UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Physiology

2627-4-H4102D024-H4102D080M

Aims

• To provide basic understanding of the function of cardiovascular system and its homeostatic control
• To relate physiologic principles to cardiovascular disease states, diagnosis and treatment
• To illustrate clinical applications of important physiology 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 O2 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
Determinants of capillary filtration/reabsorption balance – mechanisms of “edema”
Mechanisms of venous return (preload maintenance and regulation)

The coronary circulation
Subepicardial and intramural vessels
Left vs right flow profiles – phasic LV flow
Wall stress and extravascular compression- concept of “closure pressure”
Coronary flow reserve and its recruitment
Paracrine and neural regulation (redundancy and feed-forward)
Coronary flow during exercise (consequences of proximal obstruction)

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

- Frontal teaching (about 60%) and interaction with the audience (tracing and case discussion, about 40%)
  All course activities will be held in English

Textbook and teaching resource

- Basic Cardiovascular Physiology (Pagliaro et al) River Publishers 2020 - available as on-line resource at: ht tps://login.proxy.unimib.it/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=26 34437&lang=it&site=eds-live&scope=site
- Guyton and Hall Textbook of Medical Physiology 12 edition. Saunders Elsevier 2011, Unit III (The Heart) and IV (The Circulation)
- Mohrman DE, Heller LJ. Cardiovascular Physiology 9th edition. McGraw Hill 2018

Semester

1st semester

Assessment method

Questions concerning this module will be included in the written questionnaires of the CV track. Questions during the CV track oral exam

Office hours

Office hourse on appointment

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING