

# Thyroid disease examination

## Indicators of Thyroid Dysfunction

### Serum TSH

- Its concentration is inversely proportional to the concentration of  $T_4$ ,
  - assuming normal function of the hypothalamo-pituitary axis reflects the level of  $T_4$ ,
- significantly increased: primary hypothyroidism,
- sometimes a modified version is produced - it is also possible to find out
- method of first choice** when primary hypothyroidism or hyperthyroidism is suspected,
- monitoring  $T_4$  replacement therapy,
- is examined in hypercholesterolemia and hyperprolactinemia.

### Functional test with TRH

- Reflects TSH secretion,
- in central hypothyroidism, in TSH-producing tumors.

### Total thyroxine (TT4) and free (FT4) in serum

- Indicators of current secretion,
- FT4 indicates the availability of the hormone to the tissue,
- free thyroxine index - FTI.

$$FTI = \frac{\text{concentration } T_4 \cdot \%T_3 - \text{Uptake}}{100}$$

- Priority in the treatment of hyperthyroidism, TSH secretion can still be suppressed in the long term.

### Serum total (TT3) and free (FT3) triiodothyronine

- High levels of  $T_3$  during thyroxine treatment - autonomous hyperactivity of the gland,
- indication - examination of hyperthyroidism, severity of primary hypothyroidism, differential diagnosis of low TSH values.

### Reverse $T_3$ (RT3)

- Indirect indicator of conversion of  $T_4$  to  $T_3$ ,
- investigation of unknown causes of low TT3 or TT4.

### Serum Thyroglobulin (TG)

- Indicator of TG release from an active, inflammatory or tumor gland,
- follow-up of patients after thyroidectomy for differentiated ca as a tumor marker - diagnosis of relapse (rising TG).

### $\alpha$ -subunit of hCG

- In general, they detect the formation of molecules with this subunit - also TSH.

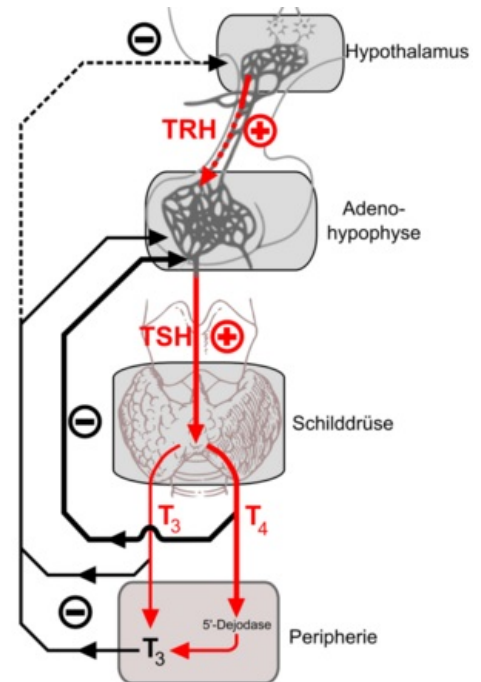
### Calcitonin, serum thyrocalcitonin

- Indicator of secretory activity of C-cells thyroid glands,
- in the diagnosis of medullary tumors.

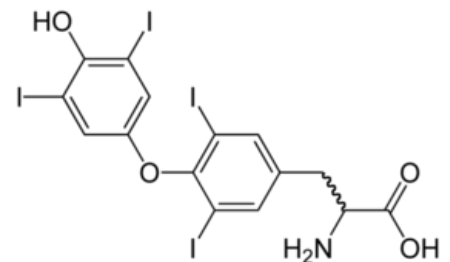
## Thyroid hormone transport disorders

### Thyroxine binding globulin (TBG) in serum

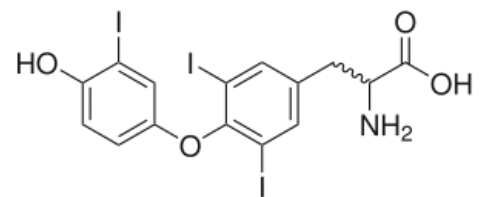
- Quantitatively the most significant carrier,
- high values: genetically, during pregnancy, with contraception,



Control of thyroid hormone secretion



Thyroxine



Triiodothyronine

- low concentrations: malnutrition, malabsorption, hepatic synthesis disorders,
- we investigate T3 and T4 values, which do not correlate with the clinical condition.

## **Prealbumin, transthyretin in serum**

- The second most important transmitter.

## **Binding capacity of transport proteins, T-uptake**

- Meaning and indications as for TBG, we saturate the serum sample with a known concentration of T3 and determine the unbound fraction.

## **Indicators of autoimmune thyroid diseases**

### **Antibodies against thyroperoxidase (Thyreoperoxidase Antibodies, TPOAb)**

- Previously described as antimicrosomal,
- reveal the presence of an autoimmune process, a possible risk of dysfunction,
- indication: goiter of unknown etiology, differential diagnosis of hyperthyroidism,
- risk screening after birth.

### **Thyroglobulin antibodies**

- They reveal the autoimmune process, can explain incorrect results of TGB determination,
- monitoring of differentiated carcinomas of the thyroid gland.

### **Antibodies against TSH receptors**

- They can either stimulate or inhibit,
- risk of developing Graves disease, risk of endocrine ophthalmopathy,
- differential diagnosis of hyperthyroidism.

## **Links**

### **Related Articles**

- Thyroid
- Thyroid hormones
- Hyperthyroidism
- Hypothyroidism
- Thyroid function test
- Thyroid disease
- Radionuclide thyroid tests
- Symptomatic mental disorders in endocrinopathies

### **Used literature**

- SCHNEIDERKA, Petr, et al. *Kapitoly z klinické biochemie*. 2. edition. Praha : Karolinum, 2004. ISBN 80-246-0678-X.