

Pancreas



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Pancreas

2 glands in 1:

- Exocrine: Acinar, ductal cells
- Endocrine: Islet cells

Neoplasms:

- Adenocarcinomas: Most common
- Pancreatic neuroendocrine neoplasms
- Acinar cell carcinoma: Rare
- Other

All pancreaticobiliary AdCAs look alike

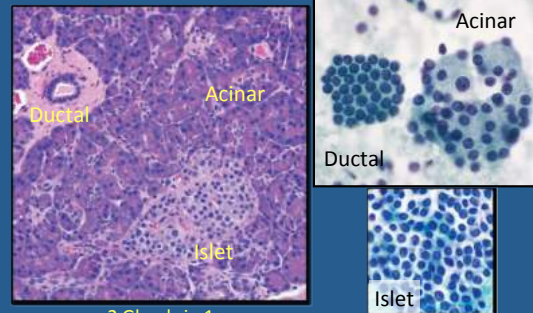
FNA Bx of Pancreas

Primary indication:

Chronic pancreatitis vs neoplasm

- Tissue biopsy:
 - Complications—fistula, etc
 - FN relatively high; FP up to 3%
 - FNA biopsy:
 - Safe and reliable
 - At least as accurate as tissue Bx
 - Much less morbidity/mortality
- => FNA Bx technique of choice

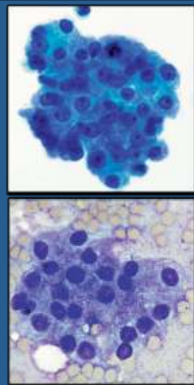
Normal Pancreas



2 Glands in 1

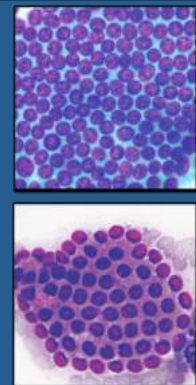
Acinar Cells: Exocrine

Normally predominate
~ Serous acinic salivary gland
Grape-like clusters
Microacinar structures
Pyramidal/polygonal cells
Uniform nuclei,
conspicuous nucleoli
Granular (zymogen) cytoplasm



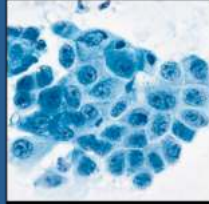
Ductal Cells

Normally present, but sparse
Cohesive honeycomb sheets
Uniform cells
cuboidal to columnar
Smooth nuclei, fine chromatin,
inconspicuous nucleoli
Delicate cytoplasm,
± mucin, goblet cells



Reactive/Reparative Changes

WARD Cells: Worrisome Atypia in Reactive/Degenerative Cells



Nuclear enlargement
Prominent nucleoli
Mitoses

Order, cohesion vs
Smooth nuclei
Fine chromatin

Islet Cells: Endocrine

Islets of Langerhans

<2% of cells, most in tail

Islet cells

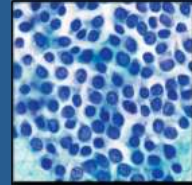
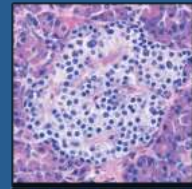
Neuroendocrine chromatin

Neurosecretory granules

Secrete ≥ 4 hormones

- Insulin
- Gastrin
- Somatostatin
- Pancreatic polypeptide

Rarely ID w/o special studies



Clues to GI Pickups vs Neoplasm

First diagnostic clue:

Neoplastic mucus is thick, sticky
"Spinnbarkeit"

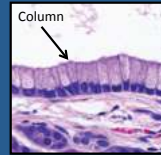
The stringy, elastic character of
cervical mucus time of ovulation



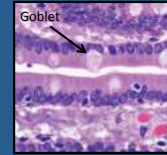
Clues to GI Pickups vs Neoplasm



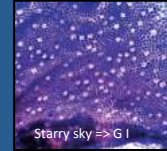
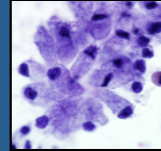
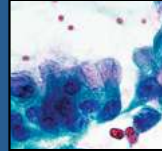
Gastric Foveolar Cells



Mucinous Neoplasm

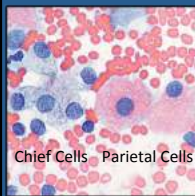


Small Intestinal Cells



Starry sky => GI

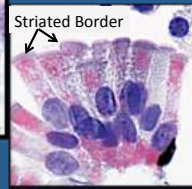
More Clues



Gastric Cells

Dense colloid-like mucus
Degenerated cells
Cyto-atypia
Debris

"Neoplastic Mucus"



Intestinal Cells

Summary: GI "Pick Ups"

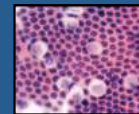
Intestinal cells: Starry sky

Gastric cells: Mucin cup

Neoplastic cells: Mucin column

Neoplastic mucus: Thick, sticky, colloid-like;
+ cyto-atypia, inflam'n, degeneration, debris

Pitfall: IPMNs ± intestinal or gastric cells



Diseases of the Pancreas

Solid

Chronic pancreatitis
 Ductal adenocarcinoma
 Pancreatic neuroendocrine neoplasms
 Acinar cell carcinoma
 Pancreatoblastoma
 Solid pseudopapillary neoplasm
 Lymphoma
 Mesenchymal tumors
 Metastases

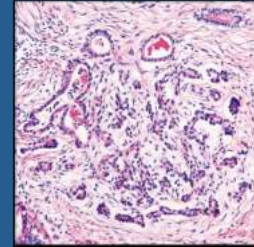
Cystic

Nonneoplastic
 Pseudocyst (most common)
 Miscellaneous cysts
Neoplastic
 Serous cystadenoma
 Mucinous cystic neoplasms
 Intraductal papillary mucinous neoplasms
 Cystic degeneration in a solid tumor

Chronic Pancreatitis

Histology

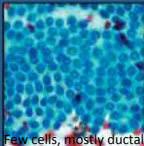
Acinar atrophy
 Ductal metaplasia
 Chronic inflammation
 Fibrosis, calcification



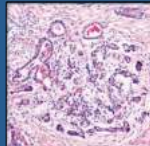
Reversal of Acinar/Ductal Cell Ratio
 Overall cellularity low

FNA Bx: Not to dx pancreatitis, but to exclude malignancy

Chronic Pancreatitis



Few cells, mostly ductal



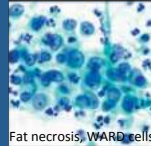
Ductal Plugging



Debris, calcification



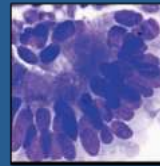
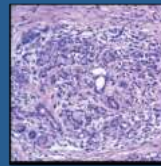
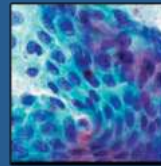
WARD Cell



Fat necrosis, WARD cells

Pancreatitis does not exclude CA!

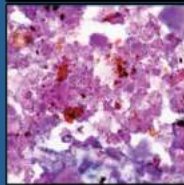
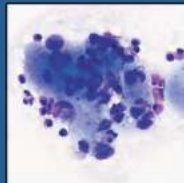
Autoimmune Pancreatitis



M > F, 50s, ↑ serum IgG4
 ± Other autoimmune disease
 Stromal fragments with many:
 ▪ Lymphocytes (T cells)
 ▪ Plasma cells (IgG4 [+])
 DDX: Adenocarcinoma!

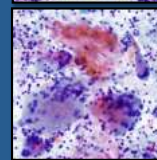
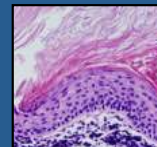
Pseudocyst

By far most common cyst
 Caused by pancreatitis
 Unilocular without septations
 No epithelial lining (pseudocyst)
 Dx: Turbid brown fluid
 ↑ amylase; no mucus
 Histiocytes, inflam' n, debris
 Few/no epithelial cells
 DDx: WARD cells



Lymphoepithelial Cysts

Rare, mid-old age men
 ~Branchial cleft cysts
 ▪ Squamous lining
 ▪ Lymphoid stroma
 Histiocytes
 Cholesterol crystals



Neoplastic Pancreatic Cysts

10-25% of all cysts; ~5% all neoplasms

Two general types:

- Serous
- Mucinous
 - Mucinous cystic neoplasms
 - Intraductal papillary mucinous neoplasms

Dx: FNA biopsy *plus*—

clinical, radiology, fluid analysis

DDx: Cystic degeneration in solid tumors

DDx Cystic Neoplasms

	Serous Cystadenoma	Mucinous Cystic Neoplasms	IPMN*
Proportion	33%-40%	10%-45%	20%-33%
Average age	65yrs	50yrs	60yrs
Sex	F > M	F >> M	M > F
Location	Body, Tail > Head	Tail (most)	Head (most)
Duct connection	No	No	Yes
Malignant potential	Low	Medium	High
Cysts	Multiple, small	Few, large	Duct ectasia
Fluid	Thin, glycogen rich	Thick, viscous mucus	

*Intraductal papillary mucinous neoplasm

Pancreatic Cyst Fluid Analysis

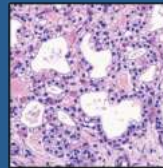
	Viscosity	CEA	Amylase	Mucin	Cytology
Pseudocyst	Low	Low	High	–	Inflammatory cells, debris
Serous	Low	Low	Low	–	Cuboidal, glycogen rich cells, minimal atypia
Mucinous	High	High	Low	+	Columnar, mucinous cells, variable atypia
IPMN	High	High	High	+	

Diagnostic Triad

1. Clinical + imaging
2. Fluid analysis
3. FNA Biopsy

IPMN: Intraductal papillary mucinous neoplasm

Serous Cystadenoma

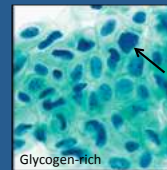


Elderly, F > M; B,T > H
Spongy, stellate scar
Fluid:
Thin, glycogen-rich
Low amylase & CEA

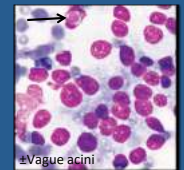
Bx: Does not collapse
Sparse ± non-dx
MΦs, hemosiderin
No mucus, inflam'n,
or debris



Bland duct-like cells

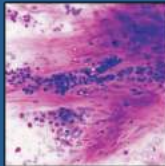


Glycogen-rich

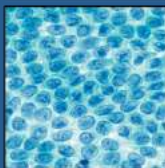
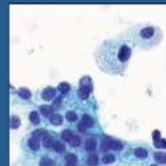


± Vague acini

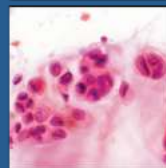
Mucinous Cystic Neoplasm



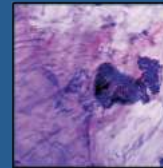
Mid age F >> M
Tail; no duct cxn
↑ CEA, ↓ amylase
Thick sticky mucus
Cells: Bland to AdCA
Ovarian-like stroma



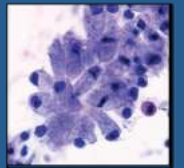
Ovarian-like stroma
(rare in FNA)



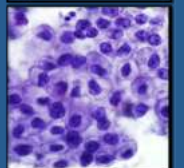
Intraductal Papillary Mucinous Neoplasm



Elderly M > F
Head >> Tail
Duct cxn, ectasia
↑ CEA and amylase
Thick sticky mucus
Mucinous cells
Bland to malignant

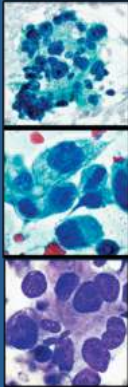


Duct ectasia
No ovarian stroma

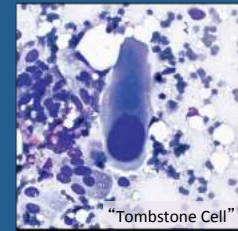
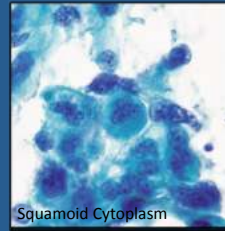


Ductal Adenocarcinoma

By far most common pancreatic malignancy
 FNA bx usually highly cellular, but can be limited by fibrosis
 Dx: MD to PD carcinoma usually straightforward (Nuclear enlargement, pleomorphism, abnormal chromatin, nucleoli, etc)
 WD can be subtle



Other Features



Pitfall: WD Adenocarcinoma

1st clue: Too many (glandular) cells!
 Abnormal architecture

Too loose Too crowded

order chaos

Benign Malignant

Abnormal nuclei: Big & irregular

Increased mitoses

no doubt about it

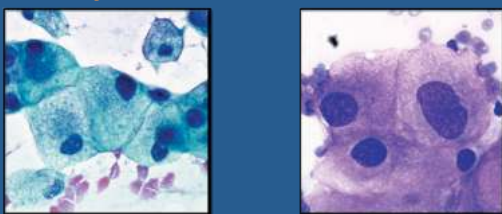
+ some single cells

Well-Differentiated Adenocarcinoma

1st clue: Too many [ductal] cells
 Abnormal architecture (low power)
 Too crowded ("tight wads")
 Too loose ("drunken honeycombs")
 Nuclear enlargement (≥ 2 x normal)
 Irregular nuclear membranes
 Increased mitoses
 Martian Popping Things
 (ie, rare, obviously malignant cells)
 + at least a few single atypical cells

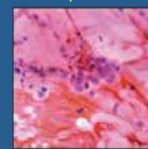
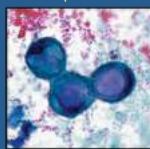
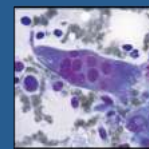
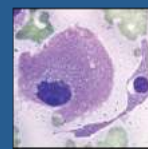
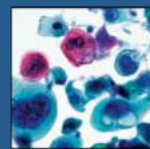


Foamy Cell Carcinoma



Low grade adenocarcinoma
 ■ Drunken honeycombs
 ■ Irregular nuclear membranes
 Abundant foamy cytoplasm
 => Low N/C ratios!

Variants of Pancreatic Carcinoma



Acinar Cell Carcinoma

Rare, mostly older, M>F
 ±Hypersecretory syndrome
 = Fat necrosis, polyarthralgia, eosinophilia
 Acinar cells *only*
 Clue: Crowded, atypia
 DDx: Benign panc; PENs

Oncocytic Neoplasms

Ductal, acinar, or neuroendocrine
 Special studies, eg, EM, immuno
 to determine nature of tumor

Clear Cell Neoplasms

Ductal CA or Neuroendocrine neoplasms
 DDx: Metastatic clear cell tumors,
 particularly renal cell carcinoma

Pancreatoblastoma

Very rare; bimodal: ~4 yrs + adults
 ↑ serum α -fetoprotein
 Dx: Small blue cell tumor, with:

- Epithelial cells
 - Exocrine (acinar) cells
 - Endocrine (islet) cells
- Mesenchymal (spindle) cells

Pearl: Squamous pearls!

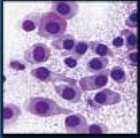
Pancreatic Neuroendocrine Neoplasms

Unusual (~5%); most low-grade
 Mid age, F=M, body/tail > head
 Rare hormone syndromes aid dx
 Dx: ~ Carcinoid tumor
 Monotonous tumor cells
 Plasmacytoid ± endocrine atypia
 "Salt-&-pepper" chromatin
 Fine metachromatic NSGs
 DDx: Acinar CA–Zymogen granules
 Adenocarcinoma–Mucin

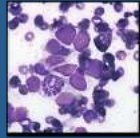
Pancreatic Neuroendocrine Neoplasms

Pancreatic Neuroendocrine:	Equivalent
Tumor grade 1	Typical carcinoid
Tumor grade 2	Atypical carcinoid
Carcinoma (grade 3)	Small cell NE carcinoma Large cell NE carcinoma

Neuroendocrine Spectrum

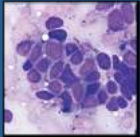


PN Tumor, Grade 1

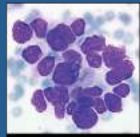


PN Tumor, Grade 2

Mitosis
Necrosis

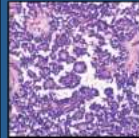


PN CA: Small cell

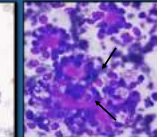
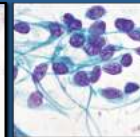
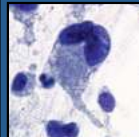
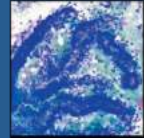


PN CA: Large cell

Solid Pseudopapillary Neoplasm



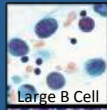
Low-grade malignancy
Mostly young F
Dx: Pseudopapillae
Bland nuclei w/ grooves
Cytoplasmic processes
 α_1 -AT+, β -catenin+, CK \pm
Pearl: hyaline globules!



Other Rare Pancreatic Tumors

Lymphoma

Forms mass, can mimic pancreatic carcinoma
Most = large B cell type



Large B Cell

Mesenchymal Tumors

Benign, eg, angiomas, lipomas, etc
Malignant, eg, leiomyosarcoma, "MFH," etc



Synovial sarc

Metastases

Kidney, lung, breast, GI Tract, etc
Lymphoma, sarcoma, melanoma



Renal Cell CA

Thank you

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