



**UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA**

SYLLABUS DEL CORSO

Patologia Generale e Immunologia

2627-3-H4101D038

Aims

The course aims to provide students with the knowledge and tools necessary to understand the mechanisms of tissue repair and regeneration in human health and disease, as well as the etiological and pathogenetic processes underlying human disorders. It also seeks to provide the essential concepts required to address functional alterations associated with pathological conditions. In this module, these topics will be specifically explored in the context of neoplastic pathology, with particular emphasis on its molecular, cellular, and tissue mechanisms.

Contents

In this module, students will acquire knowledge and competencies related to the processes of aging and alterations of cellular homeostasis, the definition and classification of neoplasms, the distinguishing features of benign and malignant tumors, and the molecular basis of tumorigenesis, with particular emphasis on the roles of oncogenes, tumor suppressor genes, and epigenetic alterations. The module will also examine the mechanisms of biological, chemical, physical, and viral carcinogenesis, as well as tumor progression and metastasis, and the contribution of hypoxia, angiogenesis, and the tumor microenvironment to cancer development and progression. Additional topics will include cancer epidemiology, tumor biomarkers, preneoplastic conditions and lesions, sex- and gender-related oncology, and the principal in vivo and in vitro models used in tumorigenesis research. Finally, the course will address antitumor immunity and cancer immunosurveillance, together with the molecular and biological foundations of the major anticancer therapeutic strategies, including immunotherapy, molecularly targeted therapies, and antibody-drug conjugates.

Detailed program

- Preneoplastic lesions: hyperplasia, metaplasia, and dysplasia.

- Definition of neoplasia; biological and clinical features of benign and malignant tumors.
- Local invasion, tumor progression, and metastasis.
- Histogenetic classification of neoplasms; principles of tumor grading and staging.
- Chemical, physical, and biological carcinogenesis.
- Carcinogenic effects of ionizing and ultraviolet radiation.
- DNA and RNA oncogenic viruses.
- Multistep carcinogenesis: initiation, promotion, and progression.
- Molecular events involved in neoplastic transformation; driver and passenger mutations.
- Inherited cancer susceptibility and principles of precision medicine.
- Oncogenes and tumor suppressor genes: roles in cell-cycle regulation, apoptosis, and malignant transformation.
- Alterations in cellular proliferation and differentiation in cancer.
- Molecular mechanisms of therapeutic resistance.
- Tumor metabolism and cancer-associated cachexia.
- Tumor hypoxia and related molecular signaling pathways.
- Physiological and pathological vasculogenesis and angiogenesis.
- The tumor microenvironment: cellular and stromal components, cell–cell and cell–extracellular matrix interactions.
- Cytokines, chemokines, and fibroinflammatory mediators in tumor–host interactions.
- Cancer epidemiology.
- Environmental, occupational, iatrogenic, dietary, and lifestyle-related cancer risk factors.
- Impact of sex and gender on cancer development and progression.
- Tumor biomarkers: characteristics, limitations, and clinical applications.
- Antitumor immunity and cancer immunosurveillance.
- Tumor-specific and tumor-associated antigens.
- Principles of cancer immunodiagnostics and immunotherapy.
- Genomic integrity and cellular responses to DNA damage.
- Major DNA repair pathways and their role in the prevention of tumorigenesis.
- Alterations in DNA repair mechanisms and their biological and therapeutic implications in cancer.

Prerequisites

Knowledge concerning the previous preparatory courses in biology and physiology.

Teaching form

Ex cathedra lessons: lessons of 2h each

Textbook and teaching resource

- Patologia generale e fisiopatologia:

“Le basi patologiche delle Malattie” Robbins e Cotran, X edizione, Edra;

“Patologia Generale” Pontieri, Russo, Frati. V ed. Piccin;

“Cellule, tessuti e malattia- Principi di Patologia Generale” Majno e Joris, ed. CEA.

- Immunologia e immunopatologia:

Roitt, Immunologia, Zanichelli;

Abbas, Immunologia cellulare e molecolare, X edizione, Edra;
Abbas, le basi dell'immunologia, V edizione, Edra
Kuby, Immunologia, UTET.
- Others: scientific papers, slides et similia

Semester

First semester, III year

Assessment method

Oral exam, as detailed in the general Syllabus which intensively evaluates the candidate's preparation on the entire teaching program carried out in class and on the exam texts, with a request for further information and connections.

Office hours

By appointment.
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Sustainable Development Goals

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