Endocrine Glands: الغدد الصماء

The endocrine system is the collection of glands of an organism that secrete hormones directly into the circulatory system to be carried towards distant target organs.

The major endocrine glands include the:

- pineal gland (الصنوبرية), A small gland that is located near the center of the brain. This gland secretes melatonin, and it may therefore be part of the body's sleep-regulation apparatus.

- Pituitary (النخامية) gland, is a gland that is attached to the base of the brain. It produces hormones which affect growth, sexual development, and other functions of the body.

- Pancreas, a glandular organ in the digestive system and endocrine system. In humans, it is located in the abdominal cavity behind the stomach. It is an endocrine gland producing several important hormones such as insulin and also as a digestive organ, secreting pancreatic juice containing bicarbonate to neutralize acidity as well as digestive enzymes that assist digestion and absorption of nutrients in the small intestine.

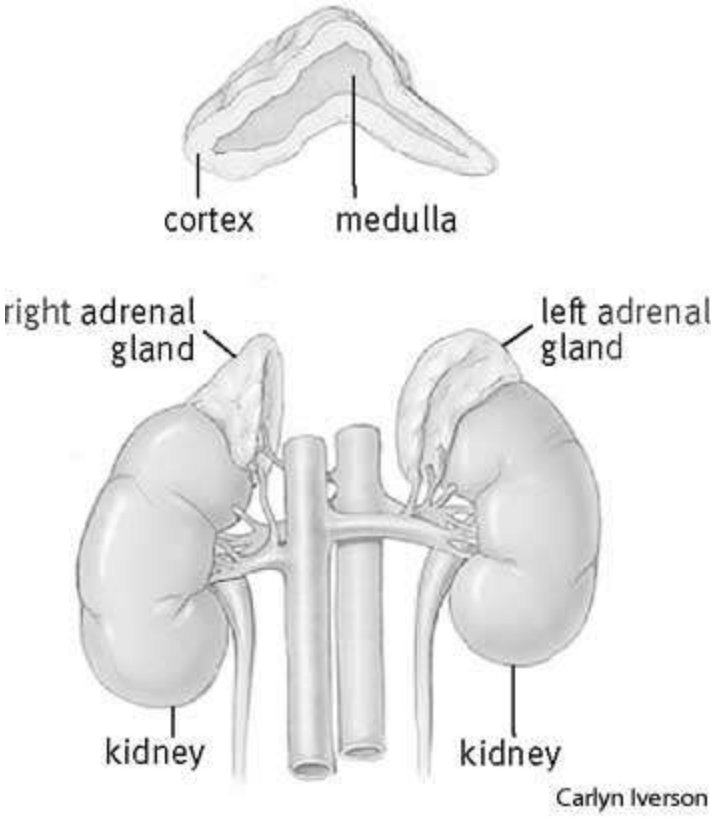
- Ovaries, one of a pair of reproductive glands in women. The ovaries are located in the pelvis, one on each side of the uterus. Each ovary is about the size and shape of an almond. The ovaries produce eggs (ova) and female hormones. During each monthly menstrual cycle, an egg is released from one ovary. The egg travels from the ovary through a fallopian tube to the uterus. The ovaries are the main source of female hormones, which control the development of female body characteristics, such as the breasts, body shape, and body hair. They also regulate the menstrual cycle and pregnancy.

- Testes (testicles), The male sex gland, located behind the male organ (penis) in a pouch of skin called the scrotum. They produce and store sperm and are also the body's main source of male hormones, such as testosterone. These hormones control the development of the reproductive organs and other male characteristics, such as body and facial hair, low voice, and wide shoulders.

- Thyroid gland(الدرقية),

- parathyroid gland, A gland that regulates calcium, located behind the thyroid gland in the neck. The parathyroid gland secretes a hormone called parathormone (or parathyrin) that is critical to calcium and phosphorus metabolism. Although the number of parathyroid glands can vary, most people have four, one above the other on each side. They are plastered against the back of the thyroid and therefore at risk for being accidentally removed during thyroidectomy.

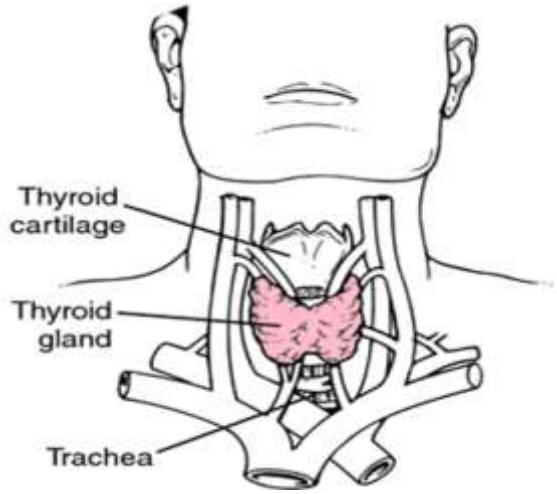
- Adrenal glands (الكضرية) found on the top of each kidney.



Thyroid: is one of the endocrine glands located in the lower part of the neck around the trachea (windpipe). It has the shape of a butterfly: two wings (lobes) attached to one another by a middle part called the **isthmus**.

It regulates the speed of metabolic processes by producing a hormone, thyroxin. It is also called

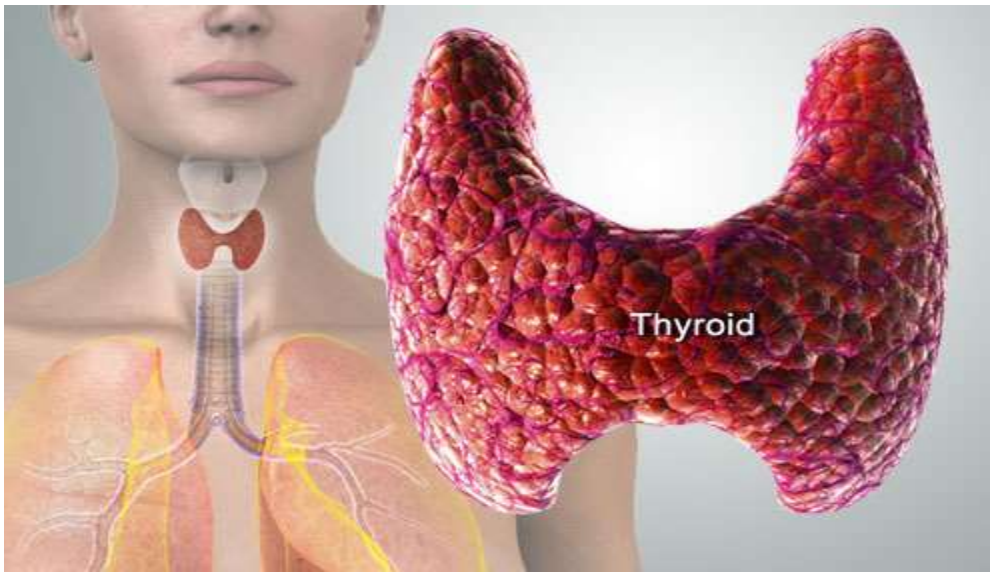
Thyroid gland: A gland that makes and stores hormones that help regulate the heart rate, blood pressure, body temperature and the rate at which food is converted into energy.



Thyroid hormones are essential for the function of every cell in the body. They help regulate growth and the rate of chemical reactions (metabolism) in the body. Thyroid hormones also help children grow and develop.

The thyroid uses iodine, a mineral found in some foods and in iodized salt, to make its hormones. The two most important thyroid hormones are thyroxine (T4) and triiodothyronine (T3). Thyroid stimulating hormone (TSH), which is produced by the pituitary gland, acts to stimulate hormone production by the thyroid gland.

The thyroid gland also makes the hormone calcitonin, which is involved in calcium metabolism and stimulating bone cells to add calcium to bone



Malfunction of Thyroids:

The two most common malfunctions are called:

1. Hypothyroidism: is the low activity of Thyroid causing Weight gain due to low levels of thyroid hormones. In contrast, hyperthyroidism is a condition of thyroid produces more hormones than the body needs, that may causes lose weight unexpectedly.

2. Hyperthyroidism:

Hyperthyroidism is a medical condition that results from an excess of thyroid hormone in the blood. Thyroid hormones control most metabolic processes in the body. In cases of hyperthyroidism, these processes are often sped up causing symptoms of hyperthyroidism,

which will be discussed later in this slide show. Thyrotoxicosis is an extreme version of hyperthyroidism that can cause severe or life-threatening symptoms.

What Are Thyroid Hormones?

Thyroid hormones control most metabolic processes in the body. They are produced by the thyroid gland located in the anterior (front) part of the neck. These hormones affect many organs and biochemical systems in your body.

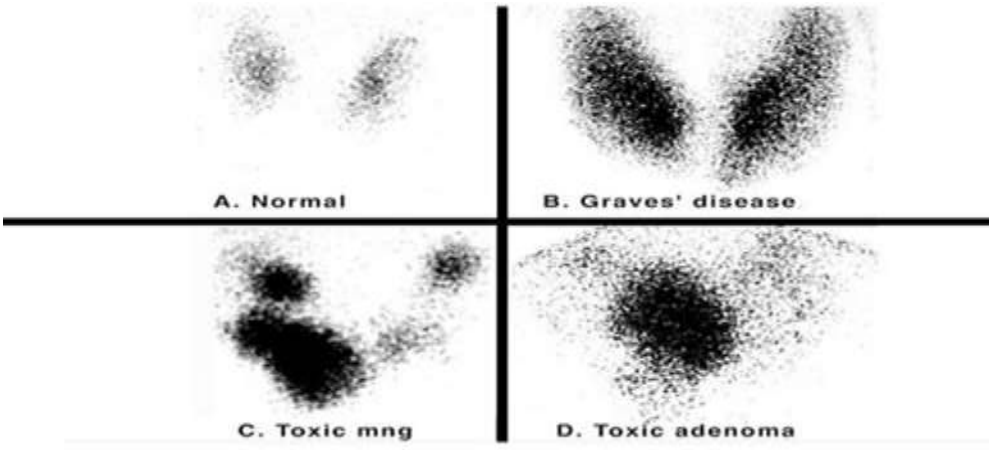
Thyroid Hormone Regulation – The Chain of Command

Complex biochemical processes in the body control the thyroid gland's production of thyroid hormones. Two other glands – the hypothalamus and the pituitary gland – both have a biochemical effect on the thyroid. The hypothalamus (the "master gland") releases a hormone called thyrotropin-releasing hormone (TRH), which sends a signal to the pituitary to release thyroid-stimulating hormone (TSH). In turn, TSH sends a signal to the thyroid to release thyroid hormones. A problem with any of these three glands may cause an over-production of thyroid hormone and can cause hyperthyroidism.

What Causes Hyperthyroidism?

Some common causes of hyperthyroidism that will be covered in the following slides include:

- Graves' Disease
- Functioning adenoma ("hot nodule") and Toxic Multinodular Goiter (TMNG)
- Excessive intake of thyroid hormones
- Abnormal secretion of TSH
- Thyroiditis (inflammation of the thyroid gland)
- Excessive iodine intake



Graves' Disease

The most common cause of hyperthyroidism is Graves' disease. The thyroid gland itself over-produces thyroid hormone and is no longer able to respond to the pituitary and hypothalamus. Graves' disease is five times more common in women and runs in families. Risk factors for Graves' disease include smoking, viral illnesses, radiation to the neck, and medications. The condition is associated with an eye disease called Graves' ophthalmopathy and skin lesions called dermopathy. Diagnosis of Graves' disease is made by blood tests, and a nuclear medicine thyroid scan.

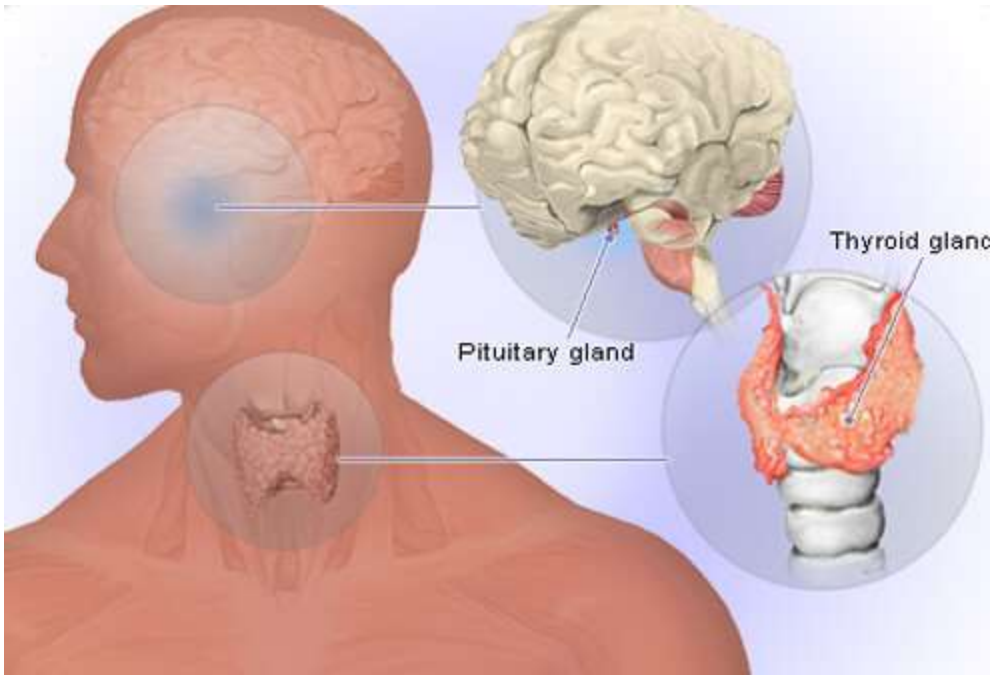
Functioning Adenoma and Toxic Multinodular Goiter

When the thyroid gland tissue overgrows, either in individual nodules (the functioning adenoma) or in multiple clusters (multinodular goiter), it is generally termed a "goiter." Goiters

appear as large, swollen areas in the front of the neck near the Adam's apple. These goiters may over-produce thyroid hormone, causing symptoms of hyperthyroidism.

Excessive Intake of Thyroid Hormones

Hyperthyroidism may be caused by the intake of too much thyroid medication. Supplemental thyroid medication is given to patients who have low thyroid hormone, or hypothyroidism. If the dose is not correct or the patient takes too much of the medication, hypothyroidism may occur. Some people may abuse thyroid hormone medications in an attempt to lose weight. Taking thyroid hormones the body does not need may result in hyperthyroidism.



Abnormal Secretion of TSH

Thyroid-stimulating hormone (TSH) is secreted by the pituitary gland and causes the thyroid gland to produce thyroid hormone. A tumor or problem with the pituitary gland can cause and excess of TSH to affect the thyroid, and can result in hyperthyroidism.

Hyperthyroidism Symptoms and Treatment

Thyroiditis (Inflammation of the Thyroid)

Thyroiditis is inflammation of the thyroid. It is usually caused by a viral illness. The patient may have generalized neck pain, sore throat, fever, chills, and a tender thyroid. The inflammation of the thyroid causes an increased amount of thyroid hormone to be secreted into the body,

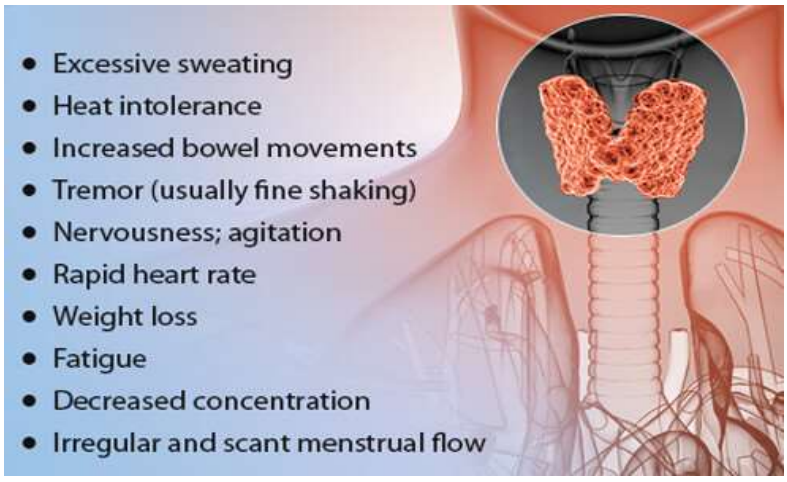
causing hyperthyroidism. After pregnancy, some women – up to 8% - may develop a condition called lymphocytic thyroiditis where white blood cells called lymphocytes accumulate in the glandular tissue. Thyroiditis can be diagnosed with blood tests and a thyroid scan.

Hyperthyroidism Symptoms and Treatment

Excessive Iodine Intake

An important component of thyroid hormone is iodine. If an excess of iodine is ingested the thyroid may over-produce thyroid hormone and cause hyperthyroidism. Some medications such as such as the anti-arrhythmic drug amiodarone (Cordarone) contain large amounts of iodine and can induce thyroid dysfunction.

Hyperthyroidism Symptoms and Treatment



What Are the Symptoms of Hyperthyroidism?

When hyperthyroidism is mild, patients may not experience any symptoms. This may also occur in patients age 70 years and older.

Early symptoms may include:

- Tremors
- Excessive sweating
- Smooth velvety skin
- Fine hair
- Rapid heart rate
- Enlarged thyroid gland
- Puffiness around the eyes
- A characteristic 'stare' due to the elevation of the upper eyelids

As the disease progresses, symptoms of hyperthyroidism are all related to an increased metabolic rate and may include:

- Irregular heart rhythms and heart failure
- "Thyroid storm" - high blood pressure, fever, and heart failure
- Mental changes, such as confusion and delirium

How Is Hyperthyroidism Diagnosed?

If hyperthyroidism is suspected, diagnosis is made through a blood test to measure TSH levels in the blood. To further delineate what the specific cause of the hyperthyroidism would be, tests such as antibody screenings, nuclear thyroid scans, and the use of radioactively labeled iodine can help pinpoint the cause. Testing of the hypothalamus and pituitary may also be necessary.