



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Omeostasi Cellulare nei Tessuti Somatici e Cellule Staminali

2021-1-F0601Q070

Aims

The aim of this course is to extend and elaborate current notions on stem cells functions, focusing in particular on tissue homeostasis and repairing/regenerative mechanisms.

1. Knowledge and understanding:

Students will be able to understand how stem cells regenerate our tissues and replace differentiated cells lost by the normal tissue homeostasis and/or tissue damage.

2. Applied knowledge and understanding:

In addition, the course will delineate limits and potentialities of stem cells in regenerative medicine, in order to enable students to develop an informed opinion on current innovative experimental therapies and to be aware of safety and efficacy issues of each stem cell type.

3. Making judgments

Students will be able to critically review the scientific bibliography inherent researches investigating stem cells. In addition, students will be able to develop an informed opinion on the scientific rationale of the potential clinical use of specific stem cell types. This is important also considering the "stem cell tourism", that means patients traveling to receive stem cells treatments in clinics that often do not follow the regulatory standards.

4. Communication skills:

At the end of the course, students will be able to give a definition of stem cell and describe its functional, morphological and antigenic characteristics that differentiate the different types of stem cells. They will also be able to summarize the mechanisms that sustain tissue homeostasis of various tissues using an appropriate scientific language.

Students will be able to use an appropriate scientific language to define stem cell types and describe their functions, morphology and antigenic properties. Students will be able to describe mechanisms sustaining tissue homeostasis by using appropriate scientific terms.

5. Learning skills:

This course will give to the students the information to achieve a more comprehensive knowledge of the physiology of our tissues.

Contents

Comprehensive knowledge of stem cell field: definition, categories, functional characteristics, definition. General mechanisms and models describing cell homeostasis in somatic tissues. Description of the different stem cells type, considering their developmental origin, their role in tissue homeostasis and potential therapeutic application.

Detailed program

1. STEM CELLS: Definition, functional properties, classification and role in tissue homeostasis.
2. CELL HOMEOSTASIS IN SOMATIC TISSUES.
 - a. Cell compartments: Stem cells, Transit amplifying progenitors and differentiated cells
 - b. Self-maintenance of stem cells compartment: symmetric and asymmetric cell division, deterministic model, stochastic models.
 - c. Genealogies
 - d. Hierarchical cellular models: single cells, ribbon-model.
3. MOLECULAR MECHANISMS INVOLVED IN STEM CELLS FUNCTIONS:
 - a. Differentiation and functional maturation
 - b. Proliferation, symmetric and asymmetric cell division
 - c. Stem cells niches
4. PLURIPOTENT STEM CELLS
 - a. Embryonic Stem Cells
5. SOMATIC STEM CELLS:
 - a. Stem cells in intestinal crypts
 - b. Skin Stem Cells
 - c. Neural Stem Cells
 - d. Hematopoietic Stem Cells
 - e. Mesenchymal Stem Cells
6. CANCER STEM CELLS
7. INDUCED PLURIPOTENT STEM CELLS

Prerequisites

The knowledge of the basic mechanisms of cell biology, human physiology and histology is required.

Teaching form

Lectures

Textbook and teaching resource

Stem cells, di C.S. Potten, Academic Press. Classes are based on original or review articles in English language. Fundamental articles and the ppt slides presented will be available on the e-learning system.

Semester

second semester

Assessment method

Students will be evaluated by three written "open" questions. The questions will be aimed at evaluating both the knowledge of the topics discussed throughout classes and the ability to synthesize the most important elements of each topic. First question will be focused on general aspects of cells homeostasis and stem cells definition. Second and third questions will be focused on one of the stem cells types described. A critical discussion of the written assessment will complete the evaluation

Office hours

Email to biocell1@libero.it to schedule a meeting.
