University of Mosul
Lecture No.: 5
College of Veterinary Medicine
Date:
Unit of Scientific Affairs
Website:

Lecture title: **The Endocrine System (Thyroid gland)**

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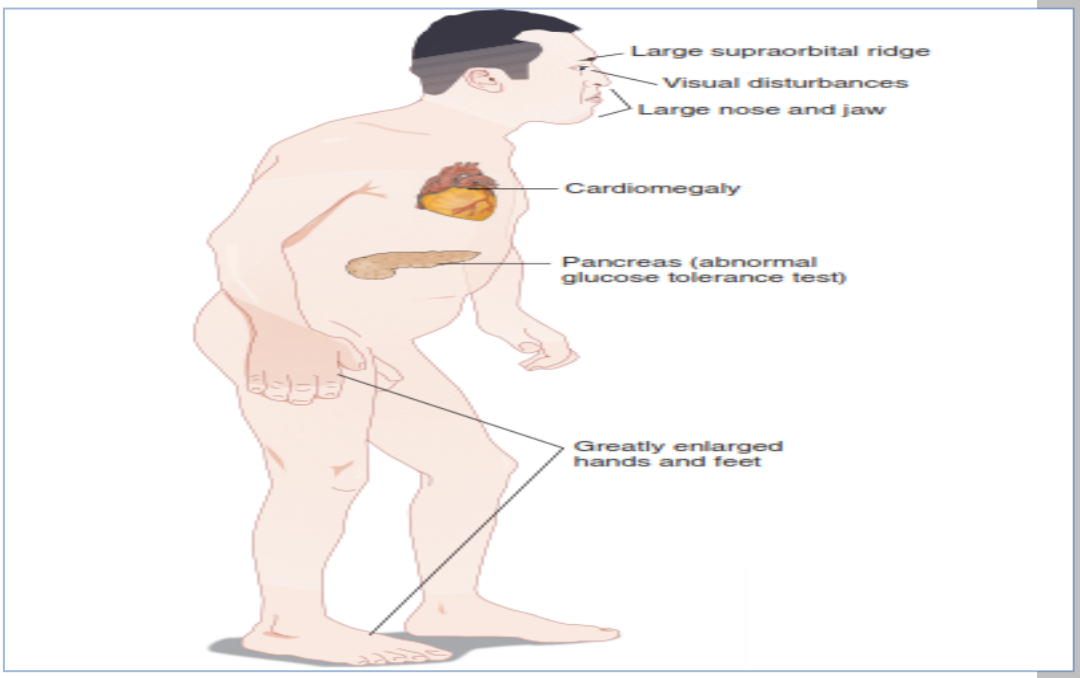
Summary: **The 5th lecture is a review of the thyroid gland and its hormones. Its a butterfly-shaped endocrine gland located in the neck that produces the hormones thyroxine (T4) and triiodothyronine (T3). These hormones regulate the body's metabolism, growth, and development. The gland's activity is controlled by thyroid-stimulating hormone (TSH) from the pituitary gland.**

- **ACROMEGALY** (acro means extremity, megaly mean large).

If growth hormone hyper secretion occurs after adolescence (when the epiphyseal plates have already closed, further growth in height is prevented. Under the influence of excess GH, the bones become thicker & the soft tissues, especially connective tissues &skin, proliferate. This disproportionate growth pattern produces a condition known as



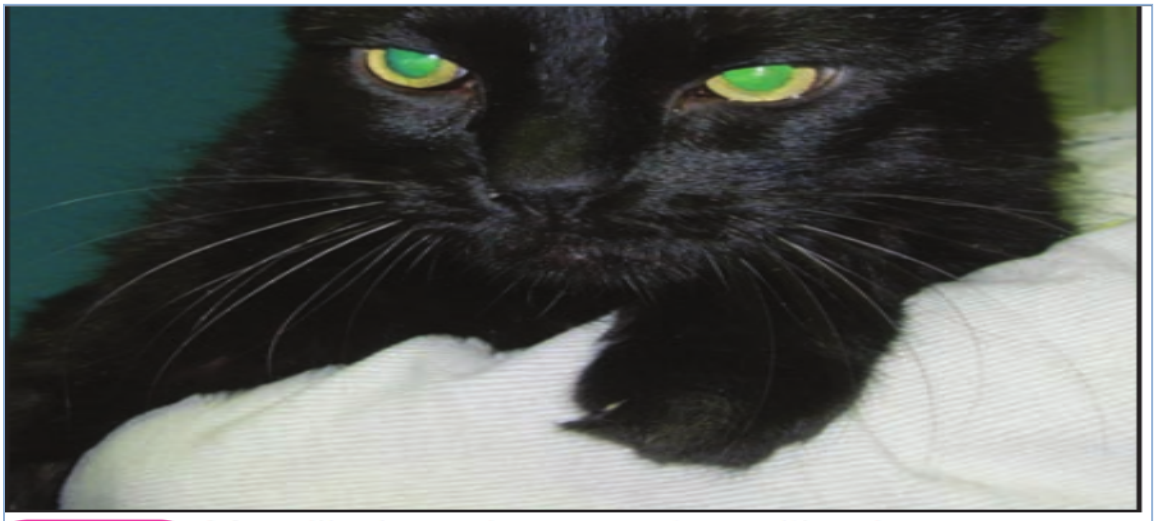
ACROMEGALY.

THYROID GLAND

Consists of two lobes joined in the middle by a narrow portion of the gland, lying over the trachea just below the larynx.

The major thyroid secreting cells are arranged into hollow spheres, each of which forms a functional unit called a follicle, so these secretary cells referred to as follicular cells.

Thyroid- produces hormones that control metabolism and calcium



5.2 Mandibular enlargement resulting in prognathism and thickening of the bony ridges of the skull in a cat with acromegaly. While a typical finding, this is not seen in all acromegalic cats.

in blood.

Thyroid hormones are important regulators of overall basal metabolism.

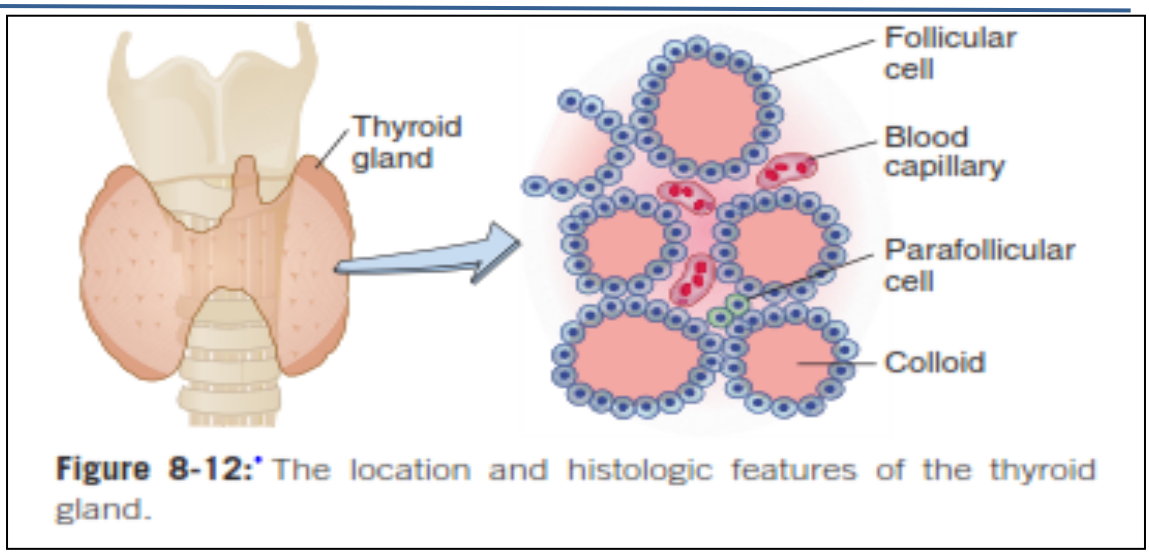


Figure 8-12: The location and histologic features of the thyroid gland.

- Thyroid gland is composed of spherical follicles.

- The follicles appear as rings of follicular cells enclosing an inner lumen filled with colloid, a substance serves as a storage site for thyroid hormones.

-The chief constituent of the colloid is a large, complex molecule known as **THYROGLOBULIN.**

-Interspersed in the interstitial spaces between the follicles another secretory cell type, THE C CELLS, so called because they secrete the peptide hormone CALCITONIN, which plays a role in calcium metabolism.

-**The follicular cells** produce 2 iodine –containing hormones derived from amino acid tyrosine.

1-tetraiodotyronine (T4 or Thyroxine).

2-triiodotyronine (T3).

-**Para follicular "C" cells**: produce calcitonin.

SYNTHESIS, STORAGE & SECRETION OF THYROID HORMONS:

1-All steps of thyroid hormone synthesis take place on the thyroglobulin Molecules.

2-Thyroglobulin (TGB) is produced by thyroid follicular cells.

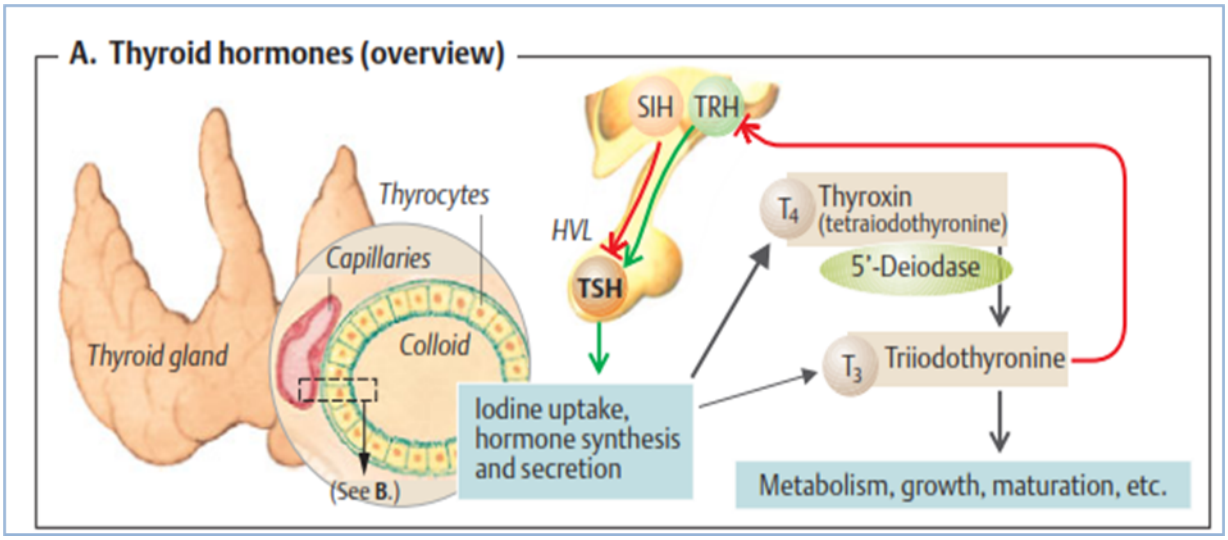
3-Tyrosine are incorporated with the thyroglobulin molecules.

4-Tyrosine containing (TGB) is transported into the colloid by exocytosis.

5-Iodine is actively transported from the blood into the colloid by the follicular cells.

6-T3 and T4 diffuse into the blood.

7-MIT and DIT are DE iodinated and the free iodine is recycled for synthesis of more hormones.



FUNCTIONS:

Virtually every tissue in the body is affected either directly or indirectly by thyroid hormones.

EFFECTS ON METABOLIC RATE:

1- Increase the body's overall basal metabolic rate.
2- It's the most important regulator of the body rate of O2consumption &energy expenditure under resting conditions.
3- Have a calorigenic (heat producing) effect.

EFFECT ON INTERMEDIARY METABOLISM:

Thyroid hormones increase the general metabolic rate.

Thyroid hormone modulates the rates of many specific reactions involved in fuel metabolism.

SYMPATHOMIMMETIC EFFECT:

Thyroid hormone increases target cell responsiveness to catecholamines (epinephrine & norepinephrine).

This permissive action by causing a proliferation of specific catecholamine target cell receptors.

EFFECT ON CARDIO VASCULAR SYSTEM:

Thyroid hormones increase the heart rate & force of contraction thus increasing cardiac output.

EFFECT ON GROWTH &THE NERVOUS SYSTEM:

Thyroid hormone is essential for normal growth.

Thyroid hormones not only stimulate growth hormone secretion but also promote the effects of growth hormone (or somatomedins) on the synthesis of new structural proteins and on skeletal growth.

Thyroid hormone plays a crucial role in the normal development of the nervous system, especially the CNS.

Thyroid hormone is essential for normal CNS activity in adults.