What is Osmoregulation?

Worksheet

Osmoregulation is the physiological process that maintains stable water and solute (salt) balance in the body, mainly through ADH (antidiuretic hormone) controlling how much water the kidneys reabsorb.

Questions

1. What is the main role of osmoregulation?

A) Regulating heart rate
B) Maintaining water and solute balance
C) Producing digestive enzymes
D) Controlling muscle contraction

2. Which hormone increases water reabsorption in the kidneys?

A) Insulin
B) ADH
C) Glucagon
D) Adrenaline

3. When you are dehydrated, ADH levels

A) decrease
B) increase
C) stay the same
D) disappear

4. What detects changes in blood water concentration?

A) Chemoreceptors in the lungs
B) Osmoreceptors in the hypothalamus
C) Baroreceptors in the heart
D) Photoreceptors in the eye

5. A person sweats heavily during a marathon and becomes dehydrated. Explain the osmoregulatory response.

6. Someone drinks 2 liters of water quickly. What happens to ADH and urine output?

7. A patient has diabetes insipidus and cannot produce ADH. Predict the effect on urine.

8. Define: What is osmoregulation?

9. Define: What hormone controls water reabsorption in the kidney?

10. Define: What detects changes in blood osmolarity?

Answer Key

1. B) Maintaining water and solute balance - Osmoregulation keeps water and solute concentrations in body fluids stable.

2. B) ADH - ADH (antidiuretic hormone) makes kidney collecting ducts more permeable to water.

3. B) increase - Dehydration raises blood osmolarity, triggering more ADH release to conserve water.

4. B) Osmoreceptors in the hypothalamus - Hypothalamic osmoreceptors sense blood osmolarity and trigger ADH release.

5. Blood osmolarity rises as water is lost through sweat Osmoreceptors in the hypothalamus detect the increased concentration The posterior pituitary releases more ADH ADH increases water reabsorption in the kidney's collecting ducts Result: less, more concentrated urine is produced and body water is conserved

6. Blood osmolarity drops as excess water dilutes the plasma Osmoreceptors detect the low concentration ADH release decreases Less water is reabsorbed by the kidneys Result: a large volume of dilute urine is excreted to remove the excess water

7. Without ADH, the kidney's collecting ducts stay impermeable to water Water filtered by the kidneys is not reabsorbed Result: the patient excretes large volumes of dilute urine (polyuria) and must drink constantly to avoid dehydration

8. The control of water and solute balance in the body to keep osmolarity stable.

9. ADH (antidiuretic hormone), released from the posterior pituitary.

10. Osmoreceptors in the hypothalamus.