UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Histology 1

2425-1-H4101D002-H4101D007M

Aims

The objectives of the course are to provide expertise in cytology, histology, and embryology, necessary to tackle the modules relating to macroscopic and microscopic anatomy of integrated teaching.

Contents

The primary goal of the course is to provide the fundamental principles of cell ultrastructure, tissues organization and embryonic development.
Some clinical correlations will also be addressed during the course.

Detailed program

CYTOLOGY

Introduction. General methods of investigation in histology and histological stainings.

Plasma membrane (structural, ultrastructural and chemical organization).

Specializations of the cell surface (cilia, stereocilia, flagella, microvilli, basal folds).

Cell contacts (tight, gap and anchoring junctions; cell adhesion molecules) ultrastructure and function.

Transport of the substances through the cell membrane. Endocytosis and exocytosis.

Interphasic nucleus structures: nuclear envelope and nuclear pores; nuclear lamina; nucleoplasma; chromatin; nucleulus.

Endoplasmic reticulum (rough and smooth reticulum) structural, ultrastructural and functional characteristics.

Ribosomes structural and ultrastructural characteristic and general steps of protein synthesis and post traductional modifications.

Golgi apparatus structural, ultrastructural and functional characteristics.

Synthesis and secretion in the cell. Constitutive and regulated secretion. Cellular vesicles trafficking.

Lysosomes: biogenesis, structure, ultrastructure and function. Etero phagocytosis and auto phagocytosis.

Peroxisomes.

Mitochondria: structural, ultrastructural and functional characteristics.

Cytoskeleton: microfilaments, microtubules and intermediate filaments. Centrioles.

GENERAL HISTOLOGY

Tissues: general characteristics and classification.

Methods for preparation of histological specimens.

For each of the following tissue structural, ultrastructural, functional characteristics and classification will be discussed:

Lining epithelia;

Exocrine gland epithelia. Merocrine, apocrine, holocrine and eccrine secretion;

Proper connective tissue. Intercellular substance of the connective tissue (fibres and ground substance). Biosynthesis of collagen. Connective tissue cells;

Adipose tissue (unilocular and multilocular adipose tissue);

Cartilage (hyaline, elastic and fibrous cartilage);

Bone (woven and lamellar bone, compact and trabecular bone). Osteogenesis (intramembranous and endochondral ossification);

Muscle tissue (smooth, skeletal striated and cardiac striated muscle tissue). Sarcomere ultrastructure and mechanisms of contraction, neuromuscular spindle and Golgi tendon organ;

Nervous tissue (neurones and neuroglia). Myelin and myelination. Nervous fibres;

Blood tissue and hematopoiesis;

Stem cells.

GENERAL EMBRYOLOGY

Introduction. Gametogenesis (spermatogenesis and spermatozoa, oogenesis and oocytes).

Capacitation. Fertilization. Cortical reaction. Zygote.

First week of development: segmentation, morula, cavitation, blastocyst (embryoblast and trophoblast)

Implantation.

Early development of human embryo: formation of epiblast and ipoblast, bilaminar embryonic disc.

Late development of human embryo: primitive streak, epithelial-mesenchymal transition (gastrulation), formation of mesoderm, trilaminar embryonic disc, notochord and formation of body axes, neurulation (neural tube and neural crest cells).

Cephalo-caudal and lateral folding.

Germ layers (ectoderm, endoderm and mesoderm) and their derivatives.

Somites and their derivatives.

Pharyngeal arches and their derivatives.

Intra-embryonic Coelom formation.

Development of diaphragm. Formation of pleural, peritoneal and pericardial cavities.

Placenta, yolk sac, chorion, allantois, umbilical cord, amnios.

Fetal circulation.

Monozygotic and dizygotic twins.

Teratogenic factors.

Development of digestive, urogenital, cardiovascular and central nervous systems.

Abnormalities in embryonic development.

Prerequisites

Scientific knowledge at high school level

Teaching form

18 Frontal lessons (2 hours each) in attendance.

Textbook and teaching resource

Citology/Histology:
-Ross M.H. e Pawlina W. Istologia Testo e atlante. Casa Editrice Ambrosiana;
-Mattioli Belmonte et al., Istologia Umana, Casa Editrice Idelson-Gnocchi
-S. Adamo et al. Istologia di Monesi. Piccin.

Embriology:
-Bertini et al., Embriologia umana. Casa Editrice Idelson-Gnocchi.
-Moore, Persaud, Torchia. Lo sviluppo prenatale dell'uomo. Embriologia ad orientamento clinico. Edra.
-Sadler. Embriologia medica di Langman. Edra.
-Schoenwolf, Bleyl, Brauer, Francis-West. Larsen. Embriologia umana. Edra

For all books, refer to the latest edition

Semester

First semester

Assessment method

An extensive mid-course assessment is scheduled for the end of the first semester. For details about mid-course asessment and final oral exam see General Syllabus of course.

Office hours

From Monday to Friday upon request for an appointment via email (gabriella.nicolini@unimib.it).

Sustainable Development Goals

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