UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Practical Course On Immunological Techniques

2425-2-E0201Q052-E0201Q067M

Aims

The course provides some basic theoretical knowledges and practical skills on Immunological techniques.
Students will be trained in the manipulation of cell lines of interest for immunology, in the generation of monoclonal antibodies and in the detection of antigens through methods and tools typically used by immunologists. Students attending the LTA-Immunology practical course are expected to achieve the following aims:
Knowledge and understanding.
Consolidate and deepen basic knowledge (theoretical, technical and methodological) in the field of Immunology.
Applying knowledge and understanding.
Correctly interpret the experimental protocols (cell line isolation and cultivation, proliferation assays, preparation of hybridoma, identification of cellular antigens etc) and recognize their relevant aspects; carry out the proposed experimental protocols in compliance with good laboratory practices and safety standards; collect and process experimental data.
Making judgements.
Recognize the experimental design, consider its critical points; critically evaluate the results obtained; recognize the contexts of application of the experimental methods carried out.
Communication skills.
Re-elaborate experimental data, effectively describe experimental procedures and results, using an appropriate technical vocabulary.
Learning skills.
Recognize and give a correct interpretation to experimental protocols similar to those practically performed, in a different context (i.e., a research laboratory).

Contents

This teaching module aims at introducing students to main immunological techniques.
Students will be trained on the following techniques:

- cultivation and evaluation of the viability of cell lines
- preparation of hybridomas and monoclonal antibody production
- separation of cellular populations (lymphocytes and monocytes / macrophages),
- lymphoproliferation assay (Mixed Lymphocyte Reaction, MLR)
- Enzyme immunoassays for quantitative analysis of antigens and antibodies (ELISA).
- Students will be introduced to the use of sterile biological hoods (biohazard di class II), CO2 incubators, bench centrifuges, cell cultures, microscopes, spectrophotometers

Detailed program

This teaching unit aims to introduce the main immunological techniques.
Operating and personal safety standards will be illustrated together with sterile operating techniques, use of sterile biological hoods (class II biohazard), CO2 incubators, bench centrifuges, microscopes, spectrophotometers.
The immunological techniques considered are:

- Preparation of cell cultures;
- Maintenance in cultures of adherent cell lines (macrophages / monocytes) and in suspension (lymphocytes).
- Cell separation by Magnetic Sorting (use of magnetic beads coated with antibodies)
- Production of monoclonal antibodies: immunization methods, effects of antigen doses, adjuvants and cell fusion for hybridoma generation.
- Characterization of antigenic specificity of frequency and function: cultures with limit dilution.
- Detection, measurement and characterization of antibodies and their use in research and diagnostics
- Antigen identification test (direct ELISA)
- Antibody identification test (indirect ELISA).

Prerequisites

Background: attendance to the Immunology course (second year, I semester)
Specific prerequisites: none
General prerequisites: Students can take the exams of the second year after passing the examinations of Introductory Biology, General and Inorganic Chemistry, Mathematics, and Foreign Language.

Teaching form

This learning unit is addressed through practical lessons which are carried out in a teaching laboratory. At the beginning of each lesson, theory, aims and experimental design will be exposed. At the end of experimental experience, a discussion of collected results will be guided by the teacher.
Attendance at the laboratory is mandatory.
Teaching language: Italian.

Textbook and teaching resource

Learning material (handouts) is available at the e-learning platform of LTA-Immunology module.

Semester

Second semester

Assessment method

Written examinination. Practical and theoretical knowledge will be assessed though open questions and problems.

Office hours

Contact: on demand, upon request by mail to lecturer.

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING | QUALITY EDUCATION