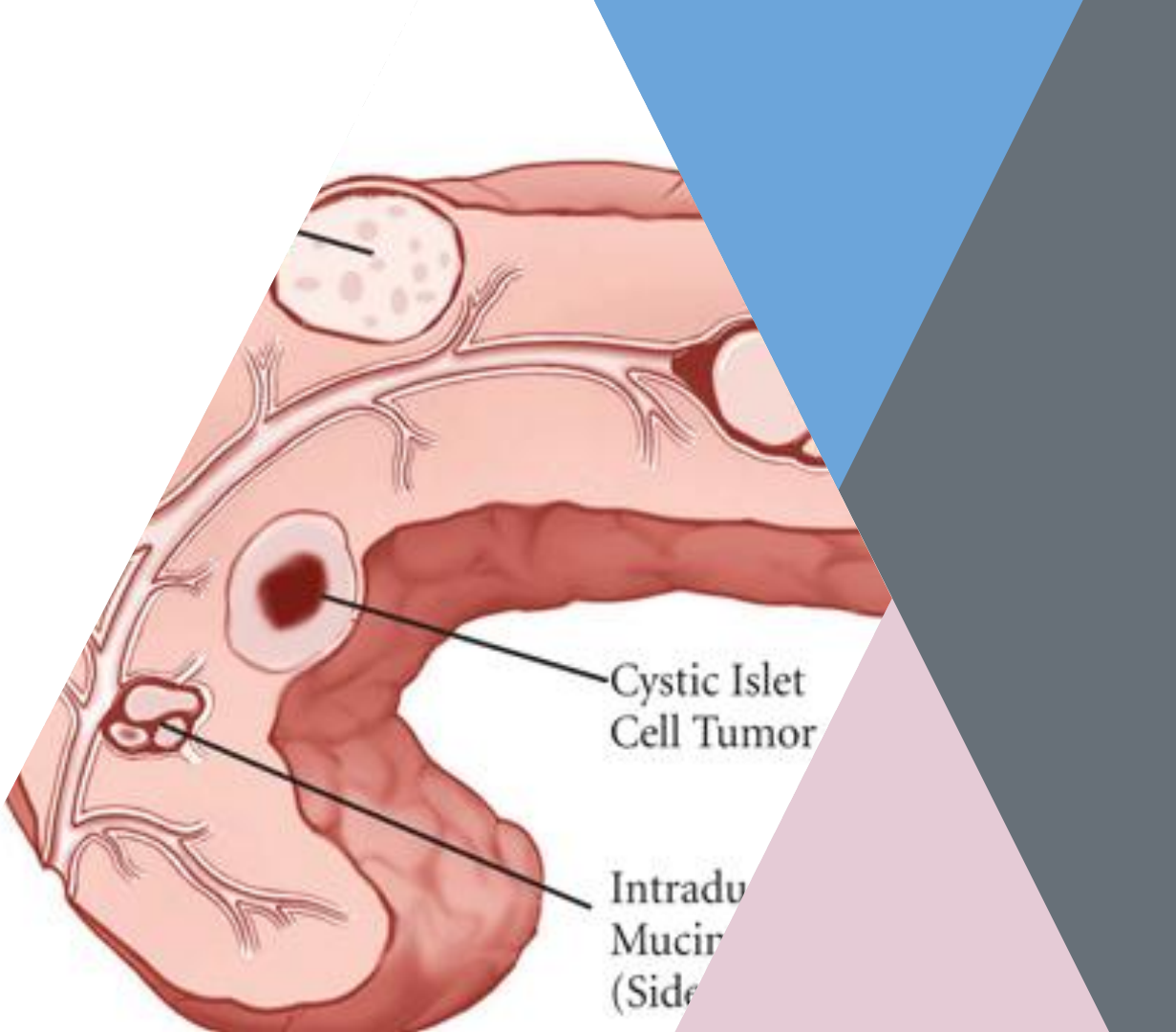
INSELGRUPPE

Pancreatic Cysts

BC 19.02

Riad Sarraj



Epidemiology

Prevalence ?

2-15% → 50%

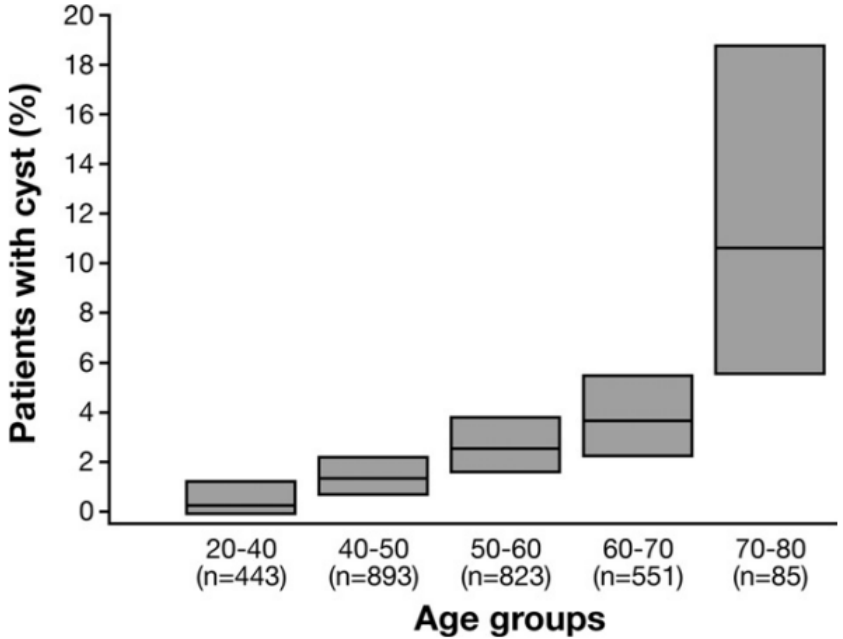


Figure 1. Prevalence of pancreatic cysts per age group. The *black line* shows the prevalence and the *gray boxes* represent the CI. For patients older than age 80, see the text for more details.

CLINICAL GASTROENTEROLOGY AND HEPATOLOGY 2010

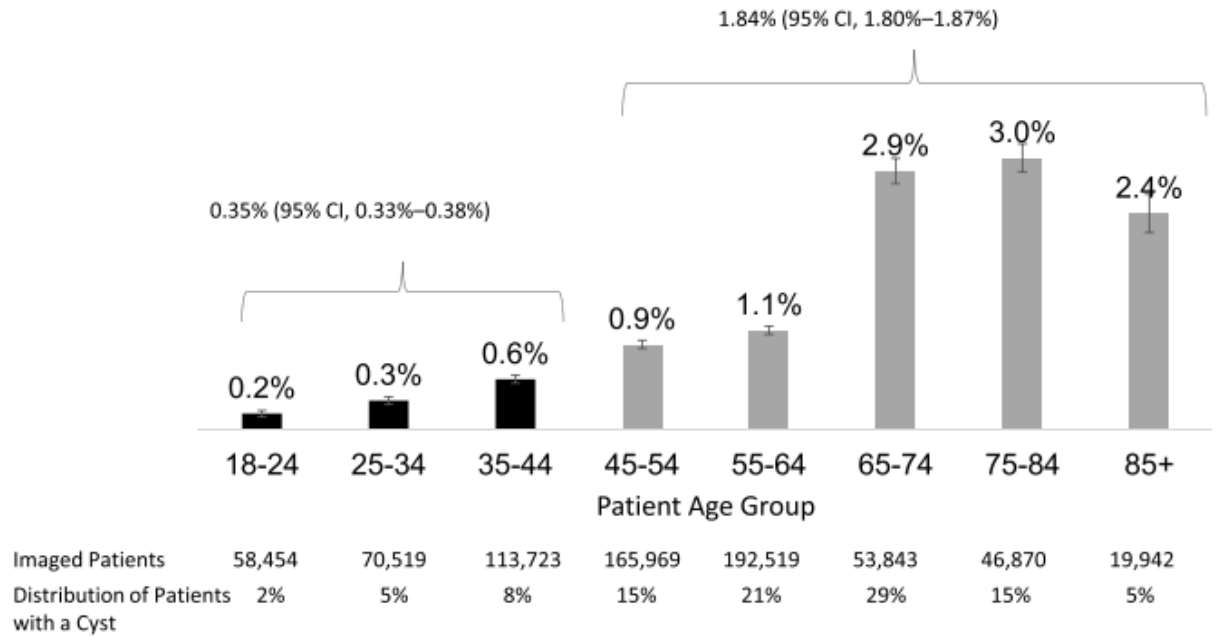


FIGURE 1. Standardized prevalence by age group (2017).

Pancreas 2021

Risks of malignancy ?

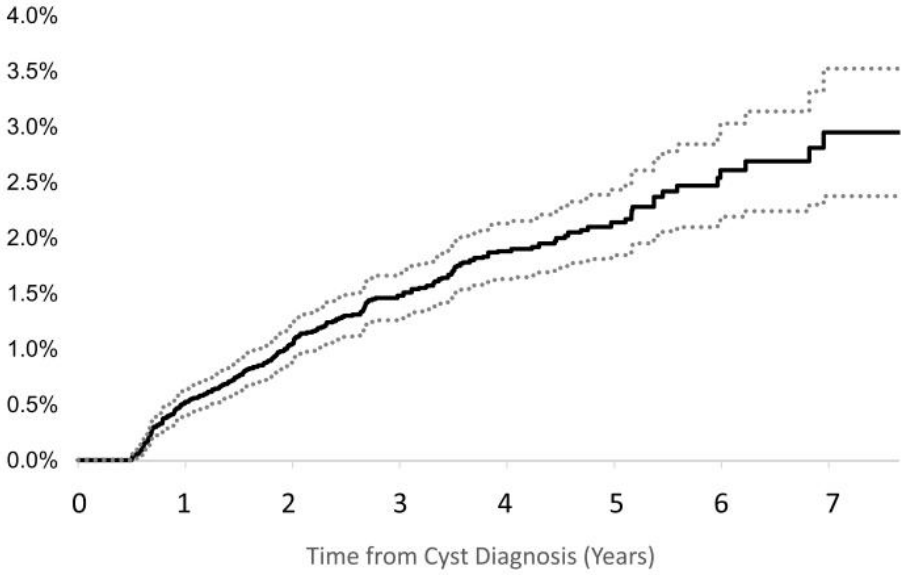
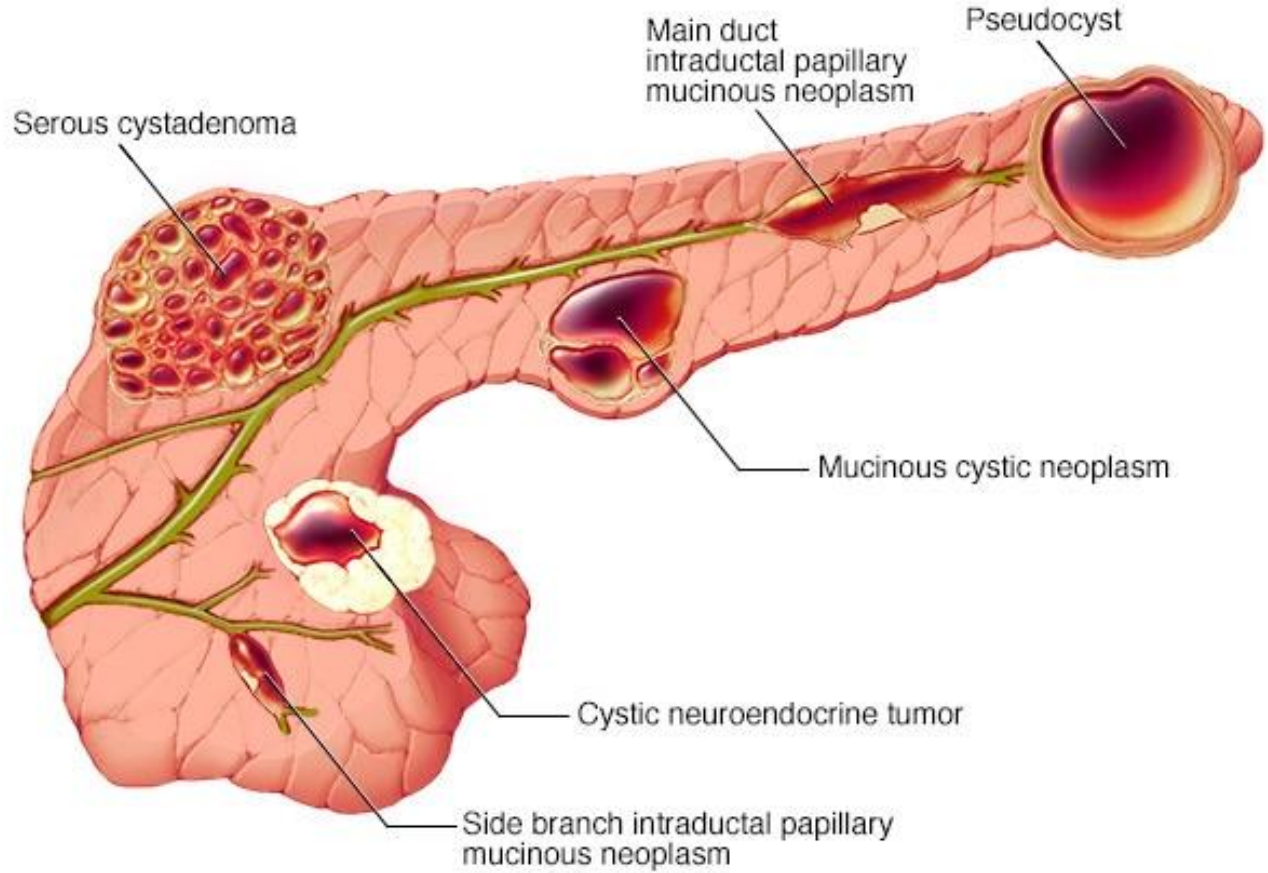


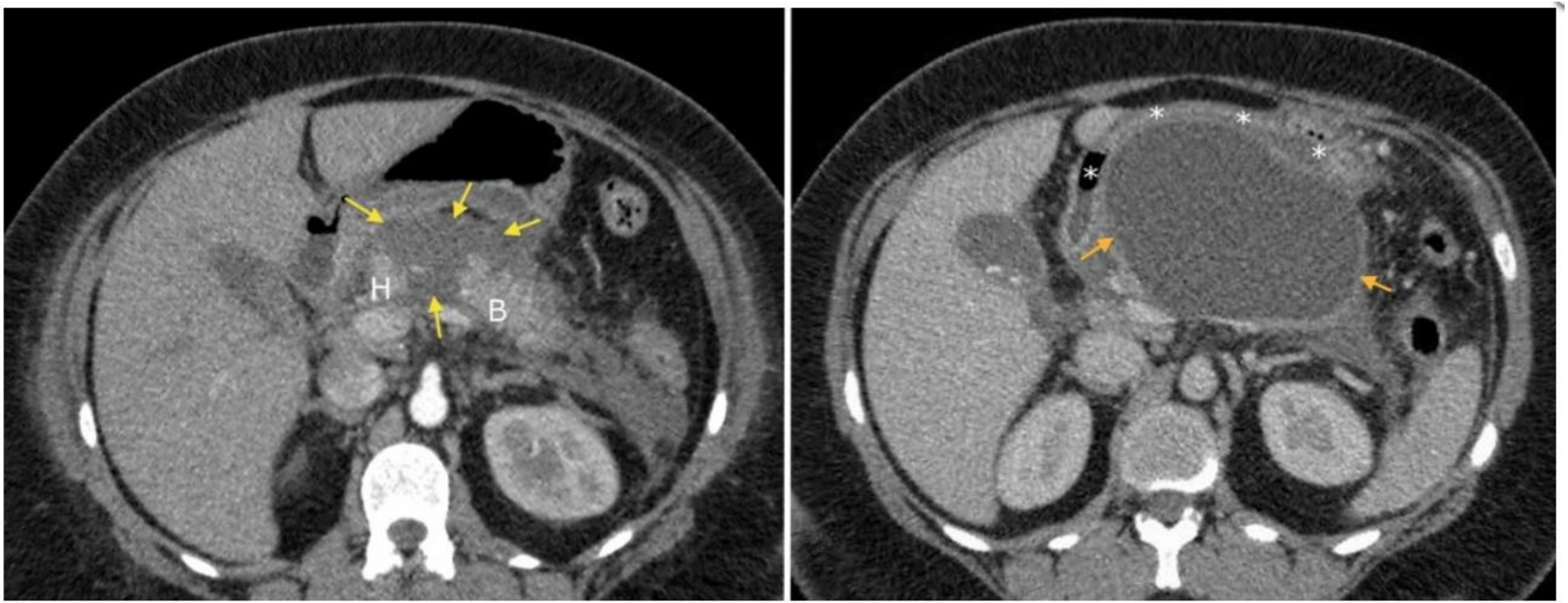
FIGURE 4. Cumulative risk of progression to PC.

OR 0.5-1.5%
AR : 0.5%

Pancreas 2021

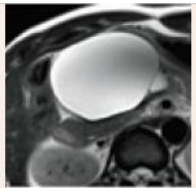
Cysts Type





Pseudocyst

Pseudocyst

Cyst Type	Patient Characteristics and Clinical Presentation		Imaging Findings		Malignant Potential
Pseudocyst	Associated with antecedent acute or chronic pancreatitis		Unilocular or multilocular May be connected to MPD		0%

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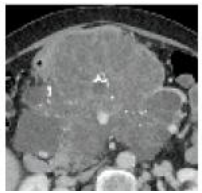
Serous Cystadenoma

Serous Cystadenoma

Cyst Type	Patient Characteristics and Clinical Presentation		Imaging Findings		Malignant Potential
SCA	Predominantly in women (60% of cases) Occurs in 5th–7th decades of life Mostly asymptomatic		Microcystic or oligocystic Central scar No communication with pancreatic duct		0%

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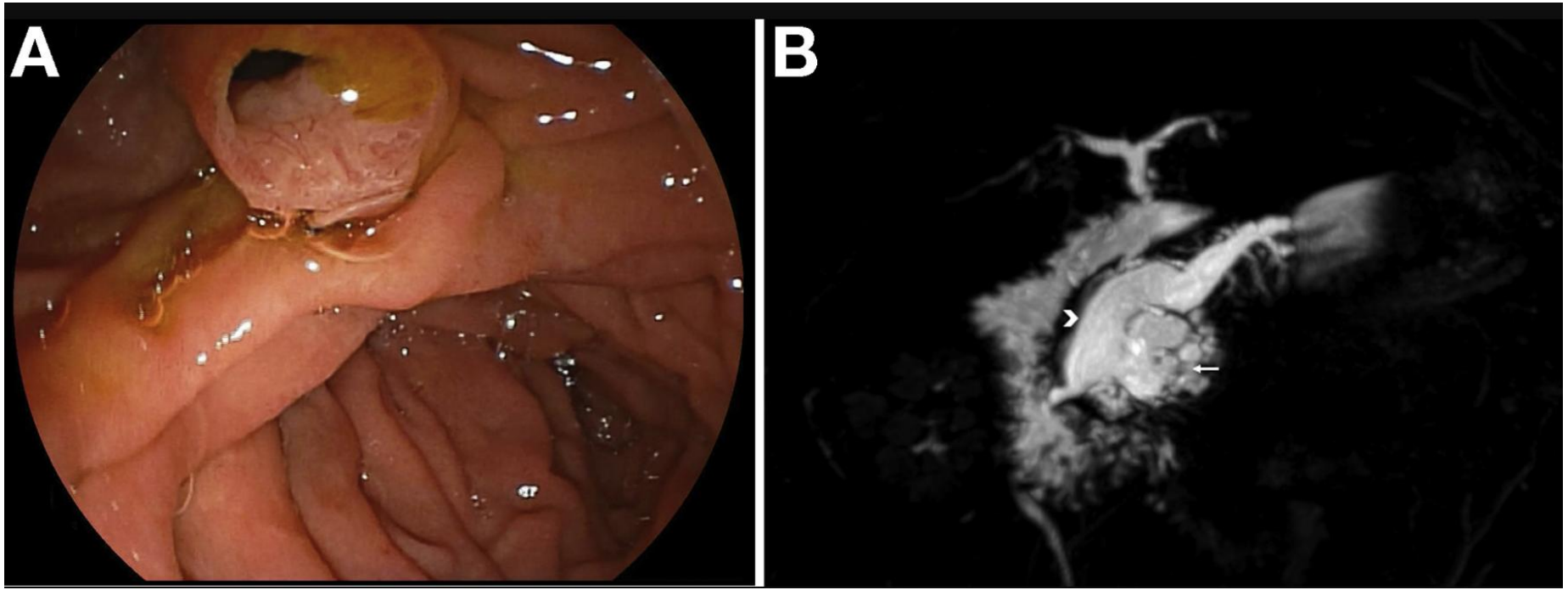
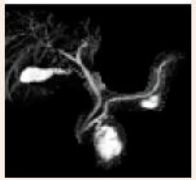
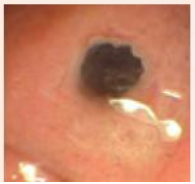


IPMN

Intraductal papillary mucinous neoplasm

Cyst Type	Patient Characteristics and Clinical Presentation		Imaging Findings		Malignant Potential
IPMN	Equal sex distribution Occurs in 5th–7th decades of life Mostly asymptomatic May cause pancreatitis	 Branch-duct IPMN	Communication with pancreatic duct Multiplicity		1–38%
		 Main-duct IPMN	MPD dilatation Fish-mouth papilla		33–85%

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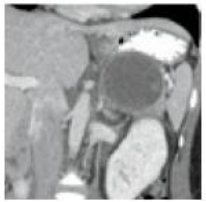
Mucinous Cystic Neoplasm

Mucinous Cystic Neoplasm

Cyst Type	Patient Characteristics and Clinical Presentation		Imaging Findings		Malignant Potential
MCN	Almost exclusively in women (90% of cases) Occurs in 4th–6th decades of life Mostly asymptomatic		Mostly pancreatic tail Unilocular or oligolocular Thickened wall Eggshell calcifications in 25%		10–34%

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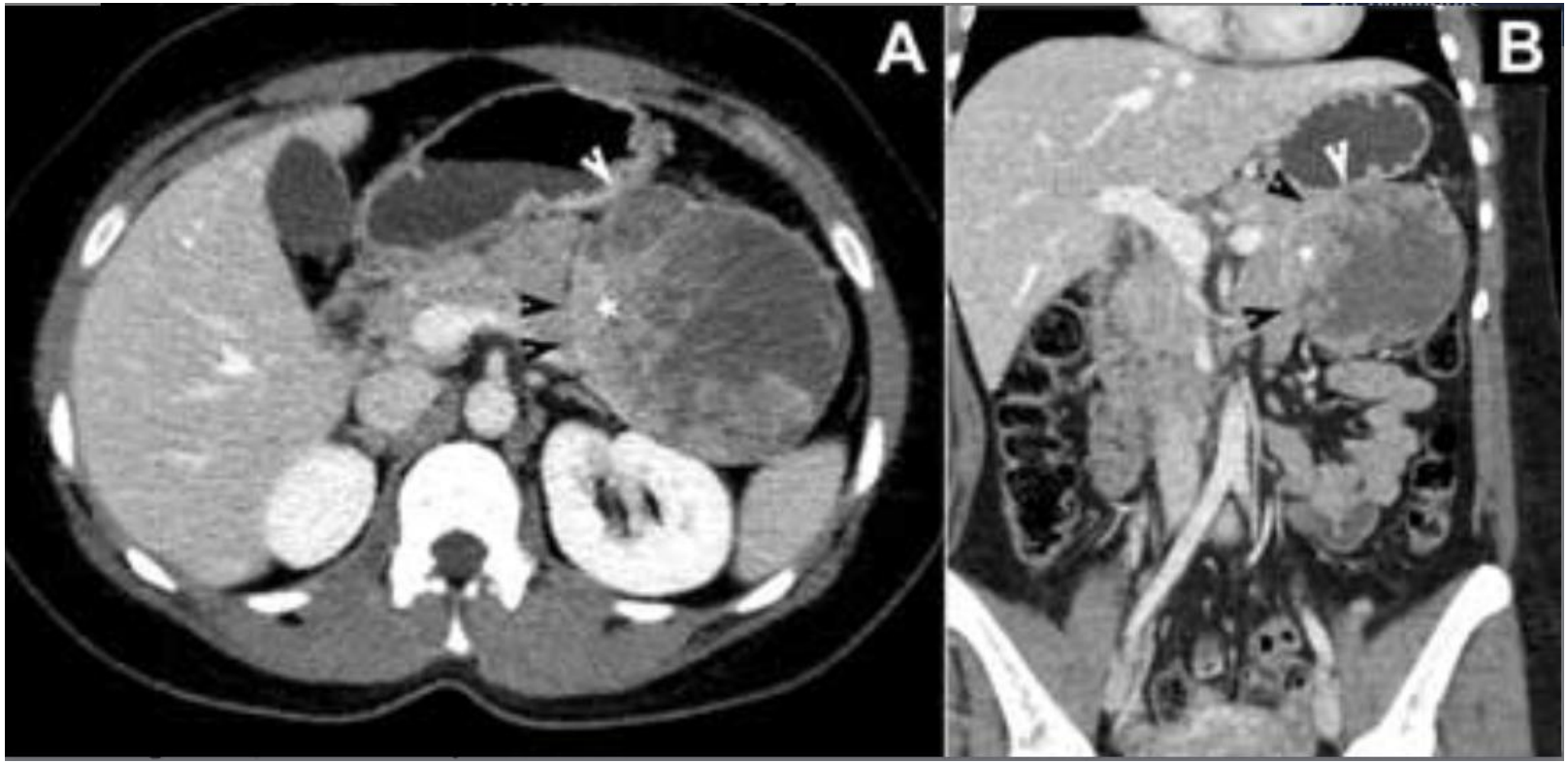
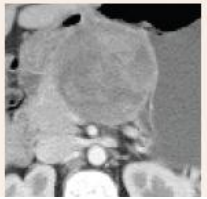


Solid Pseudopapillary Neoplasms

Solid Pseudopapillary Neoplasms

Cyst Type	Patient Characteristics and Clinical Presentation		Imaging Findings		Malignant Potential
SPT	Almost exclusively in women (90% of cases) Occurs in 2nd or 3rd decade of life Mostly asymptomatic		Heterogeneous Eggshell calcifications		10–15%

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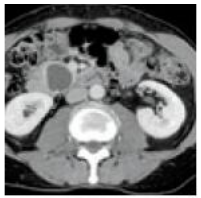
Cystic Pancreatic Neuroendocrine Tumors

Cystic Pancreatic Neuroendocrine Tumors

Cyst Type	Patient Characteristics and Clinical Presentation		Imaging Findings		Malignant Potential
CNET	Variable age and sex Mostly asymptomatic 10% Are functional		Enhancing, thickened wall		5–10%

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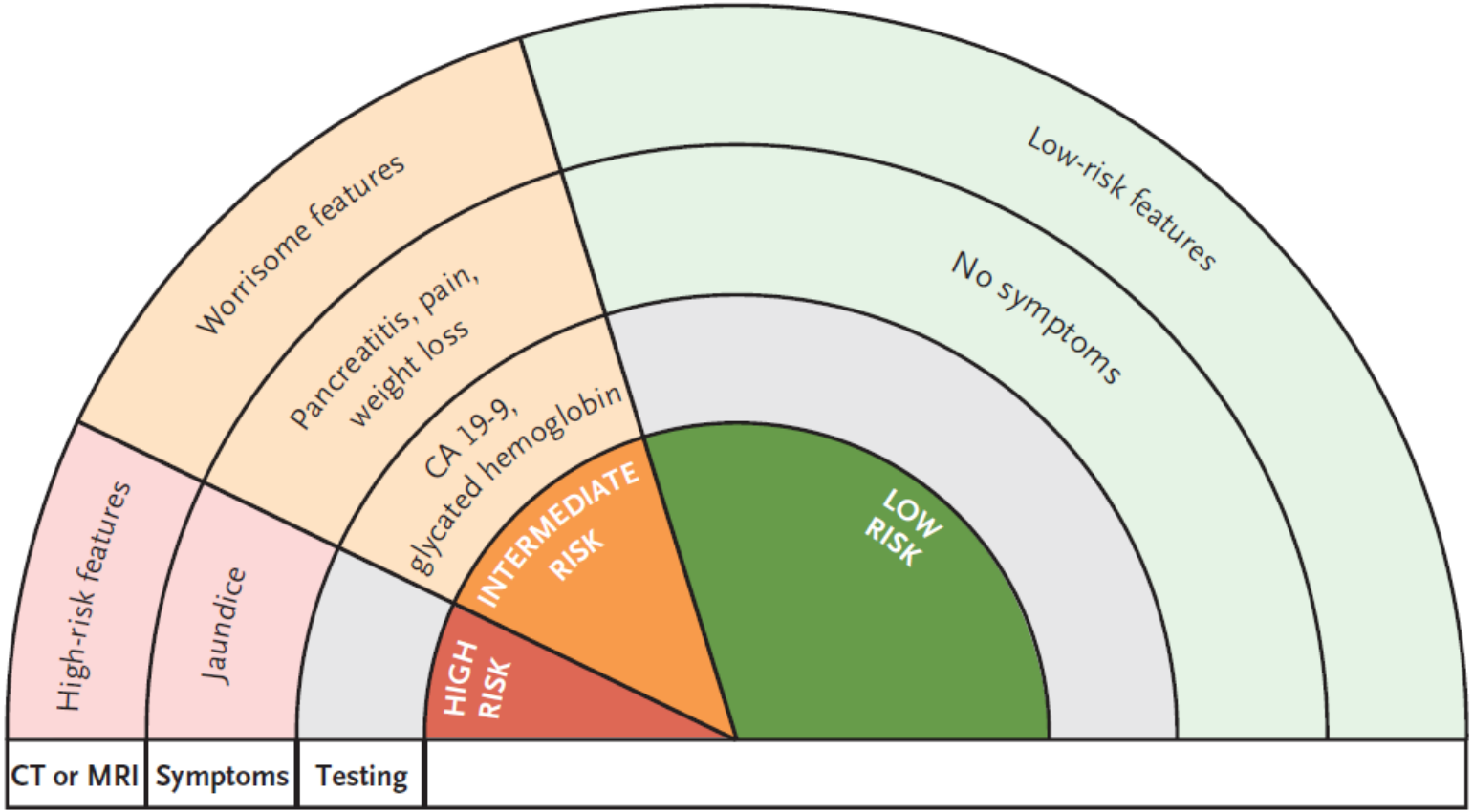
Diagnostics
Risk Assessment

A Approach to the Assessment of Cancer Risk in Patients with Pancreatic Cysts



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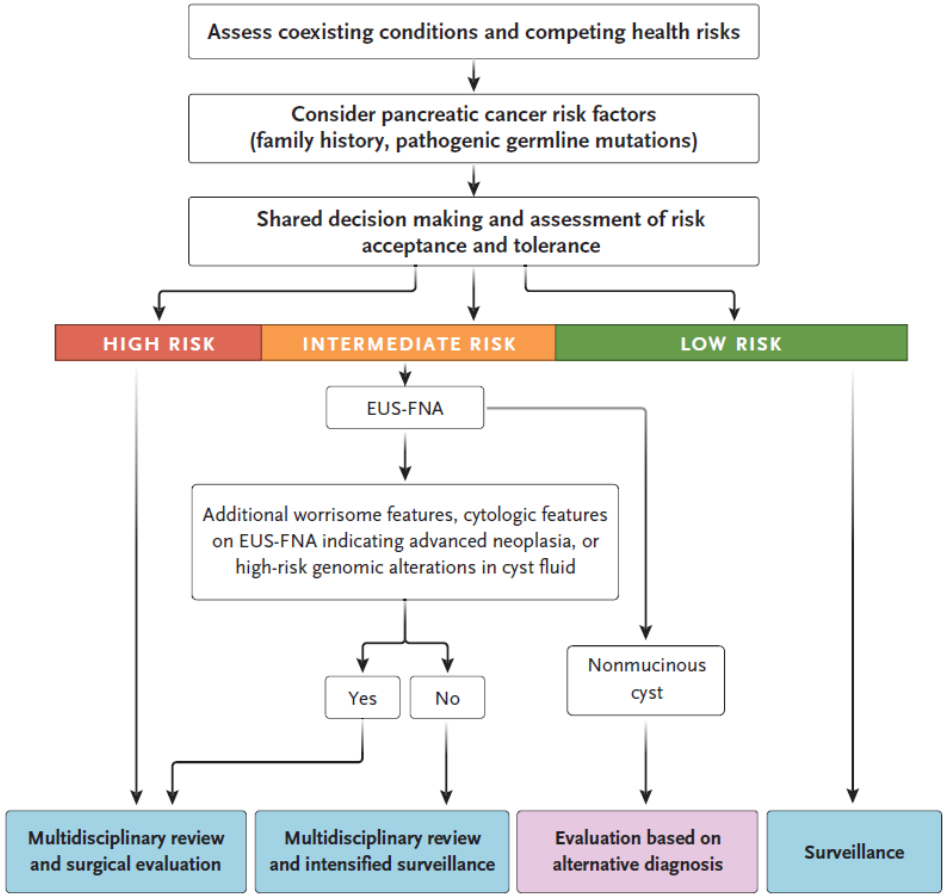
B Algorithm for the Management of Presumed Mucinous Cystic Lesions



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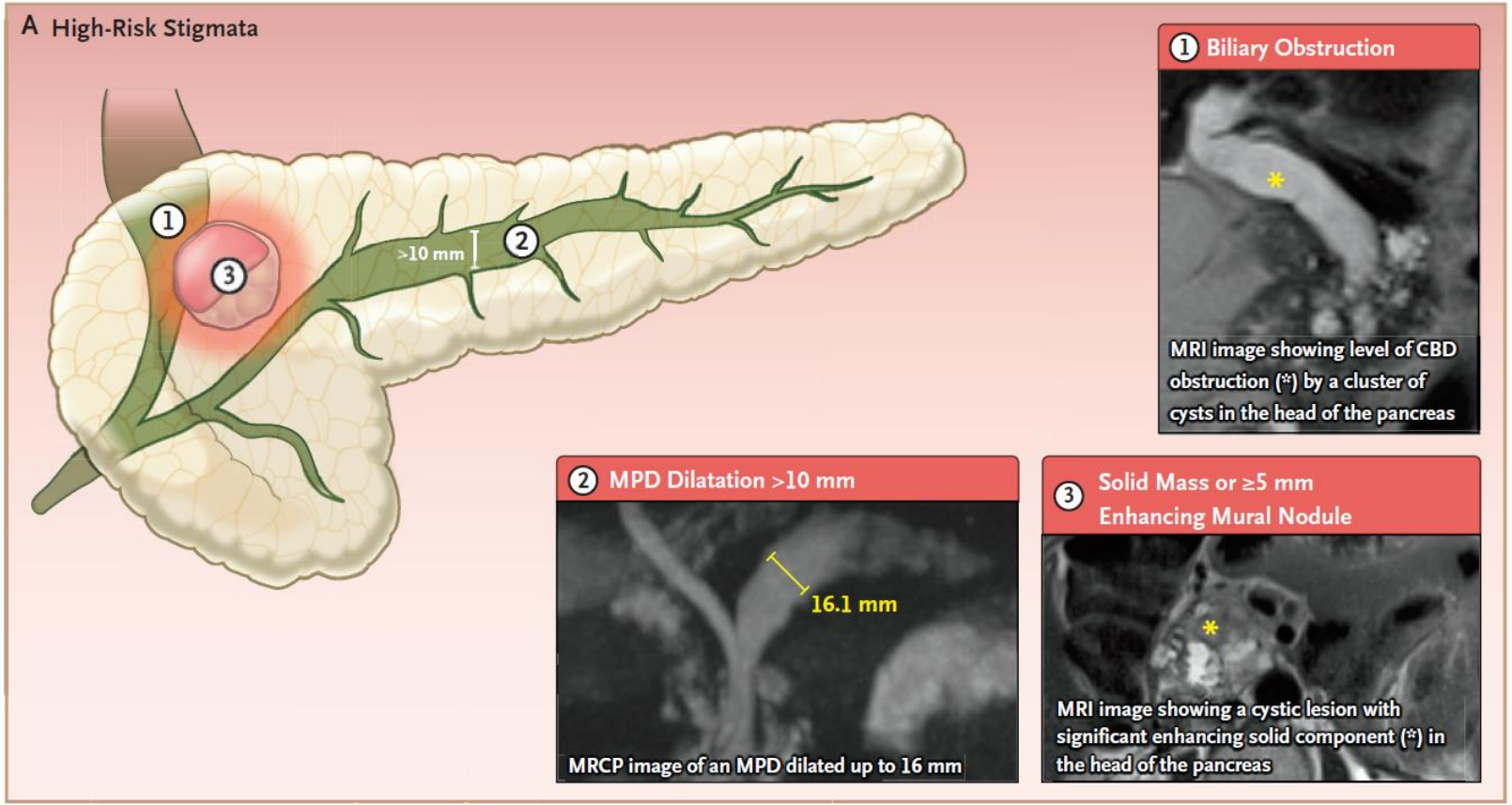
High-Risk Stigmata ?


A High-Risk Stigmata
1
2
3
>10 mm
1 Biliary Obstruction
MRI image showing level of CBD obstruction (*) by a cluster of cysts in the head of the pancreas
2 MPD Dilatation >10 mm
16.1 mm
MRCP image of an MPD dilated up to 16 mm
3 Solid Mass or ≥5 mm Enhancing Mural Nodule
MRI image showing a cystic lesion with significant enhancing solid component (*) in the head of the pancreas

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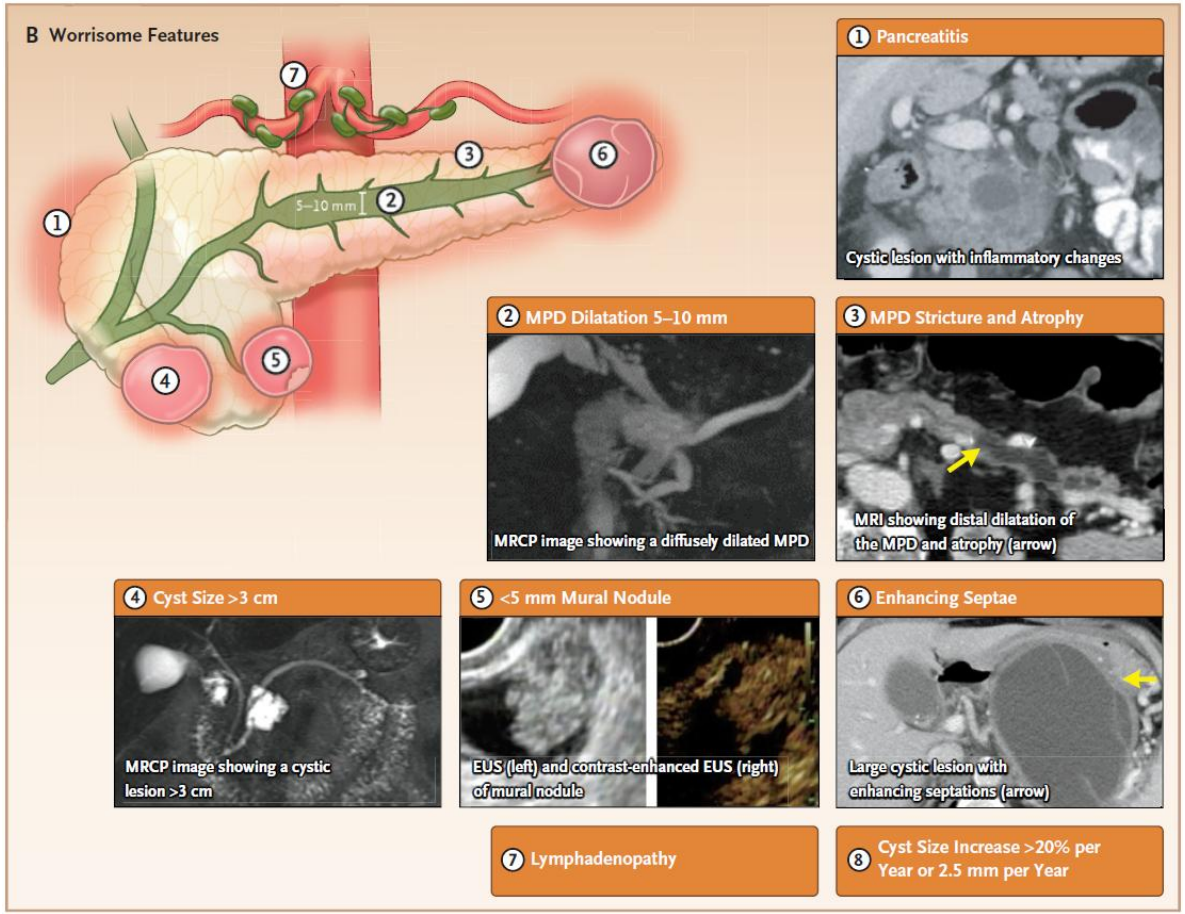
Worrisome Features ?


B Worrisome Features
5–10 mm
1 Pancreatitis
Cystic lesion with inflammatory changes
2 MPD Dilatation 5–10 mm
MRCP image showing a diffusely dilated MPD
3 MPD Stricture and Atrophy
MRI showing distal dilatation of the MPD and atrophy (arrow)
4 Cyst Size >3 cm
MRCP image showing a cystic lesion >3 cm
5 <5 mm Mural Nodule
EUS (left) and contrast-enhanced EUS (right) of mural nodule
6 Enhancing Septae
Large cystic lesion with enhancing septations (arrow)
7 Lymphadenopathy
8 Cyst Size Increase >20% per Year or 2.5 mm per Year

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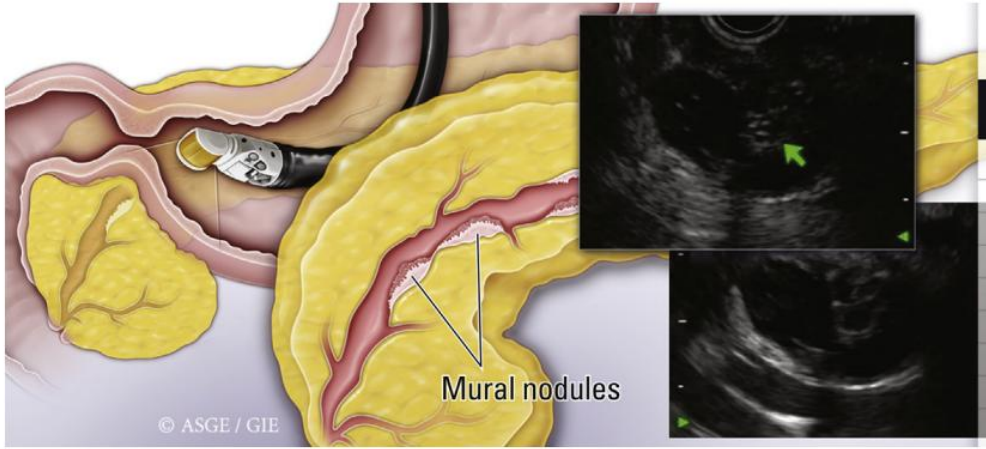
Endoscopic Evaluation

TABLE 2: Sensitivity and Accuracy of Characterization by MRI and Endoscopic Ultrasound

Technique, Parameter	Septa	Mural Nodule	Main Pancreatic Duct Dilatation	Communication With Main Pancreatic Duct
MRI reviewer 1				
Sensitivity	17/18 (94.4)	8/12 (66.7)	13/14 (92.9)	9/9 (100)
Accuracy	20/21 (95.2)	15/21 (71.4)	19/21 (90.5)	19/21 (90.5)
MRI reviewer 2				
Sensitivity	17/18 (94.4)	7/12 (58.3)	12/14 (85.7)	9/9 (100)
Accuracy	18/21 (85.7)	15/21 (71.4)	17/21 (81.0)	19/21 (90.5)
Endoscopic ultrasound				
Sensitivity	14/18 (77.8)	7/12 (58.3)	12/14 (85.7)	8/9 (88.9)
Accuracy	17/21 (81.0)	13/21 (61.9)	18/21 (85.7)	18/21 (85.7)

Note—Data are the number of lesions detected/total number studied (%) by each imaging technique.

AJR 2010



Pooled diagnostic performance of CH-EUS for the characterization of mural nodules in pancreatic cystic neoplasms

Diagnostic performance	CH-EUS (8 studies, 320 PCNs)
Sensitivity (95% CI)	97.0% (92.5% - 99.2%)
Specificity (95% CI)	90.4% (85.2% - 94.2%)
Positive likelihood ratio (95% CI)	8.89 (4.50 – 17.55)
Negative likelihood ratio (95% CI)	0.06 (0.03 – 0.13)
Estimated prevalence (95% CI)	41.7% (36.3% - 47.0%)
Positive predictive value (95% CI)	87.8% (81.5% – 92.1%)
Negative predictive value (95% CI)	97.7% (94.2% - 99.1%)
Diagnostic accuracy (95% CI)	95.6% (92.6% - 98.7%)
Number needed to diagnose (95% CI)	1.2 (1.3 – 1.1)

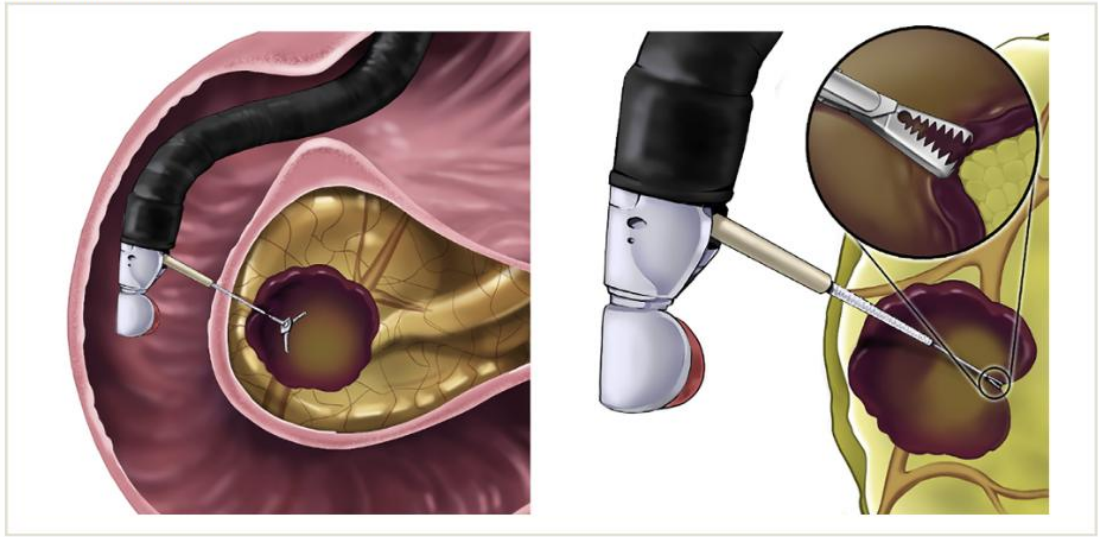
GIE 2020

Efficacy and safety of EUS-guided through-the-needle microforceps biopsy sampling in categorizing the type of pancreatic cystic lesions (CME)

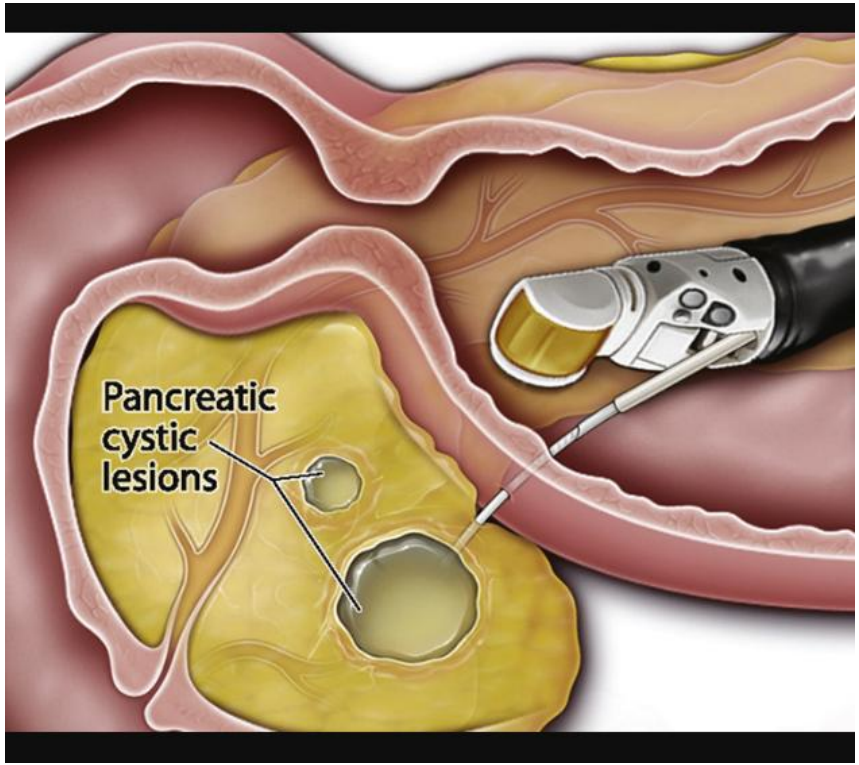
Sung Hyun Cho, MD,* Tae Jun Song, MD, PhD,* Dong-Wan Seo, MD, PhD, Dongwook Oh, MD, Do Hyun Park, MD, PhD, Sang Soo Lee, MD, PhD, Sung Koo Lee, MD, PhD, Myung-Hwan Kim, MD, PhD

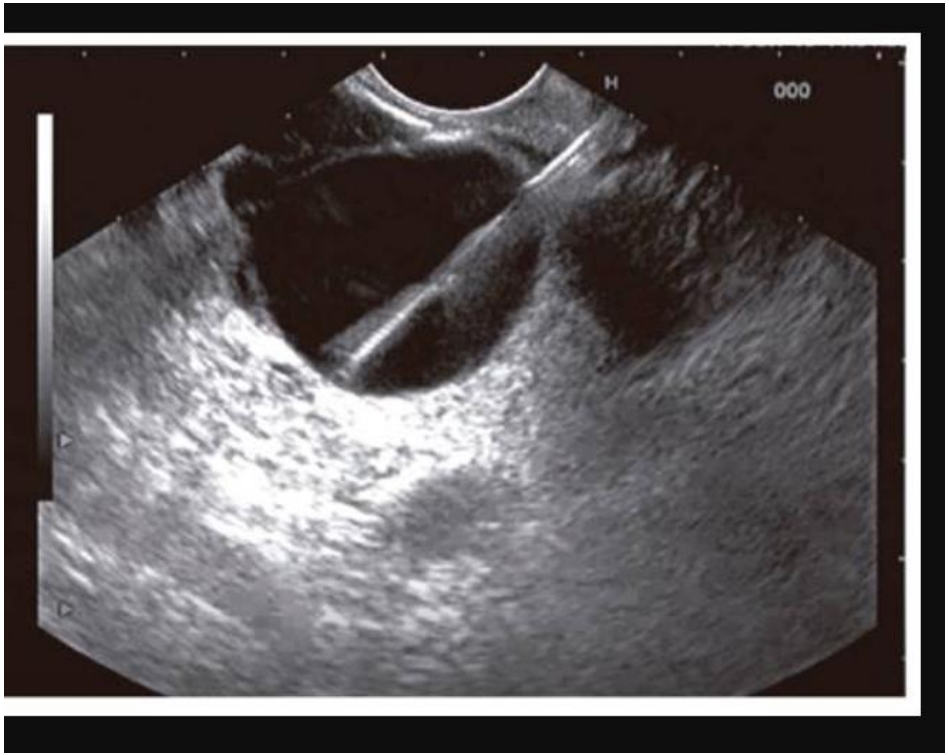
Seoul, South Korea

GRAPHICAL ABSTRACT



Endoscopy International Open 2020


Pancreatic
cystic
lesions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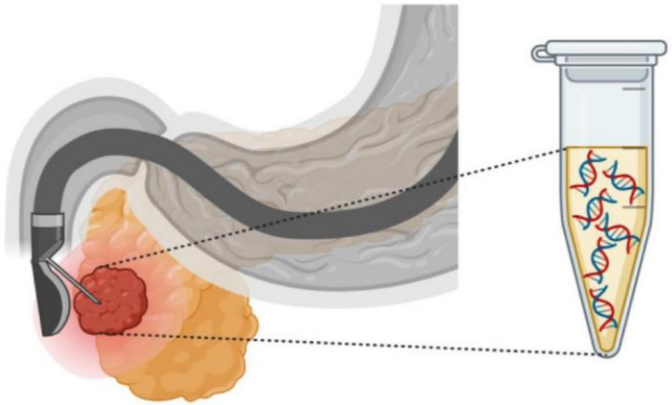
Fluid Analysis ?

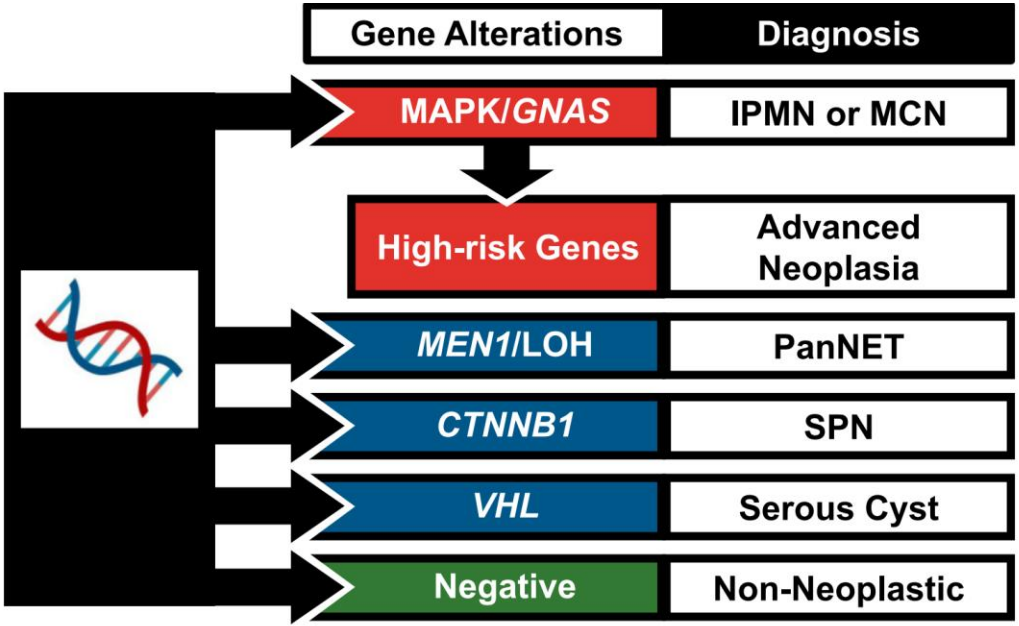
Table 1. Cyst-Fluid Characteristics and Genes Altered in Common Types of Pancreatic Cysts.*

Cyst Type	Macroscopic and Cytologic Features	CEA Level	Glucose Level	Amylase Level	Altered Genes	
					Associated with Cyst Type	Associated with Advanced Neoplasia
Pseudocyst	Macrophages and lymphocytes, debris	Variable	High	High	None	None
SCA	Proteinaceous debris and blood, glycogen-rich cuboidal epithelial cells	Very low	High	Low	*VHL*	None
IPMN	Thick mucinous fluid, mucinous epithelial cells, papillary structures†	High	Low	High	*KRAS*, *GNAS*	*TP53*, *CTNNB1*, *CDKN2A*, *SMAD4*, genes involved in mTOR pathway‡
MCN	Thick mucinous fluid, mucinous epithelial cells, ovarian-type stroma†	High	Low	Low	*KRAS*	*TP53*, *CDKN2A*, *CTNNB1*, *SMAD4*, genes involved in mTOR pathway‡
SPT	Hemorrhagic debris; monomorphic, discohesive small cells; hyaline globules and grooved nuclei	Variable	Normal	Low	*CTNNB1*	None
CNET	Uniform cells in loosely cohesive clusters; coarse, granular, chromatin-containing nuclei	Variable	Normal	Low	*MEN1*	None

* CEA denotes carcinoembryonic antigen, CNET cystic neuroendocrine tumor, SCA serous cystadenoma, and SPT solid pseudopapillary tumor.
† Ovarian stroma in mucinous cystic neoplasms (MCNs) and papillary structures in intraductal papillary mucinous neoplasms (IPMNs) are histologic findings that are observed only in rare cases in samples obtained by means of fine-needle aspiration or microforceps biopsy.
‡ Genes involved in the mammalian target of rapamycin (mTOR) pathway include *PIK3CA*, *PTEN*, and *AKT1*.

EUS-FNA Pancreatic Cyst Fluid





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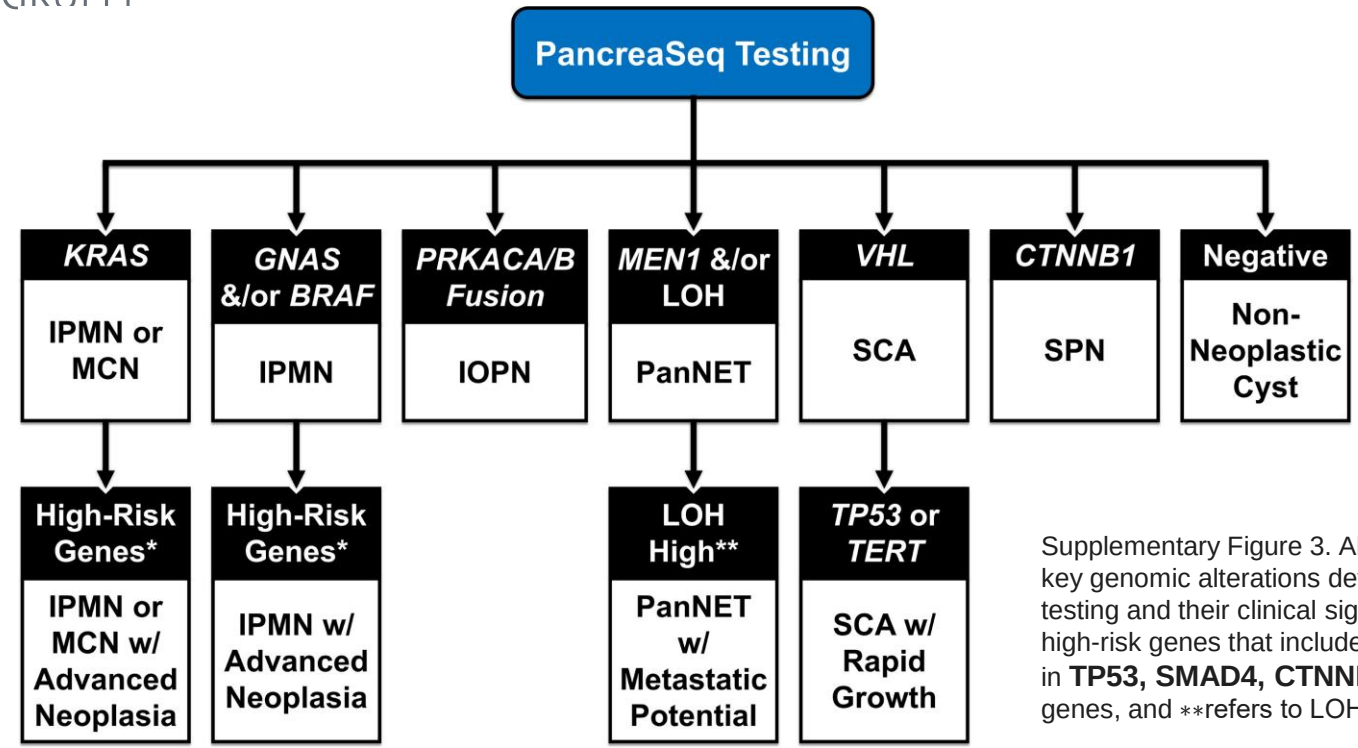

Supplementary Figure 3. Algorithmic approach to key genomic alterations detected by PancreaSeq testing and their clinical significance. ∗Refers to high-risk genes that include genomic alterations in **TP53, SMAD4, CTNNB1,** and the **mTOR** genes, and ∗∗refers to LOH of ≥3 genes.

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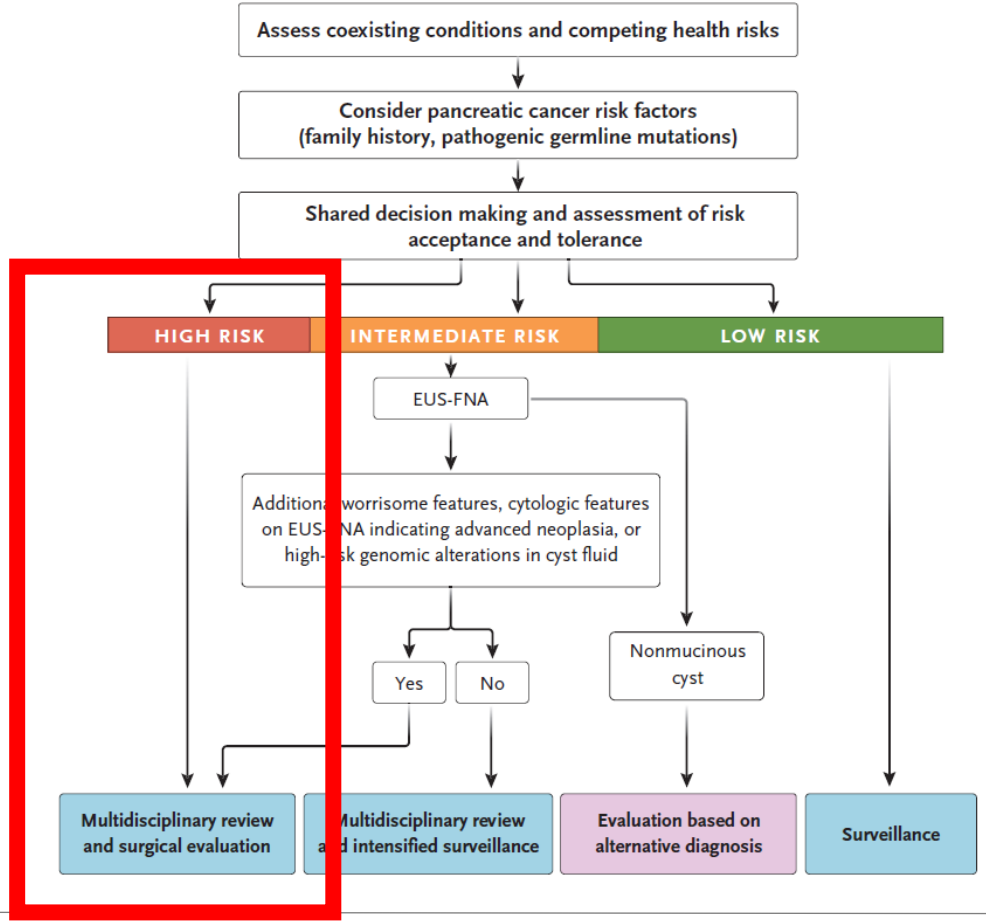
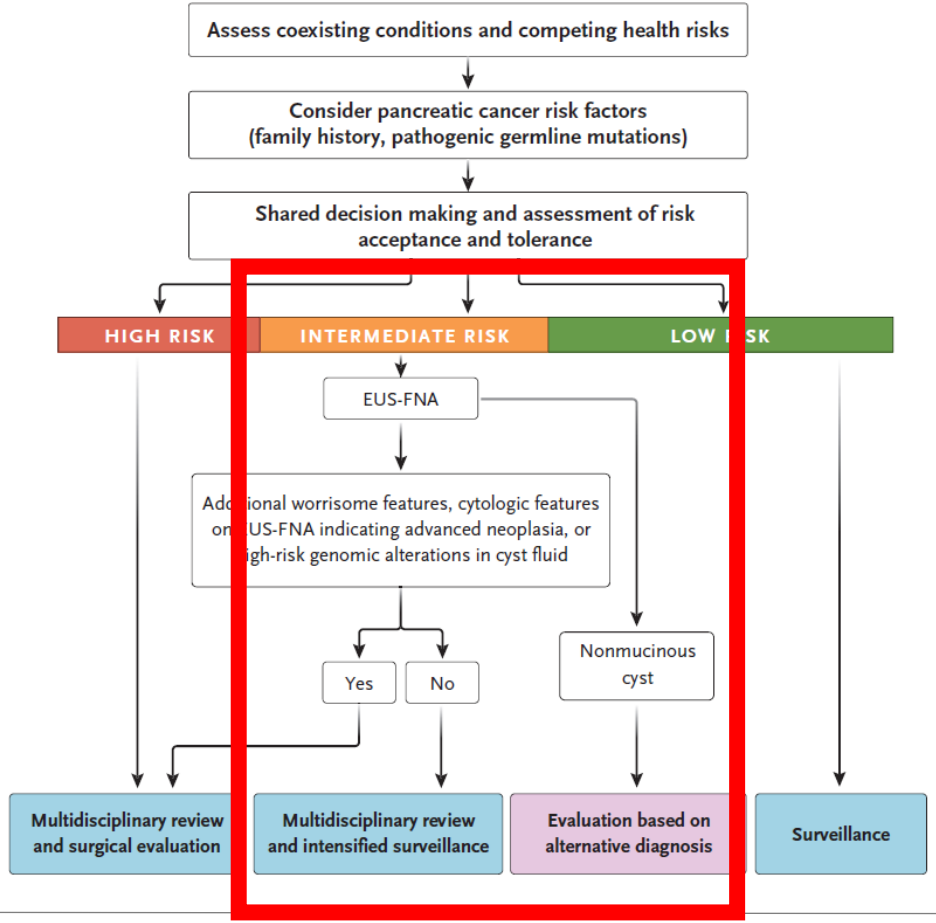
Managment

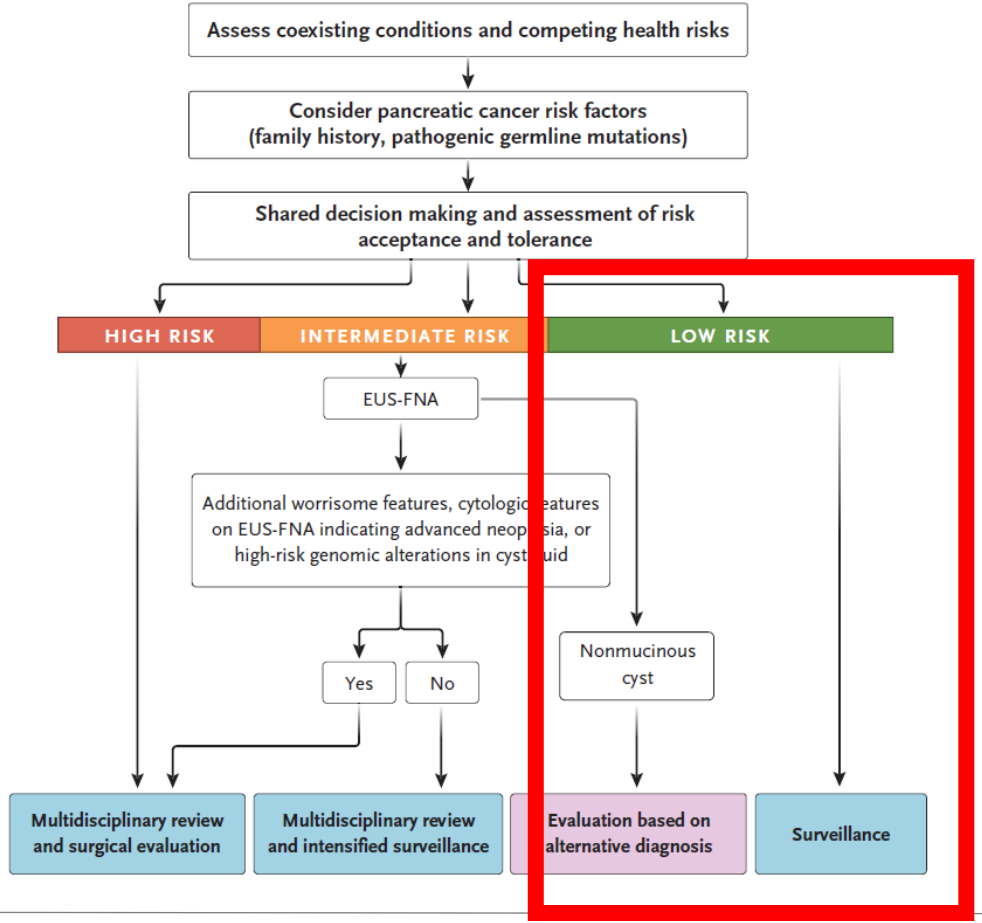
B Algorithm for the Management of Presumed Mucinous Cystic Lesions



B Algorithm for the Management of Presumed Mucinous Cystic Lesions



B Algorithm for the Management of Presumed Mucinous Cystic Lesions



Cyst Size and Features	Year 1	Years 2–5	After >5 Years of Stability
<1 cm without worrisome features or high-risk stigmata	**12 Months** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels	**Every 2 years** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels	**Every 2 years** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels **Or consider** • Ceasing surveillance
1–2 cm without worrisome features or high-risk stigmata	**6–12 Months** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels	**Every 1–2 years** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels	**Every 2 years** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels **Or consider** • Ceasing surveillance
2–3 cm without worrisome features or high-risk stigmata	**Alternating every 6 months** • MRI or endoscopic ultrasonography • Measurement of CA 19-9 and glycated hemoglobin levels	**Either in 6–12 months** • MRI or endoscopic ultrasonography • Measurement of CA 19-9 and glycated hemoglobin levels	**Every year** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels • Continue surveillance
>3 cm or worrisome features (when surgical resection is not pursued)	**Alternating every 3 months** • MRI or endoscopic ultrasonography • Measurement of CA 19-9 and glycated hemoglobin levels	**Alternating every 3–6 months** • MRI or endoscopic ultrasonography • Measurement of CA 19-9 and glycated hemoglobin levels	**Every 6–12 months** • MRI • Measurement of CA 19-9 and glycated hemoglobin levels • Continue surveillance

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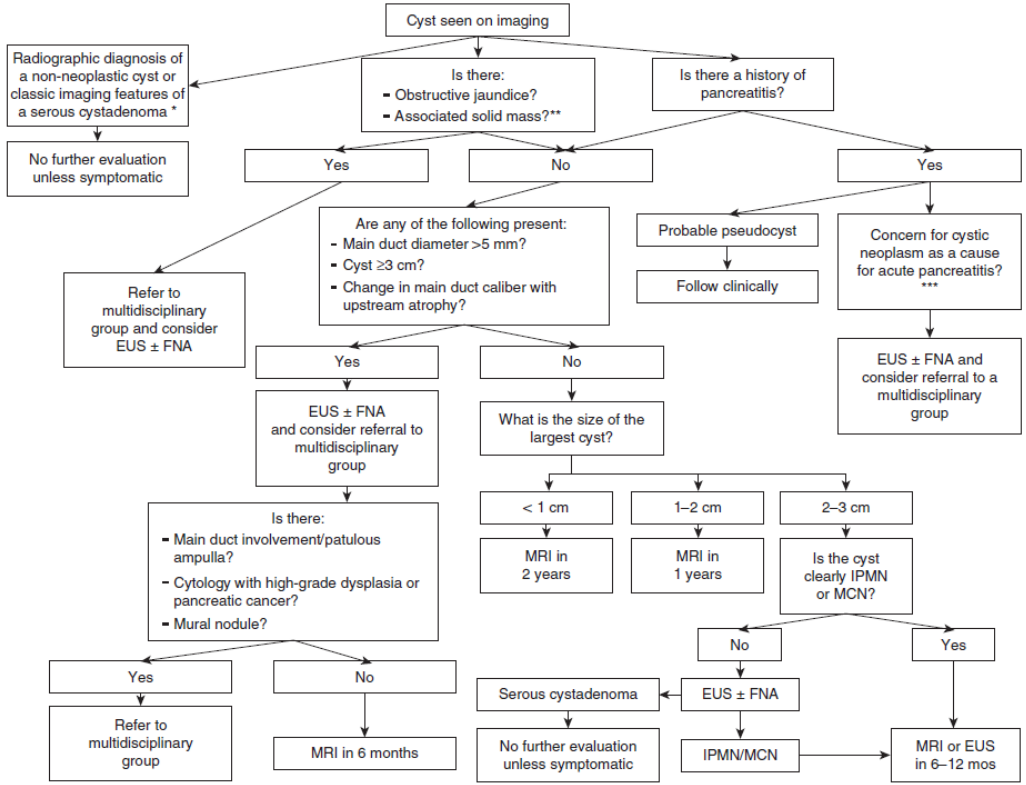

Figure 1. Approach to a patient with a pancreatic cyst. *Pathognomonic radiographic features of a serous cystadenoma are a microcystic appearance with a central stellate scar. **Occasionally benign lesions can have a solid appearance. In cases where the diagnosis is unclear EUS±FNA should be performed. ***Unusual cystic features or present at initial onset of acute pancreatitis. EUS, endoscopic ultrasound; FNA, fine needle aspiration.

The American Journal of Gastroenterology 2018

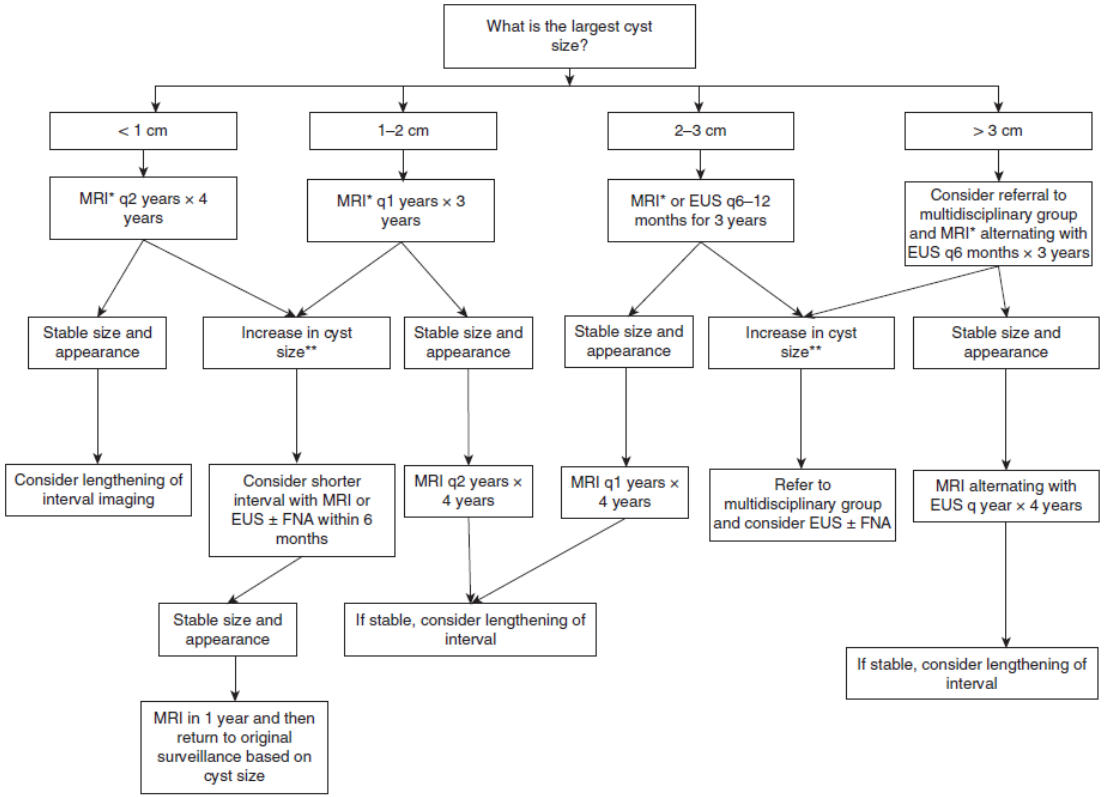

Figure 2. Surveillance of presumed IPMN or MCN. *Surveillance should preferably be performed with same imaging modality in attempt to capture consistency in size measurements. **≥3 mm/year. IPMN, intraductal papillary mucinous neoplasm; MCN, mucinous cystic neoplasm.

The American Journal of Gastroenterology 2018

INSELGRUPPE

Vielen Dank für die Aufmerksamkeit.