

Anatomy & Physiology II

January 16, 2014

Hormones (cont'd)

- Hormone Interactions:
 - Permissive—you need a second hormone for the first to work
 - Synergistic—hormone A & B make added effects together (like kids playing together)
 - Antagonistic—they work against each other
- Secretion regulated by:
 - Neural stimuli
 - Chemical changes in body fluids. Ex: calcium levels
 - Humoral effects
 - Hormonal effects—some hormones are released in response to other hormones
 - Negative feedback

Hormones & Sites of Production

- Hypothalamus
 - Located in the brain, just below thalamus
 - Controls autonomic nervous system
 - Regulates homeostasis
 - Temperature, thirst, hunger, sexual behavior, fear, anger
 - Secretes regulatory hormones
 - Produces 9 hormones
 - 7 affect release of anterior pituitary hormones
 - 2 are stored in and released by posterior pituitary
- Pituitary Gland
 - Connected to the hypothalamus by infundibulum (small piece of tissue)
 - Composed of two parts
 - Anterior pituitary—under direct influence of the hypothalamus
 - Hypophyseal portal system—specialized blood vessels that transport hormones from the hypothalamus directly to the anterior pituitary (only 7 hormones do)
 - 2 sets of capillaries in series
 - Posterior pituitary
- Anterior Pituitary
 - Secretes 7 hormones (*know abbreviations for these hormones*)
 - Prolactin (PRL)
 - Milk production in women postpartum
 - Melanocyte Stimulating Hormone (MSH)

- In large quantities can darken skin. Scientists think it may also affect hunger
 - Human Growth Hormone (GH)
 - Promotes growth
 - Too much=gigantism
 - Not enough=dwarfism
 - Acromegaly—typically caused after the epiphyseal plates are closed. Human growth hormone causes abnormal features
 - Thyroid Stimulating Hormone (TSH)
 - Follicle Stimulating Hormone (FSH)
 - Leutenizing Hormone (LH)
 - Adrenocotropin Hormone (ACTH)
 - Last four hormones listed affect other endocrine glands
- Posterior Pituitary
 - Does not produce own hormones
 - Stores 2 hormones from the hypothalamus and releases them
 - Oxytocin (OXT)
 - Affects smooth muscle of the reproductive tract, mostly the uterus
 - Also responsible for milk let down
 - In males its responsible for smooth muscle contraction for ejaculation of sperm
 - Antidiuretic Hormone (ADH)
- Pineal Gland
 - Located in the diencephalon
 - Melatonin—modified amino acids
 - Affected by light levels
 - Levels increase in the dark
 - Seasonal affective disorder (SAD) patient becomes depressed and sad
 - Levels decrease in the light
 - Responsible for circadian rhythms
 - Inhibits reproductive function in mice
- Thyroid Gland
 - Located in the throat in front of larynx
 - Thyroxine (T4) and T3
 - Follicle cells
 - Thyroglobin (converted into T3)
 - Iodine
 - Involved in the regulation of:
 - Increased metabolic rate
 - Calorigenic effect—raises body temperature
 - Production of Na/K ATPase—helps to keep K in the cell and membrane potential

- Increase effects of catecholamines (epinephrine, norepinephrine; dopamine)
 - Growth and development
 - Synergistic with growth hormone
 - Calcitonin
 - C cells
 - Regulates Ca^{2+} levels in blood
 - Promotes addition of Ca^{2+} to bone
 - **Secreted when Ca^{2+} levels are high**
- Parathyroid Glands
 - Posterior surface of thyroid gland
 - Four pea sized glands
 - Parathyroid Hormone (parathormone)
 - Increases blood Ca^{2+} levels
 - Release of Ca^{2+} from bone
 - Increase Ca^{2+} absorption in kidney
 - Promotes release of calcitrol
 - Calcitrol—active form of vitamin D
 - Increases Ca^{2+} absorption by gut