

# The Endocrine System

Chapter 16 Lesson 3

# Structure of the Endocrine System

- The principal structures of the endocrine system are the **endocrine glands**- *ductless, tubeless structures that secrete hormones*. And **hormones**- *chemical substances produced by ductless glands that regulate the activities of all the different body cells*.
- Hormones are secreted by endocrine glands and carried to their destinations via the bloodstream.
- Endocrine glands are scattered throughout the body and work independently from one another.
- Major glands of the endocrine system include: the pituitary, thyroid, parathyroid, adrenals, pancreas, and gonads.

# The Pituitary Gland

- Considered the “master gland” because it *regulates and controls the activities of all other endocrine glands*.
- Located at the midpoint of the skull it has three sections, the anterior lobe, intermediate lobe, and posterior lobe.
- Anterior lobe (front)- regulates metabolic activities of cells and stimulate other endocrine glands.
- Intermediate lobe- (middle)- secretes MSH which controls the darkening of the skin by stimulating pigment cells in the skin.
- Posterior lobe (back)- secretes ADH and oxytocin. ADH principal function is to regulate the balance of water in the body through the kidneys. Oxytocin stimulates the smooth muscles in the uterus of a pregnant female, causing contractions during childbirth.

# The Thyroid Gland

- Function: *produces hormones that regulate metabolism-use of nutrients by the body's cells-body heat production, and bone growth.*
- Located in the front of the neck below the larynx.
- Principal hormone produced is thyroxine, which regulates the way cells release energy from nutrients.
- Too little thyroxine (hypothyroidism) causes tiredness, weight gain, constipation, and sensitivity to cold.
- Too much thyroxine (hyperthyroidism) causes weightloss, anxiety, diarrhea, and inability to tolerate heat.

# The Parathyroid Glands

- Function: *structures that regulate the bodies calcium and phosphorous balance.*
- These are the smallest glands in the endocrine system and are situated on the lobes of the thyroid gland.

# The Adrenal Glands

- Function: *two glands located on the top of the kidneys, consist of an outer region called the adrenal cortex, and an inner region called the adrenal medulla.*
- The Adrenal Cortex is absolutely essential for life since it controls: the amount of sodium excreted in urine, the metabolism of fats, proteins, and carbohydrates, and assists in stopping of inflammation through various hormones.
- The Adrenal Medulla secretes epinephrine (adrenaline) which increases heart action, raises blood pressure, increases respiration, and suppresses the digestive process. Known as the emergency hormone, this hormone is released during highly emotional states.

# The Pancreas

- Function: *a gland that serves two systems- the digestive, and the endocrine.*
- Lies behind the stomach attached to the first section of the small intestine.
- Scattered throughout the pancreas are small clusters of endocrine cells called Langerhans. Langerhans secrete two hormones- glucagon and insulin- that regulate the level of glucose (blood sugar), in blood.
- Glucagon stimulates the liver to convert glycogen to glucose, raising the blood sugar level.
- Insulin, decreases blood sugar levels by stimulating the liver to form glycogen-stored energy in the muscles- from glucose.

# The Gonads

- Of all the endocrine glands, the gonads are the only ones different in females and males.
- The ovaries in females produce and release ova.
- The testes in males produce and release sperm.
- Hormones released by these glands are responsible for development and maintenance of secondary sex characteristics that begin to appear during adolescence.



# Endocrine System Problems

- **Diabetes Mellitus-** a disorder in which the pancreas produces too little or no insulin. As a result, the glucose level in the blood becomes high. Symptoms include excessive urination, constant thirst, weight loss, and fatigue.
- **Graves Disease-** (hyperthyroidism) is an autoimmune disorder in which the thyroid gland becomes overactive and enlarged, producing excessive amounts of thyroid hormones.

# Endocrine System Problems cont.

- **Cushing's Disease**- overproduction of adrenal hormones can lead to Cushing's disease. People with Cushing's develop round faces, humped upper backs, weak limbs, thin and easily bruised skin, and fragile bones. Treatment depends on whether the cause is a tumor, or due to corticosteroid steroids.
- **Goiter**- an enlargement of the thyroid gland. This can be seen as a swelling on the neck. In many parts of the world, the main cause of a goiter is a lack of iodine in the diet.

# Growth Disorders

- If during the growing years, the anterior lobe of the pituitary gland does not produce enough of the growth hormone, a person does not grow.
- A person's stature is short because of delayed bone growth.
- If diagnosed early, proper treatment can be prescribed and enable a child to reach full height.