Hello. I'm Dr Alex Lathbridge and this is Bitesize Biology.

This is the third episode in our eight-part series about Homeostasis and Response.

Today, we're going to talk about the endocrine system, the system that secretes hormones into the bloodstream to regulate processes in our bodies.

You're going to need to know what hormones are, so grab a pen to write this definition down:

A hormone is a chemical messenger, produced in glands and carried by the blood to specific organs in the body.

As I said in our series on The Cell, we are made up of trillions of cells where reactions are happening all the time and there are lots of chemicals that cells use to send messages to one another, usually in relatively close proximity, like within an organ.

Remember how we said in the last episode that the nervous system transmits signals very quickly?

Well, hormones are a lot slower, but the key thing about them is that they can send messages from one part of the body to all of the other parts of the body.

Remember, your blood circulates all around your body like water flowing in a river, so it's a good way to send a message.

So if our message is a chemical in the blood, it goes where the blood goes, and the blood goes everywhere in the body.

When one body part, a gland, wants to send a message to the whole body, it just tips a certain hormone into the blood, and that gets the message to the rest of the body.

I already know your next question: if hormones are circulating in the blood, won't they affect every single organ?

No, because cells in different organs have different receptors, so they can only pick up the messages from specific hormones.

So what we say is that hormones travel in the blood to specific target organs.

Hormones are produced and secreted by glands, which altogether make up the endocrine system.

You need to know about six different glands, what their names are, where they're based, and what

they do:

1. The Pituitary Gland. It's situated at the base of the brain and its generally known as the 'master gland.' It produces many hormones, one of which is ADH (anti-diuretic hormone) which affects the kidneys and controls the water levels in blood.

2. The Thyroid Gland. It's in the neck and produces thyroxine, which regulates temperature, heart rate and the rate of metabolism.

3. The Pancreas. This is an organ in the abdomen, it's near to the liver and close to the stomach. It produces Insulin, which targets the liver, and regulates blood glucose levels.

4. The Adrenal Glands. There are two of them. They are located close to your kidneys. They produce Adrenaline, which is released in response to scary or stressful situations. The body gets prepared for the "fight or flight" response, increasing things like heart rate, breathing rate and blood flow to your muscles.

5. The Ovaries. They're part of the female reproductive system, producing oestrogen, which plays an important part in the menstrual cycle.

6. The Testes. These are part of the male reproductive system, they produce testosterone, which effects puberty and the production of sperm.

In the last episode, we spoke about sending messages with the nervous system and now we've got the endocrine system. They do similar jobs but how they do it are very different. Let's compare:

The nervous system carries electrical signals, whereas hormones are chemicals.

The nervous system transmits electrical impulses by nerve cells (called neurones), whereas hormones are carried in the bloodstream.

The nervous system uses effectors such as muscles or glands to generate a response, whereas hormones target cells in particular organs and tissues.

The nervous system generates a rapid response (it's really quick), whereas most hormones are slow to react.

The electrical impulses in the nervous system act for a very short time, whereas hormones act for a long time, until the hormone is broken down.

You might be asked in your exam to identify if a response is from hormones or nerve impulses.

If a response is really quick, it's likely to be a nervous one. If your body needs to make a really quick change, like moving hands away from a hot stove, you need a message sent to the effectors as quickly as possible. Hormones would just take too long.

However, if a response lasts a long time, it likely to be a hormonal one. The effects of hormones are much slower than the nervous system, but they last for longer.

When adrenaline is released into your bloodstream as part of that fight or flight response, your heart rate and breathing rate goes up over time. It's not just an instantaneous push. You also feel a bit wobbly afterwards, which is when the hormonal response still ongoing.

I'm Dr Alex Lathbridge and this is Bitesize Biology -the key things you need for your biology GCSE, all available now on BBC sounds.