

## **HISTOLOGY with EMBRYOLOGY and CYTOPHYSIOLOGY**

### **2024/2025**

#### **Obligatory literature:**

- Junqueira's Basic Histology: Text and Atlas, last edition
- Sadler T. W. "Langman's Medical Embryology", 2015, Wolters Kluwer Health, thirteenth edition.
- Cell and Molecular Biology Lippincott's illustrated Review by Chandar, Viselli

#### **Supplementary literature:**

- Stevens A., Lowe J. "Human Histology" 2005, Elsevier Mosby, third ed.
- Ross M.H., Pawlina W. "Histology: A text and atlas", 2011, Lippincott Williams & Wilkins, sixth ed.
- Gartner L. P., "Textbook of Histology", Elsevier, last edition.
- Schoenwolf, Bleyl, Brauer, Francis-West "Larsen's Human Embryology" 5th Ed.
- Nanci A. "Ten Cate's - Oral Histology", 2008, Elsevier, seventh edition or newer

## **CYTOPHYSIOLOGY**

### **SEMINAR - BASIC TECHNIQUES OF CELL AND TISSUE STAINING. LIGHT AND ELECTRON MICROSCOPE.**

#### **PRACTICAL CLASS - VARIOUS TYPES OF CELLS. PRINCIPLES OF WORKING WITH A LIGHT MICROSCOPE.**

1. fibroblasts (slide # 97),
2. isolated cells from smooth muscles (slide # 19),
3. nerve cells impregnated with silver nitrate (slide # 112),
4. macrophages from mesentery – smear (slide # 68), demonstration slide

### **SEMINAR - CELL ULTRASTRUCTURE - PHYSIOLOGY OF SELECTED CYTOPLASMIC PROCESSES.**

#### **PRACTICAL CLASS - STRUCTURE AND PHYSIOLOGY OF CELL MEMBRANES, CYTOSKELETON AND SELECTED ORGANELLES.**

### **SEMINAR - STRUCTURE AND CYTOPHYSIOLOGY OF THE CELL NUCLEUS.**

#### **PRACTICAL CLASS - REGULATION OF GENE EXPRESSION.**

### **SEMINAR - CELLULAR SIGNAL TRANSDUCTION MECHANISMS.**

#### **PRACTICAL CLASS - PRACTICAL ASPECTS OF SIGNAL TRANSDUCTION IN THE CELL.**

### **SEMINAR - CELL PROLIFERATION.**

#### **PRACTICAL CLASS - REGULATION OF THE CELL CYCLE.**

1. mitosis in sections of limb obtained from 16.5-day-old mouse fetus (slide # 4),
2. mitosis in in vitro cultured cells (slide # 1),

### **SEMINAR - CELL DIFFERENTIATION AND SENESCENCE.**

#### **PRACTICAL CLASS - CELL DEATH, AUTOPHAGY.**

### **SEMINAR - DISRUPTION OF THE REGULATION OF CELLULAR PROCESSES – THE BASICS OF ONCOGENESIS.**

#### **PRACTICAL CLASS - SELECTED TOPICS IN CANCER BIOLOGY.**

## **INTERMEDIATE EXAMINATION IN CYTOPHYSIOLOGY**

# GENERAL HISTOLOGY

## SEMINAR - SPECIALIZED STRUCTURES OF THE EPITHELIAL CELL SURFACE.

### PRACTICAL CLASS - EPITHELIAL TISSUE, GLANDS - HISTOLOGICAL STRUCTURE.

1. simple squamous epithelium - cornea (slide # 3),
2. simple columnar epithelium - jejunum (slide # 51a),
3. simple cuboidal epithelium - thyroid gland (slide # 8),
4. stratified squamous epithelium – cornea (slide # 3),
5. pseudostratified columnar epithelium - trachea (slide # 60),
6. stratified cuboidal epithelium (transitional) - urinary bladder (slide # 67),

## SEMINAR - TYPES OF CONNECTIVE TISSUE PROPER. FUNCTIONS OF CONNECTIVE TISSUE AND ADIPOSE TISSUE.

### PRACTICAL CLASS - CONNECTIVE TISSUE PROPER - HISTOLOGICAL STRUCTURE.

1. loose connective tissue – mesentery, mast cells, elastic fibers (slide # 9),
2. dense connective tissue – tendon (slide # 7),
3. unilocular (yellow) adipose tissue – hypodermis or synovial membrane of joint capsule (slide # 38),
4. multilocular (brown) adipose tissue (slide # 110),
5. reticular fibers - spleen (slide # 113),

## SEMINAR - TYPES AND FUNCTIONS OF CARTILAGE AND BONE TISSUE.

### PRACTICAL CLASS - DEVELOPMENT OF DIFFERENT TYPES OF BONE TISSUE – BONE REMODELING.

1. hyaline cartilage (slide # 10),
2. elastic cartilage – epiglottis (slide # 12),
3. compact bone – ground section (slide # 14),
4. compact bone, decalcified (slide # 16),
5. intramembranous ossification (slide # 17),
6. endochondral ossification – late stage (slide # 18),
7. synovial membrane of joint capsule (slide # 59), (Fragment of synovial membrane from human knee joint. A layer of synoviocytes rests on the cushion of fat cells. Numerous blood vessels are present. The layer of synoviocytes contains both fibroblasts (F cells) and macrophages (M cells), but they are difficult to distinguish without special staining. F cells usually have elongated nuclei with the long axis parallel to the surface of the synovial membrane. Nuclei of M cells are usually larger and more rounded. L. general structure of synovial membrane; H. a layer of synoviocytes.)

## SEMINAR - STRUCTURE, ORGANIZATION AND FUNCTION OF MUSCULAR TISSUE AND NERVOUS TISSUE. PERIPHERAL AND CENTRAL NERVOUS SYSTEM.

### PRACTICAL CLASS - MUSCLE AND NERVOUS TISSUE - HISTOLOGICAL STRUCTURE.

1. smooth muscular tissue - the wall of jejunum (slide # 13),
2. cross-striated muscle - tongue (slide # 20),
3. cardiac muscle (slide # 23),
4. cross-striation in the muscle (slide # 22),
5. isolated nerve fiber (slide # 25),
6. peripheral nerve (slide # 27),
7. peripheral nerve – impregnated with OsO<sub>4</sub> (slide # 26),
8. dorsal root ganglion (slide # 76),
9. nerve cells in the spinal cord – tigroid (slide # 75),
10. brain (slide # 77),
11. cerebellum (slide # 79),

## SEMINAR - BONE MARROW - FORMATION OF PARTICULAR TYPES OF BLOOD CELLS.

### PRACTICAL CLASS - ASSESSMENT OF BLOOD AND BONE MARROW CELL MORPHOLOGY.

1. blood film (slide # 104),
2. smear of bone marrow cells (slide # 35a),
3. the section of red bone marrow (slide # 35),
4. foetal liver (no. 54a),

## INTERMEDIATE EXAMINATION IN GENERAL HISTOLOGY

# MICROSCOPIC ANATOMY

## SEMINAR - CIRCULATORY SYSTEM, STRUCTURE AND FUNCTION OF ENDOTHELIAL CELLS.

### PRACTICAL CLASS - HISTOLOGICAL STRUCTURE OF BLOOD AND LYMPHATIC VESSELS.

1. heart (slide # 33),
2. aorta stained with resorcin (elastic membranes and fibers) (slide # 31),
3. aorta stained with HE (slide # 30),
4. muscular artery and vein (slide # 29),
5. capillaries – mesentery (slide # 28),

## SEMINAR - STRUCTURE OF THE IMMUNE SYSTEM - TYPES OF CELLS AND THEIR FUNCTIONS.

### PRACTICAL CLASS - HISTOLOGICAL STRUCTURE AND FUNCTIONS OF LYMPHATIC ORGANS.

1. spleen (slide # 34),
2. lymph node (slide # 36),
3. thymus (slide # 37),
4. palatine tonsil (slide # 46),

## SEMINAR - FUNCTIONS OF ORAL AND UPPER GASTROINTESTINAL STRUCTURES.

### PRACTICAL CLASS - DIGESTIVE SYSTEM (1) - STRUCTURE OF THE TOOTH, SALIVARY GLANDS, MUCOUS MEMBRANES OF THE ORAL CAVITY, ESOPHAGUS AND STOMACH.

1. filiform papillae – tongue (slide # 41),
2. circumvallatae papillae – tongue (slide # 42),
3. parotid gland (slide # 44),
4. sublingual gland (slide # 45),
5. tooth germ (slide # 103),
6. dentine, ground section (slide # 100),
7. oesophagus (slide # 47),
8. stomach (slide # 48),
9. **specimen x (slide # 74)** – please, answer the following questions:  
Can you recognise in this specimen:
  - 1) epithelium (if the answer is yes what type is it?),
  - 2) glands (if the answer is yes, what type are they?),
  - 3) fibroblasts,
  - 4) adipocytes (fat cells),
  - 5) fibers: a)collagen, b)elastic,
  - 6) striated muscle cells,
  - 7) smooth muscle cells,
  - 8) blood vessels, arterioles, venules,
  - 9) capillaries,
  - 10) nerves.

## SEMINAR - STRUCTURE AND FUNCTION OF THE SMALL AND LARGE INTESTINE, LIVER AND PANCREAS.

### PRACTICAL CLASS - DIGESTIVE SYSTEM (2) – HISTOLOGICAL STRUCTURE OF THE SMALL AND LARGE INTESTINE, LIVER AND PANCREAS. LYMPHATIC TISSUE OF THE DIGESTIVE SYSTEM.

1. duodenum (slide # 50),
2. small intestine – jejunum (slide # 51),
3. large intestine – colon (slide # 52),
4. ileum – Peyer's patches (slide # 55),
5. appendix (slide # 53),
6. liver (slide # 54),
7. pancreas (slide # 58),
8. gall bladder (slide # 57)
9. **specimen x (slide # 43)**
10. **specimen x (slide # 94)**

## SEMINAR - FUNCTIONS OF VARIOUS SECTIONS OF THE RESPIRATORY SYSTEM.

### PRACTICAL CLASS - HISTOLOGICAL STRUCTURE OF THE RESPIRATORY SYSTEM.

1. trachea (slide # 60),
2. lung (slide # 61),
3. foetal lung (slide # 61a),
4. bronchoalveolar lavage – smear (macrophages, lymphocytes and granulocytes) (slide # 65)
5. **specimen x (slide # 107)**

## **SEMINAR: KIDNEY FUNCTIONS.**

### **PRACTICAL CLASS: HISTOLOGICAL STRUCTURE OF THE URINARY TRACT.**

1. kidney (slide # 63),
2. urinary bladder (slide # 67),
3. ureter (slide # 66),
4. **specimen x (slide # 96)**

## **SEMINAR: FUNCTION OF SKIN. SPECIAL SENSES.**

### **PRACTICAL CLASS: HISTOLOGICAL STRUCTURE OF THE SKIN AND ITS APPENDAGES. SENSORY ORGANS.**

1. nonhairy skin (slide # 83),
2. nonhairy skin – fingertip (slide # 84),
3. hairy skin (slide # 85),
4. eyelid (slide # 91),
5. **specimen x (slide # 91)**
6. lacrimal gland (slide # 80) – Lobal structure – LM, Single cuboidal glandular epithelium (lipid droplets and eosinophilic granules in cytoplasm), myoepithelial cells located between basal lamina epithelium, intralobular ducts – single cuboidal, epithelium, interlobular ducts – stratified columnar epithelium – HM,
7. eye ball (slide # 81),
8. retina (slide # 82),
9. cornea (slide # 3),

## **INTERMEDIATE EXAMINATION IN MICROSCOPIC ANATOMY**

## **EMBRYOLOGY**

### **SEMINAR - FUNCTIONS OF ENDOCRINE GLANDS.**

#### **PRACTICAL CLASS - HISTOLOGICAL STRUCTURE OF ENDOCRINE GLANDS.**

1. hypophysis (slide # 40),
2. thyroid gland (slide # 8),
3. parathyroid gland (slide # 90),
4. suprarenal gland (slide # 39),
5. pineal gland slide # 49),
6. chromaffin reaction in the suprarenal gland (slide # 5),
7. **specimen x (slide # 32)**

### **SEMINAR - FORMATION OF FEMALE REPRODUCTIVE CELLS.**

#### **PRACTICAL CLASS - HISTOLOGICAL STRUCTURE OF THE FEMALE REPRODUCTIVE SYSTEM.**

1. ovary (slide # 72),
2. corpus luteum (slide # 94),
3. oviduct (slide # 73),
4. uterus (slide # 74),
5. fragments of uterus wall obtained from biopsy:
  - slide # 105 proliferative phase,
  - slide # 105a – secretory phase
6. vagina (slides # 96)
7. vagina and fragment of vestibule (slides # 96a)
8. active (lactating) mammary gland (slide # 86),
9. inactive mammary gland (slide # 87),

### **SEMINAR - FORMATION OF MALE REPRODUCTIVE CELLS.**

#### **PRACTICAL CLASS - HISTOLOGICAL STRUCTURE OF THE MALE REPRODUCTIVE SYSTEM.**

1. testis (slide # 69),
2. epididymis (slide # 70),
3. ductus deferens (slide # 71),
4. prostate (slide # 92),
5. prostate fixed in glutaraldehyde (slide # 92a),
6. human spermatozoa (smear) (slide # 69a).

### **SEMINAR - MECHANISMS OF EMBRYOGENESIS.**

#### **PRACTICAL CLASS - STRUCTURE OF THE EMBRYO, AMNIOTIC MEMBRANES AND PLACENTA.**

1. Blastocyst (slide 246) - trophoblast, embryoblast, zona pellucida, II polar body.
2. Decidual reaction (slide 111) – polyhedral cells of the endometrium.

3. Early trophoblast villi from a 5-week tubal pregnancy (slide 106) - syncytiotrophoblast, cytotrophoblast, villus mesoderm, extravillous trophoblast cells, megaloblasts.
4. Villi and extravillous trophoblast cells of the mature placenta (slide 107) - syncytiotrophoblast, villous vessels, extravillous trophoblast cells, fibrinoid.
5. Umbilical cord (slide 6) - amniotic epithelium, Wharton's jelly, vein, arteries.
6. Nucleus pulposus of the intervertebral disc, remnant of the notochord (slide 108) – notochordal cells, annulus fibrosus with isogenic groups, vertebral bodies.
7. Human embryo from a tubal pregnancy (slide 109 I / 1-128 and 109 II / 70-181), - viewing sets of preparations with attached descriptions.

## **INTERMEDIATES EXAMINATIONS IN EMBRYOLOGY**

**SEMINAR - DISCUSSION AND DEMONSTRATION OF HISTOLOGICAL SLIDES.**

**PRACTICAL CLASS - DEMONSTRATION OF HISTOLOGICAL SLIDES BEFORE THE FINAL EXAMINATION.**

## **INTERMEDIATES EXAMINATIONS IN CYTOPHYSIOLOGY**

- *December 6. 2024 (Friday) – Theoretical (MCQ)*
- *December 13. 2024 (Friday) – Retake of the theoretical (MCQ)*

## **INTERMEDIATES EXAMINATIONS IN GENERAL HISTOLOGY**

- *February 19. 2025 (Group 3A, 3B, 4A, 4B, 5A, 5B) - Theoretical (MCQ)*
- *February 21. 2025 (Group 1A, 1B, 2A, 2B, 6A, 6B) - Theoretical (MCQ)*
- *February 28. 2025 (Friday) - Retake of the theoretical (MCQ)*

## **INTERMEDIATES EXAMINATIONS IN MICROSCOPIC ANATOMY**

- *April 14, 16. 2025 - Theoretical (MCQ)*
- *May 9. 2025 (Friday) - Retake of the theoretical (MCQ)*

## **INTERMEDIATES EXAMINATIONS IN EMBRYOLOGY**

- *June 6. 2025 (Friday) - Theoretical (MCQ)*
- *June 13. 2024 (Friday) - Retake of the theoretical (MCQ)*

## **Final Examination in Histology and Embryology**

- **Practical Final Examination will be held on July 1, 2025 (Tuesday)**
- **Theoretical Final Examination (MCQ test) will be held on July 2, 2025**
- ***Retake of Final Examination (practical & MCQ ) – 4.09.2025***

**Dates of all examinations are not subject to negotiation.**