UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

General Biochemistry

2526-1-H4602D005-H4602D00501

Aims

GENERAL BIOCHEMISTRY

Main goal of this module is to provide students with concepts needed to understand biological phenomena and associated energy changes. Doing this, we aim to lay down fundamentals of molecular understanding of complex processes which form the basis of metabolism of all living creatures.

Contents

GENERAL BIOCHEMISTRY

The course aims to educate students to reason, in molecular terms, the main cellular metabolisms, understand and explain at the molecular level cellular functions and tissue control systems, in particular connective, bone and tooth tissues. In addition, the course aims to provide students with fundamental knowledge about the biochemical and clinical investigations related to major alterations of organs/tissues relevant in dentistry.

Detailed program

GENERAL BIOCHEMISTRY

Enzymology: enzyme kinetics and catalysis. Significance of Vmax and Km. factors influencing enzyme activity. Inhibitors. Allostericenzymes. Isoenzymes. Diagnostic use of enzymes.

Bioenergetics: Respiratory chain and oxidative phosphorylation. High-energy molecules. The production of ATP.

Oxidative phosphorylation. Inhibitors and uncoupling factors.

Glucose metabolism: Digestion, absorption and carbohydrates transport. Aerobic and anaerobic glycolysis. Hormonal and metabolic regulation of glycolysis. Glycogen synthesis and glycogenolysis. Metabolic and hormonal regulation of glycogen metabolism. Sugars interconversion. Galactose and fructose metabolism

Lipid metabolism: Lipids. digestion and absorption. 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. Conversion of cholesterol to steroid hormones and bile salts. Metabolism of ketone bodies. Lipoprotein metabolism of plasma lipoproteins. Lipoprotein receptors.

Protein metabolism: Protein Digestion. Absorption and transport of amino acids. General metabolism of aminoacids. Gluconeogenesis and its regulation.

Purine and pyrimidine metabolism: Biosynthesis of purines and pyrimidines. Purine nucleotides recovery pathway.

Prerequisites

Aims of Preparatory Sciences course.

Teaching form

All lectures are conducted in face-to-face delivery mode:

- 15 (2-hour) lectures conducted in the in-presence delivery mode.

In-person group exercises will be organized during the lecture period

Textbook and teaching resource

1. Siliprandi/Tettamanti: Biochimica Medica. Piccin
2. Devlin T.M.: Biochimica (con aspetti clinici). Idelson-Gnocchi
3. Nelson D.L. et al.: Introduzione alla biochimica di Lehninger. Zanichelli
4. Ferguson D.B.: Biologia del cavo orale. Zanichelli/CEA
5. Maccarrone M.: Fondamenti di Biochimica Umana ed Zanichelli

Semester

second year, I semester

Assessment method

All students have access to a written test followed by an oral interview. The written test consists of 27 closed-ended tests, (20 single-answer and the remaining multiple-choice).

A time of one hour for the written test is assigned. The student is admitted to the oral exam if the answers score reaches a minimum of 17; The oral is carried out the same day, after the correction of the writing and takes about 20 minutes for each candidate. The questions proposed in the written test aim at evaluating the comprehension of the topics covered in lesson, with particular reference to the acquisition of knowledge concerning cell and organ metabolism.

In the oral examination, taking into account the written test, the student is asked to explain / deepen some of the answers provided (both those provided wrong and correct), in order to verify the correct interpretation of the question and the reasoning that led to the answer. It also evaluates the knowledge of the main metabolic pathways, and of the biochemical interactions between the cells or in the different organs / tissues and of the dysfunctions.

Office hours

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Sustainable Development Goals

GOOD HEALTH AND WELL-BEING