

Advanced Human Biochemistry

Biochemistry · Answer Key · 15 Questions

1. Which specific complex in the electron transport chain does cyanide inhibit, effectively ceasing aerobic cellular respiration?

- A) Complex I (NADH dehydrogenase)
- B) Complex II (Succinate dehydrogenase)
- C) Complex III (Cytochrome c reductase)
- D) Complex IV (Cytochrome c oxidase)**

2. In the urea cycle, which molecule acts as the primary nitrogen donor for the synthesis of citrulline from ornithine?

- A) Aspartate
- B) Carbamoyl phosphate**
- C) Argininosuccinate
- D) Glutamate

3. Which amino acid is the primary precursor for the synthesis of the neurotransmitter serotonin in the human central nervous system?

- A) Tyrosine
- B) Tryptophan**
- C) Phenylalanine
- D) Histidine

4. During gluconeogenesis, which enzyme is responsible for the bypass of the pyruvate kinase step by converting pyruvate into oxaloacetate?

- A) Pyruvate carboxylase**
- B) Phosphoenolpyruvate carboxykinase
- C) Fructose-1,6-bisphosphatase
- D) Glucose-6-phosphatase

5. What is the rate-limiting enzyme in the cholesterol biosynthesis pathway, which is the target of statin medications?

- A) Squalene synthase
- B) HMG-CoA reductase**
- C) Mevalonate kinase
- D) Acetyl-CoA acetyltransferase

6. Which form of vitamin K is required as a cofactor for the gamma-carboxylation of glutamic acid residues in blood clotting factors?

- A) Phylloquinone
- B) Menaquinone
- C) Menadione
- D) Hydroquinone**

7. Which metabolic intermediate is common to both the citric acid cycle and the urea cycle?

- A) Fumarate**
- B) Alpha-ketoglutarate
- C) Succinyl-CoA
- D) Oxaloacetate

8. In the pentose phosphate pathway, which enzyme is responsible for the rate-limiting step that produces NADPH?

- A) 6-phosphogluconate dehydrogenase
- B) Glucose-6-phosphate dehydrogenase**
- C) Transketolase
- D) Transaldolase

9. The Bohr effect describes the rightward shift of the oxygen-hemoglobin dissociation curve in response to which conditions?

- A) Increased pH and decreased CO₂
- B) Decreased pH and increased CO₂**
- C) Increased pH and increased 2,3-BPG
- D) Decreased pH and decreased CO₂

10. Which human enzyme is primarily responsible for the detoxification of reactive oxygen species by converting superoxide radicals into hydrogen peroxide?

- A) Catalase
- B) Glutathione peroxidase
- C) Superoxide dismutase**
- D) Peroxiredoxin

11. Which biochemical feature characterizes the structure of the human insulin receptor?

- A) G-protein coupled receptor
- B) Nuclear hormone receptor
- C) Receptor tyrosine kinase**
- D) Ligand-gated ion channel

12. During prolonged starvation, what is the primary source of carbon for gluconeogenesis in the human liver?

- A) Glycerol from adipose tissue
- B) Alanine from skeletal muscle**
- C) Glycogen from muscle
- D) Dietary fructose

13. Which enzyme is deficient in patients with Phenylketonuria (PKU), preventing the conversion of phenylalanine to tyrosine?

- A) Phenylalanine hydroxylase**
- B) Tyrosinase
- C) Phenylalanine transaminase
- D) Homogentisate 1,2-dioxygenase

14. In the beta-oxidation of odd-chain fatty acids, the final cleavage produces acetyl-CoA and which other molecule?

- A) Malonyl-CoA
- B) Propionyl-CoA**
- C) Succinyl-CoA
- D) Acetoacetyl-CoA

15. Which iron-sulfur cluster protein is essential for the mitochondrial synthesis of heme groups?

- A) Ferrochelatase
- B) Aconitase**
- C) Succinate dehydrogenase
- D) Cytochrome b