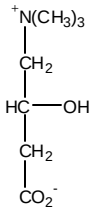
BIOSCI 1820
Quiz #5
MAR 2001

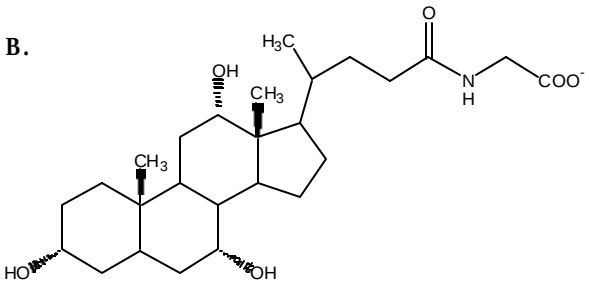
KEY

I. Choose the structure on the right that best matches the definition on the left.

A.



B.



D stearic acid

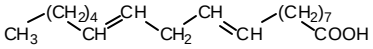
E oleic acid

A carnitine

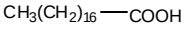
F acyl carrier protein

B bile salt

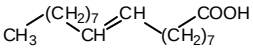
C.



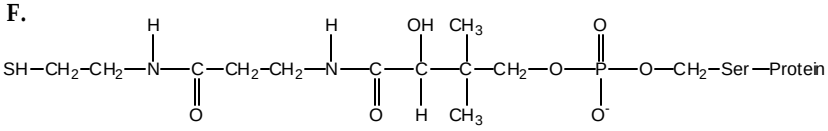
D.



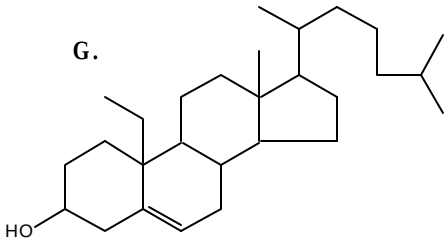
E.



F.



G.



II. You subject a purified mixture of LDL, chylomicrons, and HDLs to centrifugation in order to separate them by density and obtain the following 3 bands in the centrifuge tube after spinning the sample. Identify each of the three bands:

chylomicrons -least dense
LDL
HDL -most dense

III. Explain how triacylglycerols move from the intestine to the lymph system and capillaries **soon after** the ingestion of fats (do **not** discuss the entire VLDL-IDL-LDL, etc. pathway...).

TAGs are solubilized with bile salts which facilitates the cleavage of FAs from TAGs by pancreatic lipase. The FAs are transported across the membrane of the mucosal cells, and are re-added onto glycerol to re-form TAGs, which are incorporated into chylomicrons.

IV. Multiple Choice: Choose the best answer...

Which of the following is false with regard to the mechanism by which an LDL particle delivers its cholesterol into a target cell?

A. ApoB-100 interacts with the LDL receptor

B. The LDL-LDL receptor complex is endocytosed via "coated pits"

C. The endocytic vesicles fuse with lysosomes, which have a high internal pH because of a proton pump in their membrane.

low

D. Cholesterol and amino acids are freed into the cytoplasm

E. The liberation of cholesterol down-regulates HMG-CoA reductase and the synthesis of new LDL receptors.

F. All of the above are correct.

During exercise, epinephrine is released into the blood stream, with the ultimate goal being the generation of metabolites for energy production. Which of the following events is not evident in this pathway?

A. Epinephrin binds to the G-Protein-coupled receptor

B. The β-subunit of the G protein exchanges its pre-bound GDP for GTP

α

C. Adenylate cyclase is activated, with a resulting increase in cAMP

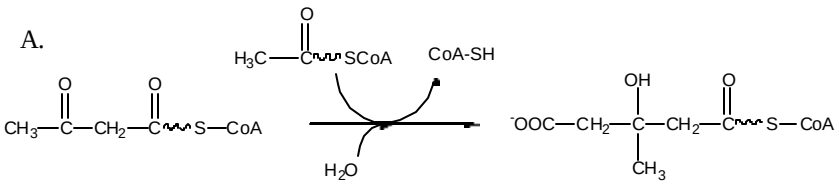
D. Protein kinase phosphorylates triacylglycerol lipase

E. Fatty acids are freed from triacyl glycerol

F. All of the above are correct.

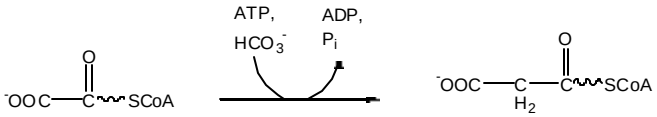
V. Draw the structures of the products of the following reactions:

A.



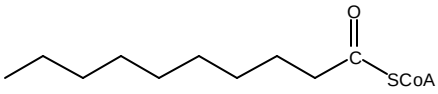
HMG CoA

B.



Malonyl CoA

VI. The following compound is delivered to the b-oxidation pathway. Showing all of your work and assumptions, how many ATPs could be generated from the complete oxidation of this molecule in the mitochondria?



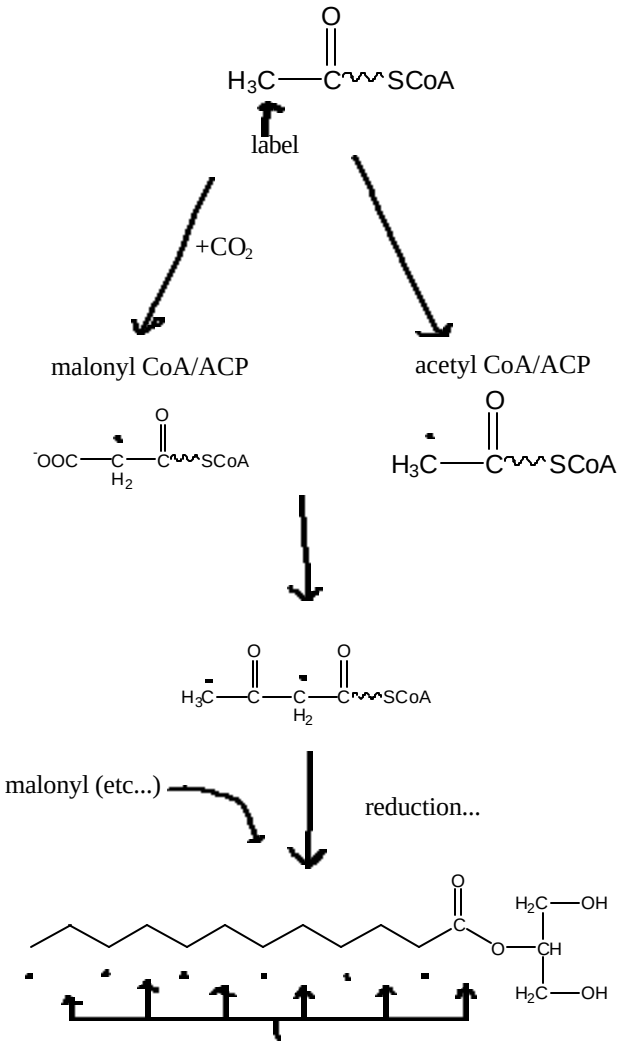
[Already activated, so don't have to use 2ATP equation.]

10-C FA, so 4 rounds of b-oxidation.

Each round: 1 FADH => 2ATP
1 NADH => 3ATP
1AcCoA => 12ATP in TCA cycle
17 x 4 = 68

Plus, 1 more AcCoA at the end = 12 ATP => **80 ATPs total**

VII.Acetyl-CoA radio-labeled with carbon-14 at the indicated position is fed into the fatty acid synthase pathway. Draw the structure of a monoacylglycerol containing a 12 carbon fatty acid at the 2-position which was generated exclusively from the radiolabeled acetate (assume that the glycerol was pre-existing).



These all come from the carbonyl carbons!