NUCLEAR MEDICINE: Goals and Objectives

The Nuclear Radiology Core Curriculum is designed to provide the Radiology foundation for developing the necessary skills to become competent in clinical Nuclear Medicine. The recognition and differential diagnoses are reinforced by daily Teaching Sessions on a 1-1 basis. Descriptive skills are fostered in the process of dictating cases regularly. Development of consultative skills are reflected in the increasing ability to discuss various studies with clinicians as required. Teaching skills are improved by preparation and presentation of cases at conferences. The structure of this training provides the base for Board preparation and clinical practice in Nuclear Medicine.

RESIDENT CORE CURRICULUM:

ROTATION 1 (Radiology Year 1)

MEDICAL KNOWLEDGE

At the end of the rotation, the resident should be able to:

- Demonstrate a thorough knowledge of the clinical indications, general procedures (including radiopharmaceutical and dose), and scintigraphic findings in:
  - Pulmonary (emboli) ventilation and perfusion imaging
  - Hepatobiliary imaging and functional studies
  - GI blood loss imaging
  - Bone Imaging
- Discuss the basic physical principles of nuclear medicine imaging and instrumentation.
- Identify the isotopes (including physical and chemical properties) that are used routinely in the compounding of radiopharmaceuticals for nuclear radiology procedures.

PRACTICE BASED LEARNING

At the end of the rotation, the resident should be able to:

- Participate in pharmaceutical quality assurance testing
- Attend Case conferences
- Review equipment and quality assurance with assigned technologist once per week
- Place three cases in Nuclear Medicine Teaching File with full write-ups
- Participate in case check-outs and dictate most cases
INTERPERSONAL COMMUNICATION SKILLS

At the end of the rotation the resident should be able to:

- 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 technologist about special views or specific parameters of the study that require special attention.
- Assist technologists in the determination of the radiopharmaceutical dosage when patient conditions do not fit the criteria of the standard dose.
- Observe at least one of each of the different scans routinely performed, as well as all the infrequently ordered studies.
- Make preliminary review of the images and advise technologists when additional views or repeat views are needed.
- Recognize limitations in personal knowledge and skills, being careful not to make decisions beyond the level of personal competence.

ROTATION 2 (Radiology Year 3)

MEDICAL KNOWLEDGE

At the end of the rotation, the resident should be able to:

- Demonstrate a thorough knowledge of the clinical indications, general procedures (including radiopharmaceutical and dose) and scintgraphic findings in:
  - Renal and urinary tract studies
  - Liver/spleen Imaging
  - GI tract imaging and functional studies
  - Thyroid imaging and functional studies
  - Tumor and abscess imaging, including PET imaging
  - Myocardial perfusion studies (rest and stress)
  - Myocardial infarct imaging
  - Multigated acquisition imaging and function studies
- Identify and discuss indications for isotopes used for therapeutic purposes.
- Describe the protocol for using I-131 for treatment of hyperthyroidism and thyroid malignancies, including protocol for hospitalization and monitoring of patients who receive over 30mCi of activity.
- Describe the radiopharmaceuticals used in cardiac nuclear studies, including the methods of red cell labeling, patient dosages, and physical properties of the isotopes.
- Discuss patient conditions and patient monitoring requirements, particularly in relation to exercise and drug stress studies.
- Discuss the range of invasive and noninvasive tests, test characteristics, and the prognostic value of tests used to evaluate cardiac disease.
PRACTICE BASED LEARNING

At the end of the rotation, the resident should be able to:

- 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.
- Review equipment and quality assurance with assigned technologist once per week.
- Place three cases in Nuclear Medicine Teaching File with full write-up

INTERPERSONAL COMMUNICATION SKILLS

At the end of the rotation, the resident should be able to:

- Recognize limitations in personal skill and knowledge, always making sure dictations and consultations are checked by the faculty radiologist.
- 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 the faculty radiologist is not available for consultation.

ROTATION 3 (Radiology Year 4)

MEDICAL KNOWLEDGE

At the end of the rotation, the resident should be able to:

- Identify normal and abnormal findings on all imaging and functional studies including nuclear cardiology studies and Brain SPECT studies.
- Discuss all aspects of nuclear studies, including indications, pathologists, protocols, correlative studies, radiopharmaceuticals used for each study, and various parameters that might interfere with the results of the procedure.

PRACTICE BASED LEARNING

At the end of the rotation, the resident should be able to:

- Comprehend quality control procedures, camera performance, and specific imaging techniques including SPECT acquisition and processing and wet lab procedure.
- Attend lectures/conferences, expand concepts, applications, and comparison to other diagnostic methods.
- Review equipment and quality assurance with assigned technologist once per week.
- Place three cases in Nuclear Medicine Teaching File with full write-ups.
- Participate in case check-outs and dictate most cases.
- Present and discuss an article at monthly journal club meeting.
INTERPERSONAL COMMUNICATION SKILLS

At the end of the rotation, the resident should be able to:

- Recognize knowledge and skills for making competent decisions

ROTATION 4 (Radiology Year 5)

MEDICAL KNOWLEDGE

At the end of the rotation, the resident should be able to:

- Understand, discuss, perform, and interpret nuclear radiology including Brain SPECT and CNS Studies and nuclear cardiology procedures
- Competently recommend appropriate Radiologic workup for clinical presentation
- Complete faculty assigned reading list

PRACTICE BASED LEARNING

At the end of the rotation the resident should be able to:

- Participate once in the morning (8:00 AM) pharmaceutical quality assurance testing
- Attend lectures/conferences
- Present and discuss an article at monthly journal club meeting
- Review equipment and quality assurance with assigned technologist once per week
- Place three cases in Nuclear Medicine Teaching File/Month with full write-ups
- Participate in case check-outs and proficiently dictate cases
- Teach/instruct junior resident and medical students
- Complete final preparations to pass the certifying examination if the ABR

INTERPERSONAL COMMUNICATION SKILLS

At the end of rotation, the resident should be able to:

- Carry out the practice of nuclear radiology with due regard to quality control, quality assurance, and radiation safety for the patient and personnel.

LECTURES AND CASE CONFERENCES

The lecture and case conferences expand on concepts, applications and comparisons with other diagnostic methods. A generous use of examples that demonstrate strength and limitations of the procedures is illustrated as well as review of specific radiopharmaceuticals in each area.
NUCLEAR MEDICINE CURRICULUM

1. Instrumentation/QC
2. Radiopharmaceuticals
3. Legal Requirements/Radiation Safety
4. Thyroid and Parathyroid Imaging
5. Brain Imaging
6. GU/Adrenal Imaging
7. Infection and Inflammation
8. Musculoskeletal Imaging I and II
9. PET Imaging
10. Molecular Imaging
11. Pulmonary Imaging
12. Tumor Imaging
13. Radioimmunoassay/Blood Volume
14. Cardiac Imaging Overview
15. Myocardial Perfusion Imaging
16. GI Imaging
17. Radionuclide Therapy
18. Radioimmunotherapy

IN ADDITION TO "SELECTION" TOPICS AS SHOWN BELOW ARE COVERED IN THE NOON CONFERENCE.

- NM evaluation of the hip prosthesis
- NM evaluation of the diabetic foot
- Evaluation of the renal transplant
- NM evaluation of the renal artery stenosis
- Evaluation of hemangiomas in correlation with other modalities such as MRI, and angio.
- Brain SPECT studies in cerebrovascular disease: Brain Death, Epilepsy, Dementia, etc.,
- closed Head imaging
- Brain SPECT thallium studies

SUGGESTED READING LIST & CD-ROM

- Nuclear Medicine: The Requisites By: James N. Thrall and Harvey A. Zelssman
- ACR Nuclear Radiology Syllabus (2nd Series): 13
- ACR Nuclear Radiology Syllabus (4th Series): 30
- ACR Nuclear Radiology Syllabus (5th Series): 44
- Nuclear Medicine Imaging: A Teaching File By: Habibian, Martin and Delbeke, Sandler
- ACR CD-ROM: Nuclear Medicine
ADDITIONAL REFERENCE BOOKS

• Principles of Nuclear Medicine. Henry Wagner et al.
• Nuclear Medicine A Teaching File. Frederick Datz et al.
• Pediatric Nuclear Imaging. Miller and Gelfand.
• Skeletal Nuclear Medicine. David Collier et al.
• Nuclear Medicine in Clinical Diagnosis and Treatment. Murray et al,