Sanjay Gandhi Post Graduate Institute of Medical Sciences, Lucknow.

DEPARTMENT OF NUCLEAR MEDICINE
PDCC in Radionuclide Therapy

Guidelines For Competency-Based Postgraduate Training Programme For PDCC in Radionuclide therapy

1. Preamble:

The potential use of radionuclides in therapy has been recognized for many decades. A number of radionuclides, such as iodine-131 (^{131}I), phosphorous-32 (^{32}P), strontium-90 (^{90}Sr), and yttrium-90 (^{90}Y), have been used successfully for the treatment of many benign and malignant disorders. Recently, the rapid growth of this branch of nuclear medicine has been stimulated by the introduction of a number of new radionuclides and radiopharmaceuticals for the treatment of metastatic neuroendocrine,prostate,lymphoma,palliative bone pain relief and other malignant or non-malignant tumours like radiation synovectomy. As a central component of patient care, imaging has followed, and often made possible, discoveries of drugs and treatments, evolving from a valuable diagnostic tool to a now powerful guide for enhancing disease characterization, patient selection, prediction of treatment response and tissue toxicity, and determination of the prognosis . In summary, imaging is integrated into therapy now more than ever before. In this context, an approach referred to as theranostics has been frequently used. *Theranostics* is a hybrid term that refers to the fusion of two words, *thera*py and diag*nostics*, and this approach was first proposed in 2002 . Although the term is reportedly new,

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the concept behind theranostics is not and has been applied and revisited over the years .

2. NEED:

Radionuclide therapy is a rapidly growing paradigm-shifting approach that has the potential to change the nature and scope of nuclear medicine practice. By using the same molecular target, it further tightens the connection between imaging and therapy of cancer. There is great promise for these agents to be approved for selection of appropriate local and hormonal therapies, as well as for selection of patients for both radioactive and nonradioactive PSMA-targeted therapies . Critically, PSMA and somatostatin receptors are not the only molecular targets that can be exploited. Other potential therapeutic targets have been identified and are in early-phase development by both academia and industry. This PDCC program will focus on radionuclide therapy for various benign and malignant diseases.

Subject Specific Learning Objectives

At the end of the PDCC in Radionuclide Therapy, the student should meet the following objectives:

1. Acquisition of knowledge:

The learner should comprehensively understand the principles and applications of various radionuclides in treatment of various benign and malignant conditions. The learner should be able to describe the mechanism of action of various radionuclides,

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technical aspects, including the production , imaging , discharge limits ,post therapy advices and continuity of care.

The student should learn regarding the relevant drug treatment and different interventional procedures for same disease at different stages so that radioisotopic therapy can be offered appropriately.Learning through different RCT and guidelines of different societies for different disease condition like prostate cancer can be reviewed from time to time.

2. Acquisition of Skills

Students are expected to develop practical skills, especially in administration of radionuclides, pretherapy evaluation , intra and post therapy patient monitoring. Learners should be able to prepare patients data collection and data analysis. Learners should be able to interpret and integrate image data from multiple modalities and apply appropriate image analysis techniques and statistical methods to extract meaningful information. Learners should also develop practical communication skills, such as writing scientific reports and presenting results at conferences and seminars.

3. Teaching and training

The learner has access to state-of-the-art imaging facilities , equipment , radionuclide wards and experienced and qualified instructors who can provide hands-on training and guidance. The teaching will include didactic lectures, journal clubs, seminar presentations and inter-departmental meets. The student is expected to take a small prospective project. The student will be

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encouraged to research and present papers at national and international conferences.

4. Research

Learners should be able to apply radionuclide therapy techniques to answer scientific and clinical questions about human physiology, disease pathology and therapeutic interventions. The student should be able to critically evaluate the scientific literature, identify knowledge gaps and design and conduct experiments to fill these gaps.

5. Professionalism, Ethics, and Communication skills

- The student should acquire communication skills of a high order to report/interact and devise therapy plan with referring doctors, other health professionals and patient attendants.
- The student should acquire educational skills of a high order to support a teaching role in areas related to the specialty, especially with medical students, junior staff, allied health professionals and members of the public.
- The student should be able to learn and apply principles of professionalism, ethics, and effective communication in research, nuclear medicine-based services, educational activities and day-to-day work.

Therefore, the program aims to enable the PDCC radionuclide therapy students to independently perform radionuclide therapy, teaching and research. This will help to fulfill the human resources needs of an ever-expanding therapeutic medicine branch.

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Colour Coding
Global GREEN
Regional BLUE
National ORANGE
Local (State) PINK

Post Graduate Training will consist of Theoretical and Practical Training:

SUBJECT-SPECIFIC COMPETENCES

By the end of the course, the student should have acquired knowledge (cognitive domain), professionalism (affective domain) and skills (psychomotor domain) as given below:

1. **Cognitive domain (Knowledge domain)**

- Learners should be able to explain the principles and technical aspects of various therapeutic radionuclide
- Learners should be able to explain the principles and technical aspects of PET/CT, MRI, and PET/MRI imaging modalities.
- Learners should be able to evaluate the patient, plan therapy protocol and follow up of patients following radionuclide therapy.
- Learners should be able to assess the scientific literature on radionuclide therapy methods critically.
- Should have knowledge of basic principles of radiation physics and radiation protection subsequent applications.
- Should have knowledge of the safe handling of radionuclides and their disposal at a regional, state and national level.
- Should be able to conduct clinical research and write a research paper under supervision.

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- Should develop a good working relationship with user specialties and handle inter-specialty referrals at a regional, state, and national level

B. Affective domain:

- Students should understand the importance of radionuclide therapy techniques in biomedical research.
- Student must commit to ethical research practices, including data integrity and confidentiality. Always adopt ethical principles, maintain proper etiquette in dealings with patients, relatives, and other health personnel, and respect the patient's rights, including the right to information and second opinion. Should be able to accept feedback and criticisms with an open mind.
- Learners should develop curiosity and creativity while exploring new radionuclide therapy and techniques.
- Should be able to function as a part of a team, develop an attitude of cooperation with colleagues and interact with the patient and the clinician or other colleagues to provide the best possible treatment .
- Learners should develop effective communication skills to present research findings clearly and concisely.
- Communicate well with patients and make all efforts to explain the rationale of the diagnostic and treatment approach to patients and their caregivers in their language for ease of understanding.
- Have the skills to participate in seminars, Continued Medical Education programs, panel discussions and lectures to discuss and review recent scientific data to **further the cause**

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of Nuclear Medicine in the country and increase visibility on national and global platforms.

- Should be able to pass on such information and knowledge gained to other students and colleagues, especially those working in resource-limited settings **to improve cancer care in the region, state and country**.
- Should actively cultivate skills to work in a team, with mutual respect, basic human courtesy and a supportive attitude towards others, including other clinicians, para-clinical staff, policymakers and health administrators to improve Nuclear Medicine services **at a regional, state, and national level**.
- Develop a habit of maintaining honest, detailed, and comprehensive medical records.
- Be aware of ethical principles of clinical research as guided by institutional ethics committee (IEC).

C. Psychomotor domain

At the end of the course, the student should have acquired the following skills:

- Students should develop the technical skills necessary to perform radionuclide therapy including preparation, radionuclide administration and pre & post therapy monitoring.
- Learners should develop the ability to work alone or as part of a team when performing radionuclide therapy.

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Needs: Local : Pink, National : Orange, Regional: light blue, International : green

Training programme:

The detail training programme is as follows:

The training programme aims to impart the candidates a sound theoretical and practical knowledge in radioisotopic therapy which is evolving at a rapid pace. During this period they shall take part in all activities of the department as well as multidisciplinary team meeting to develop insight into practical approach in clinical management. The training programme includes:

1) Patient management in OPD, ward and ICU: an appropriate selection of a patient for radioisotope therapy from Nuclear Medicine OPD and further work up with a clinical assessment and laboratory investigations will be done prior to the treatment. Care of the patient admitted in beds for the administration of radionuclide/radiopharmaceuticals will provide first-hand clinical training to these candidates enrolled for the course.
2) Postings with PET/CT and Gamma camera: basic operation of the equipment and imaging modalities, interpretation of PET, CT, planar and SPECT/CT for the whole body as well as the region of interest respectively as per disease involvement of the organs. The candidate has to perform and interpret the procedure independently in said postings along with supervision of the consultant.
3) Postings in OPD: All the patients for radionuclide therapy will be evaluated clinically, request for relevant investigations and schedule for radioisotopic therapy. The post-therapy patients

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will also be done in Nuclear Medicine OPD or in through tele-follow up. The candidates will be given clinical training in the treatment of thyrotoxicosis, thyroid cancer, neuroendocrine tumours, prostate cancer, metastatic bone pain, radiation synovectomy, radioembolization in hepatocellular cancer, radioimmunotherapy and evolving radionuclide therapy.

4) Posting in the ward: The candidate will spend a substantial duration in the ward. During this he/she will be provided with the relevant knowledge and skill so that he may be able to:
   a) Help the physician/ surgeon in choosing the right radioisotopic procedure for therapy as well as relevant investigations prior or post-procedure.
   b) Plan, modify and execute the radioisotopic therapy procedures independently or with the assistance necessary.
   c) Management of the patient following noninvasive or invasive procedures inward as an inpatient.
   d) Handle medical emergencies like tetany, thyroid storm, carcinoid syndrome requiring emergency evaluations and appropriate treatment.
   e) Recognizing the symptoms and eliciting the signs interpreting the vital signs and investigations of different disorders relevant to radionuclide therapy. The candidate will be trained to deal with these emergency procedures so as to be able to respond diligently and quickly to these needs.

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1. FACULTY ASSSOCIATED:

Dr. S. Gambhir, Professor, Nuclear Medicine Physician
Dr. P.K. Pradhan, Professor, Nuclear Medicine Physician
Dr. S. Barai, Professor, Nuclear Medicine Physician
Dr. A. Arya, Professor, Nuclear Medicine Physician
Dr Manish Dixit, Additional Professor, Radiopharmacist
Dr Manish Ora , Associate Professor
Dr Aftab H Nazar , Associate Professor

2. ELIGIBILITY CRITERIA:

M.D. in Nuclear Medicine
D.N.B. in Nuclear Medicine

5. SELECTION PROCEDURE:

Entrance examination as per the policy of the Institute.

6. DURATION OF THE COURSE:

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