EXPERIMENTAL MODELS OF PATHOLOGY THYROID MELIA

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Abstract: The issues of experimental modeling of thyroid pathology in laboratory animals (hypothyroidism, hyperthyroidism, etc.) are considered, an analysis of research works studying functional disorders from various systems of the body that occur in these experimental conditions is carried out. Today, among the most reliable and easily reproducible experimental models of thyroid pathologies, chemical models are widely used. It is shown that against the background of thyroid diseases, the functional state of the immune, cardiovascular, nervous and other body systems changes.

Keywords: Endocrine system, thyroid gland, experimental model, experimental animals, hypothyroidism, hyperthyroidism.

Today, among all diseases of the endocrine glands, thyroid diseases (TD), such as hyperthyroidism, hypothyroidism, autoimmune thyroiditis, diffuse toxic goiter, myxedema and much more, rank second in prevalence after diabetes mellitus. Considering the fact that recently there has been an increase in the incidence of TD, the interest of researchers is directed towards the formation (selection) of experimental models of endocrine diseases in order to study and analyze the pharmacological properties of new compounds, as well as to reliably identify the features in the mechanism of action of already known drugs. Primary hypothyroidism is distinguished, which occurs as a result of damage to the thyroid gland (chronic autoimmune thyroiditis and other types of thyroiditis) and secondary - due to damage to the pituitary gland and/or hypothalamus (neoplasms,

inflammatory-infiltrative diseases). The pathogenetic mechanism of diffuse toxic goiter is based on a violation of the functional balance between T-suppressors and T-helpers, as a result of which “forbidden” clones of T-lymphocytes appear, acting in relation to antigens of follicular epithelium of the thyroid gland, which in turn contributes to the formation of thyroid-stimulating antibodies, the interaction of which with the receptor apparatus of the follicular epithelium of the thyroid gland leads to an increased production of thyroid hormones. Today, for modeling experimental hyper-, hypothyroidism and other diseases of the thyroid gland, chemical models are widely used. With the development of experimental hyperthyroidism, numerous changes were found from the activity of various fragments of the neuromuscular apparatus, which is a manifestation of their pathophysiological effect, the severity of which determines the degree of violation of the thyroid status. It was found that modeling experimental hyperthyroidism in animals by daily oral administration of thyrotom, which is a combination of substances of liothyronine at a dose of 40 mcg/kg and levothyroxine sodium at a dose of 160 mcg/kg for 8 weeks as part of food, is characterized by an increase: follicular-colloid index, the number of newly formed follicles, the height of thyrocytes, the content of bound iodine in the colloid, the volume fraction and density of the colloid. It has been experimentally established that in mice, on which hyperthyroidism was modeled by intraperitoneal administration of L-thyroxine 50 mcg/day for 40 weeks, motor and emotional disorders in behavior are observed in the “Open Field” test. In hyperthyroid animals, starting from the 18th week of the experiment, an increase in quantitative indicators of all components of research activity and grooming is traced. It was found that with hyperthyroidism, the expression of GFAP and VEGF increases with a decrease in the expression of PDGFR-a in the same structures, which contributes to a moderate change in the activity of the dopaminergic and serotonergic systems of the brain of laboratory animals. In studies on male Wistar rats, on which hyperthyroidism was modeled by the introduction of liothyronine (triiodothyronine 50) at a dose of 10 mcg/100 g body weight for a week, it was found that experimental hyperthyroidism is

accompanied by an increase in biocidity and a decrease in the functional reserves of phagocytic cells in the periodontal tissue and blood, a decrease in the compensatory capabilities of the antioxidant system and an increase in the intensity of lipid peroxidation. It has been revealed that the state of the thyroid status affects mineral metabolism, while the largest changes in the content of chemical elements are recorded in the body of rats with experimental hyperthyroidism. With the development of hypothyroidism, the following picture is observed, demonstrating regular changes in indicators of the morphofunctional state of the gland: a decrease in the blood concentration of T3, T4 and an increase in the level of thyroid-stimulating hormone by the mechanism of feedback, a decrease in the mass of the thyroid gland [35]. As shown by the methods of enzyme immunoassay of blood serum, with intragastric administration of thyreostatic mercazolil to sexually mature male rats at the rate of 5 mg/100 g body weight for 21 days, animals develop changes characteristic of hypothyroidism in the content of thyroid hormones) Higher doses of mercazolil (10 and 20 mg/100 g) body mass distort the experimental model of hypofunctional state of the thyroid gland. In experiments on Wistar line rats with experimental hypothyroidism, the morphological characteristics of the myocardium, the processes of lipid peroxidation and the expression of antioxidant protection were studied. Higher doses of mercazolil (10 and 20 mg/100 g) mass distort the experimental model of hypofunctional state of the thyroid gland. Also, with hypothyroidism, pronounced morphological changes were observed in the heart muscle and blood vessels (interstitial edema and large-droplet fatty dystrophy of the myocardium, infiltration by lymphocytes and plasma cells, areas of atrophy with the development of fibrosis, damage to the endothelium of vessels with its swelling) [271]. It has been shown that experimental hypothyroidism, modeled by resection of the thyroid gland or a course of oral administration of thiamazole (mercazolil) at a dose of 5 mg/kg in rabbits of the Chinchilla breed for 21 days, leads to a decrease in the expression of the efflux polyspecific protein transporter glycoprotein-P in the liver, kidneys, small intestine and cortex of the large hemispheres of the brain (371). Among the main

pathological conditions of the human endocrine system today, autoimmune diseases of the thyroid gland, in particular autoimmune thyroiditis (AIT), which is based on the “break” of tolerance to its own antigens, are of particular importance. Thus, in recent years, in connection with the high social significance of thyroid diseases, the study of experimental models remains relevant, which allow revealing the regularities and features of the development of these pathological processes and their complications, developing methods of treatment and prevention, as well as studying the mechanisms of action of new compounds for their targeted use. Based on the results of numerous studies, it can be concluded that in order to study pathophysiology, pathomorphology, pharmacotherapy of thyroid diseases in modern conditions, chemical models of hypo-, hyperthyroidism and other diseases of the thyroid gland are widely used. Such models represent the most simple, reliable and practical way of inducing the indicated pathologies in experimental animals.

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