

MCQ on Fatty Acid Synthesis and Breakdown (Lipid Metabolism)

Multiple Choice Question on Fatty Acid Synthesis and Breakdown (beta-oxidation)

- 1) Free fatty acids in the plasma
 - a) Circulate in the unbound state
 - b) Bind to lipoproteins and circulated
 - c) Bind to albumin and circulated
 - d) Bind to a fatty acid-binding protein and circulated

- 2) In what compartment does the de novo fatty acid synthesis occur?
 - a) Mitochondria
 - b) Peroxisome
 - c) Endoplasmic reticulum
 - d) Cytosol

- 3) What is the precursor for fatty acid synthesis?
 - a) Acetyl CoA
 - b) Propionyl CoA
 - c) Succinyl CoA
 - d) Acetoacetyl CoA

- 4) The conversion of acetyl CoA to malonyl CoA is the rate-limiting step in fatty acid synthesis. Which of the following enzyme catalyzes the above-mentioned reaction?
 - a) Acetyl CoA carboxylase
 - b) Malonyl CoA synthetase

- c) Acetyl CoA decarboxylase
- d) Malonyl CoA synthase

5) The acetyl CoA is produced in the mitochondria and must be transported into the cytosol for the synthesis of fatty acid. Which of the following is true regarding its transport?

- a) Acetyl CoA is diffused from the mitochondrial membrane
- b) Acetyl CoA is transported by its specific transporter protein
- c) Acetyl CoA is converted into pyruvate, enters into the cytosol and acetyl CoA is regenerated
- d) Acetyl CoA is converted into citrate, enters into the cytosol and acetyl CoA is regenerated.

6) What is the allosteric regulator of acetyl CoA carboxylase?

- a) Fatty acid
- b) ATP
- c) Citrate
- d) Acetyl CoA

7) Which of the following event inactivates acetyl CoA carboxylase?

- a) ADP-Ribosylation
- b) Glycosylation
- c) Phosphorylation
- d) Farnesylation

8) Which of the following is not a positive regulator of acetyl CoA carboxylase

- a) Excess calories
- b) Insulin
- c) Citrate
- d) Long-chain fatty acid

9) Which of the following enzyme statement is not true regarding fatty acid synthase?

- a) Fatty acid synthase is a multifunctional enzyme
- b) Fatty acid synthase is active as a dimer
- c) Fatty acid synthase is activated by high-calorie food
- d) Fatty acid synthase complex is inhibited by its phosphorylation

10) What form of energy is required for fatty acid biosynthesis?

- a) ATP
- b) NADH
- c) NADPH
- d) FADH₂

11) What is the source of NADPH required for fatty acid synthesis?

- a) Pentose phosphate pathway
- b) Malic enzyme
- c) Both
- d) None

12) What is the fate of fatty acid entering into the cells

- a) Fatty acid diffuses into mitochondria for beta-oxidation
- b) Fatty acid is converted into fatty acyl CoA (activated form)
- c) Fatty acid is bound to albumin in the cytosol
- d) None of the above

13) The role of L-carnitine in fatty acid metabolism is

- a) Facilitate the transport of fatty acid from the cytosol to mitochondria
- b) Serve as a cofactor for enzyme fatty acid synthase
- c) Activator of acetyl CoA carboxylase
- d) None of the above

14) Identify the correct sequential enzymatic step for fatty acid synthesis

- a) Delta-2-enoyl CoA Dehydrate, Acyl CoA Dehydrogenase, Hydroxy acyl dehydrogenase, Thiolase
- b) Hydroxy acyl dehydrogenase, Acyl CoA Dehydrogenase, Delta-2-enoyl CoA Dehydrate, Thiolase
- c) Thiolase, Acyl CoA Dehydrogenase, Delta-2-enoyl CoA Dehydrate, Hydroxy acyl dehydrogenase
- d) Acyl CoA Dehydrogenase, delta-2-enoyl CoA Dehydrate, Hydroxy acyl dehydrogenase, Thiolase

- 15) The complete beta-oxidation of palmitoyl CoA yield
- a) 8 molecules of Acetyl CoA and 16 NADH
 - b) 8 molecules of Acetyl CoA and 16 FADH₂
 - c) 8 molecules of Acetyl CoA, 8 NADH, and 8 FADH
 - d) 8 molecules of Acetyl CoA and 16 NADPH

16) High rate of beta-oxidation in the liver leads to ketogenesis (ketone body synthesis).

Which of the following condition result in ketogenesis

- a) Uncontrolled Type I diabetes
- b) Pregnancy
- c) Starvation
- d) All of the above

17) Which of the following step is unique to the formation of ketone bodies

- a) Formation of Acetoacetyl CoA catalyzed by thiolase
- b) Formation HMG CoA catalyzed by HMG CoA synthase
- c) Splitting of HMG CoA to acetyl CoA and acetoacetate catalyzed by HMG CoA lyase
- d) Reduction of acetoacetate to 3-hydroxybutyrate catalyzed by 3-hydroxybutyrate dehydrogenase

18) Identify the key regulators of the ketogenic pathway

- a) Acyl CoA/CoA ratio
- b) NADH/NAD ratio
- c) Insulin/Glucagon ratio
- d) All of the above

19) Dicarboxylic aciduria is characterized by the excretion of C6-C10 ω -dicarboxylic acids and by nonketotic hypoglycemia. Identify the defective enzyme from the following?

- a) Long Chain Acyl CoA Dehydrogenase
- b) Medium Chain Acyl CoA Dehydrogenase
- c) Short Chain Acyl CoA Dehydrogenase
- d) Very Long Chain Acyl CoA Dehydrogenase

20) Which of the following is the rate-limiting step of fatty acid oxidation and also inhibited by malonyl CoA

- a) Thiokinase
- b) Carnitine Palmitoyl transferase I
- c) Acyl CoA Dehydrogenase
- d) Thiolase

Multiple Choice Answer Reviewase

1-c) Bind to albumin and circulated

2-d) Cytosol

3-a) Acetyl CoA

4-a) Acetyl CoA carboxylase

5-d) Acetyl CoA is converted into citrate, enters into the cytosol and acetyl CoA regenerated.

6-c) Citrate

7-c) Phosphorylation

8-d) Long-chain fatty acid

9-d) Fatty acid synthase complex is inhibited by its phosphorylation

10-c) NADPH

11-c) Both

12-b) Fatty acid is converted into fatty acyl CoA (activated form)

13-a) Facilitate the transport of fatty acid from the cytosol to mitochondria

14-d) Acyl CoA Dehydrogenase, delta-2-enoyl CoA Dehydrate, Hydroxy acyl dehydrogenase, Thiolase

15-c) 8 molecules of Acetyl CoA, 8 NADH, and 8 FADH

16-d) All of the above

17- Option c) and d)

18-d) All of the above

19-b) Medium Chain Acyl CoA Dehydrogenase

20-b) Carnitine Palmitoyl transferase I