TheraMed Nuclear offers a range of diagnostic studies and targeted radionuclide therapies in the ever-growing field of nuclear medicine - predominantly molecular imaging and theragnosis.

What diagnostic modalities are available at TheraMed Nuclear?

At TheraMed Nuclear we not only offer conventional single-photon-emission (SPE) diagnostic studies (i.e. using gamma camera detection), but also offer tomographic 3D reconstruction of this data (SPET) which can be fused to a CT scan for more accurate localisation, so called SPET-CT (previously SPECT-CT).

We also offer positron emission tomography coupled to CT scan or PET-CT. While the principles of radiotracer injection and imaging remains the same, the technology and the type of radioisotopes used is somewhat different.

Nomenclature – how are the molecules named?

When referring to the tracer as a whole, the radioactive substance used is given first e.g. $^{99m}$Tc- followed by the acronym for chemical name of the substrate e.g. MAG3. Occasionally a trade name is given instead of this acronym e.g. Octreoscan.

Examples are: $^{18}$F-FDG; $^{99m}$Tc-RBC; $^{123}$I-MIBG; $^{111}$In-Octreoscan

What is Theragnostics?

The type of radiation attached to this substrate determines whether we image it using SPET or PET. There are, however, further radioactive isotopes that may also emit larger particles of higher energy that can also be used to radiate the target to which the substrate attaches. When a pathology (especially certain malignancies), can be imaged and treated with the same substrate, the substrate is called a Theragnostic agent.

Theragnostics is the practice of diagnosing and treating with the same substrate.

How can TheraMed Nuclear be of assistance to Urology?

Cardiovascular system:

• Multigated equilibrium radionuclide ventriculography (MUGA) – various functional cardiac parameters including LVEF. This may be of particular benefit pre-operatively in patients at risk for cardiac dysfunction

• Myocardial perfusion imaging:
  • Risk assessment and stratification for major adverse cardiac events (MACE) and sudden cardiac death pre-operatively for major surgery in patients at risk for coronary events

Endocrine (non-malignant) system:

• Parathyroid scintigraphy:
  • To assess for parathyroid adenoma/hyperparathyroidism in proven hypercalcemia and raised PTH
  • To allow for intra-operative localisation using a gamma probe (less invasive)
Oncology – both SPET-CT and PET-CT:
- Location of cancer of unknown primary (CUP)
- Selection of biopsy site
- Detection of recurrence

Lymphatic system:
Sentinel lymph node mapping especially in prostate cancer patients

Musculoskeletal system:
- Survey for metastases typically inducing increased osteoblastic activity i.e. prostate and renal cancers
- Skeletal survey and staging for other bony pathology e.g. metabolic bone disease, Paget’s disease, fibrous dysplasia et cetera – please consult you Nuclear Physician. This may be of use in patients with renal impairment

Uro-nephrological system:
- Testicular torsion evaluation and testicular viability
- Cystouretography – direct & indirect. This is especially useful in suspected ureteric reflux and neurogenic bladder evaluation. Concomitant urodynamic scintigraphy is possible
- Dynamic renogram:
  - Assessment of baseline renal function and follow-up including determination of functional parameters
  - Assessment for obstructive uropathy versus dilated non-obstructed collecting system and follow-up post intervention
  - Differentiation between ATN, ARF and allograft rejection
  - Indirect assessment of ureteric reflux in children
- Differential renal function (although Tc-99m DMSA is a better test; see “Static Renogram”
- ERPF & GFR
- Cortical or static renogram (DMSA):
  - To assess cortical split function especially when global GFR is known
  - To assess for acute pyelonephritis and to exclude risk of scarring if no defects are present
  - To assess for scarring on follow-up DMSA (at least 6 months following pyelonephritis episode)
  - Detection of focal renal parenchymal abnormalities
  - Detection of renal sequelae, 6 months after acute infection
  - Detection of associated abnormalities: abnormal duplex kidney, small kidney, dysplastic tissue, horseshoe kidney
  - Detection of ectopic kidney
  - Confirmation of non-functional multicystic kidney

Pulmonary system:
- V-Q scan:
  - Suspected acute PTE in patients at risk, especially those with contra-indications to CTPA or where risk of CTPA outweighs the benefit:
    - Iodine allergy
    - Renal failure patients
    - Pregnancy
    - Any premenopausal female (as radiation from CTPA increases lifetime breast cancer risk by n odds ratio of 5)
  - Screening for acute PTE where radiation exposure from CTPA is deemed inappropriate according to the risk-benefit ratio

Infection imaging:
- Localising an infection site in fever of unknown origin (PUO)
- Assessing response to antibiotic therapy

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Our website provides more information regarding each of the following studies including mechanism of action, indications, contra-indications, patient preparation etc.

www.theramednuclear.co.za

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