

LEC 3 Q – META

- 1. What is the primary purpose of thermogenesis?**
 - A) To generate ATP solely
 - B) To produce heat in addition to ATP
 - C) To enhance metabolic pathways
 - D) To regulate body temperature only**Answer: B**
- 2. Which type of thermogenesis is characterized by asynchronous muscle contractions in response to cold?**
 - A) Non-shivering thermogenesis
 - B) Shivering thermogenesis
 - C) Brown adipose thermogenesis
 - D) Adaptive thermogenesis**Answer: B**
- 3. In redox reactions, which statement is true regarding oxidation?**
 - A) It involves the gain of electrons.
 - B) It always occurs in the presence of a coenzyme.
 - C) It results in the loss of hydrogen.
 - D) It is synonymous with reduction.**Answer: C**
- 4. Which coenzyme is primarily involved in catabolic pathways?**
 - A) NADPH
 - B) NADH
 - C) FAD
 - D) NADP⁺**Answer: B**
- 5. Which of the following correctly describes the role of NADPH in cellular metabolism?**
 - A) Primarily involved in oxidative phosphorylation.
 - B) Involved in anabolic pathways like fatty acid synthesis.
 - C) Acts as an electron acceptor in catabolic pathways.
 - D) Functions only in glycolysis.**Answer: B**
- 6. In the context of redox reactions, what does a negative ΔE° indicate?**
 - A) The reaction is favored and spontaneous.
 - B) The oxidized form is more abundant.
 - C) The reduced form is more prevalent.
 - D) The reaction cannot occur.**Answer: B**
- 7. Which statement accurately describes the coenzyme FAD?**
 - A) It primarily accepts electrons as hydride ions.
 - B) It is involved mainly in anabolic reactions.

- C) It accepts electrons in the form of hydrogen atoms.
- D) It is less efficient than NAD^+ in electron transfer.

Answer: C

8. **Which type of tissue is primarily responsible for non-shivering thermogenesis in infants?**

- A) White adipose tissue
- B) Brown adipose tissue
- C) Skeletal muscle
- D) Cardiac muscle

Answer: B

9. **During redox reactions, which of the following is always true?**

- A) Oxidation and reduction can occur independently.
- B) Electrons are transferred from oxidants to reductants.
- C) The reaction always requires oxygen.
- D) Reduction occurs only in the presence of NADH.

Answer: B

10. **What is the significance of the ratio of NAD^+ to NADH in cellular metabolism?**

- A) A high ratio favors anabolic pathways.
- B) A low ratio enhances ATP synthesis.
- C) A high ratio promotes catabolic pathways.
- D) The ratio has no significant impact.

Answer: C

11. **What does a positive ΔE° value indicate about a reaction?**

- A) The reaction is unfavorable and will not occur.
- B) The oxidized form is more stable than the reduced form.
- C) The reaction tends to be spontaneous under standard conditions.
- D) The reaction requires external energy input to proceed.

Answer: C

12. **In metabolic pathways, NADPH is primarily utilized for which of the following processes?**

- A) Glycolysis
- B) Oxidative phosphorylation
- C) Fatty acid synthesis
- D) TCA cycle

Answer: C

13. **Which of the following accurately describes the effect of temperature on thermogenesis?**

- A) Increased temperature stimulates shivering thermogenesis.
- B) Cold environments activate non-shivering thermogenesis.
- C) High temperatures enhance ATP production.
- D) Thermogenesis is independent of external temperature.

Answer: B

14. **Which enzyme is primarily responsible for the reduction of NAD⁺ to NADH during glycolysis?**
- A) Glyceraldehyde-3-phosphate dehydrogenase
 - B) Lactate dehydrogenase
 - C) Alcohol dehydrogenase
 - D) Pyruvate kinase
- Answer: A**
15. **Which physiological condition would most likely lead to an increase in non-shivering thermogenesis?**
- A) Hyperthermia
 - B) Prolonged exposure to cold
 - C) Fever
 - D) High-calorie diet
- Answer: B**
16. **Which of the following best describes the process of non-shivering thermogenesis?**
- A) Activation of skeletal muscles to generate heat.
 - B) Utilization of brown adipose tissue to produce heat in infants.
 - C) ATP production through glycolysis.
 - D) Increased metabolic rate due to high ambient temperatures.
- Answer: B**
17. **In the context of redox reactions, what does a negative ΔG° indicate?**
- A) The reaction is unfavorable and will not occur.
 - B) The oxidized form of the substrate is more abundant.
 - C) The reaction proceeds spontaneously in the forward direction.
 - D) There is a higher concentration of NADH than NAD⁺.
- Answer: C**
18. **Which reaction pair demonstrates a higher reduction potential, making it more likely to be reduced?**
- A) NAD⁺/NADH
 - B) Acetaldehyde/Ethanol
 - C) Oxygen/Water
 - D) Succinate/ α -Ketoglutarate
- Answer: C**
19. **What is the primary role of coenzymes like NAD⁺ in redox reactions?**
- A) To serve as substrates for enzymatic reactions.
 - B) To accept electrons and facilitate the transfer of energy.
 - C) To inhibit metabolic pathways.
 - D) To provide structural support to enzymes.
- Answer: B**
20. **What is the relationship between oxidation and reduction in redox reactions?**
- A) Oxidation occurs without reduction.
 - B) Oxidation involves the loss of electrons, while reduction involves the gain

of electrons.

C) Both processes can occur independently.

D) Reduction always requires oxygen.

Answer: B

21. Which statement correctly describes the significance of the reduction potentials in metabolic reactions?

A) They indicate the energy yield from ATP synthesis.

B) They help predict which substrate will be oxidized or reduced in a reaction.

C) They are irrelevant to cellular metabolism.

D) They only apply to reactions involving NADH.

Answer: B

22. What happens to the ratio of NAD^+ to NADH during high-energy demand conditions, such as exercise?

A) The ratio increases significantly.

B) The ratio decreases, favoring NADH.

C) The ratio remains constant.

D) The ratio decreases but favors NAD^+ .

Answer: D

23. How does shivering thermogenesis primarily generate heat?

A) Through metabolic processes that produce ATP only.

B) By causing rhythmic muscle contractions that consume ATP.

C) Through the oxidation of brown adipose tissue.

D) By increasing blood flow to peripheral tissues.

Answer: B

24. Which metabolic pathway is primarily associated with the function of NADP^+ ?

A) Glycolysis

B) TCA cycle

C) Fatty acid synthesis

D) Oxidative phosphorylation

Answer: C

25. Which of the following statements regarding coenzymes is correct?

A) Coenzymes can only act as electron donors.

B) They are always consumed during the reaction.

C) Coenzymes like NAD^+ and FAD are essential for energy transfer in metabolism.

D) They are only involved in catabolic pathways.

Answer: C

26. In the context of thermogenesis, what physiological response occurs in cold environments?

A) Decreased metabolic rate

B) Activation of both shivering and non-shivering thermogenesis

C) Increased body temperature without energy expenditure

D) Reduction in ATP production

Answer: B

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