



KENYATTA UNIVERSITY

UNIVERSITY EXAMINATIONS 2008/2009

SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF MEDICINE

HMB 103: MEDICAL BIOCHEMISTRY

DATE: Thursday, 10th September, 2009 TIME: 9.00 a.m. – 12.00 p.m.

INSTRUCTIONS:

Section A: Answer all the three Questions (5 Marks each)

1. Fill in the information missing in the following Table

Disease	Enzyme	Lipid accumulating	Clinical symptoms
Tay-Sach's	Hexosaminidase A		
Fabry's	Alpha- galactosidase		
Krabbe's	Beta- galactisidase		
Gaucher's	β - glucosidase		
Niemann- PiCK	sphingomyelinase		

2. The ability of glycolysis to provide ATP in the absence of oxygen is especially important because it allows _____ to perform at very high levels when oxygen supply is insufficient and because it allows tissues to survive _____. However, _____ muscle, which is adapted for aerobic performance, has relatively low glycolytic activity and poor survival under conditions of _____. Diseases in which enzymes of glycolysis

(eg, pyruvate kinase) are deficient are mainly seen as _____ or, if the defect affects skeletal muscle (eg, phosphofructokinase), as _____. In fast-growing cancer cells, glycolysis proceeds at a higher rate than is required by the citric acid cycle, forming large amounts of _____, which is reduced to _____ and exported. This produces a relatively _____ local environment in the tumor which may have implications for _____.

3. Most proteins are active only within a narrow pH range, 5-9. This is a result of the effects of pH on a combination of factors:

- (a).....
- (b).....
- (c).....
- (d).....

Section B: Answer all the three Questions (5 Marks each)

1. Define the terms

- i. Hypoxia
- ii. Gluconeogenesis
- iii. Glycogenesis
- iv. Hypoglycemia
- v. Isozymes

2. Explain how the kinetic parameters K_M and V_{max} (K_{cat}) can be used to decide whether an enzymatic reaction occurs through steady state or equilibrium mechanism.
3. a. What are the non-steroidal anti-inflammatory drugs (NSAIDs)?
- b. Briefly explain the mechanism of acetyl-salicylic acid (aspirin) and its significance

Section C: Answer all the three Questions (10 Marks each)

1. Discuss Cori and Glucose-Alanine cycles
2. Explain the mode of action of the following anti-cholesterol therapies.
- a. Anion exchange resins.
 - b. Competitive inhibitors of HMG-CoA reductase.
3. Describe how the irreversible glycolytic reactions are bypassed in gluconeogenesis.

Section D: Multiple Choice Questions (5 Marks each)

Instructions:

Answer True or False.

1. The following statements refer to lipoproteins. Indicates which is true or false
 - A. High density lipoproteins (HDL) are involved in the transport of cholesterol from peripheral tissues to the liver.
 - B. High level of HDL- cholesterol is detrimental to health.
 - C. The major protein moieties of HDL are apolipoproteins A-I and A-II.
 - D. HDL appears to be antithrombotic
 - E. None of the above.
2. The following metabolic processes may be active in the fasting states. Which ones are true or false?
 - A. Activating cAMP-dependent hormone sensitive lipase in adipose tissue.
 - B. Lipolysis of triglycerols of chylomicrons by lipoproteins lipases in capillaries.
 - C. Activation of Acetyl-coA carboxylase in liver.
 - D. Phosphorylation of glycerol by glycerol kinase adipose
 - E. None of the above
3. In the fed state, when fatty acids are being synthesized in liver they cannot immediately undergo beta oxidation. Which of the statements below is true or false?
 - A. cAMP and fatty acyl coA depress the activity of acetyl CoA carboxylase.
 - B. They are used in esterification pathway.
 - C. Fatty acyl- coA inhibits mitochondrial citrate synthesis
 - D. Insulin leads to increased uptake of glucose into cells and on an increased rate of glycolysis.
 - E. None of the above.
4. In the control of fatty acid metabolism, which of the following statements are true or false?
 - A. When fuel is abundant fatty acid oxidation is enhanced
 - B. High carbohydrate intake causes increased fatty acid synthesis.
 - C. High carbohydrate causes decreased fatty acid synthesis.
 - D. Palmitoyl-coA has no effect on fatty acid synthesis.
 - E. None of the above.
5. The following are regulators of Pyruvate Dehydrogenase Multienzyme Complex
 - A) NADH
 - B) FADH₂
 - C) Pyruvate
 - D) Glucose
 - E) Acetyl-CoA

6. The following are substrates of gluconeogenesis
- A. Alanine
 - B. Glycerol
 - C. Oxaloacetate
 - D. Succinate
 - E. 1,3-Bisphosphoglycerate
7. The following enzymes catalyze reactions in the preparatory phase of glycolysis
- A. Aldolase
 - B. Enolase
 - C. Phosphoglycerate mutase
 - D. Hexokinase
 - E. Phosphohexose isomerase
8. The following hormones are positive effectors of Fructose-1,6-Bisphosphatase
- A. Insulin
 - B. Glucagon
 - C. Epinephrine
 - D. Norepinephrine
 - E. Growth hormone