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Seminars in
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# FDG-PET for Assessment of Endometrial and Vulvar Cancer

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**Fluorodeoxyglucose positron emission tomography computed tomography (FDG-PET/CT) provides a comprehensive whole body evaluation in patients with endometrial and vulvar cancer. Here, we discuss the role of FDG-PET/CT in defining the disease extent in patients presenting with these cancers. Detection of lymph node and distant metastases has implications for staging, treatment planning, and patient prognosis. Procedures for image acquisition and interpretation for optimum accuracy and essential elements that should be included in the PET-CT report are described. Common imaging pitfalls are presented and illustrated with examples.**
**Semin Nucl Med 49:471-483** 

## Introduction

FDG-PET/CT is unique among imaging modalities in providing a noninvasive whole body evaluation in patients with gynecologic malignancy. For treatment planning in patients at initial presentation and those with recurrent disease, FDG-PET/CT has a role to play. In this article we describe technical parameters for optimum image acquisition, criteria for image interpretation, and essential elements for treatment planning to be included in the exam report.

## Technique

### Timing of Imaging

The timing of the PET study is important in order to avoid false positive findings related to medical, radiation, and surgical therapies.[1] Imaging at 2 and 6-12 weeks postmedical and radiation therapy, respectively, is recommended.[2] Medical treatment with colony stimulating factors can lead to intense bone marrow uptake. Radiation treatment can cause inflammatory change at tumor sites and in local soft tissues. Postsurgical change can also affect PET imaging, with changes most evident 6-8 weeks postoperatively, which gradually decrease over the next several weeks to months. Although the optimum time for imaging can vary with several individual patient factors, the treatment modalities employed should be taken into consideration when deciding on the timing of imaging.

### Patient Preparation

Patients are asked to avoid strenuous activity and exercise on the day prior to the examination in order to decrease skeletal muscle uptake.[1,3] Patients are also asked to fast for 4-6 hours prior to FDG administration to facilitate tracer uptake. Diabetics are asked to fast for at least 4 hours, and encouraged to eat and administer insulin before fasting.[2] If the patients' blood glucose level is greater than 250 mg/dL the examination is deferred.[3] Women of child-bearing age are screened for pregnancy.

Typically, PET imaging is performed 60-90 minutes following FDG administration. Patients are asked to void prior to imaging, to minimize tracer activity in the bladder.

### Scanning Protocol

At our institution, the standard FDG-PET/CT imaging protocol begins with a noncontrast, low dose whole-body CT for attenuation correction.[1,3] Following this, the FDG-PET study is performed, from the skull base, to the proximal thighs, with the patients arms raised. Subsequently, a diagnostic, quality CT with standard radiation dose and intravenous contrast is performed.

There is practice variability relating to the acquisition of a diagnostic quality CT, throughout the United States.[4] A diagnostic quality CT with standard radiation dose is

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https://doi.org/10.1053/j.semnuclmed.2019.06.011
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necessary for accurate tracer localization in the abdomen and pelvis. It enables anatomic differentiation of background physiologic tracer (eg, urine and bowel) from metastases (eg, lymphadenopathy and peritoneal carcinomatosis) and thereby improves accuracy of the test.[5,6] Diagnostic CT images also enable morphologic tumor measurements for standardized response assessment (eg, RECIST assessment).[1] In addition to diagnostic radiation doses, use of intravenous contrast aids in evaluation of solid parenchymal organs (eg, liver and kidney) and vessels but its use is less essential in gynecologic cancer patients.

Specific to FDG-PET/CT for the evaluation of gynecologic malignancy, there are a number of features of our imaging protocol designed to optimize whole body evaluation. First, we scan in the caudal-cranial direction to minimize the time between attenuation correction CT and PET scanning at the pelvic bed position. This is preferred for abdomino-pelvic evaluation as it minimizes potential attenuation correction artifact resulting from misregistration due to bowel peristalsis and bladder filling over time.[1] Second, our standard protocol extends from the skull base to upper thighs to include the supraclavicular and inguinal lymph node stations, both potential sites for metastatic disease.[3]

# Endometrial Cancer

Endometrial cancer is the most common gynecologic malignancy in the United States with 63,230 newly diagnosed cases and 11,350 deaths expected in 2018.[7] Approximately 90% of patients with endometrial cancer present with abnormal vaginal bleeding and an abnormally thickened endometrium on endovaginal ultrasound (Fig. 1).[8]

Clinically, endometrial cancer is divided into two subtypes, type 1 (low risk) and type 2 (high risk).[9-12] Type 1 neoplasms are of low grade, that is, grade 1 and 2, endometrioid and comprise the majority of endometrial cancer diagnosed.[13] These tumors are estrogen sensitive, usually preceded by endometrial hyperplasia, present at an early stage and have a favorable prognosis.[14,15] Type 2 neoplasms include grade 3 endometrioid endometrial carcinomas and the nonendometrioid histologies that include serous, clear cell, mixed cell, and undifferentiated carcinomas with carcinosarcomas.[12] These tumors are not estrogen sensitive, not associated with obesity and are associated with a poor prognosis.[16]

## Staging and Primary Treatment Planning

The disease is staged with surgery and pathology according to the FIGO system.[17] Surgical FIGO staging calls for a total

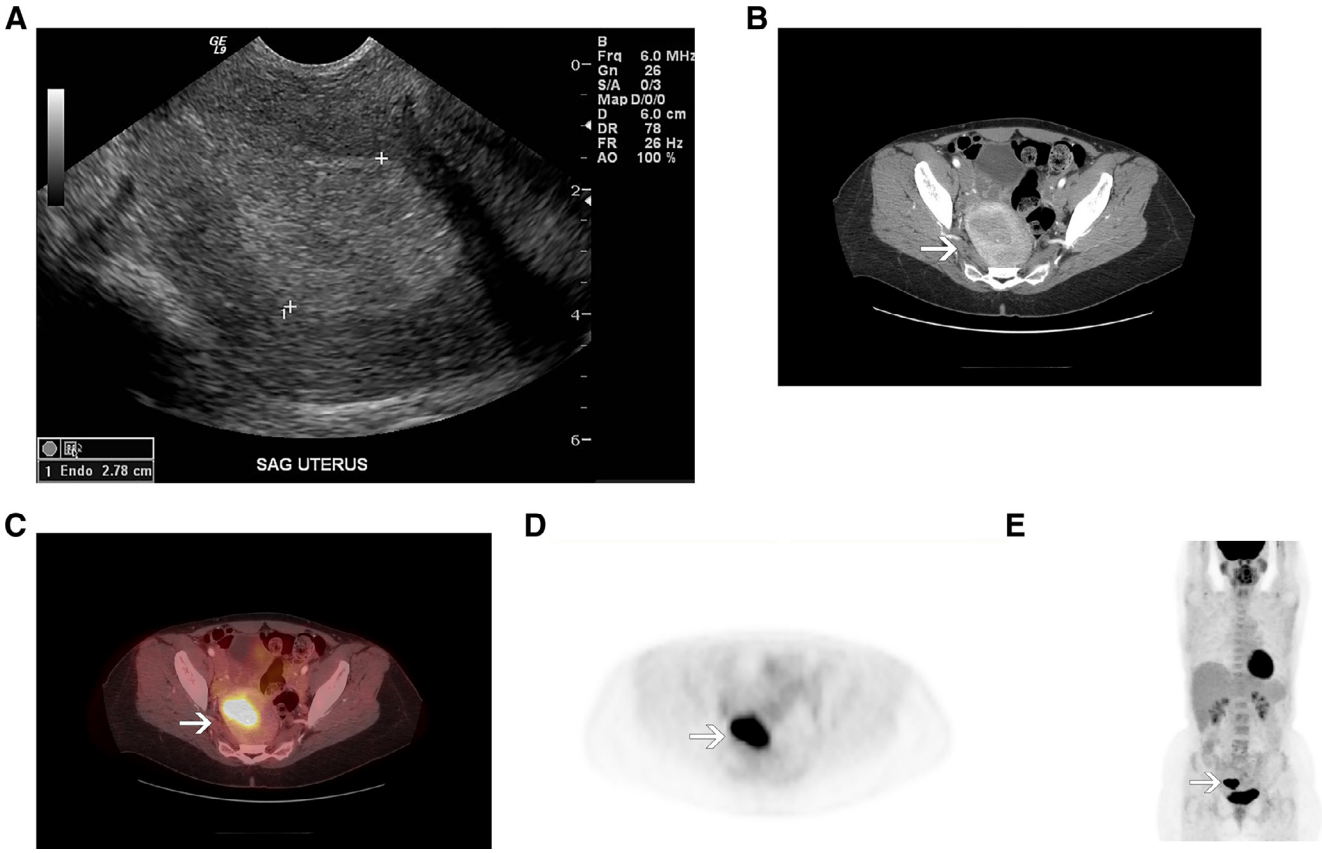


**Figure 1** Incidental detection of uterine endometrial cancer. A 53-year old peri-menopausal female who underwent a PET-CT for an incidentally detected pulmonary nodule. PET-CT demonstrated enhancing mass within the uterine cavity with associated increased FDG uptake suspicious for malignancy. Endometrial adenocarcinoma, endometrioid type, was diagnosed on biopsy. Sagittal endovaginal ultrasound image (A) demonstrates endometrial thickening (calipers). Axial contrast-enhanced CT (B), fused PET/CT (C), PET (D) images of the pelvis, and (E) whole body MIP PET images demonstrate mass FDG-avid mass (arrows).

abdominal hysterectomy, bilateral salpingo-ophorectomy, peritoneal washings, and retroperitoneal lymph node dissection.[17] However, to minimize the morbidity of surgical staging, lymph node dissection is performed selectively depending on the features of the primary tumor.

Lymph nodes are a common site of metastasis in endometrial cancer. First echelon nodal groups that drain the uterus are the abdominopelvic retroperitoneal regions.[3] The pelvic retroperitoneum (external, internal, common iliac, and obturator) nodes drain the adnexa, uterus, cervix, and upper 2/3 of the vagina. Paracaval and paraaortic nodes are first echelon drainage sites for drainage of the adnexa and uterine fundus.

The approach to lymph node evaluation in patients with endometrial cancer is a topic that has been debated and has evolved over time. Previously, a complete staging lymphadenectomy, including dissection and assessment of pelvic and paraaortic lymph nodes was recommended for all patients.[18] This approach was associated with long operating times, and peri- and postoperative morbidity, including lymphedema. Now, a more selective approach is recommended by the European Society for Medical Oncology, European Society of Gynecologic Oncology, and European Society of Radiotherapy and Oncology;[19] the Society of Gynecologic Oncologists;[20] and the National Comprehensive Cancer Network.[8]

Aside from high histologic grade, the features of endometrial cancer that predict lymph node involvement include tumor size larger than 2 cm, myometrial invasion greater than 50% thickness and cervical stromal invasion.[21,22] In practices where frozen section analysis and gynecologic oncologic surgical expertise is routinely available, surgeons can usually forego preoperative imaging and decide on whether to perform lymphadenectomy intraoperatively based on the hysterectomy specimen.[21] However, most practices rely on preoperative MRI to evaluate the primary tumor, specifically the above-mentioned features, to assess the need for lymphadenectomy.

## Image Analysis

Imaging is specific but of limited sensitivity in detecting lymphadenopathy. Sensitivity and specificity for the detection of lymph node metastases in endometrial cancer has been reported at 53% and 99%, respectively.[23,24] A more recent meta-analysis demonstrated an overall pooled sensitivity and specificity of 72% and 94%.[25] PET-CT is more sensitive than CT or MRI for the detection of lymphadenopathy[26-29] (Table 1) as it allows for the detection of tumor involvement in lymph nodes less than 1 cm in short axis (Fig. 2).

Studies have attempted to correlate metabolic activity of the tumor, measured by standardized uptake value (SUV), with its biologic behavior. One study of 44 patients demonstrated an association between SUV max of the primary tumor and FIGO grade.[30] Another study, of 42 patients with stage III or IV endometrial cancer, found that an SUV of 9.5 or less in the involved lymph nodes correlated with better overall survival.[31]

Resolution is a limiting factor for PET-CT sensitivity. The senstivity for the detection of metastatic lymph nodes was 17% for nodes less than 4 mm, 67% for nodes 5-9 mm, and 93% for nodes greater than 10 mm.[23] Consequently, although preoperative PET-CT assists in surgical planning and for targeted nodal resection for histologic confirmation, staging lymphadenectomy is still performed in patients with primary tumors demonstrating high-risk features without imaging evidence of extrauterine disease. This enables pathologic detection of micrometastases to the lymph nodes that might have been missed with imaging alone.

**Table 1 Comparison of Sensitivities of Fusion FDG-PET/CT vs CT in Detecting Retroperitoneal Lymph Nodes in Patients With High-Risk Endometrial Cancer**

| Sensitivity for Lymphadenopathy Detection | | | |
|---|---|---|---|
| **ACRIN6671/GOG0233: 256 Endometrial Cancer Patients, 13 Sites** | | | |
| **Sensitivity** | **PET/CT** | **CT** | ***p* value** |
| Abdomen | 0.65 (CI:0.57,0.72) | 0.42 (CI:0.36,0.48) | 0.01 |
| Pelvis | 0.65 (CI:0.57,0.72) | 0.48(CI:0.41,0.56) | 0.004 |

Adapted from Atri et al.[29]

A proportion of patients with high-grade tumor histology have distant metastases that is, disease outside the uterus and abdominopelvic nodes, such as in the peritoneal cavity, lungs, or bones.[32] A recent analysis of a prospective multicenter study demonstrated that 11.8% of patients with high-risk endometrial cancer harbored distant metastases detected with PET-CT[33] (Table 2). The presence of metastatic disease confirmed with biopsy would triage a patient to systemic therapy and away from the morbidity of a large scale staging operation and to systemic therapy[34] (Fig. 3).

## Exam Reporting

The FDG-PET/CT report in endometrial cancer patients (Table 3) should describe whether the primary tumor is FDG-avid. In patients with low-grade non—FDG-avid tumors, detection of extrauterine disease would rely solely on the CT without the benefits of PET. If the tumor can be accurately measured, its size should also be reported. The presence or absence of retroperitoneal lymph node metastases and their locations in the pelvic stations (internal, external, and common iliac and obturator) and abdominal stations (paraaortic) should be described. Local and distant metastases that commonly include the peritoneum, lungs, bones, and nonretroperitoneal lymph nodes should also be reported.

## Imaging in Recurrence

In following patients after primary therapy, imaging is performed only when there is clinical suspicion for disease recurrence.[35] PET-CT may be more sensitive than conventional imaging (eg, CT or MRI) for the detection of recurrent endometrial cancer.[36] Consequently, it is particularly useful in defining disease extent when loco-regional therapy is planned. Recurrence is typically seen in the vaginal vault and in pelvic and paraaortic lymph nodes[35] (Fig. 4). Other sites for recurrent disease include liver, lung, bone, and peritoneal

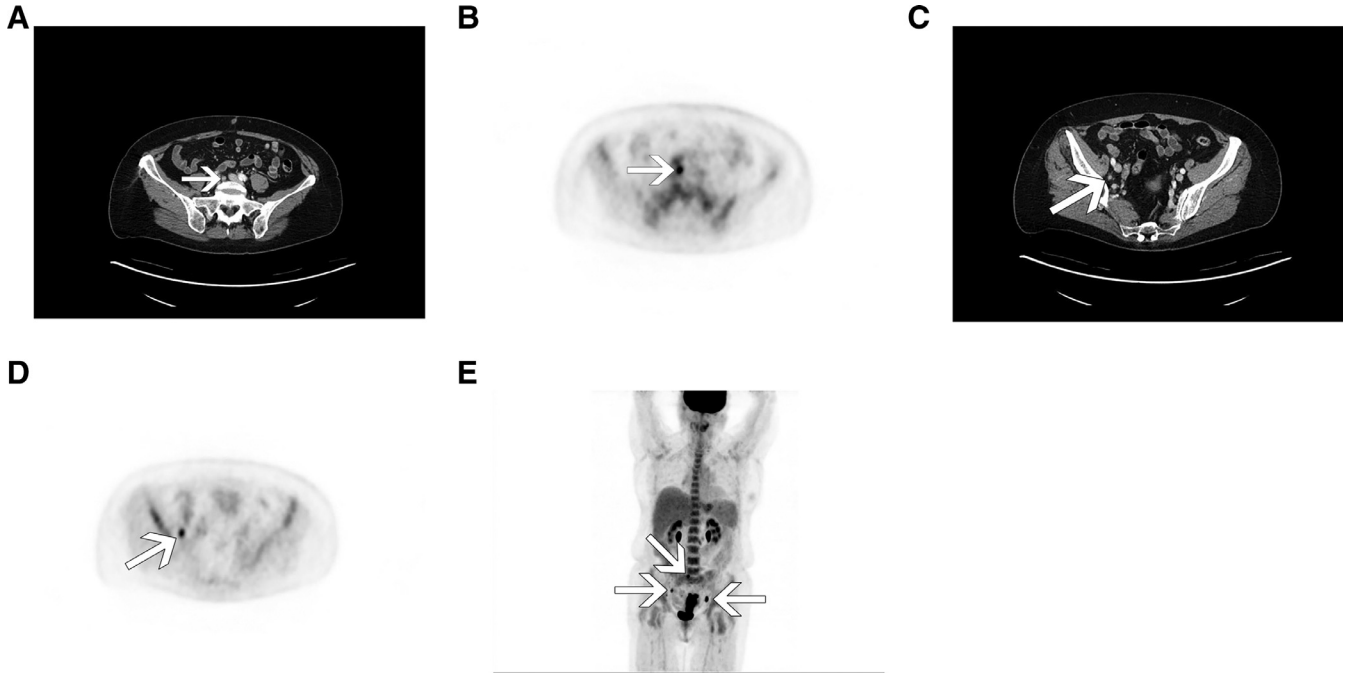


**Figure 2** PET-CT in the detection of small lymph node metastases in endometrial cancer surgical planning. A 79-year-old postmenopausal female, with histologic diagnosis of high-grade endometrial adenocarcinoma with clear cell features. Axial contrast-enhanced CT (A and C) and axial PET images (B and D) and coronal PET (E) images demonstrate nonenlarged, FDG avid right common iliac (A and B) and right obturator (C, D, and E) lymph nodes (arrows). A hysterectomy, bilateral salpingo-oophorectory, right pelvic lymphadenectomy and right para-aortic lymph node excision were performed. Metastatic high-grade serous adenocarcinoma was present in 5 of 13 right pelvic lymph nodes including a single right common iliac lymph node.

cavity. 64% of recurrences occur within 2 years and 87% within 3 years.[35]

# Vulvar Cancer

Vulvar cancer is a relatively rare gynecologic malignancy, estimated at 6190 new cases and 1200 deaths in 2018.[7] Most patients are diagnosed at an early stage when the disease is confined to the perineum without metastases.[37] Histologically, 90% of vulvar cancers are squamous cell.[38] The remaining 10% include melanomas, basal cell carcinomas, sarcomas, and adenocarcinomas.[39,40]

**Table 2** Rates and Location of Distant Metastases Detected With FDG-PET/CT in Women With High-Risk Endometrial Cancer

| Detection of Distant Metastases in High-Risk Endometrial Cancer | |
|---|---|
| Total patients | 203 |
| Pts with distant mets | 24 |
| % pts with distant mets | 11.8 (7.7-17.1) |
| Locations: | Peritoneum (14) |
| | Supraclav LN (2) |
| | Lung (2) |
| | Inguinal LN (2) |
| | Thoracic LN (2) |
| | Liver (2) |
| | Bone (2) |
| | Pleura (1) |

Adapted from Gee MS, Atri M, Bandos AI et al *Radiology* 2017.

## Staging and Primary Treatment Planning

Vulvar cancer is staged with surgery and pathology according to the FIGO system.[41] Guidelines recommend complete surgical resection of the primary vulvar tumor, with at least 1 cm margins. This may not always be achievable if resection of vital structures (eg, urinary or anal sphincter) is required. In such cases, radiation therapy alone or in combination with surgery is used to treat the primary tumor. In patients with tumors >2 cm, either a unilateral or bilateral inguinofemoral lymphadenectomy, or a sentinel lymph node biopsy is performed for staging.[41-43]

The typical pattern of spread in vulvar carcinoma is via lymph nodes[44] (Fig. 5). Lymphatic drainage from the vulva is primarily to the inguinofemoral region and secondarily to the external and internal iliac lymph node stations.[41] Ipsilateral lymph node involvement is typical. However, the risk of contralateral lymph node metastases increases as the lesion approaches midline.[45] Stage IVb disease is defined as any distant metastasis which includes the second echelon external iliac lymph nodes in the pelvis[41] (Fig. 6). Lymph node status is the most important determinant of survival.[46] Patient age >55 years, tumor thickness, lymphovascular invasion, age above 55 years, and poor histologic differentiation are risk factors for nodal involvement.[47]

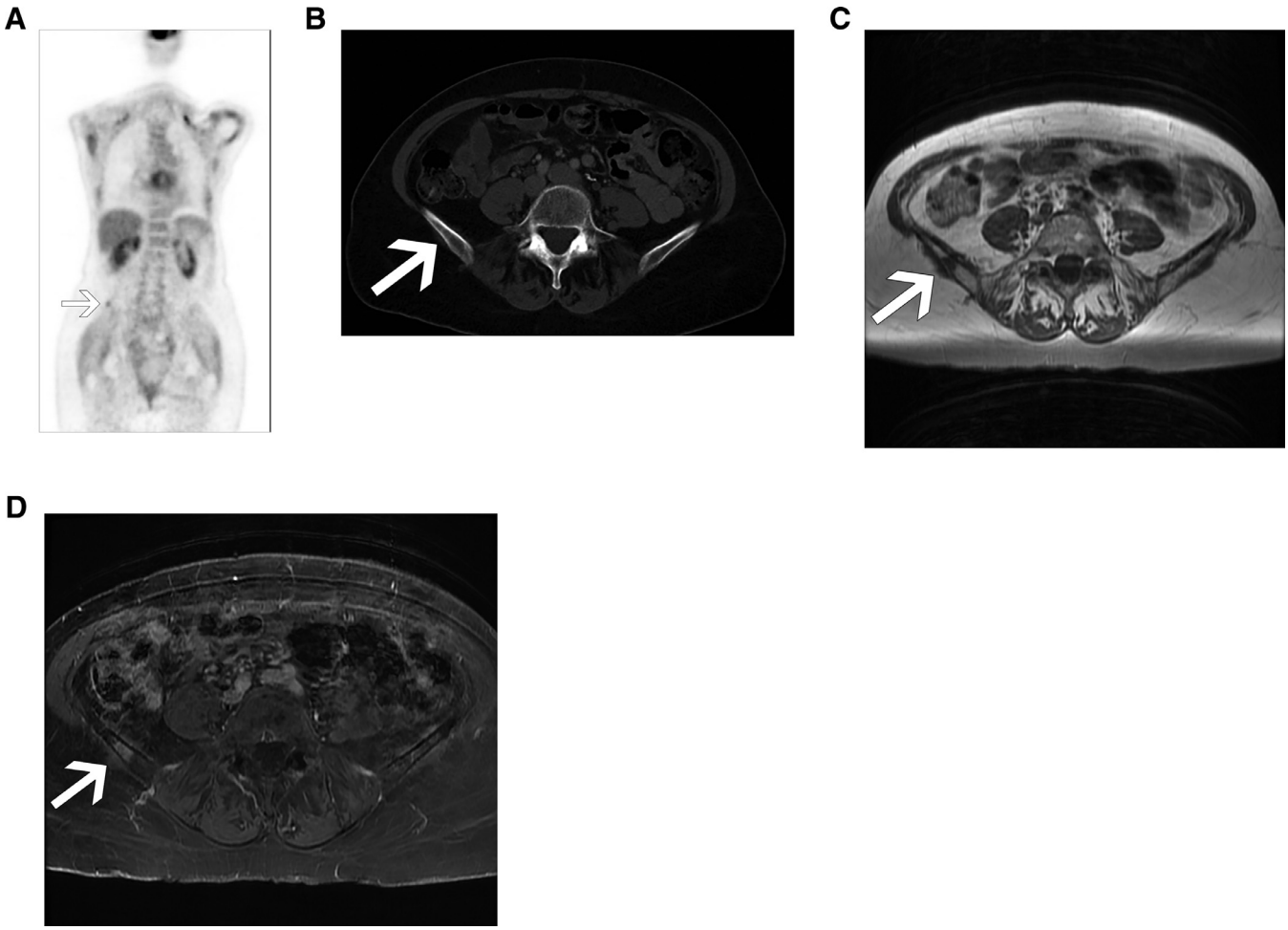


**Figure 3** FDG-PET for the identification of unsuspected distant metastatic disease in endometrial cancer at presentation. A 70-year-old postmenopausal female with a diagnosis of small cell carcinoma of the endometrium. Coronal PET image (A) identifies a focus of FDG uptake in the right iliac bone (arrow) which is associated with focal sclerosis (arrow) on the concurrent CT (B). Pelvic MR axial T1-weighted image without fat saturation (C) and postgadolinium image (D) demonstrate an enhancing marrow-based lesion (arrows) at the same site which was histologically confirmed on biopsy as metastatic adenocarcinoma consistent with an endometrial primary.

## Image Analysis

FDG-PET/CT is used to evaluate for lymph node metastases to the inguinofemoral region (stage III) or to the pelvis (stage IVb). Lymph nodes are considered positive for metastases if they are more tracer avid than normal lymph nodes elsewhere in the body. Small cohort prospective studies demonstrate that, for lymphadenopathy detection, PET-CT is moderately sensitive and specific. Reported sensitivities range between 50% and 92% and specificities of 67% and 100%.[48-52]

A retrospective study of 21 patients demonstrated that lymph nodes with an $SUV_{max}$ over 4.5 were likely to be malignant and those with an $SUV_{max}$ over 9 certain to be so.[53]

## Exam Reporting

The FDG-PET/CT report should include the site of the primary tumor. The presence or absence of lymph node metastases, which lymph node groups are involved and the highest level of lymph node involvement. Local and distant metastases should also be reported (Table 4).

High recurrence rates of between 30% and 50% at two years have been reported in squamous cell carcinoma of the vulva[54,55] (Fig. 7). Most recurrences are local. In one multicenter study, over 50% of the recurrences were vulvar, with almost 20% inguinal and 14% multisite.[56] Recurrences in the groin are associated with a poor prognosis.

# Pitfalls

## False Positives

### Infection and Inflammation

Infection and inflammation are common causes of false positives. This is a common finding in the evaluation of inguinal lymph nodes. Lymph nodes draining an infected tumor could mimic metastatic lymphadenopathy[57,58] (Fig. 8).

**Table 3** Reporting Elements for Endometrial Cancer Treatment Planning

| Reporting Elements for Endometrial Cancer Treatment Planning |
|---|
| • Primary tumor |
| – Size |
| • Reliably assessed on contrast-enhanced CT, not as well on the PET or noncontrast CT. |
| – FDG avid: Y/N |
| • If primary tumor is not FDG avid, only the CT images will be useful in evaluating for metastases |
| • Retroperitoneal lymph node metastases |
| – Present/absent |
| • Nodes considered positive for metastases if increased FDG uptake relative to normal nodes elsewhere in body |
| – Anatomic location |
| • Pelvis: external or internal iliac, obturator, common iliac |
| • Abdomen: – right and left para-aortic |
| • Distant metastases |
| – Present/absent |
| – Anatomic location |
| • Common sites include peritoneal nodules, bone, lung, and lymph nodes outside the abdominopelvic retroperitoneum (eg, intraperitoneal, inguinal, and supraclavicular) |

Chronic diagnoses, such as sarcoid or HIV infection, should also be accounted for as these can lead to FDG-avid lymph nodes that mimic tumor metastases.[59,60] Thus, lymphadenopathy read as positive on imaging should be confirmed histologically. Following primary therapy, the timing and nature of the patient's treatment history is important to avoid false positive image interpretation. Gynecologic cancer treatment can include surgery, radiation and/or chemotherapy which could lead to cystitis, enteritis, and pneumonitis which can also cause false positive findings. Knowledge of the timing and nature of the patients' treatment history is important for image interpretation.

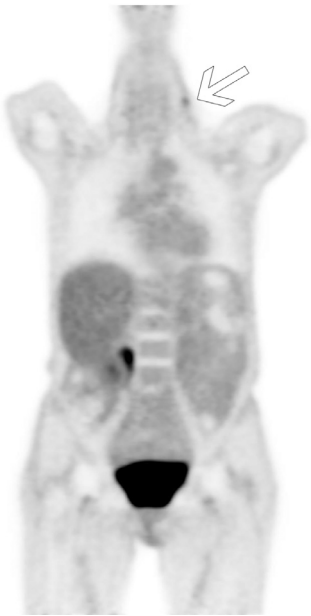

**Figure 4** FDG-PET for the identification of unsuspected multifocal metastatic disease in recurrent endometrial cancer. A 69-year-old postmenopausal female, history of poorly differentiated endometrial cancer with a known recurrence in a left paraaortic lymph node. Coronal PET image from a PET/CT obtained before chemotherapy demonstrates a focus of uptake in the lower left neck (arrow) confirmed on biopsy to be poorly differentiated carcinoma, with cytologic features compatible with the endometrial cancer recurrence.

## Benign Neoplasms

Benign neoplasms in the pelvis, including endometrial polyps, fibroids, and adenomyosis can display FDG uptake[61] (Fig. 9). The degree of tracer uptake in uterine fibroids is highly variable.[3] Knowledge of the patient's menstrual status is important in image interpretation, as increased FDG uptake in uterine fibroids can occur in the menstrual and ovulatory phases.[58] Uptake can mimic uterine sarcoma,[62] as well as cervical and endometrial carcinoma.[61,63] In general, uptake in benign lesions is less than that of malignant lesions, although there is considerable overlap. Given that leiomyomas are more common than leiomyosarcoma, increased FDG uptake alone, in the setting of otherwise reassuring morphologic features, should not raise suspicion for a malignant entity.

## Tracer Mislocalization

Defining tumor extent in the abdomen and pelvis can be challenging for the reader as normal physiologic uptake and excretion is present and its location variable with each case. Location of the bowel, bladder, and other pelvic organs alters during the duration of scanning. Physiologic excretion of FDG in the ureters can mimic retroperitoneal lymphadenopathy. Tracer in bowel loops can be mistaken for peritoneal tumor. Specific to vulvar cancers, urinary contamination of the perineal region can be problematic, particularly in the absence of a diagnostic quality CT. Thus, precise anatomic localization of the tracer using a diagnostic quality CT is essential to avoid false positive diagnoses. Minimizing the scanning delay between the PET and attenuation correction CT image acquisitions, also aids in more precise registration of the image sets. At imaging interpretation, multiplanar

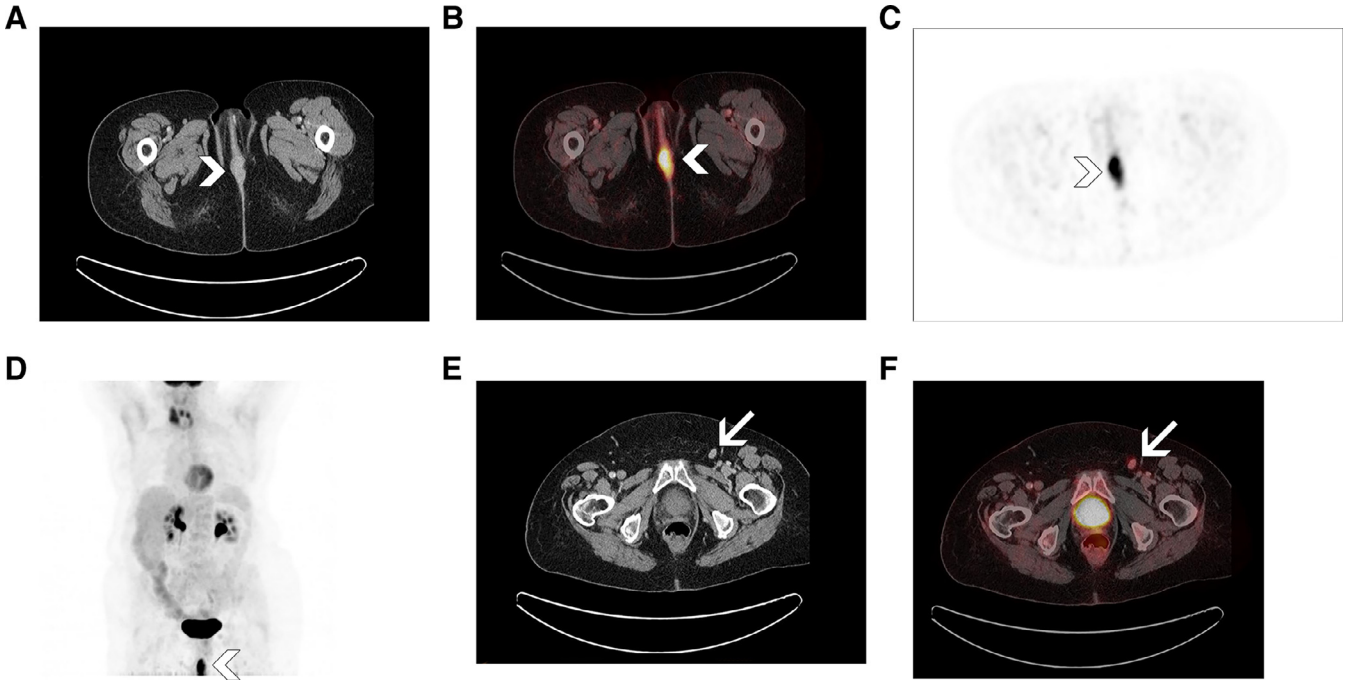


**Figure 5** PET/CT for the detection of small lymph nodes in primary treatment planning for vulvar cancer. A 85-year-old female with squamous cell carcinoma of the vulva. Axial contrast-enhanced CT (A), fused PET/CT (B) and PET (C) images through the pelvic floor and a coronal whole-body MIP (D) image demonstrate a FDG-avid vulvar mass corresponding to the primary tumor (arrowheads). Axial contrast-enhanced CT (E) and fused PET/CT (F) images through the lower pelvis demonstrate a FDG-avid left inguinal lymph node (arrow), which is not enlarged by size criteria, but histologically confirmed to be metastasis.

reformations and analysis of the fusion images also aids in minimizing these errors.[1,3]

## False Negatives

### Non-FDG Avid Cancers

Most endometrial cancers are abnormally hypermetabolic on PET-CT. However, low-grade cancers (eg, grade 1 endometrioid) can demonstrate little-to-no FDG avidity.[30] Thus, reporting of PET-CT exams on patients with endometrial cancer should include a comment on whether the primary tumor is FDG avid.

### Small Lesions Below Limit of Spatial Resolution

Small lymph nodes and peritoneal metastases may not be reliably detected by PET-CT and is better evaluated with a diagnostic quality CT (Figs. 10 and 11). The upper limit of in-plane spatial resolution for PET as recommended by the Society of Nuclear Medicine and adopted by the American College of Radiology is 6.5 mm.[1,64,65] This essentially means that small structures with a diameter of between 7 and 10 mm may not be reliably sampled.[66]

### Cancer Obscured by Background Tracer

Excreted tracer in the bladder can obscure pelvic tumor implants.[1] Proposed methods to account for this issue include delayed pelvic imaging following tracer excretion[67] or bladder catheterization[58,68,69] with or without irrigation, although these are not widely employed. In our practice, scanning in a caudocranial direction, requesting that patients void prior to image acquisition and acquiring diagnostic quality CTs helps to mitigate against the effects of bladder excretion.

# Conclusion

FDG-PET/CT has assumed an important role in the pretreatment evaluation of patients with uterine endometrial and vulvar cancers. Aside from treatment planning, the exam is used to aid in staging and to determine prognosis. Essential reporting elements require a standardized description of the disease extent. This includes description of regional lymphadenopathy and metastases to distant organs. Familiarity with the common patterns of tumor spread and careful adherence to technical standards for image acquisition and interpretation is necessary to avoid false positive and false negative diagnoses.

## Acknowledgments

Aoife Kilcoyne would like to acknowledge the contribution of the MacErlaine Research Scholarship from the Academic Radiology Research Trust, St. Vincents Radiology Group, Dublin, Ireland and the Higher Degree Bursary, from the Faculty of Radiologists, RCSI, Ireland. The authors would like to thank Jacqueline Silva for her assistance in image preparation.

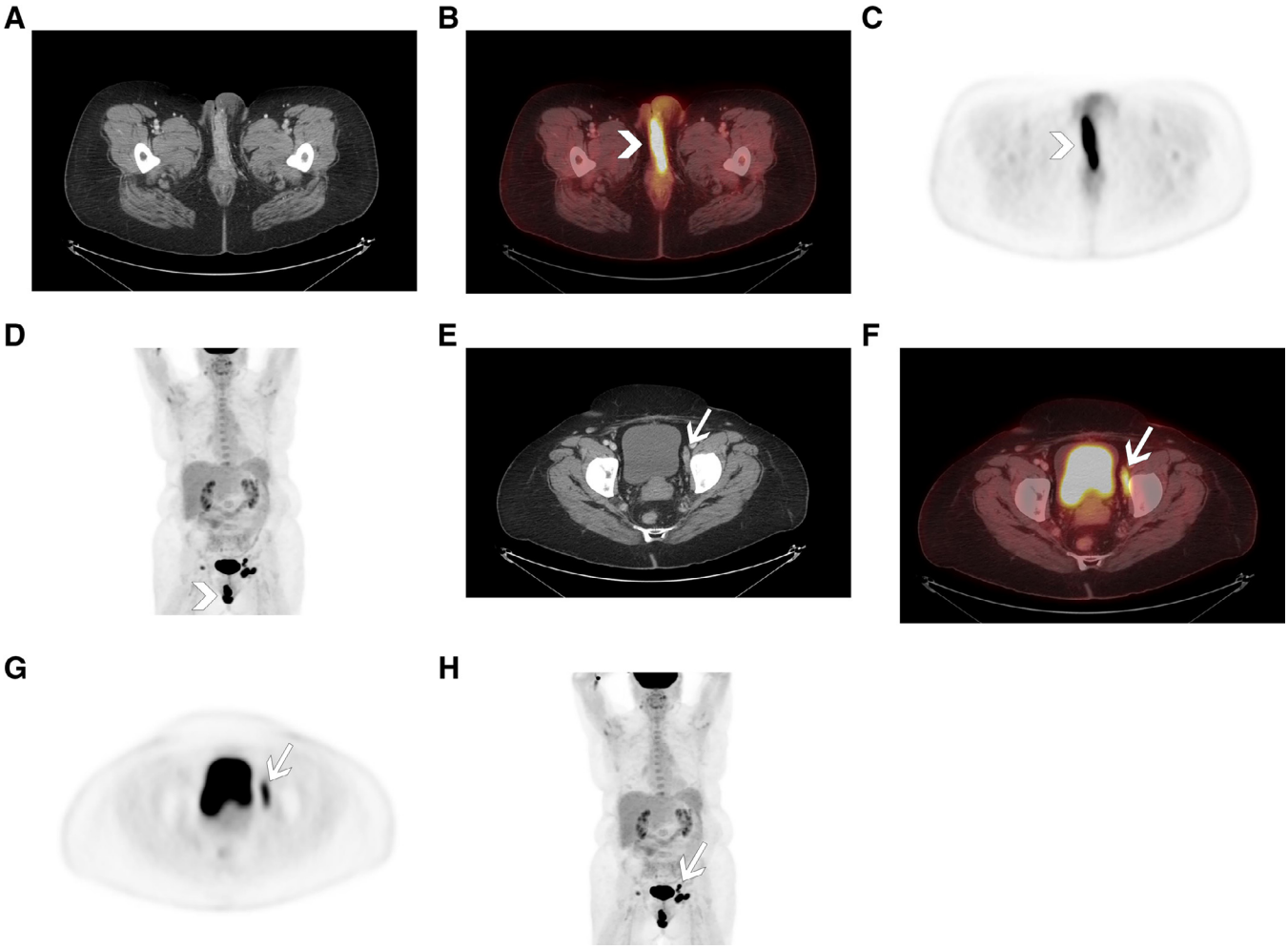


**Figure 6** PET/CT for vulvar cancer staging. A 65-year-old female with squamous cell carcinoma of the vulva. Axial contrast-enhanced (A and E), fused PET/CT (B and F), and PET (C and G) images and coronal MIP PET images (D and H) images demonstrate an enhancing FDG-avid left vulvar mass (arrowheads) corresponding to the primary tumor and an FDG-avid left external iliac lymph node (arrows) that indicates stage IVb disease.

**Table 4** Reporting Elements for Vulvar Cancer Treatment Planning

| Reporting Elements for Vulvar Cancer Treatment Planning |
|---|
| • Primary tumor |
| – Size |
| • Usually reliably assessed on the CT images. |
| – Laterality: right/left |
| • Not reliably assessed with imaging if the mass is near midline |
| • Inguinofemoral lymph node metastases |
| – Present/absent |
| • Nodes considered positive for metastases if increased FDG uptake relative to normal nodes elsewhere in the body |
| – Laterality: right/left |
| • Distant metastases – includes pelvic lymph nodes |
| – Present/absent |
| – Anatomic location |

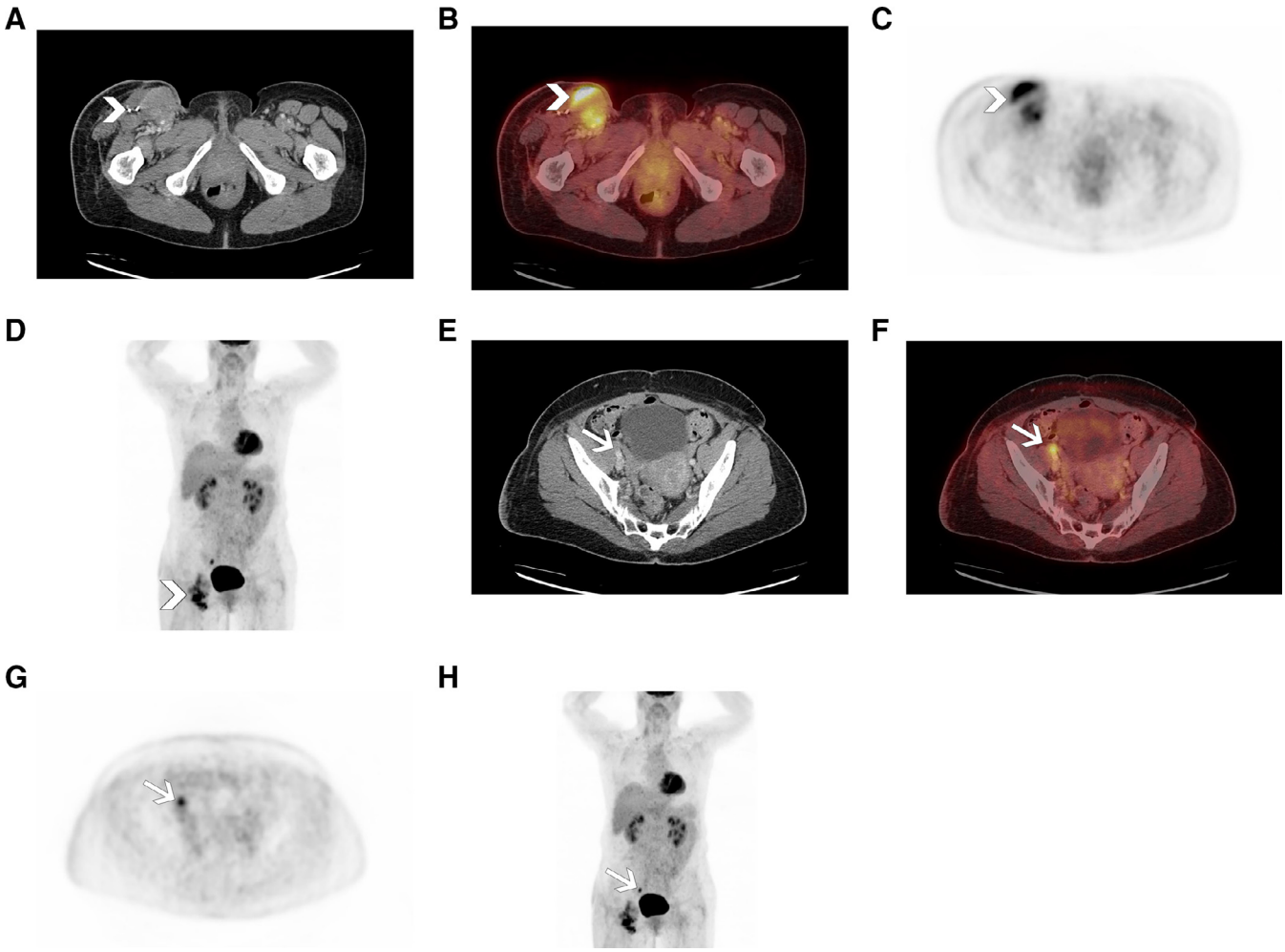


**Figure 7** PET/CT in defining anatomic extent of disease in recurrent vulvar cancer. A 58-year old female with a history of invasive squamous cell carcinoma of the vulva, with a known recurrence in the right groin. Axial contrast-enhanced (A and E), fused PET/CT (B and F), and PET (C and G) images and coronal MIP PET images (D and H) images demonstrate an FDG-avid right inguinal mass (arrowhead) corresponding to the groin mass and an enlarged FDG-avid right external iliac lymph node (arrows) which was not clinically suspected.

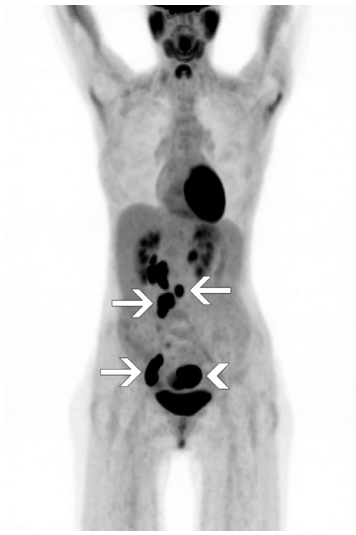

**Figure 8** Pitfall: False positive PET in the setting of infection and malignancy. A 57-year-old female with high-grade endometrial adenocarcinoma. Coronal MIP image from a PET/CT demonstrates an intensely FDG avid uterine mass (arrowhead) consistent with the patients known primary malignancy and FDG-avid lymph nodes (arrows) along the right pelvic side wall and in the right and left paraaortic regions. These lymph nodes were described as suspicious for metastases. A hysterectomy, left salpingo-ophorectomy and retroperitoneal lymph node sampling demonstrated left fallopian tube salpingitis and one right pelvic and seven left paraaortic lymph nodes that were negative for tumor.

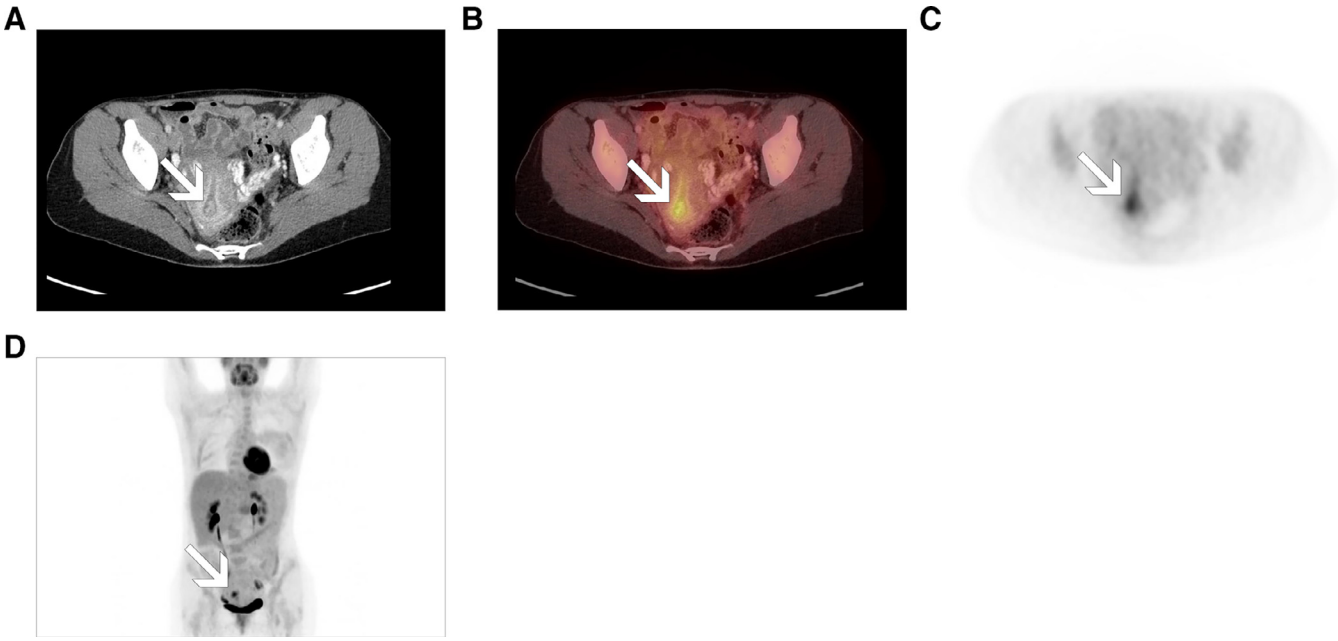


**Figure 9** Benign neoplasms can display FDG uptake. A 41-year-old female with a history of stage I triple negative breast cancer with previous internal mammary node recurrence. Axial CT (A), PET (B), fusion PET/CT (C), and coronal MIP image (D). Staging PET/CT demonstrated focal FDG uptake within the endometrial cavity, localizing to a small enhancing lesion on CT (A) (arrows). The differential included an endometrial polyp, pedunculated fibroid or endometrial malignancy. Hysteroscopy was performed with removal of an endometrial polyp. Pathology demonstrated a benign endometrial polyp.

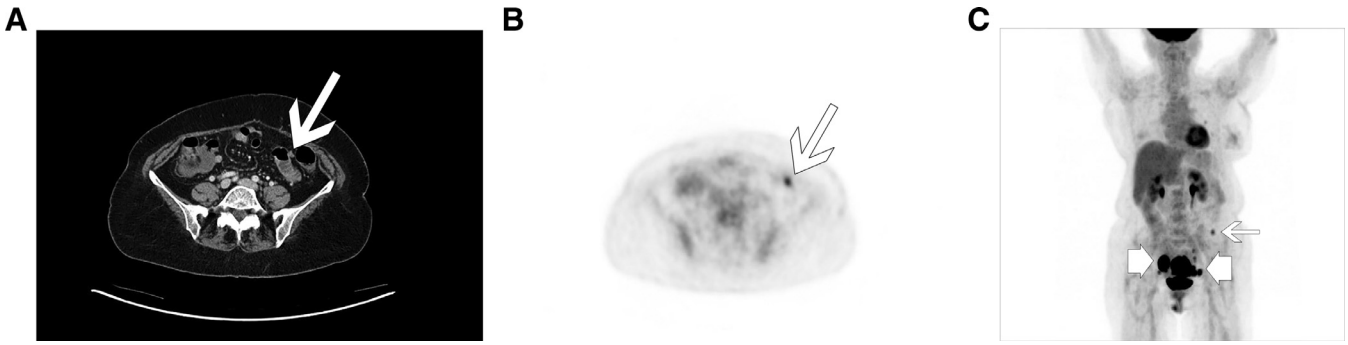


**Figure 10** Utility of PET for the detection of unsuspected peritoneal carcinomatosis in endometrial cancer treatment planning. A 68-year-old postmenopausal female with poorly differentiated carcinoma with adenosquamous differentiation arising from the lower uterine endometrium. Axial contrast-enhanced CT (A) and PET (B) images and a coronal MIP PET image (C) from a pretreatment PET-CT demonstrate a subcentimeter peritoneal nodule (arrows), detected due to its FDG avidity and bilateral adnexal masses (thick arrows).

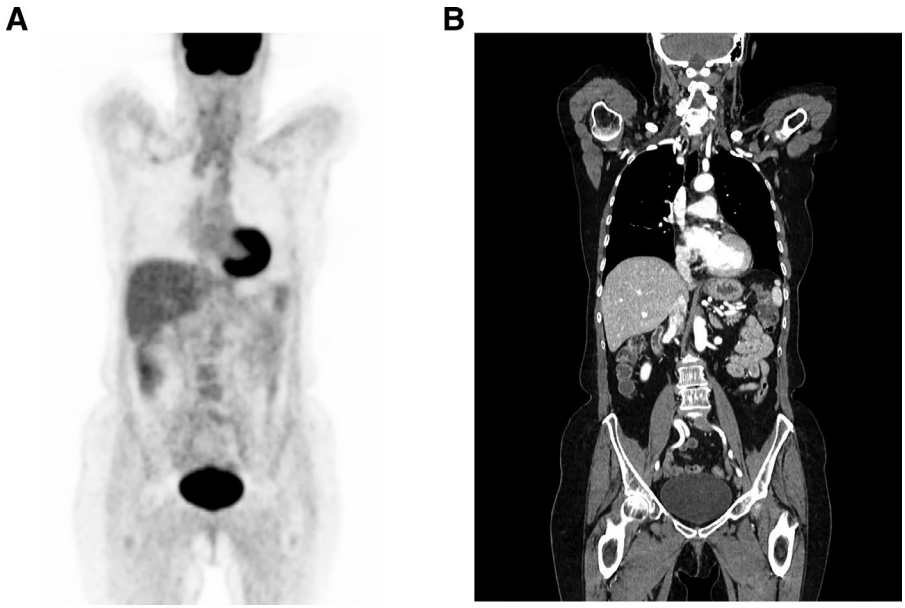


**Figure 11** Pitfall: False negative FDG-PET due to small lymph node size. A 74-year-old postmenopausal female with high-grade serous adenocarcinoma of the uterus. No abnormally enlarged or FDG-avid lymph nodes were seen on the PET/CT, coronal MIP (A) and coronal reconstructed contrast-enhanced CT (B) images. At hysterectomy, bilateral salpingo-oophorectomy, and retroperitoneal lymphadenectomy demonstrated metastatic adenocarcinoma involving one of ten left pelvic lymph nodes, one of two right paraaortic lymph nodes, and one of six left para-aortic lymph nodes.

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