UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Molecular Immunology

2627-3-E0201Q056

Aims

The course aims to provide modern concepts on how the immune system interacts and responds to an environment containing different species of potentially dangerous microorganisms. The teaching delves into the problem of how the immune system exists and evolved to protect the individual from infections. The course will also analyze the role of the immune system in the context of cancer, autoimmune diseases and organ transplants.
The various problems will be treated through the discussion of original experiments and particular relevance will be given to the themes that have characterized new molecular immunology studies in recent years, including imaging approaches, ex vivo three-dimensional models and/or in vivo models

Dublin Specific Descriptors:

1. Knowledge and Understanding
   At the end of the course the student will have learned specific content on how the immune system exists and has evolved to protect the individual from infections. The teaching will also analyze the role of the immune system in the context of cancer, autoimmune diseases and transplants.
2. applied knowledge and understanding
   At the end of the course, the student will have evaluated various current immunological issues through the discussion of original experiments and particular importance will be given to the themes that in recent years have characterized the new studies of molecular immunology, including imaging approaches, three-dimensional ex vivo models and/or in vivo models
3. independent judgment
   At the end of the course, the student will have learned to evaluate the scientific value of immunological articles, identify scientific questions, procedural and methodological errors and scientific content
4. communication skills
   Thanks to the presence of Journal clubs, the student will learn to describe a scientific article in a concise manner, to identify the main points and explain them concisely but effectively to his/her colleagues
5. learning ability
   through the presence of links to additional content to the course, students will be able to explore topics of interest independently

Contents

1. how to study the immune system:
   three-dimensional approaches and models, ex vivo and in vivo models, advanced imaging
2. study of the immune system in infections
3. study of the immune system in autoimmunity, allergies, organ transplants
4. study of the immune system in the mucous membranes
5. immune system in cancer

Detailed program

Description: anatomical and physiological barriers. The cells of innate immunity. The receptors of innate immunity. Signal transduction by toll like receptors. Signal transduction by the inflammasome.
Immunometabolism.
Description: relationship between cellular metabolism and immunity. The immunometabolism of phagocytes. Lymphocyte immunometbolism. Immunometabolism and tumors.
The immune defense against infections.
Description: Innate and adaptive immunity to viral, bacterial and fungal infections
Interaction between commensal microorganisms and the immune system.
Description: mucosal and intestinal immunology. Pathophysiology of the interaction between commensal microorganisms and the organism.
Immunopathologies.
Description: sepsis and inflammatory bowel diseases.
Phagocytes and tumors.
Description: role of macrophages and neutrophils in blocking or promoting tumor growth and study of the molecular mechanisms of this relationship.

Prerequisites

basic knowledge of Immunology
General preparatory requirements: the student can take the third year exams after having passed all the exams of the first year of the course

Teaching form

Teaching is held in Italian.
20 classroom lessons, including analysis and discussion of scientific articles, created with the support of PowerPoint presentations (25 hours DE, 15 hours DI)
At the end of each topic, students will interactively discuss the scientific articles relevant to the content of the thematic module (10 hours DI)
A 2-hour practice activity as support for studying and preparing for the exam carried out in interactive mode
in presence
A lesson will be given in co-teaching with Prof. Guglielmetti to discuss the interactions between the mucosal

immune system and the microbiota in the food sector.

Textbook and teaching resource

The material presented during the lessons (slides and scientific articles discussed in class) is available on the course's e-learning page.
Suggested textbooks:
“Immunobiology, the immune system in health and disease”, by Paul Travers, Mark Walport, Mark Shlomchik, Mark Schlomchik Charles Janeway (Authors); Taylor & Francis, Inc. (Publisher) (latest English edition or latest edition of the Italian translation, Publisher: Piccin)

recorded lessons and slides will be available

Semester

second semester

Assessment method

oral examination.
method: the student will present an article from which basic skills on immunology (theory) will be deduced and from which conceptual questions will start on topics such as autoimmunity, mucosal immunology, cancer immunology

Office hours

Office hours: by appointment, by email to the teacher.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING