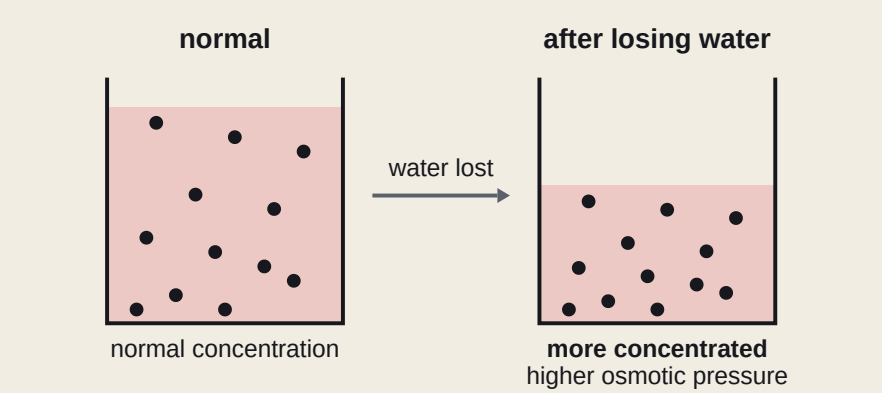
A14 · Water and salt balance: ADH and aldosterone · Completed notes

Goals: Explain how the body detects that the blood is too concentrated. Trace the loop of ADH, and say what ADH does to the urine. Describe diabetes insipidus. State what aldosterone responds to and what it does. Decide whether ADH or aldosterone responds in a given case.

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

Slide 1 of 5 · Sensing how concentrated the blood is

In lesson A13, hormones kept blood sugar steady. This is the last lesson of the unit. Today, hormones keep the water and salt in your blood steady.



Key ideas

When the body loses water, the blood is more **concentrated**.

Its **osmotic pressure** rises.

Osmoreceptors in the hypothalamus detect the change.

Example

You sweat a lot and do not drink. Predict what happens to the osmotic pressure of your blood.

1. The blood has lost water.
2. It is more concentrated.
3. Its osmotic pressure rises.

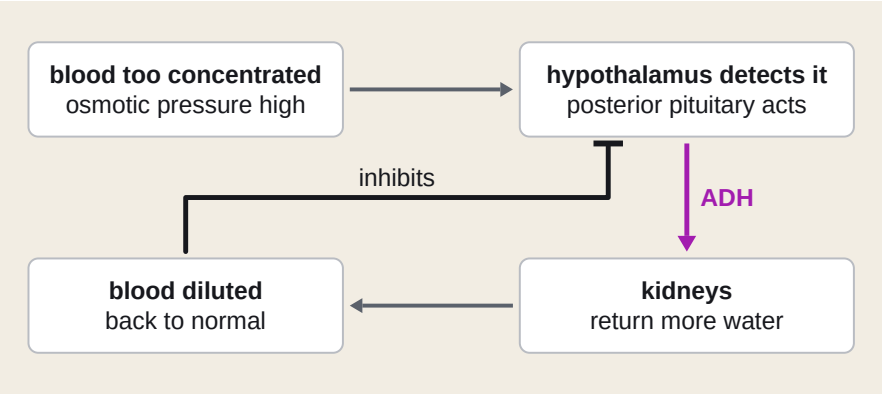
Try it

State where the osmoreceptors are and what they detect.

1. They are in the hypothalamus.
2. They detect how concentrated the blood is.

Slide 2 of 5 · ADH saves water

On the last slide, osmoreceptors in the hypothalamus detected blood that was too concentrated. The hypothalamus responds with a hormone.



Key ideas

The hypothalamus makes **ADH**. The posterior lobe of the pituitary gland releases it.

ADH makes the **kidneys** return more water to the blood.

The blood is **diluted** back to normal. Less ADH is released.

Example

State what ADH makes the kidneys do.

1. They return more water to the blood.
2. Less water is lost in the urine.

Try it

Explain how the release of ADH is turned off.

1. The blood is diluted, and its osmotic pressure falls.
2. The osmoreceptors are no longer stimulated.
3. Less ADH is released.

Slide 3 of 5 · ADH and the urine

On the last slide, ADH made the kidneys return more water to the blood. Water that returns to the blood does not leave in the urine.

ADH	Kidneys	Urine
a lot	return more water to the blood	small volume, concentrated
little	return less water to the blood	large volume, dilute

no ADH at all: diabetes insipidus
up to 16 L of dilute urine a day

Key ideas

With a lot of ADH, the urine is small in volume and **concentrated**.

With little ADH, the urine is large in volume and **dilute**.

With no ADH, the result is **diabetes insipidus**.

Example

You drink a litre of water quickly. Predict what happens to ADH and to your urine.

1. The blood is dilute, so ADH falls.
2. The kidneys return less water.
3. The urine is large in volume and dilute.

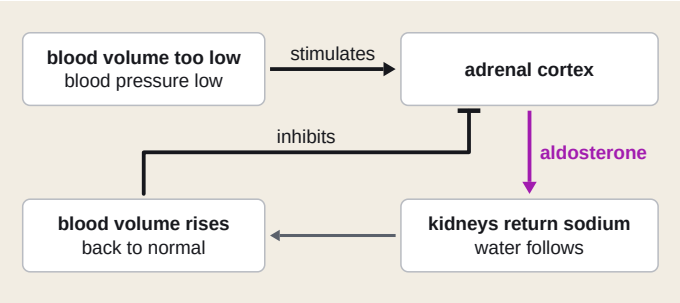
Try it

A person makes 12 L of dilute urine a day. There is no glucose in it. Name the condition and the missing hormone.

1. No glucose rules out diabetes mellitus.
2. The condition is diabetes insipidus.
3. The missing hormone is ADH.

Slide 4 of 5 · Aldosterone and blood volume

On the last slide, ADH adjusted how concentrated the blood is. A different hormone responds when there is simply too little blood.



	ADH	Aldosterone
Released by	posterior pituitary	adrenal cortex
Responds to	blood too concentrated	blood volume too low
Kidneys return	more water	more sodium ions; water follows
Result	blood is diluted	blood volume rises

Key ideas

When blood volume is too low, the adrenal cortex releases **aldosterone**.

The kidneys return more **sodium ions** to the blood. Water follows.

ADH responds to blood that is too **concentrated**.

Aldosterone responds to blood **volume** that is too low.

Example

Explain how aldosterone raises the volume of the blood.

1. The kidneys return more sodium ions to the blood.
2. Water follows the sodium ions by osmosis.

Try it

State what ADH responds to and what aldosterone responds to.

1. ADH responds to blood that is too concentrated.
2. Aldosterone responds to blood volume that is too low.

Slide 5 of 5 · Method: ADH or aldosterone?

Questions describe what happened to a person and ask which hormone responds. These four steps sort it out.

1. **Decide** what is wrong with the blood: too concentrated, or too little of it.
2. **Name** the hormone: ADH for concentration, aldosterone for volume.
3. **State** what the kidneys return to the blood.
4. **State** what happens to the blood and to the urine.



Check: both hormones save water, so both make less urine.

Used again in: this lesson's page

Key ideas

Step 1: decide if the blood is too **concentrated**, or too little.

Step 2: concentration is **ADH**. Volume is **aldosterone**.

Step 3: state what the kidneys return. Step 4: state what happens to the blood and the **urine**.

Example

Use the four steps. A runner sweats for two hours and drinks nothing.

1. Water is lost, so the blood is too concentrated.
2. ADH is released.
3. The kidneys return more water.
4. The blood is diluted. The urine is small in volume and concentrated.

Try it

Use the four steps. A person loses a lot of blood in an accident.

1. There is too little blood.
2. Aldosterone is released.
3. The kidneys return more sodium ions, and water follows.
4. Blood volume and blood pressure rise.