



GHAPP

Gastroenterology & Hepatology
Advanced Practice Providers

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Advanced Practice Providers

Pancreas Cysts & Pancreatitis

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Disclosures

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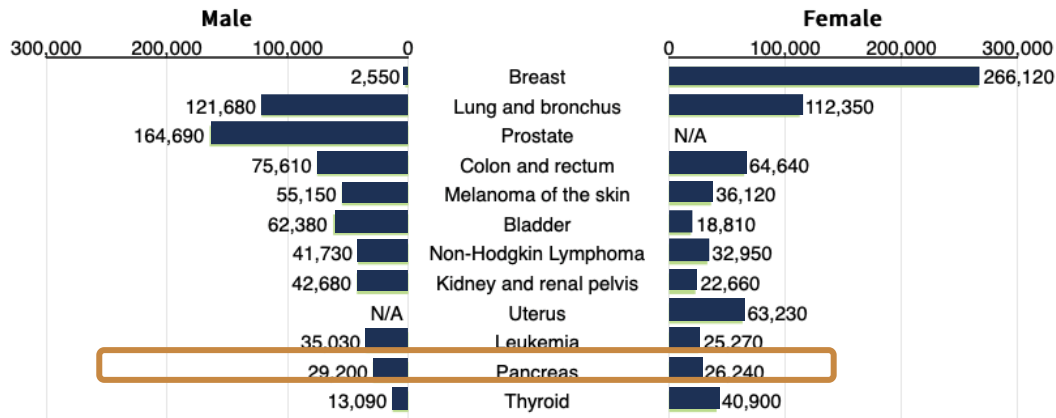
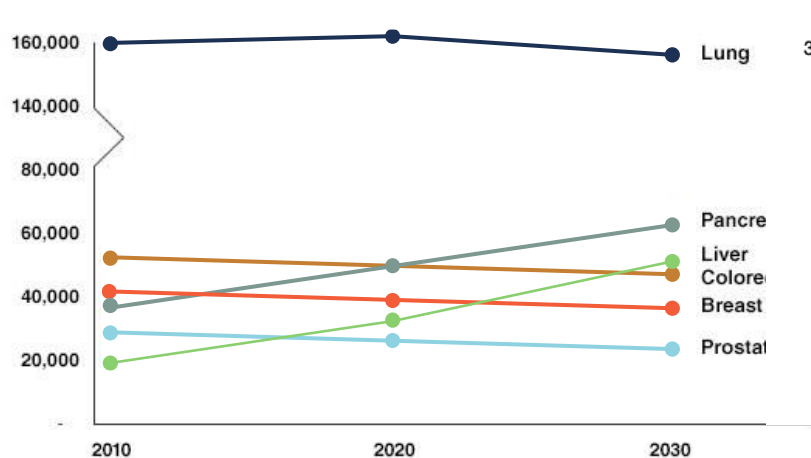
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No financial relationships to disclose.

Pancreas Cyst Objectives

- Epidemiology
- Classification
- Treatment
 - Surveillance
 - Surgery

Pancreatic Cancer Is Estimated to Be the Second Leading Cause of Cancer-Related Death by 2020

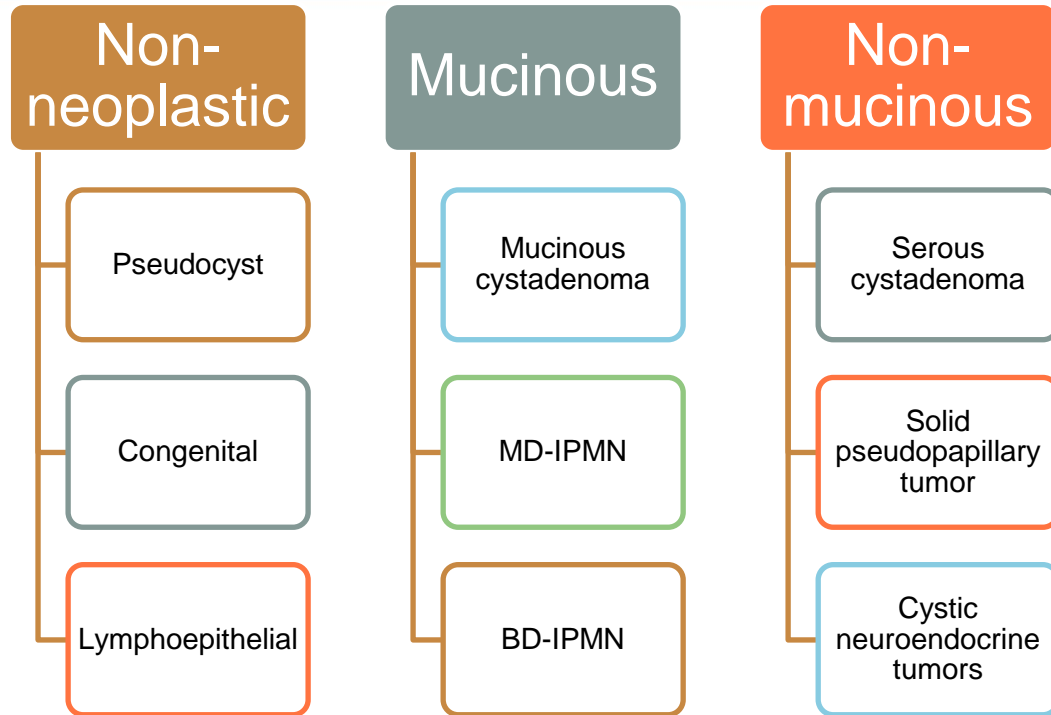


Low prevalence disease, so widespread, population-based screening is not feasible

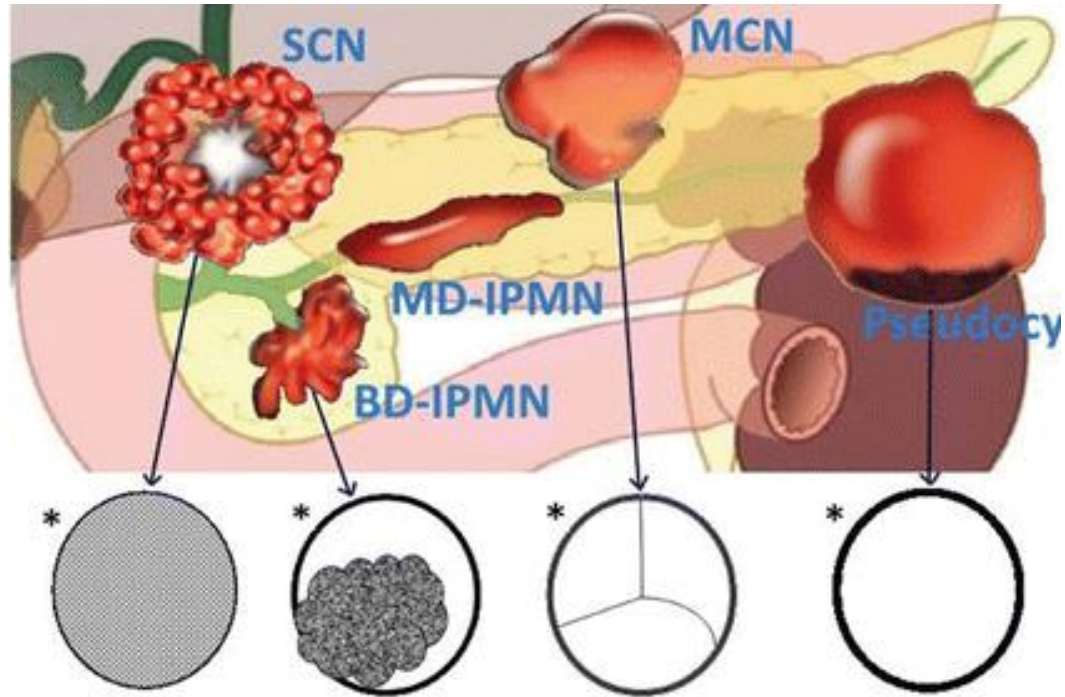
Pancreatic Cysts

Age band	Total number of subjects	Cyst prevalence (95% CI)	Cyst prevalence > 2cm
<40	557	0.5% (0.07-1.21%)	0.03%
40-49	1027	2.6% (0.4-6.7%)	0.17%
50-59	970	4.0% (1-10%)	0.27%
60-69	665	10% (0.3-32%)	0.67%
70-79	154	25% (3-60%)	1.67%
80+	46	37% (24-51%)	2.47%

Simplified Overview of WHO Classification



Pancreas
Cystic
Lesions



Honeycomb Pattern of SCN



Use consistent terminology when describing cysts

Locularity

Locularity



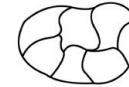
Unilocular with smooth contour



Bilocular with lobulating contour and thick septum



Oligolocular

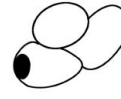


Multilocular

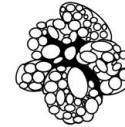
Size of cysts



Multiple microcysts



Macrocysts with mural nodule



Honeycomb-like appearance



Mixed micro- and macrocysts

Size of cyst components

Communication with main pancreatic duct

Communication with pancreatic duct



Branch-duct IPMN; grape-like cluster with communication

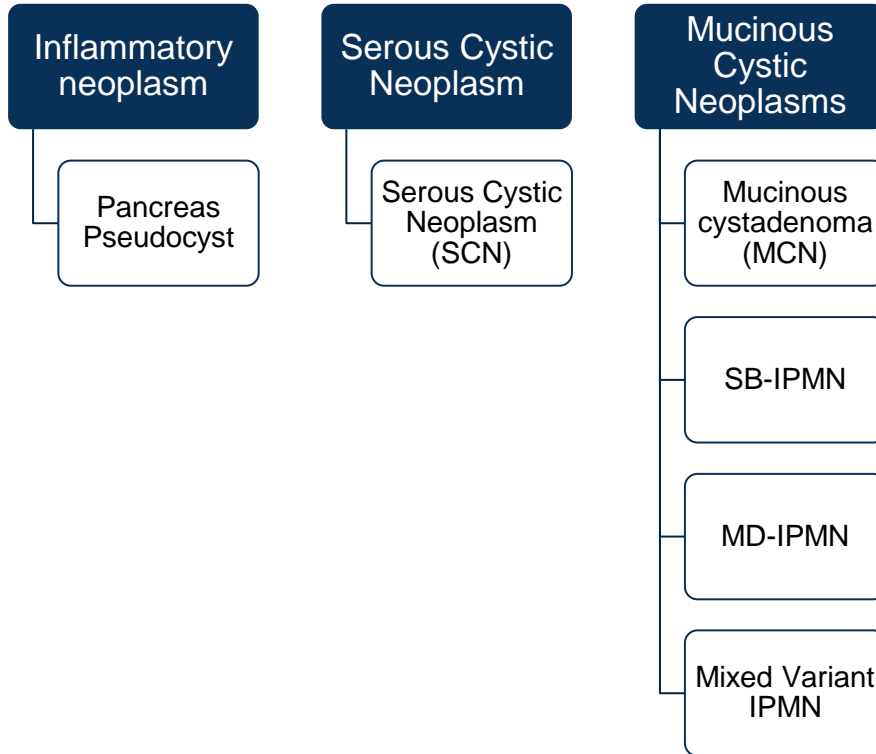


Main-duct IPMN; Sacular dilation of main pancreatic duct with mass

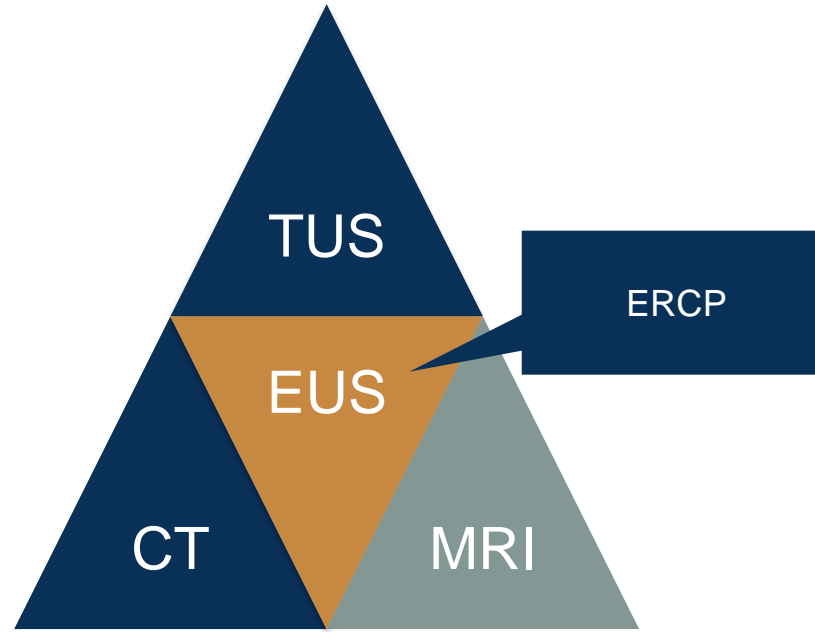


Mucinous cystadenocarcinoma without communication

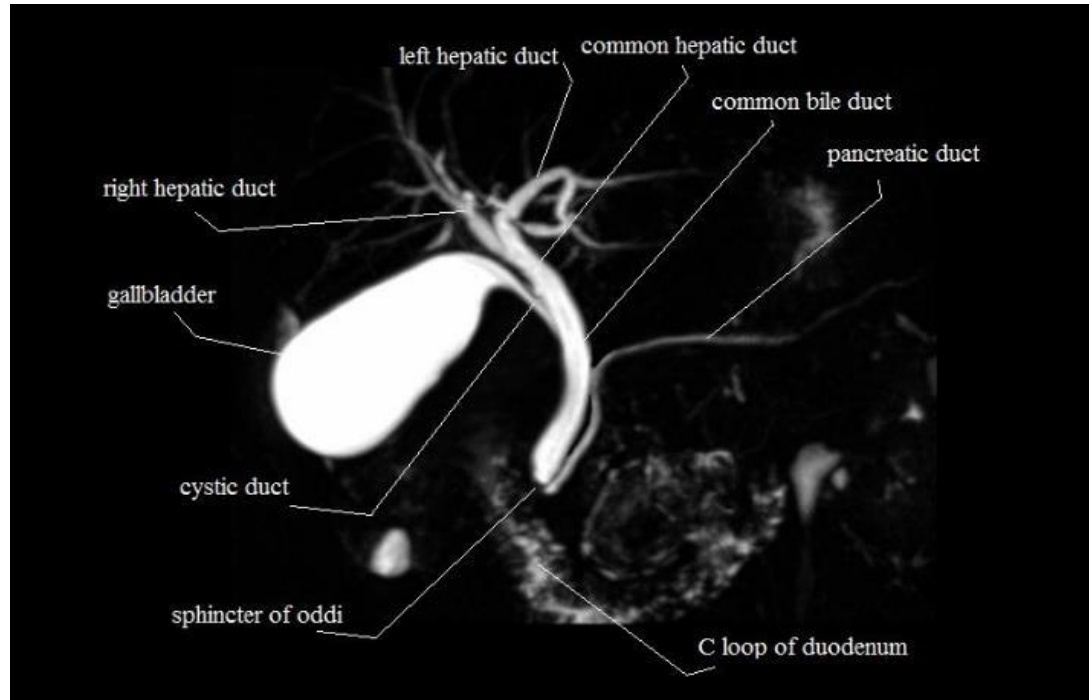
Most Common Pancreas Cystic Lesions



Imaging Modalities



MRI/MRCP



EUS

- Cyst morphology
- Cyst fluid analysis
 - Cytology
 - Amylase
 - CEA
 - Cyst fluid genetics

Cyst Characteristics

LESION	DEMOGRAPHICS	CYST FLUID:		
		Viscosity	CEA ng/mL	Amylase
Pancreas pseudocyst	HO pancreatitis		Low/ ND	High
Serous cystic neoplasm	60s, F>M	Low	Low/ ND	Low
MCN	40-50s, F	High	>192	Variable
IPMN	M=F	High	>192	High

CEA Cut-Off: 192ng/mL

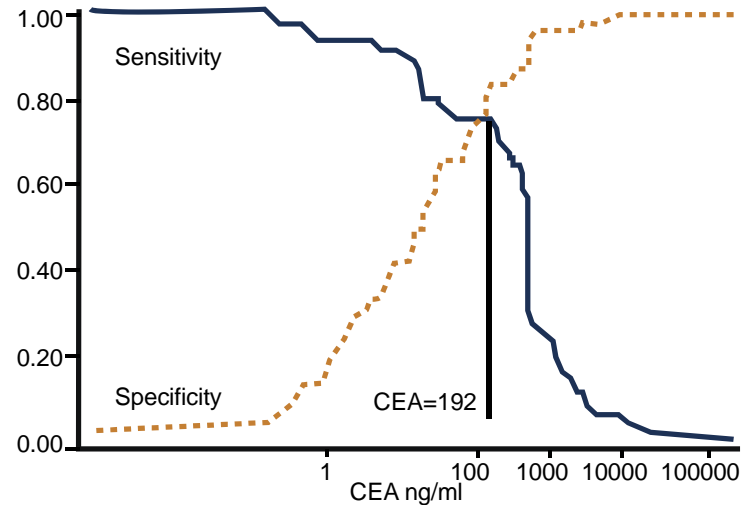
Table 4. Accuracy of the 3 Primary Tests for Differentiating Between Mucinous and Nonmucinous Cystic Lesions

	EUS morphology	Cytology	CEA
Sensitivity	32/57 (56.1%)	19/55 (34.5%)	42/56 (75%)
Specificity	25/55 (45.4%)	45/54 (83.3%)	46/55 (83.6%)
Accuracy	57/112 (50.9%)	64/109 (58.7%) ^a	88/111 (79.2%) ^{b,c}

^aThree patients did not have cytology result.

^bOne patient did not have a CEA result.

^cP<0.05 vs cytology, EUS morphology.



Performance of CEA and Amylase

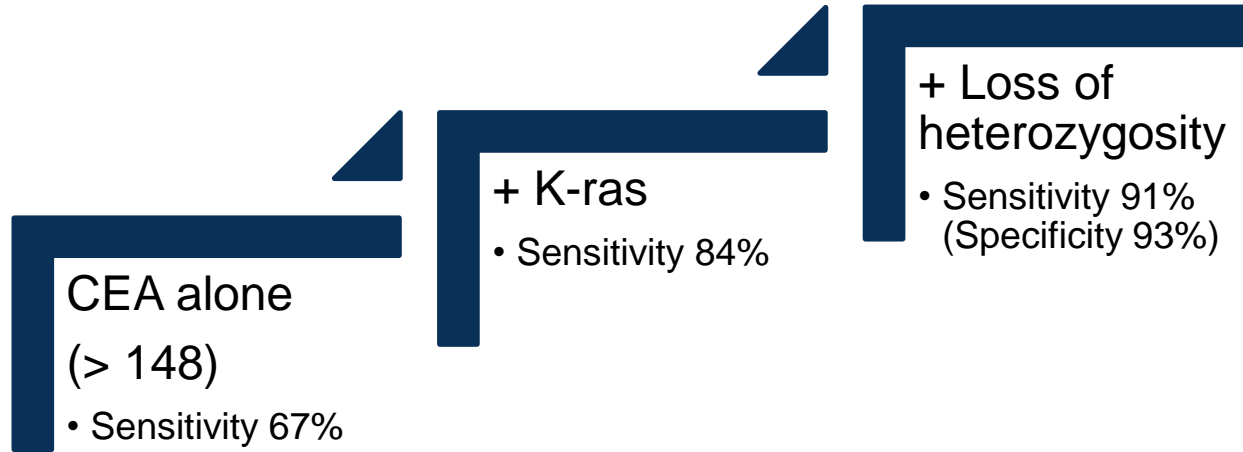
	Sensitivity	Specificity	Comparison
Amylase < 250	44%	98%	Serous/Mucinous vs. Pseudocyst
CEA < 5	50%	95%	Pseudocyst vs. Serous/Mucinous
CEA > 800	48%	98%	Mucinous vs. all others

EUS morphology + cytology + cyst CEA vs. CEA alone

- Sensitivity 91% vs. 75%
- Lower specificity and AUC

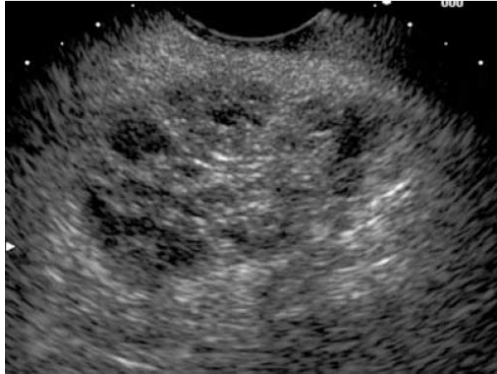
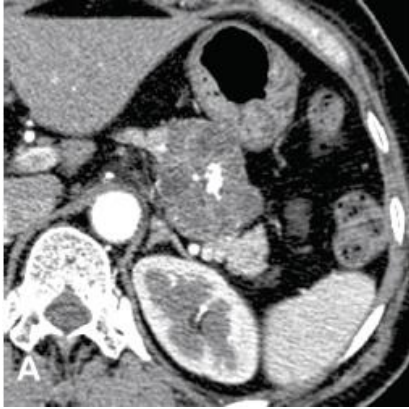
Van Der Waaij LA, Van Dullemen HM, Porte RJ. Cyst fluid analysis in the differential diagnosis of pancreatic cystic lesions: A pooled analysis. *Gastrointestinal Endoscopy*. 2005;62:383-389; Brugge WR, Lewandrowski K, Lee-Lewandrowski E, Centeno BA, Szydio T, Regan S, Del Castillo CF, Warshaw AL. Diagnosis of Pancreatic Cystic Neoplasms: A Report of the Cooperative Pancreatic Cyst Study. *Gastroenterology*. 2004;126:1330-1336.

Cyst Fluid Genetics



Combining elevated CEA >192 and any mutation in K-ras or allelic LOH was able to identify all mucinous cysts that were missed by cytological exam

Case 1:



- 65yo woman presents to your clinic with asymptomatic 5cm tail of pancreas (TOP) lesion
 - CT + EUS show 5cm cyst comprised of many small fluid filled cysts clustered together (AKA microcystic lesion)
 - Imaging also shows central stellate scar or “sunburst calcification”
 - EUS demonstrates a honeycombing appearance
 - EUS FNA cyst fluid CEA is not detectable
 - What is your diagnosis?

SCN

- Generally considered benign and do not require surgery
- Follow-up surveillance imaging not needed
- Demonstration of a central scar or “sunburst” calcification by CT or MRI is highly diagnostic, but only see this about 20% of cases
- Consider surgery if symptomatic or if diagnosis remains in doubt

Case 2:



- 40 yo woman with asymptomatic 7cm cystic lesion in body of pancreas (BOP)
 - CT shows macrocystic lesion with a thick fibrous wall
 - CT also shows peripheral calcifications
 - MRI indicates the lesion does not communicate with the MPD
 - EUS FNA shows thick fluid with fluid CEA level in the 400s
 - What is your diagnosis?

MCN

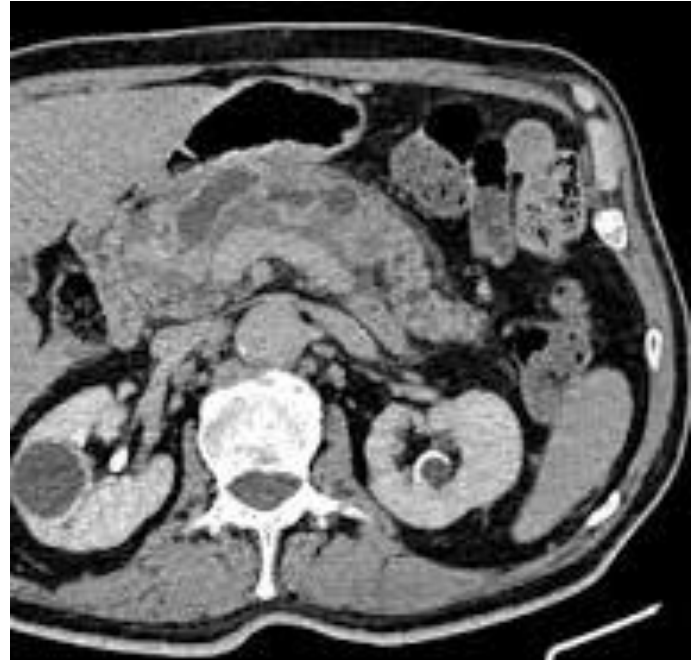
- Mostly in women (95%)
- Mostly in the body or tail of the pancreas (97%)
- **Does not communicate with the main pancreas duct**
- Eccentric calcifications are specific to MCNs but present in only about 15% of cases
- EUS cyst fluid CEA concentration is above 200 in approximately 80% of MCN

MCN

- 13% risk of invasive adenocarcinoma
- 15% risk of pre-cancerous cells
- Treatment is surgical resection
 - Size or presence of high risk features do not matter here, remove with surgery
- Surgery is curative, no further surveillance required long term

Case 3

- 66yo male with new onset diabetes x 2 months was hospitalized last month with acute pancreatitis. No prior history of pancreatitis, never drinker or smoker, had cholecystectomy in his 30s.
 - CT showed dilated main pancreas duct to 11mm
 - EUS confirmed MPD dilation and noted mucin extruding from a widely patent “fish mouth” ampulla
 - What is your diagnosis?



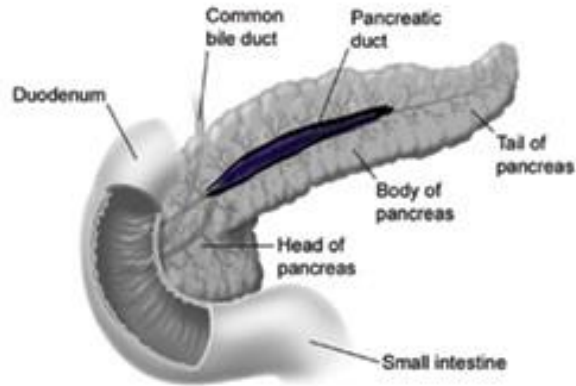
Main Duct IPMN

- Defined as having main duct dilation $>5\text{mm}$ without other identifiable reason for obstruction
- MD-IPMN is essentially a malignant lesion
 - 70% risk of already harboring cancer cells or of turning into cancer with time
- Treatment is surgical excision
 - Partial pancreatectomy possible
 - total pancreatectomy

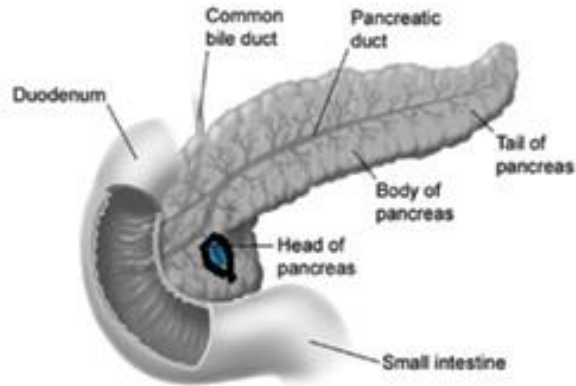
MD-IPMN

- New onset diabetes in patient >50yo, consider possible pancreas cancer
- New onset acute pancreatitis >65yo is rare, consider pancreas cancer

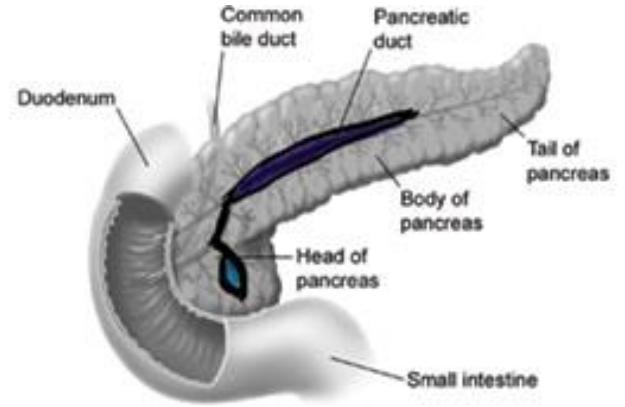
Side Branch vs Main Duct IPMN



Main Duct - IPMN



Branch Duct - IPMN



Mixed Type - IPMN

Three Categories of All IPMNs

- IPMN with high-risk stigmata
- IPMN with worrisome features
- Low risk IPMN

IPMN With High-Risk Stigmata

- 70% risk of already harboring cancer or pre-cancer cells
- High risk stigmata
 - Obstructive jaundice with cystic lesions in pancreatic head
 - Enhanced mural nodule \geq 5mm
 - MPD \geq 10mm
- Treatment is surgery
 - Partial pancreatectomy possible
 - total pancreatectomy

IPMN With Worrisome Features

- 20-30% risk of already harboring pre-cancer or cancer cells
- Worrisome features:
 - Cyst size \geq 3cm
 - Enhancing mural nodule $<$ 5mm
 - MPD dilated to 5-9mm
 - Abrupt change in the MPD
 - Rapid cyst growth rate (more than 5mm over 2 years)
 - Elevated CA 19-9
 - Lymphadenopathy
- Treatment:
 - Surgery

Low Risk IPMN

- Low risk IPMN
 - Most common type of IPMN
 - SB-IPMN without any identifiable worrisome features
 - Safe to monitor with serial imaging
- Risk of complication or death with surgery is higher than the risk of degeneration to cancer
- Goal is to monitor them for life to ensure they don't develop higher risk stigmata

Fukuoka Guidelines

- Surgical excision of IPMN if:
 - Worrisome features
 - High risk stigmata
- Serial imaging if low risk IPMN
 - We often get CT, MRCP, and EUS at first diagnosis to ensure no higher risk features
 - Imaging at 6 months to confirm stability
 - Then annual imaging

Less Common Cysts Requiring Resection

**Cystic
neuroendocrine**



**Solid
pseudopapillary
tumor**



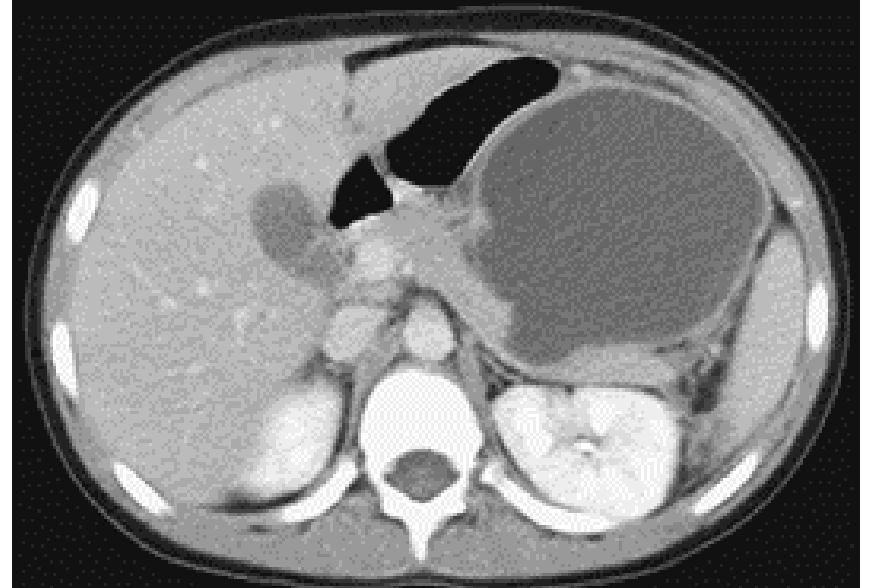
Summary

- Careful history, radiographic (MRI >>> CT) characterization
 - Not all cysts require EUS, especially not right away
- Selective use of EUS-FNA with advanced tissue and biomarker acquisition
- Menu of surveillance strategies for branch duct IPMNs
 - Fukuoka – AGA – ACG
 - Many cysts included in surveillance are not BD-IPMN!
- Better diagnostics and prognostics anticipated

Case 4

35 yo man comes to the ER with worsening epigastric abdominal pain x 4 months that is stabbing like a knife and radiates to his back

- Labs
 - Serum amylase 5,000
 - WBC 28k
- CT
 - Large cystic structure body of pancreas
 - Edematous pancreas parenchyma
- What is your diagnosis?



Pancreatic Pseudocyst

- Benign cyst
- Collection of leaked pancreatic enzymes
- Caused by acute and / or chronic pancreatitis
- Can result in disconnected pancreas duct

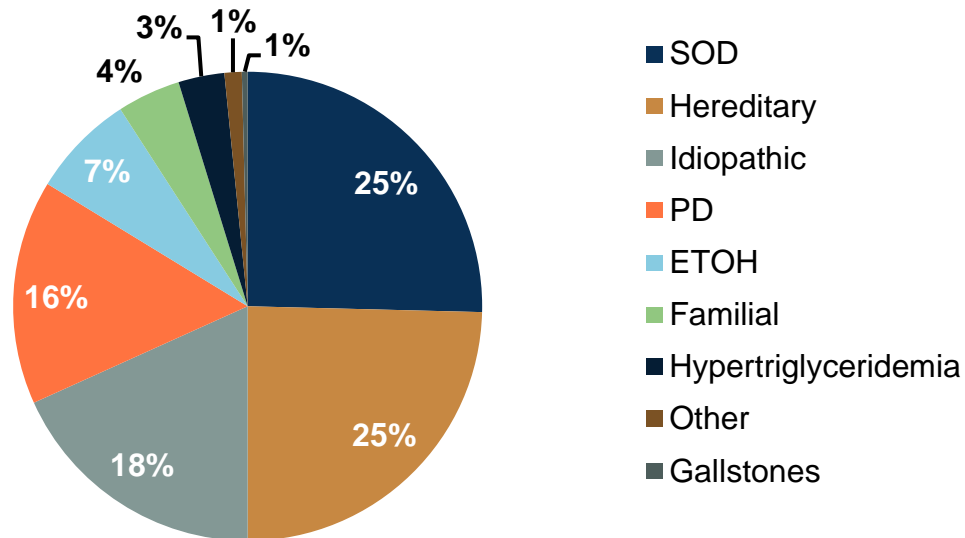
Pancreatitis

- Acute pancreatitis
 - Acute pancreas inflammation
 - Usually subsides
- Recurrent acute pancreatitis
 - Repeated episodes of acute pancreatitis
 - Can go on to become chronic pancreatitis
- Chronic pancreatitis
 - Permanent damage to the gland from prolonged inflammation and scarring
 - Often develops between ages 30-40yo
 - M>F

Chronic Pancreatitis

- 8-10 new patients per 100,000 population per year in the US
- Incidence has quadrupled in the last 30 years
- No cure for the disease
- Risk factors
 - Gallstones
 - Alcohol

Risk Factors for Chronic Pancreatitis at MUSC



Chronic Pancreatitis

- 70% develop Type 3c insulin dependent diabetes
- 30-85% develop exocrine pancreas insufficiency
- Shortened life expectancy
 - 10 year survival 70%
 - 20 year survival 45%
 - About 20% of deaths are related to pancreas cancer
 - Death also from complications of DM, ETOH, and opioids

CP Diagnosis

- Need objective evidence to make the diagnosis
- Labs
 - Amylase
 - Lipase
 - LFTs
 - CA 19-9 if older patient or suspicious findings on cross sectional imaging
- CT
- MRI / MRCP
- EUS / ERCP

CT Features of CP

- CT abdomen or pancreas protocol with IV contrast
 - Dilated main pancreas duct (<5mm)
 - Irregular main pancreas duct
 - Pancreas atrophy
 - Pancreatic calcifications
 - Pancreatic pseudocyst

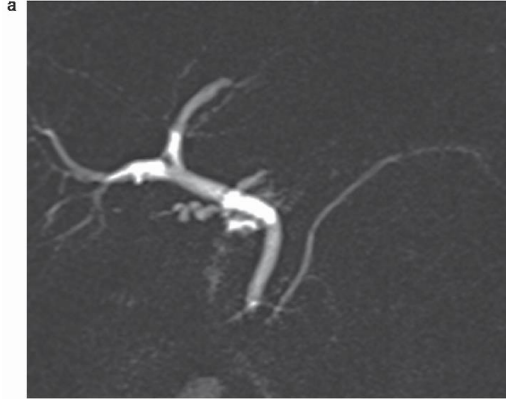
CT Features of CP



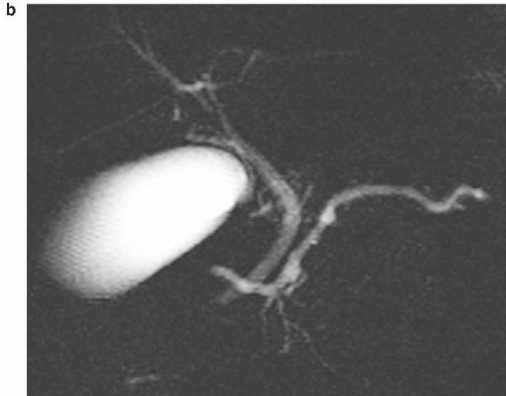
MRCP Features of CP

- Allows for better imaging of the pancreas and biliary ductal systems
- Dilated MPD (<5mm)
- Irregular MPD
- Stricture of MPD
- Ductal filling defects
 - Suctal stones
 - Strictures from scar tissue
- Dilated side branches
- Parenchymal atrophy or enlargement

MRCP



MRCP with normal MPD



MRCP with MPD dilation and visible side branches in body and tail

EUS Rosemont Criteria Diagnosis of CP

Major Criteria		Minor Criteria	
Major A		Cysts	
Hyperechoic foci with shadowing		MPD calibre ≥ 3.5 mm	
MPD calculi		Irregular ductal contour	
Major B		Side branch ectasia ≥ 1 mm	
Lobularity with honeycombing		Echogenic duct walls and strands	
		Non-shadowing hyperechoic foci	
		Lobularity with non-contiguous lobules	
I. Consistent with CP	II. Suggestive of CP	III. Indeterminate for CP	IV. Normal
A. 1 major A (+) ≥ 3 minor features	A. 1 major A feature (+) < 3 minor features	A. 3 to 4 minor features, no major features	≤ 2 minor features and no major features
B. 1 major A feature (+) major B feature	B. 1 major B feature (+) ≥ 3 minor features	B. major B feature alone or with < 3 minor features	
C. 2 major A features	C. ≥ 5 minor features (any)		

Treatment Options

- Medical
 - Opioids
- Endoscopic
 - ERCP
 - EUS with celiac plexus block
- Surgical
 - Primary indication for surgery is intractable pain
 - 40-67% of patients with CP require surgery at some point
 - Goals of Surgery
 - Improve pain control
 - Improve QOL

Conclusion

- Inflammatory pancreas pseudocysts are a finding in pancreatitis
- Patients with chronic pancreatitis often don't have elevations in their serum lab values
- May need CT, MRI / MRCP, and EUS to make the diagnosis of CP
- Many patients with CP will experience improved pain control and quality of life with surgical intervention

Thank You

