UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Molecular Medicine

2425-1-F0901D055

Aims

The course is intended to provide students with fundamental concepts on translational and molecular medicine and the biotechnological applications in this field. The following topics will be discussed: human physiopathology, molecular and cellular pathology, molecular mechanisms of the diseases, immunology within tissues like gut. The biological and clinical relevance of immune cells in tissues. The molecular mechanisms of inflammatory processes and pathologies of the immune system and advanced biotechnological applications in molecular medicine will also be discussed. A deeper learning of the experimental processes that led to the identification of the pathogenic mechanisms involved in the neoplastic transformation as well as the role of the microenvironment in tumor progression and drug resistance will be also provided..

Contents

Cellular and organelle pathology. Extra-cellular matrix pathology. Physiopathology and pathology: pathology of blood coagulation, of glicemic control, of the kidney. Molecular mechanisms of the diseases: molecular mechanisms and pathways (tumors and other relevant diseases). Advanced biotechnological techniques and in vitro and in vivo model to study pathogenetic processes at cellular and organism level. Molecular mechanism of Innate Immunity, immunity of Mucosal Districts and mechanisms of regulation of immunity response. Diseases of gut immunity system. Models to study the pathogenetic mechanism involved in neoplastic transformation, in tumor progression and in mechanisms of drug resistance.

Detailed program

CELLULAR AND MOLECULAR PATHOLOGY: Extracellular matrix pathology (amyloidosis, prion disease, collagenopathies, elastopathies, fibrosis). Intracellular accumulations (metabolic disorders-thesaurismosis,

steatosis). Organelles pathology (lysosomal disease, mitochondrial diseaes). Cystic fibrosis. Hemoglobin diseases (sickle cell anemia, thalassemia). Membrane receptors pathologies (familial hypercholesterolemia). Alpha 1-antitrypsin deficiency. DISEASES OF ORGAN SYSTEMS. Red blood cells and bleeding disorders. The kidney (glomerulopathies and tubulopathies, polycystic kidney disease). Diabetes. PHYSIOPATHOLOGY OF IMMUNE SYSTEM AND PATHOLOGY OF IMMUNE RESPONSE: General characteristics of the immune responses of epithelial barriers. Immune System in the Gastrointestinal Tract. Innate and adaptive immunity of the gastrointestinal tract. Control of immunity in the gastrointestinal tract by regulatory T cells and cytokines. Role of the commensal microbiome in the regulation of the immune system. Diseases related to the immune responses of the intestine. GENERAL AND TRANSLATIONAL ONCOLOGY: Models to study the pathogenetic mechanism involved in neoplastic transformation and their effects on the regulation of cellular populations. Models to study the role of microenvironment in tumor progression. Models to study the mechanisms of drug resistance. Models to study of programmed cell death: morphological features and molecular mechanisms (p53, Bcl2 family, IAPs, caspases, Death Receptors). Models of apoptotic dysregulation and molecular target therapy in cancer. Metronomic chemotherapy: a new approach in cancer therapy.

Prerequisites

Knowledge in the field of genetic and cell biology, biochemistry, human histology and anatomy.

Teaching form

Course with different teaching activities:
23 frontal lessons of 2 hours in attendance
4 frontal practical sessions of 2 hours in attendance
3 seminars of 2 hours in attendance
4 interactive group works of 2 hours in attendance

Textbook and teaching resource

1. Robbins e Cotran, LE BASI PATOLOGICHE DELLE MALATTIE, 10 edizione, Edra
2. Moncharmont, PATOLOGIA GENERALE, 2019, Edizioni IDELSON-GNOCCHI
3. Pardi e Di Fiore, PATOGENESI, 2023, PICCIN
4. Abate-Shen C., Politi K., Chodosh L.A., Olive K.P. MOUSE MODELS OF CANCER. A LABORATORY MANUAL. 2014, Cold Spring Harbor Laboratory Press.
5. Abul K. Abbas. IMMUNOLOGIA CELLULARE E MOLECOLARE IX Edizione Edra
6. Infection, Immune Homeostasis and Immune Privilege, Joan Stein-Streilein Editor Springer1.
7. Review and selected papers will be discussed and provided to the students during the course.

Semester

First Year, First Semester

Assessment method

No “in itinere” tests.
Oral discussion about different topics belonging to the classroom lessons (teachers’ choice) to evaluate scientific communication skills and the ability to establish scientific links among different topics.

Office hours

Available on request by email at:
cristina.bianchi@unimib.it
maria.foti@unimib.it
mariagrazia.cerrito@unimib.it

Sustainable Development Goals

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