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HEAVY METALS – ACCUMULATION AND REPRODUCTIVE TOXICITY

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Abstract

Pollution of the environment and contamination of animals including game with cadmium is serious problem in most countries. Increasing concern about environmental pollution calls for advanced and rapid methods to estimate ecological toxicity. Xenobiotics, including heavy metals, exist in nature as complex mixtures of compounds with possible interactions. Animal studies on the toxicity of heavy metals have been widely used as model to simulate the impacts of environmental pollution on the human health. It has been reported that many metals have negative effects on the reproduction in animals.

Accumulation of heavy metal

Concentration of lead, cadmium and mercury was evaluated in liver and kidney of brown hare in relation to season, age and sex. During a year, an average lead, cadmium and mercury concentrations in studied organs were the highest in winter period. Significantly higher cadmium concentrations in liver and kidney of adult brown hares were detected in comparison with juvenile individuals. In comparison of cadmium concentrations in various animal species, generally higher concentration in kidneys was found. The highest concentration was detected in brown hare kidney and the lowest in reproductive organs and muscular tissue. Comparison of wild and farm animals shows higher cadmium concentrations in wild animals.

Reproductive toxicity of heavy metals

In this study histological alteration of rabbit female reproductive organs after an experimental cadmium administration were analyzed. After a cadmium administration changes in the number of follicles with less than 2 layers as well as more than 2 layers of follicular (granulosa) cells and antral follicles were detected. The number of atretic follicles was significantly higher in all experimental groups with cadmium administration. The relative volume of growing follicles was significantly decreased and that of stroma significantly increased in experimental groups compared to control, directly suggesting the effect of cadmium on folliculogenesis. In comparison with ovaries, alterations detected in oviduct and uterus was weaker. Obtained data of in vitro experiments were confirmed also in in vitro conditions. The results of these studies proved negative effect of cadmium on the ovarian structure on the level of light as well as electron microscopy.

After experimental cadmium administration to mice dose dependent accumulation of cadmium in testes was found. Morphometric analysis detected weak decrease of germinal epithelium and increased relative volume of interstitium. After a lead and mercury administration to rats, dilatation of blood capillaries in interstitium, undulation of basal membrane and occurrence of empty spaces in seminiferous (germinal) epithelium of testis was observed. Similar alterations cause also the cobalt and nickel administration.