1) **Which of these enzyme reactions is not irreversible in glycolysis?**

a) **Hexokinase**

b) **Glucokinase**

c) **3-phosphoglycerate kinase**

d) **Phosphofructokinase-1**

e) **Pyruvate kinase**

2) **Which out of the following statements is not true about aerobic glycolysis?**

a) **The rate limiting enzyme is phosphoructokinase-1 which converts fructose-6- phosphate to fructose-1,6-bisphosphate**

b) **The pathway is activated allosterically by fructose-2,6-bisphosphate and AMP**

c) **The pathway takes place in mitochondria of every cell**

d) **The pathway produces Pyruvate and NADH**

e) **The pathway begins with glucokinase or hexokinase**.

3) **The first enzyme in the glycolytic pathway in muscle-**

a) Is glucokinase

b) Uses ATP and glucose-6-phosphate as substrates

c) Produces glucose-1-phosphate and ADP

d) Is reversible

e) Is an isozyme of glucokinase found in the liver

4) **Phosphoglycerate kinase functions in carbohydrate metabolism to produce ATP via:**

a Oxidative phosphorylation.

b) Substrate-level phosphorylation.

c) Oxidative decarboxylation.

d) Phosphorolysis

e) Oxidative deamination

5). **The enzyme that transfers a phosphate group to fructose-6-phosphate in glycolysis-**

a) Is called phosphofructokinase-2

b) Catalyzes a reversible reaction

c) Produces fructose-2,6-bisphosphate as a product

d) Is the rate-limiting enzyme for glycolysis

e) Produces ATP as a product

6). **The enzyme that produces NADH from a triose phosphate in the glycolytic pathway**

a) Uses NAD* and dihydroxyacetone phosphate as substrates

b) Produces 3-phosphoglycerate and NADH

c) Is reversible

d) Is called 3-phosphoglycerate kinase

e) Uses FADH,and glyceraldehyde-3-phosphate as substrates

7). **The first substrate-level phosphorylation in glycolysis**

a) **Produces 3-phosphoglycerate as a product**

b) **Produces ADP from AMP**

c) **Is called glyceraldehyde-3-phosphate dehydrogenase**

d) **Is called phosphofructokinase**

e) **Is irreversible.**

8). **The enzyme that catalyzes the second substrate-level phosphorylation of glycolysis:**

a) **Is called phosphoglyceromutase**

b) **Produces lactate as a product**

c) **Uses phosphoenolpyruvate as a substrate**

d) **Is found in the mitochondria**

e) **Is reversible**

9). **Which of the following statements about the LDH reaction is FALSE?**

a) The enzyme converts pyruvate to lactate

b) The enzyme converts NADH to NAD+

c) The reaction is reversible

d) It is the last enzyme reaction in anaerobic glycolysis

e) The enzyme is found in the liver but not in muscle

10). **The two major factors determining whether a cell oxidizes glucose by aerobic glycolysis or by anaerobic glycolysis are:**

a) FADH/and the number of mitochondria

b) NADH and the ATP/ADP ratio

c) Ca++and AMP

d) Oxygen pressure and the number of mitochondria

e) Cat+and NADH

11) **All of the following help to explain some cases of Lactic Acidosis EXCEPT:**

a) Poor oxygen uptake by blood in the lungs

b) Inhibition of phosphoructokinase-1

c) Not enough oxygen to satisfy the needs of oxidative phosphorylation

d) Congenital deficiency of liver lactate dehydrogenase

e) Inhibition of the electron transport chain.

12) **When cells use energy, the greatest change is seen in the concentration of**

a) Creatine phosphate

b) ATP

c) ADP

d) AMP

e) Pi

13). **In the liver, all of the following are part of the pathway whereby increased glucagon causes a decrease in the glycolytic pathway EXCEPT:**

a) Increased binding of GTP to G-protein

b) Activation of the cAMP cascade

c) Increased phosphorylation of enzymes by protein kinase A

d) Activation of fructose-2,6-bisphosphatase and inhibition of phosphofructokinase-2

e) Increased binding of fructose-2,6-bisphosphate to phosphofructokinase-1

14) **Your patient has a chronic obstructive pulmonary disease so not enough oxygen is reaching her tissues. You would expect all of the following EXCEPT**

a) The electron transport chain would be inhibited

b) Glycolysis would be activated by a low ATP/ADP ratio

c) Concentrations of NADH and pyruvate would be lower than normal

d) Less than normal amounts of H would be pumped out of the mitochondria

e) Less than normal amounts of ATP would be synthesized by ATP synthase

15) **All of the following are true EXCEPT? In the fasting state and in the liver:**

a) Glucagon will activate the cAMP cascade

b) Protein kinase A will be activated

c) Phosphofructokinase-1 will be phosphorylated

d) Pyruvate kinase will be phosphorylated

e) Phosphoenolpyruvate will not be converted to pyruvate.

16) **Your patient has been walking and begins to sprint. All of the following changes would occur in muscle cells EXCEPT:**

a) The ATP concentrations would decrease and the ADp and AMP concentrations would increase

b) The rate of oxidation of NADH in the mitochondria by the electron transport chain would increase

c) The rate of phosphoructokinase-1 reaction would increase due to increased ATP

d) The rate of conversion of pyruvate to lactate would increase

e) The rate of conversion of pyruvate to acetyl Co would increase.

Answer:

1. **C**
2. **c**
3. **e**
4. **b**
5. **d**
6. **b**
7. **a**
8. **c**
9. **C**
10. **b**
11. **b**
12. **d**
13. **e**
14. **d**
15. **c**
16. **c**