

BIOCHEMISTRTY - I PHL 284 (2 + 0)

Course Description:

This course is concerned with the study of the chemistry and biological importance of proteins, nucleic acids and porphyrins. Emphasis is given to the study of enzyme kinetics and to the biological oxidation. Clinical correlations are explained whenever possible.

Course Contents:

	Hours
1. Amino acids and proteins:	2
- Amino acid composition of proteins.	
- Acid-base properties of amino acids and the PI concept.	
- Physical and chemical properties of amino acids, (Reactions of NH ₂ -gp, COOH-gp and R-gp).	
- Identification and quantification of amino acids.	
- Functional role of proteins in humans.	
- Levels of protein structure:	1
- Primary structure: the determination of the amino acid sequence of protein molecules.	
- Secondary structure: α -helical, β -pleated and random coil structures.	
- Tertiary and quaternary structures.	
- Classification of proteins: simple (globular & fibrous), and conjugated proteins.	3
- Isolation and separation of proteins.	
- Structure and mechanism of action of antibody molecules.	
- Plasma proteins.	
- Denaturation of proteins.	
- Clinical correlations:	
a) The use of amino acid analysis in the diagnosis of disease.	
b) Differences in the primary structure of insulins utilized in the treatment of diabetemellitus.	
2. Enzymes:	3
- Classification and nomenclature.	
- Enzyme kinetics.	
- Inhibition of enzyme activity.	
- The catalytic site.	
- Mechanism of enzyme action.	
- Isoenzymes.	
- Regulation of enzyme activity.	2
- Allosteric control of enzyme activity.	
- Coenzymes, structure and function.	
- Clinical correlations:	1
a) A case of gout demonstrating two phases to the mechanism of enzyme action.	

	b) A case of gout demonstrating the difference between an allosteric site and the active center.	
3.	Nucleotides and nucleic acids:	2
	- Nomenclature of nucleosides and nucleotides.	
	- Metabolic functions of nucleotides.	
	- Chemistry of nucleotides.	
	- Metabolism of pyrimidine nucleotides.	1
	- Metabolism of purine nucleotides.	
	- DNA & RNA types: rRNA, mRNA & tRNA.	2
	- The genetic code.	
	- Protein biosynthesis	1
	- Clinical correlations:	
	a) Lesch-Nyhan Syndrome.	
	b) Gout.	
	c) Orotic Aciduria.	
4.	Porphyryns and Bile Pigments:	2
	- Porphyrin biosynthesis.	
	- Heme biosynthesis and its regulation.	
	- Myoglobin, catalases, peroxidases & cytochromes and their biological functions.	
	- Catabolism of hemoglobin and formation of bile pigments.	
	- Clinical correlations:	
	a) Porphyrias.	
	b) Jaundice.	
5.	Biological Oxidation:	
	- Energy-producing and energy-utilizing systems: The ATP cycle.	2
	- Source and fate of acetyl-coenzyme A.	
	- Sources and fate of pyruvate.	
	- The tricarboxylic acid cycle.	1
	- Structure and compartmentation of mitochondrial membranes.	3
	- Mitochondrial transport systems.	
	- Components of mitochondrial electron transport chain.	
	- Inhibition of mitochondrial electron transport.	
	- Microsomal electron transport.	
	- Oxidative phosphorylation.	
	- Clinical correlations:	
	a) Pyruvate dehydrogenase deficiency.	
	b) Cyanide poisoning.	
	c) Mitochondrial myopathies.	
	EXAMINATIONS:	2

Total Hours: 28