Chem. 454 EXAM 3-40pts

NAME KEY

1) Drawing upon you experience in this class, name two risk factors for promoting coronary artery disease (CAD) and explain in detail how these risk factors influence the disease and how their effects can be minimized. Two treatments, (1) feeding of gritty cationic polymers (cholestyramine) and (2) taking the drug Lovastain have been shown to reduce the risk of CAD. Explain how for each one. (11)

many answers eg.

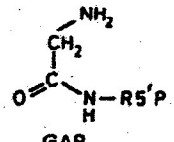
I) Smoking: MDA (malonyl dialdehyde) forms crosslinks with lysines on LDL. This neutralizes LDL and prevents uptake. These LDL's circulate a long time and oxidize and end up adhering to collagen in the arteries. This is the start of an atherosclerotic plaque. Stop smoking to minimize!

2) High blood pressure: High B.P. stresses endothelia in arteries causing them to open & leak LDL's underneath. LDL's oxidize and are picked up by macrophages which accumulate cholesterol esters, convert to foam cells and cause proliferation of cells and atheromas to form. Lower B.P. with B-blockers or salt reduction or weight loss.

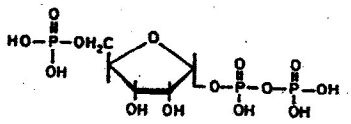
II. 1. Anion exchange resins bind bile acids and stop them from being reabsorbed in the intestine. The liver takes up more LDL to make more bile acids in response. Thus [LDL] goes down and does not circulate as long so fewer fatty streaks form.

2. Statin drugs inhibit HMG-CoA reductase, the committed step in cholesterol synthesis. Cells must take in more LDL to make up the difference and so [LDL] in serum goes down. Also LDL circulates for less time due to these extra LDL receptors on cells.

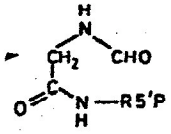
2) Arrange the 12 intermediates of <u>IMP biosynthesis</u> in correct order (first to last). (6)


GAR

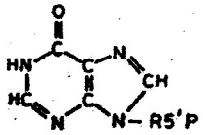
A



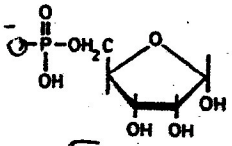
B


Formyl GAR

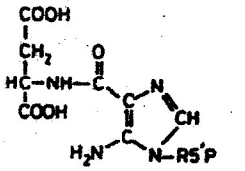
C


IMP

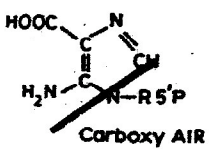
D



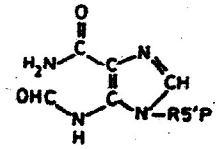
E


Succino-AICAR

F


Carboxy AIR

G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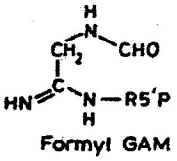
H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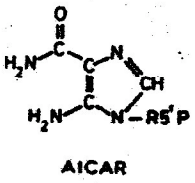
I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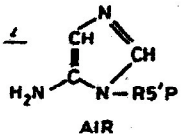
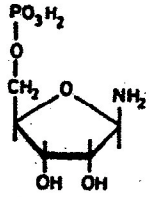
J


AIR

K

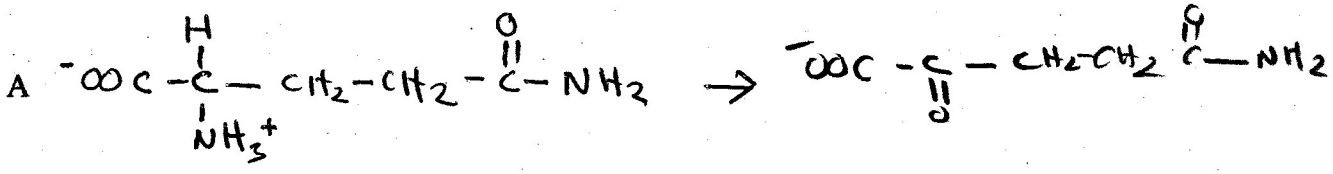


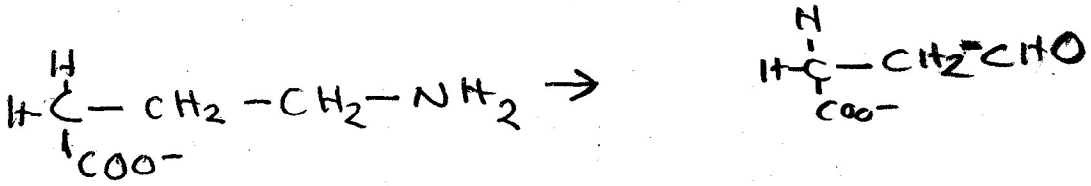
L

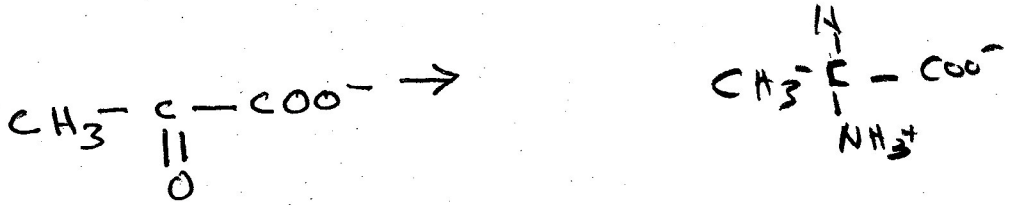
E / 1st — B / 2 — L / 3 — A / 4 — C / 5 — I / 6 — K / 7 — G / 8 — F / 9 — J / 10 — H / 11 — D / 12 last

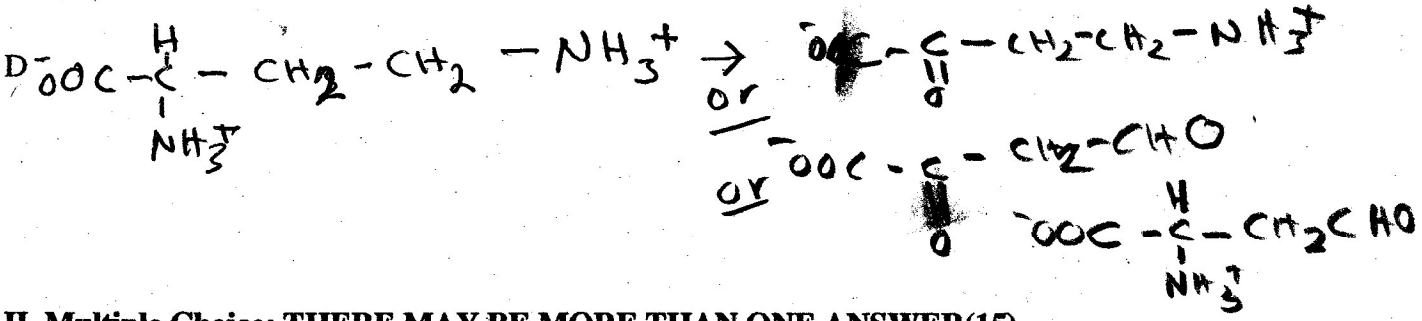
Steps

3) Draw ***all*** the possible transamination products for the following molecules (if any)(8):

A 

B 

C 

D 

II. Multiple Choice: THERE MAY BE MORE THAN ONE ANSWER(15)

1) B Which of the following is NOT a precursor or intermediate in the synthesis of sphingomyelin?

A) palmitoyl CoA
B) lysophophatidic acid
C) CDP-choline
D) Acyl CoA

2) A,E Which of the following are common features of the synthesis of mevalonic acid and ketone bodies?

A) both involve 3-hydroxy-3-methylglutaryl CoA (HMG CoA).
B) Both require NADPH
C) Both require HMG-CoA cleavage enzyme
D) Both occur in the mitochondria
E) Both occur in liver cells

3) C In which compartment of the cell does ganglioside G_{M2} accumulate in Tay-Sachs patients?

A) nucleus
B) Golgi apparatus
C) lysosome
D) mitochondria

4) AB Which of the following answers complete the sentence correctly?

Glutathione _____....

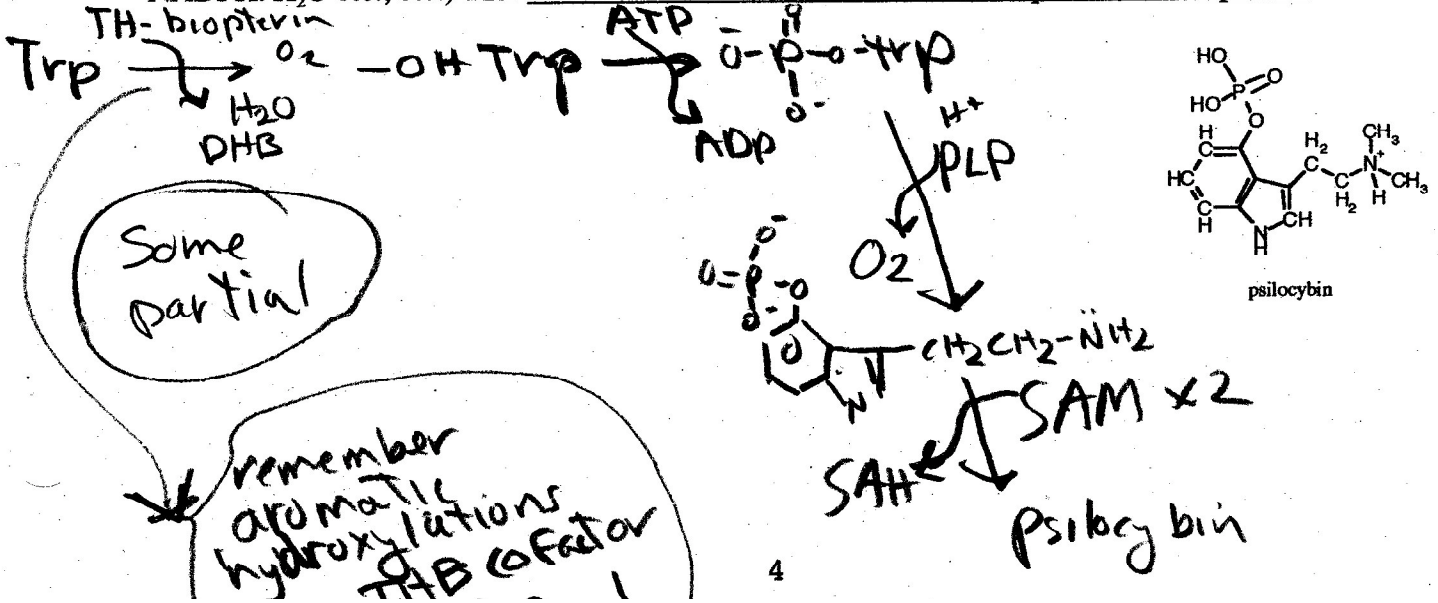
A) cycles between oxidized and reduced forms in the cell.
B) is involved in the detoxification of H_2O_2 and organic peroxides.
C) donates amide groups from its γ-glutamyl residue during biosynthetic reactions.
D) contains an Se atom.

5) ACEFG Which of the following are intermediates or precursors in the synthesis of heme?

A) δ-aminolevulinic acid
B) bilirubin
C) porphobilinogen
D) biliverdin
E) glycine
F) succinyl CoA
G) Fe^{2+}

BONUS(5)

The psychoactive mushroom compound, psilocybin (below) is synthesized from tryptophan. Outline the most likely biosynthetic route *from tryptophan* <u>including</u> all expected <u>soluble or enzyme bound cofactors, products and reactants</u> (*e.g.* O_2, PLP, biotin, FAD, methylene-THF, NADPH. H_2O etc., etc.) This <u>conversion will have more than one step; no miracles please!</u>



psilocybin