

American Roentgen Ray Society
Annual Meeting

Chicago, Illinois
Monday, May 2nd, 2011
10:30 am- 12:00 noon

Instructional Course #IC109

Challenging and Unexpected PET/CT Findings
in Gastrointestinal Cancer:
Now What Do I Do?

Harry Agress Jr., M.D., FACR

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Hackensack University Medical Center
Hackensack Radiology Group, PA
Hackensack, New Jersey

Clinical Professor
Department of Radiology
College of Physicians and Surgeons
of Columbia University New York, NY

Purpose of Talk

- Case studies involving PET/CT scanning of Gastrointestinal Tract Cancer with emphasis on:
 - unexpected findings
 - close attention to correlation of PET and CT components, especially with subtle findings
 - follow-up

REFERENCES

- “Clinical PET-CT in Radiology – Integrated Imaging in Oncology” Springer 2011
Edited by P. Shreve and D. Townsend
- PET/CT in Gastrointestinal Cancer
- Full Issue of PET Clinics – Dec 2008

Seminars in Ultrasound, CT and MRI

August 2008 (Vol. 29, No. 4)
Edited by Paul Shreve, MD
<http://www.sem ultrasoundctmri.com>

- PET/CT – Best Practices
 - Protocols
 - Patient management and flow
 - Interpretation and reporting

Clinical PET and PET/CT Imaging

Categorical Course in Diagnostic Radiology
Editor, Richard L. Wahl, MD
RSNA 2007 Syllabus

PET Changes Management and Improves Prognostic Stratification in Patients with Recurrent Colorectal Cancer: Results of a Multicenter Prospective Study

Andrew M. Scott, Dishan H. Gunawardana, Ben Kelley, John G. Stuckey, Amanda J. Byrne, Jayne E. Ramshaw and Michael J. Fulham

J Nucl Med 2008; 49:1451-1457

18F-FDG PET and PET/CT in the Evaluation of Cancer Treatment Response.
Ben-Haim S. and Ell P.
J Nucl Med 2009; 50:88-99

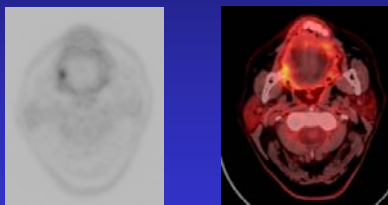
PET and PET/CT Articles on Gastrointestinal Malignancies

- GI Tract Malignancies and PET: An Overview. Esteves FP, et al. *Semin Nucl Med* 36 (April, 2006):169-181
- PET and PET/CT for Evaluation of Colorectal Carcinoma. Delbeke D. and Martin WH. *Semin Nucl Med* 34 (July, 2004):209-223.

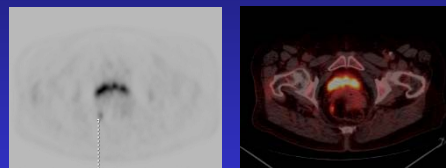
PET and PET/CT Articles on Gastrointestinal Malignancies

- Incremental Value of CT in PET/CT of Patients with Colorectal Cancer. Kamel IR, et al. *Abdom Imaging* (2004) 29: 663-668.
- Neoplasms of the Esophagus and Stomach. Dehdashti F. and Siegel BA. *Semin Nucl Med* 34 (July, 2004):198-208
- FDG-PET/CT Imaging Evaluation of Esophageal Cancer. Jadvar H, Henderson RW and Conti PS. *Mol Imaging Biol* (2006) 8: 193-200.

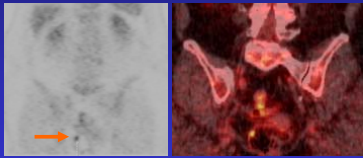
67 y/o female - initial staging for tongue cancer.



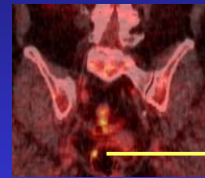
67 y/o female - initial staging for tongue cancer.
Tiny pelvic focus.



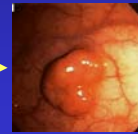
Unexpected tiny rectal focus.



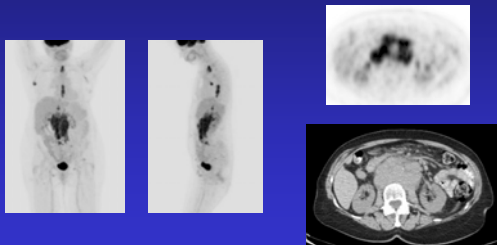
Unexpected tiny rectal focus.



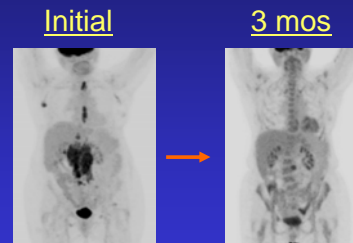
- Endoscopy = tubular adenoma



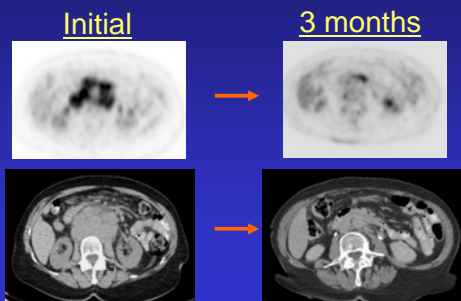
76 y/o female with lymphoma
Initial



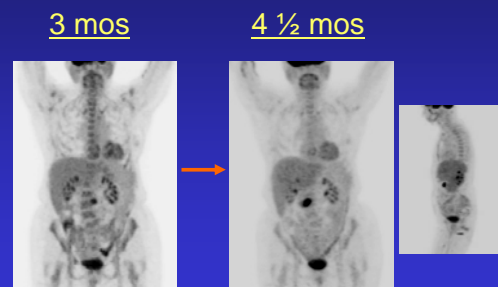
76 y/o female with lymphoma
3 months



76 y/o female with lymphoma
3 months



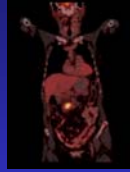
76 y/o female with lymphoma
4 1/2 months



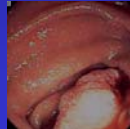
76 y/o female with lymphoma
4 ½ months



76 y/o female with lymphoma



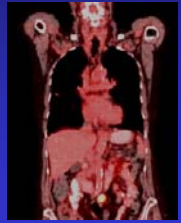
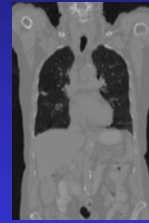
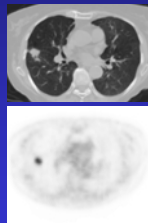
Endoscopic biopsy →
duodenal *adenocarcinoma*
arising in villous adenoma



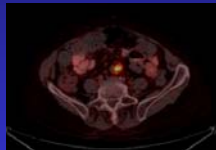
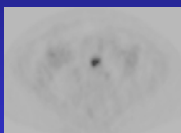
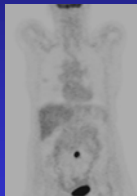
Surgery → duodenal resection

Importance of closely
correlating PET and CT
components

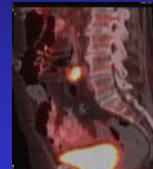
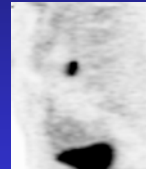
79 y/o female with RUL SPN
increasing in size.



79 y/o female with RUL SPN
Intense focus mid abdomen.

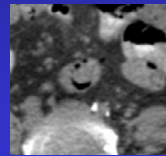
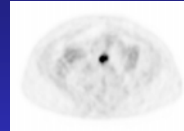


79 y/o female with RUL SPN
Intense focus mid abdomen.



- If discretely focal and no abnormality on CT, still recommend endoscopy.
- If linear or only faintly positive, can recommend attention to this region on follow-up PET/CT in 3-6 months.

79 y/o female with RUL SPN
Intense focus mid abdomen.



- Colonoscopy →
2 cm sigmoid polyp
- TVA with intramucosal
adenocarcinoma

Use of Laxative-augmented
Contrast Medium in the Evaluation
of Colorectal Foci at FDG PET

Y-KChen , MD , PhD, J-H Chen , MD, C-C Tsui , MSc
Radiology: Volume 259: Number 2—May 2011

- Compare the diagnostic accuracy of FDG PET in the detection of colon lesions with that of delayed PET/CT performed after the administration of laxative-augmented (magnesium citrate) contrast medium.

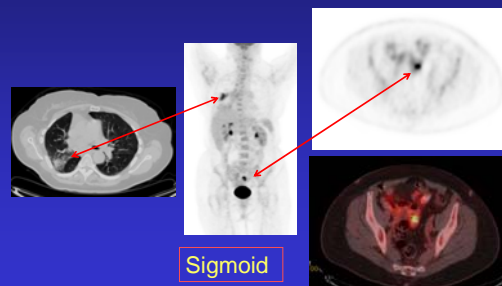
Use of Laxative-augmented
Contrast Medium in the Evaluation
of Colorectal Foci at FDG PET

- If initial scan has colonic foci
 - in the ascending or transverse colon
 - rescan over area of interest, 90-120 minutes after oral laxative augmented contrast (LAC)
 - in descending/recto-sigmoid colon
 - rescan immediately after rectal LAC.

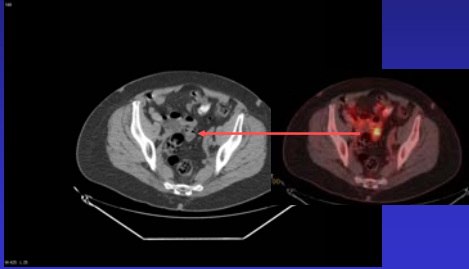
Use of Laxative-augmented
Contrast Medium in the Evaluation
of Colorectal Foci at FDG PET

- Accuracy for PET depiction of colorectal cancer:
 - Initial scan = 71.5%
 - Delayed scan = 93.4%
- Must consider added time and/or patient discomfort

72 y/o female F/U lung cancer.
RUL pneumonia.
Incidental mid-pelvic focus.



Incidental focus with no abnormality on CT



Incidental focus with no abnormality on CT

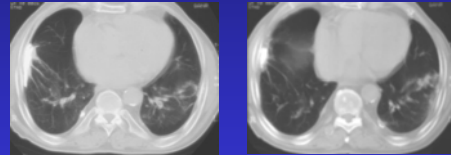


- Endoscopy → cecal polyp
- too large to remove
- F/U Surgery → frozen = benign polyp
- Final path = ***TVA with high grade dysplasia and intramucosal adenocarcinoma***

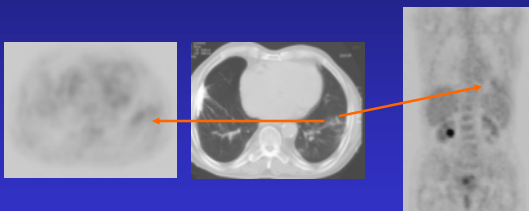
CT component is key

- AAA
- Gallstones
- Renal calculi or mass
- Small pulmonary nodules
- Pulmonary emboli, if C+ scan

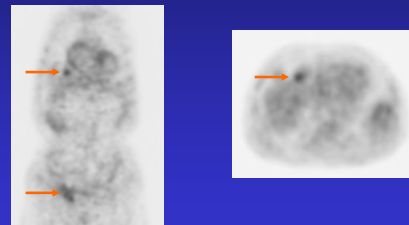
78 y/o male with asbestos exposure.
CT = scarring and nodular opacity
left > right lower lobes



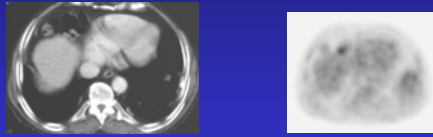
PET = faint hypermetabolism
in LLL c/w inflammation



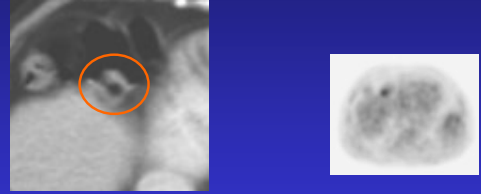
PET = incidental foci anterior
to liver and right inguinal
(recent hernia repair)



PET = focus right anterior to liver at cardiophrenic angle

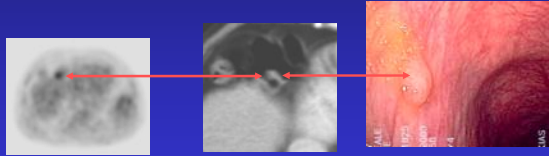


PET = focus right anterior to liver at cardiophrenic angle



Colonoscopy
(reviewed with endoscopist
prior to scope)

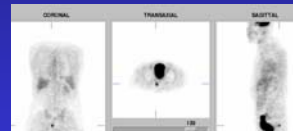
Hepatic flexure



Biopsy = Tubular adenoma

Patient with squamous cell skin cancer.
Unexpected recto-sigmoid focus

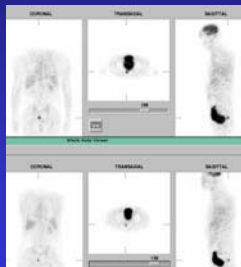
Initial



- Endoscopy = negative

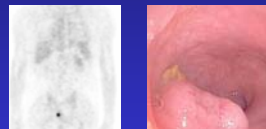
Follow-up PET
Recto-sigmoid focus increased

One year
follow-up



Initial

Rectal focus worse



- Repeat endoscopy = 3 cm tubular villous adenoma (sigmoid)

What % of unexpected findings* on PET will be malignant or pre-malignant?

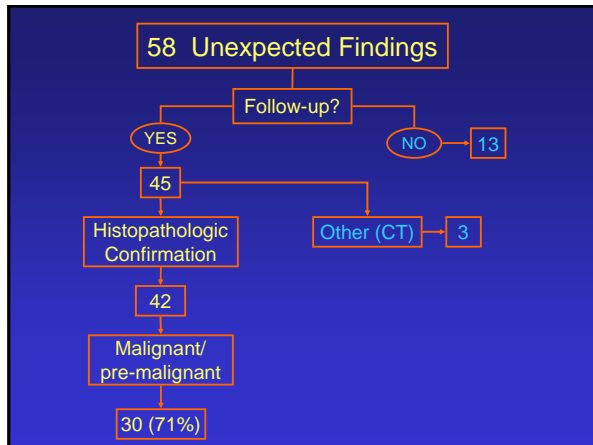
- A) 5 %
- B) 15 %
- C) 25 %
- D) 50 %
- E) 70 %

*Totally unrelated to the cancer for which the PET was ordered.

Detection of Clinically Unexpected Malignant and Premalignant Tumors with Whole-Body FDG PET: Histopathologic Comparison

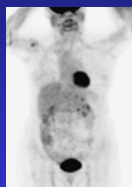
Agress H. and Cooper B.
Radiology 2004 (February); 230:417-422

- Examined 1750 PET scans

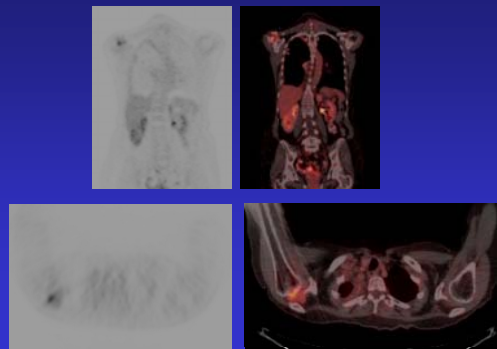


With all the information provided by PET/CT, why would we recommend another study?

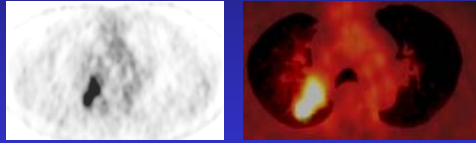
Follow-up lung cancer.
Arthritis right shoulder



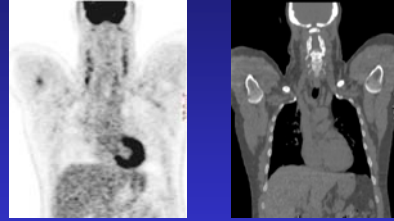
Arthritis right shoulder



Staging RUL lung cancer



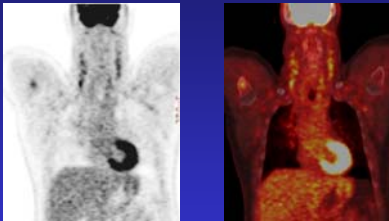
PET/CT → right shoulder focus



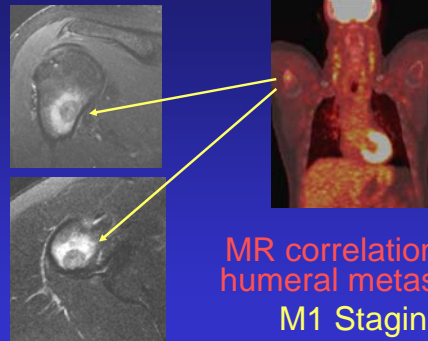
Negative on CT portion.

NWDID?

Look at fused PET/CT



NWDID?



MR correlation →
humeral metastasis
M1 Staging

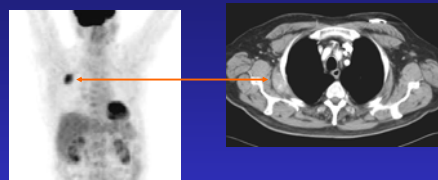
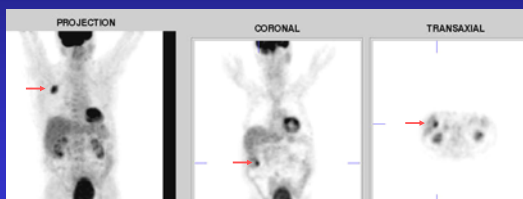
Unusual locations

81 y/o male with history of lung,
colon and prostate cancers.

- Rising CEA
- CT= "No evidence of metastasis."
- Original plan = follow with serial CTs.

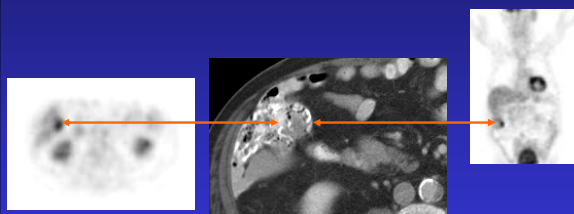
→ PET suggested.

Rising CEA and "negative" CT



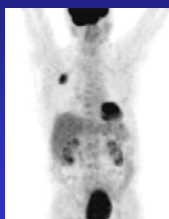
Chest wall mass biopsy =
colon metastasis

Hepatic flexure



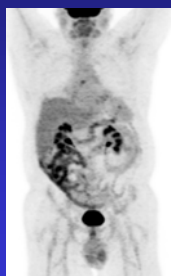
Colonoscopy =
tubular villous adenoma

Prior to PET → no diagnosis or treatment plan

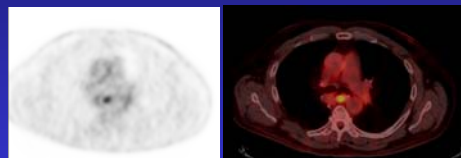


- Following PET → patient placed on chemotherapy and TVA endoscopically resected.

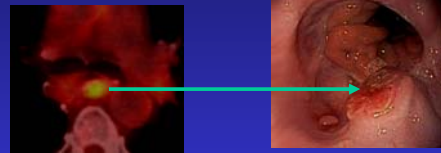
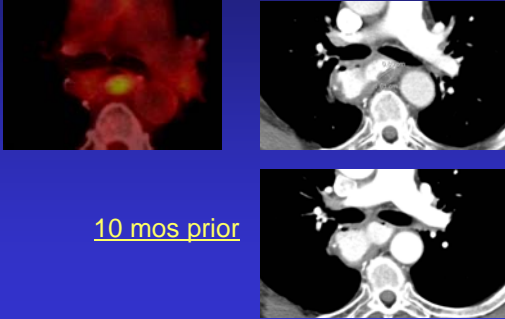
63 y/o male with esophagectomy and gastric pull-through.



63 y/o male with esophagectomy and gastric pull-through.



Contrast CT



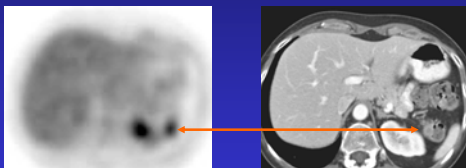
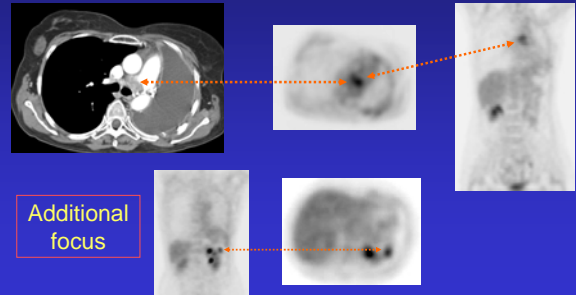
Endoscopy → ulcerative mass at anastomosis

Biopsy → recurrent carcinoma

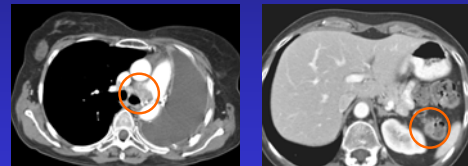
PET can provide unique approach to determining recurrence

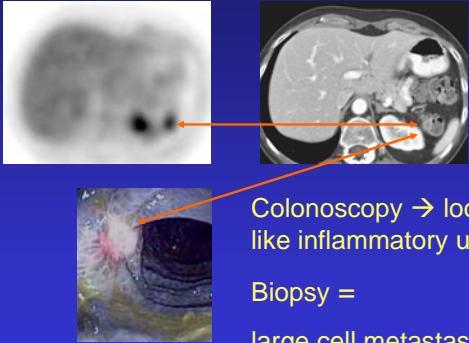
- 60 y/o female s/p left pneumonectomy for large cell lung cancer

F/U CT = new APW adenopathy ? malignant



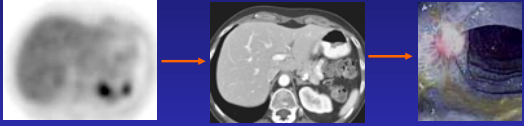
Easier to attempt colonoscopy than to biopsy mediastinal nodes to diagnose recurrence





Colonoscopy → looked like inflammatory ulcer

Biopsy = large cell metastasis



Treatment = chemotherapy

Summary

- Use close correlation of PET and CT images to evaluate subtle findings and guide for biopsies.
 - Review with endoscopist or surgeon prior to biopsy
- Expect unusual findings with PET/CT
 - Both in sites of recurrence and often in initial staging of cancer
- Get follow-up:
 - Best single thing for your education and confidence
 - Good for patient care and personal involvement

Thank you.



<http://www.hrgimaging.com>

Go to "For Physicians" → "Download" → ARRS 2011