

# An Introduction to Fine Needle Aspiration of the Breast

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4/13/13  
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## BREAST- CLINICAL

- Clinically evident breast “mass” common cause of office visits
- ~ 1 million biopsies performed annually (U.S.A)
- ~ 85% of these biopsies are benign
- Workup of a breast mass has a heavy toll on patient

## APPROACHES TO BIOPSY

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- Exisional biopsy
  - Traumatic
  - Expensive
  - Scar tissue makes subsequent imaging difficult to interpret
- Core biopsy
  - Less traumatic but may miss lesion
  - If no lesion seen, may still need excision

## APPROACHES (CONT.)

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- Excision/core bx
  - Time consuming/expensive
  - Requires tissue processing

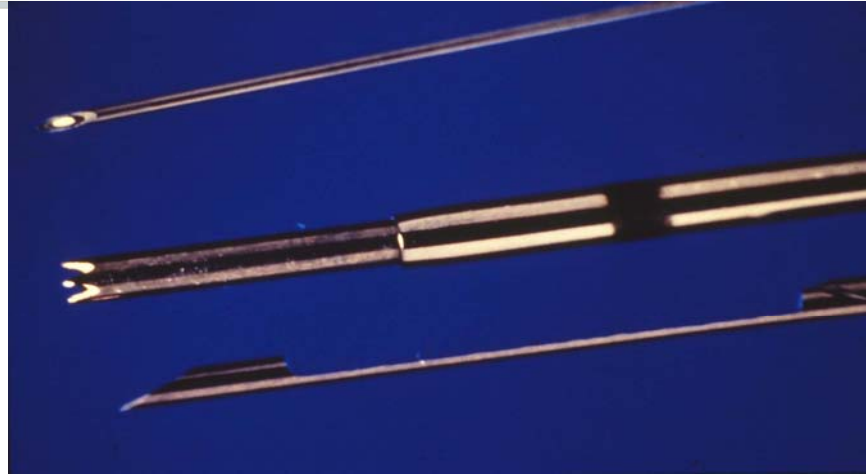
## FNA OF BREAST (ADVANTAGES)

- Cost effective
- Minimally invasive/traumatic
- No anesthesia/hospitalization
- Fast and accurate
- Pre-treatment planning
- Avoidance of surgical biopsy
- Therapeutic

## FNA vs CORE BX

- Both operator dependent
- Only one chance to sample lesion by core bx
  - FNA- multiple movements redirecting needle with each pass, increasing sampling area
- Some lesions may be difficult to stabilize by core needle bx (benign lesions more mobile tends to push away from advancing needle)
- Cystic lesions better sampled by FNA
- Calcifications better sampled by core bx

## FNA vs CBx



## BREAST FNA (COMPLICATIONS)

- Bleeding/hematoma
- Infection
- Pneumothorax
- Vasovagal reaction

## ADEQUACY CRITERIA

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- Problematic
- No minimal cellular criteria required
- Nonproliferative lesions are paucicellular
  - Fibrocystic changes composed predominantly of fibroblasts
  - Physiological stromal thickening
  - Fibrotic fibroadenoma
  - Lipomas

## ADEQUACY- BREAST FNA

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- Applying criteria would make a good percentage of negative FNA'S unsatisfactory subjecting them to additional surgical procedures
- Based on opinion of pathologist and based on ability of operator to adequately stabilize and penetrate lesion

## PATIENT MANAGEMENT PROTOCOL

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- Triple Test:
  - Imaging (mammography, u/s)
  - Clinical
  - Cytology

## CYTOLOGY OF NORMAL BREAST STRUCTURES

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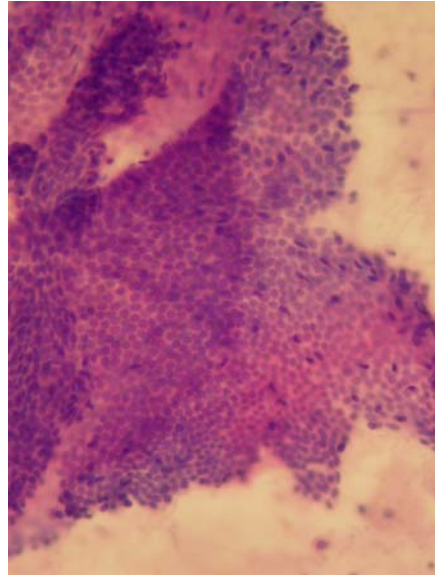
- Ductal cells
- Myoepithelial cells
- Acini
- Stroma

## DUCTAL CELLS

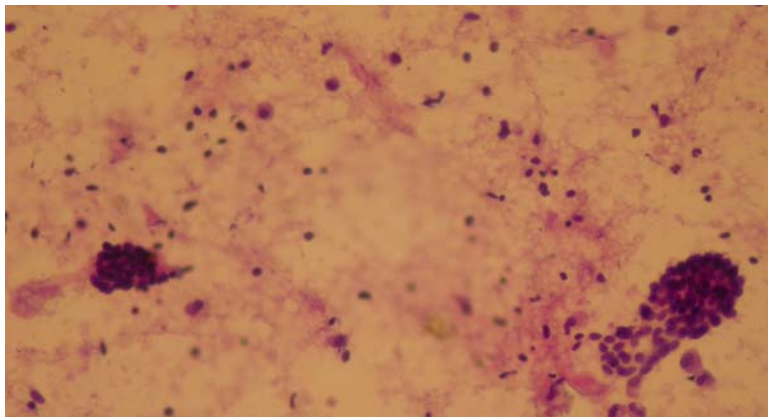
- Flat sheets
- Discernable borders (honeycomb)
- Nuclei uniform

## MYOEPITHELIUM

- Small dark bipolar nuclei
- Scant cytoplasm
- Singly or within epithelium

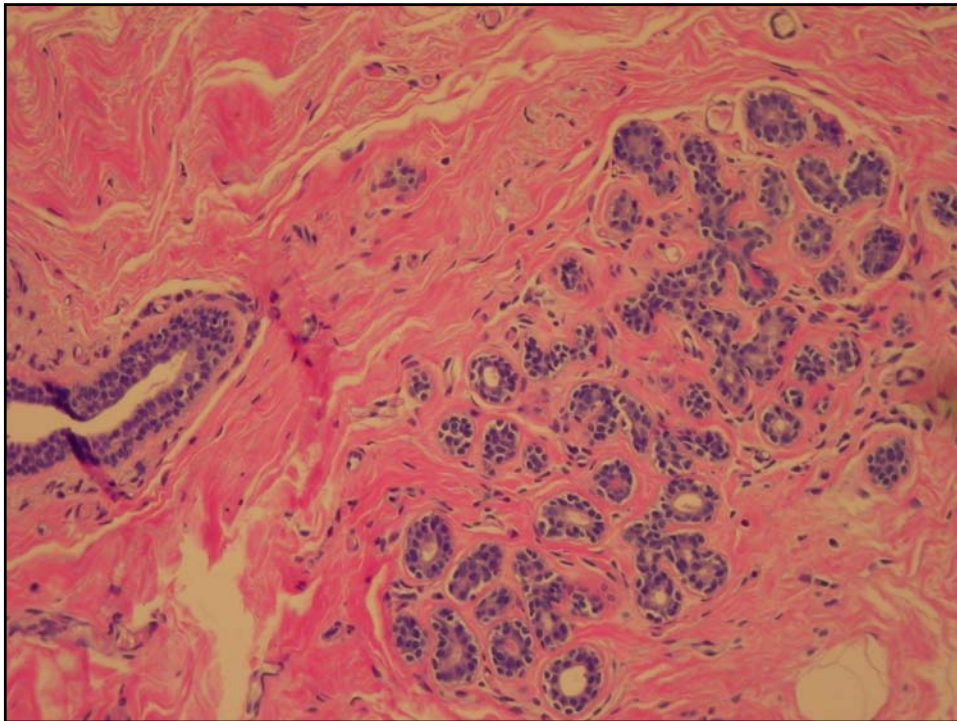
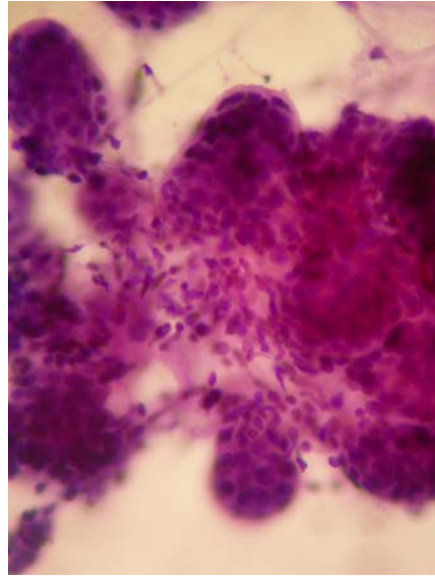


## MYOEPITHELIUM



## ACINI

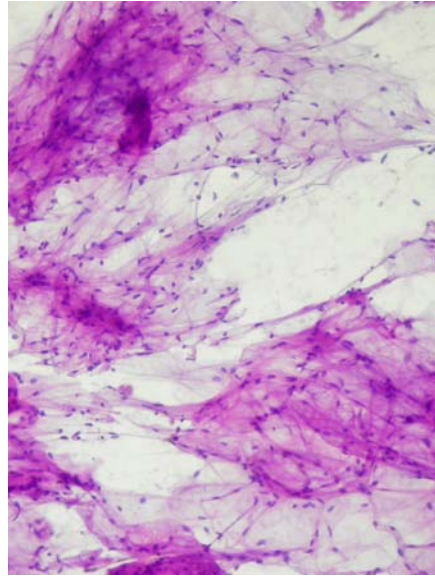
- Form spherical, tight lobulated, dense structures
- Seen singly or in grapelike clusters
- Not seen in males
- Pronounced in pregnancy
- May see myoepithelium surrounding lobules





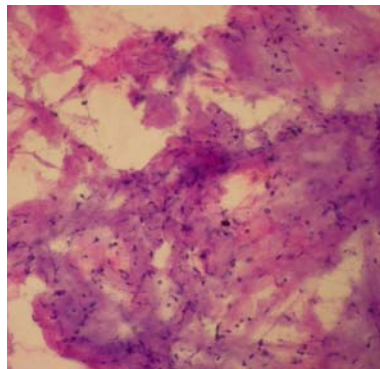
## STROMA

- Adipose tissue
- Fibrous tissue
- Macrophages

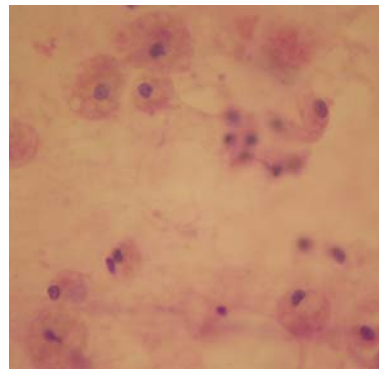


## STROMA

### FIBROUS TISSUE



### MACROPHAGES



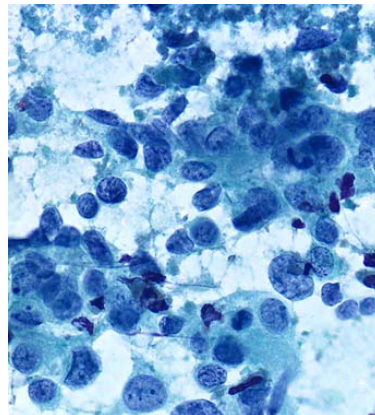
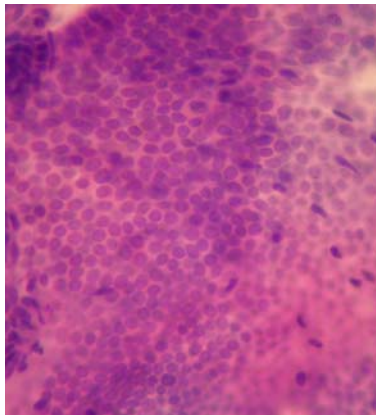
# CYTO-ARCHITECTURAL FEATURES

## BENIGN

- Scant cellularity
- Cohesive
- 2-D honeycomb sheets
- Tightly cohesive
- Minimal atypia
- Myoepithelium present
- No mitosis

## MALIGNANT

- Cellular
- Loosely cohesive/single cells
- Sycitia/crowded groups
- Loosely cohesive
- Moderate/severe atypia
- No myoepithelium
- Mitosis present



# DIAGNOSTIC ERROR

## FALSE POSITIVE

- Subareolar abscess
- Fat necrosis
- Silicone granuloma
- Granuloma
- Mucocele like lesion
- Lactational change
- Gynecomastia
- Fibrocystic change

## FALSE NEGATIVE

- Small cancer arising from fibrocystic change
- Well differentiated cancer
- Extensively necrotic tumor
- Interpretive error

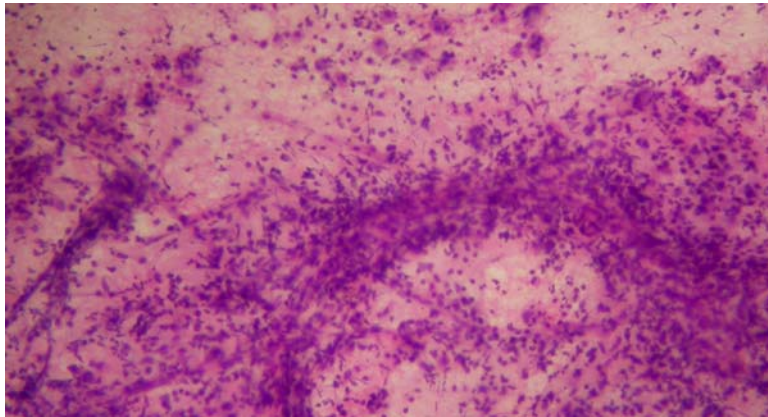
# SUBAREOLAR ABSCESS- CLINICAL

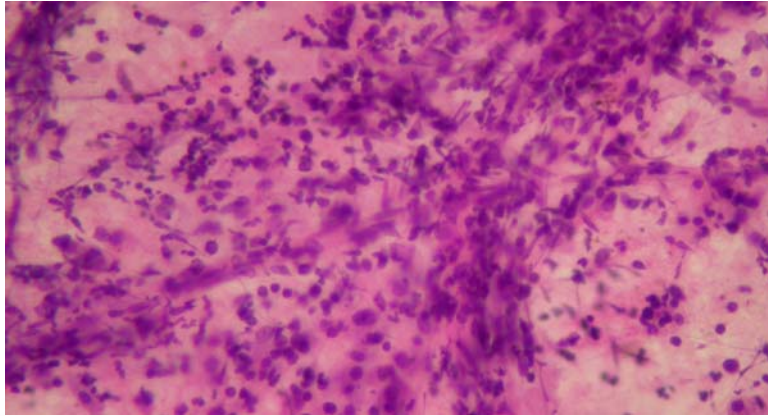
- Occurs at any age
- Related to duct ectasia
- Can mimick breast ca (mass, nipple inversion)
- Local inflammation beneath the nipple > squamous metaplasia > keratin plugging > rupture of the lactiferous duct

## SUBAREOLAR ABSCESS- MORPHOLOGY

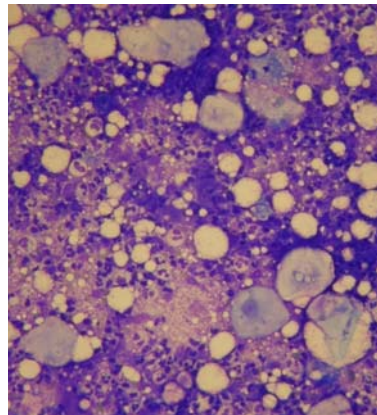
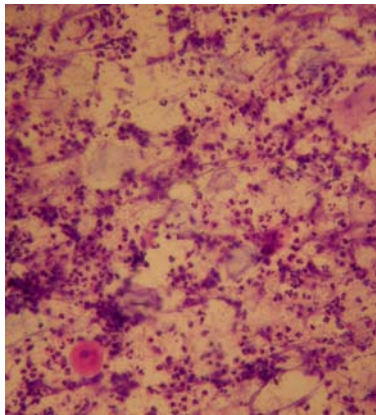
- Cellular smears (usually no duct epithelium seen)
- Mixed inflammatory exudate
- Granulation tissue (arborizing vessels with inflammatory cells sloughing off)
- Squamous material considered the hallmark of this disease (anucleated squamous, mature or metaplastic squamous epithelium, parakeratotic squamous epithelium)

## SUBAREOLAR ABSCESS



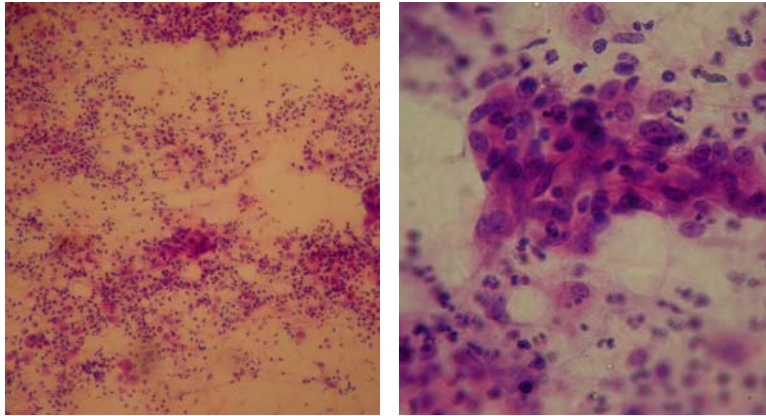


## SUBAREOLAR ABSCESS





## SUBAREOLAR ABSCESS



## SUBAREOLAR ABSCESS

- CAUTION
  - Be careful making a diagnosis of malignancy in the presence of abundant acute inflammation

## FAT NECROSIS- CLINICAL

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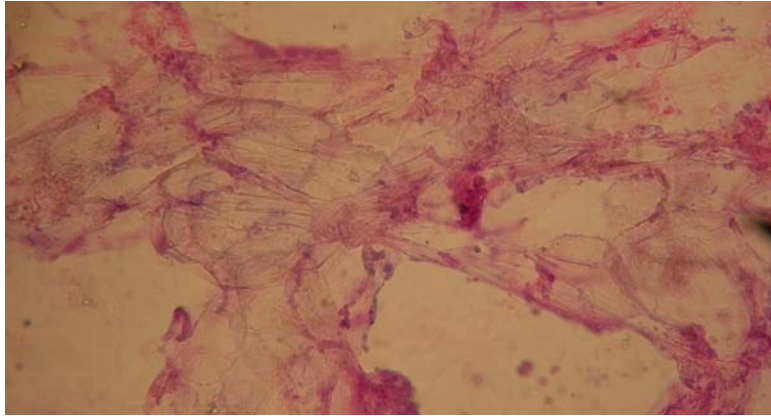
- History of trauma
- Firm, irregular, fixed, painful masses
- May contain calcifications
- Mimic breast cancer clinically and radiographically

## FAT NECROSIS- CYTOMORPHOLOGY

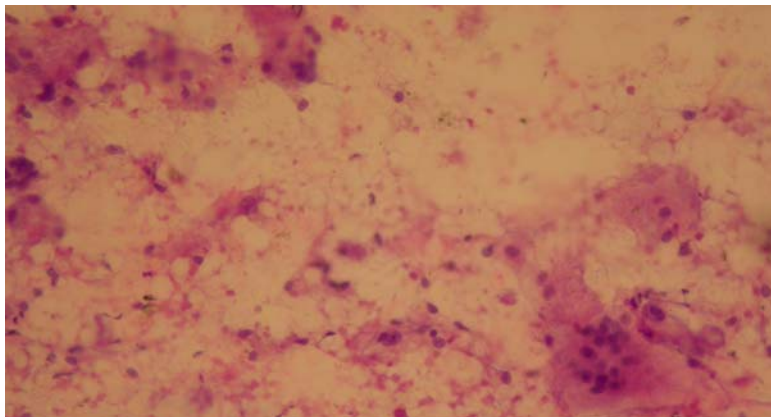
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- Variably cellular
- Degenerated fat vacuoles
- Multinucleated giant cells
- Epithelioid histiocytes, macrophages
- Myospherulosis

## FAT NECROSIS



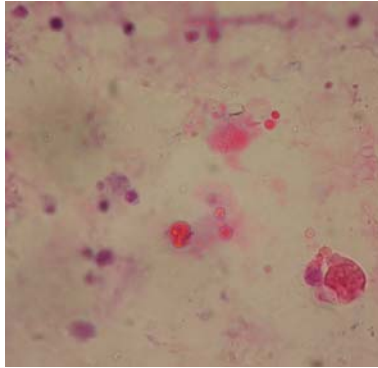
## FAT NECROSIS



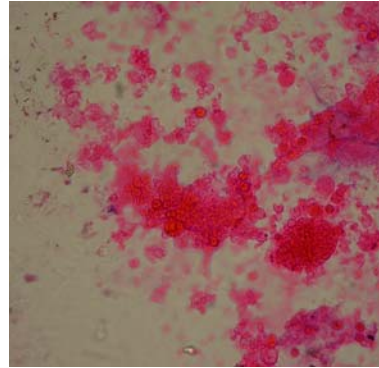


# FAT NECROSIS

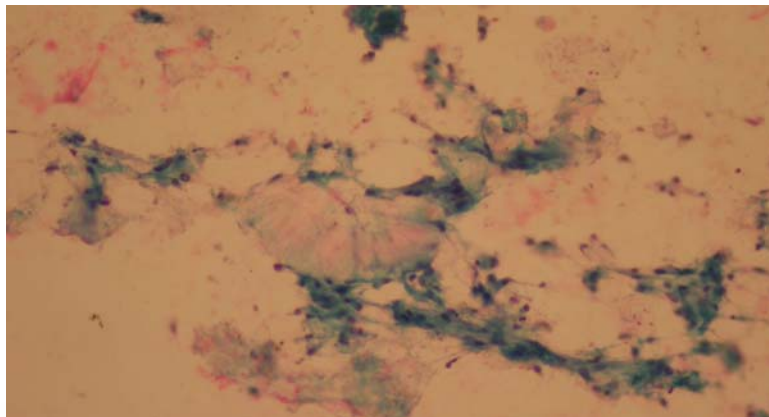
myspherulosis



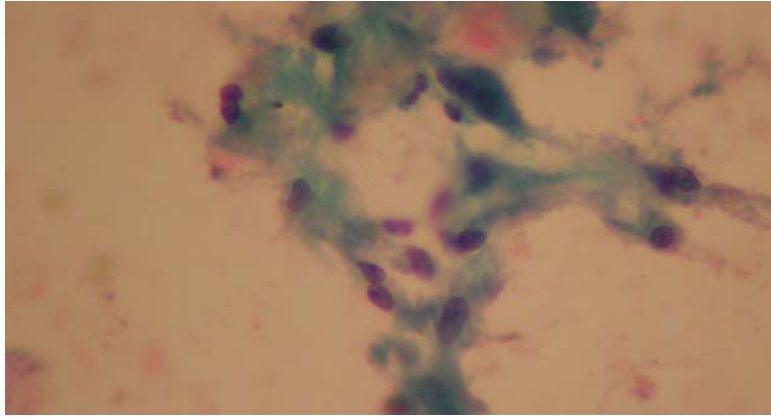
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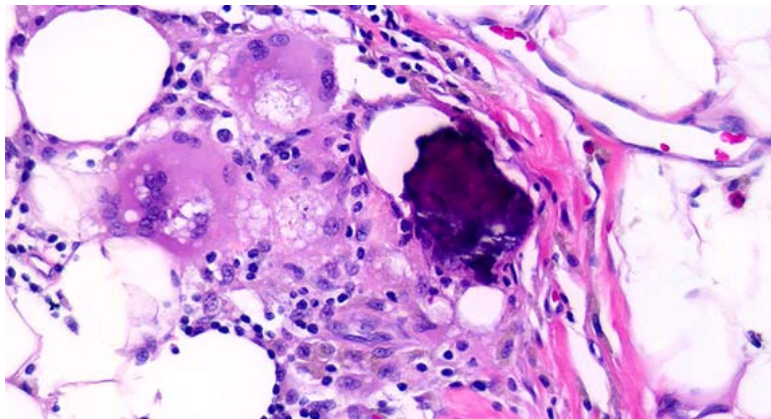
# FAT NECROSIS



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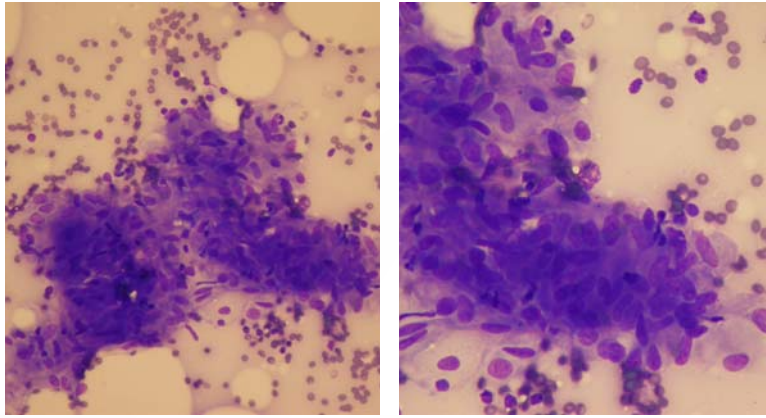
# GRANULOMA

- Loose aggregates of epithelioid histiocytes
  - Elongated to polygonal cells
  - Indistinct cell borders
  - Elongated “boomerang” shaped nuclei
  - Associated with lymphocytes, plasma cells and Langhans type giant cells

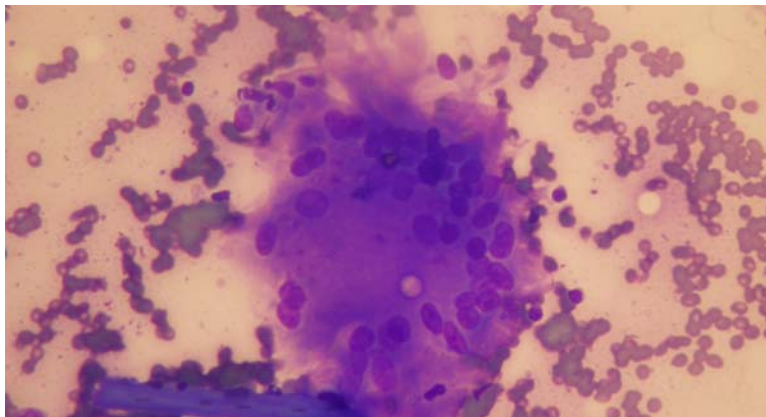
# GRANULOMAS IN THE BREAST

- Tuberculosis- can mimic breast ca (firm breast mass with axillary enlarged lymph nodes)
- Sarcoidosis
- Idiopathic granulomatous mastitis- self limiting, young women- unknown etiology
  - Non-caseating granulomas, microabscesses surrounding lobules
  - Can mimic cancer
- Granulomatous reaction to malignant cells

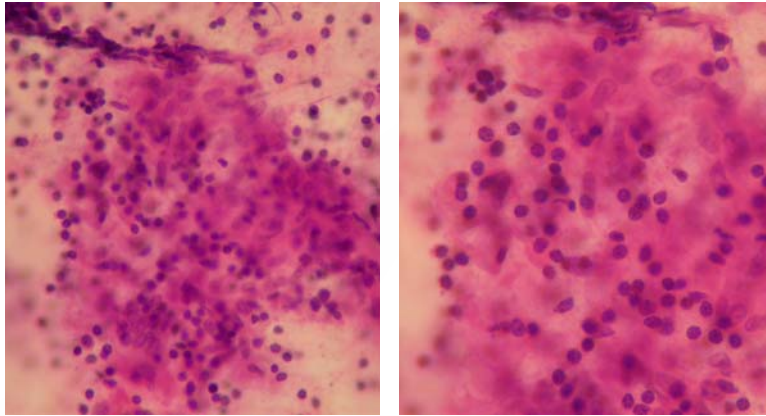
# GRANULOMA



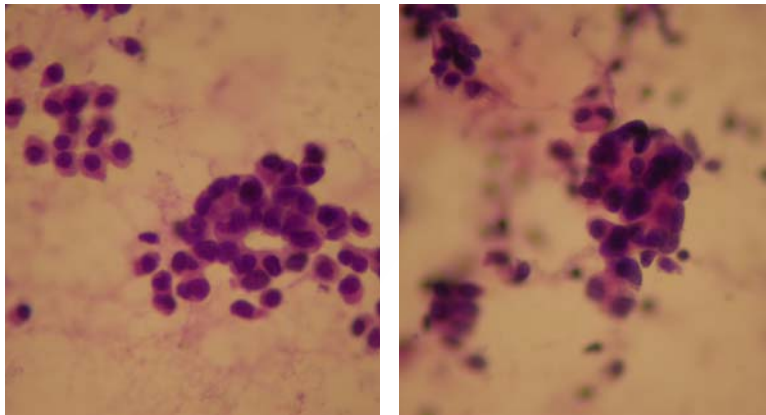
# GRANULOMA



## GRANULOMA

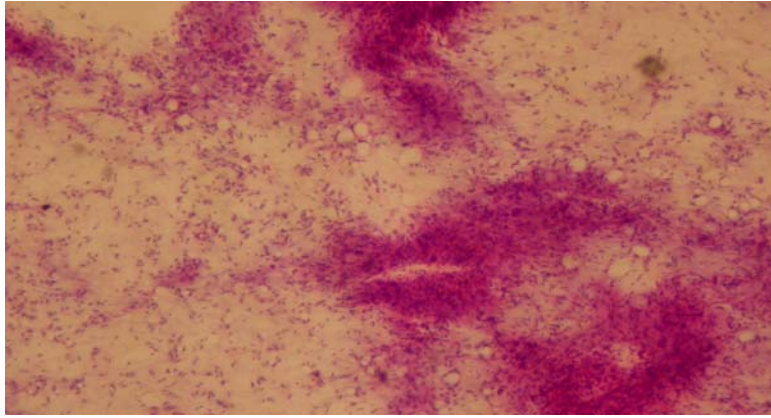


## CARCINOMA

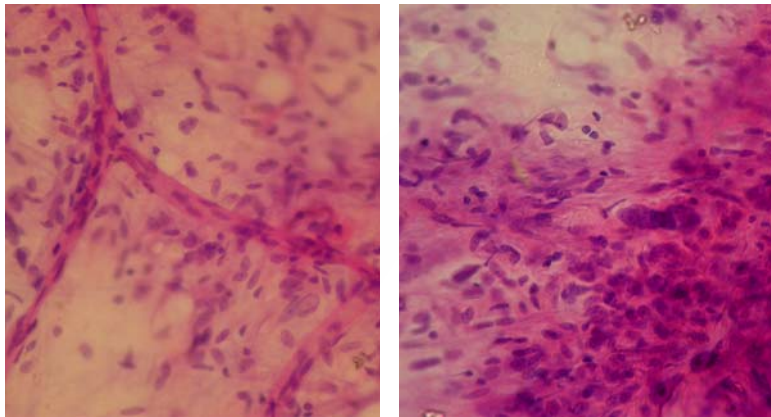




## SPINDLE CELL CARCINOMA



## SPINDLE CELL CARCINOMA



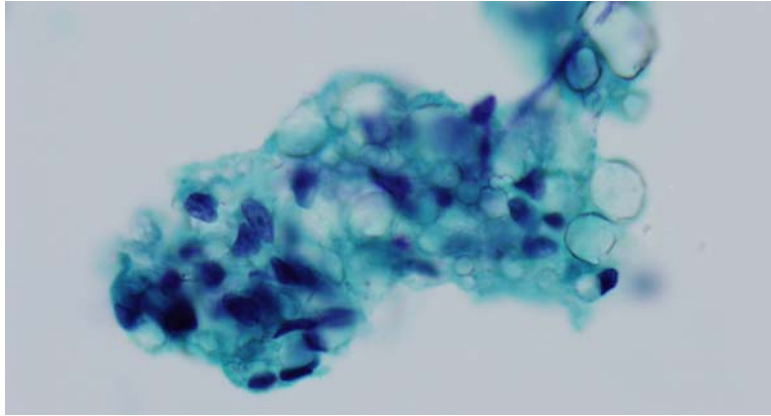
## SILICONE GRANULOMA

- Can be clinically suspicious, hard mass, single or multiple nodules
- Can resemble fat necrosis
- Look for refractile (silicone) material
- Aggregates of distended macrophages/histiocytes containing refractile cytoplasmic globules can be confused for adenoca

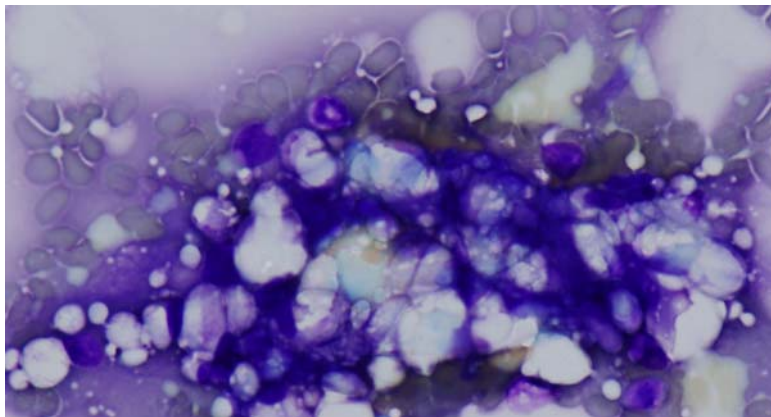
## SILICONE GRANULOMA



## SILICONE GRANULOMA

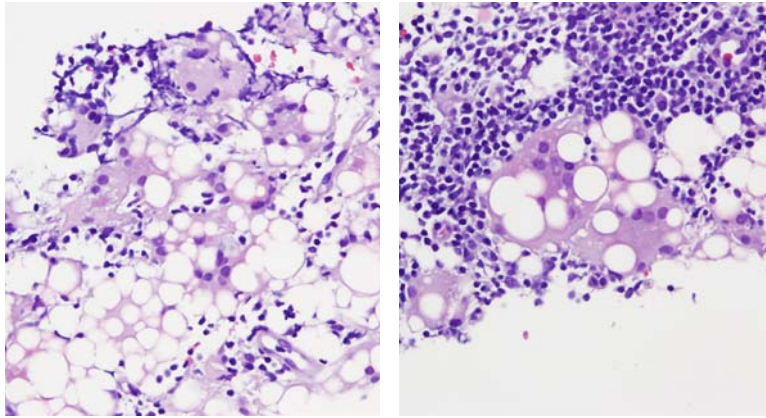


## SILICONE GRANULOMA





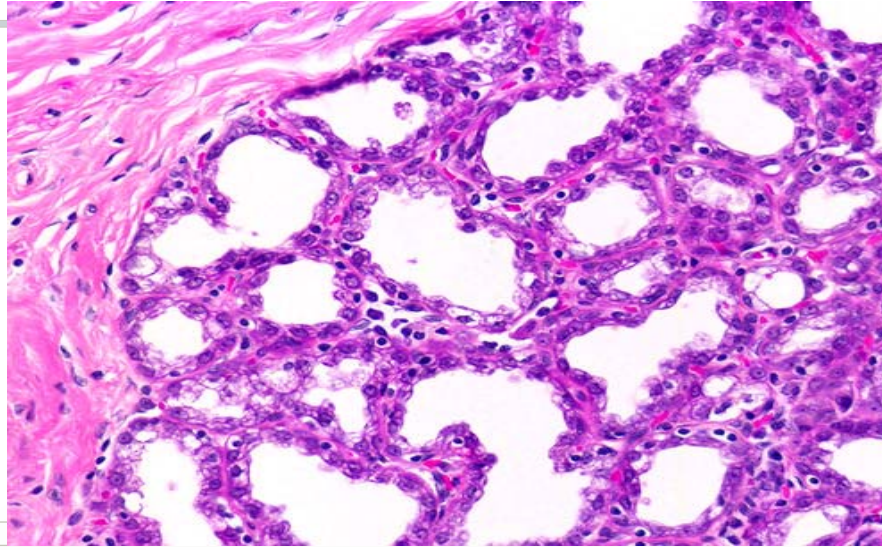
## SILICONE GRANULOMA



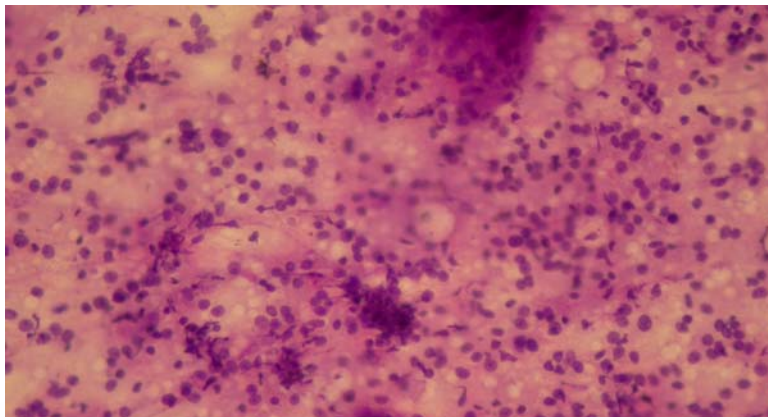
## LACTATIONAL CHANGES- MORPHOLOGY

- Hypercellular smears
- Lobular fragments seen
- Numerous round, naked nuclei in background (epithelial)
- Large cells, prominent nucleoli, foamy cytoplasm
- Background- proteinaceous frothy cytoplasm

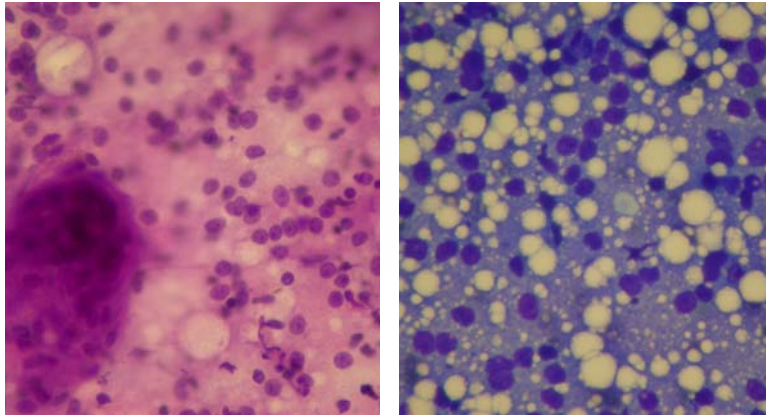
## LACTATIONAL CHANGE



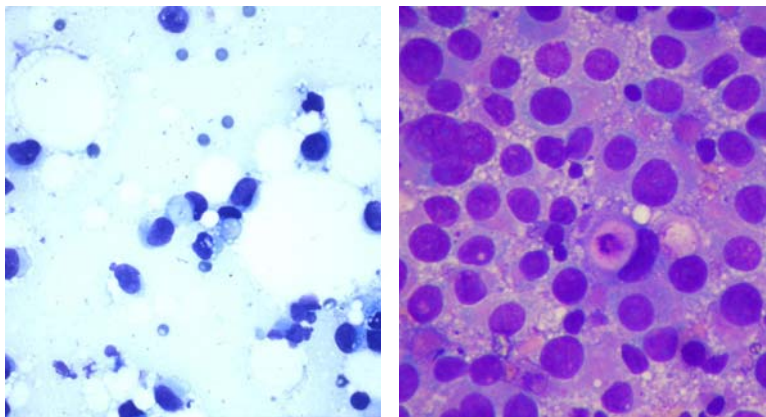
## LACTATIONAL CHANGE



## LACTATIONAL CHANGE



## CARCINOMA



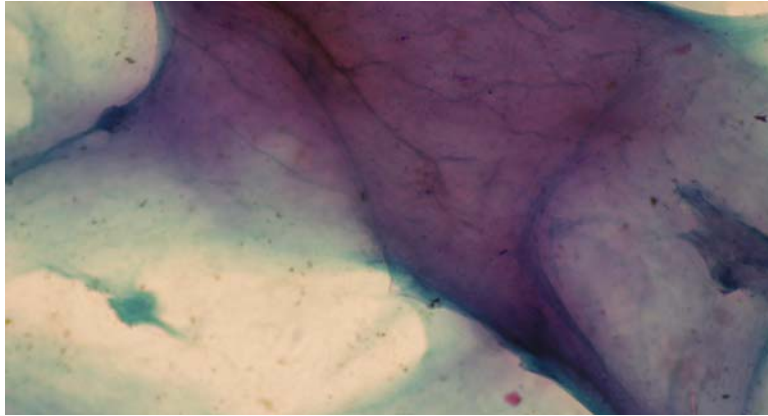
## MUCOCELE-LIKE LESION- CLINICAL

- Lesions often quite small
- Associated with fibrocystic change
- Originates from ruptured mucinous cyst into stroma

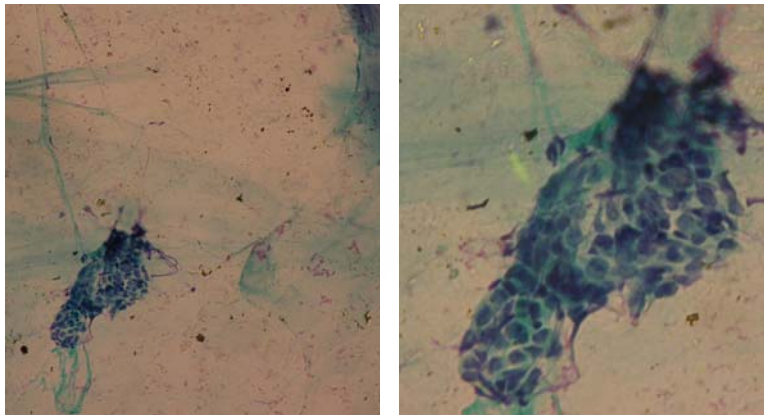
## MUCOCELE LIKE LESION- CYTOMORPHOLGY

- Scant cellularity
- Small epithelial fragments, monomorphic, lack of atypia
- Abundant background mucin
- Muciphages

## MUCOCELE LIKE LESION

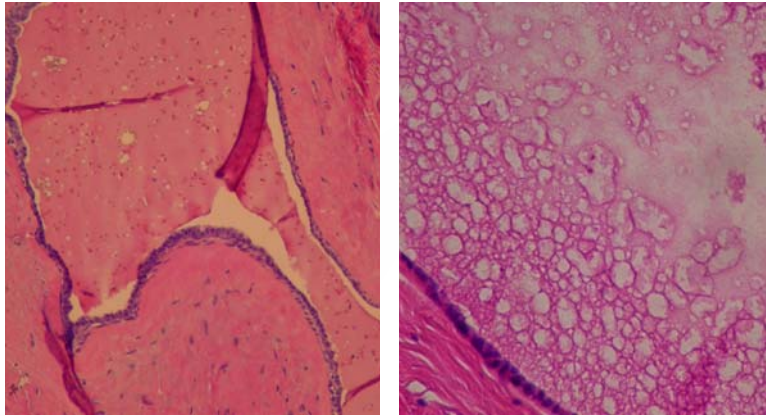


## MUCOCELE LIKE LESIONS





## MUCOCELE LIKE LESION



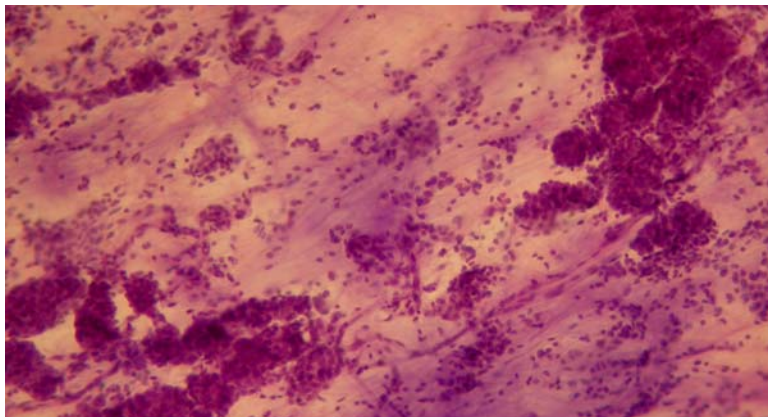
## MUCOCELE LIKE LESION

- Can see mucin in background of
  - Fibrocystic change
  - Fibroepithelial lesions (fibroadenoma, phyllodes tumor)
  - Papilloma
- Excise all mucocele like lesions

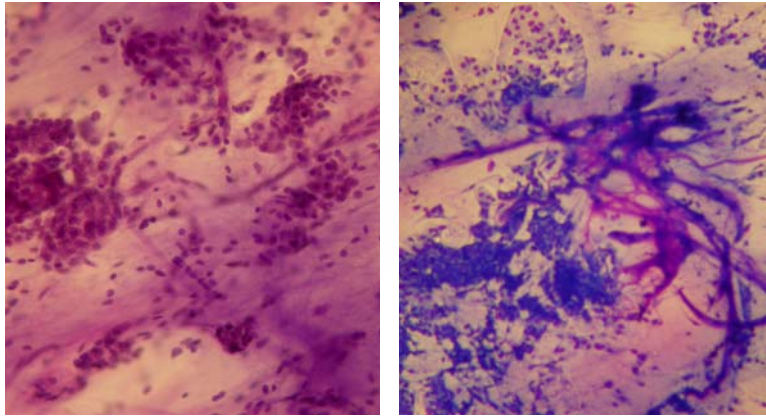
## COLLOID CARCINOMA- MORPHOLOGY

- Usually cellular
- Cohesive, minimally pleomorphic epithelial nests
- Occasional single cells
- Background- abundant mucin, arborizing capillary vessels

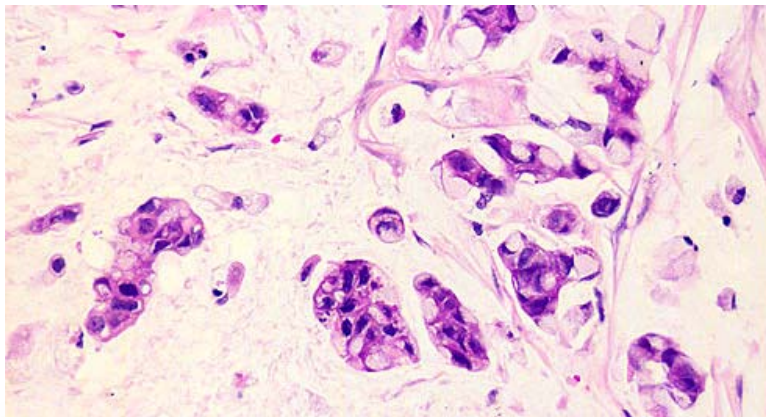
## COLLOID CARCINOMA



## COLLOID CARCINOMA



## COLLOID CARCINOMA





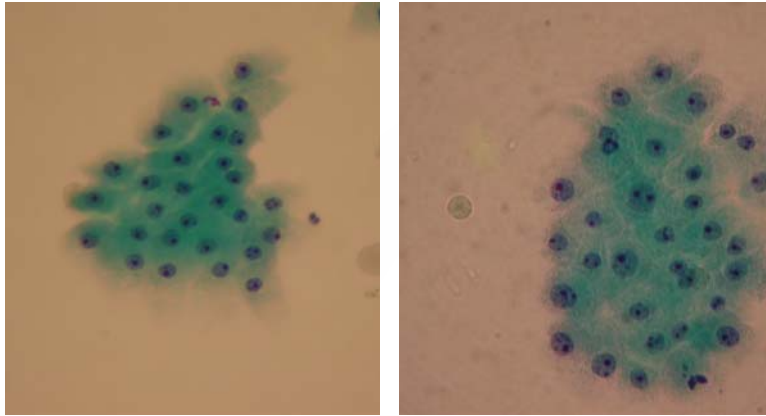
# CYSTS

- Usually see apocrine cell change
  - Larger than normal duct cells
  - Usually seen in sheets
  - Abundant granular cytoplasm
  - May see nucleoli
  - ❖ Occasionally prominent nucleoli or variability in size can cause overinterpretation
  - ❖ Can show architectural complexity that can lead to misinterpretation

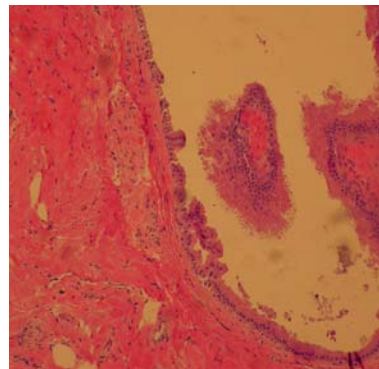
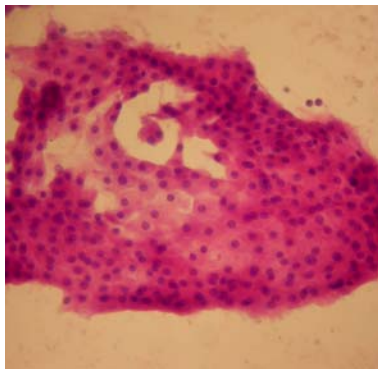
# CYST



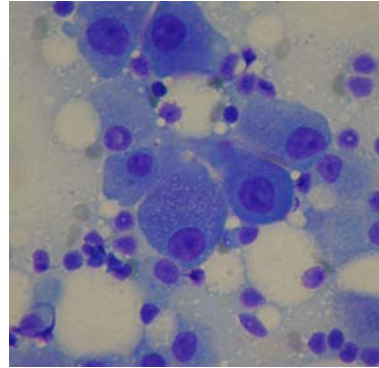
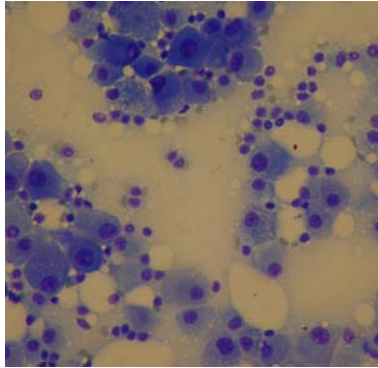
## APOCRINE METAPLASIA



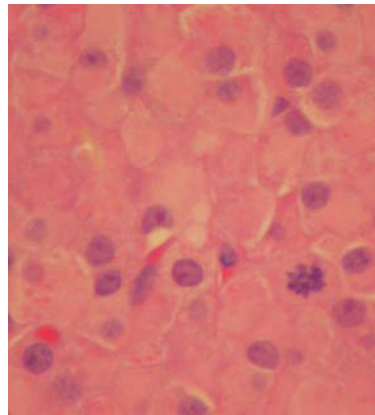
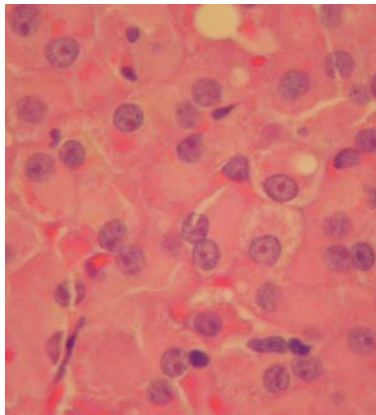
## CYST



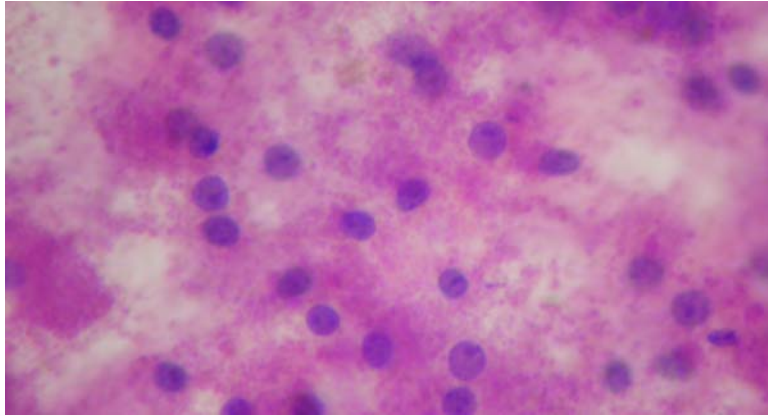
## APOCRINE CARCINOMA



## APOCRINE CARCINOMA



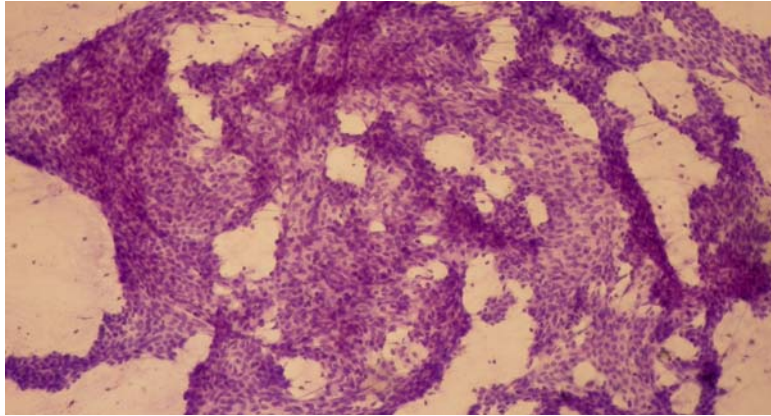
## GRANULAR CELL TUMOR



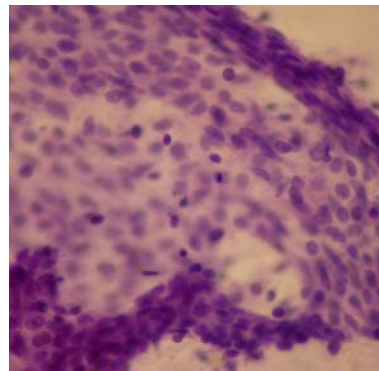
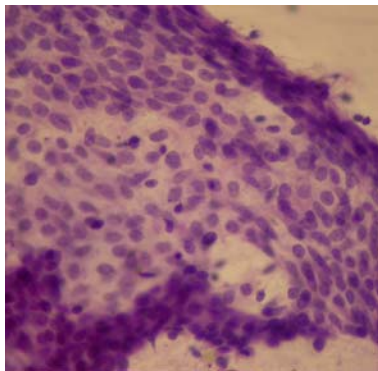
## FIBROCYSTIC CHANGES

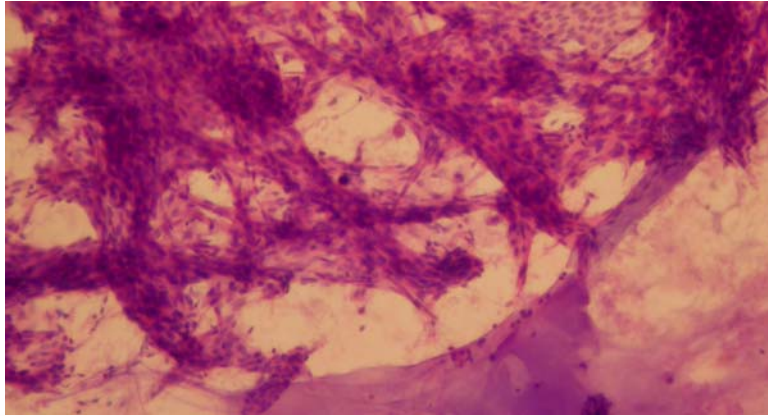
- Heterogenous cytological picture
  - Cellular vs paucicellular/acellular
- Architectural complexity
- Myoepithelial cells in epithelial groups
- Background myoepithelial cells
- Cell cohesion
- Monolayers with cell swirling
- Micronucleoli

FCC

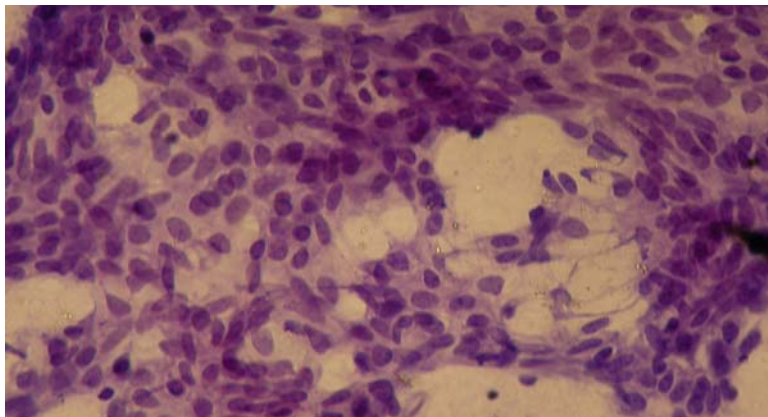


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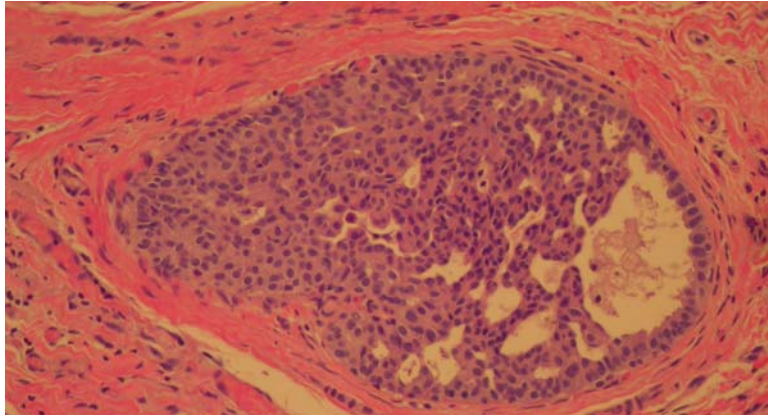




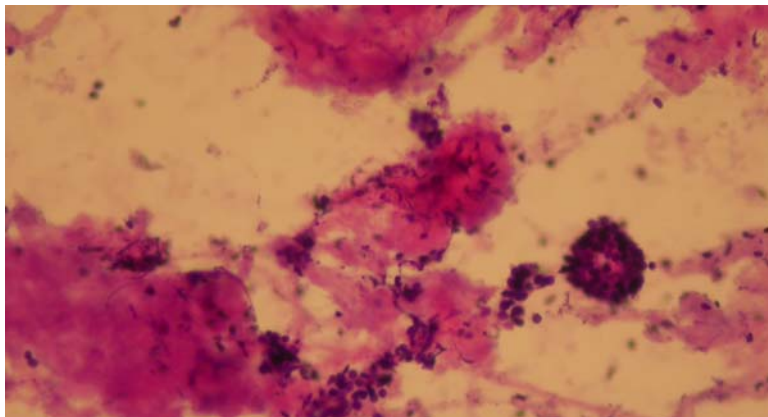
FCC

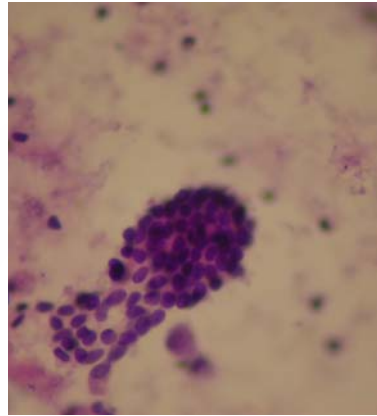
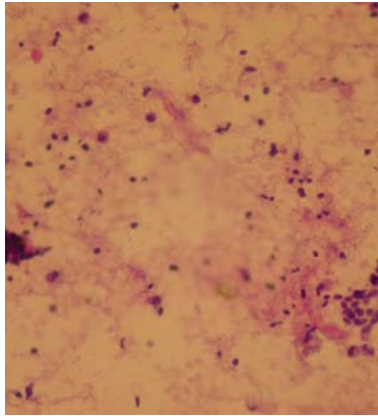




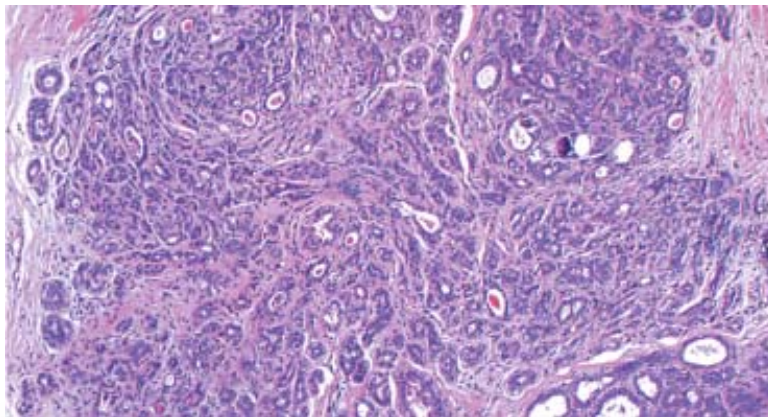


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FCC





# GYNECOMASTIA

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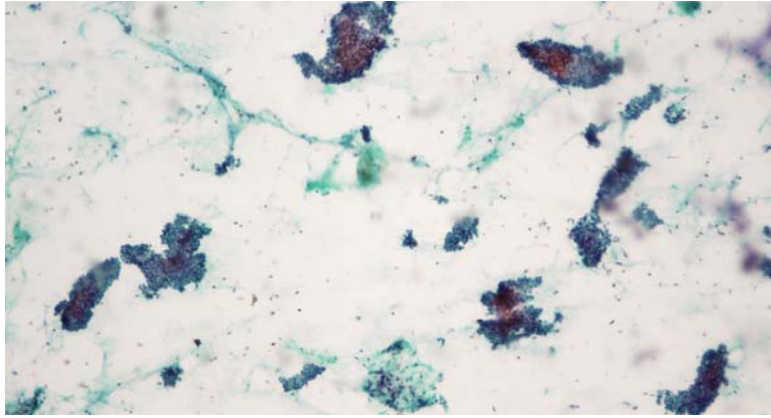
- Tender painful sub/periareolar lump
- Bimodal age distribution
- HIV, ETOH, drugs, liver disease
- Can be cellular
- Cohesive epithelium, can see papillary configurations
- Can see crowding, atypia, nuclear enlargement

# GYNECOMASTIA

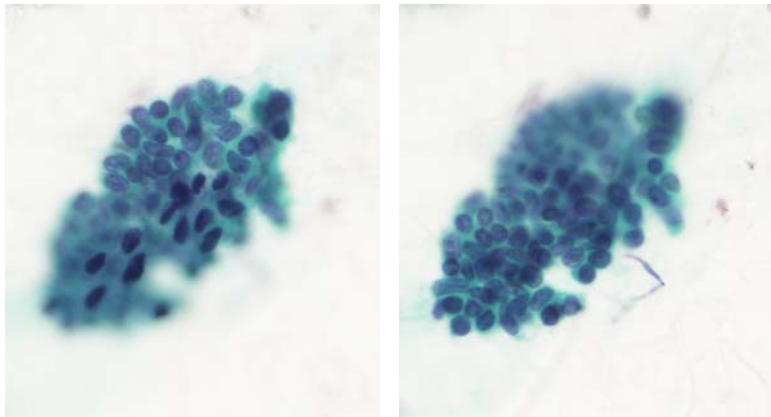
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- Myoepithelium
- Stromal fragments
- Because of hypercellularity/atypia, have a higher threshold for cancer dx in a male breast

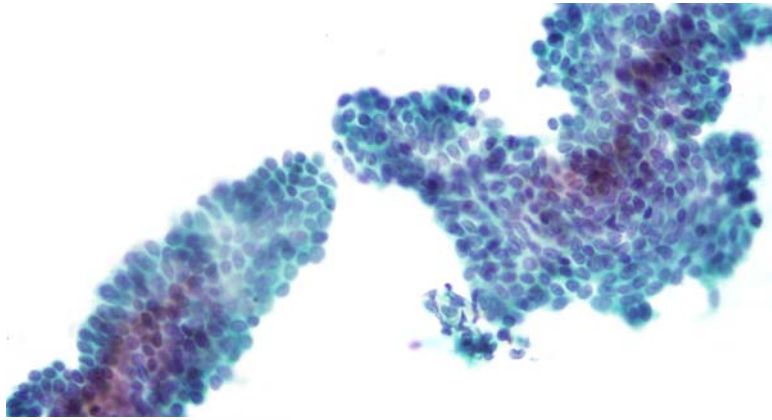
# GYNECOMASTIA



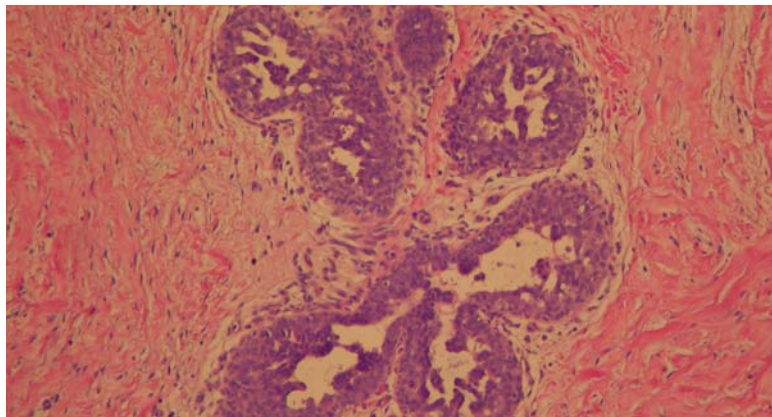
# GYNECOMASTIA



# GYNECOMASTIA



# GYNECOMASTIA



## ATYPICAL DUCT EPITHELIUM

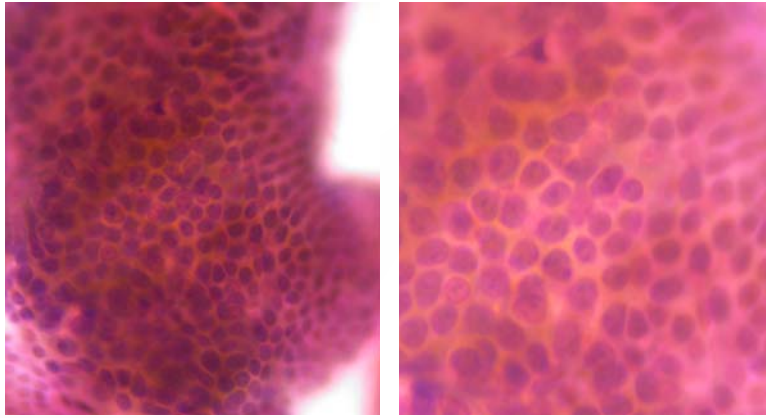
- Cells with micro-architectural pattern and cellular atypia which fall short of duct carcinoma in situ
- Atypical duct epithelium may not correlate with histologic diagnosis of atypical duct hyperplasia and should not imply the same lesion

## FCC WITH ATYPIA

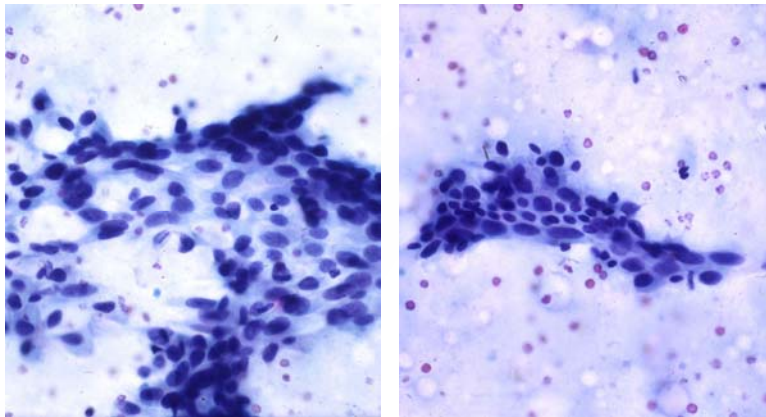
- Greater complexity
- Nuclear overlap
- Nuclear pleomorphism
- Hyperchromasia with chromatin clumping
- Macronucleoli

*Do not make a diagnosis of carcinoma when these features are seen accompanying benign cytologic features.*

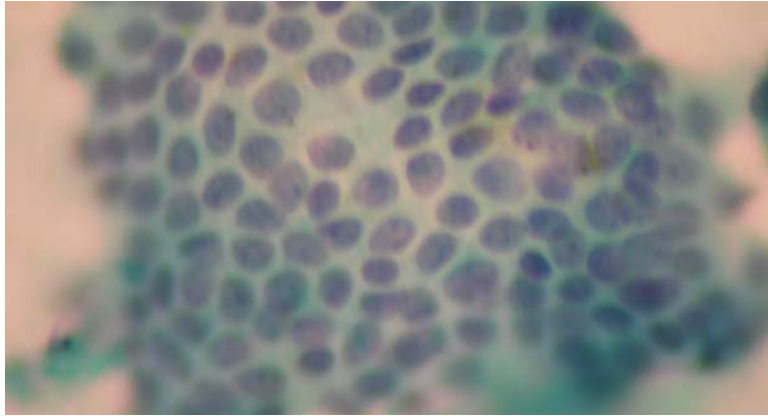
# ATYPIA



# ATYPIA



# ATYPIA



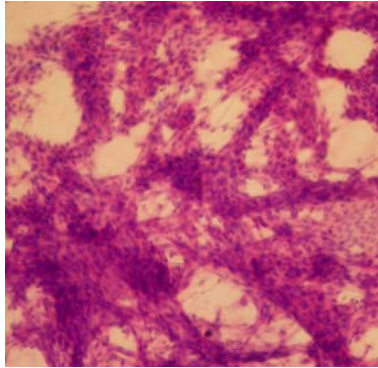
# DUCTAL CARCINOMA IN SITU

- Crowded enlarged cells, nuclei hyperchromatic, lack myoepithelial cells
  - Cribriform DCIS- Cohesive fragments with sharply punched out holes
  - Micropapillary DCIS- slender well formed papillary structures with narrow stalks
  - Comedo DCIS- cohesive sheets with high nuclear grade, accompanying necrotic debris

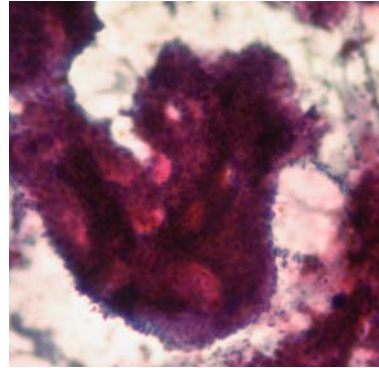


## IN SITU CARCINOMA, CRIBRIFORM

FCC

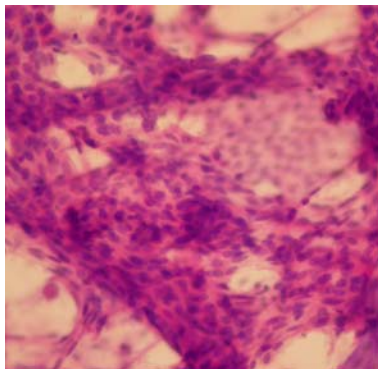


DCIS

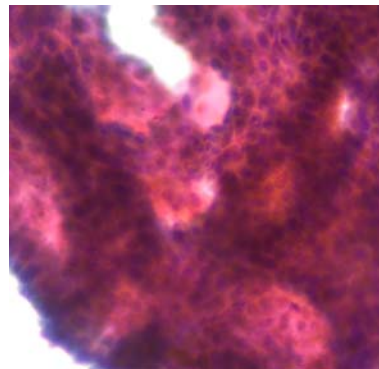


## IN SITU CARCINOMA, CRIBRIFORM

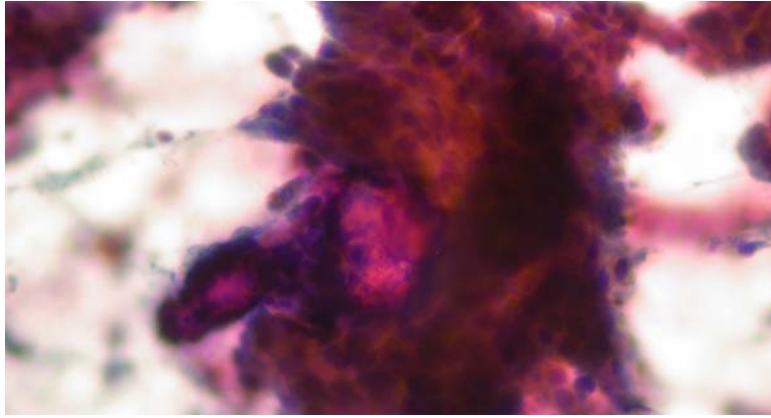
FCC



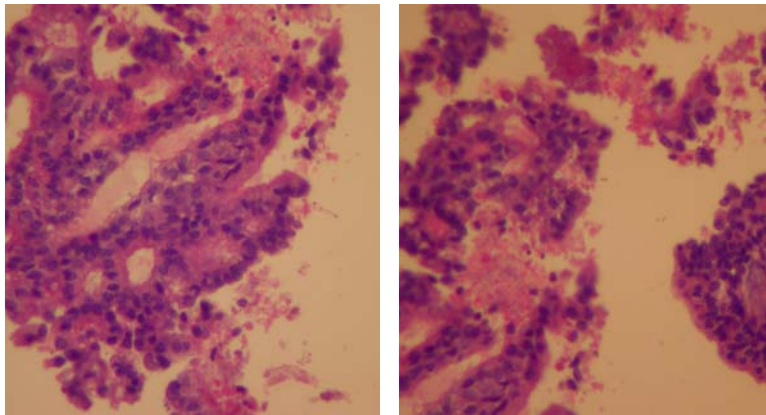
DCIS



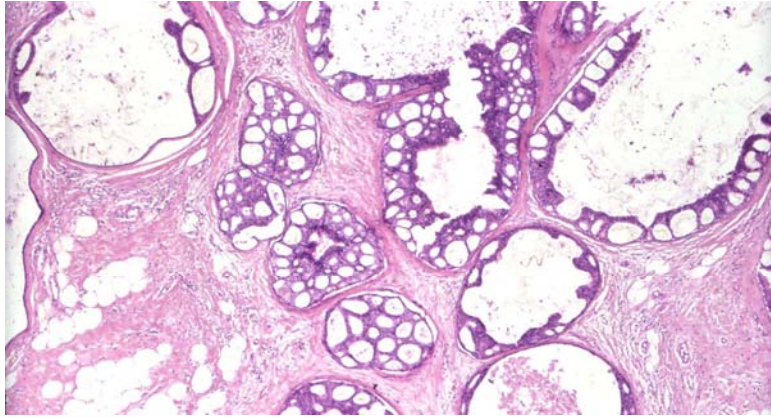
## CRIBRIFORM DCIS, MICROCALCIFICATIONS



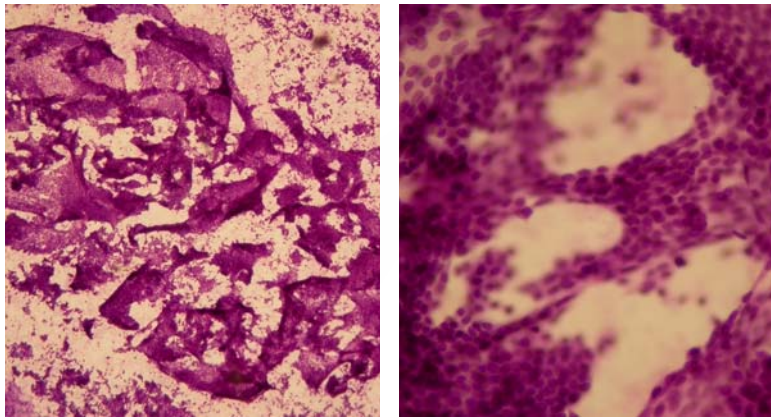
## DCIS- CELL BLOCK



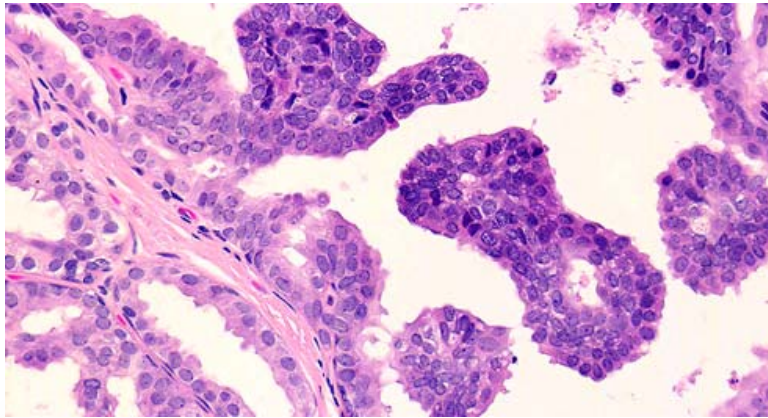
## DCIS



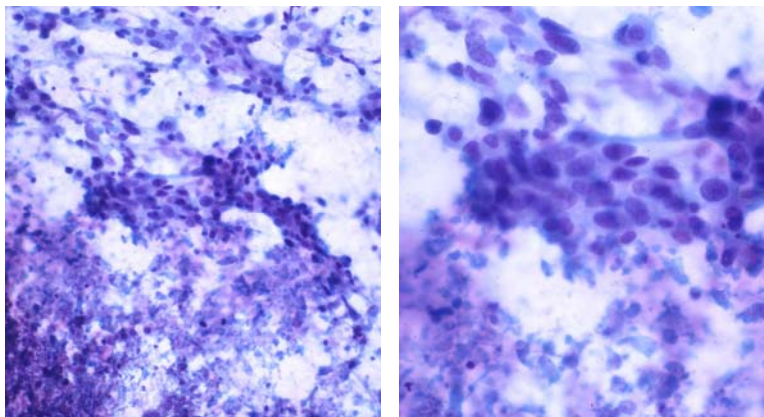
## DCIS-MICROPAPILLARY



## DCIS-MICROPAPILLARY

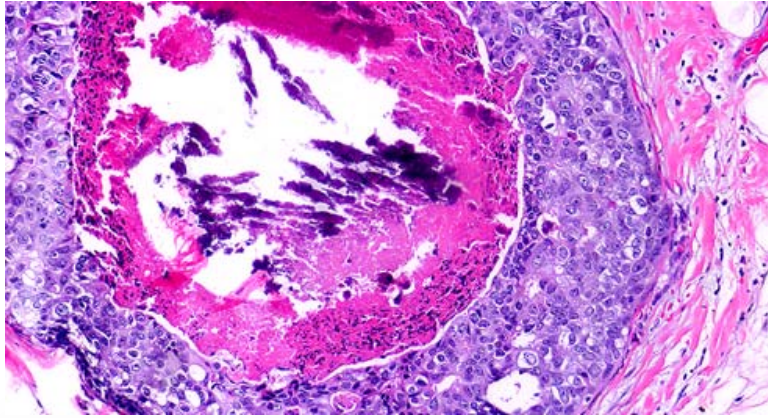


## DCIS- COMEDO TYPE





## DCIS- COMEDO TYPE



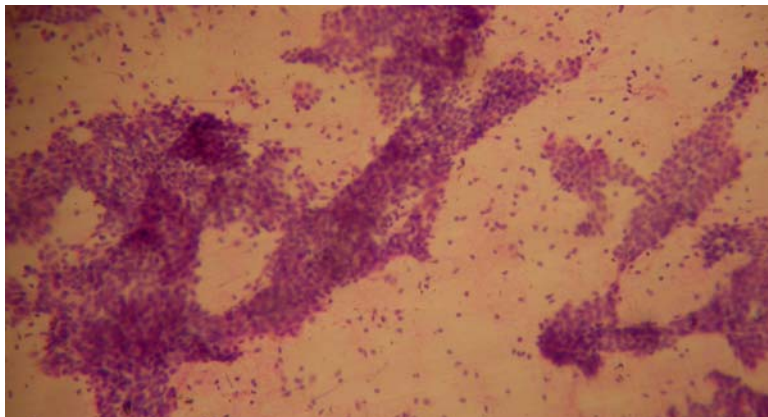
## FIBROADENOMA- CLINICAL

- Most common benign tumor
- Usually solitary, firm, mobile, well circumscribed
- Most common in third and fourth decade
- Most common cause of false positive diagnosis
  - Absence of one or more of the triad of sheets of ductal cells, fibromyxoid stroma and myoepithelial cells
  - May see low cellularity, cellular dyshesion and prominent nucleoli (older patients)

# FIBROADENOMA

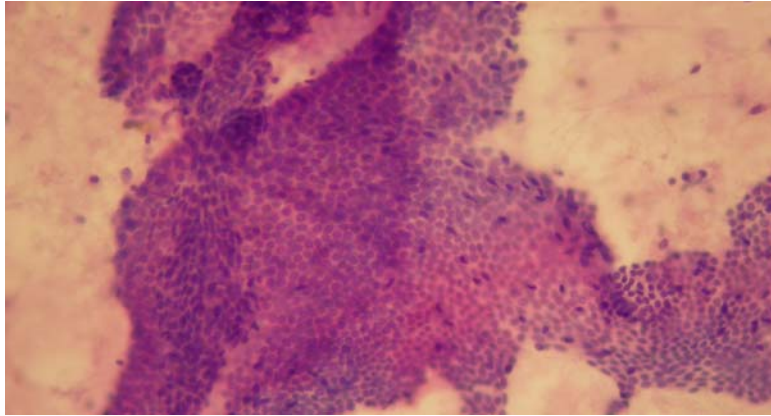
- High cellularity, biphasic appearance
- Monolayered sheets, branching architecture (“staghorn”)
- Fibrous stroma (metachromatic on diff-quick)
- Bland cellular morphology
- Background- naked oval myoepithelial nuclei

# FIBROADENOMA

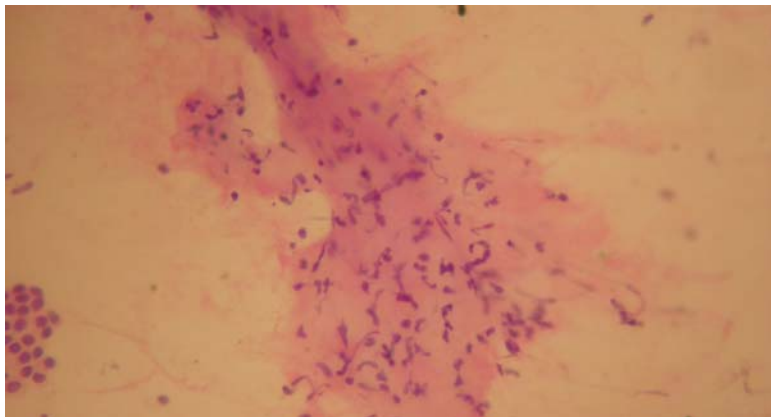




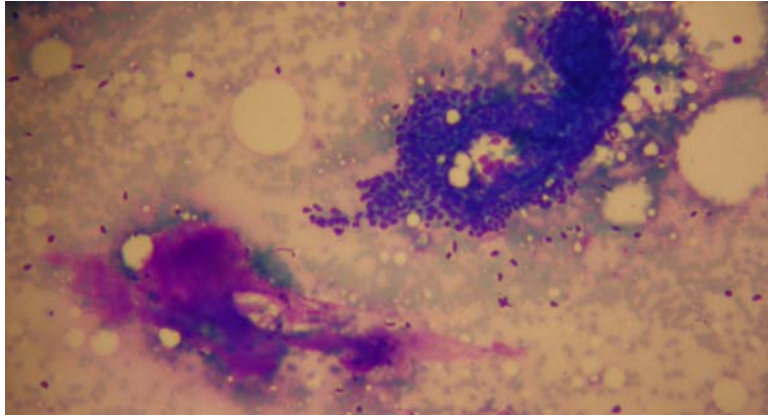
## FIBROADENOMA



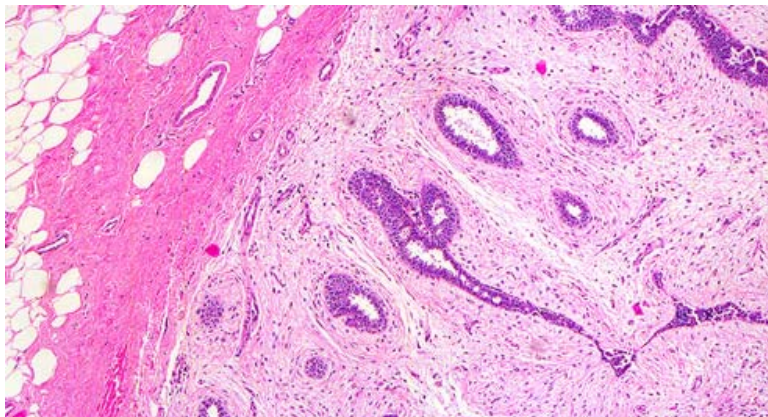
## FIBROADENOMA



# FIBROADENOMA



# FIBROADENOMA



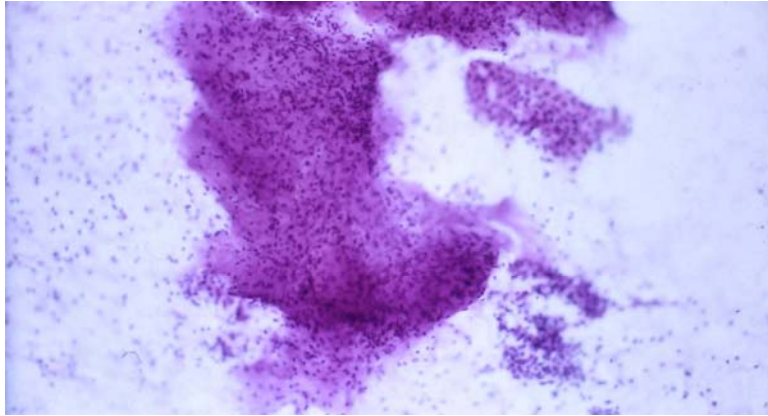
## PHYLLODES TUMOR- CLINICAL

- Peak incidence in fifth to sixth decade
- Unilateral slowly enlarging mass
- Larger than fibroadenoma (~5 cm)

## MALIGNANT PHYLLODES TUMOR

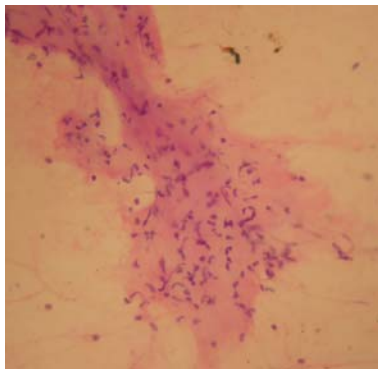
- Biphasic pattern
- Stroma with high cellularity, may contain significant atypia, mitotic figures may be seen
- Epithelial component benign

# PHYLLODES TUMOR

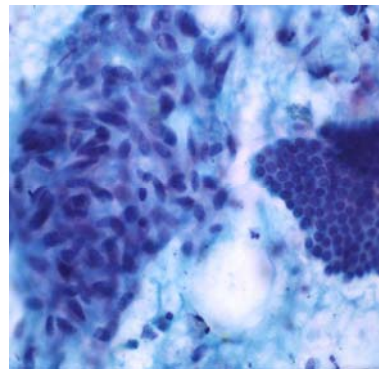


# FIBROEPITHELIAL LESIONS

FIBROADENOMA



PHYLLODES



# PHYLLODES TUMOR

