AMSER Rad Path Case of the Month:

56 year old male with dull abdominal pain

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Patient Presentation

HPI: 56-year-old male with 2 previous episodes of abdominal pain. The initial episode resolved and he did not seek medical care. Today, he presents for his second episode of pain and was referred to GI. States that the abdominal pain is a “dull ache” in the periumbilical region radiating to the left side that is worsening.

PMHx: HTN, Obesity

Medications: Amlodipine, Vitamin D3, Losartan

FHx: Pancreatic Cancer in Father

Social Hx: never smoker; denies drug use; positive for alcohol use

Vitals: BP: 127/91, Pulse: 70, RR: 16, Temp: 98.7F BMI: 31

Physical Exam: Abdomen soft, nontender, non distended. Dull periumbilical pain tender with deep palpation.

Pertinent Lab Values: WBC 16.54; Hematocrit 50.8

Select the applicable ACR Appropriateness Criteria

American College of Radiology
ACR Appropriateness Criteria®
Acute Nonlocalized Abdominal Pain

Variant 1: **Acute nonlocalized abdominal pain and fever. No recent surgery. Initial imaging.**

Procedure	Appropriateness Category	Relative Radiation Level
CT abdomen and pelvis with IV contrast	Usually Appropriate	☢☢☢
MRI abdomen and pelvis without and with IV contrast	May Be Appropriate	O
US abdomen	May Be Appropriate	O
CT abdomen and pelvis without IV contrast	May Be Appropriate	☢☢☢
MRI abdomen and pelvis without IV contrast	May Be Appropriate	O
CT abdomen and pelvis without and with IV contrast	May Be Appropriate	☢☢☢☢
Radiography abdomen	May Be Appropriate	☢☢
FDG-PET/CT skull base to mid-thigh	Usually Not Appropriate	☢☢☢☢
In-111 WBC scan abdomen and pelvis	Usually Not Appropriate	☢☢☢☢
Tc-99m cholescintigraphy	Usually Not Appropriate	☢☢
Tc-99m WBC scan abdomen and pelvis	Usually Not Appropriate	☢☢☢☢
Fluoroscopy contrast enema	Usually Not Appropriate	☢☢☢
Fluoroscopy upper GI series with small bowel follow-through	Usually Not Appropriate	☢☢☢

This imaging modality was ordered by the ER physician

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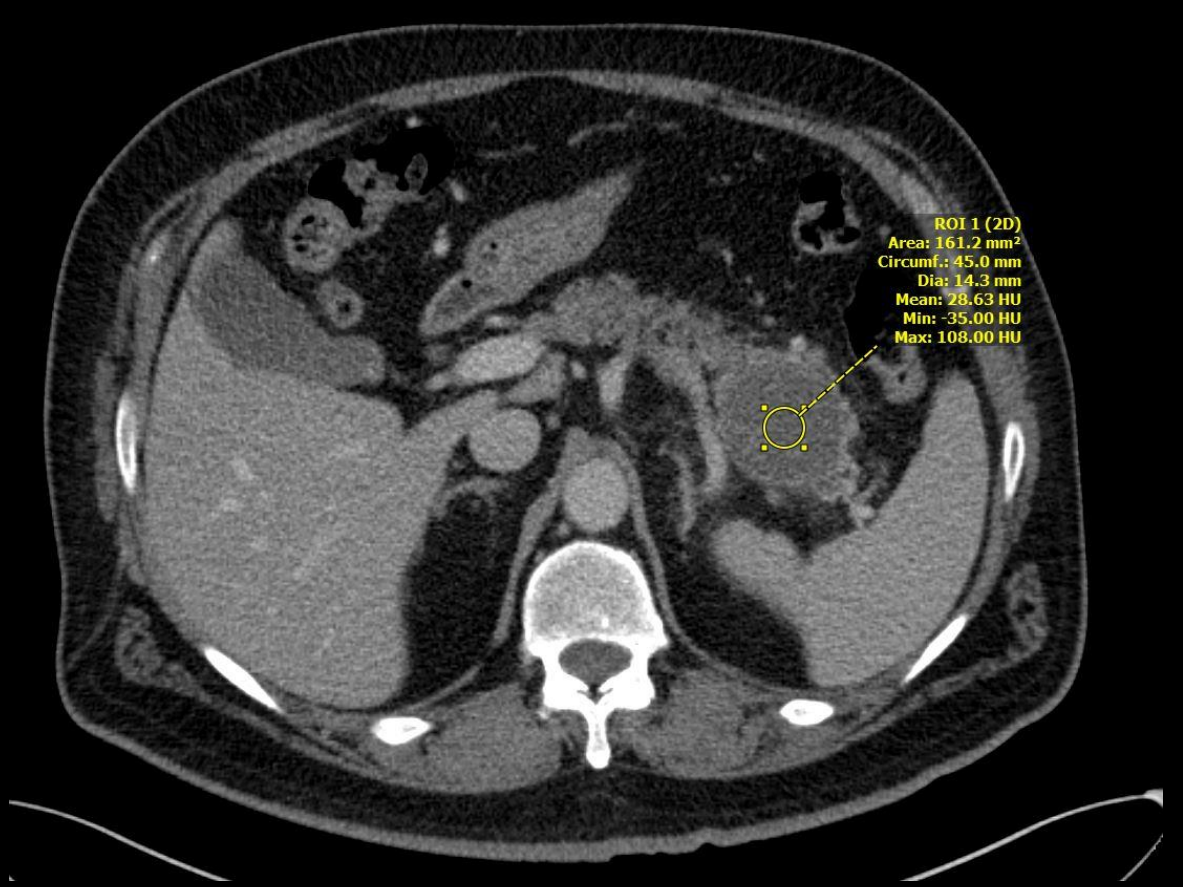
Axial CT Abdomen (not labeled)



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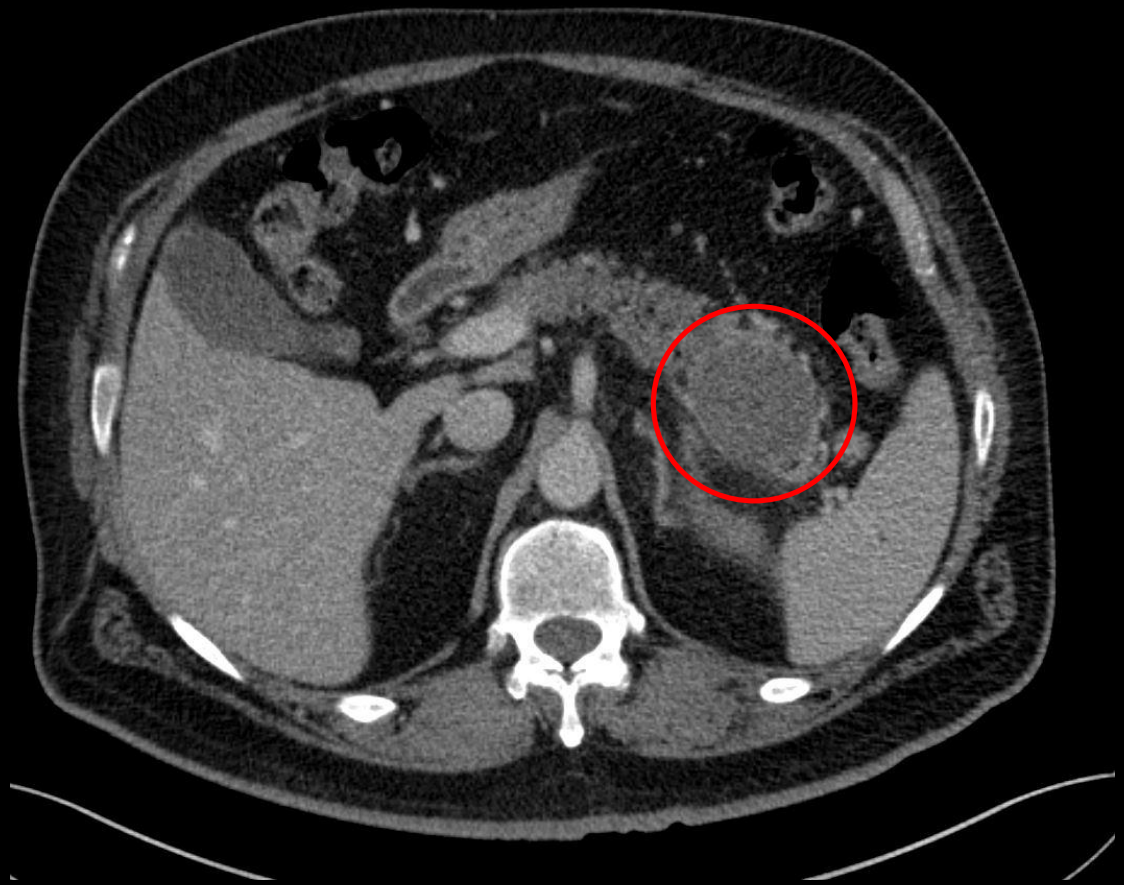
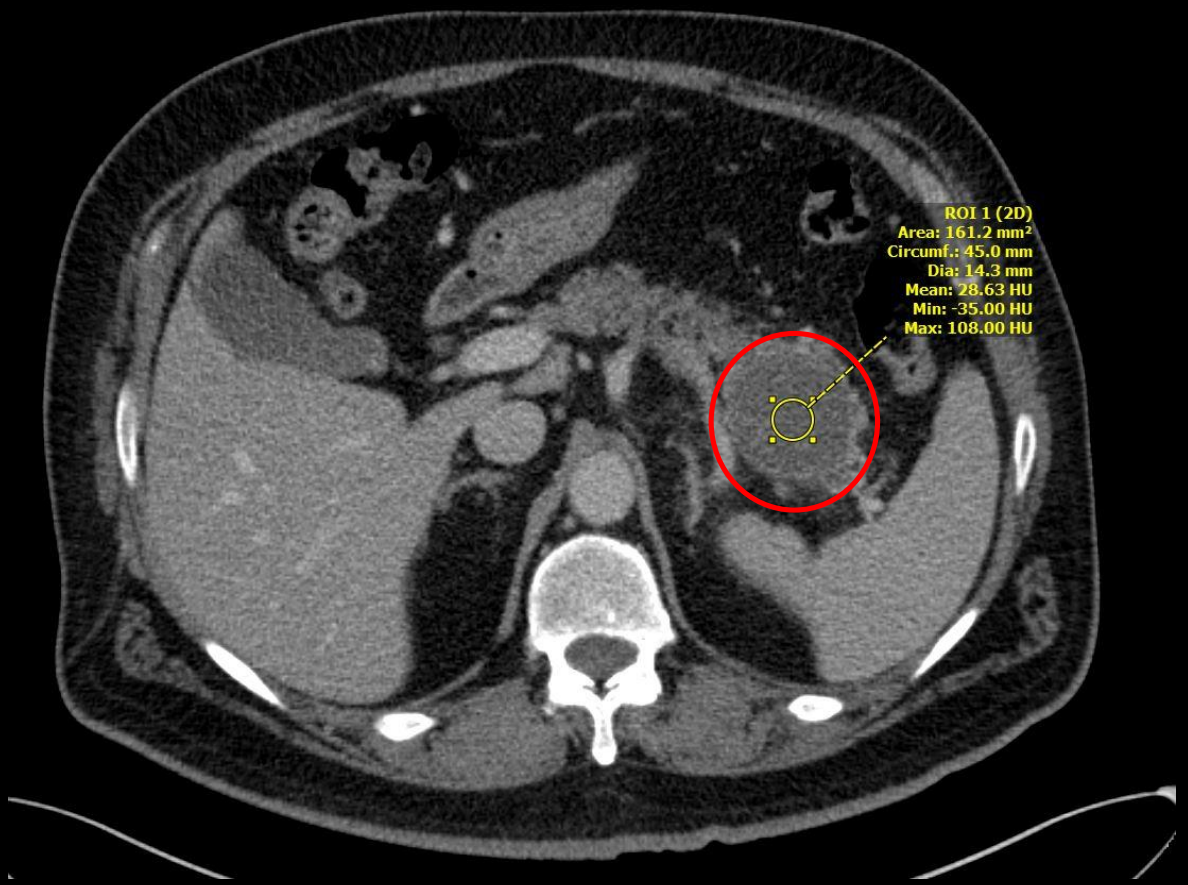
Axial CT Abdomen (labeled)





= Hypoattenuating 4.1 x 5.6 cm mass in the tail of the pancreas abutting the splenic artery; No ductal dilatation.

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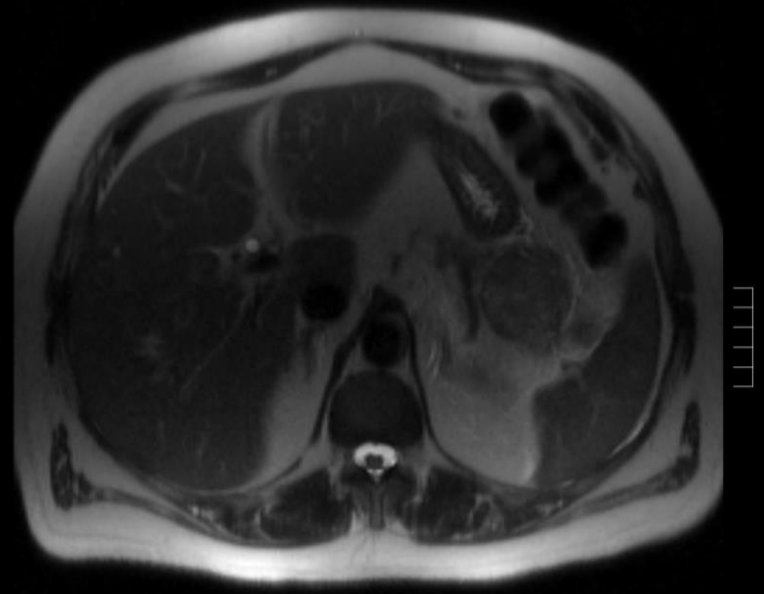
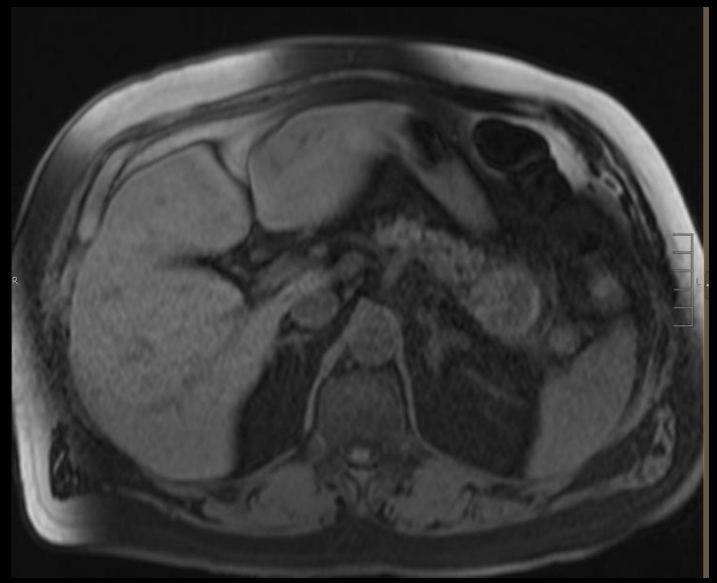
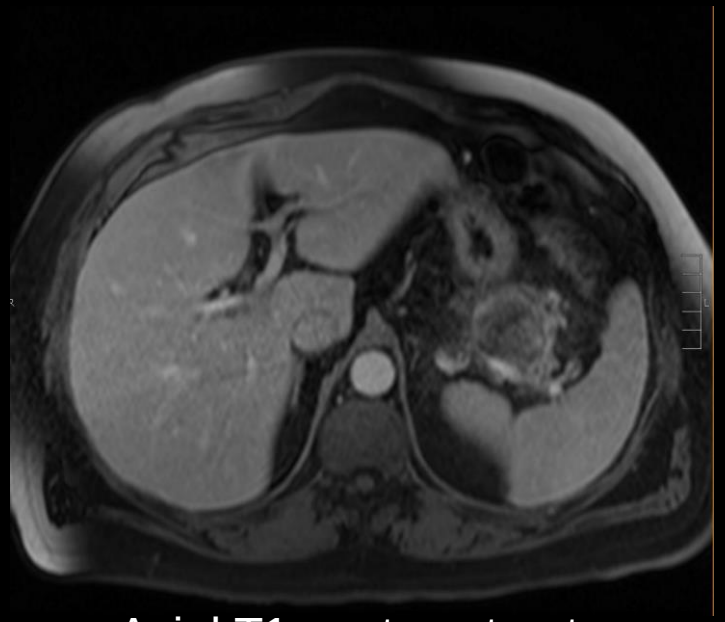
MRI Images (not labeled)



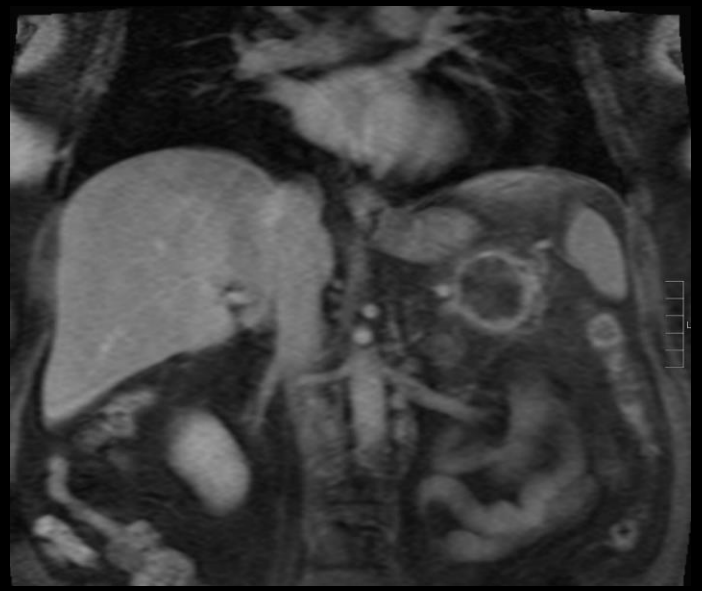
Axial T2



Axial T1 Noncontrast



Axial T1 post contrast



Coronal T1 post contrast

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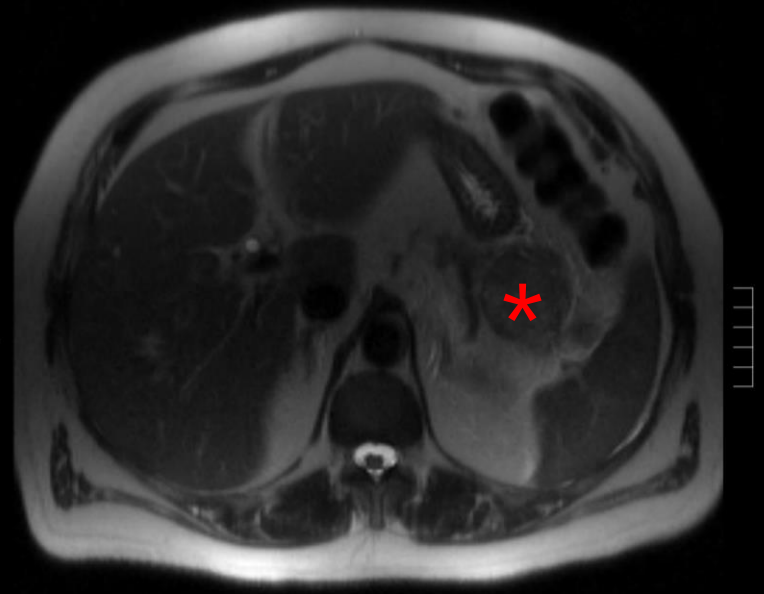
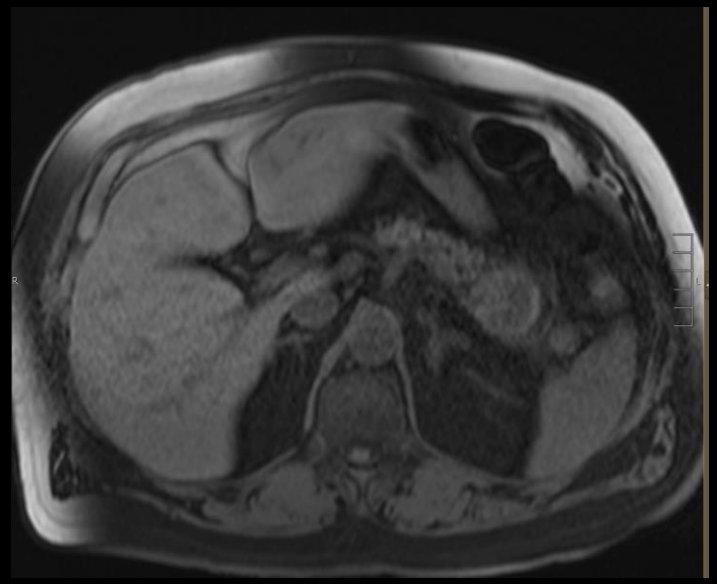
MRI Images (labeled)

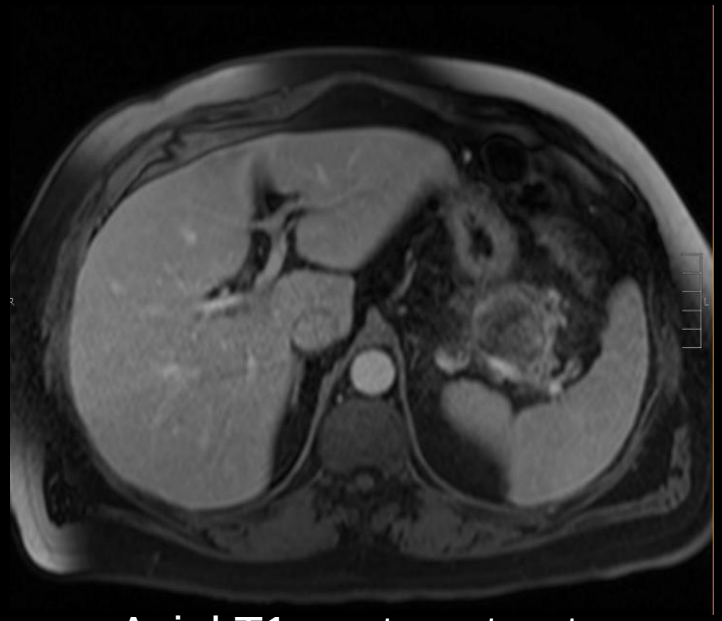


Axial T2

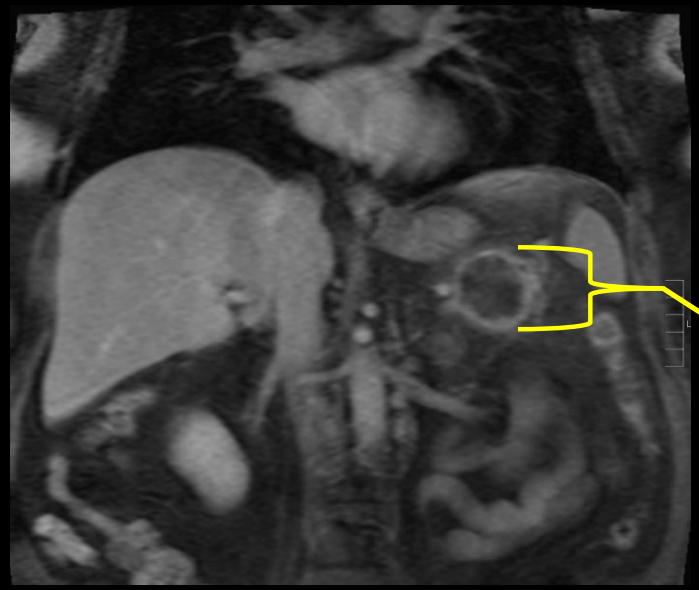
* = T2 Hypointense pancreatic lesion



Axial T1 Noncontrast



Axial T1 post contrast



Coronal T1 post contrast

Peripheral enhancement around but not within the lesion

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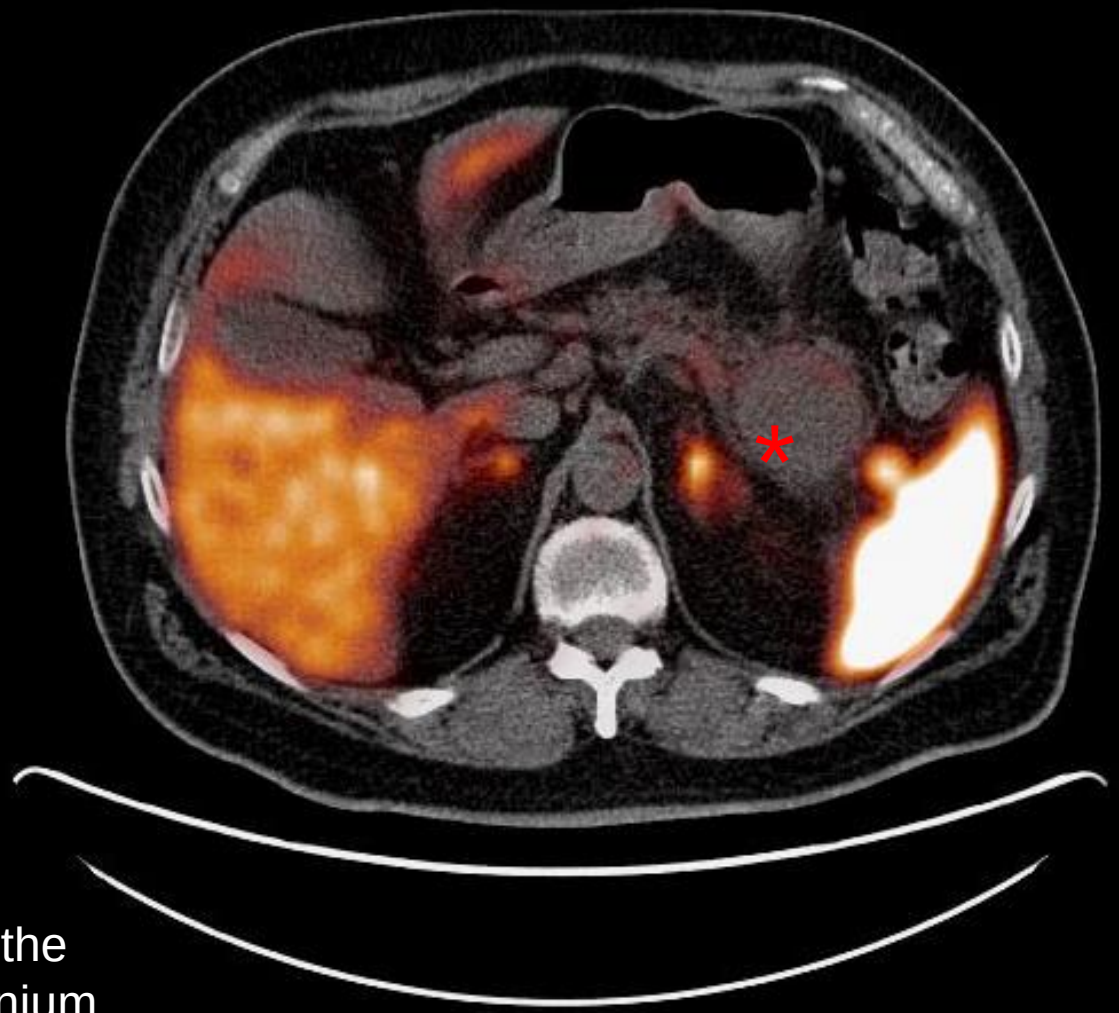
GA-68 PET CT (labeled)



* = No Galium activity within the pancreatic lesion on gadolinium PET CT

DDX (based on imaging)

- Pseudocyst
- Mucinous Cystic Neoplasm
- Neuroendocrine Tumor
- Adenocarcinoma
- Metastasis

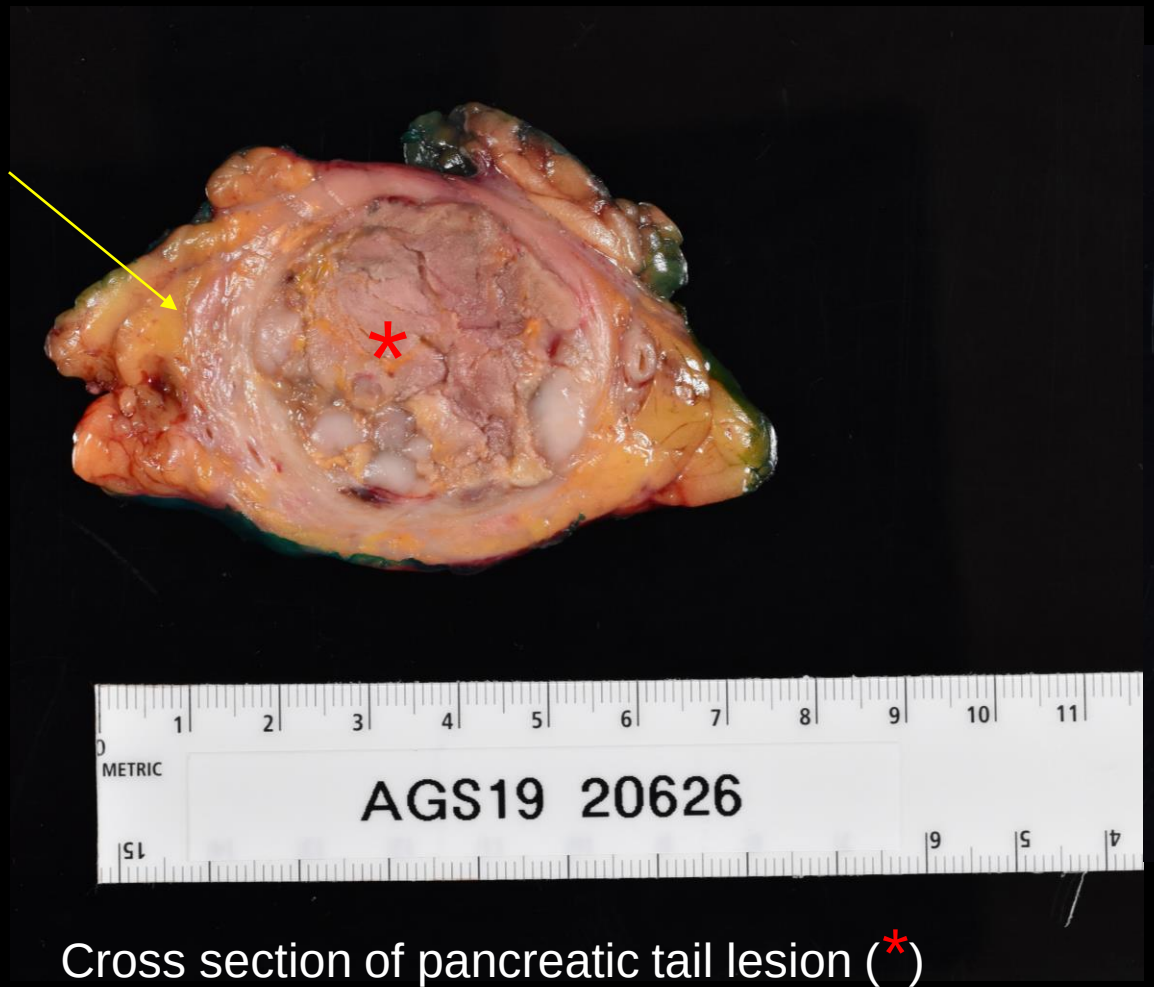
Gross Path (labeled)

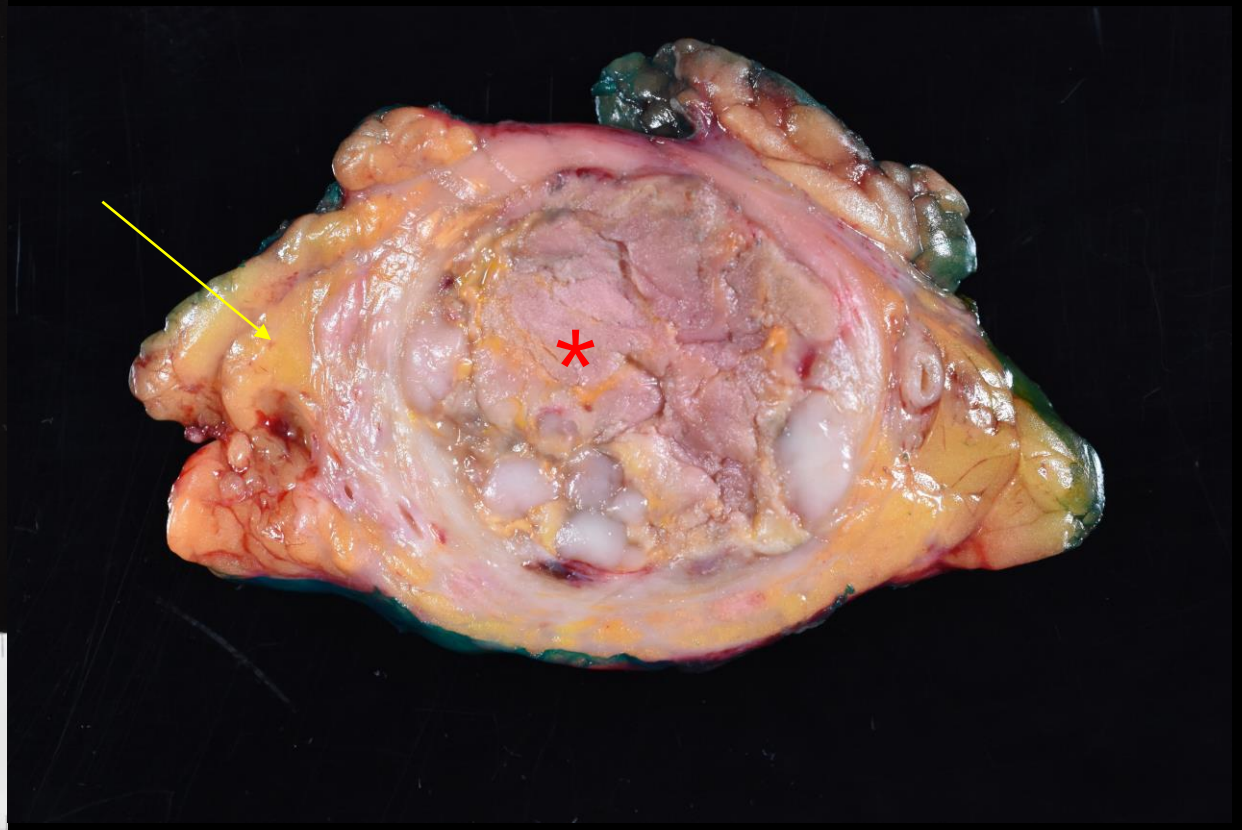
Posterior

Anterior

4.2 x 3.9 x 3.7 well circumscribed, tan-yellow soft, necrotic mass within pancreatic tail

Gross Path (labeled)

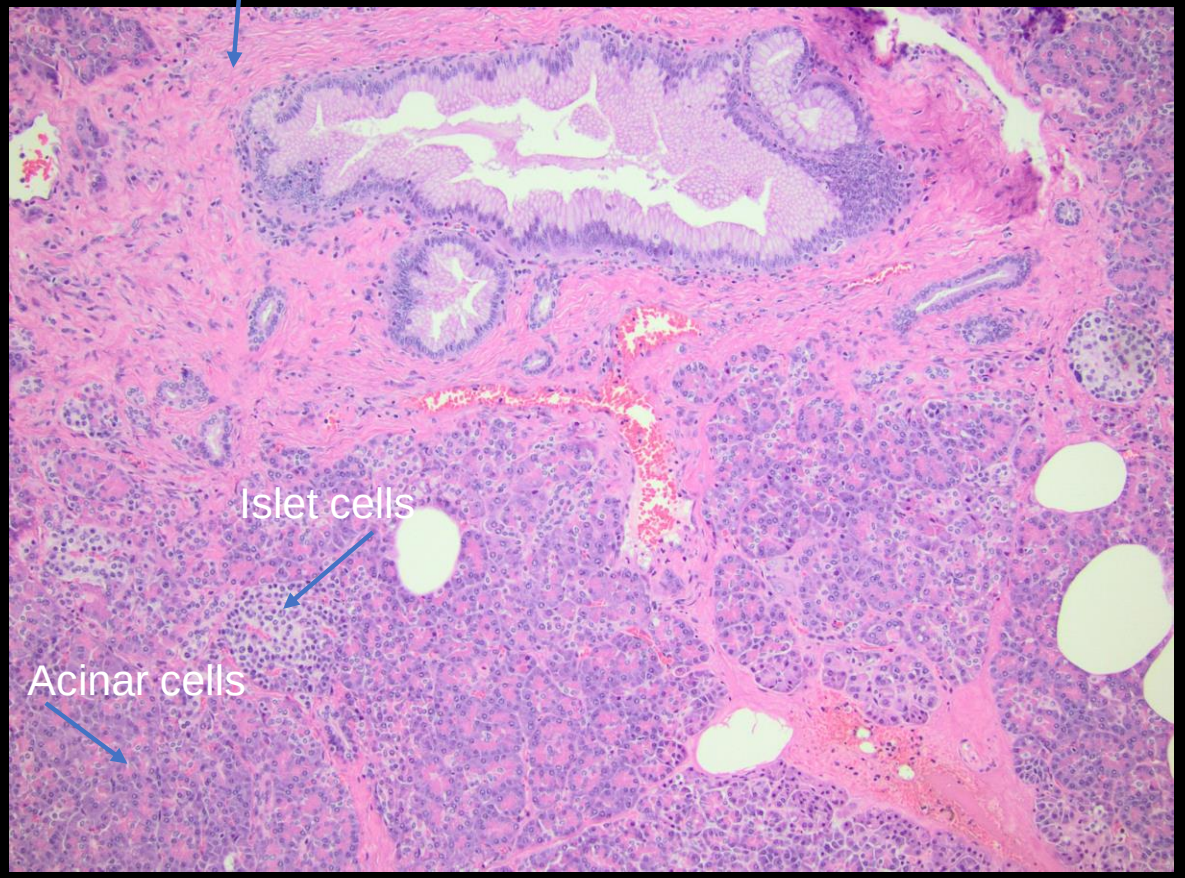




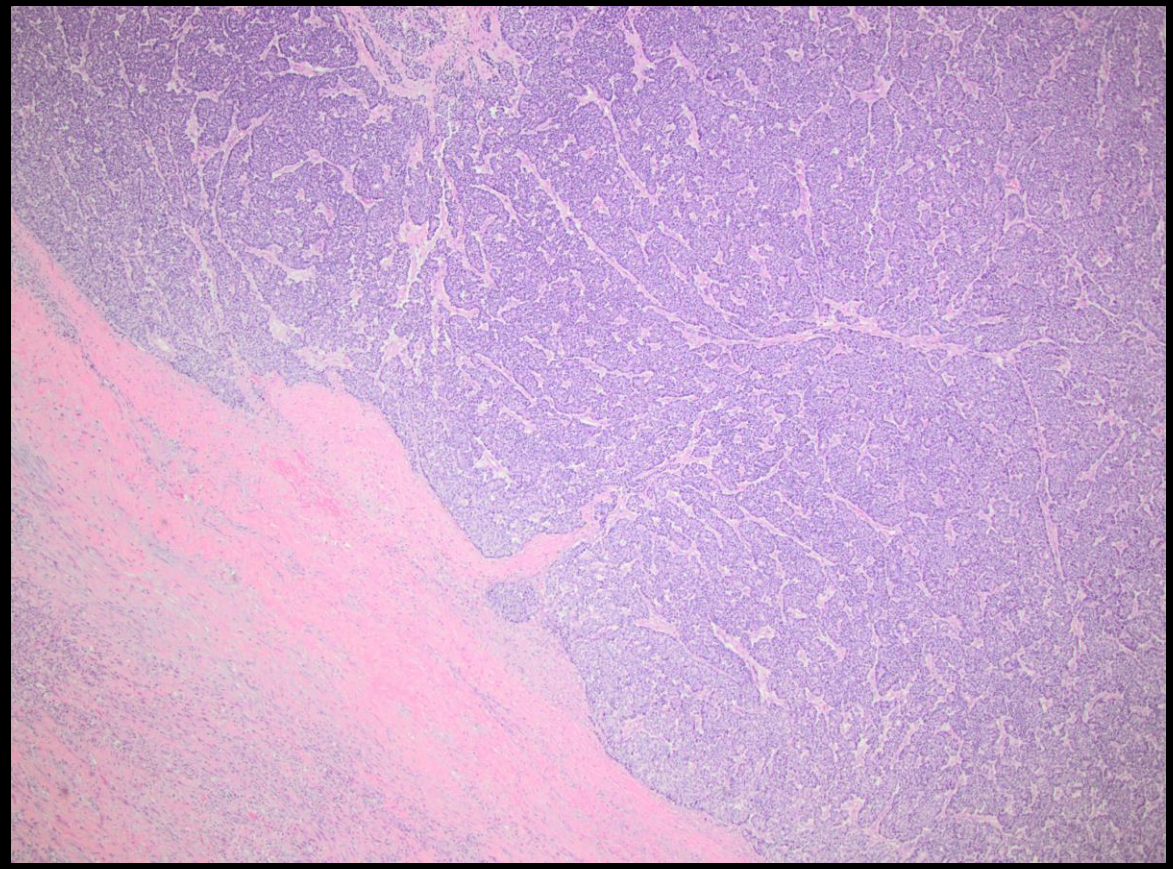
Cross section of pancreatic tail lesion (*)

Peripancreatic adipose tissue (⟶)

Micro Path (labeled)

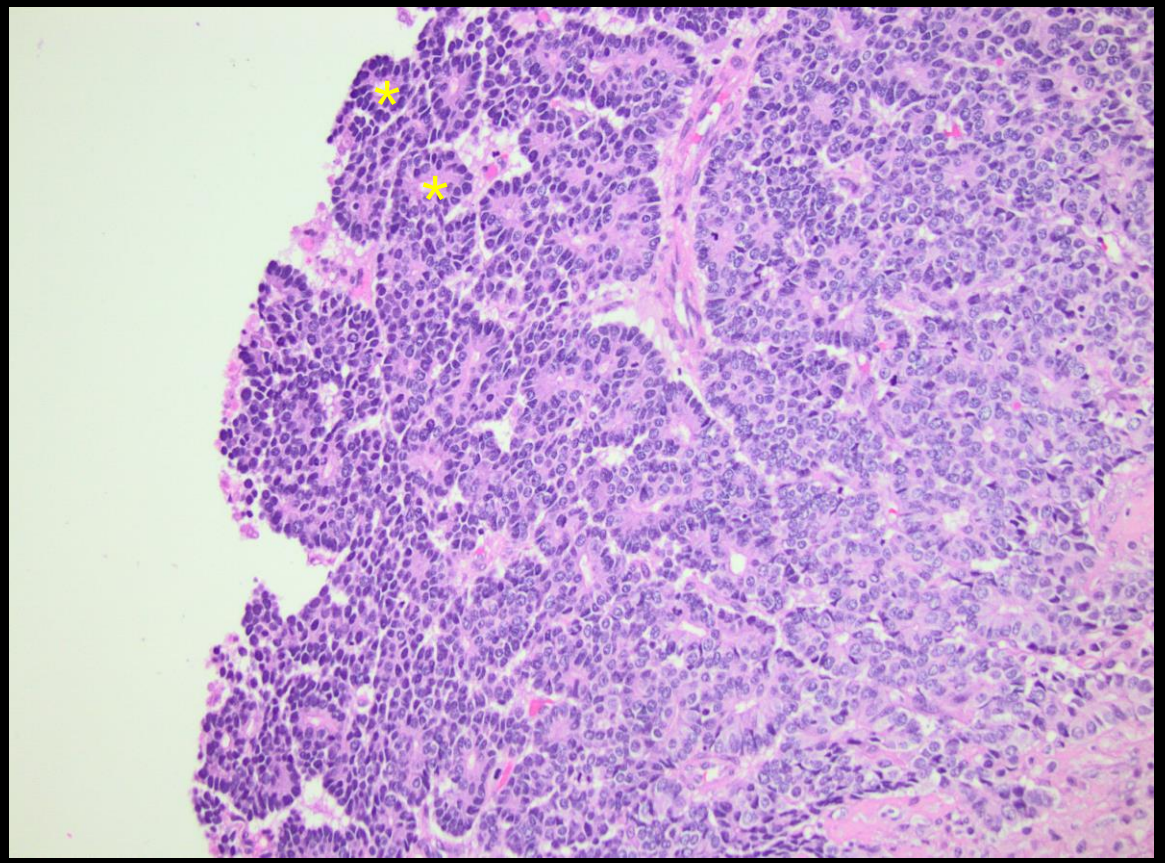


Hematoxylin and Eosin stain of normal pancreatic tissue surrounding the pancreatic tail mass

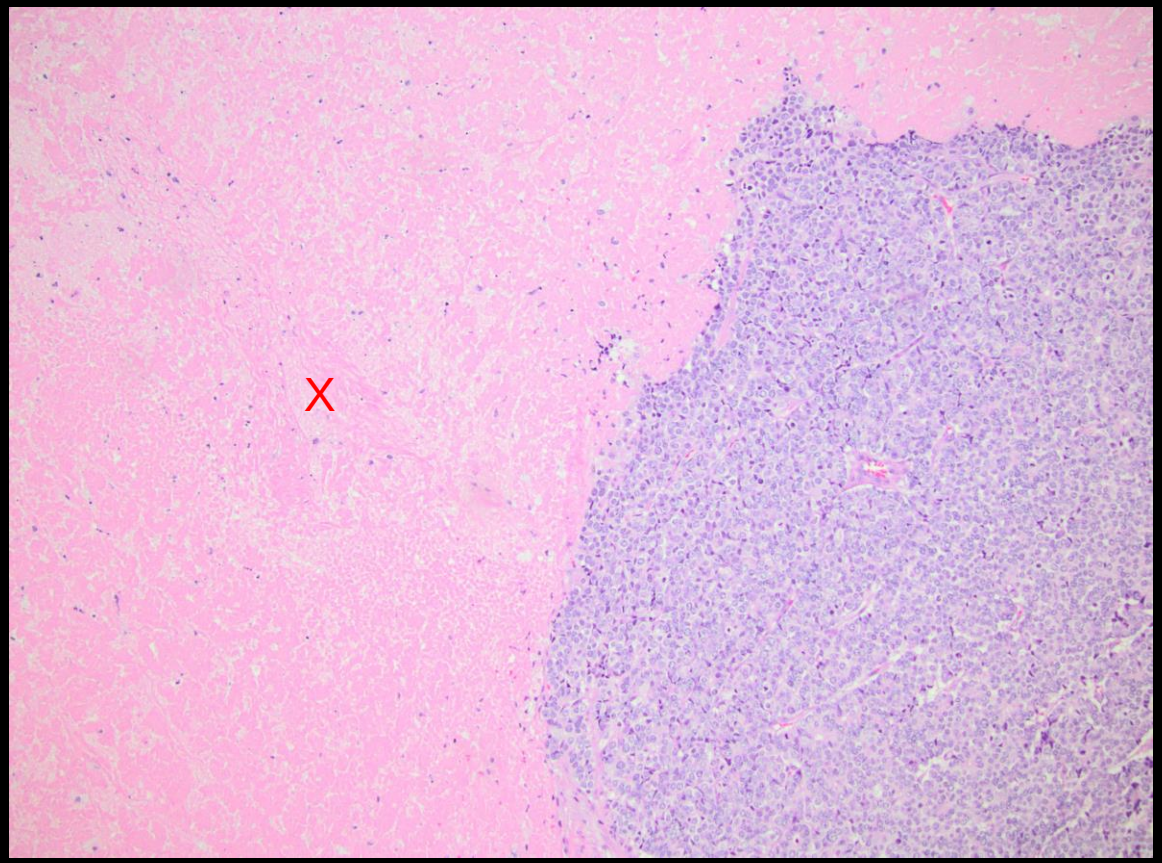


Hematoxylin and Eosin stain of the pancreatic tail mass

Micro Path (labeled)



Neuroendocrine tumor cells with rosette formation (*)



Tumor with infarcted (non-viable) ghost cells (X)

Ki67 = 85%; slide not shown
Mitoses = >30/hpf

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Final Dx:

Well Differentiated Neuroendocrine Tumor (NET) Grade 3

Case Discussion: Pancreatic NET

- PanNETs are rare compared to exocrine tumors, accounting for only **2%** of all pancreatic neoplasms
- Prognosis is influenced by local invasion, metastasis, vascular involvement and functional status
  - ~90% of functioning insulin producing tumors are benign
  - 60-90% of other functioning and nonfunctioning tumors are malignant
- Functioning neoplasm subtypes include insulinoma, glucagonoma, gastrinoma and VIPoma syndrome
  - Insulinoma is the most common subtype
  - The above subtypes usually present with a hormonal syndrome

Case Discussion: Pancreatic NET

- Nonfunctioning PanNETs present most commonly with abdominal pain (35-78%), weight loss, anorexia and nausea
- PanNETs are commonly associated with hereditary endocrinopathies
  - MEN1
  - Neurofibromatosis 1
  - von Hippel-Lindeau syndrome
  - Tuberous Sclerosis

Case Discussion: Pancreatic NET

- Differentiation
  - Originally, classified by the WHO in 2004 into two groups:
    - Well differentiated Neuroendocrine Tumor
    - Poorly differentiated Neuroendocrine Carcinoma (NEC)
  - Updated in 2017 to be classified by number of mitoses and/or Ki-67 index
    - Grade I: Ki67 < 3%; <2 mitoses/hpf
    - Grade 2: Ki67 3-20%; 2-20 mitoses/hpf
    - Grade 3: Ki67 > 20%; >20 mitoses/hpf
  - Well differentiated vs poorly differentiated is not based alone on the grading system described above; morphology also has an influence
    - Neuroendocrine neoplasms meeting the WHO criteria for NEC (described above) with a well-differentiated morphology and an "organoid pattern" have also been identified
    - Organoid features: solid nests, trabeculae, ribbon-like, glandular, acinar and **rosette** formations
      - True rosette formation is seen **only in neuroendocrine tumors**, helping to rule out mesenchymal and epithelial tumors

= Our Patient

Case Discussion: Pancreatic NET

- Immunohistochemistry
  - Diagnostic markers can further help define well differentiated PanNETs
  - Reliable markers:
    - Synaptophysin
    - Chromogranin A
  - EUS Biopsy from our patient stained **positively** for:
    - Synaptophysin
    - Chromogranin
    - Pancytokeratin
    - Cytokeratin 7

Radiographic Diagnosis

- CT Scan Sensitivity for PanNETs is >80%
  - Most NETs are highly vascular
    - Enhancing during the early arterial phase on a contrast CT
    - Washout occurs during portal venous phase
  - Liver metastasis will appear as isodense on noncontrast CT scan
- MRI is characterized by low signal on T1 and high signal on T2
- Endoscopic US is highly sensitive
  - Added value due to ability to take a fine needle aspiration biopsy
- Somatostatin receptor based imaging: 68-Ga DOTATATE in combination with CT improve the detection and staging
  - Most well differentiated PanNETS express high levels of somatostatin receptors

References:

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