Estimation of T3, T4 and TSH

Dep. Medical laboratories techniques,
University of Al Maarif

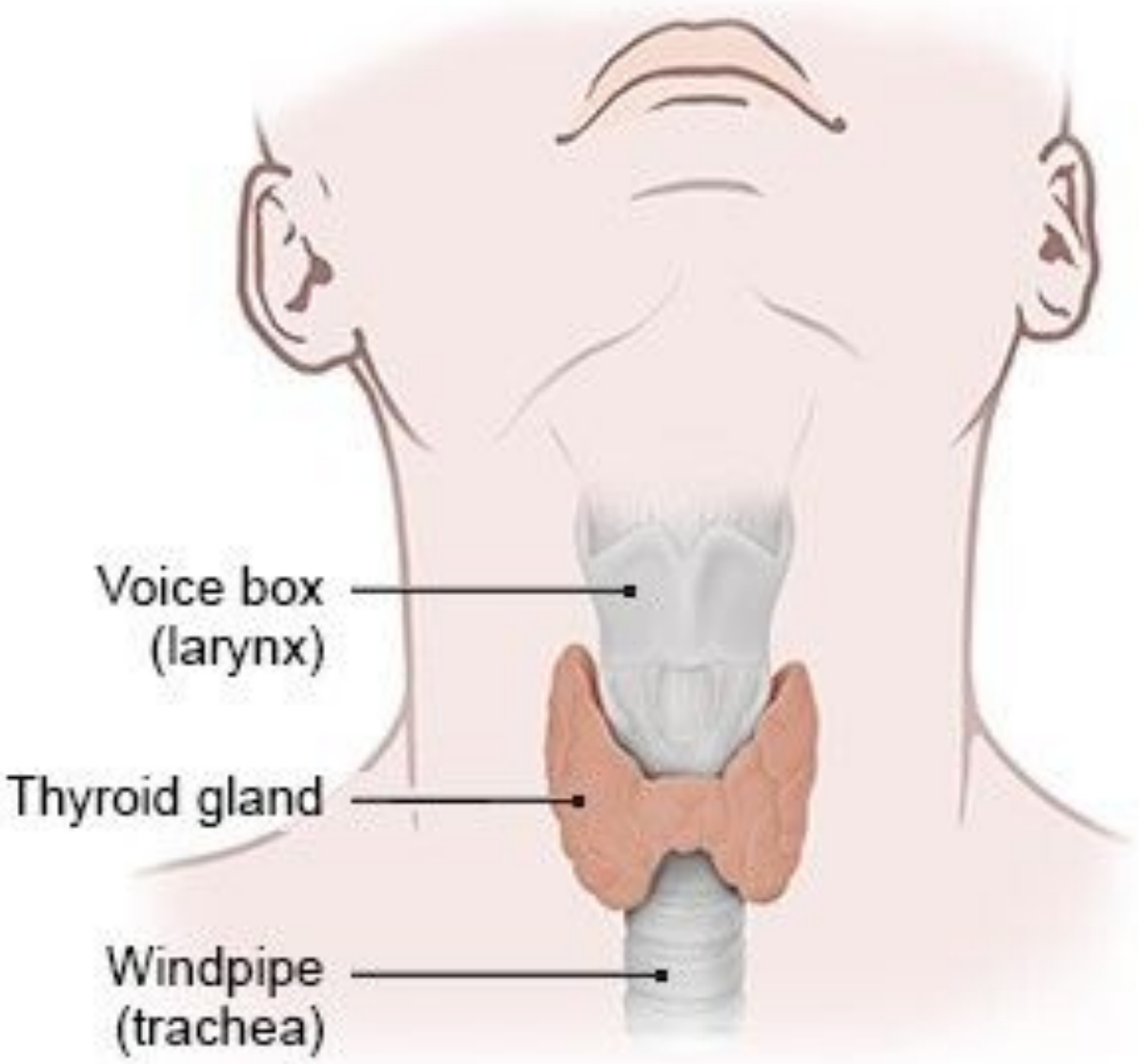
Lab -3- Clinical endocrinology

Msc. Sumaya Nadhim

Thyroid gland : is a vital endocrine (hormone-producing) gland. It plays a major role in the metabolism, growth and development of the human body. It helps to regulate many body functions by constantly releasing a steady amount of thyroid hormones into .the bloodstream

Location and structure of the thyroid gland

The thyroid gland is found at the front of the neck, under the voice box. It is butterfly-shaped: The two lobes on either side lie against and around the windpipe (trachea), and are connected at the front .by a narrow strip of tissue known as the isthmus


Voice box
(larynx)
Thyroid gland
Windpipe
(trachea)

The thyroid typically weighs between 20 and 60 grams. It is surrounded by two fibrous capsules. The outer capsule is connected to the voice box muscles and many important blood vessels and nerves. There is loose connective tissue between the inner and the outer capsule, so the thyroid can move and change its position when .we swallow

The thyroid tissue consists of many individual lobules that are each enclosed in a thin layer of connective tissue. These lobules contain a great number of small sacs – called follicles – which store thyroid .hormones in the form of little droplets

?What hormones does the thyroid make

:The thyroid gland produces three hormones

Triiodothyronine (T3)-

Tetraiodothyronine (T4), also called thyroxine-

Calcitonin-

Only T3 and T4 are considered proper thyroid hormones.

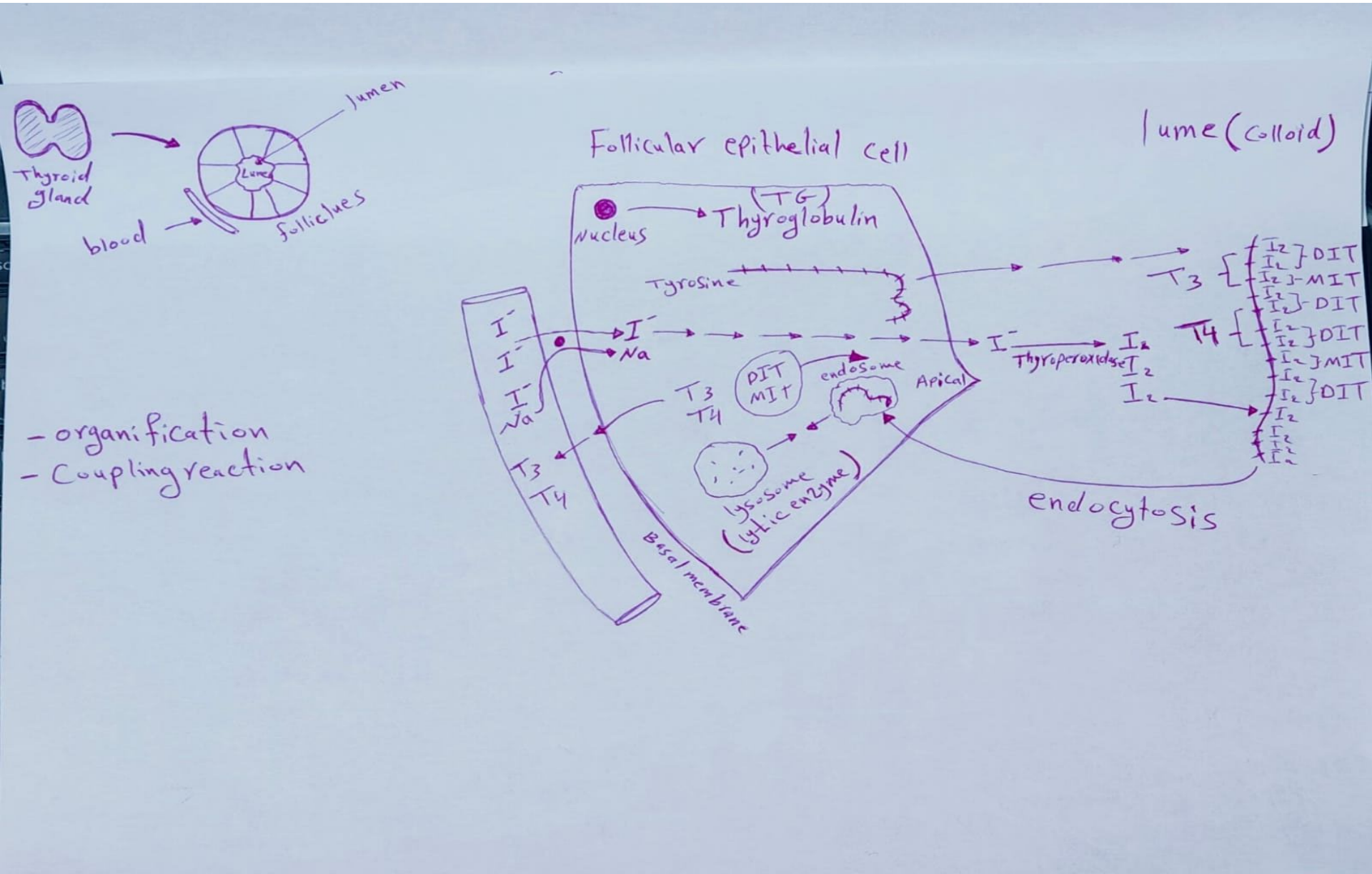
Calcitonin is made by C-cells. It is involved in calcium and bone .metabolism

Iodine is an important substance that is needed to make the thyroid hormones T3 and T4. Our bodies can't produce this trace element, so we need to get enough of it in our diet. Iodine is absorbed into our bloodstream from food in our bowel. It is then carried to the

Triiodothyronine (T3) is a useful marker for the diagnosis of hypothyroidism and hyperthyroidism. The level of T3 is decreased in hypothyroid individuals and is increased in hyperthyroid .individuals. The level of T3 is normal in euthyroid individuals

Thyroxine (T4) is synthesized in the thyroid gland. T4 is metabolized to triiodothyronine (T3) peripherally by deiodination. T4 is considered a reservoir or prohormone for T3, the biologically most active thyroid hormone. About of circulating T4 is in the free, ie, unbound, portion. The 0.05% ,remainder is bound to thyroxine-binding globulin .prealbumin, and albumin

Thyroid hormone synthesis



Thyroid Stimulating Hormone (TSH) is a glycoprotein hormone secreted by the pituitary gland and regulates the synthesis/release of T3 and T4 by thyroid gland.

TSH has two subunits, namely alpha and beta. The alpha subunit is similar to the alpha subunit found in LH, FSH, and hCG glycoprotein hormones.

However, the beta subunit is specific and differs from hormone to hormone.

The serum TSH measurement is one of the most important tools in the diagnosis of thyroid disorders. Increased serum TSH is an early and sensitive indicator of decreased thyroid reserve and overt primary hypothyroidism. Decreased of TSH levels is an indicator of TSH-independent hyperthyroidism (Graves disease).

THYROID FUNCTION TEST

HORMONES	DEFINATION	NORMAL RANGE
TRIIODOTHYRONINE (T3)	Abnormally high levels most commonly indicate a condition called Grave's disease.This is an autoimmune disorder associated with hyperthyroidism.	75 -200 ng/dL
THYROXINE (T4)	A high level of T4 indicates an overactive thyroid (hyperthyroidism). Symptoms include anxiety, unplanned weight loss, tremors, and diarrhea.	4.5 -11.5 ug/dL
THYROID-STIMULATING HORMONE (TSH)	is a pituitary hormone that stimulates the thyroid gland to produce (T4), and then (T3) which stimulates the metabolism of almost every tissue in the body.	0.3 - 5.0 U/mL

Thank you for listening