

## Exercise 27: Anatomy of the Endocrine Glands

- **Be able to identify and name the major endocrine glands and tissues of the body when provided with an appropriate human torso models and/or diagrams.**
  - pituitary gland (hypophysis)
  - thyroid gland
  - parathyroid glands
  - adrenal glands
  - pineal gland
  - thymus
  - pancreas
  - gonads
- **Be able to list the hormones produced by the endocrine glands and discuss the general function of each.**

### I. Pituitary Gland or Hypophysis

#### **Anterior Pituitary:**

Tropic Hormones:

- 1, 2. **Gonadotropins – follicle stimulating hormone (FSH) and leutinizing hormone (LH)** —regulate gamete production and hormonal activity of the gonads (ovaries and testes).
  3. **Adrenocorticotrophic hormone (ACTH)** – stimulates adrenal cortex to release corticosteroid hormones.
  4. **Thyroid stimulating hormone (TSH)** or thyrotropin – stimulates the growth and secretory activity of the thyroid gland.
- \*Other two hormones do not regulate the secretory action of other endocrine glands.
5. **Growth hormone (GH) or somatotropin** – a general metabolic hormone with the important role of stimulating growth in long bones and skeletal muscles.
  6. **Prolactin (PRL)** – stimulates breast development and promotes and maintains lactation by the mammary glands after childbirth.
    - stimulates testosterone production in males.

**Posterior Pituitary:** Does not synthesize any hormones, but acts as a storage area for two hormones.

1. **Antidiuretic hormone (ADH) or vasopressin** – stimulates kidney tubule cells to reabsorb more water from urinary filtrate, thereby reducing urine output and conserving body water and plays a minor role in increasing blood pressure because of vasoconstrictor effect on the arterioles.
2. **Oxytocin** – stimulates uterine contractions during birth and coitus and causes milk ejection in lactating mother.

### II. Pineal Gland, or Epiphysis

**Melatonin** – somewhat of a mystery, but in children it inhibits precocious (too early) sexual maturation and affects the timing of puberty.

### III. Thyroid Gland

1. **Thyroid hormone (TH)** – two active hormones
  - a. **T<sub>4</sub> (thyroxine)**
  - b. **T<sub>3</sub> (triiodothyronine)**– controls the rate of body metabolism and cellular oxidation, TH affects every cell in the body.
2. **Calcitonin (thyrocalcitonin)** – decreases blood calcium levels by stimulating calcium salt deposit in the bones.

#### IV. Parathyroid Gland

**Parathyroid hormone (PTH)** – regulates the calcium balance of the blood by stimulating the kidneys to reabsorb calcium and less phosphate and activate vitamin D.

#### V. Thymus

**Thymosin & thymopoietin** – help direct maturation and specialization of T-lymphocytes, or T cells

#### VI. Adrenal, or Suprarenal, Glands

##### A. Adrenal Medulla

**Epinephrine & Norepinephrine** – act in conjunction with the sympathetic nervous system to elicits the fight or flight response to stressors.

##### B. Adrenal Cortex

1. **Mineralcorticoids** or **Aldosterone** – regulate water and electrolyte balance in the extracellular fluids, mainly regulate sodium ion reabsorption by kidney tubules.
2. **Glucocorticoids** (cortisone, hydrocortisone, and corticosterone) – enables the body to resist long-term stressors such as increasing blood glucose levels.
3. **Gonadocorticoids** or **sex hormones** – produced by cortex are chiefly androgens (male sex hormones, but some estrogen (female sex hormones) are formed.

#### VII. Pancreas

1. **Insulin** – regulates blood sugar levels by decreasing sugar (glucose) when high levels are present.
2. **Glucagon** – regulates blood sugar levels by increasing sugar (glucose) when there's a low glucose level and stimulates liver to break down glycogen.

#### VIII. Gonads

##### A. Female gonads, or ovaries

1. **Estrogen** – development of secondary sex characteristic (maturation of reproductive organs, breast development) of female at puberty; and with **progesterone** brings about cyclic changes in the uterine lining during the menstrual cycle and prepares mammary glands for lactation.
2. **Progesterone** – acts with **estrogen** to bring about the menstrual cycle and helps prepare breast tissue for lactation.

##### B. Male gonads, or testis

1. **Testosterone** – development of secondary sex characteristics (maturation of male reproductive organs) at puberty and stimulates sexual drive, or libido.

- **Be able to indicate the means by which hormones contribute to body homeostasis by giving appropriate examples of hormonal actions.**

- **Be able to describe the structural and functional relationship between the hypothalamus and the pituitary.**

- **Be able to describe a major pathological consequence of hypersecretion and/or hyposecretion of the following hormones:**

GH:

ADH:

TH:

PTH:

Insulin:

Sex hormones:

- **Be able to recognize the microscopic slides and/or the histologic structures for the following:**

- |   |                           |
|---|---------------------------|
| ① Thyroid: colloid filled follicles, follicle cells | ⑥ Parathyroid             |
| ② Pancreas: islets of langerhans, pancreatic acini  | ⑦ Anterior pituitary      |
| ③ Adrenal gland: cortex, medulla                    | ⑧ Posterior pituitary     |
| ④ Ovary: follicle, graafian follicle, corpus luteum | ⑨ Pineal body             |
| ⑤ Testis: seminiferous tubules, interstitial cells  | ⑩ Thymus: cortex, medulla |

### **Dissection Ex. 3: Selected Endocrine Organs of the Cat**

- **Be able to identify the following endocrine glands and tissues of the body, if seen on the cat:**
  - thyroid gland
  - parathyroid glands
  - gonad (ovaries)
  - thymus
  - pancreas
  - gonad (testes)