



Scottish Clinical Imaging network



CLINICAL INDICATIONS FOR THE USE OF PET CT IN SCOTLAND

Guidance regarding the use of PET CT in Scotland were first published in 2008 and updated in 2016 with subsequent revision undertaken every 3 years. These revisions were undertaken by the Scottish Clinical Imaging Network (SCIN) PET CT working group, with representation from each of the four PET centres, taking into account advances in evidence base, PET CT service capacity, expansion in clinical services and current clinical management guidelines. Prior to publication clinical opinion and feedback was sought via the regional and national cancer networks where appropriate. In the instance of new clinical indications and radiopharmaceuticals, advice statements were first requested from the Scottish Health Technology Group.

This document is a collation of the current published guidelines and is meant as a reference guide for both radiologists and referring clinicians. It is the intention that this document will be continually updated as guidelines are further developed/revised. Individual guideline documents including references can be found via links below or on the SCIN website.

Indications are split into “routine” and “non-routine” with the expectation that all “non-routine” referrals are discussed at the appropriate MDT and/or with the appropriate regional PET CT centre in the first instance. It is acknowledged that PET CT may be of benefit in individual oncology cases as well as specific conditions such as pyrexia of unknown origin and sarcoidosis which are not covered by current guidelines. In these instances, MDT review and discussion with regional PET centre on a case-by-case basis is advised.

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Dave Colville
On behalf of the SCIN PET CT Working Group
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Statement on radiotherapy planning

It is accepted that the additional information obtained from PET CT can assist in radiotherapy planning for some patients/patient groups. Current oncology practice in Scotland is to use the fused images from the routine PET CT acquisition in radiotherapy planning.

Due to the additional time required, additional technical factors and lack of standardised practice it is not feasible to routinely image patients in the radiotherapy position without a significant impact on capacity and waiting times. It is therefore at the discretion of regional PET CT centres whether individual requests can be accommodated based on local capacity and expertise. The use of an additional PET CT purely for radiotherapy planning cannot be routinely supported.

INDICATIONS FOR THE USE OF ¹⁸F-FDG PET CT IN LUNG CANCER IN SCOTLAND

Routine Indications

- Staging of Non Small Cell Lung Cancer (NSCLC) in patients who are potentially suitable for treatment with curative intent. Radiotherapy positioning/equipment should be considered during PET CT, for future treatment planning, where appropriate
- Assessment of solid solitary pulmonary nodules (≥8mm) with an initial risk of malignancy of >10% (Brock model). PET CT can also be considered in the management of patients with part-solid Ground Glass Nodules with a solid component ≥8 mm.
- Assessment of response to chemotherapy or radiotherapy in selected patients who have had an apparently very good response on conventional imaging and surgery is being considered.
- To differentiate between treatment effects and recurrent cancer where conventional imaging is equivocal.
- In selected patients with Small Cell Lung Cancer (SCLC) who may be at risk of distant metastasis and are being considered for intensive treatment/radical surgery.

Non-Routine Indications

- Repeat PET CT, although not routinely recommended, can be considered in selected patients where treatment has been delayed for at least 8-10 weeks since the original scan and repeat conventional imaging has been inconclusive or demonstrates disease progression.
- In selected patients with oligometastases being considered for curative treatment
- PET CT could be considered in the management of selected patients with suspected pleural tumours, after consideration at the MDT.

SCOTTISH GUIDELINES ON THE USE OF ¹⁸F-FDG PET/CT SCANNING IN THE MANAGEMENT OF PATIENTS WITH LYMPHOMA

Routine Indications

- **Hodgkin lymphoma**
 - Staging - all patients treated with curative intent should get a baseline PET/CT scan
 - Interim PET (iPET) should be performed to assess disease response to chemotherapy and guide patient management as per clinical management guidelines
 - End of treatment assessment where complete metabolic response is not achieved at iPET
 - Staging at relapse
 - Post salvage therapy and prior to autologous transplantation
- **Diffuse large B-cell lymphoma (including Burkitt's lymphoma) and T-cell lymphoma**
 - Staging - where clinically feasible
 - End of treatment – recommended, especially for further assessment of residual masses on CT scan
 - Staging at relapse
 - Post salvage therapy and prior to autologous transplantation
- **Follicular lymphoma**
 - Recommended for patients with apparent stage I or II disease on CT scan who are being considered for curative radiotherapy
- **CAR-T therapy**
 - Patients with Mantle Cell Lymphoma or DLBCL undergoing CAR-T therapy will require PET CT at baseline (pre-treatment) and during follow up at Day 28 and Day 100. Beyond this point PET CT is not routinely indicated if complete metabolic response has been achieved

Non-Routine Indications

- PET CT can be considered in other FDG avid lymphomas where the result would alter management

INDICATIONS FOR THE USE OF 18F-FDG PET CT IMAGING IN THE MANAGEMENT OF HEAD AND NECK CANCER

Routine Indications

- Patients with biopsy proven metastatic cervical lymphadenopathy with no primary found on clinical examination and where CT/MRI are negative/equivocal. It is desirable to perform PET prior to biopsy of suspected but unproven primary sites. To expedite this process, if conventional imaging fails to identify a primary site, direct referral from the reporting specialist head and neck radiologist can be considered.
- To assess disease response, in conjunction with locally agreed policy, 3-6 months post (chemo)radiotherapy in patients with locally advanced, node positive, head and neck cancer.
- In patients with clinically suspected disease recurrence post treatment in whom CT/MRI results are negative/equivocal.
- Staging of N3 upper aerodigestive tract cancer.
- Staging of T4 cancer of hypopharynx or nasopharynx.
- In selected cases of advanced disease where complex management decisions need to be made. Such patients must be referred through a multidisciplinary team process.
- Treated differentiated thyroid cancer patients with rising thyroglobulin and negative or equivocal conventional imaging, including $^{131}\text{I}/^{123}\text{I}$, US and CT.
- In patients with iodine refractory differentiated thyroid cancer prior to starting Tyrosine Kinase Inhibitor (TKI) therapy.
- In selected patients with differentiated thyroid cancer prior to radical treatment for recurrent locoregional disease or oligometastatic disease.

Non routine

- Patients with treated medullary carcinoma of thyroid with a raised calcitonin level and negative or equivocal conventional imaging (including ^{68}Ga DOTA PET CT).

INDICATIONS FOR THE USE OF ¹⁸F-FDG PET/CT IN THE MANAGEMENT OF GYNAECOLOGICAL CANCER

Routine Indications

- In patients with stage 1B or 2A cervix cancer (greater than 2 cm) who are being considered for radical hysterectomy and pelvic lymph node dissection (RHND).
- Cases being selected for Concomitant Chemo-Radiation Therapy (CCRT) are recommended to undergo PET/CT because of the significant risk of extra pelvic disease which if detected will change patient management.
- When exenteration is proposed for locally relapsed disease to identify those patients who are not suitable surgical candidates.
- In patients with pelvic relapse after surgery who are being considered for CCRT.
- In suspected recurrence where conventional imaging is equivocal.

INDICATIONS FOR USE OF ¹⁸F-FDG PET/CT IN THE MANAGEMENT OF PATIENTS WITH COLORECTAL CANCER

Routine Indications

- Patients with apparently organ-restricted liver or lung metastases (either at primary presentation or during follow-up) who are being considered for resection. A PET/CT scan should be considered prior to the administration of cytoreductive chemotherapy.
- In selected patients with other sites of oligometastatic disease (e.g. peritoneal, adrenal) where treatment with curative intent is being considered following appropriate conventional imaging and MDT discussion.
- In patients with either rising CEA levels or clinically suspected local/presacral relapse where conventional imaging is negative/inconclusive
- In the staging of anal cancer with equivocal findings on conventional staging with CT/MRI and where PET CT would directly influence the patient's management

INDICATIONS FOR THE USE OF ¹⁸F-FDG PET/CT IN OESOPHAGEAL AND OESOPHAGOGASTRIC JUNCTION (OGJ) CANCER

Routine Indications

- Patients deemed suitable for radical concurrent chemoradiotherapy, radical radiotherapy or surgery should proceed to FDG-PET/CT on the basis of primary staging and following MDT assessment.
- FDG-PET/CT should be considered in patients with clinically suspected recurrent disease in whom CT and/or endoscopy are equivocal/negative following MDT assessment or when radical treatment of recurrent disease is being considered.

INDICATIONS FOR THE USE OF ¹⁸F-FDG PET IMAGING IN THE MANAGEMENT OF SARCOMA PATIENTS AND GASTROINTESTINAL STROMAL TUMOURS (GIST)

Non routine Indications

- Assessment of disease response in patients with GIST receiving systemic therapy.
- Staging of high-grade sarcomas with a high tendency to have early metastatic disease. This includes Ewing's sarcoma, rhabdomyosarcoma (including alveolar), osteosarcoma, synovial sarcoma and myxoid liposarcoma. These specific sub-types represent less than 15% of all soft tissue sarcomas. There is no clear role for PET CT in the staging of other types of high-grade sarcoma.
- Pre-amputation of high-grade sarcomas to assess for distant disease that would alter surgical management, for example if amputation is considered as the definitive treatment of a limb primary sarcoma.
- In patients with metastatic high-grade sarcomas being considered for liver or lung metastectomy.
- For the staging, response to therapy and restaging/detection of relapse of paediatric patients with osteosarcoma, Ewing's sarcoma and rhabdomyosarcoma.

INDICATIONS FOR THE USE OF ¹⁸F-FDG PET CT IN MALIGNANT MELANOMA IN SCOTLAND

Non-routine Indications

- PET-CT should only be considered for patients with indeterminate findings on CT or for patients who are being considered for major surgical resection, after discussion with the specialist multidisciplinary team.

INDICATIONS FOR THE USE OF ¹⁸F-FDG PET CT IN BREAST CANCER PATIENTS IN SCOTLAND

Routine indications

- Assessment of multi-focal disease or suspected recurrence in patients with dense breasts in whom MRI is not available or is inconclusive.
- Differentiation of treatment-induced brachial plexopathy from tumour infiltration in symptomatic patients with an equivocal or normal MR.
- Assessment of extent of disease in carefully selected patients (following MDT discussion) with disseminated breast cancer if aggressive therapy is being considered, e.g. metastasectomy.
- Assessment of response to chemotherapy in patients whose systemic disease is not well demonstrated using other techniques; for example, bone metastases.
- Selected patients where conventional imaging is equivocal or conflicting.
- Consider for patients with inflammatory breast cancer (in whom there is a significant incremental detection rate of distant metastases over and above conventional CT).

INDICATIONS FOR THE USE OF ¹⁸F FDG PET CT IN PANCREATIC AND HEPATOBILIARY CANCER

Routine indications

- Patients with biopsy proven or highly suspected pancreatic ductal adenocarcinoma (PDAC) who are being considered for radical surgery following staging with CT/MRI +/- EUS.

Non-Routine

- Patients with potentially resectable hepatobiliary malignancy (cholangiocarcinoma, gallbladder carcinoma and HCC) with equivocal findings

for metastatic disease on staging CT/MRI in whom the confirmation of metastatic disease would alter radical management.

INDICATIONS FOR THE USE OF PET CT FOR PATIENTS WITH BRAIN TUMOURS IN SCOTLAND

Routine indications

- Whole body FDG PET is indicated in suspected cases of neurological paraneoplastic syndrome, where body CT/MRI imaging fails to identify a primary site and there is a high clinical suspicion of malignancy.
- Whole body FDG PET is indicated in suspected cases of cancer of unknown primary presenting as a brain metastasis, where body CT/MRI imaging fails to identify a primary site and identification of the primary site would alter existing management plan.

Non routine

- FDG PET may be indicated in suspected PCNSL, only if the result of this investigation would alter existing management plan.
- Met-PET (or other tracer that is sensitive to protein synthesis) is indicated where it is important to distinguish between tumour progression and treatment effect and this would alter existing management plan.

CLINICAL INDICATIONS FOR THE USE OF ¹⁸F-FDG PET/CT IMAGING IN VASCULITIS

Non Routine Indications

- In selected cases of large vessel vasculitis to determine the extent and distribution of disease activity or confirm diagnosis where conventional imaging is negative or equivocal.
- In selected cases of atypical vasculitis where paraneoplastic phenomenon is suspected and where conventional imaging is negative or equivocal.
- PET-CT would not be indicated in all patients with giant cell arteritis but is of use in patients where conventional investigations are unhelpful and treatment would be altered if ongoing inflammatory disease is confirmed.

INDICATIONS FOR THE USE OF PSMA PET CT IN PROSTATE CANCER PATIENTS

Routine Indications

- Biochemical recurrence after radical prostatectomy (PSA ≥ 0.2 ng/mL on ≥ 2 consecutive samples). PSMA is particularly useful in investigating patients with low PSA values between 0.2 and 10 ng/mL. In patients with PSA > 5 , or rapidly rising (doubling time < 6 months), PSMA should only be considered where conventional imaging has been performed and has been negative or equivocal.
- Biochemical recurrence after radical radiotherapy/brachytherapy (PSA nadir + 2 ng/mL) in patients being considered for salvage therapy following negative or equivocal conventional imaging
- Biochemical recurrence (PSA ≥ 0.2 ng/mL) after surgery and salvage radiotherapy where there is intent for further salvage therapy (e.g. salvage lymphadenectomy, nodal RT, SABR) and conventional imaging has been negative or equivocal

Non-routine

- Patients being considered for Lutetium PSMA therapy
- In selected high risk patients with equivocal lesions on baseline staging investigations where management will be directly influenced by PSMA result

INDICATIONS FOR THE USE OF ^{68}Ga GALLIUM DOTA PET CT (^{68}Ga DOTA) IN NEUROENDOCRINE TUMOURS

Routine Indications

- **Gastroduodenal Neuroendocrine Neoplasms (GNENS):**
 - Type 3- GNEN- when staging CT/laparoscopy inconclusive in patients being potentially considered for radical surgery.
- **Jejunal/Ileal NENS**
 - Staging of patients with small bowel NET being considered for surgery.
 - Post op staging in patients presenting with small bowel obstruction secondary to small bowel NET.

- Staging of patients with metastatic disease considered for treatment with curative intent e.g. Hepatic metastases.
- Suspected tumour (clinical/elevated urinary 5-HIAA/serum CgA) with negative conventional imaging.
- Suspected biochemical recurrence or progressive disease with negative/stable conventional imaging.
- **Pancreatic NENS**
 - Localisation of functional (non Insulinoma) NENS not identified on CT/MRI/EUS.
 - Staging of Gastrinoma and other rare functional tumours (RFT).
 - Patients being considered for radical surgery (other than Insulinoma).
- **G1/2 Colorectal NEN**
 - When CT/MRI demonstrates possible/definite metastatic disease which would be suitable for treatment with curative intent.
- **Appendiceal NEN**
 - G1/2 disease with suspected/ definite metastatic disease on CT/MRI in patients with tumours >2cm and or with deep mesoappendiceal infiltration or angioinvasion.
- Metastatic NET of unknown primary being considered for treatment with curative intent.
- Patients being considered for PRRT
- Staging of bronchial carcinoids in patients being considered for radical surgery.
- Medullary thyroid cancer with increasing calcitonin and negative/equivocal conventional imaging.
- Clinically or biochemically suspected paraganglioma/phaeochromocytoma with negative or equivocal imaging including MIBG.

Non-routine

- Somatostatin receptor status should, in the first instance, be assessed using SRS with ⁶⁸GA DOTA only be considered in exceptional cases (unless in conjunction with the indications above).