

General principles - Radiology

1. Roentgen radiation – *characteristics, X-ray tube*
2. Skiagraphy – *principle, indications, position in the diagnostic algorithm, radiation dose*
3. Fluoroscopy - *principle, indications, position in the diagnostic algorithm, radiation dose*
4. Diagnostic ultrasound - *principle, indications, position in the diagnostic algorithm*
5. Computer tomography (CT) - *principle, indications, position in the diagnostic algorithm, radiation dose*
6. Magnetic resonance imaging (MRI) - *principle, indications, position in the diagnostic algorithm*
7. Diagnostic angiography incl. DSA - *principle, indications, position in the diagnostic algorithm, radiation dose*
8. Interventional radiological methods - *principle, indications, position in the diagnostic algorithm, radiation dose*
9. Contrast agents in radiology – *types according to structure and imaging method*
10. Contrast agents for ultrasound and MR imaging
11. Side effects after contrast agents applications, their prevention and therapy
12. Digitalization in radiology – principles, storing and sharing of images, 3D reconstructions (types), virtual radiology
13. Radiation dose, dosimetry, protective aids in radiology and nuclear medicine
14. Radiological structured report, requirements for correct report, methods for reduction of false positive and negative findings

General principles - Nuclear medicine

15. Ionizing radiation detection – matter interaction – detectors of the radiation – shielding, electronic evaluation
16. Radioactive conversion – alpha, beta-, beta+, electron capture
17. Measuring devices in vivo – scintillating probe, gamma camera, whole body detector
18. Data recording and processing – analog and digital image, recording methods, image reconstruction. Archivation and transmission of the images.
19. Imaging methods in nuclear medicine – planar scintigraphy static, dynamic, tomography
20. Emission tomography – SPECT, PET (principles and practical use)
21. Radiopharmaceutics – definition, forms, requirements, quality control
22. Sources of the radionuclides – principles of the nuclear reactor, accelerators and generators (practical examples of radionuclides)
23. Hybrid imaging systems (SPECT/CT, PET/CT)

Special part

1. a) Traumatology – axial skeleton – diagnostic algorithms, fracture types
b) Palliative treatment of bone metastases with radionuclides, clinical outcome and comparison with other treatment methods
2. a) Traumatology – long bones – diagnostic algorithms, fracture types
b) Radionuclide diagnostics of bone inflammation, clinical outcome and comparison with other imaging methods
3. a) Traumatology – polytrauma – diagnostic algorithms
b) Radionuclide diagnostics of functional disorders of gastrointestinal tract, clinical outcome and comparison with other imaging methods
4. a) Traumatology in children - fracture types, battered child
b) Nuclear medicine examination in children – radiopharmaceutics application and amount, differences in organ distribution
5. a) Diagnostic imaging of degenerative bone changes – diagnostic algorithms
b) Diagnostic imaging with ^{99m}Tc -MIBI, ^{123}I - MIBG , ^{99m}Tc –DMSA, clinical outcome and comparison with other imaging methods
6. a) Diagnostic imaging of bone inflammation and tumors – diagnostic algorithms
b) Bone scintigraphy – principle, radiopharmaceutics, methods, clinical outcome and comparison with other imaging methods, principle of triphasic scintigraphy
7. a) Diagnostic imaging of soft tissues (trauma, inflammation, tumors) – diagnostic algorithms
b) Radiation synovectomy – principle of the method, clinical outcome
8. a) Diagnostic imaging of the thorax – diagnostic algorithms
b) Diagnostic imaging with ^{99m}Tc -MIBI, ^{123}I - MIBG , ^{99m}Tc –DMSA, clinical outcome and comparison with other imaging methods
9. a) Diagnostic imaging of the lung disorders – inflammation and circulation abnormalities – diagnostic algorithms
b) Perfusion scintigraphy of the lung – principle of method, radiopharmaceutics, indications and evaluation, comparison with other imaging methods
10. a) Diagnostic imaging of lung and pleural tumors – diagnostic algorithms
b) Ventilation scintigraphy of the lung - principle of method, radiopharmaceutics, indications and evaluation, comparison with other imaging methods
11. a) Diagnostic imaging of esophagus – diagnostic algorithms, most frequent abnormalities
b) Dynamic scintigraphy of esophagus, indications and comparison with other imaging methods
12. a) Diagnostic imaging of heart - diagnostic algorithms, most frequent abnormalities

- b) Myocardial perfusion – principles, radiopharmaceuticals, load tests, indications and comparison with other imaging methods
- 13. a) Diagnostic imaging of arterial system - diagnostic algorithms, most frequent abnormalities
 - b) Radionuclide methods in hematology
- 14. a) Diagnostic imaging of venous system - diagnostic algorithms, most frequent abnormalities
 - b) Principle of immunoscintigraphy – clinical outcome
- 15. a) Diagnostic imaging of thorax in children
 - b) Diagnostic imaging of neuroblastomas with radionuclides, comparison with other imaging methods
- 16. a) Acute abdomen - diagnostic algorithms, most frequent abnormalities
 - b) Gastrointestinal tract hemorrhage detection – radiopharmaceuticals, Meckels diverticulum
- 17. a) Diagnostic imaging of gastrointestinal tract - diagnostic algorithms, most frequent abnormalities
 - b) Examination of stomach evacuation
- 18. a) Diagnostic imaging of liver - diagnostic algorithms, most frequent abnormalities
 - b) Static scintigraphy of liver – principles, radiopharmaceuticals, indications and comparison with other imaging methods
- 19. a) Diagnostic imaging of gallbladder and bile ducts - diagnostic algorithms, most frequent abnormalities
 - b) Dynamic cholescintigraphy - principles, radiopharmaceuticals, evaluation, indications and differential diagnosis of cholestasis, comparison with other imaging methods
- 20. a) Diagnostic imaging of pancreas - diagnostic algorithms, most frequent abnormalities
 - b) Radionuclide diagnostics of gastro-entero pancreatic tumors, comparison with other imaging methods
- 21. a) Diagnostic imaging of gastrointestinal tract in children
 - b) Evaluation of intestinal motility with radionuclides, indications and comparison with other imaging methods
- 22. a) Diagnostic imaging of urogenital tract - diagnostic algorithms, most frequent abnormalities
 - b) Dynamic scintigraphy of kidneys – principles, radiopharmaceuticals, indications and comparison with other imaging methods
- 23. a) Diagnostic imaging of male genital - diagnostic algorithms, most frequent abnormalities
 - b) Monoclonal antibodies in diagnostics

24. a) Diagnostic imaging of female genital - diagnostic algorithms, most frequent abnormalities
b) Radionuclide methods in endocrinology
25. a) Urolithiasis - diagnostic algorithms, most frequent abnormalities
b) Static scintigraphy of kidneys - principles, radiopharmaceuticals, indications and comparison with other imaging methods
26. a) Diagnostic imaging of inflammation and tumors of urogenital tract - diagnostic algorithms, most frequent abnormalities
b) Assessment of glomerular filtration and ERPF of kidney
27. a) Head and neck imaging (excl. CNS) - diagnostic algorithms, most frequent abnormalities
b) Diagnosis and therapy of thyroid gland diseases – scintigraphy of thyroid gland, value of radioiodine for diagnostic and therapeutic use
28. a) Diagnostic imaging in stomatology - diagnostic algorithms, most frequent abnormalities
b) Thyroid gland carcinoma – differentiated, medullar and anaplastic – different diagnostic and therapeutic algorithms
29. a) Neuroradiology - diagnostic algorithms, most frequent abnormalities
b) Static scintigraphy of brain – importance of hematoencephalic barrier – clinical value and comparison with other imaging methods
30. a) Neuroradiology in children
b) Neuroreceptor scintigraphy – principle of method, examples of some receptors and their clinical outcome
31. a) Diagnostic imaging of brain – traumatic and non-traumatic haemorrhage – diagnostic algorithms
b) Perfusion scintigraphy of brain – conditions for application – clinical outcome and comparison with other imaging methods
32. a) Diagnostic imaging of brain – tumors and inflammation - diagnostic algorithms, most frequent abnormalities
b) Radionuclide scintigraphy – principle of method, radiopharmaceutics, clinical outcome and comparison with other imaging methods
33. a) Diagnostic imaging of spinal cord - diagnostic algorithms, most frequent abnormalities
b) Radionuclide diagnostics of cerebrospinal fluid, radiopharamaceutics, clinical outcome and comparison with other imaging methods
34. a) Diagnostic imaging in mammology
b) Imaging of sentinel nodes with radionuclides
35. a) Diagnostic imaging in gynecology and obstetrics - diagnostic algorithms, most frequent abnormalities
b) PET - clinical outcome and comparison with other imaging methods

36. a) Diagnostic imaging of lymphatic system - diagnostic algorithms, most frequent abnormalities
b) Radionuclide lymphography - clinical outcome and comparison with other imaging methods
37. a) Interventional diagnostic (diagnostico-therapeutical) procedures on vascular system
b) Radionuclide phlebography - clinical outcome and comparison with other imaging methods
38. a) Interventional diagnostic (diagnostico-therapeutical) procedures on urogenital system
b) PET - clinical outcome and comparison with other imaging methods
39. a) Interventional diagnostic (diagnostico-therapeutical) procedures on gastrointestinal system
b) Therapy with radioactive phosphorus, ^{131}I - MIBG, with antibodies, with colloids
40. a) Interventional diagnostic (diagnostico-therapeutical) procedures on central nervous system
b) Brain death detection with radionuclides and comparison with other imaging methods
41. a) Percutaneous drainage of fluid collections and abscesses
b) Inflammation detection by nuclear medicine methods and comparison with other imaging methods
42. a) Screening imaging methods and early detection of oncological diseases
b) Oncological diagnosis with nuclear medicine methods, receptor analysis, comparison with other imaging methods
43. a) Staging of oncological diseases – diagnostic algorithms
b) Monoclonal antibodies in therapy