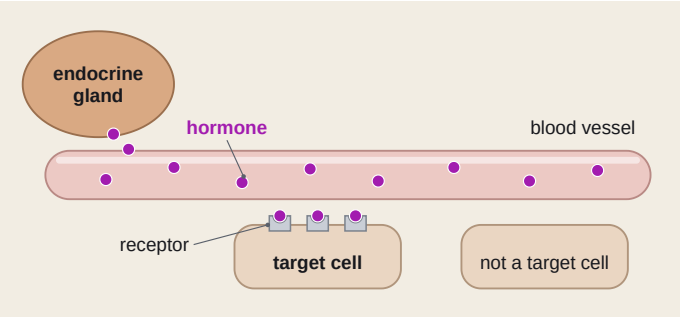
A10 · Hormones, feedback and the endocrine glands · Completed notes

Goals: Say what a hormone and a target cell are. Compare the nervous system and the endocrine system. Explain negative feedback and positive feedback. Trace a negative feedback loop. Find the main endocrine glands and name their hormones. Explain how the hypothalamus controls the pituitary gland.

These are the completed notes. The blanks are filled in and each question is worked.

Slide 1 of 7 · Hormones and target cells

In lesson A1, the body had two systems that keep homeostasis. Lessons A1 to A9 covered the nervous system. Today you start the endocrine system.



	Nervous system	Endocrine system
Signal	action potentials	hormones
Carried by	neurons	the blood
Speed	fast	slower
Effect lasts	a short time	longer

Key ideas

An endocrine gland releases a **hormone** into the blood.

Only **target cells** respond. They have **receptors** that the hormone fits.

The endocrine system is **slower** than the nervous system, and its effects last longer.

Example

A hormone reaches every cell in the body. Explain why only some cells respond.

1. Only target cells have receptors that the hormone fits.
2. Cells without those receptors ignore it.

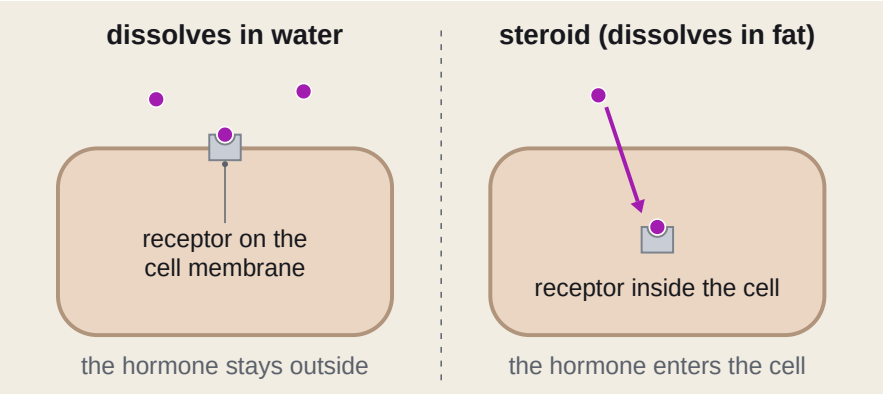
Try it

Give two differences between the nervous system and the endocrine system.

1. Nerves use action potentials. The endocrine system uses hormones.
2. Nerves are fast. Hormones are slower and last longer.

Slide 2 of 7 · Two kinds of hormone

On the last slide, a hormone fitted a receptor on its target cell. Where that receptor is depends on the kind of hormone.



Key ideas

Most hormones dissolve in **water**. They attach to a receptor on the **outside** of the cell.

Other hormones are **steroids**. A steroid dissolves in fat.

A steroid passes through the cell membrane. Its receptor is **inside** the cell.

Example

Explain why a steroid hormone can enter a cell.

1. A steroid dissolves in fat.
2. The cell membrane is fatty.
3. So the steroid can pass through it.

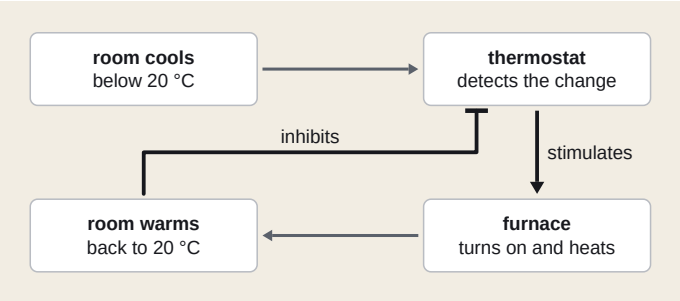
Try it

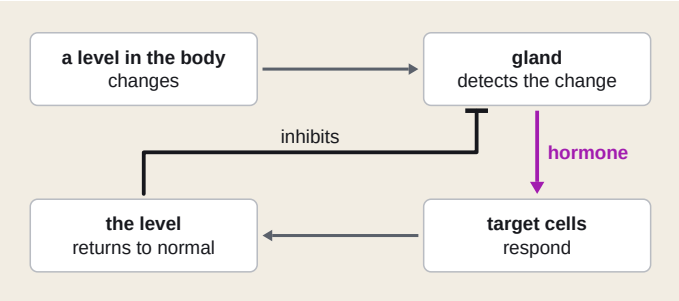
State where a hormone that dissolves in water attaches.

1. It cannot cross the cell membrane.
2. It attaches to a receptor on the outside of the cell.

Slide 3 of 7 · Negative feedback

On slide 1, a gland released a hormone and target cells responded. Something must tell the gland when to stop. That control is called feedback.





Key ideas

A change causes a **response**.

The response brings the level back to **normal**.

The normal level **inhibits** the gland.

This is **negative feedback**.

Example

A room cools below 20 °C and the furnace turns on. State what turns the furnace off.

1. The furnace heats the room.
2. The room warms back to 20 °C.
3. The thermostat detects this and turns the furnace off.

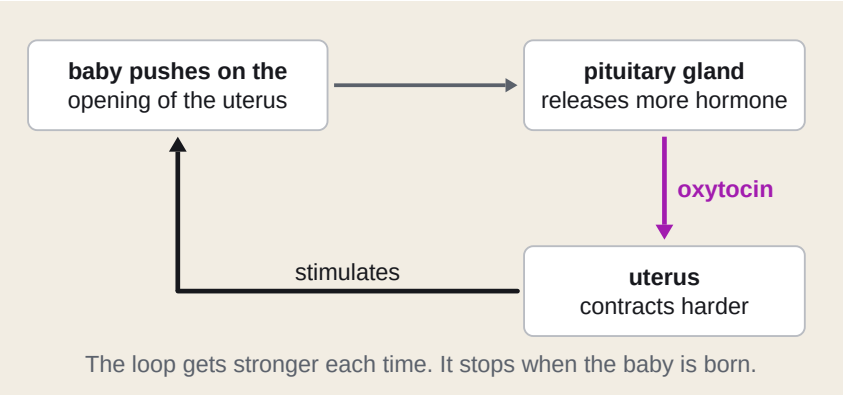
Try it

Compare the response with the change that started it, in negative feedback.

1. The response is opposite to the change.
2. It brings the level back to normal.

Slide 4 of 7 · Positive feedback

On the last slide, negative feedback reversed a change. A few loops in the body do the opposite: they make the change bigger.



The loop gets stronger each time. It stops when the baby is born.

Key ideas

In **positive feedback**, the response **adds** to the change.

In childbirth, the hormone **oxytocin** makes the uterus contract harder.

The loop stops when the baby is **born**.

Example

Explain how you can tell that the childbirth loop is positive feedback.

1. Stronger contractions cause more oxytocin to be released.
2. The response adds to the change.
3. Nothing inhibits the gland.

Try it

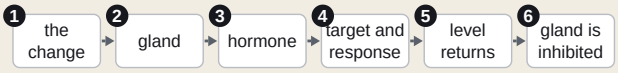
State what positive feedback is useful for.

1. It makes a change bigger and bigger.
2. It finishes one event quickly.

Slide 5 of 7 · Method: trace a negative feedback loop

Every hormone in this unit is controlled by a loop like the furnace and thermostat. These six steps trace any of them.

1. **Name** the level that changed, and which way.
2. **Name** the gland that responds.
3. **Name** the hormone it releases.
4. **Name** the target, and state what it does.
5. **State** how the level changes back.
6. **State** what this does to the gland: it is inhibited.



Check: the response is opposite to the change.

Used again in: lessons A11 to A14

Key ideas

Step 1: name the **level** that changed. Step 2: name the **gland**.

Step 3: name the **hormone**. Step 4: name the target and what it does.

Step 5: the level changes back. Step 6: the gland is **inhibited**.

Example

Use the six steps for a furnace and thermostat when the room cools.

1. The room temperature fell.
2. The thermostat responds and sends a current to the furnace.
3. The furnace heats the room.
4. The room warms back, and the thermostat switches off.

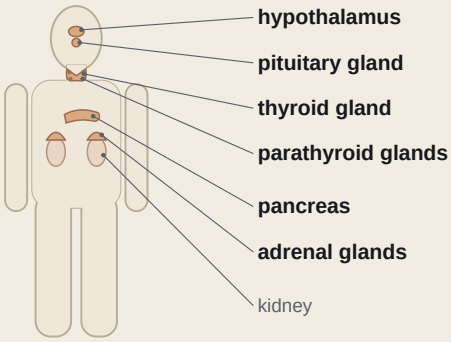
Try it

Hormone X raises the level of a substance. The level falls below normal. Use the six steps to predict what happens to hormone X.

1. The level of the substance fell.
2. The gland releases more hormone X.
3. The target raises the level back to normal.
4. The gland is inhibited, so it releases less hormone X.

Slide 6 of 7 · The endocrine glands

So far a "gland" has been a box on a loop. Now you meet the real glands and see where each one is.



Gland	Hormones in this unit
pituitary gland	hGH, TSH, ACTH, ADH
thyroid gland	thyroxine, calcitonin
parathyroid glands	PTH
adrenal glands	epinephrine, cortisol, aldosterone
pancreas (islet cells)	insulin, glucagon

Key ideas

The **pituitary gland** is in the head, below the hypothalamus.

The **thyroid gland** is in the neck, with four **parathyroid glands** on it.

One **adrenal gland** sits on top of each kidney.

In the pancreas, the **islet cells** make hormones.

Example

Name the gland that releases each hormone: insulin, and thyroxine.

1. Insulin: the pancreas (islet cells).
2. Thyroxine: the thyroid gland.

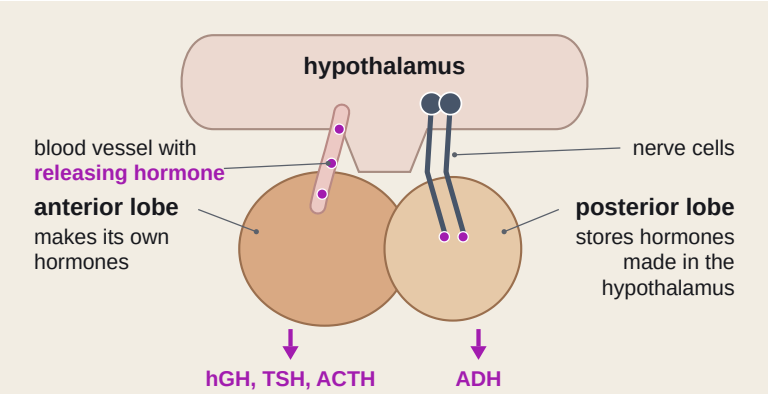
Try it

Name the gland that releases each hormone: epinephrine, and PTH.

1. Epinephrine: the adrenal glands.
2. PTH: the parathyroid glands.

Slide 7 of 7 · The hypothalamus and the pituitary gland

On the last slide, the pituitary gland released four hormones. It does not act alone: the hypothalamus controls it.



Key ideas

The **posterior lobe** stores hormones that the hypothalamus makes. ADH is one.

The **anterior lobe** makes its own hormones: hGH, TSH and ACTH.

The hypothalamus sends **releasing hormones** to the anterior lobe.

Example

Name the lobe of the pituitary gland that stores hormones made in the hypothalamus.

1. Nerve cells carry these hormones down from the hypothalamus.
2. The posterior lobe stores and releases them.

Try it

Explain why the pituitary gland is called the master gland. Name what controls it.

1. Its hormones control other glands.
2. The hypothalamus controls the pituitary gland.