

# DYNAMICS OF CHANGES IN THE CELLULAR COMPOSITION OF VARIOUS STRUCTURAL AND FUNCTIONAL ZONES OF PEYER'S PATCHES OF OFFSPRING BORN FROM FEMALE RATS WITH HYPOTHYROIDISM

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**Abstract.** *Clinical observations indicate that hypothyroidism negatively affects the structural and functional state of the body as a whole, including the immune system. In the body of patients with hypothyroidism, various immune disorders develop, which depend on the level of thyroid hormones and the duration of the disease. To date, the structural features of the immune system organs, including Peyer's patches, of offspring born from mothers with thyroid hormone deficiency have not been sufficiently studied.*

*The aim of the study was to elucidate the effect of experimental maternal hypothyroidism on the cellular composition of various structural and functional zones of Peyer's patches in early postnatal ontogenesis.*

*Hypothyroidism was induced in white outbred female rats weighing 180-200 g by administering mercazolil per os at a dose of 5 mg/kg for 21 days. The PB of the offspring born from them was studied using morphological, morphometric and statistical research methods.*

*It has been established that under experimental hypothyroidism in animals there is a decrease in the mass of lymphoid organs and their cellular composition. Quantitative shifts in various PB zones progressed on the 21st day of experimental hypothyroidism and manifested themselves as a decrease in the number of cells in all structural and functional zones, mainly due to lymphocytes, macrophages, plasmacytes and destructive cells in all PB zones. In all zones, the total number of cells showed a pronounced tendency to decrease.*

**Keywords:** *peyer's patches, experimental hypothyroidism.*

**Relevance.** The structural features of Peyer's patches were studied in the offspring of rats born from intact female rats and from females with experimental hypothyroidism, using morphological and morphometric research methods.

Disturbances in the functioning of the thyroid gland are observed in almost a third of the world's population, while most diseases of this organ can be prevented and cured with timely diagnosis and treatment.

Neonatal screening for congenital hypothyroidism is performed in many countries around the world. The problem of screening for thyroid dysfunction is relevant for pregnant women, women planning pregnancy, and is currently included in the algorithm for examining patients with infertility. Even minimal increases in TSH may be associated with a risk of pregnancy failure and fetal abnormalities [1, 6].

It has been established that with experimental hypothyroidism in animals there is a decrease in the mass of lymphoid tissue of various organs, a change in their cellular composition, and a violation of humoral and cellular immunity [3,5,6]. In a number of works devoted to the study of

the immune status in hypothyroidism of various etiologies, profound changes in the T- and B-immune systems were discovered.

This explains the increased interest of clinical endocrinologists and immunologists in studying the issues of immunological disorders and autoimmune processes in diseases of the thyroid gland.

**Purpose of the study:** to elucidate the effect of experimental hypothyroidism in the mother on the cellular composition of various structural and functional zones of Peyer's patches in early postnatal ontogenesis.

**Materials and research methods:**

The experiment was carried out on 60 outbred female rats weighing 180-200 g. The animals were divided into two groups: the first group of rats received Mercazolil per os at a dose of 5 mg/kg for 21 days before conception. The second group of animals received an equal amount of saline. On days 7, 14 and 21, the levels of triiodothyronine, free thyroxine and TSH were determined in the blood serum of rats. During pregnancy, experimental rats continued to be administered Mercazolil daily at a dose of 0.25 mg/kg. After birth, the offspring were divided into two subgroups: the first of them, the control group, consisted of rat pups born from intact animals, while the second subgroup included rat pups born from females with experimental hypothyroidism.

On days 7, 14, and 21 after birth, the rat pups were removed from the experiment with light ether anesthesia followed by decapitation.

**Results and its discussion**

In newborn animals, Pp have the appearance of flat, whitish, slightly protruding rounded structures, not visible from the mucous membrane, but noticeable from the serous membrane.

A microscopic examination of the mucous membrane of the ileum of 7-day-old rat pups revealed that Pp contain an accumulation of cellular elements, with a small number of lymphocytes. During this period, the lymphoid nodules are devoid of germinal centers. The interfollicular zone also does not have clear outlines. The dome is covered with single-layer prismatic epithelium with single intraepithelial lymphocytes. On the 14th day, as a result of the colonization of the PP by lymphocytes and their precursors, nodules with light germinal centers and a marginal zone are revealed on the preparations. On the 21st day, the observed trend towards an increase in the number of lymphoblasts in the lymphoid nodules becomes pronounced. During this age period, the centers of reproduction in the lymphoid nodules were wide, the marginal zone did not have clearly defined boundaries. Reproduction centers were represented mainly by blast forms of lymphocytes, the internodular zone was pronounced.

Pp are concentrated mainly in the ileum, single nodules are found in the jejunum and are absent in the duodenum. The Pp is covered with a dome, bulging into the intestinal lumen in the shape of a semi-spherical, lined with single-layer prismatic epithelium. There are no villi or crypts on the surface of Pp.

Thus, our data indicate that the mucous membrane of the small intestine, including Peyer's patches of rats, develops mainly after birth and the formation of their structural and functional zones begins at the time of transition to definitive nutrition.

In the offspring of rats with experimental hypothyroidism, there is a significant lag in the development of Peyer's patches, which is expressed in a decrease in both the total number and the number of lymph nodes included in their composition. The cellular composition in all structural

and functional zones of Peyer's patches also tended to decrease compared to the indicators of control animals.

**Conclusion.** The research results showed that a deficiency of thyroid hormones in female rats led to hypoplasia and changes in the cytoarchitecture of Peyer's patches in the offspring. This is apparently explained by the fact that thyroid hormones are involved not only in the processes of growth, differentiation and maturation of tissue, but also take an active part in immunological processes.

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