

Exam Questions Nuclear Medicine

Clinical Section

Nuclear Cardiology 1 – Myocardial Perfusion Scintigraphy, Myocardial Viability

Nuclear Cardiology 2 – Cardiac Amyloidosis, Cardiovascular Inflammations (Infective Endocarditis, Vasculitides), Equilibrium Gated Ventriculography, Cardiac Shunts Detection

Radionuclide Diagnostics in Pulmonology – V/P Scan (Perfusion Pulmonary Scintigraphy, Ventilation Pulmonary Scintigraphy), Examination of Pulmonary Malignancies, Sarcoidosis

Nuclear Neurology – Diagnosis of Extrapyrimal Disorders, Diagnosis of Dementias, Perfusion Brain Imaging, Brain Death

Diagnostics of Digestive Tract Diseases – Examination of Food Transport by the Esophagus, Gastric Emptying, Localization of Bleeding Site in the Gastrointestinal Tract, Identification of Ectopic Gastric Mucosa (Meckel's Diverticulum), Gastrointestinal Tumors, Static Liver Scintigraphy

Nuclear Nephrology – Dynamic Renal Scintigraphy, Static Renal Scintigraphy, Measurement of Total Kidney Function, Radionuclide Cystography

Skeletal Scintigraphy – Static, Three-Phase Scintigraphy

Imaging of Lymphatic and Vascular Systems – Lymphoscintigraphy, Detection of Sentinel Lymph Node, Radionuclide Phlebography

Endocrinological Diagnostics – Role of Nuclear Medicine Methods in Endocrinology, Thyroid Scintigraphy, Parathyroid Glands, Adrenal Glands

Diagnostics of Acute Conditions – Role of Nuclear Medicine Methods in Diagnosing Acute Conditions, Ventilation-Perfusion Scintigraphy, Detection of Gastrointestinal Bleeding, Localization of Fever/Sepsis of Unknown Origin, Brain Death, Testicular Torsion

Inflammation Diagnostics – Scintigraphy with Labeled Leukocytes, PET

Oncological Diagnostics 1 – Scintigraphic Diagnosis of Tumors (Skeletal Scintigraphy, Neuroendocrine Tumors: Somatostatin Receptors, MIBG), Theranostics

Oncological Diagnostics 2 – PET in Malignancies in General, Use of ¹⁸F-Fluorodeoxyglucose from a Clinical Perspective, Lymphomas, Prostate Carcinoma, Neuroendocrine Tumors

Radionuclide Therapy 1 – Treatment of Malignant and Benign Thyroid Gland Diseases

Radionuclide Therapy 2 – Palliative Treatment of Bone Metastases, Theranostics, Radionuclide Synovectomy

Physical Section

Basic Physical Terms and Concepts – Radioactivity, Types of Radiation and Their Use in Medicine, Fundamental Quantities and Their Units (Activity, Energy, Doses), Interaction of Ionizing Radiation with Matter

Biological Effects of Ionizing Radiation – Mechanism of Biological Effects, Deterministic Effects, Stochastic Effects, Assessment of Radiation Exposure

Radiation Protection – General Principles, Assessment of Radiation Exposure, Radiation Protection of Patients, Radiation Protection of Radiation Workers

Radiopharmaceuticals – Definition, Production and Preparation, Quality Assessment, Examples of Clinical Use

Principles of Conventional Scintigraphy – Construction of Gammacamera, Function of its Components, Image Formation, Types of Imaging (Planar Scintigraphy vs. SPECT, Static vs. Dynamic Scintigraphy), Differences from PET and Radiological Methods

Principles of Positron Emission Tomography – Construction of the Camera, Function of Components, Image Formation, Comparison with Conventional Scintigraphy and Radiological Methods (Differences, Advantages, Disadvantages)

Diagnostic Accuracy of Examinations – Sensitivity, Specificity, Predictive Values, ROC Curves, Clinical Practice Significance

The student draws two questions: 1 clinical + 1 physical. Part of the exam are also **additional questions** asked to verify overall orientation of the examined student in nuclear medicine and its understanding. **Final mark reflects the answers to all questions asked during the exam.** Substantial ignorance manifested by the student's failure to answer one of the questions is the reason to finish the exam with classification 'failed'.

What do we want to hear about in diagnostic methods/therapy?

1. **Indications:** The main reasons why the examination or therapy is performed.
2. **Radiopharmaceutical:** At least in broad strokes, chemical group.
3. **Pharmacodynamics:** What does the radiopharmaceutical bind to, what does it visualize/treat, and what is the pathophysiology?
4. **Patient preparation:** What does the referring physician need to inform the patient about?
5. **The course of the examination:** explanation to a patient
6. **Interpretation, findings terminology:** For example, in myocardial perfusion SPECT - we are looking for perfusion defects, their types, and what clinical significance they have. Dynamic renal scintigraphy - describe the renographic curve. Etc.