**Questions A. Gargalionis**

1. Which sentence is incorrect?

1. Insulin promotes glycogen synthesis in the liver

2. Insulin promotes the synthesis of fatty acids in the liver

3. Insulin promotes gluconeogenesis in the liver

4. Insulin is secreted as a response to high blood glucose concentration

1. Which sentence is incorrect?

1. Glucagon promotes the breakdown of glycogen in the liver

2. Glucagon inhibits glycolysis in the liver

3. Glucagon promotes gluconeogenesis in the liver

4. Glucagon promotes protein synthesis

5. Glucagon promotes the production of ketone bodies to be used as fuel in neurons

6. Glucagon promotes the degradation of triacylglycerols

1. Which sentence is incorrect? In the well-fed state

1. Amino-acids and glucose pass from the intestinal epithelial cells to the blood circulation and through the portal vein arrive to the liver.

2. Chylomicrons are secreted from intestinal epithelial cells to the lymphatic circulation towards body tissues

3. Glycogen synthesis is induced

4. Glycolysis is induced

1. Proteins are catabolized in skeletal muscles for glucose synthesis
2. Which sentence is incorrect? In the fasting state

1. Cori and alanine cycles replace glucose breakdown in other tissues by glucose formation in the liver

2. Synthesis of urea is enhanced

3. Glycogen synthesis is induced

4. The brain completely oxidizes glucose

5. Branched-chain amino-acids (valine, leucine, isoleucine) provide nitrogen for alanine and glutamine in muscle cells

1. Which of the following would favor gluconeogenesis in the fasted state?

1. Fructose 1,6-biphosphate stimulation of pyruvate kinase

2. Acetyl-CoA activation of pyruvate carboxylase

3. Citrate activation of acetyl-CoA carboxylase

4. Malonyl-CoA inhibition of carnitine palmitoyltransferase I

5. Fructose 2,6-biphosphate stimulation of 6-phosphofructo-1-kinase

1. The increase in fatty acids in obesity leads to:

A. Increased cellular glucose uptake through inactivation of PKC that activates transmembrane transport of GLUT transporters

B. Decreased cellular glucose uptake through activation of PKC that inhibits translocation of GLUT transporters to the membrane

1. Mobilization of stored triacylglycerols occurs through:

A. of glucagon/epinephrine which activates PKA

B. of insulin that activates PKA

C. by shifting the hormone-sensitive lipase that breaks down triglycerides

D. A + C

E. B + C

1. In diabetes mellitus, insulin deficiency:

A. leads to an inability to use glucose

B. leads to insufficient synthesis of fatty acids

C. leads to increased fat oxidation

D. leads to overproduction of ketones

E. leads to weight loss

F. all of the above

1. Between meals or during prolonged fasting, the regulation of carbohydrate metabolism in hepatocytes takes place:
2. through the glucagon/cAMP/PKA/glycogen synthase axis, leading to a decrease in glycogen synthesis.
3. through the glucagon/cAMP/PKA/glycogen synthase axis, leading to an increase in glycogen synthesis.
4. through the glucagon/cAMP/PKA/glycogen phosphorylase axis, leading to increased glycogen breakdown.
5. through the glucagon/cAMP/PKA/PFK-1 axis, leading to a decrease in glycolysis.
6. A + B + C
7. A + C + D
8. How is insulin secretion regulated by pancreatic β-cells?
9. through the uptake and catabolism of glucose in β-cells
10. through ATP-gated potassium channels
11. through an increase in intracellular calcium concentration
12. through the glucose transporters SGLT1 and GLUT5
13. A + B + C
14. B + C + D
15. In obese individuals, the increased concentration of fatty acids favors insulin resistance mainly through:
16. reduction of glucose intake due to the inability of insulin to bind to its receptor.
17. reduction of glucose uptake due to allosteric inhibition of GLUT4 transporters by fatty acids.
18. reduction of glucose uptake due to allosteric inhibition of GLUT4 transporters by PKC.
19. reduction of glucose uptake due to inhibition of insulin receptor signaling by PKC and inability to move GLUT4 to the cell membrane.
20. During periods of prolonged fasting:
21. Glycogen synthesis in the liver and muscles increases.
22. The carbon skeleton of amino acids participates in gluconeogenesis and nitrogenous residues are eliminated in the form of urea.
23. Accumulation of acetyl-CoA favors entry into the citric acid cycle
24. Accumulation of acetyl-CoA favors the production of ketone bodies.
25. B + C
26. B + D