MCM Practice Questions Answer Key: Lecture Day 1

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Lecture 3: Enzymes and Isoenzymes I

Question 1: B

The symptoms listed in the questions stem- fatigue, weakness, and dizziness- are characteristic of Fe [Iron] deficiency (B). Due to decreased iron in heme, blood has less oxygen carrying capacity making cellular respiration more taxing. The other ions (A), (C), (D) are not found in heme proteins.

Question 2: A

Pepsin (A) is a protein that has evolved to survive in the harsh environment of the stomach. Its catalytic sites have a low pKa thus making this protein uniquely suited to thrive in low pH environments. Secretin (B) is another protein that works optimally in low pH's but this incorrect as secretin is secreted in the duodenum, not the stomach. Cholecystokinin (C) is a peptide hormone produced by the small intestine that regulates gastric emptying and regulating satiety. Trypsin is a protein found in the small intestine that aids in protein digestion.

Question 3: D

Aspirin has drastic effects on the functions of COX-1 and COX-2. When acting on COX-2, aspirin functions to change the enzymatic product of the enzyme. It will change COX-2 product from Prostoglandins to lipoxins. On COX-1 however, aspirin covalently binds to a serine residue on COX-1, irreversibly inhibiting (D) the enzyme. (A), (B), and (C) are all different types of inhibition that aspirin does not exhibit.

Question 4: C

The enzyme that produces uric acid is Xanthine Oxidase. Thus in order to reduce the activity of this enzyme, the Rheumatologist will prescribe allopurinol (C), which is the "suicide" inhibitor of Xanthine Oxidase. Penicillin (A) is a type of Beta-lactam antibiotic that prevents the final step in bacterial peptidoglycan synthesis. Aspirin (B) is a NSAID that acts on cyclooxygenases to alter or inhibit its enzymatic function. Paracetemol (D), more commonly known as acetaminophen, is an antipyretic and mild painkiller.

Question 5: D

Glycogen phosphorylase requires Pyridoxal Phosphate (D) =, also known as Vitamin B6, as a coenzyme to function. If glycogenolysis is impaired, it can lead to decreased energy which is what the patient is experiencing. Biotin (A), or B7, is an important cofactor in biological carboxylase enzymes; think pyruvate carboxylase. Riboflavin (B), or B2, is the precursor to biologically important coenzymes like FAD. Niacin (C), or B3, like riboflavin is also a precursor, this time to NAD.

Question 6: C

The key to this question is understanding that enzymes are EFFICIENT and SPECIFIC. (A) is incorrect as all enzymes are proteins but not all proteins are enzymes. Thus calling something a protein does not imply that it is also an enzyme. (B) is incorrect as enzymes are catalysts, meaning they are by definition not used up in reactions. (D) is incorrect as enzymes can only catalyze one type of reaction for a specific substrate. This leaves (C) as the correct choice.