PREVENTION OF THYROID DISEASES.

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Abstract: thyroid gland is a small organ located on the front surface of the neck in its lower part. It consists of two lobes located along the sides of the windpipe. As a rule, the right lobe of the gland is larger than the left. The lobes are connected by an isthmus lying on the anterior surface of the trachea. The thyroid gland in an adult weighs an average of 16-30 g, but its weight in some cases can vary within more significant limits – from 5 to 50 g. In a newborn, the thyroid gland weighs 1 g. By the year its weight doubles, and by the age of 25 – 20 times. Especially rapid growth of the thyroid gland is observed at the age of 12-15 years. With age, the size of the thyroid gland decreases. In women, it is usually greater than in men.

Keywords: trachea, thyroid gland, adult weighs.

Microscopically, the lobules consist of many vesicles – follicles. Follicles are closed hollow formations of various shapes. Their walls are formed by cells that produce a thick yellowish mucous fluid – a colloid.

The smallest thyroid follicles have a diameter of 0.03 to 0.1 mm; their average size is 0.15 mm, but sometimes they can reach 1 mm in diameter.

There are the following types of thyroid cells:

• A-cells – thyrocytes (synonym: cells of the follicular epithelium of the thyroid gland) synthesizing thyroid hormones.

• B cells – modified A cells (synonyms: Gürtle-Ashkenazi cells, Ashkenazi cells, oncocytes, oxyphilic cells). They are absent in normal thyroid tissue and appear in some diseases.

• C-cells – cells synthesizing calcitonin (synonyms: parafollicular cells, K-cells).

Thyroid Hormones

The thyroid gland as an endocrine organ produces three hormones:

• thyroxine;

• triiodothyronine;

• thyrocalcitonin.

Thyroxine and triiodothyronine are iodine–containing hormones, their synthesis is closely related to the exchange of iodine in the body.

One of the conditions that ensure the normal function of the thyroid gland should be considered a regular intake of iodine into the body. The daily human need for iodine is 150-200 mcg. The body receives iodine mainly from food – vegetable (about 58%) and animal (about 33%), and to a lesser extent with water (about 4.2%) and inhaled air (up to 4.8%).

In the intestine, iodine is split off from food products and enters the blood in the form of iodides (NaI, KI). The thyroid gland has the ability to capture iodide, despite the fact that the concentration of iodine in the thyroid gland is many times greater than in the blood.

Only pure elemental iodine can participate in the synthesis of thyroid hormones. Iodide in the thyroid gland first undergoes oxidation and turns into elemental iodine. This oxidation occurs with the participation of oxidative enzymes peroxidase and cytochrome oxidase. Thyrostatic drugs (methylthiouracil, mercazolil) widely used for the treatment of diffuse toxic goiter have a therapeutic effect, inhibiting the activity of oxidative enzymes and blocking the formation of thyroid hormones. The process of entering iodides into the thyroid gland and their oxidation into elemental iodine stimulates the thyroid-stimulating hormone of the pituitary gland.

The actual formation of thyroid hormones begins with iodization – the inclusion of iodine in the amino acid tyrosine. When one iodine atom is turned on, monoiodothyrosine is formed, and when two iodine atoms are turned on, diiodothyrosine is formed. Mono– and diiodothyrosine do not yet possess the properties of hormones. The next stage is the fusion, condensation of two molecules of diiodothyrosine, or mono– and diiodothyrosine, and the formation of tyronines. Tyronines are thyroid hormones. When two diiodothyrosine molecules merge, tetraiodothyronine (thyroxine, T4) is formed; when di– and monoiodothyrosine condense, the hormone triiodothyronine (T3).

Under the influence of specific enzymes, the deioding process occurs simultaneously, consisting in the cleavage of molecular iodine from mono– and diiodothyrosine. The latter re-enters the internal circulation and is eventually used in the biosynthesis of thyroxine and triiodothyronine.The colloid of the follicles contains a specific protein – thyroglobulin. Thyroglobulin performs the function of an acceptor molecule on which thyroid hormones are synthesized and stored. The biosynthesis of iodine-containing hormones takes place inside the thyroglobulin molecule. Treoglobulin is a glycoprotein with a molecular weight of about 600,000 daltons, the size of which is so large that it prevents it from entering the blood from an intact thyroid gland. Only with its pathology, accompanied by loss of cell integrity, thyroglobulin can enter the general

bloodstream.Consequently, thyroid hormones are formed not as free units, but as part of the thyroglobulin molecule. In the future, the proteolytic cleavage of thyroglobulin occurs, the release of thyroxine and triiodothyronine and their entry into the bloodstream. At the same time, free iodine is released, which can be reused for the formation of thyroid hormones.

Under normal conditions, the thyroid gland contains 200 mcg / g of thyroxine (T4) and 15 mcg / g of triiodothyronine (T3).

The daily secretion of thyroid gland T4 is 80-90 mcg, which is many times more than the secretion of T3 (9 mcg).

The concentration of T4 in the blood serum (when using the method of radioimmune analysis) is normally 100 (65-160) nmol / l, Tk – 1.8 (1.17-2.5) nmol/L.The content of free T4 is 9-28 pmol/l (0.7–2.2 ng / dl), free T3 is 3.8–7.7 pmol/ L (2.5–5.0 pg/ml).Excess thyroid hormones accumulate in thyroid colloid thyroglobulin and are used depending on the needs of the body. Normally, the thyroid gland has a supply of hormones for 2-10 weeks, which is very different from the amount of hormones available in other endocrine organs.

The biosynthesis of thyroid hormones is carried out under the control of the central nervous system, hypothalamus and pituitary gland. The level of thyroxine and triiodothyronine production is regulated by the thyroid-stimulating hormone of the anterior pituitary gland (TSH). It influences the main process of hormone biosynthesis – condensation, that is, the fusion of di– and monoiodothyrosines into thironines (thyroxine and triiodothyronine). Under the influence of TSH, the protease enzyme breaks down thyroglobulin, and thyroid hormones are released from the thyroid gland into the blood. Thyroid-stimulating hormone of the pituitary gland increases blood supply and growth of the thyroid gland.

The release of TSH is regulated by the level of free thyroid hormones according to the feedback principle: with an increase in the concentration of T3 and T4 in the blood, the release of TSH decreases, and with a decrease it increases. At the same time, the normal level of TSH in the blood is 0.3–4.0 iU / l.

The activity of the thyroid gland and adenohypophysis is under the control of the highest regulator of the neuroendocrine system – the hypothalamus. The latter contains tyroliberin (tyretropin-releasing hormone, TRH), which stimulates the thyroid-stimulating function of the anterior pituitary gland.

The hypothalamus reacts to changes in the concentration of thyroid hormones in the blood by lowering or increasing the level of the secreted neurosecret – tyroliberin. In diseases

of the thyroid gland, the dynamic balance in the "hypothalamus – pituitary – thyroid gland" system (the so-called thyroid axis) is disturbed.

The thyroid system, like other human endocrine systems, has a circadian rhythm. The secretion of tyroliberin by the hypothalamus is maximal in the morning and minimal at midnight. The content of thyroid-stimulating hormone of the pituitary gland is increased in the evening and at night and reduced in the morning and in the morning. The concentration of thyroid hormones is also subject to daily fluctuations with a maximum in the morning and a minimum at night.

Seasonal fluctuations in the level of TSH and thyroid hormones are noted. In winter, the concentration of triiodothyronine increases, as well as thyroid-stimulating hormone and its reaction to tyroliberin, and the level of thyroxine does not change.

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