I have not had in the past 3 years, a financial interest, arrangement or affiliation with one or more organizations that could be perceived as a direct or indirect conflict of interest in the content of this presentation.
OBJECTIVES

After this session on pancreas eus fnab, should be able to:

- **Recognize** diagnostic approaches to complex cytological problems

- **Expand** knowledge & skills in interpretation of advanced cytology sampling techniques
AGENDA

- 2 cases
- Pancreas eus fnabs

Photos:
Hologic, PathologyOutlines, cytology.wordpress.com
www.eurocytology.eu  www.joplink.net  www.pubcan.org,
researchgate, PathPedia.com
Case 1

- 55 year old female
- Body of pancreas (BOP) mass
- Solid, 5 x 4 cm
- Transgastric EUS FNAB
What is the pattern?
What is the pattern?

GLANDULAR & ACINAR

What is your diagnosis?
What is your diagnosis?

a) Neoplastic mucinous cyst
b) Gastric contamination
c) Pancreatic endocrine neoplasm
d) Acinar cell carcinoma
e) Solitary pseudopapillary neoplasm
Approach

- Clinical & imaging important
  - if solid – use algorithm for DDX

- Microscopic approach
  - Adequacy
    - Background
    - Contamination
  - Diagnosis
ALGORITHM: Solid Pancreas Mass EUS FNAB

Non-neoplastic
- Normal contaminant
- Pancreatitis
  - chronic
  - autoimmune
  - acute
- Infection

Neoplastic
- Adenocarcinoma, ductal
- Pancreatic endocrine neoplasm
- Acinar cell carcinoma
- Solid pseudopapillary neoplasm
- Pancreaticoblastoma
- Metastasis
ALGORITHM: Acinar pattern

Non-neoplastic

- Normal contaminant
- Pancreatitis

Neoplastic

- Pancreatic endocrine neoplasm
- Acinar cell carcinoma
- Solid pseudopapillary neoplasm
- Pancreaticoblastoma
- Metastasis

Other patterns: single cells, glandular, cystic
ADEQUACY: ROSE

- Define adequacy to accommodate threshold differences in interpretation

- Solid lesion:
  - Epithelial predominant: > 10 groups
  - Inflammation: may not be lesional

- Purpose: triage for ancillary studies
  NEED cell block!
  Do cores
Coagulative necrosis: malignant

Fat necrosis & pancreatitis
BACKGROUND: Mucus/Mucin

GI luminal mucus
- watery, thin, dirty, heterog
- bare nuclei, food

Mucin
- thick, uniform
- cracked, colloid-like

BOTH + mucin stains
CONTAMINATION

Pancreas

Patterns
Single cells
Glandular
Acinar
**DIAGNOSIS: LO POWER**

**Glandular Pattern**

<table>
<thead>
<tr>
<th>Mucosal Contamination</th>
<th>Adenocarcinoma</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low to high cellularity</td>
<td>High</td>
</tr>
<tr>
<td>Cohesive, 2-D, flat</td>
<td>Loosely cohesive, 3D</td>
</tr>
<tr>
<td>Polarized groups</td>
<td>Drunken honeycomb</td>
</tr>
<tr>
<td>Naked grooved nuclei</td>
<td>Single abN cells</td>
</tr>
<tr>
<td>In mucus blobs</td>
<td>Necrosis (coagulative)</td>
</tr>
</tbody>
</table>
Mucosal contamination
Polarized, cohesive

Ductal adenocarcinoma
Drunken honeycomb, atypia
CASE 1

GI mucus
Gastric mucosal contam’n

What about the acinar pattern?
## DIAGNOSIS: LO POWER
### Acinar Pattern

<table>
<thead>
<tr>
<th>Contamination (pancreas/pancreatitis)</th>
<th>Neoplasm</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Lo – mod cellularity</td>
<td>- Variable cellularity</td>
</tr>
<tr>
<td>- Cohesive, polarized</td>
<td>- Dyshesion</td>
</tr>
<tr>
<td>- Grape-like clusters</td>
<td>- Single cells</td>
</tr>
<tr>
<td>- Acini, ductal, islets</td>
<td>- Uniform cell type</td>
</tr>
</tbody>
</table>
# DIAGNOSIS: HI POWER

## Acinar Pattern

<table>
<thead>
<tr>
<th>Contamination (pancreas/pancreatitis)</th>
<th>Neoplasm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lobular</td>
<td>Vascular (PEN, SPN)</td>
</tr>
<tr>
<td>CB: 2-toned cytoplasm</td>
<td>Nuclear clues</td>
</tr>
<tr>
<td>Granular cytoplasm</td>
<td>- salt/pepper (PEN)</td>
</tr>
<tr>
<td>Lymphoid tangles</td>
<td>- grooves (SPN)</td>
</tr>
<tr>
<td>CB: fibrosis, loss of acini</td>
<td>- ++ nucleoli (ACC)</td>
</tr>
</tbody>
</table>
Chronic pancreatitis

Normal pancreas

Grapes

Lobular, two toned

Chronic pancreatitis

Fibrosis, atrophy
Acinar Pattern

PEN

SPN

ACC
Acinar pattern
Single cells
Large polygonal
Smaller finely granular
Chief cells (purple)
Parietal cells (pink)

Acinar pattern
CASE 1

Non-lesional
Normal gastric oxyntic (body type) glands
Remember to exclude contaminant first
Case 2

- 60 year old male
- Distal pancreatectomy for PEN
- TOP region mass
- Transgastric EUS FNAB
- ?? recurrent PEN
What is the pattern? What is your diagnosis?
What is your diagnosis?

a) Gastric contamination
b) Pancreatic endocrine neoplasm
c) Renal cell carcinoma
d) Solitary pseudopapillary neoplasm
e) Something else?
Approach

- Clinical & imaging important
  - if solid – use *algorithm* for DDX

- Microscopic approach
  - Adequacy
    - Background
    - Contamination
  - Diagnosis
ALGORITHM: Acinar pattern

**Non-neoplastic**
- **Normal contaminant**
  - pancreas
  - gastric oxyntic cells
- Pancreatitis

**Neoplastic**
- Pancreatic endocrine neoplasm
- Acinar cell carcinoma
- Solid pseudopapillary neoplasm
- Pancreaticoblastoma
- Metastasis

Other patterns: single cells, glandular, cystic
ADEQUACY: ROSE

- **Purpose**: triage for ancillary studies
  
  NEED cell block!
  
  Do cores

- **EUS toys**
  
  - Shark cores
    - decrease # smears
    - better sampling fibrosis
    - id invasion: stromal, perineural
    - material for immunomarkers
Dyshesive, homogeneous
Salt & pepper
Cell block: insular/acinar pattern
Chromogranin, synaptophysin +
The worms

Vascular
Heterogeneous
Pseudopapillary
Grooved nuclei
B-catenin, CD10 +
Chromo -, synapto +
ACC

Dyshesive
Loose acini
Nucleoli
Chymotrypsin, trypsin +
Foamy vacuolated cytoplasm
Bland nuclei

Lacks salt/pepper
No grooves
Not vascular
Cell block

Inhibin +
Melan-A +
<table>
<thead>
<tr>
<th>Outer layer</th>
<th>Inner Layer</th>
</tr>
</thead>
<tbody>
<tr>
<td>foamy lipid rich background</td>
<td>smaller cells</td>
</tr>
<tr>
<td>single cells, clusters</td>
<td>lipofuscin pigment</td>
</tr>
<tr>
<td>bland oval nuclei</td>
<td>granular eosinophilic cytoplasm</td>
</tr>
<tr>
<td>no or small nucleoli</td>
<td>no vacuolization</td>
</tr>
<tr>
<td>abundant vacuolated cytoplasm</td>
<td></td>
</tr>
<tr>
<td>with frayed edges</td>
<td></td>
</tr>
</tbody>
</table>
What is the pattern?

What is your diagnosis?
CASE 2

➤ How would you report this?
CASE 2

- How would you report this?
  - Indeterminate
  - Adrenal cortical sampling

- May represent normal cortex or neoplasm (benign/mal)
- Distinction not possible based on fnab alone
**ALGORITHM: Acinar pattern**

<table>
<thead>
<tr>
<th>Non-neoplastic</th>
<th>Neoplastic</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normal contaminant</strong></td>
<td>Pancreatic endocrine neoplasm</td>
</tr>
<tr>
<td>- pancreas</td>
<td>Acinar cell carcinoma</td>
</tr>
<tr>
<td>- gastric oxyntic cells</td>
<td>Solid pseudopapillary neoplasm</td>
</tr>
<tr>
<td>- adrenal</td>
<td>Pancreaticoblastoma</td>
</tr>
<tr>
<td><strong>Pancreatitis</strong></td>
<td>Metastasis</td>
</tr>
<tr>
<td></td>
<td>Adrenal neoplasm</td>
</tr>
</tbody>
</table>
Optimization Cell Blocks

- **ROSE triage**
  - once dx made, then CB #1 priority

- **Increase # CB & fixative types**
  - formalin, Cytolyt, cores, pellets, Histogel

- **Avoid refacing CB**

- **Cut H&E levels**
Remember sampling of adjacent structures
Take home points

- Use solid, acinar **algorithm** for DDX
- Remember **ABCDs**

- Consider
  - normal contaminants
  - adjacent structure sampling

- Optimize **cell block** use
Questions?