
COURSE: Biochemical and Metabolic Processes

ACADEMIC YEAR: 2019-20

TYPE OF EDUCATIONAL ACTIVITY: Basic

TEACHER: Prof. Rocco Rossano Ph.D

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website:

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Language: **Italian**

ECTS: **8** (6 lessons and
tutorials/ 2 practice)n. of hours: **72**(48 lessons
and tutorials/ 24 practice)Campus: **Potenza**
Dept./School: **Dept. of Sciences**
Program: **Biotechnology for
Medical, Pharmaceutical and
Veterinary Diagnostics.**Semester: **II**
from: March 2, 2020
to: June, 20 2020

EDUCATIONAL GOALS AND EXPECTED LEARNING OUTCOMES**Knowledge and understanding:**

Knowledge of brain tissue metabolism and some molecular mechanisms linked to the metabolism of proteins and other nitrogen compounds, cell detoxification, signal transduction, nerve impulse propagation, membrane transport. Knowledge of the molecular mechanisms of action of hormones, liposoluble vitamins and plasma lipoproteins. Knowledge about the importance of the diet on the health and wellness. Knowledge of the nutraceutical properties of natural antioxidants, glucosinolates and polyunsaturated fatty acids. Knowledge about the extraction of proteins from different biological matrix, protein determination and their identification by MALDI-ToF mass spectrometry. Knowledge about the extraction of antioxidant substances from vegetal matrix and the determination of antioxidant capacity.

Applying knowledge and understanding:

Ability to analyze the mechanisms underlying the hormonal regulation of the major metabolic pathways. Ability to analyze interconnections between different metabolic pathways. Ability to analyse the effects of diet molecules on health. Ability to analyse problems related to excess or lack of some biomolecules. Ability to analyze the mechanisms of the cellular detoxification. Ability to plan and apply protocols for the extraction and determination of proteins and vegetable antioxidants.

Making judgements:

Ability to evaluate the relationship between structure and functions of the biomolecules. Ability to evaluate the mechanisms of biomolecular metabolism, related to the hormonal regulation. Ability to evaluate the factors underlying pathologies related to deficiency or excessive biomolecular conditions. Ability to evaluate the functional aspects of the diet.

Communication skills:

Ability to communicate and illustrate, in scientific and / or dissemination contexts, the metabolic pathways of the main biomolecules, the correlations existing between the different metabolic pathways. Ability to communicate and illustrate the mechanisms underlying the hormonal regulation. Ability to communicate the impact of nutrition on human health and wellness.

Learning skill:

Ability to access and understand the scientific literature, in order to be able to attend: specialization courses, specialist seminars and master.

PRE-REQUIREMENTS

To the students are required a satisfactory knowledge of different concepts of general biochemistry already acquired. In particular, on the principal molecular components of the cell and related biochemical processes.

SYLLABUS

The group is divided in 8 teaching blocks.

Block 1 (8 h, lectures):

Nervous tissue, brain metabolism, BEE, cerebral oxygen consumption and the importance of glucose. The transmission of nervous impulse and propagation mechanism. The synthesis and inactivation of neurotransmitters. Trans-membrane transport

Block 2 (4 h, lectures): Metabolism of purine and pyrimidine nucleotides.

Block 3 (12 h, lectures): Mechanism of action of liposoluble vitamins. Role of vitamin A in the vision, role of vitamin D in the maintaining the physiological concentration of calcium and phosphate, hormonal action, antioxidant action of vitamin E, role of vitamin K in the blood coagulation process. Hormones and signal transduction. Seconds messengers. Ionic channels. Nature of hormones, hormone receptors, mechanism of action.

Block 4 (6 h, lectures): Hormonal regulation of glucidic and lipid metabolism. Hyperlipidemia, atherogenesis, diabetes, hypo and hyperthyroidism. Plasma lipoproteins, lipoprotein receptors.

Block 5 (8 h, lectures): Cellular detoxification. Free radicals and oxidative stress. Functional rolet of diet. Natural diet antioxidants, glucosinolates and polyunsaturated fatty acids (PUFAs), characteristics, functions and metabolism.

Block 6 (4 h, lectures): Proteases. Proteins degradation, ubiquitin-proteasoma system, lisosomal proteolysis, selective proteolysis and caspase-dependent proteolysis.

Block 7 (4 h, lectures): Proteomics in the study of protein expression profiles and post-translational modifications.

Block 8 (24 h, laboratory): Extraction of proteins from different biological matrix, protein determination. Protein identification by MALDI-ToF MS, Peptide Mass Fingerprinting (using Mascot search engine and NCBI nr and Swiss-Prot / trEMBL databases). Extraction of vegetable antioxidants, determination of polyphenol content and antioxidant activity by DPPH assay.

TEACHING METHODS

Lectures and laboratory activities

EVALUATION METHODS

Oral examination. Evaluation: score on 30 points

TEXTBOOKS AND ON-LINE EDUCATIONAL MATERIAL

1. Nelson and Cox: I Principi di Biochimica di Lehninger, Ed. Zanichelli, Bologna.
 2. Campbell and Farrell: Biochimica, Ed. Edises, Napoli.
 3. Material provided by the teacher.
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INTERACTION WITH STUDENTS

Office hours (3rd floor-3ANord building): Wednesday from 9:00 to 11:00 and Friday from 9:00 to 11:00. In addition, the teacher is available at all times for a contact with the students through e-mail.

EXAMINATION SESSIONS (FORECAST)¹

February 10, 2020
9 march, 2020
May 4, 2020
June 22, 2020
July 13, 2020
October 5, 2020
December 7, 2020

SEMINARS BY EXTERNAL EXPERTS YES NO

FURTHER INFORMATION

¹Subject to possible changes: check the web site of the Teacher or the Department/School for updates.