Selective reabsorption and ADH

Student activity • observation and reasoning

YEAR 11 / LESSON 70 / BIOLOGY ONLY

The question

How can kidneys retain useful substances and vary water loss?

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: 2.76B–2.78B. Glucose reabsorption and water regulation.

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. Mark return of filtered glucose from the proximal convoluted tubule to the blood; explain why it is normally retained.

2. Distinguish selective solute reabsorption from water movement by osmosis.

3. Trace water from the collecting duct through surrounding tissue to blood when the duct is water-permeable.

4. Explain how increased ADH release makes the collecting duct more permeable to water, increasing reabsorption and producing a smaller volume of more concentrated urine.

5. Predict the opposite response when ADH release decreases, holding other conditions comparable.

6. Draw a negative-feedback loop and explain that ADH changes permeability rather than directly pumping water.

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

Filtered glucose is normally reabsorbed in the proximal convoluted tubule. ADH is made in the hypothalamus and released from the posterior pituitary; it changes collecting-duct water permeability. Water moves by osmosis down a water-potential gradient. This is a physiological model, not a diagnostic test.

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 glucose normally reabsorbed?

2. Why retain glucose?

3. What does more ADH change?

4. How does water move?

5. What urine change follows more water reabsorption?

6. Does ADH pump water directly?