Metastatic Invasive Ductal Carcinoma of the Breast

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9/18/2019

RAD 3030

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Clinical History

- 30yo female s/p R mastectomy showing HER2+, ER+ invasive ductal carcinoma w/necrosis, THP x 6 cycles
  - Back pain – 1 month, constant pain, uses wheelchair
    - No recent trauma or falls
    - Movement exacerbates
    - Morphine does not provide relief
  - SOB – worsens on inspiration and with exertion but also occurs at rest
  - Recent Travel – China
  - Initial workup –
    - Stable vitals – T: 98.0 F, HR: 85, RR: 16, BP: 112/82, SpO2: 95%
    - EKG – sinus tachycardia
    - CT PE – negative for PE
    - Labs unremarkable

Step 1: MRI - ACR appropriateness Criteria

- Management of Vertebral Compression Fractures
  - MRI was appropriate
- Case was in accordance with the ACR appropriateness guidelines

Variant 4: **Known malignancy and new back pain. Compression fracture identified on radiographs or CT.**

Procedure	Appropriateness Category
MRI spine area of interest without and with IV contrast	Usually Appropriate
Image-guided biopsy spine area of interest	Usually Appropriate
FDG-PET/CT skull base to mid-thigh	May Be Appropriate
MRI spine area of interest without IV contrast	May Be Appropriate (Disagreement)
Tc-99m bone scan whole body	May Be Appropriate
Tc-99m SPECT/CT spine area of interest	May Be Appropriate
MRI spine area of interest with IV contrast	May Be Appropriate

Spine cervical and thoracic w/wo contrast MRI (9/13/2019)

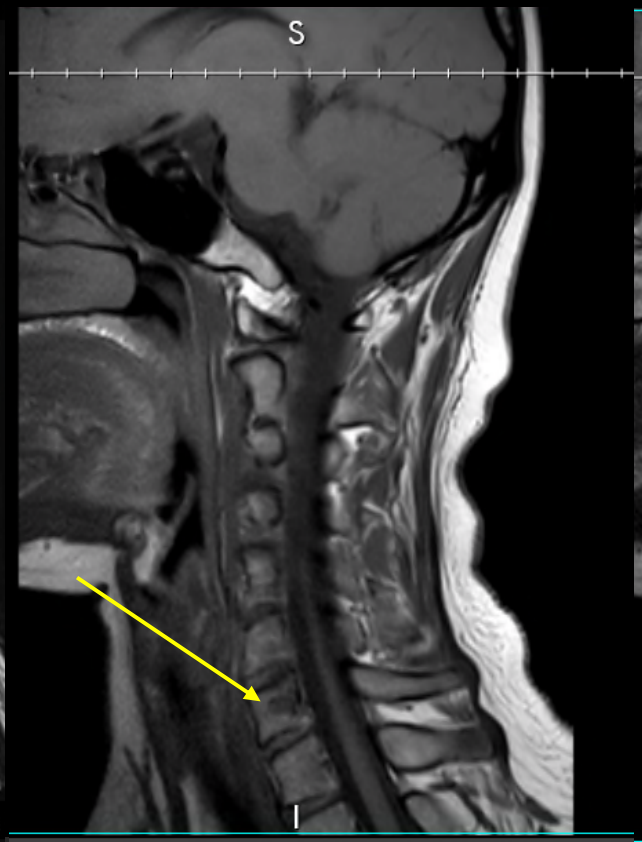
- Findings
  - Mostly cystic lesion with ring enhancement of left C7
  - Central compression fracture of T4 with inc T2/STIR signal and spinal stenosis
  - Small cystic enhancing lesion in T10
  - Diffuse enhancement with inc T2 signal in T11
  - Multicystic lesion in anterior vert body of L1
- Impression
  - Pathologic burst compression fracture of T4
  - Abnormal enhancement consistent with metastatic disease involving T11 which extends into the pedicles
  - Irregular cystic rim enhancing lesions in T7, T10, L1

Cervical Spine MRI

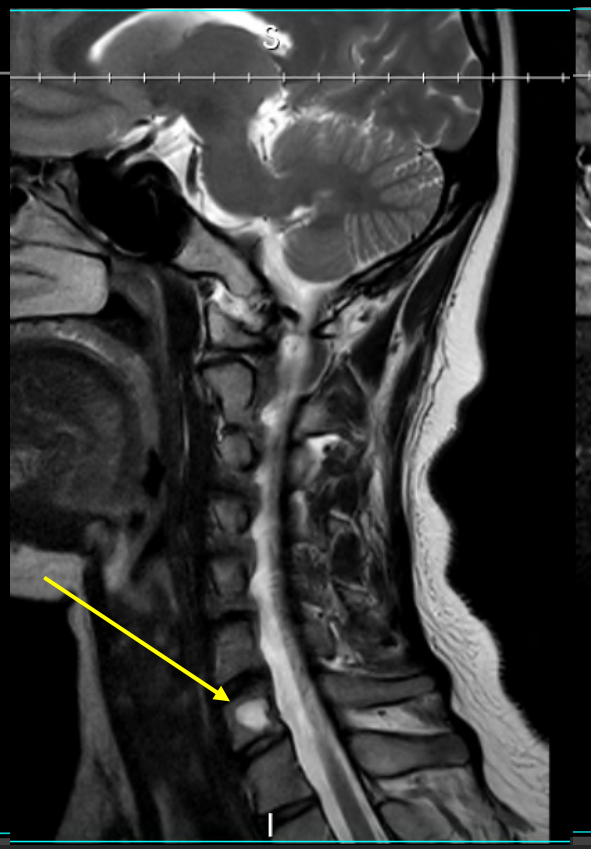
mostly cystic lesion with ring enhancement of L C7

Normal

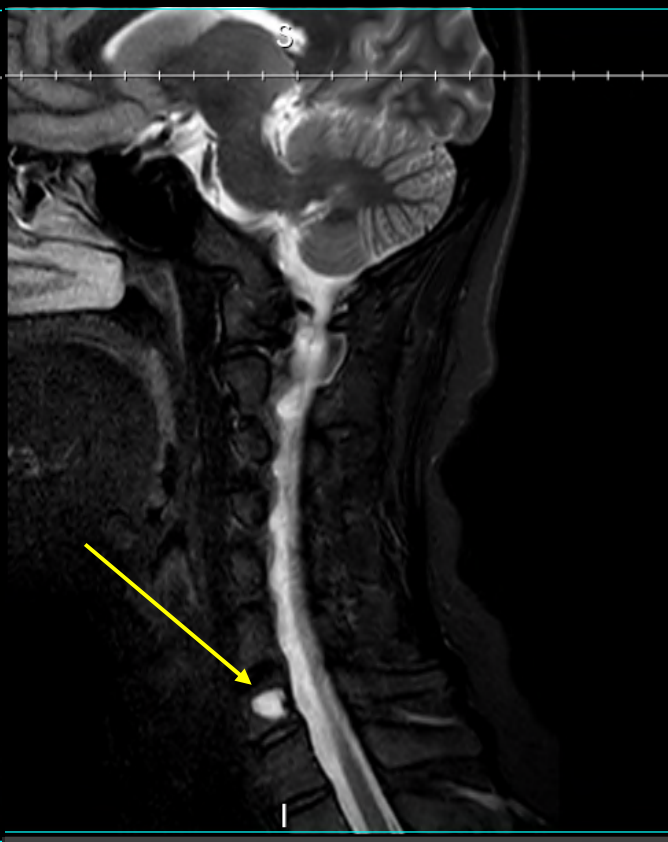
T1



T2



T2 STIR



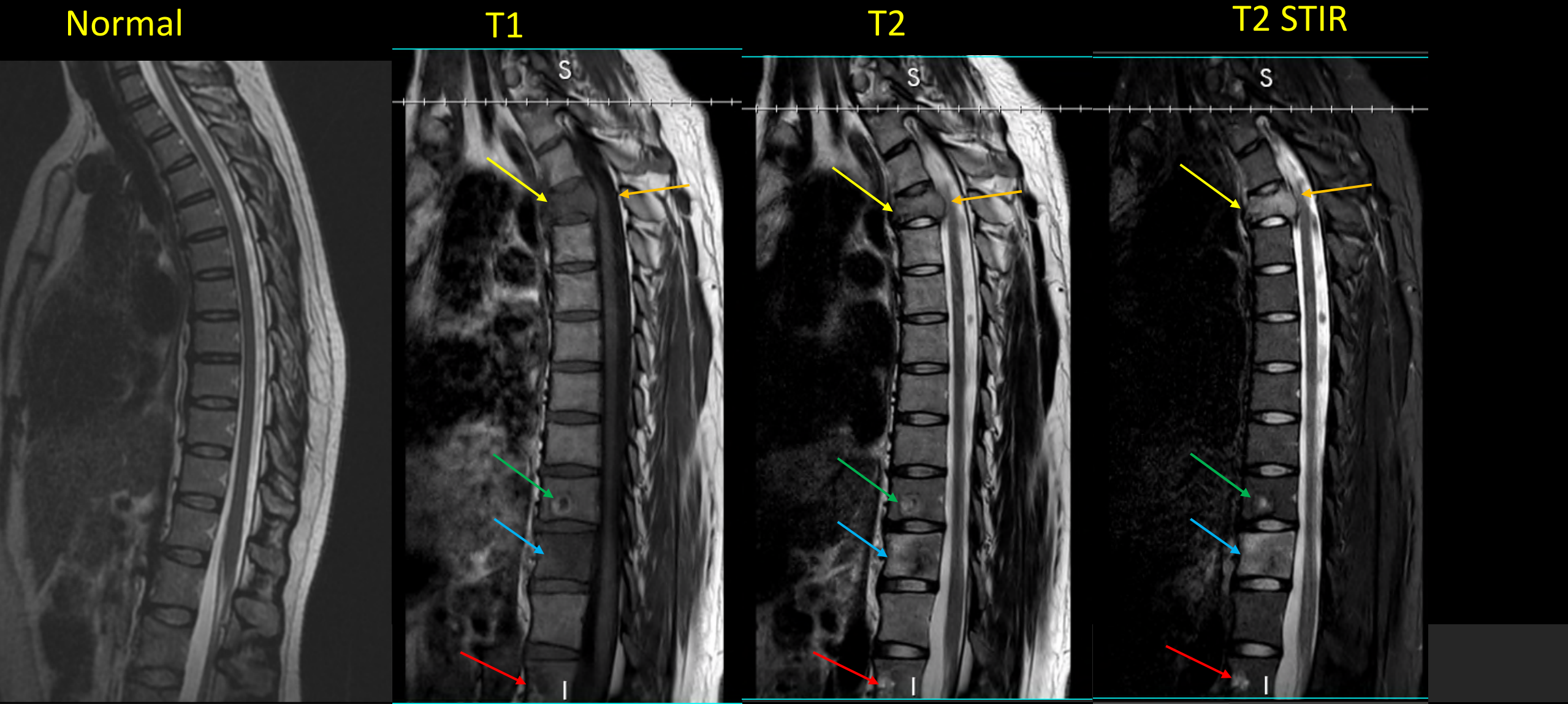
Thoracic Spine MRI

Central compression fracture of T4 with inc T2/STIR signal and spinal stenosis

Small cystic enhancing lesion in T10

Diffuse enhancement with inc T2 signal in T11

Multicystic lesion in anterior vert body of L1



Step 2: PET/CT - ACR appropriateness Criteria

- Management of Vertebral Compression Fractures
  - FDG-PET/CT whole body is appropriate
- Case was in accordance with the ACR appropriateness guidelines

Variant 4: **Known malignancy and new back pain. Compression fracture identified on radiographs or CT.**

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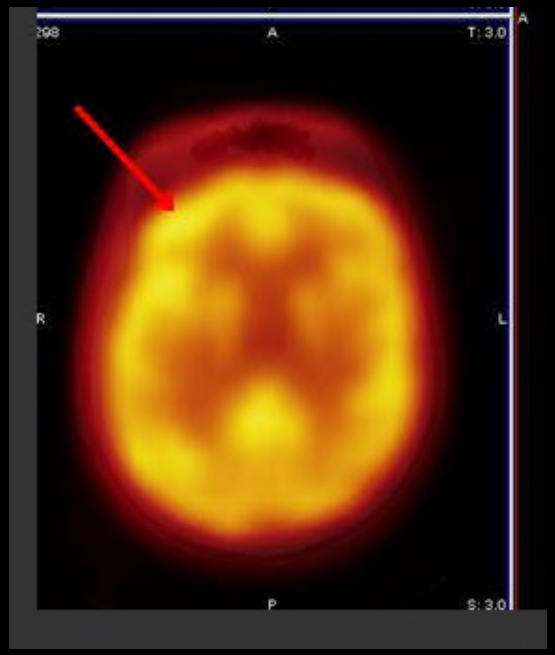
PET CT Breast CA (9/13/2019) – Restaging

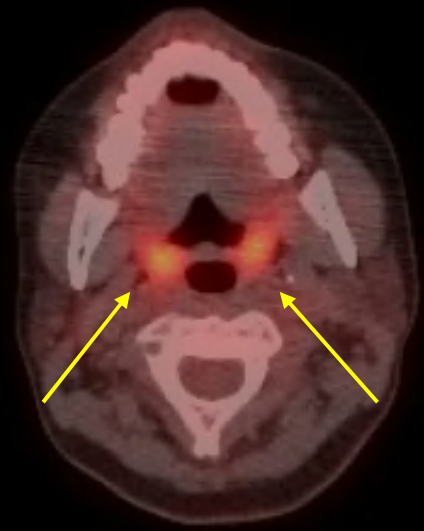
- Findings
  - Head and Neck –
    - Focal uptake in R occipital brain
    - Focal uptake in bilateral lower neck LNs
  - Chest –
    - Multiple FDG avid breast nodules involving fat tissue and pectoralis major
    - Focal uptake in number LNs
    - Numerous FEG avid bilateral speculated lung nodules consistent with metastasis
  - Abdomen/Pelvis –
    - Inc focal tracer uptake in stomach and pancreatic head
    - Inc focal uptake in numerous intra abdominal, mesenteric, retroperitoneal, peritoneal, and pelvic LNs
  - Skeleton –
    - Inc focal uptake in T4
    - Inc focal uptake T11 lytic lesions
    - Non FDG avid cystic rim enhancing lesions in T10 and L1
- Impression
  - Multiple hypermetabolic metastases in the R occipital brain, bilateral lungs, stomach, pancreatic head, bone, and numerous lymphadenopathy.

PET/CT Head Neck

Normal



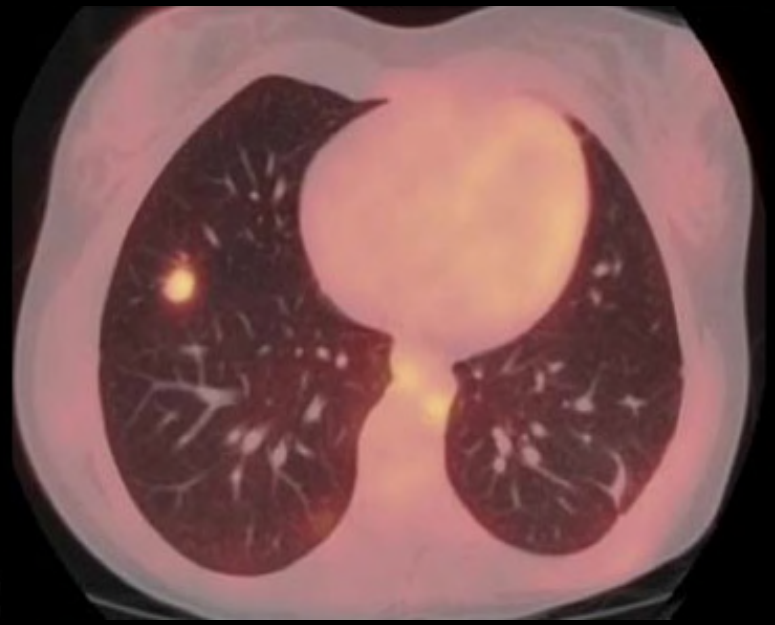
Focal uptake in bilateral lower neck LNs



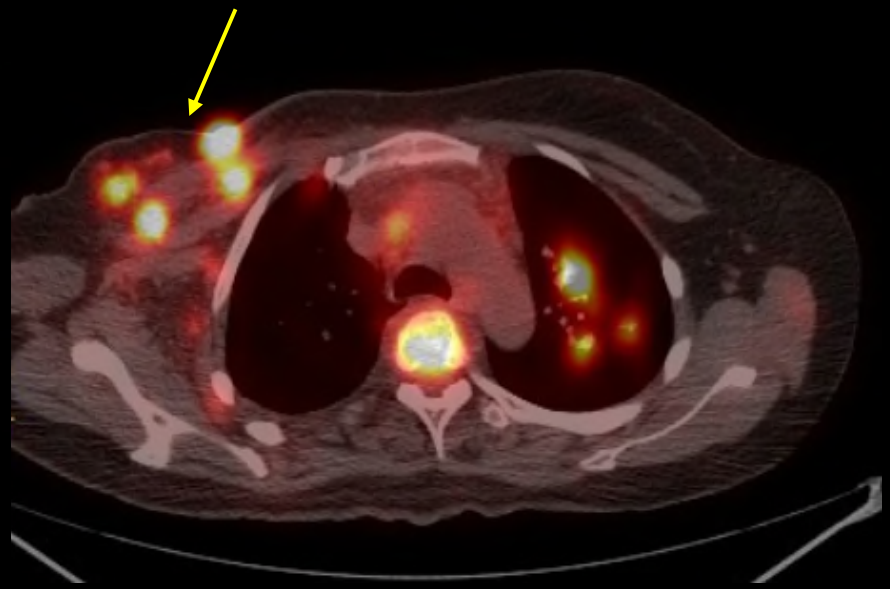
Focal uptake in R occipital brain

PET/CT Chest

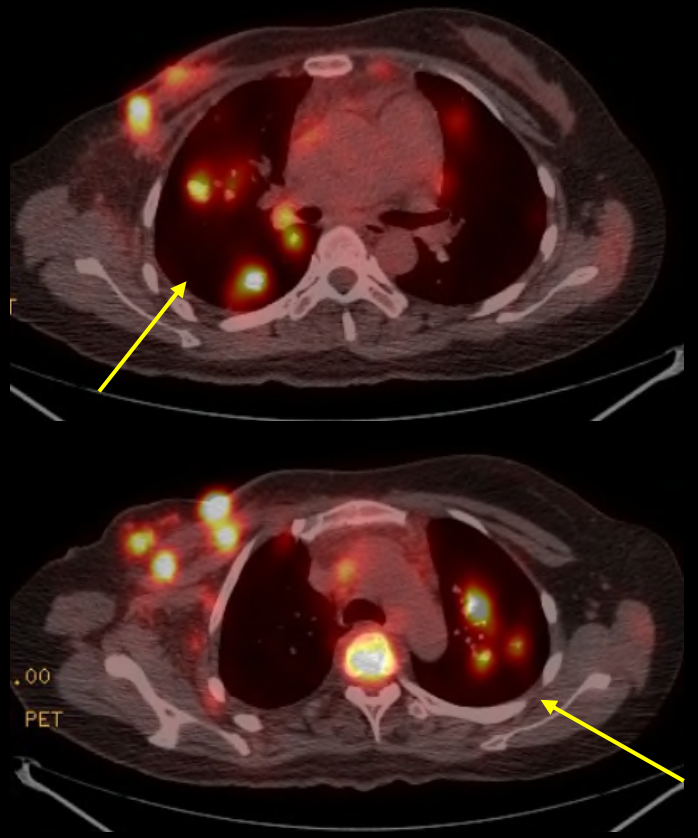
Normal (mostly)



C



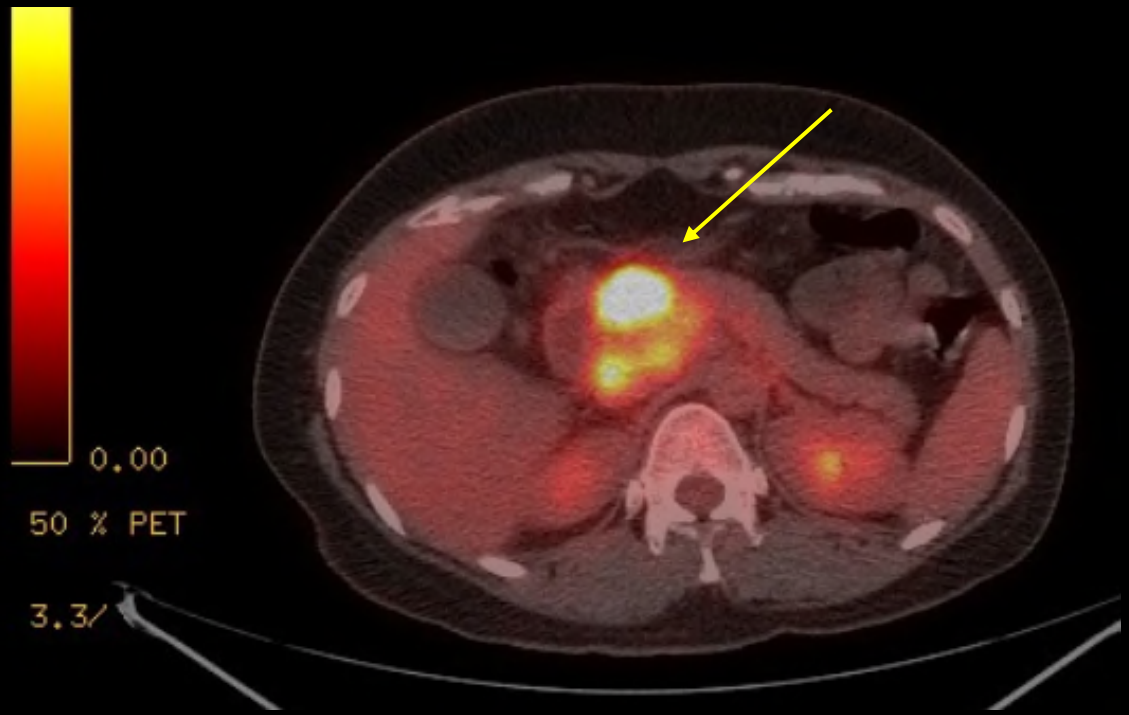
Multiple FDG avid breast nodules involving fat tissue and pectoralis major



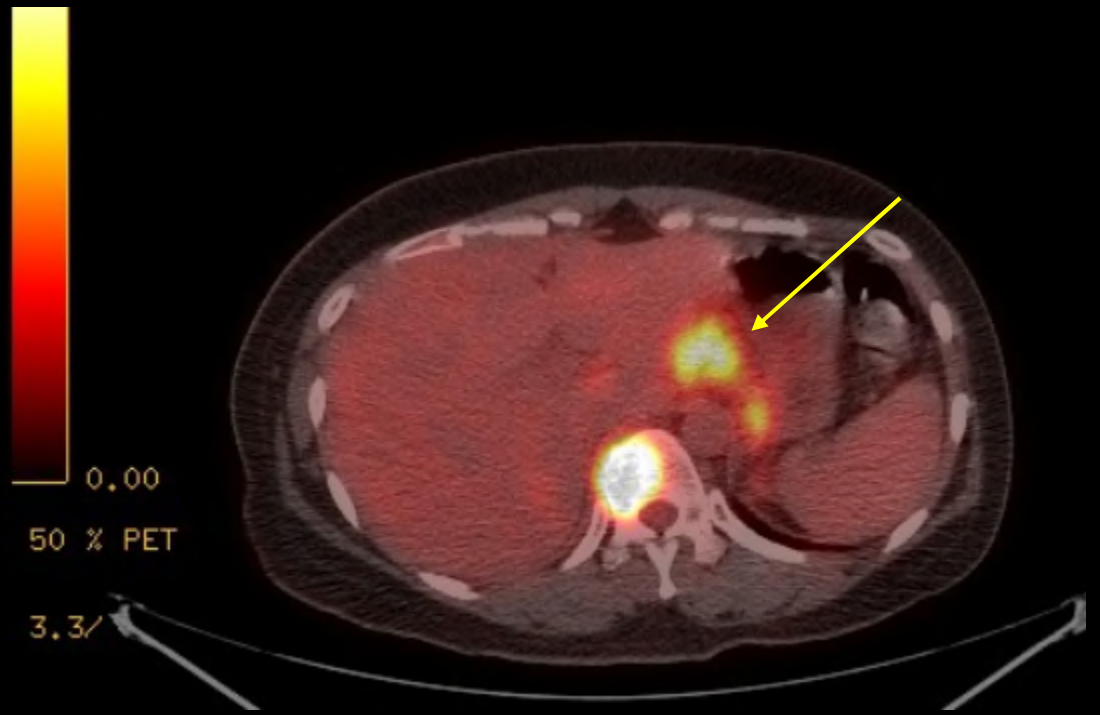
Numerous FEG avid bilateral speculated lung nodules consistent with metastasis

PET/CT Abdomen Neck

Focal tracer uptake in stomach and pancreatic head

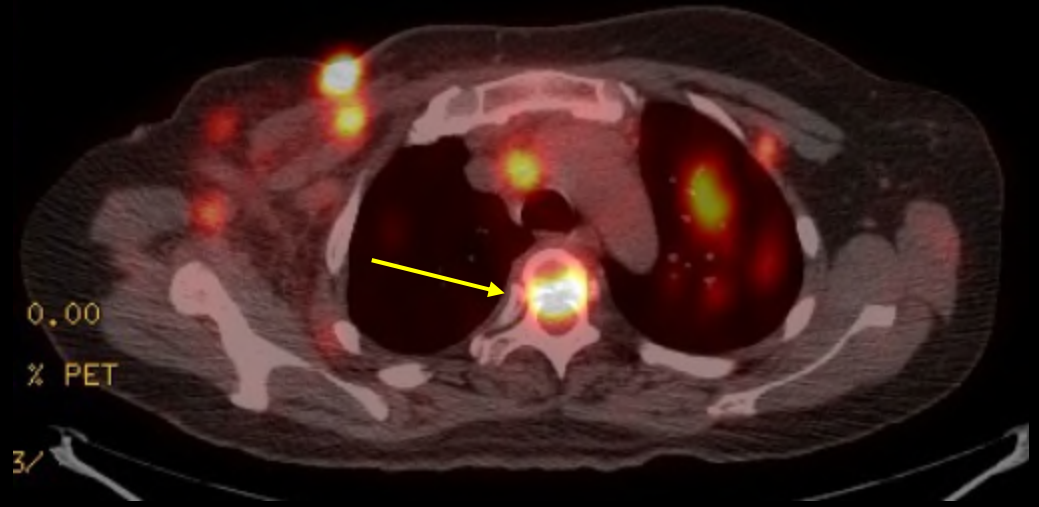


Focal tracer uptake in stomach

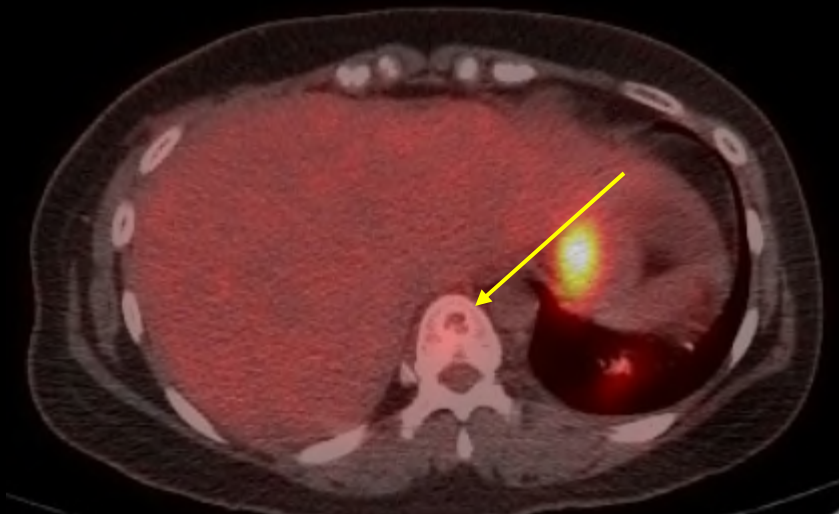


PET/CT Skeleton

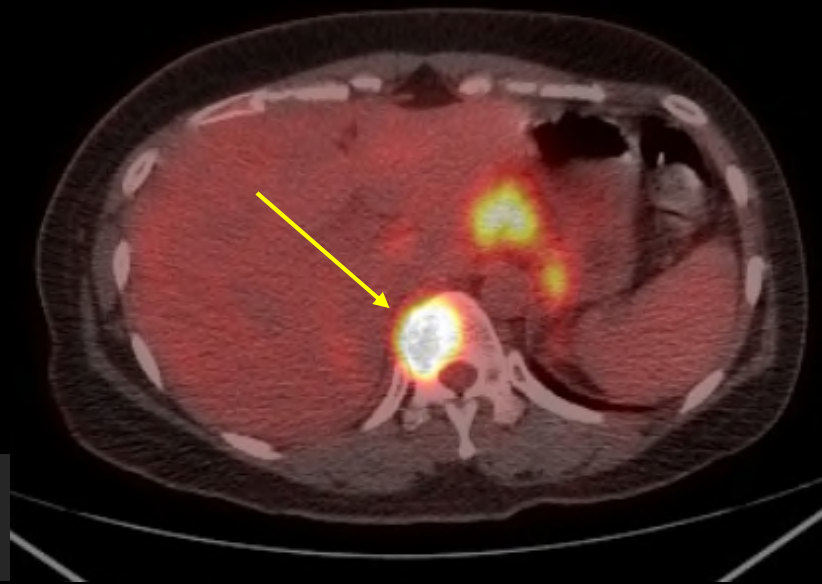
Inc focal uptake in T4



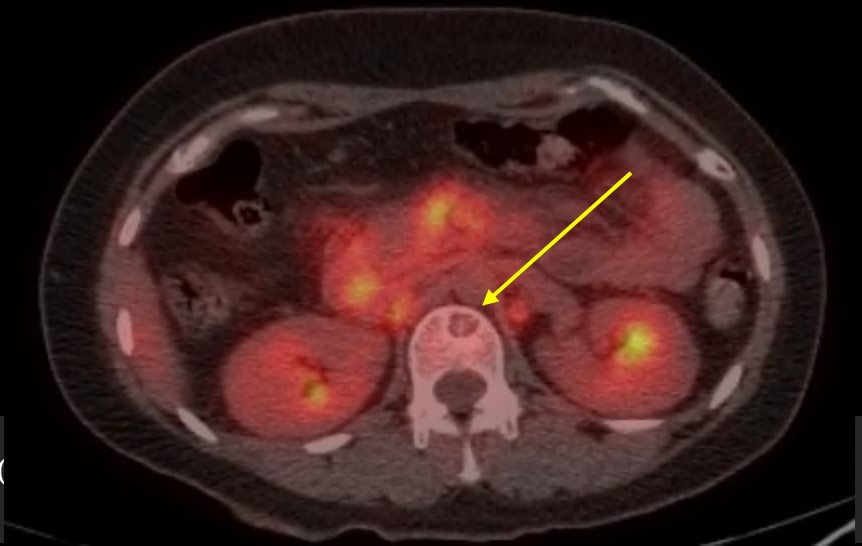
Non FDG avid cystic rim enhancing lesions in T10

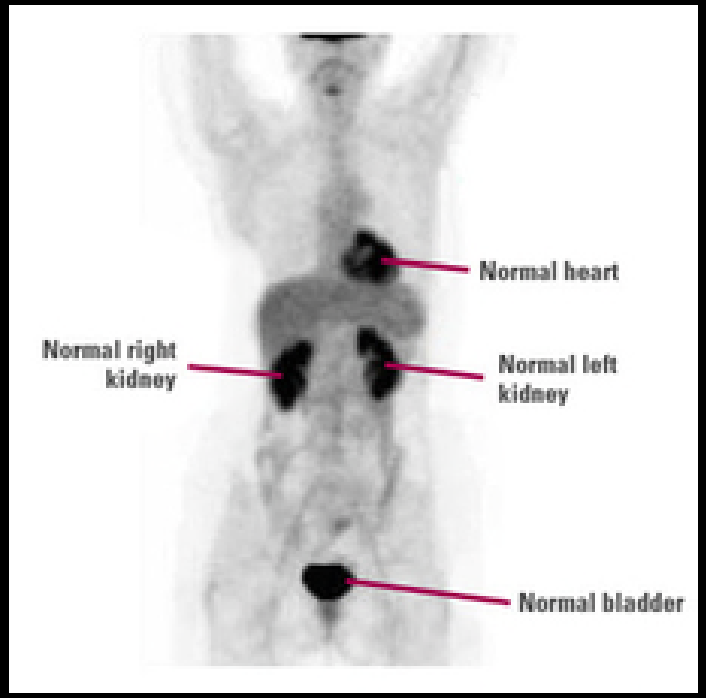


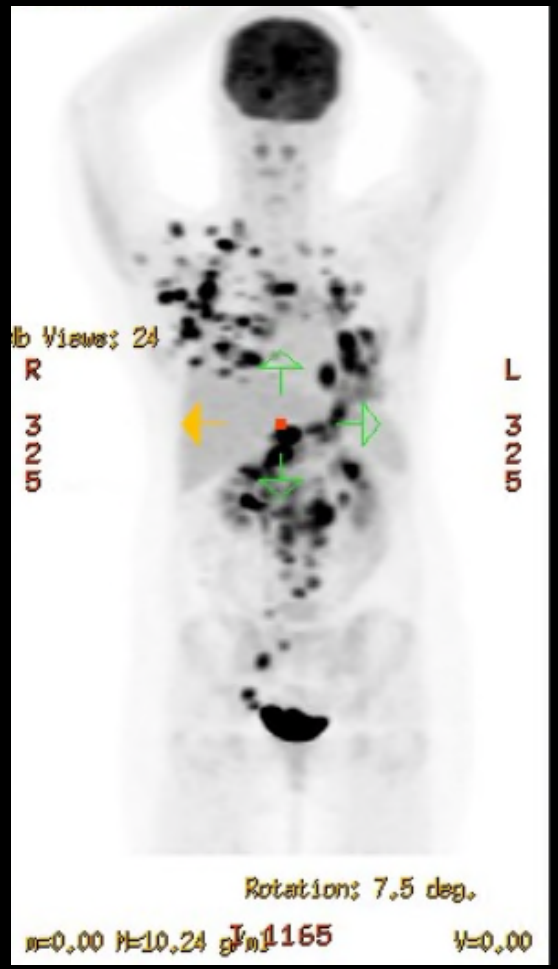
Inc focal uptake T11 lytic lesions



Non FDG avid cystic rim enhancing lesion in L1




Normal heart
Normal right kidney
Normal left kidney
Normal bladder


Views: 24
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1165

Positron Emission Tomography

- Noninvasive technique to quantify radioactivity in vivo
  - IV injection of radiolabeled fluoro-D-glucose (FDG)
  - Uptake by cells with a high metabolic rate and broken down
  - Accumulation is detected and quantified
- Normal physiologic uptake
  - Brain, skeletal muscle, myocardium, GI/GU, brown fat, thymus, bone marrow
- Limitations
  - Motion artifact
    - Physiologic muscle uptake should be symmetrical

Integration of Imaging with Clinical History

- Pt complains of severe back pain
  - Imaging shows metastasis to spine
- Pt complains of shortness of breath
  - Imaging shows numerous lung metastasis

Differential Diagnosis

- Incomplete resection of primary breast cancer with metastasis
- Breast cancer recurrence with metastasis
- New primary cancer in addition to breast cancer

Discussion

- Most likely diagnosis – Stage IV breast cancer from incomplete resection with metastasis
  - Stage IV – metastatic disease
  - Incomplete resection suggested by infiltration into the fat and muscle after R mastectomy
  - Most common metastatic location for breast cancer are lymph nodes, bone, liver, lungs, and brain

Final Diagnosis

- Stage IV ER+, HER2+ Invasive Ductal Carcinoma of R Breast with metastasis to brain, spine, lung, pancreas, and stomach

Treatment

- Given significant progression of patient she will be switched to ado-trastuzumab (kadcyla)
  - IV infusion of anti-HER2 monoclonal antibody combined with a microtubular inhibitor
- Possible Gamma Knife Radiation (GKR)
- Possible MRI brain w/wo contrast to further evaluate R occipital lesion seen on PET
- Prognosis is poor – focus on pain management

Cost at Memorial Hermann

- MRI cervical w/wo contrast
  - Uninsured
    - Cervical – $3,165
    - Thoracic – $2,515
  - Insured
    - Cervical – charged $8,792, owe $170
    - Thoracic – charged $6,987, owe $375
  - Total Uninsured - $5,680
  - Total Insured – charged $15,779, owe $545
- FDG-PET/CT whole body
  - Uninsured – unavailable
    - PET CT Tumor Image Skull - $3,081
  - Insured – unavailable
    - PET CT Tumor Image Skull – charged $8,558, owe $493

Take Home Points

- PET imaging is a great way to evaluate cancer metastasis
- Breast cancer can spread to places other than the lungs, liver, and bones
  - Like pancreatic head and stomach in this case
- Metastatic invasive breast cancer can happen in young people

References

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- https://radiopaedia.org/articles/positron-emission-tomography?lang=us
- https://www.memorialhermann.org/patients-caregivers/pricing-estimates-and-information/


Questions?