What is Thermoregulation?

Worksheet

Thermoregulation is the homeostatic process that maintains a stable internal body temperature through negative feedback, using the hypothalamus to coordinate heat-loss responses (sweating, vasodilation) and heat-gain responses (shivering, vasoconstriction).

Questions

1. What is the normal human core body temperature?

A) 30C
B) 37C
C) 42C
D) 25C

2. Which response occurs when the body is too hot?

A) Vasoconstriction
B) Shivering
C) Vasodilation and sweating
D) Piloerection

3. Which brain region controls thermoregulation?

A) Cerebellum
B) Hypothalamus
C) Medulla oblongata only
D) Occipital lobe

4. Shivering helps the body by

A) cooling the skin
B) generating heat through muscle contraction
C) increasing sweat output
D) dilating blood vessels

5. A person walks outside in 5C weather without a coat. Describe the thermoregulatory response.

6. Someone exercises hard on a hot day and their core temperature rises to 38.5C. Explain the cooling response.

7. A hiker's core temperature drops to 34C (mild hypothermia). What thermoregulatory failure has occurred?

8. Define: What is thermoregulation?

9. Define: Which organ acts as the body's thermostat?

10. Define: What does vasodilation do?

Answer Key

1. B) 37C - 37C is the typical human core temperature set point.

2. C) Vasodilation and sweating - Vasodilation and sweating release heat to cool the body.

3. B) Hypothalamus - The hypothalamus is the body's thermostat, integrating temperature signals.

4. B) generating heat through muscle contraction - Rapid involuntary muscle contractions during shivering produce heat.

5. Thermoreceptors in the skin detect the cold The hypothalamus triggers heat-conserving responses Blood vessels in the skin constrict (vasoconstriction), reducing heat loss Shivering begins, generating heat through rapid muscle contractions Result: core body temperature is protected from dropping

6. Thermoreceptors detect the temperature rise The hypothalamus triggers heat-loss responses Skin blood vessels dilate (vasodilation), bringing warm blood near the surface Sweat glands increase sweat output, which evaporates and cools the skin Result: heat is lost to the environment and temperature falls back toward 37C

7. Heat loss to the cold environment exceeded the body's heat-generating responses Prolonged vasoconstriction and shivering were not enough to maintain 37C As temperature keeps falling, shivering may stop entirely, worsening heat loss Result: this shows thermoregulation can be overwhelmed by extreme or prolonged cold exposure

8. The homeostatic control of body temperature around 37C.

9. The hypothalamus.

10. Widens skin blood vessels to release heat and cool the body.