UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Physiology

2021-4-H4102D024-H4102D080M

Aims

The course aims to provide the basic understanding of the function of cardiovascular system and its homeostatic role. After completion of this course, the students will learn how underlying physiologic principles of cardiovascular system relate to disease states, diagnosis and treatment. The course will describe the main clinical applications of most important physiologic concepts.

Contents

cardiac physiology and adaptations (in health and disease); physiology of the systemic and pulmonary circulations; regulation of cardiovascular function; methods of measurement of cardiovascular function

Detailed program

The heart

- Structural and functional aspects of cardiac excitation - the electrical cycle (with reference to ECG)

- Structural and functional aspects of cardiac excitation-contraction coupling and its modulation (inotropy, lusitropy)

- The cardiac mechanical cycle (on pressure/time and pressure/volume planes) – definition of “systolic” and “diastolic” functions and their coupling.

- Cardiac “mechanical” and “chemical” work - relation to cardiac O_2 consumption (myocardial efficiency)

- Cardiac adaptation to preload and afterload changes in health and disease

- Principles of cardiac (systolic and diastolic) functional measurements (invasive and imaging)

The systemic circulation

- Large arteries dynamics: windkessel mechanism, pressure pulse and its propagation

- Small arteries: regulation of peripheral resistance (intrinsic, neural, paracrine)

- Systemic pressure/flow relationship – peculiarities of the coronary circulation

- Determinants of capillary pressure – mechanisms of “edema”

- Mechanisms of venous return (preload maintenance and regulation)

The pulmonary circulation

- Structure-function peculiarities

- Pulmonary vascular resistance : definition, regulation and measurement

Regulation of cardiovascular function

- Pressure / volume homeostasis (neural and endocrine)

- Adaptation to physiologic demand (exercise, gravity, pregnancy etc)

Prerequisites

- Fundamentals of human physiology module (by Profs. Sancini and Rivolta)

- English language

Teaching form

- During COVID-19 emergency period, the lectures will be held remotely, by synchronous online videoconference (also recorded for offline use).

- All course activities will be held in English language

Textbook and teaching resource

- Guyton and Hall Textbook of Medical Physiology 14 edition. Elsevier 2020, Chapters III (The Heart), IV (The Circulation) and VII (Respiration)

- Mohrman DE, Heller LJ. Cardiovascular Physiology 9th edition. McGraw Hill 2018

Semester

- First semester

Assessment method

Oral exam: interview on the lesson topics in English

In the event of pandemic emergency period, only telematic exams will be available. They will be carried out using the WebEx platform and on the e-learning page there will be displayed a public link where possible virtual spectators may get access and assist to the examination.

Office hours

By email appointment: antonio.zaza@unimib.it