NUCLEAR RADIOLOGY STUDY GUIDE

Note: The Certifying examination for those who choose three modules in nuclear radiology will have greater depth and breadth than the examination for those choosing one to two modules. Subspecialists should expect more questions on some of the less common procedures such as CNS imaging and cardiac PET as well as a greater number of questions on quality control and Nuclear Regulatory Commission issues.

Cardiovascular System

- SPECT, SPECT/CT, and gated SPECT Myocardial Perfusion Studies (including different radiopharmaceuticals, techniques and protocols, pharmacological stress agents, technical artifacts, infarction, ischemia, stunned myocardium, hibernating myocardium, false positive, false negative, exam indications, and noncoronary disease)
- Wall motion studies using gated blood pool imaging (including coronary artery disease; non- coronary disease; EF, volume, phase and amplitude analysis; artifacts and technical aspects)
- PET Cardiac Imaging

Central Nervous System

- Brain Death
- Dementias (PET and SPECT)
- Seizure Work-up (PET and SPECT)
- Cerebrovascular Disease
- Tumors (PET and SPECT)
- Infection and Inflammation
- CNS Stress Tests (including Wada test, Diamox, balloon occlusion)
- Cerebrospinal Fluid Studies

Endocrine System

- Benign Thyroid Disease (including thyroid nodules, thyroiditis, organification defect, sublingual thyroid, hyperthyroidism)
- Thyroid Cancer
- Parathyroid Disease (including adenoma, hyperplasia, ectopic parathyroid)
- Adrenal and Neuroendocrine Imaging

Gastrointestinal System

- Hepatobiliary (including acute/chronic cholecystitis, common bile duct obstruction, biliary leaks, postoperative evaluations, liver transplantation studies, use of pharmacological agents)
- Liver/Spleen (including altered tracer distribution, masses, vascular abnormalities, accessory spleen, pre-radioembolization of liver tumors)
- GI Motility (including solid, liquid, mixed, reflux, aspiration)

Genitourinary System

- Diuretic Studies
- Renal Artery Occlusion and Renal Vein Thrombosis
- Cortical Imaging, Ectopic, Pyelonephritis, and Horseshoe Kidney
- Acute Tubular Necrosis (ATN)
- Transplant Kidneys and their Complications
- Ureteral Reflux and Cystography
- Renin-dependent Hypertension
- Female and Male Reproductive System Neoplasms
- Pregnancy Issues

Musculoskeletal System

- Benign Tumors
- Malignant Tumors (primary and metastatic, including the effect of therapy
- Metabolic and Vascular Abnormalities
- Trauma
- Infection and Inflammation (including different imaging techniques)
- Soft Tissue Update (including benign, malignant, and technical causes)

Pulmonary System

- Thromboembolic Disease
- Non-thromboembolic Disease
- Airway Disease
- Preoperative Work-up and Post-therapy Changes
- Shunts
- Congenital Disease
- Lung Transplantation
- Techniques and Artifacts

Neoplasms

- PET and non-PET Techniques (including protocols, patient preparation, quantitation, artifacts)
- Benign and Malignant Disease
- Preoperative Work-up
- Response to Therapy
- Lymphoscintigraphy

Infection/Inflammation

- Different Techniques and Agents
- Altered Tracer Distribution
- Soft Tissue and Musculoskeletal Infection/Inflammation
- Immunocompromised Patients
- Post-therapy Changes

Therapy

- Endocrine Therapy (including hyperthyroidism and thyroid cancer)
- Musculoskeletal Tumor Therapy (including ^{223}Ra dichloride and ^{153}Sm)

Quality Control/Nuclear Regulatory Commission Issues

- Radiopharmaceuticals (including radiation dose, quality control, spill procedures, safe handling, receipt, and storage/disposal, mathematics pertaining to the use and measurement of radioactivity, chemistry of by-product material for medical use)
- Radiation physics and instrumentation (including imaging cameras, dose calibrator, generators, PET/CT scanners
- Personnel Issues (including exposure to radiation workers, pregnant technologists)
- Patient-related Issues (including pregnant patients, breastfeeding patients, radioactive body fluids, radiation security detectors, patient dose, and patient post-therapy instructions for beta, alpha, and gamma-related administrations)
- Radiation Biology and Radiation Protection (including radiation exposure, ALARA, Radiation Safety Committee)
- Administration and Licensure (including radiation area rules and signage, reporting and record keeping, inspections)
- Adverse Events (including radiation emergencies, medical events)
- Authorized User

SAMPLE QUESTIONS:

The following is an example of a multipart image-based question containing a block and a follow-up text-only question:

QUESTION 1A

What is the most likely diagnosis for the finding on the ^{123}I scan?

A. Multinodular goiter
B. Thyroid carcinoma
C. Thyroiditis
D. Lymphoma
E. Solitary adenoma

ANSWER = E

AT THIS POINT YOU WILL BE TOLD THAT IF YOU MOVE TO THE NEXT PAGE YOU CANNOT CHANGE YOUR ANSWER TO QUESTION 1A. YOU WILL BE ABLE TO GO BACK TO VIEW THE IMAGE AND QUESTION.

QUESTION 1B

Approximately what percentage of hot nodules on a ^{123}I scan are malignant?

A. 0.1% to 0.9%
B. 1% to 5%
C. 6% to 10%
D. 11% to 20%

ANSWER = B

The following is an example of a nonimage-based question:

QUESTION 2

To decrease the risk associated with lung perfusion studies in patients with pulmonary hypertension, which of the following methods should be used?

A. Decrease both the number of ^{99m}Tc-MAA particles used and the activity administered
B. Decrease the number of ^{99m}Tc-MAA particles used but keep the activity administered unchanged
C. Inject the ^{99m}Tc MAA slowly over 5 minutes
D. Inject the ^{99m}Tc MAA as a rapid bolus over 2 seconds

ANSWER = B