Effects of electromagnetic radiation on laboratory animals who were in conditions cold stress

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In our time, it is widely known that EMF are the most common irritants that affect the living organisms. EMF sources are numerous, their intensity permanently increased and influence on the health of the multilateral. Influencing on a man EMF may increase the risk of cardiovascular, neurological and psychiatric diseases or serve factor that contributes to the emergence of complex diseases with difficult etiology. The aim of the research study over the reporting period (9 months 2013) was study the features of changes in the functional state of the immune system of laboratory animals of the dual action of chemical and physical factors in toxicological model experiments.

Materials and methods of research.

The experimental studies of the dual effect on the body positive low temperature and electromagnetic radiation and isolated electromagnetic field was carried out in modeling toxicological experiments on laboratory animals. For this, the developed and manufactured original equipment "Zatravochnaya camera" (patent number 83559) that allows simultaneously model the impact on laboratory animal's ambient temperature and to keep the necessary parameters of the electromagnetic radiation. In 2013, was held determination of toxic, bloodtoxic, immunotoxic effects and morphological changes of internal organs in conditions of combined impact on the laboratory animals electromagnetic radiation (frequency of 70 kHz, the intensity of 600 V / m) and low positive temperatures (from 4 to 60C) in time model toxicological experiment. Experimental group observations were 9 animals which subjected to cold exposure factor (EF) and electromagnetic radiation (EMR) during 30 days. The control group observations were 9 intact mature male animals.

Basic results of research and discussion.

The biochemical indicators.

In the analysis of biochemical parameters was founded that the combined effect of EF and EMR leads to effects of oxidative stress on the following criteria. (Table shows below)

Pathomorphological research of the internal organs of laboratory animals.

Morphological study internal organs in the control group.

Liver histoarchitectonics saved, in particles trabeculae are represented by rows of hepatocytes.In the cortex of the kidney are located renal glomeruli, surrounded by transverse sections of the proximal tubules. Renal glomerulus a uniform size, the capillaries their moderate plethoric.In the spleen are determined connective tissue trabeculae, intensive «fuksinofil» at coloring by Van Hizon. Trabeculae containing arteries and veins.A connective tissue capsule of the adrenal gland without signs of edema and fibrous. Clearly observed zonality of the cortex.Particles of testis represented concentric slices or flattened seminiferous tubules, closely adjacent to each other. In tubules are visible area, adjacent to basement membrane (basal area) containing spermatogonia, ablyuminal zone, located close to the lumen of the tubule in which are spermatotsyty whish are divided.Thyroid parenchyma presented a uniform size follicles which contain colloid, which has the form pale homogeneous eosinophilic masses.

Morphological study internal organs during exposed EMR under low temperatures.

In most of the observations (6 cases) lobular structure of the liver is saved, hepatic trabeculae with «sun» location, presented rows of hepatic cells separated by sinusoids. In Pas-dyeing cytoplasm of hepatocytes pale-red, that testifies to a low glycogen content. In 2 observations are defined focal tracts of red-purple deposits of glycogen. Is known that an important factors supporting the body temperature in cold is to mobilize carbohydrates from depot for thermogenesis, which could make sense in the experimental conditions. Among the normal hepatocytes there are numerous polyploidy cells having big nuclei. Availability polyploidy cells in the liver confirms the saved regenerative potential in the organ. Focal, in hepatocytes observed degenerative changes in the form basophilia and places - hydropic changes cytoplasm up to necrosis of cells. In the kidneys glomerulus uneven quantities many - increased, education of capsule Bowman constricted by proliferation mezanhiotsyt. Glomerular capillaries plethoric, with signs of stasis. Straits twisted tubules is constricted. At the same time manifested monotselyulyar necrosis of epithelial tubules. Interstitial connective tissue with evidence of edema. With regard to the immune system, as in the spleen dominated by large and medium-sized lymphoid follicles with clearly defined extensive T-and B-areas. Light reproduction centers of proliferating lymphocytes, reticular cells, accumulation of macrophages, plasmocytes. Adrenal histology for morphologic assessment criteria is undergoing some changes. There is uneven refinement of glomerular layer. There is dominated by dark acidophilic cells that is occurs lipodystrophy cytoplasm cells of glomerular layer. In the tuft zone there are areas of dystrophic changes: there is a pronounced dyskompleksation kortykotsytes, who lose their characteristic linear orientation and ability to form epithelial strands. In the brain layer marked decrease in compared with the control volume of neyroendokrynotsytiv cytoplasm and reduced the number and size of vacuoles with a parallel increase in the blood supply of the brain substance. Thyroid parenchyma represented medium-sized follicles as well in the subcapsular parts of glands defined by group of large follicles. Is noted cell proliferation nonfollikle epithelium. The changes indicate a high functional activity of the organ.

The findings.

1. In animals of control group in the internal organs identified uneven plethora of vessels, moderate activity of functional components, a sufficient level of metabolic and reparative processes.
2. In the experimental group, response to stressor was observed in all investigated organs. Revealed changes reflect functional state of tension, which is the body's response to the impact of the stressor and in some of observations, is reversible.
3. In all observations take place varying severity circulatory disorders as dilation, uneven blood supply and development of stasis in the vessels of the microcirculation.
4. In 30% of cases in the liver marked by rough dystrophic and necrobiotic changes in the form of effects dyskompleksation, degeneration and necrosis of hepatocytes. In 50% of the investigated cases in the kidneys occurs formation glomerulonephritis of varying degrees of severity and severe degenerative changes in the epithelium of the tubules.
5. Significantly responsive to the impact of the stressor such organs like the adrenals. Availability small amounts of vacuoles in the cytoplasm of glomerular beam and mesh layers adrenal indicates a partial exhaustion initial product for the synthesis of hormones.

6. Morphological changes in the thyroid gland in the form of increasing the size of the follicular epithelium reflects some increase its function.
7. In the testes most sensitive germ cell epithelium, while the structure sustenotsytes and hlandulotsytes not broken.