

COURSE SYLLABUS

Physiology

2223-4-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 regional 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

- Lezioni frontali con modalità interattiva (non sono previste prove in itinere)
Tutte le attività del corso verranno tenute in lingua Inglese

Textbook and teaching resource

- Basic Cardiovascular Physiology (Pagliaro et al) River Publishers 2020 - available as on-line resource at: <https://login.proxy.unimib.it/login?url=https://search.ebscohost.com/login.aspx?direct=true&db=nlebk&AN=2634437&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

Assessment method

Questions concerning this module will be included in the questionnaires of the CV track

Office hours

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Sustainable Development Goals

GOOD HEALTH AND WELL-BEING
