BIOCHEMISTRY TESTS TO PRACTICE

1st MTO (enzymology, bioenergetics, carbohydrates, lipids)

1. Match the levels of protein structures in left column with the appropriate descriptions in the right column

(a) Primary	1.Association of protein subunits
(b) Secondary	2.Aggregate of α-helixal and B-sheet structures
(c) Supersecondary	3.Linear amino acid sequence
(d) Tertiary	4.Spatial arrangement of amino acids that are near each other in the linear sequence
(e) Quaternary	5.Necessary for the catalytic activity of an enzyme

2. Which of the following statements regarding simple Michaelis-Menten enzyme kinetcs are correct? M

a) K_M is the concentration of substrate required to achieve one half of Vmax
b) K_M is expressed in terms of a reaction velocity (e.g., mol s-1)
c) K_M is the concentration of substrate required to convert one half of total enzyme into the enzyme-substrate complex
d) K_M is the dissociation constant of the enzyme-substrate complex

3. Which of the following statements about the different types of enzyme inhibition is/are correct? M

a) competitive inhibition is seen when the substrate and the inhibitor compete for the active site on the enzyme
b) noncompetitive inhibition of an enzyme cannot be overcome by adding large amounts of substrate
c) competitive inhibitors are often similar in chemical structure to the substrates of the inhibited enzyme
d) competitive inhibitors often bind to the enzyme irreversibly

4. When protein subunits combine to form a quaternary structure, which of the following interaction(s) may arise? M

a) hydrogen bonding
b) hydrophobic interaction
c) electrostatic bonding
d) van der Waals forces

5. Which of following statements about protein structure is/are correct? S

a) the extended β-configuration is not found in globular proteins
b) the stability of the α-helix is mainly due to hydrophobic interactions
c) the primary stucture of a peptide does not influence the formation of the native three dimensional configuration
d) globular proteins tend to fold configurations that keep hydrophopic side chains in interior of the molecule

6. Which of followings is a macroergic (high energy) compound of the glycolytic pathway? S

a) glucose–6-phosphate
b) fructose-1,6-bisphosphate
c) glyceraldehyde-3-phsphate
d) 1,3-bisphosphoglycerate

7. Wich of the following aldolases is needed for the catabolism of fructose? S

a) threonine aldolase
b) transaldolase
c) aldolase A
d) aldolase B

8. What is the role of the hexose–monophosphate-shunt in the RBC-s? S

a) to generate $NADPH+H^+$
b) to produce ribulose-5-phosphate
c) to oxidize glucose directly to CO_2
d) to produce more ATP

9. Uronic acid plays a role in the following pathways of humans EXCEPT: S

a) conjugation of bilirubin
b) formation of glycosaminoglycans
c) hyaluronate synthesis
d) synthesis of ascorbate

10. Phosphorylase enzyme is regulated by the followings, EXCEPT: M

a) phosphorylase kinase
b) Ca
c) glucose
d) enzyme induction

11. **ATP is an allosteric inhibitor of the following enzymes: M**

a) lactate dehydrogenase
b) phosphofructokinase 1
c) phosphofructokinase 2
d) pyruvate kinase
e) pyruvate carboxylase

12. Which of the following statements are true in relation with glycogen storage diseases? M

a) in type IV disease (Andersen's), the branching enzyme is absent, thus the glycogen formed is without branches, therefore, only one phosphorylase enzyme is able to act upon one molecule of glycogen
b) in type V disease (McArdle's), the liver phosphorylase is absent, therefore, the liver is not able to maintain the normal blood glucose level
c) in type I disease (Gierke's), glucose-6-phosphatase is absent from the muscle, so thr glucose supply for glycolysis is reduced, therefore, the patients are naot capable to perform physical exercise
d) in the B type of Gierke's disease, glucose-6-P translocase is missing

13. The fate of NADH + H^+ produced in glycolysis could be: M

a) it can be reconverted to NAD in the pyruvate-lactate anaerobic reaction
b) in aerobic conditions, it is transported into the mitochondria by donating its proton
c) its protons are taken up by glycerol-3-phosphate, that transports them to the mitochondria
d) its protons gain access into the mitochondria by the malate-aspartate shuttle
e) its protons are transported into the mitochondria by the glycerophosphate shuttle

14. Which of the following enzymes are involved in gluconeogenesis? M

a) phosphorylase
b) fructose-1,6-bisphosphatase
c) aldolase B
d) pyruvate carboxylase
e) glycerokinase

15. How many ATP molecules per one glucose molecule are produced (net gain) in anaerobic conditions if our precursor is an unbranched glycogen? S

a) 1
b) 2
c) 3
d) 4

16. Which glucose transporter is regulated by insulin? S

a) GLUT 1
b) GLUT 2
c) GLUT 3
d) GLUT 4
e) GLUT 5

17. Which of the following enzymes is activated by fructose 2,6-bisphosphate? S

a) aldolase B
b) phosphofructokinase 1
c) phosphofructokinase 2
d) phosphorylase kinase
e) fructose-1,6-bisphosphatase

18. Which apoprotein activates lecitin:cholesterol acyltransferase (LCAT) ? S

a) apo A-I
b) apo A-II
c) apo B-48
d) apo C-III
e) apo C-II

19. Which process/reaction is involved in the formation of $NADPH+H^+$ that is necessary for the (de novo) fatty acid synthesis? M

a) ω-oxidation of fatty acids
b) β-oxidation of fatty acids
c) oxaloacetate $\rightarrow$ malate conversion (malate dehydrogenase)
d) malate $\rightarrow$ pyruvate conversion (malic enzyme)
e) pentose phosphate pathway

20. Which statements are INCORRECT? M

a) pancreatic lipase acts at positions 1 and 3 of triacylglycerols
b) colipase forms a complex (in 1:1 molar ratio) with pancreatic lipase, that inhibits the linkage of the lipase to the lipids
c) the absence of bile acids results in decreased digestion and absorption of lipids, so a considerable amount of the lipids is found in the feces
d) cholesteryl ester from the diet is absorbed without enzymatic hydrolysis

21. The absence of carnitine may inhibit: M

a) β-oxidation of fatty acids
b) the synthesis of ketone bodies from acetyl-CoA
c) gluconeogenesis
d) mobilization of neutral lipids (triacylglycerols)
e) fatty acid uptake of tissues from the blood

22. Chylomicrons are characterized by: S

a) they are produced in the duodenum, where the lipids are bound to proteins by covalent bonds
b) they are produced by specific liver cells and contain mainly cholesterol and proteins
c) they are produced in the blood from circulating lipoproteins and contain cca. 6§5 triacylglycerol
d) they are produced in the intestinal epithelial cells, and they are enriched primarily in triacylglycerols

23. Which is true in relation with β-oxidation of fatty acids? S

a) ATP is generated even if the produced acetyl-CoA does not enter the citric acid cycle
b) it is regulated by primary allosteric modulators
c) its substrates include proprionyl-CoA
d) NADP is required for the process

24**. Which part of the lipids can be a precursor for gluconeogenesis? S**

a) a part of cholesterol
b) acetyl-CoA
c) glycerol
d) phosphoric acid
e) dicarboxylic acid formed in ω-oxidation

CORRECTION:

1. a3, b4, c2, d5, e1
2. a,c
3. a,b,c
4. a,b,c,d
5. d
6. d
7. d
8. a
9. d
10. b,d
11. b,d
12. a,d
13. a,d,e
14. b,d
15. c
16. d
17. b
18. a
19. d,e
20. b,d
21. a,b,c
22. d
23. a
24. c