General histology
Department of dentistry
Second stage
Second semester **lecture.3**
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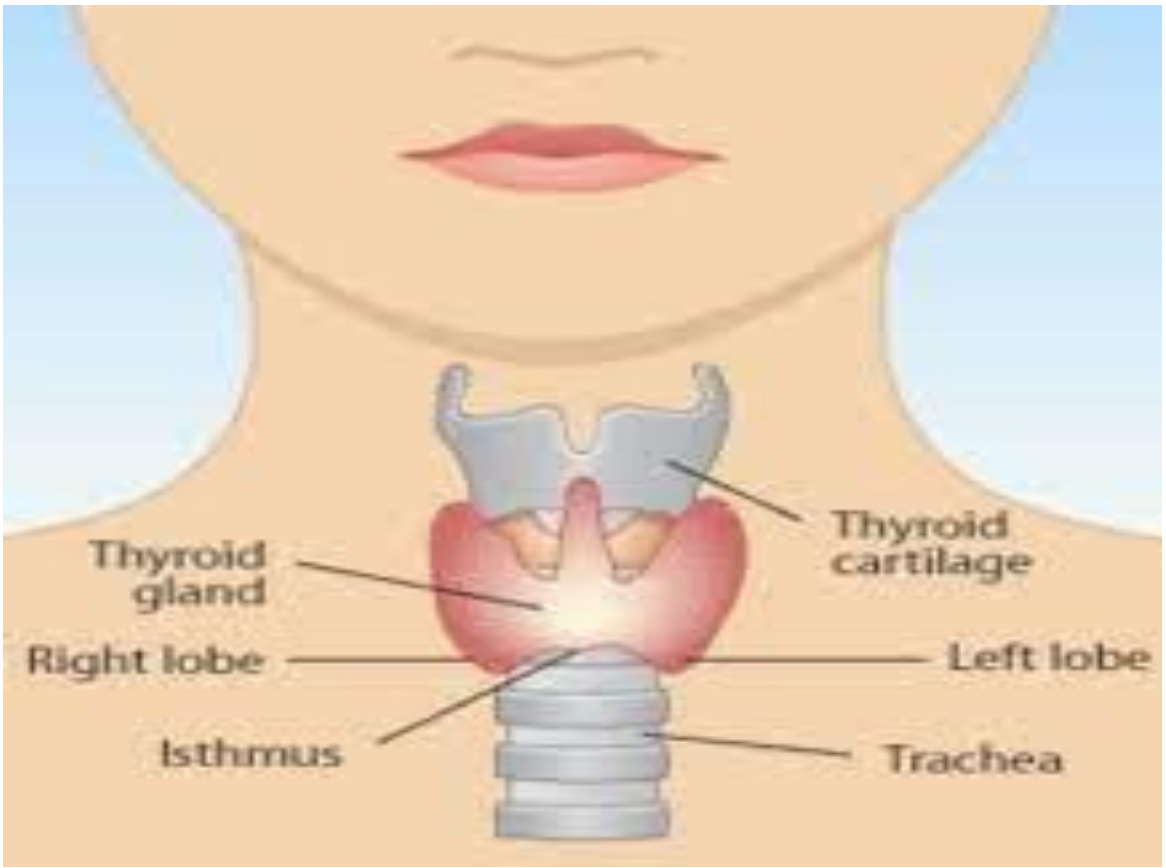
Endocrine system3

Thyroid Gland

The thyroid is a small gland that sits in the front of the neck and wraps around the windpipe (or trachea). It is shaped like a butterfly or bow tie, with two lobes joined by a narrow bridge (called an isthmus).

Each lobe of the thyroid is 4-6 cm long and approximately 1.5 cm thick. It is generally larger in women than men, and increases in size during pregnancy.



Functions/Roles of the thyroid gland

The thyroid makes hormones that regulate all cells in the body. They help control:

1. Metabolism – breaking down foods to make energy
2. Energy levels – production and use by cells in the body
3. Body temperature/heat production
4. Oxygen use by cells in the body
5. Heart rate and blood flow
6. Bone growth
7. Calcium levels
8. Vitamin metabolism
9. Brain development, particularly before birth and during childhood
10. Reproductive function

Hormones produced by the thyroid gland

Triiodothyronine (T3)

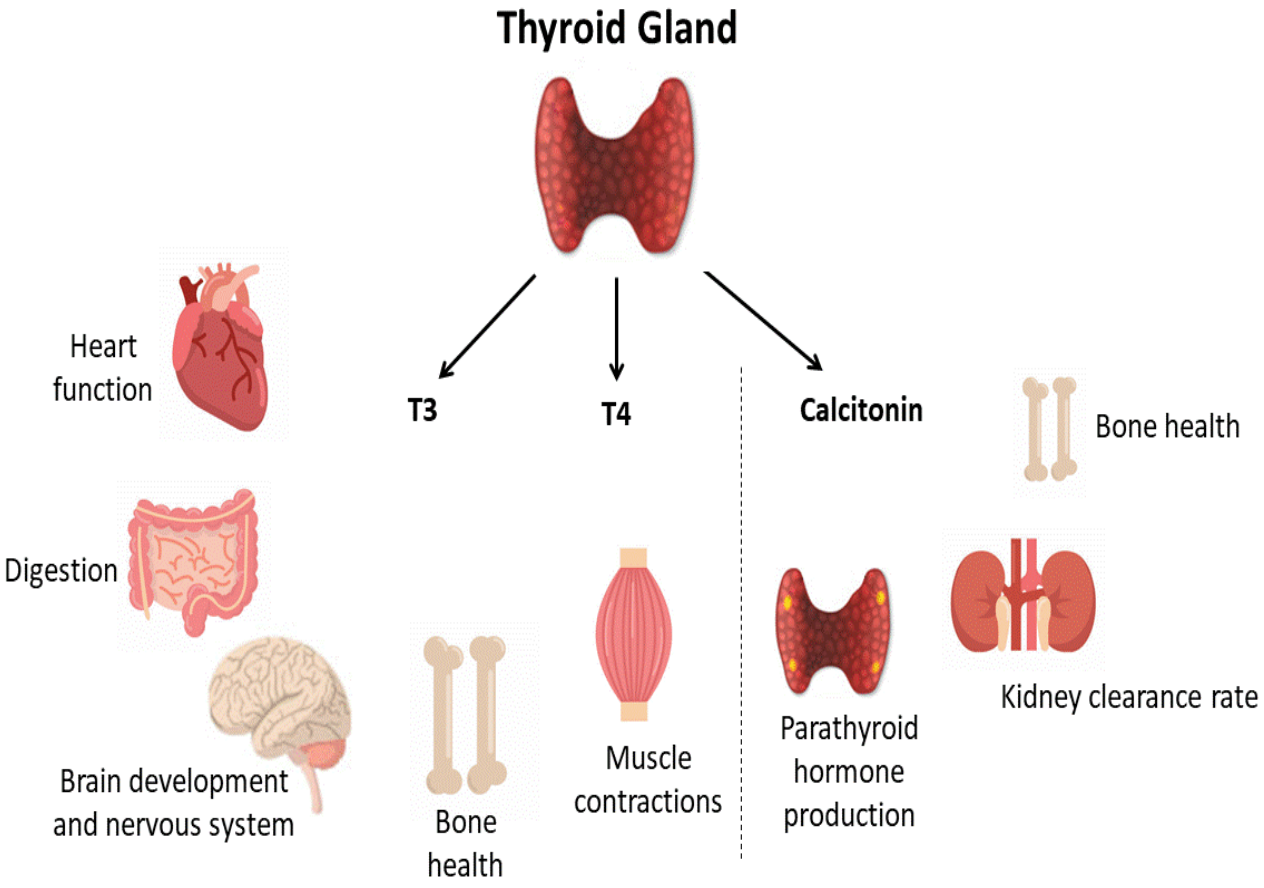
Triiodothyronine (T3) helps control basal metabolic rate, which is the least amount of energy needed to keep the body functioning while at rest. T3 also controls body temperature, glucose production, heart rate, blood pressure, and brain and lung development before birth and in early childhood. T3 works with other hormones to promote growth of long bones.

Thyroxine (T4)

Thyroxine (T4) is the main hormone produced by the thyroid. Some of the T4 made is changed into T3, which is a more active hormone. T4 controls heart function, metabolism, bone and muscle health and brain development.

Calcitonin (CT)

Calcitonin (CT) helps control the amount of calcium and phosphate in the blood. It does this in three ways: by altering the rate at which bones are broken down and reformed, by signalling the kidneys to pass more calcium into urine, and by signalling the parathyroid gland to make more parathyroid hormone (PTH).


Thyroid Gland
Heart function
Digestion
Brain development and nervous system
T3
T4
Bone health
Muscle contractions
Calcitonin
Parathyroid hormone production
Bone health
Kidney clearance rate

Keeping the thyroid gland hormones in balance

Triiodothyronine (T3) and Thyroxine (T4)

Triiodothyronine (T3) and thyroxine (T4) are regulated by negative feedback loops. T3 and T4 are made and released in response to signals starting in the hypothalamus of the brain. The hypothalamus makes thyrotrophin releasing hormone (TRH) which signals the pituitary gland to make thyroid stimulating hormone (TSH). TSH then signals the thyroid to start making T3 and T4. When T3 and T4 levels in the blood reach a certain threshold, the hypothalamus makes less TRH and the pituitary gland makes less TSH. This system keeps the level of T3 and T4 within a narrow range.