



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Fisiopatologia Cellulare

2021-1-F0601Q085

Aims

Knowledge and understanding: the course aims to improve students' knowledge and understanding about the mechanisms linking molecular abnormalities (genetically determined or acquired) to the clinical manifestations of disease

Applying knowledge and understanding: the applicative counterpart of mechanistic knowledge is identification of molecular "targets" for drug therapy or diagnostic "biomarkers"

Making judgements: the course aims to improve students' skills in critical evaluation of scientific information concerning the topics addressed.

Communication skills: the interactive modality of teaching promotes the development of communication skills

Learning skills: the course will disclose illustrate principles of general applicability, as such useful in improving learning skills

Contents

The course will focus on themes of cellular pathophysiology with reference to different organic functions. It will deal with both gene-based abnormalities (channelopathies, sarcomere abnormalities etc.) and acquired ones (cell response to stress). To render the course suitable also for students coming from graduation courses other than Biological Sciences, the address to pathophysiology will be preceded by a succinct review of the physiological mechanisms involved.

Detailed program

The program is organized around the function of proteins with specific functions (ion channels, transporters, motor

proteins etc.). The role of these proteins in different organic systems will be illustrated through examples of disease conditions (in parenthesis) mechanistically linked to their abnormality. Considering the course duration (21 lessons), the program below is rather ambitious. However, every topic in the list is an independent module; therefore, it will be possible to decide during the course how many and which topics to address, depending on the students' background knowledge and interest.

Na⁺ channels and their function (review)

Mutations of V-gated Na⁺ channels (syndromes: LQT3 and Brugada s.)

Mutations of epithelial Na⁺ channels (syndromes: Liddle s.)

Cl⁻ channels and their function (review)

Mutations of Cl⁻ channels (syndromes: cystic fibrosis)

K⁺ channels and their function (review)

Mutations of V-gated K⁺ channels (syndromes: LQT1 and LQT2, SQT)

Mutations of "inward rectifier" K⁺ channels (syndrome: Bartter s.)

H₂O channels and their function (review)

Mutations of AQP channels (syndrome: diabetes insipidus)

Intracellular Ca²⁺ homeostasis (review)

Mutations of RyR channels (syndrome: CPVT)

Mutations of SERCA/PLN (syndromes: dilative cardiomyopathy and bronchial asthma)

Ca²⁺-sensor proteins (review)

Mutations of calmodulin (syndromes: LQTS and CPVT)

Motor proteins (review)

Mutations of sarcomeric proteins (syndromes: hypertrophic cardiomyopathy)

Prerequisites

Acquaintance with the contents of the courses of General and Systems Physiology (graduation course in Biological Sciences) is recommended. Depending on students' background, the teacher will decide the extent to which physiology principles shall be summarized before addressing pathophysiology; this will obviously impact on the number of topics that will be covered in the time available. Considering the impossibility to provide a single reference textbook for the course content, attendance is recommended.

Teaching form

Frontal teaching with interactive discussion.

If necessary, lessons will be held on-line in the **"synchronous" mode**, by using the "meeting" modality of the Webex platform. Lessons will also be recorded; nonetheless, synchronous participation is necessary for interaction and highly recommended.

Textbook and teaching resource

A cell Physiology textbook (e.g. Cell Physiology Sourcebook, N. Sperelakis ed., 4th edition, Academic Press) may serve as a reference for basic concepts, but it will not cover many of the specific topics presented in the course. Specific reading material, mostly in the form of review articles, will be made available during the course. Course slides will also be uploaded on the e-learning platform.

Considering the unavailability of a comprehensive textbook and the interactive teaching modality, attendance to the course is highly recommended

Semester

Second semester

Assessment method

Students will be evaluated by an oral exam. The exam will focus on knowledge of basic mechanisms and on student's ability to apply it to the interpretation of specific conditions.

Office hours

Appointment by E-mail (antonio.zaza@unimib.it)
