

University of Szeged, Faculty of Medicine
Department of Anatomy, Histology and Embryology

Chairman: Prof. András Mihály MD, PhD, DSc

Address: Kossuth L. sgt. 40., H-6724 Szeged, Hungary

Mail address: P.O. Box 427, H-6701 Szeged, Hungary

E-mail: titk@anatomy.szote.u-szeged.hu

<http://anatomy.szote.u-szeged.hu/Anatomy>

Tel.: +36-62-545-665

Fax: +36-62-545-707

TOPICS OF THE ANATOMY FINAL EXAMINATION

I. HISTOLOGY

A., BASIC HISTOLOGICAL SLIDES (description and identification)

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|------------------------------|-------------------------|
| 1. Chondrogenic ossification | 16. Kidney |
| 2. Bone (cross ground) | 17. Urinary bladder |
| 3. Blood smear | 18. Testis-epididymis |
| 4. Lymphatic node | 19. Prostate |
| 5. Spleen | 20. Ovary |
| 6. Radix of the tongue | 21. Uterine tube |
| 7. Parotid gland | 22. Uterus |
| 8. Submandibular gland | 23. Thyroid gland |
| 9. Oesophagus | 24. Sensory ganglion |
| 10. Ileum | 25. Autonomous ganglion |
| 11. Vermiform appendix | 26. Spinal cord |
| 12. Liver | 27. Cerebral cortex |
| 13. Pancreas | 28. Cerebellar cortex |
| 14. Trachea | 29. Skin |
| 15. Lung | 30. Mammary gland |

B., THEORETICAL QUESTIONS

1. Preparation of tissues for microscopic examination. The microscope. Basic methods of histochemistry.
2. Basic histochemical and cytochemical principles: the structure of the cell membrane; specializations of the cell surface; intercellular junctions. Types of epithelial tissues.
3. The cytoskeleton, intracellular transport, endocytosis and exocytosis. Cilia and flagella. Structural and molecular basis of muscle contraction.
4. The cell nucleus and intracellular membranous organelles.
5. Connective- and supporting tissues. Cells, fibers and extracellular matrix.

II. PRACTICAL EXAMINATION **(DISSECTION ROOM, CADAVER DEMONSTRATION)**

1. The axillary fossa.
2. The deltoid region.
3. The muscles, vessels and nerves of the upper arm.
4. The cubital fossa.
5. The muscles, vessels and nerves of the forearm.

6. The volar and dorsal carpal regions.
7. The palmar region.
8. The back of the hand.
9. The gluteal region.
10. The subinguinal region.
11. The muscles, vessels and nerves of the thigh.
12. The adductor canal and popliteal fossa.
13. The muscles, vessels and nerves of the leg.
14. Topography of the medial and lateral malleolar regions.
15. The back of the foot.
16. The sole of the foot.
17. The infraclavicular (pectoral) region. Intercostal topography.
18. The structure and topography of the abdominal wall.
19. The inguinal canal. The contents of the scrotum.
20. The diaphragm and passing items.
21. The supracardiac mediastinum. The branches of the superior vena cava and subclavian artery.
22. Demonstration of the anatomical structures of the heart.
23. The posterior mediastinum. The branches of the thoracic aorta.
24. The anatomy and topography of the stomach and the duodenum.
25. The anatomy and topography of the pancreas.
26. The anatomy and topography of the liver and the extrahepatic biliary ducts.
27. The anatomy and topography of the small intestine, large intestine and rectum.
28. The branches of the abdominal aorta.
29. The portal system. Branches of the inferior vena cava.
30. The topography of the female pelvis.
31. The topography of the male pelvis.
32. The branches of the internal iliac artery.
33. The anatomy of the female perineum.
34. The anatomy of the male perineum.
35. The items of the anterior regions of the face (infraorbital and buccal regions).
36. The parotideo-masseteric region.
37. The retromandibular fossa and the infratemporal region.
38. The submandibular region.
39. The carotid region. The branches of the external carotid artery.
40. The anterior region of the neck. The branches of the cervical plexus.
41. The supraclavicular region.
42. The nuchal region. The suboccipital topography.
43. The topography of the orbit: muscles, vessels, nerves.

III. OSTEOLOGY, SYNDESMOLOGY AND MYOLOGY **(ANATOMY MUSEUM)**

1. The frontal bone. General osteology, ossification, regeneration of the bone.
2. The temporal bone.
3. The ethmoid bone. Development of the skull and the vertebral column.
4. The occipital and the parietal bones. Features of the newborn skull. Sutures and fontanelles.
5. The sphenoid bone and the pterygopalatine fossa.
6. The bony nasal cavity. The paranasal sinuses.
7. The mandible and the maxilla, anatomy of the teeth.
8. The temporomandibular joint and the muscles of mastication.
9. The orbit. The hard palate.
10. The external base of the skull.

11. The internal base of the skull.
12. General syndesmology (types and components of the joints). The atlantooccipital and atlantoaxial joints.
13. The structure (bones and joints) and movements of the vertebral column.
14. The structure of the thorax (bones and joints). Development of the thorax.
15. The bones of the upper limb.
16. The joints and movements in the shoulder girdle.
17. The elbow joint, pronation and supination.
18. The joints and movements of the wrist and the hand. The carpal tunnel.
19. The bones and ligaments of the pelvis. The diameters and the statics of the bony pelvis.
20. The bones of the lower limb.
21. The structure and movements of the hip joint.
22. The structure and movements of the knee joint.
23. The joints, ligaments and movements of the foot.
24. General myology: types, innervation and regeneration of the muscles. Development of the skeletal muscles and the limbs.
25. The muscles of facial expression (origin, insertion, innervation).
26. The superficial muscles of the neck (origin, insertion, innervation).
27. The deep muscles of the neck, the suboccipital muscles, the deep (axial) muscles of the back (origin, insertion, innervation).
28. The cervical plexus.
29. The broad muscles of the abdomen, muscles of the posterior abdominal wall (origin, insertion, innervation).
30. The rectus abdominis muscle and the rectus sheath.
31. The superficial muscles of the trunk: the thoracohumeral and spinohumeral muscles (origin, insertion, innervation).
32. The muscles of the respiration (origin, insertion, innervation). The development of the diaphragm.
33. The muscles of the shoulder girdle (origin, insertion, innervation). The rotator cuff.
34. The muscles of the arm and the forearm (origin, insertion, innervation).
35. The muscles of the hand (origin, insertion, innervation).
36. The brachial plexus.
37. The muscles of the hip (origin, insertion, innervation).
38. The muscles of the floor of the pelvis and the perineum (origin, insertion, innervation).
39. The muscles of the thigh (origin, insertion, innervation).
40. The lumbar plexus.
41. The muscles of the leg (origin, insertion, innervation).
42. The muscles of the sole and the back of the foot (origin, insertion, innervation).
43. The sacral plexus.

IV. SPLANCHNOLOGY, HISTOLOGY AND EMBRYOLOGY

1. The anatomy, histology and cyclic changes of the ovary. The oogenesis; primary, secondary and Graafian follicles.
2. The anatomy, histology and the cycle of the uterus – histological and hormonal changes.
3. The anatomy and histology of the testis and epididymis. The spermatogenesis; the electron microscopic structure of the spermatozoon.
4. The ovulation, fertilization, cleavage and implantation. The formation and structure of the placenta. Structure of the matured placenta.
5. The structure of the blastocyst and the formation of the embryonic disc. The formation of the amnion and the yolk sac; the neurulation. Derivatives of the germ layers.

6. The lateral and cephalocaudal foldings of the embryo; formation of the umbilical cord. The clinical importance of the fetal membranes and the amniotic fluid. Twinning and teratogenesis.
7. The development and derivatives of the branchial apparatus.
8. The external features of the heart, the anatomy of the chambers and the structure of the valves.
9. The impulse-generating and impulse-conducting systems and the extrinsic innervation of the heart. The vessels of the heart. The anatomy of the pericardium. Histology of the heart.
10. The development and malformations of the heart.
11. The histology of the vessels; the fine structure of the capillaries. The development of the arteries and veins.
12. The fetal circulation and circulatory changes at birth.
13. The anatomy and histology of the larynx.
14. The anatomy, blood supply and innervation of the trachea, bronchial tree and the lungs (bronchography and bronchoscopy).
15. The anatomy of the pleura. The histology of the lung and the pleura. The development of the respiratory system.
16. The anatomy, blood supply and histology of the nose and the nasal cavity. The paranasal sinuses.
17. The anatomy and histology of the pharynx.
18. The development of the face, the oral and nasal cavities.
19. The anatomy, histology and development of the teeth.
20. The anatomy, histology and development of the tongue.
21. The anatomy, histology and development of the major salivary glands.
22. The anatomy, histology and development of the esophagus and the stomach.
23. The anatomy, histology and development of the small intestines.
24. The anatomy, histology and development of the large intestines.
25. The anatomy, histology and development of the rectum and the anal canal.
26. The anatomy, histology and development of the liver.
27. The anatomy, histology and development of the pancreas.
28. The layers, duplicatures and recesses of the peritoneum.
29. The lymphatic drainage and lymph nodes of the visceral organs of the abdominal cavity.
30. The anatomy, blood supply and innervation of the kidney and the ureter. The microcirculation of the kidney.
31. The histology of the kidney and ureter. Electron microscopic structure of the nephron.
32. The development and malformations of the kidney.
33. The anatomy, blood supply, innervation, histology and development of the urinary bladder.
34. The anatomy and histology of the female and male urethra.
35. The development and the malformations of the ovary, uterine tube, uterus and vagina.
36. The anatomy, histology and development of the female external genital organs.
37. The anatomy, blood supply and innervation of the penis. The development of the male external genital organs.
38. The anatomy and histology of the vas deferens, the prostate and seminal vesicle.
39. The development and malformations of the male genital system.
40. The histology of the blood: morphology of formed elements, cell size and number.
41. The histology of the red bone marrow. Erythropoiesis.
42. Granulopoiesis and the thrombopoiesis. The origin and differentiation of the lymphocytes.
43. The anatomy of the lymphatic system: major lymphatic vessels and trunks in the body.
44. The histology of the lymph node.
45. The anatomy, histology and development of the thymus.
46. The spleen: anatomy, histology, blood supply and development.
47. The pituitary gland: anatomy, histology, blood supply and development.
48. The thyroid and parathyroid glands: anatomy, histology, blood supply and development.

49. The adrenal gland: anatomy, histology, blood supply and development.
50. The anatomy and histology of the integumentary system.
51. The anatomy, histology and development of the mammary gland.

V. NEUROANATOMY AND SENSE ORGANS

1. The cell types of the nervous system. Cytology of the neuron and glial cells. Molecular biology of the synaptic transmission.
2. Development and early histological differentiation of the neural tube. Development of the nerve cells. Degeneration and regeneration in the nervous system.
3. The blood supply of the central nervous system, veins and sinuses. Blood-brain barrier.
4. The anatomy, histology, blood supply and innervation of the meninges. Subarachnoid space of the spinal cord and the brain.
5. Histology of the peripheral nerves, receptors, effectors and ganglia. Development of the peripheral nervous system.
6. The anatomy of the sympathetic nervous system (peripheral ganglia, plexuses and nerves).
7. The anatomy of the parasympathetic nervous system (peripheral ganglia, plexuses and nerves).
8. The anatomy of the spinal cord (gross anatomy, meninges, blood supply).
9. The anatomy of the spinal cord (ascending, descending and intersegmental tracts).
10. The structure of the gray substance of the spinal cord. Neuron types, transmitters, nuclei and the Rexed laminae.
11. The fine structure of the medulla oblongata (nuclei and tracts).
12. The fine structure of the pons (nuclei and tracts).
13. The fine structure of the midbrain (nuclei and tracts).
14. The structure and transmitters of the reticular formation.
15. The anatomy, histology and connections of the cerebellum. The role of the cerebellum in the regulation of the movements.
16. Nuclei and connections of the hypothalamus. Neurosecretion. Anatomical basis of the neuroendocrine regulation.
17. Structure of the thalamus: nuclei and connections.
18. The anatomy, transmitters and connections of the basal ganglia. The role of the basal ganglia in the regulation of the movements.
19. The gyri and sulci of the neocortical lobes, their function and blood supply. Brodmann's areas.
20. The histology, cell types, afferents, efferents and transmitters of the neocortex.
21. White matter of the hemispheres: association and commissural fiber systems. Centrum semiovale and internal capsule.
22. The anatomy of the limbic system and the ring of Papez. The amygdala and its connections. Structure and connections of the hippocampus.
23. The anatomy of motor pathways: corticospinal and corticobulbar tracts. Upper and lower motoneuron injuries.
24. The origin, brain stem localization, thalamic termination and thalamocortical projections of the spinothalamic tract. Neuroanatomy of the pain.
25. The ascending tracts of the spinal cord's dorsal column, the medial lemniscus and its projections. Lesion and its symptoms.
26. Neuroanatomy of the olfactory system.
27. The brain stem nuclei and the peripheral branches of the oculomotor, trochlear and abducent nerves.
28. The brain stem nuclei of the trigeminal nerve and the trigemino-thalamic projections. The peripheral branches of the trigeminal nerve.

29. The brain stem nuclei and the peripheral branches of the facial nerve. Central and peripheral facial nerve paralysis.
30. The brain stem nuclei and the peripheral branches of the glossopharyngeal and vagus nerves.
31. The brain stem nuclei and the peripheral branches of accessory and hypoglossal nerves.
32. The anatomy of the brain ventricles and the choroid plexus. The formation and circulation of the cerebrospinal fluid. The cisterns.
33. The development and malformations of the brain and the spinal cord.
34. The anatomy and histology of the external fibrous coat and the refractive media of the eye. The cornea reflex.
35. The anatomy and histology of the vascular coat of the eye. Formation, absorption and clinical significance of the aqueous humor.
36. The histology of the retina. Types of neurons and neurotransmitters. Blood supply of the retina.
37. The neuroanatomy of the visual pathway, representation of the visual fields in the different structures of the visual system.
38. The pupillary reflex. Mechanism of accommodation.
39. The central control of the eye movements (pathways of the horizontal and vertical gazing).
40. Additional structures of the eye: eyelids, lacrimal apparatus, muscles of the eye.
41. The development of the eye.
42. The anatomy and development of the middle and external ear.
43. The structure of the osseous and membranous labyrinth. Fundus of the internal acoustic meatus.
44. The fine structure of the macula statica, ampullary crest and the organ of Corti.
45. The neuroanatomy of the auditory and the vestibular pathways. Development of the inner ear.

VI. HISTOLOGICAL SLIDES

1. Simple squamous epith. (mesentery, Ag)
2. Unicellular glands (small intestine, PAS)
3. Mast cells (cresyl violet)
4. Adipose tissue (embedded, HE)
5. Adipose tissue (frozen section, Sudan)
6. Tendon (HE)
7. Hyaline cartilage (HE)
8. Elastic cartilage (orcein)
9. Fibrocartilage (HE)
10. Bone (ground cross section)
11. Endochondral ossification (HE)
12. Smooth muscle (HE)
13. Skeletal muscle (cross sect., HE)
14. Skeletal muscle (longit. sect., HE)
15. Cardiac muscle (HE)
16. Cardiac muscle (iron haematoxylin)
17. Motor end plate (AChE)
18. Blood smear (MGG)
19. Bone marrow (HE)
20. Aorta (HE)
21. Aorta (resorcin-fuchsin)
22. Artery and vein (HE)
23. Artery and vein (orcein)
24. Lymph node (HE)
25. Thymus (HE)
26. Spleen (HE)
27. Palatine tonsil (HE)
28. Radix of the tongue (HE)
29. Lip (HE)
30. Tooth (HE)
31. Back of the tongue (HE)
32. Circumvallate papilla (HE)
33. Parotid gland (HE)
34. Submandibular gland (HE)
35. Sublingual gland (HE)
36. Oesophagus (HE)
37. Stomach: cardia (HE)
38. Stomach: fundus and corpus (HE)
39. Stomach: pylorus (HE)
40. Duodenum (HE)
41. Jejunum (HE)
42. Ileum (HE)
43. Large intestine (HE)
44. Vermiform appendix (HE)
45. Anal canal (HE)
46. Liver (HE)
47. Liver (reticular fibres)
48. Liver (Kupffer cells, inj. ink)
49. Gall bladder (HE)
50. Pancreas (HE)
51. Larynx (HE)
52. Trachea (HE)
53. Lung (HE)
54. Lung (orcein)
55. Kidney (HE)
56. Ureter (HE)
57. Urinary bladder (HE)
58. Penis-urethra (HE)
59. Testis-epididymis (HE)
60. Spermatic cord (HE)
61. Prostate (HE)
62. Seminal vesicle (HE)
63. Ovary (HE)
64. Oviduct (HE)
65. Uterus (HE)
66. Uterine cervix (HE)
67. Pituitary gland (HE)
68. Thyroid gland (HE)
69. Parathyroid gland (HE)
70. Adrenal gland (HE)
71. Corpus luteum (HE)
72. Peripheral nerve (cross section, HE)
73. Peripheral nerve (longit. section, HE)
74. Peripheral nerve (cross section, Os)
75. Peripheral nerve (longit. section, Os)
76. Sensory ganglion (HE)
77. Sensory nerve ending (Meissner, Ag)
78. Sensory nerve ending (Paccinian, HE)
79. Autonomic ganglion (Ag)
80. Spinal cord (HE)
81. Spinal cord (myelin staining)
82. Cerebellum (HE)
83. Cerebellum (Ag)
84. Cerebral cortex (HE)
85. Diencephalon (oxytocin)
86. Astrocyte (GFAP)
87. Eye (HE)
88. Eyelid (HE)
89. Lacrimal gland (HE)
90. Hairy skin (HE)
91. Mammary gland (resting, HE)
92. Mammary gland (lactating, HE)
93. Umbilical cord (HE)
94. Placenta (HE)
95. Embryo (segmentation of the mesoderm)
96. Cochlea (HE)