Citopatologia Ecoendoscopica

XX Congreso de la Sociedad Espanola de Citologia

ZARAGOZA

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PANCREAS
Endoscopic Ultrasound-Guided Fine-Needle Aspiration Biopsy

EUS-FNA Approach

Start with 25 g. needle.

Fine Needle Aspiration

- EUS is probably the "easiest" way to sample the pancreas
- Allows for identification and characterization of very small lesions

FNA of Ductal Adenocarcinoma

Author	# Cases	Sensitivity	Specificity	Suspicious
Mitchell	79	79	100	7.6
Alpern	63	60	93	8
Fekete	74	50	100	5.4
Pinto	40	81	100	N/A
Mitchel1	73	68	100	5.4
Kocjan	62	86	100	9.6
Al-Kaisi	134	87	100	7
Robins	90	70	100	12
David	364	98	100	6
Lin	291	98	100	5
	1271			

Adapted from Cancer Cytopathol 2003; 99: 44-50.

False Negatives* at UVa

Sensitivities (Overall =74%)

Brush (46%)
FNA (85%)

Head (79%)
Body and Tail (54%)

<1 cm (67%)
1-3 cm (82%)
>3 cm (65%)

Pancreatic Ductal Adenocarcinoma (79%)
Pancreatic Endocrine Tumor (75%)
IPMN (70%)
Acinar Cell Carcinoma (100%)
Mucinous Cystic Neoplasm (42%)

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* False negatives were considered those cases in which sampled resectable neoplasms yielded cytologic diagnoses which did not suggest resection.

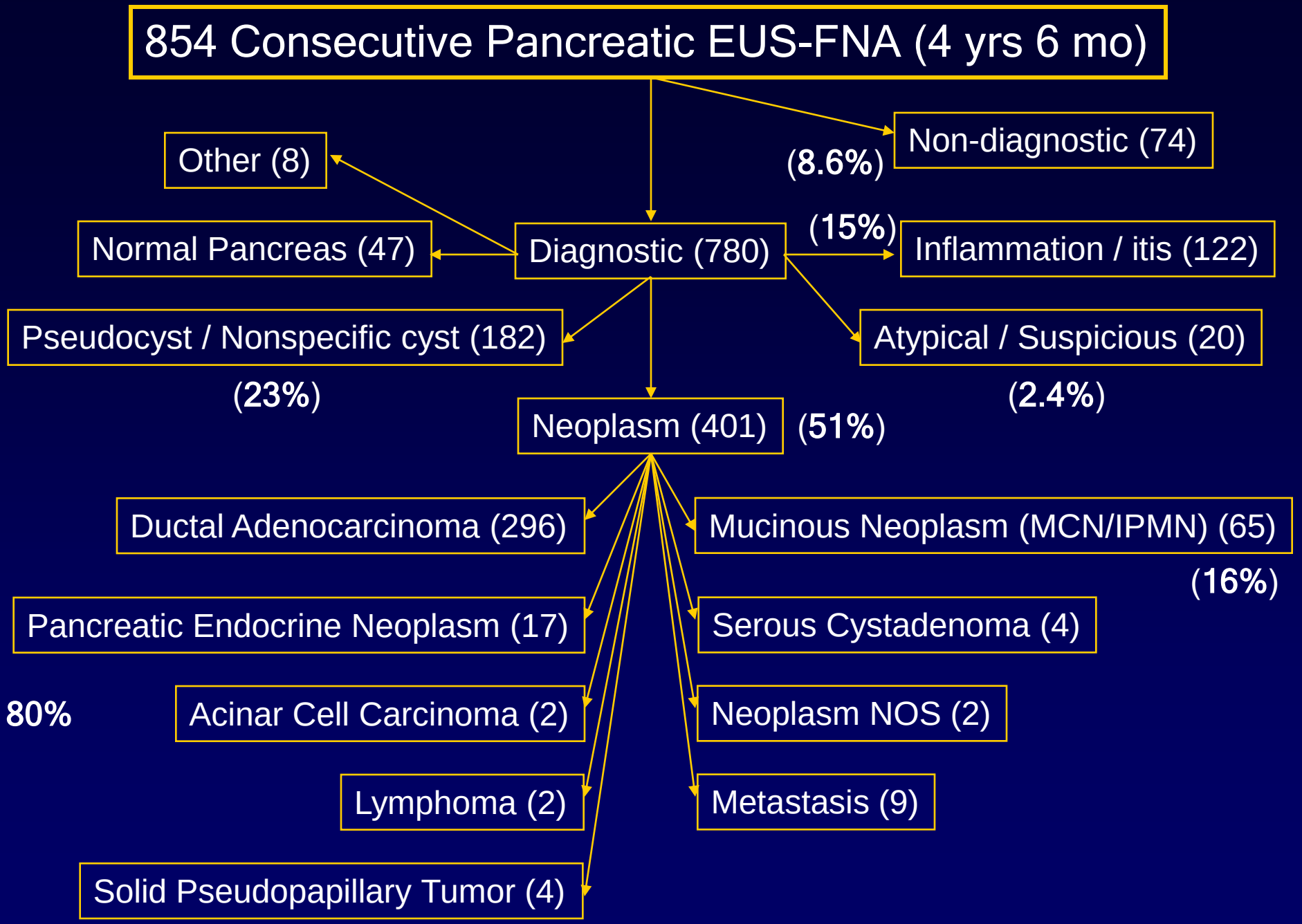
EUS-FNA of the Pancreas

- Complications are rare
- Acute pancreatitis: 0.29-0.93%
- Others include perforation, peritonitis, aspiration pneumonia, FNA seeding, etc (All are extremely rare.)

Gastrointest Endosc 2004;60: 385-9 and 2001; 53: 470-4.

WHO Classification of Primary Tumors of the Exocrine and Endocrine Pancreas (Abridged)

Acinar Cell Carcinoma
Ductal Adenocarcinoma
Intraductal Papillary Mucinous Neoplasm
Mucinous Cystic Neoplasm
Pancreatic Endocrine Tumor
Pancreatoblastoma
Serous Cystadenoma
Solid Pseudopapillary Neoplasm


854 Consecutive Pancreatic EUS-FNA (4 yrs 6 mo)
Non-diagnostic (74)
(8.6%)
Other (8)
Normal Pancreas (47)
Diagnostic (780)
(15%)
Inflammation / itis (122)
Pseudocyst / Nonspecific cyst (182)
(23%)
Atypical / Suspicious (20)
(2.4%)
Neoplasm (401)
(51%)
Ductal Adenocarcinoma (296)
Mucinous Neoplasm (MCN/IPMN) (65)
(16%)
Pancreatic Endocrine Neoplasm (17)
Serous Cystadenoma (4)
80%
Acinar Cell Carcinoma (2)
Neoplasm NOS (2)
Lymphoma (2)
Metastasis (9)
Solid Pseudopapillary Tumor (4)

Pancreatic Ductal Adenocarcinoma

- 80% of cases manifest between 60-80 y.o.
- M:F = 1.6:1
- Blacks with higher rates than whites
- Cigarette smoking (RR=2-3), chronic pancreatitis, hx of gastric surgery, diabetes, radiation exposure, solvent exposure all possible etiologic factors

Pancreatic Ductal Adenocarcinoma

- 60-70% of tumors found in the head
- Rarely tumors arise in uncinate process of heterotopic pancreas
- Clinical features include abdominal pain, weight loss, jaundice, pruritus, diabetes, thrombosis, liver metastases symptoms

Pancreatic Ductal Adenocarcinoma

- Mean survival of 3 months (10-20 months with resection)
- 5-year survival rate of 3-4%
- Only chance of cure is removal (better for small tumors confined to the pancreas)
- Residual tumor at site determining factor, in general

Genetics

Oncogenes	
K-ras:	>90%
MYB, AKT2, AIB1	10-20%
HER-2/neu	70%

Mismatch Repair	
MSH2, MLH1, others	<5%

Tumor Suppressor Genes	
p16:	95%
p53:	50-70%
DPC4:	55%
BRCA2:	7%
MKK4:	4%
LKB1/STK11	5%
AL5/TGF BR2	4%

Tumours of the Digestive System.
IARP Press 2000, p. 228.

Cytology of Pancreatic Ductal Adenocarcinoma

Cytologic Feature	Cohen	Lin	Robins	Ylagan
Anisonucleosis	98%	97%	100%	100%
Irregular nuclear contours	94%	97%	100%	100%
Enlarged nucleoli	92%	99%	100%	100%
Loss of "honeycomb pattern" / nuclear overlap	67%	92%	100%	100%
Cellular discohesion	-	-	93%	-
Chromatin clearing and clumping	55%	14%	98%	77%
Prominent nucleoli	47%	14%	-	77%
Background necrosis	57%	7%	80%	40%
Mitotic figures	-	22%	-	-

Adv Anat Pathol 2005; 12: 62-73.

FNA of Ductal Adenocarcinoma

- **90 Cases with histologic follow-up reviewed**

Rank	Variable	-2 Log likelihood ratio
1	Nuclear crowding/overlap	7.10
2	Chromatin clearing/clumping	7.20
3	Irregular nuclear contours	7.20
4	Single intact cells	11.78
5	Increased nuclear size	14.23
6	Increased cellularity	24.43
7	Necrosis	30.69
8	Mitoses	34.62
9	Nuclear size variability	38.67
10	Micronucleoli	39.89
11	Dyshesive cells	40.49
12	Mucine production	42.17
13	Macronucleoli	46.19
14	Nuclear/cytoplasmic ratio	48.14
15	Hyperchomasia	51.92
16	Multinucleate cells	52.52
17	Fibrosis	53.35
18	Intranuclear inclusions	58.19
19	Columnar palisading	58.88

ACTA Cytol 1995; 39: 1-10.

FNA of Ductal Adenocarcinoma

- 2 or more major criteria or 1 major with 3 minor criteria improved sensitivity and specificity to 100%

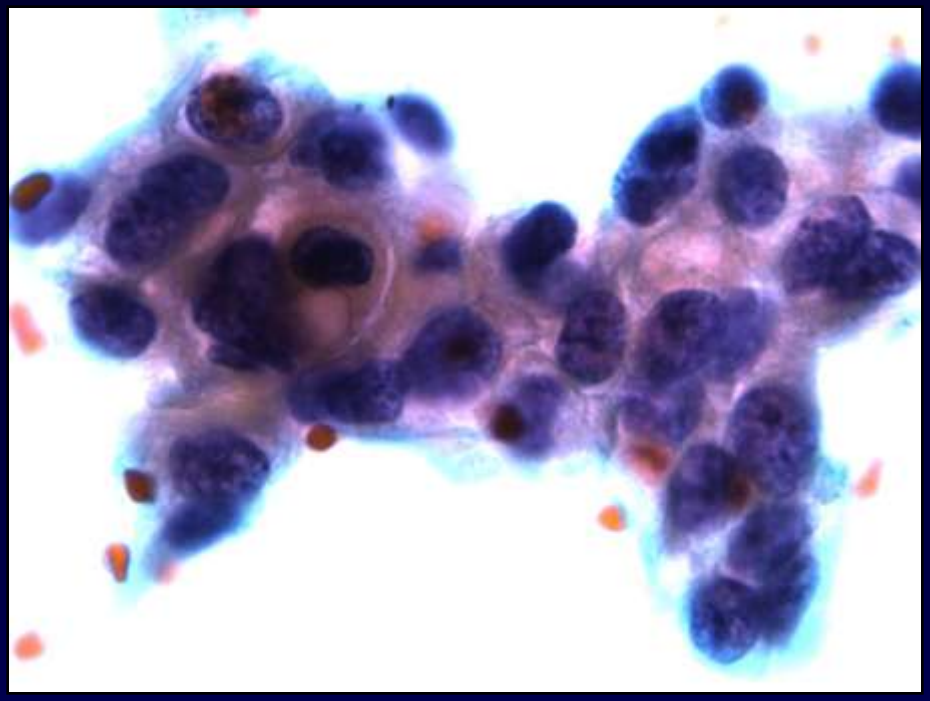
Major Criteria

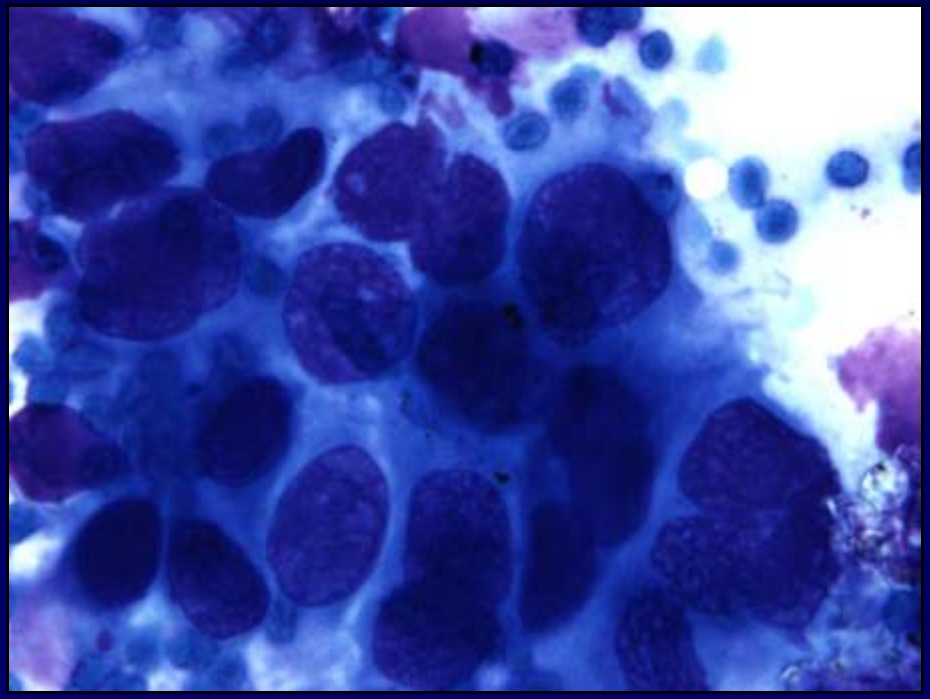
1. Nuclear overlap and crowding
2. Nuclear contour irregularity
3. Chromatin clearing/clumping

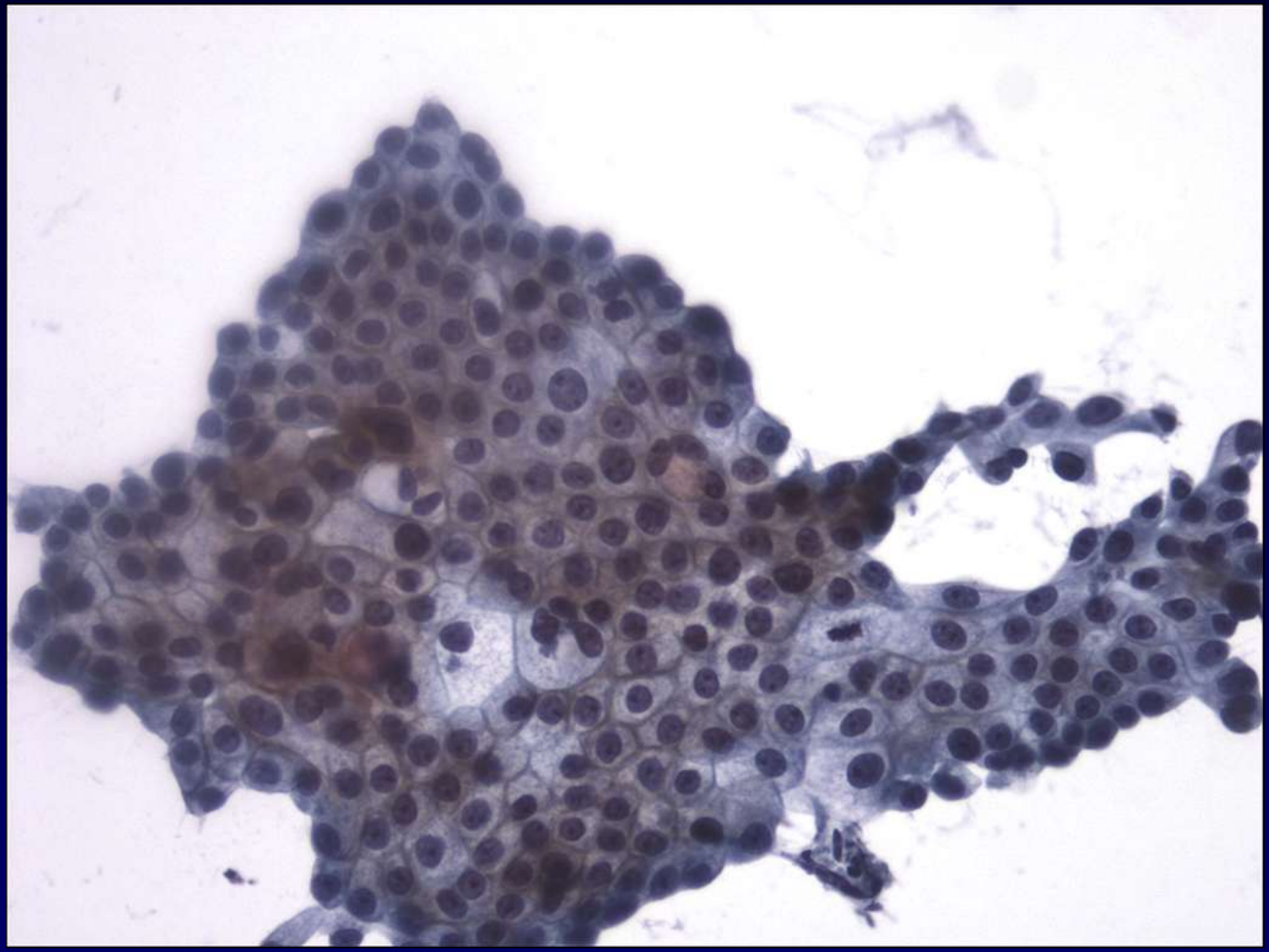
Minor Criteria

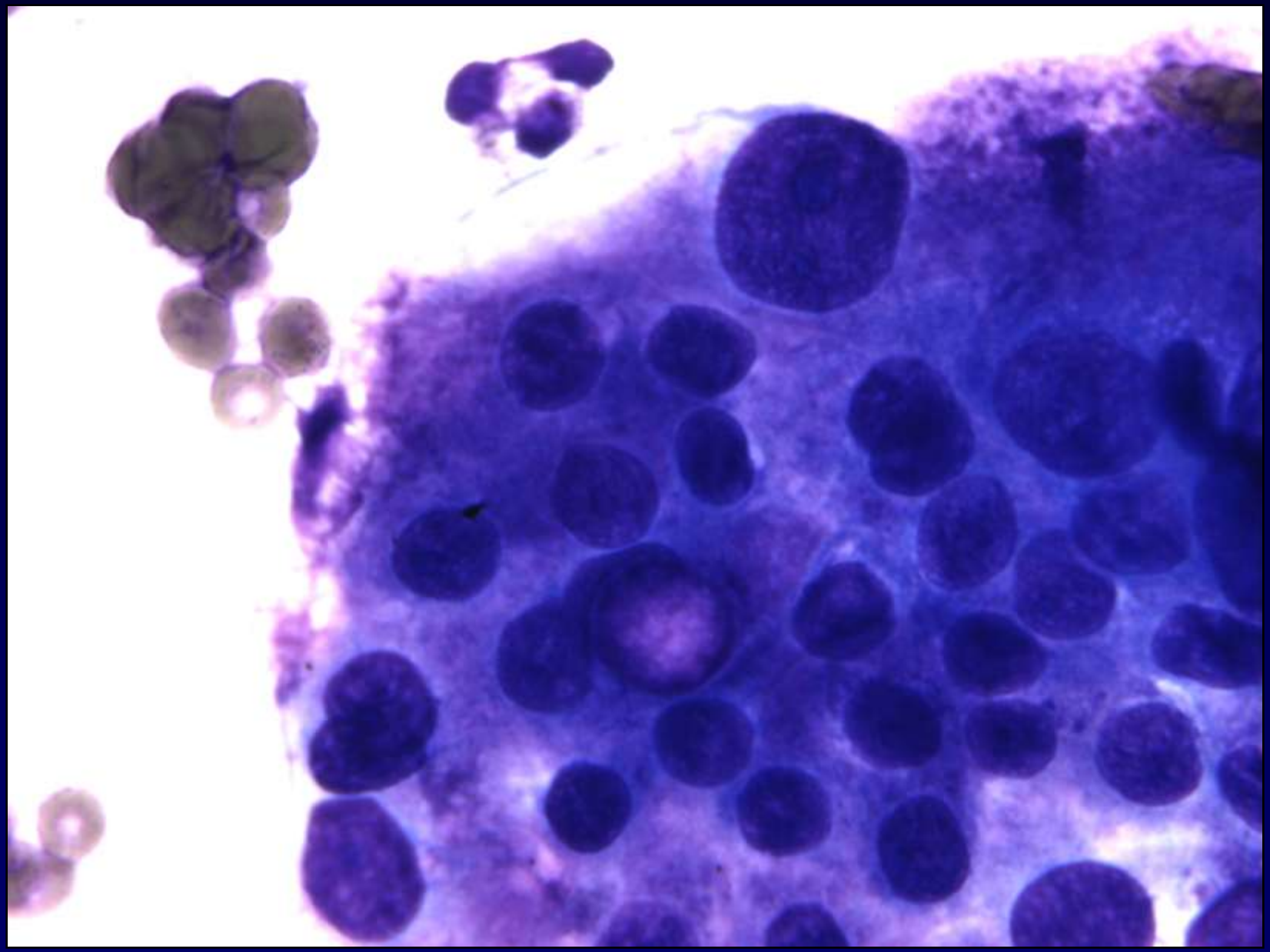
1. Single Epithelial Cells
2. Necrosis
3. Mitoses
4. Nuclear enlargement

ACTA Cytol 1995; 39: 1-10.









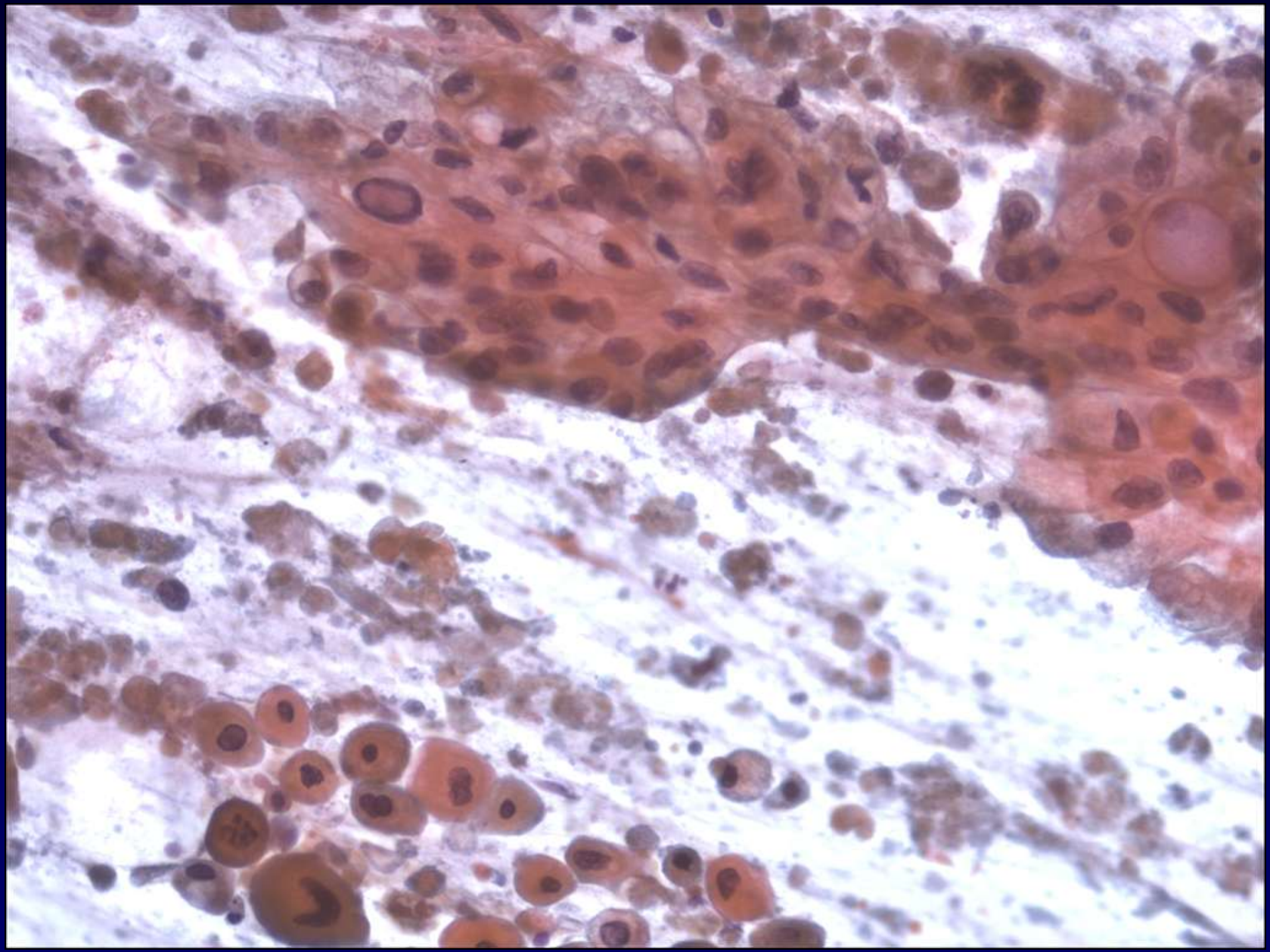
Pancreatic Ductal Adenocarcinoma Variants and Patterns

- Adenosquamous
- Mucinous and Colloid
- "Foamy gland"
- Anaplastic
- Mostly it is just important to be aware of the variants, not to prospectively diagnose them!

Adenosquamous / Squamous Cell

- > 30% of the tumor is squamous (defined histologically)
- Recent review of cytology of 15 cases showed smears with groups of cells with . . . squamous differentiation
- Know that pancreatic adenocarcinoma often has squamous differentiation and that squamous change can also happen in benign disease!!

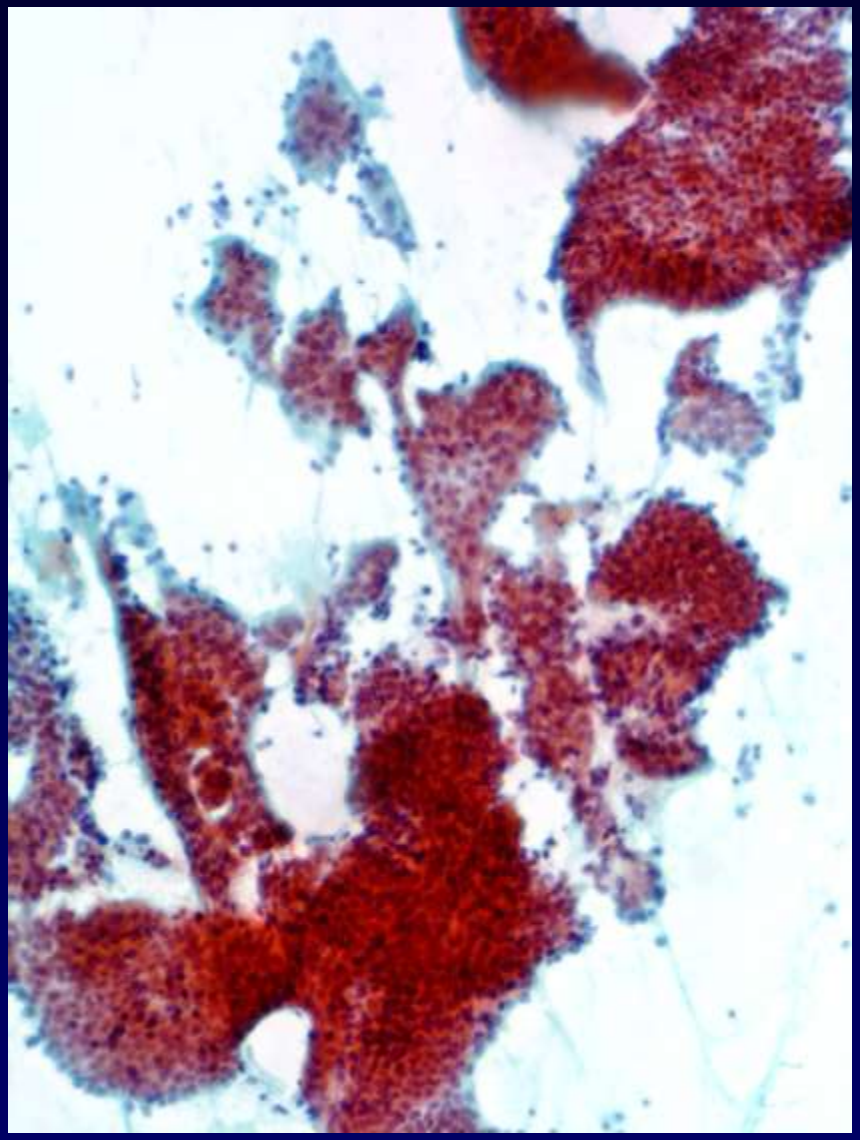
Cancer Cytopathol 2003;99:372-8

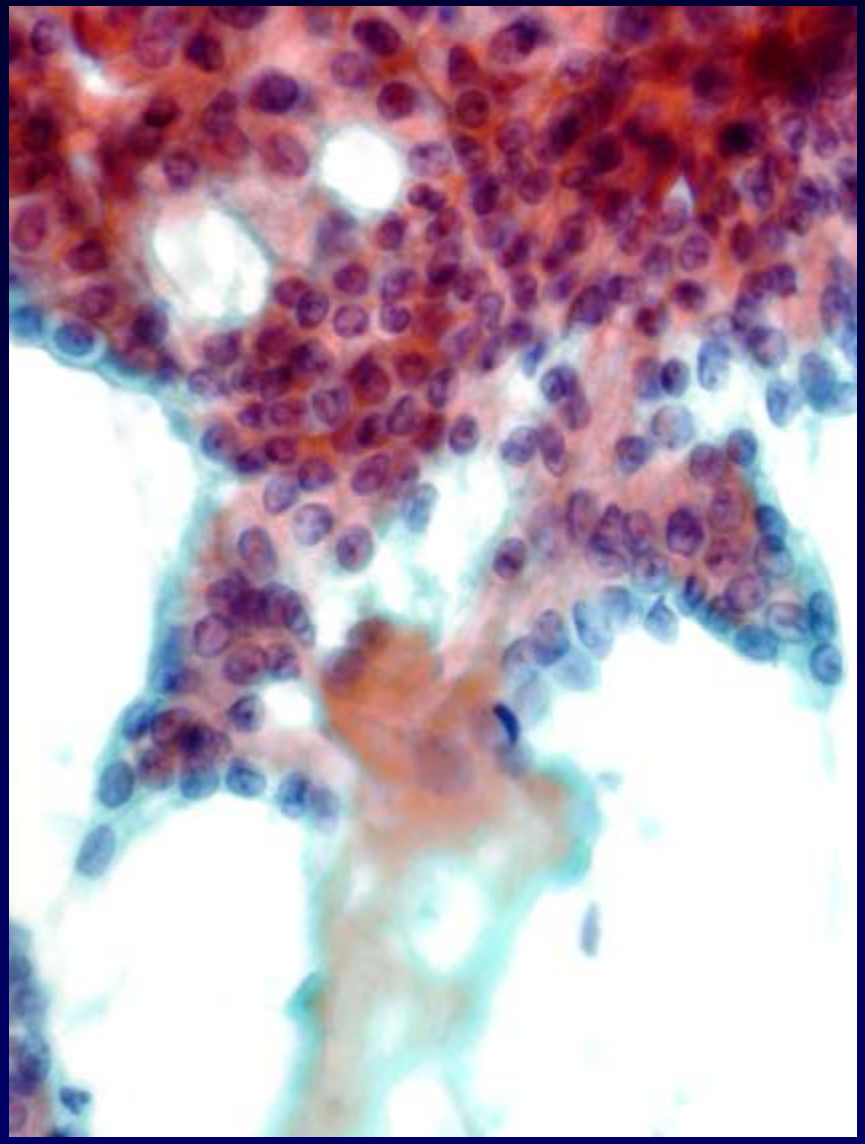


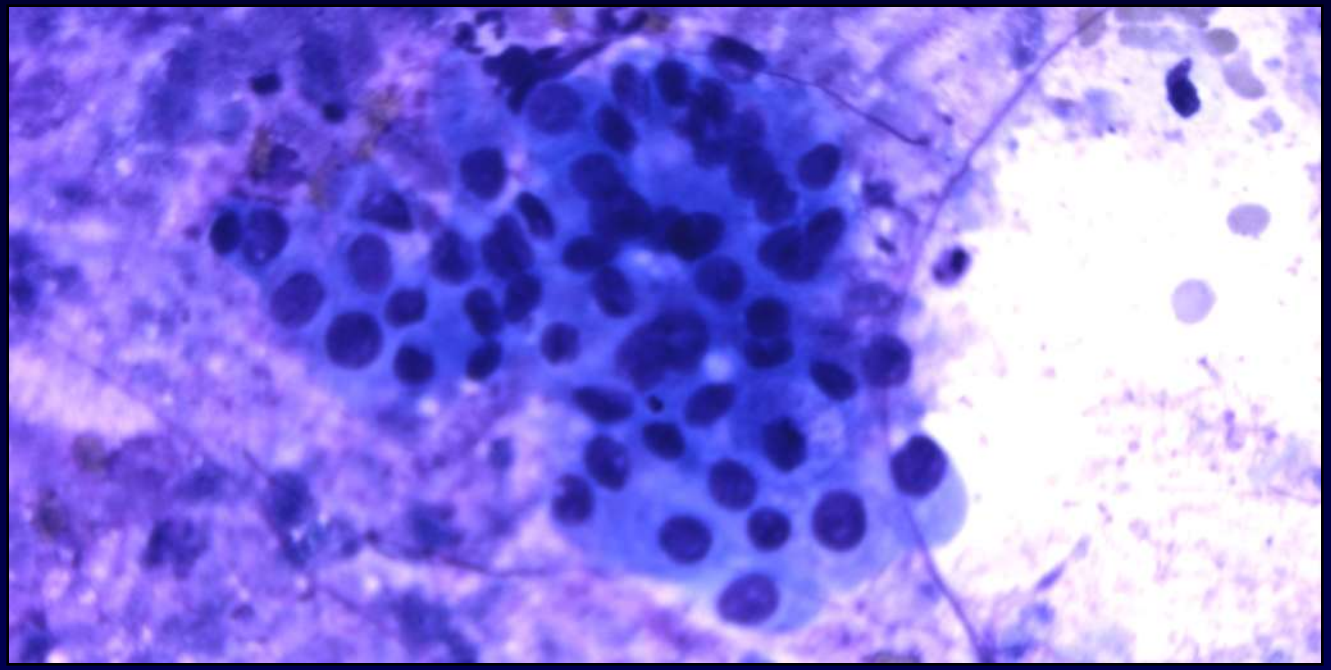
Mucinous Ductal Adenocarcinoma

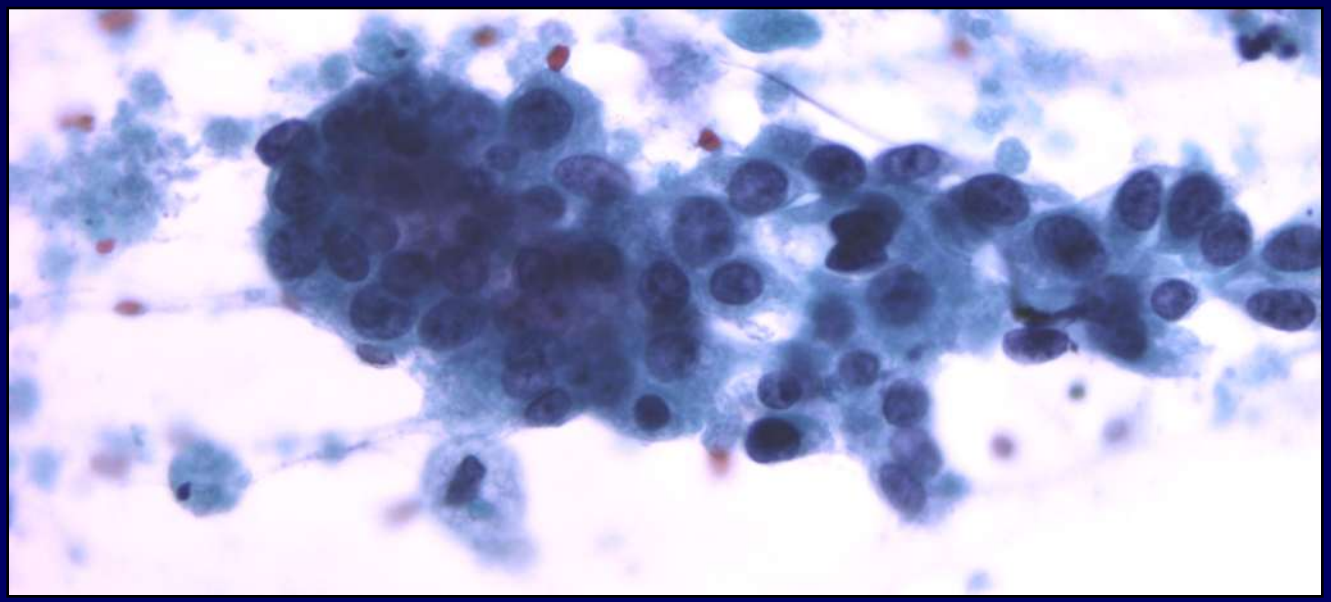
- Better prognosis than typical ductal adenocarcinoma (if colloid)
- ? Colloid vs. just mucinous
- 38 of 39 colloid carcinomas arose with IPMN or ampullary TVA
- Mucin expression of colloid carcinoma more like IPMN than typical ductal adenocarcinoma

Am J Surg Pathol 2002;26:56-63





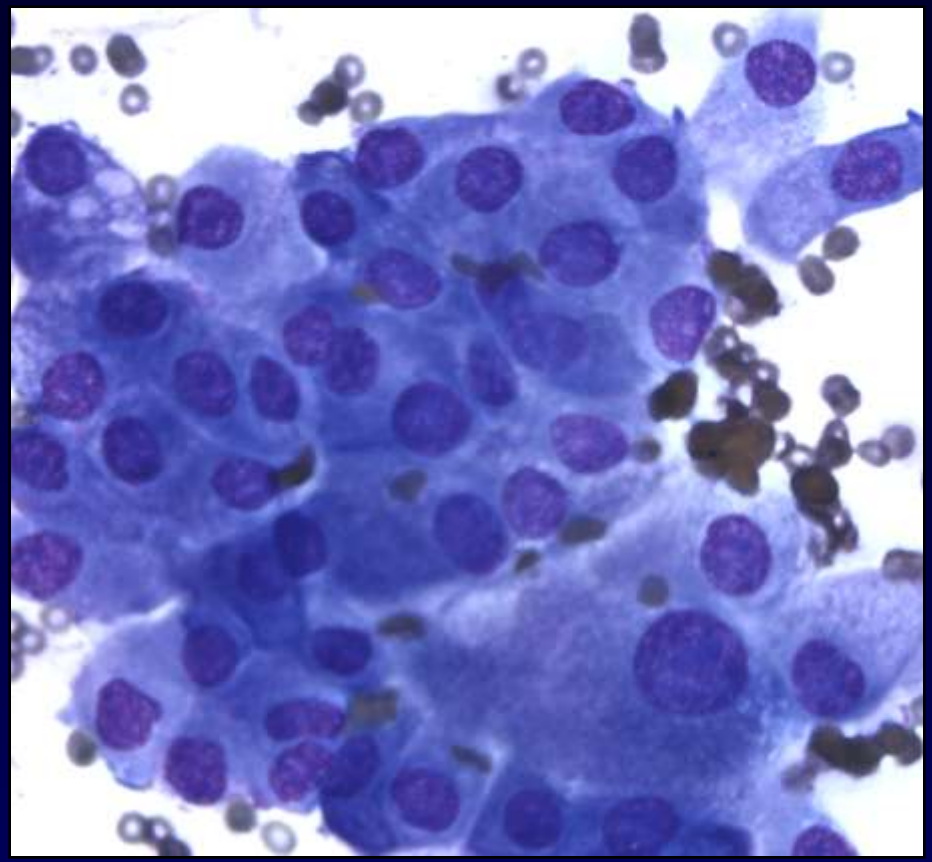


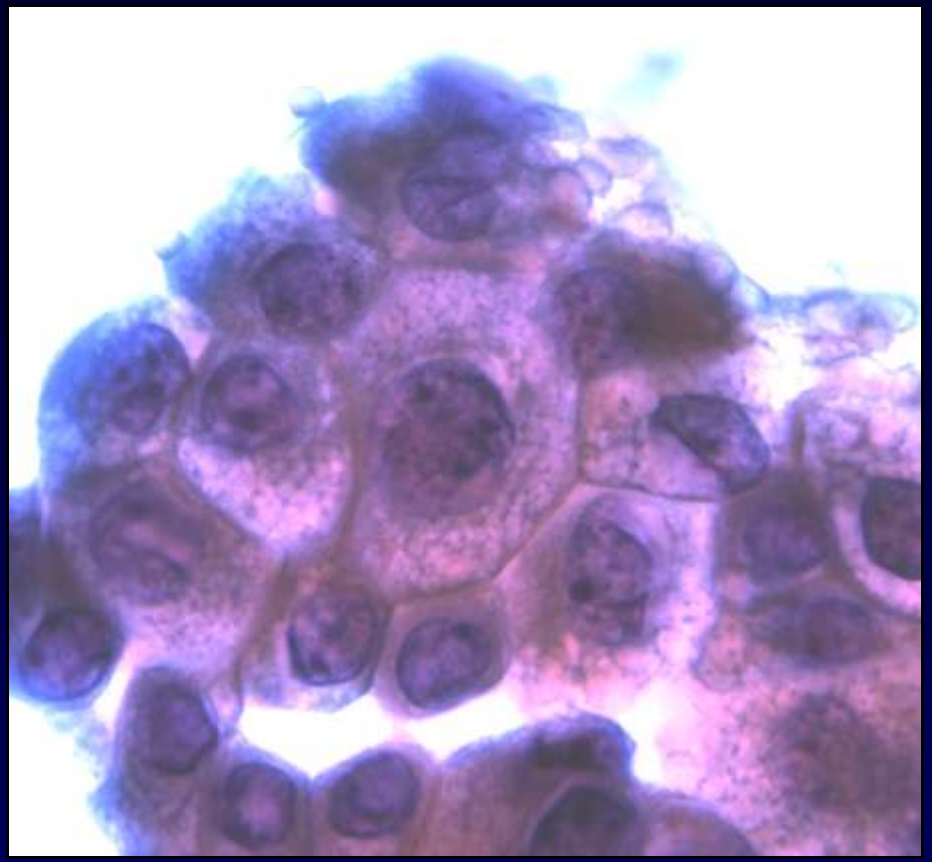


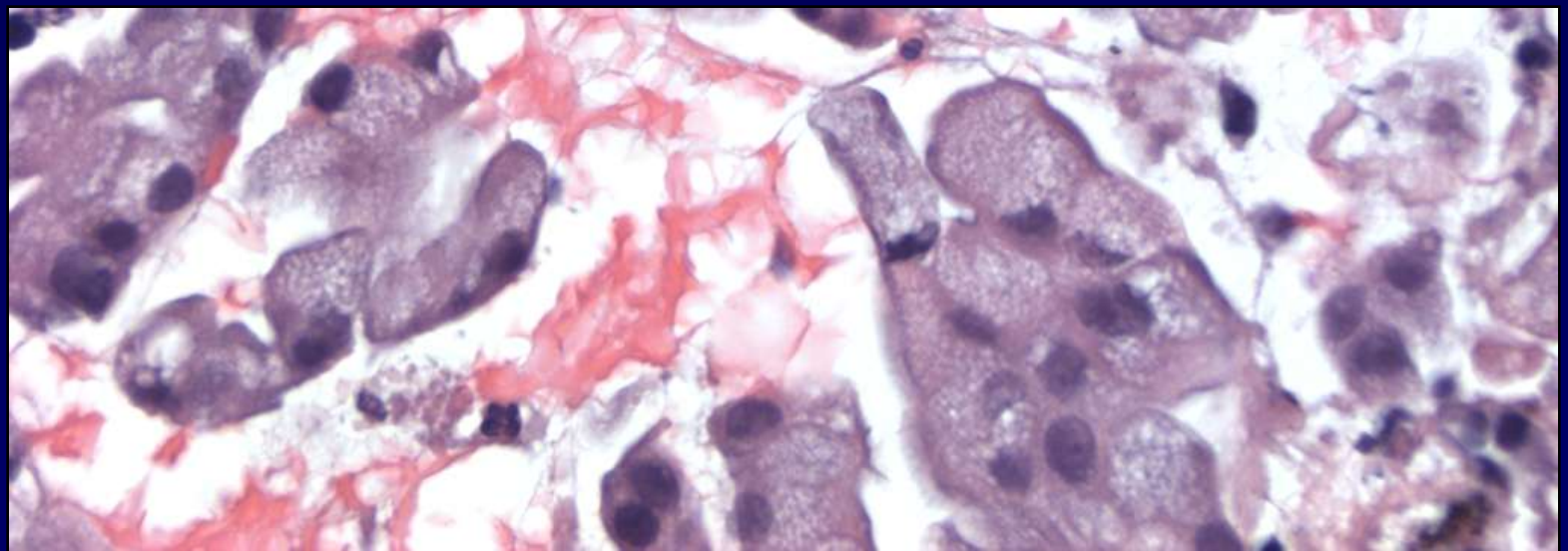
Foamy Gland Pattern

- Deceptively benign appearing with white, foamy cytoplasm, basally located, hyperchromatic, compressed nuclei, irregular nuclear contours, “brush-border-like” zone
- Appears to be clinically similar to typical pancreatic adenocarcinoma
- Cytology will show same features as typical adenocarcinoma

Am J Surg Pathol 2000; 24: 493-504. Am J Clin Pathol 2004; 121: 893-7.

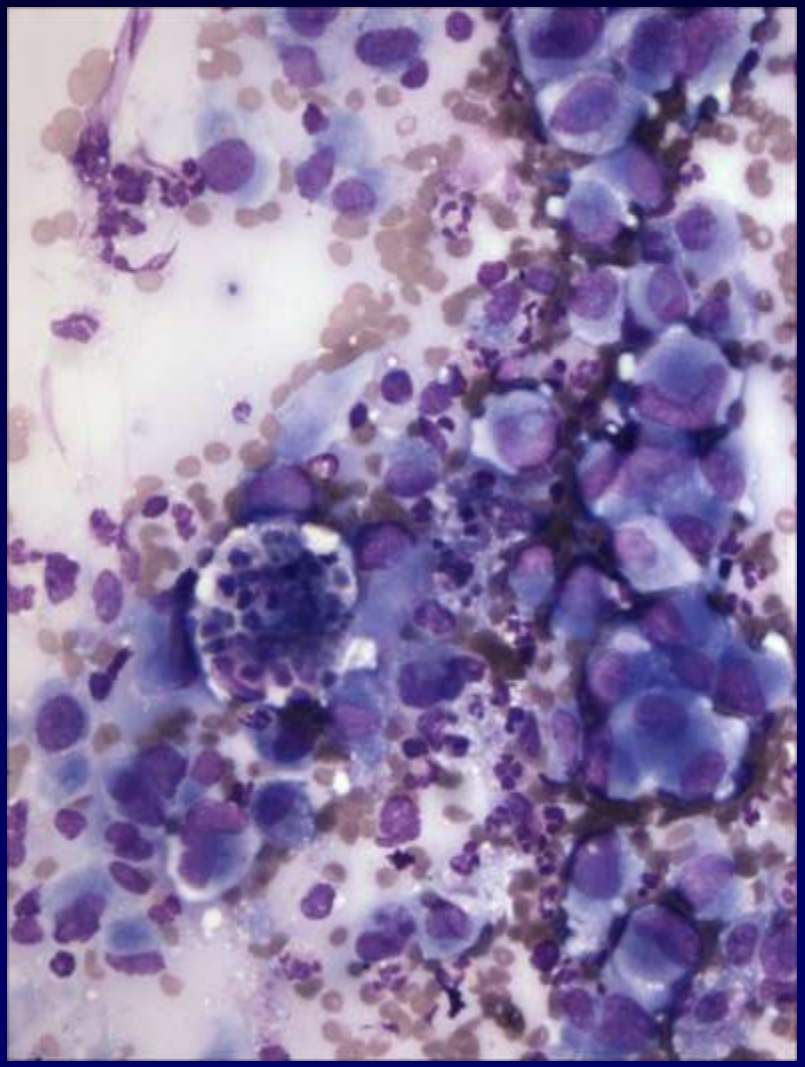


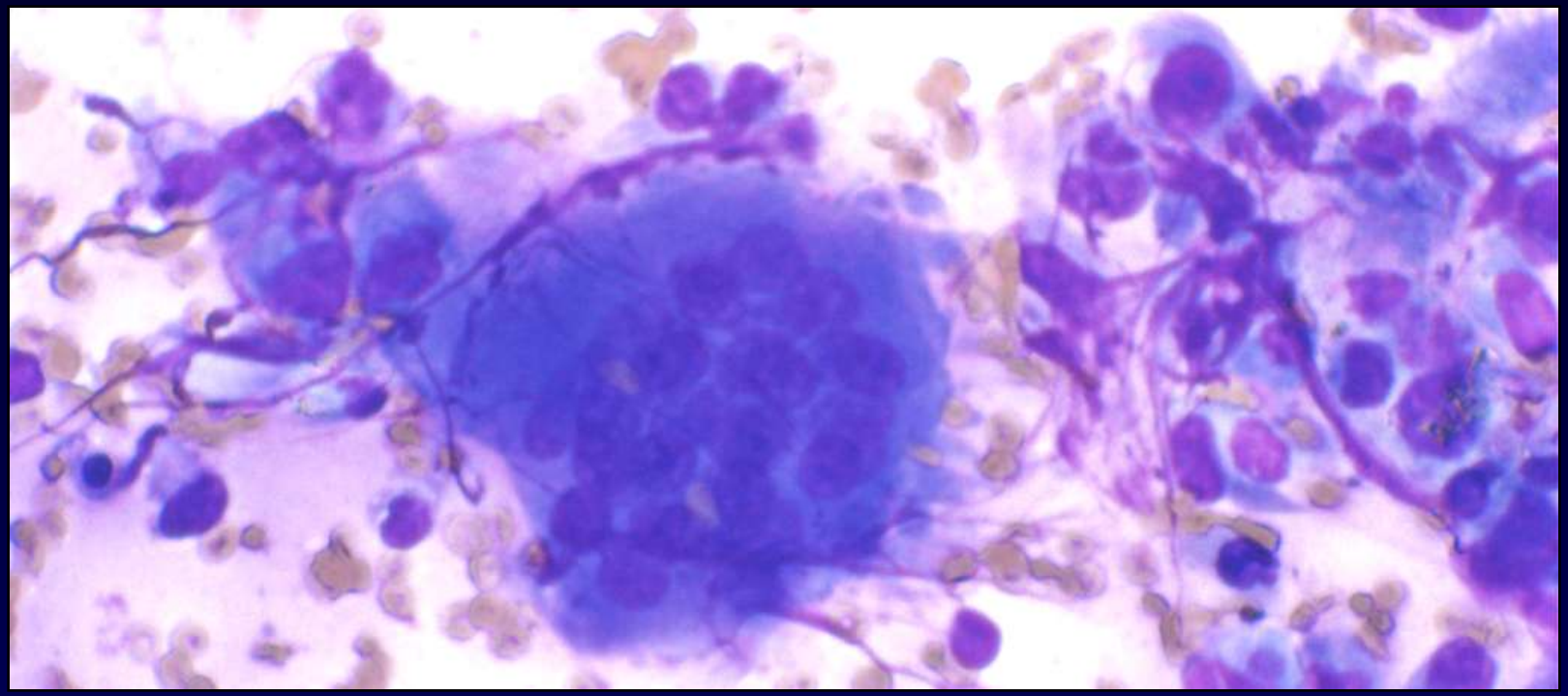


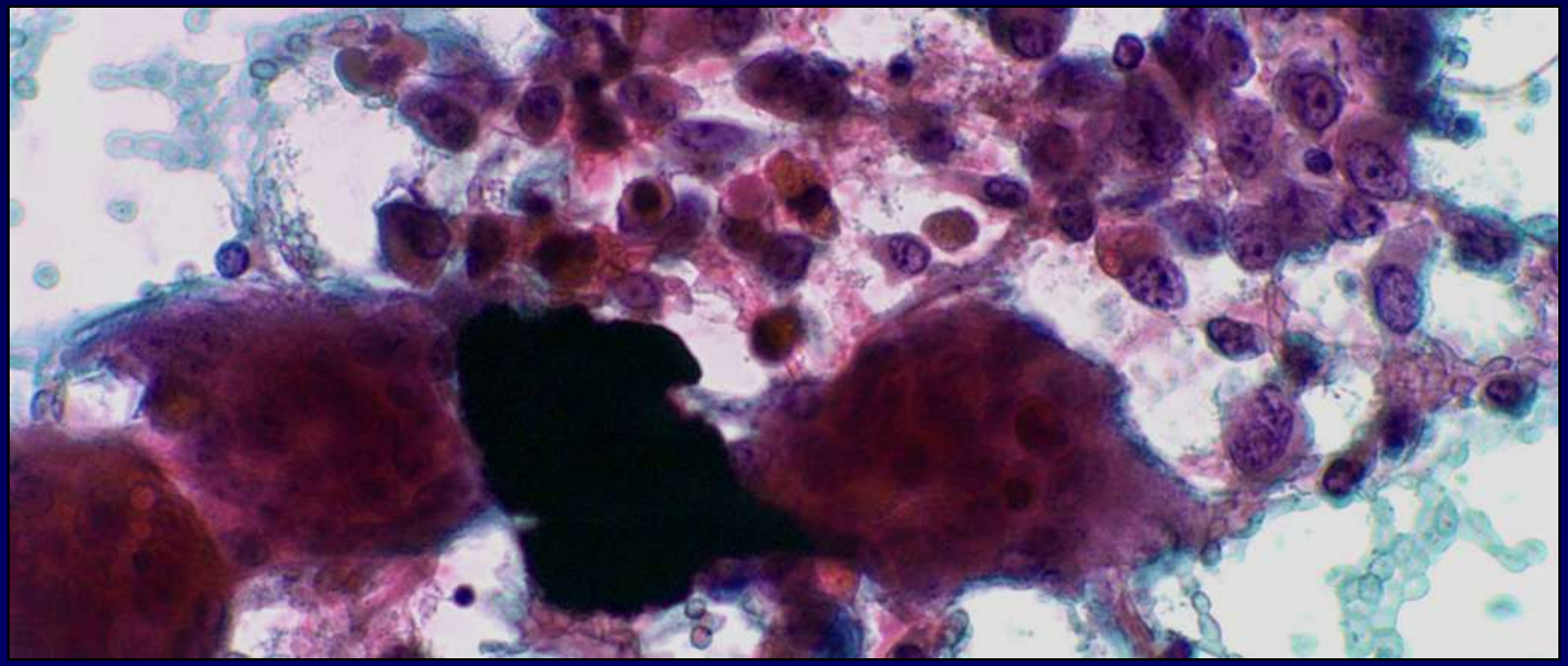


Anaplastic Carcinoma

- 2-7% of pancreatic carcinoma
- Anaplastic - spindled
- Multinucleated cells with atypical nuclei
- Neutrophils
- ? Osteoclast-like giant cells







Solid Primary Pancreatic Neoplasms Other Than Ductal Adenocarcinoma

- Basically, pancreatic endocrine tumors (islet cell tumors), acinar cell carcinomas, and solid pseudo-papillary tumors
- Cytology is very helpful
- Cell block immunohistochemistry is also very helpful!!

Pancreatic Endocrine Tumors

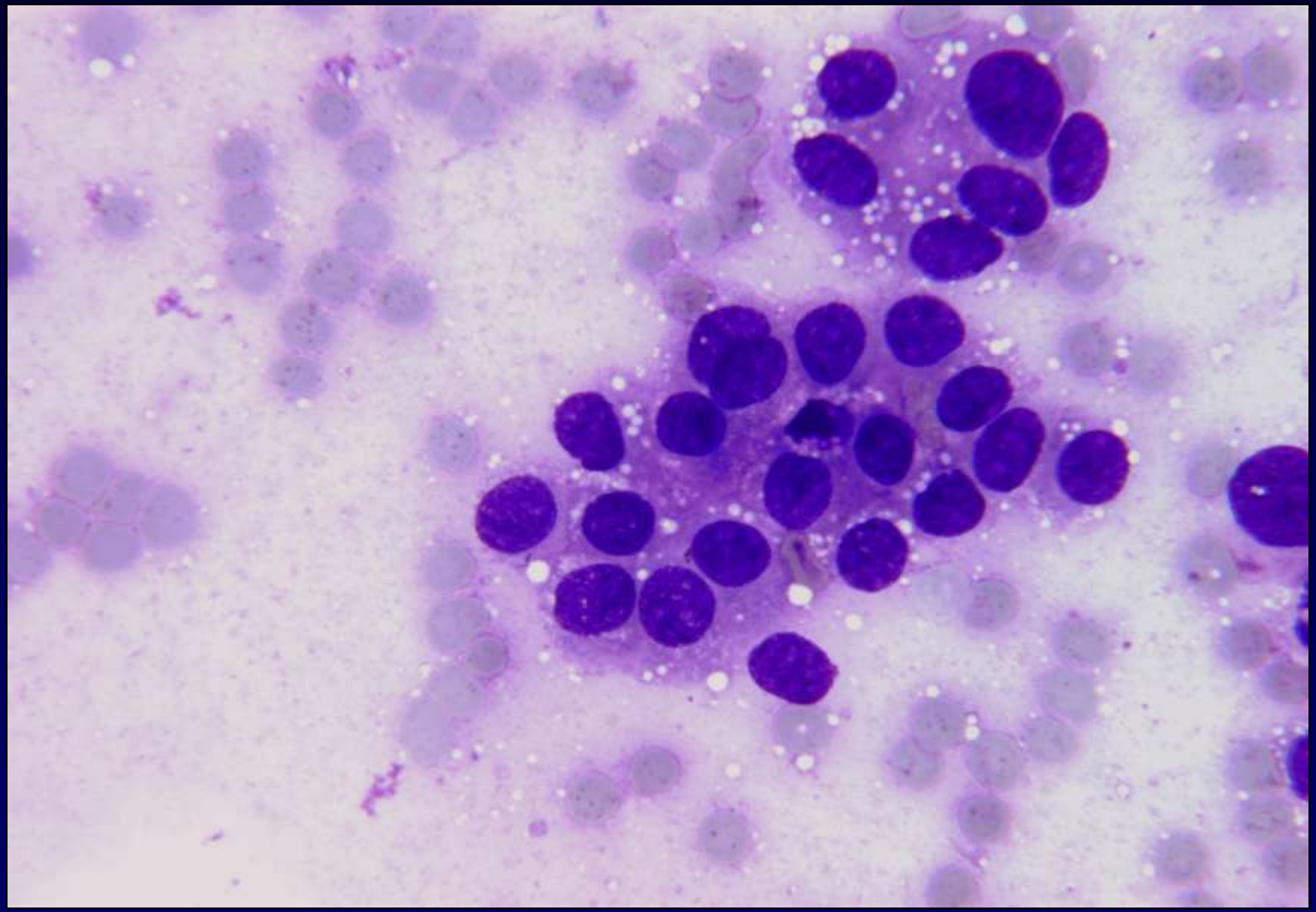
- Any age (Mean 58)
- 1-2% of pancreatic neoplasms.
- Functioning- 65% (NOT!)
- Mostly grade 1-2 (well to moderately differentiated)
- Size, grade, hormone production, vascular and perineural invasion, mib-1 . . .

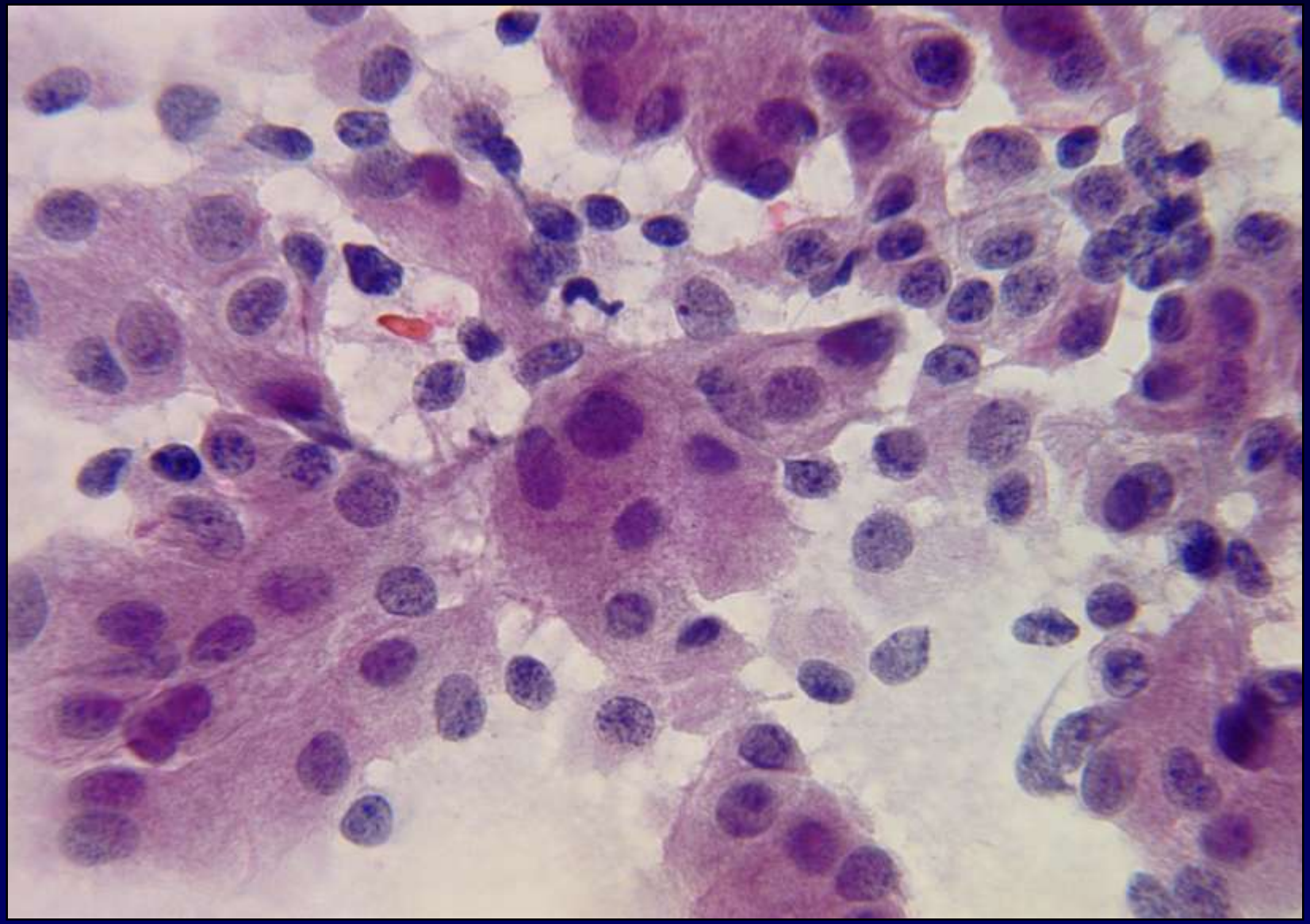
Cytology of PET

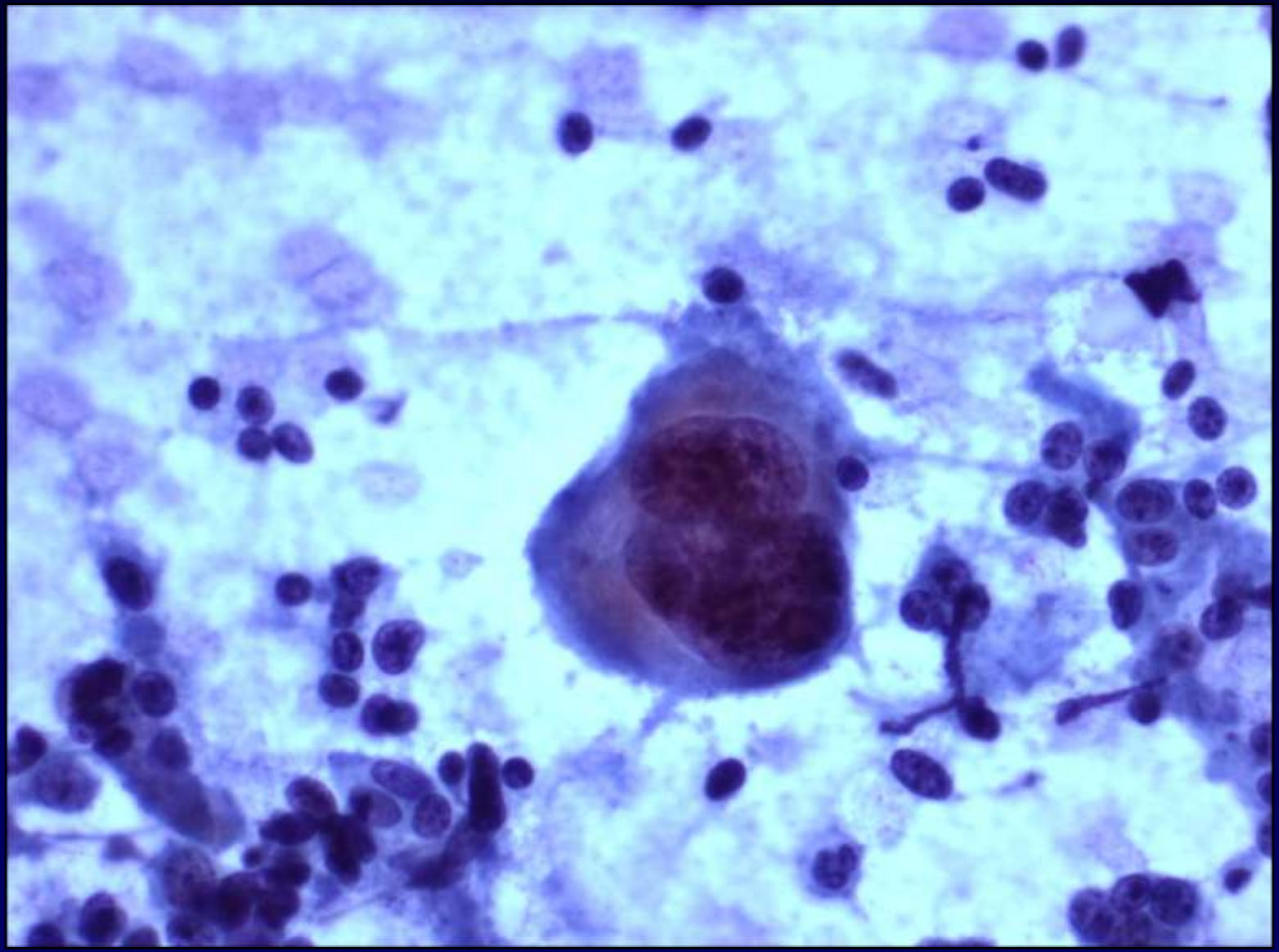
13 cases (11 Mets)

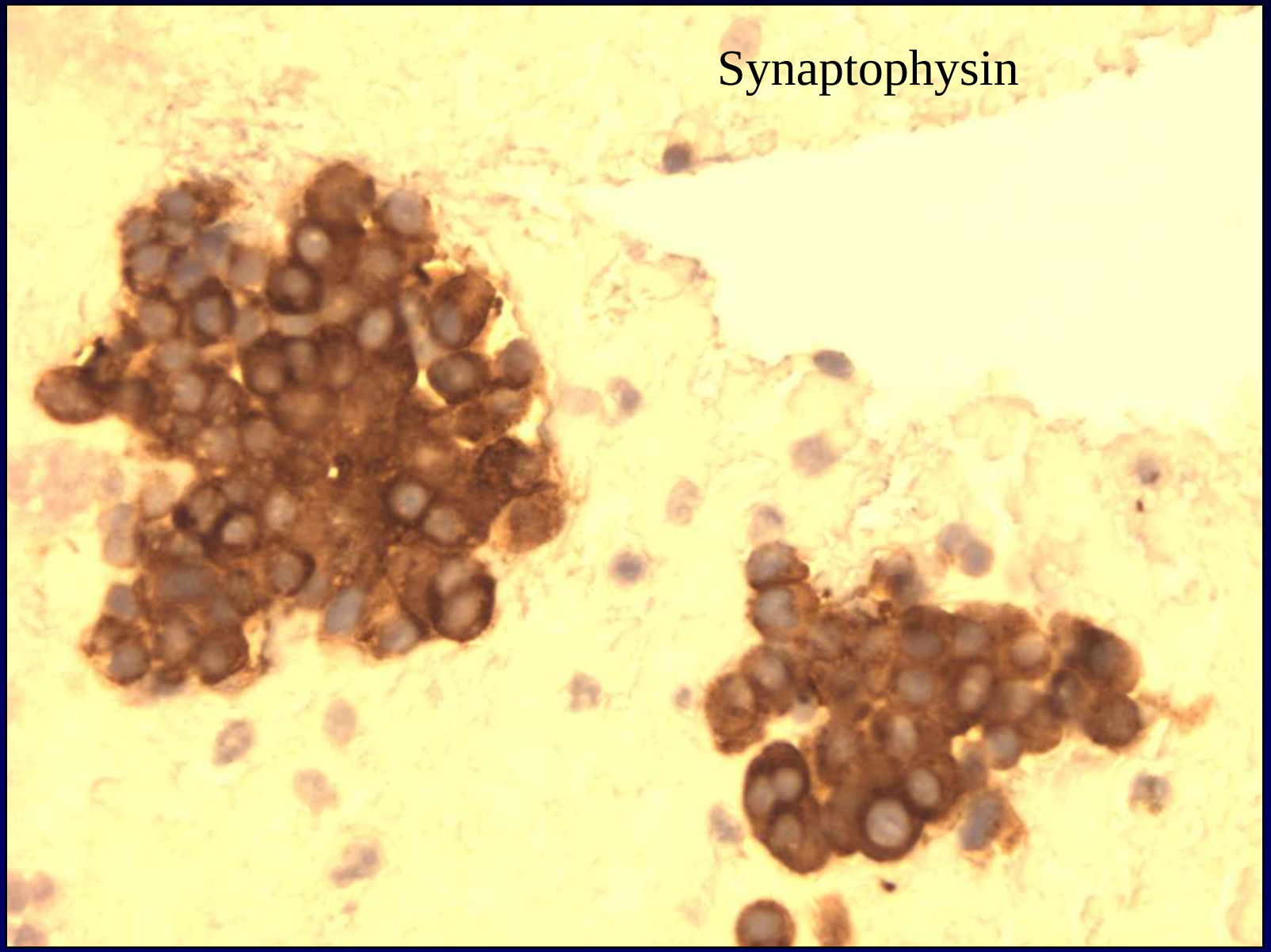
Architecture	Single cells > Loose groups (8)
Arrangement	Multilayered (11)
Nuclei	
Size	Medium (11)
Pleomorphism	Minimal (9)
Location	Eccentric (11)
Shape	Round to Oval (13)
Chromatin	Finely Granular (11)
Nucleoli	Absent (5), Small (4)
Binucleation	Present (7)
Cytoplasm	
Volume	Moderate (11)
Cell Borders	Ill-defined (13)
Fine Granularity	Present (13)
Vacuoles	Present (4)

Diagn Cytopathol 1996; 15: 37-45.








Synaptophysin

Solid-Pseudopapillary Tumor

- Name reflects histology, cell of origin unknown
- Rare
- Generally occurs in young women in the tail of the pancreas
- Mostly benign
- Often solid and cystic with calcifications

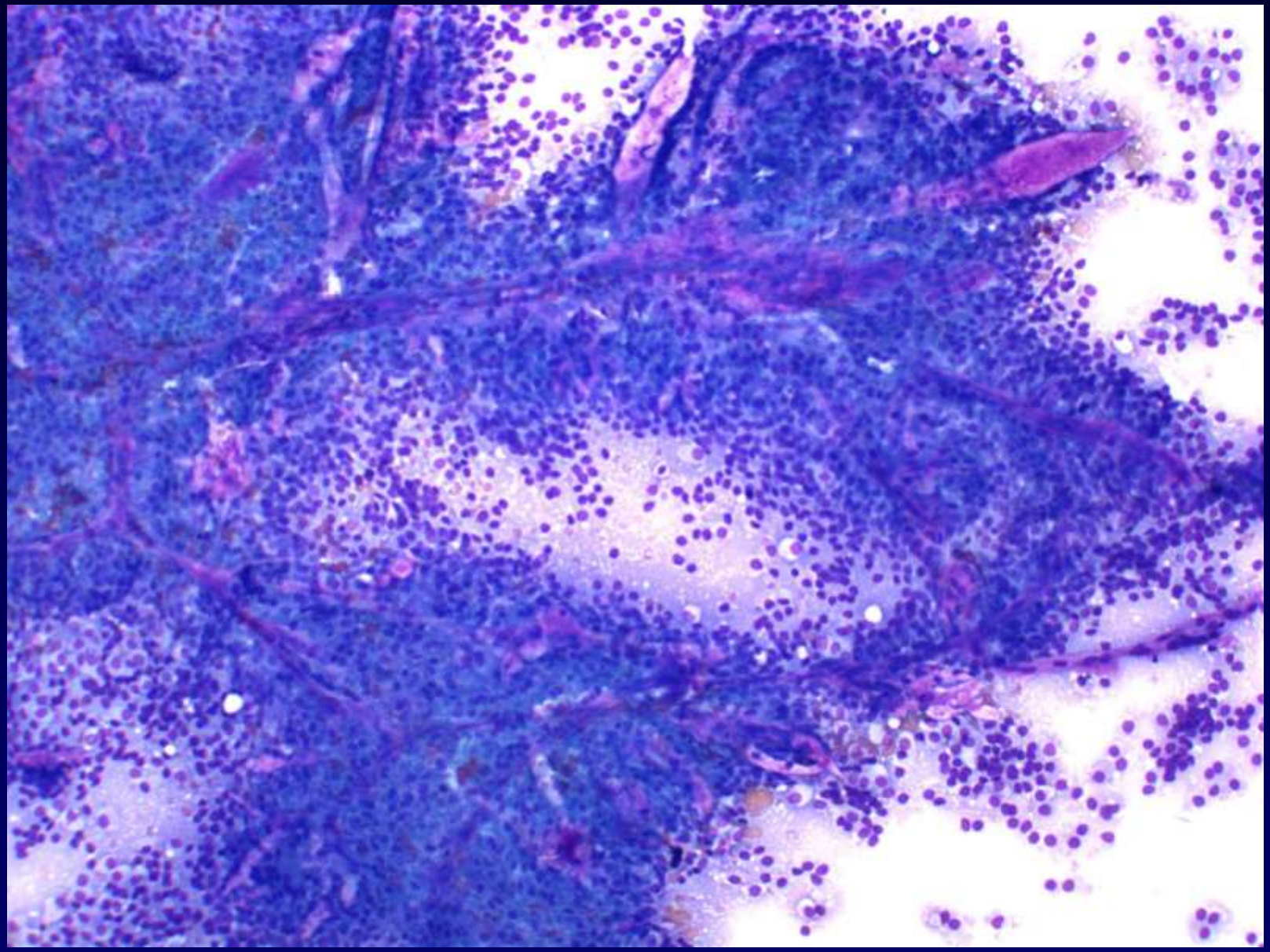
Solid-Pseudopapillary Tumor (Cytology)

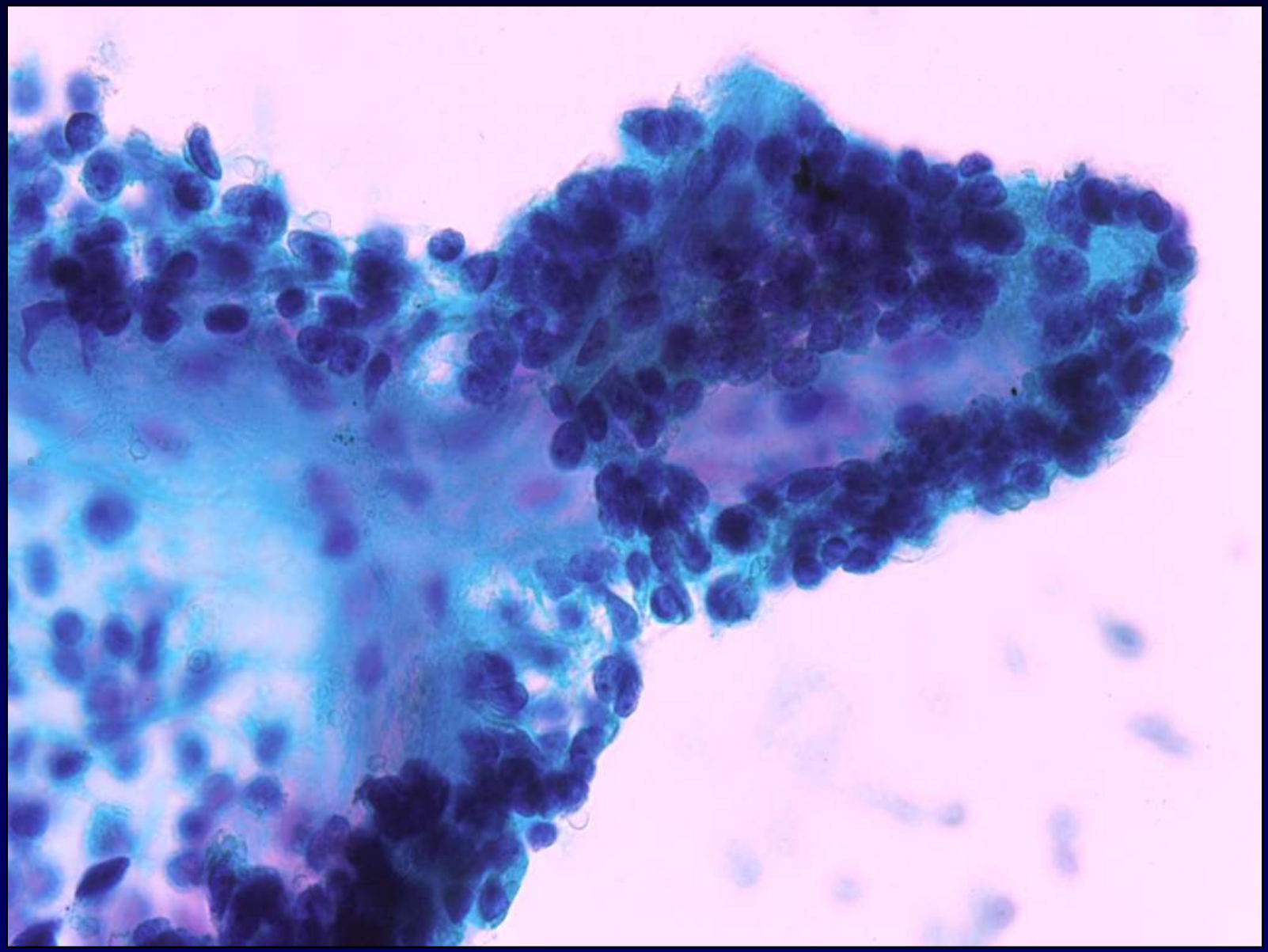
Review of 7 new cases and 43 previously reported cases

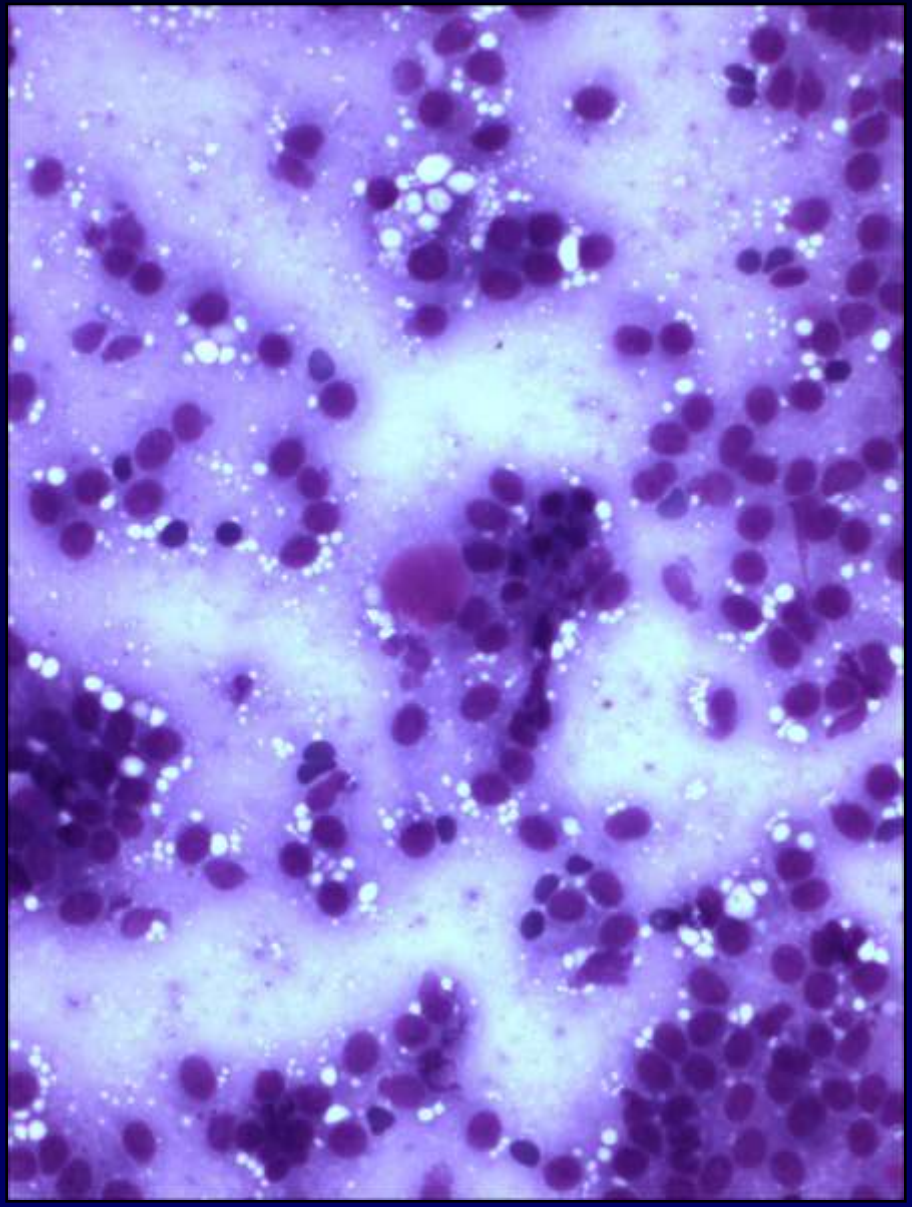
Cytologic Features of Most Cases

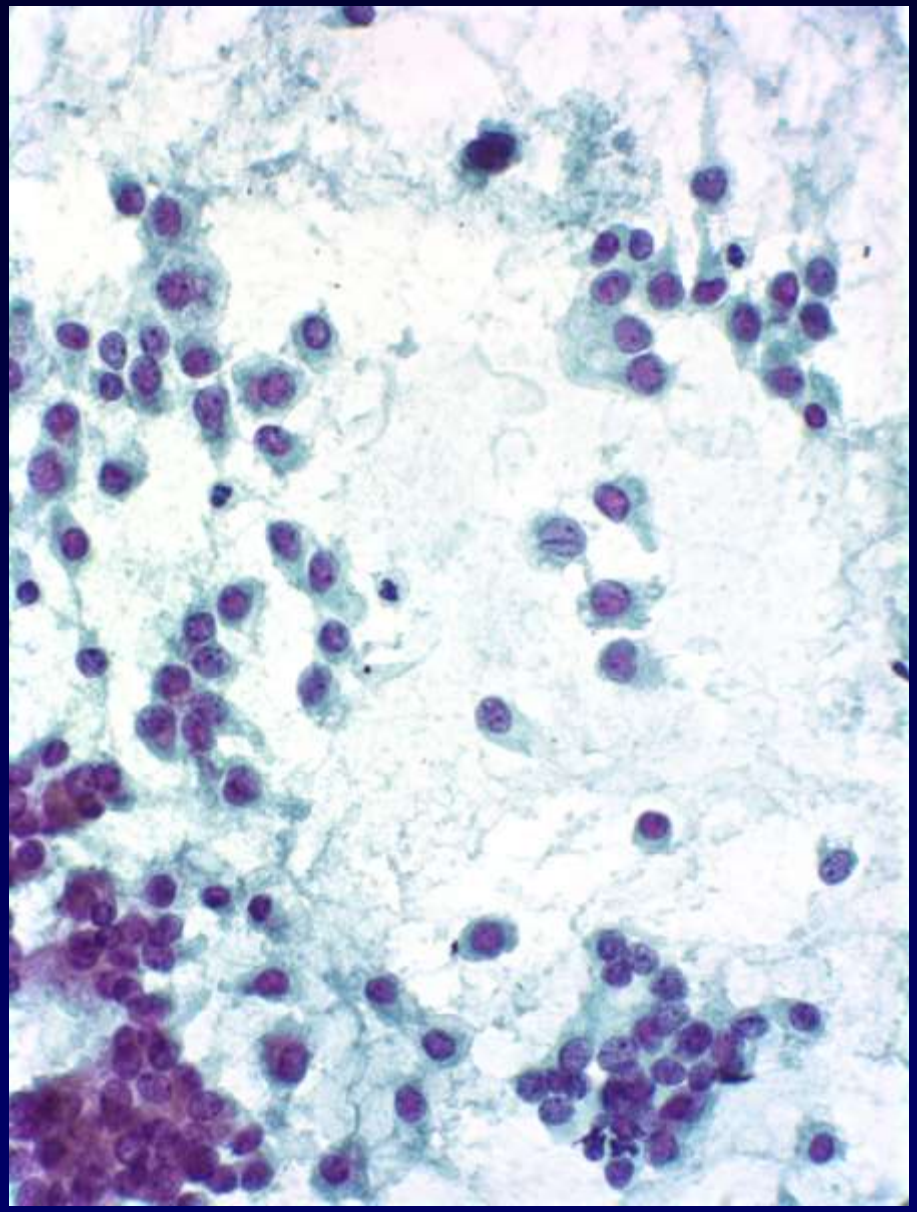
Cellularity	High
Architecture	Branching papillary fronds, small aggregates, acinar-like structures, and single cells
Nuclei	Uniform, folding, small nucleoli
Cytoplasm	Variable amount, pale, ill-defined.
Background	Hyaline globules, mucoid substance, and foamy histiocytes

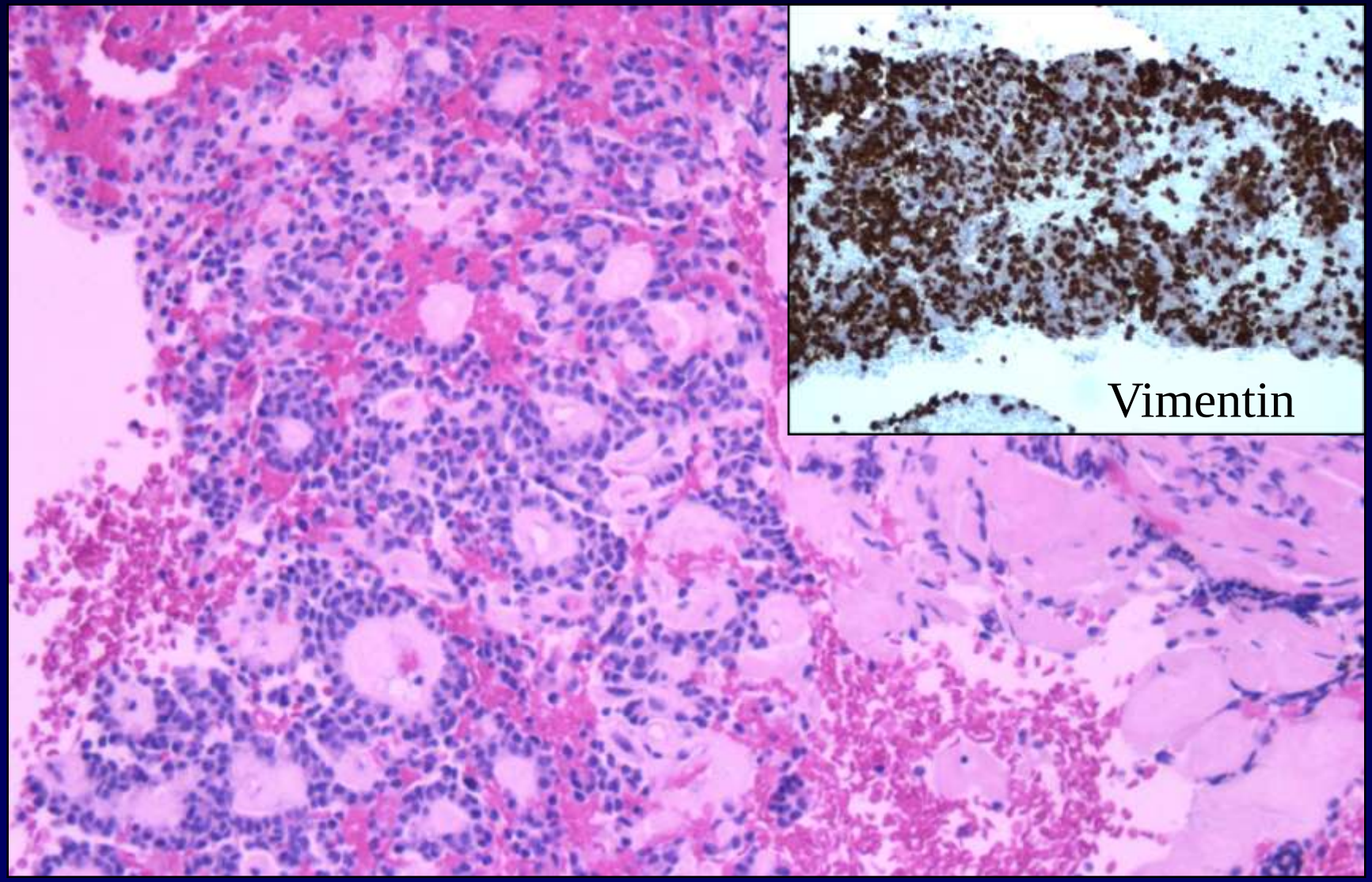
Diagn Cytopathol 2002;27:325-34










Vimentin

Acinar Cell Carcinoma

- Extremely rare (1-2% of exocrine neoplasms).
- Usually in older men (M:F = 2:1)
- Prognosis slightly better than ductal adenocarcinoma (5 year survival approximately 10%)
- Can show mixed phenotype with other pancreatic neoplasms (adenocarcinoma and endocrine neoplasms)

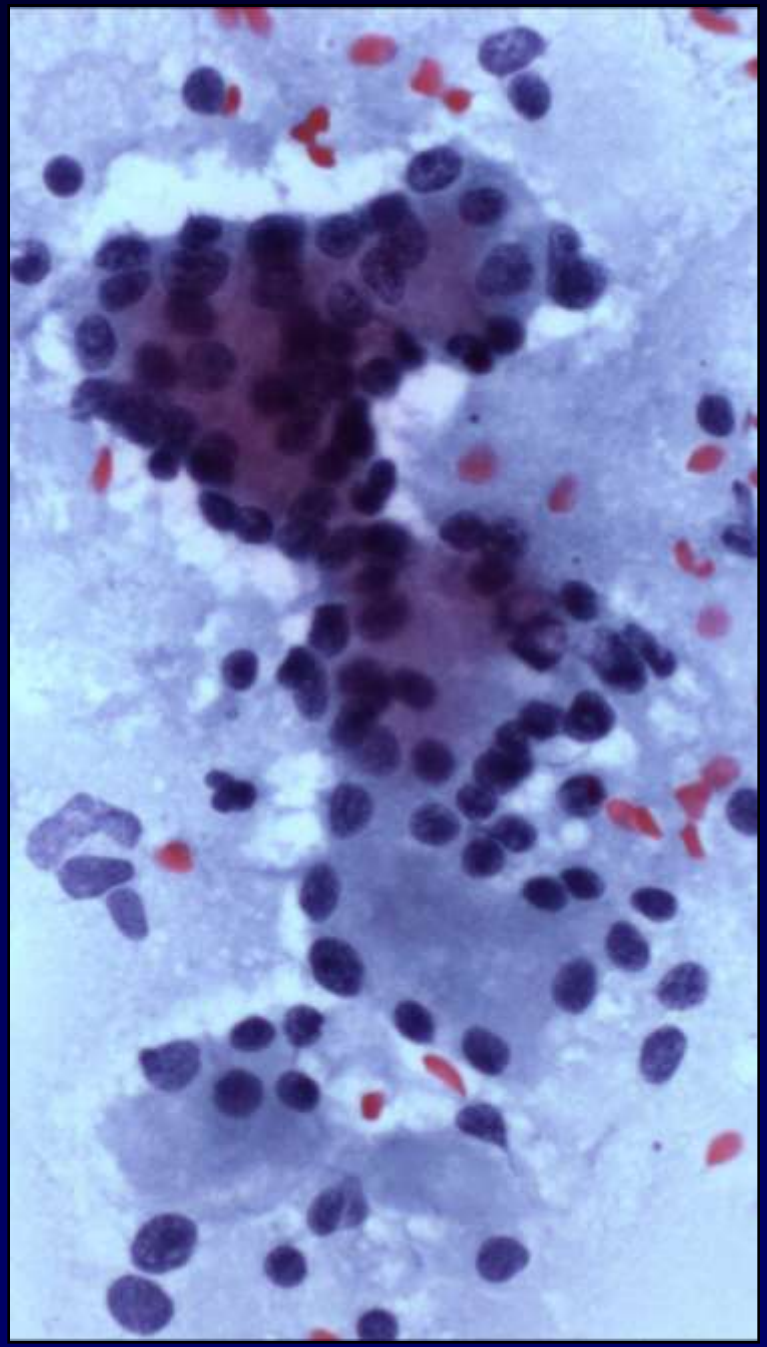
Acinar Cell Carcinoma

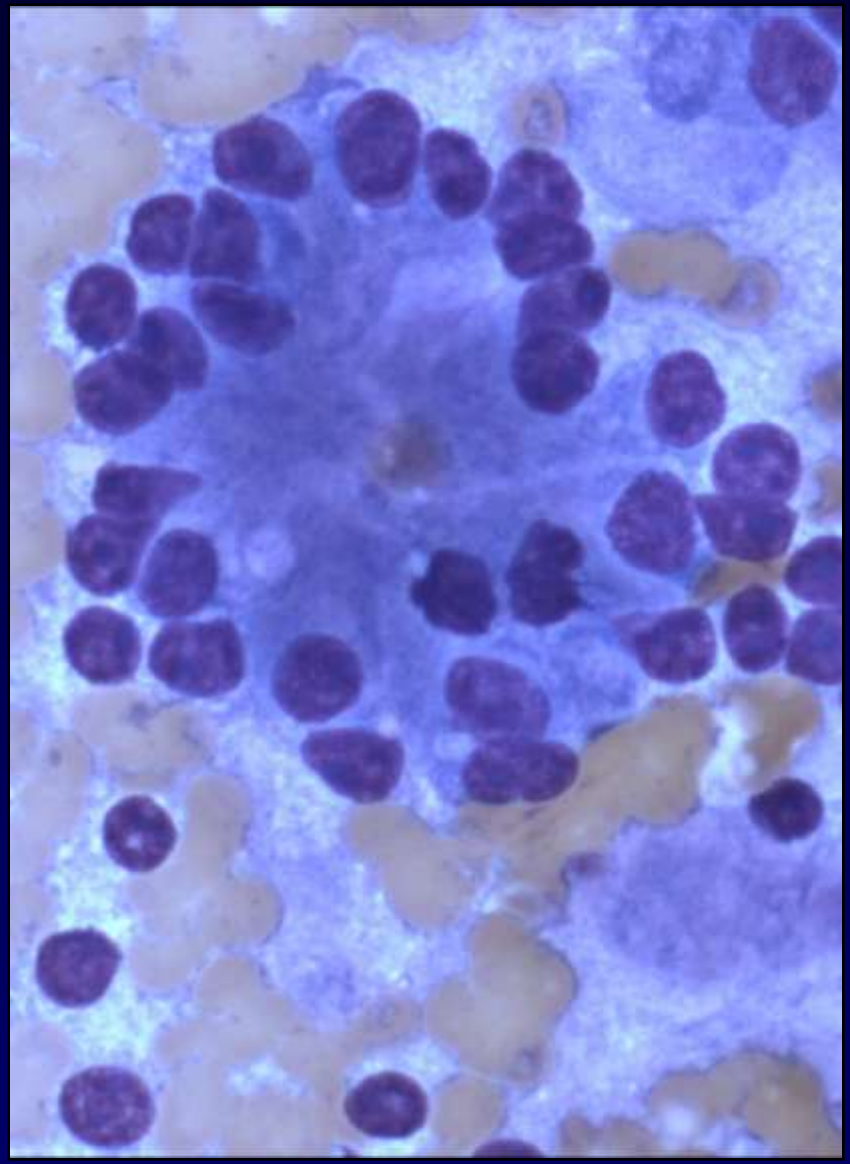
Acinar Cell Carcinoma	Pancreatic Endocrine Tumor
Loosely Cohesive (5/7)	Poorly Cohesive (8/10)
Vague Acinar Formation (5/7)	Rosette-like Structures (5/10)
Prominent Nucleoli (6/7)	Prominent Nucleoli (0/10)
	Finely Granular Chromatin (6/10)
Plasmacytoid Cells (0/7)	Plasmacytoid Cells (6/10)
ICC Endocrine* (0/7)	ICC Endocrine (8/10)
ICC Enzyme** (6/7)	ICC Enzyme (0/10)

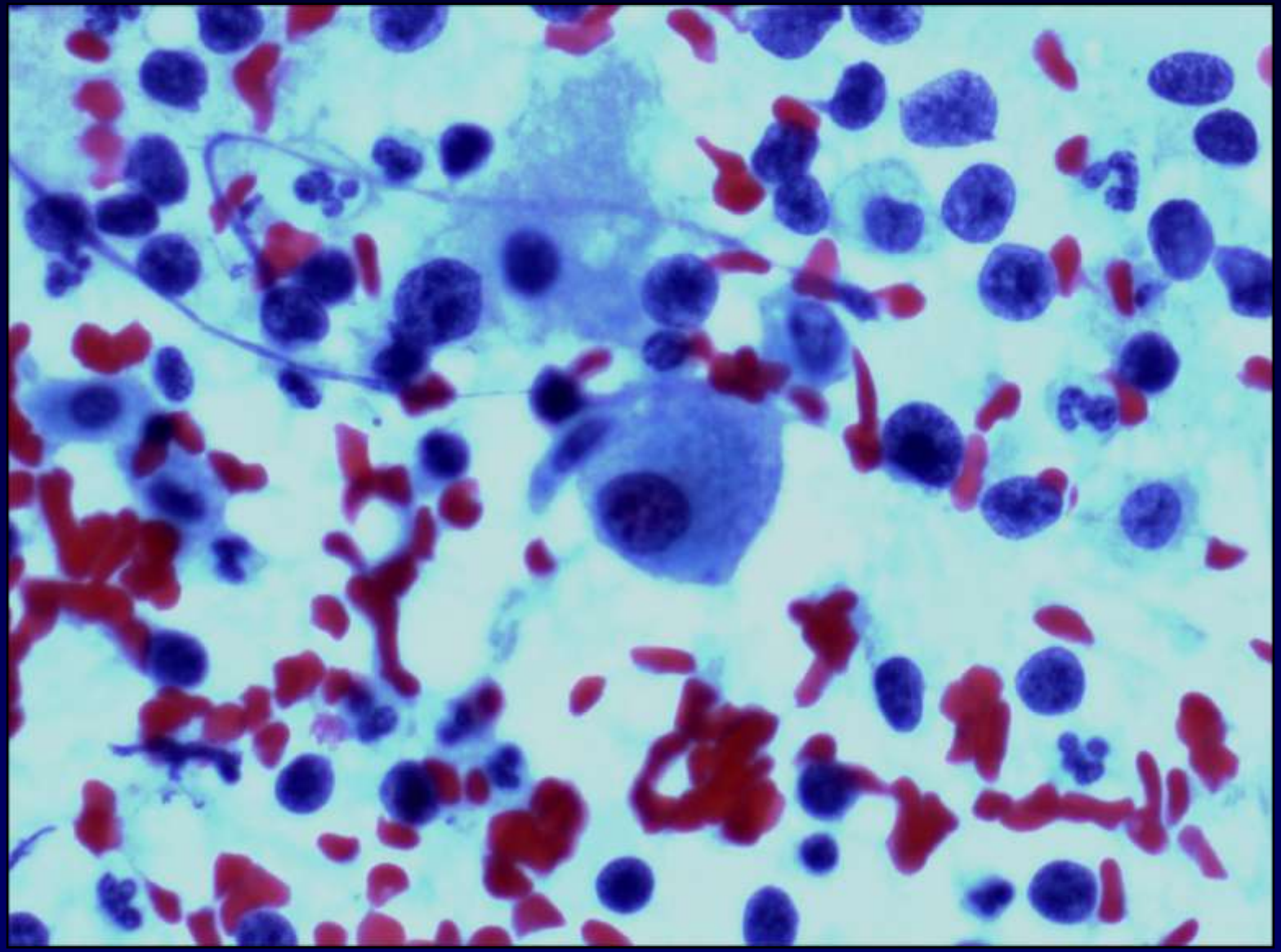
*Synaptophysin and/or Chromogranin

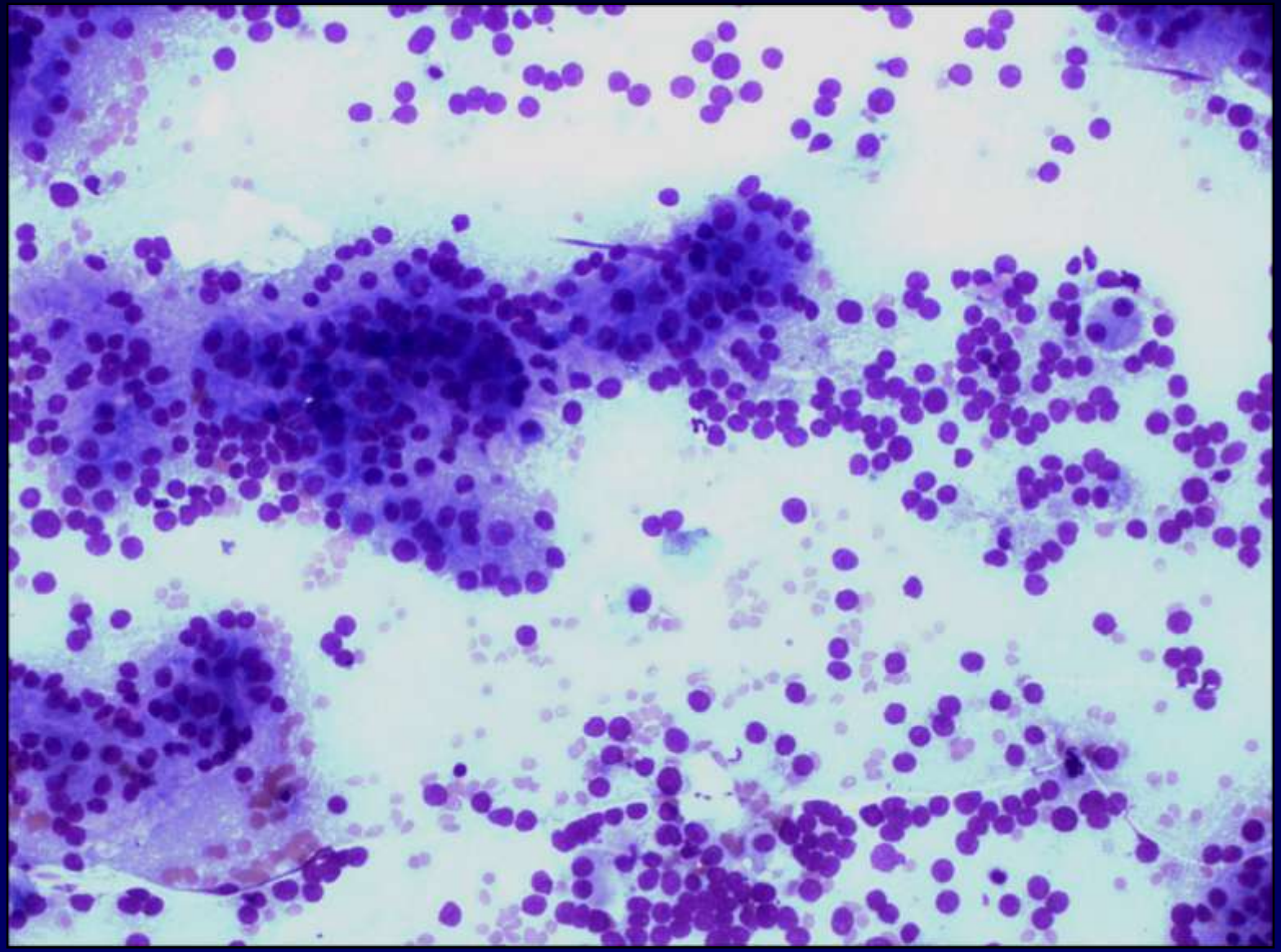
**Trypsin and/or Chymotrypsin

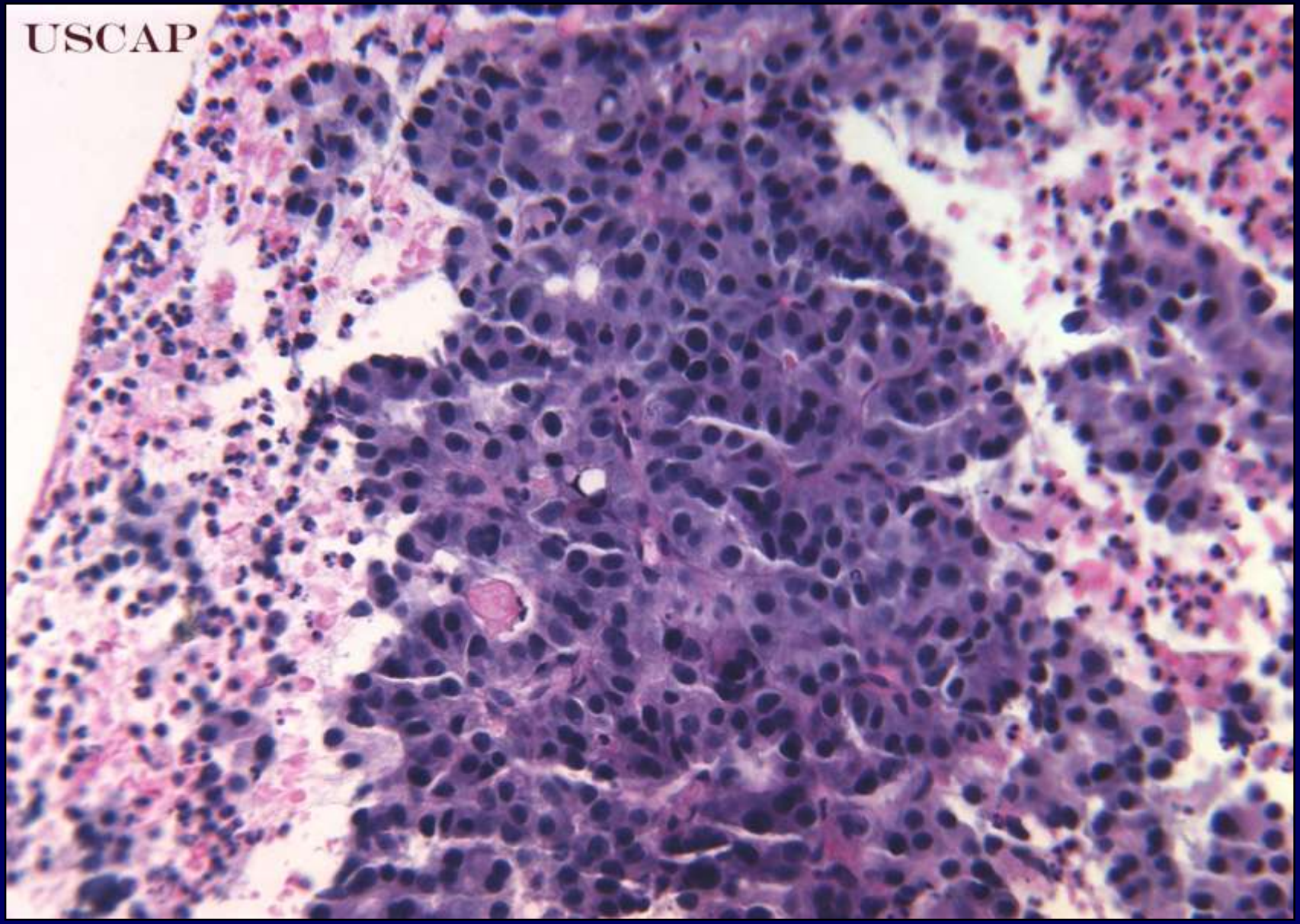
Diagn Cytopathol 1997; 16: 112-6.










USCAP

Immunohistochemistry of Solid Pancreatic Neoplasms

Neoplasm	CK	CD56	SYN	CHR	VIM	CT	AAT	AACT	LIP	TRP
PDA	+	-	-	-	-	-	-	-	-	-
PET	+	+	+	+	-*	-	-	-	-	-
SPT	-**	+	-**	-	+	+	+	+	-	-
ACC	+	-	-	-	-	+	+	+	+	+

PDA- pancreatic ductal adenocarcinoma, PET- pancreatic endocrine tumor, SPT- solid pseudopapillary neoplasm, ACC- acinar cell carcinoma, CK- pancytokeratin, SYN- synaptophysin, CHR- chromogranin, VIM- vimentin, CT- chymotrypsin, AAT- alpha-1-antitrypsin, AACT- alpha-1-antichymotrysin, LIP- lipase, TRP- trypsin.

*Up to 20-30% of PENs may be immunoreactive for vimentin.

**Occasional focal immunoreactivity for CK and SYN has been noted in SPTs. Rare SPTs may show diffuse, weak reactivity for SYN.

Adv Anat Pathol 2005;12:62-73.

Metastases to the Pancreas

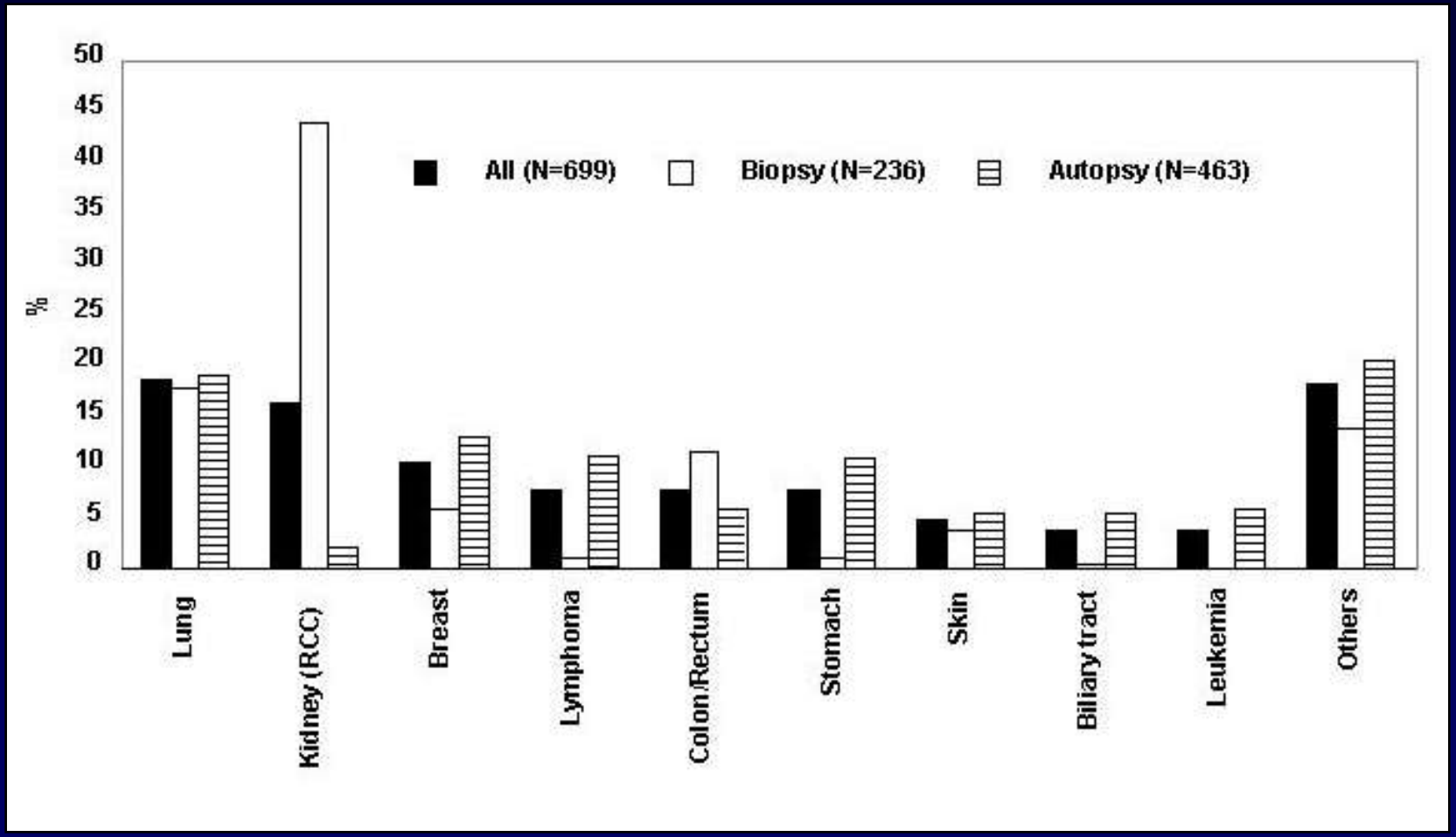
- Uncommon, except for other retroperitoneal malignancies
- Not generally sampled, unless unexpected (thus FNA / biopsy literature is different from autopsy literature)
- Knowing patient history is essential!!
- Cell block immunohistochemistry can be very helpful

Secondary Tumors of the Pancreas

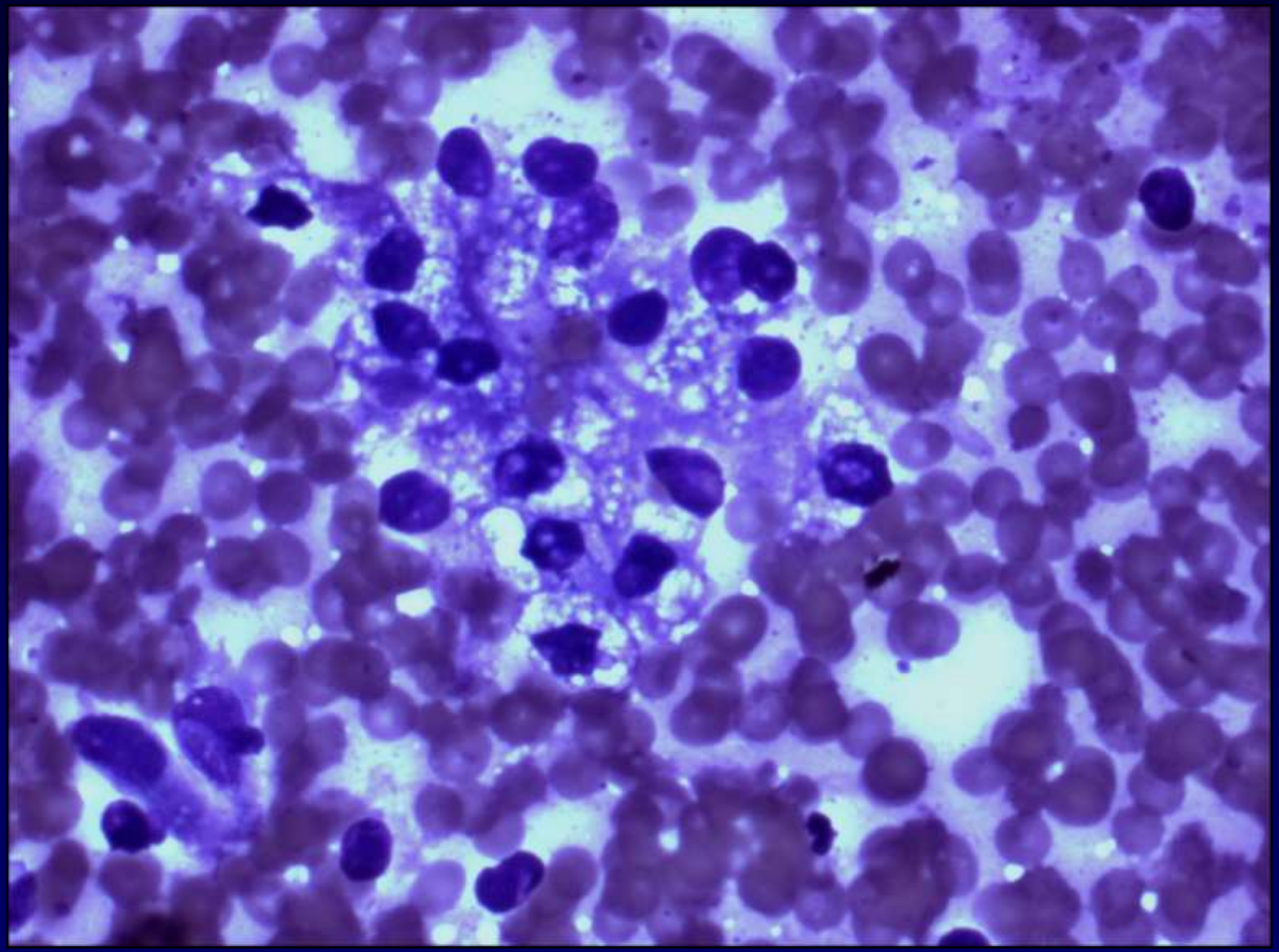
Origin	N	%	Histologic type
Lung	4	36.4	Squamous (2), small cell(1), adenocarcinoma (1)
Breast	2	18.2	Ductal(1), lobular(1)
Colon	1	9.1	Colonic adenocarcinoma
Uterus	1	9.1	Leiomyosarcoma
Ovary	1	9.1	Mucinous adenocarcinoma
Kidney	1	9.1	Clear cell carcinoma
Lymphoid	1	9.1	Large cell lymphoma
Total	11	100	

Diagn Cytopathol 2004; 31:313-8.

Metastases to the Pancreas



Diagn Cytopathol 2004; 31: 313-8.

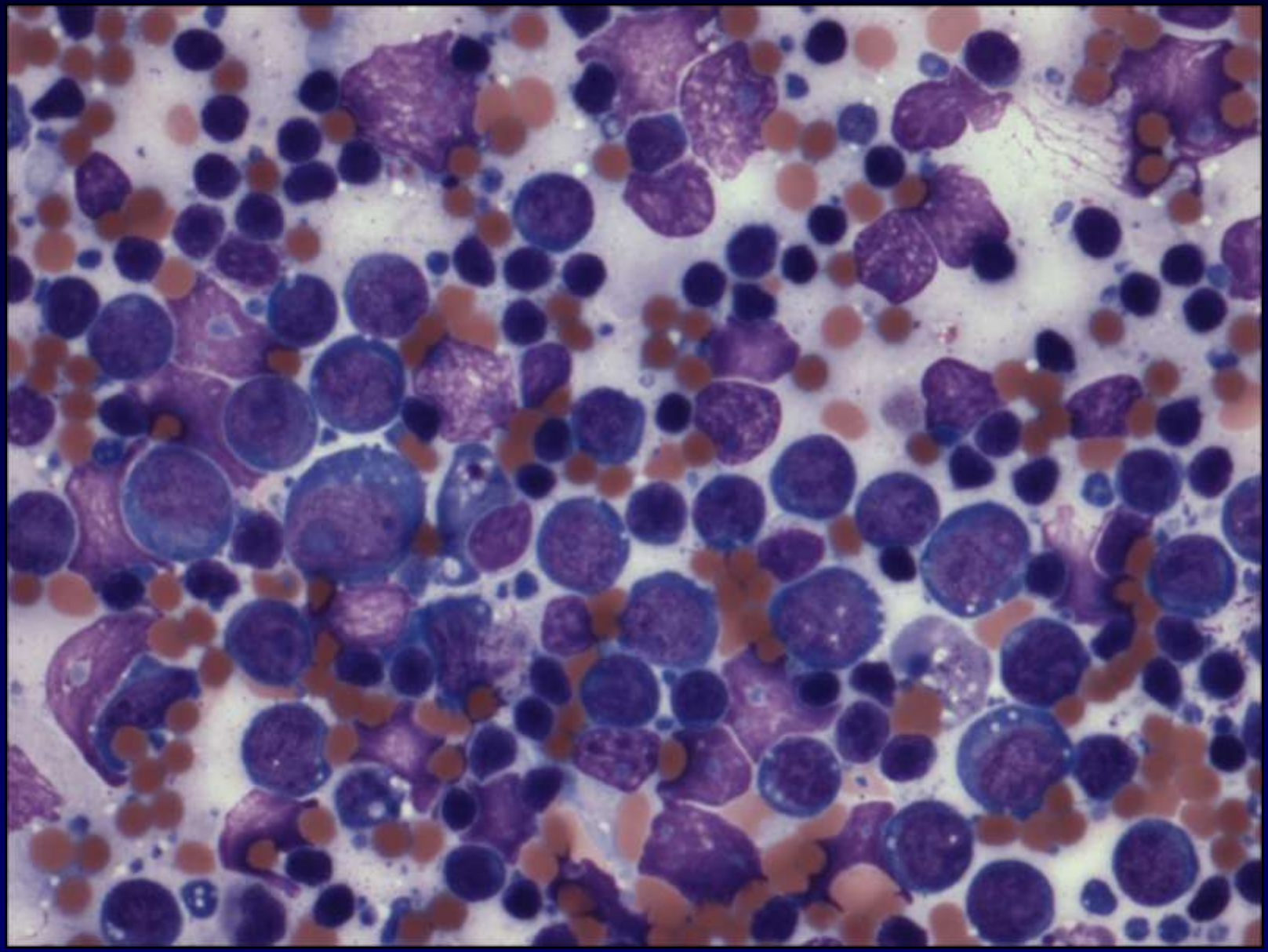


Metastatic Renal Cell Carcinoma

Pancreatic Lymphoma

- 14 cases reviewed (10 patients)
- Male: Female = 7: 3. Mean age= 64.7 yrs
- 6 DLBC, 3 follicular lymphomas, 1 B-cell unclassified
- 2 of 14 aspirates didn't have enough material for proper phenotyping by flow cytometry

Am J Clin Path 2004;121:898-903



Other Lesions

- Acute pancreatitis and abscess
- Chronic pancreatitis
- Lymphoplasmacytic sclerosing pancreatitis / Duct-destructive pancreatitis (autoimmune pancreatitis)
- Benign pancreas

Chronic Pancreatitis

- Can clinically and radiographically appear identical to PDA
- Can be present with PDA
- Often can be diagnosed by EUS
- Question isn't whether it's CP or PDA, question is whether PDA is present with CP

Chronic Pancreatitis

- Mixed inflammation with macrophages and hemosiderin-laden macrophages
- Ductal cells with mild atypia (anisonucleosis <3X)
- Fibrosis and fibrotic acinar cell tissue are common
- Debris with calcific material is often present

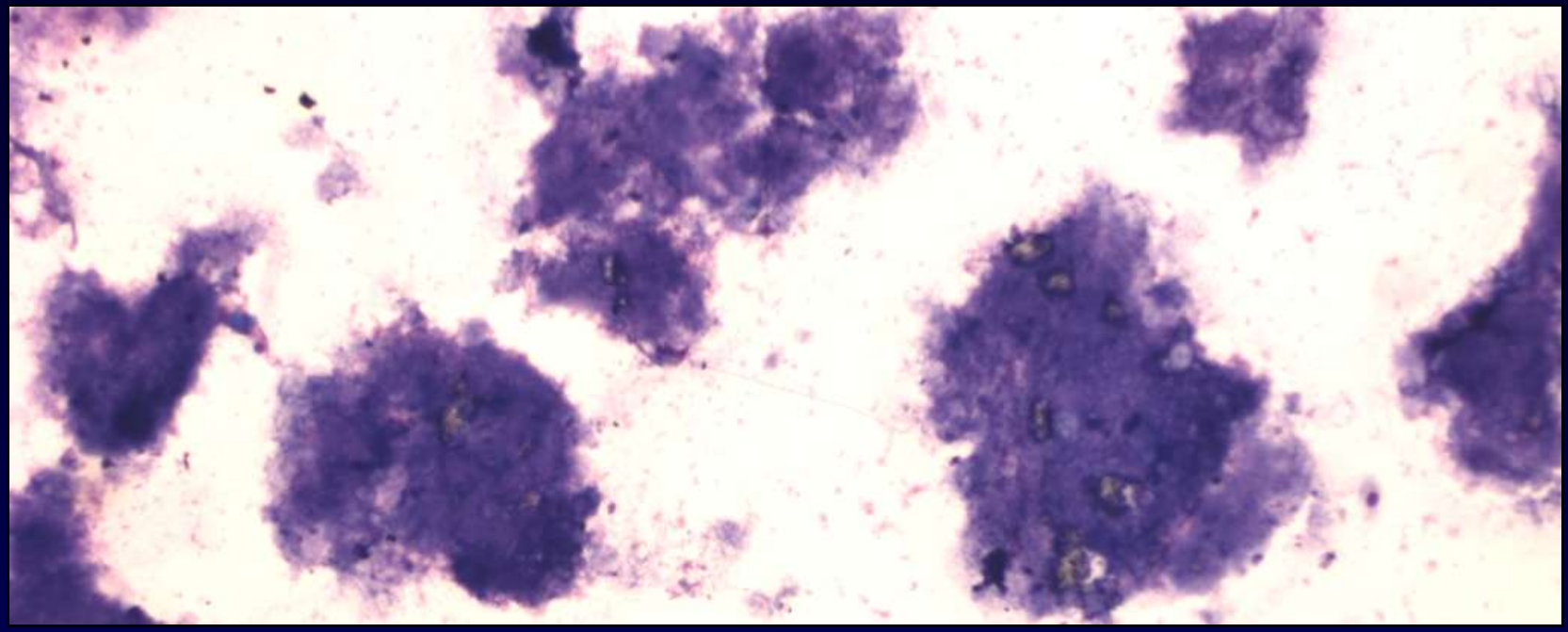
HCMC CP Data
20 Consecutive Cases

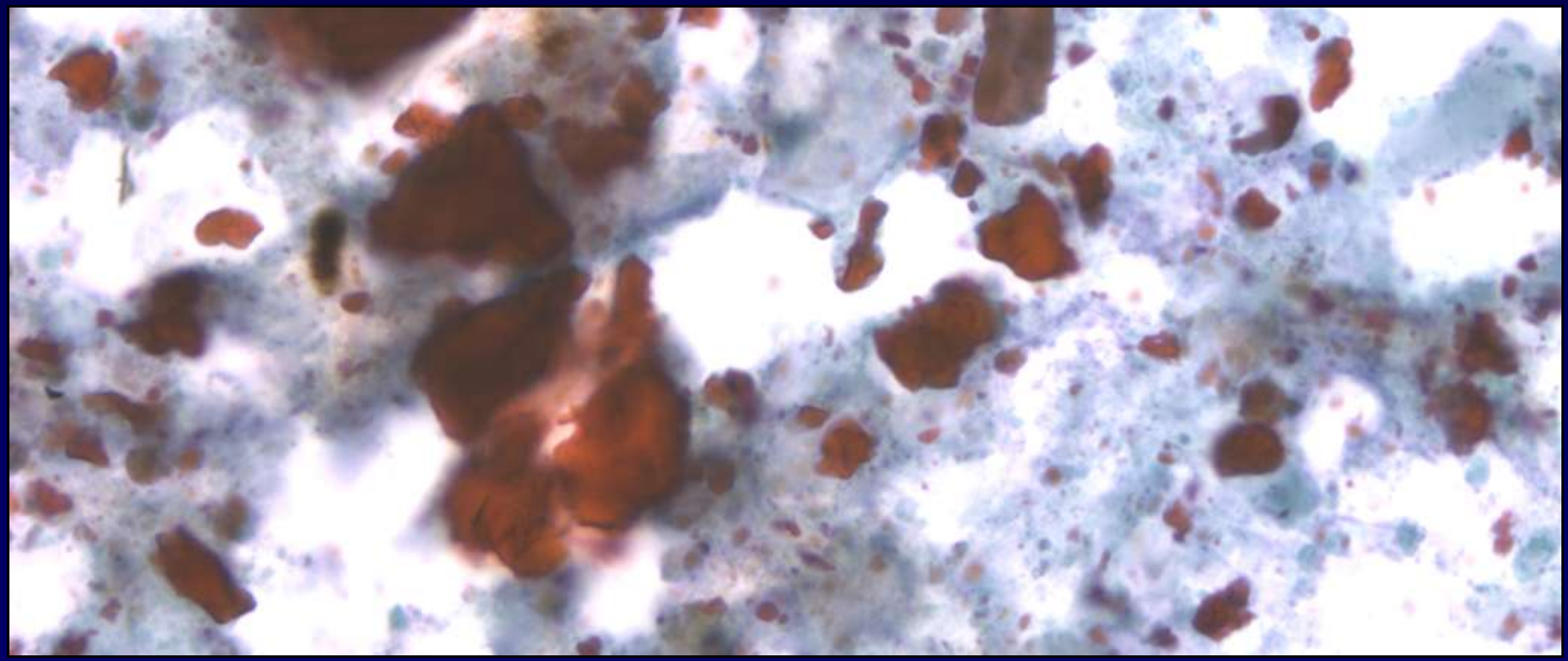
Inflammation	Ductal Cells	Mild Atypia*	Mod Atypia**	Fibrosis	Debris
20/20	19/20	10/19	1/19***	14/20	19/20

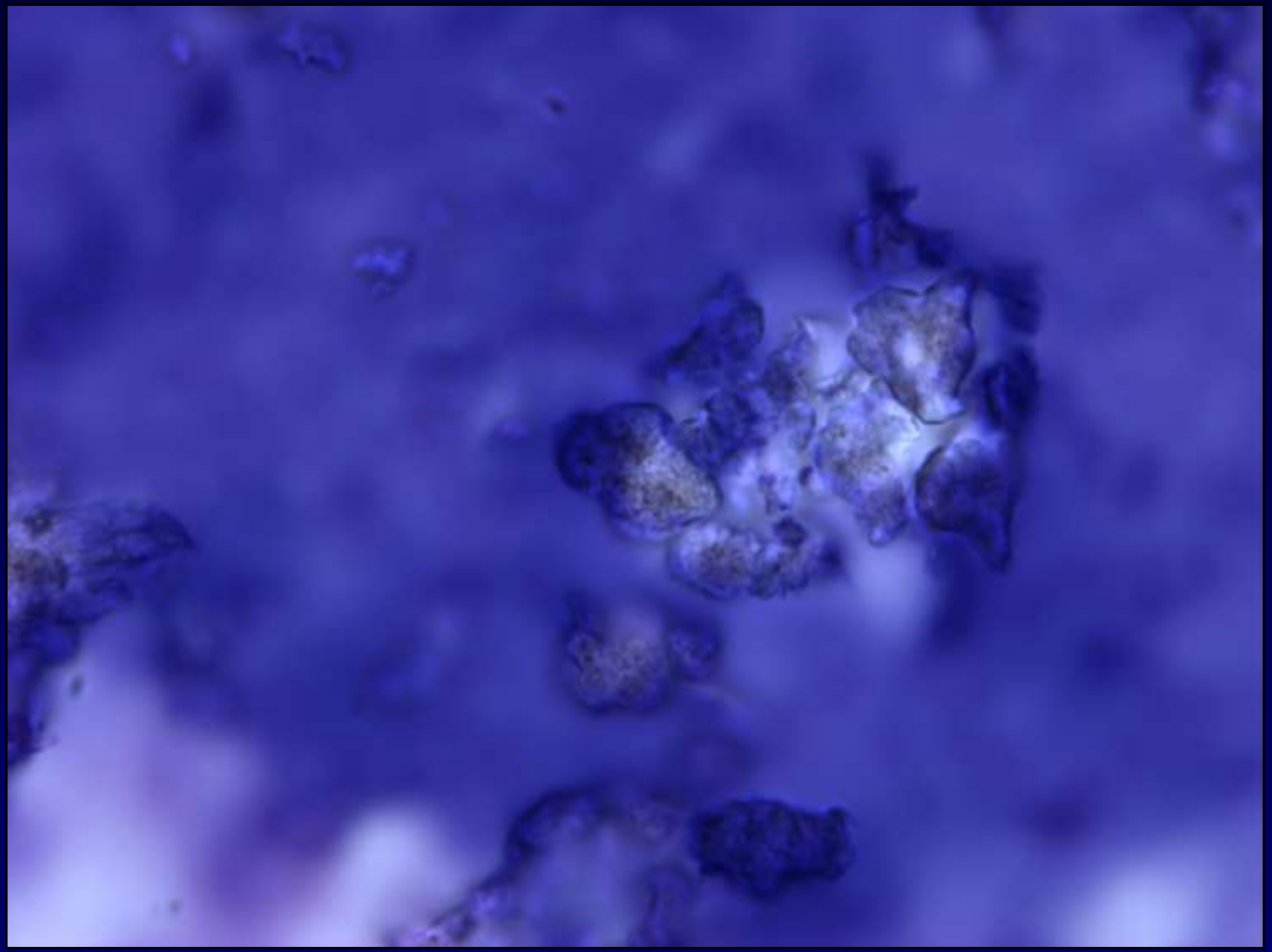
*Anisonucleosis of 1-2X
**Anisonucleosis of 3-4X
***Patient was found to have cancer on follow-up

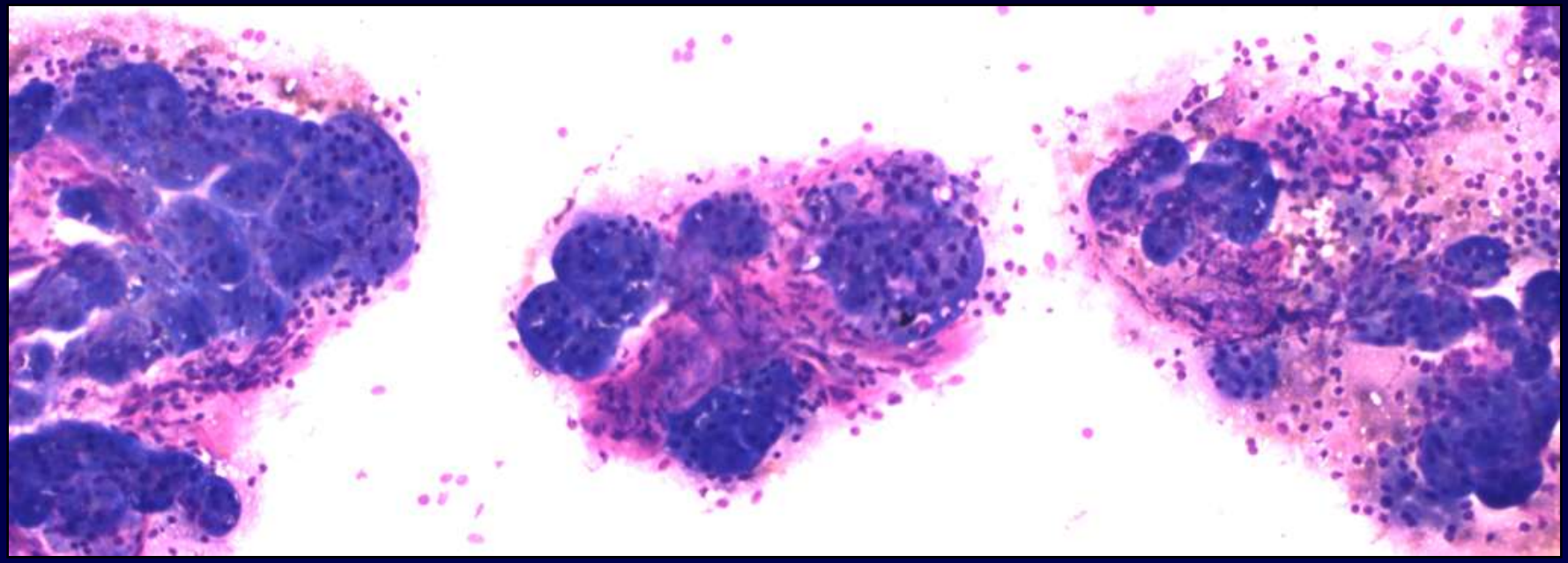
3 of 17 patients with follow-up were eventually found to have pancreatic adenocarcinoma.

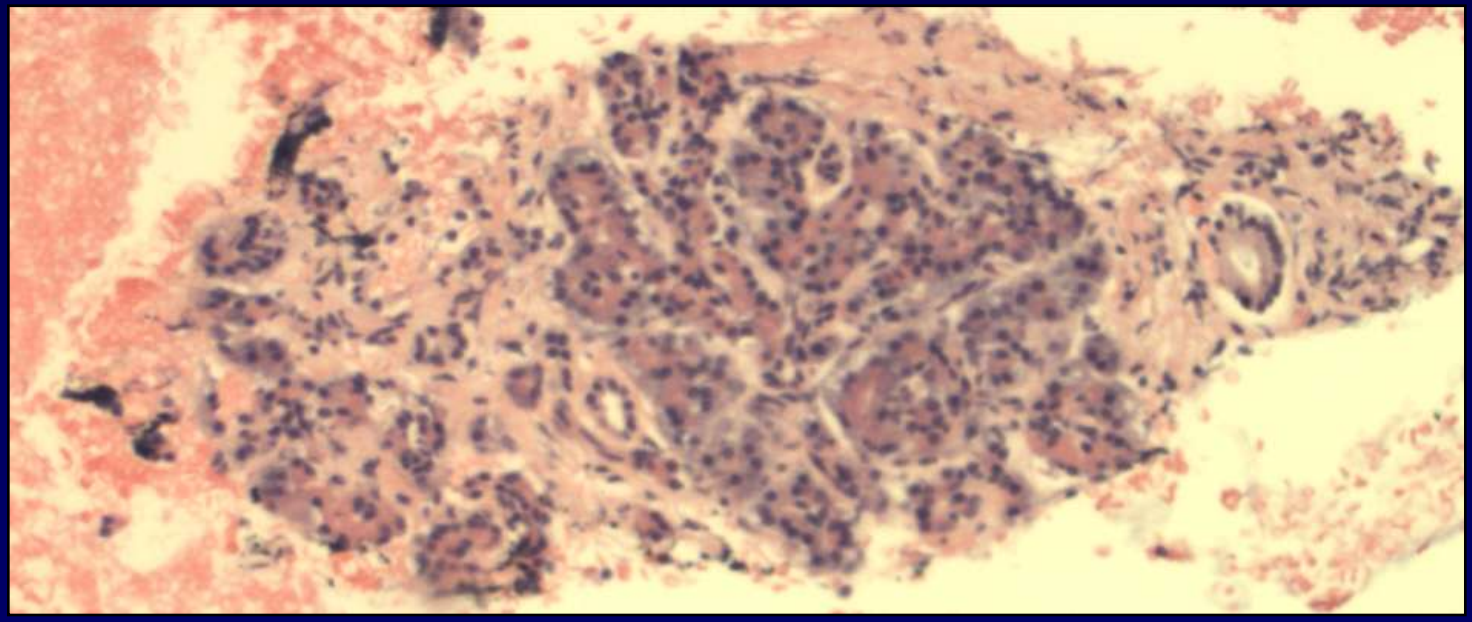
Diagn Cytopathol 2005; 32: 65-9.

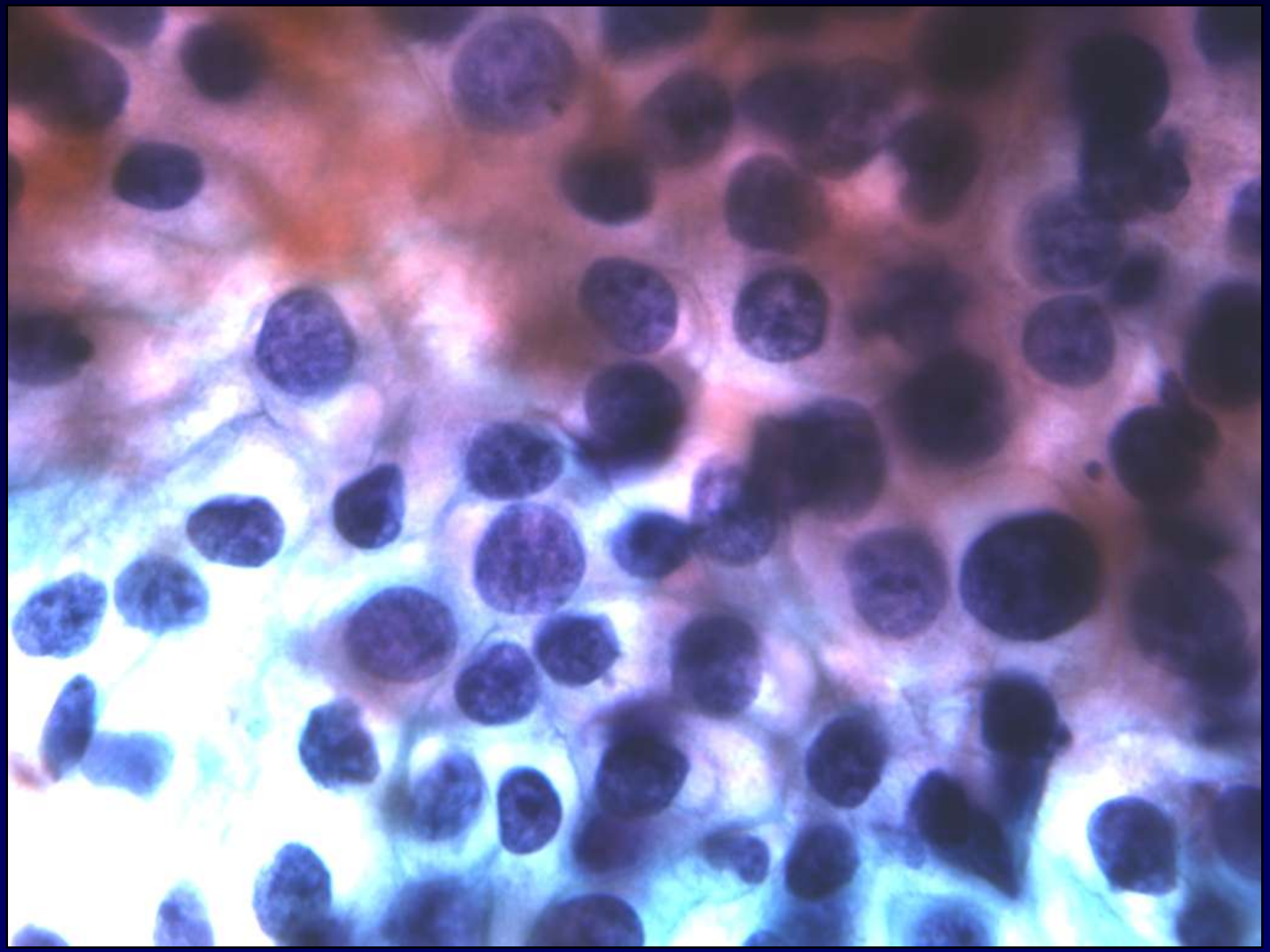












Rare group of adenocarcinoma

Autoimmune Pancreatitis (AIP)

- Mimics cancer clinically and radiographically (patients are free of general risk factors for chronic pancreatitis)
- Associated with other autoimmune disease (sclerosing sialadenitis, UC, PBC, sclerosing lesions, etc)
- Increased serum IgG4
- Will sometimes respond to steroid therapy

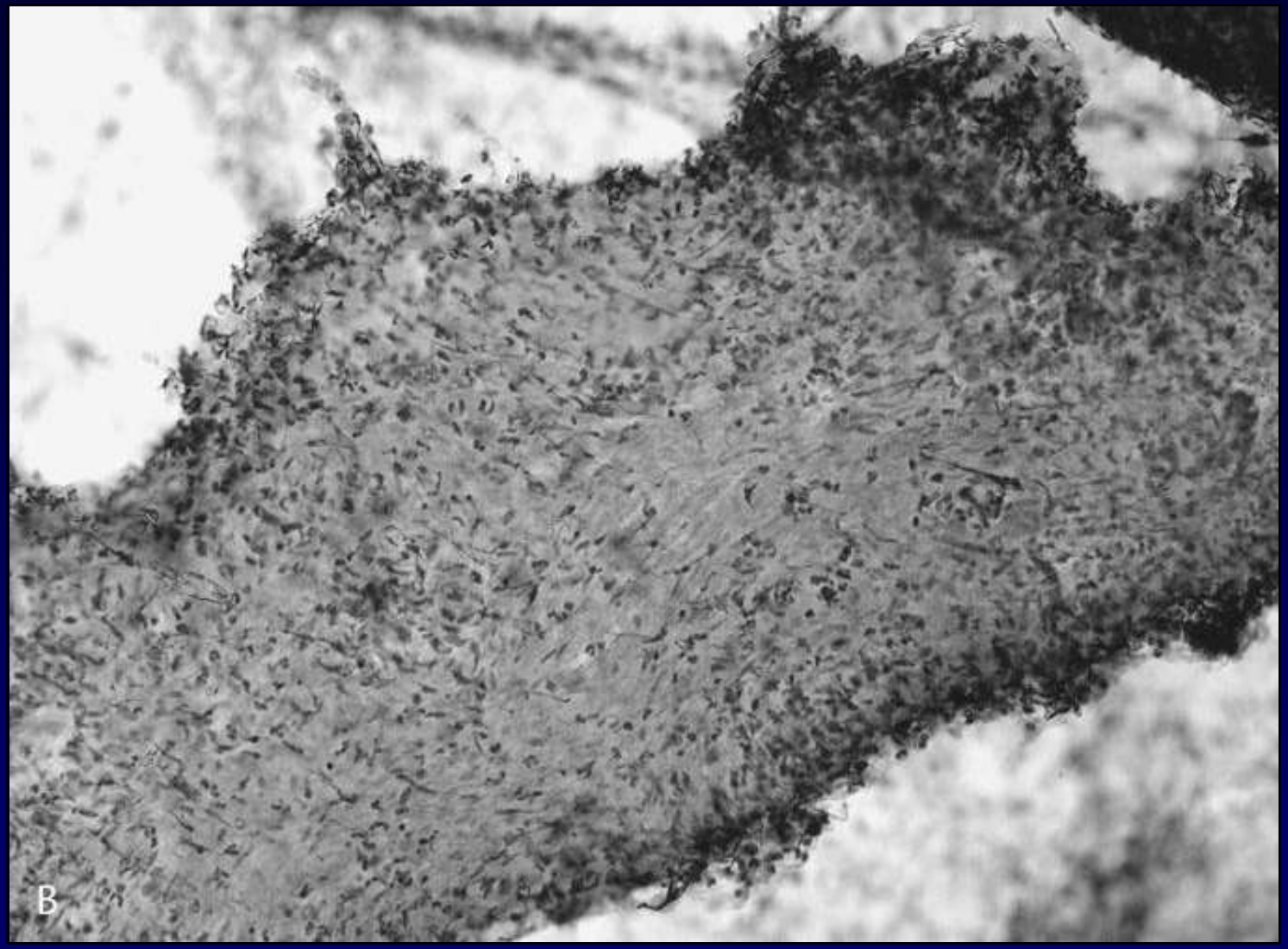
AIP Cytology

- Can you make such a diagnosis??
- 16 cases reviewed with AIP, 9 dx's originally as atypical glandular cells or as other neoplasm
- On review 10 showed no ductal cells!!
- **Cellular stromal fragments** the clue

	Semi-Quantitation Score	AIP (n = 16)	Chronic Pancreatitis, NOS (n = 19)	Pancreatic Adenocarcinoma (n = 16)	*P*
Stromal fragments	0	2	12	4	<0.05
	1	5	5	7	
	2	1	2	2	
	3	8	0	3	
Inflammatory cells within stromal fragments	0	5	5	7	NS
	1–5	1	2	1	
	6–10	0	1	3	
	11–20	2	0	0	
	>31	6	0	1	
Background inflammatory cells	None	12	19	14	NS
	Few lymphs	2	0	0	
	Many lymphs	1	0	0	
	Neutrophils	1	0	2	
Cellularity of stroma	Acellular	4	5	1	<0.05
	Low	1	2	8	
	High	9	0	3	
Fibrous tissue with embedded pancreas	Absent	9	17	16	<0.05
	Present	7	2	0	
Acinar tissue	Absent	9	11	14	NS
	1	2	2	1	
	2	4	3	1	
	3	1	3	0	

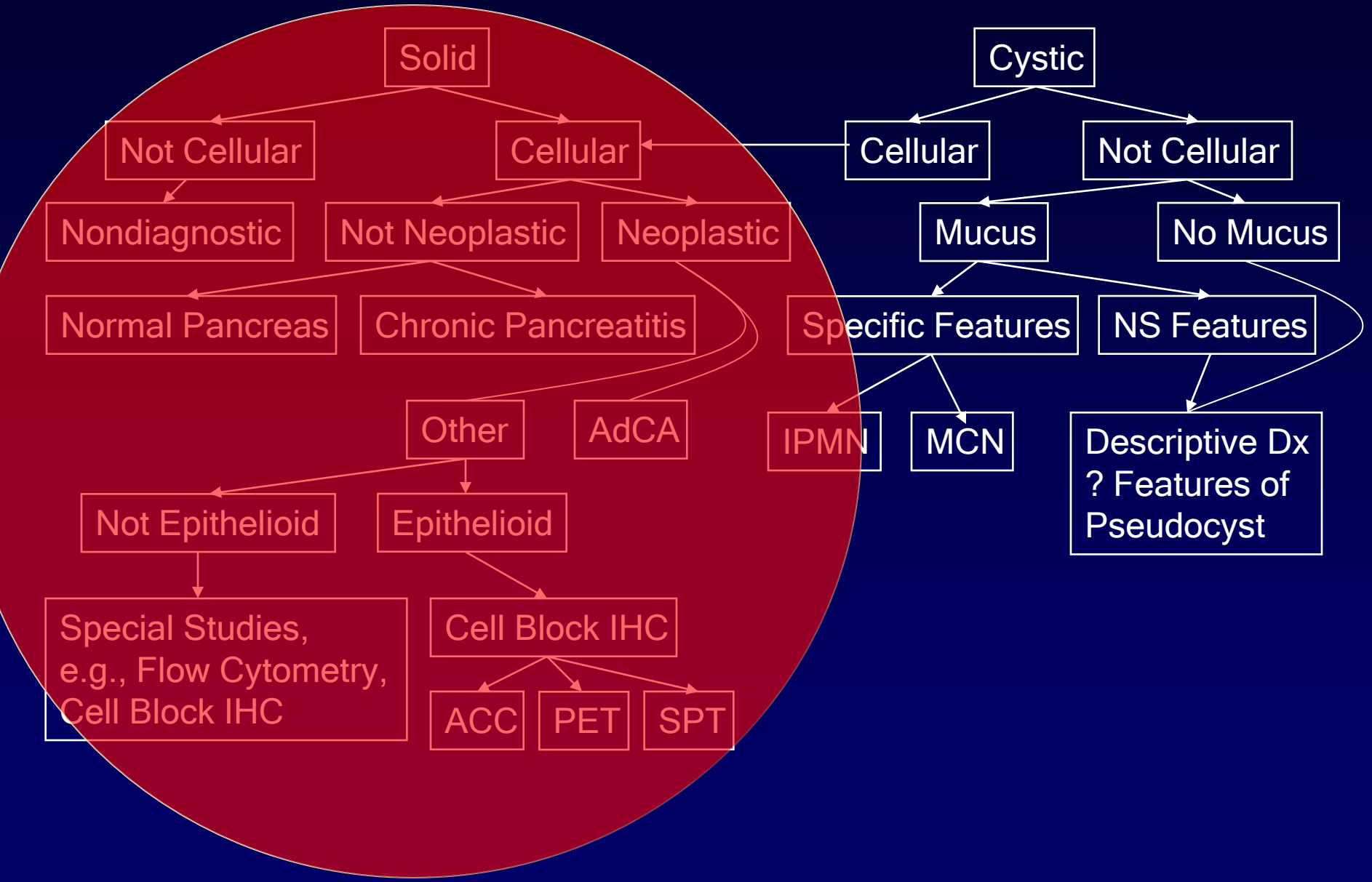
NS, not significant.

AJSP 2005; 29: 1464-71.



AJSP 2005; 29: 1464-71.

Easy Algorithm



EUS-FNA Cytology of Cystic Pancreatic Lesions... Our Only Hope

Cystic Neoplasms

- Mucinous
  - IPMN: 31%
  - MCN: 10%
  - Mucinous ductal carcinoma: 4%
  - PanIN: 1-3%
- Non Mucinous
  - Pseudocyst
  - Serous Cystadenoma: 38%
  - Solid pseudopapillary neoplasm: 12%
  - PEN: 2%
  - Lymphoepithelial, dermoid, schwannoma: 2%

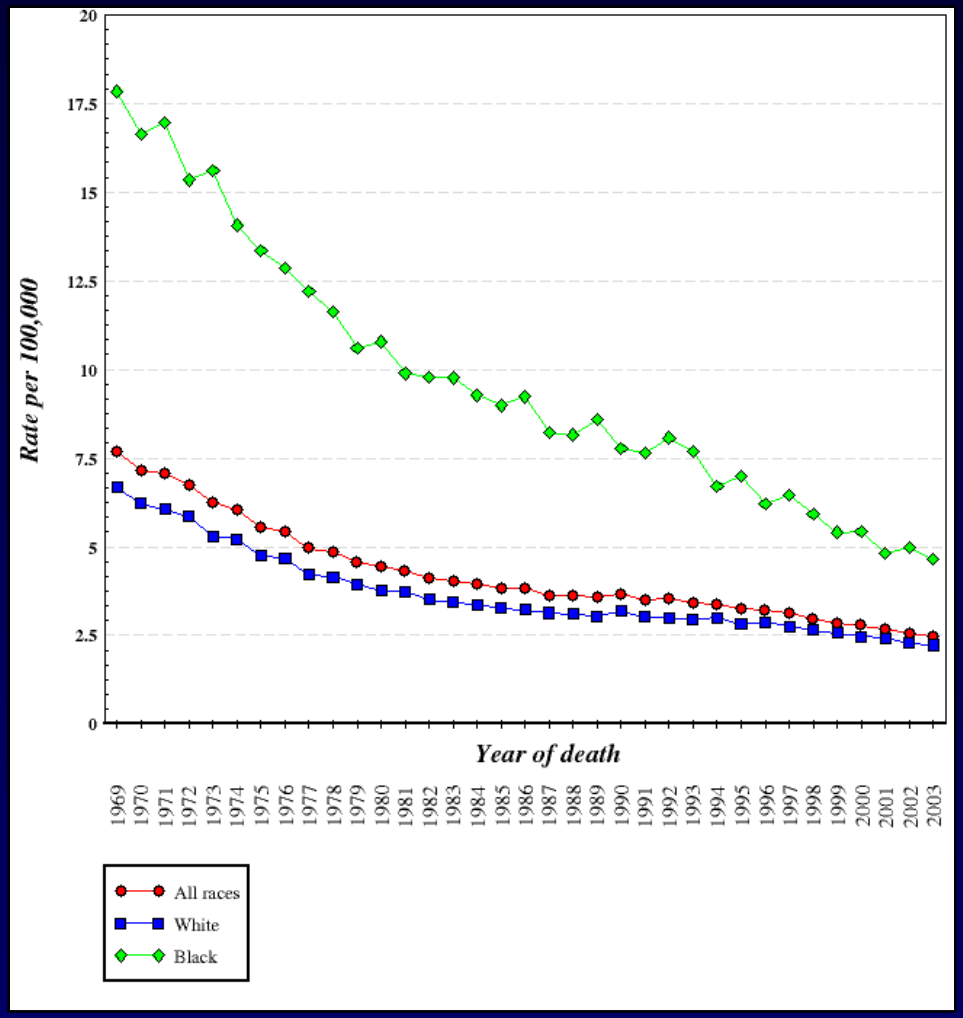
Virchows Arch 2004;445:168-178

Pancreatic Cyst FNA General

- We don’t do as well.
- We have to deal with it.
- *It might be one of the few things we help with.*

Why does it matter???

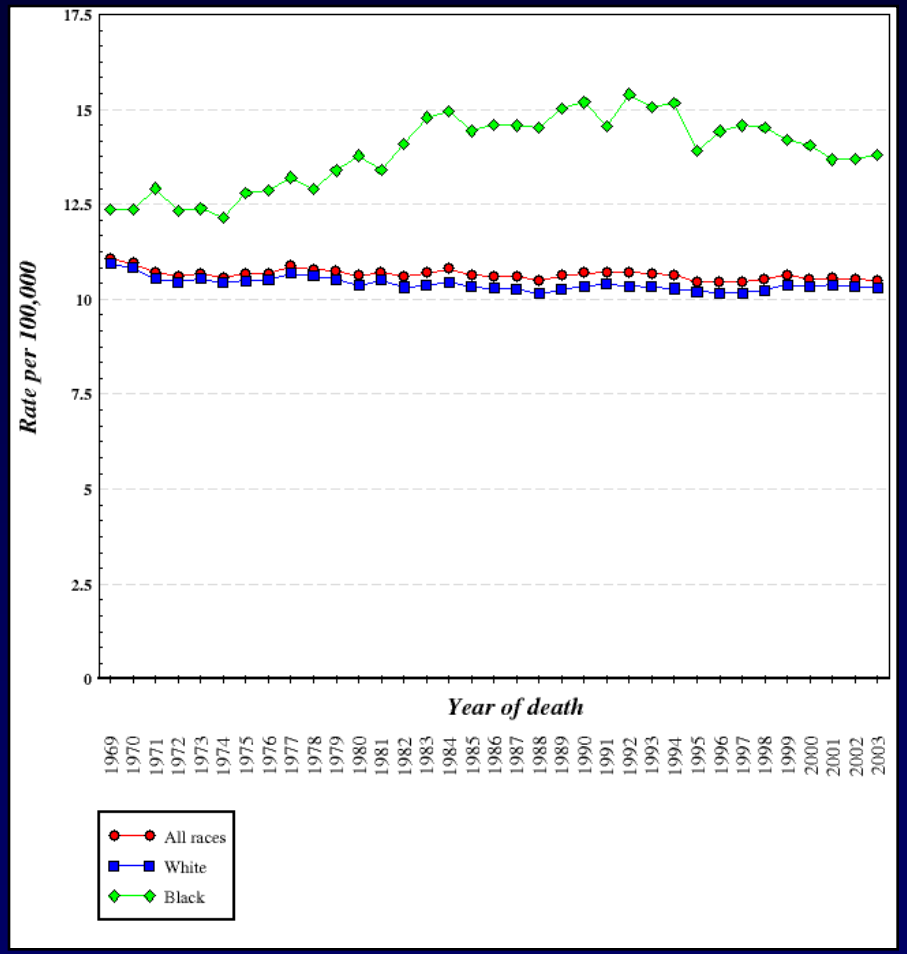
Age Adjusted US Mortality Rate for Cervical Cancer



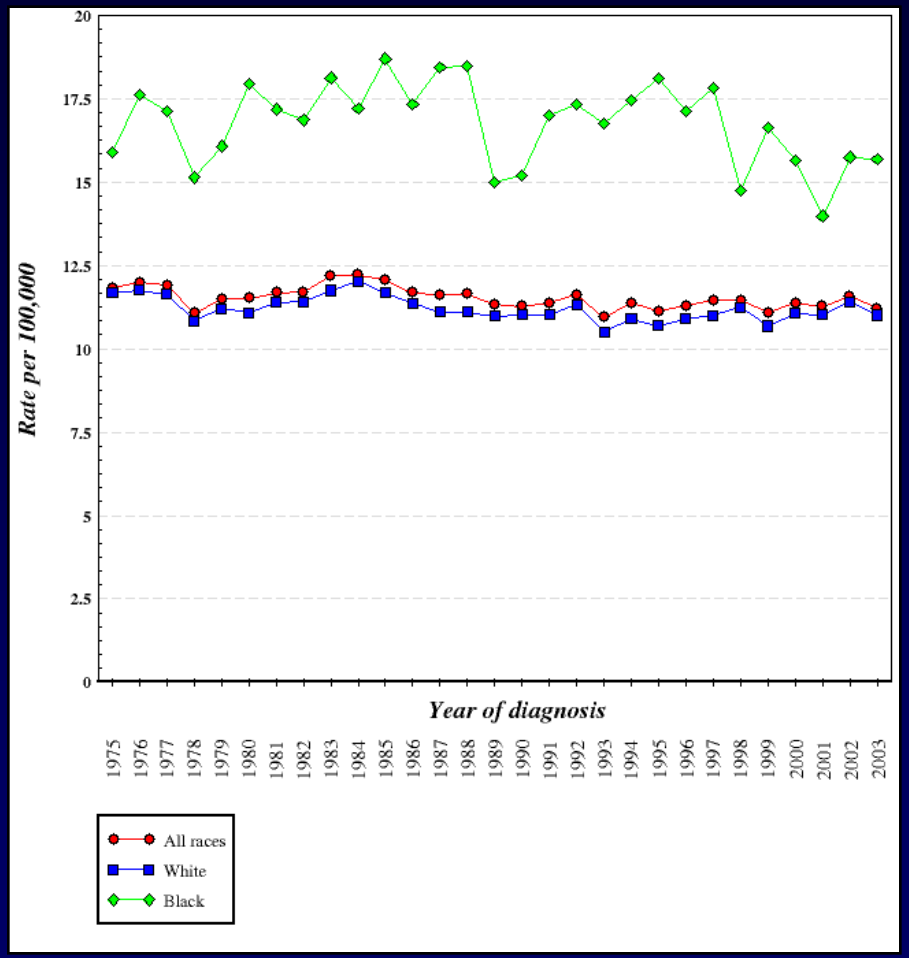
SEER

Pancreas Cancer

Mortality



Incidence



SEER

How can we cure pancreatic cancer?

- Find surgical candidates
- Develop superior chemotherapy of radiation therapy (not going to address, nothing cures pancreatic cancer- gemcitabine + / neoadj chemorads)

Better surgical candidates

- Problem- when tumors present, near 85% are considered unresectable (due to metastases or extent of local disease)
- Even patients with resected tumors don’t do very well

Better surgical candidates

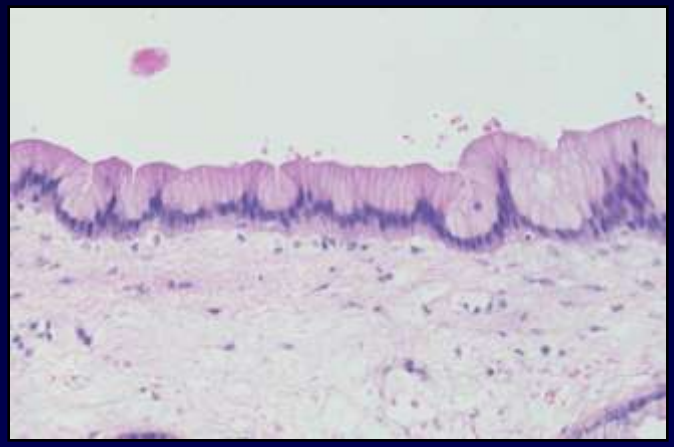
- Are there precursor lesions?

- Most agree that ductal adenocarcinoma arises from intraductal neoplasia

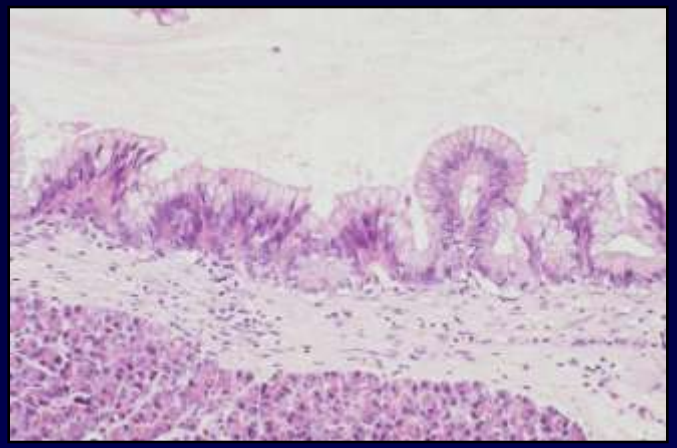
AJSP 2001; 25; 579-86.

Conventional PanIN

(**Pan**creatic **I**ntraepithelial **N**eoplasia)



1A



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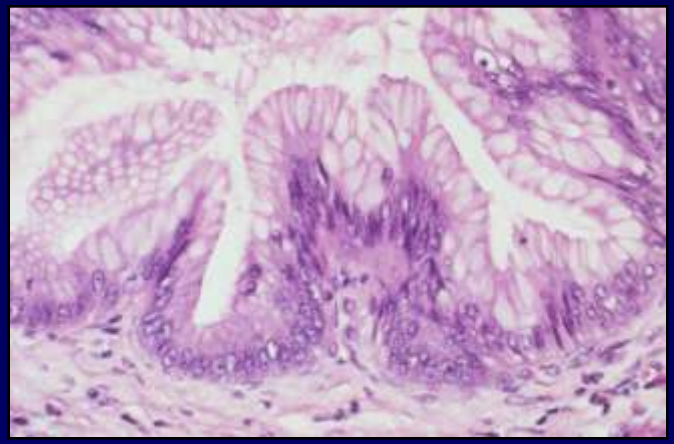
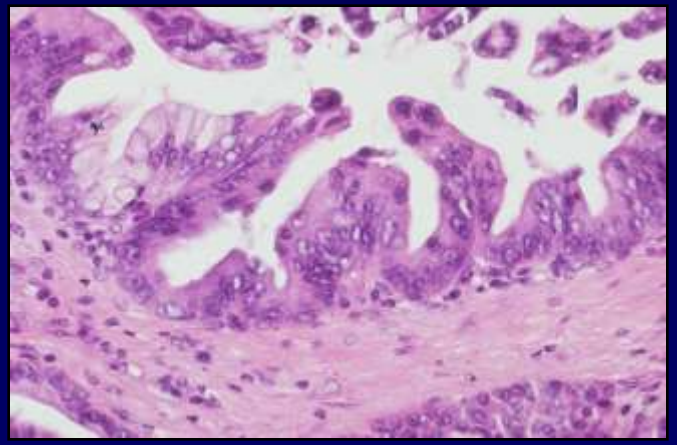


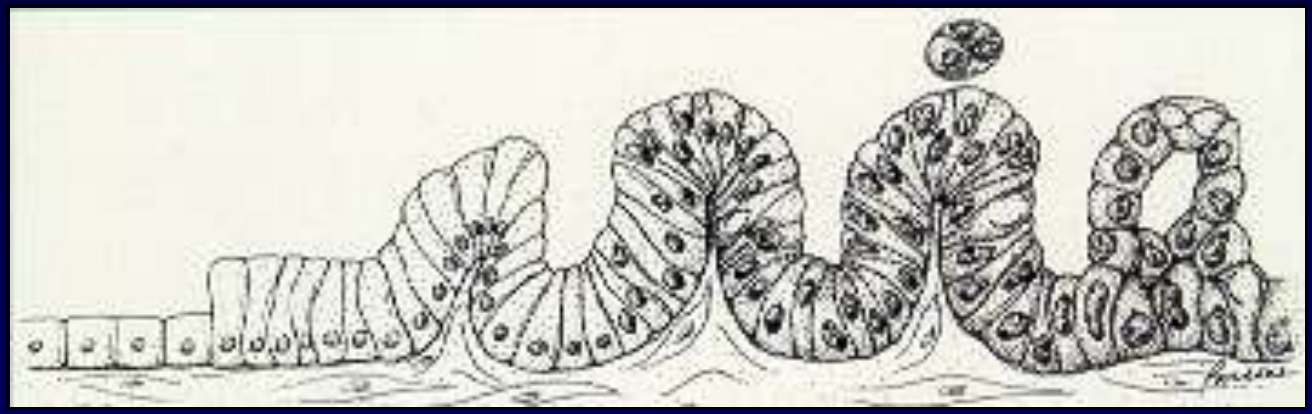
2



3

AJSP 2001; 25; 579-86.

PanIN and Genetics: A Model of Progression



Cancer Research 2000; 60: 2002-6.

Finding PanIN

- Problem - No symptoms, no radiological findings, no chemical findings
- Problem - PanIN lesions, especially lower grade lesions are common

PanIN - Prevalence

	Pancreatitis	Other Neoplasms	Ductal Adenocarcinoma
Overall	60%	80%	82%
Grade3	4%	10%	40%

Mod Pathol 2003; 16: 996-1006
Am J Surg Pathol 2006; 30; 36-41

Are there any other precursor lesions that we can identify?

WHO Classification of Primary Tumors of the Exocrine and Endocrine Pancreas (Abridged)

Acinar Cell Carcinoma
Ductal Adenocarcinoma
Intraductal Papillary Mucinous Neoplasm
Mucinous Cystic Neoplasm
Pancreatic Endocrine Tumor
Pancreatoblastoma
Serous Cystadenoma
Solid Pseudopapillary Neoplasm

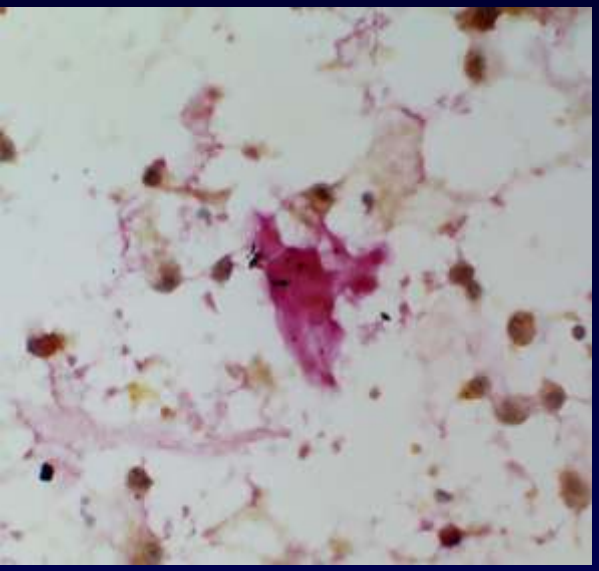
So how we will diagnose these cystic lesions…

Cystic Neoplasms

- Basically, intraductal papillary mucinous neoplasms, mucinous cystic neoplasms, and serous cystadenomas
- Remember that any pancreatic neoplasm may actually appear cystic!

Cystic Neoplasms

- Up to 1% of patients may be found to have a pancreatic cyst by radiology
- Task is, generally, to differentiate mucinous cysts from serous cysts and pseudocysts (for now)
- Cytology is only a one piece of the puzzle

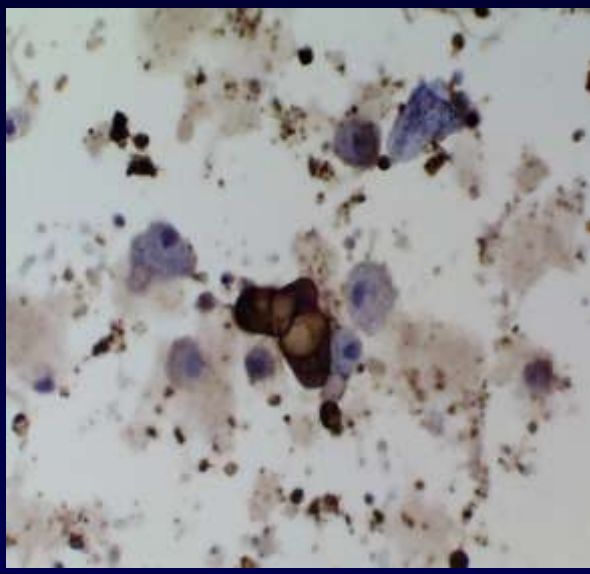


Fluid Analysis

Cytology

Mucin Stain

Viscosity



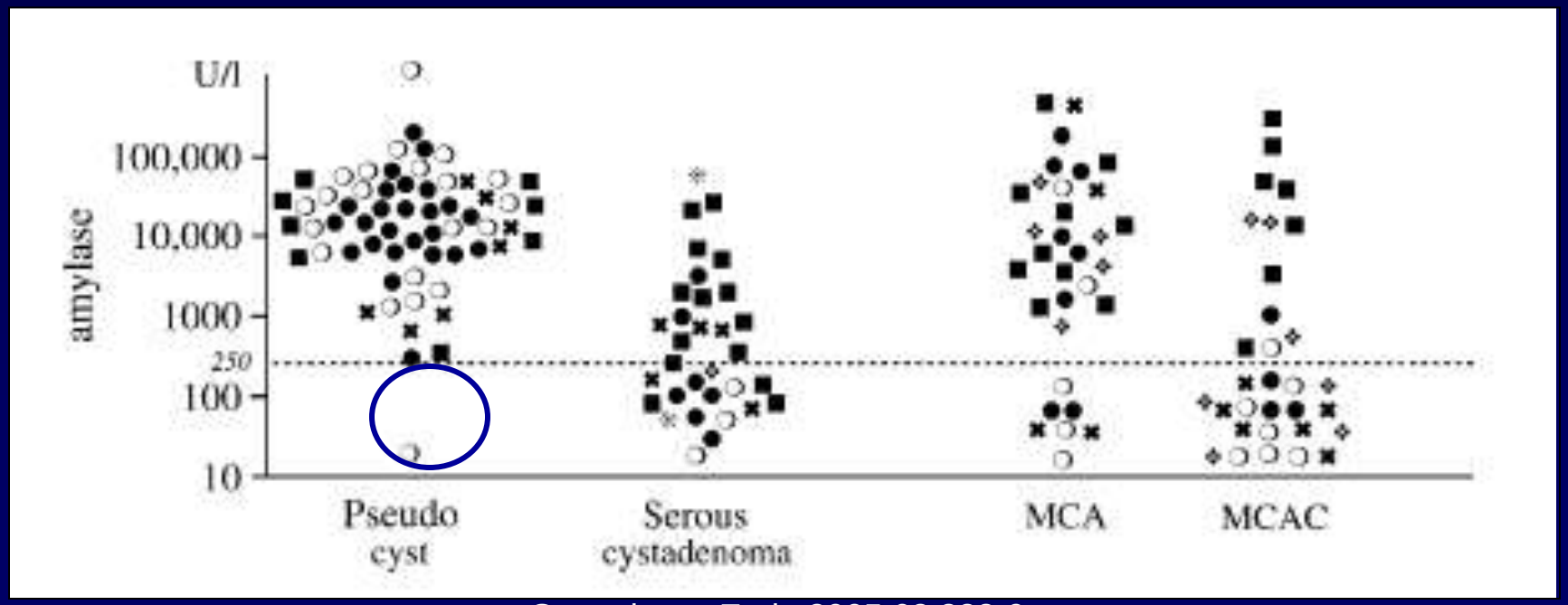
Enzyme levels: amylase, lipase

Tumor markers: CEA, CA-125,CA-19.9, CA-15.3

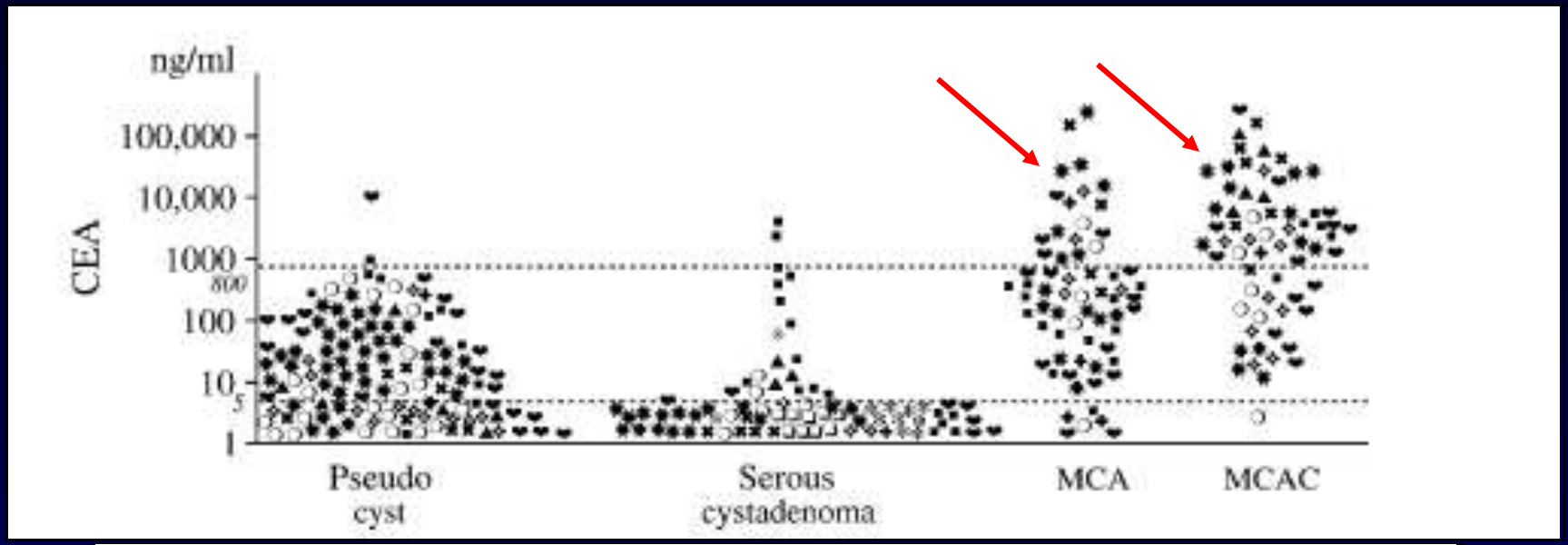
GOAL: Pre-op discrimination of pancreas cysts

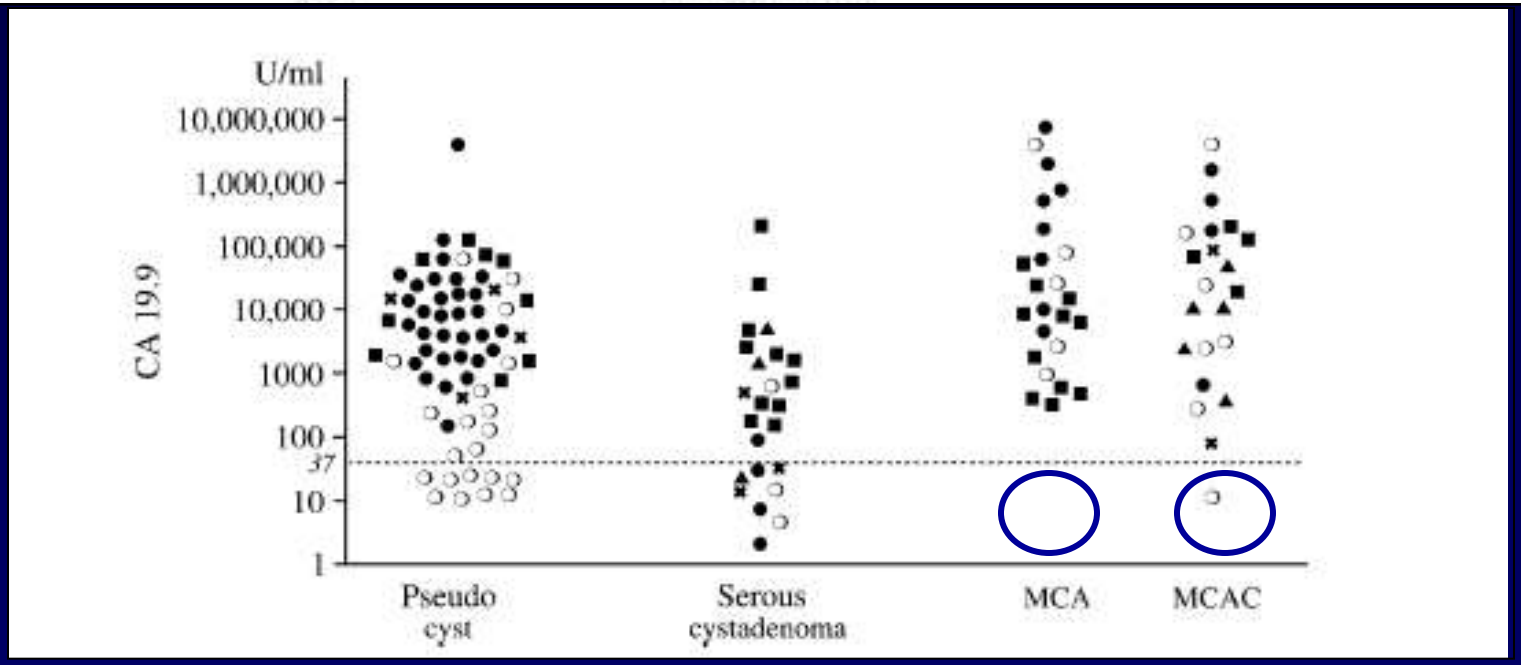
Cutoff	Diagnosis	Sensitivity	Specificity	PPV	NPV	Accuracy
Amylase<250 U/L	SCA, MCA, MCAC	44	98	98	53	65
CEA <5 ng/mL	SCA, PC	50	95	94	55	67
CEA >800 ng/mL	MCA, MCAC	48	98	94	75	79
CA 19-9 <36 U/mL	SCA, PC	19	98	94	38	46
Malignant Cytology	MCAC	48		100		

PC: Pseudocyst; **SCA**: Serous Cystadenoma; **MCA**: Mucinous Cystadenoma; **MCAC**: Mucinous Cystadenocarcioma



Gastrointest Endo 2005;62:383-9





Gastrointest Endo 2005;62:383-9

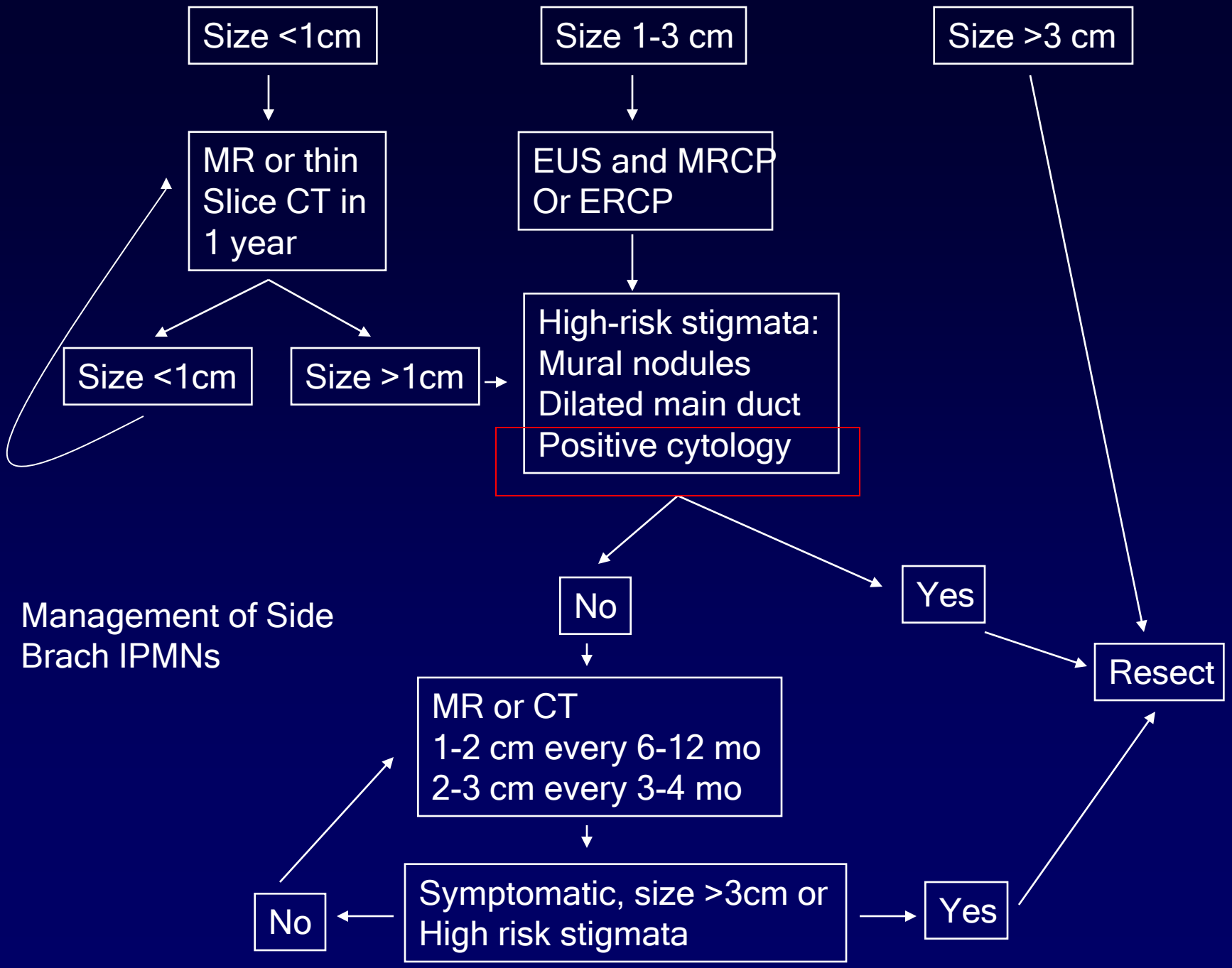
Suggested Management Based on Cyst Fluid Analysis

Cyst Fluid Analysis	Diagnosis	Management
Malignant Cytology	Malignancy	Resect
CEA > 800 ng/mL	MCA, MCAC	Resect
CEA < 5 ng/mL	SCA, PC	Do Not Resect
CA 19-9 < 37 U/mL	SCA, PC	Do Not Resect
Amylase < 250 U/L	Not a PC	??

PC: Pseudocyst; **SCA**: Serous Cystadenoma; **MCA**: Mucinous Cystadenoma; **MCAC**: Mucinous Cystadenocarcioma

International consensus guidelines for management of intraductal papillary mucinous neoplasms and mucinous cystic neoplasms of the pancreas

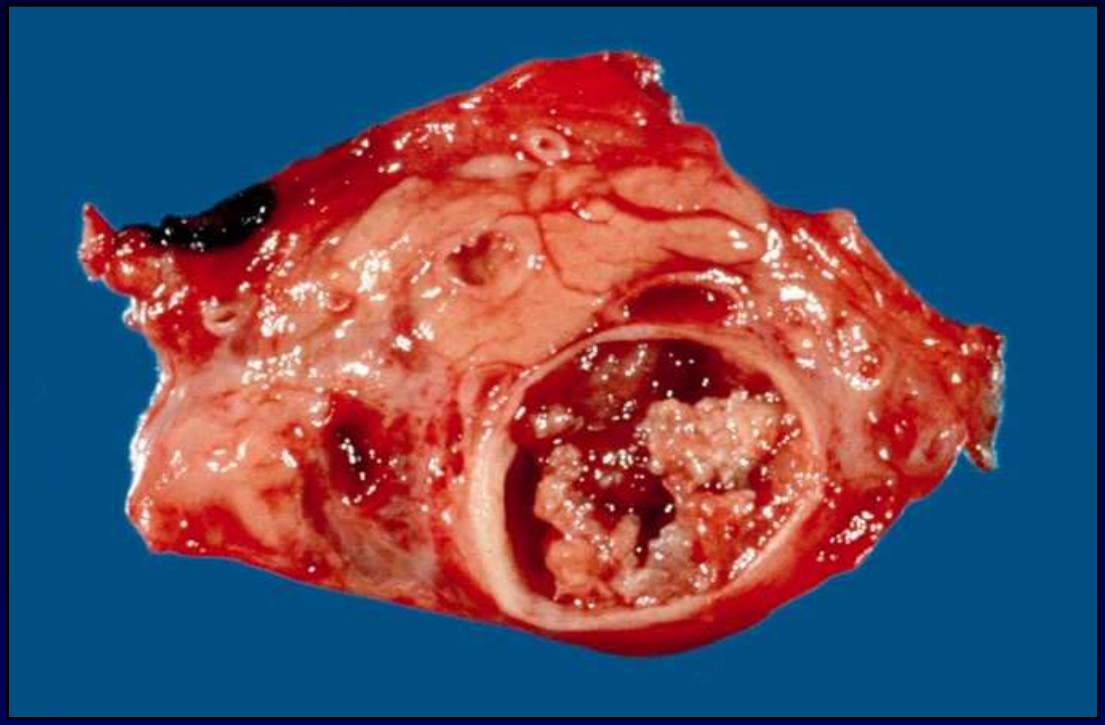
- All IPMNs involving the main duct
- All MCNs
- Some side-branch IPMNs

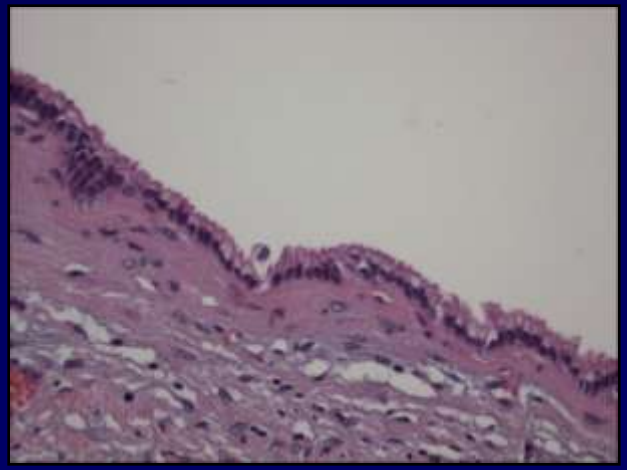


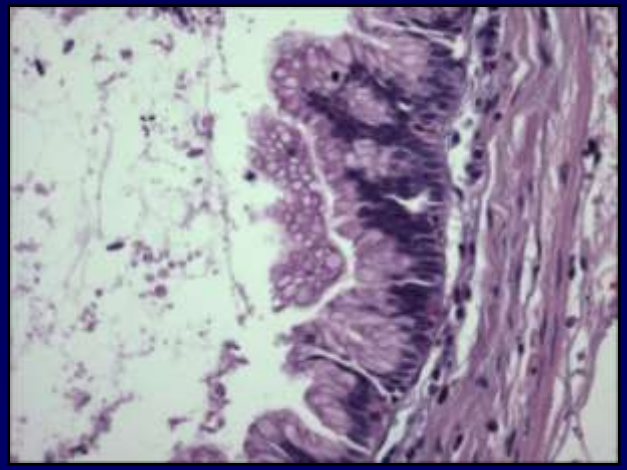
Management of Side Brach IPMNs

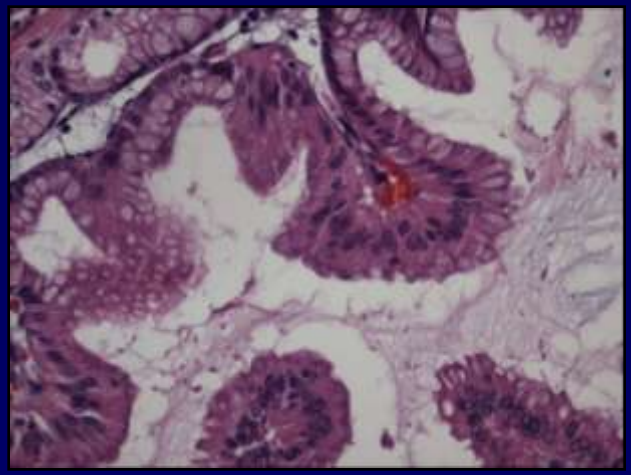
Intraductal Papillary Mucinous Neoplasm

- Historically rare, although it represents about 10-15% of HCMC neoplastic pancreatic FNA
- Older men with history of pancreatitis or incidental finding
- 3 grades (IPMA, IPMB, IPMC)
- Side-branch, main duct, both
- Invasive and not invasive

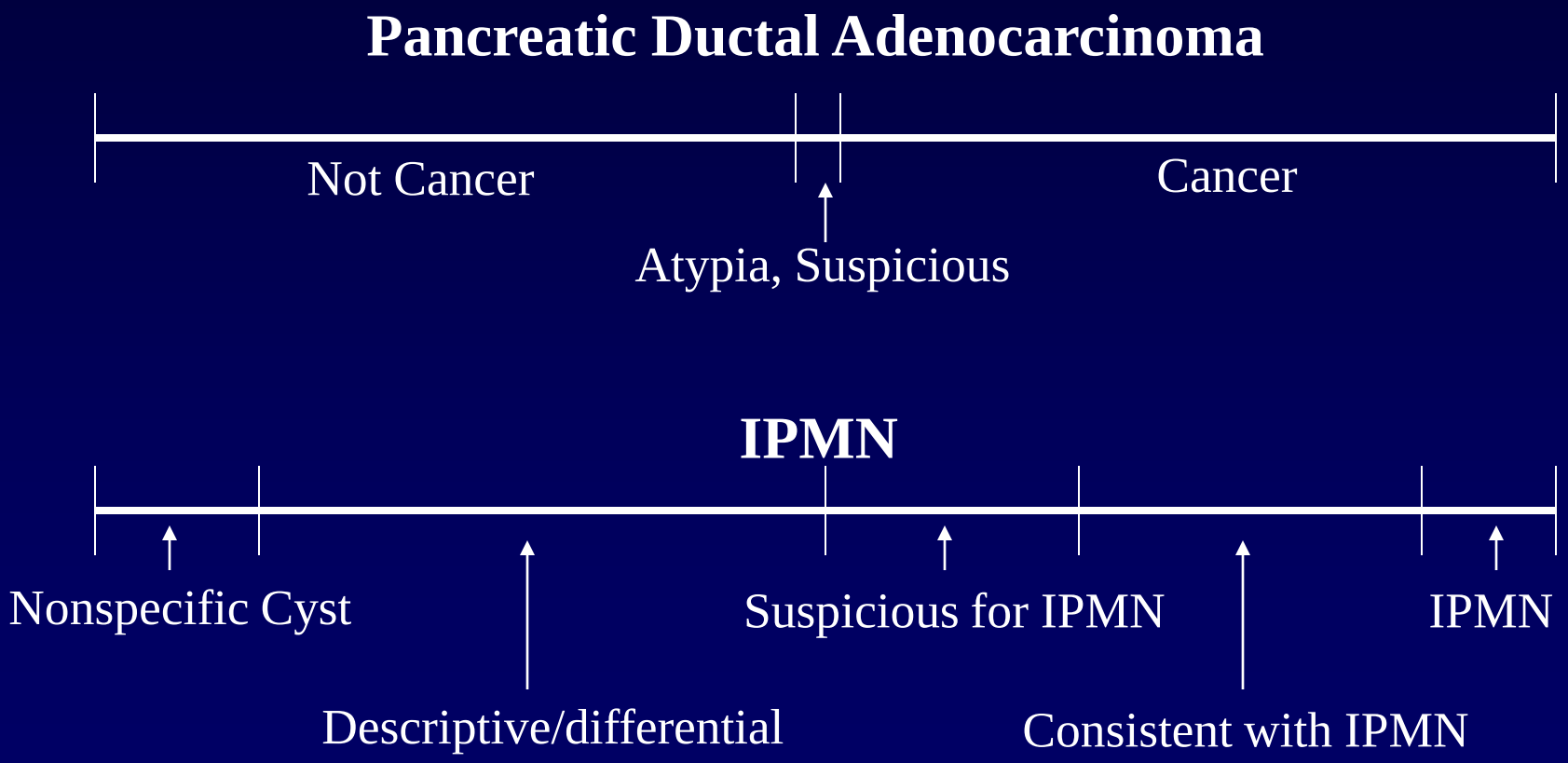








Reporting IPMNs



Note:
The findings may be consistent with either a mucinous cystic neoplasm or an intraductal papillary mucinous neoplasm.

I have reviewed these slides and their interpretation with the fellow, Hina Qureshi, M.D. and concur with the findings

Diagnosis:
PANCREAS, CYSTIC LESION, TRANSGASTRIC FNA:
THICK MUCUS PRESENT. See note.

Electronically Signed Out By Edward B Stelow, M.D. on 4/6/2005

jlc/4/6/2005

Edward B Stelow, M.D.
Alveta Nash, CT(ASCP)
Hina Qureshi, M.D.

CYTOLOGIC DIAGNOSIS:

1. PANCREAS, TRANSGASTRIC FNA, C05-7679, 1 SLIDE TAKEN ON 4/4/05.
UNSATISFACTORY SPECIMEN.
MUCUS PRESENT ONLY.
NO CELL IDENTIFIED.

Statement of Adequacy:
UNSATISFACTORY SPECIMEN.

I ATTEST THAT THE ABOVE DIAGNOSIS IS BASED UPON MY PERSONAL EXAMINATION OF THE SLIDES (AND/OR OTHER MATERIAL), AND THAT I HAVE REVIEWED AND APPROVED THIS REPORT.

18 IPMNs Reviewed

- M:F 7:11; 52-87 years old
- EUS identified dilatation of the main duct only (3), side branches only (3), or both (12)

Extracellular Mucus	Papillary Structures	Low or no cellularity	Moderate to High Cellularity	Goblet cells	Atypia
18/18	3/18	9/18	9/18	6/18	3/18

Am J Clin Path 2003;120:398-404

More IPMNs Reviewed*

Abundant Extracellular Mucus	Papillary Structures	Low or no cellularity	Moderate to High Cellularity	Goblet cells	Atypia
10/11	5/11	4/11	7/11	NA	7/11

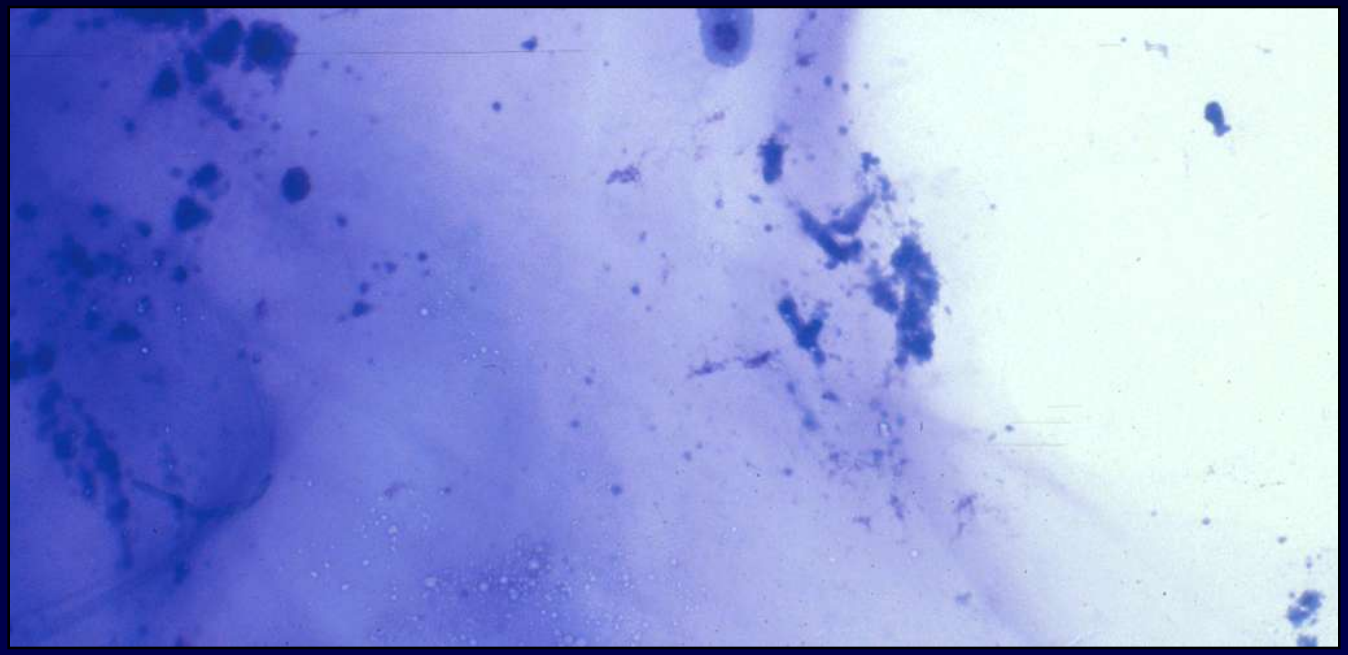
Cancer Cytopathol 2005: In Press.

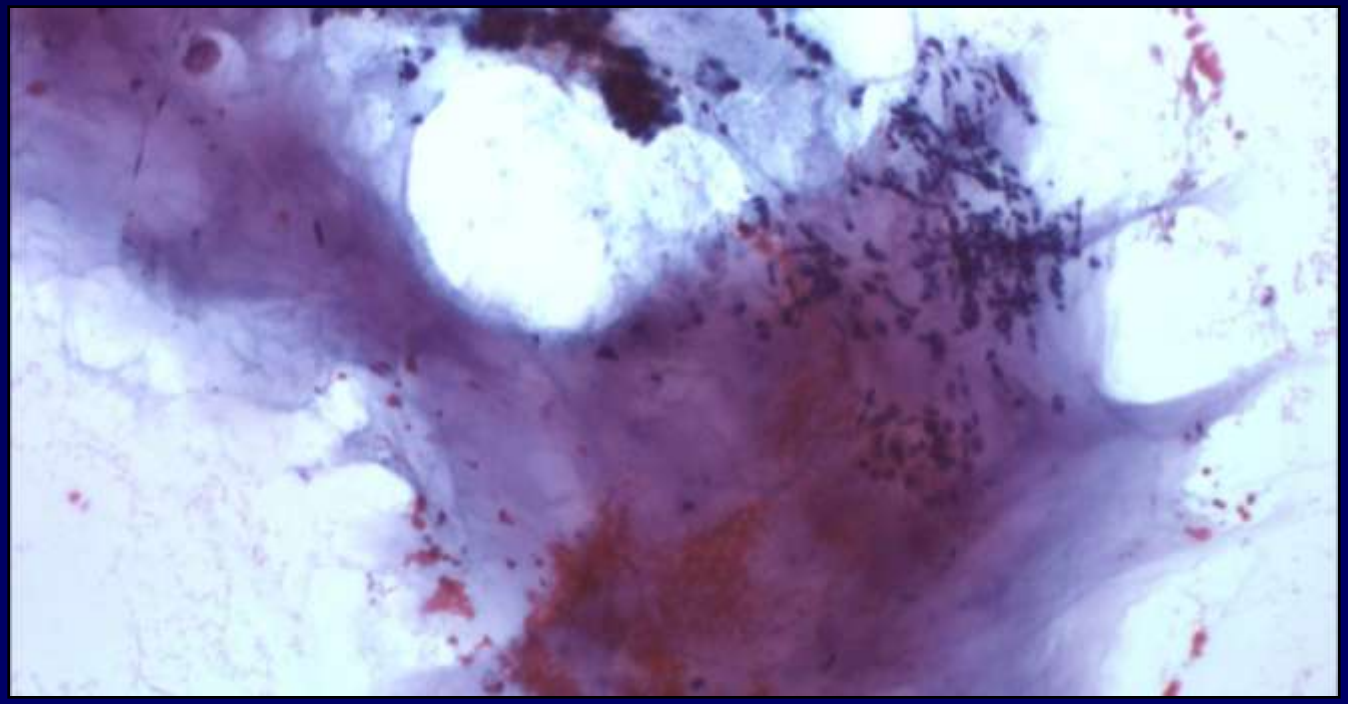
Abundant Extracellular Mucus	Papillary Structures	Low or no cellularity	Moderate to High Cellularity	Goblet cells	Atypia
10/13	8/13	5/13	8/13	NA	8/13

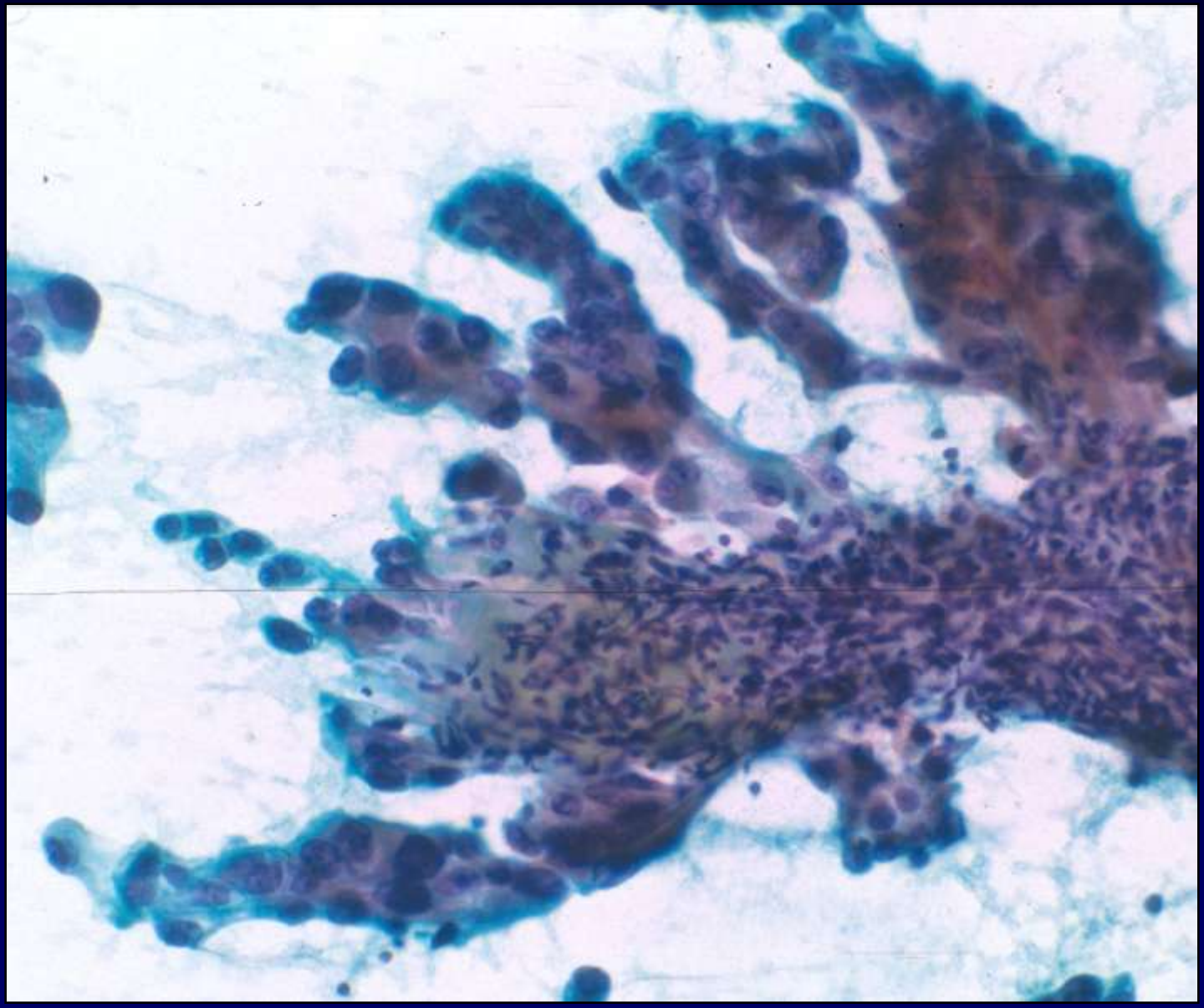
Diagn Cytopathol 2005;32:16-20.

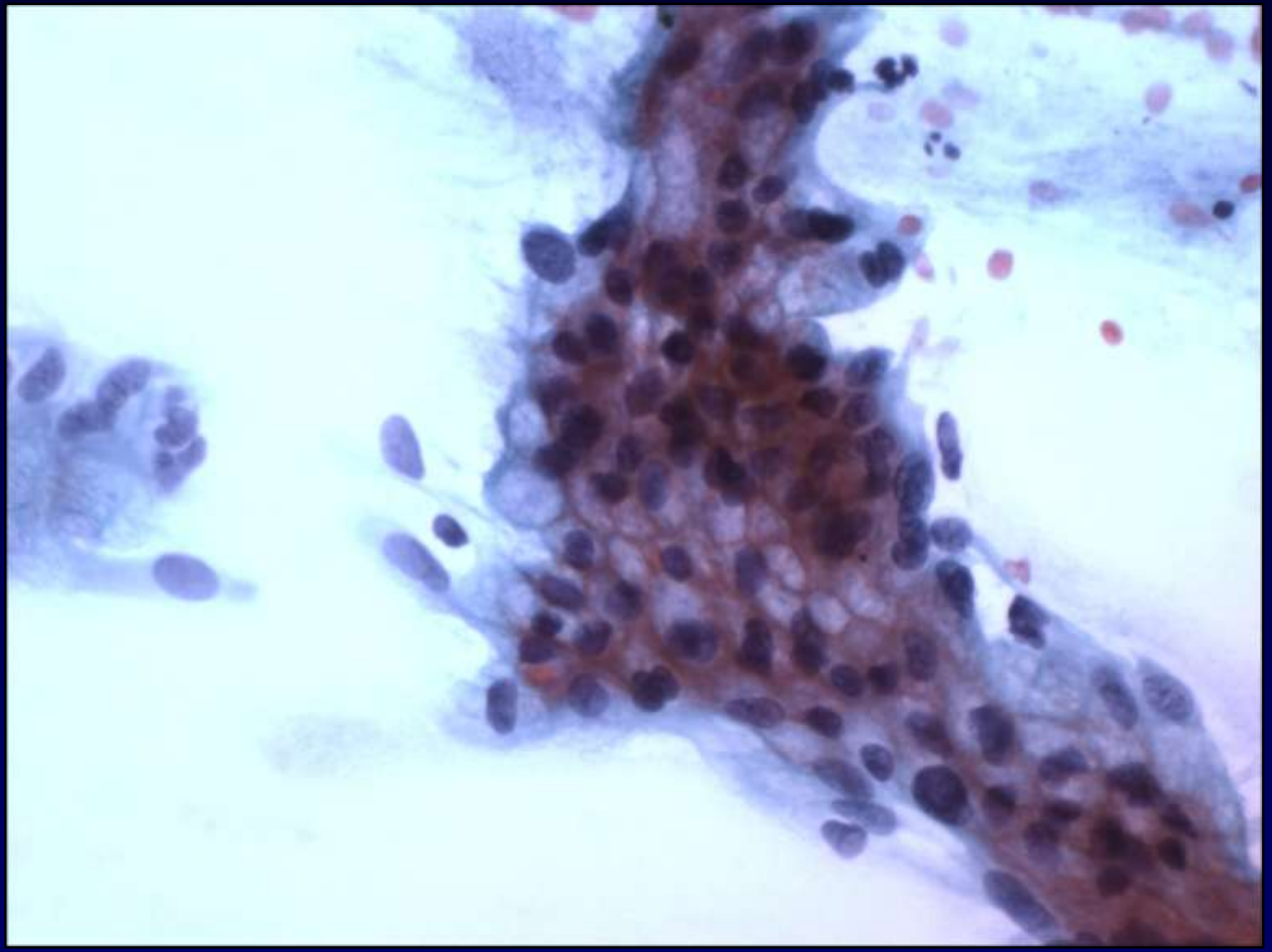
* ??Selection Bias

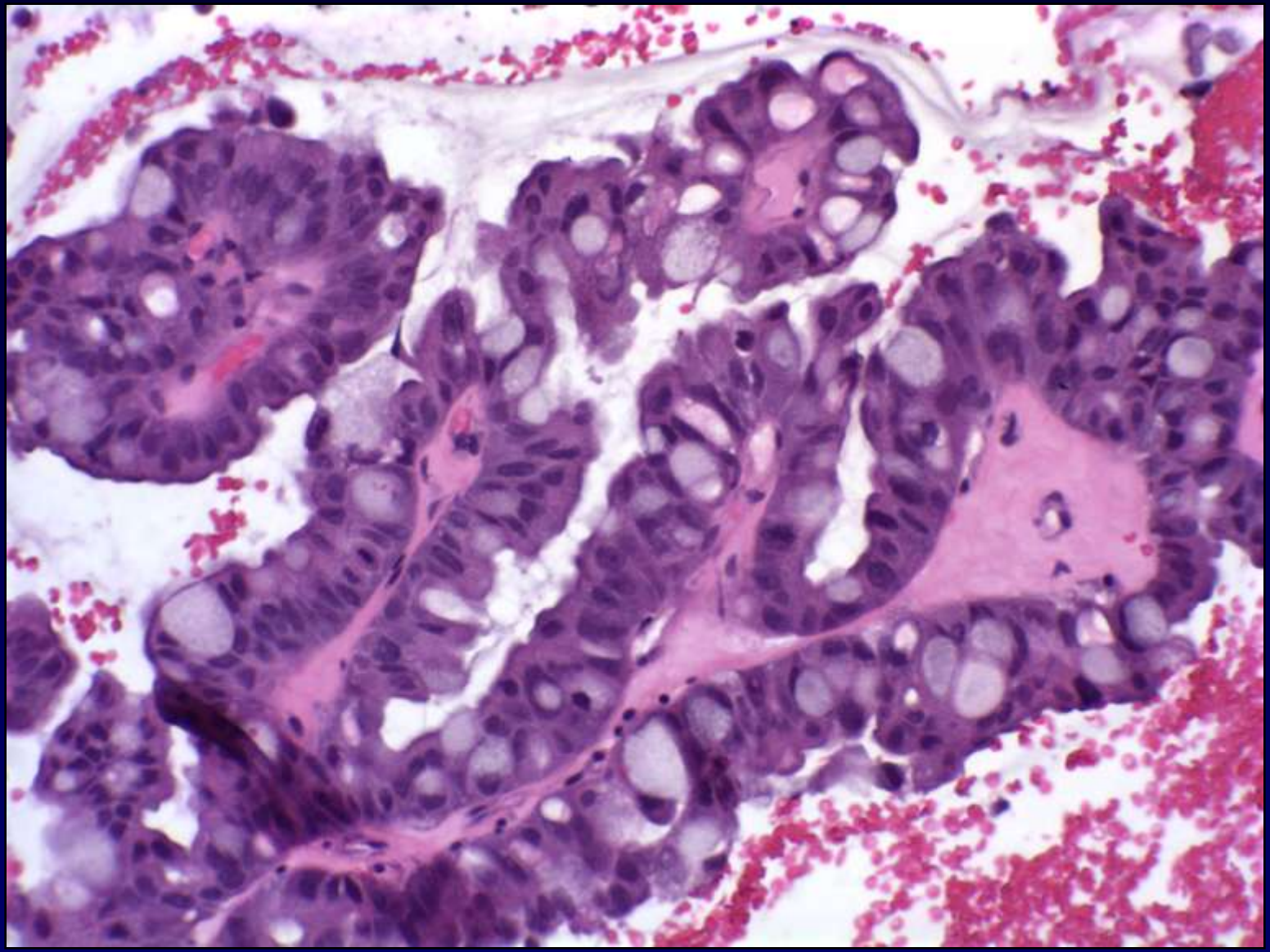

C05-
Cytology
UVA HEALTH SYSTEM





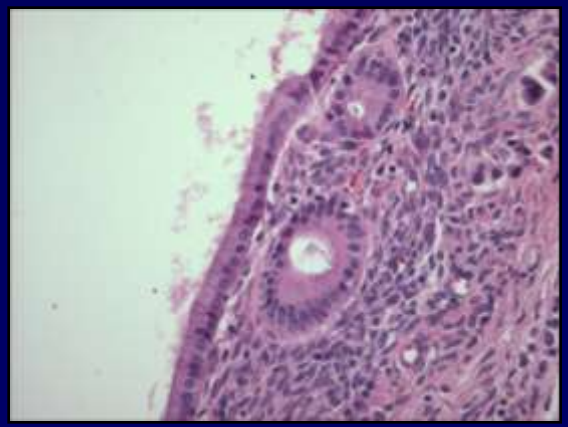


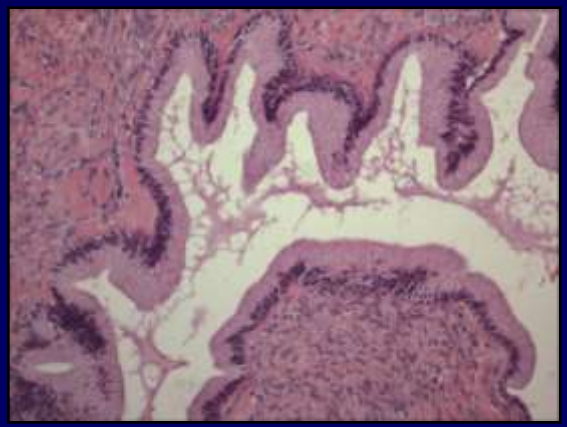


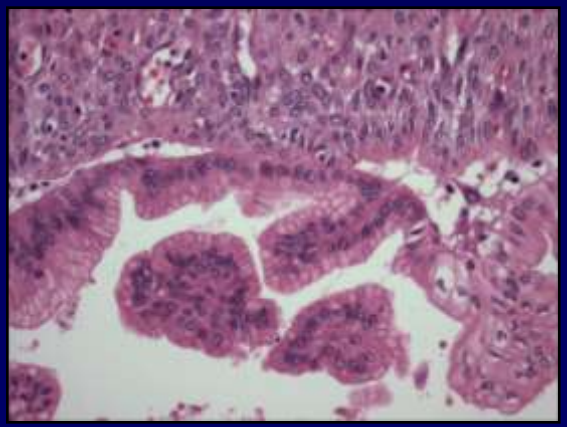


Mucinous Cystic Neoplasm

- ? 2-5% of exocrine lesions
- Do not communicate with the ductal system
- 3 grades, like IPMN, with invasive and noninvasive tumors
- Ovarian stroma
- Middle aged women



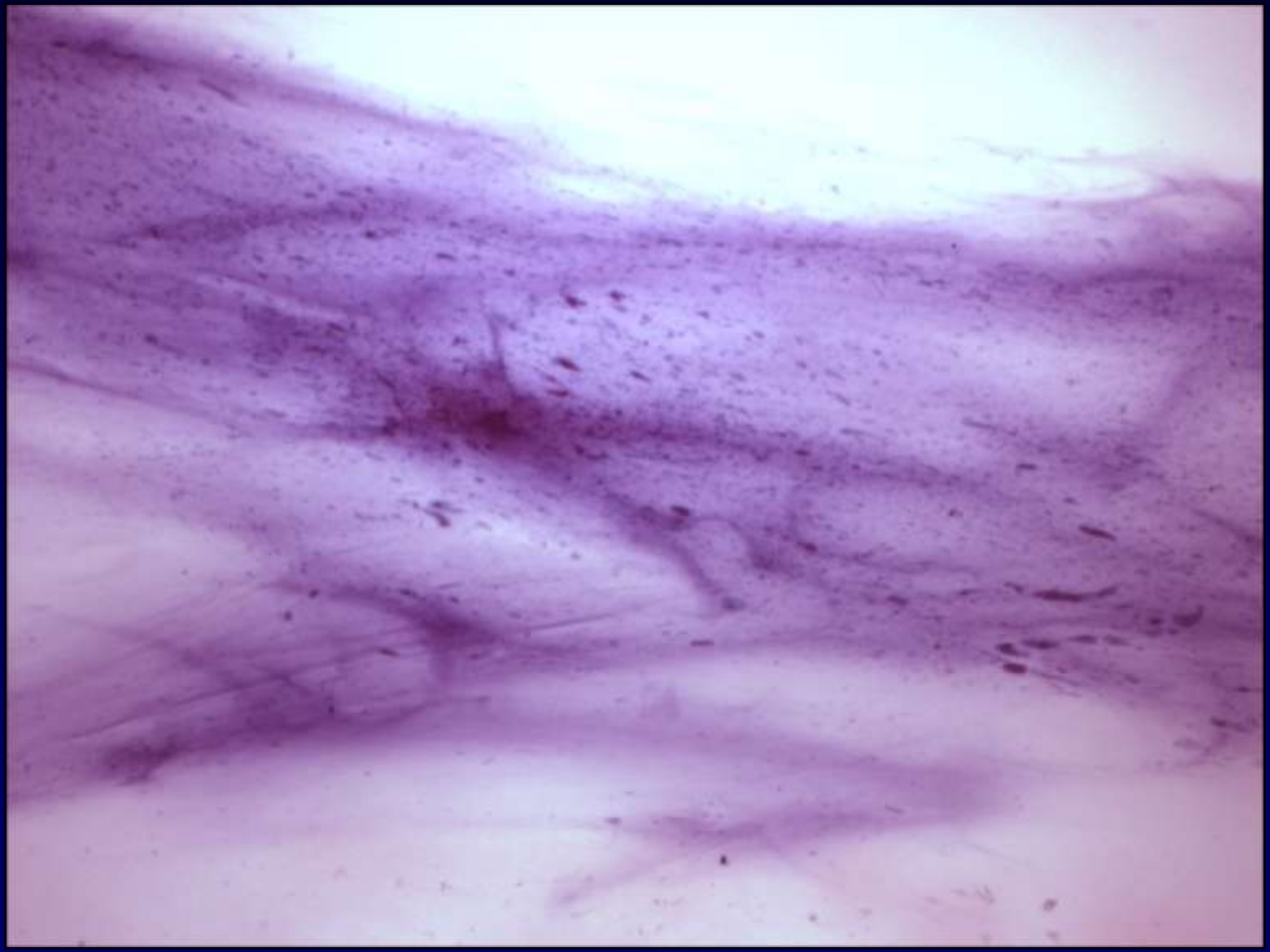


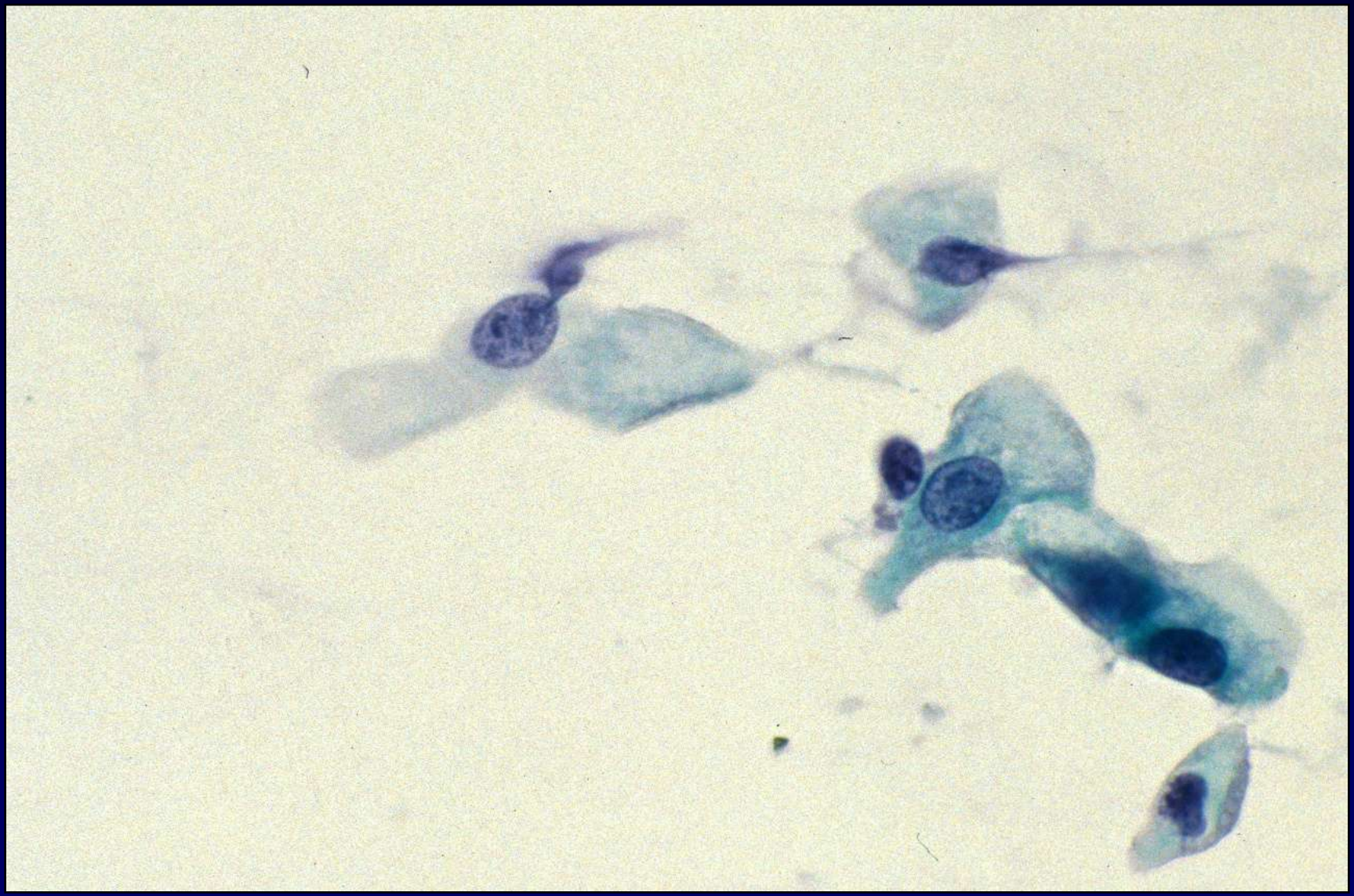


Mucinous Cystic Neoplasm (Cytology)

- Like IPMN - Thick mucus extremely helpful
- EUS/clinical impression important
- Low cellularity
- ? Ovarian stroma
- Some authors claim that cytology can tell the difference between these and IPMNs (lower cellularity, absence of papillae)
- Mucus: thinner than IPMNs (lower grade, not intestinal-type) (my experience)

Cancer Cyto 2004;102:92-9





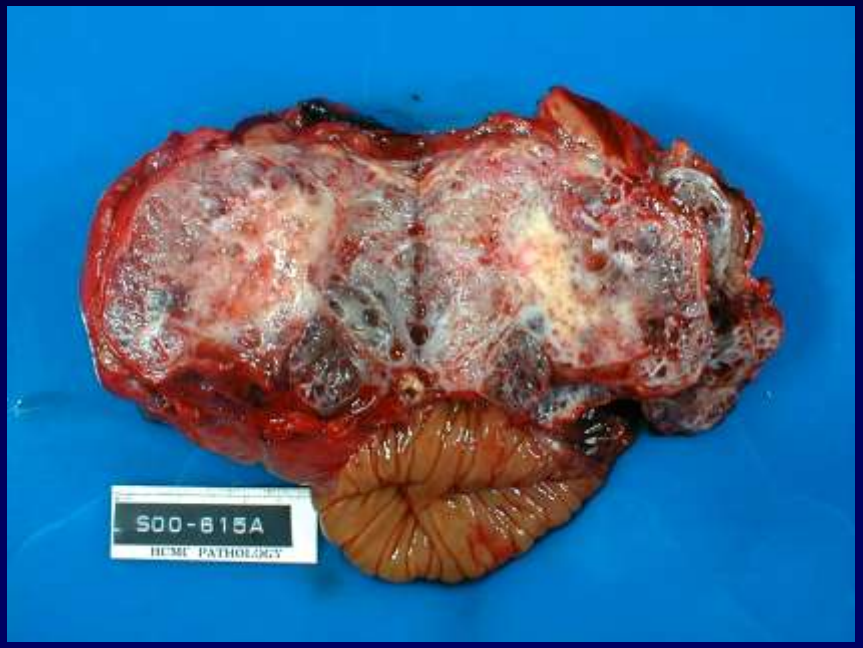
IPMN vs. MCN

	Mucinous Cystic Neoplasm	Intraductal Papillary Mucinous Neoplasm
Patient Age	5th to 6th decades	7th to 8th decades
Gender	90% F	M > F
Tumor Location	90% Tail	80% Head
Ampullary Mucorrhea	No	Yes
Duct System Communication	10%	Yes

	Mucinous Neoplasm	Serous Neoplasm	GI Contaminant
Fluid	Thick, gelatinous, viscid, crystal clear mucous.	Thin, watery, "proteinaceous" fluid.	Thin to watery, clear to "dirty" fluid.
Epithelial Cells	Relatively small groups and/or single cells. Rare papillae may be present. A "honeycomb" pattern is usually not seen. Goblet cells, or vacuolated cells may be present. Variable features of dysplasia may be present including nuclear crowding, anisonucleosis, nuclear membrane irregularity, chromatin clumping, and prominent nucleoli.	Rare sheets of epithelial cells composed of bland cuboidal cells that have finely granular cytoplasm with round to oval nuclei with homogenous, dispersed chromatin.	Relatively larger groups mostly arranged as cohesive sheets with a marked "honeycomb" pattern. Cells are small and uniform with evenly spaced, round to oval nuclei with fine chromatin. Changes of dysplasia should not be present. Goblet cells are evenly dispersed.

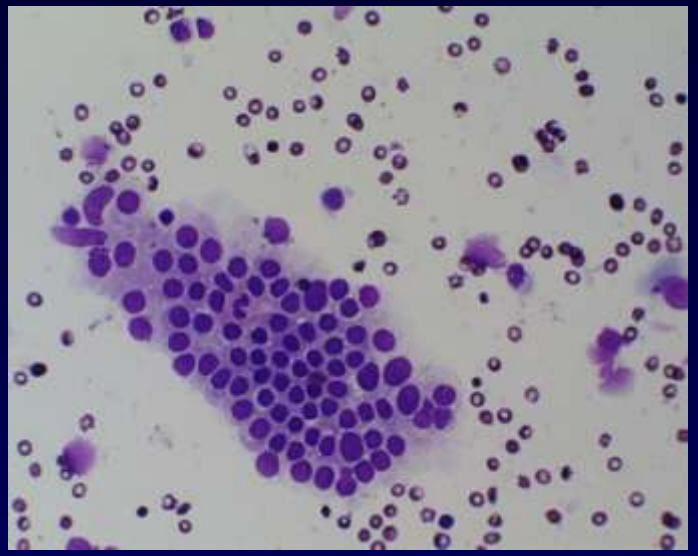
Serous Cystadenoma

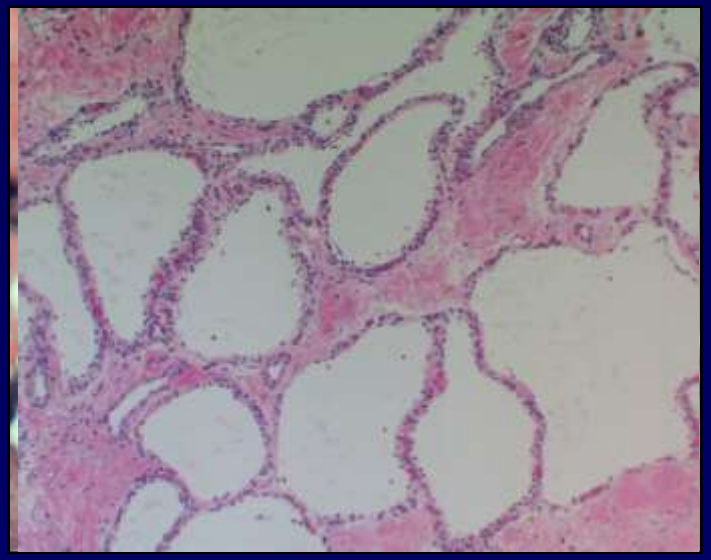
- 1-2% of exocrine pancreatic neoplasms
- Older individuals, mostly women
- Numerous small cysts lined by cuboidal, glycogen rich epithelial cells
- Central scar
- Associated with VHLD



Serous Cystadenoma

- Clean, watery not mucinous background.
- Cohesive sheets.
- Cells: small, uniform, cuboidal.
- Cytoplasmic glycogen.
- Low viscosity, PAS +, CEA -, mucin –



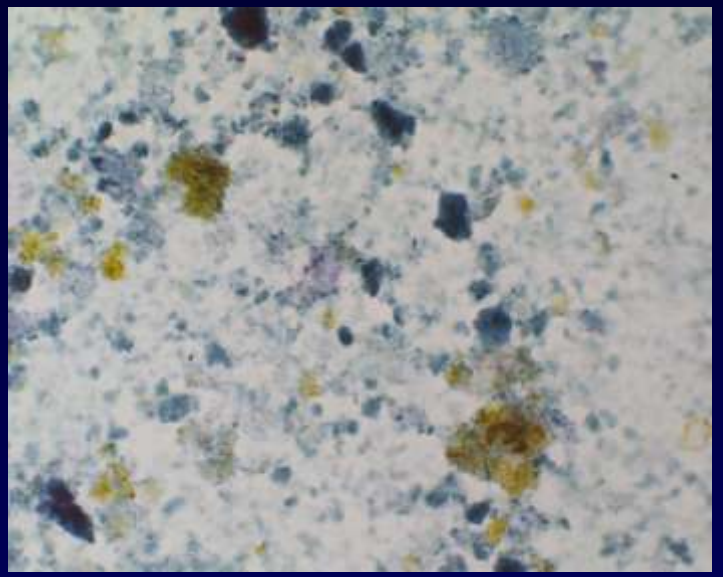


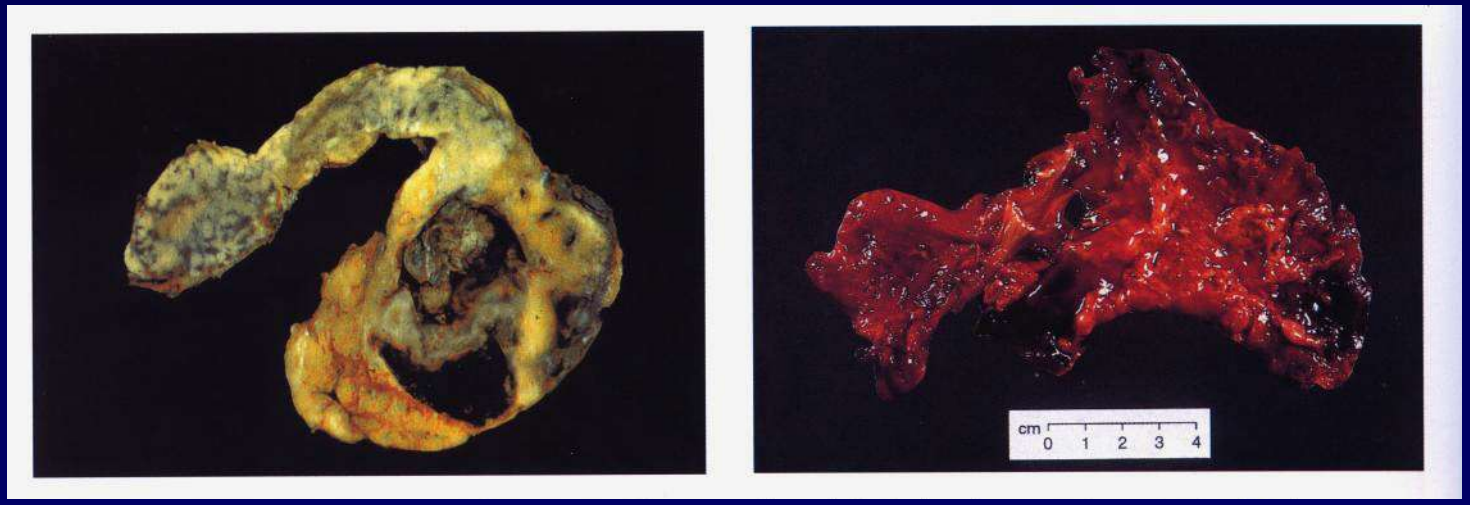
Other cysts

- Pseudocyst
- Congenital/simple Cyst
- Cystic Fibrosis
- Infectious
- Lymphoepithelial cyst
- Other neoplasm

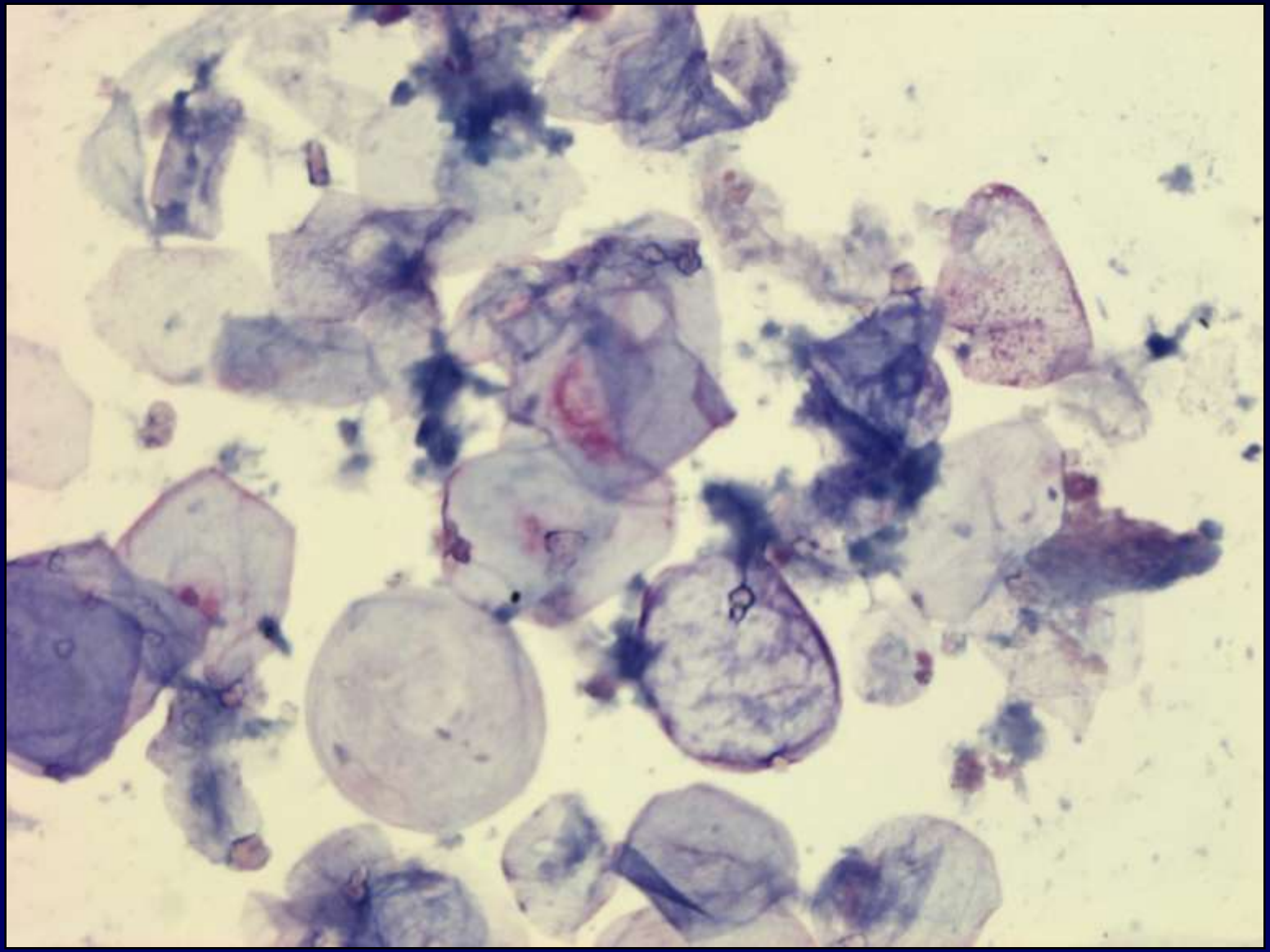
Pseudocyst

- Turbid fluid.
- Granular background.
- Calcification.
- Macrophages.
- Inflammatory cells.
- No epithelial cells.

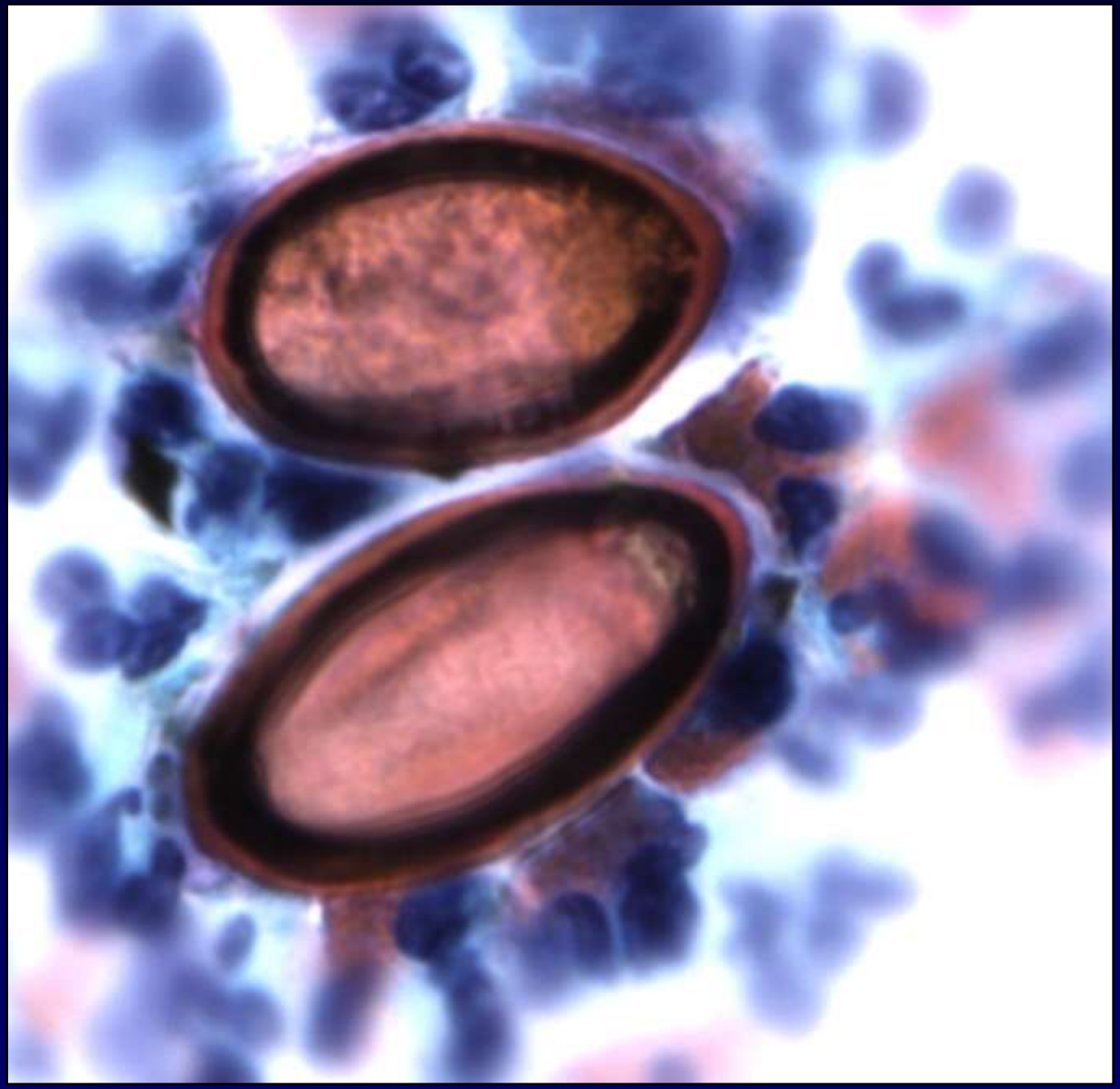




Pathology of the Pancreas, gallbladder… Lack EE. Oxford Univ Press. 2003.

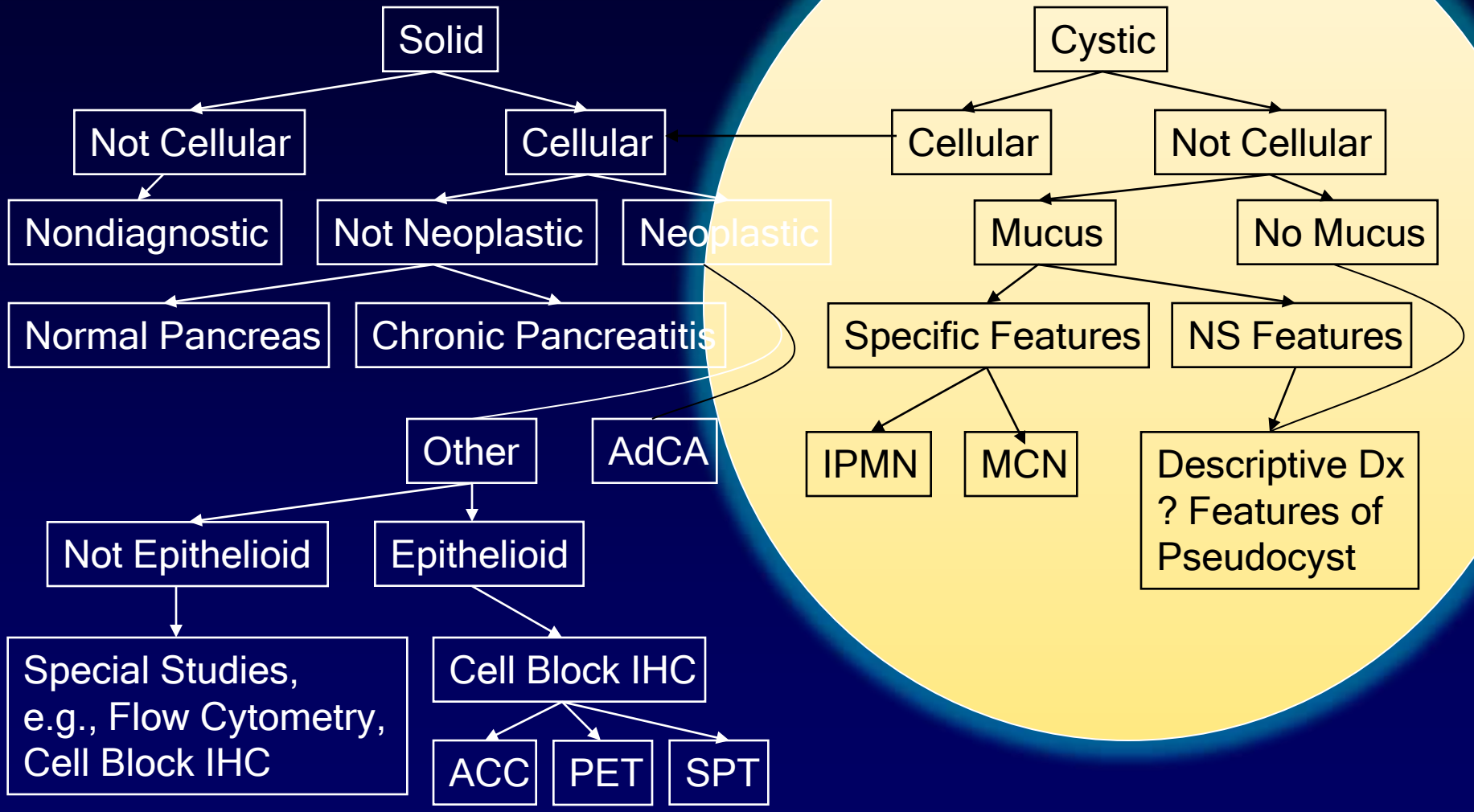


Lymphoepithelial Cyst



Opisthorchis

Easy Algorithm



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