UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Biochemistry I

1819-1-H4102D001-H4102D002M

Aims

The Biochemistry I Module aims : i) to provide the concepts necessary to understand the biological phenomena and the energetic changes connected to them, illustrating the complex chemical reactions that give rise to life. Object of study is the structure and transformation of cell components, such as proteins, carbohydrates, lipids, nucleic acids and other biomolecules. The description of the metabolism will take place both qualitatively and quantitatively. ii) to explain how organ functions can be regulated according to their particular biochemical processes, focusing on metabolic integration. iii) to explain how the regulation of metabolism occurs. iv) to illustrate the role of nutrients and balanced nutrition for maintaining the state of health

Contents

The Biochemistry I module will illustrate the importance of life-sustaining chemical reactions. Object of study are the structure and the metabolòic pathways involved in the transformations of cell components, such as proteins, carbohydrates, lipids, nucleic acids and other biomolecules. Moreover the main hormones and their role in the regulation of metabolism will be described . Finally, the main components of the foods (macro and micronutrients, including vitamins and minerals) will be described in relation to a healthy diet.

Detailed program

General Biochemistry and Enzymology: Catalysis and enzyme kinetics. Vmax and Km. Factors influencing enzymatic activity. Inhibitors. Allosteric enzymes. Isozymes. Diagnostic use of enzymes and Bioenergetic isoenzymes: Respiratory chain and oxidative phosphorylation. Molecules with high energy content. The production of ATP. Inhibitors and decoupling of oxidative phosphorylation. Glucidic metabolism: Digestion, absorption and transport of carbohydrates. Glycolysis (aerobic and anaerobic). Metabolic and hormonal regulation of glycolysis. Synthesis of glycogen and glycogenolysis. Interconvertion of sugars. Metabolism of galactose and fructose. Lipid metabolism: Digestion and absorption of lipids. Catabolism of lipids. beta oxidation of fatty acids. Role of carnitine. Citric acid cycle. Lipogenesis: biosynthesis of fatty acids; biosynthesis of triglycerides. Regulation of lipolysis and lipogenesis. Metabolism of cholesterol and its derivatives. Cholesterol conversion into steroid hormones and bile salts. Metabolism of ketone bodies. Plasma lipoproteins Metabolism of lipoproteins. Lipoprotein receptors. Protein metabolism: Digestion of proteins, absorption and transport of amino acids. General metabolism of amino acids. Gluconeogenesis and its regulation. Metabolism of purine and pyrimidine nucleotides: Purine and pyrimidine pathways . Hormones: Gastroenteropancreatic hormones: insulin, glucagon. Hormones: Hypothalamic and pituitary hormones. Release hormones. GH. Prolactin. ACTH. Vasopressin. Oxytocin. Hormones of the thyroid. Corticosteroids. Sex hormones. Hormones of regulation of hunger / satiety. Biochemistry of nutrition: Biochemical aspects of digestive processes and nutrient absorption. Basal metabolism. Water-soluble and fat-soluble vitamins. Homeostasis of the carbohydrates, lipids and proteins. The feeding-fasting cycle. Diets

Prerequisites

Basic knowledge of biology and chemistry.

Teaching form

Frontal lectures . Students will also be involved in actively participating in lectures, bringing experiences to clinical cases to be discussed in the classroom.

Textbook and teaching resource

Biochemistry with clinical aspects , Thomas Devlin

Biochemistry, Berg et al.

Semester

II semester

Assessment method

Written and oral exam: 15 multiple-choice questions (2 marks each) to be completed in 30 minutes. The exam is positively evaluated with a mark 18/30 or higher.

The final vote of Biochemistry will be the mean with the mark of Biochemistry II. The final mark of module of Biochemistry will be the mean of Biochemistry I and II

Some questions may have more than one correct answer. Oral discussion of the written with possible deepening of one or more topics. The questions proposed in the written exam will be constructed in such a way as to induce the student to biochemical-clinical reasoning, to understand the units of measurement and to be able to evaluate the skills and competences acquired according to the objectives of the course.

Office hours

On appointment, allthe year