

CHAPTER 40: Animal Physiology and Homeostasis

1. Why must (multicellular) animals regulate their internal environment?

2. What is the goal of homeostasis and how is it maintained?

3. Define negative feedback. Give an example.

4. Define positive feedback. Give an example in living systems.

5. Define feedforward information. How is this utilized?

6. Place the following terms in order from smallest to largest group: organism, organ, cell, organ system, tissue, organelle

7. List the four general categories of animal tissues.

_____	_____
_____	_____

8. Describe the functions of epithelial tissue.

9. What are the types and characteristics of muscle tissue?

- a. _____
- b. _____
- c. _____

10. What are the types and characteristics of connective tissue?

- a. _____
- b. _____
- c. _____
- d. _____

11. What are the types and characteristics of nervous tissue?

- a. _____
- b. _____

12. What is Q_{10} ?

13. Compare the energy usage and maintenance of endotherms and ectotherms.

14. What is the equation for the 'energy budget'?

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15. What is BMR and how does it relate to body size of an animal?

16. What mechanisms do endotherms use to maintain a relative constant internal temperature?

17. Describe how the hypothalamus works as the vertebrate thermostat.

END OF CHAPTER 40 MULTIPLE CHOICE

1. Which of the following characterizes the protein elastin?
 - A) It functions predominantly in muscle tissue to resist excess stretching.
 - B) It is found predominantly in epithelial tissue.
 - C) It is found in the extracellular matrix of connective tissue.
 - D) It is the most abundant protein in the body.
 - E) It is responsible for the elasticity of the long extensions of neurons.

2. If the Q_{10} of the metabolic rate of an animal is 2, then
 - A) the animal is better acclimatized to a cold environment than if its Q_{10} is 3.
 - B) the animal is an ectotherm.
 - C) the animal consumes half as much oxygen per hour at 20°C as it does at 30°C.
 - D) the animal's metabolic rate is not at basal levels.
 - E) the animal produces twice as much heat at 20°C as it does at 30°C.

3. Which statement about brown fat is true?
 - A) It produces heat without producing ATP.
 - B) It insulates animals acclimatized to cold.
 - C) It is a major source of heat production for birds.
 - D) It is found only in hibernators.
 - E) It provides fuel for muscle cells.

4. Which of the following is the most important and most general characteristic of endotherms adapted to cold climates compared to those adapted to warm climates?
 - A) Higher basal metabolic rates
 - B) Higher Q_{10} values
 - C) Brown fat
 - D) Greater insulation
 - E) Ability to hibernate

5. Which of the following would cause a decrease in the hypothalamic temperature set point for metabolic heat production?
 - A) Entering a cold environment
 - B) Taking an aspirin when you have a fever
 - C) Arousing from hibernation
 - D) Getting an infection that causes a fever
 - E) Cooling the hypothalamus

6. Mammalian hibernation
- A) occurs when animals run out of metabolic fuel.
 - B) is a regulated decrease in body temperature.
 - C) is less common than hibernation in birds.
 - D) can occur at any time of year.
 - E) lasts for several months, during which body temperature remains close to environmental temperature.
7. Which of the following is an important difference between an ectotherm and an endotherm of similar body size?
- A) The ectotherm has higher Q_{10} values.
 - B) Only the ectotherm uses behavioral thermoregulation.
 - C) Only the endotherm can constrict and dilate the blood vessels to the skin to alter heat flow.
 - D) Only the endotherm can have a fever.
 - E) At a body temperature of 37°C , the ectotherm has a lower metabolic rate than the endotherm.
8. How would you describe the role of skin temperature in the human thermoregulatory system?
- A) It provides feedforward information.
 - B) It acts as a set point for metabolic heat production.
 - C) It provides positive feedback information.
 - D) It provides an error signal.
 - E) It provides negative feedback information.
9. What is the biggest difference between a "cold" fish such as a trout and a "hot" fish such as a tuna?
- A) The temperature of the blood leaving the heart.
 - B) The temperature of the blood entering the gills.
 - C) The arrangement of blood vessels in the gills.
 - D) The temperature of the brain.
 - E) The volume of blood flowing in lateral arteries just under the skin.
10. Which of the following statements about the thermoneutral zone is true?
- A) Metabolic heat production is variable.
 - B) Skin blood flow is variable.
 - C) The environmental temperature equals body temperature.
 - D) Its lower boundary (lower critical temperature) is lower for small than for large endotherms.
 - E) It is the range of hypothalamic temperatures that do not alter metabolic heat production. Answer: b