

King Saud University

Faculty of Science

Biochemistry Dept.

Time : Three hours

Bch 347 Metabolism-1

Final Exam

First semester:1430-1431

Student Name :-----

Student number:-----

Serial number :-----

Marks of each group questions:

Group	Marks
Section A	/ 20
Section B	/ 20
Section C	/ 15
Section D	/ 5
Total	/60

Good luck

Section A):

Read the following statements carefully and write whether they are true (T) or false (F):

- 1- The oxidative phase of pentose phosphate pathway is irreversible. ()
- 2- α - oxidation of fatty acids generates energy. ()
- 3- The regulatory enzyme of ketogenesis is HMG CoA lyase. ()
- 4- Glucagon stimulates glycogenolysis in liver and muscles. ()
- 5- β -oxidation of Fatty acid produces one FAD and one NAD in each cycle. ()
- 6- β -oxidation of fatty acid includes two oxidation steps in each cycle. ()
- 7- Complete β - oxidation of C 12 fatty acid needs 5 cycles. ()
- 8- Malic enzyme is an important source of NADPH in the mitochondria. ()
- 9- ketolysis does not occur in the liver due to absence of the enzyme thiolase. ()
- 10- Free fatty acid pool 1 (FFA pool1) formed by the action of lipoprotein lipase on triacylglycerol in adipose tissue. ()
- 11- β -oxidation of fatty acids in peroxisomes is induced by high fat diet. ()
- 12- The rate limiting step in glycolysis is catalyzed by pyruvate kinase. ()
- 13- Pyruvate is converted to acetyl CoA by oxidative decarboxylation. ()
- 14- TCA cycle is an amphibolic pathway. ()
- 15- In glycogenesis, glycogen synthase catalyzes the transfer of glucose units from glucose-1-phosphate to glycogen primer. ()
- 16- Fatty acid synthase complex for denovo synthesis of fatty acids stop on formation of 16 carbon fatty acids. ()
- 17- α -Oxidation of fatty acids causes accumulation of phytanic acid in the brain. ()
- 18- Ketogenesis occurs when there is a high rate of fatty acid oxidation in the liver. ()

19- Ketosis may cause metabolic alkalosis due to depletion of bicarbonate. ()

20- Omega oxidation of fatty acids involves formation of succinyl di CoA. ()

Section B): Choose the right answer only (only one answer):

1-Complete oxidation of palmitic acid gives-----ATP:

- a) 125.
- b) 129.
- c) 130.
- d) 132.

2-Chylomicrons are cleared from plasma by:

- a) Gastric lipase.
- b) Pancreatic lipase.
- c) Hormone-sensitive lipase.
- d) Lipoprotein lipase.

3-Mitochondrial system for chain elongation of fatty acids:

- a) The source of 2 carbon atoms is malonyl CoA.
- b) NADH and NADPH are the sources of the reducing agents.
- c) Serves for the elongation of existing long chain fatty acids.
- d) Needs fatty acid synthase multienzyme complex.

4-The end product of β -oxidation of odd chain fatty acids is:

- a) 2 Acetyl Co A molecules.
- b) 2 Malonyl Co A molecules.
- c) One acetyl CoA & one Propionyl Co A molecule.
- d) One acetyl coA & one acetoacetoacetyl Co A molecule.

5-Hormone stimulates lipolysis during fasting:

- a) Insulin.
- b) Glucagon.
- c) Epineperine.
- d) Adrenocroticotropic hormone (ACTH).

6- Fatty acid biosynthesis:

- a) Requires NADPH.
- b) Requires NADH.
- c) Requires FAD.
- d) Takes place in the mitochondria.

7- Glycogen synthase:

- a) Requires ATP to add glucose to growing glycogen chain.
- b) Forms an immature glycogen molecule.
- c) Forms branched chain polymer.
- d) Is the only enzyme needed for glycogen production.

8-Emulsification of dietary lipids is done by:

- a) Bile salts.
- b) Peristalsis.
- c) Colipase
- d) All of the above.

9- α -oxidation of fatty acids:

a) Hydroxylation takes place on the methyl carbon.

b) Needs hydroxylase enzyme that requires NADPH+H⁺, molecular oxygen and cytochrome P 450.

c) Occurs in the brain as a source of energy.

d) Occurs in the cytosol.

10-In microsomal system for chain elongation of fatty acids the source of the 2 added carbon atoms is:

a) Acetyl Co A.

b) Propionyl Co A.

c) Malonyl Co A.

d) Acetoacetyl Co A.

11-A lipid component that can be converted to glucose:

a) Glycerol.

b) Fatty acid.

c) Cholesterol.

d) Sphingosine.

12-In fatty acid synthesis, the transfer of acetyl group across the inner mitochondrial membrane mainly by means of:

a) The carnitine shuttle.

b) Malonyl transacylase.

c) Acetyl transferase.

d) Citrate transport system.

13-Phospholipases:

- a) Phospholipase D separate remove fatty acid at C1 of phospholipids.
- b) Lysophospholipase removes fatty acid at C2 of phospholipids.
- c) Phospholipase C separate phosphoryl base from glycerol.
- d) Are activate d in the pancreas by trypsin.

14-The fatty acids, fatty acid synthase for denovo synthesis of:

- a) 3-ketoacyl synthase catalyzes condensation of acetyl unit with 2 carbon portion of malonyl unit on ACP.
- b) Exist as monomer in eukaryotes.
- c) Acyl carrier protein contains SH group of cysteine.
- d) In each cycle 2 CO₂ molecules are produced

15-Digestion of lipids:

- a) Colipase is the major enzyme of TG hydrolysis.
- b) Pancreatic lipase hydrolyses TG with optimum pH 5.
- c) Cholesterol ester hydrolase is non specific enzyme.
- d) Pancreatic lipase is specific for esters in the β position of TG.

16- Glycerol kinase is present in the following tissues except:

- a) Liver.
- b) Kidney
- c) Adipose tissue.
- d) Intestine.

17-In glycogenolysis, glycogen phosphorylase:

- a) Is activated by insulin.
- b) Is inhibited by epinephrine.
- c) Is inhibited by glucose - 6 phosphate.
- d) The phosphorylated form is inactive.

18-The major site of gluconeogenesis is:

- a) Muscle
- b) Kidney.
- c) Intestine.
- d) Liver.

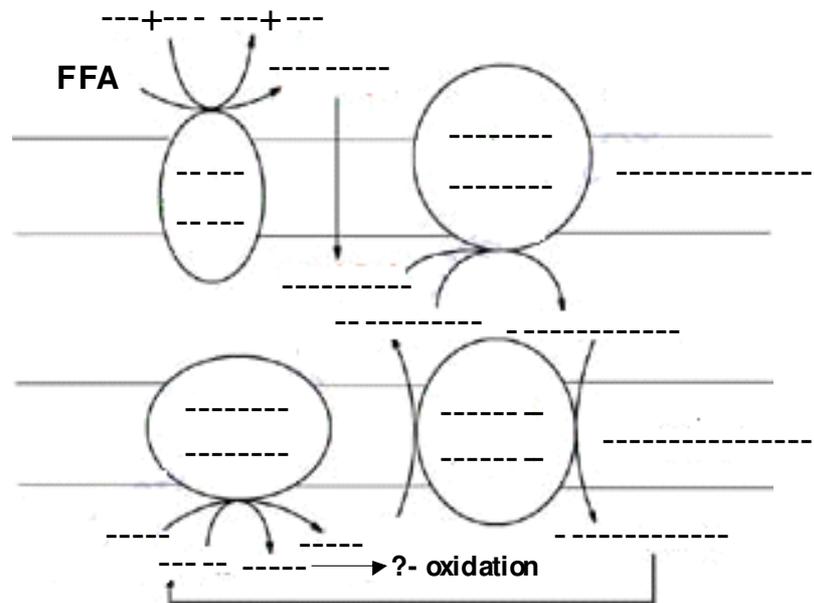
19-ketolysis:

- a) Takes place in the liver mitochondria.
- b) Can occur in cardiac and skeletal muscles during severe exercise.
- c) Reactivation of acetoacetate is carried by cytosolic enzyme thiophorase.
- d) Starvation is a pathological cause of ketosis.

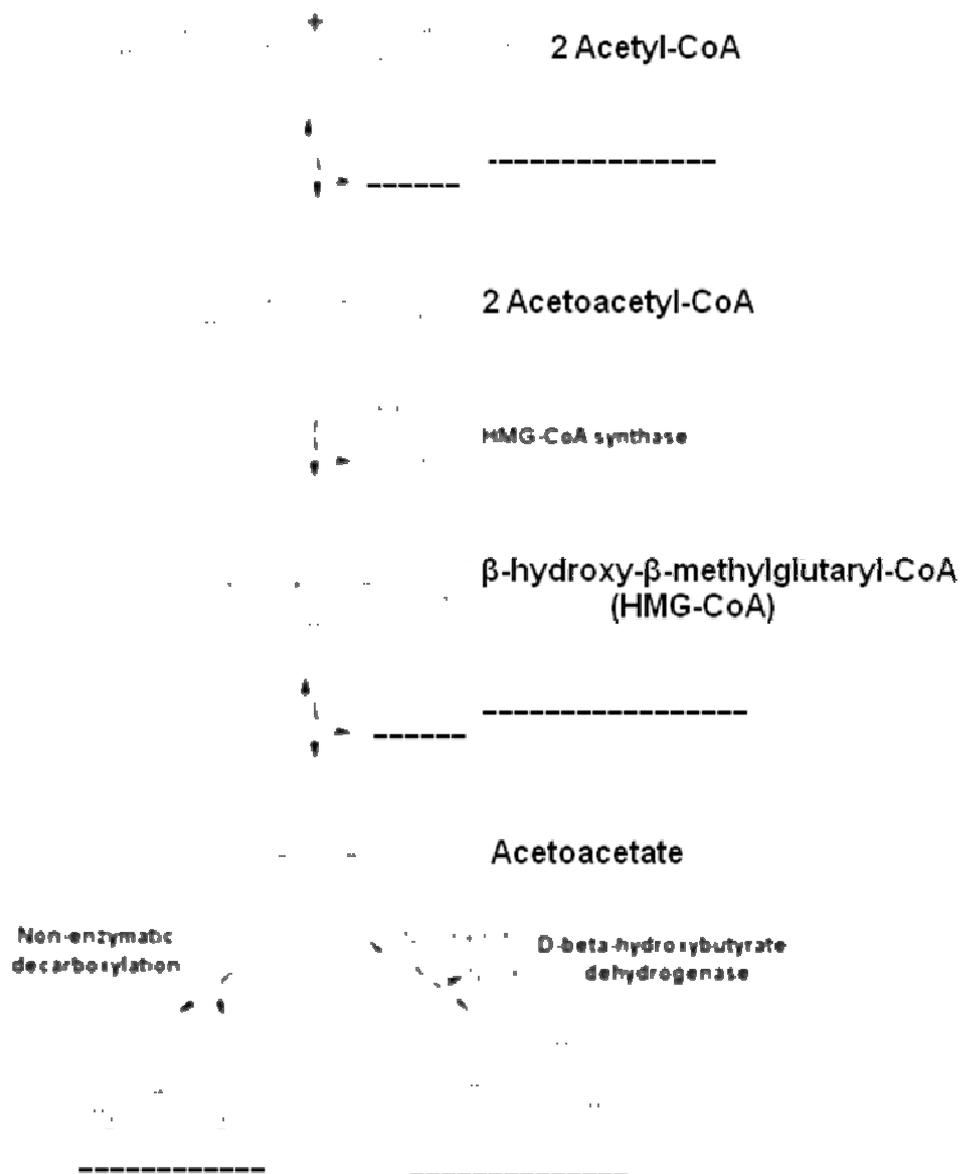
20- Glycogenolysis:

- a) Takes place mainly in the liver and kidney.
- b) Glycogen phosphorylase catalyzes release of free glucose from glycogen.
- c) Liver glycogen can maintain relatively constant glucose level.
- d) α 1, 4 \rightarrow α 1, 4 glucotransferase catalyzes the transfers of 6 glucose residues from one branch to the nearest one.

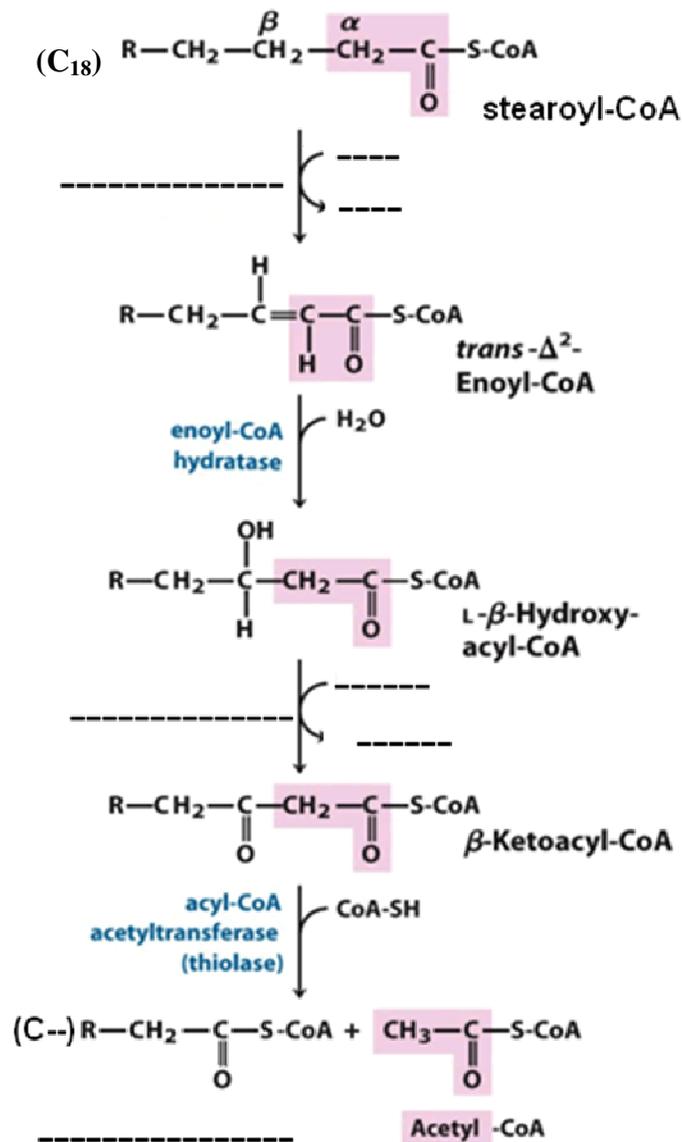
Section C: Label the following diagrams, and then answer the related questions:



- a- What is this pathway? -----
- b- It is important for-----
- c- Carnitine is synthesized in the-----
from-----



- a- What is this pathway? -----
- b- Where it occurs? -----
- c- What is the regulatory enzyme, how it is regulated?
- The regulatory enzyme is:-----
 - It is induced by-----
 - It is inhibited by-----



a) What is this pathway? -----

b) Calculate ATP produced from complete oxidation of stearoyl CoA (C₁₈)?

1- Complete the following:

a) 2 enzymes in denovo synthesis of fatty acids that catalyzes the two reduction reactions are:

1-----

2-----

b) In regulation of glycogen metabolism, insulin stimulates protein phosphates-1

which activates-----, while inactivates

-----.

c) The key regulatory enzyme of fatty acid synthesis is-----

Which is activated by-----and is inhibited by

d) Malonyl Co A inhibits-----that inhibits

thus inhibits β -oxidation.

e) α -oxidation of fatty acids is important for synthesis of

-----for cerebroside formation.

f) Oxidation of fatty acids in peroxisomes leads to formation of

-----which is broken down by catalase.