

NUCLEAR MEDICINE

Knowledge Based Objectives: The resident should be able to:

1. Demonstrate a thorough knowledge of the clinical indications, general procedures (including radiopharmaceutical and dose), and scintigraphic findings in:
 - i. Pulmonary (emboli) ventilation and perfusion imaging
 - ii. Hepatobiliary imaging and functional studies
 - iii. GI blood loss imaging
 - iv. Bone imaging
2. Discuss the basic physical principles of nuclear medicine imaging and instrumentation.
3. Identify the isotopes (including physical and chemical properties) that are used routinely in the compounding of radiopharmaceuticals for nuclear radiology procedures.
4. Demonstrate a thorough knowledge of the clinical indications, general procedures (including radiopharmaceutical and dose) and scintigraphic findings in:
 - i. Renal and urinary tract studies
 - ii. Liver/spleen imaging
 - iii. GI tract imaging and functional studies
 - iv. Thyroid imaging and functional studies
 - v. Brain imaging and functional studies
 - vi. Tumor (PET/CT) and abscess imaging
5. Identify and discuss indications for isotopes used for therapeutic purposes.
6. Describe the protocol for using I-131 for treatment of hyperthyroidism and thyroid malignancies, including protocol for hospitalization and monitoring of patients who have on monitoring more than 7mCi/h and are unable to follow guidelines for release. Patients need to be able to answer yes to all of the questions.
7. Identify normal and abnormal findings on all imaging and functional studies, other than nuclear cardiology studies.
8. Discuss all aspects of nuclear studies, including indications, pathologies, protocols, correlative studies, radiopharmaceuticals used for each study, and various parameters that might interfere with the results of the procedure.
9. Demonstrate a thorough knowledge of the clinical indications, general procedures, and findings in:
 - i. Myocardial perfusion studies (rest and stress)
 - ii. Myocardial infarct imaging
 - iii. Multigated acquisition imaging and function studies
10. Describe the radiopharmaceuticals used in cardiac nuclear studies, including the methods of red cell labeling, patient dosages, and physical properties of the isotopes.
11. Discuss patient conditions and patient monitoring requirements, particularly in relation to exercise and drug stress studies.
12. Process computer data obtained in each of the different cardiac studies.
13. Discuss the range of invasive and noninvasive tests, test characteristics, and the prognostic value of tests used to evaluate cardiac disease.

14. Discuss the following information regarding all radiopharmaceuticals used in nuclear radiology studies:
 - i. Production of isotopes
 - ii. Physical properties of isotopes
 - iii. Generation, elution and quality control
 - iv. Compounding of radiopharmaceuticals
 - v. Radiochemical quality control
 - vi. Biodistribution and mechanisms of localization.
2. Calculate patient doses, using information related to decay factors, volume concentration, and patient parameters.
15. Describe the procedures and rationale for instrument quality control in nuclear medicine.
16. Discuss rules and regulations that apply to the practice of nuclear radiology as outlined in 10CFR20 and other appropriate sources.
17. Describe the types of records that must be maintained in order to comply with federal/state guidelines for radiation safety and radioisotope receipt/use/disposal.
18. Demonstrate an in-depth understanding of the physics of nuclear radiology.

Technical Skills: The resident should be able to:

1. Recognize limitations in personal knowledge and skills, being careful to not make decisions beyond the level of personal competence.
2. Read and/or dictate images under the supervision of attending radiologist.
3. Assist with radioactive therapy treatments, making sure the consent form is completed properly and that the appropriate dose is administered, giving particular attention to radiation safety practices during the procedure.
4. Assist with preparation/presentation of cases for resident noon interesting case review.
5. Review and dictate with attending radiologist all scans performed.
6. Review cases.
7. Compound radiopharmaceuticals from kits and do appropriate quality control procedures.
8. Elute a generator and do appropriate quality control procedures.
9. Calculate and draw up patient doses.
10. Demonstrate appropriate use of a survey meter to monitor radioactivity spills or other sources.
11. Perform a wipe test.
12. Perform quality control procedures on cameras, well/uptake probes, and dose calibrators.
13. Handle radioactive sources according to the established guidelines.

Decision-Making and Value Judgment Skills: The resident should be able to:

1. Review histories of patients to be imaged each day to determine the relevance of the study to clinical symptoms, to evaluate for contraindications to the study, and to advise technologists about special views or specific parameters of the study that require special attention.

2. Assist technologists in the determination of the radiopharmaceutical dosage when patient conditions do not fit the criteria of the standard dose.
3. Observe at least one of each of the different scans routinely performed, as well as all the infrequently ordered studies.
4. Make a preliminary review of the images and advise technologists when additional views or repeat views are needed.
5. Recognize limitations in personal skill and knowledge, always making sure dictations and attending radiologist checks consultations.
6. Review all scans as they are performed for significant findings that require prompt attention, and make decisions in regard to notification of the referring physician if attending radiologist is not available for consultation.
7. Make preliminary decisions on all matters of image interpretation and consultation, recognizing need for and obtaining assistance in situations that require the expertise of attending radiologist.
8. Comment on anatomical findings, scanning technique, and reasons for doing the study to students in such a way that the students will be able to develop an appreciation for the value of nuclear radiology procedures in patient management.
9. Select tests for evaluation of cardiac disease on the basis of patient condition and clinical symptoms.
10. Correlate the results from various tests with interpretation of nuclear cardiology exams.
11. Carry out the practice of nuclear radiology with due regard to quality control, quality assurance, and radiation safety for the patient and personnel.