UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Physiology

2627-4-H4102D029-H4102D107M

Aims

The course aims to allow medical students to understand renal physiology using methods which improve their deep learning of the physiological process at the basis of the kidney functions. This will provide them the tools to consciously approach the diseases of the kidney and of the urinary tract. At the end of the course the student will be able to discuss the glomerular functions and its regulation, the hydro-electrolyte homeostasis and the role of the kidney in the regulation of the blood pressure and in the acid/base homeostasis.

Contents

The course will examine aspects of the renal physiology as they serve to introduce the students to the relevance and the importance of the kidney system. The module will address important homeostatic kidney functions such as the capacity to regulate the concentration of solutes and electrolytes within the blood and matching their excretion in the urine, to regulate the blood pressure and the maintenance of the pH of the extracellular fluid throught the excretion and synthesis of acidic and basic molecules. Moreover, a number of important endocrine functions carried out by the kidney will be presented.
During the course, the effects of the aging process on the physiology of the gastrointestinal system and the effects due to gender differences will be emphasized.

Detailed program

Functional organization of the glomerulonephronic unit
Glomerular filtration, glomerular filtration rate
Renal blood flow
Tubular reabsorption and transport. The topic will be detailed in the proximal tubule, descending loop of Henle, thin

ascending loop of Henle, thick ascending loop of Henle, early distal tubule, late distal tubule and collecting duct, peritubular capillary transport.
Mechanism of urine concentration and dilution
General Regulatory Mechanisms: regulation of GFR and RBF and glomerulo-tubular balance
Specific Regulatory Mechanisms: regulation of urine osmolarity, regulation of sodium excretion, potassium balance, regulation of phosphate excretion, regulation of calcium excretion

Prerequisites

Fundamentals of Human Physiology, in particular the revision the balance in body fluid volume and composition addressed in the second year.

Teaching form

The two-hour classes will be held in person. They will begin with a presentation of concepts (instructional phase), followed by student interaction that shapes the subsequent part of the lesson (interactive phase). Teaching methods will include lectures, videos, and class discussions.
Up to 30% of the teaching hours may involve innovative teaching methods—such as delivery under the instructor's supervision, co-teaching, or remote learning—in accordance with Ministerial Decree no. 1835 of December 6, 2024.

Textbook and teaching resource

Guyton & J.E. Hall, Textbook of Medical Physiology, Elsevier;
Boron WF, Boulpaep EL, Medical Physiology, Ed. Elsevier.
Reviews or scientific papers recommended by the Professor During Lectures.

Semester

Fourth year, second semester

Assessment method

The exam foresees the quiz mode and will be carried out in integrated mode according to the modality envisaged by the vertical layout

Office hours

By appointment. To be scheduled with Prof. Rivolta via e-mail.

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Sustainable Development Goals

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