C785 Final Exam 1

5' - [...] ATT CGC TAG GGC [...] - 3' − Normal DNA
5' - [...] ATT CGC GAG GGC [...] - 3' − Mutant DNA

Which type of mutation and outcome characterizes the Mutant DNA? - CORRECT ANSWER ✅: A missense mutation leading to a longer protein

A commonly used technique for protein denaturation is adding an acid or a base to dramatically change the pH.

Which force is most impacted by this change in pH? - CORRECT ANSWER ✅: Ionic bonds

A particular enzyme acts on the succinate substrate and is inhibited by malonate.

Which type of inhibition is expected based on the following structures? - CORRECT ANSWER ✅: Competitive

An active elderly patient is becoming frequently disoriented, having trouble recalling her daily routine, and becoming aggravated easily. She forgets words and places and has difficulty recognizing her children.

Which biochemical event is responsible for this patient's behavior? - CORRECT ANSWER ✅: Protein aggregation

Approximately how many ATP molecules can be produced from a single molecule of glucose during aerobic metabolism? - CORRECT ANSWER ✅: 30

Assuming 100% reaction efficiency, how many DNA copies are created after the completion of four complete PCR cycles? - CORRECT ANSWER ✅: 16

At low O 2 concentrations, how does myoglobin's affinity for O 2 relate to hemoglobin's affinity for O 2? - CORRECT ANSWER ✅: Myoglobin has a much greater affinity for O 2 than hemoglobin does.

Based on the provided enzyme pathway below, what would occur as a result of a defect in the enzyme which catalyzes the D→E reaction? - CORRECT ANSWER ✅: The amount of C would increase.

Frying an egg changes the egg white from a clear liquid to an opaque solid.

Which molecular change in the albumin protein causes this change in appearance? - CORRECT ANSWER ✅: Hydrophobic interactions form between denatured egg white proteins.

How can an alteration in protein structure lead to a disease state? - CORRECT ANSWER ✅: A mutation replaces an isoleucine with an aspartic acid in a transcription factor protein, which blocks the normal folding of the protein and its function in the expression of certain genes.

How does heating beyond optimum temperature inactivate enzymes? - CORRECT ANSWER ✅: By changing the enzyme's three-dimensional shape

How does insulin impact carbohydrate metabolism? - CORRECT ANSWER ✅: It stimulates the uptake of glucose from the blood by cells in the body.

How does insulin reduce blood glucose levels? - CORRECT ANSWER ✅: It increases the translocation of GluT4 transporters to the cell membrane.

How does pH level promote the deoxygenated conformation of hemoglobin? - CORRECT ANSWER ✅: When pH lowers, O 2 binds with excess HCO 3 - in the blood, which blocks its ability to bind to the heme group and pull it into the dome conformation.

How does the Bohr effect describe the relationship between carbon dioxide levels, blood pH and the amount of oxygen bound to hemoglobin? - CORRECT ANSWER ✅: An increase in carbon dioxide production leads to a decrease in blood pH, causing hemoglobin to release oxygen more readily.

How is energy provided for ATP production during the final stage of aerobic metabolism? - CORRECT ANSWER ✅: Protons diffuse through a transmembrane protein.

How many molecules of acetyl-CoA will the following fatty acid produce? - CORRECT ANSWER ✅: 8

How many molecules of lactate are required to produce one molecule of glucose? - CORRECT ANSWER ✅: 2

In sickle-cell disease, the glutamic acid (Glu) at position number seven is mutated to valine (Val).

What change in codons corresponds to this mutation? - CORRECT ANSWER ✅: GAA to GTA

In which situation would altering a protein structure lead to a disease state? - CORRECT ANSWER ✅: A mutation in aconitase blocks an essential step in aerobic metabolism