



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Pathophysiological Insights and Novel Therapies in Type 2 Diabetes and Obesity

2627-2-F0902D015-F0902D01501

Aims

The objectives of this course are to provide students with knowledge and awareness of the following topics:

Cardio-renal-metabolic diseases associated with overweight, obesity, and insulin resistance represent a pathological continuum that begins with the increased risk driven by adipose tissue dysfunction in overweight and obesity and progresses to the development of the major traditional cardiovascular risk factors, including hypertension, dyslipidaemia, diabetes mellitus, chronic kidney disease, and metabolic dysfunction-associated steatotic liver disease (MASLD).

The progression of this continuum leads to the development of target organ damage, affecting the vascular system (atherosclerosis, heart failure), kidneys (proteinuria, chronic kidney disease), liver, and metabolism (type 2 diabetes mellitus), ultimately culminating in acute clinical events resulting from progressive organ injury, such as myocardial infarction, stroke, the need for dialysis, liver failure, and acute metabolic decompensation (e.g., severe hyperglycaemic crises).

Contents

Pathophysiological aspects: The objectives of this course are to provide students with knowledge and awareness regarding the following topics:

- Cardio-renal-metabolic diseases associated with overweight, obesity, and insulin resistance constitute a pathological continuum. This progresses from a risk state driven by adipose tissue dysfunction—associated with being overweight or obese—to the manifestation of classic cardiovascular risk factors such as hypertension, dyslipidemia, diabetes, renal insufficiency, and MASLD.
- Complications involving end-organ damage—affecting the vasculature (atherosclerosis, heart failure), kidneys (proteinuria, chronic kidney disease), liver, and metabolic systems (type 2 diabetes mellitus)—culminating in acute clinical events resulting from progressive damage (myocardial infarction, stroke, dialysis, liver failure, acute

glycemic decompensation).

- The relationship of obesity and insulin resistance syndrome with vascular, renal, hepatic, and metabolic manifestations.
- Full manifestation of renal, cardiovascular, metabolic, and hepatic diseases.
- Methodological introduction to randomized clinical trials.
- Clinical studies supporting the use of innovative therapies—such as SGLT2 inhibitors and incretin axis modulators—and their key findings.

Detailed program

PATHOPHYSIOLOGY

- Pathophysiology of insulin resistance and metabolic syndrome
 - o Adipose tissue physiology
 - o Regulation of energy metabolism
 - o Ectopic fat
- Pathophysiology of atherosclerosis
- Pathophysiology of metabolic kidney disease: from proteinuria to organ failure
- Pathophysiology of metabolic liver disease: from hepatic steatosis to cirrhosis via steatohepatitis
- Pathophysiology of glucose metabolism: from insulin resistance to impaired insulin secretion

CLINICAL ASPECTS

- Heart failure: definition, symptoms, and clinical impact
- Chronic kidney disease: definition, classification of damage, and epidemiology
- Liver disease: screening methods, fibrosis, clinical presentation of cirrhosis and its main complications
- Micro- and macrovascular complications of diabetes

CLINICAL TRIALS

- Introduction to the design and interpretation of randomized clinical trials
- Clinical trials with SGLT2 inhibitors in diabetes, heart failure, kidney disease, and MASLD
- Clinical trials with incretin axis modulators in diabetes, obesity, kidney disease, MASLD, dementia, weight-bearing joint disease, and obstructive sleep apnea

Prerequisites

Advanced knowledge in genetics, biology and molecular biology.

Teaching form

12 two-hour lectures, including a critical reading of a randomized clinical trial.

Textbook and teaching resource

Slides used in lectures and paradigmatic randomized clinical trials uploaded to the e-learning platform.

Semester

First semester

Assessment method

Oral exam as described in the general section

Office hours

By appointment

Sustainable Development Goals

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