

Chapter 15: Endocrine System

Endocrine System

- Comprised of ductless glands that secrete hormones into the blood stream
- Hormones travel through circulation until they reach their target cell
- Results in a slow but a prolonged response

Major glands of the endocrine system

- Anterior pituitary gland
 - Controlled by hypothalamic releasing and hypothalamic inhibiting hormones
 - Hormones produced by the anterior pituitary
 - Thyroid stimulating hormone:** stimulates the thyroid to produce thyroid hormones
 - Adrenocorticotropic hormone:** stimulates the adrenal cortex to produce cortisol
 - Gonadotropic hormones:** stimulates gonads to produce sex cells and hormones
 - Prolactin:** stimulates mammary glands to develop and produce milk only after child birth
 - Growth hormone:** promotes skeletal and muscular growth
- Posterior pituitary gland
 - Neurons in the hypothalamus have axons that extend down into the posterior pituitary; the synaptic knobs of these neurons release hormones directly into circulation
 - Antidiuretic hormone:** released in response to dehydration
Decreases urine production
 - Oxytocin:** stimulates uterine contractions during childbirth and promotes milk let down; plays a role in ejaculation in males
- Thyroid gland
 - A large gland located below the larynx
 - Iodine is needed in the diet to allow the thyroid gland to produce the hormone
 - The thyroid also secretes calcitonin helps lower blood levels by stimulating the deposition of calcium in the bones
 - what if someone lacks iodine in their diet
- Parathyroid glands
 - Small glands embedded in the surface of the thyroid gland
 - Produced parathyroid hormone:
 - Acts to increase blood calcium levels by promoting osteoclast activity
 - Promotes reabsorption of calcium by the kidneys
- Adrenal glands
 - Located on the top of the kidneys
 - 2 parts to each gland
 - Adrenal medulla
 - Inner portion of the adrenal glands
 - Hypothalamus triggers production and secretion of hormones from the adrenal medulla
 - Produces hormones that allow a short term response to stress
 - Epinephrine

- Norepinephrineuter
- Adrenal cortex
 - Outer portion of the adrenal glands
 - Produces hormones that provide a long term response to stress
- Pancreas
 - Located behind the stomach
 - Composed of 2 tissue
 - Exocrine: produces and secretes digestive juices
- Testes
 - Gonads found in males
 - Produce androgens
 - Stimulates growth of the penis and testes
 - Responsible for secondary sex characteristics such as facial, underarm and pubic hair
 - prompts the larynx and vocal cords to enlarge
 - promotes muscular strength
- Ovaries
 - gonads found in females
 - produce estrogen and progesterone
 - stimulate growth of the vagina and uterus
 - responsible for secondary sex characteristics such as females body hair
 - responsible for egg maturation
 - regulates the menstrual cycle
- Thymus gland
 - lies beneath the sternum
 - this gland is the largest and most active during childhood
 - secretes hormones called thymosins that aid in differentiation of lymphocytes
- Pineal gland
 - located in the brain
 - secretes melatonin regulates the sleep/wake cycle
 - may also regulate sexual development
- The Pituitary
 - Located beneath the hypothalamus which helps to regulate its functioning
 - Divided into the anterior and posterior pituitary
 - The two components operate in different ways
- What happens when the body produces too much or too little Gh
 - Pituitary dwarfism**: too little Gh is produce during childhood; results in small stature
 - Giagantism**: too much GH is produce during childhood; results in excessive growth
 - Acromegaly**: overproduction of Gh is produced during childhood; results in excessive growth
- Calcitonin- 9+**

Reproductive system: Chapter 16

DNA in somatic and sex cells

- Somatic cells:
 - Each somatic cell has 46 chromosomes (23 pairs) within the nucleus
 - Cells that have pairs of chromosomes are called diploid (2N)
- Sex cells:
 - Gametes (egg and sperm) have only 23 chromosomes (11 of each pair) in their nuclei
 - Cells that have only 1 of each pair of chromosomes are called haploid (N)
 - During fertilization a sperm and egg combine to form a zygote and the chromosome number is restored to the diploid number of 46

Mitosis and meiosis

- Mitosis:
 - Is a type of cell division in which a cell makes an exact copy of itself
 - This process is used for growth and repair of tissues
 - Used by somatic cells (cells other than germ-line cells)
- Meiosis:
 - Is a type of cell division in which a cell halves the number of chromosomes
 - This process is used to form eggs and sperm
 - Used by germ-line cells

Sex Determination

- Males have an X and a Y chromosome
- The Y chromosome contains the SRY gene
 - Encodes testes determining factor (TDF)
- Females have two X chromosomes
 - Lack a SRY gene
 - Default pathway
 - ** Ovaries and other female reproductive structures develop in absence of TDF

Male Anatomy

Scrotum and testes

- **Scrotum:**
 - Sac that holds the testes
 - Helps to regulate the temperature of the testes
- **Testes:**
 - Paired organs that produce sperm and male sex hormones
 - Composed of seminiferous tubules where sperm are produced
 - Interstitial cells produce testosterone

Testes

Spermatogenesis

- Sperm are produced within the seminiferous tubules of the testes