An Algorithmic approach to cystic neoplasms of the pancreas

JOHNS HOPKINS
MEDICAL INSTITUTIONS

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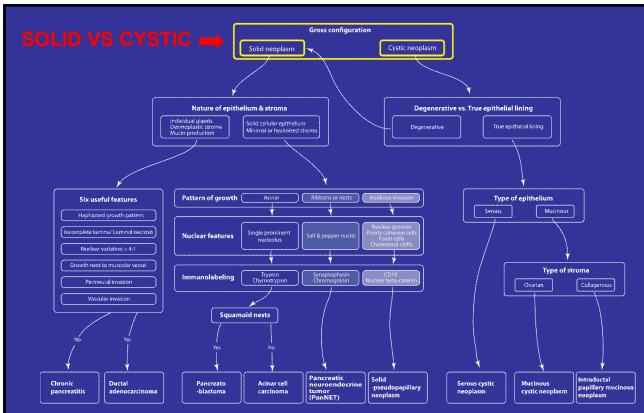
Disclosure

- I receive royalty payments from Myriad Genetics for the PALB2 invention.
- Selected images from the AFIP Fascicle with permission
- The pancreas pathology iPAD APPs are free through the iTunes Store



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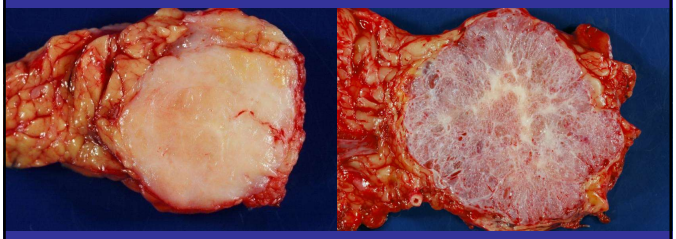
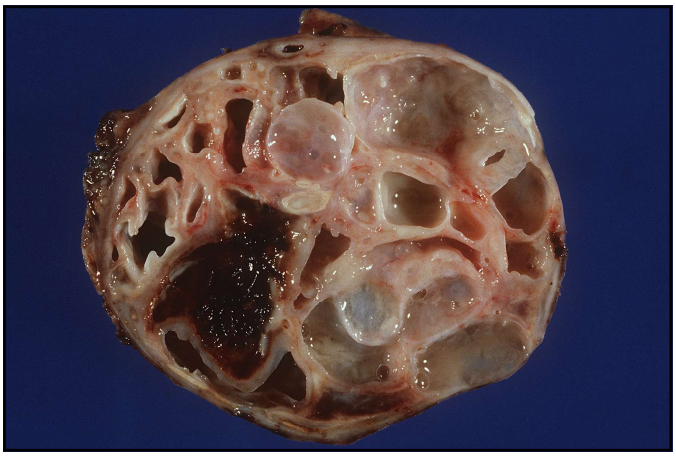
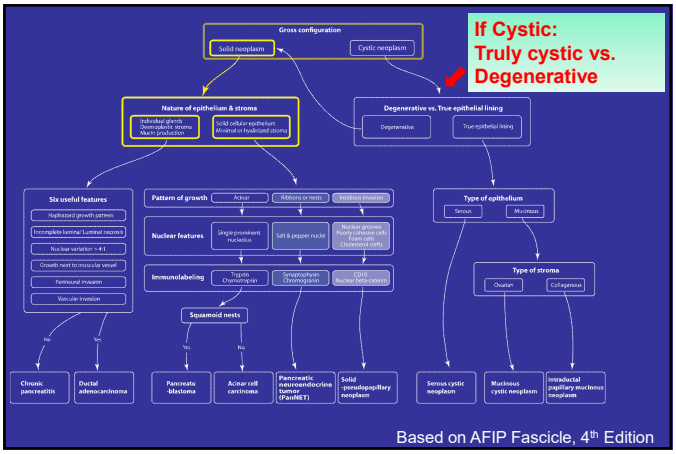
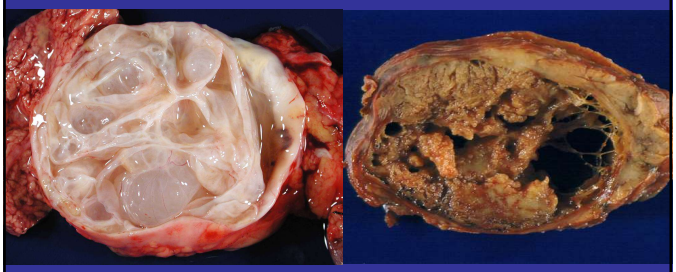
1. Is it Solid or Cystic?



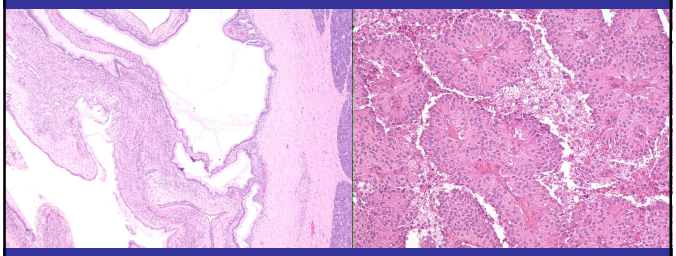


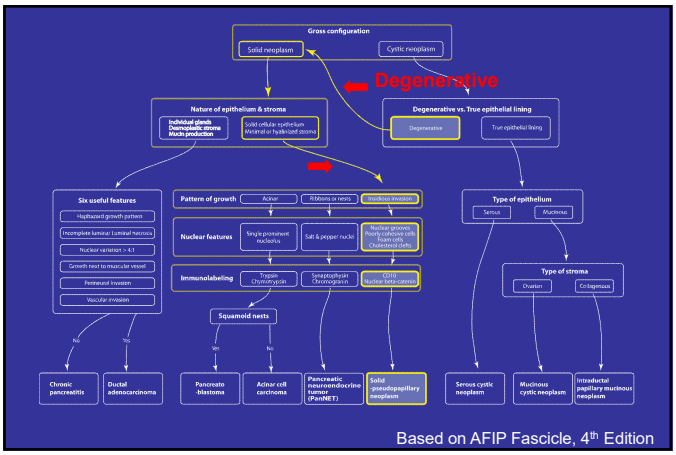


Epithelial Lined vs. Degenerative



Epithelial Lined vs. Degenerative





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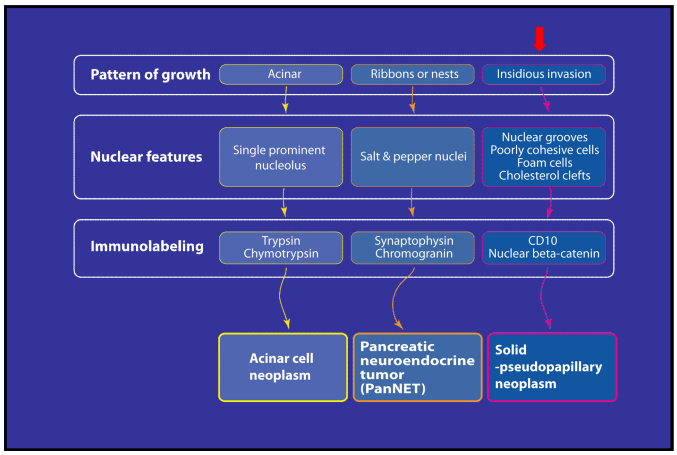
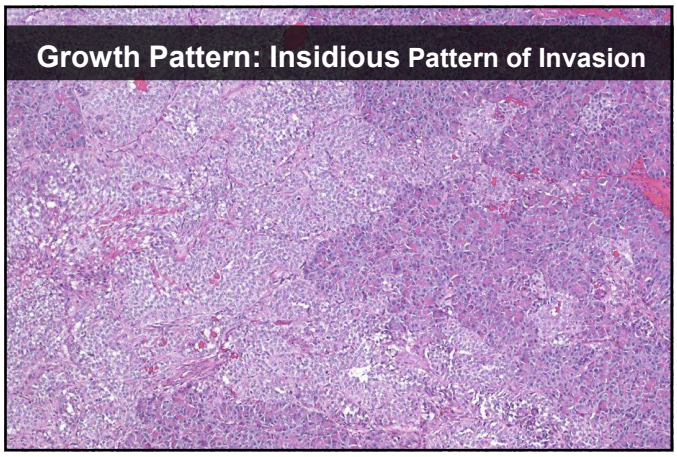
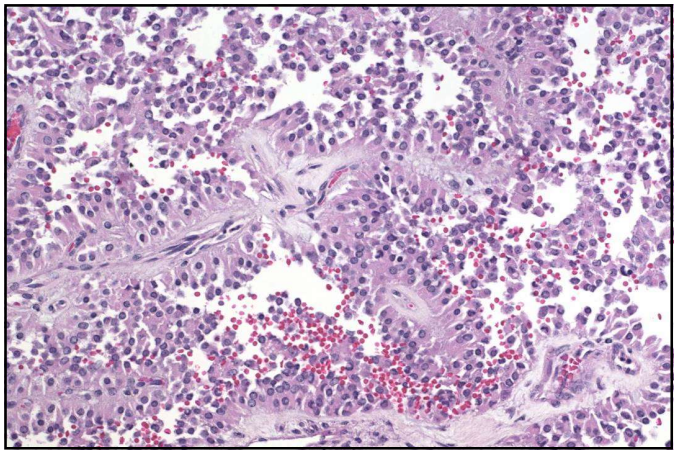
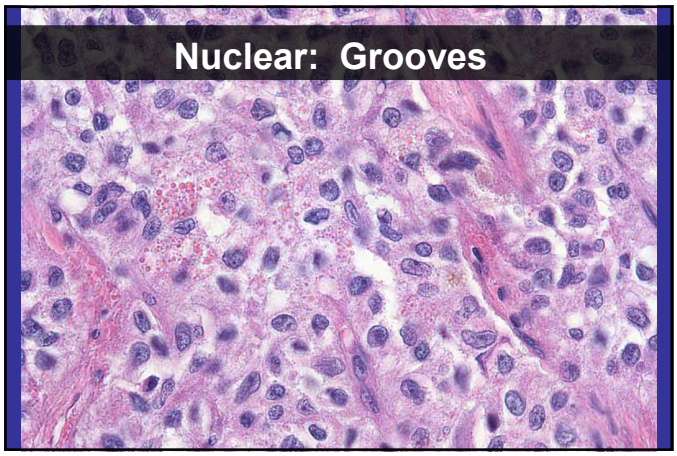
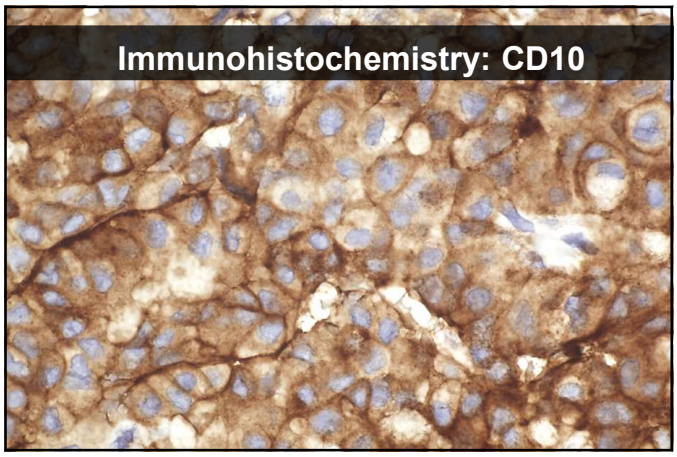
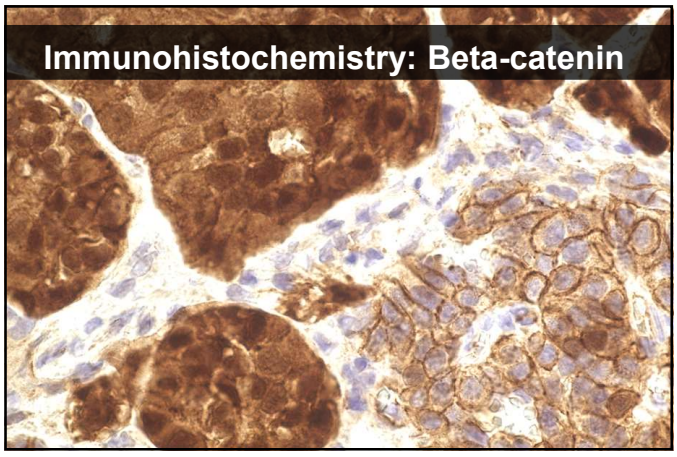

Pattern of growth
Acinar
Ribbons or nests
Insidious invasion
Nuclear features
Single prominent nucleolus
Salt & pepper nuclei
Nuclear grooves
Poorly cohesive cells
Foam cells
Cholesterol clefts
Immunolabeling
Trypsin
Chymotrypsin
Synaptophysin
Chromogranin
CD10
Nuclear beta-catenin
Acinar cell neoplasm
Pancreatic neuroendocrine tumor (PanNET)
Solid -pseudopapillary neoplasm


Growth Pattern: Insidious Pattern of Invasion

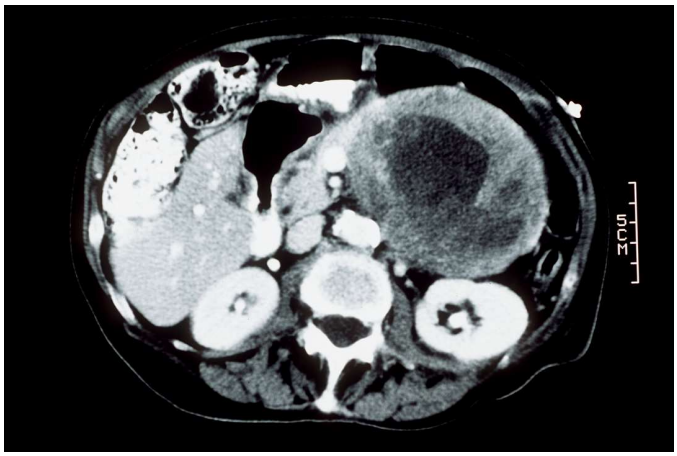



Nuclear: Grooves

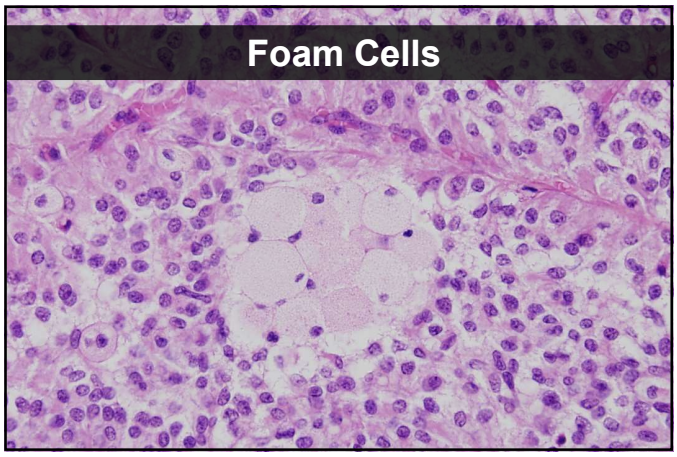

Immunohistochemistry: CD10


Immunohistochemistry: Beta-catenin

Solid-Pseudopapillary Neoplasm

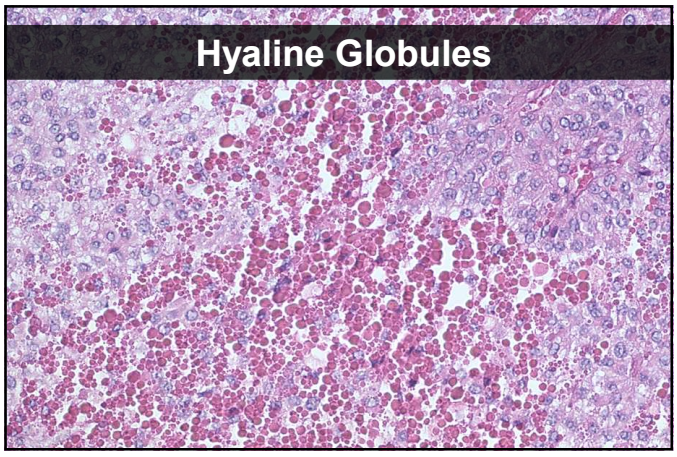


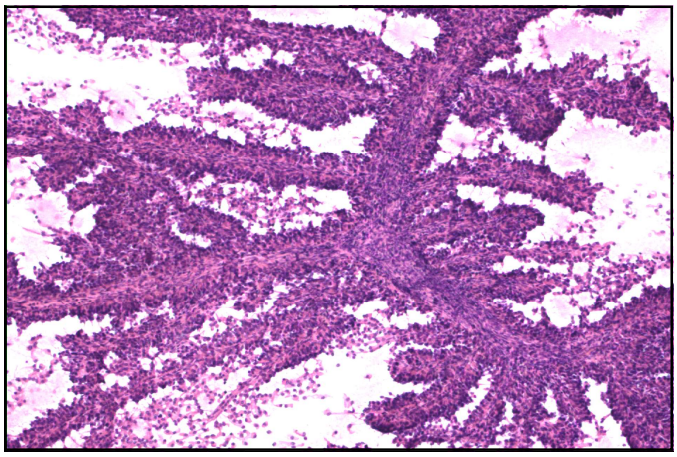
Foam Cells

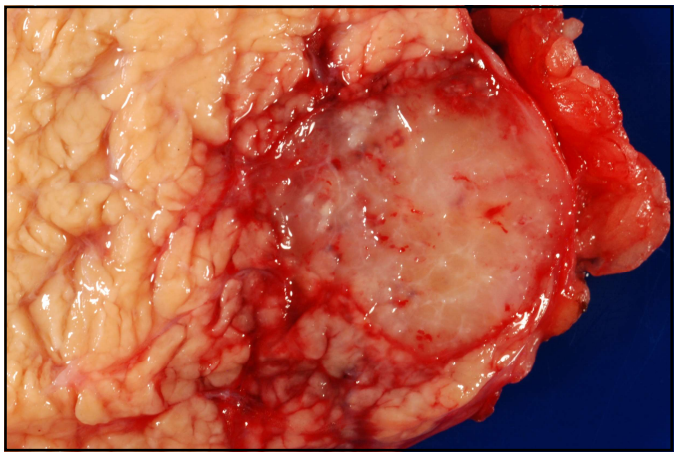


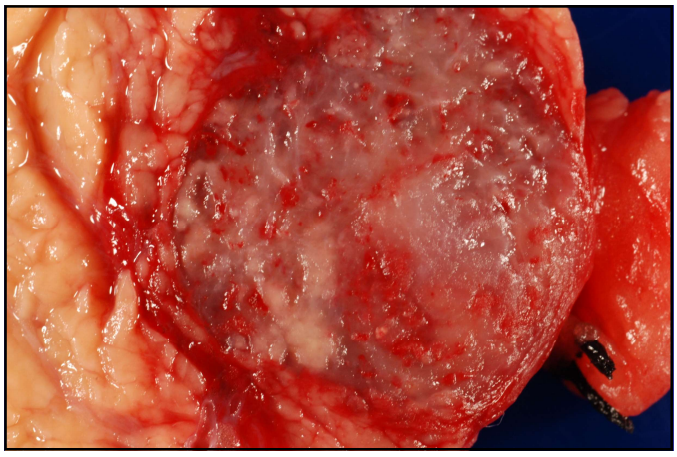
Cholesterol Clefts

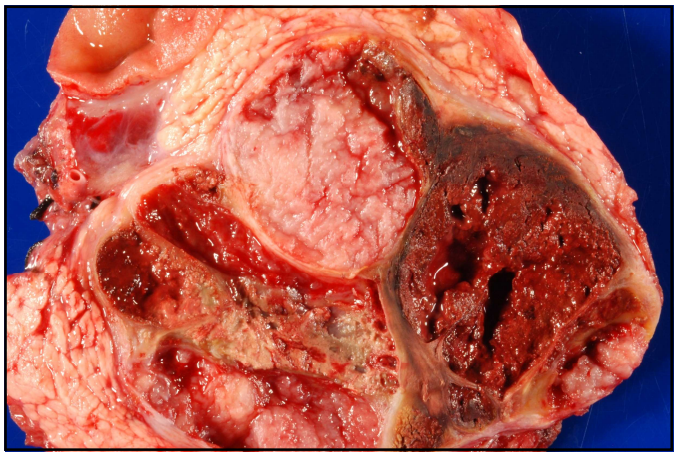
Hyaline Globules

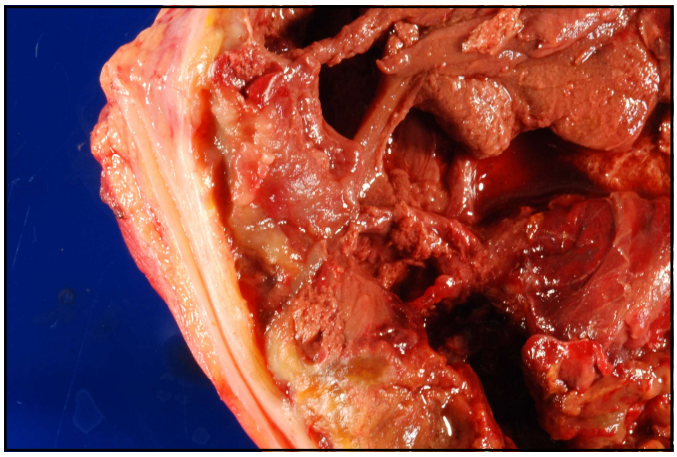






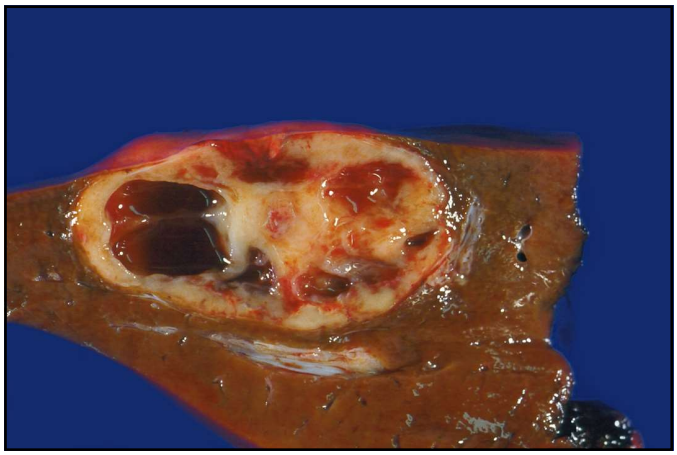






Solid-Pseudopapillary Neoplasm

- Clinically, the vast majority occur in young women (20's)
- Patients present with vague abdominal fullness or pain
- Grossly well demarcated masses. On cross section, they are cystic and solid with areas of hemorrhage and necrosis



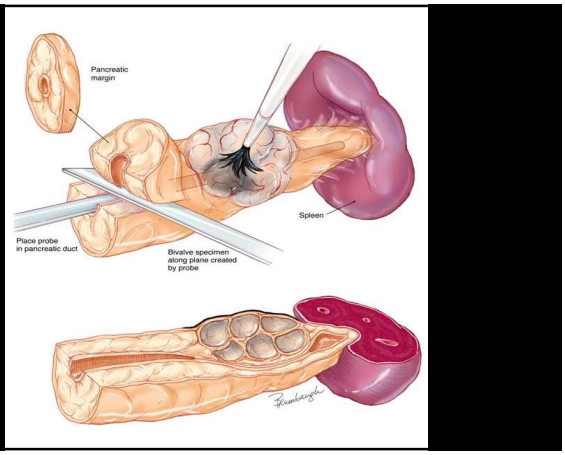
Solid-Pseudopapillary Neoplasms: Outcome

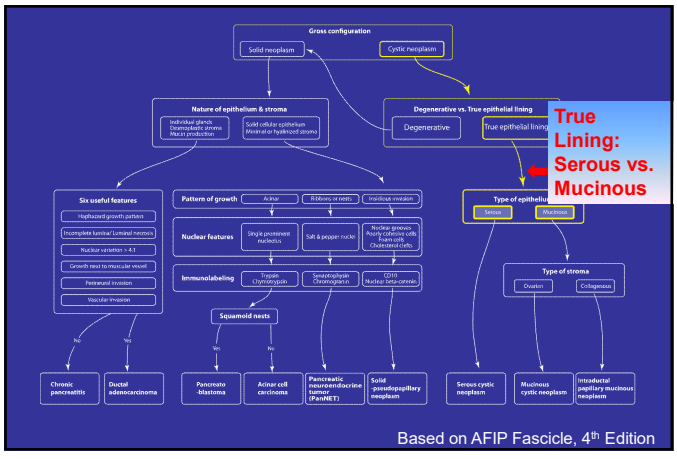
- All are classified as malignant.
- Some may be locally aggressive, but most are surgically cured.

Truly Cystic Neoplasms

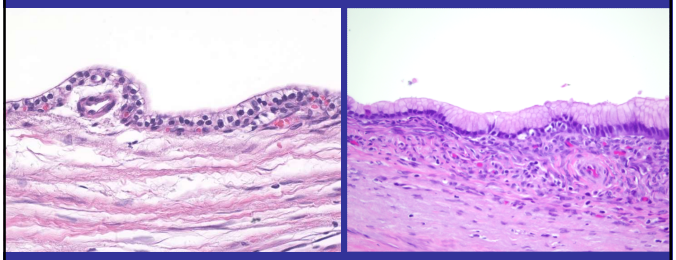
- Gender
- Tail vs. Head
- Relationship to larger pancreatic ducts
- Character of cyst fluid
- Lining (serous vs. mucinous vs. none)
- Stroma (ovarian-type)

	Mucinous Cystic Neoplasm	Intraductal papillary Mucinous Neoplasm	Solid-pseudopapillary Neoplasm	Serous Cystic Neoplasm
Gender (F:M)	20:1	1:1.5	10:1	7:3
Head/Tail	Tail	Head	Tail=Head	Tail=Head
Relation to Duct	None	Always	None	None
Cyst Contents	Mucinous	Mucinous	Necrotic/ Hemorrhagic	Serous
Epithelium	Mucinous	Mucinous	Non-cohesive	Serous
Stroma	Ovarian	None	None	None

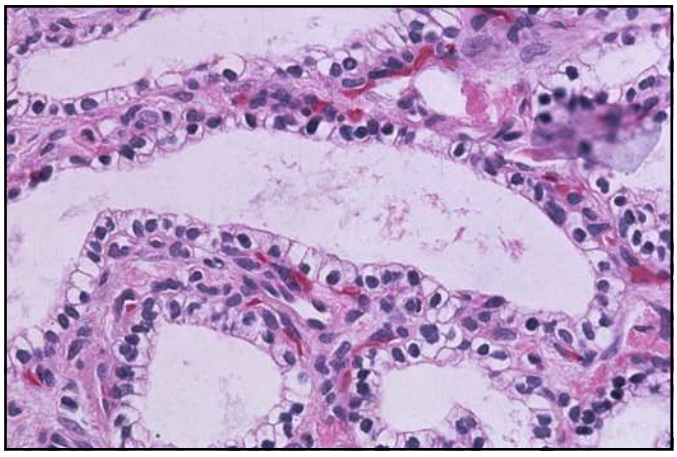


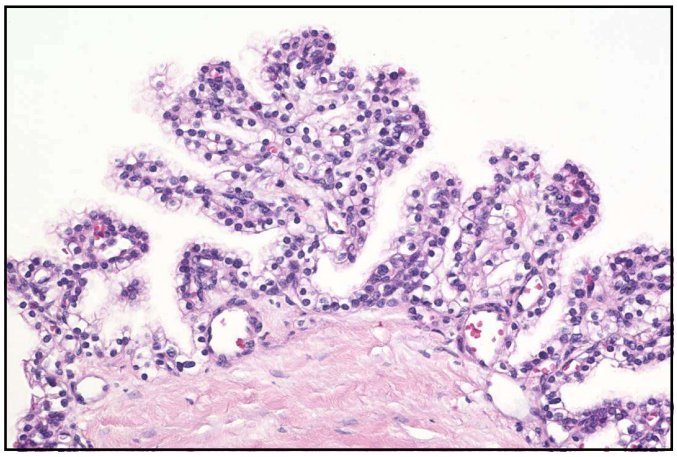


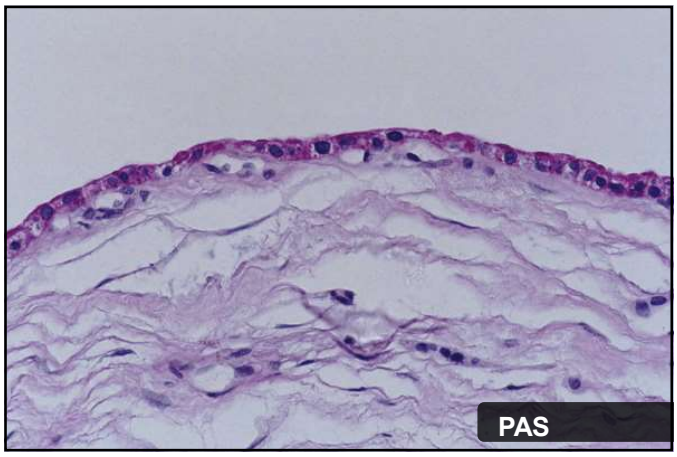
Serous vs. Mucinous

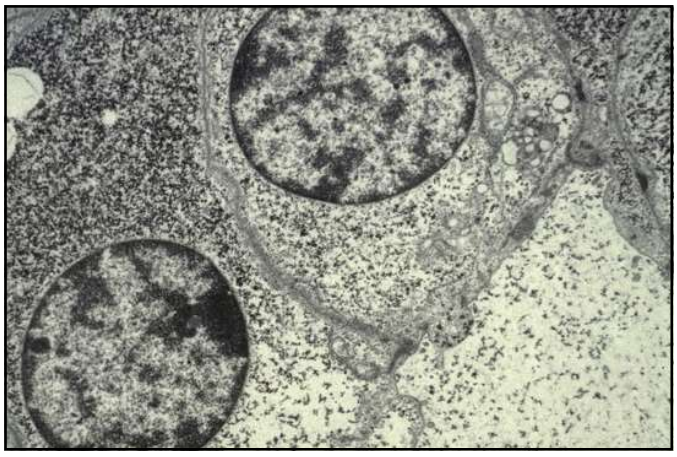


Serous Neoplasms



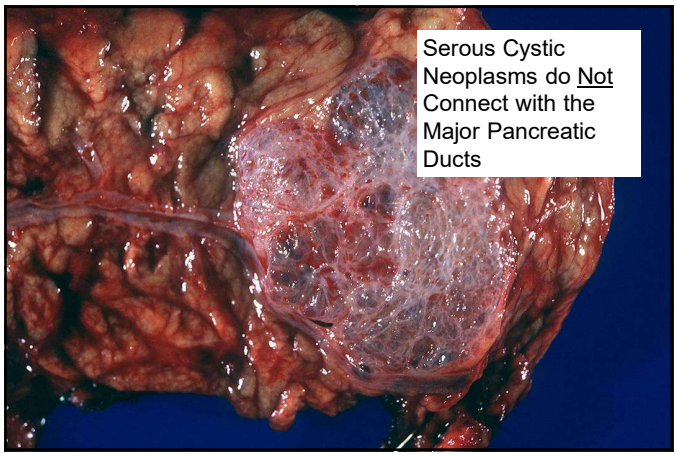


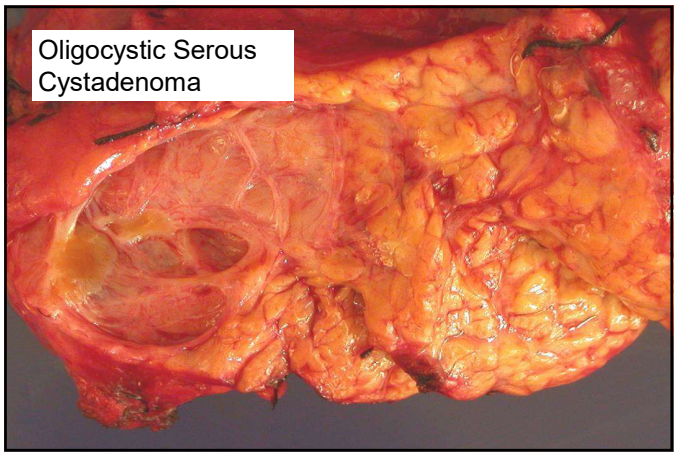

PAS

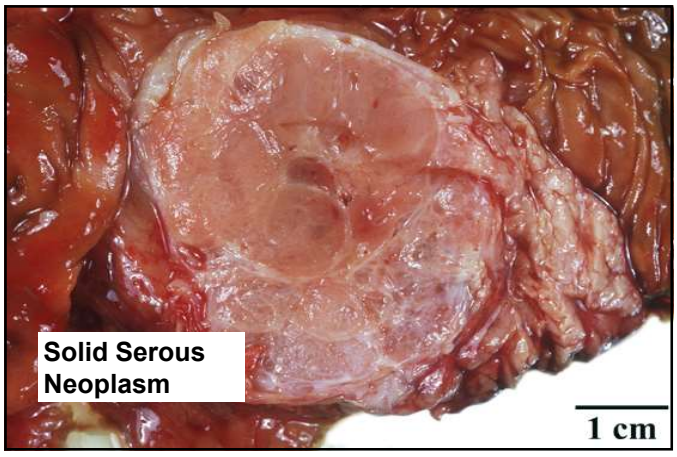


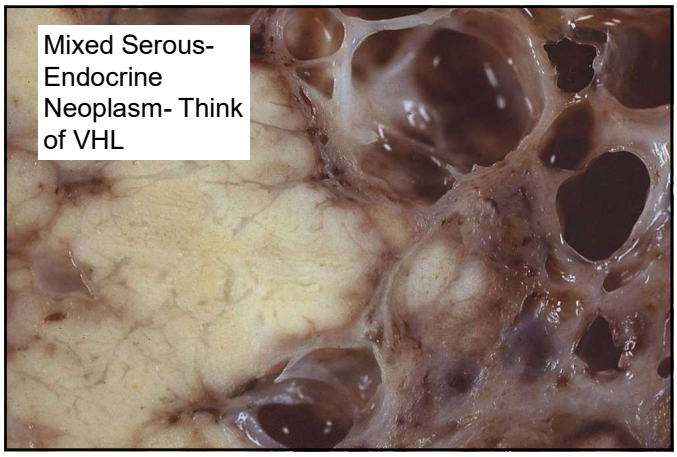
Serous Cystadenomas Clinical

- More common in women than in men
- Average age at diagnosis: 61-68 years
- Presenting signs and symptoms include:
  - abdominal pain
  - weight loss
  - palpable abdominal mass


Serous Cystic Neoplasms do Not Connect with the Major Pancreatic Ducts

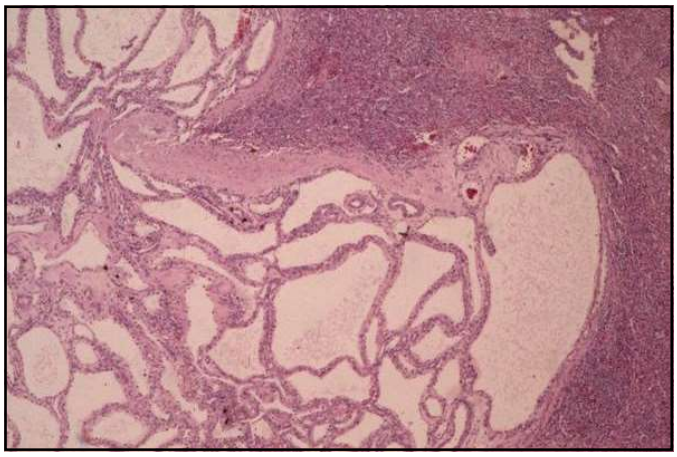

Oligocystic Serous Cystadenoma


Solid Serous Neoplasm
1 cm



Serous Cystadenoma Outcome

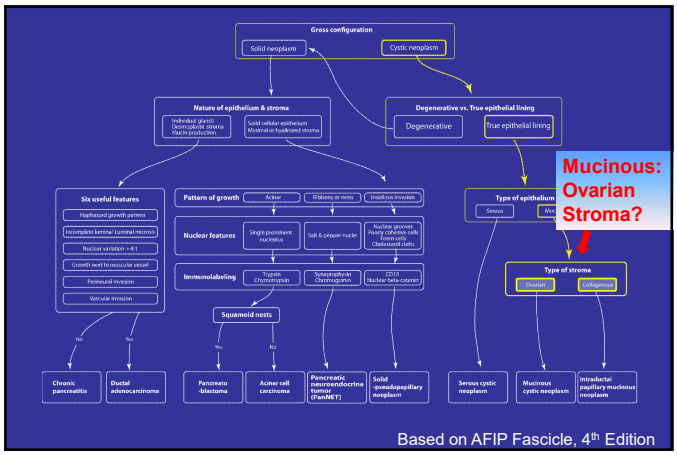
- Several case reports of “multifocal” disease
- One or two cases of malignant serous neoplasms
- The vast majority of serous cystadenomas are benign, even if incompletely resected



Serous Cystadenoma Differential Diagnosis

	Serous cystadenoma	Lymphangioma
Cytokeratin	+	-
Glycogen	+	-
Lymphocytes in the wall	-	+

Mucin-producing Neoplasms (MCNs and IPMNs)



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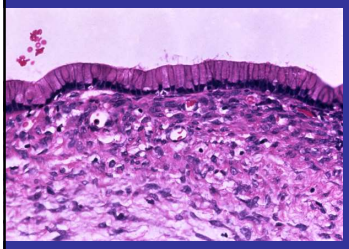
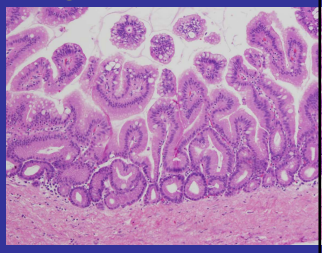
Nature of the Stroma: Ovarian vs. Collagenous

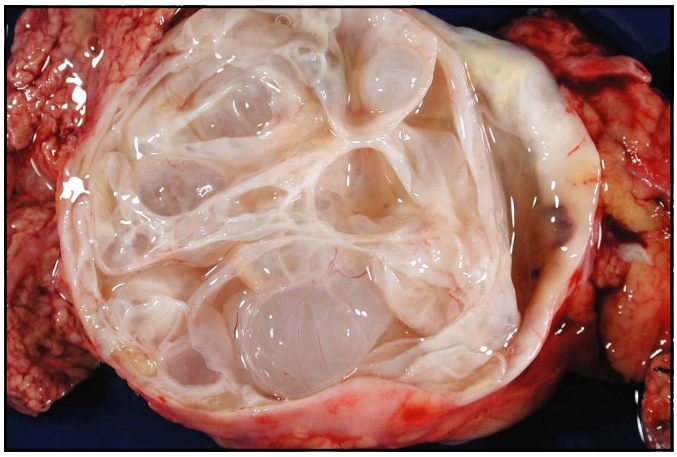


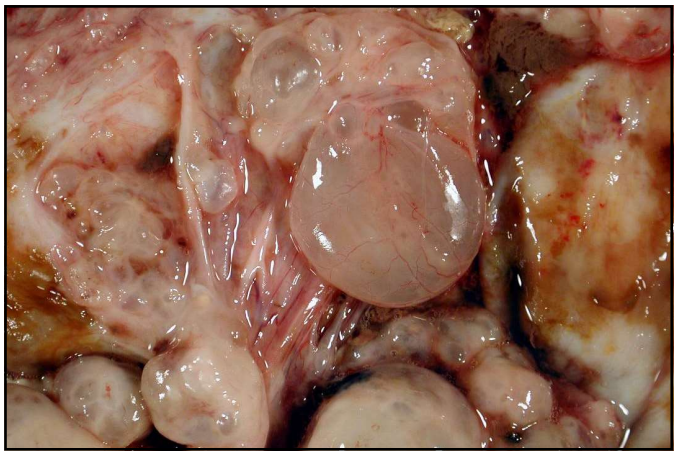


Mucinous Cystic Neoplasms

Mucinous Cystic Neoplasms

- Much more common in women than in men
- Mean age at diagnosis: ~50 (younger than for patients with serous cystadenomas)
- Tail > Head



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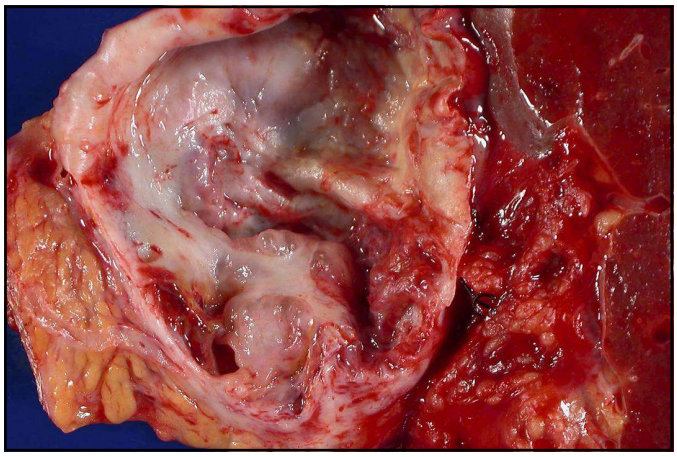
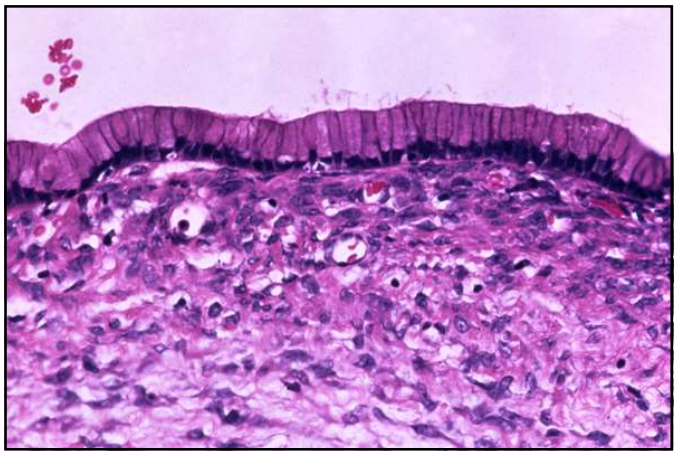
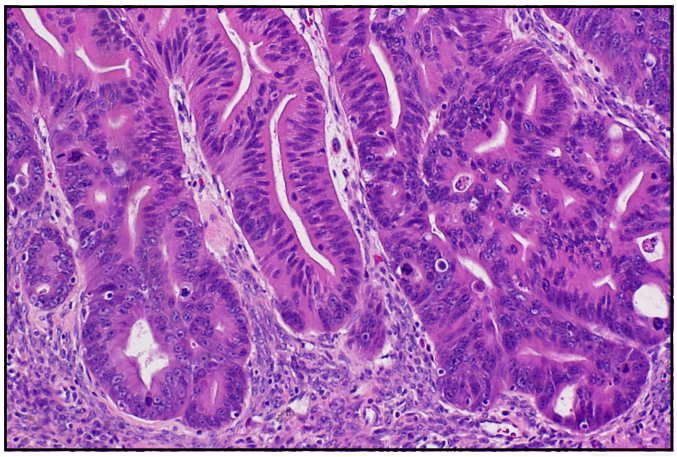
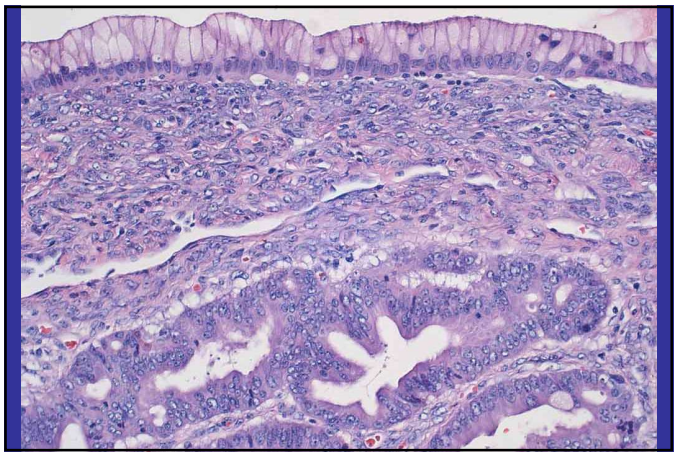
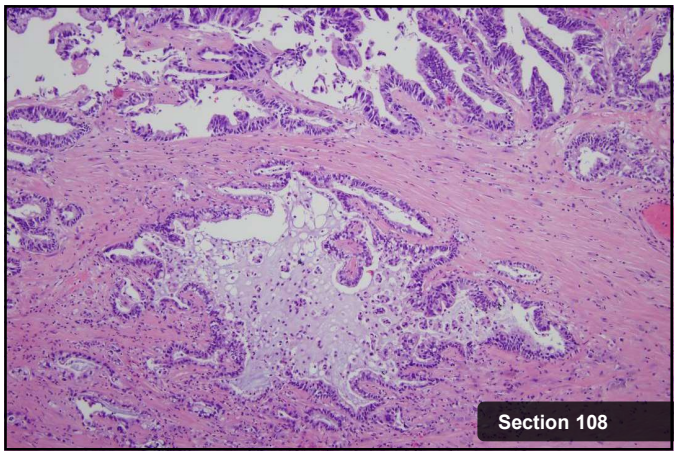









Section 108

Mucinous Cystic Neoplasms

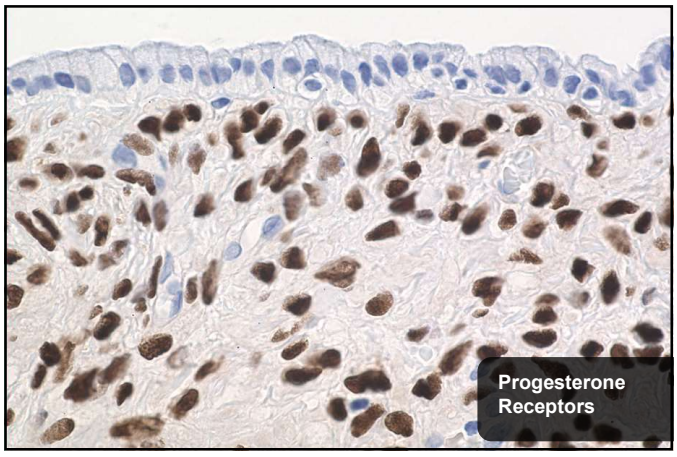
- Low-grade Dysplasia
- Intermediate grade Dysplasia
- High-grade Dysplasia

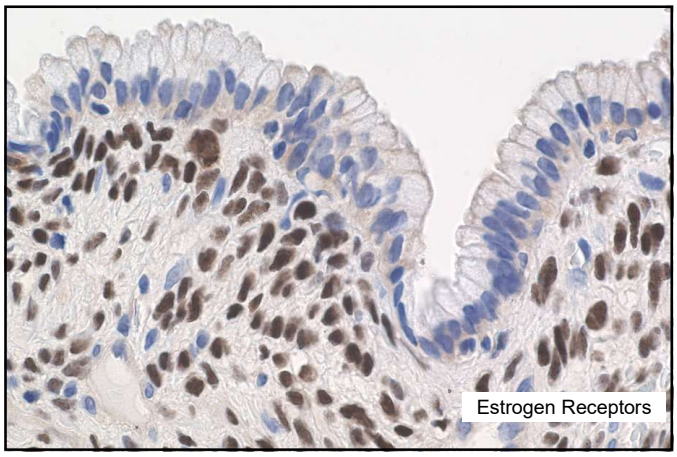
- Invasive Carcinoma

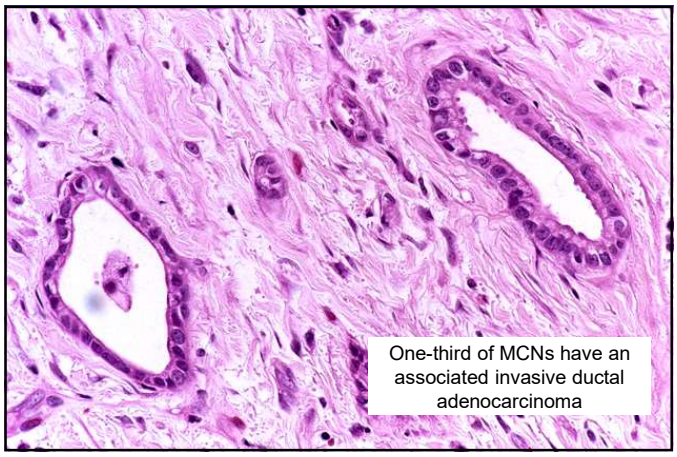
Mucinous Cystic Neoplasms- Proposed

- Low-grade Dysplasia
- High-grade Dysplasia

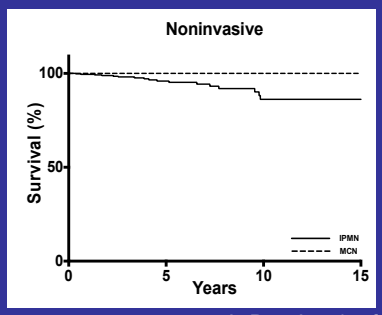
- Invasive Carcinoma







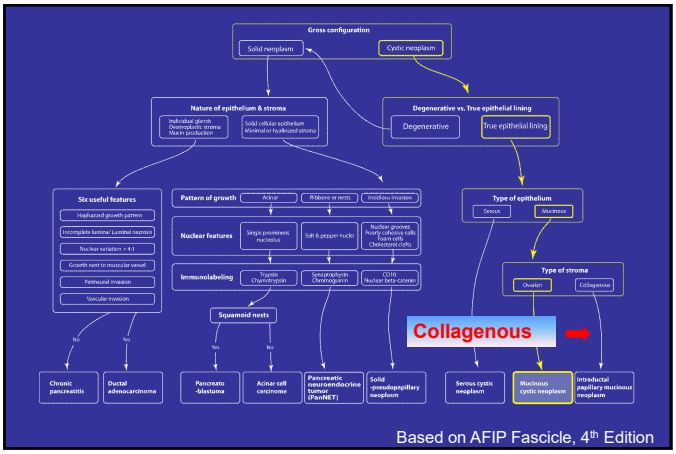
MCNs are Unifocal



A. Pea, Annals of

Completely resected and entirely examined mucinous cystic neoplasms without an associated invasive carcinoma follow benign courses.

Because invasive carcinoma can be focal, failure to study an entire mucinous cystic neoplasm may result in the miscategorization of a malignant tumor as benign.



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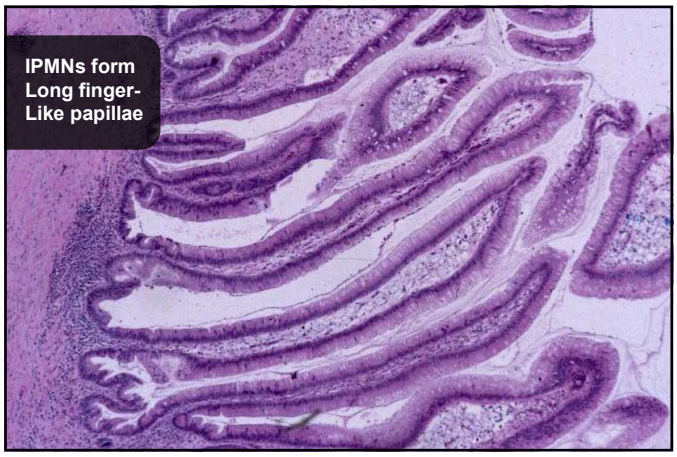
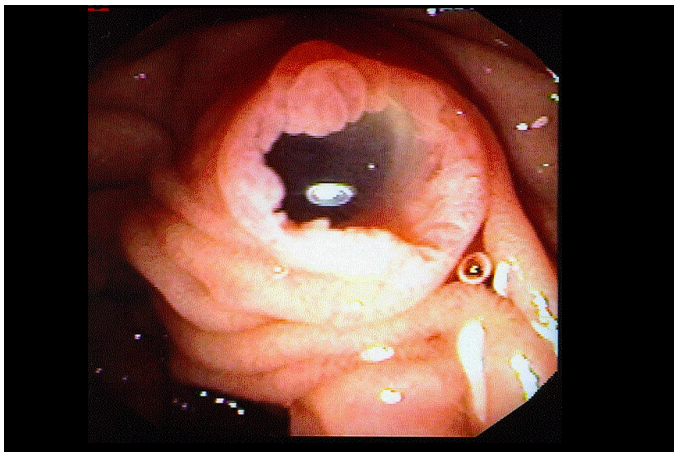
Intraductal Papillary Mucinous Neoplasm

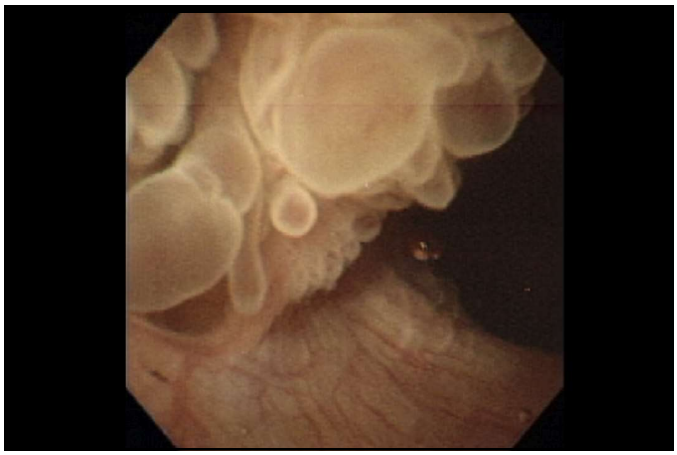


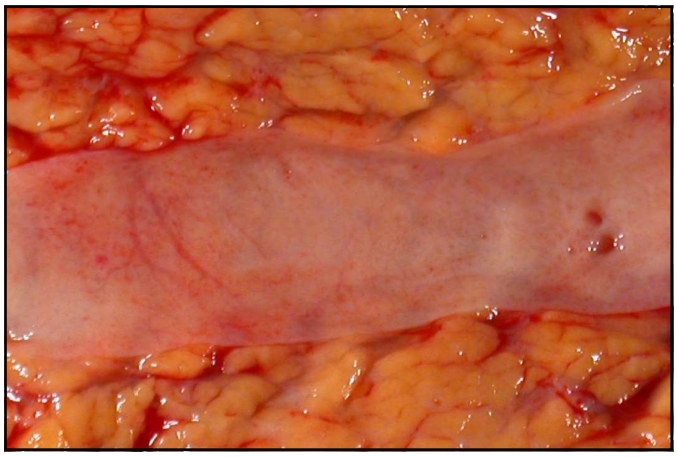
Intraductal Papillary Neoplasms

- Long history of symptoms
- Incidence in men equals that in women
- Head > Tail
- Mucin oozing from the ampulla of Vater


IPMN





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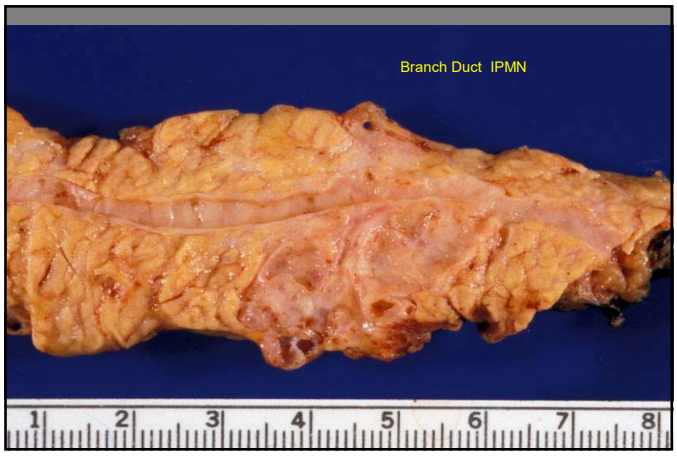
Branch Duct IPMN
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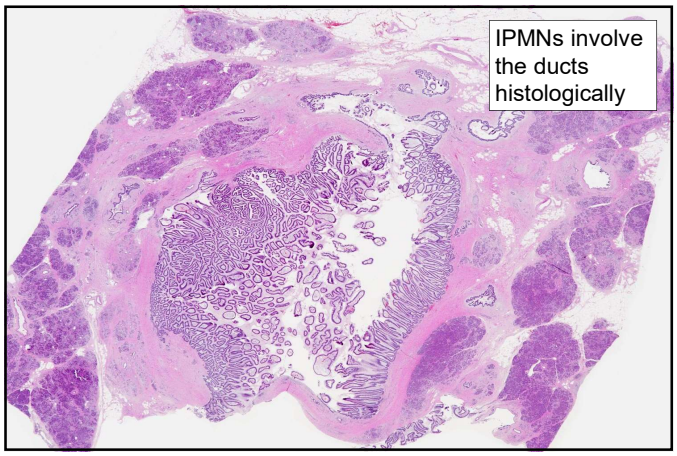
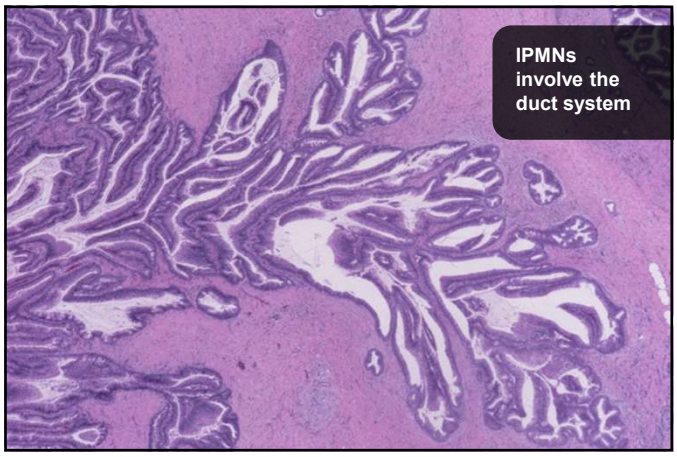
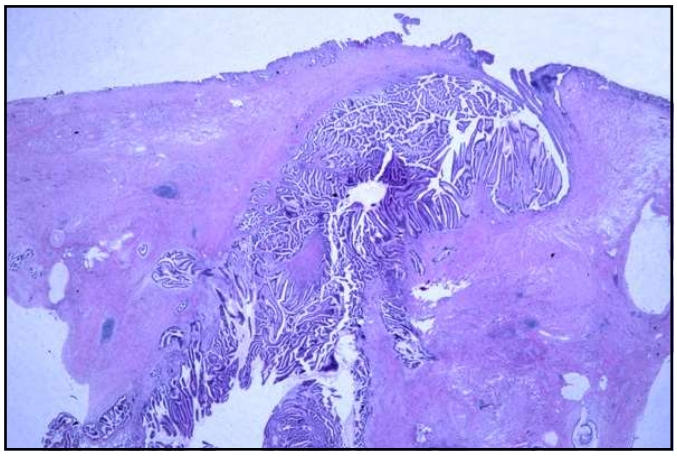

IPMNs involve the ducts histologically


IPMNs involve the duct system



Intraductal Papillary Neoplasms

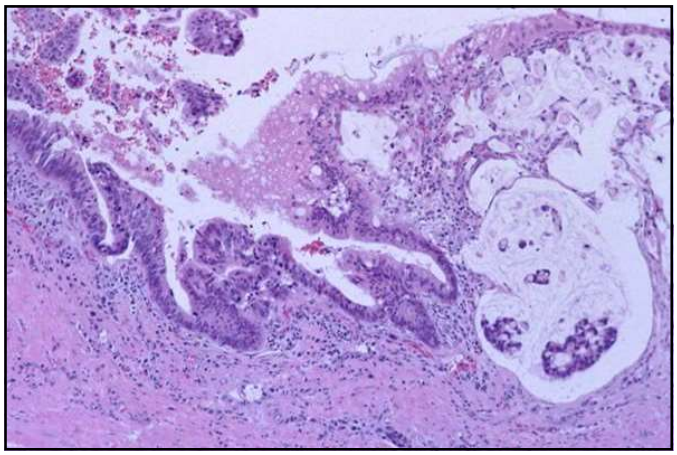
- IPMN with low-grade dysplasia
- IPMN with intermediate dysplasia
- IPMN with high-grade dysplasia

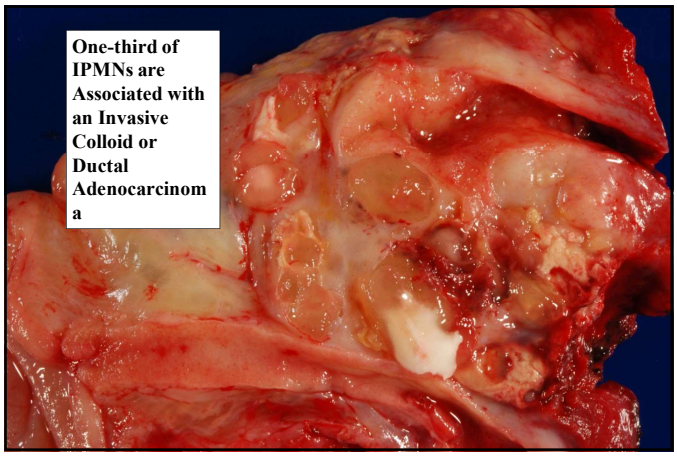
- IPMN with an invasive carcinoma
  - Colloid
  - Tubular/ductal

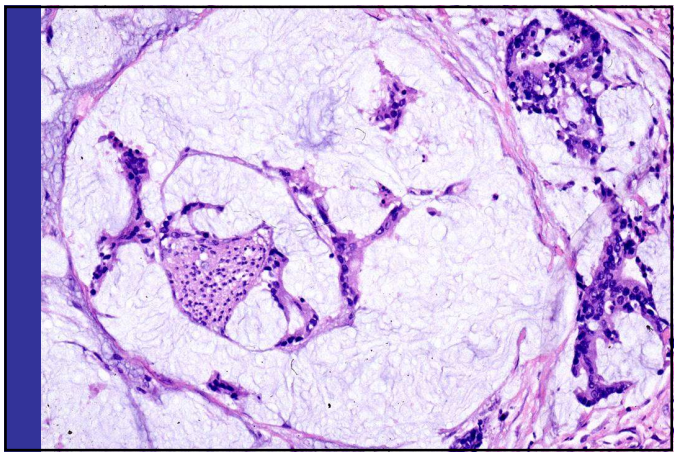
Intraductal Papillary Neoplasms Proposed

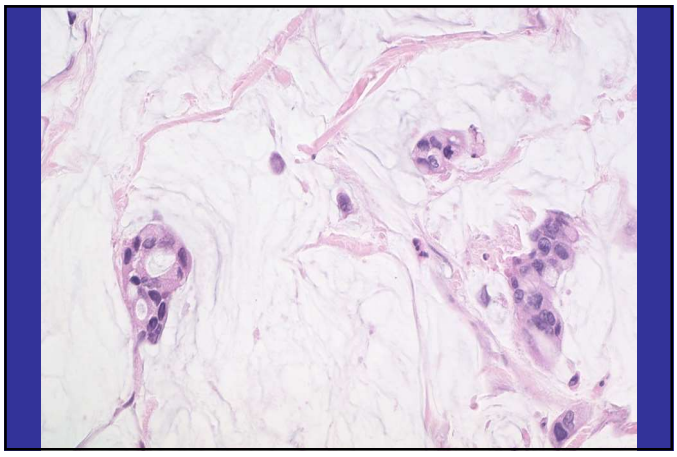
- IPMN with low-grade dysplasia
- IPMN with high-grade dysplasia

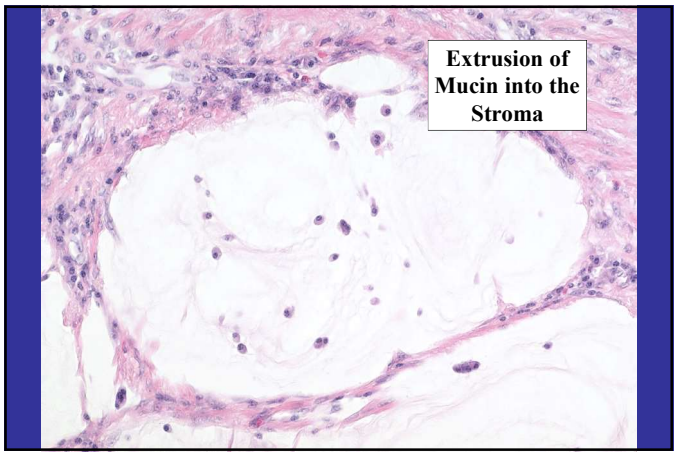
- IPMN with an invasive carcinoma
  - Colloid
  - Tubular/ductal

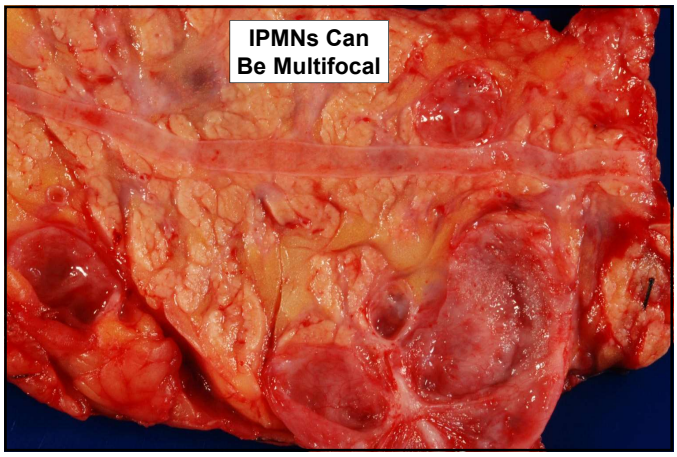



One-third of IPMNs are Associated with an Invasive Colloid or Ductal Adenocarcinoma

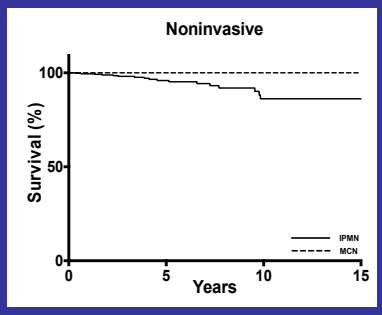






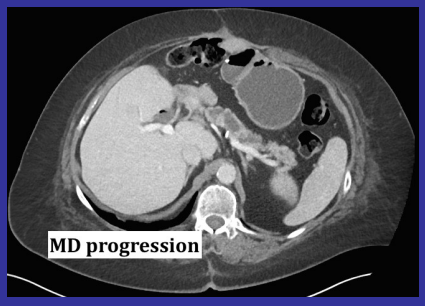


Multifocality is Clinically Important Kaplan-Meier Survival



A. Pea, Annals of Surgery, 2016

Recurrence of Disease in the Remnant Pancreas is a Big Problem for Patients with an IPMN

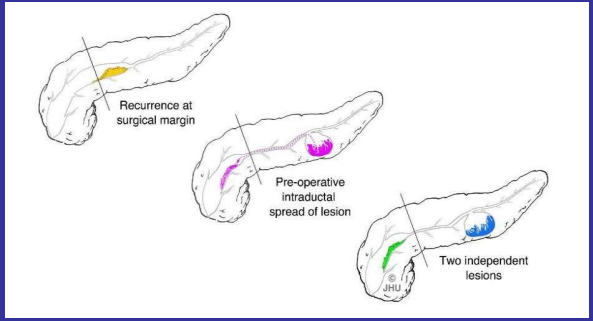


A. Pea, Annals of

Intraductal Papillary Mucinous Neoplasms

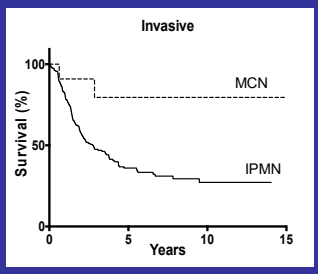
Surgically resected non-invasive IPMNs have a 90% 5-year survival rate. Most of the recurrences in patients with non-invasive IPMNs appear to be from multi-focal disease, because patients who undergo total pancreatectomy for a non-invasive IPMN have a close to 100% 5-year disease free survival

Clinical Implications



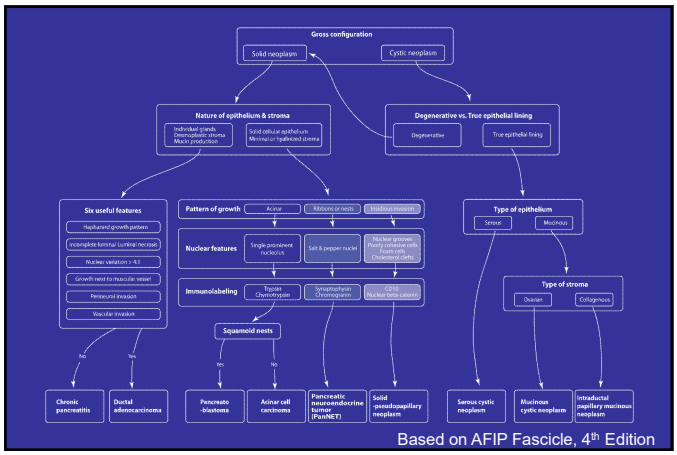
A. Pea, Annals of

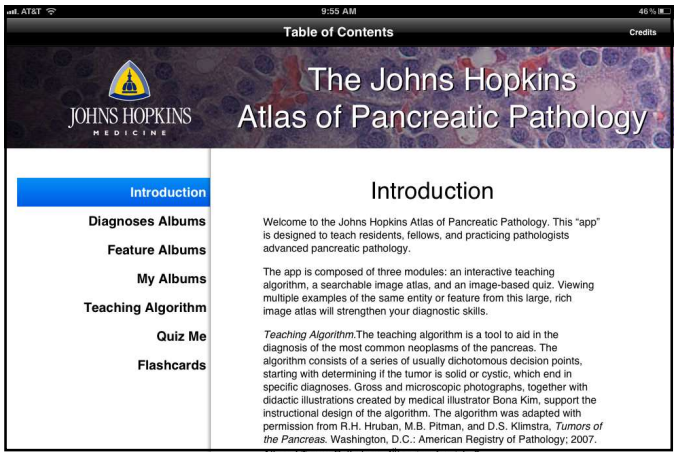
Invasive Carcinoma Arising in IPMN vs. MCN



A. Pea, Annals of Surgery, 2016

	Mucinous Cystic Neoplasm	Intraductal Papillary Mucinous Neoplasm
Age	40-50 years	60's
Gender	Female>>male	Male>female
Head vs. body/tail	Body/tail	Head
Connectivity to large ducts	Usually not	Always
Cyst Contents	Mucoid	Mucoid
Mucin oozing from ampulla	No	Yes
Stroma	Ovarian-type	Collagen
Multifocal disease	Very rare	20-30%


Gross configuration
Solid neoplasm
Cystic neoplasm
Nature of epithelium & stroma
Degenerative vs. True epithelial lining
Degenerative
True epithelial lining
Six useful features
Pattern of growth
Nuclear features
Immunolabeling
Squamoid nests
Type of epithelium
Serous
Mucinous
Type of stroma
Ovarian
Collagenous
Chronic pancreatitis
Ductal adenocarcinoma
Pancreato -blastoma
Acinar cell carcinoma
Pancreatic neuroendocrine tumor (PanNET)
Solid -pseudopapillary neoplasm
Serous cystic neoplasm
Mucinous cystic neoplasm
Intraductal papillary mucinous neoplasm
Based on AFIP Fascicle, 4th Edition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JOHNS HOPKINS
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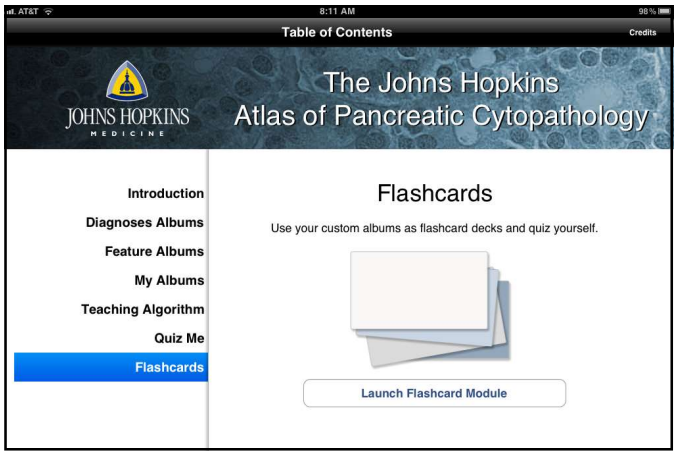
The Johns Hopkins
Atlas of Pancreatic Pathology
Introduction
Diagnoses Albums
Feature Albums
My Albums
Teaching Algorithm
Quiz Me
Flashcards
Introduction
Welcome to the Johns Hopkins Atlas of Pancreatic Pathology. This "app" is designed to teach residents, fellows, and practicing pathologists advanced pancreatic pathology.
The app is composed of three modules: an interactive teaching algorithm, a searchable image atlas, and an image-based quiz. Viewing multiple examples of the same entity or feature from this large, rich image atlas will strengthen your diagnostic skills.
Teaching Algorithm.The teaching algorithm is a tool to aid in the diagnosis of the most common neoplasms of the pancreas. The algorithm consists of a series of usually dichotomous decision points, starting with determining if the tumor is solid or cystic, which end in specific diagnoses. Gross and microscopic photographs, together with didactic illustrations created by medical illustrator Bona Kim, support the instructional design of the algorithm. The algorithm was adapted with permission from R.H. Hruban, M.B. Pitman, and D.S. Klimstra, Tumors of the Pancreas. Washington, D.C.: American Registry of Pathology; 2007.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98 %
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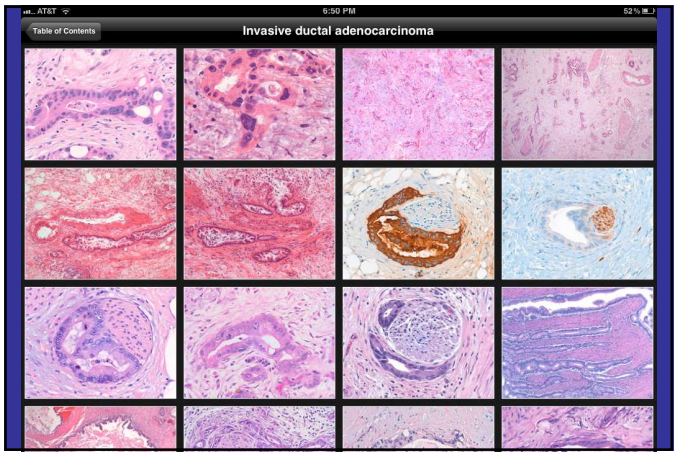
Flashcards
Use your custom albums as flashcard decks and quiz yourself.
Launch Flashcard Module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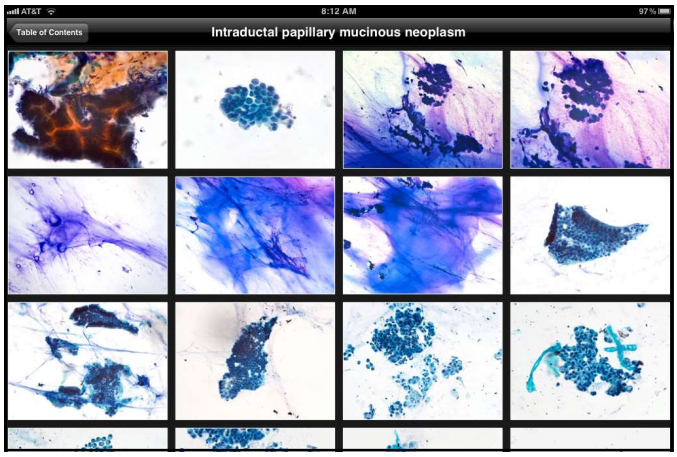
Invasive ductal adenocarcinoma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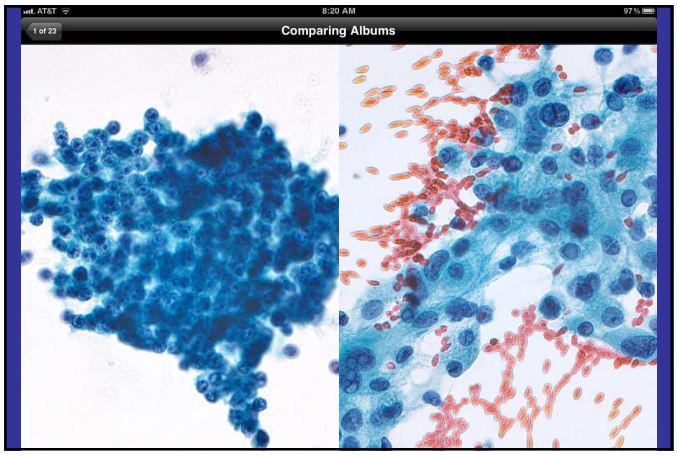
Intraductal papillary mucinous neoplasm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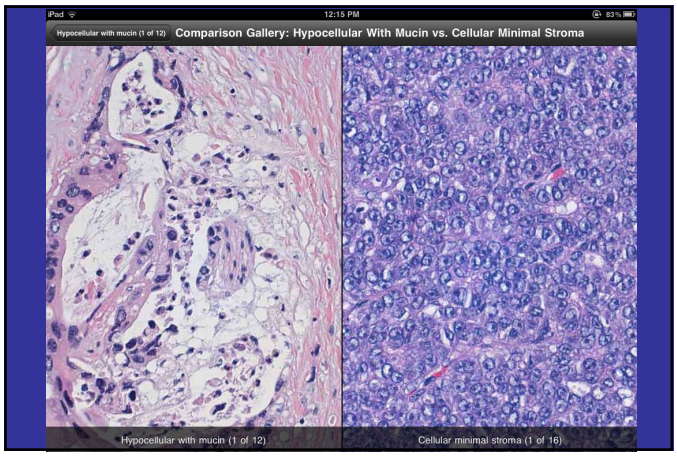
1 of 23
Comparing Albums


iPad
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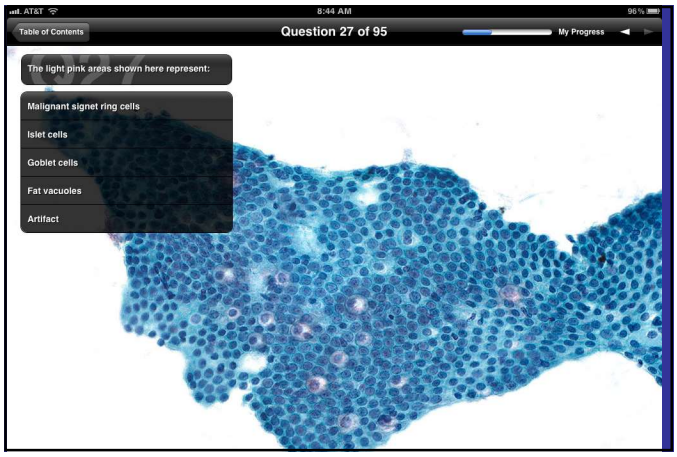
Hypocellular with mucin (1 of 12)
Comparison Gallery: Hypocellular With Mucin vs. Cellular Minimal Stroma
Hypocellular with mucin (1 of 12)
Cellular minimal stroma (1 of 16)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Question 27 of 95
My Progress
The light pink areas shown here represent:
Malignant signet ring cells
Islet cells
Goblet cells
Fat vacuoles
Artifact

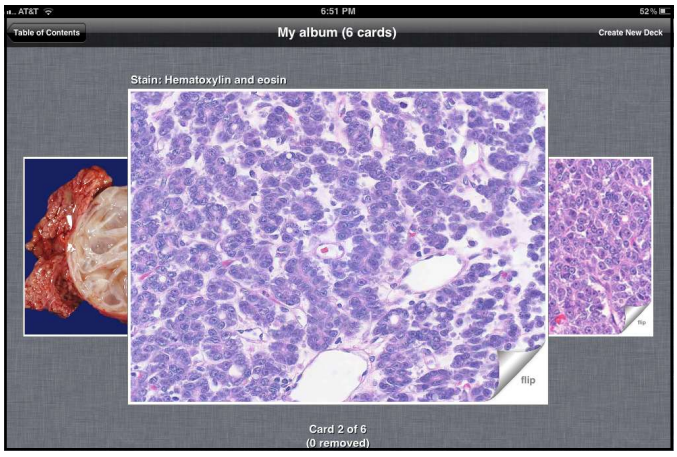
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Table of Contents
My album (6 cards)
Create New Deck
Stain: Hematoxylin and eosin
flip
Card 2 of 6
(0 removed)


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