



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Clinical Biochemistry

2627-1-I0302D005

Aims

Knowledge and Understanding

At the end of the course, students will have acquired knowledge and understanding of the biochemical and pathophysiological principles underlying the metabolism of the major organs and tissues, as well as the alterations detectable through clinical biochemical analyses. They will also be familiar with the theoretical principles, operational characteristics, and applications of the main analytical and instrumental techniques used in clinical biochemistry and clinical molecular biology laboratories, including spectrophotometric, electrophoretic, and immunometric methods, PCR-based techniques, and the most recent ultrasensitive technologies for biomarker determination in neurodegenerative diseases.

Applying Knowledge and Understanding

At the end of the course, students will be able to apply the knowledge acquired to interpret the main clinical biochemical tests used to assess the function of organs and physiological systems, identify the most appropriate analytical and instrumental methods for specific diagnostic purposes, and understand the essential phases of pre-analytical processing, analysis, and evaluation of biological samples. They will also be able to recognize and correctly use laboratory instrumentation and common laboratory equipment for the preparation and handling of biological samples, as well as understand the applications of the most recent ultrasensitive analytical technologies employed in clinical biochemistry laboratories for the determination of cerebrospinal fluid biomarkers in diseases of the central nervous system.

Making Judgements

Through the analysis of major biomarkers and their diagnostic applications, students will develop the ability to critically evaluate the usefulness, reliability, and limitations of analytical methods employed in clinical biochemistry laboratories. They will also be able to correlate laboratory findings with the underlying physiological and pathological processes, critically interpreting the results obtained in light of the biochemical and pathophysiological knowledge acquired.

Communication Skills

At the end of the course, students will have acquired the ability to describe and discuss, using appropriate scientific

terminology, the principles of the main analytical and instrumental methodologies, the significance of laboratory results, and the biochemical and pathophysiological mechanisms underlying alterations in clinical biochemical parameters.

Learning Skills

At the end of the course, students will have acquired the methodological and conceptual tools necessary to independently deepen their knowledge in the fields of clinical biochemistry, laboratory diagnostics, and clinical molecular biology, keeping up to date with developments in analytical methodologies, biomarkers, and their applications in laboratory medicine.

Contents

To provide knowledge about metabolic specificities of main organs and tissues, and on the biochemical and pathophysiological basis of laboratory analysis alterations.

To provide the fundamentals of the main principles of analytical and instrumental techniques employed in Clinical Molecular Biology and Biochemistry laboratory.

Detailed program

Laboratory instrumentation. Basic principles and applications of the main lab techniques: photometric, electrophoresis techniques, hemo-chromo-cytometric and urine test, enzymatic assays. Evaluation of analytical methods (practicability, reliability, bias).

Organ profiles: glucose, lipid protein, ethanol and bilirubin hepatic metabolism, and relates tests. Adipose tissue metabolism, Lipid and lipoprotein metabolism, muscular and myocardial metabolism. Myocardial markers. Nervous system metabolism.

Red cells metabolism. Anaemia and hemoglobinopathies.

Kidney metabolism and hydro-electrolytic balance; renal clearances, creatinine and urea. Metabolic interrelations. Bone and mineral metabolism. Iron balance. Acid-base balance and its regulation.

Techniques for the lymphocyte separation from whole blood. DNA and RNA extraction, purification, quantification and storage: theory and practical aspects. Restriction enzymes: theory and diagnostic applications. Retro transcription reaction. Polymerase chain reaction (PCR): parameters for the amplification (denaturation, hybridization, extension) master mix. Amplification products identification (agarose-gel electrophoresis and hybridization techniques). PCR product sequencing. Viral nucleic acid assays (HCV, HBV, HIV). Ultrasensitive Analytical Techniques and Technologies for Cerebrospinal Fluid Diagnostics in Neurodegenerative Diseases, with a Focus on Cerebral Amyloid Angiopathy and Alzheimer's Disease.

Prerequisites

Teaching form

Lectures and exercises

Textbook and teaching resource

SPANDRIO L. BIOCHIMICA CLINICA, ED SORBONA

SILIPRANDI N. TETTAMANTI G. BIOCHIMICA MEDICA ED PICCIN

Course materials provided by the instructor (lecture slides).

Semester

Second semester

Assessment method

written and orale exam

Office hours

By appointment required by mail

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING
