

## Department of Nuclear Medicine at Derriford Hospital in Plymouth

We are the largest specialist department in South West England. We offer the full range of diagnostic and therapeutic radioisotope procedures using the latest equipment, and are routinely involved in research work.

### Imaging and non-imaging equipment

The department has gained experience with a SPECT/CT gamma camera (GE Millennium VG Hawkeye) since 2003, and we had another SPECT/CT camera with a fully diagnostic CT (Siemens Symbia T) installed in 2007. Whilst a gamma camera provides information about the distribution of a radiolabelled drug in both time and space, SPECT/CT gives precise anatomical information about the localisation of radiopharmaceuticals providing few anatomical landmarks. The department has fully automatic gamma counters for radioactivity measurements of small-volume samples. We also routinely perform breath tests.

### Therapy suite

We have a recently refurbished single-bed lead-shielded en-suite therapy suite on the oncology ward for high-activity treatment of cancer patients with radiopharmaceuticals.

### Clinics

We have a clinic every Monday and are happy to accept referrals for any thyroid pathology. Patients will be contacted prior to their appointment to discuss potentially interfering thyroid medication, so that if a thyroid scan is required, this can be done at the same attendance. We can also arrange further diagnostic tests (ultrasound, fine-needle aspiration) if required. For treatment, we offer radioiodine, and are happy to initiate and supervise antithyroid drug treatment.

### Contact details

|                     |  |  |
|---------------------|--|--|
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## Overview of Nuclear Medicine diagnostic procedures

|         | Procedure                               | Typical indications:<br>suspected ...   | Preparation   | Duration                      | Dose<br>(mSv)* |
|---------|---|---|---|-------------------------------|----------------|
| bone    | bone scan                               | bone metastases<br>Paget's disease<br>active arthritis, degenerative changes<br>shin splints<br>loose joint replacement | none  | 5 hrs                         | 3              |
| lung    | VQ scan                                 | pulmonary embolism<br>right-to-left shunt   | normal chest X-ray (otherwise CTPA)   | 2 hrs                         | 1.4            |
| endocri | thyroid scan<br>thyroid clinic          | Referrals for assessment of any thyroid pathology are accepted.   | TFTs<br>list of current thyroid medication  | 2 hrs                         | 1              |
|         | parathyroid scan                        | parathyroid adenoma   | certain medication needs to be stopped (patient will be advised)  | up to 3 hrs                   | 8-14           |
| renal   | dynamic renogram<br>(MAG <sub>3</sub> ) | obstruction<br>reflux<br>transplant donors<br>renal artery stenosis   | good hydration  | 1 hr                          | 0.7            |
|         | static renogram<br>(DMSA)               | aberrant kidney<br>renal scars post UTI<br>unilaterally decreased function  | none  | 3 hrs                         | 0.7            |
|         | GFR                                     | measurement of renal function (mostly pre-chemotherapy)   | none  | 4 hrs                         | 0.006          |
| cardiac | myocardial perfusion scan               | IHD (diagnosis, prognosis)<br>known stenosis (impact)   | Caffeine-free for 24 hrs and fasting for 4 hrs prior to test. Certain medication needs to be stopped (patient will be advised).     | up to 4 hrs                   | 12             |
|         | Thallium scan                           | hibernating myocardium  | fasting for 4 hrs   | up to 5 hrs                   | 18             |
|         | MIBG scan                               | heart failure (risk stratification in patients considered for implantable device)                                       | Potassium iodide day before, day of and day after injection. Certain medication interferes with the test (patient will be advised). | scan at 20 hrs post-injection | 5              |
|         | MUGA scan                               | LVEF measurement<br>left-to-right shunt   | none  | 1 hr                          | 6              |
| neuro   | cerebral perfusion scan                 | dementia  | must be able to lie flat  | 1 hr                          | 5              |
|         | FDG PET scan                            | dementia  | must be able to lie flat, fasted for 6 hrs, normal blood glucose  | 2 hrs                         | 12             |

|                  |   |  |   |   |  |
|------------------|---|--|---|---|--|
|                  | DaTScan                                 | Parkinsonian symptoms<br>Lewy body dementia  | Potassium iodide day before, day of and day after injection. Certain medication interferes with the test (patient will be advised). Patient must be able to lie flat. | 4 hrs                                   | 4  |
|                  | IBZM scan                               | Parkinsonian symptoms<br>Lewy body dementia<br>(patients with abnormal DaTScan)  | Potassium iodide day before, day of and day after injection. Certain medication interferes with the test (patient will be advised). Patient must be able to lie flat. | 3 hrs                                   | 6  |
|                  | Thallium brain scan                     | viability of known tumour  | must be able to lie flat  | 1 hr                                    | 26   |
|                  | shuntogram                              | patency of ventriculoperitoneal shunt  | none  | 1 hr                                    | 2-3  |
| gastrointestinal | oesophageal transit<br>gastric emptying | SLE, achalasia, reflux, dumping,<br>gastroparesis  | Patient must not eat, drink or smoke 4 hrs before the test.   | 90 minutes                              | 0.9  |
|                  | Meckel's scan                           | Meckel's diverticulum  | none  | 1 hr                                    | 2  |
|                  | HIDA scan                               | biliary atresia<br>jaundice<br>non-functioning gall bladder<br>cholecystitis<br>bile leak<br>focal nodular hyperplasia | overnight fasting   | 1 hr                                    | 2  |
|                  | spleen scan                             | splenunculus   | none  | 1 hr                                    | 2  |
|                  | red blood cell scan                     | GI bleeding (localisation)<br>liver haemangioma  | none  | 2 hrs                                   | 4  |
|                  | protein loss                            | protein-losing enteropathy   | none  | multiple attendances<br>over 5 days     |  |
|                  | SeHCAT                                  | bile salt malabsorption  |   | two attendances 7 days<br>apart         | 0.3  |
|                  | H. pylori breath test                   | active H. pylori infection   | No antibiotics or cytoprotectives for 30 days. Certain medication interferes with test (patient will be advised). Overnight fasting.                                  | 30 minutes                              | 0.02   |
|                  | glycocholic acid<br>breath test         | intestinal bacterial overgrowth  | No antibiotics or cytoprotectives for 30 days. Certain medication interferes with test (patient will be advised). Overnight fasting.                                  | 8 hrs                                   | 0.02   |
|                  | inflammation                            | white cell scan  | active IBD<br>PUO<br>infected joint replacement   | none                                    | 7 hrs (additional<br>imaging on following<br>day for Indium-111) |
| Gallium scan     |   | connective tissue disease<br>PUO<br>unknown malignancy   | none  | scan at 48 and 72 hrs<br>post-injection | 15   |
| FDG PET scan     |   | PUO<br>arteritis   | must be able to lie flat, fasted for 6 hrs, normal blood glucose  | 2 hrs                                   | 12   |

|             |                               |   |   |  |      |
|-------------|-------------------------------|---|---|--|------|
| oncology    | lymphoscintigram              | lymphoedema<br>sentinel node localization (breast cancer)   | none  | 2 hrs                                  | 0.05 |
|             | Octreoscan                    | neuroendocrine tumours  | Somatadine and octreotide treatment discontinued<br>72 hrs prior to test  | scan at 4 and 24 hrs<br>post-injection | 12   |
|             | MIBG scan                     | neuroendocrine tumours  | Potassium iodide day before, day of and day after<br>injection. Certain medication interferes with the test<br>(patient will be advised). | scan at 20 hrs post-<br>injection      | 5    |
|             | FDG PET scan                  | unknown primary tumour<br>staging and follow-up of many<br>malignancies as per agreed protocols<br>(please enquire) | must be able to lie flat, fasted for 6 hrs, normal blood<br>glucose   | 2 hrs                                  | 12   |
| haematology | red cell mass/blood<br>volume | polycythaemia   |   |  | 0.3  |
|             | red cell life-span            | haemolytic anaemia (assessment for<br>splenectomy)  |   |  | 0.6  |
|             | ferrokinetics                 | iron malabsorption/malutilisation   |   |  | 4    |
|             | platelet life-span            | idiopathic thrombocytopaenic purpura<br>(assessment for splenectomy)  |   | multiple attendances<br>over 9 days    | 10   |
|             | salivary gland scan           | sicca syndrome  | none  | 30 minutes                             | 1    |
|             | lacrimal gland scan           | blockage  | none  | 1 hr                                   | 0.04 |

\*The annual background radiation dose from natural and man-made sources is 2.7 mSv (UK average) for comparison.

### Overview of Nuclear Medicine therapeutic procedures

| Procedure                     | Indication  |
|-------------------------------|---|
| radioiodine treatment         | hyperthyroidism, symptomatic inoperable goitre, differentiated thyroid cancer |
| radiophosphorus treatment     | polycythaemia   |
| radiosynovectomy              | active arthritis  |
| Samarium, Strontium treatment | palliative pain relief for bone metastases                                    |
| MIBG, Dotatate treatment      | palliative treatment of neuroendocrine tumours                                |
| radiolabelled microspheres    | palliative treatment of liver metastases                                      |