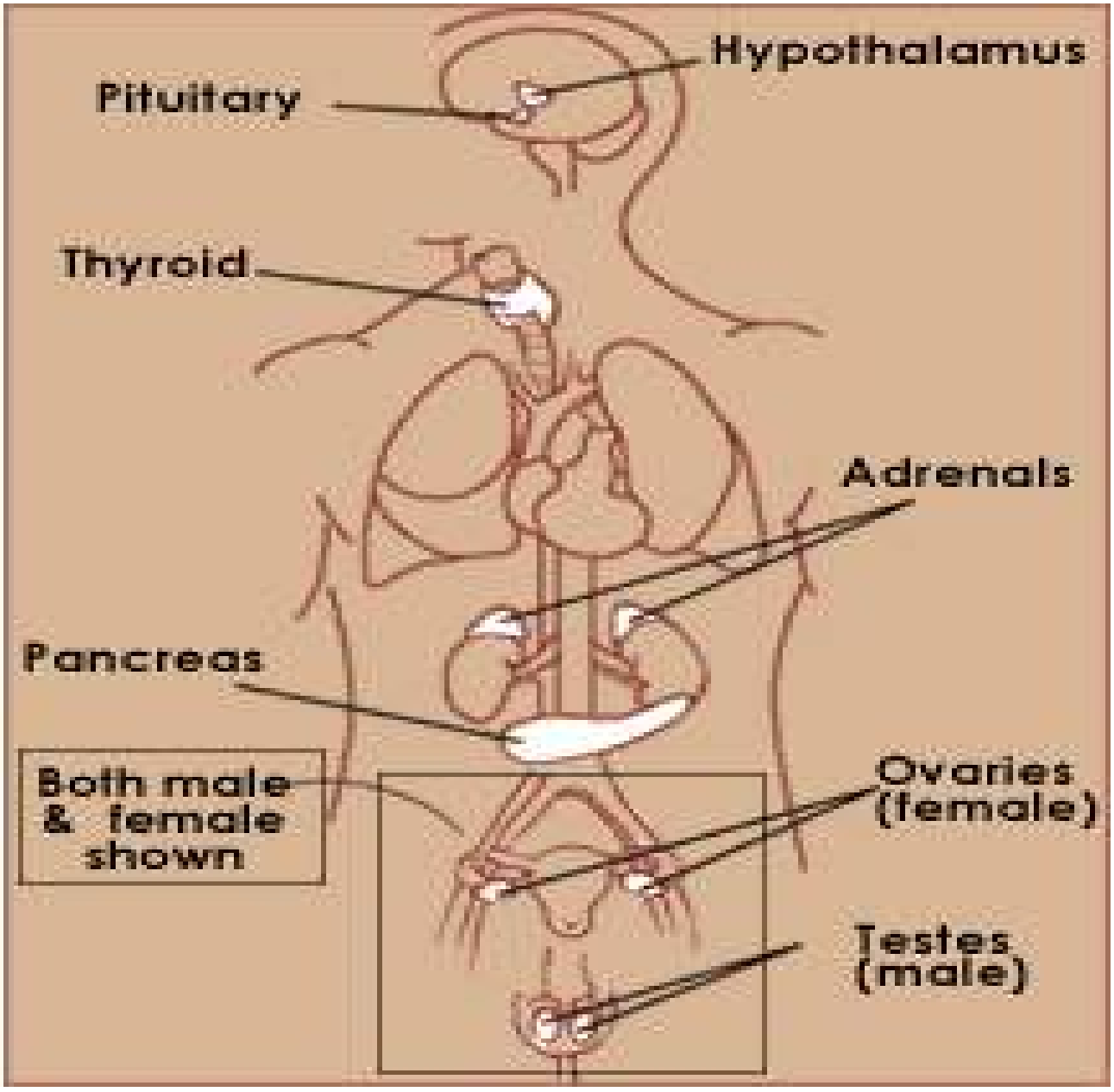
What is the Endocrine System?

The foundations of the endocrine system are the hormones and glands. As the body's chemical messengers, hormones transfer information and instructions from one set of cells to another. Although many different hormones circulate throughout the bloodstream, each one affects only the cells that are genetically programmed to receive and respond to its message**. *Hormone levels can be influenced by factors such as stress, infection, and changes in the balance of fluid and minerals in blood***


Hypothalamus
Pituitary
Thyroid
Adrenals
Pancreas
Both male & female shown
Ovaries (female)
Testes (male)

A gland is a group of cells that produces and secretes, or gives off, chemicals. A gland selects and removes materials from the blood, process them, and secretes the finished chemical product for use somewhere in the body. Some types of glands release their secretions in specific areas. For instance, exocrine glands, such as the sweat and salivary glands, release secretions in the skin or inside of the mouth. Endocrine glands, on the other hand, release more than 20 major hormones directly into the bloodstream where they can be transported to cells in other parts of body.

The major glands that make up the human endocrine system are the hypothalamus, pituitary, thyroid, parathyroids, adrenals, pineal body, the reproductive glands, which include the ovaries and testes.

The pancreas is also part of this hormone-secreting system, even though it is also associated with the digestive system because it also produces and secret digestive enzymes.

Although the endocrine glands are the body's main hormone producers, some non-endocrine organs - such as the brain, heart lungs, kidneys, liver, thymus, skin, and placenta - also produce and release hormones.

Function: maintain homeostasis

Thymus gland (site of maturation of white blood cells)

Thyroid gland (secretes thyroid hormone and calcitonin)

Parathyroid gland (secretes parathyroid hormone)

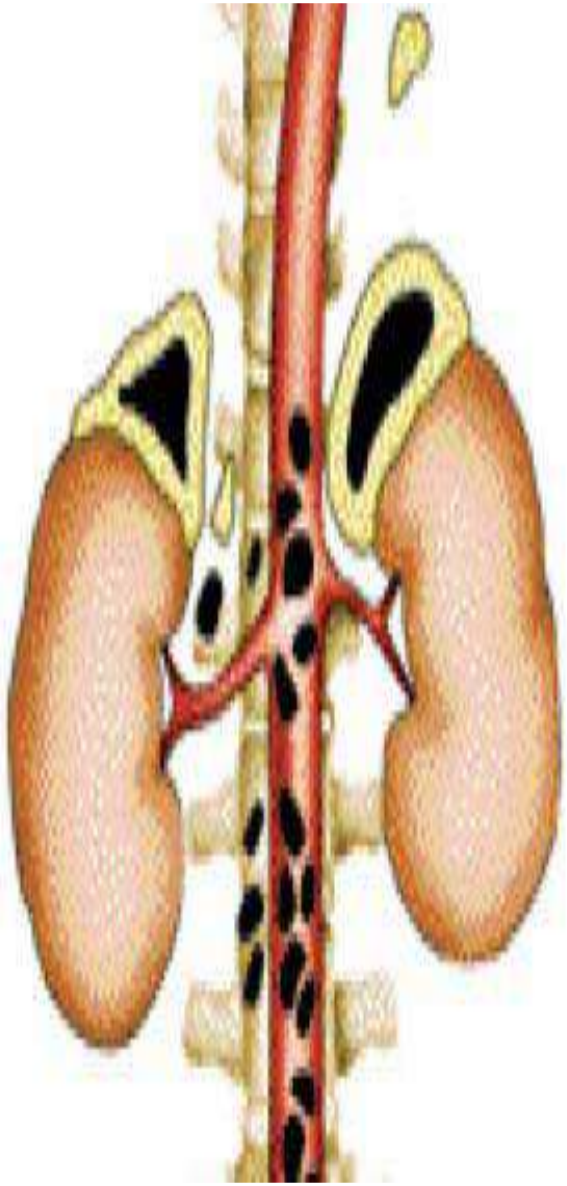
Adrenal gland (secretes aldosterone)

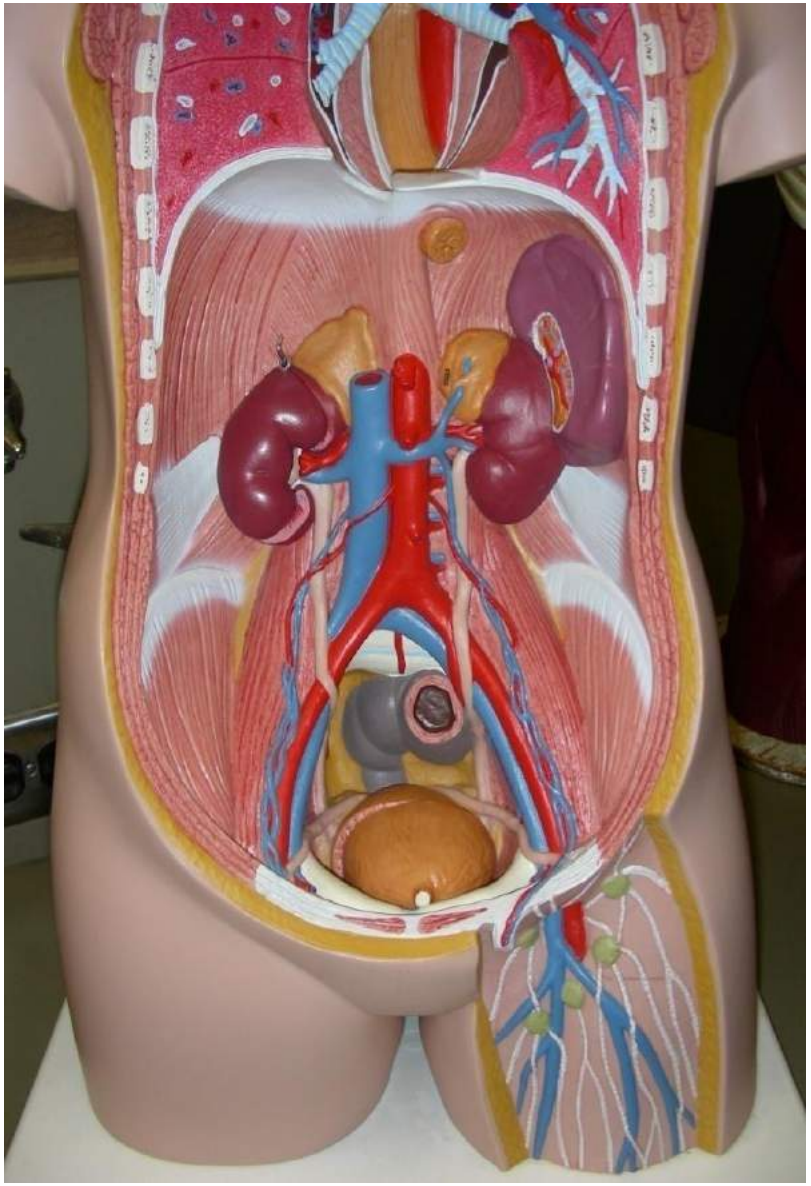
Pituitary gland (secretes FSH, etc. The neurohypophysis stores and releases hormones produced in the hypothalamus)

Ovary (also an endocrine gland; secretes estrogen)

Testes (secretes testosterone)

Pancreas (secretes insulin; lack= diabetes mellitus





Adrenal Glands

The body has two triangular adrenal glands ,one on top of each kidney. The adrenal glands have two parts, each of which produces a set of hormones and has a different function.

The outer part, the adrenal cortex, produces hormones called corticosteroids that influence or regulate salt and water balance in the body, the body's response to stress, metabolism, the immune system, and sexual development and adrenal medulla produces catecholamines such as epinephrine. Also called adrenaline, epinephrine increases blood pressure and heart rate when the body experiences stress. (Epinephrine injections are often used to counteract a severe allergic reaction.)

Islets of Langerhans

Known as the insulin-producing tissue, the islets of Langerhans do more than that. They are groups of specialized cells in the pancreas that make and secrete hormones.

There are five types of cells in an islet: alpha cells that make glucagon, which raises the level of glucose (sugar) in the blood; beta cells that make insulin; delta cells that make somatostatin which inhibits the release of numerous other hormones in the body; and PP cells and D1 cells, about which little is known.

Degeneration of the insulin-producing beta cells is the main cause of type I (insulin-dependent) diabetes mellitus

Insulin

Insulin is a naturally-occurring hormone secreted by the pancreas. Insulin is required by the cells of the body in order for them to remove and use glucose from the blood. From glucose the cells produce the energy that they need to carry out their functions.

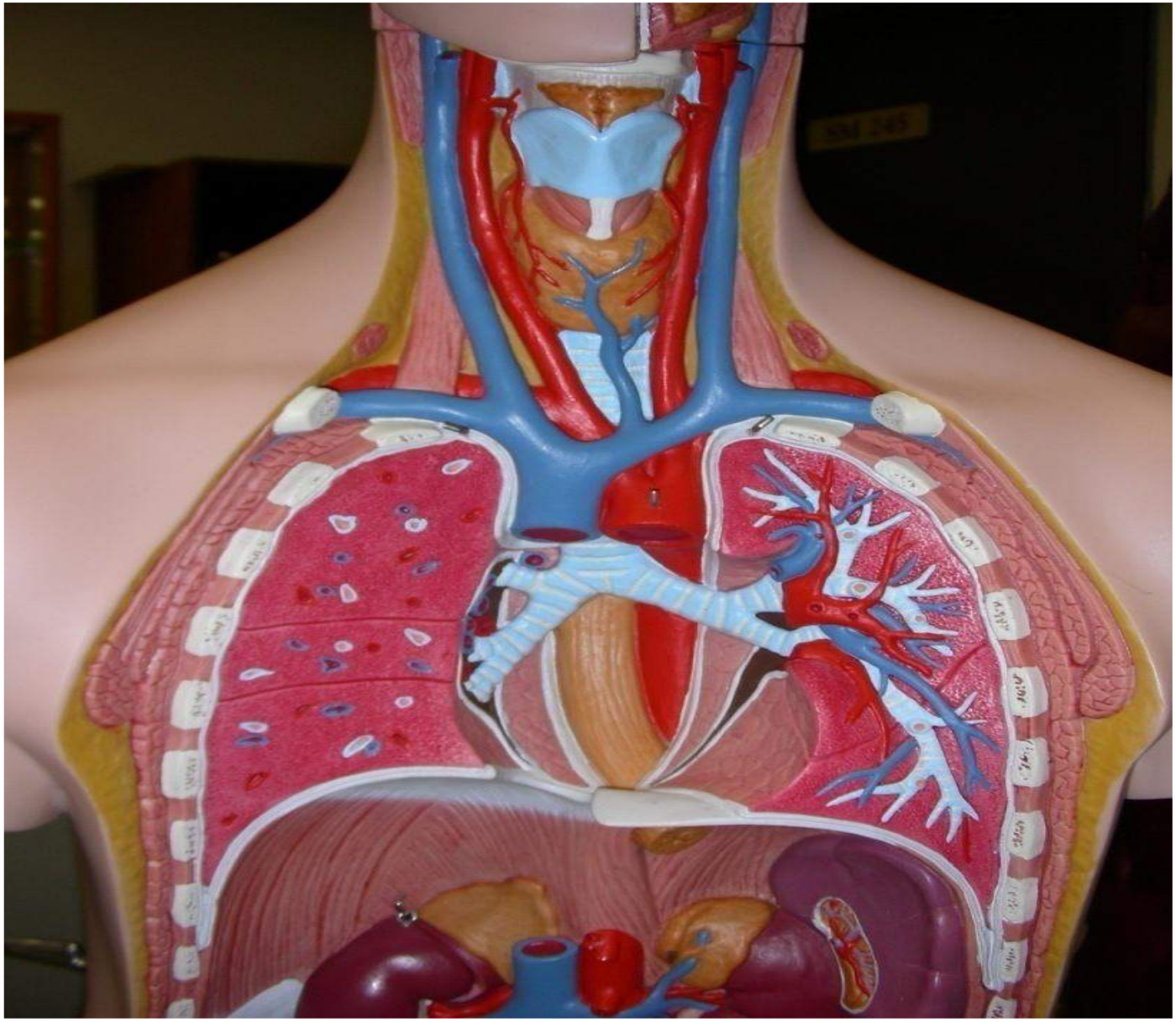
Thyroid gland

The thyroid located in the front part of the lower neck, is shaped like a bowtie or butterfly and produces the thyroid hormones thyroxine and triiodothyronine.

-These hormones control the rate at which cells burn

fuels from food to produce energy. As the level of thyroid hormones increases in the bloodstream, so does the speed at which chemical reactions occur in the body.

-Thyroid hormones also play a key role in bone growth and the development of the brain and nervous system in children. The production and release of thyroid hormones is controlled by thyrotropin, which is secreted by the pituitary gland.



Attached to the thyroid are four tiny glands that function together called the ***parathyroids. They release parathyroid hormone, which regulates the level of calcium in the blood with the help of calcitonin, which is produced in the thyroid.***

The hypothalamus

The hypothalamus, a collection of specialized cells that is located in the lower central part of the brain, is the primary link between the endocrine and nervous systems. Nerve cells in the hypothalamus control the pituitary gland by producing chemicals that either stimulate or suppress hormone secretions from the pituitary.

To accomplish this, the hypothalamus relays information sensed by the brain (such as environmental temperature, light exposure patterns, and feelings) to the pituitary.

The tiny pituitary is divided into two parts: the anterior lobe and the posterior lobe. The anterior lobe regulates the activity of the thyroid, adrenals, and reproductive glands. Among the hormones it produces are:

- ***growth hormone, which stimulates the growth of bone and other body tissues and plays a role in the body's handling of nutrients and minerals***
- ***prolactin, which activates milk production in women who are breastfeeding***
- ***thyrotropin, which stimulates the thyroid gland to produce thyroid hormones***
- ***corticotropin, which stimulates the adrenal gland to produce certain hormones***

Hyperthyroidism.

Hyperthyroidism is a condition in which the levels of thyroid hormones in the blood are excessively high. Symptoms may include weight loss, nervousness, tremors, excessive sweating, increased heart rate and blood pressure, protruding eyes, and a swelling in the neck from an enlarged thyroid gland (goiter). In children and teens the condition is usually caused by Graves' disease, an autoimmune disorder in which specific antibodies produced by the child's immune system stimulate the thyroid gland to become overactive. The disease may be controlled with medications or by removal or destruction of the thyroid gland through surgery or radiation treatments.

Hypothyroidism.

Hypothyroidism (pronounced: hi-po-thigh-roy-dih-zum) is a condition in which the levels of thyroid hormones in the blood are abnormally low. ***Thyroid hormone deficiency slows body processes and may lead to fatigue, a slow heart rate, dry skin, weight gain, constipation, and, in children, slowing of growth and delayed puberty***.