaP, representing the early stages of PCa; and DU145 and PC3, as the advanced stages. First, we treated cells with crescent doses of docetaxel (1 up to 25nM) for 24h, 48h, and 72h, and MTT assay was performed to evaluate viability curves. To investigate the viability of treated cells after SRXN1 knockdown, the castration-resistant PC3 cells were exposed to siRNA against SRXN1 mRNA (25pmol) for 48h, and also treated with docetaxel (10nM) for 48h. As results, the doseresponse curve from docetaxel exposition showed that PNT-2 and LNCaP cells had a decrease in the viability of approximately 60% at the dose of 8nM in 72h; at the same dose and time, DU145 viability reduced by 56.4%. Interestingly, PC-3 had a decrease of only 25.4% in its viability even at the highest used dose (25nM), suggesting that advanced stages of PCa needs higher doses to obtain the desired result. Preliminary results from exposure to siRNA+docetaxel showed that the knockdown slightly helps to reduce tumor viability. SiRNA + 10nM of docetaxel for 48h promoted an 18.5% drop in PC3 viability, a higher percentage compared to treatment without silencing, which was 15.94%. Therefore, considering the high incidence of PCa and promisors SRXN1 studies, our results highlight the importance of researching SRXN1 silencing as an adjuvant treatment, as such results can have a great impact on cancer patient survival.

ID: 11246

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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FeSBE2022 EFFECT OF METHOTREXATE TREATMENT ON HEPATIC PORTAL VEIN CONTRACTILITY IN RATS

Methotrexate (MTX) is an important drug in the treatment of cancer and other diseases, but it has liver and intestinal toxicity. The hepatic portal vein (HPV) is an important vessel that carries what was absorbed in the intestine to the liver. This study aims to evaluate the alterations caused by the MTX on contractile response of the HPV of rats. Wistar rats (250–300g) were used. All procedures performed in accordance with the local Animal Ethics Committee under registration no. 07280650/2020. The rats were divided into 2 groups: SAL and MTX. The MTX group was treated with MTX for 3 consecutive days subcutaneously. SAL group received saline in a similar way. After that, half of the MTX group was sacrificed 3 days after the end of treatment (M6D) and the other 4 days later (M10D). Then the dissected HPV was connected to an isometric force transducer. The HPV was placed in an organ chamber containing Krebs solution, at 37 °C and pH 7.4, gassed with carbogen. Concentration-responses curves were produced using KCl (10 - 100 mM) or Norepinephrine (NE) (0.01 – 10 µM). Data were expressed as mean ± SEM and statistical significance ($p < 0.05$) was assessed by two-way ANOVA followed by the Bonferroni test. The MTX treatment decreased the contractile response to NE and KCl, mainly in the M10D group. The maximal response to NE in the M10D was 23% of the SAL group response. For the KCl-induced contraction the maximal response in M10D group was reduced in 45% compared with the SAL group response. In conclusion, MTX reduces HPV contractility primarily one week after the end of treatment in this model used.

ID: 11326

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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**FeSBE2022 FROM MICROSCOPIC TO MACROSCOPIC ASPECTS OF CANCER
CACHEXIA IN AN EXPERIMENTAL MODEL OF CT26 COLORECTAL
CARCINOMA IN BALB-C MICE.**

In Cancer cachexia, muscle fibers respond in different ways during atrophy. The aim of this study is to evaluate the experimental model of cachexia induced by colorectal cancer CT26.WT, as well as the involvement of biochemical and oxidative changes in different muscle fibers. The CT26.WT cells (1×10^5) were inoculated subcutaneously in male Balb-c mice (5-6 weeks of age) (CEUA: 18592-2018.87). Controls were inoculated with PBS. During 7 (Precachexia - Pcaq) and 14 days (Cachexia - Caq), parameters for cachexia classification as weight, food intake and fatigue (by swimming test [FST]), and plasmatic parameters of metabolic alterations as glucose, triglycerides and plasma lactate, were analyzed. Soleus muscles (SOL) and extensor digitorum Longus (EDL) were collected; in these muscles, the marker of muscular energy metabolism (SERCA1), muscular atrophy and oxidative changes were evaluated. Our results showed that both Pcaq and Caq demonstrated significant weight loss ($p < 0.05$). Only Caq presented a significant decrease in food intake ($p < 0.05$). In FST, Pcaq showed a significant increase ($p < 0.05$) in climbing activity; in turn, Caq group showed a significant increase ($p < 0.05$) in immobility. The plasmatic parameters of systemic metabolism showed a significant reduction in both Pcaq and Caq ($p < 0.05$); in turn, plasma lactate increased only in Caq ($p < 0.05$). In the atrophy analysis, SOL showed significant atrophy in Pcaq and Caq, while EDL, only in Caq ($p < 0.001$). In the analysis of carbonyl protein, EDL showed significant differences ($p < 0.05$) in Pcaq, while SOL only in Caq. SERCA1 increased significantly only in SOL Caq ($p < 0.05$). In this study, we showed that this experimental model of cachexia is reliable and capable of inducing parameters for the classification of cachexia. Our findings indicate that in this model there is impairment of oxidative fibers in the cachexia phase, based on the presence of atrophy and protein oxidation in this phase.

ID: 11064

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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**FeSBE2022 INVESTIGATING THE MOLECULAR MECHANISMS UNDERLYING THE
IMPACT OF LNCRNA RMEL3 ON THE MAPK, PI3K/AKT, AND HIPPO
PATHWAYS IN MELANOMA**

In the search for new therapeutic targets for melanoma, the most aggressive type of skin cancer, we found that the lncRNA RMEL3 (Restricted to Melanoma 3) is highly expressed in melanoma, particularly in tumors carrying BRAFV600E mutation. In previous work, our group showed that RMEL3 knockdown in melanoma cells harmed cell survival and proliferation, and these effects occurred at least partially through the inhibition of the MAPK and PI3K. Present work aimed to elucidate the molecular mechanisms underlying the roles of RMEL3 in melanoma and its impact on the major signaling pathways involved in malignancy. We showed the RMEL3 locus code for multiple ncRNA isoforms. A nuclear/cytoplasmic fractionation showed that the canonical lncRNA fractionates about equally between the nucleus and cytoplasm while other isoforms have differential localizations. We observed staining for RMEL3 in cytoplasmic and nuclear particles of various sizes by FISH assays. In order to identify interacting protein partners, we performed pulldown assays of the endogenous RMEL3 canonic isoform using biotinylated, followed by mass spectrometry. The RMEL3 enriched fractions contained proteins directly linked to the MAPK and Hippo pathways, such as ARAF, MST2, and FAM83D. By co-expressing RMEL3 with the candidate proteins in HEK293T cells followed by RNA- immunoprecipitation assays confirmed the enrichment of RMEL3 in the fraction for the candidate proteins. Also, we confirmed the presence of these candidate proteins in pulldown fractions of endogenous RMEL3 from A375 cells by Western blots. Therefore, we are currently working to confirm whether the interactions between the RMEL3 lncRNA and the candidate proteins are direct and to map the protein and RNA interacting domains. We expect that the molecular characterization undertaken here will contribute to uncovering novel mechanisms for a lncRNA in cancer.

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Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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FeSBE2022 KNOCKDOWN OF ANTIOXIDANT ENZYME SULFIREDOXIN DIFFERENTIALLY MODULATES OXIDATIVE STRESS-RELATED GENES AND CELL SURVIVAL PATHWAYS IN PROSTATE CANCER PROGRESSION

Prostate cancer (PCa) is a world health problem, presenting the second-highest rate of death in men. This rate is associated especially with metastatic and castration-resistant PCa, which presents a large genetic heterogeneity that difficult the cure. To improve treatments and increase patient survival, new specific molecular targets are been investigated. Previously, we identified the antioxidant enzyme Sulfiredoxin (Srx) as a potential therapeutic target for PCa, as it was upregulated in a subgroup of patients with lower survival rates. The biological role of Srx in prostate tumor is still unclear, so our aim was to knockdown this enzyme in vitro, and describe the effects on oxidative stress-related genes and cell survival pathways. To represent tumor progression, we used the prostate cells PNT-2 (normal and epithelial), LNCaP (tumor and androgen-sensitive), DU145 (tumor and castration-resistant), and PC-3 (tumor and castration-resistant). To knockdown Srx mRNA, we exposed cells to siRNA (SiSrx) for 24, 48, and 72h. Then, we performed RT-qPCR to investigate the gene expression of canonical (SRXN1, NRF2, KEAP1, AP1, PRXD1-4) and non-canonical (DJ1, ERK1/2, p38 MAPK, GSK3 β) Srx master regulators, as well as proliferation (MKI67), pro-apoptosis (BAX), and anti-apoptosis (BCL2) markers. After Srx knockdown, we observed an overexpression of PRXD1 and PRXD4 in both PNT-2 and PC-3. AP-1, a transcription factor that induces Srx expression together with NRF2, was upregulated in LNCaP and PC-3 cells, at the same time that DJ1, a stabilizer of NRF2, was downregulated, demonstrating that oxidative stress controlling was misbalanced. Also, after SiSrx, PNT-2 had an increase in BCL-2; LNCaP presented a decrease in MKI67, and an increase in BAX; DU145 also had a decrease in MKI67. Inside precision medicine, the understanding of Srx role in oxidative stress controlling and cell survival may contribute to the development of new inhibitors and adjuvant treatments.

ID: 11193

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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Instituição: FCT/Unesp

FeSBE2022 LIPID NANOPARTICLE REDUCES CHARACTERISTIC OF THE CACHEXIA IN TIBIALIS ANTERIOR MUSCLE

The etiology of cancer-induced cachexia is linked to metabolic disorders arising from the tumor, causing an increase in muscle catabolism. Evidence suggests that lipid nanoemulsion (LDE) for the treatment of cancer is an effective treatment alternative in the transport of chemotherapeutics to tumor cells. To increase the specificity of the nanoparticle and the corresponding drug, we were associate it with aerobic physical training, verifying the impact on cancer cachexia in the face of therapies. In the present work, 40 rats of the Sprague-Dawley (SD) lineage (n=10 per group) were be used, aged 4 weeks, weighing an average of 130 grams. The animals were divided into 4 experimental groups: Cachexia; Cachexia+Ex; LDE and LDE+Ex. The LDE lipid nanoemulsion were prepared with lipid mixture composed of 135mg of cholesterol oleate 333mg of egg phosphatidylcholine, 6mg of free cholesterol, 132mg of migliol. We applied 6 doses of the LDE. The total load of the acute session was obtained through the product between the intensity (60% Pmax) and the time that the animals remain on the treadmill. The aerobic exercise protocol was composed for 8 weeks. Each experimental week consist of 5 consecutive days of training and 2 days of rest. Samples from the tibialis anterior muscle of all animals was collected and submitted to NADH-TR technique. The protocol was approved by CEUA 02/2020. The tibial weight (g) of the Cachexia group was 1.07 ± 0.11 ; Cachexia+Ex was 0.56 ± 0.14 ; LDE was 0.89 ± 0.12 ; and LDE+Ex was 0.82 ± 0.26 . The cross-section area between the groups wasn't show significant statistical difference. On the other hand, glycolytic fibers (type IIX) were reduced in all groups, except for the LDE group, that represent to 71.04% of the glycolytic fibers, 21.95% of the intermediate fibers, and 7.01% oxidative fibers. This distribution is a normal scenario in tibialis muscle. Our preliminary results show that LDE treatment is a great strategy for the treatment of the cancer cachexia.

ID: 10909

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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FeSBE2022 MYOBLASTS ARE MORE RESISTANT TO THERAPY WITH 5-FLUOROURACIL THAN CT26.WT TUMOR CELLS IN IN VITRO EXPERIMENTAL MODEL

Muscle tissue is one of the most severely affected tissues under systemic antitumor treatments. Considering that skeletal muscle is the main source of body energy reserve, losses negatively impact quality of life and survival of patients, besides increasing toxicity of the therapies themselves. Frequent treatment for colorectal carcinoma involves the administration of three chemotherapy drugs, in which 5-Fluorouracil (5FU) plays a key role. Therefore, the objective of this study was to demonstrate the effects of 5FU on myoblasts compared to isolated colorectal carcinoma cells. For that, two cell lineages were used: C2C12 myoblast (murine skeletal muscle) and CT26.WT (murine colorectal carcinoma) treated with increasing concentrations of 5FU (10 μ M, 100 μ M, 200 μ M, 400 μ M and 800 μ M); the parameters analyzed were: cytotoxicity (MTT), resistance of each strain (IC50), percentage of viable cells and cell size (trypan blue exclusion counting method) after 24h of treatment. The results showed that in cytotoxicity parameter, tumor cells were more sensitive to 5FU, from the lowest concentration of 10 μ M to 800 μ M ($p < 0.0001$); while the myoblast lineage showed gradual decrease, occurring only from 100 μ M ($p < 0.005$) to 800 μ M ($p < 0.0001$). In terms of resistance to 5FU, IC50 showed that myoblasts are more resistant (184.4 μ M) than tumor cells (105.2 μ M). Tumor cell viability rate decreased significantly ($p < 0.0001$) from the lowest concentration to the highest concentration, 800 μ M; in myoblasts, the same significant decrease ($p < 0.0001$) of viability rate occurred only in 400 μ M and 800 μ M. Only tumor lineage suffered decrease in cell size. These results show that 5FU, at the concentrations used, affects more the tumor lineage (CT26.WT) than myoblasts (C2C12).

ID: 10866

Área Temática: Ê-POSTER | Sinalização e Terapêutica do Câncer

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**FeSBE2022 OXIDATIVE RESPONSE AND VIABILITY OF K1 CELL CULTURE
PROVIDE INSIGHTS INTO THYROID CANCER BEHAVIOR AFTER INDIRECT
TREATMENT WITH COLD PHYSICAL PLASMA**

Thyroid carcinoma is considered the most common type of endocrine cancer and one of the fastest growing neoplasms in number of diagnoses. The incidence increases each year, with papillary thyroid carcinoma (PTC) being the most prevalent type. K1 cells has a BRAF mutation (V600E), common in most cases of PTC, active p53 protein, and is one of the cells with the least study on reactive species (RS). The effect of RS on tumor cells can play both pro and anti-tumor role, justifying the need to investigate the behavior of carcinomas against them after directed treatment. This work aimed to understand the effects of indirect treatment with cold physical plasma, a mixed RS generator, on K1 culture cell response. This physical plasma is a potent producer of RS, mainly hydrogen peroxide and reactive nitrogen species (RNS). The response of K1 with indirect plasma therapy and with each of the species produced by this therapy, was evaluated by characterizing both the viability and the redox balance of K1 cells. The irradiation times (30, 60 and 120 seconds) with cold physical plasma, affected K1 in order to decrease its viability, especially at 120 seconds ($p < 0.0001$), and significantly increase the stress suffered ($p < 0.0001$) at all times. The results also showed that only high concentrations of hydrogen peroxide ($1800\mu\text{M}$) and sodium nitroprusside (RNS donor) ($400\mu\text{M}$), were able to affect the K1 cell, showing significant decreases ($p < 0.05$) in the parameters of viability of proliferation and metabolism, as oxidative stress increased the injury of the cells ($p < 0.05$). It is possible to conclude, therefore, that there is a decrease in K1 cell viability and an increase in oxidative stress, by effects of both nitrogen and hydrogen reactive species, with indirect treatment with cold physical plasma, especially in the longer irradiation time (120 seconds), giving cold physical plasma a new therapeutic possibility for this type of cancer.

ID: 11266

Área Temática: Ê-POSTER | Sistema Endócrino

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**FeSBE2022 ADRENERGIC STIMULATION CAUSED BY ADMINISTRATION OF
ISOPROTERENOL INDUCES METABOLIC DYSFUNCTION AND PANCREATIC
REMODELING IN WISTAR RATS.**

Isoproterenol is a drug commonly used for the treatment of bradycardia, heart block, bronchospasm during anesthesia, and rarely for asthma. It is a non-selective β -adrenergic agonist (β_1 and β_2 receptor agonist) analog of epinephrine. In many studies the administration of isoproterenol is used as an experimental model for the study of cardiac alterations. It is known that adrenergic stimulation caused by high or prolonged doses of isoproterenol induces significant cardiac remodeling. However, little is known about the metabolic effects of this model. Thus, this study aims to evaluate the effects of isoproterenol administration on metabolic parameters. Adult Wistar rats (200-250g) were allocated into two experimental groups: control rats (CO) that received vehicle (150 mM NaCl, 0.1ml/kg/day; i.p.), and rats that received isoproterenol injections (ISO; 1 mg/kg/day; i.p.) for 7 consecutive days. After the treatment period, the animals were euthanized for sample collection. Animals of the ISO group showed no significant difference in body mass and food intake compared to CO animals. On the other hand, ISO animals showed an increase in brown adipose tissue mass and brown adipocyte area. In addition, the administration of isoproterenol promoted pancreatic remodeling, with an increase in the area of the pancreatic islets and interstitial fibrosis. Thus, in addition to the cardiac morphofunctional changes, the adrenergic overload induced by administration of isoproterenol was also able to promote significant morphological changes in brown adipose tissue and in the pancreas, these changes may be linked to changes in the heart and in other systems.

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Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 CENTRAL STIMULATORY EFFECTS OF APELIN ON VASOPRESSIN AND OXYTOCIN RELEASE IN ADULTS AND ELDERLY FEMALE RATS

Aging is accompanied by several physiological changes, including hypothalamic neural networks impairment. It has consequences on neurohypothalamic hormones release, such as vasopressin (VP) and oxytocin (OT), involved to water homeostasis. Apelin (APL), a new hypothalamic neurotransmitter, has already been described in the control of hydroelectrolytic balance. There is evidence that in aging, apelinergic functions are reduced, which may contribute to VP and OT secretion. We aimed to investigate the long-term central effects of apelin on VP and OT of female Wistar rats. Adult (± 4 months) and elderly (18 months) animals received a continuous intracerebroventricular (icv) infusion of 24nM/day of APL, 192nM/day of APL antagonist (ML221), or vehicle (control, 0.15M NaCl) via osmotic mini-pumps for 12 days. Forty-eight hours before this period, animals were submitted or not to water deprivation (xWD) and plasma neurohypothalamic hormones concentration were evaluated. Data were analyzed using one-way ANOVA, followed by Tukey test. This study was approved by the Ethics Committee CEUA-UFSC #6374250219. Our data showed that non osmotic stimulated aged rats increased VP and OT plasma levels when compared to control groups (both $p < 0.05$). In addition, icv infusion of APL revealed an enhancement of VP and OT concentration in these aged rats (both $p < 0.05$). Interesting, ML221 was able to reduce AVP plasma levels in aged rats and diminished OT in adult animals. As expected, WD promoted VP and OT increase in adults and old rats when compared to non osmotic stimulated control groups. Furthermore, only WD adult rats which received APL infusion showed increased OT levels when compared to WD adult control group ($p < 0.05$). Overall, our data indicate that central chronic treatment of apelin has stimulatory effects on VP and OT release. It suggest that hypothalamic apelinergic system play an important role in hydroelectrolytic homeostasis of adult and elderly female rats.

ID: 10907

Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 DOES ADRENALECTOMY PREVENT METABOLIC CHANGES INDUCED BY OVARIAN HORMONE DEFICIENCY IN RATS?

Ovariectomy (OVX) promotes hyperphagia and increase in body weight and adrenalectomy (ADX) promotes reduction of food intake and decrease of body weight, ADX being able to attenuate obesity in different experimental models. Thus, the present study aimed to investigate the effects of adrenalectomy and corticosterone replacement on intact and ovariectomized female rats on food intake, body weight, visceral adipose tissues, glucose tolerance test (GTT), plasma concentrations of free fatty acids, triglycerides and cholesterol, as well as on oxidative stress in liver and visceral adipose tissues. For this, female Wistar rats (220-240g) were divided into the following experimental groups: 1) animals submitted to fictitious surgeries of ADX and OVX (sham/non-OVX); 2) animals submitted to ADX and fictitious surgery of OVX (ADX/non-OVX), 3) animals submitted to ADX with replacement of corticosterone and to fictitious surgery of OVX (ADX+B/non-OVX), 4) animals submitted to sham surgery of ADX and to OVX), 5) animals submitted to ADX and OVX (ADX/OVX), 6) animals submitted to ADX with replacement of corticosterone and to OVX (ADX+B/OVX). Data from the present study show that ovariectomy increased food intake, body weight, area of adipocytes and weight of retroperitoneal adipose tissue, plasma concentrations of cholesterol, glycaemia after GTT, in addition to reduction of antioxidant molecules in the liver and retroperitoneal adipose tissue, where increased levels of MDA were observed. Interestingly ADX was able to attenuate these OVX-induced metabolic responses, associated with effects on oxidative stress parameters, and corticosterone treatment was partially effective in reversing the effects of ADX. Thus, it can be concluded that corticosteroids participate on the anabolic effects induced by OVX, which are associated with oxidative stress in liver and visceral adipose tissue.

ID: 10713

Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 EFFECT OF LONG-TERM HORMONE THERAPY WITH ESTROGEN ON ANXIOLYTIC PROFILE, RECOGNITION MEMORY, AND HIPPOCAMPAL REDOX STATE IN SENESCENT RATS

Perimenopause is a critical period, with less estrogen secretion and changes in the functionality of the female body and brain. Studies strongly suggest that reduced plasma estrogen concentration alters biomarkers of the redox state, leading to behavioral changes. Therefore, the aim of this study was to analyze oxidative biomarkers in the hippocampus, cognitive anxiolytic responses, and short- and long-term memory in Wistar rats in periostropause after hormone therapy with estrogen (EHT). Sixty rats (18 months) with an irregular estrous cycle, in persistent diestrus were randomly assigned to the groups (n=30/group): Vehicle (21Mo/Veh group; corn oil/0.2 mL/SC; 2x/week/120 days) and EHT (21Mo/E2; 17 β estradiol/15 μ g/Kg/SC; 2x/week/120 days) (CEUA process 0850-2021). Locomotor activity was evaluated in the open field (OF) and the anxious behavior in rats was performed with the elevated plus maze (EPM). The recognition of the new object test (RO) was applied in order to assess short-term and long-term memory retention. These tests were performed immediately before (17 months) and at the end (21 months) of the treatment period. The hippocampi were isolated and destined for biochemical analyses. The 21Mo/E2 group had significantly longer total time in the OF and entries in the open arms, and less time in the closed arms, in the EPM, compared to the animal's vehicle. In this sense, periostropaused rats that received EHT showed an anxiolytic profile in general. The RO results showed that the animals in the 21Mo/E2 group maintained the index they had at 17 months of age. In addition to a better balance of the hippocampal redox state in relation to 21Mo/Veh, managing to expose its antioxidant action in this very significant period in female life. Therefore, our data suggest that exogenous E2 in periostropause contributes to the restoration of functions and reinforces the importance of therapy as a preventive resource for neuropsychological and neurodegenerative disorders.

Keywords: Aging; Estrogen Replacement Therapy; Perimenopause; Hippocampus; Oxidative Stress.

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Área Temática: Ê-POSTER | Sistema Endócrino

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**FeSBE2022 EFFECT OF THE ENDOCRINE DISRUPTORS OF PLASTIC BISPHENOL
A AND S ON THE PROLIFERATION AND INVASION OF HUMAN THYROID
CANCER AND NON-TUMORAL CELL LINES**

Bisphenol A (BPA) is used in the synthesis of polycarbonate plastics and Bisphenol S (BPS) was developed to replace BPA in BPA-free products. Despite the increasing exposure to plastics, the effect of bisphenols on thyroid carcinogenesis remains elusive. Aim: Study the effect of BPA and BPS on proliferation and migration of human papillary thyroid cancer (BCPAP) and non-tumoral (NTHY) cell lines. Methods: NTHY and BCPAP were treated with BPA and BPS at: 0 (control, C), 10⁻⁷, 10⁻⁹ and 10⁻¹¹ M for 18, 24, 48 or 72h. After treatment, cell viability and migration were analyzed by trypan blue exclusion, crystal violet and wound healing assays. Fluorescence-conjugated phalloidin was used to stain filamentous actin. Results: There was an increase in the number of viable NTHY by trypan blue in cells treated with BPA and BPS for 24h (C=9.8 ± 0.41; 10⁻⁷M BPA=13.2±0.67; 10⁻¹¹M BPS=15.4±0.56). An increase in NTHY-ori and BCPAP viability was also observed by crystal violet assay (NTHY, 24h: C=0.067±0.007; 10⁻⁷ BPA=0.094±0.004; 10⁻⁷ BPS=0.084±0.004; 48h: C=0.11±0.006, 10⁻⁷ BPA=0.15±0.006; 72h: C=0.23±0.02; 10⁻⁷ BPA=0.31±0.01; 10⁻⁹ BPA=0.31±0.006. BCPAP, 48h: C=0.18±0.01, 10⁻⁷ BPA=0.29±0.04; 72h: C=0.27±0.01; 10⁻⁷ BPA=0.30±0.01; 10⁻⁹ BPS=0.031±0.003). An increase in NTHY and BCPAP migration was observed, as the distance between the cell fronts in wound healing assay was reduced after 18h of treatment (NTHY: C=667.9±89.4; 10⁻⁷ BPA=86.6±12.5; 10⁻⁷ BPS=148.9±20.5; BCPAP: C=734.5±95.0; 10⁻⁷ BPA=124.6±4.6; 10⁻⁷ BPS=133.9±8.3). NTHY showed a cortical distribution of F-actin, characteristic of epithelial cells, and the treatment with both BPA and BPS increased actin stress fibers, suggestive of epithelial to mesenchymal transition (EMT). Conclusion: Our data suggest a proliferative, migratory and EMT-inductive effect of BPA and BPS on thyroid cell lines. Thus, the increasing exposure to plastic endocrine disruptors could be a factor contributing to thyroid cancer prevalence growth.

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Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 EVALUATION OF PROTEIN OXIDATION IN BLOOD, EXPERIMENTAL MODEL OF NAFLD, ON WISTAR RATS WITH CHRONIC SUPPLEMENTATION AND VITAMIN D.

Vitamin D (VD) has been identified as an important pleiotropic cell modulator in the body. Studies show that patients with metabolic syndromes, such as nonalcoholic fatty liver disease (NAFLD), have low blood VD concentration, and high levels of oxidative and inflammatory markers. However, the role of VD in NAFLD on chronic administration is still unknown. Thus, the aim of this study was to evaluate blood protein oxidation in the face of chronic administration of VD in an experimental model of NAFLD in Wistar rats. The experimental protocol was approved under number 016/2020 at CEUA/UNIPAMPA. For this, rats (n=30 males and n=:30 females) were submitted to NAFLD with the ingestion of hyperlipidic food and water enriched with 45% sucrose for 45 days. After NAFLD induction, the animals were divided into 5 groups (n=6): G1: HS+ saline, G2: HS+ 500IU/kg/day, G3: HS+ 1000 IU/kg/day, G4: HS+ 2000 IU/kg/day and G5: HS +3000 IU/kg/day. VD was administered by gavage once a week for 1 month. After euthanasia, blood was obtained through cardiac puncture. Plasma was used to measure protein carbonylation using the Levine method. After statistical analysis (one-way ANOVA), it was evidenced that there was significance ($\alpha < 0.0001$) between the groups in both sexes (♂: $\bar{X} = 2,67 \times 10^{-5}$, $SD = \pm 1,93 \times 10^{-6}$; ♀: $\bar{X} = 3,48 \times 10^{-5}$; $SD = \pm 4,78 \times 10^{-6}$), especially when comparing the treatment with 3000UI/kg/day, showing an increase in protein oxidation in the bloodstream, dose dependent. However, studies with dosage at the therapeutic level show an antioxidant potential of VD in NAFLD models, even without significant total antioxidant capacity. Thus, caution should be exercised in the chronic administration of VD when combined with systemic pathologies such as NAFLD, and further studies should be carried out to elucidate this relationship.

Vitamin D; supplementation; NAFLD; Protein Oxidation.

ID: 10520

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FeSBE2022 HEPATIC ESTROGEN RECEPTOR ALPHA KNOCKDOWN RESULTS IN DELETERIOUS EFFECTS IN GLUCOSE AND LIPID METABOLISM IN MICE

Western lifestyle and high-fat diet (HFD) cause diet-induced obesity, a global epidemic that leads to increased prevalence of metabolic diseases such as insulin resistance and type 2 diabetes (DM2). Non-Alcoholic Fatty Liver Disease (NAFLD) affects 30% of adults; one of its main characteristics is a build-up of hepatic lipid accumulation, which is linked to the development of insulin resistance and DM2. Estrogen concentration reduction during menopause is associated with increased visceral fat and metabolic diseases. Given the hypothesis that estradiol's metabolically beneficial actions are mediated by estrogen receptor alpha (ER α), the objective of this project was to study the effects of ER α knockdown (KD) in the liver on glucose and lipid metabolism in female C57Bl6 mice (083/2021; 20 g; 8 weeks). Hepatic ER α KD was generated by injecting an adeno-associated virus (AAV8-TBG-GFP-mESR1-shRNAmir). After, female ER α KD mice (AAV) or vehicle-treated (control) were fed an HFD for 8 weeks. When data from AAV and control mice were compared, it was observed that AAV mice's whole-body weight increased by ~18% (P<0.05), associated with increased glucose intolerance by ~63% (P<0.01), hepatic triglycerides (TAG) by ~124% (P<0.01), plasma AST by ~22% (P<0.05), and basal plasma glucose by ~23% (P<0.05). Assessment of hepatic inflammatory markers showed increased F4/80 by ~75% (P<0.05) and IL-6 by ~236% (P<0.05), demonstrating increased hepatic inflammation in ER α KD mice. Regarding fatty acid and lipid metabolism, there was an increase in SREBP1 by ~58% (P<0.01) and SCD1 by ~75% (P<0.05). Furthermore, COL1A1 was increased by ~90% (P<0.05), and FGF21 was decreased by ~64% (P<0.05). Taken together, these data support the hypothesis that ER α mediates estradiol metabolically beneficial actions since the results showed that hepatic ER α KD, in mice fed an HFD, induced NAFLD and negative consequences on glucose and lipid metabolism, and increased markers of inflammation and fibrosis.

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Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 HYPOTHALAMIC MODULATION BY INTERMITTENT FASTING IN RATS FED A HIGH FAT DIET

Since obesity prevalence grows all over the world, the study of new approaches of treatment and the mechanisms involved become more important. Leptin is an important regulator of food intake by coordinating the expression of hypothalamic neuropeptides. Since human beings can remain a long time without caloric intake, i.e., in fasting status, the aim of this project was to elucidate whether intermittent fasting could be a good strategy to reverse weight gain and improve metabolic parameters in obesity and the possible involvement of leptin signaling in hypothalamus. For this, male adult Wistar rats were divided into 4 groups: regular diet fed ad libitum (RDAL), regular diet fed in intermittent fasting regimen (RDIF), high fat fed diet fed ad libitum (HFDAL) and high fat diet fed in intermittent fasting regimen (HFDIF). The treatment lasted 12 weeks and fasting glucose and body weight were evaluated. The hypothalamic expression of proteins involved in leptin signaling and neuropeptides involved in the control of hunger and satiety were measured by Western blot and qPCR, respectively. Even though intermittent fasting did not prevent diet-induced obesity, fasting glycaemia was improved in HFDIF group compared to HFDAL (RDAL=90.4±2.35; RDIF=91.5±2.43; HFDAL=105.1±1.98*; HFDIF=98.3 ±2.04). Phospho-STAT3, signal transducer and activator of transcription 3 (RDAL=99.98±2.22; RDIF=91.5±2.43; HFDAL=78.9±13.01; HFDIF=108.98±0.61*) and CART, cocaine and amphetamine regulated transcript (RDAL=1.01±0.1; RDIF=0.85±0.15; HFDAL=0.48 ± 0.08; HFDIF=1.21±0.14*), were significantly higher in HFDIF compared to HFDAL, suggesting an improvement of leptin signaling. In rats fed regular diet, intermittent fasting did not affect glycemic homeostasis or hypothalamic leptin signaling and neuropeptide expression. Therefore, intermittent fasting seems a good strategy bringing metabolic benefits and changing food behavior pathways in diet-induced obesity.

ID: 11061

Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 HYPOTHALAMIC OBESITY ALTERS BLOOD CELLS PARAMETERS IN MALE WISTAR ADULT RATS

More recent data have indicated that excessive white adipose tissue (WAT) may alter blood parameters, contributing to develop of diseases such as anemia. Moreover, neutrophils count showed a progressive increase with increase in body mass index. In the present work, we evaluated the red and white blood cells parameters in male hypothalamic-obese rats. Hypothalamic obesity was induced by neonatal monosodium glutamate administration (MSG; 4g/Kg) during five first days after birth. Non-obese rats received saline equimolar solution, control group (CTL). At 90 days the MSG-obese and CTL rats were maintained at fasting and the drop of blood was used to perform a blood smear which was stained by the method of May Grunwald Giemsa. Hematocrit (Hct) was evaluated by microcapillary method. In next, the rats were euthanized and adiposity evaluated by weight of white adipose tissue (WAT) depots. Total blood was collected and plasma used to biochemical dosage of glucose, triglycerides and insulin (approved by CEUA on April 7, 2017). The MSG-obese rats presented elevated WAT weight in relation to CTL animals ($p < 0.0001$). Despite of normoglycemia MSG-obese rats had hypertriglyceridemia and hyperinsulinemia in relation to CTL group ($p < 0.001$). MSG-obese rats showed reduction in red blood cells ($p < 0.037$); basophils (0.0211) and lymphocytes ($p < 0.0434$) in comparison to CTL group. The Hct value was similar between CTL and MSG-obese groups ($p > 0.05$). However, several red blood abnormalities were observed in blood smear of MSG-obese groups such as, echinocytes, dacrocytes, spherocytes, oval or elongated cells, rouleaux formation and Howell Jolly body. Neutrophils nuclei pathological state also were noted in blood from MSG-obese animals. Thus, we concluded that MSG-obese animals presented reduction in white and red blood cells count, associated with histological abnormalities of red blood cells, events that can aggravates obesity and metabolic state in this hypothalamic obese model.

ID: 11332

Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 MELANOPsin REGULATES CENTRAL AND SKIN HPA-AXIS IN RESPONSE TO UVA

Skin represents the interface of the organism with the external environment; it detects, integrates, and responds to stressors including ultraviolet radiation (UVR). In the skin, UVA radiation triggers melanogenesis through melanopsin (OPN4) activation in melanocytes. The hypothalamus-pituitary-adrenal (HPA) axis is of the utmost importance in the regulation of skin responses to various stressors, leading to the production of peptide and steroid hormones. We hypothesized that melanopsin acts as a UVA radiation sensor and regulates the murine central HPA and skin HPA-like axes. To this end, dorsal skin of 3 to 6 month-old male B6:129 (WT) and *Opn4*^{-/-} mice (28-32 g) were irradiated with 100 kJ/m². Skin, hypothalamus, pituitary, and serum from both genotypes, irradiated or not, were collected 24 h after the stimulus and processed for gene expression analysis and corticosterone measurement (CEUA-IBUSP 348/2019). As expected, the skin corticosterone concentration increased in both genotypes after irradiation, the increase being significantly higher in the absence of OPN4 as compared to WT mice. In the skin of WT animals, UVA irradiation decreased the expression of *Crh*, *Pomc*, and the glucocorticoid receptor *Gr*. Interestingly, in non-irradiated mice, the expression of *Crh* and *Gr* was reduced in the absence of *Opn4* in comparison with WT mice. We hypothesize that the decrease in these genes is a compensatory mechanism to maintain local homeostasis, although further investigations are required to prove it. Also, we found that UVA did not affect the expression of *Crh* and *Gr* in the hypothalamus of both genotypes. In the pituitary, UVA induced a remarkable increase of *Pomc* in the WT mice, whereas had no effect in the *Opn4*^{-/-} animals. As to pituitary *Gr* expression and circulating corticosterone, there were no differences between irradiated and non-irradiated animals of both genotypes. We conclude that OPN4 is necessary to mediate skin neuroendocrine responses to UVA radiation.

ID: 10977

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FeSBE2022 MODULATION OF MELATONINERGIC FUNCTION IN PINEAL GLAND AND OVARIES FROM FEMALE RATS WITH HYPOTHYROIDISM.

Melatonin is an indolamine that participates in the modulation of biological rhythms in many species, also has regulatory roles in the immune and reproductive systems. Physiological changes in the thyroid, such as hypothyroidism, could disrupt the immune and reproductive systems. The aim of this work was investigating the effects of hypothyroidism on the reproductive organs and melatonin production in female rats. The experimental procedures were approved by the Ethics Committee on the Use of Animals of Universidade Estadual de Santa Cruz (032/2018). Hypothyroidism was induced by daily oral administration of propylthiouracil (PTU) (4mg/kg) during 90 days in female Wistar rats (3 months; 226±7.42g), control group was treated with water. The animals were euthanized in the middle of light (ZT6) or dark (ZT18) phase (animals maintained in 12/12, light/dark). Body weight was measured weekly and, sexual organs were collected for histomorphometric analysis, organ weight and RT-PCR assay. Pineal gland was also collected to gene expression evaluation. The RT-PCR assay was used to evaluate gene expression of melatonin biosynthesis enzymes, arylalkylamine-Nacetyltransferase (AA-NAT) and acetylserotonin-O-methyltransferase (ASMT) and also to melatonin receptors (MT1, MT2 and GPR50) evaluation. Results showed a reduction both in body and sexual organs weight. Histomorphometric analyzes revealed an increase in the number of atresic follicles in the ovaries and in the height of the uterine myometrium. Statistical differences in RT-PCR assays were observed in some parameters: 1 - Pineal gland, Asmt expression was lower in the hypothyroid day group, both in relation to the control group of the same period or to hypothyroid group at night; 2- Ovaries, Aa-nat and Gpr50 expression showed higher levels in the hypothyroid group. In conclusion, our findings provide additional data in the understanding of the melatonin influence on the reproductive function during hypothyroidism.

ID: 11078

Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 PITUITARY NEUROENDOCRINE TUMORS SUBTYPES EXHIBIT SPECIFIC METHYLOME AND TRANSCRIPTOME SIGNATURES

Pituitary adenomas are one of the most common benign neoplasms of the central nervous system, representing up to 15% of all primary brain tumors. As a minority of them may present aggressive behavior, the nomenclature Pituitary Neuroendocrine Tumors (PitNETs) was recently adopted. We aimed to explore PitNETs pangenomic signatures in a heterogeneous Brazilian ethnic population. Retrospective cross-sectional study Clinicopathological features, methylome, transcriptome and exome were evaluated in 77 patients (61% women, age: 12-72 years) followed due to functioning (FPT: GH-secreting n=18, ACTH-secreting n=14) and non-functioning pituitary tumors (NFPT, n=45), this study was approved by the Ethics Committee (#7534/2010) at HC-FMRP-USP. Unsupervised hierarchical clustering analysis (UHCA) of DNA methylation and transcription data revealed 3 PitNETs clusters each: (A) one enriched by FPT, (B) other by NFPT, and (C) another by ACTH-secreting and NFPT. Comparison between each omics-derived clusters identified 3,568 and 5,994 differentially methylated and expressed genes, respectively, associated with clinical presentation and invasiveness. UHCA considering 11 transcripts related to PitNETs 2022 WHO classification also supported the 3 clusters: POU1F1-driven somatotroph, TBX19-driven corticotroph, and NR5A1-driven gonadotroph PitNETs. Finally, we identified the set of genes and related pathways, supported by omics profile, that define each of the PitNETs elucidated clusters. This large Brazilian cohort of PitNETs confirms that, independently of the genetic background, integrated methylome and transcriptome signatures are capable to classify PitNETs, and are associated with clinical presentation and tumor invasiveness. Moreover, a third cluster (NFPT, USP8 mutated ACTH-secreting and silent-corticotroph PitNETs) raises interest regarding PitNETs heterogeneity. Finally, this data offers the opportunity to further studies to validate genes and pathways involved in the PitNETs pathogenesis.

ID: 10877

Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 QUERCETIN ACTION ON PURINERGIC ENZYMES IN PLATELETS FROM RATS WITH HYPERTHYROIDISM

Thyroid hormones are related to the homeostasis of vascular functions and platelets also play an important role in this process. Due to the influence of purinergic signaling on the vasomotor responses and platelet function, becomes relevant evaluate the effects of polyphenol quercetin in this system. Thus, this study aimed to assess purinergic enzyme activity in platelets from hyperthyroid rats treated with quercetin 10 or 25 mg/kg. Male Wistar rats (60 days; ≈ 300 g) from the Central Animal House of the Federal University of Santa Maria were used. Animal Ethics Committee protocol: 083/2012. To induce hyperthyroidism, L-thyroxine (T4) was administered ad libitum in water (J Cell Biochem. 1-9, 2018). After 1 month of treatment, the animals were divided into six groups (n=7): CT/W(water); CT/Q10; CT/Q25; T4/W; T4/Q10 and T4/Q25. Enzymatic assay was performed as described by Lunkes et al. (Clin. Pract. 65(1), 2004) and ADA according to Guisti and Galanti (Verlag Chemie, 1984). Data were statistically analyzed by two-way ANOVA, expressed as mean \pm SEM, considered significant differences when $P < 0.05$. Results shows an increase in ATP hydrolysis in T4/W (38.22 \pm 5.7) in relation to CT/W group (24.14 \pm 1.9). On the other hand, the treatment with quercetin 10 and 25 restore ATP hydrolysis (17.74 \pm 2.3; 17.95 \pm 3.2). No significant differences were observed in the ADP hydrolysis. For AMP, there was a decrease in T4/W (9.12 \pm 0.5) when compared to CT/W (12.49 \pm 0.5). The treatment decreased AMP hydrolysis in CT/Q10 (8.37 \pm 0.8), CT/Q25 (8.87 \pm 0.8) and T4/Q25 (5.94 \pm 0.5), demonstrating the ability of quercetin to inhibit 5-Nucleotidase. Moreover, there was an increase in ADA activity in T4/W group (1.99 \pm 0.2), when compared to CT/W (1.0 \pm 0.2). Quercetin was able to reverse the increase in ADA activity in T4/Q25 group (0.83 \pm 0.1). The results demonstrate changes in the activity of purinergic enzymes in platelets from rats with hyperthyroidism and the potential of quercetin to reverse these changes

ID: 11342

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FeSBE2022 RELATIONSHIP AMONG BISPHENOL A EXPOSURE, THYROID DYSFUNCTION AND DIABETES MELLITUS.

Bisphenol A (BPA) is an endocrine disruptor able to affect thyroid hormone homeostasis and suggested to lead to insulin resistance. However, the relationship among thyroid dysfunction, diabetes mellitus and BPA exposure is not clear. Thus, our objective was to evaluate the effect of the association between BPA exposure and hypothyroidism on glycemic homeostasis in rats. We also aim to standardize a method to measure BPA levels in serum and urine of patients with thyroid dysfunction and diabetes mellitus. Adult female Wistar rats were divided into 4 groups: control (C), BPA (0.40 mg/kg/day, 40 days), MMI (0.03% methimazole in drinking water, 21 days, to induce hypothyroidism) and BPA+MMI. At the end of the treatment, fasting glycaemia and insulin tolerance test (ITT) were evaluated. Regarding the patients, they were divided into 4 groups: control (C), diabetes mellitus (DM), thyroid dysfunction (TD) and DM+TD. Treatment of rats with both BPA and MMI significantly increased fasting glycaemia (C=82.63±1.75; BPA+MMI=90.80±2.91 mg/dL) and the area under the curve of ITT (C=3344±190.1; BPA+MMI=3976±125.1) compared to control, thus suggesting that the association between hypothyroidism and BPA exposure induces insulin resistance. In patients, as expected, glycated hemoglobin was significantly increased in both DM and DM+TD groups (C=5.40±0.15; DM=8.26±2.28; DM+TD=7.00±1.19 %). Moreover, patients from both DM and DM+TD groups had an increase in fasting glycaemia (C=91.38±34.59; DM=137.7±51.57; DM+TD=128.2±10.65 mg/dL), however the difference from control was significant only for DM group. Isolated TD did not change glucose homeostasis. Quantification of BPA in the patients will occur by high performance liquid chromatography and the method is already being standardized. Therefore, our preliminary results suggest that the association between hypothyroidism and BPA exposure is deleterious to glycemic homeostasis, which is of special concern for patients with DM.

ID: 11204

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Instituição: UFRJ

FeSBE2022 STUDY OF THE EFFECTS OF SUCRALOSE AND STEVIA CONSUMPTION ON METABOLIC PARAMETERS IN MURINES

According to the World Health Organization (WHO), obesity is considered a pandemic. The consumption of highly caloric foods, combined with a sedentary lifestyle, are some of the main factors contributing to this pandemic. To produce foods with lower carbohydrate content, some chemical products were developed and added to foods, the so-called non-caloric sweeteners. Sucralose is widely used as a sweetener by consumers and the food industry due to its high sweetness. A natural alternative to synthetic sweeteners is the aqueous extract of *Stevia rubrdian* Bertoni, a plant from which stevioside is extracted, however, studies have already shown that both stevioside and sucralose are capable of interfering with endocrine axes. Despite the parallel between the growing consumption of sweeteners and the increase in obesity prevalence, little is known about the possible mechanistic relationship between them. Thus, the objective of this work is to elucidate the effects of the consumption of sucralose and stevioside on some metabolic parameters in murine. Adult male Wistar rats were divided into 4 groups: 3 diets with the same intensity of sweetness, equivalent to 10g of sucrose per 100g of chow: sucrose group (SU); sucralose group (SA) and stevioside (S) and 1 group without sweetness (control, C), for a period of 30 days. Our preliminary data showed that the retroperitoneal adipose tissue weight of the sucrose group increased (C=3.5±0.26; SU=7.3± 1.19 g). In the group treated with stevioside, the weight of brown adipose tissue (BAT) was significantly higher than control (C=0.28 ± 0.019; S=0.42 ± 0.029 g) and the fasting glucose increased after treatment (before=69.25 ± 6.9; after=92.75 ± 2.49 mg/dL). Our results show that the exposure to stevioside could be associated with an increase in fasting glycemia and BAT mass, suggesting that metabolic homeostasis can be affected by the consumption of sweeteners, even natural ones such as stevia.

ID: 11126

Área Temática: Ê-POSTER | Sistema Endócrino

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FeSBE2022 THE EFFECTS OF HYPOTHYROIDISM ON THE DAILY PROFILES OF SPONTANEOUS LOCOMOTOR ACTIVITY AND BODY TEMPERATURE OF MICE

Hypothyroidism is a common hormonal dysfunction characterized by low levels of thyroid hormones (THs) that can lead to a number of different symptoms, such as fatigue, slow metabolism, intolerance to cold temperature, lethargy, among others. It is well known that thermoregulation and basal metabolism are directly modulated by THs and central circadian clock, possessing a well-defined daily rhythmicity. Triiodothyronine alters the molecular circadian machinery of target tissues, such as the heart and anterior pituitary. Therefore, our hypothesis is that hypothyroidism affects the master clock, which could impair the rhythmic spontaneous locomotor activity (SLA) and body temperature (BT) profiles. To test this hypothesis, BT and SLA were evaluated using a telemetry sensor implanted intra-abdominally in C57BL/6J adult male mice. The protocols used consisted of light:dark (12:12) and constant darkness periods, and the data was recorded every minute per 24h, during at least 7 days of each tested light protocol. Then, part of the animals was induced into hypothyroidism by the administration of methimazole and sodium perchlorate diluted into the drinking water for 21 days. Afterward, the recording was repeated under the same light protocols. At the end of the experiment, the animals were euthanized every 4 h throughout the 24-h and the pituitary, tibia and heart were collected. The Tshb mRNA expression and the ratio between tibia/body weight (BW) and heart/BW were used to confirm the treatment effectiveness. The control mice exhibited a circadian profile of BT and SLA. The hypothyroid mice retained the SLA circadian rhythmicity, however, their overall level was reduced, which was evidenced by the lower mesor when compared to the control group, whilst other rhythmometric parameters remained statistically unchanged. Importantly, the daily oscillation in BT was no longer present in the hypothyroid mice suggesting a modulatory effect of THs on the central circadian clock.

ID: 11048

Área Temática: Ê-POSTER | Tecnologias Ópticas e Mecânicas para a Saúde

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Instituição: UFES

FeSBE2022 COMPARISON BETWEEN DILUTED VERSUS NON-DILUTED PLASMA TO IDENTIFY FABRY DISEASE BY FTIR.

Fourier Transform Infrared Spectroscopy (FTIR) is a technology that has the potential to be a new tool for diagnosis and screening of diseases. Nonetheless, a challenge is the lack of standardization. Thus, this study, approved by the ethics committees (36894020.4.0000.5526 and 50865321.4.0000.5071), aimed to analyze if diluted plasma can create a better model than non-diluted samples for the diagnosis of Fabry disease using FTIR data. The Fabry patients were from the Kidney Care Clinic (Ilhéus, BA), and from the Cassiano Antonio Moraes University Hospital (Vitória, ES). The study involved 104 patients, which 52 were healthy (65,4% females and 34.6% males), and 52 were Fabry patients (59.6% females and 40.4% males). The mean age of the participants was $36,71 \pm 10,89$ (Control) and $39,15 \pm 16,81$ (Fabry). Plasma was diluted in water at 25%(v/v) and compared to non-diluted samples. After the acquisition of the spectra in triplicate, models were created using the Genetic Algorithm based Linear Discriminant analysis (GA-LDA). Data were pre-processed by cutting in the fingerprint (FG) or high wavenumber (HWN) regions, and vectorial normalization. The model created using the HWN and non-diluted samples have 93.7% of accuracy. Differently, using the diluted samples and the HWN, the model created have only 84.38% of accuracy. Applying the cut in the region of the FG, the diluted samples created a model, with 93.75% of sensitivity and 87.5% specificity, that can identify Fabry patients with an accuracy of 90.63%. Otherwise, the non-diluted samples reached 100% of sensitivity and 93.75% of specificity, capable of identifying the Fabry patients with an accuracy of 96.88%. Furthermore, this last model selected less variables when compared with the others. This indicates that each variable had a better correlation with the condition of the patients. Therefore, the non-diluted samples were able to create a better model to identify Fabry ATR-FTIR spectral profile from plasma samples.

ID: 10982

Área Temática: Ê-POSTER | Tecnologias Ópticas e Mecânicas para a Saúde

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FeSBE2022 PLASMA ANALYSIS OF PATIENTS WITH FABRY'S DISEASE THROUGH ATR - FTIR SPECTROSCOPY

Fabry Disease (FD) is a X-linked lysosomal storage disorder, marked by deficient alpha-galactosidase-A (α -Gal A) enzyme, which leads to an accumulation of glycosphingolipids in biofluids and tissues. Due to the phenotypic heterogeneity the suspicion of FD becomes a challenge. The diagnosis consists of measuring α Gal A activity in males and genetic testing in females. Attenuated total reflectance Fourier-transform infrared (ATR - FTIR) spectroscopy is a technique that allows capturing vibrational energy of organic molecules covalent bonds through infrared radiation. The generated spectrum provides information about the sample's chemical composition. We evaluated the FTIR specters of plasma samples obtained from FD patients and applied chemometrics methods. Inclusion criteria were subjects with genetic test of pathogenic GLA gene mutation from Kidney Care Center (Ilhéus, BA). Blood samples were collected and centrifuged at 2500 rpm for 15 min and saved plasma. 10 μ l was dropped on a polished aluminum slide and left to dry for 2h before spectrum acquisition. The experiments were done in triplicate. The chemometrics multivariate analysis was performed by MATLAB. The spectra were explored in different regions and methods of preprocessing were applied on the spectral data. Plasma samples of 52 FD patients (40% male) and 52 controls (35% male) were tested to discriminate the groups. Principal Components Analysis (PCA) was performed and it was not possible to identify a distinction between the groups. Using genetic algorithm-based linear discriminant analysis (GA-LDA), we create a classify model to discriminate the groups. The model performed to 97% accuracy, 100% sensitivity, 93% specificity and a Matthew's correlation coefficient value of 0,94. Then, a permutation test (1,000 simulations) was used evidencing statistical significance of the model. The results of this preliminary study suggest that ATR - FTIR associated with GA-LDA is a potential tool to screening FD.

ID: 11130

Área Temática: Ê-POSTER | Tecnologias Ópticas e Mecânicas para a Saúde

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Instituição: UFES

FeSBE2022 STUDY OF MULTIPLE SCLEROSIS BY INFRARED SPECTROSCOPY

Multiple Sclerosis (MS) is a chronic, immune-mediated, inflammatory and degenerative disease characterized by demyelinating lesions of the central nervous system. The development of new methods that can extract biochemical information from biological fluids and promote an effective and rapid diagnosis is very important for improving disease control. The Fourier-Transform Infrared (ATR-FTIR) vibrational spectroscopy technique has been an alternative for the identification of biomarkers and diagnosis in several areas. This study aims to distinguish ATR-FTIR spectra of individuals with MS through pattern recognition (PR). The sample consisted of serum obtained from 15 control subjects (mean age 35.0 ± 13.7 ; 11 women) and 15 MS subjects (mean age 32.0 ± 11.7 ; 10 women) from the Neurology outpatient clinic of the Cassiano Antonio Moraes University Hospital following McDonald's 2017 criteria. FTIR spectra were obtained from 10uL pipetted on an aluminum plate and dried for at least 2 hours. The spectra were pre-processed and normalized in selected regions. For PR, Principal Component Analysis (PCA) and the Unsupervised Random Forest (URF) method were used. Using the PCA method, it was possible to observe a tendency to distinguish between the groups, but with a greater number of combinations up to the main component 4 (total spectrum 89.22%; high number of waves 98.68%; fingerprint 86.46%). Afterwards, URF method was performed, where it was possible to distinguish samples from the EM and control groups both in the regions of high number of waves (48.35%), fingerprint (47.84%) and total spectral (62.86%) with 3 main components. The results showed a distinction between the two groups, suggesting the presence of structures in the data capable of distinguishing biological between MS and control group. This indicates a high potential of the ATR-FTIR technique associated with machine learning methods for the study and diagnosis of MS. Ethical approval: (CAAE n.44387521.8.0000.5071).

ID: 10865

Área Temática: Ê-POSTER | Terapia Gênica e Celular, Biologia Omics

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FeSBE2022 TRANSCRIPTIONAL PROFILE OF BRONCHOALVEOLAR LAVAGE FLUID SECRETOME IN PATIENTS AT RISK FOR SEVERE COVID-19

COVID-19 has quickly spread across the globe and become a pandemic. Patients with specific comorbidities, the elderly, men, and those with high viral loads have a worse prognosis for this disease. In addition, some cases may present an exacerbated immune response resulting in the secretion of molecules that cause tissue damage and death. Thus, the characterization of COVID-19 secretome can provide insights into how cells communicate, drug targets, and prognostic biomarkers. This study aimed to analyze the global transcriptional profile of secretome genes of bronchoalveolar lavage fluid cells from patients based on their risk of developing severe COVID-19. The RNA-Seq dataset GSE152075, available on the Gene Expression Omnibus (ncbi.nlm.nih.gov/geo/), was analyzed in the Network Analyst tool (networkanalyst.ca) by comparing patients associated with severe cases (male, elderly patients, and with high viral load) with matched controls (female, young, and low viral load, respectively). The lists of differentially expressed genes ($\text{fold change} \geq |1.5|$ and $P\text{-value} \leq 0.05$), for each comparison, were filtered to the list of human secretome genes available on The Human Protein Atlas (proteatlas.org). Then, we analyzed the functional enrichment of these genes using EnrichR (maayanlab.cloud/Enrichr). We found highly variable transcriptional profiles of the secretome genes, with sets of genes with opposite regulation between men and women, young and elderly, and patients with low and high viral load. The secretome genes in patients with severe cases were mainly related to immune response pathways such as type II interferon signaling. However, 43 genes were downregulated exclusively in patients commonly associated with a good prognosis. In conclusion, we identified secretome genes that are potentially associated with a good prognosis, which might protect patients from developing severe cases of COVID-19.

ID: 10935

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 7,8-DIHYDROXY-4-METHYLCOUMARIN HAS HIGH ANTIOXIDANT
ACTIVITY BUT NO PROTECTIVE EFFECTS ON CAENORHABDITIS ELEGANS
WORMS**

With the advancement of medicine, a greater life expectancy was achieved, in contrast, a longer life span does not mean greater longevity, that is, a better quality of life. Numerous phenolic compounds are being studied for potential effects against physiological stress. Coumarins found in this group can produce up to 1300 derivatives, with potential effects against metabolic stress. Therefore, it seems necessary to seek to elucidate mechanisms that may regulate this aging process, which may be associated with the gradual loss of physiological functions of cells and tissues, increasing the number of senescent cells that may be related to increased oxidative stress. The aim of study was to identify the influence of the use of the synthetic coumarin compound 7,8-Dihydroxy-4-methylcoumarin (DHMC) on longevity and resistance to different types of stress *in vivo*. A two-way ANOVA was used for comparisons between groups, and Kaplan Meier Curve for survival tests ($p < 0.05$). Strains; Bistol N2 and GLP-4; SEK-1 were used, fed with *Escherichia coli* OP50. Each experimental group was consisting of 75 worms, divided into triplicate, that is, 25 worms per well, being divided into a control group (treated with *E. coli* + DMSO vehicle solution at a concentration of 50µl/ml) and a treated group (being treated with *E. coli* + the compound in the concentration of 10, 25 or 50µl/ml). Free radical scavenging (DPPH) analyzes were performed for compound, longevity, and stress tests (H₂O₂, NaCl, Heat) for *C. elegans* worms. In the first analysis, the compound showed 92% of antioxidant in small concentrations (25ug/ml) through the DPPH analysis. In the following tests the worms *Caenorhabditis elegans* did not show a reduction in stress or a significant improvement in longevity with the use of the compound. Therefore, the DHMC compound expresses a high antioxidant activity. However, it has no biological effects in protecting against stress or contributing to longevity in *C. elegans* worms.

ID: 10864

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 CB2 CANNABINOID RECEPTOR IMPROVES CARDIAC
CONTRACTILITY OF BRYCON AMAZONICUS**

In addition to their known classical effects, such as analgesia and impaired cognition, the cannabinoids have also been associated with the regulation of cardiovascular responses. CB2 cannabinoid receptors are present in several organs, including cardiac tissue. However, the effects of activation of these receptors on myocardial contractility are still unclear. The aim of this study was to evaluate the cardiac muscle responses after CB2 receptor activation with a synthetic cannabinoid agonist (HU-308), using fish (*Brycon amazonicus*) as an experimental model (n = 20 per group, CEUA nº 4997170718). Fish were treated with a single i.p. injection of HU-308 (1 mg.Kg⁻¹) or vehicle and after 24 h it was evaluated: (1) ex-vivo analysis of contractility comparing the relative roles of Na⁺/Ca²⁺ exchanger (NCX) and sarcoplasmic reticulum in the regulation of excitation-contraction coupling and (2) expression of calcium-handling proteins such as NCX, sarcoplasmic reticulum Ca²⁺ ATPase (SERCA2a), and phospholamban (PLB). Results were presented as means ± S.E.M. Data from control and HU groups were tested for statistically significant differences using the Student t-test. In relation to controls, HU treatment significantly enhanced the cardiac force development (66%), cardiac pumping capacity (78%), rates of contraction (62%) and relaxation (51%) and allowed increases in maximal electrical stimulation (from 2.0 to 2.4 Hz), shifting the optimum frequency curve upward and to the right. In addition, the treatment with HU-308 induced significant increases in the expression of NCX (159%), SERCA2a (28%) e PLB (67%) in fish ventricles. In conclusion, CB2 receptor activation improved excitation-contraction coupling by increasing calcium handling efficiency leading to a positive positive inotropism and lusitropism. Future research on the CB2 receptor activation on cardiac contractility in mammals is needed, given its potential application, as seen for the experimental fish heart model.

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ID: 10659

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 DECREASED FERTILITY AND REPRODUCTIVE EFFICIENCY OF F2
GENERATIONS OF BOTH SEXES AFTER INDIRECT LOW-DOSE
BENZO(A)PYRENE EXPOSURE OF THE F1 GENERATION THROUGH THE
PATERNAL LINE**

The paternal inheritance of the origin of health and disease is a little explored field of great relevance considering today's lifestyle. The F2 generation is the first not directly exposed to the environmental contaminant benzo(a)pyrene and this study investigated whether indirect exposure (via paternal germ cells) brings developmental and reproductive impairment to the offspring. Juvenile male Wistar rats (F0 – 23 days) were allocated in control group (vehicle) and BaP-group (0.1 µg/kg/day) and exposed occurred for 31 consecutive days (gavage). In adult life, they were mated with untreated females to obtain male offspring (F1) and, later, the F2 generation, which was evaluated in relation to their initial development and reproductive parameters in the offspring (Approved by ethics committee (1148/2019 - IBB/UNESP)). The male offspring showed a decrease in anogenital distance, fertility potential, testosterone levels, type A sperm, number and size of Leydig cell nuclei, and epididymal measurements. They also showed an increase in their reproductive organs. In the female offspring, there was a precocious vaginal opening and first estrus, decreased in lordosis score and fertility. There were also histomorphology changes in the ovary and uterus. The results obtained so far on the reproductive repercussions of the PF2 generation indicate that these animals showed losses in both sexual development and fertility potential when compared to the control group. This damage was generated in the sperm of the F1 generation by indirect exposure to BaP, probably due to changes in its epigenetic pattern that modified the functioning of the reproductive system of the F2 generation. These data also reinforce the importance of paternal health in offspring development.

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ID: 10969

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 DICHLORVOS PESTICIDE CAUSES NOX-1/NRF2 OXIDATIVE STRESS IN RAT VENTRAL PROSTATE

Pesticides are one of the main causes of cancer, acting as endocrine disruptors and altering the homeostasis of men's prostate leading to cancer. The organophosphate pesticide Dichlorvos (DDVP) is an endocrine disruptor that is possibly involved in these mechanisms. The endocrine homeostasis alteration is linked to the production of reactive oxygen species (ROS) by the transmembrane protein NOX-1 (NADPH oxidase 1) and the antioxidant defense by the transcription factor Nrf2 (nuclear factor erythroid 2 - related factor 2). This study aimed to evaluate the correlation between the expression of NOX-1 and Nrf2 in the ventral prostate of rats submitted to the pesticide Dichlorvos, through carcinogenic chemical induction by N-Methyl-N-Nitrosourea (MNU). 20 male Fischer 344 rats, 240 days age and 250g weight were separated into four experimental groups: Sham, DDVP, MNU, MNU + DDVP; MNU groups received chemical induction and the DDVP received DDVP enriched diet. Ethical Committee: 741/2018-CEUA/FC-UNESP/Bauru. Immunohistochemical analysis was performed on the ventral prostate tissue of the rats with positive staining for NOX-1 in the nucleus and at apical cytoplasmic regions of epithelial cells for DDVP groups. Also, there was positive staining for Nrf2 in the epithelium of DDVP groups. There was increased hyperplasia of the prostate epithelium in the MNU and MNU + DDVP groups, confirming the action of the carcinogen MNU according to the literature for cancer development. DDVP stimulates the production of reactive oxygen species through the activation of NOX-1 protein in the membrane of prostatic epithelial cells. The nuclear transcription factor Nrf2 is translocated to the nucleus, activating the production of antioxidant enzymes in response to oxidative metabolism. Therefore, the expression of NOX-1 and Nrf2 indicated the presence of oxidative stress caused by the pesticide DDVP that alters the endocrine homeostasis of the prostate in rats.

ID: 11282

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 EARLY EXPOSURE TO PHTHALATES CAUSES IMBALANCES IN
STEROIDOGENESIS OF SENESCENT RATS**

The adrenals are responsible for producing hormones that maintain the homeostasis of organism. In this sense, external factors such as endocrine disrupting chemicals (EDCs) exposure during their development can trigger important disturbances in the endocrine physiology throughout life. Phthalates are a group of chemicals used as plasticizers to impart malleability and flexibility in consumer products. Assuming that phthalates are widely disperse in the environment and can modulate the endocrine system differentiation through placental route, this study investigated whether gestational and lactational exposure a phthalate mixture could impair steroidogenesis in aged rats. Pregnant female rats were divided into 3 groups: C (control: corn oil); T1 (20 µg/kg/day) and T2 (200 mg/kg/day). T1 and T2 were exposed to an environmental phthalate mixture, in which phthalates proportion followed that one observed in pregnant women. All the groups were treated daily (orally) from gestational day (GD) 10 to postnatal day (PND) 21. In PND540 the animals were euthanized and the adrenal glands collected to RT-qPCR analysis. The results showed that Cyp19a1 (aromatase) expression reduced in T2 in relation the other 2 groups. Cyp11a1, a precursor of steroid hormones, showed an increase in T2 vs. C, and reduction in T1 vs. T2. There was no alteration in the expression of Cyp7b1, Cyp11b1 and Star. The Hsd3b1, essential to conversion of DHEA in androstenedione, increased in T2 compared to C. Gpx1 expression, related to antioxidant response during aging, was reduced in T1 vs. T2. Sult2a1 expression, an aging marker, increased in T1 vs. T2 and vs. C. Pomc, essential in steroid synthesis and ACTH production; Ki67 and Casp3 showed no difference among the groups. The data obtained so far showed that maternal exposure to a phthalate mixture has repercussions on adrenal steroidogenesis in the aged male rats.

ID: 10883

Área Temática: Ê-POSTER | Toxicologia

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Instituição: UFSCar

FeSBE2022 EFFECTS OF ACUTE AND CHRONIC EXPOSURE TO NONYLPHENOL ETHOXYLATED ON CARDIAC OXIDATIVE STRESS BIOMARKES OF BULLFROG TADPOLES, LITHOBATES CATESBEIANUS

Amphibians have morphological and developmental characteristics that make them extremely susceptible to pollutants and good bioindicators of environmental quality. In this regard, special attention must be given to emerging contaminants (ECs) that are potentially toxic substances whose effects or presence in the environment are still poorly understood and still need to be legislated, as nonylphenol ethoxylated (NPE), a non-ionic surfactant. The aim of this study was to evaluate the impacts of acute (48 h in static system) and chronic (16 days in semi-static system) exposure to NPE, at environmentally relevant concentrations of 30 ug/L, on cardiac oxidative stress biomarkers such as superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), glutathione S-transferase (GST), reduced glutathione (GSH) and lipid peroxidation (LPO) of bullfrog tadpoles, *Lithobates catesbeianus*. Following exposures, tadpoles were euthanized with an overdose of benzocaine (CEUA/UFSCar nº #1876190520), hearts were immediately removed and stored at -80 oC until the biochemical analysis. Acute exposure induced significant decreases in the SOD (38%), CAT (40%), and GPx (41%) activities and GSH levels (70%). These changes were accompanied by significant increases in LPO levels (22%). Chronic exposure also caused significant decreases in the SOD activity (66%) and GSH content (52%), but with concomitant increases in the CAT (74%), GPx (54%), and GST (44%) activities and LPO levels (34%). Together, these findings indicate that low and realistic concentration of NPE promote oxidative stress and have a negative impact on tadpoles' heart function, jeopardizing their survival.

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ID: 11113

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 EFFECTS OF EXPOSURE FOR 60 DAYS TO HgCl₂ IN THE RIGHT VENTRICLE OF RATS

Mercury is a heavy metal with proven harmful action on the cardiovascular system. However, chronic effects on the right heart have not been fully elucidated. We investigate the effects of 60 days exposure to HgCl₂ on the right ventricle (RV) of rats. Male Wistar rats with 10 weeks (200-250g) were distributed in the groups: Ct (NaCl 0.9%) and Hg (HgCl₂: 1st dose-4.6g/kg and daily doses of 0.07g/kg) i.m. The results were expressed as mean \pm SEM and analyzed by two-way ANOVA or Student's t-test. P<0.05* was considered significant. All procedures were approved by CEUA-UFES (03/2021). Exposure for 60 days to HgCl₂, at doses close to that found in exposed humans, increased inotropic response to β -adrenergic stimulation (isoproterenol - Ct:0.13 \pm 0.01; Hg:0.18 \pm 0.02*) as well as to Ca²⁺ at concentrations 1.5mM (Ct:8.28 \pm 0.94; Hg:12.00 \pm 1.15*) and 2.5mM (Ct:13.28 \pm 0.77; Hg:16.77 \pm 1.93*), suggesting that Hg group are more permeable to extracellular calcium or myofibrils are more sensitive. The Hg group presented lower activity of the sarcoplasmic reticulum (SR) evaluated indirectly by reducing the extent of contraction in the PRP after 30 (Ct:190.99 \pm 16.32; Hg:149.41 \pm 5.94*), 45 (Ct:195.30 \pm 15.60; Hg:151.36 \pm 5.95*), and 60 seconds (Ct:200.23 \pm 17.44; Hg:150.91 \pm 5.98*). Minimal derivative showed no change, however, there was an increase in maximum force derivate, indicating greater contraction velocity (Ct:1.19 \pm 0.09; Hg:1.66 \pm 1.15*). The contraction force demonstrated a small increase, but without statistical significance. These results demonstrate possible compensatory mechanisms involving the calcium cycle that keep the contraction force of RV constant, which is not observed in acute metal exposure. In conclusion, chronic exposure to HgCl₂ alters mechanisms involving changes in SR activity, β -adrenergic response and inotropic calcium response by mechanisms not yet fully elucidated, promoting harmful effects on cardiac contractility and suggesting that mercury is a risk factor for CVDs.

ID: 11106

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 EFFECTS OF SETTLEABLE ATMOSPHERIC PARTICULATE MATTER FROM AN INDUSTRIAL AREA ON HEMATOLOGICAL AND PHYSIOLOGICAL BIOMARKERS OF BULLFROG TADPOLES

Atmospheric particulate matter (PM) is a major air pollutant that is harmful to human health. Settleable PM (SePM) comprises several metallic contaminants which can be water dispersed after settling and inducing harmful impacts on aquatic biota. The aim of this study is to evaluate the effects of short-term exposure (96 h) of an environmentally relevant SePM concentration (1 g/L) on hematological and physiological parameters of bullfrog tadpoles (*Lithobates catesbeianus*) at Gosner stage 25 (CEUA/UFSCar nº 4046210222). SePM samples were collected in Ilha do Boi in the city of Vitória, Espírito Santo state (ES), Brazil, which is one of the main locations used for processing and exporting iron ore in Brazil. SePM exposure induced significant ($p < 0.05$) increases in the total blood cells (90%), hemoglobin concentration (16%), heart rate (20%), and hepatosomatic index (14%). Changes in blood parameters are the early detectable variations under stress conditions and suggest that tadpoles have a mechanism to improve oxygen transport probably because of its increased demand against SePM exposure. Increased hepatosomatic index reflects some intensification in detoxification processes associated with the exposure to metals. The acceleration in the cardiac frequency in response to SePM, despite being an energy-demanding process, seems to represent a strategy to improve cardiac performance and promote an adequate xenobiotic's detoxification. Together, these findings indicate that the exposure of *L. catesbeianus* to SePM during the larval phase could lead to alterations in their health status.

ID: 11305

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 EVALUATION OF THE EFFECTS OF DIPEP ON THE VERO RENAL CELL LINE

Phthalates are synthetic plasticizers present in the daily lives of humans, as part of the composition of various products such as plastic pots, water bottles, toys, and others. Exposure occurs easily since phthalates are not covalently bound to plastic polymers, making this contaminant free to migrate from plastic materials to the environment, which can cause endocrine disruption, reproductive and neural toxicity, and also changes in fetal formation. The assessment of the toxicity of di-isopentyl phthalate (DiPeP) is fundamentally important because to have a lack of data on the renal effects of this phthalate. DiPeP was described only in Brazil, and metabolites were found in the urine of pregnant women. The objective of this study was to evaluate the toxicity of DiPeP in the Vero renal cell line, determining if DiPeP causes cytotoxicity, alters the response of the antioxidant system, or induces apoptosis. The Vero cells were exposed to the 1, 10, 100, and 1000 μM of DiPeP for 24 and 72 h. A control group with only the culture medium and another solvent control group with 0.1% DMSO were maintained during the exposure. After exposure, the cytotoxicity parameters were analyzed, evaluation of the apoptosis-inducing potential, and analysis of the antioxidant system (SOD, GPx, GST, and GSH). The results showed that DiPeP did not cause cytotoxicity, did not induce apoptosis and did not alter the antioxidant system. However, cell death was observed after 24 hours of exposure. This result demonstrates that phthalate caused cell death by a different mechanism than the one tested in this study, therefore, it is important to investigate other toxicity parameters for a better understanding of the occurrence of cell death.

ID: 11188

Área Temática: Ê-POSTER | Toxicologia

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Instituição: UFES

FeSBE2022 EXPOSURE FOR 60 DAYS TO HgCl₂ REDUCES REACTIVITY OF SMALL PULMONARY ARTERIES OF RATS

Both acute and chronic exposure to mercury have been associated with an increased risk of developing CVDs and recent studies have shown that the lungs are a target organ for HgCl₂ deposition. Therefore, our objective was to investigate the vascular changes promoted by HgCl₂ on the pulmonary arteries. Male rats with 10 weeks (200-250g) were divided into two groups: Control (NaCl 0.9%) and Mercury (HgCl₂: 1^a dose - 4.6g/Kg and daily replacement doses of 0.07g/Kg), via i.m. After 60 days of exposure, the lungs were removed and the 2nd and 3rd order pulmonary arteries were dissected. Concentration-response curves for U46619 (TXA₂ receptor antagonist) were performed in the presence and absence of some drugs. Results are presented as mean±SEM followed by two-way ANOVA. P<0.05* was considered significant. All procedures was approved by CEUA-UFES (03/2021). Exposure to HgCl₂ for 60 days did not change body or lung weight, however, reduced vascular reactivity of pulmonary arteries (Rmax: Ct-95.7±3.5; Hg-76.0±7.5*). In the presence of L-NAME there was an increase in vascular reactivity in both groups, however, in a higher proportion in Mercury when compared to the Control group (Rmax: Ct-95.7±3.5, Ct+L-NAME-103.8±2.4* and Hg-76.0±7.5, Hg+L-NAME-104.6±4.5*). When blocking NADPH oxidase with VAS2870, no difference was observed between groups (Rmax: Ct-95.7±3.5; Ct+VAS-92.0±1.6 and Hg-76.0±7.5; Hg+VAS-80.2±4.3). However, SOD, an important antioxidant enzyme, when incubated leads to an increase in vascular reactivity in the exposed group (Rmax: Ct-95.7±3.5; Ct+SOD- 90.7±3.0 and Hg-76.0±7.5; Hg+SOD-104.4±9.7*) indicating greater conversion of O₂⁻ to H₂O₂ in the Mercury group. These results demonstrated that chronic exposure to HgCl₂ leads to reduction in vascular reactivity off small pulmonar arteries by increased NO and H₂O₂ production. This can lead to lung injury and consequently increase the risk of developing CVDs.

ID: 11121

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 GILL BIOCHEMICAL BIOMARKERS EVALUATION IN POECILIA
RETICULATA EXPOSED TO IRON OXIDE NANOPARTICLES (Γ-FE₂O₃)
ASSOCIATED WITH GLYPHOSATE**

Citrate-coated iron oxide nanoparticles (IONPs) have magnetic properties and potential to decontaminate aquatic environments exposed to toxic substances, however its toxicology effect needs to be evaluated. This study analyzed the toxicity of IONPs compared to the toxicity of Fe⁺³ ions to test the safety in the use of these particles. We also evaluated IONP exposures with Roundup Original, an herbicide glyphosate based (GBH), and on pure glyphosate (GLY), using gill tissues and biochemical biomarkers (catalase, glutathione peroxidase, glutathione s-transferase, reduced glutathione levels and lipid peroxidation), from female *Poecilia reticulata* exposed to: FeCl₃ (0.3 mg Fe/L) and IONPs (0.3 mgFe/L) associated with GLY (0.65 mg/L) and GBH (0.65 mgGLY/L (IONP+ GBH1) and 1.30 mgGLY/L (IONP + GBH2) for a period of 7, 14 and 21 days (UFG ethics committee number 046/2017). For exposure at 7 days, the study found all treatments lead to GPx activity inhibition and GST activity inhibition in IONPs and IONP+GLY treatments. In 14 days exposure, were observed an increase in GST activity in IONP+ GBH1 treatment and GSH content in all treatments, except for IONPs, and the presence of lipoperoxidation effects. In 21 days of exposure, we found GPx activity inhibition and GSH content depletion in IONP + GBH1 and IONP + GBH2 treatments. No differences were observed between treatments in CAT activity in the three biological exposure times. The results demonstrate the potential of all treatments to promote oxidative damage and an instability in biochemical responses of *Poecilia reticulata* to IONP and herbicides. Finally, this study concludes that the use of gill biomarkers in the assessment of toxicity of nanomaterials is an essential tool to comprehend cell biochemical detoxification mechanisms and co-exposure effects of different contaminants.

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ID: 10531

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 GLYPHOSATE-BASED HERBICIDE (GBH) EXPOSURE ALTERS THE
EXPRESSION OF GENES CONTROLLING THE HYPOTHALAMIC-PITUITARY-
THYROID (HPT) AXIS**

GBH is a nonselective herbicide used in agricultural crops to control weed growth, especially in genetically modified seeds. Its large use raises concerns about adverse health effects, including the endocrine system. Thyroid hormones are essential in numerous physiological processes, and peripuberty is a period sensitive to endocrine disruption. The aim of this study was to analyze the expression of genes (mRNA) related to the control of the HPT axis in sixty male Wistar rats exposed to 0, 0.5 or 5 mg of GBH/kg BW/day (Roundup Transorb R, Monsanto, Brazil) by gavage from postnatal day 23 (PND23) to PND60 or PND90 based on the prepubertal protocol. At PND60 or PND90, animals were euthanized, tissues were collected and maintained at -70°C. Transcript expression of the genes in the hypothalamus [Dio2, Dio3, Mct-8, Thra1, Thra2, Thrb2 and Trh] and pituitary [Dio2, Dio3, Mct-8, Thra1, Thra2, Thrb2, Trhr and Tshb] was performed by reverse transcription followed by real-time PCR. Rpl19 and Actb were used as internal controls. Data were analyzed by two-way ANOVA followed by Dunnett's post-hoc test (009/2021–CEUA/UNICENTRO). For the hypothalamus, the comparison among the ages showed reduced mRNA of Thra1, Dio2 and Dio3 at PND90. The comparisons among the groups showed reduced expression of Thra1 and Dio2 in the 5 mg GBH group at PND90. The expression of Thra2 was reduced in the 5 mg GBH group at PND60 and at PND90 in the 0.5 and 5 mg GBH groups. For the pituitary, the comparison among the ages showed an increase in the expression of Thra1 at PND90 and a reduction in Dio3 at PND90. The comparisons among the groups showed an increase in the expression of Thra1 in the 5 mg GBH group at PND60, a reduction in the expression of Dio2 in the 0.5 mg GBH group at PND60 and in the 5 mg GBH group at PND90, and a reduction in the Mct8 in the 0.5 mg GBH group at PND60 and PND90. GBH exposure during a sensitive window of development alters the expression of important genes of the HPT axis.

ID: 11279

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 GLYPHOSATE-BASED HERBICIDE INDUCES AVOIDANCE BEHAVIOR IN EARTHWORMS WITHOUT ALTERING METABOLIC AND IMMUNE PROFILES

The application of glyphosate-based herbicides (GBH) threatens the balance of the edaphic ecosystem. The earthworms behavior can be used as bioindicator to study soil functionality. This study aimed to verify whether exposure to agronomic concentrations of GBH induces avoidance behavior in earthworms and affects their metabolic and immune profiles. We used 144 adult earthworms ($0.250 \pm 0.05\text{g}$) *Eisenia fetida*, with apparent clitellum, divided into four groups: soil without GBH (CTRL group) and earthworms exposed to GBH (Roundup®, Original DI, Monsanto - 44.5% m/ v active ingredient) at concentrations equivalent to 1.5, 3.0 and 6.0 L/ha (GLY1.5, GLY3, and GLY6 groups, respectively) (3,0 L/ha mimetizes the agronomic use). To evaluate the avoidance behavior, experimental units (EU) (600g, 95% dystrophic red latosol:5% organic matter) were prepared with six 6 earthworms each, and were divided in one side with respective GBH dose and other side with water. The CTRL group received only water on both sides. After 48 hours, the animals on each side were collected separately and the avoidance response was calculated: $RL = [(CT)/6*]100$. GBH induced avoidance behavior at the highest dose (GLY6 = 83.3 ± 18.2 vs. CTRL = -27.7 ± 61.1 , GLY1.5 = 55.5 ± 50.2 , GLY3 = 44.4 ± 50.2 80.7, $P=0.012$). There were no alterations in body mass ($P=0.390$), total body protein concentration ($P=0.645$). Also, the coelomocytes protein concentration ($P=0.990$), total cell count ($P=0.120$) and viability of coelomocytes ($P>0.05$) of earthworms were not influenced in this protocol. We conclude that GBH exposure at higher doses than recommended (6L/ha) induces avoidance behavior in earthworms. These results indicate that earthworms are able to avoid the GBH exposure to protect against metabolic effects, however, this alteration on animal behavior may induce loss of the ecological function of the soil.

Keywords: Glyphosate-based herbicides, glyphosate, avoidance, earthworms.

ID: 11129

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 IN VITRO AND IN VIVO ANTIPROLIFERATIVE AND TOXICITY
PROFILE OF AN ETHYL ACETATE EXTRACT FROM STEVIA URTICIFOLIA
USING TRADITIONAL TECHNIQUES AND SUBSTITUTIVE METHODS**

Stevia urticifolia Thunb. is an underexploited herb with bioactive flavonoids, saponins, and terpenoids. Herein, we investigated the antiproliferative and toxicogenetic properties of the ethyl acetate extract from *Stevia urticifolia* aerial parts (EtAcSur) upon *Artemia salina*, erythrocytes, *Allium cepa* and Sarcoma 180 cells and fibroblasts, as well as in vivo studies on mice to determine systemic, macroscopic, and behaviour alterations and bone marrow chromosomal damages (CEUA-UFPI #008/2015 and #0555/2019 / SisGen #AF467FD). The assessment on *A. salina* larvae and mice blood cells revealed LC50 and EC50 values of 68.9 and 113.6 µg/mL, respectively. Root growth and mitosis were inhibited by EtAcSur, but chromosomal aberrations were detected at 100 µg/mL only. EtAcSur presented strong concentration-dependent viability reduction of S180 and L-929 cells as determined by trypan blue exclusion test and antioxidant capacity upon free radicals (ABTS• and DPPH•). No previous in vivo studies were performed before with the EtAcSur. Signals of acute toxicity were not observed at 300 mg/kg according to the OECD 423 guideline. Physiological and toxicological investigations at 25 and 50 mg/mg/day i.p. for 8 days did not display changes in body or organ relative weights, and the pattern of spontaneous locomotor activity and exploratory aspects were not altered when evaluate by elevated plus maze and open field protocols. On the other hand, clastogenic effects on bone marrow were found at 50 mg/mg/day. So, EtAcSur showed toxicity on microcrustaceans, capacity as free radical scavenger, antimitotic, cytotoxic and clastogenic activity upon vegetal and mammalian cells, and it kills tumor and normal murine cells indistinctly. In vivo damage systemic effects were slight and clinical signals of toxicity were not observed, suggesting the great pharmacological potential of *S. urticifolia* for the development of antineoplastic agents.

ID: 11238

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 INFLUENCE OF MATERNAL EXPOSURE TO CHLOROQUINE IN
SEXUAL PARAMETERS OF FEMALE RAT PUPS**

Chloroquine (CQ) is a drug prescribed for the treatment of malaria and recommended for autoimmune diseases, but it became popular due to the SARS-CoV-2 pandemic. The literature shows that chronic CQ treatment in female rats leads to an alteration of estradiol binding and action in target organs. Likewise, both sexual development and maternal behavior observed in female rats require adequate concentrations of this hormone. Thus, the present study evaluated if the maternal exposure to CQ can compromise the maternal behavior and reproductive parameters of the female offspring. Adult Wistar female rats received CQ 24mg/kg/day (n=12) or distilled water (Control dams n=11; vehicle), from gestational day (GD) 15 until GD21, by gavage. The maternal behavior was evaluated on lactational day 5 and 10, and some parameters were observed, as time spent on nest building and the latency to retrieve the first pup for the nest. Also, on postnatal day (PND) 21, the development of female pups was evaluated, by the anogenital distance (AGD) and from PND30, the onset of puberty was determined. From PND75 to PND89 the estrous cycle was monitored. Results were considered statistically significant if $p \leq 0.05$ and compared by Student t-test, Fisher's exact test or Mann-Whitney U. (CEUA/UEL: 063.2020). The results show a significant increase in the relative AGD in the CQ24 group compared to control one (CTR: 2.77 ± 0.28 ; CQ24: 3.16 ± 0.31 mm/g^{1/3}, Mann-Whitney U, $p = 0.006$). The other parameters are similar between the groups. It is known that AGD is a marker of endocrine disruption. In females, a longer AGD is a masculinizing factor, suggesting an excessive increase in androgens or ectopic activation of androgen receptors. Also, further studies are needed to show if CQ is an endocrine disruptor.

ID: 11173

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 INVESTIGATION OF REPRODUCTIVE PARAMETERS IN MALE RATS EXPOSED TO THE PSYCHOSTIMULANT LISDEXAMFETAMINE FROM THE JUVENILE PERIOD TO PERIPUBERTY

Attention deficit hyperactivity disorder (ADHD) is one of the most commonly diagnosed neuropsychiatric disorders in school-age children, in which catecholamine neurotransmission is impaired, thus pharmacological treatment aims to increase levels of neurotransmitters through psychostimulants. Amongst the most used drugs is Lisdexamfetamine Dimesylate (LDX) that, despite its benefits, can compromise gonadal function and the regulation of various hormonal pathways due to its effect on neurotransmitters levels (DA and NA), possibly causing damage to the male reproductive function. The aim of this study was to evaluate the effects of LDX exposure during the juvenile period and peripuberty on the reproductive parameters of male rats in adulthood. (CEUA: 3148130421) 40 male Wistar rats were distributed in 4 experimental groups: control (deionized water) and 3 groups of different LDX doses (5.2, 8.6 and 12.1 mg/kg), treatment occurred in 31 consecutive days (PND 23 to 53). Signs of toxicity and puberty onset were evaluated during the treatment, sexual behavior (PND 90), fertility and spermatic parameters in adulthood were also evaluated. Results showed a reduction in the average daily food and water intake in the experimental groups. The higher dose group also had a significant reduction in body weight from the 15th day of treatment. Male sexual behavior and organ weights did not differ between groups. The fertility tests showed reduced placental weight, increased percentage of fetuses small for gestational age, increased number of corpora lutea, implantations and number of live fetuses in the 12,1 mg/kg group. The spermatic parameters analysis showed an increase in type C sperm (immobile) in the animals exposed to 8,6 mg/kg of LDX and hematological alterations in the lowest dose group. Thus, so far, LDX was able to negatively impact some important parameters related to reproductive function of the animals, but other analyses should be conducted to enrich these statements.

ID: 11174

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 LEAD TOXICOKINETIC IN PREGNANT RATS EXPOSED TO AGARICUS BISPORUS MUSHROOM

Lead (Pb) is a heavy metal, highly toxic, responsible for inhibiting enzymes, especially heme synthesis. Environmental contamination by Pb is a public health issue and its illegal disposal provides direct contamination of people, causing neurological effects on development in children, and cardiovascular effects in adults. Agaricus bisporus (Ab) is a mushroom with the potential to be used as a protective agent, due to its high content of antioxidants. Thus, the objective of this study was to quantify the Pb present in blood and tissues of pregnant rats exposed to Ab, to understand the toxicokinetic of Pb, and the potential of Ab as a protective agent. Healthy female Wistar rats (CEUA/UNISO 175/2020) were used. The animals were randomly divided into 4 groups (n = 5 per group): Group I - Control; Group II – Ab 100 mg/Kg; Group III – Pb 100 mg/L; Group IV – Ab+Pb -100 mg/Kg +100 mg/L. The exposure to Pb was made in water and to Ab, orally, by gavage was carried out until the 19th day. At the end of the experiment, animals were euthanized with ketamine and xylazine. Blood and tissues were collected for Pb measurement in an Inductively Coupled Plasma Mass Spectrometer. The results showed there was lead concentration in blood, placenta and liver increased significantly in the Pb group. On the other hand, the Pb + Ab group showed a significant decrease in metal compared to the Pb group, returning to normal levels (as it did not differ from the control). Pb concentration in kidney and bone also increased significantly in the Pb group. However, in the Pb+Ab group the levels did not return to the similarity of the control group. There was protection, but the concentration was still significantly higher than the control. In brain, no significant differences were observed. In conclusion, we suggest the antioxidant properties present in the mushroom Agaricus bisporus minimized the Pb absorption and distribution in blood and tissues of exposed animals, showing reduction of Pb concentration in animals that received the mushroom.

ID: 11277

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 MARKERS OF HEPATIC METABOLIC STRESS IN RATS EXPOSED TO
GLYPHOSATE BASED-HERBICIDES (GBH)**

Glyphosate-based herbicides (GBHs) are the most used pesticide worldwide and are related to the development of metabolic stress in non-target organisms' tissues. The Brazilian Health Regulatory Agency (ANVISA) determines that the Acceptable Daily Intake (ADI) of GBHs for humans is 0,5 mg/Kg bw/day. However, the security of this dose has been questioned. Since it is well know that liver is a metabolic organ responsible for the detoxification of the organism, this study aimed to evaluate whether ADI-GBH induces oxidative and metabolic stress in liver tissue. Twelve adult male Wistar rats (3 months-old, 318 ± 33 g) were allocated into control group that received water (CTRL, n=6) and animals that received ADI-GBH dose in drinking water for 11 weeks (Roundup®, Original DI, Monsanto - 44,5% m/v active ingredient, GLY group, n=6). There was a reduction of 15,7% in the total liver protein concentration in exposed animals (GLY = $21,32 \pm 1,52$ vs. CTRL = $25,30 \pm 2,45$ [mg/mL], P = 0.014), without modifications on the relative weight of tissue (GLY = 0.031 ± 0.002 vs. CTRL = 0.033 ± 0.007 g tissue/g body weight, P=0.560). There was no alterations on glycemia (P=0.899) and in the glucose tolerance test (P=0.381). Also, the liver enzymes aspartate aminotransferase (P=0.459), Alanine aminotransferase (P=0.422) and were not affected by GBH. The exposure to GBH on ADI dose in drinking water does not induce alteration in metabolic stress markers in liver tissue but causes a reduction in the concentration of proteins, which may indicate an unbalance in cellular and tissue metabolism that remains to be investigated. (Ethical approval nº 025-19).

Keywords: Herbicides; Glyphosate; Toxicology; Liver; Metabolism.

ID: 11302

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 MATERNAL EXPOSURE TO A PHTHALATE MIXTURE IS ABLE TO
CHANGE THE MORPHOLOGY AND STEROIDOGENESIS OF THE ADRENAL
GLAND IN PREPUBERTAL AND ADULT RATS**

The adrenal glands synthesize and secrete hormones that are essential for various biological processes. Morphologically, adrenals are composed for cortical and medullar regions. Currently, substances with anti-androgenic action, such as phthalates, are responsible for triggering morphological and molecular alterations, which generate impairments in the development and physiology of different hormone-dependent organs. Considering the high physiological activity of adrenal and the mechanism of action of phthalates, this study seeks to evaluate whether maternal exposure to a phthalate mixture impairs the morphophysiology of the adrenals in prepubertal and adult male rats. Pregnant females (DG0) were randomly divided into 4 experimental groups: C: control (corn oil); T1:20µg/kg/day, T2:200µg/kg/day and T3: 200mg/kg/day of the phthalate mixture. Mixture was based in the concentration of 6 main phthalates found in urine of pregnant women. All the groups were treated daily (orally) from gestational day (GD) 10 to postnatal day (PND) 21. At PND22, sterological analysis demonstrated significant increase in the volume of the zona glomerulosa (ZG) in T2 vs. C, increase in the volume of the zona fasciculata (ZF) in T1 and T3 vs. C and, reduction in the volume of the zona reticularis (ZR) in the T1 and T3 vs. C. At PND120 there was an increase in the volume of the medullar region and decrease of the cortical region in T3 vs. C. Increase in the volume of the ZF in T1 and T3 vs. C and reduction of the ZR in T1 and T3 vs. C were observed. Testosterone and estradiol levels were decreased only at PND22 (T1 vs. C). Gene expression analyses showed increase in aromatase expression at PND22 (T1 and T3 vs. C) and decrease at PND120 (T1-T2 vs. C). Srd5a3 expression increased (T2-T3 vs. C) at PND22 and decreased at PND120 (T1-T3 vs. C). Our results demonstrated that gestational and lactational exposure to phthalates impairs adrenal morphophysiology in prepubertal and adult rats.

ID: 11232

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 MATERNAL EXPOSURE TO CHLOROQUINE: REPRODUCTIVE
PARAMETERS IN MALE RAT OFFSPRING.**

According to the Developmental Origins of Health and Disease, maternal exposure to drugs might affect the functional development of organs, increasing the risk of disease development at adulthood. Chloroquine (CQ) is a drug commonly prescribed for the treatment of malaria and is also being widely studied because of the pandemic caused by SARS-CoV-2. Although CQ crosses the placenta and can be present in fetal circulation, this drug has been considered safe. However, the maternal treatment with CQ causes an increased seminiferous tubule diameter and a reduction in the population number of Leydig cells, and plasma testosterone concentrations in male rat pups. In this way, the present study aimed to evaluate the reproductive parameters of male rat exposed to CQ during the early stages of the development. Adult Wistar female rats received CQ 24mg/kg/day (n=12) or distilled water (Control dams n=11; vehicle), from gestational day (GD) 15 until GD21, by gavage. From postnatal day (PND) 21 until PND120, the following parameters were evaluated: anogenital distance (AGD), the onset of puberty, the sperm motility and viability. Results were considered statistically significant if $p \leq 0.05$ and compared by Student t-test, Fisher's exact test or Mann-Whitney U (CEUA/UEL: 063.2020). All the parameters evaluated were similar between CQ24 and control groups, such as sperm motility (CTR: 43.5 ± 19.5 ; CQ24: 53.8 ± 13.7), showing that exposure to CQ during development induced no significant alteration in reproductive parameters of male offspring in early life and adulthood. It is suggested that the dose used can be considered safe for these parameters, and it is important to highlight that this study employs human-relevant dose. However, further studies should be necessary to confirm the security of the drug.

ID: 11184

Área Temática: Ê-POSTER | Toxicologia

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**FeSBE2022 MORPHOLOGICAL ABNORMALITIES OF OFFSPRING FROM
PREGNANT RATS EXPOSED OR NOT TO LEAD AND THE MUSHROOM
AGARICUS BISPORUS**

Lead (Pb) is a toxic metal with no known essential role in cell growth, proliferation or signaling. Exposure to Pb during early gestational development has been associated with cognitive deficits in children and delayed nervous system development. Agaricus bisporus (Ab) is a mushroom with the potential to be used to reduce the effects of Pb due to its high content of antioxidants and the presence of chitin and chitosan, substances with chelating capacity. Here, the aim was to evaluate the effects of Agaricus bisporus during Pb exposure in the gestation period. Offspring from female rats exposed to Pb and treated with Ab during the gestation period were evaluated. Healthy female Wistar rats (CEUA/UNISO 175/2020) were used. The animals were randomly divided into 4 groups (n = 5/group): Group I - Control; Group II – Ab 100 mg/Kg; Group III – Pb 100 mg/L; Group IV – Ab+Pb (100 mg/Kg +100 mg/L) Exposure to Pb (drinking water) and to Ab (gavage) were performed until the 19th day. At the end of the experiment, the animals were euthanized with was performed until the 19th day. At the end of the experiment, the animals were euthanized with ketamine and xylazine. After the embryo sac ruptured, the fetuses were euthanized, weighed and analyzed using external morphometric measurements. The results showed there was a reduction in the cranium anteroposterior length in the Pb+Ab group in relation to the Control and Pb groups. Thorax laterolateral measurement were higher in all groups in relation to Control. And the thorax anteroposterior length was increased in the Ab and Pb+Ab groups compared to Control. Cranium-caudal and tail parameters did not suffer alterations comparing all groups. In conclusion, both Pb and mushroom induced alterations in morphological measurements. The co-exposure of Pb and the mushroom Agaricus bisporus did not appear to protect the offspring; however, others parameters should be considered.

ID: 11214

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 PYRIPROXYFEN DO NOT SHOW ESTROGENIC ACTIVITY AND IT IS NOT ABLE TO CHANGE THE AGE OF PUBERTY INSTALLATION IN FEMALE MICE

Pyriproxyfen (PPF) is a larvicide used in agriculture and in drinking water to control disease-bearing mosquitoes. Previous studies have demonstrated that PPF is a possible endocrine disruptor. This study aimed to analyze the effects of exposure to PPF on female puberty installation and to evaluate its estrogenic activity. For this, Swiss female mice on postnatal day (PND) 23 were randomly distributed into three experimental groups (n= 10 per group): control (received vehicle) or PPF diluted in a vehicle at the doses of 0.1 or 1 mg/kg, respectively. Since PND 23, vaginal opening and first estrus were monitored daily, followed by body mass measurement on the day of puberty installation. In addition, the body mass gain, food, and water ingestion were monitored during the experiment. In parallel, the uterotrophic assay was performed, where females on PND 18 were distributed into five experimental groups (n= 7 per group), that received the treatments for three days: negative control (vehicle), PPF at the doses of 0.01, 0.1, or 1 mg/kg; and positive control (17 β -estradiol). Twenty-four hours after the last administration, the mice were euthanized and the uterus with and without fluid, ovaries, oviducts, adrenal glands, kidneys, and liver were collected and weighed. The experiment was approved by the CEUA-UFSC (protocol number 1963200721). One-way ANOVA was used with Tukey's post-hoc test and differences were considered significant when $p < 0.05$. The age of vaginal opening and first estrus were similar among the experimental groups and the treatment did not change the body mass, food, and water consumption of the animals. In relation to the uterotrophic assay, as expected, the treatment with 17 β -estradiol caused an increase in uterus weight with and without fluid, although PPF did not show estrogenic activity in the test. In summary, PPF showed to be not estrogenic and was not able to change the age of puberty installation in female mice.

ID: 11053

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 SETTLEABLE ATMOSPHERIC PARTICULATE MATTER INDUCES STRESS AND AFFECTS THE OXYGEN-CARRYING CAPACITY AND INNATE IMMUNITY IN FAT SNOOK (CENTROPOMUS PARALLELUS)

The steel industry is a significant source of atmospheric particulate matter responsible for air-to-water cross-contamination, which deposits metal/metalloid contaminants in aquatic ecosystems. Such source of contamination is not observed by legal monitoring agencies. Currently, settleable atmospheric particulate matter (SePM) has been demonstrated to have harmful sublethal impacts on fish, affecting gills tissue, respiration pattern, and aerobic capacity. We suggest that although sublethal, such changes can cause relevant ecological impacts at the population level, since they lead to a reduction in fish performance. We have evaluated the effects of an environmentally relevant SePM contamination produced by the iron processing industrial complex near Vitória-BR in a local representative fish, the fat snook (*Centropomus parallelus*). After acclimation, 48 fishes (61.67 ± 27.83 g) were exposed for 96 h to increasing levels (0.01, 0.1 and 1 g/L-1) of SePM. We analyzed blood biomarkers to evaluate functional indices related to oxygen transport capacity, immune activity and stress. There was 100% survival of fish. SePM exposure reduced blood oxygen carrying capacity by reducing hematocrit, hemoglobin, erythrocyte, and mean corpuscular hemoglobin concentration. SePM exposure also impacted elements of immune activity by reducing the number of leukocytes and thrombocytes; total plasma protein and leukocyte respiratory activity, increasing lysozyme concentrations. Furthermore, SePM elicited endocrine stress response, raising plasma cortisol and glucose. That alteration is directly related to SePM stress and reinforces the reported immune imbalance. The observed effects were related to SePM concentration. The observed changes may threaten both the ability to sustain aerobic metabolism and respond to pathogens. Unless these are not overcome, it might affect the fitness of fish population.

Keywords: Steel industry; Metals/Metalloids; Nanoparticles; Environmental risks; Physiological responses; Immune responses; Health status.

ID: 10889

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 THE COMBINING EFFECT OF SETTLEABLE ATMOSPHERIC PARTICULATE MATTER AND SWIMMING EFFORT IN THE GILL MORPHO-FUNCTIONAL STRUCTURE OF NILE TILAPIA (OREOCHROMIS NILOTICUS)

The settleable atmospheric particulate matter (SePM) delivered by iron ore processing has been described as a highly complex contaminant that may affect the air and aquatic environments. Such air-to-water crosscontamination causes a sublethal effect in fish which legal monitoring agencies have not been able to observe. Although SePM does not lead to immediate mortality, recent evidence pointed out that it may limit the fish performance in dealing with ecologically relevant challenges such as hypoxia, temperature change, interspecific interactions, and post-prandial metabolic increment, and others. A relevant ecological impact might be projected at the populational level if SePM limits the morpho-functional aspects of fish physiology. We evaluated the effect of environmentally relevant SePM contamination ($1 \text{ g}\cdot\text{L}^{-1}$ - produced by the iron processing industrial complex near Vitória – BR) on the gill morphology and the ionic balance of Nile tilapia, *Oreochromis niloticus* ($110 \pm 98\text{g}$). Additionally, we analysed how SePM affects gill structural adjustments to deal with a high metabolic demand elicited by swimming. SePM exposure caused gill remodelling at rest and differential gill alterations after swimming. The observed ions imbalance pointed up that essential gill functions were compromised. Such functional impairment was increased after swimming. In conclusion, short-term (96h) SePM contamination did not cause immediate lethality. However, the observed gill dysfunction might compromise fish populations due to limitations in physiological performance. These may compromise the fish's performance to cope with relevant challenges. The osmoregulation problem might impact the fish's energetic cost. Besides, it is also relevant for environmental use in the estuarian area affected by SePM. Unless the alteration is compensated, we may project harmful effects on long-term survival.

ID: 11338

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 THE EVALUATION OF EFFECTS OF EXPOSURE TO CIGARETTE SMOKE AND ELECTRONIC AEROSOL IN ADULT C57BL/6 MICE

Electronic cigarette (e-cig) were created as an alternative for smokers. The study aimed to evaluate chronic e-cig and smoke cigarette (SC) exposure in adult C57BL/6 mice. Animals were divided into 6 groups: Control Female Group (CFG) and Control Male Group (CMG); Conventional Cigarette Female Group (CCFG) and Conventional Cigarette Male Group (CCMG); Electronic Cigarette Female Group (ECFG) and Electronic Cigarette Male Group (ECMG). The animals were exposed for 60-days to SC (12 cigarettes/day) or E-cig (12 cycles/day). After, they had a recovery time (60-days). 24 hours after experimental protocol (CEUA N° 328711120), the ventilatory parameters [respiratory rate (RR) (breaths/mintidal volume (TV) (mL), and minute ventilation (MV) (mL/min)], Bronchoalveolar Lavage Fluid (BALF) [leukocytes(x105 cells/mL)], and lungs [morphometrical analysis as mean linear intercept (Lm- μ m) and stereological analysis (%)] were collected. Ecig showed an increase in RR (ECFG=189 \pm 6; ECMG=180 \pm 5; CFG=173 \pm 6; CMG=169 \pm 9) and MV (ECFG:55.9 \pm 2.0; ECMG=63 \pm 3; CFG=48 \pm 4; CMG=47 \pm 5) compared to controls. TV increased in CCMG(0.33 \pm 0.03) and ECMG(0.35 \pm 0.01) compared to CMG(0.28 \pm 0.03). SC and e-cig increased macrophages (CFG=3,7 \pm 0,6; CCFG=7.2 \pm 0.6; ECFG=5.6 \pm 0.7; CMG=3,5 \pm 1,6; CCMG=7.5 \pm 1.1; ECMG=7.1 \pm 0.8) and lymphocytes (CFG=0,06 \pm 0,02; CCFG=0,9 \pm 0,1; ECFG=3 \pm 1,06; CMG=0,06(0,02-0,1); CCMG=1(0,7-1,5); ECMG=1,3(1-1,5). Neutrophils increased in CCFG [0,4(0,4-2,6)], ECFG [0,4(0,2-0,7)] compared to CFG[0,02(0,0-0,04)] and in CCMG [1,7(0,8-1,7)] compared to CMG [0,01(0,0-0,03)]. E-cig and SC increased Lm compared to control groups (CFG=151 \pm 2; CCFG=249 \pm 3; ECFG=331 \pm 3; CMG=215 \pm 2; CCMG=381 \pm 3; ECMG=429 \pm 4). E-cig increased the volume density of alveolar air space in both sexes, and SC increased this parameter in males compared to control [(CFG=57(56- 62), CCFG=63(62-65); ECFG=77(76-80); CMG=59(58-61); CCMG=70(63-75) ECMG=77(74-79)]. The results showed that chronic exposition to SC and e-cig cause damage in the lung.

ID: 11196

Área Temática: Ê-POSTER | Toxicologia

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FeSBE2022 THE IMPACT OF SEX ON GENETIC INSTABILITY IN PROFESSIONALS OCCUPATIONALLY EXPOSED TO HIGH LEVEL OF ANESTHETIC POLLUTION

Occupational exposure to waste anesthetic gases (WAG) may be associated with toxic effects on professional's health. Controversial findings related to genetic instability and occupational exposure to WAG are reported in the literature, suggesting that variables such as anesthetic pollution and sex may interfere with the results. This study aimed to evaluate two important genetic endpoints in exfoliated oral cells and possible associations of exposure assessment and sex in professionals who have exposure to WAG. After approval by the Research Ethics Committee (4.063.468), 100 operating room personnel exposed to the most modern inhalational anesthetics (especially the halogenated sevoflurane and isoflurane in addition to nitrous oxide gas - exposed group) and 93 individuals not exposed to anesthetics (control group) were recruited. All participants signed the informed consent form and answered a detailed questionnaire. Oral cells were obtained from all subjects for evaluation of the buccal micronucleus - MN and nuclear bud - NBUD as biomarkers of effect. Additionally, concentrations of WAG were measured in the professional's breathing zone in the operating rooms without adequate scavenging systems; concentrations greater than exposure limits recommended by international regulations were detected. Demographic data did not differ between groups ($p > 0.05$). Exposed group showed higher genetic instability (MN and NBUD; $p = 0.01$ and $p = 0.007$, respectively) than the control group. When analyzed by sex, genetic instability was higher in exposed women than unexposed women ($p \leq 0.04$), with no difference between groups for men ($p > 0.05$). These findings suggest that high WAG pollution is associated with increased genetic instability in occupationally exposed professionals, and sex is an important factor, which certainly contributed to the results observed. Minimize WAG exposure is important to reduce the impacts observed on the healthcare workers, especially in women.

ID: 11019

Área Temática: Ê-POSTER | Visão e Oftalmologia

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FeSBE2022 CHARACTERIZATION OF PKC α IMMUNOREACTIVE BIPOLAR CELLS IN RETINAS OF DIURNAL AND NOCTURNAL SNAKES

Visual processing in vertebrates begins in the outer retina, at the rod and cone photoreceptors. They absorb light, generating a neural signal that is transmitted to bipolar cells (BC). Nocturnal snake species have rod-dominated retinas and two or three types of cones. Diurnal species have all-cone retinas with four cone types. These differences should be reflected in the architecture of neural connections of the inner retina, but this has not yet been examined. Thus, morphological analyses of BC are needed to understand the post-receptoral pathways. In this study, we aimed to identify and compare the morphology of PKC α -BC in nocturnal and diurnal snakes. We analysed retinas of 5 snakes from 3 families: the nocturnal *Oxyrhopus guibei* (Dipsadidae), *Crotalus durissus*, and *Bothrops jararaca* (Viperidae), and the diurnal *Philodryas nattereri* (Dipsadidae) and *Chironius multiventris* (Colubridae). Snakes were euthanized (Thionembutal: IP-USP Ethics Committee, 1805090417), and eyes were enucleated and fixed in paraformaldehyde. Eyecups were cryo-sectioned and processed for immunohistochemistry. PKC α -BC were labeled, and images were taken under a fluorescence microscope. The PKC α antibody labeled different types of BC in diurnal and nocturnal snakes. In nocturnal species, the nuclei of PKC α -BC are aligned in a single row in the distal half of the inner nuclear layer (INL), and their terminals stratify in the innermost stratum of the inner plexiform layer (IPL). In diurnal species, the nuclei of PKC α -BC are located in the center of the INL and their terminals lie in two strata in the proximal half of the IPL. The PKC α -BC in nocturnal snakes corresponds to a typical rod-BC. Diurnal snakes have a distinct population of PKC α -BC. We presume that the connectivity patterns and physiology of PKC α -BC differ between these two groups. Morphological changes in the outer retina of snakes, associated with daily activity patterns, are associated with changes in the inner retina architecture.

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ID: 10870

Área Temática: Ê-POSTER | Visão e Oftalmologia

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FeSBE2022 COMPARISON OF VISUAL AND MOTOR SYSTEM DEVELOPMENT OF PRETERM TWINS AND THE INFLUENCE OF HOSPITALIZATION ON POSTNATAL AND 3-MONTH FOLLOW-UP.

Stressful environmental experiences in the Neonatal Intensive Care Unit (NICU) continue to be a crucial factor for the survival of Premature Newborns (PTNB). A meta-analysis showed that 39.4% of NB admitted to neonatal care developed neurodevelopmental delay (Lanc. 379:445,2012). Thus, we believe that the length of stay in the NICU can cause deficits in the visual and motor development of PTNB. The aims were to compare the visual functions and the motor system of twin PTNB admitted to the NICU and at 3 months of corrected age, and to verify whether there is an influence of length of stay on early development. Prospective observational study accepted by the Ethics Committee (CAAE: 08989819.2.0000.0121). The NB was evaluated with the Visual Battery by Ricci et al. (2008) for the visual functions of Spontaneous Ocular Motility (SOM) and with a Target (SOT), Fixation, Horizontal (HVT), Vertical (VVT) and Circular (CVT) Visual Tracking, Colored Stimulus Tracking (CST), Discrimination of Stripes (DS) and Distance Attention (DA) and with Teller Acuity Cards for Visual Acuity (VA) in the NICU and at 3 months of corrected age. Alberta Infant Motor Scale (AIMS) was used to assessing the motor system at follow-up. The two NBPT had a Gestational Age (GA) of 34+4 weeks, head circumference of 31 cm, birth weight of 2,300 grams, height at birth of 37 cm, adequate growth percentile for GA, both male and Apgar 8 at 1' and in the 5'. Period of hospitalization for RN1 in the NICU was 16 days and for RN2 27 days, both because of Respiratory Distress Syndrome. With 14 days of life in the NICU, what differed between the twin NB1 was the DA function, in which the NB1 scored from 30 to 50 cm and the NB2 < 30 cm and the VA of the NB1 was 0.32 and of NB2 of 0 cycles/degree. In the follow-up, NB1 had a maximum score on the Visual Battery and NB2 had incomplete CVT visual function. For VA, NB1 had a threshold of 13 and NB2 of 4.8 cycles/degree. In the motor development assessed by the AIMS, NB1 scored 11, reaching the 50th percentile for Brazilian children, and NB2 scored 7, achieving a 5th percentile. Given the gestational homogeneity and neonatal characteristics of the sample, we can infer that the length of stay in the NICU can influence the visual and motor development of PTNB, considering that NB2 presented lower values for the variables evaluated when compared to NB1.

ID: 11056

Área Temática: Ê-POSTER | Visão e Oftalmologia

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**FeSBE2022 INFLUENCE OF THE CHROMATIC NOISE ON THE LUMINANCE
VISUAL EVOKED CORTICAL POTENTIAL**

The color and luminance perception can be mutually influenced. The mechanisms of perceptual interaction between color and luminance is not clear. The present study aimed to investigate the influence of the chromatic noise on the cortical potential for luminance contrast. The electrical activity of the primary visual cortex for a stimulus that allows studying the role of chromatic noise on the cortical response to luminance contrast was recorded using gold surface electrodes positioned at the Oz, Fz and Fpz (ground) points. It was approved by the Ethics Committee on Human Research of the Tropical Medicine Nucleus of the UFPA (report 991.803). 23 volunteers (24.25 ± 1.5 years old) were tested with stimulus composed of a mosaic of circles that had different sizes (noise size) and with 10 chromaticities around a reference chromaticity ($u' = 0.219$; $v' = 0.48$) with 5° of visual angle presented using a reverse pattern with a temporal frequency of 0.5 Hz. Three noise conditions were tested: 0.06, 0.015, and 0 $u'v'$ units. Two subsets of the mosaic circles had luminances that differed from the rest of the mosaic field forming a grating of two different spatial frequencies (0.4 and 2.4 cpd). The mosaic field presented the same mean luminance as the grating (10 cd/m²). The luminance contrast between the bands that made up the grating was 30% and 80%. The electrical signal was amplified 50000 times, digitized at 1000 Hz and filtered between 0.1 and 100 Hz. The peak-baseline amplitude and latency of P1 and N1 response components were measured and tested by one-way ANOVA to compare different stimulus conditions. It was observed a waveform with two consecutive components P1 and N1 in the interval between 50 and 350 ms in all test conditions. No condition showed a significant difference in the amplitude or latency of the components as a function of the color noise magnitude ($p > 0.05$). Thus, the chromatic noise did not influence the VECP evoked by the luminance contrast.

ID: 10958

Área Temática: Ê-POSTER | Visão e Oftalmologia

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FeSBE2022 **LINEAR DISCRIMINANT ANALYSIS ON SEXUAL DIMORPHISM IN THE HUMAN RETINA**

Sexual dimorphism in the retina has already been investigated with optical coherence tomography (OCT), the studies carried out observed a greater retinal thickness in males when compared to females. However, there is no consensus on which retinal layers are thicker in men than in women. Gender differences in retinal layers should be considered for the diagnosis of retinal diseases. This research aimed to compare the thickness of the retina and retinal layers between the sexes and to identify the differences between the sexes in the retina. 27 women (26.05 ± 4.68 years old) and 26 men (26.19 ± 4.96 years old) belonging to the age group of 20 to 40 years old, with normal vision and without ocular or systemic diseases were recruited for convenience. Retinal thickness was obtained (ethics #3,285,557) with the Spectralis HRA+OCT scanner in the macular region of the total retina and layers: retinal nerve fiber layer (RNFL), ganglion cell layer (GCL), inner plexiform layer (IPL), inner nuclear layer (INL), outer plexiform layer (OPL), outer nuclear layer (ONL), retinal pigment epithelium (RPE), inner retinal layers (IRL) and outer retinal layers (ORL). A linear discriminant analysis was performed on the thickness of the retina and its layers between the male and female groups. The layers showed greater separation between groups, in decreasing order of distance between the centroids: total retina (6.50), IRL (6.38), GCL (4.00), INL (2.88), ONL (2.81), RFNL (2.03), IPL (1.35), ORL (1.33), OPL (1.14), EPR (0.60). It was observed that the more internal the retinal layer, the less overlap between the groups and the greater the probability of classifying the layers according to sex. However, the more external the retinal layer, the greater the overlap between the groups and the lower the probability of classification of the data. The innermost layers of the retina and the total retina show the greatest difference between the sexes.

ID: 11046

Área Temática: Ê-POSTER | Visão e Oftalmologia

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**FeSBE2022 THE RETINA OF ENYALIUS PERDITUS (SQUAMATA, LEIOSAURIDAE):
MOLECULAR, MORPHOLOGICAL, AND ELECTROPHYSIOLOGICAL
CHARACTERIZATIONS.**

Lizards have elaborate color vision and high visual acuity. Different ecological features of the species are associated with the retina morphology and physiology and the gene expression profile. Here, we investigated genetic, morphological and physiological aspects of retinas of *Enyalius perditus*, a diurnal lizard with intraspecific divergences in habitat use. We aimed to determine the molecular basis of color vision, to investigate the morphology of the retina and opsins expression, and to characterize the electroretinographic (ERG) profile of *E. perditus*. For now, 4 Individuals of *E. perditus* were collected, 3 of them were anesthetized with Thionembutal for in vivo scotopic and photopic ERG analysis. All the animals were euthanized with a lethal dose of Thionembutal (IP-USP Ethics Committee, 1577270421). The eyes were enucleated and fixed for morphology or preserved for RNA extraction. For morphological analyzes, the eyecups were cryosectioned, and processed for immunohistochemistry for opsins labeling. For genetic analysis, RNA was extracted, converted to cDNA and the opsin genes were amplified by PCR and sequenced. For ERG analysis, scotopic and photopic responses were recorded. We amplified and sequenced five opsin genes expressed in one retina of *E. perditus*: a rhodopsin gene (*rh1*), and four cone opsin genes, *sws1* (UV), *sws2* (blue), *rh2* (green) and *lws* (red). Using anti-opsins antibodies, we identified photoreceptors containing the opsins LWS, SWS1 and RH1. In conclusion, the identification of the five visual opsin genes expressed in the retina of *E. perditus* indicates the potential for tetrachromatic color vision. The three opsins identified in immune-stained sections were localized in cone-like photoreceptors. Despite the absence of a typical rod photoreceptor, the ERG showed scotopic responses. Furthermore, the ERG showed rapid responses consistent with those observed in diurnal animals. Our results corroborate the data observed for other species of diurnal lizards.

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ID: 10893

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Cardiovasculares*

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Instituição: UNESP

**FeSBE2022 BLOCKADE OF PERIPHERAL AT1 RECEPTORS RESTORE P2/P1
WITHOUT CHANGING INTRACRANIAL PRESSURE IN RENOVASCULAR
HYPERTENSIVE RATS WITH 0.3 M NaCl AD LIBITUM**

Renovascular hypertension is characterized by activation of the reninangiotensin-aldosterone system, elevated sympathetic nerve activity (SNA) and sodium appetite. The association of increased sodium intake and hypertension can worsen the injury to the kidneys and blood vessels. We tested in this study the effects of peripheral AT1 receptors blockade (losartan, 10 mg/kg iv) on MAP, intracranial pressure (ICP) and P2/P1 ratio (index of brain compliance) in 2K1C rats with 0.3 M NaCl ad libitum. Male Holtzman rats 150 – 180 g) with water and food ad libitum received a silver clip around the left renal artery to induce 2K1C or SHAM surgery performing 3 groups: SHAM (n = 9), 2K1C (n = 9) and 2K1CNa (n = 7) which had an additional bottle of 0.3 M NaCl ad libitum. Six weeks after the renal surgery, mean arterial pressure (MAP) and ICP were recorded under urethane anesthesia (1.2 g/kg iv) and the P2/P1 was calculated offline from the waveform. Saline (0.2 ml/rat) was used as control injection before losartan. In SHAM rats, ICP and P2/P1 were not changed by losartan (7.8 ± 1.1 and 0.88 ± 0.02 ; vs. saline: 7.9 ± 1.1 and 0.83 ± 0.01 mmHg, respectively), while MAP was decreased (104 ± 5 , vs. saline: 120 ± 3 mmHg, $p < 0.05$). In 2K1C, MAP, ICP and P2/P1 values were greater than SHAM (respectively, 196 ± 6 , 14.7 ± 2.7 and 1.1 ± 0.03 mmHg, vs. SHAM; $p < 0.05$) and all of them were decreased by losartan pre-treatment (137 ± 6 , 8.6 ± 1.3 and 0.87 ± 0.05 mmHg, vs. saline, respectively). In 2K1C-Na MAP and P2/P1 were greater than in SHAM (186 ± 7 and 1.15 ± 0.06 mmHg, vs sham $p < 0.05$) and were decreased by losartan (162 ± 8 and 0.87 ± 0.02 mmHg, vs. saline; $p < 0.05$), although the decrease in MAP after losartan was lesser than the observed in 2K1C rats ($p < 0.05$). In 2K1C-Na rats, ICP was not different from SHAM (10.8 ± 1.2 , vs. SHAM: 7.8 ± 1.1 mmHg, $p > 0.05$) and losartan had no effect on ICP (10.3 ± 1.7 , vs. saline: 10.8 ± 1.2 mmHg, $p > 0.05$). These data suggest that, even without a change in ICP, AT1 blockade in 2K1CNa was effective in restoring P2/P1 ratio, suggesting a beneficial effect on brain compliance in this situation. In addition, other mechanisms, such as SNA might have a greater role supporting hypertension in 2K1C-Na rats.

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ID: 11023

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Cardiovasculares*

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Instituição: *UFMG*

FeSBE2022 HEART RATE REGULATES PERIOD CIRCADIAN REGULATOR 1 (PER1) TRANSCRIPTION IN THE HEART

The clock genes machinery orchestrates the daily fluctuation in cardiac functions and its dysregulation participates in the development of cardiac disease. In particular, the clock gene *Per1* (Period Circadian Regulator 1) plays a critical role in peripheral circadian rhythm generation. Despite this knowledge, the cues that reset the circadian clock in the heart have not been completely understood. We have recently shown that adrenergic stimulation induces *Per1* transcription in the heart (FASEB J. 2021 Oct;35(10):e21886). Because sympathetic activity increases heart rate, we tested the hypothesis that *Per1* transcription is regulated by heart rate by using a pharmacological approach and intracardiac pacing in vivo. We used 8- to 12-week-old male C57BL/6 mice obtained from the animal facility at UFMG (CEUA: 52/2022). Significant differences between groups were determined by oneway ANOVA followed by Tukey's post hoc test, unpaired or paired Student's t-test. The level of significance was set to values of $p < 0.05$. Strikingly, ivabradine (IVA), a heart rate-lowering agent, suppressed the nocturnal upregulation of *Per1* mRNA levels ($p < 0.01$, $n = 5$) with no apparent effect on the other clock genes. Administration of IVA also blocked *Per1* upregulation induced by isoproterenol, a β -adrenergic agonist ($p < 0.05$, $n = 4-5$). Conversely, HR elevation by intracardiac pacing triggered *Per1* transcription ($p < 0.05$, $n = 3-4$). These data provide important evidence that *Per1* expression in the heart is sensitive to alterations in beating rate. Then, we went on to explore the intracellular mechanism underlying the pacing-induced *Per1* transcription through in vitro experiments. By using ventricular myocytes, we showed that pacing increased *Per1* mRNA ($p < 0.05$, $n = 4$), which was prevented by ERK1/2 inhibition. Overall, our findings unveil a chronotropic component that acts as a physiological input for cardiac *Per1* transcription revealing a new level of complexity in the regulation of cardiac circadian clock.

ID: 11233

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 MFSD2A AND CAVEOLIN-1 MEDIATED TRANSCYTOSIS ACROSS THE BLOOD BRAIN BARRIER (BBB): EFFECTS OF HYPERTENSION AND AEROBIC TRAINING.

Chronic hypertension leads to increased BBB permeability in areas of autonomic control (Biancardi et al., 2014). We also demonstrated that the high permeability of the BBB in spontaneously hypertensive individuals (SHR) is accompanied by autonomic dysfunction, both of which are corrected by physical training (Buttler et al., 2017). Work in progress in the laboratory has indicated that the increase in BBB permeability in the SHR as well as the correction after training are accompanied by an increase and decrease in transcellular vesicles, respectively, suggesting the involvement of transcytosis in the functional alterations of the BBB (Cândido and Michelini, communication guys). We do not know the mechanism that determines these changes. Ben-Zvi et al., (2014) and Nguyen et al., (2014) observed in knockout animals for Mfsd2a (major facilitator superfamily domain 2a, a transporter of DHA, a fatty acid essential for brain development) extensive extravasation of the BBB and suggested that Mfsd2a could regulate transcytosis across the BBB. It is our working hypothesis that the transcytosis alterations observed may be due to alterations in the expression of Mfsd2a. To investigate the role played by Mfsd2a in the modulation of transcytosis in chronic hypertension, associated or not with training, SHR and normotensive controls were allocated to aerobic training (T, 50-60% maximum capacity, 1 h/day, 5 days/week) or kept sedentary (S) for 4 weeks and submitted, after recording of hemodynamic and autonomic parameters (spectral analysis), to the analysis of BBB permeability in the paraventricular nucleus of the hypothalamus (PVN). Brains were removed for quantification of protein expression (immunofluorescence) of Mfsd2a and caveolin-1 (Cav-1) in PVN. SHR-S vs. Wistar-S showed significant increases in baseline MAP and HR accompanied by high peripheral sympathetic activity, reduced cardiac parasympathetic activity, which determined a large increase in systolic BP variability and reduction in HR variability and spontaneous baroreflex (BrS) gain. In SHR-S, there was an intense increase in BBB permeability accompanied by reduced expression of Mfsd2a, but high expression of Cav-1 in the PVN. SHR-T vs. SHR-S showed resting bradycardia, unchanged MAP, reduced peripheral sympathetic activity, normalization of cardiac parasympathetic activity, decreased SBP variability, with no change in BrS. These effects occurred simultaneously with the normalization of BBB permeability, the increase in Mfsd2a expression and the reduction of Cav-1 density in the PVN. No changes were observed in Wistar-T vs. Wistar-S. The reduced density of Mfsd2a and the high permeability of BBB in SHR-S, as well as the high availability of Mfsd2a simultaneously with the correction of the high permeability of BBB in SHR-T suggest that Mfsd2a, when transporting DHA to the endothelial cell, alters the availability of Cav-1 (a protein essential for the formation of caveolae) in the plasma membrane, modifying transcytosis up or down. They also indicate that T is an effective conduct to restore the expression of Mfsd2a in the endothelial cell of the brain capillaries in chronic hypertensive patients, correcting the functional deficiency of the BBB and associated autonomic dysfunction.

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Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 PI3K γ -DEPENDENT NOX2/ROS SIGNALING ACTIVATES CARDIAC FIBROSIS IN RESPONSE TO ADRENERGIC STIMULATION

Sustained β -adrenergic receptor (β -AR) stimulation leads to cardiac fibrosis, a driver of end-stage heart failure. NADPH oxidase (NOX), a reactive oxygen species (ROS) generated enzyme, is a downstream target of adrenergic signaling that has been linked to fibrosis. How adrenergic overstimulation activates NOX to induce cardiac fibrosis is not known. We combined RNA sequencing, genetically engineered murine models and pharmacological tools to define the intracellular mechanism underlying β AR stimulation-induced NOX activation and myocardial fibrosis development. 8 to 14-weeks-old male C57BL/6J, gp91phox^{-/-}, and PI3K γ KD/KD mice were used in this study (CEUA: 117/2020). Statistical significance was determined using unpaired Student's t test or by one-way ANOVA followed by Newman-Keuls post hoc test. RNA-Seq analysis revealed that administration of isoproterenol (ISO), a β -AR agonist, for 7 days induced a robust pro-fibrotic gene program, which was prevented by apocynin (APO), an inhibitor of NOX (n=3). Likewise, ISO-induced collagen deposition (p<0.01, n=3-4) and activation of pro-fibrotic markers were abolished by APO (p<0.05, n=4-5). Mice lacking gp91phox, were protected from ISO-induced myocardial fibrosis (p=0.48, n=5) confirming the role of gp91phox/NOX2 in ISO-induced fibrotic response. Downstream of β -AR, phosphoinositide 3-kinase γ (PI3K γ) mediated ISO-induced myocardial fibrosis, since ISO failed to induce collagen production in PI3K γ kinase-dead mice (PI3K γ KD/KD) (p=0.97, n=4). Consistently, AS605240, a PI3K γ inhibitor, abolished the elevation in Col1a1 and Col3a1 transcripts in cardiac fibroblasts treated with ISO. Moreover, ISO-induced gp91phox upregulation was not observed in PI3K γ KD/KD mice (p=0.76, n=3-5), suggesting a link between PI3K γ and oxidative stress mediated by NOX2/gp91phox. Confirming this idea, AS605240 prevented ISO-induced ROS production and gp91phox increase in cardiac fibroblasts. Our findings define a pivotal role of NOX2/ROS signaling in ISO-induced myocardial fibrosis, uncovering the contribution of PI3K γ in NOX2/gp91phox activation.

ID: 10925

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Gastrointestinais*

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Instituição: UFPI

FeSBE2022 MODERATE PHYSICAL EXERCISE AND P2X7 ANTAGONIST IMPROVES GASTRIC DYSMOTILITY INDUCED BY CISPLATIN TREATMENT IN RATS.

Chemotherapy drugs such as cisplatin can cause gastrointestinal disorders such as nausea, vomiting, diarrhea, constipation, and gastric dysmotility. Exercise and purinergic modulation may be approaching that prevent adverse effects in the GI tract. In this study, we investigate the effect of the exercise and P2X7 antagonist on gastric dysmotility induced by cisplatin treatment in rats. Male Wistar rats, weighing between 200-280g, kept under a 12-h light/dark cycle, receiving food and water ad libitum. All procedures were approved by the Ethics Committee on Animal Experimentation (CEUA/UFPI) under number 600/19. Experimental groups: Control (C), Cisplatin (Cis), Exercise (E), Cisplatin + Exercise (Cis + E), Brilliant Blue G (BBG), Cisplatin + Brilliant Blue G (Cis + BBG), Cisplatin + ATP (Cis + ATP) and Cisplatin + Brilliant Blue G + ATP (Cis + BBG + ATP). Cisplatin treatment was (1mg/kg) 1/week for the 5-weeks. Physical exercise was swimming, 5/days/week with overload of 5% of body weight. Cisplatin increased ($p < 0.05$) gastric retention compared C group ($61.11 \pm 4.1\%$ vs. $33.07 \pm 1.7\%$). Exercise, BBG or E+BBG treatment, prevented the increase in gastric retention ($p < 0.05$) compared Cis group (32.6 ± 3.1 , 46.14 ± 3.6 and 43.08 ± 3.4 vs. $61.1 \pm 4.1\%$). Cisplatin increase ($p < 0.05$) intestinal retention in the proximal segment of the intestine ($66.67 \pm 5.84\%$ vs $43.93 \pm 2.05\%$), and a decrease ($p < 0.05$) in the medial ($21.52 \pm 3.86\%$ vs $35.20 \pm 1.0\%$) compared to control. BBG prevented intestinal retention in the proximal segment ($42.33 \pm 4.04\%$ vs $66.67 \pm 5.84\%$), medial ($33.81 \pm 3.56\%$ vs $21.52 \pm 3.86\%$) and distal ($23.85 \pm 2.84\%$ vs $7.83 \pm 2.51\%$) compared to the effect of cisplatin. Physical exercise and P2X7 antagonists are involved in the improvement of gastrointestinal disorders induced by cisplatin.

ID: 11047

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Renais*

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**FeSBE2022 ACUTE KIDNEY INJURY INDUCED BY CECUM LIGATION AND
PUNCTURE MODEL – A CHARACTERIZATION STUDY**

Sepsis is one of the leading causes of acute kidney injury (AKI). This study aimed to run a morphofunctional characterization of an animal model of AKI induced by CLP-induced-sepsis using increasing number of perforations (protocol number 021/20). Sixty adult Wistar rats were randomly separated into false operated (Sham) group, submitted to ligation with either two punctures in the cecum (CLP2P), five punctures (CLP5P) or ten punctures (CLP10P). Animals were harvested at 72h for blood, urine and renal tissue collection. The mortality in CLP2P and CLP5P were 7.7% in 24h, 15.4% in 48h, and CLP 10P presented 50.0% of mortality in 24h, 70.8% in 48h. Clinical signs of a systemic inflammatory response were more frequent and pronounced in animals from CLP10P. The CLP5P (0.007 ± 0.0007) and CLP10P (0.006 ± 0.0012) showed a significant reduction in urinary flow compared to Sham (0.010 ± 0.0008) and CLP2P (0.008 ± 0.0005). CLP10P showed a significant reduction in glomerular filtration rate, Na^+ and K^+ excretion and clearance. Histopathological analysis of renal tissue showed structural changes characteristic of the CLP model but with different intensities. The CLP 10P showed an increase in both tubular injury score and injury score. CLP10P (15.00 ± 5.24) showed a significant increase in pro-IL-18 mRNA relative levels when compared to Sham (1.17 ± 0.19), CLP2P (1.99 ± 0.70) and CLP5P (3.14 ± 0.58). Increased levels of pro-IL-1 β mRNA were observed in CLP5P (19.44 ± 6.33) and CLP10P (22.96 ± 4.99) compared to Sham and CLP2P. Only CLP10P showed a significant increase in the relative mRNA levels of the KIM-1 molecule (15.00 ± 5.24) and NGAL (9.36 ± 2.90) when compared to other groups. On the other hand, CLP5P and CLP10P presented a raise in leukocytes and lymphocyte neutrophil ratio. All CLP groups showed hypoglycemia, more pronounced in the CLP10P. C-reactive protein, was increased only in the CLP10P. Thus, AKI can be induced in a more severe animal model of sepsis.

ID: 10936

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Renais*

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Instituição: UFRJ

FeSBE2022 HOST IMMUNE RESPONSE PARTICIPATES IN MALARIA ACUTE KIDNEY INJURY: ROLE OF CD8+ T CELL IN RENAL TUBULOINTERSTITIAL INJURY.

Malaria acute kidney injury (MAKI) is characterized by glomerular and tubular damage caused directly by the parasite and the activation of the host immune response. But the role of T cells in MAKI is unclear. We aimed to evaluate the participation of T cells in the pathogenesis of MAKI. We used C57BL6 mice, infected with *Plasmodium berghei* ANKA that received treatment with FTY720 (FTY), an immunosuppressor, or depletion of CD8⁺ T cells, with anti-CD8 α antibody. We performed adoptive transfer (AdTr) of splenocyte-derived T cells from infected to healthy acceptor. FTY reduced infection-induced proteinuria (3-fold) and UPCr (protein to creatinine ratio, 2.8-fold). We observed a reduction in the activity of urinary γ -GT, a marker of tubular injury, while it did not alter the markers of glomerular injury (creatinine clearance, plasma urea and plasma creatinine). These results indicate that T cells induce renal tubulointerstitial injury. Using AdTr experiments, we observed an increase in T cell homing to the kidneys, spleen and brain. In the kidneys, AdTr induced proteinuria (2-fold), increased UPCr (2.3-fold) and urinary γ -GT activity (1.6-fold). AdTr did not change glomerular function. AdTr induced an increase in pro-inflammatory cytokines, IL-17 (1.3-fold), IL-6 (1.4-fold), INF- γ (1.3-fold). We observed an increase in renal CD8⁺ T cells (1.5-fold) together with an increase in the marker of cytotoxic T cell activation, perforin-1 (2.0-fold) in renal tissue. These results show that the malaria-responsive T cells induces a tubular injury in the absence of infection. Interestingly, CD8⁺ T cell depletion reduced proteinuria (3.1-fold), UPCr (2.0-fold) and urinary γ -GT (1.6-fold), but did not change the markers of glomerular injury. These results indicate that malaria-responsive CD8⁺ T cells migrate to the kidney inducing renal tubular damage. This work adds new information about the exacerbated activation of T cells during malaria infection.

FAPERJ, CNPq, CAPES

ID: 11137

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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FeSBE2022 BIOLOGIC IMPACT OF RESTRICTIVE AND LIBERAL FLUID STRATEGY AT LOW AND HIGH PEEP LEVELS ON LUNG DAMAGE IN EXPERIMENTAL ACUTE RESPIRATORY DISTRESS SYNDROME

Positive end-expiratory pressure (PEEP) potentially recruits alveoli in acute respiratory distress syndrome (ARDS), however, the association of PEEP with fluid strategy may lead to ventilator induced lung injury. We hypothesized that when using liberal fluid strategy, high PEEP could promote damage to lung, kidney and heart in experimental ARDS. For this purpose, restrictive and liberal fluid strategies associated with low and high PEEP levels were evaluated on lung, kidney damage, and cardiorespiratory function. ARDS was induced in 30 male Wistar rats (335±31g) (CEUA 101/18) through intratracheal instillation of *E. coli* lipopolysaccharide (9.6×10⁶ EU/mL). After 24-h, animals were protectively ventilated and randomized to RESTRICTIVE (5mL/kg/h) or LIBERAL (40mL/kg/h) fluid strategy. Both groups were then exposed to low PEEP (3cmH₂O, PEEP3) and high PEEP (9cmH₂O, PEEP9) for 1-h (n=6/group). Echocardiography and lung mechanics were evaluated throughout the experiment. Transpulmonary plateau pressure was higher in LIBERAL-PEEP9 (23.5±2.9cmH₂O) than RESTRICTIVE-PEEP9 (18.8±2.3cmH₂O, p=0.046). Alveolar heterogeneity index was higher while claudin-4 and zonula-occludens-1 expressions were lower in LIBERAL-PEEP9 than RESTRICTIVE-PEEP9. Interleukin(IL)-6 expression was higher in LIBERAL-PEEP9 than LIBERAL-PEEP3 (p=0.006) and RESTRICTIVE-PEEP9 (p=0.012), whereas epithelial cell damage marker was higher in LIBERAL-PEEP9 than LIBERAL-PEEP3 (p=0.010). In kidneys, IL-6 and neutrophil gelatinase-associated lipocalin expressions were higher in both PEEP9 groups regardless of fluid strategy. LIBERAL-PEEP9 compared to LIBERAL-PEEP3 showed reduced right ventricle systolic volume (37%) and inferior vena cava collapsibility index (45%), while increasing pulmonary acceleration time/pulmonary ejection time (20%). Liberal fluid strategy combined with high PEEP led to greater lung damage, while only application of high PEEP, regardless of fluid strategy, may be deleterious for the kidney.

ID: 11175

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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**FeSBE2022 CONTRIBUTION OF ACTIVE EXPIRATION TO THE VENTILATORY
RESPONSES TO HYPOXIA AND HYPERCAPNIA IN UNANESTHETIZED RATS**

During exposure to hypoxia and hypercapnia, the pre-Bötzinger complex (the breathing generator) is stimulated to increase the inspiratory activity, and expiration becomes an active process, with the presence of contractions of the abdominal muscles, due to the recruitment of the lateral parafacial expiratory group (pFL). Under these conditions of elevated respiratory drive, the preBötC and pFL should operate in a coordinated manner to synchronize the respiratory motor activities. While an increase in inspiratory drive improves the inspiratory flow and contributes to elevating the tidal volume (VT) and respiratory frequency (fR), few studies have explored the impact of augmented abdominal expiratory activity on breathing parameters and its interdependence with the inspiratory motor activity in unanesthetized animals. In the present study, we investigated the relationship between the diaphragmatic (DIA) and abdominal (ABD) electromyography activities at different levels of hypoxia (8, 10 and 12% O₂) and hypercapnia (3, 5 and 7% CO₂), and the corresponding ventilatory changes accompanying the active expiration (AE) in unanesthetized adult rats (CEUA approval n° 17/2020). Either hypercapnia or hypoxia exposure elevated DIA activity, generated AE, and increased minute ventilation (VE). Interestingly, the ABD occurrence was not present throughout the stimulus exposure. During the moments with AE, an additional increase in the minute ventilation (VE) was noted due to increments in VT. DIA activity and fR did not show further changes in the presence of AE, except at 12% of O₂, in which a reduction in fR was observed. Thus, we conclude that the emergence of AE shapes the ventilatory responses to hypoxia and hypercapnia, promoting additional increases in VT when DIA activity is no longer amplified. Our data contribute to understanding the relevance of AE on the breathing pattern in unanesthetized conditions.

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Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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FeSBE2022 EUGENOL AND ITS DIMER BISEUGENOL INHIBIT LUNG INFLAMMATION AND OXIDATIVE STRESS IN AN EXPERIMENTAL MODEL OF PULMONARY EMPHYSEMA

Eugenol (EU) and its dimer biseugenol (BIS) are phenolic compounds with anti-inflammatory and antioxidant properties. Our aim was to test if EU and BIS improve experimental pulmonary emphysema. The antioxidant activity of EU and BIS was evaluated. Then, C57BL/6 male mice (6-8 weeks, 25g) (CEUA n. 9556291018) received intranasal instillation of 50 μ l of porcine pancreatic elastase (PPE group) solution for emphysema induction or saline (0.9%) in the same volume on day 0 (Control group). EU or BIS (20mg/kg, i.p.) diluted in DMSO+saline (1:1) was given on days 21 to 28, and then the animals were euthanized and the lungs were removed for histological and immunohistochemistry analysis. GraphPad Prism was used for statistical analysis and $P < 0.05$ was considered significant. The data were expressed as Mean \pm SEM from 5-7 animals/group. BIS had higher antioxidant potential than EU (n=2 in triplicate, $P < 0.01$). Compared to control (28.1 \pm 1.0), PPE increased alveolar diameter (Lm) (37.1 \pm 2.1, $P < 0.01$), and mononuclear (MN) and polymorphonuclear (PMN) cells [PPE: (MN: 25.0 \pm 2.3) (PMN: 5.5 \pm 0.8); Control (MN: 2.1 \pm 0.1; PMN: 0.1 \pm 0.1), $P < 0.01$], and those positive to Nrf2 (PPE: 6.2 \pm 1.5; Control: 1.7 \pm 0.3) ($P < 0.01$), NF-Kb (PPE: 3.1 \pm 0.7; Control: 0.7 \pm 0.2) ($P < 0.01$), IL-17 (PPE: 9.1 \pm 0.8; Control: 1.2 \pm 0.3) ($P < 0.01$) and iNOS (PPE: 6.2 \pm 1.5; Control: 1.7 \pm 0.3) ($P < 0.01$) in the lung parenchyma. EU and BIS treatments reduced Lm (EU: 30.6 \pm 0.9; BIS: 27.4 \pm 1.3, $P < 0.01$), the MN and PMN cells [EU: (MN: 1.9 \pm 0.3) (PMN: 0.1 \pm 0.1); BIS (MN: 3.6 \pm 0.1; PMN: 0.2 \pm 0.2), ($P < 0.01$)], and those positive to Nrf2 (EU: 2.4 \pm 0.6; BIS: 2.8 \pm 0.5), NF-kB (EU: 0.5 \pm 0.1; BIS: 0.4 \pm 0.1), IL-17 (EU: 2.4 \pm 0.4; BIS: 3.3 \pm 1.1) and iNOS (EU: 1.5 \pm 0.4; BIS: 3.5 \pm 0.5) ($P < 0.01$ for all) compared to PPE group. No differences were found in SOD expressions. EU and BIS were effective in controlling lung emphysema by reducing lung inflammation and oxidative stress, suggesting that these compounds may have a promising effect for COPD treatment.

ID: 10874

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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FeSBE2022 EXTRACELLULAR VESICLES SECRETED FROM MESENCHYMAL STROMAL CELL OBTAINED FROM DIFFERENT SOURCES ELICIT DISTINCT EFFECTS ON LUNG, KIDNEY AND LIVER IN EXPERIMENTAL SEPSIS.

Mesenchymal stromal cells (MSCs)' extracellular vesicles (EVs) seem to have immunological properties as MSCs. To evaluate the effects of different sources of MSCs-derived EVs on mortality rate, lung, kidney, and liver damage in experimental sepsis. Additionally, comparative proteomic content of EVs was evaluated. Sepsis was induced by cecal ligation and puncture surgery (SEPSIS). A sham-operated group was used as control. After 6 and 24 hours, all animals received antibiotic therapy. After 24 hours, SEPSIS animals received saline or EVs from 3×10^6 BM-, AD-, or L-derived MSCs. Forty-eight hours after sepsis induction, lung, liver and kidney histology, as well as protein and mRNA expression of different mediators were evaluated. Survival rate was assessed every 24 hours. EVs derived from different MSC sources were characterized according to intensity and hydrodynamic diameter as well as the proteomic content of the EV fraction. In SEPSIS group, EVs from all sources reduced tumor necrosis factor (TNF)- α in lung tissue, neutrophils in alveolar septa and diffuse alveolar damage compared to SAL. BM-EVs reduced liver congestion and cells in sinusoids. EVs from all sources decreased kidney interstitial edema, but only BM-EVs preserved brush border. Furthermore, BM- and L-, but not AD-derived EVs, reduced interleukin (IL)-18 and KIM-1 mRNA levels. Despite not being significant, AD-EVs were associated to reduced survival rate compared to BM-EVs and L-EVs. BM-, AD-, and L-EVs exhibited similar hydrodynamic diameters but differed according to their proteomic content. BM-EVs expressed more anti-inflammatory proteins. AD-EVs expressed less fibronectin, which may be associated with reduced beneficial effects in this sepsis model. In the current model of sepsis, BM-EVs were associated with less lung, liver and kidney damage compared to AD-EVs and L-EVs, which can be related to differences detected in their proteomic content.

ID: 10942

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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FeSBE2022 INHALED NINTEDANIB NANOCRYSTAL THERAPY REDUCED LUNG FIBROSIS IN EXPERIMENTAL SILICOSIS

Silicosis is an irreversible pneumoconiosis caused by continuous inhalation of crystalline silica microparticles. The tyrosine kinase inhibitor Nintedanib (NTB) inhibits key signaling pathways involved in silicosis progression, being a potential therapeutic alternative. To minimize adverse effects resulting from NTB systemic exposure, we engineered an inhalable NTB nanocrystal formulation (NTB-NS), that enhances lung pharmacokinetics while reducing dosing frequency. A wet-milling process was used to develop the NTB-NS with Pluronic F127 coating (particle size ~330nm), resulting in a formulation resistant to aerosolization, that overcomes lung biological barriers, and presents physiological stability. We then evaluated preclinical safety, by dosing healthy C57BL/6 mice (male, 10-12 w/o) with NTB-NS (0.01, 0.1 and 1 mg NTB/kg) via intratracheal instillation. Last, we investigated whether locally administered NTB-NS was capable of attenuating the fibrotic process in a murine silicosis model, compared to the conventional once-daily systemic treatment with NTB esylate (NTB-Esy, 100 mg NTB/kg). This animal study was approved by the local animal committee (protocol nº157/19). NTB-NS did not elicit acute adverse events in healthy mouse after intratracheal instillation – body temperature and weight remained unchanged while lung inflammation was not observed, regardless of the dose tested. When compared to NTB-Esy (100 mg/kg), NTB-NS (1mg/kg) presented a remarkable anti-fibrotic activity in the current silicosis model, including a significant reduction in fractional area occupied by granulomas in the lung tissue (Sham: 35.05%±16.4, NTB-Esy: 33.63%±6.8, NTB-NS: 11.37%±5.4), collagen deposition in granulomas (Sham: 27.08%±5.0, NTB-Esy: 27.6%±4.5, NTB-NS: 11.77%±4.3), and static lung elastance (Sham: 29.9±4.7 cmH₂O, NTB-Esy: 29.7 ±5.8 cmH₂O, NTB-NS: 25.7±2.4 cmH₂O). The development of nintedanib nanocrystal inhaled formulation may be a promising strategy for silicosis treatment.

ID: 10921

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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FeSBE2022 INVESTIGATION OF THE EXISTENCE OF NEUROANATOMICAL PROJECTIONS FROM THE SUBSTANTIA NIGRA TO THE PRE-BÖTZINGER COMPLEX

Parkinson's disease (PD) is a neurodegenerative pathology characterized by a reduction in the number of dopaminergic neurons in the substantia nigra pars compact (SNpc). The degeneration of these neurons leads to the classic symptoms of the disease such as bradykinesia, postural instability, and resting tremor. However, non-classical symptoms such as respiratory changes may also be present. Recent studies performed in our laboratory in experimental models of PD induced by bilateral injection of 6-hydroxydopamine (6-OHDA) in the striatum showed that respiratory functional alterations may be related to neuronal loss in the region of the pre-Bötzinger complex (preBötC) - responsible to generate the respiratory rhythm. Thus, the aim of the present study was to investigate whether there are direct projections from SNpc dopaminergic neurons to the preBötC region, to justify the degeneration observed in this medullary respiratory nucleus in the 6-OHDA experimental model. Different groups of mice expressing fluorescence in glutamatergic neurons (Vglut2-cre Ai6) (protocol CEUA 6641200919) received injections of retrograde tracers in the preBötC (N = 3) or of anterograde tracers in the SNpc (N = 4) for the analysis of projections between these regions. We performed the immunohistochemical treatment to evidence the presence of these tracers and the results showed that there was no presence of varicosities containing the anterograde tracer in the preBötC region and cell bodies in the SNpc region marked with the retrograde tracer. We could observe the presence of cell bodies containing the retrograde tracer in intermediate regions between the SNpc and the preBötC, such as periaqueductal gray. Thus, we conclude that there are no direct projections between SNpc and preBötC. However, there may be indirect projections justifying the degeneration of preBötC in experimental models of PD.

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Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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FeSBE2022 PRESSURE-SUPPORT COMPARED TO PRESSURE-CONTROLLED VENTILATION IMPROVES CARDIORESPIRATORY FUNCTION AND MITIGATES BRAIN ENDOTHELIAL CELL DAMAGE IN EXPERIMENTAL ACUTE ISCHEMIC STROKE

Acute ischemic stroke (AIS) is one of the leading causes of morbidity and mortality worldwide. During the acute phase (first 24-hours) of AIS, different ventilatory strategies may be used, such as controlled (pressure controlled ventilation [PCV]) or spontaneous (pressure support ventilation [PSV]). Additionally, there is no consensus about the level of positive end-expiratory pressure (PEEP). Both PSV and PCV as well as PEEP level can have profound effects on hemodynamics, which in turn, may protect or exacerbate the brain injury, as well lung damage. We hypothesized that PSV compared to PCV at higher PEEP level may mitigate impairment of brain endothelial cells and lung damage due to better hemodynamic. CEUA: 117/19. Thirty-two healthy male Wistar rats (345±38g) were submitted to AIS by thermocoagulation of pial vessels over the right primary sensorimotor cortex. After 24-h, animals were anesthetized and randomly assigned to non-ventilated, PSV or PCV, delta pressure adjusted for tidal volume=6mL/kg and PEEP=2 cmH₂O or 5 cmH₂O for 2-hours. Lung mechanics, arterial blood gases, and echocardiography were evaluated during the experiment. At the end of experiment, lungs and perilesional brain tissue were removed for molecular biology. At PEEP=2cmH₂O, there were no changes in lung mechanics, cardiac function or molecular biology between PSV and PCV. At PEEP=5 cmH₂O, transpulmonary peak and mean airway pressures in PSV were lower than PCV (p=0.015 and p=0.002, respectively). Lung Interleukin (IL) 1-β gene expression was lower in PSV than PCV at PEEP=5cmH₂O (p<0.001). Left ventricular stroke volume was higher in PSV than in PCV (0.3 vs 0.2, p=0.02). Brain zonula occludens-1 and claudin-5 gene expressions was higher in PSV compared to PCV (p<0.001 for both). In conclusion, in the present AIS model, PSV compared to PCV at PEEP=5cmH₂O was associated to better lung mechanics, inflammation, hemodynamics, as well as, mitigation of brain injury markers.

ID: 11182

Área Temática: PRÊMIO ÁLVARO | *Biologia e Doenças Respiratórias*

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Instituição: *Universidade de São Paulo*

**FeSBE2022 REGULATION OF BLOOD VESSELS BY ATP IN THE VENTRAL
MEDULLARY SURFACE IN A RAT MODEL OF PARKINSON'S DISEASE**

Parkinson's disease (PD) patients often experience impairment of autonomic and respiratory functions. These include conditions such as orthostatic hypotension and sleep apnea, which are highly correlated with dysfunctional central chemoreception. Blood flow is a fundamental determinant of tissue CO₂/H⁺, yet the extent to which blood flow regulation within chemoreceptor regions contributes to respiratory behavior during neurological disease remains unknown. Here, we tested the hypothesis that 6-hydroxydopamine (24 µg/µl) injection into the CPu inducing a known model of PD results in dysfunctional vascular homeostasis, biochemical dysregulation, and glial morphology of the ventral medullary surface (VMS) (CEUA:9674120619 and 104/23/03). Following injections, we observed a significant reduction of TH immunoreactive neurons in the SNpc in the PD-group, compared to sham injection (84% of reduction). We show that hypercapnia (FiCO₂ = 0.1) induced elevated VMS pial vessel constriction in PD animals through a P2-receptor dependent mechanism (3.24% of constriction). At baseline condition, our functional experiments confirmed that PD animals showed a reduction of DiaEMG amplitude (0.69 vs. sham: 0.86 mV), and a reduction in respiratory frequency (fR: 41 vs. sham 72 breaths/min), compared to sham animals. The increase in DiaEMG amplitude induced by hypercapnia was higher in PD animals. Even though the PD animals presented a DiaEMG frequency lower compared to control animals, the percentage of increase for DiaEMG frequency induced by 10% of CO₂ was higher in PD animals (ΔDiaEMG frequency: 53.65 vs. sham: 32.32%). Similarly, we found a greater CO₂-induced vascular constriction after ARL67156 (an ectonucleotidase inhibitor) in control and PD-induced animals. Altogether, our data indicate that dysfunction in purinergic signaling, potentially through altered ATP bioavailability in the VMS region, may compromise the parafacial neuroglial vascular unit in a PD animal model.

ID: 11021

Área Temática: PRÊMIO ÁLVARO | Ciência de Animais de Laboratório

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Instituição: UNICAMP

FeSBE2022 SUPPLEMENTATION WITH CO INDUCES LEPTIN AND INSULIN RESISTANCE BUT DOES NOT IMPAIR LIPID METABOLISM IN HEALTHY SWISS MICE.

The consumption of saturated fatty acids, the main compound in coconut oil (CO), are associated with inflammation, metabolic disorders, and obesity. Rich diet in SFA can promote insulin and leptin resistance in peripheral and hypothalamic tissues. This study investigated the effects of CO supplementation on leptin signaling in healthy Swiss mice. All procedures were approved by the Research Ethics Committee for Animal Use of the University of Campinas (Protocol number: 5124-1/2019). Five-week-old male mice of Swiss lineage (weighing approximately 20g), with ad libitum water and chow diet. The mice (n=60) were randomly distributed into three groups and received oral supplement with pipette tip, for eight weeks with 300 µL of water for the control group (CV, n = 20), 100 or 300 µL of commercial extra-virgin coconut oil (CO100, n = 20 and CO300 n = 20, respectively). After eight weeks of supplementation, the animals were stimulated (via IP) with saline or leptin (5 mg/g or 2.5mg/g), to evaluate sensitivity to leptin and to investigate the leptin signaling, respectively, in the hypothalamus and white adipose tissues, or insulin (1.5 UI/kg) to evaluate sensitivity in the hypothalamus, liver and white adipose tissue. At the end of the supplementation period, molecular (WB and qPCR) and metabolic parameters were analyzed by calorimetry indirect. The CO supplement induced endoplasmic reticulum stress in the hypothalamus and hypothalamic leptin resistance, as demonstrated by reduced effect of leptin on the energy expenditure, hypothalamic JAK2 and STAT3 phosphorylation, and expression of POMC. In the adipose tissue, lipogenesis was favored and STAT3 and JAK2 signaling was impaired after CO supplementation and stimulation with leptin. Furthermore, the supplementation with CO reduced insulin-stimulated AKT phosphorylation in the hypothalamus, liver and white adipose tissue. These results show that CO supplementation induces hypothalamic and peripheral resistance to leptin and insulin in healthy mice.

ID: 10900

Área Temática: PRÊMIO ÁLVARO | Dor e Inflamação

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FeSBE2022 IN VIVO ANTINOCICEPTIVE CAPACITY OF A FRACTION WITH CLERODANE DITERPENES IN A MODEL OF ONCOLOGIC PAIN

Pain caused by cancer has been correlated with increased morbidity and reduced quality of life. This work evaluated the antinociceptive effects of a fraction with Casearins (FC) from *Casearia sylvestris* leaves using chemical or biological pain inducers and pharmacological blockers in models of mechanical or inflammatory hyperalgesia and allodynia. Acute or subacute abdominal writhing assays induced chemically by acetic acid and formalin techniques were used to evaluate the antinociceptive action followed by Von Frey filament test to determine mechanical allodynia in Swiss Mus musculus mice bearing or not S180 tumor cells in the right paw after 14 days of tumor transplantation (CEUA-UFPI #373/2017). Behavior alterations were verified by the elevated plus maze and open field tests. In the neurogenic phase of formalin protocol, all doses (10 and 25 mg/kg i.p. and 25 and 50 mg/kg oral) reduced paw licking time. Meanwhile, only higher doses 25 mg/kg i.p. and 50 mg/kg oral reduced paw lick time during the inflammatory phase, as well as seen for the number of abdominal writhing after a single dose or subacute exposure for 7 days ($p < 0.05$). It was noted the involvement of specific pathways for pain blockade since naloxone (2 mg/kg) and L-NAME (20 mg/kg) reversed the antinociceptive effects during the neurogenic phase while the inflammatory phase was also blocked by glibencamide (10 mg/kg), tropine (1 mg/kg), and flumazenil (2 mg/kg) ($p < 0.05$). FC decreased mechanical allodynia within 4 h ($p < 0.05$) with no changes in locomotor activity or exploratory parameters of S180 tumor-bearing mice ($p > 0.05$). So, the antinociceptive action of FC in hyperalgesia models was reversed by opioid, cholinergic, GABAergic or nitrenergic blockers, and mechanical allodynia was strongly reduced in tumor-transplanted mice, indicating that FC has peripheral action, mainly, but associated with late inhibition of release or action of neurochemical or inflammatory mediators from the spinal cord.

ID: 11070

Área Temática: PRÊMIO ÁLVARO | Educação, História e Filosofia da Ciência, Comunicação Científica

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FeSBE2022 "FACE-TO-FACE WITH DISEASES": AN EDUCATIONAL GAME TO ASSIST THE CORRELATION BETWEEN ENDOCRINE PHYSIOLOGY AND ITS DISORDERS

Medical students consider the study of endocrine diseases challenging to master due to the wide range of manifestations caused by hormone imbalance. In order to optimize learning in the academic environment, gamification has been used as a pedagogical tool. Thus, the aim of this study was to develop an educational board game to correlate basic endocrine physiology with endocrine disorders by means of artistic illustrations that reveal patients' features, improving students' learning and interest. A literature review was carried out to raise ideas and to search the clinical manifestations of endocrine diseases. Based on the main characteristics found in the physical exam and considering epidemiological aspects, cards were created with artistic illustrations and descriptions of patients' clinical findings of the most common endocrine disorders, such as Cushing's syndrome. As a result, we developed an educational board game called "Face-to-face with diseases" based on the board game "Guess Who?". The game's aim is to guess the mystery patient on your opponent's card by asking one question per turn and eliminating any faces that don't fit the mystery patient's description. This game must be played by two students and the first step is each player chooses one patient card at random. Then, each one must ask your opponent one "yes" or "no" question about the patients' features or clinical findings, allowing players to eliminate one or more faces. Students must take turns asking questions, until one makes a guess. If the guess is correct, or the opponent guess is incorrect, the game ends. Thus, it is possible to create an alternative methodology by means of gamification that integrates the concepts of endocrinology clinical practice with basic endocrine physiology. Our future perspective is to apply this educational board game during practical classes in medical courses.

ID: 11157

Área Temática: PRÊMIO ÁLVARO | Farmacologia Básica e Clínica

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FeSBE2022 STATINS TREATMENT INDUCED ALTERATION IN NEUROMUSCULAR STRUCTURES AFTER EXPOSURE IN PREGNANT WISTAR RATS

Statins are drugs widely prescribed for cholesterol reduction and prevention of cardiovascular diseases. Statin-associated muscle symptoms (SAMS) are the most common adverse effect associated with treatment of cholesterol health issues. Although widely reported in clinical practice, mechanisms that underlie the pathogenesis of SAMS remains unclear. Furthermore, pregnancy is a critical period for mother's cardiovascular health and it may be related to increased cholesterol levels. The aim of this study was to investigate the effects of exposure of pregnant Wistar rats to rosuvastatin and simvastatin on neuromuscular interaction, targeting the sciatic nerve, the soleus muscle and the associated neuromuscular junctions (NMJs). Twenty one pregnant Wistar rats (CEUA: 1115110620) were randomly assigned to 3 experimental groups (n=7): Control (C), treated with vehicle (dimethylsulfoxide + distilled water); Simvastatin (S), 62.5 mg/kg/day; and Rosuvastatin (R), 10 mg/kg/day. The treatments were performed daily, from the 8th to the 20th gestational day, via gavage. Blood, soleus muscles and sciatic nerves were collected and submitted to: morphological and morphometric analysis of NMJs and nerve fibers and intramuscular collagen analysis. No differences were found in relation to the nerve fibers and intramuscular collagen analysis. Regarding NMJs, in S and R groups, diameter and area enlargement were observed, also with loss of their common circularity. At the chosen dosage the deviations from the common circularity, size and "pretzel-like" shape of the NMJs are suggestive of remodeling. These changes may have a direct relation with the progression of SAMS observed in clinical practice, but further studies with different dosages and periods of exposure are needed to ensure this safely.

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ID: 11259

Área Temática: PRÊMIO ÁLVARO | Medicina Regenerativa e Biologia do Desenvolvimento

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Instituição: UFRGS

**FeSBE2022 PRODUCTION AND CHARACTERIZATION OF A BIOINK CONTAINING
DECELLULARIZED SPINAL CORD TISSUE FOR 3D BIOPRINTING FOR NEURAL
TISSUE ENGINEERING**

Over the last few years, 3D bioprinting has emerged as a promising approach in the field of tissue engineering. This technique allows for the production of 3D scaffolds to support cell transplantation due to its ability to mimic the extracellular environment. Using 3D bioprinting it is possible to functionally recover tissues with poor intrinsic regeneration capacity, such as the nervous tissue. To enhance cell adhesion, survival and proliferation, decellularized extracellular matrix can be used as a bioink component. The aim of this study was to produce a bioink using lyophilized rat Decellularized Spinal Cord Tissue (DSCT) for 3D bioprinting. Rat spinal cord tissue was collected, cut in 1 cm length segments and decellularized using ionic detergents. DNA was quantified by spectrophotometry, histological sections of the samples were stained with DAPI or with hematoxylin and eosin and immunohistochemistry analyses were performed to evaluate the presence of specific neural cell proteins. MTT cytotoxicity assay was used to analyze DSCT cytocompatibility. The bioink was produced with 1.5% lyophilized DSCT, 4% alginate, 3% gelatin and 1.5×10^6 PC12 cells/mL. Rheological characterization was performed using a rheometer with a Peltier equipment. Cell viability was analyzed using MTT assay. DNA quantification indicated a 50-fold DNA reduction. The histological staining indicated the presence of only a few cells. Immunohistochemistry analyses showed a reduction in GFAP, NF-M, TUJ and laminin in DSCT compared to the control. MTT cell viability assay showed that the decellularized matrix is not cytotoxic for PC12 cells. The hydrogel presented shear thinning behavior and low G''/G' ratio, allowing for good printability without compromising cell viability after 3D bioprinting. To our knowledge this was the first bioink described containing DSCT. According to the data mentioned above this bioink represents an easily-available biomaterial suitable for neural tissue engineering.

ID: 10976

Área Temática: PRÊMIO ÁLVARO | Medicina Regenerativa e Biologia do Desenvolvimento

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FeSBE2022 THE ADULT AND NEONATE MOUSE DECELLULARIZED LUNG MATRIX: SCAFFOLD COMPOSITION, LUNG MECHANICS AND REGENERATIVE POTENTIAL

Lung transplant is considered the only curative therapy for some end-stage diseases. However, it is not always possible due to the lack of available organs and post-surgery issues. In order to overcome this, bioengineering aims to use decellularized lung scaffolds. In this process, the extracellular matrix (ECM) in the scaffold needs to be preserved. Evidences indicate differences between adults and neonates lung ECM. We hypothesized that, compared to the adult, neonatal ECM has better regenerative potential to reintroduce lung cells due to its components. For this purpose, 32 male Wistar rats (CEUA 017/2019) were split into 2 experimental groups: NEONATE (3 weeks old) and ADULT (12 weeks old) and subdivided into nondecellularized (CONTROL-n=8/group) and decellularized (DECEL-n=8/group). All animals were anesthetized, tracheal cannulated, paralyzed, connected to ventilator and lung mechanics was assessed. Then, animals were euthanized, chest wall was removed and lung mechanics was assessed. Both DECEL groups were subjected to the decellularization protocol, which consisted of a monitored 3-day intermittent alveolar and intravascular lavage using deionized water, Triton 0,1%, sodium deoxycholate, sodium chloride, DNase and phosphate saline buffer. Electron microscopy, biochemical and liquid chromatography tandem mass spectrometry were analysed in all groups' scaffolds. After the protocol, NEONATE-DECEL group revealed higher lung elastance (21 vs 145 cmH₂O/ml-p<0.0001) and airway resistance (1.1 vs 6.5 cmH₂O/ml-p=0.006). There were no significant differences in the elastic fibers contents in both groups (CONTROL-p=0.48, DECEL-p=0.12). CONTROL had higher hexuronic acid contents in NEONATE compared to ADULT. NEONATE-DECEL groups showed higher emilin-1, α 55-laminin and nidogen-2 levels in semi-quantitative proteomic analysis. The neonate decellularized scaffold seems to show higher expressions of matrix proteins that are crucial to the recellularization process.

ID: 10923

Área Temática: PRÊMIO ÁLVARO | Neurobiologia

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FeSBE2022 EFFECT OF PHARMACOLOGICAL MANIPULATION OF β -ADRENORECEPTORS ON MOTOR AND NEUROCHEMICAL CHANGES IN THE EXPERIMENTAL RESERPINE-INDUCED MODEL OF PARKINSONISM

Parkinson's disease is characterized by the progressive death of neurons in the dopaminergic pathway. However, disease progression may be associated with dysfunction in the noradrenergic pathway. This study evaluated the effect of pharmacological manipulation of β -adrenoreceptors (β AR) on motor behavior and neurochemistry in the reserpine-induced animal model of parkinsonism. Sixty-seven Wistar rats, 6-8 months old, 350-500g, were divided into six groups: CTL, RES, SALB, RES-SALB, PRO, and RESPRO. The animals received 12 s.c. injections of reserpine (0.1 mg/kg) or vehicle, every other day 48h for 24 days. From day 16, the animals were treated daily with salbutamol (5 mg/kg), propranolol (20 mg/kg) or vehicle, i.p., for eight days. Behavioral tests were performed throughout the experiment, and on day 24, the animals were perfused, and the brains were submitted to immunohistochemistry. Animal Research Ethics Committee/UFS nº 13/2018. Data were analyzed using one-way and twoway ANOVA. Data were expressed as mean \pm S.E.M, and $p < 0.05$ were considered significant. SALB administration reduced the duration of reserpine-induced catalepsy of the 18th day (CTL 11.3 \pm 2.3; RES 115.2 \pm 14.3; SALB 10.2 \pm 2.1; RES-SALB 72.3 \pm 11.6; PRO 13.3 \pm 4.5 and RES-PRO 88.4 \pm 11.2) until 24th day (CTL 10.8 \pm 2.8; RES 79.5 \pm 12.6; SALB 7.3 \pm 1.5; RES-SALB 47.7 \pm 8.4; PRO 9.8 \pm 2.5 and RES-PRO 73.7 \pm 10.0). SALB and PRO protected against TH immunoreactivity decrease in SNpc (CTL 1.0 \pm 0.02; RES 0.8 \pm 0.01; SALB 0.9 \pm 0.01; RES-SALB 0.9 \pm 0.01; PRO 0.9 \pm 0.01 and RES-PRO 0.9 \pm 0.01), D β H decrease in LC (CTL 1.0 \pm 0.05; RES 0.6 \pm 0.08; SALB 0.8 \pm 0.03; RES-SALB 1.2 \pm 0.07; PRO 1.0 \pm 0.09 and RES-PRO 0.9 \pm 0.1), and prevented the increase of α -syn immunoreactivity in the dorsal striatum (CTL 1.0 \pm 0.1; RES 1.4 \pm 0.06; SALB 0.9 \pm 0.03; RESSALB 1.0 \pm 0.02; PRO 0.9 \pm 0.1 and RES-PRO 0.8 \pm 0.07) caused by reserpine. The results suggest that manipulation of β AR protects against reserpineinduced motor and neurochemical damage

ID: 11198

Área Temática: PRÊMIO ÁLVARO | Neurobiologia

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Instituição: USP

**FeSBE2022 INVOLVEMENT OF THE NUCLEUS OF THE SOLITARY TRACT IN
RESPIRATORY CHANGES OBSERVED IN AN EXPERIMENTAL MODEL OF
PARKINSON'S DISEASE**

Parkinson's Disease (PD) is a neurodegenerative disease characterized by loss of dopaminergic neurons in the substantia nigra pars compact (SNpc), leading to motor symptoms. However, studies have shown that PD also affect medullary respiratory areas, triggering respiratory impairments. Few studies demonstrated that respiratory deficit in the PD during hypoxia is associated with neuronal loss in the commissural area of the nucleus of the solitary tract (cNTS). Our aims were to investigate: 1) if dopaminergic neurons from SNpc project to NTSc and 2) the role of cNTS in the respiratory changes produced by hypoxia in a model of PD induced by bilateral injection of 6-hydroxydopamine (6-OHDA) in the striatum of male Wistar rats (BW: 300-350g; CEUA:1856280120). Ventilatory recordings were performed by whole-body plethysmography. Neuronal activity during hypoxia (8%O₂) and neuronal loss were detected by immunohistochemistry. Our data showed a reduction of 76% of dopaminergic neurons of SNpc in the PD model. Forty days after 6-OHDA injection, there was a reduction in the baseline respiratory frequency (25.4±2.3%) and ventilation (34.3±9.4%). The hypoxic ventilatory response was also reduced by 38.3±4.3%. To investigate neuronal activation we analyzed Fos expression in rats submitted to hypoxia (1h) 41 days after 6-OHDA injection. The model 6-OHDA reduced Fosactivated neurons in the cNTS by 82.3 ± 1.9%. To investigate whether a direct projections from SNpc to cNTS mediate the neurodegeneration, a retrograde tracer Fluorogold (FG: 2%) was injected in the cNTS. There was no FG+ cell body in dopaminergic neurons of SNpc. However, we observed FG+ neurons in the periaqueductal gray matter (PAG) and previous study from our laboratory have shown direct inputs from SNpc to PAG. Therefore, our data shows an that hypoxia ventilatory response is impaired in PD and suggests that it is related to the reduction of neurons in the cNTS. We also showed that may exist an indirect pathway from SNpc to cNTS, through PAG, justifying the neuronal loss observed in cNTS in this experimental model.

ID: 11148

Área Temática: PRÊMIO ÁLVARO | Neurobiologia

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Instituição: USP

FeSBE2022 NEUROINFLAMMATION IS RESPONSIBLE FOR RESPIRATORY DEFICITS IN A MICE MODEL OF PARKINSON'S DISEASE.

Respiratory impairment in a mice model of PD induced by 6-hydroxydopamine (6-OHDA) injection in caudate-putamen (CPu) is probably linked to brainstem degeneration. This study aims to investigate the role of inflammation in respiratory deficits and neurodegeneration in this model of PD. C57BL/6 male mice or tumor necrosis factor receptor 1 knockout mice (TNFR1^{-/-}) (CEUA:8760150318) received bilateral injection of 6-OHDA (10 µg/µl) or vehicle in CPu through stereotaxic surgery. 20 days after surgery, mice were submitted to whole body plethysmography under normal and hypercapnic conditions (7% CO₂). In another protocol, C57BL/6 mice received daily intraperitoneal minocycline (microglia inhibitor, 45mg/kg) injection in between day 5 and day 10 post stereotaxic surgery when they were submitted to plethysmography. Perfused brains were removed to anatomical analysis. 6-OHDA destroyed TH⁺ neurons in Substantia nigra (SNc) in all groups analyzed (6-OHDA WT:77%; 6-OHDA TNFR1^{-/-}:79%; 6-OHDA minocycline: 79% of reduction). Degeneration was observed in preBötzing complex (preBötC) and in retrotrapezoid nucleus (RTN) in 6-OHDA WT group, but not in 6-OHDA TNFR1^{-/-} group (preBötC: 6-OHDA WT: 43%, 6-OHDA TNFR1^{-/-}: 22%; 6-OHDA minocycline: 30%; RTN: 6-OHDA WT: 52%; 6-OHDA TNFR1^{-/-}: 15% of reduction). Astrocyte's density in SNc is enhanced in 6-OHDA WT group but not in 6-OHDA TNFR1^{-/-} group (6-OHDA WT:122%) and is reduced in preBötC in all groups analyzed (p<0.05). In RTN, no change was observed. Microglia analysis indicates neuroinflammation in SNc and RTN in all groups. Respiratory assessment reveals reduction in basal respiratory rate in 6-OHDA WT group but not in 6-OHDA TNFR1^{-/-} and 6-OHDA minocycline groups (6-OHDA WT:24%; 6-OHDA TNFR1^{-/-}:0,38%; 6-OHDA minocycline: 0,63%). Inhibiting microglia and TNF-α inflammation pathway, reduction in respiratory rate and neurodegeneration is prevented indicating the involvement of this pathway in the respiratory changes observed in this model.

ID: 11213

Área Temática: PRÊMIO ÁLVARO | Neurobiologia

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**FeSBE2022 RETINAL GANGLION CELL DEGENERATION INDUCED BY
GLAUCOMA ALTERS CIRCADIAN RHYTHMS WITHOUT AFFECTING
MELANOPSIN EXPRESSION**

The retinal ganglion cells (RGCs), expressing melanopsin, are intrinsically photosensitive in the mammalian eyes. These melanopsin-positive cells are essential for light detection leading to the synchronization of circadian time system. Therefore, RGC degeneration would impair light transmission for the circadian system. Through this, desynchronization could be expected in glaucomatous mice, in which a neurodegeneration of RGCs is the hallmark of the disease. Spontaneous locomotor activity (SLA) and core body temperature (Tc) were monitored by telemetry in 12-month-old healthy and glaucomatous mice under 12:12 light-dark cycle (LD) and darkness condition (DD) using mice that progressively developed this disease (CEUA ICB N° 8143290819). No alterations were found in the period of SLA and Tc rhythms in glaucomatous mice; however, some circadian parameters were compromised by RGCs degeneration induced by high intraocular pressure. In both LD and DD, glaucomatous mice show reduction in SLA, and advance and delay SLA onset, respectively. On the other hand, glaucomatous mice show reduction in the robustness of SLA circadian rhythm under LD but not DD. No alterations were observed in the robustness of Tc, but the onset was advanced in glaucomatous mice under both LD and DD. Then, we investigated melanopsin gene and protein expression in RGC by qPCR and immunohistochemistry respectively. Remarkably, glaucomatous mice showed no differences in melanopsin expression compared to healthy mice, indicating that circadian light detection may be preserved in a model of RGC degeneration. Thus, this result suggests that glaucoma may impact the downstream pathway of the retina. The fact that SLA and Tc rhythm were altered in DD condition suggest that glaucoma development impair the functioning of suprachiasmatic nucleus, since it is one the main target of intrinsically photosensitive RGCs. Therefore, glaucoma may induce alterations in SCN-driven endogenous circadian rhythms.

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ID: 11025

Área Temática: PRÊMIO ÁLVARO | Neurobiologia

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FeSBE2022 THE EFFECTS OF DIFFERENT TONICITIES FLUIDS INFUSION ON INFLAMMATION AND ENDOTHELIAL DAMAGE IN THE BRAIN, LUNG AND KIDNEY IN A MODEL OF FOCAL ISCHEMIC STROKE

Acute ischemic stroke (AIS) is a major cause of morbidity and mortality worldwide. Different approaches are performed within 3 hours after the ischemic event, including fluid infusion. However, there is no consensus on the use of fluids with different tonicities after AIS. The present study verified whether hypotonic fluids compared to hyper or normotonic fluids may reduce brain, lung and kidney inflammation and endothelial damage in experimental focal AIS (CEUA 013/21). For this purpose, 40 male Wistar rats (375 ± 23 g) were submitted to focal ischemic stroke. After 3h, the animals were anesthetized and randomly assigned into 4 groups: hypertonic (HYPER: 1.5% saline Na = 256 mEq/L), normotonic (NORMO: 0.9% saline Na = 154 mEq/L), hypotonic (HYPO: 0.45% saline Na = 77 mEq/L) and only glucose (GLUCO: 5% Na = 0 mEq/L) infusion for two hours. During fluid infusion, animals were mechanically ventilated with protective ventilation. Arterial blood gases and pulmonary function were measured throughout the experiment. At the end of the experiment, the lungs, brain tissue and kidneys were removed for histological and molecular biology analysis. The preliminary data showed that the average volume of fluids was 2.7 ± 0.1 ml among groups. Mean arterial pressure increased overtime in all groups ($p=0.03$) but remained within 70 and 110 mmHg. No changes in blood gas analyses were observed, however, a decrease in tidal volume ($p=0.02$) was noted while there was an increase in peak pressure of respiratory system ($p=0.01$). Overall, sodium levels reduced overtime ($p=0.04$) in all groups as well as chloride ($p=0.03$) and calcium ($p=0.00$). In this preliminary report, although we did not observe major changes in lung function and hemodynamic, the electrolytes levels were modified. Further data and analysis is necessary to observe brain, lung and kidney inflammation and endothelial damage in experimental focal AIS.

ID: 11066

Área Temática: PRÊMIO ÁLVARO | Neurobiologia

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FeSBE2022 VESTIBULAR COMPENSATION MECHANISM IN BALANCE CHANGES IN A RESERPINE-INDUCED PROGRESSIVE MODEL OF PARKINSONISM

The present study investigated the role of the vestibular compensation mechanism in balance alterations in a model of parkinsonism. In both experiment 1 and, 28 male Wistar rats (8–9 months) received 4 or 10 s.c. inj. of vehicle (CT) or reserpine (RE) 0.1 mg/kg. 48h after the 4th inj., half of the animals in each group (n=7) were perfused and submitted to ChAT immunoreactive. The remaining animals were perfused 48h after the 10th inj. In exp. 1, the animals were submitted to the static balance and dynamic balance test (every 48h). In exp. 2, only one beam balance test was performed on 0 day and 48h after the 4th and 10th inj. Protocol number of the Animal Research Ethics Committee (#74/2018). In exp. 1, the RE group showed: a decrease in the stay time on the beam from day 6 (CT=50±4–RE=33±6; p<0.01) to day 16 (CT=60±1– RE=47±5; p<0.01) and a score lower score from day 6 (CT=3±0.3–RE=2±0.3; p<0.01) to day 18 (CT=4±0.1–RE=3±0.5; p<0.01) in the static balance test. In the dynamic balance test an increase in the crossing time was verified from day 4 (CT=31±8–RE=68±8; p<0.01) to day 20 (CT=70±12 – RE=104±6; p<0.01). In the pendunculopontine nuclei (PPN), was observed a decrease in the number of ChAT+ cells for the RE animals that received 4 inj. (CT=53±2–RE=49±3; p<0.01), which was not observed for the animals that received 10 inj. (CT=49±2–RE=53±3; p=0.7). In exp. 2, the RE group showed: longer crossing time on day 8 (CT=6±2–RE=96±14; p<0.01) and on day 20 (CT=12±4–RE=92±16; p<0.01) in the dynamic balance test. In PPN, there was a decrease in ChAT+ cells in the RE group that received 4inj (CT=74±3–RE=46±0.04; p<0.01) and 10 inj. (CT=71±4–RE=53±8; p<0.01). Was observed behavioral changes in balance from the early stages accompanied by a decrease in the number of ChAT-immunoreactive cells in the PPN. Was possible to verify that repeated balance exercises on the beam potentiated the performance of the central vestibular compensation mechanism in the exp. 1.

ID: 11187

Área Temática: PRÊMIO ÁLVARO | Neuropsicofarmacologia

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**FeSBE2022 PHARMACOLOGICAL EFFECTS OF CANNABIDIOL: A
SENSORIMOTOR GATING APPROACH**

Schizophrenia is a complex mental condition that affects about 1 % of the population in the world. The prepulse inhibition test (PPI), is considered particularly useful and a translational model to understand the sensory-motor gating in schizophrenia. PPI disruption can be experimentally reproduced by acute treatment with drugs that enhance dopaminergic neurotransmission, such as amphetamine. On the other hand, antipsychotic drugs can prevent PPI deficits. Several studies suggest that the endocannabinoid system and cannabinoids may be implicated in the pathophysiology and treatment of schizophrenia. Cannabidiol (CBD) is the main non-psychotomimetic compound of *Cannabis sativa*, has also been reported to have the ability as an antipsychotic, but its mechanism is not well understood. This study aimed to further investigate the possible CBD pharmacological mechanisms of action involved with its antipsychotic profile. Male Swiss mice (7-8 weeks, 35-40g) divided into different pharmacological treatment regimens submitted to the PPI test (Ethical Committee number: 2019.1.143.58.6). In general, acute treatment with amphetamine (5mg/kg) induced PPI disruption at all prepulse intensities (80dB, 85dB and 90dB). CBD (30 and 60mg/kg) was able to prevent amphetamine-induced PPI impairment. Pretreatment with WAY1000635 (0.1mg/kg), a 5-HT_{1A} type serotonergic receptor antagonist, robustly blocked the antipsychotic effect of CBD in the PPI test. Similarly, the effect of CBD at 60mg/kg was also blocked with pretreatment with Capsazepine (1mg/kg, TRPV1 receptor antagonist). Pretreatment with AM251 and AM630 (CB1 and CB2 receptor antagonists, respectively) did not interfere with the action of CBD. Two-way ANOVA was used for statistical analysis ($p < 0.05$). Our study has shown that the antipsychotic profile of CBD is mediated by TRPV1 and 5HT_{1A} receptors but not by CB1 and CB2.

ID: 11345

Área Temática: PRÊMIO ÁLVARO | Neuropsicofarmacologia

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FeSBE2022 PHARMACOLOGICAL MODULATION OF SEROTONERGIC SYSTEM DURING PERINATAL PERIOD BY PAROXETINE HYDROCHLORIDE AND ITS PSYCHOBIOLOGICAL CONSEQUENCES

Serotonin (5-HT) plays an important role in the embryogenesis of central nervous system of mammals. It modulates the ontogenesis of different neuronal system, including those involved in the regulation of humor and the response to stress. In this context, changes in the 5-HT signaling in the early life may compromise the mental health and increase the susceptibility to humor and anxiety disorders in the adulthood. Our aim in this study was to evaluate the influence of perinatal exposure of swiss female mice offspring to paroxetine hydrochloride (PAR) and its consequences on behavioral profiles in the adulthood. To reach our aim we used three groups of swiss couple mice (n = 11 each, body weight ~ 35 g). They were mated and kept together up to the delivery of the offspring. The offspring mice were then treated subcutaneously (sc) by either NaCl 0.9% (Control - CTL), paroxetinehydrochloride 0.3mg/mL (PAR 3 mg/kg) or paroxetine hydrochloride 1.0 mg/mL (PAR 10mg/kg) from day 5th to day 15th post-natal. The male were kept up to day 70th and then submitted to the following behavioral methods: Open Field (OF), Elevated Plus Maze (EPM), Light-Dark Box (LDB), Social Interaction (SI) and Tail Suspension (TS). After were used for molecular biology protocols. Statistical analysis was performed using GraphPad Prism 8.0 software and the results were expressed as mean \pm standard error of mean (s.e.m) and we considered statistical difference between groups when p value was smaller than 0.05. All the experimental protocols were approved by the local Animal Welfare Committee (CEUA-ICBS-UFRRJ) under the protocol 005/2017. In the OF method among the parameters analyzed, we observed an increase in the fecal pellets (CTL – 1.87 ± 0.59 ; PAR 3mg/kg – 1 ± 0.45 ; PAR 10mg/kg – 2.88 ± 0.64). In the EPM, we observed an a smaller time spent in opened arms (CTL – 20.2 ± 6.86 ; PAR 3mg/kg – 12 ± 4.55 ; PAR 10mg/kg – 10.2 ± 6.67 ; $p < 0.05$). We also found an increase in the TS method, in immobility time (CTL – 99.3 ± 7.40 ; PAR 3mg/kg – 110 ± 11.5 ; PAR 10mg/kg – 134 ± 9.46 ; $p < 0.05$). We did not find any changes in the others behavioral parameters when compared to the control group in the LDB method. Therefore, the result presented here in the OF, reveal an increase in fecal pellets indicates increase in the emotionality due to Paroxetine exposure during postnatal time. The decrease in time spent in open arms in EPM, indicates an in anxiety-like behavior. Increased immobility time in the TS, suggests depression-like behavior. We believe that these changes are due to the possible modulation of the serotonergic system development during the postnatal time exposure to PAR. However, to elucidate the molecular mechanism of it is necessary to investigate the changes in quantity of proteins (TPH2, SERT, 5-HT1a/1b, 5-HT2 e 5-HT3) directly related to serotonin function.

Financial support: FAPERJ

ID: 11330

Área Temática: PRÊMIO ÁLVARO | Nutrição e Metabolismo

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**FeSBE2022 ALTERNATE-DAY FASTING PROMOTE LOSS-WEIGHT BUT DID NOT
MODIFY ADIPOSITY AND GLYCEMIC RESPONSE IN MIDDLE-AGED OBESE
FEMALE RATS**

Obesity is a multifactorial disease associated with chronic comorbidities as type 2 diabetes, that can be aggravated in female aging. Dietary approaches such as 24-hour alternate-day fasting (ADF) can be applied to promote body weight (BW) loss, however, there are controversies about ADF effects on glycemic control. Thus, we investigated if ADF decreases the adiposity and improves glycemic control in Eighteen 15-month-old female Wistar rats. Animals were submitted to free access to high-fat diet (HFD) for 8 weeks. After that, half of animals receiving HFD were treated with ADF (HFD+ADF group, n=9) for more than 8 weeks while the group HFD (n = 9) remained with the same protocol. We evaluated BW, adiposity (adp%) and glucose tolerance test response (GTT) and the differences between groups were analyzed by Unpaired T-test and multiple conditions by One-way and Two-way ANOVA, followed by Bonferroni ($P < 0.05$) using GraphPad 8.0. Data expressed as mean \pm SD. The consumption of a high-fat diet for 8 weeks increased by 13.4% the BW of the HFD animals and also decreased the glucose tolerance ($P = 0.01$). At the end of the study (16th week) the BW of HFD group increased more 4,7% ($18.9g \pm 4.7$) while the BW of HFD+ADF was reduced by 7% the BW (HFD+ADF vs HFD, $P = 0.04$). However, there were no alteration in adp% (HFD+ADF vs HFD, $P = 0.98$) and the glycemic response (HFD+ADF vs HFD, $P = 0.77$). Although the ADF may be useful to reduce body weight, this type of intervention may not help to improve glycemic control and adiposity, especially in older women (CEUA n° 013/2018).

ID: 11134

Área Temática: PRÊMIO ÁLVARO | *Nutrição e Metabolismo*

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FeSBE2022 EFFECTS OF CHRONIC CENTRAL LEPTIN INFUSION ON SEXUAL BEHAVIOR OF MALE OFFSPRING OF SNACK-FED DAMS WITH GESTATIONAL DIABETES

Leptin has a fundamental role in the modulation of the reproductive function and offspring of dams with metabolic and nutritional impairments present altered serum levels of leptin. Our aim was to evaluate the effects of chronic central leptin infusion on the sexual behavior of male offspring of snack-fed dams with gestational diabetes during pregnancy. In order to obtain offspring from snack-fed dams with gestational diabetes, pregnant Sprague-Dawley female rats were divided into two groups on pregnancy day (PD) 0: Control, which received standard diet, and Snack, which received standard diet plus snacks (potato chips and 1.5% sucrose solution with artificial red fruit flavor) from PD 0 to lactation day (LD) 14. On PD 7, mild hyperglycemia with glycemic levels between 120 to 300 mg/dL was induced by intraperitoneal administration of 35 mg/kg of streptozotocin (STZ) diluted in citrate buffer in half of the females from both experimental groups. Around PD 21, the females gave birth and, on postnatal day (PND) 1 the litters were culled to 4 males and 4 females. On PND 82, two males from each litter underwent stereotaxic surgery for implantation of a cannula in the lateral cerebral ventricle connected to an osmotic pump releasing saline or leptin (1 µg/day) for 7 consecutive days. Thus, offspring were divided into experimental groups according to maternal metabolism (normal or hyperglycemic), maternal nutrition (standard diet or standard diet + snacks) and treatment (saline or leptin). After that, the sexual behavior analysis was performed. All procedures were approved by the Ethics Committee on Animal Use CEUA-IBB (protocol 1134). Our results showed that the presence of maternal hyperglycemia was able to modify the sexual behavior of male offspring, increasing the number of mounts until the first ejaculation and total mounts. However, those changes were not modulated by leptin central treatment. Plus, there was no effect of maternal diet on the evaluated parameters.

ID: 10819

Área Temática: PRÊMIO ÁLVARO | Nutrição e Metabolismo

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FeSBE2022 VITAMIN D SUPRESSES THE DEVELOPMENT AND FUNCTION OF BROWN ADIPOSE TISSUE IN YOUNG RATS

The physiological role of Vitamin D in Brown Adipose Tissue (BAT) is completely unknown. The present study aimed to investigate the effects of maternal Vitamin D deficiency (VDD) on BAT development and function in rat offspring. For this, female rats (Wistar Hannover) were fed either a control (1000 IU Vit. D3/kg) or a VDD diet (0 IU Vit. D3/kg) for 6 weeks and during gestation and lactation. At weaning, male offspring were euthanized and BAT was harvested for analysis. Values were expressed as Mean \pm EPM (n=5-6) and the t-student test was used for statistics (p<0.05) (CEUA 52/2018). As expected, VDD offspring showed a drastic reduction in the calcidiol serum levels, which lead to hypocalcemia (7.0 \pm 0.2 vs. 8.7 \pm 0.1 mg/dL in CTRL) and hyperparathyroidism (2534 \pm 83 vs. 169 \pm 28 pg/mL of serum PTH in CTRL). BAT mass did not change but showed a decrease in the lipid droplet area (55.2 \pm 0.6 vs. 68.7 \pm 0.5 % in CTRL) associated with an increase (4.7 fold) in PRDM16 gene expression, a well-known regulator of differentiation and thermogenic program. This finding was accompanied by higher mRNA levels of BAT selective genes, including PPAR- γ , PGC1- α , and UCP-1, and an increase in ATP-synthase and PPAR- γ protein content. Accordingly, functional mitochondrial analysis using high-resolution respirometry showed that O₂ consumption rate (pmol O₂/second . tissue weight) of VDD BAT was increased after addition of basal mitochondrial substrates (leak state; 26.9 \pm 3.8 vs. 18.0 \pm 0.8 in CTRL) and ADP (OXPHOS state; 33.9 \pm 3.0 vs. 27.1 \pm 0.8 in CTRL). It is unlikely that these effects were mediated by sympathetic activation since the content of BAT norepinephrine and β 3-adrenoceptor downstream targets were not affected. These data show that maternal VDD leads to an abnormal induction of BAT thermogenesis and its mitochondrial activity in offspring and suggest that Vitamin D exerts a suppressive effect on BAT development and function in young rats.

FAPESP (19/19993-6).

ID: 10975

Área Temática: PRÊMIO ÁLVARO | Respostas de Treinamento Físico

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**FeSBE2022 EPIGENETIC, FUNCTIONAL AND STRUCTURAL ADAPTATION IN
GLYCOLYTIC, OXIDATIVE AND MIXED SKELETAL MUSCLE FIBERS OF
HEALTHY RATS AFTER 8 WEEKS DYNAMIC RESISTANCE TRAINING**

Exercise promotes diverse positive adaptations in the skeletal muscle^{1,2,3}, but its mechanisms are not fully understood². There are indications that epigenetic markers, such as global DNA methylation, are influencing these alterations^{2,3,4}. The aim was to analyze the impact of dynamic resistance training (DRT) on epigenetic, functional and structural adaptations in different muscle fibers. The study was approved by the local Animal Use Ethics Committee, protocol n° 01/2020. Twentytwo male Wistar rats weighing 200±50g at 50 days were divided into groups: Sedentary (S) and Trained (T). T group performed DRT on a vertical ladder with weekly progressive load increase, 1x/day, 3x/week for 8 weeks. After euthanasia under anesthesia, the extensor digitorum longus (EDL), soleus (S) and gastrocnemius (G) muscles were removed for global DNA methylation assay and histopathological analysis. Muscle strength (MS) was evaluated by the maximum load (ML) test 3x during the intervention. Epigenetic adaptation was not observed and was extremely variable, with no difference in global DNA methylation in EDL (p=0.172), S (p=0.611) and G (p=0.524) muscles comparing T vs S. When comparing the types of muscles, a significant difference was found (p=0.0004) indicating that each fiber has its own potential for global DNA methylation, with or without external intervention. On the other hand, DRT provoked increase of the MS as observed in the ML test (p<0.0001) and in the pre and post-intervention comparison (p<0.003). In the histopathological analysis, DRT did not promote structural adaptation in the EDL (p=0.799), S (p=0.748) and G (p=0.778) muscles. The results can be explained by the fact that the adaptation to training starts with a neural mechanism, which favors the gain in the MS. We concluded that the improvement of MS in 8 weeks DRT did not involve changes in the global DNA methylation or the structure of different skeletal muscle fibers in rats.

ID: 11081

Área Temática: PRÊMIO ÁLVARO | Respostas de Treinamento Físico

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**FeSBE2022 FOUR-WEEK DETRAINING AFTER 12-WEEK RESISTANCE TRAINING
IMPAIRS MITOCHONDRIAL TRANSCRIPTION IN THE SKELETAL MUSCLE OF
OBESE RATS**

Obesity is a metabolic disease that contributes to the mitochondrial (mito) changes. Resistance training (RT) induces an increase in some mito biogenesis proteins. Mitochondrial Transcription Factor A (TFAM) is a key activator of mito transcription, being involved in its replication. Interactions between mtDNA and TFAM participate to regulation of mito biogenesis. We aimed to evaluate the effect of four-week detraining after 8 weeks of RT in rats submitted to a high-calorie diet (HD) in the expression of TFAM in the soleus muscle. Forty-two male Wistar rats weighing 200 ± 50 g at 50 days were divided into: Sedentary Control (SC), Sedentary Obese (SO), Exercised Control (EC), Exercised Obese (EO), Detrained Control (DC), and Detrained Obese (DO). SO, EO and DO were fed a highcalorie diet for 12 weeks. EC, EO, DC, and DO rats performed climbing on a vertical ladder with progressive load, 4 series a day, 3x a week. The duration of RT was 12 weeks for EC and EO rats. DC and DO animals stopped training from the 9th until 12th week. After euthanasia, the soleus muscle was removed for Western Blotting. The study was approved by the local Animal Use Ethics Committee, CEUA nº 01/2017. SO group showed a higher body weight (BW) ($P<0.001$), calorie ingestion ($P<0.001$), and fat mass ($P<0.05$) compared to the other groups ($P<0.05$). SO rats showed increased BW ($P<0.0001$), higher fat mass ($P<0.05$), and calorie ingestion ($P<0.0001$) compared to SC, EC, and DC ($P<0.05$). SO and DO rats showed reduced TFAM protein levels compared to the SC group ($P<0.018$). DC rats showed increased TFAM levels compared to DO ($P<0.018$). The RT avoided the exaggerated gain of BW and fat mass, and the reduction in the TFAM protein levels in the rats fed HD. We concluded that four-week detraining after eight weeks of RT is so prejudicial to muscle mitochondria as HD ingestion alone is. Both impair the expression of the key protein involved in the transcription of the mitochondria, compromising mito biogenesis.

ID: 10956

Área Temática: PRÊMIO ÁLVARO | Respostas de Treinamento Físico

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FeSBE2022 URINARY BLADDER (UB) WALL IS REMODELED BY UNDULATORY RESISTANCE TRAINING IN FEMALE RATS

High impact sports cause stretching and weakening of the pelvic floor due to increased intra-abdominal pressure elicited by exercise. Undulatory resistance training (URT) induces acute inflammatory process, which may evolve with tissue remodeling. Healing tissue depends on the equilibrium of Metalloproteinases (MMP) and their inhibitors (TIMPS). We aimed to investigate the effects of daily URT on UB. Female Wistar rats (protocol CEUA#03/2020) were randomly divided in 2 groups: sedentary (SED, n=6) and URT (n=6). URT was performed with a ladder climbing equipment. The Maximum Loaded Carrying Test (MLCT) was carried out, in which all rats were loaded with 50% of their body weight (b.w.) and gradually increased to 75, 90 and 100% b.w. on subsequent climbing attempts. Afterwards, 30 g were added at each attempt until failure. The training sessions were organized in 3 blocks using daily URT with respective loads 60, 75 and 90% MLCT each block with new MLCT at each final block. After the last training, rats were euthanized and the UB was harvest and stored in formalin for later histological analysis. UB slices were stained with Hematoxylineosin (HE) and Masson Trichrome (MT). Immunohistochemistry for MMP1 and TIMP1 was also carried out. UB slices stained with HE showed alterations on all layers of URT group as increase and predominance of pseudostratified epithelium, thinner mucosa layer (ML) without blood vessels, fibrosis, thicker smooth muscle layer and absence of conjunctive tissue among cells. The UB of the URT group stained with MT had high predominance of collagen located on ML. MMP1 immunolabeled intensively on ML of URT rats, but not on SED's. In contrast, a light TIMP1 labeling on ML was observed in URT rats, and none label was found on the SED's. Therefore, daily URT evoked a UB wall remodeling with alterations in all layers with collagen formation on ML and a disbalance between MMP1 and TIMP1, likely altering UB function.

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ID: 10821

Área Temática: PRÊMIO ÁLVARO | Sistema Endócrino

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**FeSBE2022 PROGESTERONE TREATMENT DOES NOT IMPACT ENERGY
METABOLISM AND INSULIN RESISTANCE IN MENOPAUSE**

High-fat diet (HFD) has been implicated with insulin resistance, dyslipidemia, and metabolic diseases. Recent studies have shown that HFD can be related to metabolic syndromes and non-alcoholic fatty liver disease (NAFLD). In general, the prevalence of NAFLD is higher in men than in women of reproductive age, and postmenopausal women are especially susceptible to developing NAFLD. Clinical studies suggest the importance of estradiol replacement in energy metabolism. However, evidence related to hormone replacement therapy (estradiol + progesterone) and the consequences of progesterone on glucose homeostasis is still controversial. Therefore, the objective of this project was to investigate the effects of progesterone on energy metabolism and insulin resistance in an animal model of menopause fed an HFD. Female C57BL/6J mice were submitted to bilateral ovariectomy (OVX) and maintained on an HFD for six weeks. We include two groups of OVX animals treated with estradiol (E2) or estradiol + progesterone (E2+P4) by implanting subcutaneous pellets. Our results revealed statistical differences in final body weights ($p < 0.05$), with OVX+E2 and OVX+E2+P4 mice displaying a reduced body weight by ~13% when compared with OVX mice. OVX+E2 and OVX+E2+P4 mice also displayed higher glucose tolerance compared with OVX mice ($p < 0.05$). In addition, OVX+E2 and OVX+E2+P4 mice displayed lower insulin secretion over the course of the GTT ($P < 0.05$) compared with OVX mice, suggesting greater insulin sensitivity in these mice. Moreover, our results showed that OVX+E2 and OVX+E2+P4 animals had significantly reduced hepatic and muscle TAG content ($p < 0.05$) by ~54,1% and ~40%, respectively, compared with OVX mice. There was no significant difference between OVX+E2 and OVX+E2+P4 mice in the parameters analyzed. In conclusion, these results showed that the addition of progesterone in the hormone replacement therapy (estradiol+progesterone) in an experimental model of menopause (OVX mice) does not impact energy metabolism and insulin action.

ID: 11092

Área Temática: PRÊMIO ÁLVARO | Sistema Endócrino

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FeSBE2022 T3 TREATMENT ATTENUATES THE GLUCAGON SIGNALING PATHWAY IN THE LIVER OF ALLOXAN-INDUCED DIABETIC RATS: POSSIBLE MECHANISM BY WHICH T3 REDUCES HEPATIC GLUCOSE PRODUCTION IN DIABETIC RATS

Previous studies of our laboratory have revealed that treatment of rats induced to diabetes mellitus by alloxan with triiodothyronine (T3) reduces glycemia by mechanisms that involve, among others, the reduction of hepatic production of glucose. Liver RNAseq analysis from control (C), alloxan-induced diabetic (D) and diabetic rats treated with T3 (1.5 µg/100g b.w., ip) for 28 days (DT3) (CEUA 103/2016) revealed that, among the differentially expressed genes, four of the gluconeogenesis pathway (G6pc, Fbp1, Gpi and Pck1) showed reduced expression by T3 (DT3 vs D). After validation of these genes in another study with the same experimental groups, we evaluated the content of the proteins encoded by them by Western blotting, and obtained a reduction of FBP1, PEPCK-C and G6PC in the DT3 vs D group. In this study we aimed to identify, by means of RNAseq, regulatory networks involved in hepatic glucose production differentially expressed by T3 in the DM condition. Taking into account that glucagon secretion is elevated in the absence of insulin, and that there are indications that T3 can counteract the actions of this hormone, we evaluated the glucagon signaling pathway in liver of D vs DT3 using RNAseq and KEGG software. We observed that Pparg1a, Creb3l4, Foxo1 and Cpt1a gene expression was reduced in the DT3 vs D. Then we evaluated CREBp protein content by western blotting and showed a reduction in its expression. We additionally evaluated bile acids serum concentration, since they appeared to decrease glucagon responsiveness, however no changes were detected in DT3 vs D group, ruling out their participation in the observed effect. Our findings indicate that liver glucagon signaling pathway is impaired by the treatment of diabetic animals with T3. This was reinforced by the reduced content of pCREB, which plays a crucial role on gene expression of the enzymes of gluconeogenesis, and could justify the reduced hepatic glucose production in D rats treated with T3.

ID: 11123

Área Temática: PRÊMIO ÁLVARO | Toxicologia

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Instituição: Universidade Federal de São Carlos

FeSBE2022 LIVER BIOCHEMICAL RESPONSES OF CENTROPOMUS PARALLELUS TO EXPOSURE TO METALLIFEROUS ATMOSPHERIC PARTICULATE MATTER FROM VITÓRIA-ES

Coastal industrialization and urbanization are continuously increasing around the world and the waste discharge of potentially unsafe materials contaminate all environmental compartments and the resident organisms of these ecosystems. Among the estuarine contaminants, the deposition of atmospheric particulate matter from industries contributes to input metals and metallic nanoparticles on the environment with toxic potential and bioaccumulation trends into organisms and along the food chain. Metalliferous atmospheric contamination by iron pelletizing and steel industries was the main source of metal input in estuaries in coastal areas of Espírito Santo state (Brazil). In this study, multiple biochemical biomarkers (catalase, superoxide dismutase, glutathione peroxidase, glutathione transferase and lipid peroxidation) were analyzed in the liver of the edible fish (*Centropomus parallelus*) of females and males weighing 50-120 g, after exposure to 0, 0.01, 0.1 and 1.0 mg L⁻¹ of settleable atmospheric particulate matter from Vitória-ES, for 96 hours. Experiments were conducted in a static system of Federal University of Paraná (UFPR) and analysis were performed at Federal University of São Carlos (UFSCar) (UFSCar Ethics Committee nº 6082080518). Alterations in the activities of SOD, CAT, GPx and GST were observed. Results show an inhibition of SOD and GST activities at 1 mg L⁻¹ treatment and of CAT at 0.1 mg L⁻¹ treatment. On the other hand, GPx activity increased at 1 mg L⁻¹ treatment showing that H₂O₂ detoxification probably occurs through this pathway. Despite the changes observed in the antioxidant enzymes and GST activity, there was no significant change in the level of lipid peroxidation suggesting that the gills of *C. parallelus* was efficient in detoxifying the free radicals generated by exposure to atmospheric particulate matter.

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ID: 11136

Área Temática: PRÊMIO BRANCA | *Biologia e Doenças Cardiovasculares*

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FeSBE2022 SPIRONOLACTONE PREVENTS OBESITY-INDUCED PERIVASCULAR ADIPOSE TISSUE DYSFUNCTION IN FEMALE MICE.

Obesity is a risk factor for cardiovascular diseases and is more prevalent in women than men. The mineralocorticoid receptor (MR) contributes to adipose tissue inflammation and MR blockade has been demonstrated to improve vascular function in obesity, especially in female sex. Perivascular adipose tissue (PVAT), a fat surrounding almost all vessels, has been suggested as a mechanism involved in the obesity-induced vascular dysfunction. However, sex differences in obesity-induced PVAT dysfunction with a possible contribution of MR activation is not known yet. The aim of this study is to analyze the PVAT anticontractile function and inflammatory markers in obese female and male mice. We hypothesized that MR signaling is involved in PVAT dysfunction in female obesity. (CEUA:5474-1) Male and female C57Bl6/J mice (8 weeks-old) fed a chow or a high-fat diet (HFD) for 20 weeks. At the last 4 weeks of HFD, mice were treated with the MR antagonist spironolactone (Spi, 100 mg/kg/day). Statistics: Student t test or one-way ANOVA, $p < 0.05$. HFD induced PVAT dysfunction in mesenteric resistance arteries of females only, which was prevented by Spi. HFD doubled serum aldosterone, as well as MR transcripts SGK1 and ENaC β protein expression, and total and M1 macrophages evaluated by flow cytometer in PVAT of females. MR blockade with Spi prevented these alterations in female sex only. HFD increased gene expression of TNF α (3x) and IL-6 (2.7x) and protein expression of iNOS (+45%) and nitrotyrosine proteins (+35%) in PVAT of female mice. iNOS inhibition with 1400w restored PVAT anticontractile function while Spi prevented iNOS upregulation and protein nitration in PVAT of female obese mice. In conclusion, MR blockade prevented HFD-induced PVAT inflammation and anticontractile dysfunction in females only. Therefore, data suggest MR activation as a mechanism mediating sexual dimorphism in PVAT dysfunction in the setting of obesity.

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ID: 10929

Área Temática: PRÊMIO BRANCA | *Biologia e Doenças Gastrointestinais*

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Instituição: UFPI

FeSBE2022 MODERATE PHYSICAL EXERCISE IMPROVES BODY COMPOSITION, NUTRITIONAL PARAMETERS, OXIDATIVE STRESS BIOMARKERS, AND GASTRIC EMPTYING DELAY IN POLYCYSTIC OVARY SYNDROME-RATS.

Polycystic Ovarian Syndrome (PCOS) is the most common endocrine disorder in women. However, few studies investigated the effect of exercise on gastrointestinal, oxidative stress, and nutritional parameters in PCOS rats. In this study, we investigated the effect of exercise on gastrointestinal, nutritional, body composition and oxidative stress in PCOS-rats. Wistar females, (190-220g), divided in: control (CO), PCOS and PCOS+Exercise (PCOS+Ex). PCOS was induced by letrozole (1mg/kg via p.o), for 21 days. Rats performed swimming (5% of body weight), 1h/day/21 days. We assess body weight, nutritional and murinometric parameters, body composition, gastric emptying, thermography, and oxidative stress biomarkers in brown adipose tissue (BAT) and epididymal tissue (ET). The study was approved by the Ethics Committee for the Use of Animals (CEUA-UFPI no-599/19). PCOS increase weight gain ($p < 0.05$) vs. CO rats (28.3 ± 4.6 vs. 15.3 ± 2.0 g). PCOS+Ex prevent this gain compared with PCOS (11.8 ± 2.0 vs. 28.3 ± 4.6 g). In comparison with CO group PCOS increase ($p < 0.05$) energy intake (57.4 ± 2.1 vs. 64.0 ± 3.4 Kcal/day), Feed efficiency (23.9 ± 2.5 vs $56.1 \pm 4.4\%$), specific rate of weight gain (66.3 ± 8.1 vs. 165.7 ± 28.4 g/kg), total water body (102.0 ± 2.3 vs. 120.0 ± 3.0 mL), Fat-Free Mass ($137,8 \pm 3,1$ vs 164.5 ± 4.2 mL) and gastric retention (39.7 ± 2.3 vs. $55.3 \pm 2.2\%$). In the PCOS+EX groups, all parameters were prevented ($p < 0.05$) in comparison with PCOS. In ET, PCOS decrease ($p < 0.05$) SOD (1.750 ± 0.05 vs. 2.416 ± 0.20 U), GSH (16.28 ± 4.32 vs. 51.17 ± 9.21 NPSH/mg) compared to CO. In BAT, MPO decrease ($p < 0.05$) in PCOS+Ex compared with PCOS (0.66 ± 0.2 vs. 1.26 ± 0.1 U/mg). PCOS+Ex decrease ($p < 0.05$) MDA in BAT (697.3 ± 201.9 vs. 1.751 ± 75.9 nmol/g) and in ET (316.7 ± 5.49 vs. 834.6 ± 64.8 nmol/g) compared with PCOS. Physical exercise was able to improve body composition, nutritional parameters, gastric dysmotility, and oxidative stress biomarkers in BAT and ET induced by PCOS.

ID: 11176

Área Temática: PRÊMIO BRANCA | *Biologia e Doenças Renais*

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Instituição: Universidade Federal da Bahia - IMS

FeSBE2022 HIGH-INTENSITY INTERVAL TRAINING REGULATES APOPTOTIC AND INFLAMMATORY SIGNALING PATHWAYS IN FEMALES RATS WITH CISPLATIN NEPHROTOXICITY

Apoptotic and inflammatory pathways are involved in acute kidney injury (AKI) induced by cisplatin (CP). We compared the impact of high-intensity interval training (HIIT) with low-to-moderate-intensity training (LIT) on apoptotic and inflammatory markers expressions in female rats with CP-induced AKI. Rats Wistar, weight 190-220g, 10 weeks old were divided into four groups (n=7): control and sedentary (C+S); CP and sedentary (CP+S); CP and LIT (CP+LIT) and CP and HIIT (CP+HIIT). At the end of 8 weeks of treadmill running, the rats received an injection of CP (5 mg/kg), 7 days later, they were euthanized and the kidneys were submitted to real-time PCR (fold change), immunohistochemistry (IHC) (%), and ELISA (pg/mg) assays. Study was approved by the Ethics Committee in Animal Experimentation of UFBA/IMS (056.2018). There was a more significant increase in TNFR1, p38 (MAPK14), and p53 gene expressions in CP+S (20.1±2.0; 17.5±0.9; 31.5±1.4, respectively) compared to the C+S group (p<0.05), however, although both trainings attenuated this effect compared to CP+S (p<0.05), HIIT (11.6±1.5; 8.5±1.4; 6.8±1.53, respectively) was more effective than LIT (16.7±0.6; 15.6±0.5; 23.6±1.3, respectively) (p<0.05). Similarly, IHC stains revealed higher CASP3 and Bax expressions in CP+S (27.4±14.1; 26.5±8.3, respectively) than in C+S (4.3±4.6; 3.0±1.5) (p<0.05), both protocols reduced this effect in CP+LIT (12.6±6.7; 17.4±4.7) and CP+HIIT (8.1±7.1; 8.1±4.7) (p<0.05), with HIIT being more effective than LIT (p<0.05). There was increased Bcl-2 immunostaining in all CP-treated groups compared to C+S (3.0±1.5) (p<0.05), but this effect was more significant in CP+HIIT (30.2±12.6) than in the CP+S (14.3±6.8) and CP+LIT (17.3±6.3) groups (p<0.05). There was an increase in IL-8 renal levels in CP+S (25.6±5.0) compared to C+S (3.6± 0.9) (p<0.05), but HIIT (7.5±1.4) was more effective than LIT (15.9±2.4) (p<0.05). HIIT appears to provide superior renoprotection than LIT by modulating apoptotic and inflammatory signaling pathways.

ID: 11022

Área Temática: PRÊMIO BRANCA | *Biologia e Doenças Respiratórias*

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Instituição: Laboratório de Investigação Pulmonar, Instituto de Biofísica Carlos Chagas Filho da Universidade Federal do Rio de Janeiro

**FeSBE2022 EXTRACELLULAR VESICLES DERIVED FROM HYPOXIA-
PRECONDITIONED BONE MARROW MESENCHYMAL STROMAL CELLS
DECREASE RIGHT VENTRICLE SYSTOLIC PRESSURE IN EXPERIMENTAL
PULMONARY ARTERIAL HYPERTENSION**

Pulmonary arterial hypertension (PAH) affects pulmonary vasculature, and actual therapy focuses mainly on vasodilation. Preclinical studies have shown the potential of mesenchymal stromal cells (MSCs) in holding PAH progression but it has limitations on the number of MSCs administered. Hypoxia-Preconditioning of bone marrow MSCs may better reflect their physiological niche. Here, we hypothesized that prior hypoxia incubation of bone marrow MSCs may increase the therapeutic effects by extracellular vesicles (EV)s. Bone marrow MSCs were isolated from 6 male Wistar rats, and then submitted to normoxia (21%O₂) or hypoxia (1%O₂) for 48-h. Total proteins from EVs were isolated for mass-spectrometry analysis and proteomics. Additionally, 48 male Wistar rats were randomly assigned to: 1) PAH group that received monocrotaline (60mg/kg, ip); 2) control group (CTRL) that received saline (CEUA 022/19). On day 14, PAH was confirmed by echocardiography and EVs obtained from Normoxia-MSC or Hypoxia-MSC conditions were intravenously injected. On day 28, right ventricular hypertrophy (RVH) index and right ventricular systolic pressure (RVSP) were measured. Overall, 718 proteins were identified, of which 30 in Normoxia-EV (N-EV) and 293 in Hypoxia-EV (H-EV). H-EV showed enrichment of biological processes related to the immune system and extracellular matrix organization. RVH index was higher in PAH (0.7±0.2g) than CTRL group (0.3±0.1g). Both N-EV and H-EV reduced RVH index compared to PAH (p=0.006, and p<0.001, respectively). RVSP was higher in PAH (62±18mmHg) than CTRL (26±2mmHg) groups. N-EV and H-EV (35±5mmHg and 31±9mmHg, respectively) reduced RVSP compared to PAH group. MSCs under hypoxia released more EVs, and their content was related to the expression of regulatory proteins of the immune system and extracellular matrix organization. In addition, EVs derived from hypoxia-preconditioned MSCs decrease right ventricle hypertrophy and systolic pressure in experimental PAH.

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ID: 11307

Área Temática: PRÊMIO BRANCA | Dor e Inflamação

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FeSBE2022 CANNABIDIOL HAS THERAPEUTIC POTENTIAL FOR MYOFASCIAL PAIN IN FEMALE AND MALE PARKINSONIAN RATS

The musculoskeletal orofacial pain is a complex symptom of Parkinson's disease (PD) resulting in stomatognathic system dysfunctions aggravated by the disease rigidity and postural instability. We tested the effect of cannabidiol (CBD), a non-psychotomimetic constituent of Cannabis sativa, in PD-related myofascial pain. All experimental animal procedures were approved by the local Animal Care and Use Committee of the University of Sao Paulo/Brazil at the Ribeirao Preto Campus (2019.1.421.58.8). Wistar adult female and male rats (7 - 8 weeks / 150 - 200gr) orofacial allodynic and hyperalgesic responses were tested by Von Frey and formalin tests, before and 21 days past 6-OHDA lesion. Algesic response was tested after masseter muscle injection of CBD (10, 50, 100 µg in 10 µL) or vehicle, female (orofacial allodynia and hyperalgesia. According to the estrous cycle's phases, females presented distinct orofacial nociceptive responses, being the estrus phase well-chosen for nociceptive analysis after 6-OHDA lesion (phase with fewer hormone alterations and adequate length). Dopaminergic neuron lesion decreased mechanical and inflammatory nociceptive thresholds in females and males in a higher proportion in females. CBD local treatment reduced the increased orofacial allodynia and hyperalgesia, in males and females. The female rats were more sensitive to CBD effect considering allodynia, responding to the lowest dose. It was considered a statistical difference when $p < 0.05$. Although females and males respond to the effect of three doses of CBD in the formalin test, males showed a superior reduction in the hyperalgesic response. These results indicate that hemiparkinsonian female in the estrus phase and male answer differently to the different doses of CBD therapy and nociceptive tests. CBD therapy is effective for parkinsonism-induced orofacial nociception. n = 112) and male (n = 99). Males compared to females in all estrous cycles' phases presented reduced.

ID: 10903

Área Temática: PRÊMIO BRANCA | Farmacologia Básica e Clínica

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FeSBE2022 CAN TOPIRAMATE TREATMENT DURING CHILDHOOD CAUSE VASCULAR DYSFUNCTION IN RATS IN ADULTHOOD?

Topiramate (TPM), an antiepileptic drug, has been associated with increased vascular risk markers in the pediatric population. However, there are no studies evaluating the late vascular adverse effects of this drug. The present study evaluated the vascular function of adult rats treated with TPM during childhood. Male and female Wistar rats were treated with TPM (41 mg/kg/day) or water (TPM vehicle) by gavage from postnatal day (PDN) 16 to 28. In adulthood (PDN 90), thoracic aorta reactivity to the vasoconstrictor phenylephrine (phenyl) and the vasodilators acetylcholine and sodium nitroprusside was evaluated in rings with (Endo+) and without (Endo-) endothelium. The comparison between groups was made using the maximum response (maxR, grams) for the agonist. In addition, the aortic thickness and expression of cyclooxygenases (COX-1 and COX-2), NOX2, and p47phox were analyzed. Finally, we also sought to understand the role of endothelium-derived contractile factors in TPM-induced vascular dysfunction [CEUA/UEL: 100/2018]. There was no difference in vasodilation between TPM and controls rats. On the other hand, the aortic response to phenyl was increased in male and female rats from the TPM group when compared with the control group. In TPM male rats, the hyperreactivity to phenyl in Endo+ rings [2.87 ± 0.12 , n=11] was abrogated by the inhibition of NADPH oxidase [2.29 ± 0.14 , n=11] and COX-2 [1.80 ± 0.18 , n=6]. In TPM female rats [2.16 ± 0.16 , n=9], the response to phenyl in Endo+ rings were restored only by inhibition of COX-2 [1.49 ± 0.13 , n=9]. In addition, TPM male rats presented aortic hypertrophy and increased expression of NOX-2 and p47phox, while TPM female rats showed increased COX-2 aortic expression. Together, the present study provides evidence that treatment with TPM during childhood causes vascular dysfunction in adulthood, and that the mechanism underlying the vascular effects of TPM is sex-specific.

ID: 11221

Área Temática: PRÊMIO BRANCA | Neurobiologia

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FeSBE2022 DOXYCYCLINE IMPROVES THE MOTOR IMPAIRMENT OF 6-OHDA INDUCED UNILATERAL LESION OF DOPAMINE NEURONS LESION IN FEMALE AND MALE RATS

Doxycycline (Doxy) potential as a protective drug for Parkinson's disease might go beyond preventing dopaminergic cell death. Our aim was to compare the action of Doxy on motor activity in hemiparkinsonian animals of both sexes. This study was approved by the Ethics Committee on Animal Experimentation of University of São Paulo (2020.1.473.58.0). Female and male Wistar Hannover (8-9 weeks;200-250g) rats were submitted to 6-OHDA lesion and the efficacy of dopaminergic loss was confirmed with the forepaw adjusting steps test. Animals with similar lesion intensities were equally divided into the experimental groups: Control, 6-OHDA, 6-OHDA+Doxy (20 or 40mg/kg, i.p.), and 6-OHDA+L-DOPA (5mg/kg + benserazide 5mg/kg, s.c.). The treatments last 21 days and forepaw adjusting test, rotarod and actimeter were performed. 6-OHDA-induced lesion caused a reduction in the use of the paw contralateral to lesion indicating a unilateral impairment in females (F: $F(3,23)=10,66$, $p<0,0001$) and males (M: $F(4,25)=140,2$, $p<0,0001$). In females, both doses of Doxy (40: $F(3,23)=10,66$, $p=0,0043$; 20: $F(3,23)=12,24$, $p=0,0010$); in males, only the higher Doxy dose was effective (40: $F(4,25)=140,2$, $p<0,0001$). The actimeter test, in females, demonstrated that Doxy 40mg/kg induced decrease in the horizontal ($F(3,23)=5,067$, $p=0,0208$) and vertical ($F(3,23)=6,721$, $p=0,0056$) movements. At the rotarod test in males, Doxy 40mg/kg ($F(4,25)=30,58$, $p<0,0001$) reversed the 6-OHDA induced latency period to fall. In conclusion, Doxy recovered males and females deficit in the use of the contralateral to lesion paw caused by the unilateral neurotoxin microinjection. Likewise, males rotarod test suggest a Doxy treatment assembled recovery on neuromuscular coordination. The results indicate that Doxy is a drug that improves Parkinsonian disability.

ID: 10947

Área Temática: PRÊMIO BRANCA | Neurobiologia

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FeSBE2022 ONE SINGLE PHYSICAL EXERCISE SESSION PROMOTES RECOGNITION MEMORY PERSISTENCE IN FEMALE RATS

A single bout of physical exercise (PE) can modulate memory persistence in male rats. However, most research does not include female rats, even though it is known that there may be different outcomes in males and females. We investigated the effect of acute PE on the modulation of memory of adult female Wistar rats. The Ethics Committee in Animal Experimentation approved the study (029/2021). Memory was evaluated by the object recognition (OR) task. For OR, after the habituation protocol, the rats were exposed to two different objects for free exploration for 5 min (training). Immediately after, rats were submitted or not to a PE session on a treadmill for 30min, according to 60 to 70% of the previously measured maximum indirect oxygen consumption (VO_2). The rats were tested 24 h and 7 days later to assess, respectively, memory consolidation and persistence. In each test, a familiar object was kept, and a novel object was inserted, and exploration was measured for 5 min. The exploration time of the objects in the OR was converted into a percentage of the total exploration time and the one-sample t-test was used to compare the percentage with the theoretical mean (50%). Differences were considered statistically significant when $P < 0.05$. As expected, all rats explored for a similar time each of the unknown objects in the OR training ($P > 0.05$). Control group rats consolidate the OR memory, exploring the novel object for more than 50% of the total time in the 24 h test ($P = 0.0143$), but it is not observed memory persistence in the 7-day test ($P = 0.2886$). In contrast, rats submitted to a PE session after training explored more than 50% of the time the novel object in the 24 h test ($P = 0.0118$), and, in the 7-day test ($P = 0.0086$) demonstrating memory consolidation and persistence. Therefore, here we demonstrated that a single session of PE after OR learning improves the female rats' memory since they were able to consolidate and persist the NOR memory.

ID: 11331

Área Temática: PRÊMIO BRANCA | Nutrição e Metabolismo

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FeSBE2022 FISH OIL SUPPLEMENTATION DURING GESTATION ATTENUATES PERINATAL MATERNAL HIGH-FAT DIET-INDUCED SEX-SPECIFIC CHANGES IN SKELETAL MUSCLE AT WEANING

Perinatal maternal moderate high-fat (HF) diet increased skeletal muscle (SkM) mitochondrial damage associated with lipid accumulation in adult male offspring, which may be related to the higher plasma n6:n3 polyunsaturated fatty acids ratio they exhibit at birth. We studied the effects of maternal HF diet in offspring's SkM at weaning and the potential benefits of fish oil (FO, rich in n3) during gestation. Female Wistar rats consumed control (C: 11% fat) or isocaloric high-fat (HF: 29% fat) diet 8 weeks pre-gestation through lactation. Part of the HF dams received HF diet with addition of 4% FO (HFFO: 35% fat) only during gestation. At weaning, female (F) and male (M) HF and HFFO offspring had higher body weight and adiposity ($p < .05$ vs C). Soleus muscle had misaligned sarcomeres and abnormal mitochondrial cristae in HF-F and M offspring. HFFO mitochondria also had defective cristae; however, attenuated in both sexes. HFFO-F increased mRNA of myosin heavy chain isoform Myh4 (MHCIIb: $p = .01$ vs HF) and uncoupling protein 3 ($p = .01$ vs HF), which may partially protect against damage. HF-M tended to exhibit higher SkM triglyceride content ($p = .08$), regardless of FO, with lower Myh7 (MHCI $p = .04$) and a trend for lower Myh1 (MHCIIx $p = .09$) and Myh4 ($p = .06$), which were attenuated in HFFO-M. HFFO-M increased fatty acid transporter Slc27a4 ($p = .03$ vs C; $p = .06$ vs HF), possibly to improve SkM n3 uptake. HF-M pups tended to reduce mitochondrial transcription factor Tfam ($p = .06$) and the thermogenic marker sarcolipin Sln ($p < .01$), but no changes in Ca²⁺-ATPase SERCA2 protein. HFFO-M increased Tfam ($p = .01$) and tended to increase Sln ($p = .06$ vs HF; $p = .02$ vs C). Despite unaltered thyroid hormone (TH) receptor (Tra) and metabolic enzymes (Dio2 and Dio3), HF-M reduced Slc16a2 transporter ($p < .01$) regardless of FO, suggesting decreased TH supply. Our data indicate that FO treatment during gestation improves sex-specific changes in SkM oxidative metabolism induced by maternal HF diet at weaning.

ID: 10820

Área Temática: PRÊMIO BRANCA | Nutrição e Metabolismo

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Instituição: UEM

FeSBE2022 PROTEIN-CALORIC RESTRICTION AT LACTATION PROVOKES BROWN ADIPOSE TISSUE MORPHOLOGY ALTERATIONS IN ADULT RAT FEMALE OFFSPRING

It is well known that nutritional insults in the neonatal period can program the metabolism of offspring through adaptations and modulations in the central nervous system and in the tissues that are in development, which can cause cardiometabolic diseases in adult life. Thus, we hypothesized that the insult of protein malnutrition during lactation, which is an important programming window, can cause morphological and metabolic changes in offspring. Studies have already shown that male adult offspring of malnourished mothers demonstrated a lean phenotype and metabolic alterations. We evaluated the biometric parameters and morphological effects of a low-protein maternal diet during lactation in adipose tissue of adult females. The study consisted of 2 groups subdivided at birth: NP, diet with normal protein during lactation (n = 3 litters, 20.5% protein) and LP, diet with low protein during the first fourteen days of lactation (n = 3 litters, 4% protein), ethical approval nº 8625310521 from our University. At 90 days of age, the pups were euthanized and histological processing of white and brown adipose tissue was performed. We observed a 22% reduction in body weight ($p < 0.0001$) along with lower fat stores of retroperitoneal, periovarian, periuterine and mesenteric ($p < 0.0001$, $p < 0.01$, $p < 0.01$, $p < 0.05$ respectively) in the LP group. However, there was no difference between groups in brown adipose tissue weight. Interestingly, the LP group showed hyperplasia in brown adipose tissue ($p < 0.002$), with significant increase in tissue area ($p < 0.02$), and no difference was found in the histology of white adipose tissue. Therefore, we conclude that nutritional insult during lactation programs adult female offspring to lean phenotype; it maybe with more activity in brown adipose tissue.

ID: 11275

Área Temática: PRÊMIO BRANCA | Respostas de Treinamento Físico

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**FeSBE2022 ARTERIAL BAROREFLEX IS CRUCIAL TO HYDROCHLOROTHIAZIDE
-AND EXERCISE TRAINING-INDUCED ADAPTATIONS IN HYPERTENSIVE
MENOPAUSED RATS**

Baroreflex is essential to arterial pressure (AP) control and its impairment is implicated in hypertension-induced end-organ damage. Here, we investigate the effects of sinoaortic denervation (SAD) on adaptations induced by hydrochlorothiazide (HCTZ) and concurrent exercise training (aerobic+resistance, CET) in hypertensive menopausal rats. After approval by the animal ethics committee (n°7611290618), female spontaneously hypertensive rats (3 mo) were ovariectomized and submitted to sham (OS) or HCTZ treatment: alone (OSH), plus CET (OTH) or plus CET and SAD (OTH-SAD). HCTZ (30mg/kg) and CET (3 days/wk) were conducted for 8 weeks. AP was directly recorded, and AP variability and vasopressor systems were evaluated. Oxidative stress markers were assessed in cardiac tissue. OTH showed higher performance in exercise tests and these results were partially impaired after SAD. Trained groups showed reduced basal AP (vs. OS); however only the OTH group presented reduced AP variance (28 ± 8 vs. OS: 60 ± 13 mmHg²) and AP fall after hexamethonium (-50 ± 12 vs. OS: -75 ± 18 mmHg). SAD increased AP variance (OTH-SAD vs. OSH and OTH), and vasopressin receptor antagonist (OTH-SAD vs. OTH) and losartan (OTH-SAD vs. OS, OSH and OTH) induced-AP falls. Oxidized proteins (damage) were reduced, and antioxidant enzymes activities (catalase and glutathione peroxidase) were increased in the hearts of OTH (vs. OS group); however, these changes were not observed in SAD group. In conclusion, our data suggest a crucial role of baroreflex to modulate neurohumoral adaptations induced by HCTZ plus exercise training, probably negatively impacting in cardiac oxidative damage and functional capacity in an experimental model of hypertension and menopause.

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ID: 11133

Área Temática: PRÊMIO BRANCA | Sistema Endócrino

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**FeSBE2022 ACTIONS OF RESISTANCE PHYSICAL TRAINING OR HORMONE
THERAPY WITH ESTROGEN ON COGNITIVE FUNCTION AND MOTOR
ACTIVITY OF RATS IN THE PERIESTROPAUSE PERIOD**

The transition from the regular to the irregular cycle characterizes perimenopause, and this period is essential for health promotion. The possible neuronal decline is influenced by endogenous and exogenous factors, and estradiol and physical exercise can modulate changes in cognitive functions and motor activity. The study aimed to evaluate anxiolytic responses, short- and long-term memory, and functional gait of rats in periostropause after hormone therapy with estrogen (EHT) or resistance physical training (RPT). Forty rats (17 months) performed elevated plus-maze analysis, object recognition (OR), and the footprint test (FT) and were distributed into groups: not trained (21Mo/NT), RPT (21Mo/RPT; 3x/week), vehicle (21Mo/Veh; corn oil/0.2 mL/SC; 2x/week), and EHT (21Mo/E2; 17 β -estradiol/15 μ g/Kg/SC; 2x/week) (CEUA n° 0585-2021). At the end of the intervention period (120 days), all animals (now 21-months-old) were re-exposed to the tests. The 21Mo/NT and 21Mo/Veh groups spent less time and had fewer entries in the open arms compared to animals at 17 months and 21 months that received EHT or performed RPT. Improvement in short-term and long-term memory occurred in the 21Mo/RPT group when compared to the 17Mo and 21Mo/NT groups. However, the 21Mo/E2 group presented maintenance of the index compared to when they were 17 months old. The FT showed an increase in stride length and decrease in stride width after therapies when comparing the 17Mo and 21Mo groups. This dataset suggests that exogenous E2 or RPT performed during periostropause contributes to an anxiolytic profile, restoration of cognitive functions, and functional repercussions, with better gait activity. This study reinforces the importance of EHT, as well as the role of RPT in the preservation of functions that were previously performed, representing possible therapies to be progressively explored as preventive resources for neuropsychological and neurodegenerative disorders.

Keywords: Aging; Perimenopause; Physical Exercise; Estrogen Replacement Therapy

ID: 10627

Área Temática: PRÊMIO BRANCA | Sistema Endócrino

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Instituição: FMRP-USP

**FeSBE2022 HEPATIC ESTROGEN RECEPTOR ALPHA OVEREXPRESSION
PROMOTES REDUCTION IN BODY WEIGHT AND IMPROVES GLUCOSE
TOLERANCE IN MICE**

Insulin resistance is defined as an impaired biological response of insulin action in target tissues. Hepatic insulin resistance is one of the main factors associated with dyslipidemia and obesity, including elevated plasma triglyceride levels and reduced HDL cholesterol levels, increasing cardiovascular risk and the development of non-alcoholic fatty liver disease (NAFLD). Experimental and clinical studies reveal that estradiol contributes positively to glucose homeostasis, and the mechanisms of these beneficial actions are mediated by estrogen receptor alpha (ER α). Thus, the aim of this study was to evaluate the effects of ER α overexpression specifically in the liver on body weight, inflammatory markers in liver, and glucose tolerance in mice fed a regular chow (RC) or high fat diet (HFD). Hepatic ER α overexpression was induced by adeno-associated virus (AAV). Male C57/BL6 mice were divided into 4 groups (n=8): RC fed control mice (C-RC); RC fed AAV-treated mice (AAV-RC); HFD fed control mice (C-HFD); and HFD fed AAV-treated mice (AAV-HFD). The virus was inoculated via the tail vein and the experiments were performed 6 weeks later. Gene expression was analyzed by RTPCR and glucose tolerance was evaluated by an intraperitoneal glucose tolerance test (ipGTT). The gene expression of ER α (Ers1) in AAV-HFD (p<0.05) and AAV-RC (p<0.05) animals was increased by ~80 fold in HFD and ~300 fold in RC when compared with the respectively control animals. Hepatic ER α overexpression induced a reduction (p<0.0001) in body weight at the end of treatment in both HFD and RC fed animals, showing a ~25% and ~45% reduction, respectively. AAVHFD animals had higher glucose tolerance when compared with C-HFD animals (p<0.05). Also, AAV-HFD animals displayed reduced gene expression of TNF- α (p<0.01) and IL-1 β (p<0.01) in liver. The groups fed a RC with or without AAV treatment showed no significant difference. Taken together, these data provide evidence that the effects of hepatic ER α overexpression protects male mice against increased body weight and hepatic inflammation, promoting greater glucose tolerance.

ID: 10880

Área Temática: PRÊMIO EDUCAÇÃO EM CIÊNCIAS | *Biologia e Doenças Respiratórias*

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FeSBE2022 SURVIVAL RATE, INTENSIVE CARE UNIT AND HOSPITAL LENGTH OF STAY OF COVID-19 PATIENTS UNDER ONLY NONINVASIVE VENTILATION, HIGH-FLOW NASAL CATHETER OR COMBINED IN A TERTIARY HOSPITAL IN RIO DE JANEIRO: RETROSPECTIVE COHORT STUDY.

During the clinical course of COVID-19, some patients may require noninvasive ventilation (NIV) or high-flow nasal catheter (HFNC) oxygen therapy. However, their application whether only NIV, HFNC or combined (NIV+HFNC) has been controversial in COVID-19 population. The aim of the study was to describe, retrospectively, the survival rate, and intensive care unit (ICU) and hospital length of stay (LOS) of COVID-19 patients under NIV, HFNC or combined (NIV+HFNC) in a tertiary hospital in Rio de Janeiro. A retrospective cohort study was done analyzing official medical records, between March 2020 and July 2021. (CAAE: 52534221.5.0000.5249). The inclusion criteria were age > 18 years-old, and positive swab test for COVID-19 or computed tomography consistent of COVID-19. The exclusion criteria were hospital LOS less than 3 days, patients whose therapy (NIV, HFNC or NIV + HFNC) less than 48 hours, and missing data about the outcome variables. The primary outcome was survival rate, and the secondary outcomes were ICU and hospital LOS. Chi-Square test was used to assess survival rate. The Mann-Whitney U test was applied to assess differences in ICU and hospital LOS ($p < 0.05$). Overall, 1,371 patients were enrolled. 120 patients were only submitted to NIV, 35 patients were only submitted to HFNC, and 148 patients to both NIV+HFNC. The survival rates were 27.5%, 20%, and 28% for NIV, HFNC, and NIV+HFNC, respectively, and did not differ among groups ($p = 0.598$). The ICU-LOS was higher in NIV+HFNC (median [IQR] 14 days [9.5-24]) than NIV (9 days [6-15]), $p < 0.001$. The hospital-LOS was higher in NIV+HFNC (19 days [13-31]) than NIV (13 days [10-22]) and HFNC (13 days [9-29]), $p < 0.001$ and $p = 0.040$, respectively. Although survival rate did not differ among groups, patients who needed for NIV and HFNC combination showed higher ICU and hospital length of stay. Due to the exploratory nature of the retrospective study, we cannot assure causality, but instead, a marker for COVID-19 severity.

Área Temática: IV PRÊMIO EDUCAÇÃO EM CIÊNCIAS

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FeSBE2022 AULA NOTURNA

A estratégia didática intitulada ‘Aula Noturna’ se trata de uma Sequência didática que culminou em um evento organizado na Escola Municipal Agostinho Franceschi, em Araruama-RJ, em que os alunos foram convidados à uma noite de imersão no mundo da Astronomia e Astronáutica. Em sua primeira edição, que ocorreu na noite do dia 12 de Novembro de 2021, o evento contou com uma sequência de 5 atividades, nas quais os estudantes tiveram a oportunidade de adquirir novos conhecimentos e/ou exercitar diferentes habilidades científicas, relacionadas à Unidade Temática Terra e Universo da BNCC. A primeira atividade consistiu em assistir a uma sessão de vídeos que respondem a indagações sobre o Cosmos, tais como “Como colonizar a galáxia?” e “Qual é o nosso lugar no Universo?”. Em seguida, os alunos participaram da oficina “Sistema Solar em escala”, em que puderam confeccionar modelos dos planetas em escala de tamanho e realizaram uma dinâmica de grupo para compreender as relações de distância entre eles no Sistema Solar. Um minicurso de construção de foguetes de garrafas PET, movidos a água e pressão do ar, vinha na sequência, contando com uma sessão de testes de lançamento ao final. Na quarta atividade, os estudantes realizaram a observação da Lua cheia e suas crateras utilizando lunetas caseiras, feitas de lentes recicladas e canos de PVC. As lunetas haviam sido confeccionadas previamente pela turma de 6º ano da escola com o auxílio da professora, durante as aulas de Ciências da Natureza. Por fim, os participantes assistiram a uma palestra ministrada por duas integrantes do Minerva Rockets UFRJ, time aeroespacial da Universidade Federal do Rio de Janeiro, em que aprenderam sobre o trabalho das cientistas projetando foguetes. O evento proporcionou para além de momentos de intensa investigação científica e aprendizagem, muita diversão para todos os presentes. Temas como Astronomia e Astronáutica, apesar de fascinantes por natureza, são muitas vezes abstratos para a compreensão pelos discentes, mas neste dia, através das estratégias didáticas utilizadas, se aproximaram mais da realidade estudantil. A realização de eventos científicos na escola é de fundamental importância para garantir o acesso ao conhecimento de forma lúdica pelos estudantes, os quais, em sua maioria, não têm oportunidade de frequentar espaços de educação não formal, como museus e planetários. A “Aula Noturna” foi um evento avaliado de forma muito positiva por todos os participantes, desde os alunos, que vivenciaram novas formas de aprender Ciência, até a equipe pedagógica e de apoio, que pôde se maravilhar com a observação inédita da Lua através de uma luneta. O sucesso foi tanto, que a “Aula Noturna” passa a ter edições anuais incluídas no calendário da escola. Por fim, ressaltamos que o trabalho interdisciplinar realizado pelas educadoras envolvidas no planejamento e mediação das atividades foi possível graças ao comprometimento de toda a equipe da escola, desde a direção e coordenação passando pelos auxiliares de serviços gerais e as merendeiras, até o motorista e a monitora do ônibus escolar, os quais estiveram ativamente envolvidos para proporcionar uma noite de experiências inesquecíveis a todos.

Área Temática: IV PRÊMIO EDUCAÇÃO EM CIÊNCIAS

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FeSBE2022 EDUCAÇÃO CIENTÍFICA E POPULARIZAÇÃO DA CIÊNCIA: O ENSINO POR INVESTIGAÇÃO COMO ABORDAGEM DIDÁTICA

É quase usual que o ensino de Ciências e Biologia carregue os aspectos que reverberam a própria historicidade científica. São conhecidas as queixas de estudantes da Educação Básica de que aprender Ciências se resume a “decorar palavras difíceis”. Essa realidade reflete a “imagem manchada” de uma ciência puramente positivista, fechada, de conteúdos prontos e acabados. Ademais, na realidade de muitas escolas públicas brasileiras, discentes não se “veem” ou desconhecem aquilo que é “produzido” na universidade, justificando o mérito de que pesquisas científicas ampliem seus benefícios pleiteados para além dos prédios acadêmicos. Nesse sentido, o estudo em questão objetivou a proposição de uma sequência de ensino investigativa (SEI) com 70 alunos no Ensino Médio de uma escola pública por meio do intercâmbio entre academia (universidade) e escola, visando a popularização da ciência. A escolha pela intervenção se deu a partir de pesquisa realizada durante o estágio de doutoramento da autora do trabalho, que buscou compreender o efeito recuperador e protetor do óxido nítrico em sementes de alface submetidas à seca e salinidade. A SEI foi dividida em 4 etapas: problematização; investigação; sistematização do conhecimento e contextualização do conhecimento. A etapa de “problematização” foi conduzida em dois espaços físicos: Escola e Universidade. A dinâmica desta etapa inicial se deu a partir de reportagem extraída do portal G1 que abordava sobre o problema da salinização em áreas irrigadas do Nordeste. A professora apresentou aos alunos questões catalisadoras (problematizações), após a leitura da reportagem. Para fomento da problematização exposta no momento introdutório da SEI, foi proposta atividade experimental desenvolvida em dois ambientes distintos: a priori em laboratório da Universidade Federal do Espírito Santo – UFES e, posteriormente, no próprio laboratório da unidade escolar (Etapa de “Investigação”). Na Universidade, os alunos se familiarizaram com os equipamentos e com a rotina laboratorial dos pesquisadores que desempenham pesquisas com germinação de sementes. Os estudantes foram orientados acerca das etapas que compreendem o processo germinativo em placas de Petri e realizaram uma prática experimental com objetivo de avaliarem a germinação de sementes submetidas a condições ambientais distintas. De volta ao ambiente escolar, o mesmo delineamento experimental foi replicado e acompanhado pelos alunos durante 7 dias. Os discentes montaram ensaios de germinação com alface e feijão em três condições (controle; solução salina a -0,6 Mpa² e solução salina acrescida de nitroprussiato de sódio a 100 µM³). Durante esta etapa, os alunos aferiram medidas de comprimento de radícula e da parte aérea das plântulas, com o objetivo de realizarem um comparativo entre os tratamentos. Os alunos aprenderam a calcular os parâmetros de porcentagem de germinação (%G) e índice de velocidade de germinação (IVG), por meio de fórmulas descritas pela literatura científica da área. Na terceira etapa da SEI (Etapa de “Sistematização”), os alunos foram orientados à elaboração de relatórios com os dados coletados durante o experimento, além de serem submetidos a duas atividades para verificação da capacidade interpretativa de textos científicos (atividade 1) e para análise do patamar de alfabetismo científico dos mesmos, após a execução do experimento (atividade 2). Na Etapa final (Etapa de “Contextualização”), foi conduzida uma roda de conversa com os alunos. Com a mediação do pesquisador, buscou-se detectar nos discentes os pontos positivos e negativos, as potencialidades

e aprendizagens da sequência de ensino aplicada. Foram pontuados durante o diálogo aspectos relevantes sobre a importância das pesquisas científicas para o progresso de comunidades humanas e de seres animais e vegetais. Esta última fase da SEI foi concluída com a livre produção de textos pelos alunos, com “insights” e “impressões” da experiência. A proposta possibilitou aos estudantes o exercício da argumentação e a reflexão em torno de um problema, instigando a participação ativa dos mesmos na busca da solução de conflitos. Os relatórios produzidos pelos estudantes, após a execução dos experimentos fornecem pistas relevantes sobre a apropriação de conceitos e ampliação do repertório cultural científico, como observado no domínio de aspectos técnicos específicos. Finalmente, percebe-se a aplicabilidade ou a implantação do conhecimento adquirido pelos estudantes em outros contextos em que o indivíduo em formação é agente sócio participante.

Área Temática: IV PRÊMIO EDUCAÇÃO EM CIÊNCIAS

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FeSBE2022 POEIRA DAS ESTRELAS: UMA PROPOSTA TRANSDISCIPLINAR DE ENSINO DE ASTRONOMIA E CIÊNCIA CIDADÃ NA ESCOLA

A astronomia é a mais antiga ciência da humanidade, e uma das mais importantes. As aplicações tecnológicas oriundas do desenvolvimento e evolução da astronomia vão desde o GPS, até o setor médico, como por exemplo, em exames de ressonância magnética e exames de tomografia. Estas e outras tecnologia são oriundas das missões espaciais e hoje beneficiam a sociedade. Apesar de toda a sua importância, ensinar astronomia ainda é uma realidade distante nas escolas do Brasil. Há muitos anos, o ensino de astronômica se esbarra em muitos problemas e barreiras, tais como escassez de materiais e espaços adequados, o desinteresse das instituições de professores em abordar o tema em sala de aula e a falta de formação adequada dentro dos cursos de licenciatura na área de ciências da natureza. Visando contribuir para a solução desta problemática a nível local, foi criada a estratégia didática “Poeira das Estrelas”, aplicada em duas turmas da 2ª série do Ensino Médio Técnico da Escola Cidadã Integral Técnica Estadual Melquíades Vilar, localizada no município de Taperoá-PB. O projeto focou-se em inserir o importante tema da astronomia no meio escolar, através de uma abordagem transdisciplinar e lúdica. Os estudantes das duas turmas são, na sua grande maioria, oriundos de famílias carentes e provenientes de escolas públicas do fundamental I. Inserir astronomia no ensino básico não é uma tarefa obscura nem impossível. Para tanto, é preciso, a priori, recorrer a uma metodologia de ensino que agregue valores epistemológicos e axiológicos. Para a presente estratégia de ensino, recorreu-se ao uso de estratégias pedagógicas lúdicas; experimentos virtuais; o uso de aplicativos como o Stellarium, que simula o céu em qualquer época e lugar no mundo; e a inserção dos estudantes em projetos paralelos de ciência cidadã, tais como o programa de busca por asteroides IASC (International Astronomical Search Collaboration – Colaboração Internacional de Busca Astronômica, um dos projetos de ciência cidadã vinculados à NASA, a mais conhecida agência espacial do planeta), e o Zooniverse (a maior plataforma de ciência cidadã do mundo). Tais projetos de ciência cidadã buscam aproximar o público geral (no caso, os estudantes que estiveram envolvidos nessa estratégia pedagógica), em grandes iniciativas que eram, até então, restritas a cientistas. Ao mesmo tempo que os educandos contribuíram com a ciência de ponta por meio das buscas astronômicas, os alunos puderam inclusive fazer descobertas importantes. Foi o caso das descobertas de três asteroides pela equipe de alunos, que já estão catalogados como no site do IASC/NASA conforme será evidenciado nos vídeos. Este foi o resultado mais importante, histórico e promissor deste projeto. Através de uma linguagem simples, acessível, inclusiva e utilizando-se da experiência cotidiana dos alunos – dos seus conhecimentos prévios a respeito do tema – bem como de uma metodologia rica, ativa e significativa – na qual o aluno é inserido no corpo do conhecimento e, portanto, passa a ser autônomo em seu aprendizado – foi possível, desta forma, inserir a astronomia dentro da sala de aula de uma maneira relevante e motivadora. Este projeto, portanto, cumpriu com suas metas e objetivos.