

Homeostasis

What is homeostasis

- Homeostasis is the maintenance of a constant internal environment.
- Water levels, temperature and blood sugar levels are controlled by homeostasis.
- Constant levels are maintained by **negative feedback**

Blood glucose levels

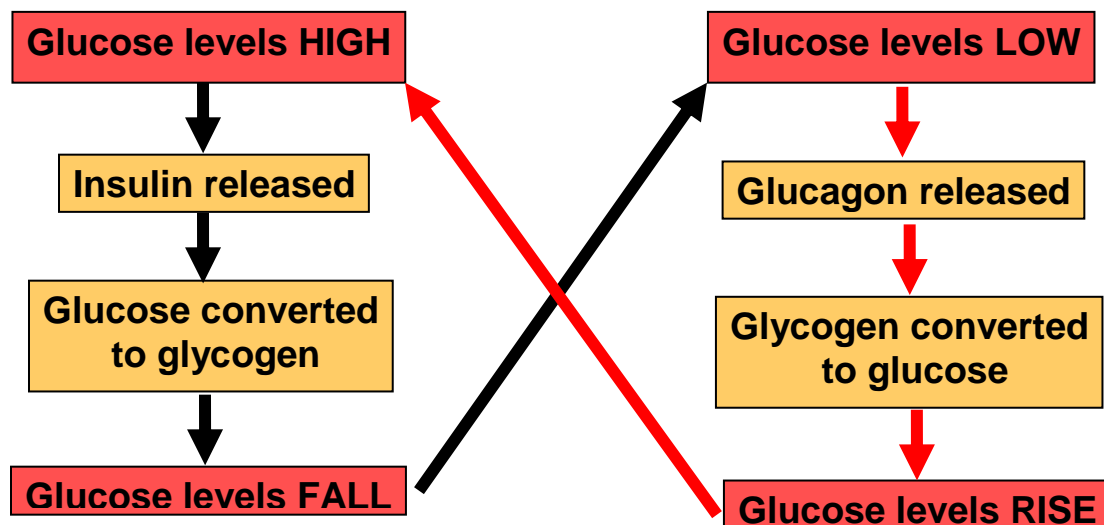
- Constant blood plasma levels of glucose are important as the amount of glucose affects the water potential of the plasma and also all cells require glucose for respiration.
- Levels are controlled by two hormones: insulin and glucagon, both made by the pancreas and act on the liver.

Insulin

- Lowers blood sugar levels.
- Released from the pancreas when chemoreceptors detect high glucose levels.
- These usually occur after a meal
- Glucose is taken up by the liver and converted to glycogen for storage.
- Insulin also inhibits glucagon.

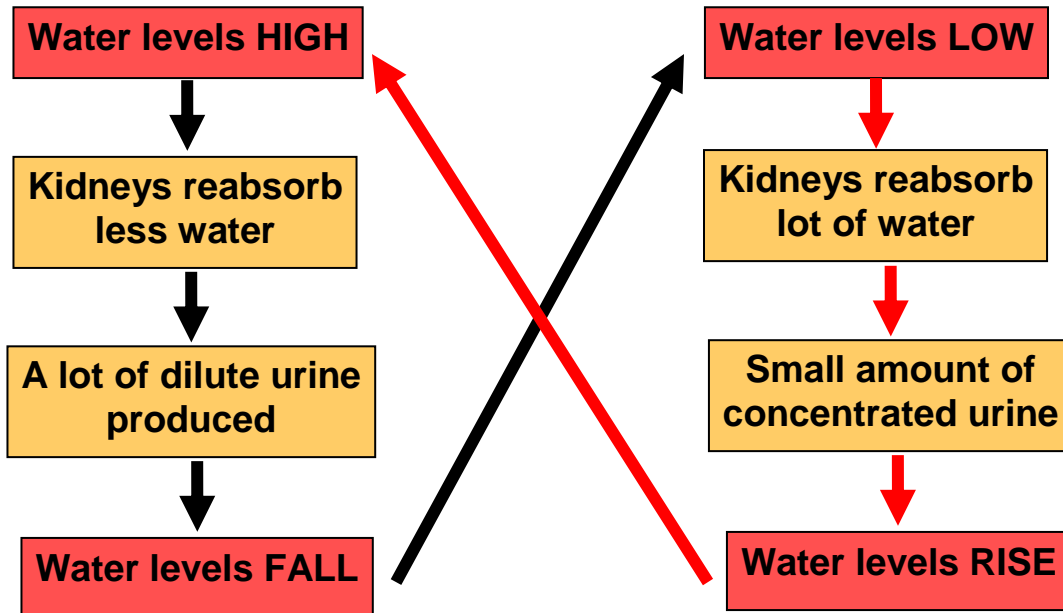
Glucagon

- Increases blood glucose levels.
- Released when a drop in glucose levels is detected.
- Released from pancreas and targets the liver.
- Liver converts glycogen to glucose and releases it into the blood.
- Inhibits insulin production.



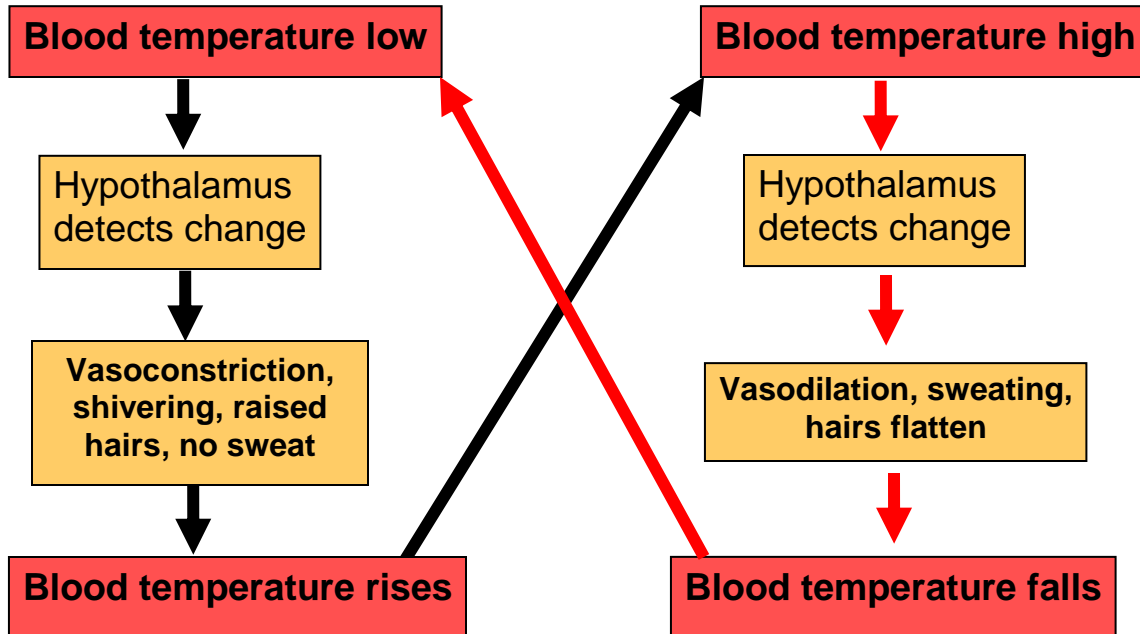
Osmoregulation

- Maintenance of water levels in the blood and body tissues.
- Kidneys regulate the water content.
- Controlled by the hormone ADH.



Thermoregulation

- Heat is **lost** by sweating (evaporation), hairs lying flat and movement of blood to skin surface (vasodilation).
- Heat is **retained** by stopping sweating, shivering, raising hairs (insulation) and movement of blood away from skin surface (vasoconstriction).
- Controlled by the hypothalamus in the brain.



Putting this into practice

Answer the questions below:

1. If a man drank a lot of water would his volume of urine increase or decrease?
2. If a women ran a long race, and did not replenish her fluids, would her volume of urine increase or decrease? Explain your answer.
3. If someone ate a meal containing a large amount of carbohydrates what would happen to the glucose plasma levels after the meal?
4. What hormone would be released after this meal.
5. What hormone would be released during vigorous exercise? Explain your answer.
6. If someone ate a large amount of protein how would the urine change?
7. What part of the body detects temperature change?
8. Which organs are involved in maintaining blood glucose levels?
9. How would shivering help maintain body temperature.
10. Explain why you look pale when you are cold and red when you are hot.