



SNS COLLEGE OF ALLIED HEALTH SCIENCES
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DEPARTMENT : PHYSICIAN ASSISTANT

COURSE NAME : ANATOMY

UNIT : ENDOCRINE SYSTEM

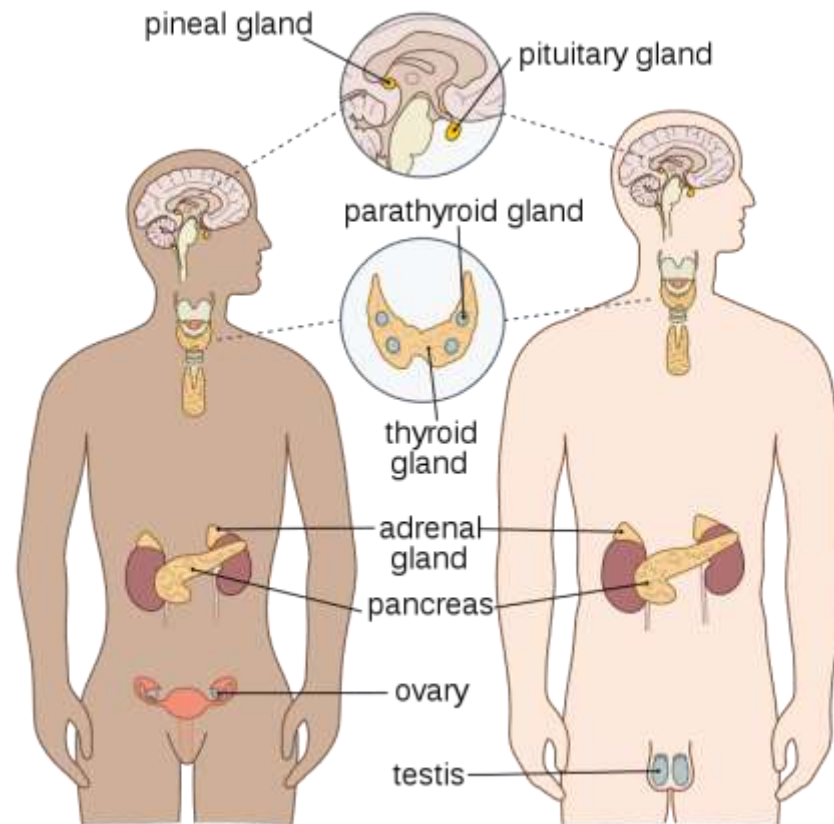
TOPIC : MAJOR ENDOCRINE GLANDS



ENDOCRINE SYSTEM



- The endocrine system is made up of seven different glands that make chemicals called hormones.
- Hormones are substances that act as "messengers" to control many body functions.





The endocrine system makes hormones that help control:

- Growth
- Reproduction
- Sexual development
- Use and storage of energy
- Response to physical stress or trauma
- Levels of water, salt and sugar in the body



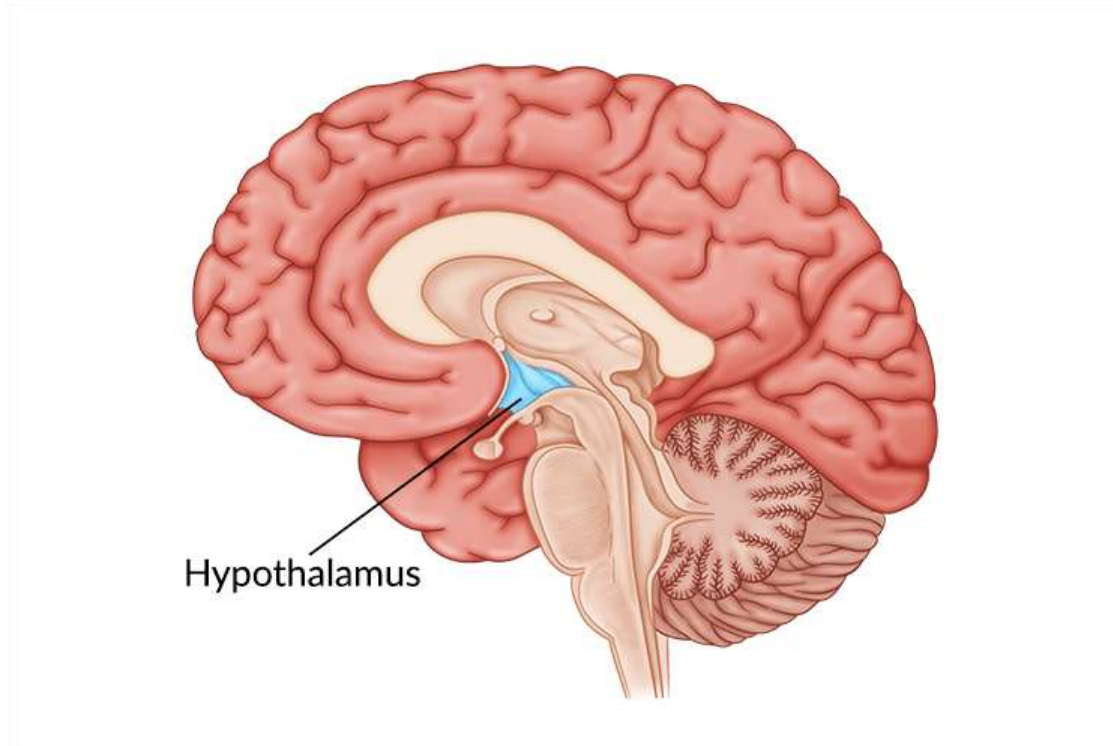
HYPOTHALAMUS



- Location : The hypothalamus is located at the base of the brain, near the optic chiasm where the optic nerves behind each eye cross and meet.
- Structure: Divided into anterior and posterior regions.
- Hormones : The hypothalamus secretes hormones that stimulate or suppress the release of hormones in the pituitary gland, in addition to controlling water balance, sleep, temperature, appetite, and blood pressure.



- Blood Supply: Branches of the internal carotid arteries (anterior cerebral artery, anterior communicating artery) and the posterior cerebral arteries.
- Nerve Supply: There is no direct parasympathetic or sympathetic innervation to the hypothalamus, but it receives inputs from higher brain centers and autonomic nuclei.





PINEAL GLAND



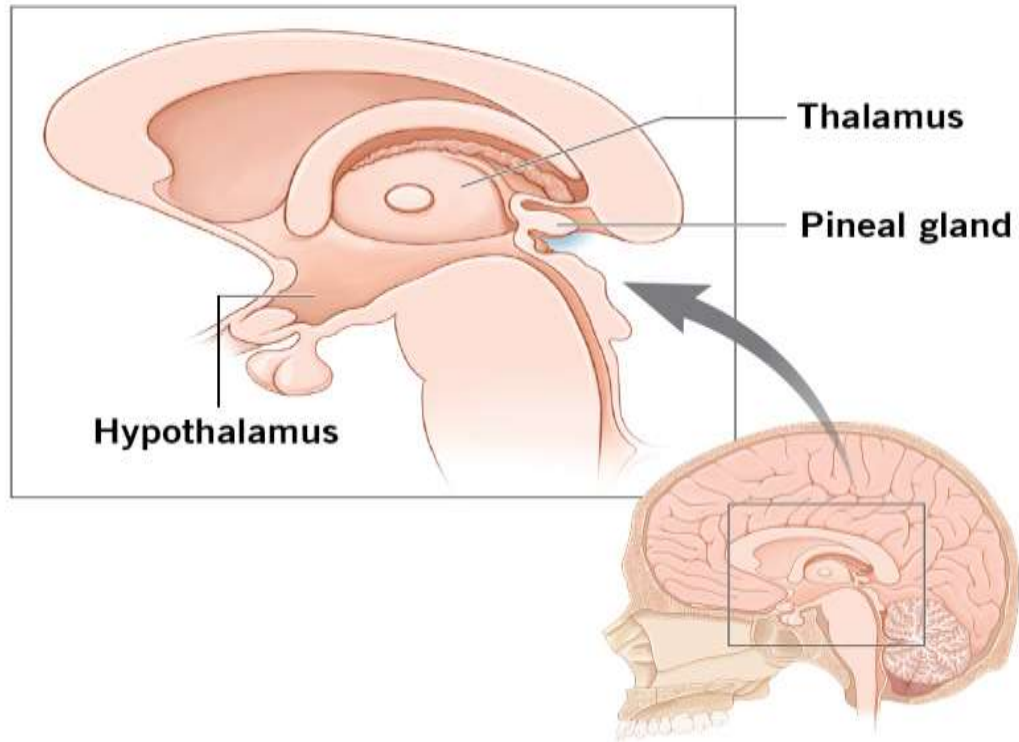
- Location : The pineal body is located below the corpus callosum, in the middle of the brain.
- Structure: Pinealocytes and supporting cells.
- Hormones : It produces the hormone melatonin, which helps the body know when it's time to sleep.



- **Blood Supply:** The pineal gland receives its blood supply from the posterior cerebral artery and the choroidal arteries, which are branches of the posterior circulation of the Circle of Willis.
- **Nerve Supply:** The pineal gland receives sympathetic innervation via the pineal nerve, which arises from the superior cervical ganglion.



Pineal Gland





PITUITARY GLAND



Location: Lies at the base of the brain, connected to the hypothalamus via the pituitary stalk.

Structure:

Anterior Pituitary (Adenohypophysis):

- Divided into pars distalis, pars intermedia, and pars tuberalis.
- Contains different cell types producing specific hormones.

Posterior Pituitary (Neurohypophysis):

- Composed of nerve fibers and glial cells.



Hormones:

- Anterior Pituitary Hormones:
- Growth Hormone (GH)
- Thyroid-Stimulating Hormone (TSH)
- Adrenocorticotrophic Hormone (ACTH)
- Follicle-Stimulating Hormone (FSH)
- Luteinizing Hormone (LH)
- Prolactin (PRL)

Posterior Pituitary Hormones:

- Oxytocin
- Vasopressin (Antidiuretic Hormone, ADH)

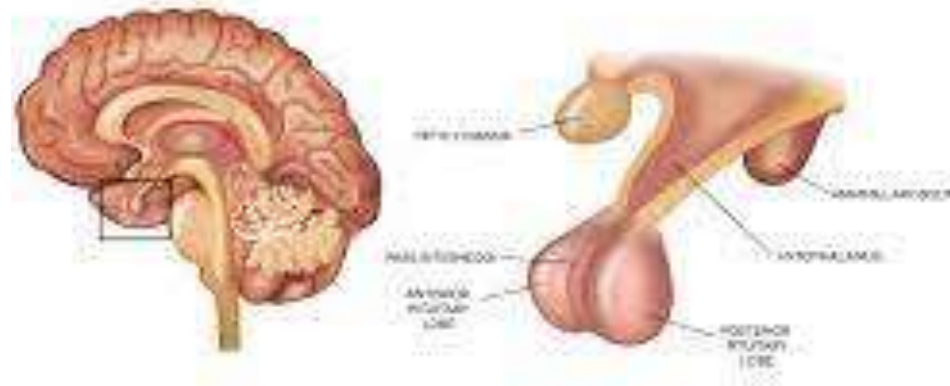


Blood Supply: The pituitary gland receives its blood supply from the superior hypophyseal artery, which branches from the internal carotid artery.

Nerve Supply: The pituitary gland is connected to the hypothalamus by the hypothalamo-hypophyseal tract, forming a neuroendocrine connection. Nerve fibers from the hypothalamus release hormones directly into the bloodstream in the posterior pituitary.



THE PITUITARY (HYPOPHYSIS) GLAND





THYROID GLAND



Location: The thyroid gland and parathyroid glands are located in front of the neck, below the larynx (voice box).

Structure:

- Composed of two lobes connected by the isthmus.
- Follicular cells produce thyroid hormones.

Hormones:

- Thyroxine (T4)
- Triiodothyronine (T3)

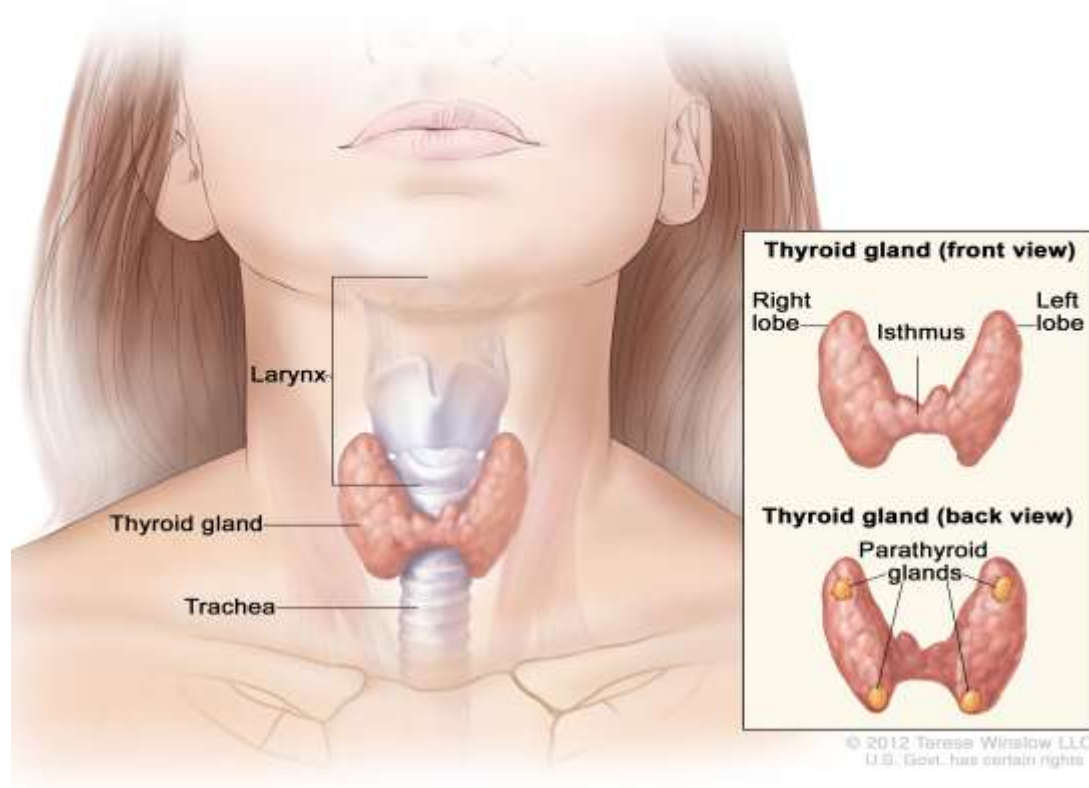


Blood Supply: The thyroid gland is supplied by the superior thyroid artery (branch of the external carotid artery) and the inferior thyroid artery (branch of the thyrocervical trunk).

Nerve Supply: Sympathetic and parasympathetic nerve fibers influence thyroid function. The sympathetic fibers arise from the cervical sympathetic ganglia, while parasympathetic fibers originate from the vagus nerve.



Anatomy of the Thyroid and Parathyroid Glands





PARATHYROID GLAND



Location: Four small glands located on the posterior surface of the thyroid.

Structure:

Typically two superior and two inferior glands.

Hormone: Parathyroid Hormone (PTH)



Blood Supply: The parathyroid glands receive blood from the inferior thyroid arteries.

Nerve Supply: Parathyroid glands receive sympathetic innervation from the cervical sympathetic ganglia.



ADRENAL GLAND



Location: Situated on top of each kidney.

Structure:

Adrenal Cortex:

Divided into three layers: zona glomerulosa, zona fasciculata, and zona reticularis.

Adrenal Medulla:

Composed of chromaffin cells.



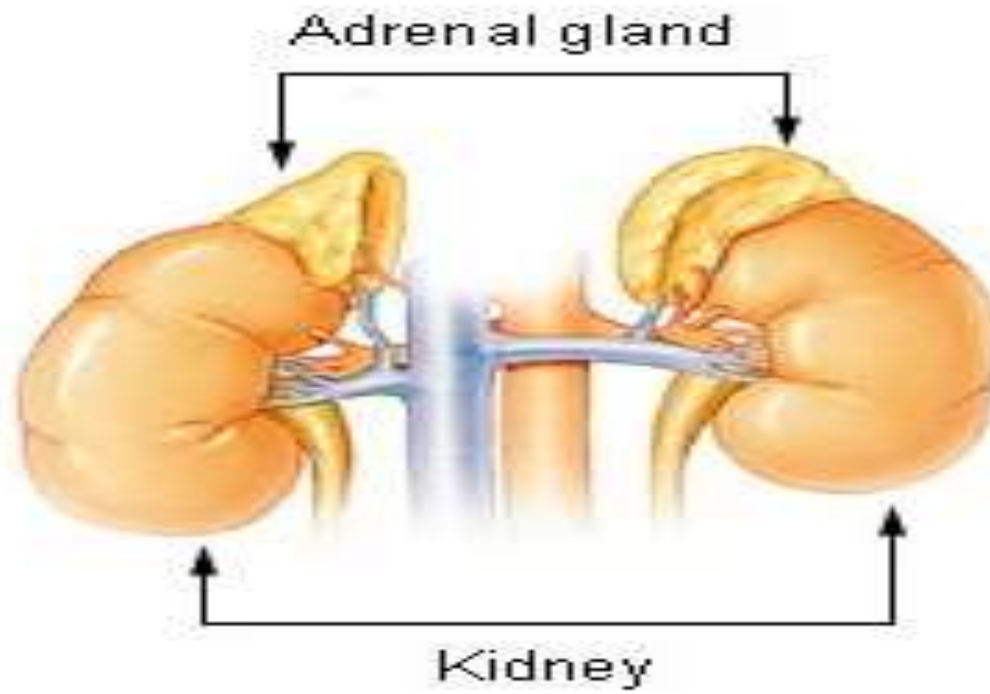
Hormones:

- Adrenal Cortex Hormones:
 - Cortisol
 - Aldosterone
 - Androgens
- Adrenal Medulla Hormones:
 - Epinephrine (Adrenaline)
 - Norepinephrine (Noradrenaline)



Blood Supply: The adrenal glands have a rich blood supply. The adrenal cortex is primarily supplied by the superior, middle, and inferior suprarenal arteries, while the adrenal medulla is supplied by numerous small arteries.

Nerve Supply: Both the adrenal medulla and cortex receive sympathetic innervation. The adrenal medulla acts as a modified sympathetic ganglion, releasing catecholamines in response to sympathetic stimulation.





PANCREAS GLAND



Location: Positioned behind the stomach.

Structure:

Contains both endocrine (Islets of Langerhans) and exocrine cells.

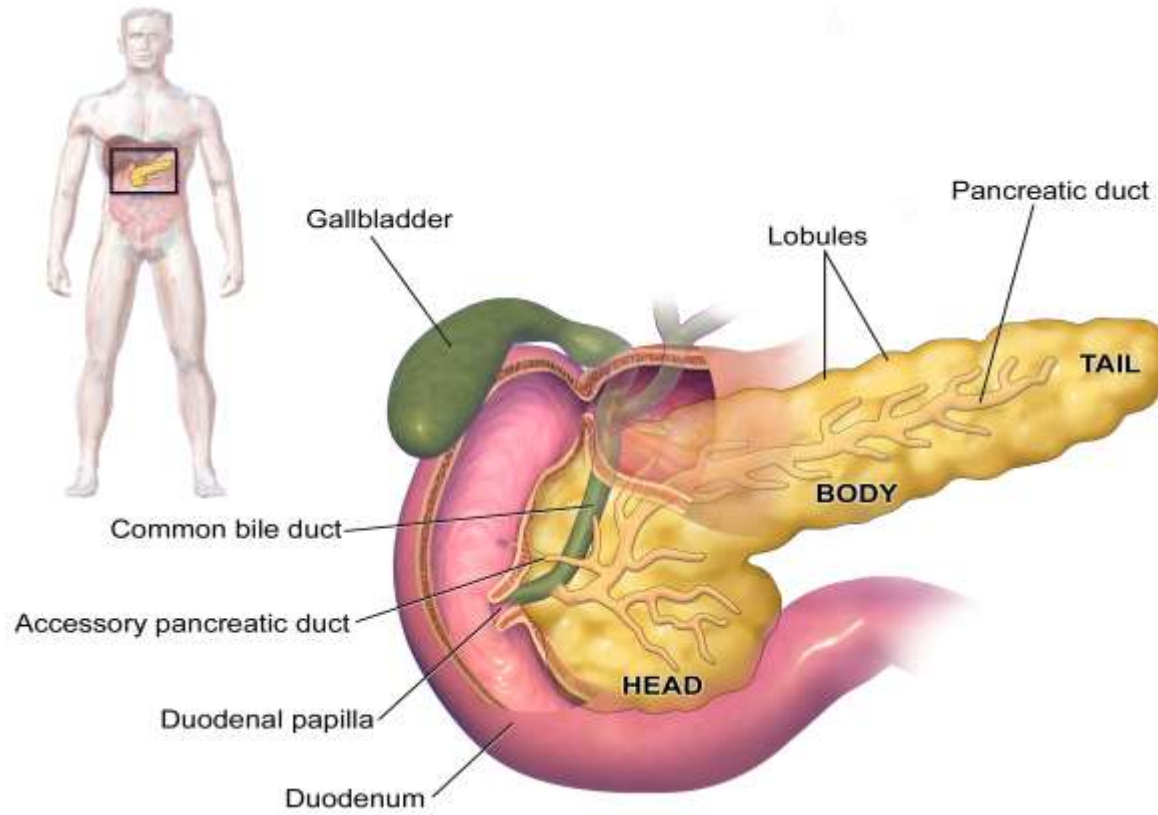
Hormones:

- Insulin
- Glucagon



Blood Supply: The pancreas is supplied by the pancreatic arteries, which branch from the splenic artery and the superior mesenteric artery.

Nerve Supply: The pancreas has both sympathetic and parasympathetic innervation. Sympathetic fibers come from the celiac plexus, while parasympathetic fibers come from the vagus nerve.





GONADS



Testes (Male):

- Location: A man's testes are located in a pouch that hangs suspended outside the male body.
- Hormones: Testosterone

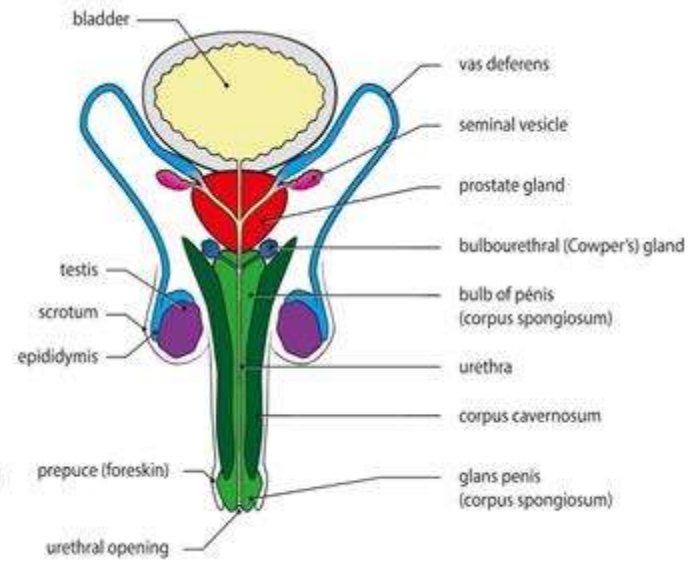
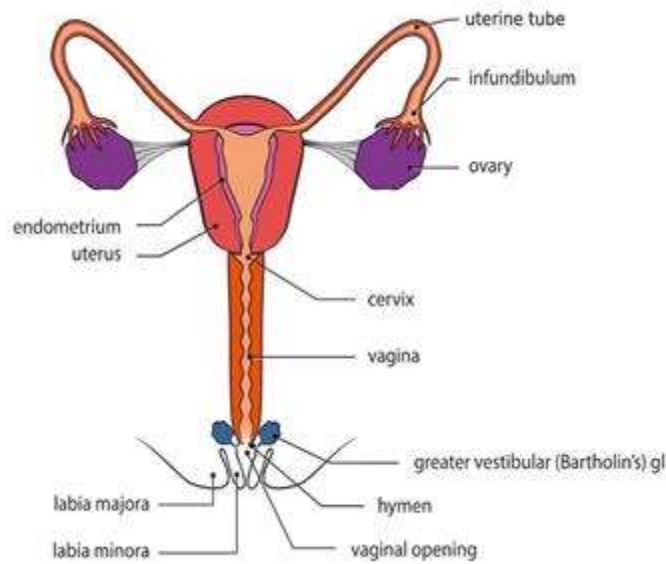
Ovaries (Female):

- Location: A woman's ovaries are located on both sides of the uterus, below the opening of the fallopian tubes (tubes that extend from the uterus to the ovaries).
- Hormones: Estrogen, Progesterone



Blood Supply: Ovaries receive blood from the ovarian arteries, while testes receive blood from the testicular arteries.

Nerve Supply: Both ovaries and testes receive sympathetic and parasympathetic innervation. The autonomic nervous system influences reproductive functions.





THYMUS GLAND



Location: Located in the upper chest, posterior to the sternum.

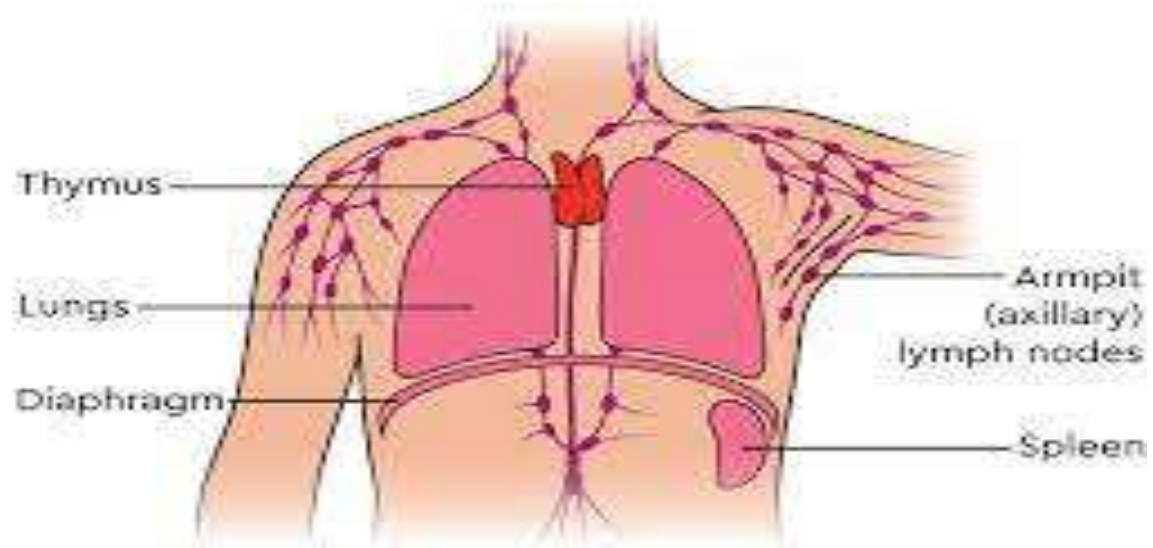
Structure: Composed of lobules containing thymic epithelial cells and lymphocytes.

Hormones: Thymosins



Blood Supply: The thymus is supplied by small branches of the internal thoracic arteries.

Nerve Supply: The thymus receives sympathetic innervation, and nerve fibers influence its function.





OTHER ENDOCRINE TISSUES



GI Tract: Enteroendocrine cells in the stomach and intestines release hormones influencing digestion and metabolism.

Kidneys: Produce renin (regulates blood pressure) and erythropoietin (stimulates red blood cell production).

Placenta (during pregnancy): Secretes hormones like human chorionic gonadotropin (hCG), estrogen, and progesterone.



APPLIED ANATOMY



- Hypothyroidism
- Hyperthyroidism
- Diabetes Mellitus
- Addison's Disease
- Cushing's Syndrome
- Hyperparathyroidism
- Hypoparathyroidism
- Polycystic Ovary Syndrome (PCOS)
- Gigantism and Acromegaly
- Hyperaldosteronism



ASSESSMENT



- What is the Location of Hypothalamus ?
- What all are the Other endocrine tissues ?