Test questions

From the Chemistry Exam to the Final Exam in Biochemistry

Dr. Lengyel Anna

Question

Which of the following enzymes catalyzes a not irreversible reaction in glycolysis?

a) Hexokinase
b) Glucokinase
c) Phosphofructokinase-1
d) Phosphoglycerate kinase
e) Pyruvate kinase

Question

The enzyme that catalyzes 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-1.
e) Is the rate limiting enzyme of glycolysis.

Question

The enzyme that catalyzes second substrate level phosphorylation in glycolysis:

a) Is called phosphoglycerate mutase.
b) Produces lactate as a product.
c) Uses phosphoenolpyruvate as a substrate.
d) Catalyzes a reversible reaction.
e) Is stimulated by glucagon.

Question

Why phosphofructokinase-1 rather than hexokinase is the committed step of glycolysis?

a) Hexokinase has low K_M for glucose.
b) Hexokinase is inhibited by feedback inhibition.
c) Hexokinase is not irreversible.
d) Glucose 6-phosphate is not solely a glycolytic intermediate.
e) None of the above.

Question

After a heavy meal, which of the following allosteric activator would be the most effective in increasing the rate of glycolysis?

a) ATP
b) Citrate
c) Acetyl-CoA
d) Fructose-2,6-bisphosphate
e) 2,3-Bisphosphoglycerate

Question

A mixture of sodium fluoride and potassium oxalate is added to sample collected for blood glucose estimation to prevent loss of glucose by anaerobic glycolysis. Fluoride is an inhibitor of glycolysis. Which of the following enzymes is inhibited by fluoride?

a) Hexokinase
b) Phosphofructokinase-1
c) Glyceraldehyde 3-phosphate dehydrogenase
d) Lactate dehydrogenase
e) Enolase

Question

The ATP/AMP ratio has a major effect upon the rate of ATP production by glycolysis. ATP and AMP bind to allosteric sites on:

a) Hexokinase
b) Glucokinase
c) Phosphofructokinase-1
d) Phosphofructokinase-2
e) Phosphoglycerate kinase

Question

Which one of the following statements about pyruvate kinase is *false*?

a) Can convert phosphoenolpyruvate to pyruvate.
b) Is regulated by forward regulation.
c) Is active in the dephosphorylated form.
d) Is also involved in gluconeogenesis.
e) Deficiency causes hemolytic anemia.

Question

During fasting state, the insulin to glucagon ratio drops and all of the following occur, except:

a) Protein kinase A will phosphorylate pyruvate kinase.
b) The pyruvate kinase step will be activated.
c) Protein kinase A will phosphorylate tandem enzyme.
d) The concentration of fructose-2,6-bisphosphate will decrease.
e) The liver will not be able to synthesize pyruvate from phosphoenolpyruvate.

Question

A high concentration of glucose-6-P is inhibitory to which of the following enzymes?

a) Hexokinase
b) Glucokinase
c) PFK-1
d) PFK-2
e) All of the above.

Question

An enzyme used in both glycolysis and gluconeogenesis is:

a) Phosphoglycerate kinase
b) Hexokinase
c) Glucose 6-phosphatase
d) Pyruvate kinase
e) Phosphofructokinase-1

Question

Which one of the following statements about gluconeogenesis is *false*?

a) For starting materials, it can use carbon skeletons derived from certain amino acids.
b) It consist entirely of the reactions of glycolysis, operating in the reverse direction.
c) It employs the enzyme glucose 6-phosphatase.
d) It is one of the ways that mammals maintain normal blood glucose levels between meals.
e) It requires metabolic energy (ATP or GTP).

Question

All of the following enzymes involved in the flow of carbon from glucose to pyruvate (glycolysis) are also involved in the reversal of this flow (gluconeogenesis) *except*:

a) Phosphoglycerate kinase
b) Aldolase
c) Enolase
d) Phosphofructokinase-1
e) Phosphohexose isomerase

Question

Which of the following substrates cannot contribute to net gluconeogenesis in mammalian liver?

a) Alanine
b) Glutamate
c) Palmitate
d) Pyruvate
e) α-Ketoglutarate

Question

Which of the following is a common intermediate in the conversion of glycerol and lactate to glucose?

a) Pyruvate
b) Oxaloacetate
c) Malate
d) Glucose-6-phosphate
e) Phosphoenolpyruvate

Question

Which of the following enzymes is not present in muscle?

a) Glycogen phosphorylase
b) Hexokinase
c) Glucose 6-phosphatase
d) Lactate dehydrogenase
e) Glycogen synthase

Question

The major metabolic product produced under normal circumstances by erythrocytes and by muscle cells during intense exercise is recycled through liver in the Cori cycle. This metabolite is:

a) Oxaloacetate
b) Alanine
c) Glycerol
d) Lactate
e) NADH

Question

All of the following are part of the Cori cylce, except:

a) Lactate is the result of anaerobic glycolysis in a number of tissues.
b) Lactate is transported to the liver.
c) Lactate is converted to glucose in the liver.
d) ATP is produced by the conversion of lactate to glucose.
e) Glucose is transported from the liver to other tissues.

Question

Which of the following vitamins is not required to convert pyruvate into acetyl-CoA?

a) Thiamine
b) Lipoic acid
c) Pantothenic acid
d) Niacin
e) Ascorbic acid

Question

Which of the following enzymes catalyzes a reaction that involves a decarboxylation reaction?

a) Pyruvate dehydrogenase
b) Isocitrate dehydrogenase
c) α-Ketoglutarate dehydrogenase
d) All of the above

Question

Where is the Krebs cycle carried out in eukaryotic cells?

a) Inner membrane of the mitochondria
b) Cytosol
c) Nucleus
d) Mitochondrial matrix

Question

Which of the following substrates in the citric acid cycle is not coupled to the production of NADH?

a) Succinate
b) Malate
c) Isocitrate
d) α-Ketoglutarate

Question

Which of the following vitamins is required for the conversion of succinate to fumarate?

a) Thiamine
b) Lipoic acid
c) Pantothenic acid
d) Niacin
e) Riboflavin

Question

Anaplerotic reactions are those that result in replenishing intermediates in the TCA cycle. Which of the following enzymes catalyzes an anaplerotic reaction?

a) Malate dehydrogenase
b) Pyruvate carboxylase
c) Pyruvate kinase
d) Citrate synthase
e) Succinyl-CoA synthetase

Question

In TCA cycle, GTP is produced at one step by substrate level phosphorylation and that is subsequently utilized for gluconeogenesis. Which of the following enzymes is involved in this process of formation of GTP from GDP?

a) Malate dehydrogenase
b) Succinate dehydrogenase
c) Isocitrate dehydrogenase
d) Citrate synthase
e) Succinyl-CoA synthetase

Question

Which of the following intermediates of TCA cycle can be directly converted to phosphoenolpyruvate to trigger the pathway of gluconeogenesis?

a) Malate
b) Succinate
c) Isocitrate
d) Oxaloacetate
e) Pyruvate

Question

Which of the following intermediates of TCA cycle cannot be be utilized for gluconeogenesis?

a) Malate
b) Succinate
c) α-Ketoglutarate
d) Oxaloacetate
e) Acetyl-CoA

Question

All of the following vitamins except one participate in the TCA cycle:

a) Pantothenic acid
b) Lipoic acid
c) Folic acid
d) Riboflavin
e) Niacin

Question

During cellular respiration, where is NADH produced?

a) The nucleus
b) The cytosol
c) The mitochondrial intermembrane space
d) The cytosol and mitochondrial matrix
e) The endoplasmic reticulum

Question

Anaerobic respiration differs from aerobic respiration in that...

a) anaerobic respiration includes the enzymes of the TCA cycle.

b) anaerobic respiration is more energy efficient than aerobic.

c) anaerobic respiration only includes the metabolic pathway of glycolysis.

d) anaerobic respiration is an anabolic reaction type.

Question

The main function of pentose phosphate pathway is to:

a) Give the cell an alternative pathway when glycolysis fail
b) Provide a mechanism for the utilization of the carbon skeletons of excess amino acids
c) Supply energy
d) Supply NADH
e) Supply pentoses and NADPH

Question

Which of the following statements about the oxidative section of the pentose phosphate pathway is correct?

a) The pentose phosphate pathway generates NADH.

b) The pentose phosphate pathway oxidizes NADPH to $NADP^+$.

c) The rate-limiting reaction of the pentose phosphate pathway is catalyzed by glucose 6-phosphatase.

d) The pentose phosphate pathway supplies ribose-5-phosphate and NADPH in the quantities the cell requires.

e) The pentose phosphate pathway is highly active in fasting state.

Question

Which of the following enzymes acts in the pentose phosphate pathway?

a) Glycogen phosphorylase
b) Aldolase
c) Glucose 6-phosphatase
d) Pyruvate kinase
e) 6-phosphogluconate dehydrogenase

Question

Which of the following generates free glucose during enzymatic breakdown of glycogen in skeletal muscle?

a) Glycogen phosphorylase
b) Debranching enzyme – Glucosidase activity
c) Debranching enzyme – Glycosyl transferase activity
d) Glucose-6 phosphatase
e) Alpha amylase

Question

Glycogen synthase is the regulatory enzyme for glycogen synthesis. It adds glucose residues to the nonreducing ends of a glycogen primer from:

a) UTP
b) ATP
c) Glucose-1-P
d) Glucose-6-P
e) UDP-glucose

Question

Glycogen synthase is activated by:

a) Phosphorylation catalyzed by GSK3

b) Dephosphorylation catalyzed by PP1

c) Phosphorylation catalyzed by pyruvate kinase

d) Phosphorylation catalyzed by PKA

e) Phosphorylation catalyzed by AMPK

Question

A 30-year-old male presents with severe muscle cramps. He is found to have muscle glycogen phosphorylase deficiency, McArdle's disease. Glycogen phosphorylase degrades glycogen to produce:

a) Glucose
b) Glucose-1-P
c) Glucose-6-P
d) UDP-glucose
e) Glycogen primer

Question

The degradation of glycogen normally produces which of the following?

a) More glucose than glucose-1-P
b) More glucose-1-P than glucose
c) Equal amount of glucose and glucose-1-P
d) Neither glucose nor glucose-1-P
e) Only glucose-1-P

Thank you for your attention!