UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Clinical Biochemistry and Molecular Biology

2627-1-I0103D005-I0103D00504

Aims

The course is designed to provide students with the fundamental knowledge of Clinical Biochemistry and Laboratory Medicine, with particular emphasis on the scientific and clinical significance of laboratory tests, their role in disease prevention, diagnosis, patient monitoring, and the assessment of organ and system function. By the end of the course, students will have achieved the following learning outcomes:

Knowledge and understanding:
The course will provide a solid foundation for understanding the role of Laboratory Medicine in the diagnostic and healthcare process, the principles underlying the performance and interpretation of laboratory tests, the main sources of pre-analytical, analytical, and post-analytical variability, and the clinical significance of the most commonly used biomarkers for assessing hepatic, renal, metabolic, and hematological function.

Ability to apply knowledge and understanding:
The course will develop students' ability to apply the acquired knowledge to critically interpret the main laboratory tests, recognize the factors that may affect their reliability, understand the clinical significance of laboratory results, and use this information to support patient care.

Making judgements:
The course will develop students' ability to independently assess the appropriateness of laboratory test requests and the interpretation of laboratory results, recognizing the limitations of diagnostic investigations, potential analytical interferences, and the variables that may influence test outcomes, thereby contributing appropriately to clinical decision-making. The assessment method, consisting of multiple-choice questions and open-ended questions, promotes the development of critical thinking and independent judgement in the interpretation of laboratory data.

Communication skills:
The course will provide students with the skills required to communicate the significance of laboratory test results clearly and appropriately, collaborate effectively with other healthcare professionals, and provide understandable information to patients and their families while respecting professional competencies.

Learning skills:
The course will enable students to develop an autonomous and critical approach to learning, supporting lifelong learning in the fields of Laboratory Medicine and the interpretation of biochemical data, while facilitating the integration of this knowledge with subsequent clinical courses and future professional practice.

Contents

The meaning of the examination laboratory, his scientific and clinical relevance; the contribution of the laboratory in disease prevention, diagnosis, especially in assessments of organ function and patients monitoring; the foundation for interpreting laboratory tests; the influence of the way to collect, transport and storage biological samples on results of the laboratory tests.

Detailed program

Role, purpose and limits of Laboratory Medicine. How to ask for a laboratory test. Characteristics of a laboratory examination: biological materials on which are performed laboratory tests; quantities and units; reference values; critical values. Features of laboratory methods. Pre-analytical, analytical and post-analytical mistakes. Precision. Accuracy. Sensitivity. Specificity. Predictive value. Patient preparation, identification collection and preservation of samples for the transportation to the laboratory. Sources of variability in sample collection: patient position, location and type of sampling, disinfectants, tourniquet application, blood amount taken, anticoagulants and preservatives, sample types, time of harvesting. Physiological factors that alter the composition of body fluids. Biological variables controllable: posture, hospitalization and immobilization, exercise, circadian rithym, influence of food, tobacco smoking, alcohol consumption, drug therapies, patient's medical condition. Uncontrollable biological variables: age, sex, race, environmental factors. Interferences: hemolysis, lipemia, jaundice. The laboratory diagnostic in organ and metabolic functions, in monitoring drug therapies and some process of the desease. Liver: the main laboratory tests used to assess liver function; definition, classification and clinical significance of the aspartate aminotransferase, alanine aminotransferase, alkaline phosphatase, gamma-glutamyl transferase, bilirubin, albumin, ammonium, lactic dehydrogenase, alpha-fetoprotein. Kidney: the main laboratory tests used for the evaluation of renal function; definition classification and clinical significance of plasma creatinine, creatinine clearance, estimation of glomerular filtrate by MDRD, Urea plasma, serum uric acid, chemical-physical examination of urine. Carbohydrate metabolism: the main laboratory tests used for the evaluation of glucose metabolism; definition, classification and clinical significance of fasting plasma glucose, postprandial plasma glucose, plasma glucose after oral load (OGTT), glycated hemoglobin, Fructosamine, plasma insulin, Peptide C. Examples of indices of acute phase assayed in the laboratory: speed of erythrocyte sedimentation rate (ESR); C-Reactive Protein. Monitoring of drug therapies and dosing an overuse of substance: INR and prothrombin activity; measurement of ethanol. The markers of organ failure: tumor markers; markers of myocardial necrosis. Principles of Immunology: the blood groups; finding Antibodies Irregulars; blood components; outline of transfusion reactions.

Prerequisites

None.

Teaching form

The lessons are held in presence. Some lessons are held through the Distance Learning mode Teledidattica.

Textbook and teaching resource

Learning material (slides of the lessons) is available at the e-learning platform of the course.
Recommended textbooks:

- Rossi A., Biagiotti S., De Francesco D. (1993) Elementi di immunologia, immunoematologia e pratiche trasfusionali, Milano, Sorbona.
- Melzi D'Eril G. V., Chelazzi G. (1999) Biochimica clinica e immunologia, Milano, Sorbona.

Semester

I year, II semester

Assessment method

Written test composed by 7 multiple choice quizzes and 1 open-ended question. The exam is passed by obtaining a passing grade in all 4 modules.

Office hours

By appointment (email request).

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY