UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Cardiovascular Diseases and Respiratory Sciences

2021-4-H4102D024

Aims

The course will provide the essential theoretical knowledge of anatomic, pathophysiologic, diagnostic and therapeutic principles of major cardiovascular and respiratory diseases. The acquired knowledge will contribute to a better understanding of the mechanisms and decision algorithms involved in cardiovascular and respiratory pathologies. The course will also serve to explain the role of cardiovascular risk factors, the importance of primary prevention and of an early diagnosis of pathologic conditions, as well as of cardiac and respiratory rehabilitation.

Contents

Gross anatomy and embryology of heart, great vessels and lung; embryology and anatomy of thoracic cavity, spatial relationships and function of inner cardiac structures; basic physiologic principles of circulatory and respiratory system, heart pump and lung function; main classes of cardiovascular and respiratory drugs; the macroscopic and microscopic morphological bases of cardiovascular and respiratory diseases; cardiac arrhythmias; hypertension; vascular diseases; valvular heart diseases; ischemic heart diseases; diseases of myocardium, pericardium, lung and pulmonary circulation; heart failure; interventional cardiology; surgical treatment of ischemic, valvular, congenital heart diseases, vascular pathologies; cardiovascular fluid mechanics; cardiorespiratory emergencies; respiratory failure; chronic pulmonary diseases; pleural and interstitial lung disorders; cardiac, pleural and lung tumors

Detailed program

CARDIAC ANATOMY I - Anatomical concepts related to heart embryology and development; the heart: basic

concepts regarding cardiomyocytes, connective tissue, sinoatrial node, and the conduction tissue; anatomical concepts related to heart chambers and pericardium: normal and pathological aspects; anatomical concepts related to heart valves apparatus: normal and pathological aspects; anatomical concepts related to systemic circulation anatomy: normal and pathological aspects

CARDIAC ANATOMY II - Anatomical concepts related to lung, pleural and chest wall embryology and development; chest wall: anterior and posterior landmarks and anatomic border; mediastinum and thoracic cavity: landmarks, organs' content and relations; pleural gross and microscopic anatomy; the lung: basic concepts regarding normal anatomic structure; histology of respiratory system: structure, microscopic anatomy of trachea, bronchial tree and the functional unit of the lung: the secondary pulmonary lobule; anatomical concepts related to lung and tracheobronchial tree: normal and pathological aspects; anatomical concepts related to pulmonary circulation anatomy: normal and pathological aspects

PHYSIOLOGY - Overview of cardiovascular system; electrical activity of the heart; cardiac cell structure and function; the cardiac cycle; the heart pump: cardiac inotropy, preload and afterload; vascular structure and function; arterial and venous blood pressure; overview of respiratory system; the lung function, ventilation and principles of gas exchange; neurohormonal control of cardiovascular and respiratory system; cardiovascular and respiratory responses to physiologic stresses

PHARMACOLOGY - General overview of pharmacologic therapy for cardiovascular disease; anti-ischemic and antianginal therapies; anti-hypertensive therapies; anti-arrhythmic therapy; antithrombotic agents; antiplatelet agents; treatment of acute and chronic heart failure; lipid-modifying therapies; therapeutic principles in metabolic syndrome and diabetes; non-cardiac drugs affecting the heart; treatment of asthma and chronic obstructive pulmonary disease

PATHOLOGY - Pathological bases, macro- and microscopic evolutionary aspects and complications of myocardial infarction and chronic ischemic cardiopathy; morphological classification of endocarditis, myocarditis, pericarditis and cardiomyopathies; pulmonary granulomatous diseases: primary and post-primary tuberculosis and sarcoidosis; histological and cytologic diagnosis of pulmonary neoplasia, histological classification of lung neoplasia; histomorphological features of pleural mesotelioma

DIAGNOSTICS - Cardiovascular examination; electrocardiography; cardiopulmonary exercise testing and pulmonary function tests; overview and selection of noninvasive imaging modalities; transthoracic echocardiography and lung ultrasound; stress and transesophageal echocardiography; chest radiography and computed tomography; cardiac magnetic resonance; nuclear imaging and positron emission tomography; invasive imaging and hemodynamics

CARDIOLOGY - Arrhythmias; syncope; hypertension; dyslipidemias; metabolic syndrome and diabetes; aorta, cerebrovascular and peripheral vascular disease; valvular heart disease; infective endocarditis; myocarditis; coronary artery disease; acute coronary syndromes; interventional cardiology; heritable channelopathies; cardiomyopathies; heart failure; risk stratification and cardiac rehabilitation; pericardial diseases; pulmonary embolism; pulmonary hypertension; right ventricular failure and cor pulmonale; adult congenital heart diseases; cardiac tumors; sleep disorders and heart disease; adaptation of cardiovascular system to various physiologic conditions (aging, exercise, pregnancy, high altitude)

CARDIAC SURGERY - Surgical anatomy of ischemic, valvular and congenital heart diseases; basic concepts regarding treatment of coronary artery diseases; basic concepts regarding treatment of mitral, aortic and tricuspid diseases; basic concepts regarding treatment of congenital heart diseases.

VASCULAR SURGERY - Diagnosis of the most important vascular diseases in the outpatient setting; Surgical indications for vascular surgery in hospitalized patients; Basic concepts and observations activities regarding treatment of aneurysms in the operating room; Basic concepts and observations activities regarding treatment of carotid disease in the operating room; Basic concepts and observations activities regarding treatment of peripheral artery disease in the operating room.

EMERGENCY - Causes of cardiocirculatory arrest and treatment (BLS-D, ACLS, ECLS); Definition and classification of shock types and focus on cardiogenic shock, pathophysiology, clinical presentation and treatment; obstructive shock: focus on the causes of cardiac tamponade, pathophysiology, clinical presentation and treatment; causes of aortic dissection, classification, clinical presentation and medical treatment prior to surgery; causes of pulmonary embolism, acute cor pulmonale, pathophysiology, clinical presentation and treatment; causes of acute respiratory insufficiency, clinical presentation and principle of treatment

MODELING AND SIMULATION - Basic blood flow in arteries; basic concepts of cardiac function; properties of blood and vessels; laws of conservation of mass, momentum and energy balance

RESPIRATORY SCIENCES I - Specific diagnostic tests for respiratory disorders; lung infections; chronic pulmonary diseases, including asthma, COPD, bronchiectasis and cystic fibrosis

RESPIRATORY SCIENCES II - Pleural diseases, imaging and procedures; interstitial lung disorders; pleural and lung tumors; smoking-related pulmonary disease; palliation in chronic pulmonary diseases; guidelines of the main pulmonary pathologies

Prerequisites

- Fundamentals of human genetics, morphology, biology, biochemistry, histology and physiology of cardiovascular and respiratory system, basic clinical skills, basic pathology and image diagnostics

- English language

Teaching form

- Lectures including theoretical concepts, clinical case presentations, examples of diagnostic tests, images, reports or therapeutic interventions.

During COVID-19 emergency period, the lectures will be held remotely by asynchronous online videoconference (recorded video lectures available on demand)

All course activities will be held in English language

Textbook and teaching resource

- Harrison’s Principles of Internal Medicine 20th Edition 2018, McGraw-Hill

- Lilly LS. Pathophysiology of Heart Disease. 6th Edition. 2016 Wolter Kluwer

- Kumar V, Abbas AK, Aster JC, Robbins and Cotran Pathologic Basis of Disease. 9th Edition 2014, Elsevier

- Hurst’s The Heart 14th Edition 2017, McGraw-Hill

- McPherson RA, Pincus MR Henry's Clinical Diagnosis and Management by Laboratory Methods, 23th Edition

2016, Elsevier

Semester

- First semester

Assessment method

Written examination comprising multiple-choice questions with only one correct answer (among 5) aimed at evaluating global comprehension of course program. Each correct answer is scored 1.

or

Written and oral examination comprising a first written test (as above) followed by an oral exam (*a minimum score of 18 at written test is required to be admitted to oral exam*)

During the Covid-19 emergency only telematic oral exams will be available. They will be carried out using the WebEx platform. For access to the events, the links will be published in the e-learning page of the subject

All assessments will be done in English language

Office hours

By email appointment at gianfranco.parati@unimib.it