

Quiz Answers About Homeostasis, Cells & other Bio Concepts

These questions & answers demonstrate a wide array of knowledge on general biology concepts.

QUESTION (HOMEOSTASIS, REGULATION & FEEDBACK):

Describe what happens to regulate blood glucose (1) when glucose levels are rising after a meal and (2) when glucose levels are declining a long time after a meal. Include in your answer the words: pancreas, liver/skeletal muscle, insulin, glucagon, glucose, glycogen.

ANSWER:

1) After a meal a person's small intestines will absorb large amount of nutrients such as **glucose** which gets circulated in the blood stream. In order to prevent blood glucose levels from getting too high the **pancreas** produces the hormone **insulin** which basically tells various cells around the body, like **liver or skeletal muscle cells** to start absorbing glucose from the blood stream. These cells store glucose in a chain formation called **glycogen**.

2) A while later when blood glucose levels start declining, in order to prevent the body's blood sugar from dropping too low the pancreas produces another hormone called **glucagon** which tells receptor cells like those making up **liver or skeletal muscle** to release some of the stored glucose in the form of glycogen back into the blood stream to increase the amount of glucose in the blood stream.

QUESTION (INTERDEPENDENCE, INTERACTIONS):

You are probably already well aware that you are more likely to learn something if you have to teach it to someone else. Many people in this course are homeschooling their children or younger siblings. One of the hardest organ systems to teach about is the endocrine system. Write a short narrative paragraph that would introduce the endocrine system to another adult with no background knowledge on the topic. Include: why the endocrine system is important, examples of endocrine organs, and basics on hormones (what they are, where they come from, where they go, and what happens).

ANSWER:

One strategy I use a lot when trying to explain complicated topics is to relate them to a general real-life phenomenon we experience or can understand. We can think of the endocrine system as analogous to a mail delivery service from which organs communicate with each-other to synchronize bodily functions.

Endocrine organs, essentially, are the ones sending out the messages or "mail" in the form of hormones. These messages get picked up by our blood stream, which we can think of as a postal worker delivering packages or other mail to people based on their address.

Hormones, "the mail" sent by the endocrine organs can only be received by cells with the right hormone receptors, much like how a postal worker will only deliver mail to the location it is addressed to.

This analogy of the endocrine system and postal service breaks down a little bit when we discuss what happens after a cell receives hormones, as the cells behavior will change in a relatively radical way whereas regular mail typically doesn't a radical change in our behavior.

The response by cells can vary a lot, either in terms of releasing substances, taking in more substances, etc. The gist is that the endocrine system allows for modifications in our bodily functions via messages sent through our blood stream.

QUESTION (STRUCTURE & FUNCTION):

Using your notes, for each of the seven organs introduced in the video, say what the organ is, where it is located, and the hormone(s) it produces.

ANSWER:

1. Pituitary Gland

The pituitary gland is a relatively small organ which is hardwired to the hypothalamus part of our brain and allows our endocrine and nervous system to work in parallel and not work against each other. The pituitary releases a variety of hormones which mostly serve to tell other endocrine organs (i.e. thyroid) what to do.

2. Pancreas:

This organ is located around the mid body near the duodenum section of the small intestine. This organ has other functions beyond just producing hormones (as it also produces enzymes to help break down chyme in the intestines) but in terms of hormone production, the pancreas creates two important hormones in regulating blood sugar. It produces **insulin** which decreases blood sugar by allowing cells to store blood sugar in the form of glycogen. On the other hand, **glucagon** is produced which causes target cells to release stored sugar back into the blood stream.

3. Thyroid Gland

The thyroid gland is a butterfly shaped gland wrapped around our trachea which also produces a wide array of hormones. Notable among the hormones are **thyroxin**, which increases body temperature, and **calcitonin** which lowers the calcium content in our blood stream by telling osteoblasts to build more bone.

4. Parathyroid gland

The parathyroid refers to the tiny dot glands atop the thyroid which produces mostly just one hormone known as the **parathyroid hormone** which serves as an opposing force to calcitonin produced by the thyroid, in increasing the amount of calcium in our blood by causing some of our bone to get broken down, releasing calcium into our blood stream.

5. Adrenal Glands

These glands can be found atop the kidneys, and produce hormones relating to our stress response, **adrenaline** gets produced to respond to short term stress, whereas **cortisol** gets produced in response to long stress in the event that body thinks its starving. Adrenaline mostly tries to make us more alert, whereas cortisol tries to preserve bodily energy via increasing blood sugar, decreasing metabolism, serotonin, etc.

6. Testes & 7. Ovaries

These organs, which vary based on a person's sex (as in combination of X & Y chromosomes), produce a variety of hormones like estrogen and progesterone. They are both generally located near the crotch area (forgive crude terminology) of a person (I think, ovaries might technically be more centrally located than the testes, point is they are at least south of the trachea).