UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Histology

2425-1-H4102D087-H4102D021M

Aims

The general educational objectives of the course are aimed at providing cytology, histology and embryology skills.

Contents

The main aims of the course are the knowledge of the ultrastructure of the cell, the organization of tissues and of the embryonic development. Some clinical correlations will also be addressed during the course.

Detailed program

CYTOLOGY

Introduction. Techniques employed in histology and histological staining.
Cell membrane (structure, ultrastructure and chemical composition).
Specializations of the cell surface (cilia, stereocilia, flagellum, microvilli).
Ultrastructure and functions of cell junctions (tight, adherent and gap junctions). Adhesion molecules.
Transport mechanisms across the cell membrane. Endocytosis and exocytosis.
Organization of the interphase nucleus: nuclear envelope and nuclear pores; nuclear lamina; nucleoplasm; chromatin; nucleolus.
Structure and ultrastructure of ribosomes. Notes on protein synthesis and the main post-translational modifications.
Structure, ultrastructure and functions of the endoplasmic reticulum (rough and smooth).
Structure, ultrastructure and functions of the Golgi complex.
Fate of the proteins produced.
Lysosomes: biogenesis, structure, ultrastructure and functions. Heterophagocytosis and autophagocytosis.

Peroxisomes, structure, ultrastructure and functions.
Mitochondria: structure, ultrastructure and functions.
Cytoskeleton: microfilamenets, microtubules and intermediate filaments.

HISTOLOGY
General characteristics and classification of huma tissues.
Structure, ultrastructure and functions of:

- Lining epithelia;
- Glandular epithelia. examples of exocrine glands and ways of secretion (merocrine, apocrine, holocrine and eccrine); examples of endocrine glands
- Connective tissue proper. Extracellular substance of connective tissues (ground substance and fibres). Collagen biosynthesis. Cells of loose, dense and reticular connective tissue.
- Adipose tissue (unilocular and multilocular);
- Cartilage (hyaline, elastic and fibrous);
- Bone tissue (non-lamellar and lamellar, compact and trabecular).
- Muscle tissue (striated skeletal, striated cardiac and smooth). Ultrastructure of the sarcomere and mechanism of contraction.
- Nervous tissue (neurons and glial cells). Myelin and myelination. Nerve fibres;
- Blood and hematopoiesis

EMBRYOLOGY
Introduction. Gametogenesis (spermatogenesis and sperms, oogenesis and oocytes).
Capacitation. Fertilization. Cortical reaction. Zygote.
First week of embryonic development: segmentation, morula, cavitation, blastocyst (embryoblast and trophoblast). Implantation.
First stages of development of the human embryo: formation of the epiblast and hypoblast, bilaminar embryonic disc.
III-IV week of embryonic development: primitive streak, epithelial-mesenchymal transition (human gastrulation), mesoderm formation, trilaminar embryonic disc, notochord and body axes, neurulation (neural tube and neural crest cells).
The three embryonic layers (ectoderm, endoderm and mesoderm) and their derivatives.
Somites and their derivatives.
Embryo folding.
Development of the coelomic cavity..

Prerequisites

Scientific knowledge at high school level

Teaching form

10 Frontal lessons (2 hours each), in attendance.
Lessons will be in english.

Textbook and teaching resource

- Wheater's Functional Histology (Sylvia Wright, Geraldine O'Dowd, Sarah Bell), Elsevier Health Sciences.
- Junqueira's Basic Histology: Text and Atlas (Anthony L. Mescher), McGraw-Hill Education.
- The Developing Human, Clinically Oriented Embryology (Keith L. Moore & T. V. N. Persaud & Mark G. Torchia), Elsevier/Saunders.

Semester

The course is annual. This part will be held during the first semester

Assessment method

An extensive intermediate assessment (not mandatory) on this part of the Course is scheduled for the end of the first semester, for details see the General Syllabus of "Fundamentals of Human Morphology".

Office hours

every day (mon-fri), upon appointment.
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Sustainable Development Goals

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