

Endocrine System Notes

_____ is the tendency to maintain a stable internal environment.

_____ - parts of the body that secrete hormones directly into the body.

_____ - parts of the body that make secretions which travel through tubes to the outside of the body.

Purpose of the endocrine system:

- Works with _____ system to coordinate and direct activities of the body
- Helps maintain _____ by regulating the following:
H₂O/electrolyte balances, reproductive processes, material transport, and metabolic processes
- Does this by producing _____ and moving them throughout the body

Location:

- _____ of endocrine tissue found throughout the body

Hormones:

- _____ that is produced and secreted by cells that has a _____ effect on other cells
- A given hormone only acts on a specific _____ (contain special receptors)
- Hormones are released into the extracellular space and are then transported to the area in which it is needed

Types:

1) *Steroid Hormones (Water-soluble)*

- formed of _____ they are soluble in lipids, giving them easy access to cells they are activating.
- responsible for triggering the manufacture of many _____
- may _____ processes in the body
- Ex) sex hormones

2) *Non-steroid Hormones (Lipid-soluble)*

- consists of many types of hormones that need _____ in entering cells
- may cause a _____ reaction that will eventually lead to the production of proteins or secretions of other hormones

3) *Prostaglandins*

- similar to hormones
- regulate processes on a _____ level and are produced when it is needed
- many times these are responsible for triggering the use of _____

Mechanism of Hormone Activity

- One or more of the following occurs when a hormone binds to a cell:
 - o Changes in membrane _____ or electrical state
 - o Synthesis of _____ or certain regulatory molecules (enzymes)
 - o Activation or inactivation of _____
 - o Stimulation of _____

Steroidal Hormones (Water-soluble)

- _____ into cell
- enters nucleus
- Binds to specific receptor proteins
- Binds to DNA
- Activates certain genes to transcribe into RNA
- RNA leaves nucleus and makes a protein in the ribosome

Non-steroidal Hormones (Lipid-soluble)

- binds to _____ on cell membrane
- sets off a series of reactions that activates enzymes
- Enzymes cause production of second messenger
- _____ causes addition changes to promote the typical reaction by the cell

Hormonal Secretions

- Hormones are potent and powerful substances working in very small amounts so your body must have an accurate way of determining how much is needed and when.

What prompts the endocrine glands to release or not release their hormones?

_____—the need for a particular hormone is sensed and the gland in charge of regulating that need goes into action. Once the need is met the gland stops. If the action of the hormone acts in the _____ direction of the need it is considered a negative feedback.

Three categories of endocrine stimulation:

- 1) _____ stimulus – endocrine organs are prodded into action by other hormones
Ex) Hypothalamic hormones activate the anterior pituitary hormones
- 2) _____ stimulus – changes in blood levels of certain chemicals
Ex) release of parathyroid hormone is triggered by low blood calcium levels
- 3) _____ stimulus – nerve fibers stimulate hormone release
 - a. Ex) sympathetic nervous system releases norepinephrine during times of stress

Actions of Major Glands

Pituitary: “_____” connected to the base of the hypothalamus. It is formed of two lobes the anterior and posterior.

Anterior - the anterior pituitary is controlled by hormones that are released by the _____. These hormones travel to the pituitary through the hypophyseal portal vein.

- All hormones are proteins, act through second messengers, and regulate by hormonal stimuli

Growth hormone (GH) – GH controls growth of _____.
Release of GH is controlled by either GH releasing hormone or GH inhibiting hormone, both of the hypothalamus

Prolactin (PRL) - causes the continuing production of _____ after birth. It is activated by the hypothalamus hormones.

Thyroid-stimulating hormone (TSH) - controls the secretions of the _____. It is activated by both the hypothalamus and thyroxine in blood.

Adrenocorticotrophic Hormone (ACTH) - controls secretions of the _____

- o Stress and the hypothalamus control the release of this hormone

Gonadotropic hormones – *Follicle Stimulating hormone (FSH)* and *Luteinizing hormone (LH)* - control the _____ or sex organs and activated by hypothalamus hormones

- o Females: produces estrogen, readies eggs for ovulation
- o Males: produces testosterone, sperm development

Disorders: **Pituitary dwarfism – hyposecretion of GH during childhood**
Gigantism – hypersecretion of GH

Posterior - the posterior pituitary is controlled by nervous messages coming in from the hypothalamus.

Antidiuretic Hormone (ADH) - formed in the hypothalamus and moves to the pituitary for secretion. Functions to decrease the _____ of the kidneys

- o Certain situations may increase or decrease the release of this hormone

Oxytocin (OT) - weak antidiurectic also helps in _____ used in child birth and in breast feeding

Disorders: Diabetes Insipidus – hyposecretion of ADH

Thyroid Gland: located in the anterior part of the throat is wraps about ½ way around the pharynx.

Thyroxine & Triiodothyroxine - these hormones share the same purpose and are activated by TSH

- Increase the rate at which cells release energy from carbohydrates (_____) and rate of protein synthesis
- Important in maintaining proper _____
- Proper amount of iodides are needed in the system for the thyroid to produce these hormones.

Calcitonin - acts to lower blood _____ and phosphate levels. This regulation is sensed and controlled by the body measuring the Ca level in the body.

Disorders: **Goiters – deficiency of iodine in diet causes an enlarged thyroid**
Cretinism – hyposecretion of thyroxine that leads to dwarfism
Hyperthyroidism – results from a tumor of the thyroid

Parathyroid Glands: four total, two located on the posterior side of each of the thyroid lateral lobes. On each side there is one superior and one inferior.

Parathyroid Hormone (PTH) - used to _____ the amount of Ca in the blood and decrease the concentration of phosphate. PTH is activated on a negative feedback system between the blood and Calcitonin secretions.

Adrenal Glands: sit on top of the kidneys and is composed of two different portions (medulla and cortex). The medulla (_____) is related to the sympathetic nervous system and the cortex (_____) is responsible for producing over 30 hormones that carry out various functions in the body.

Adrenal Medulla - *Epinephrine and Norepinephrine* - act in _____ the processes of the body and may last for quite some time.

- They can cause increased heart rate, increased blood pressure, increased breathing rate and a decrease in digestive processes.
- These hormones are one cause of the _____ reaction of the body.

Adrenal cortex:

Aldosterone—*mineralcorticoid* produced and secreted from the outer layer of the cortex.

Maintains a _____ through re-absorption and secretion. This ultimately causes the blood volume to remain high and maintains a proper blood pressure.

Cortisol—*glucocorticoid* that affects the _____ of glucose, protein and fats. This hormone also stimulates the liver to produce glucose from amino acids and glycerol (simple fat). This hormone aids in the maintenance of a normal blood sugar level that fluctuates according to the demands of the body.

Adrenal Androgens—male sex hormone produced in the adrenals that may be converted into female hormone. May play a role in early sexual development (7-13 years) and the female sex drive and provide estrogen for women after menopause.

Pancreas: a _____ functioning organ that secretes digestive enzymes into the intestine but also produces and secretes hormones used for regulating homeostasis. The pancreas is located behind the stomach attached to the beginning of the intestines.

Pancreatic islets - _____ of the pancreas made of two groups of cells (alpha and beta) that help regulate blood sugar levels.

- Alpha cells—secrete _____, causes liver to convert glycogen and some amino acids into glucose. This raises the blood glucose level, preventing hypoglycemia.
- Beta cells—release _____, causes the formation of glycogen in liver. Insulin also aids in the facilitated diffusion of glucose into certain cells. These processes lower the blood sugar level.
- Beta and alpha cells act in a _____ feedback loop to maintain a steady blood sugar level.

Pineal Gland: many things are still unclear about the pineal gland.

Melatonin - secreted in the _____ controlled by nervous impulses coming from the eyes.

- An imbalance or disruption of the release of this hormone may result in insomnia or tiredness which may be related to irritability and depression.
- Melatonin is also believed to control many of the _____ functions of the body including the menstrual cycle involved in female reproduction.

Thymus Gland: releases *thymosin* which aids in the production of _____ blood cells involved with the immune system.

Gonads:

Ovaries and Placenta - female the sex hormones _____ and _____ are produced.

- Stimulates the uterine lining growth; development and maintenance of female secondary sex characteristics

Testes - the male sex hormone *androgens* (_____) is produced.

- Support sperm formation; development and maintenance of male secondary sex characteristics

