Semmelweis University
Department of Anatomy, Histology and Embryology
2020/2021

Faculty of Medicine
1st year, 2nd semester

HANDBOOK
Macroscopic Anatomy II
Microscopic Anatomy and Embryology I

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Anatomy, Histology and Embryology for EM students

TEACHING DEPARTMENT:
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LEARNING OBJECTIVES

Aims of the lectures in Anatomy - Presentation of important and/or complicated topics such as the structure of the body wall (e.g. thorax, pelvis), extremities and the cranium; the morphology of internal organs including the cardiovascular, digestive and urogenital systems; and the composition of the central nervous system, together with the organs of special senses and topography of body regions.

Aims of the lectures in Histology - Presentation of the cell, basic principles in cellular morphology, detailed description of the epithelial, connective, muscle and nervous tissues. During the 2 semesters, the lectures contribute to the gross anatomical description of organs with a detailed presentation of their fine structures, including ultrastructural details. Important chapters: basic tissues, viscera, central nervous system.

Aims of the lectures in Embryology - Presentation of the early development from the differentiation of the germ cells to the formation of the human embryo (basic embryology). In the 2nd and 3rd semesters, the embryology topics will complement the previous gross anatomy and present histology lectures of the organs and systems also mentioning the most frequent malformations.

For the deeper understanding of relatively difficult questions small group discussions may be organized during the practical dissection room classes.

Aims of the practical dissection classes - In the first two semesters, based on their weekly programs, the students will study the morphology of the human body using anatomical specimens (bones, joints, muscles, viscera, brain) as well as learning the basic principles of dissection, including the proper usage of tools (scalpel, forceps, scizzors) under the supervision of their lab instructors. The anatomy of the locomotor system and the peripheral nervous system will be principally taught in the dissecting room.

Aims of the histology practical classes - Under supervision by the lab instructor, the students will learn the use of the a digital light microscope and the individual viewing of histology slides will facilitate the understanding of the basic tissues (epithelial, connective, muscle and nervous) and the fine structure of the organs.

The knowledge of students will be tested by regular **mid-term examinations**.

Lectures: First semester: 1x 45 min (Macroscopic Anantomy I) ; second semester: 2x 2x45 min (Macroscopic Anatomy II and Microscopic Anatomy and Embryology I) third semester: 2x 45 min (Microscopic Anatomy II)

Practical classes: First semester: 6x 45 min (Macroscopic Anantomy I) ; second semester: 6x 45 min and 2x45 min (Macroscopic Anatomy II and Microscopic Anatomy and Embryology I) third semester: 2x 45 min (Microscopic Anatomy II)

Topics:

First semester: Gross anatomy of the bones, joints and muscles; composition, vessels and nerves of limbs and the body wall, skull, organs, cavities, nervous and vascular supply of the head and neck regions.

Second semester: Morphology of the heart and vessels, thoracic/abdominal/pelvic viscera, body cavities and serous membranes. Sectional anatomy of the thorax, abdomen and pelvis. Description of the diaphragms. Macroscopy of central and peripheral nervous systems, organs of special senses.

General embryology, general histology (basic tissues). Histology and embryology of the heart and vessels, gastrointestinal and urogenital organs.

Third semester: Development of the skull, spine and limbs. Histology and embryology of the lymphatic system, central and peripheral nervous system together with the organs of special senses and endocrine organs. Microscopy of the CNS

RULES AND REGULATIONS IN THE DISSECTING ROOM

IT IS STRICTLY FORBIDDEN to eat, drink, smoke, to chow gums, or to use music devices. No telephone calls, please.
Bags and coats should be left in the lockers before entering the dissecting room.
The lockers will have to be locked using your padlocks.
Please, remember to keep your valuables always on you, or lock them in the lockers since the department takes no responsibility for lost items.
Everybody is supposed to behave conforming to the spirit of the site in the dissecting room. Loud speech, out-of-place jokes and any kind of behaviour, disregarding the dignity of human corpses, should strictly be avoided.

Students are expected to be prepared for the practical work.

Students should take care of the furniture and equipment of the dissecting room. Do not sit on the dissection tables or stand on the tripod stools to avoid accidents. **Fire and work safety regulations** should be maintained. The dissection room is a hazard area. **Cleanliness and order** should be kept.

Working in the dissection room involves the use of **sharp and pointed tools**, injuries should be reported to the lab instructor. The technical personnel will provide first aid when necessary.

The white lab coats should be worn while in the dissection room, but should be removed before leaving the dissection room area. The purpose of wearing the lab coats is to protect one's clothing from contacting the cadaver specimen. Furthermore we advise you to wear closed toed shoes and clothing covering the legs. In the end of the class, lab coats should be emptied and put away in your personal bag. Fresh lab coats are provided every 2nd week or when necessary.

Only the members of the study group can participate in the sessions, visitors may be present only with prior permission by the lab instructor. Students can leave the sessions only with the approval of the lab instructor.

NO RECORDINGS ARE ALLOWED WHILE IN THE DISSECTION ROOM.

Specimen preparations should be wrapped and labeled. Dissection materials of other groups or individuals should not be handled. Dissected cadaver pieces should be discarded in a designated container and discarded blades have to be collected separately.

Dissecting rooms are closed between 6:00 PM to 8:00 AM and over the weekends Students may not stay in the dissecting room without the supervision of one of the assistants of the department. In the absence of an instructor, the technical personnel should ask the students to leave the dissecting room.

SMOKING IS STRICTLY FORBIDDEN ON THE DEPARTMENTAL PREMISES INCLUDING THE GARDEN AND THE YARD!

EM I Macroscopic Anatomy II.

Announcements

SUBJECT MATTER OF THE 2ND SEMESTER

I. Macroscopy of the cardiovascular system (heart, blood vessels in general, pulmonary circulation, systemic circulation, arteries andveins)

II. Macroscopy of internal organs (gastrointestinal tract , respiratory tract, urogenital tract, separation of body cavities, peritoneum, pelvic floor, perineum)

III. Macroscopy of the central nervous system (brain, spinal cord, meninges, blood supply, cranial nerves)

ACCEPTENCE OF THE SEMESTER

Active participation in dissection room lab sessions **including the midterm tests** is obligatory. Students should attend at least 75% of the scheduled hours, to gain a signature proving the validity of the semester. Absences are therefore limited in 25%.

MIDTERM TESTS

There are two oral/practical tests held in the dissection room. Attendance is obligatory, in case of absence students will be offered two retake possibilities (TBA).

Midterm test 1 - *Internal organs of the thorax, abdomen and pelvis*
Date: Week 9 (1st dissection class of the week)

Midterm test 2 – *Macroscopy of the central nervous system*
Date: Week 12 (last dissection class of the week)

PLEASE NOTE - Students may earn a ***bonus dissection mark*** *(4 or 5 only) from the average of the two oral tests. A mark 4 (good) can be earned if the midterm average is 4,00; while a mark 5 (excellent) will be earned if the average of the midterm marks is at least 4,50.
This ***bonus mark*** will be added to the marks of the practical part of the final examination.

EXAM COMPETITION (1st round, written)

All students with a **successful Macroscopy I. examination** are invited to participate in a written (moodle) competition from the topics of the 2 semesters of the subject held on Week 14. Students achieving good marks (4 or 5) at the test may be **exempted**** from the written part of the final examination.

ANATOMY COMPETITION (2nd round, pin test)

The **first 10 students** achieving the best results in the written test are invited to participate in the 2nd round where certain anatomical structures (labelled by numbers) will have to be identifed on true specimens / prosections. The competition is held during week 14.

The winners of the 1st, 2nd and 3rd prizes will be decorated with a diploma of merit.

FINAL EXAMINATION

Topics: Subject matter of the two semesters (Macroscopic Anatomy I-II.)

The final examination consists of practical and theoretical parts:

1. Written pretest (Macroscopic Anatomy questions, via the moodle system)
2. Oral examination (Identification of structures on anatomical prosections, including relevant theoretical questions)

Marking system

The final result/mark of the examination is calculated form the following partial marks:

1. Written test (unless exempted**)
2. Musculoskeletal system
3. Internal organs
4. Macroscopy of the central nervous system
   +
5. *Bonus dissection mark** (for those having an average of 4,00-5,00 from the midterm marks)

PLEASE NOTE

1. Only those students are eligible to sit for the final examination who have successfully finished their dissection task.

2. Students enrolled in a CV course in Macroscopic Anatomy I. may only sit for the final examination in Macroscopic Anatomy II. following a successful examination in Macroscopic Anatomy I.

Macroscopic Anatomy II. schedule

Week	Lectures **Lenhossék lecture room** *EM 1-10 Wednesday 14.30-16.10* *EM 11-20 Monday 8.00-9.40*	Practical sessions ***EM 1-6 and EM 13-17 Tues/Wed/Fri*** ***EM 7-12 Mon/Tues/Thurs*** ***EM 18-20 Mon/Wed/Fri***
Week 1 02. 15-19.	1. Thoracic cavity, mediastinum. Morphology of the esophagus, trachea and the lung. Pleura (*Altdorfer)* 2. Chambers of the heart, external features. Structure of heart wall, valves, fibrous skeleton *(Kocsis)*	**Thorax**: Division and organs of the thoracic cavity (trachea, lungs, pleura) Opening of the thoracic cavity
Week 2 02.22-26.	3. Cardiac vessels, conducting system. Surface projection. Auscultation points. Pericardium. *(Kozsurek)* 4. Stomach and small intestines (duodenum, jejunum, ileum) *(Szél)*	**Organs** of the thoracic cavity (heart, great vessels, pericardium)
Week 3 03.1-5.	5. Liver, gall bladder, pancreas, spleen. *(Alpár)* 6. Large intestine, rectum *(Alpár)*	**Mediastinum**: division and organs (branches of the thoracic aorta, esophagus) **Abdominal organs** (stomach, liver, gall bladder, celiac trunk) Opening of the abdominal cavity
Week 4 03.8-12.	7. Peritoneum, peritoneal recesses, peritoneal relations of abdominal organs. *(Szél)* 8. Morphology of the kidney, capsules of the kidney, ureter, urinary bladder. *(Katz)*	**Abdominal organs** (branches of the abdominal aorta, pancreas, spleen, small and large intestines, rectum)
Week 5 03.15-19	9. Organs, vessels and nerves of the retroperitoneum (*Dóra*) 10. Morphology and coats of the testicle (*Barna*)	Portocaval anastomoses **Peritoneum** (recesses, lesser and greater omentum, omental bursa, peritoneal relations of abdominal organs) ***No dissection class on Monday (March 15 is a National Holiday)***
Week 6 03.22-26.	11. Morphology of the epididymis, spermatic cord, seminal vesicle and prostate (*Nemeskéri*) 12. Morphology of penis and male urethra. Male perineum (*Hanics*)	**Retroperitoneum** (kidney, ureter, urinary bladder together with their blood supply)
Week 7 03.29-04.02.	13. Ovary, Fallopian tube and uterus (*Alpár*) 14. Vagina, female perineum, external genital organs (*Alpár*)	**Organs of the lesser pelvis** (int. iliac artery, male genital apparatus) ***No dissection class for groups 1-6, 13-20 (Good Friday Easter Holiday)***
Week 8 04.05-09.	15. Blood supply and lymphatic drainage of the abdomen and lesser pelvis (*Csáki*) 16. Introduction to the study of the nervous system Meninges, hemispheres, CSF, blood supply (*Székely*)	Female genital apparatus, pelvic floor, male /female perineum ***No dissection class for groups 7-12, 18-20 (Easter Monday Easter Holiday)***
Week 9 04.12-16.	17. Lateral ventricles, diencephalon, 3rd ventricle (*Katz*) 18. Brain stem, cerebellum, 4th ventricle (*Ádám*)	***MIDTERM 1. Internal organs of the thorax, abdomen and pelvis*** **Macroscopy of the CNS**, meninges and blood supply of the brain, CSF. ***No class on Tuesday (April 13 is Faculty Day)***
Week 10 04.19-23.	19. Spinal cord, spinal segment. Spinal nerves, nerve plexuses (*Alpár*) 20. Intracranial topography (*Horváth*)	Surface features of the brain (gyri, sulci) Borders of the lateral ventricles
Week 11 04.26-30.	21. Cranial nerve nuclei (*Barna*) 22. Olfactory nerve (CN 1), optic nerve (CN 2). Orbit (*Csáki*)	Frontal sections Cranial nerve exits
Week 12 05.03-07.	23. Extraocular muscles and eye movements. Protective and lacrimal apparatus of the eye (*Szél*) 24. Oculomotor n (CN 3), trochlear n (CN 4), abducent (CN 6) n (*Minkó*)	Macroscopy of the spinal cord ***MIDTERM 2. Macroscopy of the CNS***
Week 13 05.10-14.	25. Trigeminal nerve (CN 5) (*Ádám*) 26. Facial nerve (CN 7) (*Ádám*)	Branches of cranial nerves Dissection of deep head&neck regions
Week 14 05.17-21.	27. Glossopharyngeal nerve (CN 9), vagus nerve (CN 10), accessory nerve (CN 11), hypoglossal nerve (CN 12) (*Vereczki*) 28. Sympathetic and parasympathetic nervous systems (*Tóth*)	***Exam competition (written)*** Dissection of deep head & neck regions Revision ***Competition (pin test)***

Topics of the final examination in Macroscopic Anatomy II

Musculoskeletal Anatomy

General osteology, classification of bones
Continuous connections of bones. Classification of joints; components, movements and mechanisms
General myology
Structure of the vertebral column, the gross anatomy of the muscles acting upon it
Movements and muscles of the head&neck (atlantooccipital and atlantoaxial joints)
Joints of the shoulder girdle, the gross anatomy of the muscles acting upon them
Shoulder joint, the gross anatomy of the muscles acting upon it
Axillary fossa, quadrangular and triangular spaces
Muscle compartments and cross section of the arm
Elbow joint, the gross anatomy of the muscles acting upon it. Cubital fossa
Muscles and cross section of the forearm
Structure and movements of the radiocarpal joint, gross anatomy of the muscles acting upon it
Osteofibrous spaces and muscle compartments of the hand, tendinous sheaths
Carpometacarpal, metacarpophalangeal and interphalangeal joints of the thumb and fingers, the gross anatomy of the muscles concerned with the movements
Osteofibrous structure of the thoracic cage (bones, joints, ligaments, movements)
Thoracic muscles
Diaphragm
Muscles and spaces of the abdominal wall, rectus sheath
Composition of the pelvis (bones, ligaments and membranes)
Muscles of the buttock, the posterior abdominal wall and the pelvis (external and internal muscles of the hip)
Inguinal canal, femoral canal
Subinguinal hiatus, vascular and muscular compartments; adductor canal, femoral canal
Hip joint and the gross anatomy of the muscles concerned with the movements
Osteofibrous compartments, muscles and cross section of the thigh
Knee joint and the gross anatomy of the muscles concerned with the movements. Popliteal fossa
Osteofibrous compartments, muscles and the cross section of the leg
Ankle joint together with the gross anatomy of the muscles acting upon it
Subtalar and talocalcaneonavicular joints, the muscles acting upon them
Osteofibrous compartments and structure of the foot, arches of the foot
Bones, spaces and connections of the skull, external and internal skull bases
Neurocranium, components and cavities (anterior, middle and posterior cranial fossae)
Viscerocranium, components and cavities (walls and connections of the nasal cavity, orbit, oral cavity, pterygopalatine and infratemporal fossae)
Temporomandibular joint and the gross anatomy of the muscles of mastication
Superficial muscles of the neck, muscle triangles
Deep muscles of the neck and the laminae of the cervical fascia
Muscles of facial expression

Internal organs of the head & neck region

Oral cavity (divisions, boundaries)
Floor of mouth, sulcus lateralis linguae
Macroscopy of the tongue
Types and morphology of teeth, blood supply and innervation
Tooth development
Salivary glands together with topography
Faucial isthmus, palate. Tonsils
Pharynx and parapharyngeal spaces
Blood supply and innervation of pharynx
Pharyngeal muscles

Nose, nasal cavity (boundaries, nasal meatus, vessels)
Paranasal sinuses (connections, vessels)
Larynx (shape, position, muscles, vessels, nerves)
Skeleton and joints of larynx together with the fibroelastic membranes, mucous membrane
Common and external carotid arteries and their branches. Maxillary artery and its branches
Venous drainage of face and neck
Lymph nodes and lymphatic vessels of the head&neck
Axillary artery and branches. Arteries and veins of the arm, forearm, and hand
Arteries and veins of the lower limb
Lymph nodes and lymphatic drainage of the upper and lower limbs

Further topics with relevence to the musculoskeletal system
Lymphatic drainage of the thoracic wall including the mamma
Dorsal branches of the spinal nerves, intercostal nerves
Cervical plexus, brachial plexus, lumbar plexus, sacral plexus.
Innervation of limbs
Innervation of the trunk
Cutaneous innervation

Circulatory system
Shape, external features of heart
Chambers of heart
Endocardium, ostia, valves of heart
Skeleton of heart, anuli fibrosi
Structure of heart wall
Pulse generating and conducting system of heart
Pericardium
Position and surface projections of heart
Percussion and auscultation (area of cardiac dullness, heart sounds)
Radiology of heart
Pulmonary circulation
Ascending aorta, arch of aorta and its branches
Subclavian artery and its branches
Thoracic aorta and its branches
Abdominal aorta and its branches

Celiac trunk and its branches
Superior mesenteric artery and its branches
Inferior mesenteric artery and its branches
External and internal iliac arteries and their branches
Internal pudendal artery and its branches
Superior vena cava and its tributaries
Inferior vena cava and its tributaries
Azygos and hemiazygos veins and their tributaries
Portal vein and its tributaries, portocaval anastomoses

Lymphatic drainage of the abdominal and pelvic organs
Thoracic duct, right lymphatic trunk

Digestive system
Description and topography of the esophagus
Stomach (shape, position, parts, blood supply and innervation). Peritoneal relations
Duodenum (shape, position, divisions, vessels)
Jejunum-ileum (shape, position, vessels)

Large intestine (shape, position, vessels)
Rectum, anal canal (shape, position, vessels)
Liver (shape, position, peritoneal relations, vessels)
Gall bladder and biliary passages (anatomy)
Pancreas (shape, position, vessels)
Peritoneum, greater and lesser omentum, mesentery, omental bursa

Respiratory system and thoracic relations
Trachea and bronchial tree
Lung (shape, parts, surfaces, hilum)
Lung (position, topography, vessels, nerves)
Surface projection of pleura and lung
Pleura, pleural cavity
Mediastinum (divisions and content)

Urogenital system
Kidney (shape, position, hilum, sinus, capsules, vascular architecture)
Renal pelvis and calyces. Ureter
Urinary bladder (shape, position, muscles, vessels)
Female urethra
Male urethra, bulbourethral gland
Testis (shape, position, vessels). Scrotum, coats of testis
Epididymis, vas (ductus) deferens, spermatic cord
Seminal vesicle, prostate
Penis (shape, position, mechanism of erection, vessels, nerves)
Pelvic floor, male perineum (connective tissue spaces)
Hernia canals (inguinal and femoral)
Ovary (shape, position, vessels)
Uterine tube (shape, position, vessels)
Uterus (shape, parts, position, supporting structures, vessels) Broad ligament
Vagina, female perineum (connective tissue spaces)
External female genital organs (mons pubis, labia, vestibule of vagina, greater vestibular gland, vessels)

Macroscopy of the nervous system
Intracranial topography Dura mater, dural sinuses
Arachnoid mater, pia mater, cisterns, CSF circulation
Description and meninges of the spinal cord
Brain stem (medulla oblongata, pons, midbrain)
Cerebellum
Diencephalon (parts, blood supply). Thalamus, hypothalamus
Lateral ventricles, III. ventricle, IV. ventricle
Hemispheres
Internal carotid artery (course, parts and branches)
Vertebral artery (course and branches)
Circle of Willis
Veins of the brain
Cranial nerve nuclei, macroscopy of cranial nerves together with the brain, dural and skull exits
Branches of cranial nerves (CN 3, CN 4, CN 5, CN 6, CN 7, CN 9, CN 10, CN 11, CN 12)
General composition of the autonomic nervous system
Sympathetic nervous system (cranial, cervical, thoracic and lumbar parts)
Sympathetic trunk
Parasympathetic system (cranial and sacral parts)
Topography of the orbit. Extraocular muscles. Eye movements.
Eyelids, conjunctiva, fasciae of the orbit, lacrimal apparatus

EM I Microscopic Anatomy I.
Announcements

SUBJECT MATTER OF THE SEMESTER

I. Microscopy of basic tissues

Simple, stratified and glandular epithelia, connective & supporting tissues, muscle tissues, blood, bone marrow

II. Microscopical strucure of internal organs

Cardiovascular, gastrointestinal, respiratory and urogenital systems and elements of the peripheral nervous system apparent in the organs

III. Embryology

General embryology, including spermatogenesis, oogenesis, fertilization, cleavage, blastulation, formation of germinal layers, body axes, molecular basis of right-left asymmetry, formation of the placenta, fetal membranes.

Organ development including the cardiovascular, digestive, respiratory, urogenital systems together with their malformations

ACCEPTENCE OF THE SEMESTER

Active participation in dissection room lab sessions **including the midterm tests** is obligatory. Students should attend at least 75% of the scheduled hours, to gain a signature proving the validity of the semester.

Absences are therefore limited in 25%.

MIDTERM TESTS

There are two written tests held in the Digital Histology Laboratories. Attendance is obligatory, in case of absence students will be offered two retake possibilities (TBA).

Midterm test 1 - Date: Week 5

Basic tissues (slides viewed during weeks1-4)

Midterm test 2 Date: Week 13

Histology of organs (except for the female genital tract);

General embryology, organ development (except for the urogenital and cardiovascular systems)

EXEMPTIONS - Students may earn an ***exemption*** *from the written part of the semifinal examination with a 4 or a 5 calculated from the average of the two written tests. A mark 4 (good) can be earned if the midterm average is 4,00; while a mark 5 (excellent) will be earned if the average of the midterm marks is at least 4,50.

SEMIFINAL EXAMINATION

Topics: Subject matter of the semester (Microscopic Anatomy and Embryology I.)

The semifinal examination consists of practical and theoretical parts:

1. Written pretest - unless exempted*(Microscopic Anatomy and Embryology questions)
2. Oral examination (Identification of structures on a digital slide including relevant theoretical question

Microscopic Anatomy I. schedule

Week	Lectures ***EM 1-10 Friday 12.40-14.20 (Lenhossék lecture hall)*** ***EM 11-20 Friday 8.00-9.40 (Huzella lecture hall)***	Histology Laboratory ***EM 1-6 Friday 8.00-10-15*** ***EM 7-12 Thursday 15.30-17.55*** ***EM 13-14-16-17 Friday 13.00-15.15*** ***EM 15 + 18 Monday 16.30-18.45*** ***EM 19-20 Monday 12.00-14.15***
Week 1 02. 15-19.	1. Epithelial tissues, cell contacts, intercellular connections (*Kiss*) 2. Glandular epithelium (*Puskár*)	Introduction to Histology; general terms. Case viewer program Simple and stratified epithelia Glandular epithelium
Week 2 02.22-26.	3. Connective tissue cells and fibres. Extracellular matrix (*Vereczki*) 4. Blood. Corpuscular elements. Red bone marrow, erythropoiesis, Formation of leukocytes (*Dóra*)	Connective tissue fibres and cell types Blood smear, bone marrow
Week 3 03.1-5.	5. Supporting tissues (cartilage, bone) (*Puskár*) 6. Ossification, bone remodelling (*Kocsis*)	Supporting tissues Types of bone formation
Week 4 03.8-12.	7. Muscle tissues (*Barna*) 8. Histology of vessels (*Nagy*)	Types of muscle tissues Histology of vessels
Week 5 03.15-19	9. Histology of the tongue and teeth (*Székely*) 10. Histology of the airways (*Hanics*)	***MIDTERM 1: Basic tissues (to be held on a separate day for EM 15, 18-20)*** ***-------*** Gastrointestinal tract I. (lip, tongue, lingual papillae, tooth bud, salivary glands) ***No histology class for groups 15, 18-20 March 15. National Holiday***
Week 6 03.22-26.	11. Gametes, fertilization, cleavage, blastulation (*Székely*) 12. Implantation. Placenta, placental circulation, fetal membranes (*Minkó*)	***Gr 7-12 and 15, 18-20*** Respiratory system (larynx, trachea, lung) ***Gr 1-6 and 13-17*** Respiratory system (larynx, trachea, lung) **+** Histology of the gastrointestinal tract II. (esophagus, stomach)
Week 7 03.29-04.02.	13. Histology of the esophagus and stomach (*Katz*) 14. Microscopical anatomy of the small and large intestines (*Alpár*)	***Gr 15, 18-20*** Histology of the gastrointestinal tract II. (esophagus, stomach, duodenum, jejunum ileum, colon, liver, gall bladder, pancreas) ***Gr 7-12*** Histology of the gastrointestinal tract II. (esophagus, stomach, duodenum, jejunum ileum, colon) ***No histology class for Grs 1-6, 13-17*** ***Good Friday Easter Holiday***
Week 8 04.05-09.	15. Molecular basis for gastrulation. Formation, differentiation and derivatives of the germinal layers (*Nagy*) 16. Neurulation, folding of the embryo. Body axes, left-right lateralization, asymmetry (*Szél*)	***Gr 1-6 and 13-17*** Histology of the gastrointestinal tract II-III. (duodenum, jejunum ileum, colon, liver, gall bladder, pancreas) ***Gr 7-12*** Histology of the gastrointestinal tract III. (liver, gall bladder, pancreas) ***No histology class for groups 15, 18-20 Easter Monday Ester Holiday***
Week 9 04.12-16.	17. Histology of the liver and pancreas (*Hanics*) 18. Pharyngeal arches, development of the foregut. Development of the midgut and hindgut (*Nagy*)	Histology of the urinary system (kidney, urinary bladder, urethra)
Week 10 04.19-23.	19. Development of the face, malformations (*Nagy*) 20. Microscopical anatomy of urinary organs (*Alpár*)	Histology of the male genital system I. (testicle, epididymis, spermatic cord)
Week 11 04.26-30.	21. Histology of the male genital system (*Tóth*) 22. Histology of the female genital system (*Katz*)	Histology of the male genital system II. (seminal vesicle, prostate, penis, glans penis)
Week 12 05.03-07.	23. Development of the urinary system (*Ádám*) 24. Development of the genital system (*Adorján*)	Histology of the female genital system I. (ovary, Fallopian tube, corpus luteum)
Week 13 05.10-14.	25. Development of the peritoneum (peritoneal relations) (*Szél*) 26. Development of the heart (*Kozsurek*)	***MIDTERM 2: Organ histology (except for the female genital system). General embryology, organ development (except for the urogenital and cardiovascular systems)*** Histology of the female genital system II. (uterus, placenta, vagina)
Week 14 05.17-21.	27. Development of arteries and veins (*Dóra*) 28. Development of the respiratory system. Fetal circulation (*Kocsis*)	Embryology consultation

List of slides

Microscopic Anatomy I. Faculty of Medicine 2020/ 2021 EM I

Week	Histological specimens – Digital slides
Week 1 02. 15-19.	**Introduction to Histology** **Simple and stratified epithelial tissues** 91. Simple squamous epithelium (human aorta, HE) 3. Simple columnar and cuboidal epithelia (human gall bladder human, HE) 57. Pseudostratified simple columnar epithelium (human trachea, HE) 8. Transitional epithelium (monkey urinary bladder, HE) 5. Stratified non-keratinizing squamous epithelium, (sophagus: upper and middle portions, human, HE) 6. Stratified keratinizing squamous epithelium; stratified cuboidal epithelium in the excretory duct of eccrine sweat gland (human plantar skin, HE) 7. Stratified columnar epithelium (urethra, human penis, HE) **Glandular epithelium** 99. Unicellular gland, goblet cell (human ileum, HE) 52. Merocrine (seromucous) secretion (human submandibular gland, HE) 148. Apocrine secretion (human axillary skin, HE) 11. Holocrine secretion (hairy skin, HE)
Week 2 02.22-26.	**Connective tissue fibres and cells. Connective tissue types.** 12. Umbilical cord, mesenchymal cells (human newborn, HE) 40. Reticulum cells, plasma cells, macrophages, mastocytes (rat lymph node, toluidine blue) 155. Connective tissue cells in granulation tissue (healing ulcer, human stomach, HE) 6. Dense irregular connective tissue; collagen fibres, fibrocytes, fibroblasts, adipocytes, (human plantar skin, HE) 73. Reticular fibres (human liver, silver nitrate impregnation) 21. Elastic fibres (human aorta, resorcin fuchsin) 18. Dense regular connective tissue (human tendon, HE) 84. Cell rich (spinocellular) connective tissue (human uterus, HE) 37. Blood smear (human, May-Grünwald-Giemsa/MGG)

To be continued ☺

Topics of the semifinal examination in Microscopic Anatomy I

General Histology
Concept of basic tissues
Definition and classification of epithelial tissue
Simple epithelia
Stratified epithelia
Membrane specializations of epithelia
Glandular epithelia
Pigment epithelium, sensory neuroepithelium
Cells of connective tissue
Ground substance and fibres of connective tissue
Types of connective tissue
Blood and the corpuscular elements of blood
Histology of the bone marrow, maturation of erythrocytes and platelets
Differentiation of granulocytes, lymphocytes and monocytes
Histology of cartilage
Histology of the bone tissue
Intramembranous ossification
Endochondral ossification
Growth and remodeling of bone
Smooth muscle and myoepithelial cells
Skeletal muscle tissue
Cardiac muscle tissue
Nervous tissue

Histology of organs
Histological structure of arteries and arterioles
Composition of capillaries and veins
Wall structure of hollow organs
Histology of the lip, tongue and teeth
Structure of the esophagus
Histology of the airways (epiglottis, larynx, trachea, lung)
Histology of the stomach
Structure of the small and large intestines
Histology of the liver and biliary passages including the gall bladder
Histology of the pancreas
Histology of the kidney and the urinary passages (ureter, urinary bladder)
Histology of the testicles togeteher with the epididymis
Histology of the prostate, seminal vesicle, spermatic cord
Histology of the penis
Histology of the ovary, uterine tube; corpus luteum
Histology of the uterus
Histology of the vagina
Placenta, umbilical cord

General Embryology
Spermatogenesis, spermiogenesis
Oogenesis
Fertilization, cleavage of the zygote

Blastocyst formation; the bilaminar embryonic disc
Implantation
Formation of body axes, parts of the early embryo (yolk sac, amnion, chorion, body stalk)
Gastrulation
Formation of the intraembryonic mesoderm; the notochord
Neurulation (neural tube and neural crest)
Derivatives of ectoderm, endoderm and mesoderm
Folding of the embryo
The structure and function of the placenta
Development of the fetal membranes (chorion and amnion), umbilical cord
Twin formation

Development of internal organs
Development of the primitive vascular systems
Development of the heart
Development of arteries
Development of veins (inferior vena cava, portal vein, suprior vena cava, azygos and hemiazygos)
Fetal circulation

Face development (oral and nasal cavities)
Development and differentiation of the foregut
Derivatives of pharyngeal pouches and grooves
Derivatives of pharyngeal arches
Development of the tongue,tooth development
Development and differentiation of the midgut
Development and differentiation of the hindgut
Formation of the liver and pancreas
Development of the peritoneum

Development of the lower airways including the lungs
Development of the diaphragm, divisioning of the body cavities
Kidney development
Development of the urinary passages
Gonadal development, formation and migration of primordial stem cells
Development of the male genital tract
Development of the female genital tract
Development of the male/female external genitals

RECOMMENDED LITERATURE

List of textbooks

- Sobotta Atlas of Human Anatomy, 15th English ed. Musculoskeletal system, internal organs, head, neck, neuroanatomy, By Waschke & Paulsen, ISBN-13: 9780702052507 2013
- Gray's Anatomy for students with STUDENT CONSULT Online Access, 3rd Edition by R. Drake, A. W. Vogl, A. Mitchel, Elsevier; 2014; ISBN 9780702051319
- THIEME Atlas of Anatomy, General Anatomy and Musculoskeletal System, 2014 by Schuenke, ISBN: 9781604069228
- THIEME Atlas of Anatomy, Head, Neck and Neuroanatomy, 2016 by Schuenke, ISBN: 9781626231207
- THIEME Atlas of Anatomy, Internal Organs, 2016 by Schuenke, ISBN: 9781626231665
- McMinn and Abrahams' Clinical Atlas of Human Anatomy with STUDENT CONSULT Online Access , 7th Edition By Abrahams, Spratt, Loukas & van Schoor ISBN-13: 9780723436973 , 2013
- Netter: Atlas of Human Anatomy, Including Student Consult Interactive Ancillaries and Guides, 6th Edition, 2014.
- Human Anatomy, Color Atlas and Textbook, 6th Edition by J Gosling, P Harris, J Humpherson, I Whitmore and P Willan; ISBN 9780723438274 Elsevier, 2016.
- Functional Anatomy, Histology and Embryology for medical and dental students by M. Réthelyi and J. Szentágothai, Medicina, 2018.

- *Gray's Anatomy. The Anatomical Basis of Clinical Practice; 41st edition by S. Standring: 2015 ISBN : 9780702052309*
- *Netter's Clinical Anatomy with Online Access, 3rd Edition, by J. Hansen, 2014,* ***eBook ISBN:*** *9781455770632* ***eBook ISBN:*** *9780323312899 014*
- *Anatomy, A Photographic Atlas, 8th Edition by Rohen, Yokochi; Wolters Kluwer, 2016, ISBN: 978-1-4963-0870-2*
- *Bräuer: Sobotta Flashcards (Muscles; Bones, Ligaments, and Joints) URBFI, 2013.*
- *RMH McMinn: Last's Anatomy, Regional and Applied. Churchill Livingstone, Edinburgh 1990. ISBN 0-443-03484-4*

- Langmann's Medical Embryology, 13th Edition by TW Sadler, Wolters Kluwer, ISBN 9781469897806, 2014
- Histology: A Text and Atlas: With Correlated Cell and Molecular Biology; 7th Edition by MH Ross and W Pawlina ; Wolters Kluwer 2015, ISBN 9781451187427
- *Wheater's Functional Histology, A Text and Colour Atlas, 6th Edition by B Young, G O'Dowd and P Woodford Churchill Livingstone, Edinburgh, 2013, ISBN 9780702047473*
- Stevens & Lowe's Human Histology , Elsevier, 4th edISBN 978-0-723435020, 2015.
- Functional Anatomy, Histology and Embryology for medical and dental students by M. Réthelyi and J. Szentágothai, Medicina, 2018.

- *The Developing Human – Clinically Oriented Embryology, 10th ed. by KL Moore, TVN Persaud and M Torchia, Saunders, 2015; ISBN 9780323313384*
- *Histology Manual 1-3. by A. Nemeskéri and K. Kocsis: István Apáthy's Foundation, 2019.*
- *L. Kierszenbaum Histology and Cell Biology: An Introduction to Pathology, 4th Edition, Paperback with STUDENT CONSULT Online Access and E-Book ISBN: 9780323085885:, 2015*
- *Junqueira's Basic Histology: Text and Atlas; 13th Edition by Anthony Mescher, New York, McGraw-Hill Medical, 01/03/2013 ISBN13 978007178033*

- *Regional Anatomy, by T Tömböl, Medicina 2008, ISBN 963 242 186 8*
- *Sectional Anatomy – Workbook, by A. Nemeskéri; István Apáthy's Foundation, 2001.*
- *Neuroanatomy An Illustrated Colour Text, 4th Edition by Crossman & Neary Publication* Date*: 13/04/2010 ISBN-13: 97807020308*

Further study aids:

To be downloaded from the homepage of the Department of Anatomy, Histology and Embryology (http://semmelweis.hu/anatomia) or from Knowledgebase on the Library homepage: (https://lib.semmelweis.hu/knowledge_base).