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ABSTRACTS VOLUME

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EFFECT OF ZINC SUPPLEMENTATION ON ANTIOXIDANT STATUS IN RAT FASCICULI

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Recent research indicates that parasitic infections with high tolerance of the host are the result of defense mechanisms which include enhanced generation of reactive oxygen species. Many antioxidant defenses depend on micronutrients or are micronutrient-dependent. Studies on most micronutrients are complicated by the fact that the nutrient is multifunctional. Zinc deficiency is likely to affect a number of different enzyme systems. The study was designed to evaluate the protective effects of zinc on the enzymes and trace elements, involved in oxidative stress induced in rat liver infected with Fasciola hepatica. Forty male Wistar rats were divided into 4 groups: 1st-control, 2nd-control and treated with 2g/kg ZnCl₂/H₂O, 3rd-infected experimentally with F. hepatica and 4th-infected experimentally with F. hepatica and treated with 2g/kg ZnCl₂/H₂O. Rats were infected orally with 25 metacercariae of F. hepatica. The effect of 2g/kg ZnCl₂/H₂O treatment on rat liver antioxidant enzymes was assessed with the ferric reducing assay (FRAT), superoxide dismutase activity (SOD), glutathione peroxidase activity (GPO), glutathione reductase activity (GR) and glutathione-S-transferase (GST) activity, and trace elements (Zn, Mn, Se, Co, Fe). The study was conducted under conditions of experimental fascioliasis. Enzymes and trace elements were determined in the rat liver samples 4 and 8 weeks post-infection (dpi) spectrophotometrically. CuZn-SOD, GPx, GR and GST activity was decreased, and only CAT was increased at the acute and chronic stage of the infection. Zn treatment resulted in a significant elevation in the activity of CuZn-SOD and a reduction of already raised activity of CAT during the infection. It was also observed that concentrations of Zn, Cu, Se, Mn and Fe decreased 4 wpi. The reduction of Zn, Mn and Cu was again established at 8 wpi, but the levels of Zn and Mn returned to within normal limits when Zn was administered. Antioxidant parameters of rats infected with F. hepatica suggest a reduction in antioxidant potential leading to enhanced oxidative stress. This study concludes that Zn has a potential to regulate the activities of antioxidant enzymes as well as essential hepatic elements during fascioliasis.

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EFFECT OF DIET CHROMIUM(III) SUPPLEMENTATION ON BLOOD INDICES IN HIGH-FAT-FEED STREPTOSTOZOCIN-TREATED RATS

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Although the function of chromium(III) in glucose, lipid and protein metabolism is unquestionable, the role of chromium(III) supplementation in control of diabetes is still unresolved. Some studies performed on animals and humans showed that dietary supplementation with Cr(III) can improve glycemic control in diabetes, but other studies have focused on such effects. The discrepancies in results may be due to various factors, such as the dose of Cr(III). Its bioavailability from a supplement, the duration of treatment, individual Cr status, the degree of glucose intolerance. It is postulated that supplementary Cr(III) may be helpful in preventing or reducing diabetes symptoms even in the case of feeding atherogenic diet. The aim of this study was to investigate the effect of dietary Cr(III) supplementation on blood indices in animal model of diabetes (high-fat-fed and low dose of STZ-treated rats). As a source of supplementary Cr(III) proprionate complex [CrO(OC2H5)2(C2H5)3H]4+ of eight-week-old male Wistar rats were divided into three groups and fed a high-fat diet, with (5%) diets with 3 levels of Cr(III) (1.10, 10 and 50 ppm). After 5 weeks all rats were intraperitoneally injected with STZ (25 mg/kg b.w.) to induce hyperglycemia and fed the same diet for another week. All the rats developed hyperglycemia (blood glucose > 16 mmol/l). At the end of experimental rats were anaesthetised with thiopental and dissected to collect blood from aorta and remove inner organs for biochemical and histological tests. Blood was tested for several indices: morphological parameters, glucose, total cholesterol, LDL, HDL, tracylglycerides (TAG) concentrations. Additionally, the activities of ALT and AST, as well as creatinine, total protein and urea levels were also determined. It was found that supplementary Cr(III) did not affect morphological indices, however significant changes were noticed in biochemical parameters. Plasma glucose concentration was insignificantly lower in the Cr(III) treated rats, whereas total cholesterol, LDL cholesterol and TAG levels were markedly decreased both in 10 and 50 ppm Cr(III) groups (approx. by 30%, 40% and 50%) in comparison with the control group. Besides, serum total protein and HDL cholesterol concentrations were significantly reduced only in the Cr(III)50 ppm, by 10% and 25%, respectively, compared to the control. Serum ALT and AST levels, creatinine and urea concentrations were unchanged in the Cr(III) treated rats.

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DIETARY CHROMIUM(III) SUPPLEMENTATION AFFECT CALCIUM INDICES IN PREGNANT RATS

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Chromium(III) is an essential nutrient involved in the metabolism of insulin, glucose and blood lipids probably by enhancing receptor binding and insulin signaling transduction. Chromium products, like body-building powders, slimming snakes, bars and tablets are available in health stores. They are advertised as agents helping to reduce weight, lower serum cholesterol and glucose, burn fat and build muscles. On the other hand, uncontrolled, excessive Cr(III) intake may result in allergy and negative effect on kidney function. Also, Cr may affect Fe status due to Cr-Fe competition at the level of intestinal absorption and binding with transferrin. The results of our previous experiment showed that supplementation with Cr(III) had negative effect on Ca and Mg status in STZ-induced diabetic rats. Therefore, the aim of this study was to evaluate the influence of dietary supplementation with Cr(III) on pregnancy outcomes, with special reference to maternal Ca status in rats. 20 female 14-week old Wistar rats were mated with males. After successful conception 10 pregnant rats were fed for 40 days with an AIN-76A diet supplemented with Cr(III) propionate complex [CrO(OC2H5)2(C2H5)3H]4+ 100 ppm diet (7. mg/kg b.w.), while the control 10 females received the diet without Cr for 20 days. In the 21st day of pregnancy, all rats were anaesthetised with CO2, and dissected to remove fetal organs for analysis. Maternal and fetal body weights, number and gender of fetuses were recorded, maternal serum protein and alkaline phosphatase (AP), as well as femoral bone, kidney and liver Ca was measured by appropriate tests. It was found that supplementation Cr(III) did not affect maternal body weight, Ca and P concentration, number of fetuses and their body weights. No signs of toxic effects were detected in mothers and fetuses. The Cr(III) treated pregnant rats had significantly elevated liver and kidney Cr contents (by 177% and 45%, respectively) vs. the controls. Dietary Cr(III) supplementation did not affect femoral bone and liver Ca content, but markedly lowered the kidney Ca content (by 14%), the serum ALP activity (by 30%) and serum total protein concentration (by 8%) vs. the control group. Besides, the negative correlations was found for kidney Cr:Ca content and serum ALP and kidney Cr content (r = -0.67, p < 0.01; r = 0.54, p < 0.05, respectively). Cr(III) interferes somehow with Ca metabolic pathways in pregnant animals.

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STRUCTURAL AND FUNCTIONAL REORGANIZATION OF THYROID DUE TO EXPERIMENTAL HYPER- AND HYPOEDEMOSES IN RATS

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The 40 male rats, fed by high doses of Pb and Cd 0,022 and 16,6 mg/kg body weight daily, respectively – group 1 and low doses of essential trace elements I, Zn and Se (1.88; 0,23 and 0,0005mg/g daily – group 2) during 21 days, were investigated. Light microscopy and morphometry were used. The increasing of cystous follicles rate in group 1 was observed. Researchers have shown that there is an increase of cystous follicles quantity during the lead salts and cadmium intake on the background of trace elements deficiency in the diet. Cells with pyknotic kernels come to light in follicles, it apoptosis is found out. Basal membrane is damaged and is some places and eosinophilic come to light in this zone. In separate follicles colloid has a 'foamy' appearance, includes desquamating cells with vacuolization cytoplasm. The quantity of cells DES (diffusing endocrine system) in the organ, being revealed on the Grimels. The general tendency to quantity reduction large cystous follicles is observed, there is an active process of a new follicles growth by branch affiliated from parent, at adding separate essential trace elements in the diet. However at introduction in the diet only Se the separate destructively changed follicles with desquamating are kept. At introduction only Zn in the gland center the epithilium activity is increased, the prismatic leucocytes form, the increased volume of their kernels, exceeding parameters of control animals show it. On gland periphery in follicles colloid disappears, they are considerably flattened, like epithelium tensions bars. At iodine intake parameters of average and large cystous follicles, lyeocytes height and volume of their kernels are more approached, but nevertheless they remain below parameters of control animals. There are no destructive changes of follicles. Trace elements I, Zn, Se complex intake in animals is diet according to doze, corresponding to their physiological need on the base of heavy metals salts intake renders the protective effect: quantity of large cystous follicles decreases, in the majority of leucocytes the height and volume of their kernels.