ADH and water-balance feedback

Student activity • observation and reasoning

YEAR 11 / LESSON 72 / BIOLOGY ONLY

The question

How does a feedback response oppose a change in body-water balance?

Use the supplied examples, record your reasoning and correct it using evidence.

Equipment

- Student booklet, paper models, pencil and ruler

Paper, modelling and written reasoning only. No chemicals or biological samples are handled.

Course coverage: Biology only: 2.78B–2.79B. ADH, osmoregulation and urine.

Plan, model or apparatus sketch

Draw and label the apparatus or biological model; identify one limitation.

Method and reasoning

Read the whole sequence before starting

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1. Draw a feedback sequence beginning with reduced blood water potential after water loss.

2. Link detection in the hypothalamus to increased ADH release from the posterior pituitary.

3. Show increased collecting-duct water permeability and greater water reabsorption into blood.

4. Describe the smaller volume of more concentrated urine and how this helps oppose the initial change.

5. Draw the contrasting sequence after excess water intake: lower ADH release, lower permeability and more dilute urine.

6. Explain that feedback maintains conditions within a range rather than producing a perfectly unchanging value.

Cleanup

- Return models and keep the corrected work.

Record your evidence

Blank spaces are for your own work

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Reference and task data

ADH is made in the hypothalamus and released by the posterior pituitary. Its action changes collecting-duct permeability; water moves by osmosis. Urine volume and concentration are responses, not direct measures of a person's exact hydration needs. No deliberate dehydration or water-loading activity is used.

Example / trial	Observation / evidence	Explanation / limit
Evidence / comparison		
Explanation		
Limit / correction		

Show your calculations, labelled model or correction here.

Explain and evaluate

Use evidence and show calculation steps where relevant

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1. Where is ADH made?

2. Where is it released?

3. What happens to permeability with more ADH?

4. What happens to urine volume?

5. Why is this negative feedback?

6. Must a regulated variable remain exactly constant?