

Endocrine System

Endocrine Glands

Pituitary Gland

- also called the Master Gland
- small gland in the brain
- controlled by the hypothalamus (master of the master gland)
- regulates and releases hormones
- majority of the hormones that come from pituitary gland controls the function of the other glands in the body
- divided into 2 regions:
 - Anterior pituitary
 - TSH
 - ACTH
 - LH
 - FSH
 - GH
 - Prolactin
 - Posterior pituitary
 - Oxytocin
 - Vasopressin
- secretes hormones that influence growth, kidney function, birth, and milk production

Anterior Pituitary Gland's Hormones

- **Growth hormone (GH)**
 - functions in stimulating the growth of bones, muscles, and organs
 - over secretion of GH causes **gigantism**
 - under secretion of GH causes **dwarfism**
- **Thyroid-stimulating hormone (TSH)**
 - released by the anterior pituitary gland to thyroid gland
 - regulates the thyroid gland secretion
 - signals the thyroid gland to release hormones
 - over secretion of TSH causes **enlarged thyroid gland**
 - under secretion of TSH causes **shrinkage in the thyroid gland**
- **Adrenocorticotropic hormone (ACTH)**
 - hormones released by the anterior pituitary gland and binds with the adrenal gland cortex

- responsible in keeping the adrenal cortex from degenerating
- binds with the melanocytes in the skin causing the increase of skin pigmentation
- over secretion of ACTH causes **darkening of the skin**
- increases in secretion from the adrenal cortex
- adrenal cortex releases a hormone called Cortisol or Hydrocortisone

- **Melanocyte stimulating hormone (MSH)**

- has a similar structure with ACTH
- also binds with the melanocytes in the skin causing the production of Melanin
- over secretion of MSH also causes **darkening of the skin**

- **Gonadotropic hormones (FSH and LH)**

- also called gonadotropins
- group of hormones that binds to the gonad cells
- gonads:
 - Female – ovary
 - Male – testes
- has 2 types:
 - Follicle-stimulating hormone (FSH)
 - Luteinizing hormone (LH)
- both male and female have FSH and LH hormones
- regulates the growth, development, and function of the gonads
- if FSH and LH is not present, ovaries and testes would **decrease in size**
- **Follicle stimulating hormones (FSH)**
 - promotes the follicles (egg cell and sperm cell)
 - Female – targets the follicles present in the ovaries; stimulates the development of the follicles in the ovary to mature into egg cell (menstruation)

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glucose in the blood and fatty acids released in the adipose tissues turns into energy sources and will also release fatty acids

2. stimulation of smooth muscle to the walls of the arteries that supplies blood in the internal organs (but blood flow in the skeletal system increases)
3. increased metabolic rate of several tissues especially in the skeletal muscle, cardiac muscle, and nervous tissue

- **Adrenal Cortex**

- outer part
- secretes 3 classes of steroid hormones

- Mineralocorticoids (aldosterone)
- Glucocorticoids
- Adrenal androgens

- has 5 parts

1. **Capsule**

- outer layer

2. **Zona Glomerulosa**

- where aldosterone is secreted
- target tissue: kidneys, intestine, and sweat glands
- Aldosterone – a type of mineralocorticoid which regulates mineral balance
- causes sodium and water to be retained in the body (↑ extracellular fluid) while potassium is secreted
- also involved in regulating the blood pressure

3. **Zona Fasciculata**

- thickest layer
- middle layer
- target tissue: most tissues (liver, fat, skeletal, muscle, immune tissues, etc.)
- where cortisol is secreted (secreted in large amount)

- Cortisol – a type of glucocorticoid that regulates blood nutrient metabolism, increases the breakdown of fat and protein, increases the conversion to energy, and reduces inflammation and immune response
- helps in providing energy to tissues

4. **Zona Reticularis**

- inner layer
- also called dehydroepiandrosterone or androgen
- target tissue: most tissue; particularly stimulates masculinization and female's sex drive

5. **Medulla**

- K^+ and Na^+ affects the adrenal cortex to secrete aldosterone
- ↑ rate of aldosterone = ↑ blood potassium / ↓ blood sodium
- ↓ BP = release of Renin (liver)
- Renin – causes angiotensinogen to convert into angiotensin I
- Angiotensin II – causes the blood vessels and smooth muscle to constrict and increase the aldosterone secretion
- aldosterone stimulation in the kidneys causes Na^+ retention, K^+ excretion, and decreased water loss
- ↓ blood glucose = ↑ cortisol secretion (negative feedback)

Pancreas

- consists of pancreatic islets called Islets of Langerhans
 - dispersed in the exocrine portion of the pancreas
- islets secretes 3 hormones: Insulin, Glucagon, Somatostatin
- hormones secreted by the islets help in regulating the blood level nutrients (glucose)
- Glucose – main source of energy of nervous system