

## **Regional Radiation Medicine Centre**

### **Introduction:**

The Department Of Atomic Energy has always endeavored to make nuclear medicine facilities widely available to the common man at an affordable cost.

In eastern India, there is a lack of nuclear medicine centers. To fill up this lacuna, Regional Radiation Medicine Centre (VECC), Kolkata was setup by the DAE in the year 1989, in collaboration with the CCWHRI, Thakurpukur. This is a part of the department of atomic energy's charter with the same philosophy as Radiation Medicine Centre, BARC, Mumbai, to bring the benefits of nuclear science to the common man of eastern India for the diagnosis and treatment of human diseases.

## **In vivo nuclear imaging:**

The mainstay of nuclear imaging at RRMC is the state of art **Dual Head Gamma Camera with CT (Infinia Hawkeye™) from GE**, installed in April 2007. This is one of the finest Gamma cameras in the world for its up-to-date hardware coupled with outstanding software. Its large field of view (54 cm X 40 cm.), high sensitivity and high resolution makes it possible to produce high quality diagnostic images. The unique slip ring gantry, near free geometry of movement of detectors, easy collimator exchange system, hassle free movements of the scan bed and the remote controls make this camera very easy to operate.



*Dual Head Gamma Camera*



*Gamma Camera Control Console*

The CT option makes it possible to produce fusion imaging where the isotopic image gives the functional distribution of the pharmaceuticals according to the pathology, whereas the CT images give superior anatomical detail. The two images are then fused to yield an image which gives much more accurate location of the disease process. The CT option is used not only for fusion image but also for attenuation correction for SPECT image reconstruction.

The software of this Gamma Camera is of a very high standard with special notes on resolution recovery for bone SPECT, renal software, cardiac software, and a unique clinical interpreter language for image processing.

With this state of art camera, static and dynamic imaging's such as Skeletal (including 3-phase), Thyroid, Renal Dynamic, Hepatobiliary, Liver, G.I. bleeding, etc. are being performed regularly.

This camera is also being used occasionally for more sophisticated modes of imaging like SPECT/CT imaging of skeletal system, Myocardial Perfusion Imaging, Gated Blood Pool Imaging, Scintimammography, parathyroid imaging etc.

Whole body mode imaging of the skeletal system and I-131 large dose imaging of the whole body are also being carried out regularly.

In addition, a single head Gamma Camera procured in 2000 from GE is still being used for imaging of pediatric patients in particular.

**Around 150 patients** undergo various imaging studies on the Gamma Cameras in every month.



*PC based Fast Medical Scanner*

A **PC based Fast Medical scanner** procured from the ECIL is being used regularly for performing thyroid scan with Iodine 131. **Around 30 patients** undergo I-131 thyroid scanning every month.

### **In vivo non-imaging:**

In-vivo non-imaging studies being performed at the RRMC include Thyroidal, Iodine-131 uptake studies, and nuclear hematological studies with Cr-51 labeled RBC, like total RBC mass estimation, RBC survival, and Splenic RBC sequestration studies. The RRMC is one of the very few centers in India performing these nuclear hematological studies.

A state of the art **PC Based Uptake Probe with Well Counter**, as well as a **Sophisticated Shaking Water Bath** have been imported to facilitate these studies

**Around 35 patients** undergo in-vivo non-imaging studies every month.



*PC based uptake probe*

## **In Vitro Diagnostic studies:**

In-vitro diagnostic studies being performed regularly at present are radioimmunoassay of thyroid hormones (T-3 and T-4), Thyroid Stimulating Hormone (TSH) and free thyroxin (Free T-4). **A PC Based Multidetector Automatic RIA Counter**, capable of handling up to 500 samples at a time, has been installed in 2006. Routine use of this counter has ensured rapid generation of RIA reports and also high quality of reports.

**Around 350 patients** undergo various in vitro studies every month.



*PC based automatic RIA counter*

## **Radionuclide Therapy:**

In collaboration with the CCWH&RI, a facility for high dose Iodine – 131 therapy of Cancer of thyroid patients was started in 2004. This is the only facility of its kind in this part of the country.

Since its inception, **around 50 patients** of Carcinoma thyroid have undergone this treatment.

## **Research Activities:**

Besides its routine activities, RRMC also carries out some research and development activities. The Clinical Trial of Ga-67 citrate produced at VECC was carried out at RRMC and the results were published in the Journals. Current ongoing research projects include

- Labeling of white blood cells with Tc-99m using a novel technique based on stannous fluoride colloid (snF2), and using this Tc-99m labeled white blood cells for chronic infection imaging.
- Besides, we carry out a research collaboration project with IICB, Kolkata involving animal studies of various newly developed radiopharmaceuticals, particularly renal radio pharmaceuticals. Some of the results have been published in International Journals.

## **Future plans:**

Over the years, the demand for the services provided by the RRMC has increased enormously. Also, demand has arisen for the newly developed technology of PET imaging, particularly in the field of oncology. Keeping these factors in mind, a XIth plan project proposal for the RRMC (entitled **Nuclear Diagnostics and Medical Use of PET**) has been prepared and submitted.

This **XIth plan** project proposal includes the following:

- Augmentation of the facility of nuclear diagnostics by upgradation of the Nuclear Hematology Laboratory, and installation of an additional Dual Head Gamma Camera with CT.
- Establishment of a PET Facility by installation of a state of art PET scanner with CT option for patient imaging, and setting up of a PET Radiopharmacy.
- Carrying out Research activities for development of new radiopharmaceuticals, and their subsequent animal and clinical trials. An upgraded Radiopharmaceutical Laboratory will be established to facilitate such research.
- Utilization of Radioisotopes from the DAE Medical Cyclotron, namely, **F-18 for PET imaging, and Tl-201, Ga-67 and I-123 for SPECT imaging**
- **Developing a workstation to process and preserve medical images in DICOM format.**