The Endocrine System – Chapter 9

- Glands release hormones
- Hormones regulate the many and varied functions of an organism
- Hormones bind to receptors
- Receptors are recognition sites in the various target tissues on which hormones act

Two Types of Glands

- _____________________________
  Secrete their hormones directly into the bloodstream

- ______________________________
  Send chemical substances (tears, sweat, milk, saliva) via ducts to the outside of the body.

Glands of the Endocrine System
Endocrine System

• Common conditions that result in various pathologies of the endocrine system.

• Hypersecretion or Hyposecretion of a hormone

Pituitary Gland

• Known as a master gland

• Regulates many body activities; stimulates other glands to secrete specific hormones
• **Adrenocorticotropic Hormone** — _________
  – Promotes secretion of cortisol
  – Hyposecretion rare
  – Hypersecretion causes Cushing’s Disease

• **Follicle Stimulating Hormone** — _________
  – Stimulates ovaries to produce egg and secretion of estrogen
  – Testes in males, stimulates sperm production

• **Growth Hormone** — _______________
  – Hyposecretion in children causes _________
  – Hypersecretion in children causes gigantism
  – Hypersecretion in adults causes acromegaly

• **Luteinizing Hormone** ____________
  – Ovaries in females, promotes ovulation, estrogen and progesterone secretion
  – Testes in males, promotes testosterone secretion
  – Hyposecretion – failure of sexual maturation
  – Hypersecretion – No known effects
Pituitary Hormones – Table 9-1

- **Prolactin** – promotes lactation

- **Thyroid Stimulation Hormone**
  - Stimulates thyroid gland to secrete thyroid hormone

- **Antidiuretic Hormone (ADH)** – Increases water reabsorption by the kidney
  - **Hyposecretion** causes diabetes insipidus
  - **Hypersecretion** causes syndrome on inappropriate antidiuretic hormone (SIADH)
Combining Forms – page 396

- Aden/o
- Adren/o
- Adrenal/o
- Calc/o
- Crin/o

Adrenal Glands

Each gland has two parts

- **outer** portion,
  - Secretes glucocorticoids, mineral corticoids, gonadocorticoids

- **inner** portion,
  - Secretes catecholamines
  - Chemicals derived from amino acids
Adrenal Hormones – Table 9-4

- **Glucocorticoids**: influence metabolism of sugars, fats, and proteins (cortisol) and are anti-inflammatory (cortisone).
  Influences—SUGAR

- **Mineralocorticoids**: regulate electrolytes
  - **Aldosterone**: reabsorption of sodium/excretion of potassium. Influences—SALT

- **Gonadocorticoids**: androgens and estrogens.
  Influences—SEX

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Adrenal Hormones – Table 9-4

- Two types of **catecholamine** hormones
  
  - **Epinephrine (adrenaline)**: increases heart rate and blood pressure, dilates bronchial tubes, releases glucose from storage

  - **Norepinephrine (noradrenaline)**: constricts vessels to raise blood pressure

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Combining Forms

- **Gluc/o**
- **Glyc/o**
- **Pancreat/o**
- **Parathyroid/o**
Pancreas

- Located near and partially behind stomach
- Exocrine and endocrine organ

Parathyroid Glands

Pancreatic Hormones – Table 9-5

- **__________________**: promotes movement of glucose into cells and promotes storage as glycogen
  - Hypossecretion causes diabetes mellitus
- **__________________**: promotes movement of glucose into the blood by breaking down glycogen stored in liver cells
  - Hypossecretion causes hypoglycemia
Parathyroid Hormones – Table 9-3

- Parathyroid Hormone (PTH)
  - Increases reabsorption of Ca from bone to blood.
  - Increases Ca absorption by kidney
  - Increases Ca absorption by small intestine

Parathyroid Hormone (PTH)

- Hyposecretion causes tetnany
- Hypersecretion causes osteitis fibrosa cystica – bones become soft and deformed.

Combining Forms

- Pituitar/o
- Thym/o
- Thyro/o
- Thyriod/o
Thyroid Hormones – Table 9-2

- thyroxine or tetraiodothyronine (T₄)
- triiodothyronine (T₃)

- Thyroid hormones aid cells in their uptake of oxygen and regulate metabolic rate

- ___________________ – Regulates calcium level in the blood with PTH

- Secreted when blood calcium levels are high.
Thymus Gland

Combing Form/Suffixes

- Toxic/o
- -dipsia
- -trophs

Build Medical Words

1. excessive (many, much) thirst: poly/ _____
2. pertaining to poisonous activity of the thyroid: ___/___/toxic
3. sugar in urine: ____/uria
4. blood with excessive or abnormal glucose: ____/___/emia
Build Medical Words

5. instrument to measure sugar: o/
6. excessive (many, much) urination: poly/
7. condition of deficient insulin: hypo/
8. secrete within (internally): endo/

Build Medical Terms

9. specialist in study of poisons:
10. inflammation of the pancreas:
11. enlargement of extremities:
12. tumor of a gland:

Thyroid Abnormalities

Enlargement of the thyroid
Thyroid Abnormalities

**Hypersecretion**

Hyperthyroidism

- Graves disease – Autoimmune
  - Exophthalmos and proptosis

**Hyposecretion**

Hypothyroidism

- Myxedema
- Cretinism

**Neoplasms**

Thyroid carcinoma

Parathyroid Abnormalities

**Hypersecretion**

Hyperparathyroidism

- Loss of bone density
- Kidney stones
- Hypercalcemia
Parathyroid Abnormalities

**Hyposecretion:**

*Hypoparathyroidism*
— Deficient production of parathyroid hormone leads to hypocalcemia which leads to tetany

Abnormalities of Adrenal Cortex

**Hypersecretion**

- *adrenal virilism* — excessive androgens
  amenorrhea, hirsutism (hair growth), acne, voice deepening

- *Cushing syndrome* — excessive cortisol
  Obesity, moon-face, thoracic fat deposition
Abnormalities of Adrenal Cortex

Hyosecretion

• Addison disease – low cortisol and aldosterone levels
  hyponatremia, fatigue, weakness, low blood pressure

Abnormalities of Adrenal Medulla

• Pheochromocytoma:
  Benign tumor of adrenal medulla
  Excess epinephrine and norepinephrine
  Hypertension, palpitations, severe headaches, sweating, flushing of the face, and muscle spasms
Abnormalities of the Pancreas

Hypersecretion

• Hyperinsulinism – excessive secretion of insulin causing; Hypoglycemia, convulsions, fainting

Pancreas

Hyposcretion

• Lack of insulin secretion or resistance of insulin in promoting sugar, starch and fat metabolism in cells
  Type 1: childhood onset typically
  Type 2: adult onset typically

Abnormalities
Pituitary Gland: (Anterior Lobe)

Hypersecretion

• acromegaly
  • gigantism

Hyposcretion

• dwarfism
  • panhypopituitarism
Abnormalities
Pituitary Gland: (Posterior Lobe)

Hypersecretion
• Syndrome of inappropriate ADH (SIADH)
  Excess ADH
  Excess water retention

Hypossecretion
• Diabetes insipidus
  Deficient ADH
  Polyuria and polydipsia

Laboratory Tests
• Measures circulating glucose in a patient who has fasted at least 4 hours

• Serum and urine tests
  Measures hormones, electrolytes, glucose, etc. in blood and urine as indicators of endocrine function

• Thyroid function tests
  Measures T3, T4, and TSH in the bloodstream

Laboratory Tests
• Radioactive iodine uptake (RAIU) test
  Administration of RAIU in pill or liquid form.
  Used as a tracer to test how quickly the thyroid gland uptakes iodine from the blood.
Laboratory Tests

• Glucose tolerance test (GTT)
  – Measures blood glucose levels at regular intervals (usually 3 hours).
  – Used to diagnose diabetes mellitus with higher accuracy than other blood glucose tests.

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Monitors blood glucose levels

Self-monitoring, usually done before meals and at bedtime

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Pharmacology

Hormone replacement therapy (HRT)
  – Oral administration of injection of synthetic hormones.
    – Corrects deficiency in estrogen, testosterone, or thyroid hormone.

Oral hypoglycemics
  – Stimulate insulin secretion from pancreatic cells in non–insulin-dependent diabetics with some pancreatic function.
QUICK QUIZ:

5. What is the pathologic condition in which enlargement of the extremities is caused by hypersecretion of the anterior pituitary after puberty?
   A. Addison disease
   B. Acromegaly
   C. Cushing syndrome
   D. Graves disease