UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Physiology

2021-4-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.

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

Lectures with interactive presentation and discussion. Whenever possible, clinical case analyzes will be proposed for the evaluation of the specific physiological parameters.

Textbook and teaching resource

Guyton & J.E. Hall, *Textbook of Medical Physiology*, Elsevier;

Boron WF, Boulpaep EL, *Medical Physiology*, Ed. Elsevier.

Semester

Second Semester

Assessment method

Office hours

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