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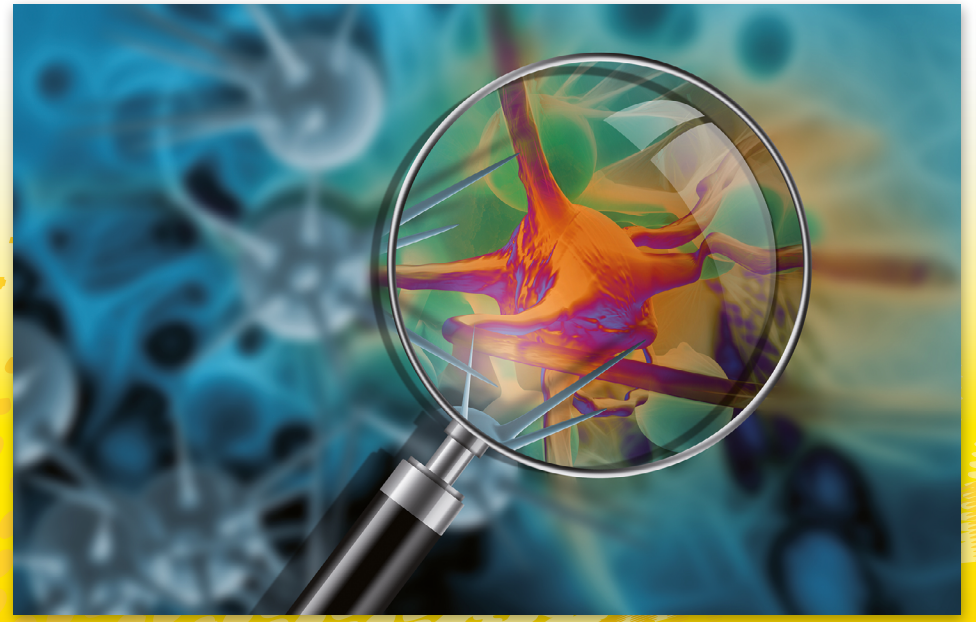
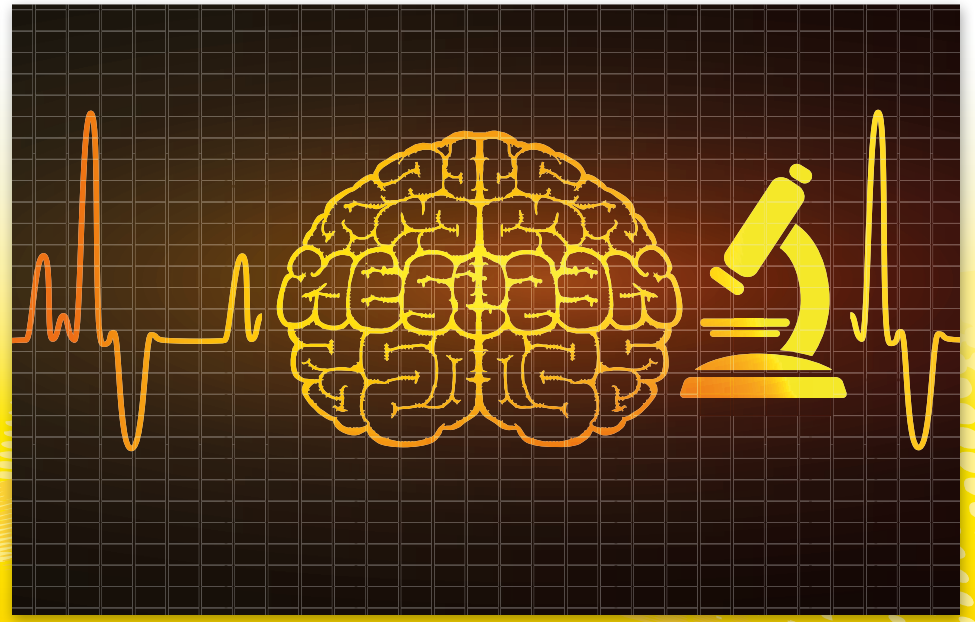
Positron Emission Tomography : Indications





Cancers

Cardiovascular diseases
Infectious and inflammatory diseases
Neurocerebral diseases

Click on the section that you want to consult.

Québec

This document was written and edited by the Institut national d'excellence en santé et en services sociaux (INESSS).

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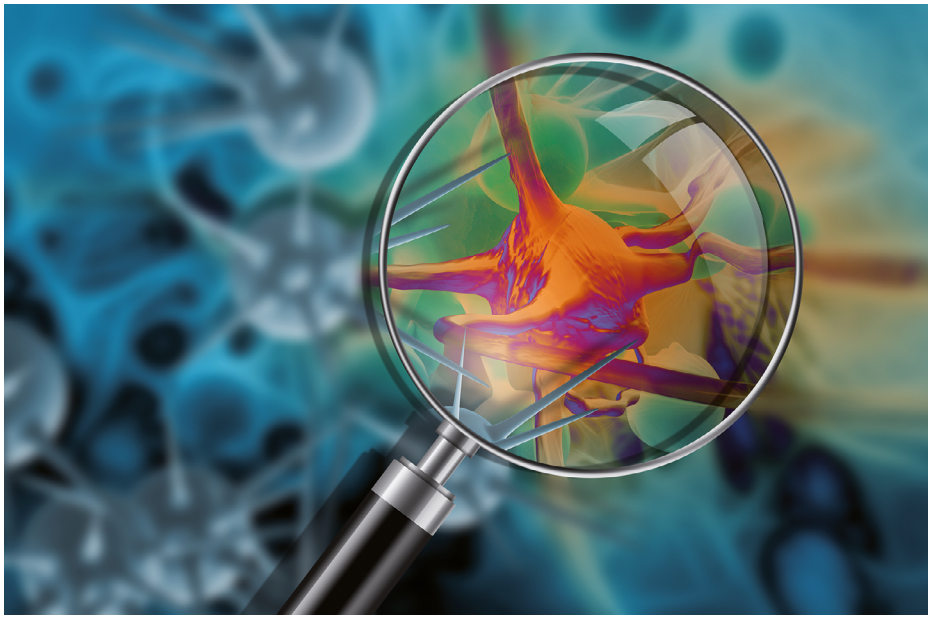
Cancers



Glossary

Recommended : Scientific and experiential data confirm that the use of positron emission tomography in conjunction with computed tomography (PET-CT[1]) is the practice standard and that it should be used in most patients concerned by the statement.

Indicated in certain cases : Scientific and experiential data suggest that the use of PET-CT should not be generalized and that it is limited to specific clinical situations.

Not indicated : Scientific and experiential data show that the use of PET-CT is not warranted or appropriate.

Suggested wait time : Wait time suggested by experts for PET-CT indications, based on the priority levels on the Ministère de la Santé et des Services sociaux's scale for prioritized access to specialized services (APSS).

[1] Unless otherwise noted, PET-CT refers to the tracer ^{18}FDG

Click on the section that you want to consult.

HEMATOLOGICAL CANCERS

For more information on this topic, visit the section **Publications** on INESSS's website.

LYMPHOMAS		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ■ For staging aggressive Hodgkin's and non-Hodgkin's lymphomas (including grade 3 follicular lymphomas and routinely excluding Burkitt's lymphoma – see non-indication below) for guiding a diagnostic or therapeutic procedure. → PET-CT should be performed early during the initial assessment (staging) as it obviates the need for other investigations when limited-stage disease is diagnosed.	≤ 10 days
	■ When radiotherapy is being considered for localized-stage (I or II) follicular non-Hodgkin's lymphoma.	≤ 28 days
	Indicated in certain cases ■ When there is clinical or radiological suspicion of transformation of an indolent lymphoma to an aggressive form. → PET-CT can effectively distinguish between indolent and aggressive lymphoma cells where there is a mix of the two and therefore be used to identify a suitable biopsy site for confirming the transformation.	≤ 10 days
	Not indicated ■ For staging indolent non-Hodgkin lymphomas known to be non-FDG-avid, namely, chronic lymphoid leukemia, lymphocytic lymphoma, lymphoplasmacytic lymphoma (Waldenström's disease), marginal zone lymphoma (gastric) and mycosis fungoides. ■ For routinely staging newly diagnosed Burkitt's lymphoma, since it is unlikely that the result could be used to guide its treatment.	—

LYMPHOMAS		SUGGESTED WAIT TIME (provided only as a guide)
Response to Treatment / Restaging	**Recommended** ■ As the standard of care at the end of treatment for evaluating the therapeutic response. → Consequently, when treatment is being considered, it is easier to interpret the PET-CT for the purpose of assessing the response to treatment if a pre-treatment PET-CT has been performed. → The required time interval between the last treatment and the PET-CT for evaluating the response should be at least 3 weeks, ideally 6 to 8 weeks after chemotherapy and 8 to 12 weeks after radiotherapy. When these time intervals are not compatible with the optimal administration of the next treatment, then the timing should be adjusted accordingly. → In the 12 weeks following the end of treatment, PET-CT is used to evaluate an inaccessible or biopsy-negative post-treatment residual mass.	3 to 12 weeks post-treatment, depending on the therapy
	■ For restaging in patients with treatment-refractory Hodgkin's lymphoma or diffuse large B-cell lymphoma for the purpose of planning second-line therapy.	≤ 10 days
	■ For assessing refractory or recurrent non-Hodgkin's lymphoma in order to evaluate the residual disease prior to high-dose chemotherapy in patients in whom an autologous hematopoietic stem cell transplant is being planned.	≤ 10 days
	Indicated in certain cases ■ For evaluating the response to treatment during chemotherapy (interim PET-CT) in patients with advanced-stage Hodgkin's lymphoma (unfavourable stage IIB or stage III or IV) and adjust therapy accordingly (e.g., a change of chemotherapy).	Synchronized with the treatment
Follow-up / Surveillance	**Recommended** ■ For the follow-up of lymphoma if there is clinical suspicion of a recurrence or of indolent non-Hodgkin's lymphoma when there is clinical or radiological suspicion of histological transformation. → In such cases, PET-CT is used to identify the best biopsy site for confirming the recurrence or for restaging.	Depends on the clinical course
	Not indicated ■ Routinely, as with any other type of imaging, for the surveillance of an asymptomatic patient in complete remission.	—

For more information on this topic, visit the section **Publications** on INESSS's website.

MULTIPLE MYELOMA		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases**	
	■ To distinguish between symptomatic and indolent forms of myeloma if conventional bone imaging findings are doubtful or negative or if there is clinical suspicion.	≤ 10 days
	■ For evaluating possible systemic involvement of isolated osseous or extraosseous plasmocytomas when whole-body MRI is not available.	≤ 10 days
	Not indicated	
	■ In patients with monoclonal gammopathy of undetermined significance (MGUS).	—
Response to Treatment / Restaging	**Indicated in certain cases**	
	■ For assessing response to treatment of non-secretory or oligosecretory myeloma. → Empirically, PET-CT should be performed after the first four cycles of chemotherapy and every 4 to 6 months during prolonged treatments. → A PET-CT should be performed at the start of treatment for comparative purposes.	≤ 10 days
Follow-up / Surveillance	**Indicated in certain cases**	
	■ For follow-up of post-treatment remission from non-secretory or oligosecretory myeloma. → Empirically, PET-CT should be performed every 4 to 6 months.	≤ 28 days
	■ For assessing the progression of an indolent to a symptomatic form when conventional bone imaging findings are doubtful or negative and there is clinical suspicion.	≤ 28 days

BRAIN TUMOURS

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases**	
	■ Reserved for high surgical risk patients in order to confirm a surgical indication.	≤ 10 days
	■ For identifying an extra-cranial primary tumour (whole-body PET-CT).	
	→ PET-CT is indicated either after conventional imaging methods yield equivocal results or as a primary imaging method based on clinical judgement.	≤ 10 days
	→ When no primary tumour can be found with other imaging methods for brain metastases.	
	■ For guiding the biopsy if there is suspicion of transformation of a low-grade to a high-grade glioma.	Depends on the clinical presentation
	■ ^{68}Ga-DOTATOC-PET is indicated when planning radiotherapy for meningiomas.	Synchronized with the investigation
	Not indicated	
	■ Routinely for diagnosing or staging of gliomas.	—
	■ For delineating the volume of a glioma.	
Response to Treatment / Restaging	**Recommended**	
	■ For the post-radiotherapy follow-up of an anaplastic glioma or a glioblastoma in order to distinguish between radionecrosis (pseudo-progression) and disease persistence.	Depends on the clinical presentation
	→ Preference should be given to using amine tracers over ^{18}FDG, if available.	

HEAD AND NECK CANCERS

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ For staging head and neck cancers when other imaging methods yield equivocal results or for stage III or IV tumours for which treatment is being considered. → Patients with stage III or IV nasopharyngeal cancer should almost always have a PET-CT at the outset to check for distant metastases. → PET-CT of the superior portion of the mediastinum/lung is indicated in certain clinical situations, such as non-keratinizing histologies, endemic phenotypes, and stage II to IV - N2-3 disease.	≤ 10 days
	■ For detecting a primary tumour in head and neck cancer of unknown primary when other imaging methods yield equivocal or negative results and treatment is being considered. → PET-CT should be performed before panendoscopy and biopsies.	≤ 10 days
	■ For planning treatment when other imaging methods cannot be used to satisfactorily delineate the tumour volume and radiotherapy is being considered.	Synchronized with the investigation
Response to Treatment / Restaging	**Indicated in certain cases** ■ After treatment when there is a complete clinical response. → PET-CT should be performed at least 12 weeks after the end of treatment. When negative, there is no need, apart from exceptional cases, to continue with other imaging methods (CT or MRI of the neck).	Minimum of 12 weeks after treatment
Follow-up / Surveillance	**Indicated in certain cases** ■ In patients with a suspected recurrence of a head and neck cancer that could not be confirmed or ruled out with CT or MRI, or when these imaging methods are considered imprecise because of overly altered anatomy.	Depends on the clinical presentation
	Not indicated ■ For surveillance of patients in whom there is no suspicion of recurrence after the end of treatment.	—

LUNG CANCER

For more information on this topic, visit the section **Publications** on INESSS's website.

General considerations regarding the use of ^{18}FDG PET-CT in lung cancer

- Since the specificity of PET-CT is substantially lower in inflammatory lung conditions (infectious or otherwise), it is best to wait until an acute episode is under control before performing it.
- If the infectious origin is uncertain and antibiotic therapy is administered prophylactically or the infectious process is directly related to an obstructive phenomenon associated with the pulmonary lesion or lesions under investigation, ^{18}FDG PET-CT can be performed, despite the antibiotic therapy.

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ■ For characterizing nodules ≥ 8 mm in patients in whom risk factors (age ≥ 50 years, a history of smoking, the nodule's size and appearance) raise suspicion of neoplasia. → The size of the nodule is measured in its largest diameter. → If the PET-CT result is positive, if the lesion is not biopsy-accessible and if there is no intention to treat at this point, PET-CT can be repeated in the next 3 months to monitor changes and guide the treatment plan if neoplasia is suspected due to changes in the nodule's appearance on follow-up CT scan. → There is generally broad agreement regarding the 8 mm criterion, but it could be raised to 10 mm for nodules in the lung bases. Technological advances might lead to change this criterion in the future. ■ For lymph node and extrathoracic staging of lung cancer that is histologically confirmed or highly probable based on the clinical and radiological evaluation, if there is an intention to treat. → A search for bone metastases in presence of signs or symptoms outside of the routine PET-CT field (below the proximal third of the thighs) should be mentioned so that these regions are included in the field (e.g., suspicious knee pain).	Depends on the degree of suspicion of neoplasia : Strong : ≤ 10 days Other : ≤ 28 days Staging : ≤ 10 days To establish the therapeutic intention, i.e., curative vs. palliative : ≤ 28 days
	Indicated in certain cases ■ For determining the location of difficult-to-visualize lesions, especially if they are close to the central structures (as in stages II and III), when planning curative radiotherapy. ■ In very specific situations assessed on a case-by-case basis when planning palliative-care therapy.	≤ 10 days ≤ 28 days

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance *(Cont'd)*	**Not indicated** ■ For investigating a patient if the result is not likely to guide or change the therapeutic approach (e.g., advanced-stage and metastatic cancers). ■ As a first-line imaging method for detecting brain metastases.	—
Response to Treatment / Restaging	**Not indicated** ■ During therapy (interim PET-CT) for the purpose of adjusting the treatment.	—
Follow-up / Surveillance	**Indicated in certain cases** ■ Strictly reserved for cases where a therapeutic approach is being considered to treat a new lesion or if a change in the lesion's appearance raises suspicion of a recurrence of the cancer.	≤ 28 days
	Not indicated ■ For surveillance at the end of treatment if no new suspected lesions have been detected with routine radiological methods.	—

DIGESTIVE CANCERS

For more information on this topic, visit the section Publications on INESSS's website.

COLORECTAL CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ■ For characterizing lesions suspect for extrahepatic or extrapulmonary metastases. ■ For evaluating patients with an elevated carcinoembryonic antigen (ACE) level when conventional imaging methods yield negative or equivocal results.	≤ 28 days ≤ 3 months
	Indicated in certain cases ■ For initial staging only when other imaging methods yield equivocal results that have an impact on therapeutic decisions. ■ Prior to curative surgical treatment for hepatic or pulmonary metastases with or without neoadjuvant or perioperative chemotherapy, in order to detect occult metastases or characterize a lesion of undetermined significance.	≤ 28 jours ≤ 28 jours
Response to Treatment / Restaging	**Indicated in certain cases** ■ For post-chemoradiotherapy staging when surgical resection is being considered.	3 to 5 weeks after the end of chemotherapy
	Not indicated ■ For evaluating the interim response to chemotherapy, given that PET-CT is temporarily negative after chemiotherapy. ■ For evaluating the therapeutic response after the end of treatment.	—
Follow-up / Surveillance	**Indicated in certain cases** ■ When there is clinical suspicion of a pelvic or presacral recurrence and other investigations yield negative or equivocal results.	≤ 28 days
	Not indicated ■ For surveillance of asymptomatic patients after the end of treatment.	—

For more information on this topic, visit the section **Publications** on INESSS's website.

STOMACH CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ▪ Only when the results obtained with other imaging methods are equivocal, in order to confirm the presence of distant metastases when surgical treatment is being considered.	≤ 28 days
Response to Treatment / Restaging	**Indicated in certain cases** ▪ After chemotherapy for an initially non-resectable primary tumour when surgical treatment is being considered.	≤ 28 days
Follow-up / Surveillance	**Indicated in certain cases** ▪ Only if a recurrence is clinically suspected.	Depends on the clinical course

For more information on this topic, visit the section **Publications** on INESSS's website.

ESOPHAGEAL CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ▪ For detecting distant metastases and for locoregional lymph node staging if the search for unsuspected lesions or the characterization of a lesion of undetermined significance have an impact on therapeutic options.	≤ 10 days
	▪ Prior to surgery for assessing resectability and before radiotherapy for planning treatment.	≤ 28 days
Follow-up / Surveillance	**Indicated in certain cases** ▪ When a recurrence is suspected and treatment is being considered.	≤ 3 months

For more information on this topic, visit the section **Publications** on INESSS's website.

GASTROINTESTINAL STROMAL TUMOURS		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	✓ **Recommended** ■ In the presence of a non-resectable disease when treatment with a tyrosine kinase inhibitor (TKI) is being considered, in order to obtain a pre-treatment image that will be used to evaluate the response to treatment.	Synchronized with treatment
	✓ **Indicated in certain cases** ■ Only when other imaging methods (CT or MRI) yield equivocal results and when surgical treatment is being considered.	Synchronized with the investigation
Response to Treatment / Restaging	✓ **Recommended** ■ For evaluating early response to treatment with a tyrosine kinase inhibitor (TKI) within 2 to 4 weeks after the start of treatment in a neoadjuvant treatment context, in order to detect resistance to treatment and adjust therapy accordingly.	≤ 28 days
Follow-up / Surveillance	✓ **Indicated in certain cases** ■ Only when other imaging methods yield equivocal results.	Synchronized with the investigation

ENDOCRINE CANCERS

For more information on this topic, visit the section **Publications** on INESSS's website.

PANCREATIC CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ In pancreatic adenocarcinoma when other imaging methods yield equivocal results and surgical treatment is being considered. → PET-CT is not recommended for predominantly mucinous tumours.	≤ 10 days
	■ In patients at high risk for metastases in whom a radical treatment is being considered. → Risk factors for metastases include a tumour of borderline surgical resectability, an elevated carbohydrate antigen 19-9 (CA 19-9) level, a large tumour, large regional adenopathies and a severe symptomatic presentation.	≤ 10 days
	■ For planning treatment when other imaging methods cannot be used to satisfactorily locate target volumes. → In this rare indication, PET-CT is also indicated for guiding decisions regarding additional treatment or change of treatment.	≤ 10 days
	Not indicated ■ Routinely for investigating a pancreatic cyst where a suspicion of cancer persists after investigation. Its utility for surgical decision-making is limited because of the high risk of false negatives.	—
Response to Treatment / Restaging	**Not indicated** ■ Routinely for evaluating the response to treatment.	—
Follow-up / Surveillance	**Not indicated** ■ For the post-treatment surveillance of cystic pancreatic cancer in asymptomatic patients with no increase in tumour markers.	—

For more information on this topic, visit the section **Publications** on INESSS's website.

PANCREATIC NEUROENDOCRINE TUMOUR		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ■ With somatostatin analogue tracers (such as ^{68}Ga-DOTATATE), where available, for the initial assessment of proven neuroendocrine tumours or for characterizing pancreatic lesions of undetermined significance whose clinical presentation points to a neuroendocrine tumour. → Low-grade (G1) and intermediate-grade (G2), well-differentiated neuroendocrine tumours should be imaged with ^{68}Ga-DOTATATE. ^{18}FDG PET-CT is preferred for high-grade (G3), poorly differentiated tumours.	≤ 28 days
Follow-up / Surveillance	**Not indicated** ■ For the routine surveillance of pancreatic neuroendocrine tumours.	—

For more information on this topic, visit the section **Publications** on INESSS's website.

THYROID CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ As with conventional imaging, for the metastatic staging of histologically confirmed anaplastic carcinoma, poorly differentiated thyroid cancer, or Hürthle cell carcinoma.	≤ 10 days
	Not indicated ■ Routinely for investigating a thyroid nodule with undetermined cytology. ■ Routinely for the initial assessment or the follow-up of thyroid cancer. ■ For planning an initial treatment of a differentiated thyroid cancer with radioactive iodine. ■ Routinely prior to a first surgical treatment for thyroid cancer.	—

THYROID CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Follow-up / Surveillance	**Indicated in certain cases** ■ For the follow-up of high-risk differentiated thyroid cancer : • With an elevated non-stimulated thyroglobulin level (> 10 µg/l) or a thyroglobulin level that has steadily increased in serial measurements ; • With no anatomical explanation (negative neck ultrasound) ; • With a negative iodine scan ; • With aggressive histology or Hürthle cell carcinoma. ■ For identifying disease persistence or recurrence in patients treated for medullary carcinoma, when the disease is aggressive with any of the following features : • Calcitonin ≥ 1000 ng/l ; • Increase in carcinoembryonic antigen (CEA) level > 5 µg/l ; • Short calcitonin doubling time < 12 months and a CEA doubling time < 24 months ; • Histology with a high cell proliferation index (Ki-67).	≤ 28 days ≤ 28 days
	Not indicated ■ Routinely for identifying disease persistence or recurrence in patients treated for medullary carcinoma.	—

UROLOGICAL CANCERS

For more information on this topic, visit the section **Publications** on INESSS's website.

KIDNEY CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ For locoregional disease staging in rare cases where the patient is at high risk and where the CT or bone scan results are equivocal.	≤ 10 days
	Not indicated ■ Routinely in kidney cancer.	—
Follow-up / Surveillance	**Indicated in certain cases** ■ When a positive pre-treatment study is available, in order to monitor the locoregional staging in high-risk patients or when the CT result is equivocal. In the case of a probable metastatic disease based on other investigations, PET-CT may be indicated for guiding a biopsy.	≤ 10 days

For more information on this topic, visit the section **Publications** on INESSS's website.

BLADDER CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ In patients at risk for metastases (≥ T2) in whom a radical treatment is being considered.	≤ 10 days
	Not indicated ■ Routinely for investigating bladder cancer.	—
Response to Treatment / Restaging	**Not indicated** ■ For predicting or evaluating the response to treatment.	—
Follow-up / Surveillance	**Indicated in certain cases** ■ For restaging purposes in patients in whom a recurrence is suspected based on other investigations.	≤ 10 days

GYNECOLOGICAL CANCERS

For more information on this topic, visit the section **Publications** on INESSS's website.

CERVICAL CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ■ For evaluating the extent of the disease in order to establish the treatment plan.	≤ 10 days
	Indicated in certain cases ■ In anticipation of radiotherapy for stage IB2 and more advanced stages, for evaluating the primary tumour as well as local and distant lymph nodes.	≤ 10 days
Response to Treatment / Restaging	**Not indicated** ■ Routinely for evaluating the response to treatment.	—
Follow-up / Surveillance	**Indicated in certain cases** ■ In 3 to 6 months after primary therapy in women at high risk for treatment failure or who have signs and symptoms consistent with disease persistence or recurrence and in whom treatment can be considered.	≤ 28 days
	Not indicated ■ Routinely for the surveillance of asymptomatic patients after the end of treatment.	—

For more information on this topic, visit the section **Publications** on INESSS's website.

ENDOMETRIAL CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ For staging in patients at risk for metastases, when treatment can be considered.	≤ 10 days
Response to Treatment / Restaging	**Indicated in certain cases** ■ For evaluating the response to chemotherapy or radiotherapy in a non-surgical, extensive-disease context in the 3 months following the end of treatment.	≤ 3 months
	Not indicated ■ Routinely for evaluating the response to treatment.	—
Follow-up / Surveillance	**Indicated in certain cases** ■ In 3 to 6 months after primary therapy in women at high risk for treatment failure or who have signs and symptoms consistent with disease persistence or recurrence and in whom treatment can be considered.	≤ 28 days
	Not indicated ■ Routinely for the surveillance of asymptomatic patients after the end of treatment.	—

For more information on this topic, visit the section **Publications** on INESSS's website.

OVARIAN CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ For planning treatment when other imaging methods yield uncertain results. → PET-CT result should be interpreted with caution in cancers with predominantly mucinous histology.	≤ 10 days
Response to Treatment / Restaging	**Indicated in certain cases** ■ For evaluating the response to chemotherapy in a non-surgical context when the extent of the disease is difficult to visualize on CT. In such case, a pre-treatment image should be obtained before initiating or modifying the treatment.	≤ 10 days
Follow-up / Surveillance	**Indicated in certain cases** ■ For detecting a recurrence when there are elevated tumour markers and for restaging a recurrence when second-line therapy is being considered.	≤ 28 days
	Not indicated ■ Routinely for the surveillance of asymptomatic patients with no elevated tumour markers after the end of treatment for ovarian cancer.	—

BREAST CANCER

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ To guide therapeutic decisions only when the initial assessment is equivocal and when biopsy investigations cannot determine the metastatic nature of the disease. → Such indication should occur only exceptionnaly.	≤ 10 days
	■ In particular cases as an alternative to conventional imaging for initial staging in patients at high risk for metastases.	≤ 10 days
	Not indicated ■ For the diagnosis or locoregional staging of primary breast cancer at low risk of distant metastases.	—
Response to Treatment / Restaging	**Not indicated** ■ For evaluating the response to treatment.	—
Follow-up / Surveillance	**Not indicated** ■ For post-treatment follow-up or for the surveillance of asymptomatic patients.	—

MALE GENITAL CANCERS

General considerations regarding the use of new prostate PET-CT tracers

- Several prostate cancer tracers exist in addition to ^{18}FDG or are under development. They include acetate derivatives, choline analogues and PMSA (prostate membrane-specific antigen) formulations. These tracers can be labelled with different isotopes (such as ^{11}C, ^{18}F or ^{68}Ga). Although the availability of these tracers in Québec is evolving, the following statements provide guidance for their present and future utilization. When a result is positive, histopathological confirmation is warranted for guiding clinical decisions.

For more information on this topic, visit the section **Publications** on INESSS's website.

PROSTATE CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ For staging cancers with high-risk of metastases (Gleason ≥ 8, PSA > 15 or T3) when local therapy is being considered or after a ^{99m}Tc-MDP bone scan when a result is negative or inconclusive for metastases.	≤ 10 days
	Not indicated ■ Routinely in low-risk prostate cancer.	—
Response to Treatment / Restaging	**Indicated in certain cases** ■ On a targeted basis after treatment when a positive pret-reatment study is available.	≤ 28 days
Follow-up / Surveillance	**Indicated in certain cases** ■ Indicated in specific cases during biochemical recurrence (persistence or recurrence of an elevated PSA (prostate-specific antigen) level or when a recurrence is suspected on the basis of other imaging methods.	≤ 10 days

For more information on this topic, visit the section **Publications** on INESSS's website.

PENILE CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ■ With a percutaneous biopsy in patients with a resectable lesion in whom neoadjuvant chemotherapy is being considered.	≤ 10 days
	Indicated in certain cases ■ For staging penile cancer when there are positive inguinal lymph nodes.	≤ 10 days
	Not indicated ■ Routinely for investigating penile cancer.	—

For more information on this topic, visit the section **Publications** on INESSS's website.

TESTICULAR CANCER		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ For staging a seminoma or a non-seminoma other than a teratoma or for characterizing a lesion that is equivoqual with conventional imaging methods. ■ For defining, in certain patients with a seminoma, the radiotherapy field or deciding whether or not to use chemotherapy.	≤ 10 days ≤ 10 days
	Not indicated ■ Routinely for staging non-seminomatous testicular cancer.	—
Response to Treatment / Restaging	**Recommended** ■ For investigating a residual mass 3 cm or larger at least 2 months (ideally, 3 months) after the end of chemotherapy for a seminoma.	Synchronized with the treatment
	Not indicated ■ For staging non-seminomatous testicular cancer after chemotherapy.	—
Follow-up / Surveillance	**Indicated in certain cases** ■ For detecting a recurrence of a seminoma or a non-seminoma when the laboratory markers are elevated or equivocal and when imaging is negative or equivocal. ■ For surveillance of patients who have bulky (stage IIb, IIC or III) initial disease, depending on the clinical course.	≤ 28 days ≤ 28 days

MELANOMA

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Indicated in certain cases** ■ For the initial staging of advanced-stage (≥ IIC) melanoma in patients at high risk of metastases and in those in whom metastatic disease is suspected, when local aggressive surgical resection is being considered. ■ For the initial staging of stage < IIC melanoma if the imaging results or clinical findings are compatible with a more advanced disease. ■ Prior to radical surgical treatment for mucosal melanoma.	Stages ≥ III : ≤ 10 days Stage IIC : ≤ 28 days ≤ 28 days ≤ 10 days
	Not indicated ■ For detecting a primary uveal melanoma.	—
Response to Treatment / Restaging	**Recommended** ■ For restaging a recurrence for which surgical treatment is being considered.	≤ 10 days
	Indicated in certain cases ■ For evaluating the therapeutic response to surgery (metastasectomy), chemotherapy or immunotherapy, if the result is likely to lead to a change in the therapeutic approach. → In general, PET-CT can be performed in as little as 14 days after treatment (optimally, right before starting an additional cycle of chemotherapy) or 3 months in the case of immunotherapy.	Depends on the clinical situation and the type of treatment
Follow-up / Surveillance	**Indicated in certain cases** ■ For detecting a recurrence in high risk patients (stage ≥ IIC, thick primary tumour or after treatment for metastasis). ■ For detecting a recurrence or metastases in patients treated for stage IIB to IV melanoma, in the first 3 years after treatment, depending on the stage and risk assessment.	Depends on the clinical situation Depends on the clinical situation
	Not indicated ■ Routinely for detecting a recurrence in low-risk patients. ■ Routinely for detecting a recurrence in asymptomatic patients after 3 years of post-treatment follow-up.	—

SARCOMAS

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	**Recommended** ■ For the metastatic staging of bone sarcomas. → PET-CT is the imaging method of choice for detecting vertebral metastases and lesions to surrounding nerve tissues. ■ For staging confirmed malignant soft-tissue tumours.	≤ 28 days ≤ 28 days
	Indicated in certain cases ■ For detecting lymph node metastases or when surgery is being considered for synovial, epithelioid, clear-cell, myxofibroblastic or Ewing sarcomas or rhabdomyosarcoma.	≤ 28 days
	Not indicated ■ For detecting metastases of a myxoid or round-cell liposarcoma. ■ Routinely for staging low-grade sarcomas.	—
Response to Treatment / Restaging	**Recommended** ■ For the response to treatment of confirmed malignant soft-tissue tumours.	≤ 28 days
Follow-up / Surveillance	**Recommended** ■ For detecting a recurrence after treatment of confirmed malignant soft-tissue tumours.	≤ 28 days
	Indicated in certain cases ■ For surveillance of local recurrence of oligometastatic bone tumours and in cases where the patient has undergone massive prosthetic reconstruction.	≤ 28 days

CANCER OF UNKNOWN PRIMARY

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUGGESTED WAIT TIME (provided only as a guide)
Diagnosis / Staging / Therapeutic Guidance	✓ **Recommended** ■ For detecting the primary tumour when other imaging methods are inconclusive or cannot be used and when a treatment is being considered.	≤ 10 days
	■ For investigating neck adenopathies from an unknown primary cancer when a radical treatment is being considered.	≤ 10 days

Glossary

Recommended : Scientific and experiential data confirm that the use of positron emission tomography in conjunction with computed tomography (PET-CT[1]) is the practice standard and that it should be used in most patients concerned by the statement.

Indicated in certain cases : Scientific and experiential data suggest that the use of PET-CT should not be generalized and that it is limited to specific clinical situations.

Not indicated : Scientific and experiential data show that the use of PET-CT is not warranted or appropriate.

Suggested wait time : Wait time suggested by experts for PET-CT indications, based on the priority levels on the Ministère de la Santé et des Services sociaux's scale for prioritized access to specialized services (APSS).

[1] Unless otherwise noted, PET-CT refers to the tracer ^{18}FDG

Click on the section that you want to consult.

CARDIOVASCULAR DISEASES

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUSUGGESTED WAIT TIME (provided only as a guide)
Myocardial perfusion	**Recommended**	
	■ Before performing a ^{18}FDG PET-CT myocardial viability study to confirm its relevance (see section "Myocardial viability").	Synchronized with the investigation
	■ As an additional test when ^{18}FDG PET-CT is performed to detect cardiac sarcoidosis.	Synchronized with the investigation
	Indicated in certain cases	
	■ For evaluating patients with suspected or confirmed coronary artery disease in whom a myocardial perfusion study during pharmacological stimulation is indicated and to whom any of the following situations applies :	
	• The inability to perform a stress imaging test ;	Depends on the clinical presentation
	• A stress imaging result that is of poor quality, inconclusive or contradictory with the results of other diagnostic tests ;	
	• Physical characteristics that impairs the quality of conventional imaging tests, such as a body mass index (BMI) > 30 kg/m^2, large breasts or a breast implant, a protruding abdomen, thoracic deformities, plural effusions or the inability to properly position the patient ;	
	• The presence of risk factors, such as diabetes, grade 3 to 5 chronic kidney disease, complex vascular disease (post-coronary bypass, heart transplant, etc.), or comorbidities that increase the surgical risk for revascularization ;	
	• A young patient in whom repeated radioisotope imaging tests are anticipated in order to reduce the radiation dose ;	
	• A patient in whom the clinician considers absolute perfusion quantification essential for better identifying or for ruling out multivessel coronary artery disease, for improving the risk stratification or for detecting a cardiac graft vasculopathy, or when an assessment of microvascular circulation is necessary for clinical decision-making.	
	■ When a previous stress imaging test was of poor quality, inconclusive or contradictory with the results of other diagnostic tests.	Synchronized with the investigation

		SUSUGGESTED WAIT TIME (provided only as a guide)
Myocardial perfusion *(Cont'd)*	**Not indicated** ■ Routinely in low-risk patients when an optimal-quality myocardial perfusion SPECT (single-photon emission computed tomography) can be performed.	—
Myocardial viability	**Indicated in certain cases** ■ When a revascularization procedure or a heart transplant is being considered in patients with : • Documented coronary artery disease AND • Left systolic ventricular dysfunction AND • Myocardial viability that is unconfirmed or equivocal with other methods. → Myocardial perfusion PET-CT (previous indication) or SPECT should be performed prior to any myocardial viability PET-CT because it can reveal the presence of ischemia, a transmural or large (≥ 50 % defect in expected activity) scar. → If an imaging method (PET, SPECT or MRI) has shown that there is no scarring over more than 50 % of the myocardial wall, a viability study should not be performed with any additional method because significant residual viability is already confirmed.	≤ 10 days
Cardiac sarcoidosis	**Recommended** ■ For investigating cardiac sarcoidosis, in conjunction with myocardial perfusion PET-CT, in patients with : • Clinical suspicion of cardiac sarcoidosis ; • Known extracardiac sarcoidosis in a patient with an abnormal electrocardiogram or unexplained cardiac symptoms. ■ For follow-up of patients with known cardiac sarcoidosis and no clinical response to treatment in order to initiate second-line therapy.	≤ 28 days ≤ 28 days
Cardiac tumours	**Recommended** ■ For investigating, as with ultrasound or MRI, primary cardiac tumours and for detecting cardiac or pericardial metastases in order to distinguish between benign and malignant lesions non-invasively, if the initial assessment is inconclusive.	≤ 10 days

		SUSUGGESTED WAIT TIME (provided only as a guide)
Cardiac devices and prosthetic valve infections	**Indicated in certain cases** ■ For investigating a suspected (clinically or on the basis of the Duke modified criteria) implantable cardiac device infection or prosthetic valve endocarditis when the diagnosis is difficult to make : • The diagnosis based on the clinical impression is uncertain, and the modified Duke criteria are negative ; • The presence of fever of unknown origin in a patient with an implantable cardiac device or a prosthetic valve ; • A confirmed cardiac device deep pocket infection/endocarditis and the need to determine its extent in order to decide whether to remove the device.	< 3 days
Septic embolism	**Indicated in certain cases** ■ For investigating a suspected septic embolism due to endocarditis (native or prosthetic valve) or a confirmed cardiac device deep pocket infection.	< 3 days
Vascular graft infection	**Indicated in certain cases** ■ For investigating a vascular graft infection when other imaging methods yield equivocal results or when there is a contraindication to a contrast agent. ■ For evaluating the response to treatment for a vascular graft infection in specific cases where the result can be used to modify the treatment.	Depends on the clinical presentation Depends on the clinical presentation
Large vessel vasculitis	**Indicated in certain cases** ■ For investigating large vessel vasculitis in the following specific cases : • Clinical suspicion with a negative temporal artery biopsy ; • An inflammatory clinical presentation or clinical suspicion of large vessel vasculitis with no identifiable site for a biopsy ; • Clinical suspicion based on imaging suggestive of aortitis. ■ For confirming the clinical and laboratory signs of disease persistence or recurrence during cortisone withdrawal or when treatment is modified.	Should be performed before corticosteroid therapy is initiated ≤ 10 days (cortisone withdrawal failure)

INFECTIOUS AND INFLAMMATORY DISEASES

For more information on this topic, visit the section **Publications** on INESSS's website.

General considerations regarding the use of ^{18}FDG PET-CT in infectious and inflammatory diseases

- In Québec, ^{18}FDG PET-CT is used for imaging infectious and inflammatory processes when gallium (^{67}Ga) or labelled leucocyte scanning does not meet diagnostic and therapeutic guidance needs, either because of a lack of precision or because of the urgency of the situation.
- The indications presented in this document are those encountered on a regular basis. Each case should be assessed individually by the nuclear medicine specialist and the infectious diseases specialist.
- It is not possible to present all the possible or emerging indications for PET-CT in the vast field of infectious diseases, as some of them may be warranted in specific contexts.

INFECTIOUS DISEASES		SUGGESTED WAIT TIME (provided only as a guide)
Cardiac devices and prosthetic valve infections	**Indicated in certain cases** ■ For investigating a suspected (clinically or on the basis of the Duke modified criteria) implantable cardiac device infection or prosthetic valve endocarditis when the diagnosis is difficult to make : • The diagnosis based on the clinical impression is uncertain, and the modified Duke criteria are negative ; • The presence of fever of unknown origin in a patient with an implantable cardiac device or a prosthetic valve ; • A confirmed cardiac device deep pocket infection/endocarditis and the need to determine its extent in order to decide whether to remove the device.	< 3 days
Septic embolism	**Indicated in certain cases** ■ For investigating a suspected septic embolism due to endocarditis (native or prosthetic valve) or a confirmed cardiac device deep pocket infection.	< 3 days
Vascular graft infection	**Indicated in certain cases** ■ For investigating a vascular graft infection when other imaging methods yield equivocal results or when there is a contraindication to a contrast agent. ■ For evaluating the response to treatment for a vascular graft infection in specific cases where the result can be used to modify the treatment.	Depends on the clinical presentation Depends on the clinical presentation

INFECTIOUS DISEASES		SUGGESTED WAIT TIME (provided only as a guide)
Prosthetic joint infection	**Not indicated** ■ Routinely for investigating a prosthetic joint infection.	—
Osteomyelitis of the axial skeleton	**Indicated in certain cases** ■ For diagnosing axial skeleton osteomyelitis and for evaluating the response to treatment when there is strong clinical suspicion of spondylodiscitis and when the MRI is inconclusive, negative or contraindicated. ■ For evaluating a postsurgical vertebral infection (instrumentation, discoidectomy, resection or graft).	Depends on the clinical presentation and the therapeutic intention At least 6 months after surgery. Varies according to the clinical presentation
Osteomyelitis of the peripheral skeleton	**Indicated in certain cases** ■ For diagnosing chronic-stage osteomyelitis of the peripheral skeleton and evaluating the response to treatment in specific cases where a rapid diagnosis (compared to a gallium scan) is important for therapeutic decision-making.	Depends on the clinical presentation and the therapeutic intention
Fever of unknown origin	**Indicated in certain cases** ■ In the investigative workup of fever of undetermined origin when conventional investigations have not revealed the source or have shown equivocal lesions. → PET-CT should be performed early in immunocompromised patients and in those with renal failure.	Depends on the clinical presentation and the therapeutic intention

INFLAMMATORY DISEASES		SUGGESTED WAIT TIME (provided only as a guide)
Sarcoidosis	**Indicated in certain cases** ■ For investigating sarcoidosis when there is clinical suspicion with an atypical presentation (no biological marker, atypical imaging, poorly localized lesion or biopsy site difficult to access) and for assessing disease activity and the need for treatment. ■ For confirming the clinical and laboratory signs of disease persistence or recurrence during cortisone withdrawal or when treatment is modified.	≤ 28 days ≤ 10 days
Large vessel vasculitis	**Indicated in certain cases** ■ For investigating large vessel vasculitis in the following specific cases : • Clinical suspicion with a negative temporal artery biopsy ; • An inflammatory clinical presentation or clinical suspicion of large vessel vasculitis with no identifiable site for a biopsy ; • Clinical suspicion based on imaging suggestive of aortitis. ■ For confirming the clinical and laboratory signs of disease persistence or recurrence during cortisone withdrawal or when treatment is modified.	Should be performed before corticosteroid therapy is initiated ≤ 10 days (failure of cortisone withdrawal)

NEUROCEREBRAL DISEASES

For more information on this topic, visit the section **Publications** on INESSS's website.

		SUGGESTED WAIT TIME (provided only as a guide)
Encephalitis	**Not indicated** ■ Routinely for evaluating a patient with encephalitis. It may be useful as a complementary investigative tool in specific cases of unexplained atypical cognitive deterioration.	—
Epilepsy	**Indicated in certain cases** ■ For investigating a patient who is candidate for the surgical resection of an epileptogenic focus, in conjunction with other diagnostic tests. → This indication is evaluated on a-case-by-case basis. The concordance between PET-CT and other investigations results has prognostic value for surgical success.	Depends on the clinical course
Neurocognitive disorders	**Indicated in certain cases** ■ For evaluating a patient with a neurocognitive disorder only in specific cases where identifying the disease process could change the treatment plan. → In February 2017, Health Canada approved ^{18}F-florbetaben, an amyloid-specific tracer, for diagnostic purposes. To ensure compliance with the current recommendations, the use of this agent should be reserved for nuclear medicine practice at a facility specializing in the evaluation of neurodegenerative diseases. → When the diagnosis is uncertain after PET-CT, it should not be repeated for at least 12 months. → In general, PET-CT should not be performed during an acute episode (delirium, encephalopathy, acute psychosis, etc.).	≤ 3 months
	Not indicated ■ Routinely for evaluating a patient with a neurocognitive disorder.	—
Parkinsonian-like motor disorders	**Indicated in certain cases** ■ When the diagnosis is uncertain or in the case of an atypical presentation, in conjunction with other diagnostic tests.	≤ 3 months
	Not indicated ■ Routinely for evaluating a patient with a Parkinsonian-like motor disorder.	—

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