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## Research Article

# MORPHOFUNCTIONAL CHANGES IN THE PANCREAS IN EXPERIMENTAL HYPOTHYROIDISM

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## ABSTRACT

Thyroid pathology is rather frequent among endocrine diseases and according to WHO, covers 7% of the world population. According to specialists' prognoses the tendency of thyroid gland (TSH) diseases number increase will remain in the nearest years due to fast industrial growth and environmental pollution with industrial and radioactive wastes, changes in microelement composition of soil, hereditary predisposition. The morphofunctional state of the thyroid gland depends directly on anthropogenic factors and is a marker of environmental disadvantage in a given region.

## KEYWORDS

Morphology, pancreas, rats, hypothyroidism.

## INTRODUCTION

In industrialized countries, the growth of thyroid pathology is directly proportional to environmental pollution. Thyroid pathology is accompanied by abnormalities in thyroid hormone production with the development of hyperthyroidism or hypothyroidism. Hypothyroidism is a syndrome associated with decreased thyroid hormones in the blood, which occurs with various diseases or exogenous deficiency of thyroid hormones. This condition may be due to a decreased effect of thyroid hormones or an increased breakdown of thyroid hormones. Hypothyroidism syndrome was first described as a disease in 1873, and the term "myxedema" (mucous swelling of the skin) began to be used in relation to severe forms of hypothyroidism in 1878.

Hypothyroidism is one of the most common endocrine diseases and is an important medical and social problem. Hypothyroidism refers to such conditions in which there are clinical and biochemical manifestations of low levels of thyroid hormones in the blood without regard to the genesis of the decrease in their levels. It is known that thyroid hormones are necessary for the normal functioning of all organs. Their deficiency can lead to irreversible changes in all body systems, primarily in the mental sphere. Changes in the thyroid also cause shifts in the liver. Thyroxine and triiodothyronine are necessary for normal organ development, growth and function. These hormones regulate the basal metabolic levels of all cells, including hepatocytes, which affects liver function, and the liver, in turn, by metabolizing thyroid hormones, thereby regulates their systemic endocrine effects. Disorders of thyroid function can lead to changes in liver function, and abnormalities in the metabolism of thyroid hormones can occur in liver diseases. Thus, evidence has been obtained that hypothyroidism can

directly affect the structure and function of the liver, leading to the development of hepatomegaly, biliary dyskinesia, cholestatic jaundice, and cholelithiasis. The rat pancreas is a large, flat, diffuse organ of inconstant outline, located between the mesenteric leaflets of small intestine. It has a characteristic structure - it consists of separate small bunch-shaped lobules connected by loose connective tissue into one tree-like branching formation.

Thus, scientific researches of the last years testify to the frequent combination of gastrointestinal tract diseases, including pancreas and thyroid gland and their deep interrelation, which makes the study of this problem very urgent.

## PURPOSE OF THE STUDY

To determine the character of morphological changes in the pancreas of rats with experimental hypothyroidism.

## MATERIALS AND METHODS OF INVESTIGATION

14 non-pedigreed white rats were used. Development of hypothyroidism in sexually mature female white rats induced by intragastric injection of mercazolil for 3 weeks at the rate of 2.5 ml/100 g of animal body weight. The objects of the study were 14 baby rats whose mothers were induced with experimental hypothyroidism. Materials were taken for a comprehensive evaluation of pathomorphological changes and morphometric parameters of the pancreas of baby rats born in rats after induction of experimental hypothyroidism. Morphological, morphometric, histological, biochemical and immunological, statistical methods of investigation were used in the study.

## RESULTS OF THE RESEARCH

It was established that against the background of experimental hypothyroidism along with reactive changes there were revealed compensatory-adaptive and destructive transformations practically in all investigated components of pancreas: vessels, secretory (exocrine and endocrine) cells as well as in nerve fibers. Already when viewing stained histological preparations under a light microscope, one notices that the majority of capillaries are overfilled with blood forming elements, in their lumen there is a sludge of erythrocytes. Contours of individual cells are poorly distinguished. Absence of free areas in the vessel lumen can be considered as one of the morphological signs of blood thickening. However, along with full-blooded capillaries there were also such capillaries the lumen of which had insignificant amount of blood form elements. One cannot but note the fact that the space between the wall of some vessels and secretory cells in some places becomes noticeably wider in comparison with the norm and looks light, devoid of any structures.

Study of exocrine part of pancreas on light-optical level revealed changes of nucleus and cytoplasm in some acinocytes. Nuclear envelope of such cells has irregular contours, as a result of which the nucleus acquires angular shape. Bright areas can be seen in the perinuclear zone of cytoplasm, which may indicate the development of perinuclear edema around the pycnotically altered nucleus. Secretory (zymogenic) granules are relatively few in such acinocytes. Small round vacuoles were detected in peripheral parts of cytoplasm. The number of similarly altered cells is small and amounts to only 3.4% of the total number of acinocytes. In the control group of animals such cells are rare. Most acinocytes are at different stages of the secretory process. The cytoplasm of some cells is dominated by secretory granules with intensely

stained contents, while others have small vacuoles free of secretion.

In the morphometric study there was some tendency to an increase in the number of granules in the cytoplasm. An increase in the ratio of the number of secretory granules to the number of neglected vacuoles was also revealed, which testifies to the predominance of granule formation processes over the secretion release into the duct lumen. These data allow us to suppose that in general granule synthesis in pancreatic acini is not suppressed, moreover, there is even some strengthening of it. However, review of a whole series of preparations allowed us to suppose a delay in secretion discharge into the lumen of insertion ducts. This is proved by accumulations of intensively stained granules, located at apical poles of acinocytes, located in immediate proximity to these ducts. On the contrary, vacuoles free from the secretion occupy more centrally located parts, often in the pericarian zone. At the same time, the lumen of the centroacinous duct usually does not contain secretory material at all or only one or two granules are found in it.

## CONCLUSIONS

Thus, the presented data testify to the fact that chronic exposure to gravitational overload results in the delay of the secretion withdrawal from the cytoplasm of the majority of acinocytes into the duct lumen, but does not disturb their synthesis in the cells. In experimental hypothyroidism developing in baby rats born by the mothers of the experimental group under mercazolil administration, morphofunctional change of pancreas structures is a consequence not only of direct effect of thyroid hormones on the gland tissue, but also of hormonal status disturbance.



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