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ANTIBIOFILM ACTIVITY OF *Schinus fasciculatus* ANTIBACTERIAL EXTRACT AND ITS COMPONENTS

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Phytopathogenic bacteria have the ability to adhere to and colonize plant tissues using biofilms. The formation of these bacterial films can be affected by the presence of bactericides in sub-lethal concentrations, something that commonly happens when the application of these compounds is not homogeneous on the surface of the plant. In this context, the antibiofilm activity of an antibacterial compound could contribute to the control of plant diseases that produce large losses in crops. We evaluate the biofilm inhibition capacity of an extract of *Schinus fasciculatus* with antimicrobial activity and its components in sub-lethal concentrations. The fAcet foliar extract of *S. fasciculatus* and its components, the flavonoids agatisflavone, quercetin, and kaempferol were tested in previously established sub-lethal concentrations (125–1.9 µg/mL) to determine their ability to inhibit the biofilm formation of 5 strains plant pathogens, *Pseudomonas syringae* pv. *tomato*, *Pseudomonas corrugata*, *Xanthomonas campestres* pv. *vesicatoria*, *Erwinia carotovora* var *carotovora*, and *Agrobacterium tumefaciens*, using the violet crystal microplate assay described by O'Toole. The results were statistically analyzed using the Shapiro-Wilk, ANOVA and Kruskal-Wallis tests using the STATISTICA software, version 7. The inhibition of biofilm was dependent on the bacterial strain and, in a lesser extent, to the compound tested, where *E. carotovora* var. *carotovora* and *A. tumefaciens* were the most susceptible, with inhibitions between 40–80%, while *P. corrugata* and *X. campestres* pv. *vesicatoria* were the least susceptible with a maximum inhibition of 39%. The extract and flavonoids inhibited by 40 to 80% the biofilm formation of the tested bacterial species, so that in sub-lethal concentrations these compounds would be able to attenuate the pathogenicity of the investigated phytopathogenic bacteria.

BIOCHEMISTRY, PHYSIOLOGY AND NEUROCHEMISTRY

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BUILDING AN EXPERIMENTAL NUTRITIONAL MODEL OF OBESITY. EVALUATION OF ANTHROPOMETRICAL AND NUTRITIONAL PARAMETERS.

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The etiology of obesity is multifactorial, and includes genetic, environmental, and dietary factors, where hypercaloric diets play a central role in the development of the disease. It is known that obesity in adulthood can increase the risk of suffering neurodegenerative diseases. As a part of an institutional project that studies obesity as a base disease for the development of chronic age-associated diseases and the search for early biomarkers with predictive potential, one of our general objectives is to establish a nutritional model of obesity in rat. Particularly, the objective of this work was to evaluate the effects of a high saturated fat diet on different anthropometric and nutritional parameters. Male Wistar rats weaned at 21 days of age were fed with a normocaloric diet (ND) containing 366 kcal from lipids/kg diet. At 2 months old, they were randomly separated and fed with the NC diet (Control group) and a high saturated fat diet containing 1570.7 kcal from margarine/kg diet (HFD group) for the following 14 weeks. Animals were maintained under 12 h light:12 h dark and 22–24°C conditions, with food and water *ad libitum*. The anthropometric profile included the evaluation of food intake, body weight, body mass index (BMI), weight gain, dietary consumption, and Lee index, throughout the entire treatment period. The following nutritional parameters were also calculated: energy-intake, and feed efficiency. Statistical differences between groups and throughout the treatment period were analyzed by two-way ANOVA, followed by Bonferroni *post-hoc* test, with $P < 0.05$ to confirm significant differences between groups and weeks. Our results show that feeding HFD resulted in significant increases in the following anthropometric parameters: body weight ($P < 0.001$ from the 9th to the 21st week), BMI ($P < 0.05$ from the 14th to the 22nd week), weight gain ($P < 0.05$ from the 15th to the 22nd week) as well as in the nutritional parameter: energy-intake from lipids ($P < 0.001$ from the 9th to the 22nd week). We did not observe significant changes in food intake, Lee index, feed efficiency nor in the total energy intake. Thus, we could conclude that a high saturated fat, from margarine, diet modifies key anthropometrical and nutritional parameters, and it could be used to establish a nutritional model of obesity in rat.

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CAN CALORIC RESTRICTION IMPROVE COGNITION IN AGING RATS?

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Caloric restriction (CR) consists of reducing daily calories intake without causing malnutrition. CR is the most effective non-pharmacological intervention in increasing longevity and reducing the effects of normal and pathological aging. Memory loss and cognitive impairment are one of the main features of aging and the effect of CR on these cognitive functions are still under study. Previous behavioral and molecular studies of our group showed that old animals had a low cognitive performance and loss of temporal expression of BDNF and TrkB, two proteins strongly linked to memory and learning processes, in hippocampus. Furthermore, we also demonstrated that CR treatment in old animals restored these temporal patterns of BDNF and TrkB in the hippocampus. Due to these antecedents, in the present work our objective was to evaluate if this restoration we previously observed at a molecular level is related to improvements in the cognitive performance of older animals under CR. Male Holtzman rats

were separated into three experimental groups: young *ad libitum* (3-month-old, Y-AL group, N = 10), older *ad libitum* (22-month-old, O-AL group, N = 10), and older subjected to a 40% CR treatment during the last 3 months prior to the 22 months of age (O-CR group, N = 5). Cognitive performance was assessed using the Barnes Maze (BM) test for spatial learning and memory and the New Object Recognition (NOR) test for contextual learning. In the BM test, we observed that the O-CR rats presented a shorter distance traveled on the platform, similar to Y-AL group. We did not find significant differences between O-CR and O-AL animals in the rest of the parameters analyzed with BM test (exploratory frequency of the target region, total exploratory activity, numbers of errors in reaching around the target hole, escape box latencies, percentage of exploration of the meta holes). In the NOR test, again we did not find significant differences between old animals and those subjected to CR. To date, the studies carried out on the effects of CR on cognitive functions are inconclusive and depend on the used protocol. The effects of CR depend on its intensity, the period of life in which the treatment begins and its duration. Our studies are preliminary, with a first group of animals in CR (N = 5), therefore increasing the number of studied animals could provide more conclusive data. CR could be a non-pharmacological alternative for maintaining mental and cognitive health during aging.

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CONTENT OF ZINC, MACRONUTRIENTS AND FIBER IN MENUS OFFERED IN ELDERLY HOMES. "MACA ANDINA" AS A SUPPLEMENTATION PROPOSAL IN THE FACE OF ZINC DEFICIENCY

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The biochemical and physiological changes that accompany the aging process, associated with the components of institutionalized life, have clear implications for the nutritional status of the elderly, making them more susceptible to nutritional deficiencies. The purpose of this research was to know the average nutritional values of zinc, macronutrients and total fiber of lunches and dinners offered to the elderly between 75 and 90 years old, who reside in long-term accommodation centers in the province of San Luis, Argentina, and furthermore, in case of zinc deficiency, suggest supplementation with "maca andina" (*Lepidium meyenii*). The study was carried out in two stages, one of them included an observational design with a cross-sectional correlational descriptive scope, and the other one involved an experimental design, being the sampling of probabilistic and multistage type. The sample was made up of 44 menus, which were classified into menus without meat (N = 22) and menus with meat (N = 22). The nutritional composition of all the menus (with and without meat) was analyzed using the SARA software. In addition, an experimental analysis of the meat-free menus was carried out (for which 3 types of menus were taken) and "maca andina" was also analyzed in triplicate, using the corresponding analytical techniques. The composition per serving of the meat-free menus was: 497.69 kcal, 58.26 g of carbohydrates (CHO), 15.81 g of proteins, 21.59 g of total lipids, 6.31 g of total fiber, and 2.29 mg of zinc. In the menus with meat, the average nutritional composition per serving was: 542.97 kcal, 49 g CHO, 27.76 g of proteins, 22.23 g of total lipids, 5.29 g of total fiber, and 4.31 mg of zinc. In relation to the recommendations established for dining rooms for the elderly, the meat-free menus covered 86.88% of kcal, 70.12% of CHO, 95.91% of proteins, 142.1% of lipids, 77.01% of total fiber, and 80.09% of zinc. Menus with meat contributed 86.17% of kcal, 53.72% of CHO, 160.7% of proteins, 113% of lipids, 63.69% of total fiber, and 151.3% of zinc. It was observed that both the composition and the percentage of protein and zinc adequacy was significantly higher in the meat menus ($P < 0.05$). Zinc deficiency was observed on meat-free menus. The experimental composition of the analyzed meat-free menus was as follows: menu n° 1 showed a deficit of all its components except for lipids, menu n° 2 showed adequate fiber and zinc coverage and menu n° 3 showed adequate caloric and zinc intake. Finally, when analyzing the zinc content in "maca andina", it was found that it provides 18.58 mg zinc/100 g; therefore, zinc deficient menus would cover the recommendations for this trace element with one tablespoon (15 g) of it. Due to its easy access and high nutritional value, "maca andina" could be beneficial to supplement diets deficient in this trace element.

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EFFECT OF A PPARγ SYNTHETIC AGONIST ASSOCIATED WITH RETINOIC ACID ON 24-HOUR RHYTHMS IN THE HIPPOCAMPUS OF AN EXPERIMENTAL MODEL OF ALZHEIMER'S DISEASE

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Alzheimer's disease (AD) is the most frequent cause of dementia in the older adults. The main pathogenic mechanism in sporadic AD is the decrease in amyloid beta peptide (Aβ) clearance. It is known that Apolipoprotein E (Apo E) modulates Aβ deposition and clearance. ApoE expression is transcriptionally induced by PPARγ in coordination with RXRs. Previously, we found that an intracerebroventricular injection of Aβ(1-42) modified the daily rhythms of Apo E, Bmal 1, and Aβ in the rat hippocampus. Taking into account those observations, the objective of this work was to investigate the effects of synthetic PPARγ agonist, pioglitazone, and retinoic acid (Pio-RA) on the 24-h rhythms of Apo E, BMAL1 and Aβ protein levels, as well as on the daily rhythms of brain-derived neurotrophic factor (Bdnf) and its receptor (TrkB) expression in the rat hippocampus. In this study, male Holtzman rats from control, Aβ-injected (Aβ) and Aβ-injected treated with Pio-RA groups were euthanized throughout a 24-h period and hippocampus samples were isolated every 6 h. Apo E, BMAL1 and Aβ proteins levels were analyzed by immunoblotting and Bdnf and TrkB mRNA levels were determined by RT-PCR. Regulatory regions of Apo E and clock genes were scanned for E-box, RORE, RXRE and PPRE sites. We observed that the treatment of Pio-RA reestablished the daily rhythms of Apo E, Aβ, BMAL1 protein, and Bdnf mRNA levels. This treatment also increased Bdnf and TrkB levels. We found E-box, RXRE, and PPRE sites on regulatory regions of Apo E and Bmal1 genes. The results of the present study could suggest that the treatment of Pio-RA would not only restore the altered rhythmic patterns of the clock genes and their target genes observed in animals injected with Aβ aggregates, but also, interestingly, would increase the levels of cognition-related genes, which are decreased in Alzheimer's patients.