Your notes

GCSE Biology: revision notes

Temperature control and the kidneys

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Controlling body temperature

- Body temperature is monitored by the **thermoregulatory centre** in the brain, which has receptors sensitive to the temperature of the blood. Skin receptors also send information.
- If you are too hot: sweat glands release sweat, which evaporates and cools the skin; blood vessels near the skin surface dilate (**vasodilation**), so more heat is lost.
- If you are too cold: blood vessels near the skin constrict (**vasoconstriction**), sweating stops, and muscles contract rapidly (**shivering**) to release heat from respiration.

Water and waste

- Water leaves the body from the lungs when we breathe out, from the skin in sweat, and in urine. Ions and **urea** are also lost in sweat.
- We have no control over water, ion and **urea** loss by the lungs and skin, so the kidneys control the balance.
- Excess amino acids are broken down in the liver (**deamination**), forming ammonia, which is converted to **urea** for safe excretion.

How the kidneys work

- The kidneys make urine by filtering the blood.
- Useful substances, including all the glucose, some ions and water, are selectively reabsorbed into the blood.
- Urine contains **urea**, excess water and excess ions. It is stored in the bladder.

ADH (Higher)

- The water level in the blood is controlled by ADH, a hormone released by the pituitary gland.
- When the blood is too concentrated, more ADH is released. ADH makes the kidney tubules reabsorb more water, so less, more concentrated urine is produced.
- This is a negative feedback system.

Kidney failure

- Kidney failure can be treated by **dialysis** or a kidney transplant.
- In **dialysis**, the blood flows past a partially permeable membrane surrounded by **dialysis** fluid; **urea** and excess ions diffuse out, but useful substances stay. It must be done several times a week.
- A transplant is a long-term cure but there are not enough donors, and anti-rejection drugs must be taken for life.

Key terms

Thermoregulatory centre	The part of the brain that monitors and controls body temperature.
Vasodilation	The widening of blood vessels near the skin surface to lose heat.
Vasoconstriction	The narrowing of blood vessels near the skin surface to reduce heat loss.
Shivering	Rapid muscle contractions that release heat from respiration.
Deamination	The breakdown of excess amino acids in the liver, forming ammonia.
Urea	A waste substance made from ammonia in the liver and excreted in urine.
Selective reabsorption	Taking useful substances, such as glucose, back into the blood in the kidneys.
ADH	A hormone from the pituitary gland that makes the kidneys reabsorb more water.
Dialysis	A treatment for kidney failure that removes urea and excess ions from the blood.

Quick questions

Cover the answers and test yourself: remembering is what makes it stick.

1. Which part of the body monitors blood temperature?
2. How does sweating cool the body?

Your notes

3. What happens to blood vessels near the skin when you are too hot?
4. Why does shivering warm you up?
5. What is urea made from?
6. Which substance is completely reabsorbed by healthy kidneys?
7. Where is ADH released from? (Higher)
8. What does ADH do? (Higher)

Answers

1. The thermoregulatory centre in the brain
2. Sweat evaporates, transferring energy from the skin
3. They dilate (vasodilation)
4. Muscle contractions release heat from respiration
5. Ammonia from broken-down amino acids
6. Glucose
7. The pituitary gland
8. Makes the kidneys reabsorb more water

What to do next

Practise 10 questions on this topic

Try 6 exam questions, with mark schemes

Read the lesson, one step at a time

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