

ENDOCRINE SYSTEM

LEARNING OUTCOMES

Students will be able to:

1. define the terms hormone and endocrine system;
2. outline the parts of the endocrine system; major glands of this system (Pituitary, Thyroid, Pancreas, Adrenal, Testes, Ovary) and names of their respective hormones;
3. describe the term "negative feedback" with reference to Insulin and Glucagon;
4. explain how adrenaline may be involved in exercise and emergency conditions.

Endocrine system

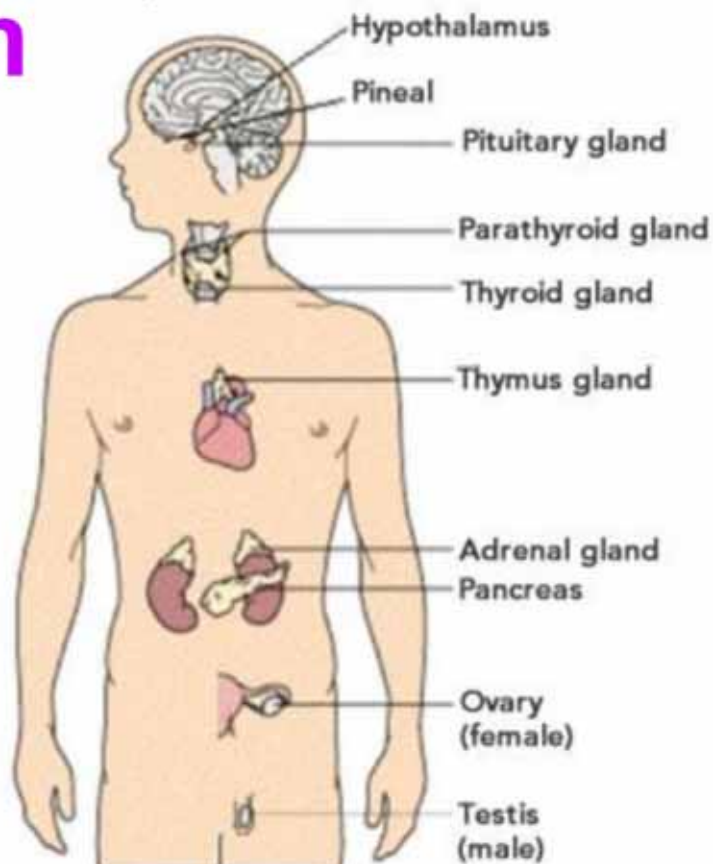
The **endocrine system** is a system of glands, each of which secretes a type of hormone directly into the bloodstream to regulate the body. The endocrine system is an information signal system like the nervous system, yet its effects and mechanism are classifiably different.

The effects of endocrine system are slow to initiate, and prolonged in their response, lasting for hours to weeks. The nervous system sends information very quickly, and responses are generally short lived.

Hormones

Hormones are substances (chemical mediators) released from endocrine tissue into the bloodstream where they travel to target tissue and generate a response. Hormones regulate various human functions, including [metabolism](#), [growth and development](#), [tissue](#) function and [mood](#).

Parts of the endocrine system



Negative feedback

Negative feedback occurs when the output of a system acts to oppose changes to the input of the system, with the result that the changes are attenuated. If the overall feedback of the system is negative, then the system will tend to be stable. Many biological processes use negative feedback. Examples of this are numerous, from the regulating of body temperature, to the regulating of blood glucose levels. The disruption of feedback loops can lead to undesirable results: in the case of blood glucose levels, if negative feedback fails, the glucose levels in the blood may begin to rise dramatically, thus resulting in diabetes.

For hormone secretion regulated by the negative feedback loop: when gland X releases hormone X, this stimulates target cells to release hormone Y. When there is an excess of hormone Y, gland X "senses" this and inhibits its release of hormone X.

Insulin and Glucagon

Insulin

Insulin is a [hormone](#) central to regulating [carbohydrate](#) and [fat](#) metabolism in the body. Insulin causes cells in [liver](#), [muscle](#) and [fat tissue](#) to take up [glucose](#) from the [blood](#), storing it as [glycogen](#) in the liver and muscle.

Insulin starts the use of fat as an energy source by inhibiting the release of [glucagon](#).

Glucagon

Glucagon, a [hormone](#) secreted by the [pancreas](#), raises blood glucose levels. Its effect is opposite to that of [insulin](#), which lowers blood glucose levels. The pancreas releases glucagon when [blood sugar](#) (glucose) levels fall too low. Glucagon causes the [liver](#) to convert stored [glycogen](#) into [glucose](#), which is released into the bloodstream. Glucagon raises blood glucose levels. High blood glucose levels stimulate the release of insulin. Insulin allows glucose to be taken up and used by insulin-dependent tissues. Thus, glucagon and insulin are part of a feedback system that keeps blood glucose levels at a stable level.

Adrenaline

Epinephrine (also known as adrenaline) is a hormone and a neurotransmitter. It increases heart rate, constricts blood vessels, dilates air passages and participates in the fight-or-flight response of the sympathetic nervous system

Adrenaline in emergencies

Multiple Choice Questions

1. Hormones are distributed throughout the body by

- A. ducts.
- B. ductless glands.
- C. blood.
- D. nerves.

2. The adrenal glands are located above the

A. kidneys.

B. heart.

C. liver.

D. brain.

3. The gland known as the "gland of emergency" is the

- A. pituitary.
- B. adrenal.
- C. thyroid.
- D. pancreas.