



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Internship in Cardiovascular Pathophysiology and Hemodynamics

2223-3-H4102D119

Aims

This internship aims at exposing students to a pathophysiological approach towards common cardiological problems and conditions, such as unexplained dyspnea, heart failure, valvular heart disease, pulmonary hypertension.

In particular, it aims at:

1. acquiring awareness that some pathognomonic alterations in cardiology can be unmasked by stress tests (such as cardiopulmonary exercise test with exercise stress echocardiography)
2. recognizing such alterations at cardiopulmonary exercise test
3. recognizing such alterations at exercise right heart catheterization
4. acquiring the skill of performing a report of cardiopulmonary exercise test and exercise right heart catheterization

Contents

Cardiopulmonary exercise testing: how to perform and interpret it, in unexplained dyspnea, heart failure, valvular heart disease, pulmonary hypertension.

Exercise right heart catheterization: how to perform and interpret it, in unexplained dyspnea, heart failure, valvular heart disease, pulmonary hypertension.

Detailed program

The student will assist to sessions of cardiopulmonary exercise test and exercise right heart catheterization.

Importance will be given to patients' preparation, contraindications and indications to these exams, pivotal

parameters under analysis (including oxygen consumption, carbon dioxide production, exercise hyperventilation; filling pressures, pulmonary pressures, cardiac output) as well as to their clinical and pathophysiological meaning. The student will be shown how to interpret these exams in different clinical and pathophysiological conditions (unexplained dyspnea, heart failure, valvular heart diseases, pulmonary hypertension)
The student will learn how to perform and interpret these exams, with a final assessment consisting in autonomous interpretation of cardiopulmonary exercise test and exercise right heart catheterization

Prerequisites

Notions of physiology and cardiology

Teaching form

Non frontal lectures.

Attendance to outpatient and inpatient activity of cardiopulmonary exercise test and exercise right heart catheterization.

Attendance and involvement in interpretation of cardiopulmonary exercise test and exercise right heart catheterization.

Textbook and teaching resource

Maron BA, Cockrill BA, Waxman AB, Systrom DM. The invasive cardiopulmonary exercise test. *Circulation*. 2013 Mar 12;127(10):1157-64. doi: 10.1161/CIRCULATIONAHA.112.104463. PMID: 23479667.

Sorajja P, Borlaug BA, Dimas VV, Fang JC, Forfia PR, Givertz MM, Kapur NK, Kern MJ, Naidu SS. SCAI/HFSA clinical expert consensus document on the use of invasive hemodynamics for the diagnosis and management of cardiovascular disease. *Catheter Cardiovasc Interv*. 2017 Jun 1;89(7):E233-E247. doi: 10.1002/ccd.26888. Epub 2017 May 10. PMID: 28489331.

Hsu S, Fang JC, Borlaug BA. Hemodynamics for the Heart Failure Clinician: A State-of-the-Art Review. *J Card Fail*. 2022 Jan;28(1):133-148. doi: 10.1016/j.cardfail.2021.07.012. Epub 2021 Aug 10. PMID: 34389460; PMCID: PMC8748277.

Caravita S, Picariello C, Garascia A, Misuraca L, De Tommasi E, Imbalzano E, Enea I, Roncon L, Vatrano M; a nome dell'Area Malattie del Circolo Polmonare ANMCO. Ipertensione polmonare pre-capillare o post-capillare? Il ruolo dei test provocativi in sala di emodinamica [Pulmonary hypertension: pre- or post-capillary? The role of provocative tests in the cath lab]. *G Ital Cardiol (Rome)*. 2022 Jul;23(7):533-541. Italian. doi: 10.1714/3831.38171. PMID: 35771019.

Semester

Assessment method

Autonomous interpretation of a cardiopulmonary exercise test
Autonomous interpretation of an exercise right heart catheterization

Office hours

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION | GENDER EQUALITY
