4.04 Understand the Functions and Disorders of the ENDOCRINE SYSTEM
What are the functions of the endocrine system?

What are some disorders of the endocrine system?

How do you relate the body’s hormones to the endocrine system?
Functions of the ENDOCRINE SYSTEM

Glands
- Any organ that produces a secretion

Hormones
- Chemical messengers
- Secreted into the bloodstream to be carried to various organs

Target Organ/Cells
- What are they? Any tissue or organ a hormone exerts its action on.

4.04 Understand the functions and disorders of the endocrine system
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**Functions of the ENDOCRINE SYSTEM**

**Glands secrete hormones**

**Hormones**
- Growth hormone (GH)
- Prolactin hormone (PRL)
- Thyroid-stimulating hormone (TSH)
- Adrenocorticotropic hormone (ACTH)
- Follicle-stimulating hormone (FSH)
- Luteinizing hormone (LH)

**Examples of target organs/cells**
- Heart
- Liver
- Stomach
- Small intestine
- Skin
Functions of the ENDOCRINE SYSTEM

Hormone Control

Nervous System

- **Sympathetic nervous system:**
  - Glands that are stimulated by nervous stimuli
  - For example: the adrenal medulla secretes adrenalin when frightened or other stressful situation
Functions of the ENDOCRINE SYSTEM

Hormone Control

What is negative feedback?

- Occurs when there is a drop in the level of hormone
- Much like a thermostat being set for a certain temperature
4.04 Understand the functions and disorders of the endocrine system

**Adrenal cortex**

2 Corticoids function:

- **Mineralocorticoids**: Mainly Aldosterone. Speed up the reabsorption of sodium and increase excretion of potassium from blood.

- **Glucocorticoids**: Cortisone and cortisol. Increase the amount of glucose in the blood.

**Androgens**:  
Function: Sex hormones  
Who has them? Males and females
Functions of the ENDOCRINE SYSTEM

**Adrenal medulla:** Secretes epinephrine and norepinephrine

**Epinephrine:** A powerful cardiac stimulant that responds to stimulation from the sympathetic nervous system

**Norepinephrine:** Responds to stimulation from the sympathetic nervous system
4.04 Understand the functions and disorders of the endocrine system

Functions of the ENDOCRINE SYSTEM

Gonads

Ovaries (female)

Secrete estrogen: Responsible for sexual reproduction and secondary sexual characteristics such as pubic hair and axillary hair

Progesterone: Responsible for building up the lining of the uterus for the fertilized egg. If no fertilization takes place, menstruation takes place.
Functions of the ENDOCRINE SYSTEM

Gonads

Testes (*male*)

**Testosterone:** Responsible for development of male reproductive organs and secondary sex characteristics. Also influences growth of beard and other body hair.

Beards are the fastest growing hairs on the human body. What causes a beard to grow?

4.04 Understand the functions and disorders of the endocrine system
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**Functions of the ENDOCRINE SYSTEM**

**Parathyroid Glands**

**Parathormone:** Controls the concentration of calcium in the bloodstream.

- When calcium level is lower than normal, parathormone is increased.
Functions of the ENDOCRINE SYSTEM

**Pancreas**
*(Islets of Langerhans)*

**Insulin**
- Promotes the use of glucose in the cells, necessary for maintenance of normal levels of glucose.
- Promotes fatty acid transport and fat deposition into cells.
- Promotes amino acid transport into cells.
- Facilitates protein synthesis.
functions of the endocrine system

Pituitary Gland (Master Gland)
Two Lobes (Anterior and Posterior)
Functions of the ENDOCRINE SYSTEM

Pituitary gland

(*Anterior Lobe*)

Adrenocorticotropic hormone (*ACTH*)

- Stimulates the growth and secretion of the adrenal cortex

Follicle-stimulating hormone (*FSH*)

- Stimulates the growth of the graaffian follicle and production of estrogen in females; stimulates production of sperm in males

4.04 Understand the functions and disorders of the endocrine system
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**Functions of the ENDOCRINE SYSTEM**

**Pituitary gland** *(Anterior Lobe)*

**Growth hormone (GH)**
- Responsible for growth and development

**Luteinizing hormone (LH)**
- Stimulates growth of the graaffian follicle and production of estrogen
Functions of the ENDOCRINE SYSTEM

Pituitary gland *(Anterior Lobe)*

**Prolactin (PRL)**

- Develops breast tissue and stimulates production of milk after childbirth

**Thyroid-stimulating hormone (TSH)**

- Stimulates the growth and secretion of the thyroid gland

4.04 Understand the functions and disorders of the endocrine system
Functions of the ENDOCRINE SYSTEM

**Pituitary gland**

(*Posterior Lobe*)

**Secretes:**

**Vasopressin:** Converts to antidiuretic hormone in the blood stream

**Oxytocin:** Released during childbirth causing strong contractions of the uterus
Functions of the ENDOCRINE SYSTEM

Thymus Gland

**Secretes Thymosin**: A hormone that stimulates T cell production which fight certain diseases.
4.04 Understand the functions and disorders of the endocrine system

**Functions of the ENDOCRINE SYSTEM**

**Thyroid Gland**

*Thyroxine*

- Controls the rate of metabolism and heat production

*Calcitonin*

- Controls calcium ion concentration
Disorders of the ENDOCRINE SYSTEM

4.04 Understand the functions and disorders of the endocrine system
Disorders of the ENDOCRINE SYSTEM

Adrenal Cortex

**Addison's disease:** Caused by hypofunctioning of the adrenal cortex.

Hormone involved: adrenocorticosteroids

**Symptoms:** weight loss, hypoglycemia, excessive skin pigmentation

**Treatment:** Replacement of deficient hormones.
Disorders of the ENDOCRINE SYSTEM

Adrenal Cortex

Cushing's Syndrome:
hypersecretion of the glucocorticoid hormone caused by an adrenal cortical tumor or long term use of prednisone.

Symptoms: High blood pressure (HTN), muscular weakness, obesity, hyperglycemia

Treatment: Surgical removal of the adrenal cortical tumor.
Disorders of the ENDOCRINE SYSTEM

Adrenal Glands

Steroid Abuse in Sports

What are the risks?

**Males:** changes in sperm, enlarged breasts, shrinking testicles

**Females:** deepening voice, decreased breast size, excessive body hair growth.

4.04 Understand the functions and disorders of the endocrine system
Disorders of the ENDOCRINE SYSTEM

Pancreas

**Diabetes Mellitus:** Insulin deficiency

Normal blood sugar: 80-110

Symptoms:
- polyuria
- polyphagia
- polydipsia

*(define!)*
Disorders of the ENDOCRINE SYSTEM

Pancreas

Diabetes Mellitus (Type I)

How is it treated? Insulin and monitor daily glucose levels

What age group is most commonly effected? Children or young adults

4.04 Understand the functions and disorders of the endocrine system
Disorders of the ENDOCRINE SYSTEM

Pancreas

**Diabetes Type II**

Compare Type I to Type II diabetes

How is Type II diabetes treated?
Medication, insulin, diet, glucose monitoring

Complications of diabetes? Heart disease, high blood pressure, poor circulation.
Disorders of the ENDOCRINE SYSTEM

Pituitary Gland

**Acromegaly**: Caused by hypersecretion of growth hormone

**Symptoms**: protruding chin, lethargy, headache

**Treatment**: medications, radiation therapy

**Giantism**: Hypersecretion of growth hormone during preadolescence.

**Symptoms**: Overgrowth of long bones, excessive tallness

**Treatment**: Same as acromegaly
Disorders of the ENDOCRINE SYSTEM

Pituitary Gland

**Growth Hormone Deficiency** *(childhood)*

**Symptoms:** Growth of the long bones is abnormally decreased

**Treatment:** Injections of human growth hormone

**Why is important to treat it early?**
Disorders of the ENDOCRINE SYSTEM

Pituitary Gland

**Gigantism**

What causes gigantism?

What are the symptoms?

How is it treated?
Disorders of the ENDOCRINE SYSTEM

Parathyroid

_Tetany_ (_hypoparathyroid_): Caused by severely diminished calcium levels

_Symptoms_: Convulsive twitching, spasms of the respiratory muscles, death

_Treatment_: Administration of Vitamin D, calcium and parathormone to restore calcium balance

4.04 Understand the functions and disorders of the endocrine system
Disorders of the ENDOCRINE SYSTEM

Thyroid Gland

**Hyperthyroidism:**
Overactivity of the thyroid gland.
Too much thyroxin is secreted

**Symptoms:** Feeling too hot, rough fingernails, weakened muscles, hand tremors, irritability.

**How is it treated?**
Medications, radioactive iodine
Disorders of the ENDOCRINE SYSTEM

Thyroid Gland

**Hypothyroidism:** Caused by insufficient thyroxin secretion

**Symptoms:** Dry, itchy skin, dry brittle hair, constipation, muscle cramps at night.

**How is it treated?** Medications to replace thyroxin

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