

Body System Notes Guide: General Biology A

You are responsible not only for the material in this guide but the diagrams and pictures on the notes. The notes can be found on Mr. Walkers website: www.walkersclass.com.

Objective 5: Explain the interactions between cells, tissues, and organs of 2 body systems (Digestive and Endocrine).

Students will be able to:

- Differentiate between cells, tissues, organs, and organ/body systems.
- Explain how the digestive system and endocrine system work together to affect blood sugar levels.
- Identify the purpose and function of the digestive system.
- Identify the purpose and function of the endocrine system.

Human Body Organization

- Body System: A group of organs which work together to perform a specific function
- Organs: A structure of definite form and function composed of two or more different kinds of tissues.
- Tissue: A group of similar cells and their intercellular substance joined together to perform a specific function.
- Cell: The basic structural and functional unit of all organisms; the smallest structure capable of performing all the activities vital to life.
 - The human body is composed of _____ body systems.

Homeostasis:

- The biological definition of homeostasis is “the tendency of an organism or cell to _____ its internal environment and maintain equilibrium, usually by a system of feedback controls, so as to stabilize health and functioning”. Generally, the body is in homeostasis when its needs are met and its functioning properly.
- Every organ in the body contributes to homeostasis. A complex set of chemical, thermal, and neural factors interact in complex ways, both helping and hindering the body while it works to maintain homeostasis.

Digestive System

- Purpose: To _____ down and convert organic compounds into chemical energy our bodies can use.
- Function: There are five functional activities:
 - ingestion, movement, digestion, absorption, defecation.
- Parts of the Digestive system:
 - Mouth: is the beginning of the digestive tract where food enters and is started to be broken down by the teeth and Salivary glands.
 - Salivary glands: Produce saliva, which keeps the mouth and other parts of the digestive system moist. It also helps break down carbohydrates (with an enzyme amylase) and lubricates the passage of food down from the pharynx to the esophagus to the stomach.
 - Teeth: Bones which break down food in preparation for internal digestion.
 - Tongue: Muscular organ used for chewing, swallowing, speech, and tasting foods.
 - Pharynx: (Throat) Permits the passage of swallowed solids and liquids into the esophagus, and conducts air to and from the trachea, or windpipe, during respiration.

- Esophagus: Tube from mouth to stomach
- Stomach: Releases enzymes to enable partial digestion of food
- Large Intestine: Absorption of water and mineral ions such as salt, formation and temporary storage of feces, and maintains a resident population of over 500 species of bacteria.
- Small Intestine: Absorption of nutrients and minerals from food.
- Pancreas: Secretes digestive enzymes and regulates blood sugar levels
- Gall Bladder: Stores and concentrates bile, a yellow-brown digestive enzyme produced by the liver
- Liver: Produces proteins that are important in blood clotting, breaks down old or damaged blood cells, and break down fats and produce energy.

Endocrine System

- Purpose: To maintain homeostasis releasing hormones into the bloodstream.
- Function: Uses _____ to release chemical messengers (hormones) into the blood stream.
- Parts of the Endocrine System:
 - Pancreas: Regulate blood sugar levels
 - Pituitary gland: Master gland which controls growth, reproductive and other hormones
 - Thyroid gland: Regulate metabolic rate and protein synthesis (production)
 - Parathyroids: Regulate calcium levels in body
 - Adrenal glands: Body control blood sugar, burn protein and fat, react to stressors like a major illness or injury, and regulate blood pressure.
 - Pineal gland: Maintains circadian rhythm and regulate reproductive hormones
 - Reproductive glands (which include the ovaries and testes): Produce sperm and oocytes
- Definitions:
 - Endocrine gland releases hormones/chemicals into the bloodstream
 - Exocrine glands release hormones/chemicals into surrounding cells

The digestive system and endocrine system work together

- The digestive system brings in _____ molecules which are broken down into simple products such as glucose and amino acids.
- As carbohydrates are broken down, our sugar levels in our blood increase, specifically glucose.
- When sugar levels get too high, the endocrine system responds by using the pancreas. The pancreas will release a hormone called insulin.
- Insulin will _____ blood sugar levels.
- When sugar levels are too low, the endocrine system responds by using the pancreas. The pancreas will release a hormone called glucagon.
- Glucagon will raise blood sugar levels by stimulating the liver to break a complex carb called glycogen into glucose.

Objective 6: Differentiate between positive and negative feedback mechanism to maintain homeostasis.

Students should be able to:

- Explain how positive feedback mechanism's function.
- Explain how negative feedback mechanism's function.
- Identify examples of positive and negative feedback functions in the body.

Positive Feedback (avalanche effect)-All in!

- Positive Feedback: In a positive feedback system, the output _____ the original stimulus.
- One example of a positive feedback system is child birth. During labor, a hormone called oxytocin is released that intensifies and speeds up contractions. The increase in contractions causes more oxytocin to be released and the cycle goes on until the baby is born. The birth ends the release of oxytocin and ends the positive feedback mechanism.
- Another example of a positive feedback mechanism is _____ clotting. Once a vessel is damaged, platelets start to cling to the injured site and release chemicals that attract more platelets. The platelets continue to pile up and release chemicals until a clot is formed.

Negative Feedback (back to the norm)-

- Negative Feedback: Almost all homeostatic control mechanisms are negative feedback mechanisms. These mechanisms change the variable back to its _____ state or “ideal value”.
- An example of a negative feedback mechanism is a home thermostat (heating system). The thermostat contains the receptor (thermometer) and control center. If the heating system is set at 70 degrees Fahrenheit, the heat (effector) is turned on if the temperature drops below 70 degrees Fahrenheit. After the heater heats the house to 70 degrees Fahrenheit, it shuts off effectively maintaining the ideal temperature.
- The control of blood _____ (glucose) by insulin is another good example of a negative feedback mechanism.
- Another example is regulating body temperature. If our body gets too cold, the muscles will start to shiver. When too warm, it will trigger a response to sweat.
- Just remember that positive feedback mechanisms enhance the original stimulus and negative feedback mechanisms inhibit it.