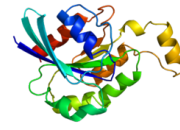




Chem 331 Biochemistry

Introduction to Enzyme Regulation and Metabolism

Learning Objectives, Study Guides
and Practice Questions



Learning Objectives

- Relate the various ways enzymes are regulated
- What is the general function of a protein kinase and protein phosphatase in regulating proteins and metabolic pathways. Know the specific structural impact on phosphorylation as well as the phosphorylation/dephosphorylation dogma
- Know and relate the important key points of the protein kinases presented in class – substrate, structural character of the kinase, how they are regulated and if included consensus sequence of target. Does the kinase have a pseudo substrate?
- Relate the glycolytic pathway in the role of generating energy. What are the various end point. Why are they different?
- For each enzyme in the pathway – know the structural features of the protein, the reaction catalyzed and any unique characteristics of each step (isozyme differences i.e. aldolase...), the chemical reaction mechanism if covered in class, regulation for the enzyme and any pertinent kinetic or thermodynamic parameters for the enzyme.
- Describe for each of the key glycolytic enzymes:
 - ✓ How can a key enzyme can be identified
 - ✓ The method by which these enzymes are regulated
 - ✓ Relate the thermodynamics of each key enzyme in relation to its importance in the pathway.
- Know the different reactions that occur during glycolysis. What is the important points for each of the enzymes in glycolysis.
- Recognize the glycolytic intermediates based on their nomenclature and basic structure.
- Know each of the enzymes that catalyze the reactions in glycolysis
- List the important characteristics distinguishing glucokinase from hexokinase, as well as the characteristics that are common to both of them.
- Know what the difference/relationship is between the R and T conformations of PFK. How are each regulated.
- Understand the regulation of the isozymes of pyruvate kinase activity.
- Identify the site of a substrate level phosphorylation in the glycolytic pathway.
- Identify those reactions along the glycolytic pathway which are considered irreversible. How is glycolysis regulated?
- Relate the metabolism in glucose in red vs. white muscle tissues.
- Describe the physiological significance of gluconeogenesis.
- Know the precursors of glucose.
- What are the thermodynamic considerations of glycolysis and gluconeogenesis.
- Understand why there is a need for such a pathway.
- List the irreversible reactions of glycolysis and the steps that gluconeogenesis bypasses them.
- Identify the organs that carry out gluconeogenesis and where in the cell this pathway occurs.
- Understand the means that glycolysis and gluconeogenesis are regulated (PFK2!!!)
- Understand the manner in which biotin is involved in carrying carbon.
- Know the role of acetyl CoA in pyruvate carboxylase and gluconeogenesis.
- Understand the confusing bifunctional enzyme and what the regulation of glycolysis and gluconeogenesis.