



Examination questions from Histology and Embryology 2 for Dentistry, academic year 2023/2024

A. TECHNIQUES USED IN HISTOLOGY AND GENERAL HISTOLOGY

1. Principles of light microscopy, and its use in medicine. Histochemistry and Immunohistochemistry.
2. Principles of electron microscopy, and its use in medicine. Types of electron microscopes.
3. Morphological and functional characteristics of the cell. Cell death. Morphological description of apoptosis and necrosis.
4. The cytoplasm and the cell membrane (their structure and function).
5. The structure and the function of the nucleus (nucleolus, chromatin, nuclear envelope ...).
6. The structure and the function of membranous organelles (mitochondrion, endoplasmic reticulum, Golgi apparatus, lysosome, peroxisome ...)
7. Morphological characteristics of protein synthesis in the cell. Ribosomes.
8. The cytoskeleton. Microtubules, microfilaments and intermediate filaments. The centrioles, basal bodies, and cilia.
9. Cell junctions (the adhering and the communicating junctions). Surface characteristics/specificities.
10. Cytoplasmic inclusions and pigments. Endocytosis and exocytosis.
11. The epithelial tissue (types, nutrition and the function of the epithelia). The structure of the basal lamina and the basement membrane.
12. The lining (covering) epithelium; their structure, classification and localization.
13. The glandular epithelium (the exocrine and the endocrine glands).
14. Connective tissue (its classification and structure). The fibres of the connective tissue (their types, function and visualization - staining).
15. Loose connective tissue (their structure, localization and function). Cells of the connective tissue.
16. Dense connective tissue (the regular and the irregular types). The microscopic structure of tendons, ligaments, and aponeuroses.
17. Special types of connective tissues: the mucoid (gelatinous) connective tissue, the reticular tissue, the white and the brown adipose tissues, the elastic tissue (their structure, function and localization).
18. The hyaline cartilage, the elastic cartilage and the fibrous cartilage (fibrocartilage) (their structure, localization, and functional histology).
19. Bone (osseous) tissue. Compact and spongy (cancellous) bones. Cells of the bone tissue.
20. Lamellar bone. The Haversian system. Periosteum and endosteum (their structure and functional histology)
21. Osteogenesis: the intramembranous and the endochondral (cartilaginous) ossifications. Woven (primary) and lamellar (secondary) bones.
22. Epiphyseal cartilage (growth plate). Bone remodelling and bone fracture healing.
23. Microscopic structure of the joints and the synovial membrane. The structure and function of the articular cartilage.





24. Muscle tissue (its types, structure and functional histology). Regeneration and innervation of the muscle tissue.
25. Cardiac muscle (myocardium) (its structure and functional histology). Cardiac conducting muscle cells.
26. Skeletal (striated) muscle. Smooth muscle tissue (their structure and functional histology).
27. Nerve tissue (its structure and functional histology). Degeneration and regeneration of the nerve tissue.
28. Neurons (nerve cells) (their types, microscopic structure, and functional histology). Nerve fibres and myelinating process (myelination). Synapses.
29. Neuroglia (their types, microscopic structure and functional histology). The blood – brain barrier.
30. Microscopic structure of the grey and the white matters of the CNS.
31. Blood and its composition. The morphology of red blood cells (erythrocytes) and their development. Platelets (thrombocytes) (their structure and development).
32. Morphology and development of white blood cells (leukocytes) and cells of the mononuclear phagocyte system.
33. The peripheral blood smear and the differential blood count.
34. Morphological overview of the haematopoiesis and the bone marrow. Erythrocytopoiesis, myelopoiesis and lymphocytopoiesis.

B. DEVELOPMENT AND MICROSCOPIC ANATOMY OF CRANIOFACIAL STRUCTURES AND ORGANS

1. Development of the cephalic end of the embryo. Pharyngeal arches, clefts and their derivatives. Anomalies.
2. Pharyngeal pouches and their derivatives. Anomalies.
3. Development of the face. The development of the oral cavity. Malformations of the face and the oral region (orofacial malformations).
4. Development and the microscopic structure of the lip. The development of the primary and the secondary palate. Clefts.
5. Microscopic structure of the soft and the hard palate.
6. The oral mucosa. Small salivary glands (their development and microscopic structure). Saliva.
7. The development, the microscopic structure and the congenital anomalies of the tongue. Sensory receptors of the tongue.
8. The development, and the microscopic structure of great salivary glands.
9. The development of the nasal cavity and the paranasal air sinuses. Microscopic structure of their mucosa.
10. The development of the teeth. Successive stages of their development. Tooth abnormalities.
11. Amelogenesis. Ameloblasts, their origin, microscopic structure and function.
12. Microscopic structure and composition of the enamel. Mineralization and the maturation of the enamel.
13. Dentinogenesis. Odontoblasts, their origin, microscopic structure and function.
14. Microscopic structure and the composition of the dentin. Predentin and its mineralization.
15. The development of the root of the tooth. Cementoblasts. Cementum (its microscopic structure and composition).





16. The development and the microscopic structure of the dental pulp (topographic regions, innervation and the blood supply).
17. Microscopic structure of the gum, its topographic regions and function.
18. The dentogingival junction. The alveolar bone socket and the periodontium (their development, microscopic structure, function and blood supply).
19. A survey of the development of sensory organs (eye, ear, olfactory region).
20. Development and the growth of the skull. Temporomandibular joint (development and microscopic structure).

C. DEVELOPMENT AND MICROSCOPIC ANATOMY OF THE STRUCTURES AND ORGANS OTHER THAN THE CRANIOFACIAL REGION. EMBRYOLOGY

1. Arteries and veins (types and the microscopic structure). Structural differences between arteries and veins. A Survey of the development of the blood vessels.
2. Types of capillaries; their microscopic structure and function.
3. The heart (its microscopic structure and function). The conducting system of the heart. A survey of the development of the heart.
4. The lymph node (its microscopic structure and function).
5. Tonsils (their microscopic structure and function).
6. The spleen (its microscopic structure and function).
7. The thymus (its microscopic structure and function).
8. The pituitary gland (*the hypophysis*) and the pineal gland (*the epiphysis*) (their microscopic structure and function).
9. The thyroid and parathyroid glands (their microscopic structure and function).
10. The adrenal (suprarenal) gland (a survey of its development, microscopic structure, and function).
11. The pharynx and the oesophagus (their microscopic structure and function). A survey of the development of the foregut.
12. The stomach (a survey of its development, microscopic structure, and function).
13. The small intestine (a survey of development, microscopic structure, and function).
14. The liver (a survey of development, microscopic structure, and function). The blood circulation in the liver.
15. The ultrastructure and the function of hepatocytes. The perisinusoidal space of Disse and sinusoids.
16. The gallbladder and the bile ducts (a survey of their development, microscopic structure, and function). The pancreas (a survey of development, microscopic structure, and function).
17. The larynx and the epiglottis (their microscopic structure and function).
18. Trachea and branches of the bronchial tree (a survey of their development, microscopic structure, and function).
19. The lungs (a survey of their development, microscopic structure, and function). The blood circulation in the lungs. Respiratory portion of the lungs. The blood-air barrier.
20. The kidney (a survey of its development, microscopic structure, and function). The structure of the nephron.
21. The filtration barrier of the kidney. The juxtaglomerular complex of the kidney (its microscopic structure and function).





22. Excretory urinary passages, the urinary bladder and the male/female urethra (a survey of their development, microscopic structure, and function).
23. The Ovary (a survey of its development, microscopic structure, and function). The ovarian cycle.
24. The uterine (fallopian) tube (a survey of its development, microscopic structure, and function). Mammary gland (a survey of its development, microscopic structure, and function).
25. The uterus and the cervix (a survey of their development, microscopic structure, and function).
26. The uterine (menstrual) cycle.
27. Vagina (a survey of development, microscopic structure, and function). Cyclic changes in the vaginal epithelium.
28. Testis (survey of its development, microscopic structure, and function).
29. The ultrastructure and development of the oocyte and the spermatozoa.
30. The epididymis and the deferens duct (their microscopic structure and function).
31. The prostate and seminal vesicles (their microscopic structure and function). Penis (a survey of its development, microscopic structure, and function).
32. The skin and its appendages (a survey of their development, microscopic structure, and function).
33. Microscopic structure of the ear, the eyeball and *regio olfactoria*.
34. A survey of the development and the microscopic structure of the cerebral cortex. Microscopic structure of the meninges.
35. A survey of the development and the microscopic structure of the cerebellum and the spinal cord.
36. A survey of the development and the microscopic structure of the peripheral nerve and the ganglia (types and functional histology).
37. Fertilization. Cleavage of the zygote and the development of the blastocyst.
38. Implantation. Differentiation of the trophoblast. The decidual reaction.
39. The development of the extra-embryonal structures: chorion, amnion and yolk sac.
40. The formation of the germ layers (the bilaminar and the trilaminar germ discs).
41. The development of the neural tube. Cells derived from the neural crest and their derivatives.
42. Somites and their derivatives.
43. The development of the umbilical cord and its anomalies.
44. The development of the placenta and its anomalies. The function and the structure of the mature placenta. The placental barrier.
45. Derivatives of the ectoderm, mesoderm and endoderm.
46. The development of the vertebra and vertebral column. Development of the limb.
47. The fetal blood circulation. The changes in the circulation after birth.

11 September 2023

Prof. RNDr. Ivan Varga, PhD et PhD
Head of the Institute of Histology and Embryology
Faculty of Medicine, Comenius University in Bratislava

