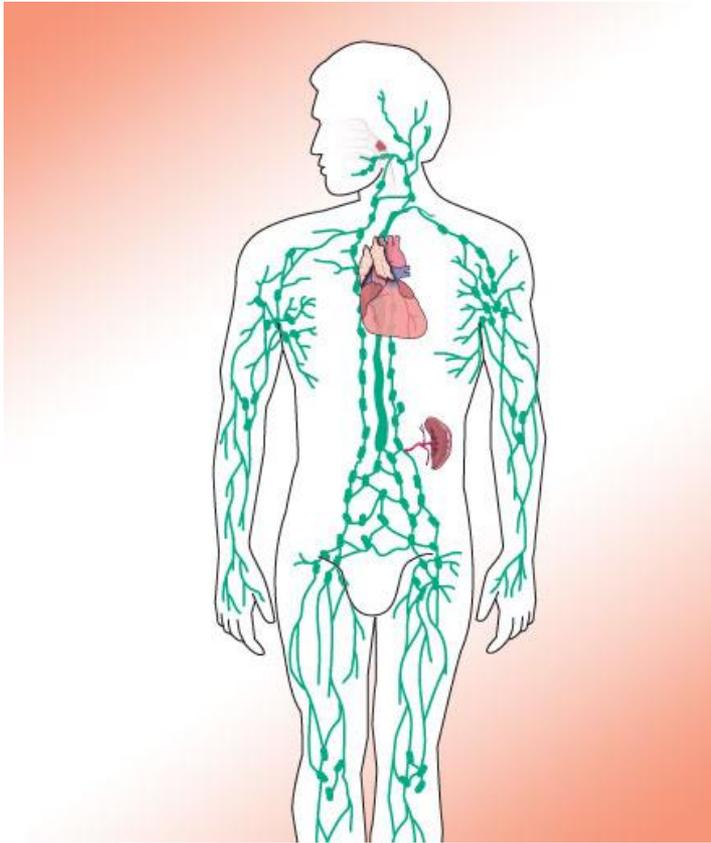


Lymphatic System

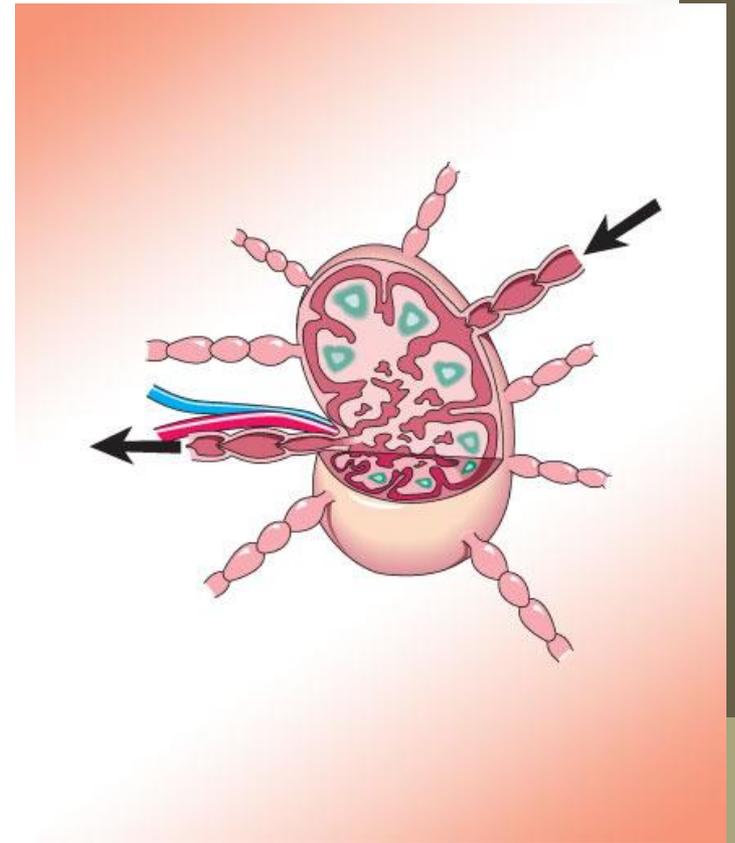
Lymphatic System



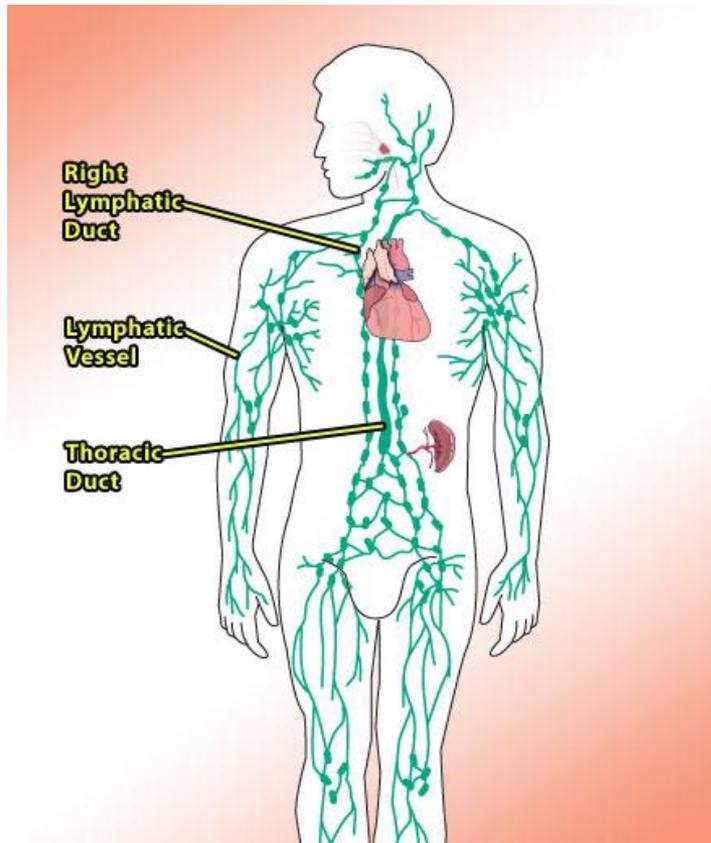
- The **lymphatic system** works along with the cardiovascular system to remove waste material.
- The lymphatic system performs these functions:
 - Transports excess fluid from tissues back into the cardiovascular system
 - Filters out harmful bacteria and other foreign substances
 - Destroys and removes old red blood cells.

Lymph

- **Lymph**
 - contains white blood cells
 - does *not* contain red blood cells, platelets, or protein molecules
- Also called **interstitial fluid** or *intercellular fluid*.



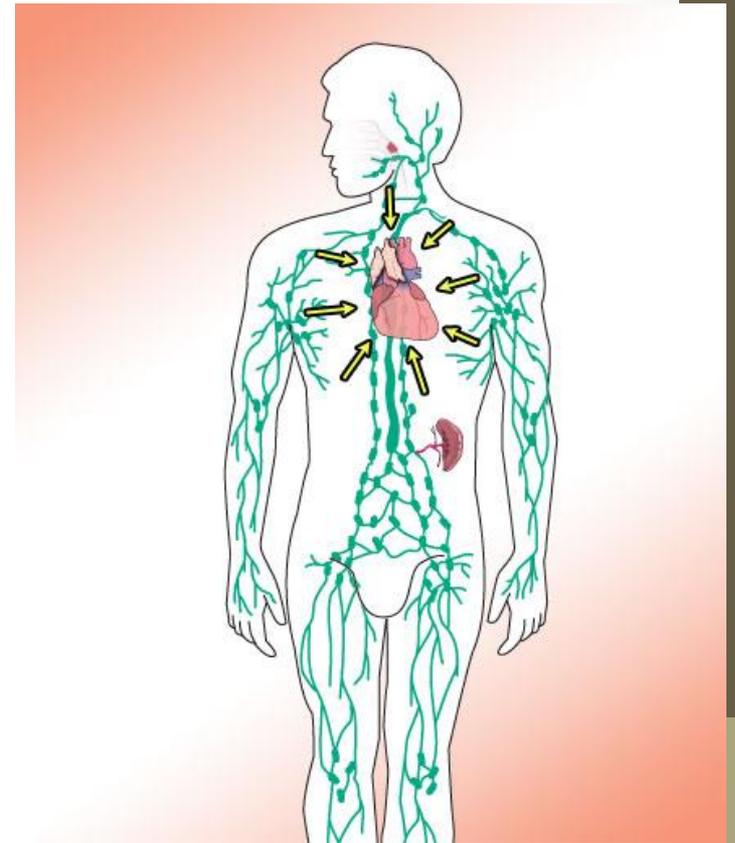
Lymphatic Vessels



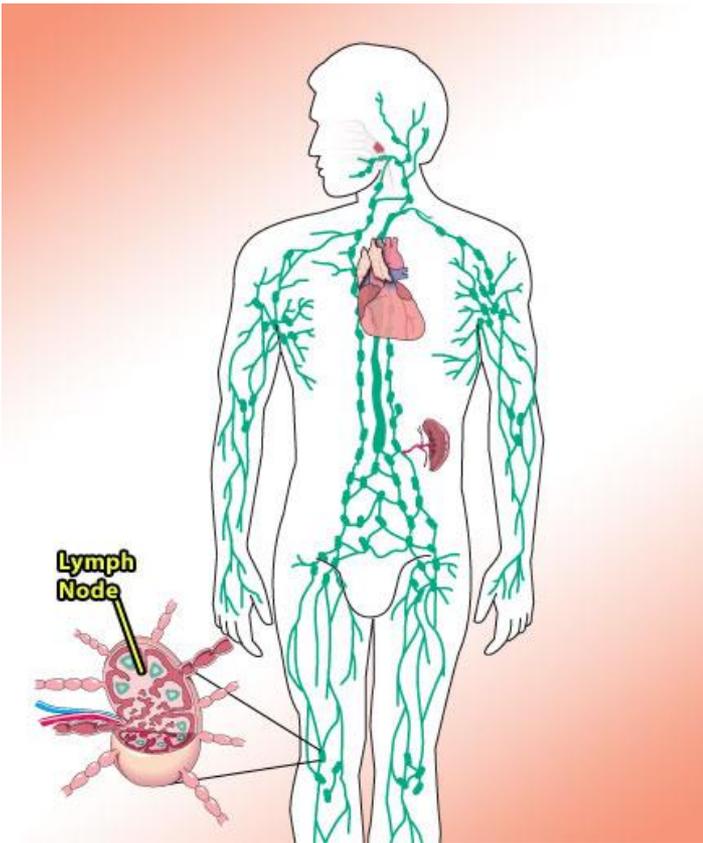
- Form a branchlike pattern throughout the body
- **Lacteals**
- All lymphatic vessels empty into one of two ducts:
 - **Right lymphatic duct**
 - **Thoracic duct**

Movement of Lymph

- Contractions of muscles keep lymph flowing
- Lymph moves toward the heart.
- Valves prevent backward flow



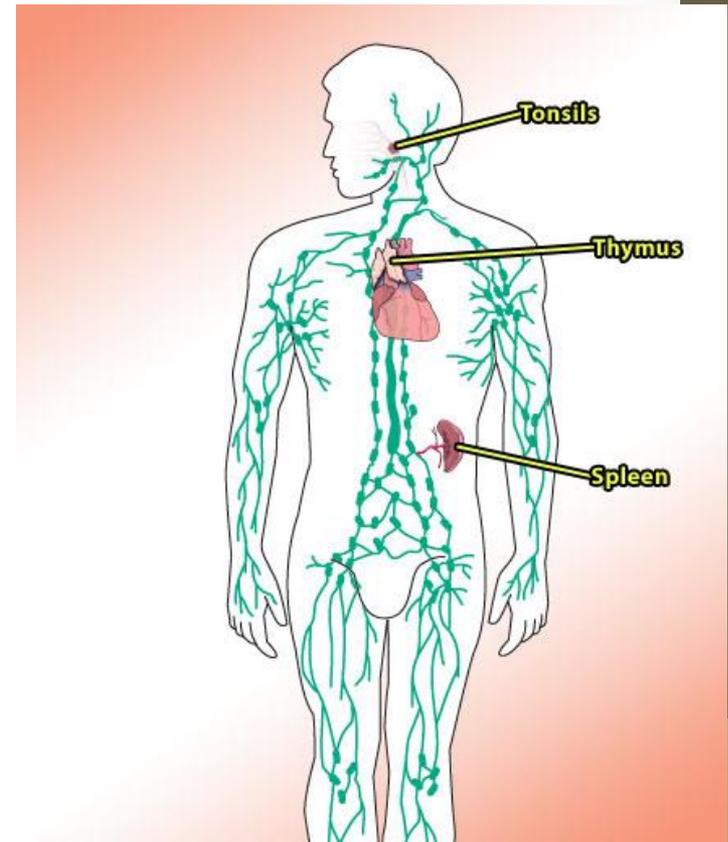
Lymph Nodes



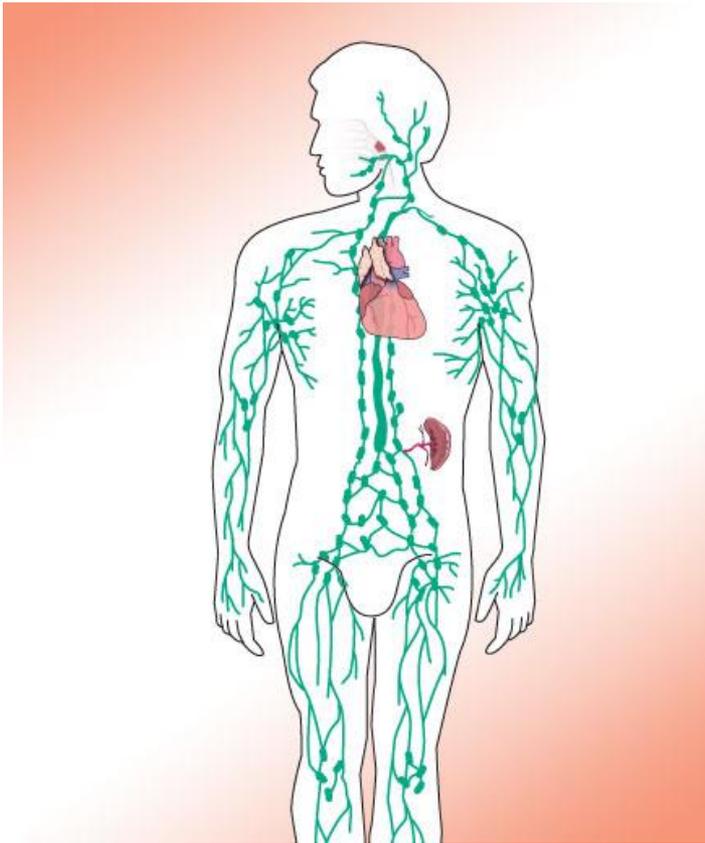
- **Lymph nodes:**
 - filter out impurities and harmful matter
 - produce **lymphocytes** and **antibodies**.

Other Lymphatic Tissue

- The **tonsils** exist in three pairs:
 - **Palatine tonsils**
 - **Pharyngeal tonsils**
 - **Lingual tonsils**
- **Spleen**
- **Thymus**



Diseases and Disorders of the Lymphatic System

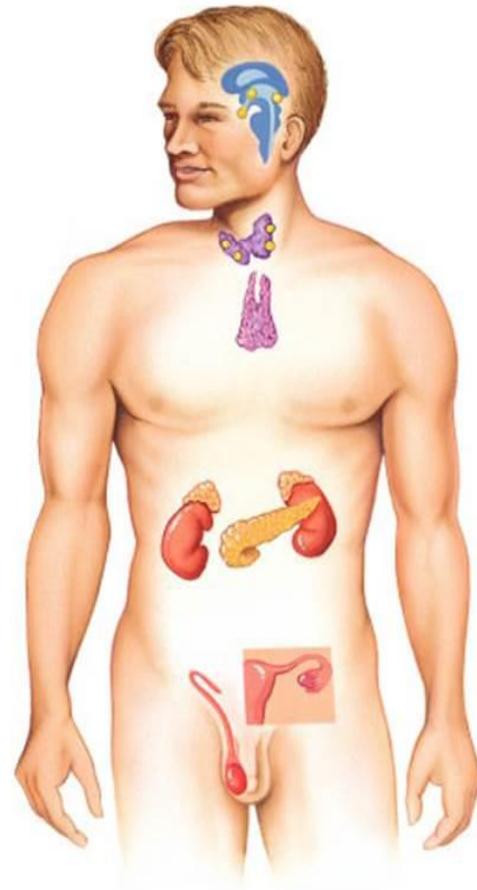


- **Allergies**
- **Autoimmune Disease**
- **Hodgkin's Disease**

Endocrine System

Endocrine System

- The **endocrine system** consists of glands that secrete substances called hormones into the bloodstream
- **Hormones**
 - “Chemical messengers”
 - Carried throughout the body by the bloodstream
 - Each hormone coordinates and directs specific activities of the body.

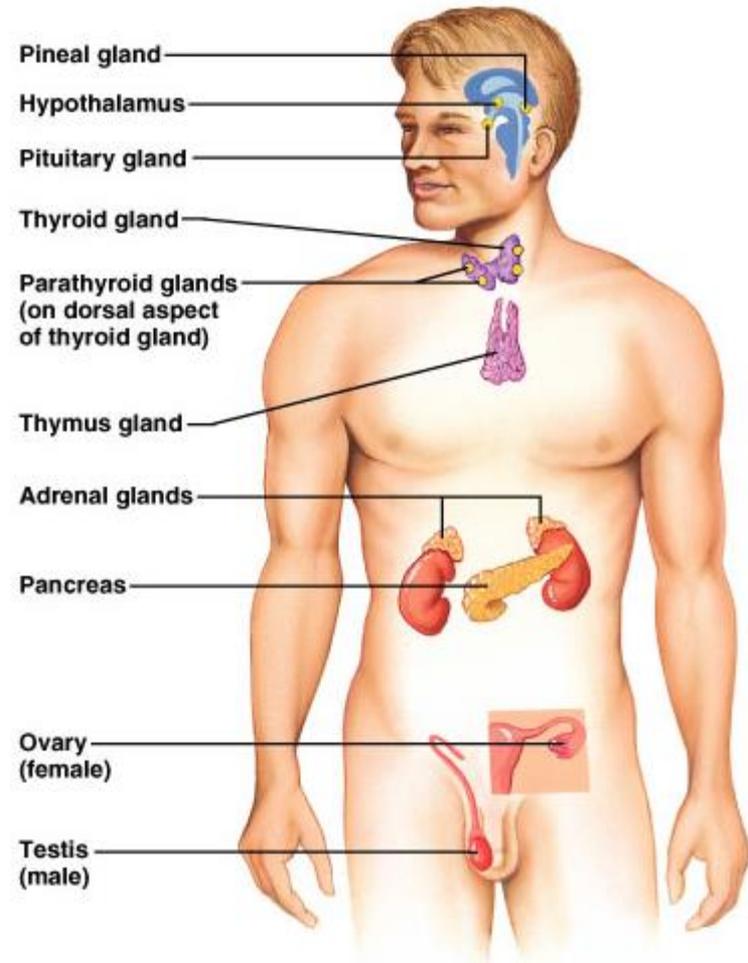


Overview

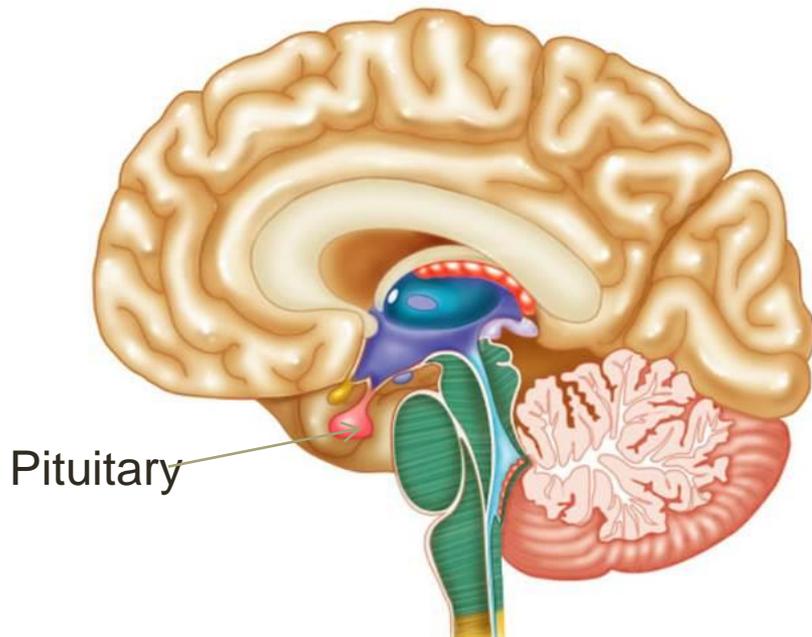
- System of ductless glands that secrete hormones
 - Hormones are “messenger molecules”
 - Circulate in the blood
 - Act on distant target cells
 - Target cells respond to the hormones for which they have receptors
 - The effects are dependent on the programmed response of the target cells
 - Hormones are just molecular triggers

Endocrine Organs

- Purely endocrine organs
 - Pituitary gland
 - Pineal gland
 - Thyroid gland
 - Parathyroid glands
 - Adrenal: 2 glands
 - Cortex
 - Medulla
- Endocrine cells in other organs
 - Pancreas
 - Thymus
 - Gonads
 - Hypothalamus



Pituitary Gland



The **pituitary gland** is a tiny gland known as the “master gland” because the hormones it produces regulate other glands.

The **pituitary gland** is divided into two sections:

- **Anterior lobe**
- **Posterior lobe**

Hormones produced in the pituitary gland (anterior lobe)

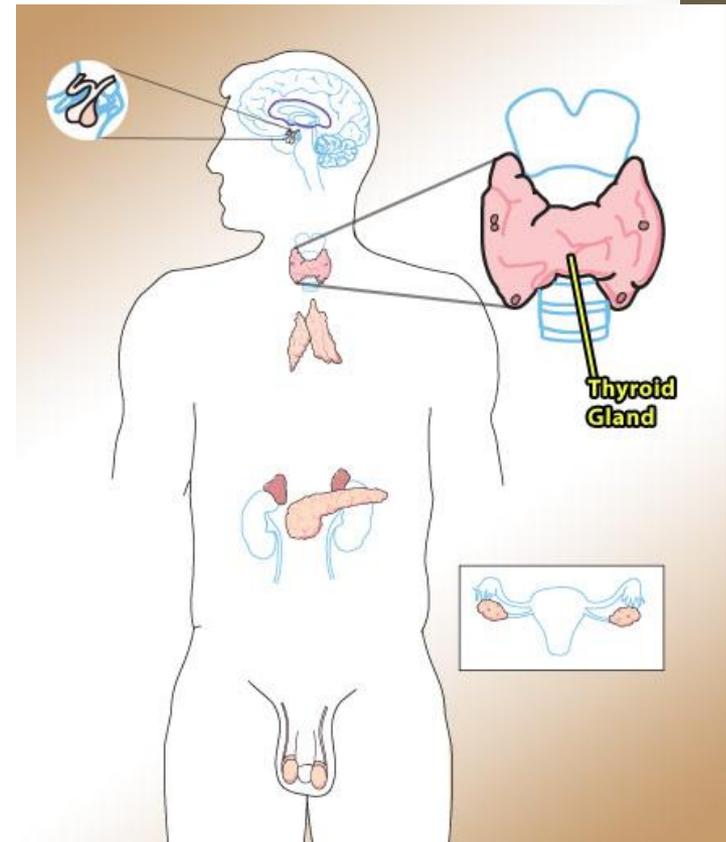
- This lobe produces seven hormones.
- Growth hormone (GH) is responsible for growth and development. It is also called somatotrophic hormone (STH).
- Thyroid-stimulating hormone (TSH) stimulates the growth and secretion of the thyroid gland.
- Adrenocorticotrophic hormone (ACTH) stimulates the growth and secretion of the adrenal cortex.
- Prolactin hormone (PRL) develops breast tissue and produces milk in females after childbirth. The function of this hormone for males is not known.
- Follicle-stimulating hormone (FSH) stimulates the growth of the ovarian follicle and estrogen production in females. It stimulates the production of sperm in males.
- Luteinizing hormone (LH) stimulates ovulation and the formation of corpus luteum to secrete progesterone in females.
- Interstitial cell-stimulating hormone (ICSH) stimulates the secretion of testosterone in males.

Hormones produced in the Pituitary Gland (posterior lobe)

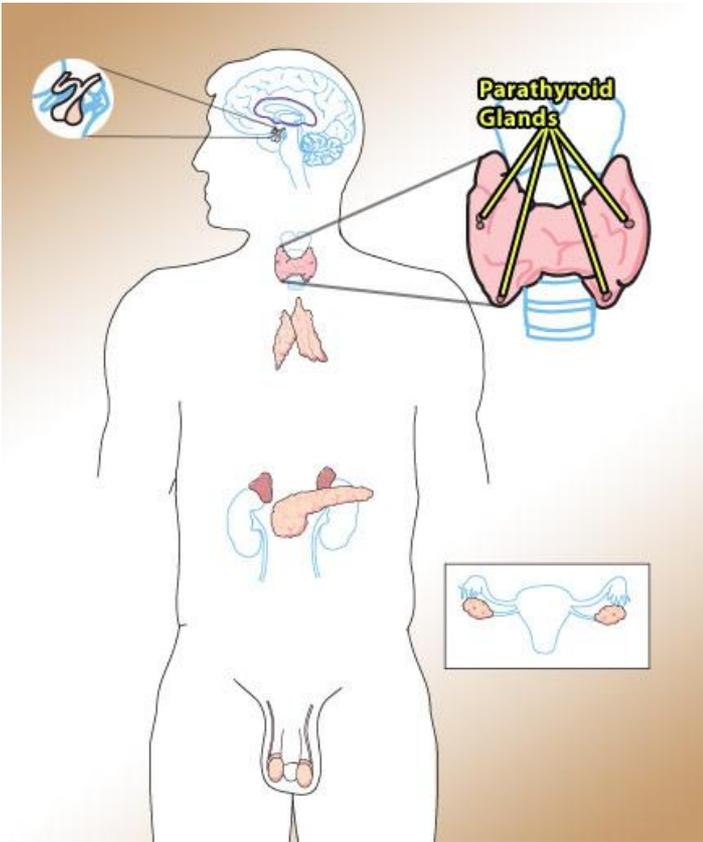
- The **posterior lobe** of the pituitary gland produces two hormones.
- Antidiuretic hormone (ADH) maintains water balance by increasing the absorption of water by the kidneys. It is also called vasopressin.
- Oxytocin stimulates contractions of the uterus in females during childbirth. It also stimulates milk flow during breastfeeding.

Thyroid Gland

- Produces hormones that regulate body metabolism and reduce the amount of calcium in the blood
- Two lobes
- **Isthmus**
- Role of iodine



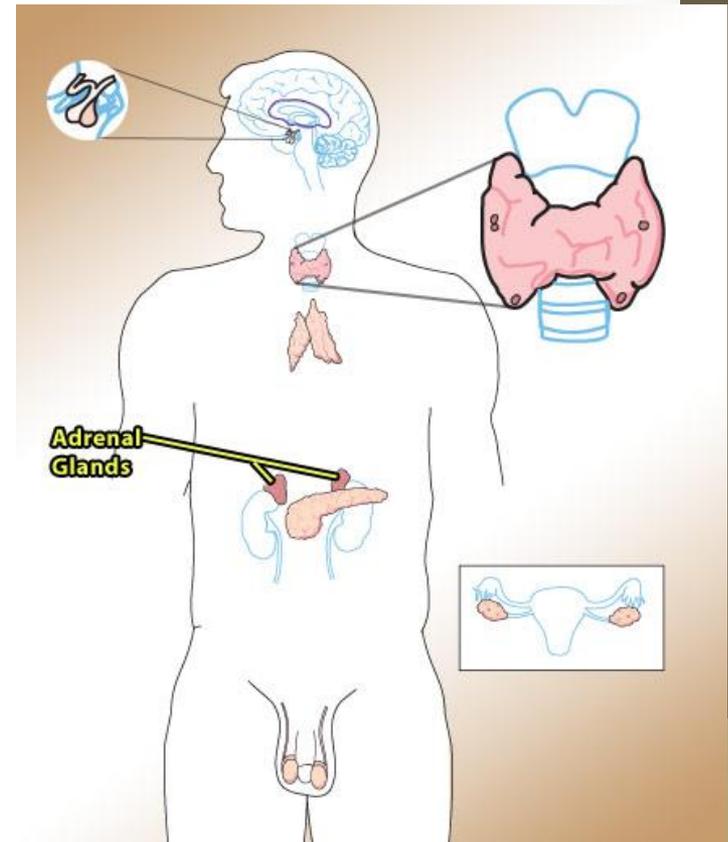
Parathyroid Glands



- Four small glands attached to the back side of the thyroid gland.
- Produce hormone that maintains the balance of calcium and phosphorus in the blood

Adrenal Glands

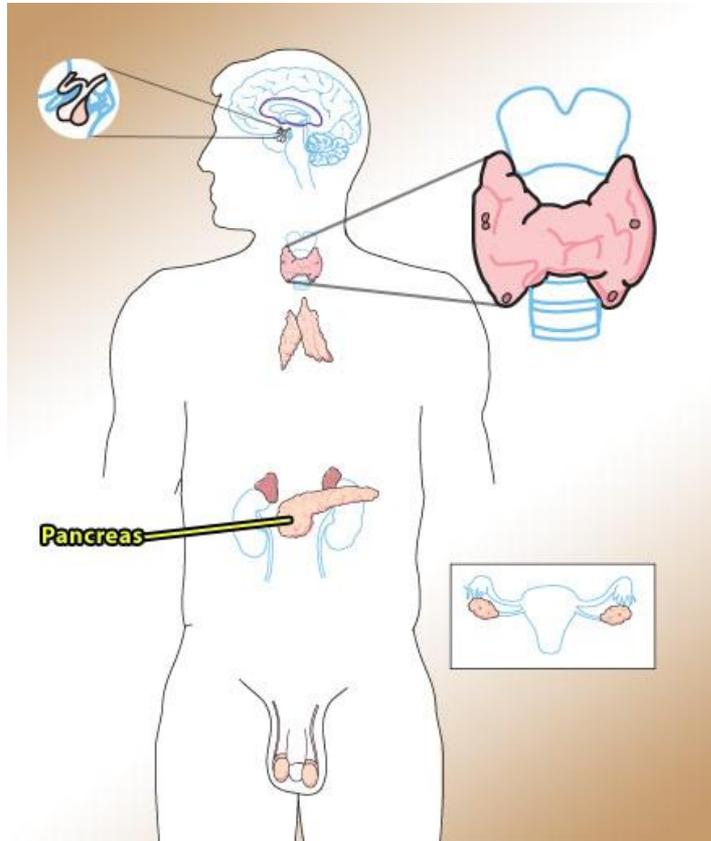
- Pair of glands, with one located above each kidney
- Produce hormones
- Two sections:
 - **Adrenal cortex**
 - **Adrenal medulla**



Adrenal glands

- The **adrenal cortex** produces about 30 hormones that can be classified into three basic groups.
 - - Glucocorticoids reduce inflammation, metabolize food, and make new cells.
 - - Mineralocorticoids control the body's fluid level and electrolyte balance. They influence the rate at which the kidneys excrete mineral salts, such as sodium and potassium.
 - - Androgens help to develop sexual characteristics in males
- The **adrenal medulla** produces the hormones epinephrine, or *adrenaline*, and norepinephrine. These hormones work with the sympathetic nervous system and cause the “fight or flight” response.

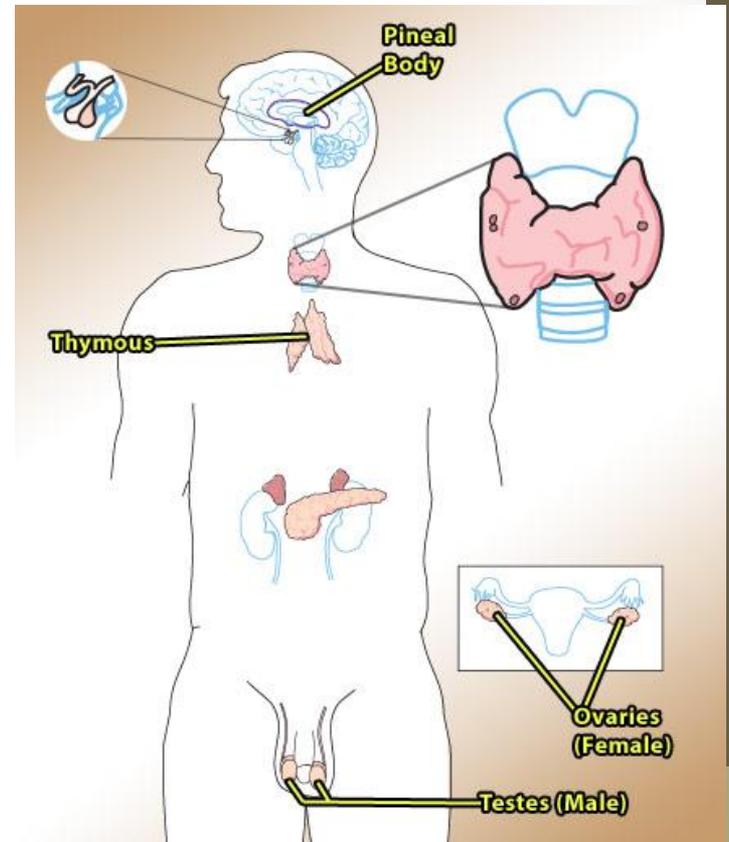
Pancreas



- Fish-shaped organ located behind the stomach
- Produces two hormones:
 - **Insulin**
 - **Glucagon**
- Pancreatic juices are secreted into the small intestine to aid in digestion.

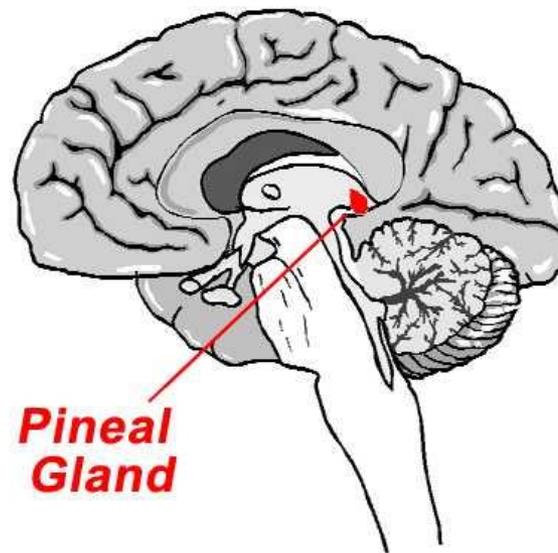
Other Endocrine Glands

- Pineal body
- Thymus
- Ovaries
- Testes



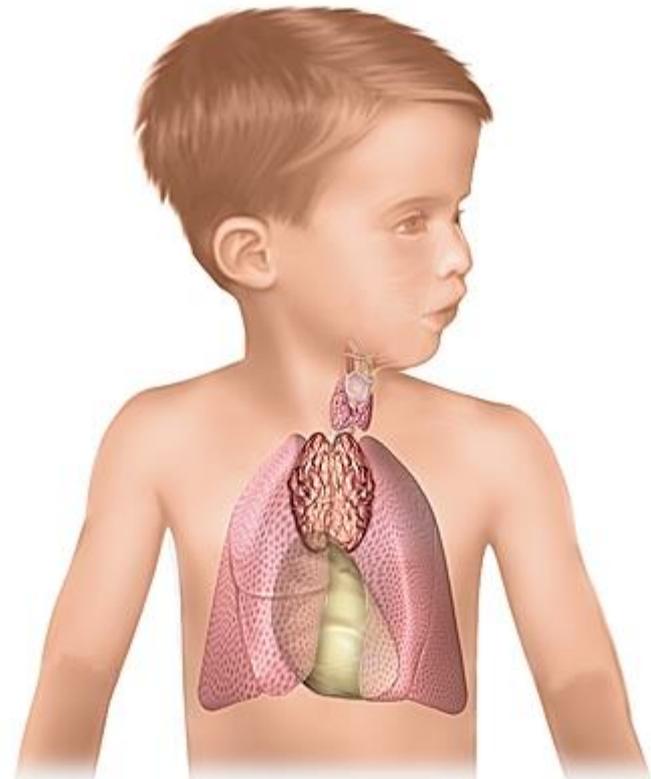
Pineal gland (pineal body)

- Pea-sized gland located deep within the brain. Knowledge about this gland is limited. It produces a hormone (melatonin) that is believed to affect the sleep cycle and delay the onset of puberty



Thymus

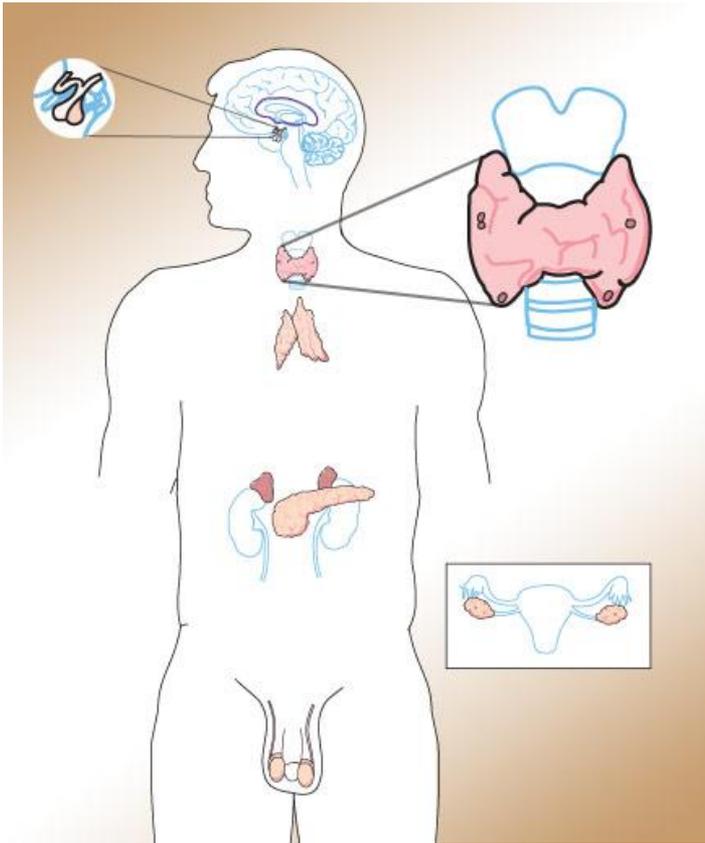
- The **thymus** is a butterfly-shaped gland located above the heart. It contains lymphatic tissue. In early life, it produces a hormone (thymosin) that stimulates cells in the immune system. However, during puberty the thymus wastes away and becomes a small mass of connective tissue and fat.



Ovaries and testes (the gonads)

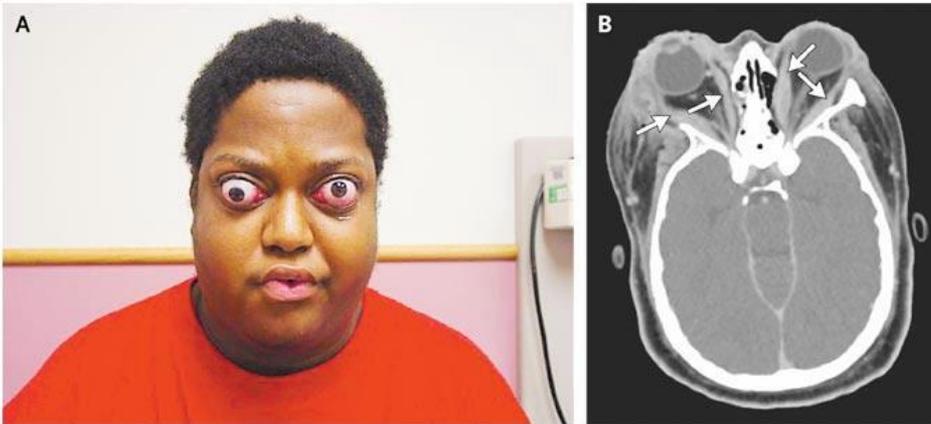
- The **ovaries** are the sex glands of the female. One is located on each side of the uterus in the pelvic cavity. They produce hormones that regulate menstruation and secondary sexual characteristics.
- The **testes** are the sex glands of the male. They are suspended outside the body in the scrotal sac. They produce hormones that regulate the sexual characteristics of the male

Diseases and Disorders of the Endocrine System



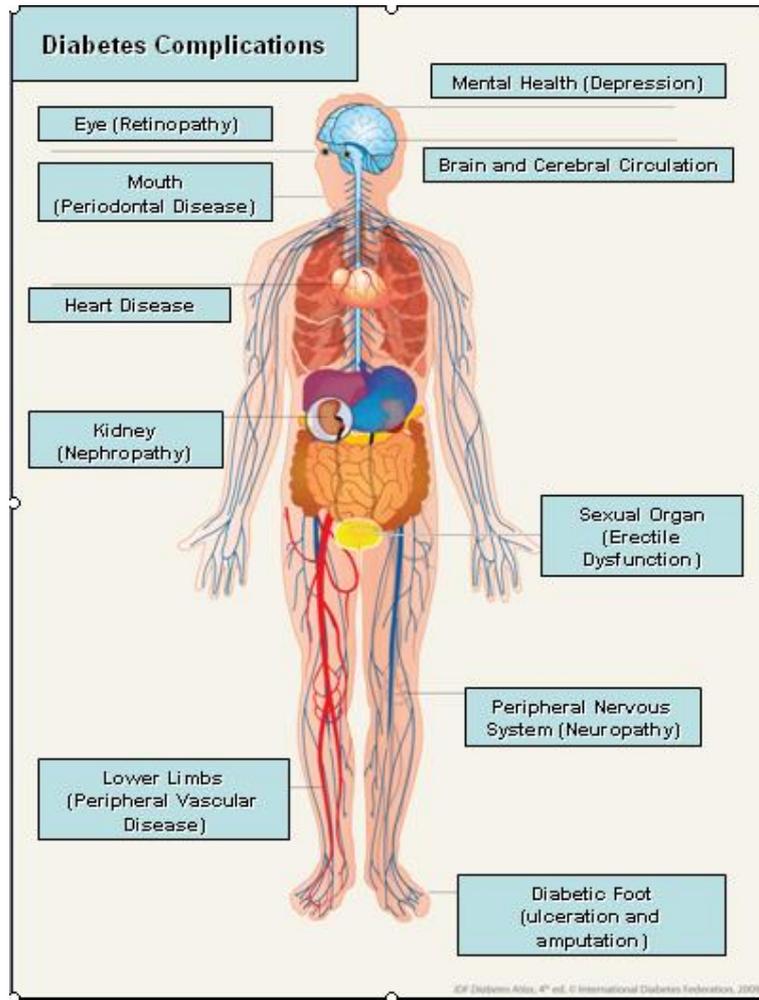
- **Diabetes Mellitus**
- **Hyperthyroidism**
- **Hypothyroidism**

Hyperthyroidism



- Graves disease
 - Ophthalmopathy
 - Graves' Ophthalmopathy is an autoimmune condition where the thyroid gland mistakenly senses harmful cells and releases antibodies to combat them. Since there are no harmful cells, the released antibodies end up fusing with muscles in the eyes, causing the onset of Graves' ophthalmopathy.

Diabetes Mellitus complications



Diabetes Mellitus Type one

- results when the pancreas does not produce any insulin. This type of diabetes may occur at any age but it is usually diagnosed early in life. Treatment involves the injection of insulin on a regular basis.

Diabetes Mellitus Type two

- results when the pancreas produces insulin, but not enough to meet the needs of the body. This type of diabetes is linked with obesity and is most common in adults over the age of 45. Treatment may involve oral medication, exercise, weight loss, and insulin injections.

Diabetes Insipidus

- Diabetes insipidus (DI) is an uncommon condition that occurs when the kidneys are unable to conserve water as they perform their function of filtering blood. The amount of water conserved is controlled by antidiuretic hormone (ADH), also called vasopressin.
- Central diabetes insipidus can be caused by damage to the hypothalamus or pituitary gland as a result of:
 - Head injury
 - Infection
 - Loss of blood supply to the gland
 - Surgery
 - Tumor
- Information on DI extracted from Medline Plus