Vanderbilt University Nuclear Medicine Resident Training Program

Program Description

Organization

The first year of the program will be oriented to the development of general clinical and laboratory skills. During this period each NMPIT will receive approximately 80 hours of didactic training in physics, radiobiology, instrumentation, dosimetry, radiopharmacy and in vivo and in vitro clinical nuclear medicine. Lectures are given by individuals with expertise in each of these areas.

Each NMPIT will be expected to interact on a daily basis with correlative images such as ultrasound, CT, MRI, and plain x-ray. This is enhanced by the geographic integration of nuclear medicine into the radiology area and by PACS. Clinical rotations include general nuclear medicine (VUH and VAMC), PET, and nuclear cardiology; pediatric cases from the Vanderbilt Children’s Hospital are integrated into the daily work flow at VUH. Vanderbilt University Hospital, Vanderbilt Children’s Hospital, and the VAMC as well as the Vanderbilt University Imaging Institute are all on a unified campus. In the first year, each NMPIT will spend 1-2 weeks in the preparation and dispensing of radiopharmaceuticals in the radiopharmacy area under the direction of the radiopharmacists. One or two rotations through CT will be arranged for those NMPITs who have not completed a radiology residency, radiation oncology residency or who do not plan to proceed to a radiology or radiation oncology residency.

During the second year of the program, each NMPIT will continue to have clinical responsibilities but will also be expected to undertake a significant clinical or laboratory project. This research activity will begin in the last half of the first year, but is expected to intensify during the second year. Additional time will also be spent in the in vitro laboratories, participating in the performance and supervision of in vitro assays and cell-labeling techniques.

The program is designed to be flexible in that each NMPIT will have the opportunity to cultivate specific interests. For example, the radiology-based NMPIT is expected to have a greater interest in the correlative nature of this specialty whereas an internal medicine-based NMPIT may have more interest in the impact of nuclear medicine on patient management.

The rate and degree of shift from pure clinical work to research is determined both by the staff evaluation of the resident’s competence in the clinical sphere and by the trainee’s own degree of interest in undertaking clinical or basic investigative projects.

A PET center has been operational at Vanderbilt since 1990 and is integrated into Nuclear Medicine and PACS. The current combined PET-CT instrument demands correlation of the PET image data with CT images for each patient. PACS enhances correlation with other modalities such as MR. Each NMPIT spends 2-4 months in PET each year.

With respect to cardiac imaging, the NMPIT actively participates in the selection of the appropriate radiopharmaceutical, type of study and the actual stressing of the patient as well as in the interpretation of results. The NMPITs are ACLS-trained and involved in the management of cardiac emergencies including EKG interpretation and cardiopulmonary life support. Cath correlation is performed monthly and each NMPIT is exposed to cardiac CTA and MR. Instruction in interpretation of cardiac CTA is available.
Cardiac imaging has benefited from the integration of cardiac PET. Perfusion PET studies are performed using Rubidium-82 and metabolic studies using F-18 FDG. Quantification of perfusion and metabolism is performed on selected cardiac scans using application of mathematics to tracer kinetics and compartmental modeling.

**Therapy Training**

As part of the clinical radiation safety and radiobiology lectures, NMPITs receive instruction in the use of unsealed sources. This material covers the use of I-131 in the treatment of hyperthyroidism and thyroid cancer, phosphorous-32 in the treatment of polycythemia vera and malignant effusions, and Strontium-89/Samarium-153 for treatment of painful bone metastases. NMPITs also participate in the treatment of patients with lymphoma using Ytterium-90 and I-131 labeled immunoconjugates and the infusion of Y-90 Microspheres for hepatic malignancies.

**Clinical Rotations**

These are on a month-to-month basis, alternating between the VA, Vanderbilt University Hospital, PET, and nuclear cardiology. Time is also spent in the in-vitro lab and radiopharmacy.

**Duties of the NMPIT include:**

1. **Clinical:**
   1. Review the QC floods for each camera daily.
   2. Review of the schedule and requests for nuclear medicine procedures each morning.
   3. Obtain relevant clinical information from computerized medical records and the patient and/or the referring physician in order to evaluate the appropriateness of each study. If the procedure ordered does not appear to be the most appropriate, communicate with the referring physician.
   4. Prescribe appropriate radiopharmaceuticals and dose for each patient.
   5. Assist the technologist performing the procedure when needed.
   6. Review the final images with the technologist before the patient leaves the department.
   7. Correlate the nuclear medicine image findings with other diagnostic studies (nuclear medicine, radiology, pathology, etc.).
   8. Formulate a preliminary interpretation and differential diagnosis for each patient.
   9. Review each procedure with the nuclear medicine faculty for final interpretation and iBox the interpretation on PACS.
10. Dictate the final report on all patients from that day.
11. Communicate the findings to the referring physician when appropriate.
12. Edit the transcribed reports as necessary.
13. For the diagnostic areas of Cardiology, Radiology, and Neurosciences, the Interpreting Provider in the diagnostic area will immediately notify the qualified responsible individual when a critical result is identified. The Interpreting Provider will include the following comment: “notified and discussed with (qualified responsible individual’s name) this critical diagnostic report.” This documentation must include the name of the person receiving the interpretive report rather than a “location” or “position of the receiving person”. In Radiology, we also iBox all of these, especially for the ED.
14. Provide coverage for conscious sedation and iodinated contrast administration (for PET CT and cardiac CTA).
At all times and for each rotation a nuclear medicine faculty is available for help and identified on the monthly nuclear medicine schedule.

2. Call: NMPITs are on call for nuclear medicine on a pager, one week at a time 24 hours/day, every 3 - 6 weeks. A faculty member shares call with the NMPIT and is available as deemed necessary and to assist with interpretation.

3. Teaching Conferences:
   1. Annually:
      a. Physics and Instrumentation lecture series. (See DRR Handbook)
      b. In vitro lecture series
      c. Clinical lecture series
      d. Nuclear Medicine student technologist lectures
         2. VAMC Nuclear Medicine clinical conferences (weekly Monday 8:30 a.m.)
         3. VUMC Radiology and Nuclear Medicine clinical conferences (daily at noon) (see DRR Handbook)
         4. PET clinical conference (weekly Thursday 8:00 a.m.)
         5. Cardiac clinical conference (daily 2:00 p.m.)
         6. Radiology Grand Rounds (monthly at noon)
         7. Cardiac catheterization/nuclear medicine /CCTA correlation conference (weekly Wednesday 7:00 a.m.)
         8. Technologist In-service teaching conference (monthly TBA)
         10. Epilepsy Multispecialty Conference, monthly
         11. Endocrine clinical conference, Tuesday 8:00 a.m. as appropriate
         12. Tumor boards as appropriate
         13. Nuclear Medicine Journal Club (monthly Friday 8:00 a.m.)
         14. Nuclear Cardiology Journal Club (monthly Friday 8:00 a.m.)
         15. Clinical Nuclear Medicine Interesting Cases Conference (monthly Friday 8:00 a.m.)
         16. Institute for Imaging Science research conference, weekly at 1pm

Miscellaneous

All NMPITs have 15 working days of vacation each year.

Attendance at a scientific meeting is paid by the department if the NMPIT is presenting a poster or abstract at that meeting.

NMPITs have a generous travel/book fund.