Institut Kanser Negara

F-18 FDG / I-124 / Y-90 based PET-CT Imaging Request Form

Please fill up the relevant information with a copy of pathology & relevant imaging reports and fax or email the form to 03-83124377 or petct@nci.gov.my. Appointment will be given once completed form is submitted and vetted. Please call 03-83145501 for confirmation.

Patient's name:		**Gender:**	**Ethnic group:**
I/C No:	**Date of birth:**	**Age:**	**Contact No:**
Address:			
City / Town:	**Postcode:**	**State:**	

Appointment Date:
(to be filled by PET-CT staff)

Relevant medical history: (please √ if it is present)

□ Diabetic (medication: _____) □ Pregnancy (LMP: _____)

□ Drug allergy (medication: _____) □ Claustrophobic

Clinical diagnosis & primary site of disease:

Type of study: □ **F-18 FDG** □ I-124 □ Y-90 based (I-124 & Y-90 based are for internal ref. only)

Indication: (Please **√** in **one** of the most appropriate box or state clearly) (Ref. Appendix 1 for clarity)

Oncology:

□ Baseline scan for i) staging in newly diagnosed malignancy **or** ii) restaging in proven recurrence **or** iii) pre-treatment scan for response assessment

□ Interim scan for early response prediction after starting a short course therapy **or** restaging after neoadjuvant therapy, keeping in view to maintain or change the treatment plan

□ End-of-treatment scan (within 6 months), after the completed (please specify) _____ (eg. surgery / chemotherapy / chemoradiotherapy / SIRT / cryo- or radiofrequency ablation etc.)

□ Second-look scan under watchful-wait strategy for earlier equivocal finding (eg. thymic uptake), please state the previous PET-CT study date: _____

□ Evaluation for recurrence based on clinical, tumour biomarker and other equivocal imaging and to proceed for restaging if recurrence is detected

□ Surveillance scan for screening patient in remission and not on any anti-cancer treatment

□ Monitoring treatment efficacy following prolonged systemic treatment, with intention to change the therapy upon disease progression

□ Localization of carcinoma of unknown primary

□ Tissue characterization **or** assessment of tumour heterogeneity for high aggressive phenotype.
Please specify further:
- □ to differentiate benign and malignant lesion in patient not known to have cancer (e.g. SPN)
- □ identification of biopsy site for cancer
- □ for targeted radionuclide therapy / theranostic planning e.g. non iodine-avid thyroid cancer, FDG-avid NET or FDG-avid prostate cancer etc.)

□ PET-CT simulation for radiotherapy planning
(Nuclear Medicine scan for RT planning)

Non-oncology:

□ Evaluation of inter-ictal seizure focus

□ Evaluation of dementia

□ Evaluation of pyrexia of unknown origin

□ Evaluation of cardiac viability

Other indication (please state):

_____

Not all cancers are FDG-avid. Variable uptake may be seen in the same cancer-type. **Vetting will be done for appropriate indication.** (Ref. Appendix 2 for some common appropriate indications.)

Clinical Summary:
Request should be accompanied by a concise summary of the patient's history and investigation results as given in the following list:

Clinical history and current relevant symptoms
Clinical examination: _____ _____ Surgical / HPE finding (Date) _____ _____ Imaging findings (e.g. CT / MRI / PET-CT) (Date) _____ _____ Others (e.g. CEA, CA-125, CgA etc.) (Date) _____
Prior treatment (please provide the date of the procedure) □ Surgery (specify) Date of procedure: □ Radiotherapy (site) Description: □ Chemotherapy (regime) □ Other: _____

Type of appointment required:
□ Urgent □ Routine □ Early (preferred date): _____

Referring consultant / specialist:

Name: Title: Hospital: Date of referral: Tel. No: Fax No: Email:	Specific request on CD/DVD DICOM scan images: (Please √) □ Yes, please pass on the CD/DVD to the patient upon completion of PET-CT procedure. □ No, the CD/DVD should only be sent to the hospital along with the study report. Signature & official stamp:

*Referring doctor may be contacted to clarify request.

Check list:
□ Completed form with specialist signature and official stamp
□ Contactable phone number (patient and referring doctor)
□ Pathology reports
□ Imaging (CT, MRI, NM imaging) reports
□ Imaging film or CD for patient to bring along during appointment

Appendix 1

Defining the indications for FDG PET-CT scan:

Lymphoma:

Baseline scan: It is performed prior to institution of the definitive therapy to provide information about the staging and enable comparison with the subsequent study to facilitate evaluation of treatment response.

Interim scan: It is the mid-treatment scan frequently done after the 2nd or 3rd cycle of therapy (e.g. ABVD-chemotherapy in HL), at a timing just before the start of the following cycle. It is useful to predict the response to the current regime so that early treatment adaptation can be performed.

End-of-treatment scan: It is used to evaluate response following the completion of the predefined treatment regime, usually within 6 months after treatment.

Follow-up scan under watchful-wait strategy: It refers to the follow-up scan which is done i) to monitor persistent thymic uptake, or ii) to assess the equivocal findings on previous PET-CT scan.

Surveillance scan: It refers to the follow-up scan which is done i) more than 6 months after completion of the definitive treatment with the purpose of screening to ensure remission, or ii) to screen for relapse after achieving complete remission, where there is no suspicious biomarker of imaging finding.

For other relevant malignancies:

Baseline scan for i) initial staging in newly diagnosed malignancy or ii) restaging in proven recurrence or iii) pre-treatment scan for response assessment: When a diagnosis has been confirmed and before the treatment is instituted.

Interim (interval) scan for early response prediction or restaging after neoadjuvant therapy: If a study is performed after commencement of a **short course therapy** but before completion of the treatment plan, with intention of early detection of any non-responder and/or altering the immediate subsequent treatment strategies if necessary (e.g. early metabolic response prediction of imatinib therapy in GIST, of gefitinib (EGFR-TKI) in advanced NSCLC; neoadjuvant chemotherapy before a planned radical surgery or RT). A baseline scan is required as findings must be interpreted in the context of known changes that occur at specific timing and type of therapy.

End-of-treatment scan (within 6 months) after completed recent surgery / chemotherapy / chemoradiotherapy / SIRT / cryoablation / radiofrequency ablation. It is useful for therapy response evaluation after: i) completed **surgery**: in general should be at least 6 weeks after; ii) completed full course of **chemotherapy or other** drug treatment regimen (e.g. immunotherapy/ targeted therapy/ hormonal therapy): should be at least 6 weeks after; iii) completed **chemoradiotherapy**: should be at least 8 weeks after; iv) completed **cryo-/ radiofrequency ablation**: should be at least after 1 month for liver metastasis and 3 months for lung metastasis; v) completed **SIRT** (radioembolism): should be at least 3 months after.

Second-look follow-up scan under watchful-wait strategy / approach: It refers to the follow-up scan which is done to assess the earlier equivocal findings seen in previous PET-CT scan.

Evaluation for recurrence in suspected clinical, other equivocal imaging or changing tumour biomarker, as well as restaging if recurrence detected: A scan for patient who may still be on (e.g. tamoxifen/arimidex for prevention after treatment of breast cancer) or had previously completed treatment with curative intent **(in remission)**, when **biochemical or other conventional imaging raised the suspicious of recurrence**.

Surveillance scan: A screening scan for **patient in remission** who had previously completed treatment with curative intent (> 6 months)**,** with **no indicator yet to suggest any recurrence**.

Monitoring treatment efficacy following prolonged systemic treatment, with intention to change the therapy upon disease progression: e.g. tamoxifen/arimidex for prevention after breast cancer treatment, rituximab as maintenance therapy after chemotherapy in follicular and mantle cell lymphoma. Basically used as imaging tumour biomarker but should not be used as a surrogate or substitute for other standard tumour markers when applicable, e.g. fluoropyrimidine ± bevacizumab for mCRC with CEA, ADT in mCRPA with PSA, octreotide in NET with CgA etc.

Tissue characterization to differentiate benign and malignant lesion: In patient not known to have cancer before, presented with pulmonary nodule of >8 mm with solid component, PET-CT can be considered.

Assess tumour heterogeneity: Before planning for targeted radionuclide therapy (e.g. high dose I-131, PRRT or PSMA-Rx), a FDG PET-CT study is performed to assess non iodine-avid thyroid cancer or compare with the related theranostic scan (e.g. Ga-68 DOTATATE, Ga-68 PSMA scans) for the purpose of detecting tumour heterogeneity and inter- and intra-tumoral spatial discordant. Tumour heterogeneity occurs following molecular alteration and change in tissue character during tumour evolution / progression / dedifferentiation.

Appendix 2

Indications for FDG PET/CT scan

Malignancy \ Indication	Baseline for staging of new dx or restaging for proven malig or assess Rx rsp	Interim scan for early rsp prediction OR restaging after neoadjuvant Rx	End-of-treatment scan	Evaluation for recurrence pt on suspicious finding(s)	Surveillance scan for patient in remission with no indicators of recurrence	Monitor Rx efficacy following prolonged systemic Rx	Tissue characterization or tumour heterogeneity	Localization of unknown primary
Lymphoma - HL	may replace BMbx	rq a baseline scan. High NPV 93%			Routine post–cancer therapy FDG PET-CT surveillance scans in asymptomatic patients should be avoided. Such monitoring does not significantly improve outcome and is associated with false-positive results leading to unnecessary invasive tests, increased cost, increased radiation, and anxiety. However, a FDG PET-CT scan for evaluation of recurrence is indicated if there are clinical suspicion of recurrence, other equivocal conventional imaging tests or changing tumor biomarkers.			
Lymphoma - NHL	cannot replace BMbx	rq a baseline scan. For DLBCL only.						
Lymphoma - follicular	upstaging in 41%					annually if indicated	for bx site	
Multiple myeloma	extramedullary S&S 96%, 78%							
Melanoma								
H&N - NPC, SCC & salivary gld	T3, T4 advanced tumour		rq a baseline scan					Cx node met
Thyroid							non-iodine avid	
Breast	option in high risk for distant met - triple -ve							
Lung* - NSC		gefitinib, crizotinib, rq a pre-Rx baseline scan					SPN >8mm, for bx site	
Oesophageal* & OGJ - especially SCC	N: high sen & low spec	neoadjuvant, rq a pre-Rx baseline scan						
Hepato-biliary	HCC : low sen for primary, high sen for extra-met CholangioCA: in suspicious met							
Pancreatic*	only for high risk extra-met. Not for mucin producing							
GIST	not always +ve, predict malig potential	imatinib, rq a pre-Rx baseline scan	unless baseline scan +ve					
Gastric*	low sen & high spec. 14% no uptake. Pt planned for radical curative Rx.							
Colorectal*	high risk dx only		sub-optimal accuracy in Rx					
Renal - RCC	NPV 50% detect extra-renal met	TKI Rx, rq a pre-Rx baseline scan		extra-renal lesions. S&S				
Testicular - seminoma			NPV 94%					
Cervix	N: low sen & high spec. Only for suspicious MRI finding							
Uterus	only if extra-met							
Ovarian								
Sarcoma - Ewing's, osteosarcoma, rhabdomyosarcoma, high/intermediate grade sarcomas	high S&S	neoadjuvant, rq a pre-Rx baseline scan						
NET							Pre-TRT	
Prostate							Pre-TRT	
Paraneoplastic synd.								Vertex to toes

*Mucin-producing adenocarcinoma frequently exhibits only mild or no increased FDG uptake (41% of false-negative results).

Appropriate May be appropriate

Abbreviations:

BMbx: bone marrow biopsy
bx: biopsy
dx: disease
malig: malignant
extra-met: extratumoural metastasis
N: nodal NPV: negative predictive value
rsp: response
rq: required
Rx: treatment
sen: sensitivity
spec: specificity
synd: syndrome
S&S: sensitivity & specificity
TKI: tyrosine kinase inhibitors
TRT: targeted radionuclide therapy

References:

SNMMI AUC Factsheet for FDG PET/CT in Restaging and Treatment Response Assessment in Lymphoma
SNMMI AUC Factsheet for FDG PET/CT in Restaging and Treatment Response Assessment in Melanoma
SNMMI AUC Factsheet for FDG PET/CT in Restaging and Treatment Response Assessment in Head and Neck Cancer
SNMMI AUC Factsheet for FDG PET/CT in Restaging and Treatment Response Assessment in Breast Cancer
SNMMI AUC Factsheet for FDG PET/CT in Restaging and Treatment Response Assessment in Lung Cancer
SNMMI AUC Factsheet for FDG PET/CT in Restaging and Treatment Response Assessment in Colorectal Cancer
SNMMI AUC Factsheet for FDG PET/CT in Restaging and Treatment Response Assessment in Sarcoma
Evidence-based Positron Emission Tomography: Summary of Recent Meta-analyses on PET, Springer Nature, 2020 by Giorgio Treglia