

EMORY
UNIVERSITY
SCHOOL OF
MEDICINE

FDG PET/CT Utility in Gynecologic Malignancies: A comprehensive review of anatomy, pathways of metastatic spread and scan findings

Nicholas Plaxton, MD¹, Aruna Polsani, MD¹, Raghuveer Halkar, MD¹, Karen Godette, MD¹, Barron, Bruce, MD^{1,2}

¹Emory University School of Medicine, ² Atlanta Veterans Affairs Medical Center



LEARNING OBJECTIVES

1. Pictorial review of clinical features of major gynecologic cancers including cervical, ovarian, endometrial, vaginal, and vulvar malignancies and demonstrate the role of FDG PET/CT.
2. Illustrate and correlate anatomic and conventional imaging features of gynecologic malignancies.
3. Demonstrate the integration of FIGO scoring and treatment planning to improve accuracy of staging.

INTRODUCTION

In the United States in 2007,* 80,976 women were diagnosed with gynecologic cancer, and 27,739 succumbed to the disease. Our objective was to review the five major gynecologic cancers (cervical, ovarian, uterine, vaginal, and vulvar) and demonstrate the role of FDG PET/CT in diagnosis, surveillance, FIGO staging and treatment strategy. We selected FDG PET/CT cases done at Emory University with strong key representative findings for each of these gynecological cancers for presentation. Understanding of key findings in gynecological malignancies is crucial for early diagnosis, treatment strategy and assessment of treatment response.

CONTACT

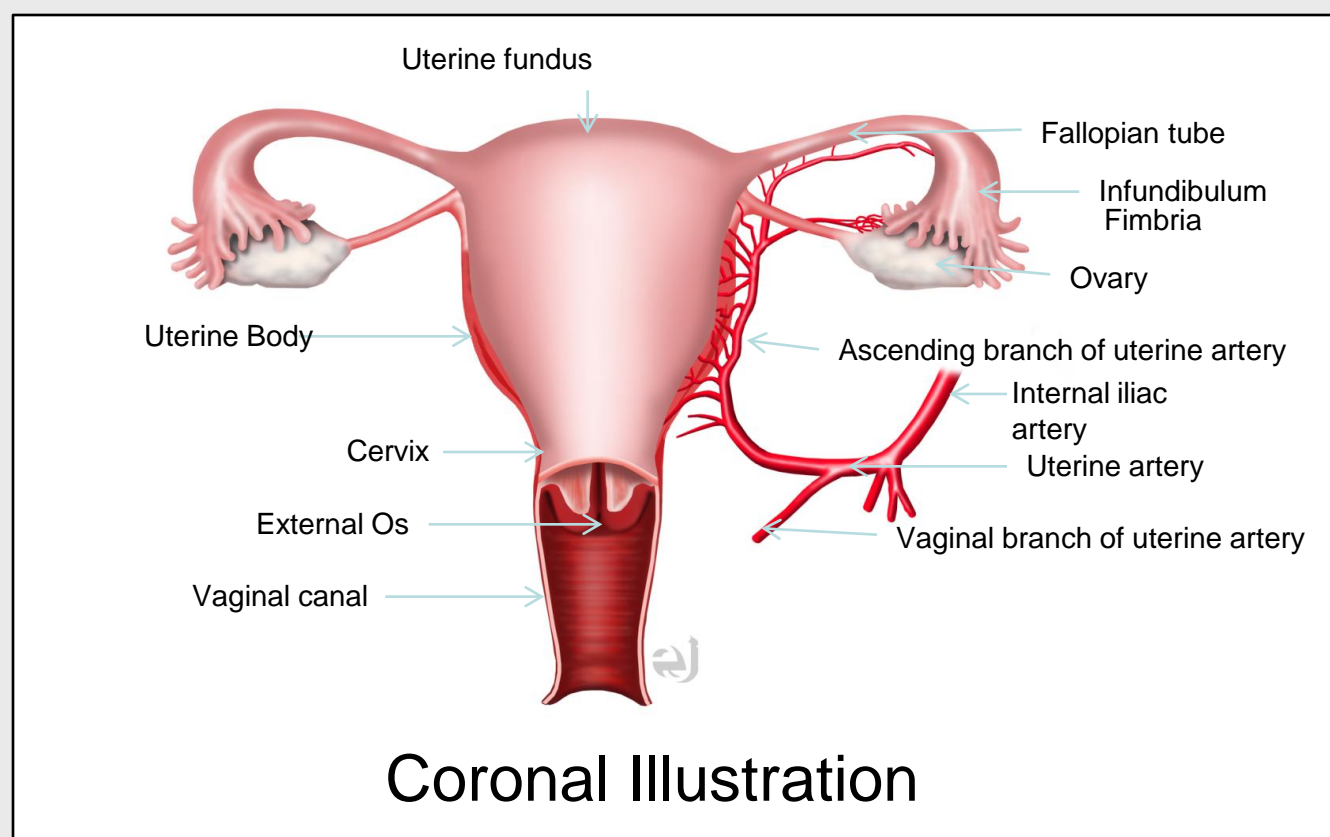
Nicholas A. Plaxton M.D.
Depart of Radiology and Imaging Sciences
Division of Nuclear Medicine
Email: nickplaxton@emory.edu
Phone: 404 712 4868

References and FIGO classification available upon request.

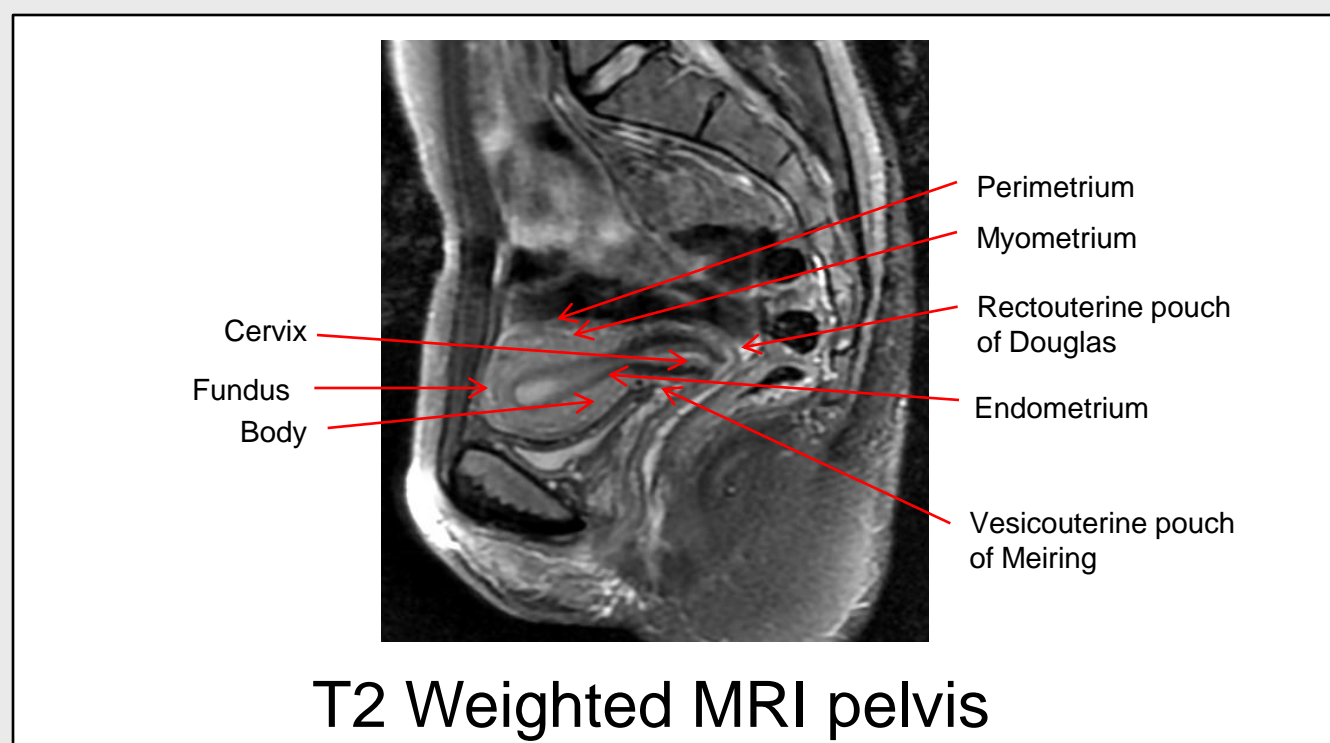
Thanks to Eric Jablonowski for illustration.

Poster Design & Printing by Geniographics® - 800.790.4001

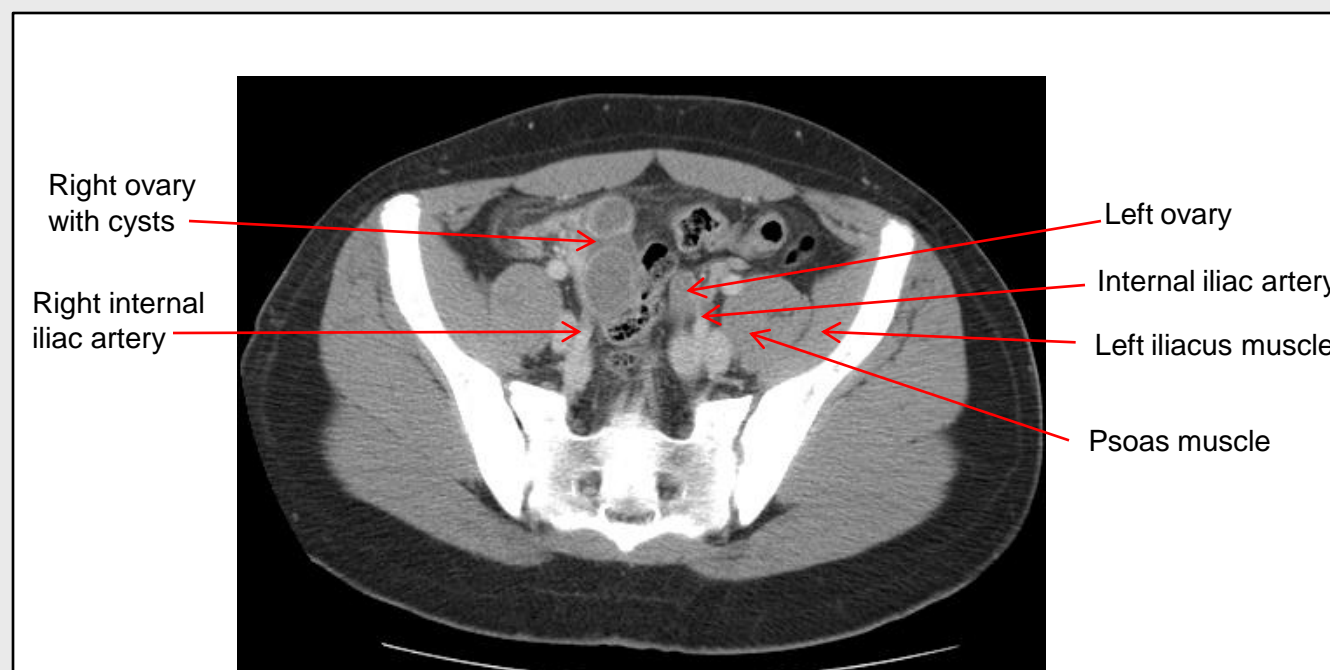
PELVIC ANATOMY



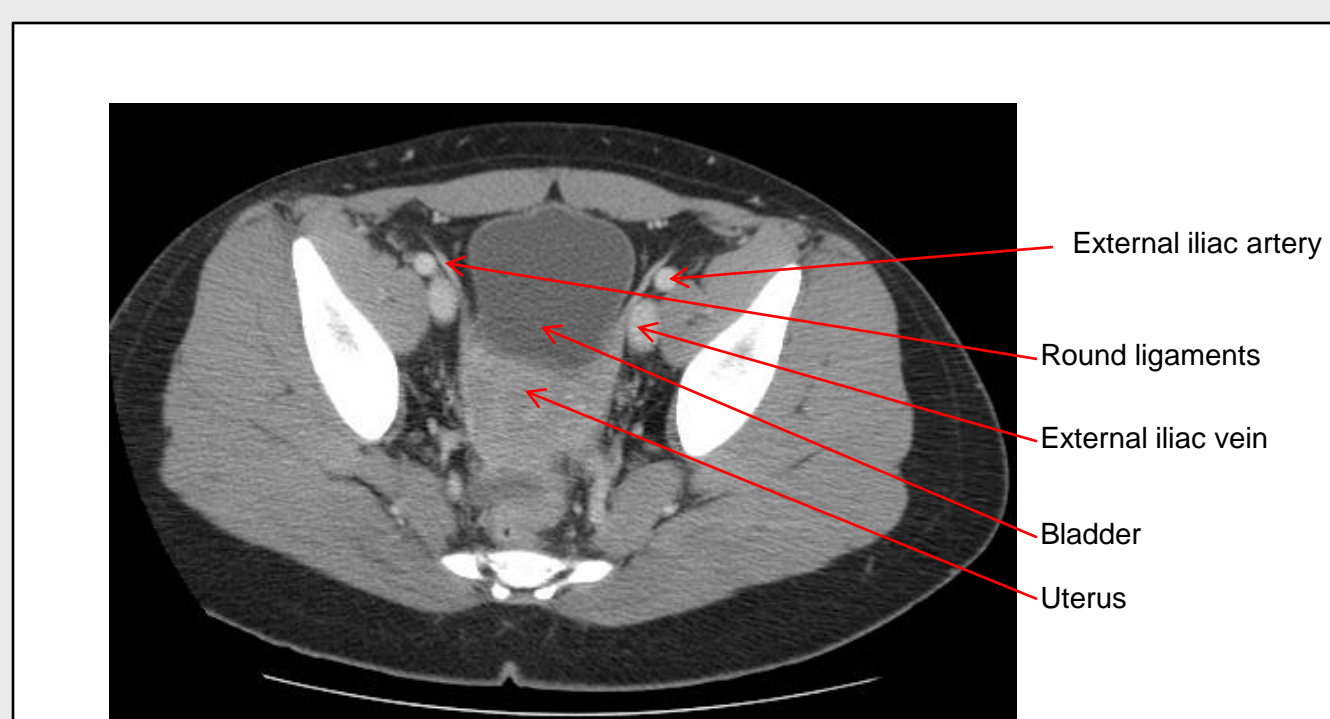
Coronal Illustration



T2 Weighted MRI pelvis



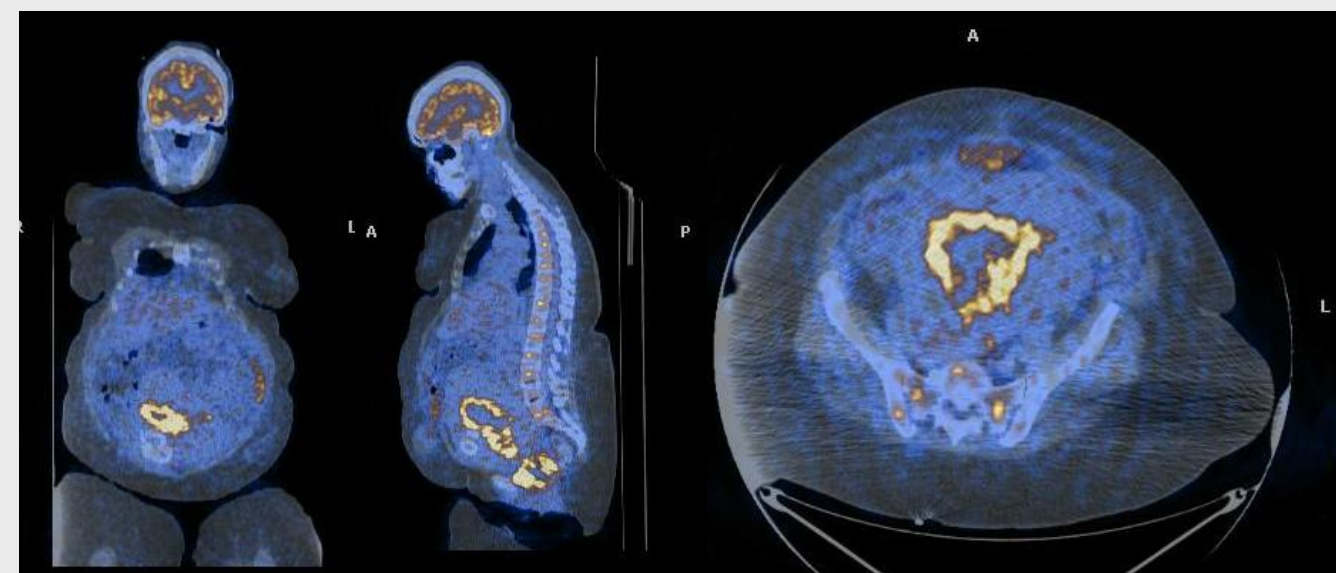
Upper pelvis axial CT with contrast



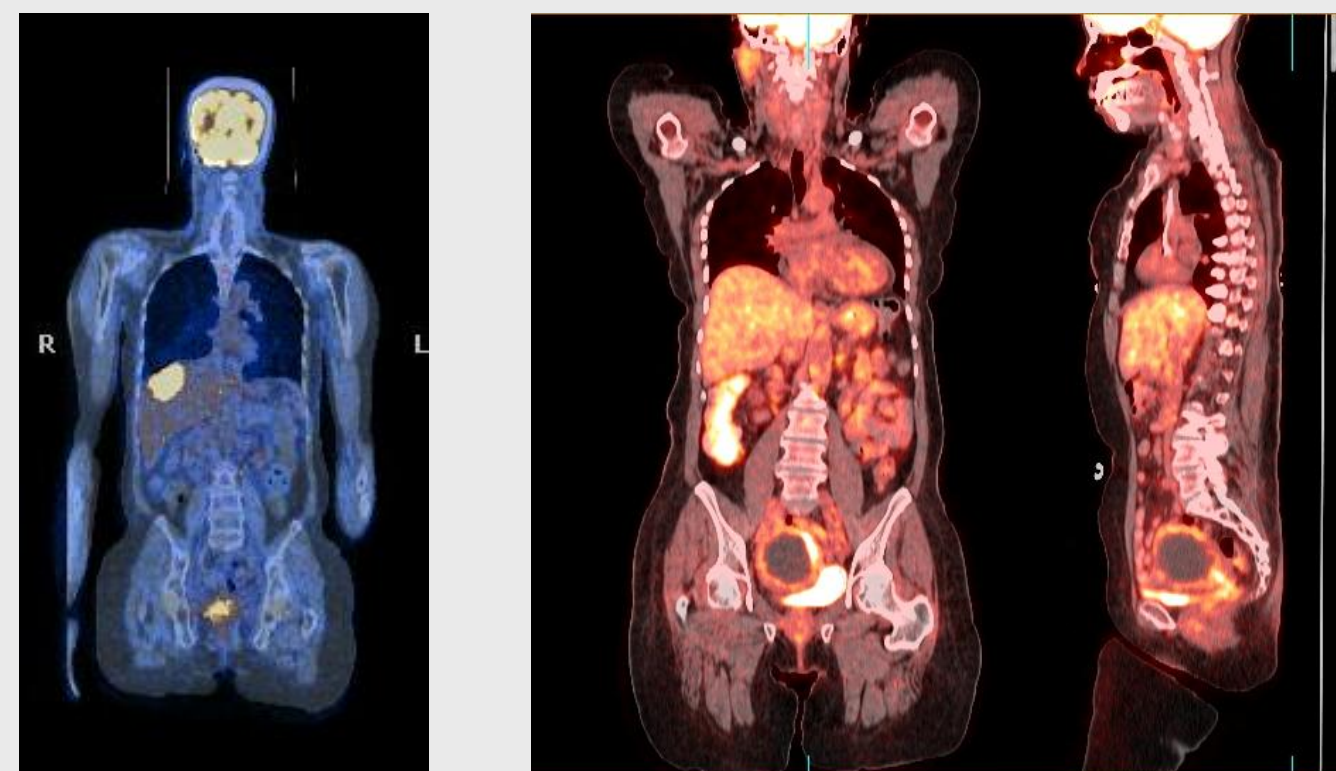
Lower pelvis axial CT with contrast

CERVICAL

- 150,000 Deaths annually
 - ✓ 4000 in US
 - ✓ 11,000 new cases in US
- PET/CT is more accurate in assessing nodal spread than CT and MRI (sensitivity 89% vs 39%)
- SUV negatively correlates to treatment response
- Positive PET has positive predictive value of 90%
- PET has high rate of false negatives
- Limited sensitivity in early stage IA and IIA
- Try to minimize urine FDG activity (Foley, voiding)
- Primary spread of tumor via lymph node paths
 1. obturator, internal iliac, external iliac, and common iliac
 2. direct to common iliac
 3. common iliac, pre-sacral and para-aortic
- Inguinal /axillary nodes reactive in HIV, not mets
- Liver metastasis in a third of recurrent disease

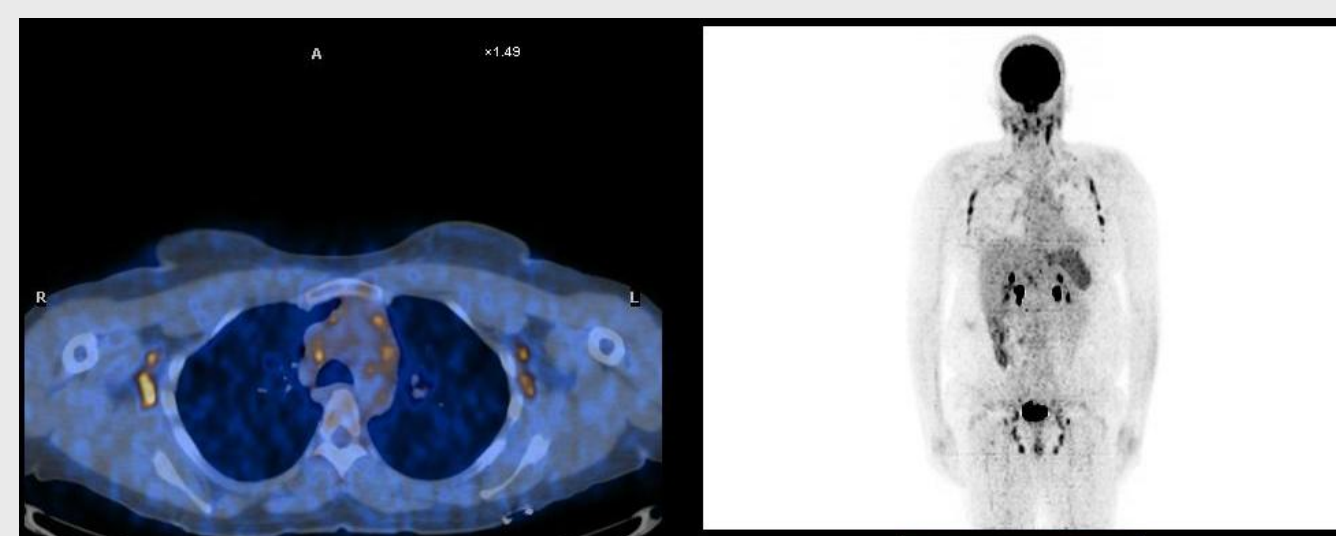


Cervical cancer with pyometra



Cervical cancer with obstructed os

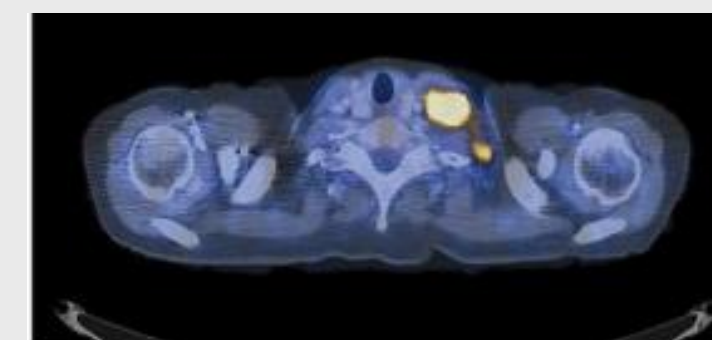
Solitary hepatic metastasis



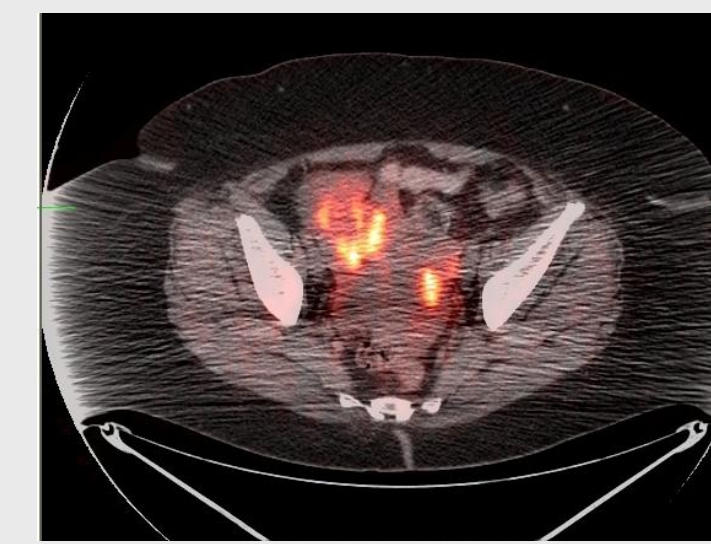
Cervical cancer with HIV and lymphadenopathy

OVARIAN

- 2nd most common gynecological cancer
- Most common death from gynecologic cancer
- 22,000 new cases and 14,000 deaths in US
- Nonspecific symptoms – bloating, distention
- 75 % present with stage III or IV disease
- Residual tumor > 2cm survival of 12-16 months
- Tumor < 2 cm survival is 40-45 months
- Debulking surgery is mainstay of treatment
- Preoperative imaging achieves optimal debulking
- PET improves accuracy in staging
- Staging concordant with clinical pathology in 69% for PET vs. 53% for CT
- Mucinous type represents 12-15% of ovarian cancers and usual is not FDG avid
- Ovarian cancer tends to spread via peritoneal



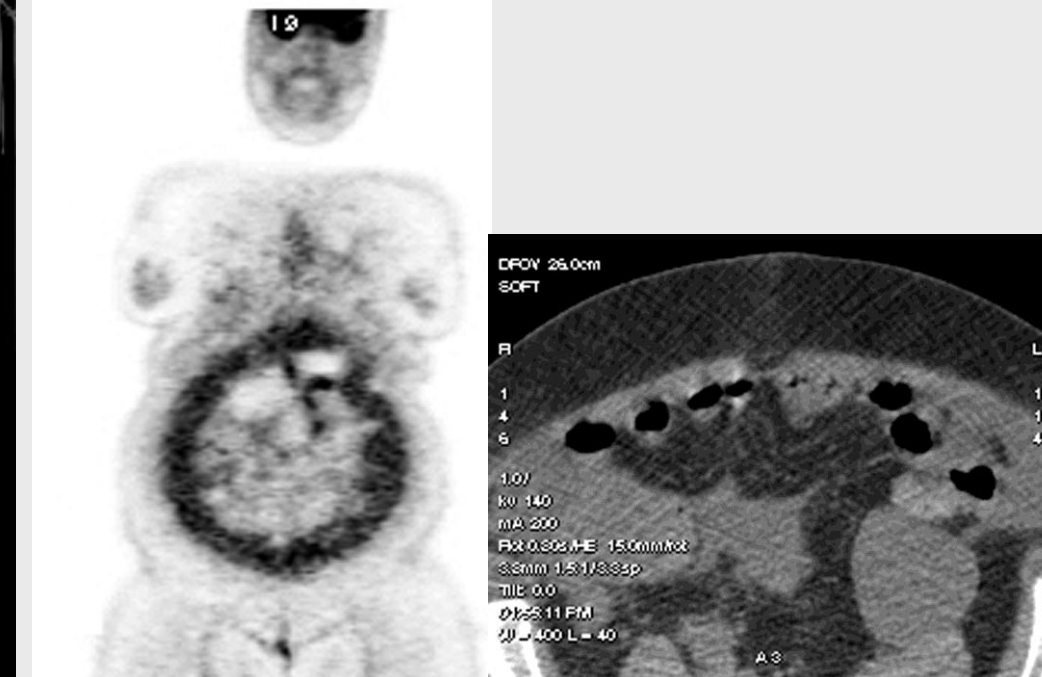
Virchow's Node



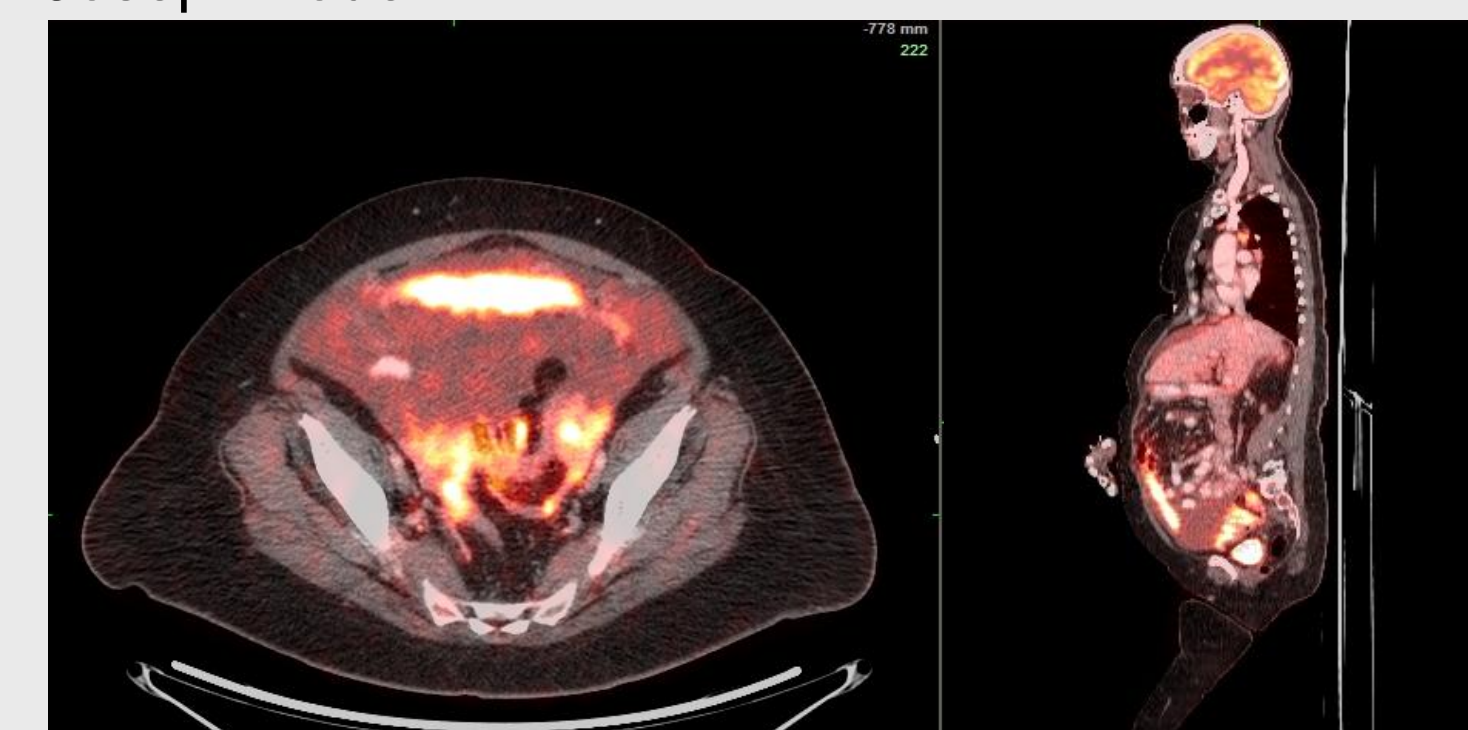
Bilateral Ovarian Cancer



Sister Mary Joseph node



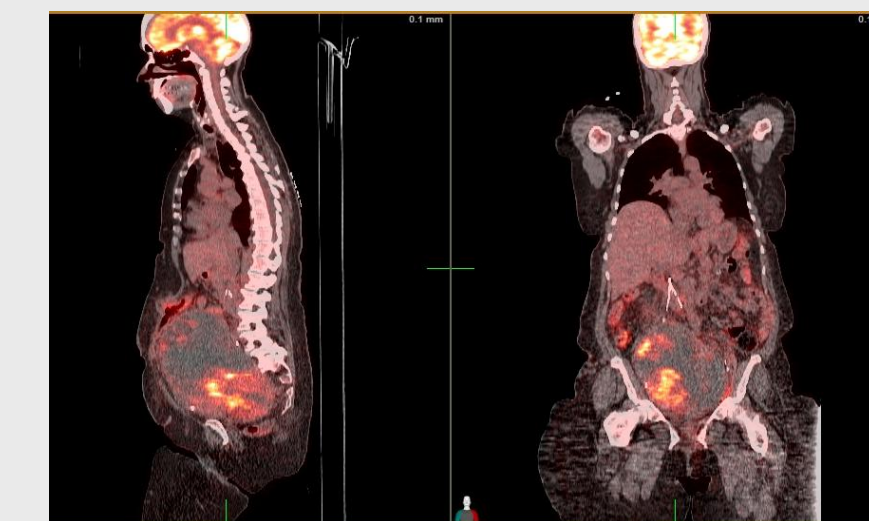
Peritoneal Caking



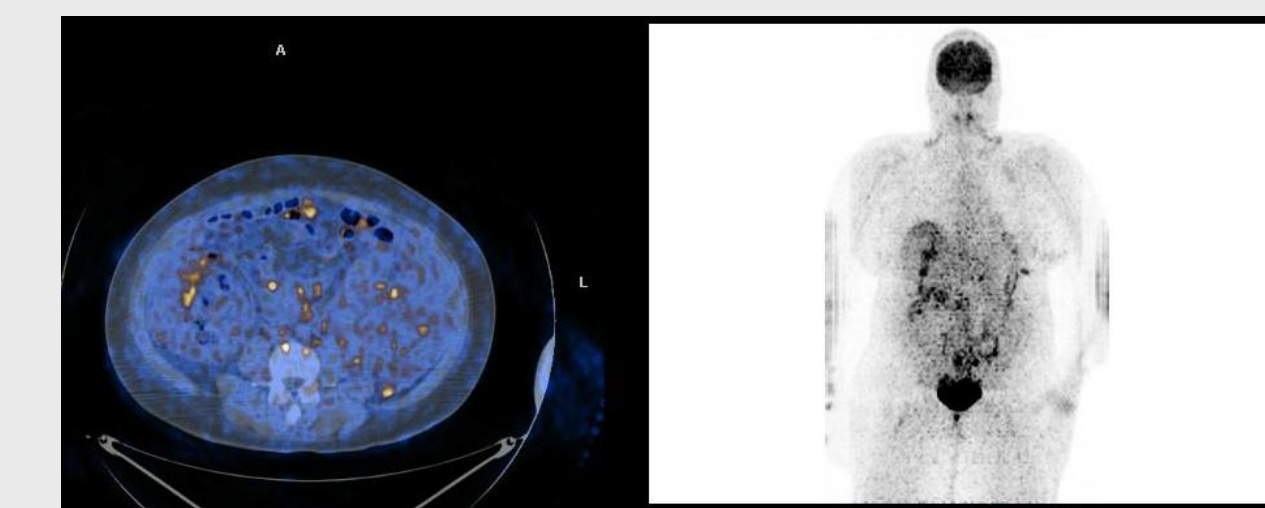
Peritoneal Implants

ENDOMETRIAL

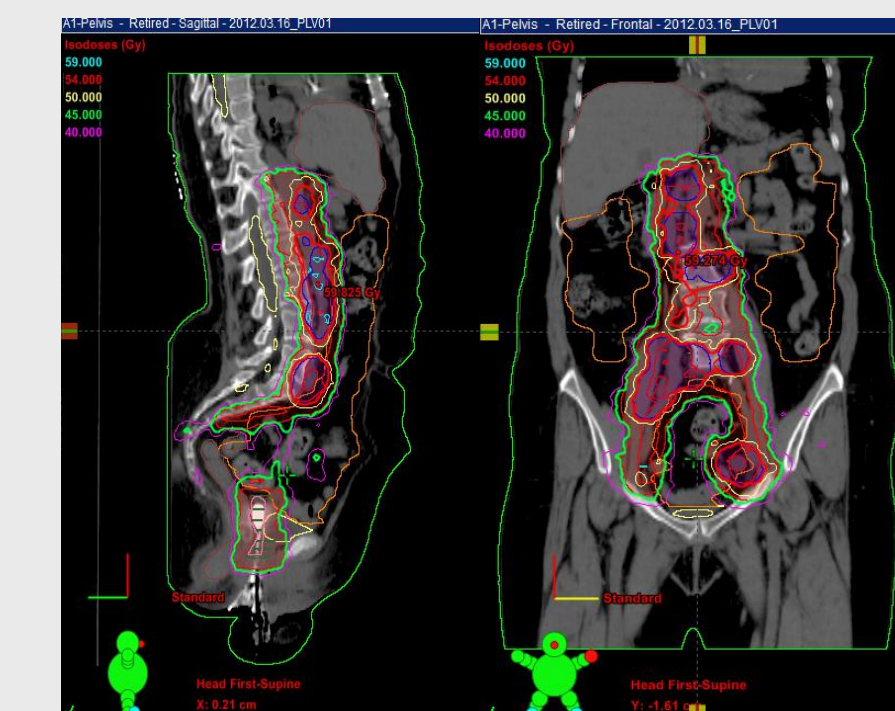
- Most common gynecological cancer
- 142,000 women per year
- 4TH most common malignancy in US women
- Most cases in post menopause
- Highest incidence in 7TH decade of life
- Abnormal uterine bleeding common symptom
- 5 year survival 80%
- Dependent on stage, myometrial involvement and histological type
- Poor prognosis in advanced or recurrent disease
- Lymphatic spread to pelvic or para-aortic nodes
- Hematogenous spread to lung, liver, bones or vagina



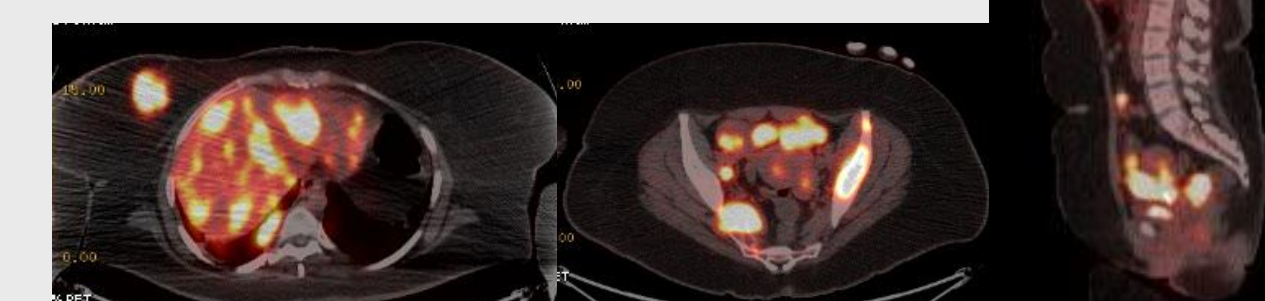
Primary uterine cancer



Endometrial cancer with malignant effusion



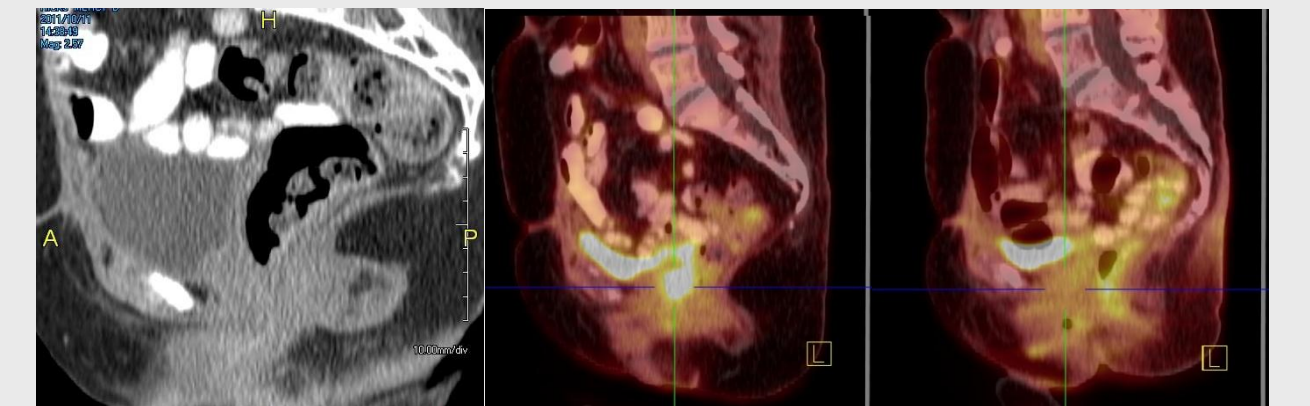
Planning Target Volume for radiation treatment



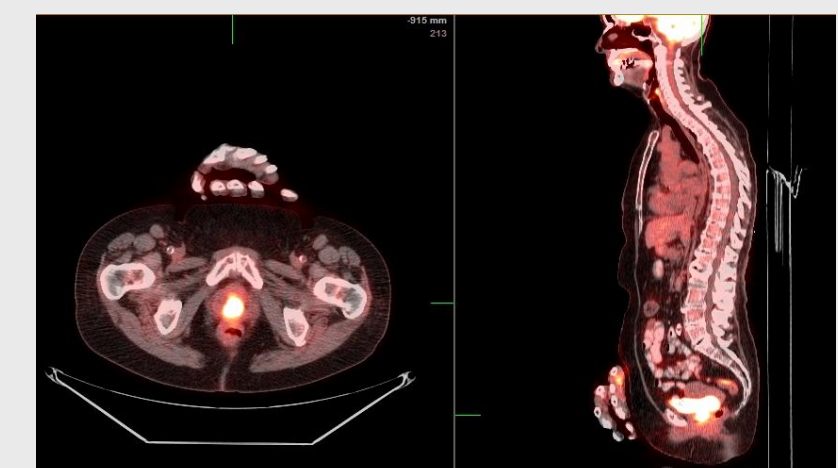
Endometrial cancer with multiple metastases

VAGINAL

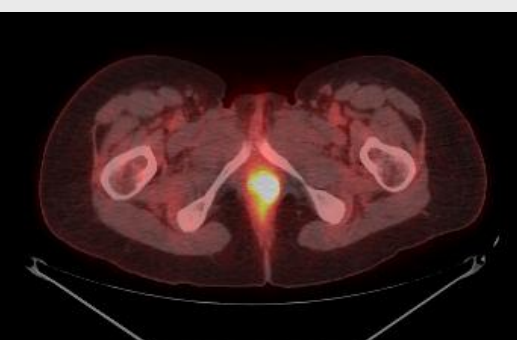
- Cervical cancer extension or recurrence into the vagina is most common tumor
- Primary vaginal cancer is less than 3% of all gynecological malignancies
- Squamous type (HPV, 60 – 80 yrs)
- Adenocarcinoma type (DES use, 12 – 30 yrs)
- Lymphatic spread in distal 1/3 to inguinal nodes
- Lymphatic spread in proximal 2/3 to pelvic and para-aortic nodes (PALN)



Vaginal metastasis before and after treatment



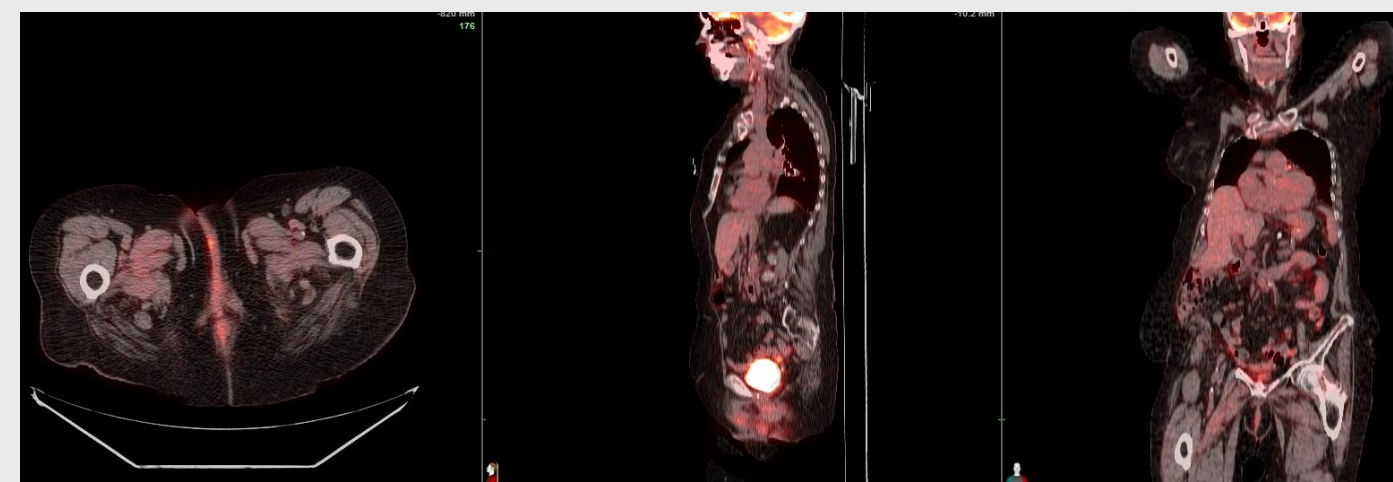
Vaginal melanoma



Vaginal cancer

VULVAR

- 4% all women genital cancers originate in vulva
- 2/100,000 women per year
- 40-60% in premenopause associated with HPV
- HPV negative more common in post-menopausal
- Growth and infiltration with direct involvement of the vagina, urethra, perineum, and /or anus
- Lymphatic spread to inguinal and femoral nodes
- 1-7% involve Bartholin's gland
- FIGO changes based on invasion and size and the number of involved lymph nodes
- FDG PET sens and spec of 80 and 90%
- More accurate in detecting extranodal metastases



Vulvar cancer