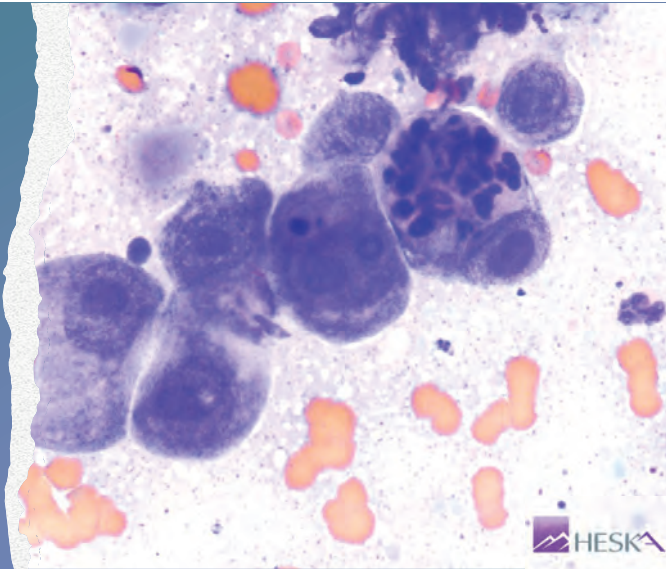


# Cytology of Skin and Subcutaneous Lesions

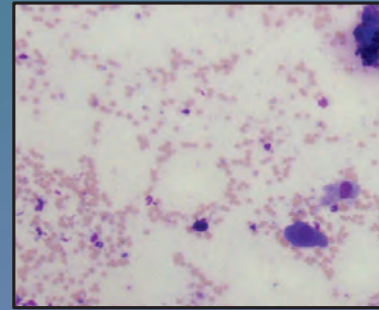
Mike Rosser, DVM, MS, DACVP (Clinical Pathology)  
Clinical Assistant Professor,  
University of Illinois at Urbana-Champaign

Consultant for Heska

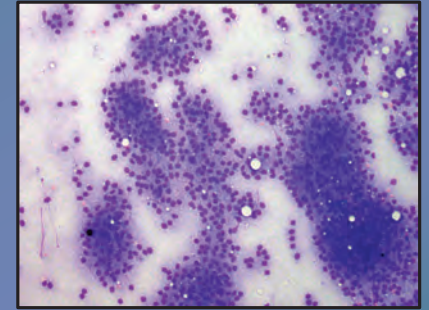


## Low Power Evaluation

Cellularity



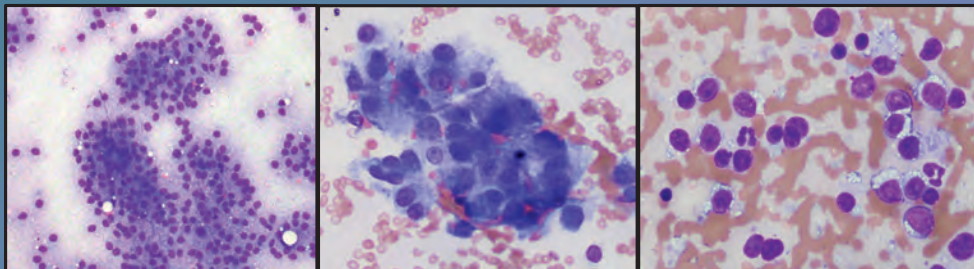
Low



High

## Low Power Evaluation

Cellular arrangement



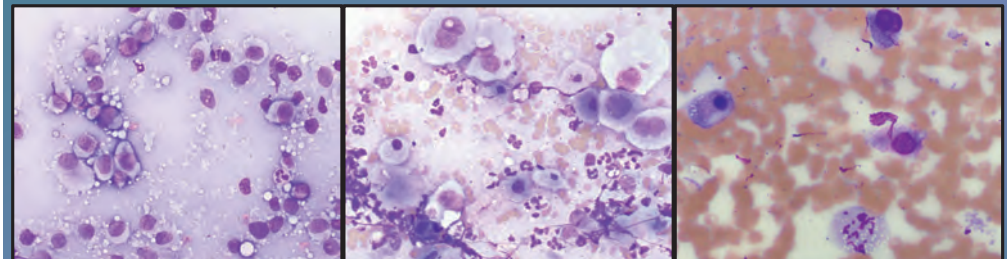
Clusters

Aggregates

Individualized

## Low Power Evaluation

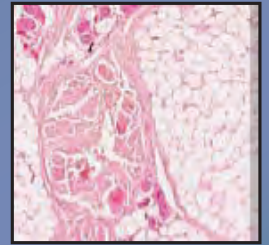
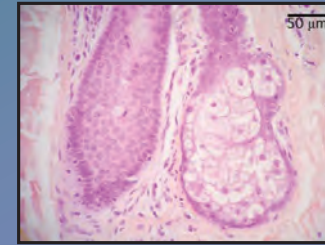
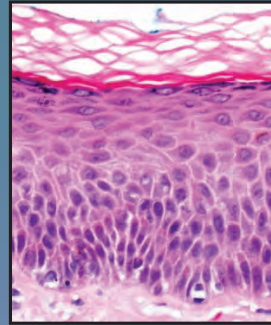
Hemodilution



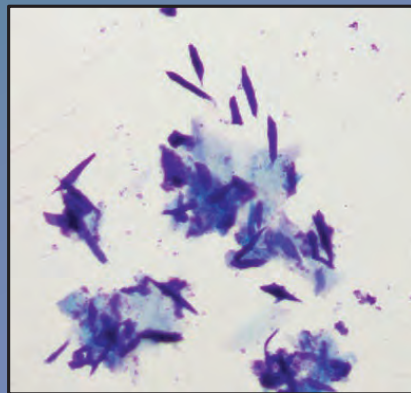
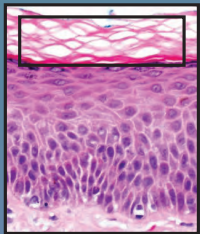
## Diagnostic categories

Normal or hyperplastic	Cystic
Inflammation	Response to tissue injury
Neoplasia	Nondiagnostic

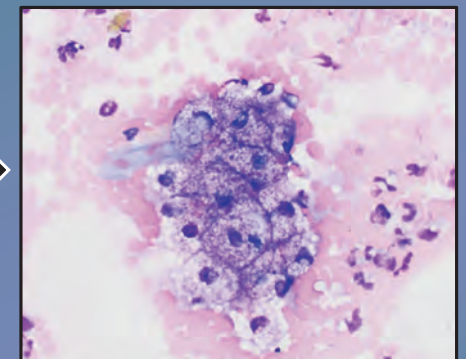
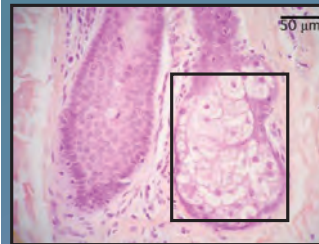
## Normal structure of skin/sc



## What can we expect as normal cytologic features?

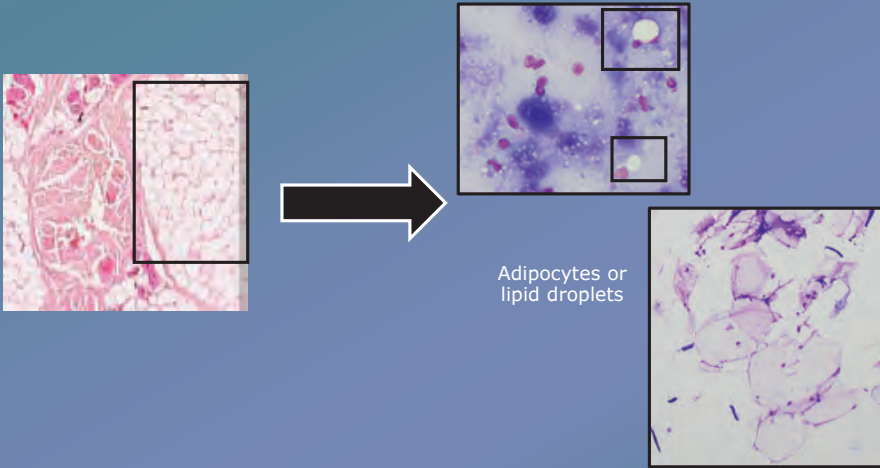


## What can we expect as normal cytologic features?





## What can we expect as normal cytologic features?



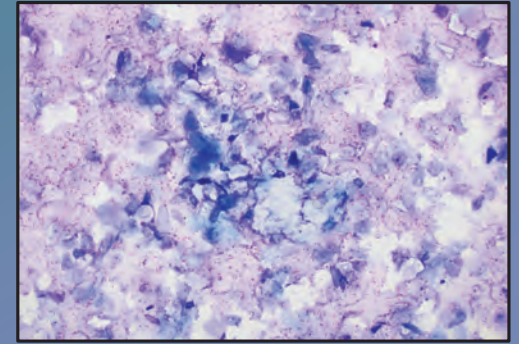
## Cystic Lesions

### Apocrine cyst

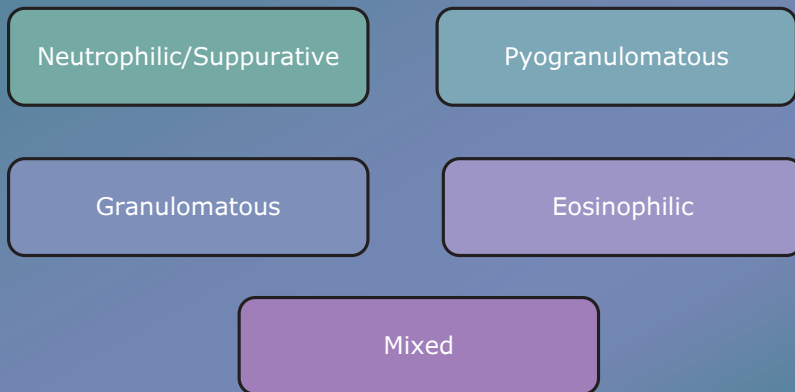
- Low cellularity to acellular
- Clear to brown-tinged fluid on aspiration

### Follicular cyst (epidermal inclusion cyst)

- Mature squamous epithelium and keratin debris
- Cholesterol crystals
- Ddx: Trichoepithelioma, keratinizing acanthoma



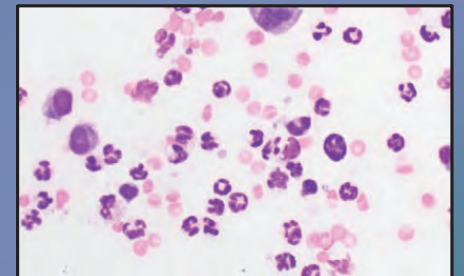
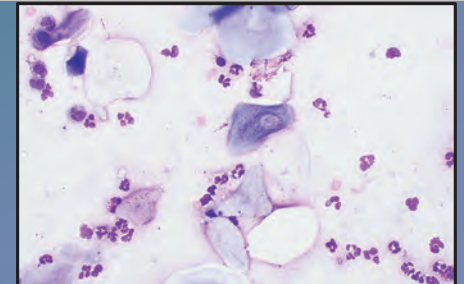
## Inflammation



## Neutrophilic/Suppurative Inflammation

### Noninfectious causes

- Ruptured follicular cyst
  - Free keratin is highly inflammatory
  - May range from neutrophilic to pyogranulomatous
- Nodular panniculitis
  - Neutrophilic inflammation associated with free lipid
- Nonspecific acute inflammation

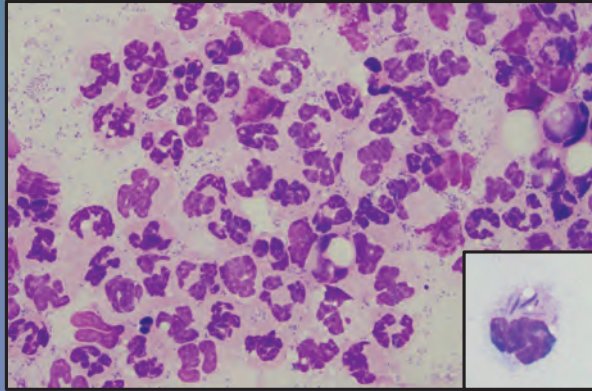


## Neutrophilic/Suppurative Inflammation

### Infectious causes

- Septic suppurative inflammation

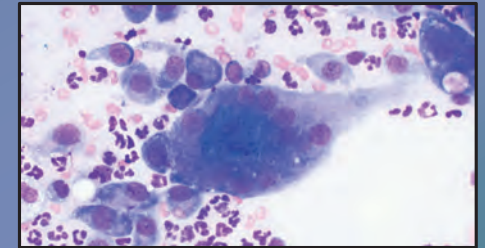
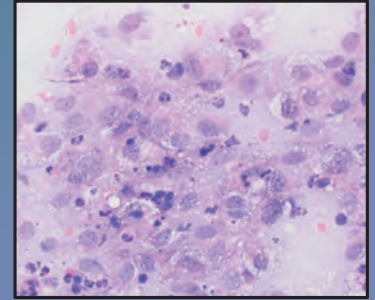
- Neutrophils are often degenerate
- “Septic” implies that intracellular bacteria are directly observed
- Aerobic and anaerobic culture/sensitivity recommended if abscess suspected



## Pyogranulomatous Inflammation

- Neutrophils and macrophages
  - Epithelioid macrophages
  - Multinucleated giant cells

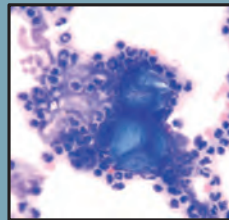
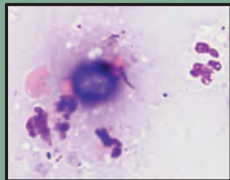
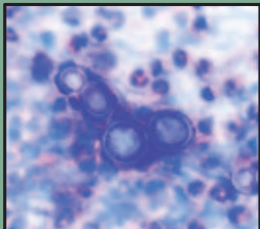
- Ddx:
  - Fungal infections
  - Foreign body responses
  - Higher-order bacterial infections
    - i.e. *Mycobacterium* spp.



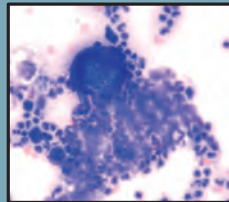
## Fun with Fungus!

### *Blastomyces dermatitidis*

- Deeply basophilic, round yeast
- Broad based budding
- Double contoured wall



Images courtesy  
of Dr. Danielle  
Gordon,  
Midwestern  
University



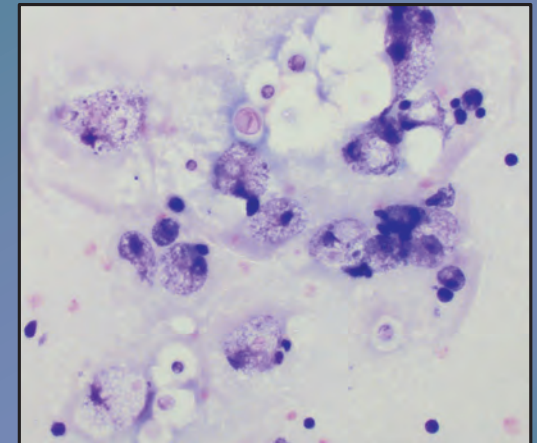
### *Coccidioides immitis*

- Large, round spherules
- Endospores

## Fun with Fungus!

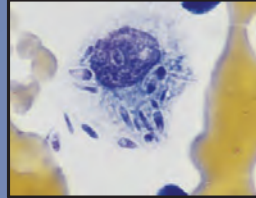
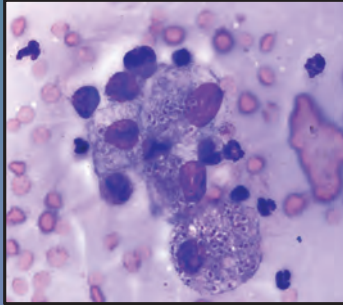
- *Cryptococcus* spp.

- Narrow based bud
- Thick capsule



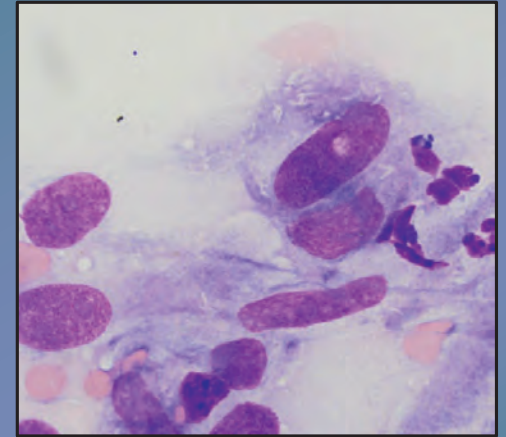
## Fun with Fungus!

- *Histoplasma capsulatum*
  - Organisms generally within macrophages
- *Sporothrix schenckii*
  - Similar to *Histoplasma* with cigar shaped organisms



## Mycobacterium spp.

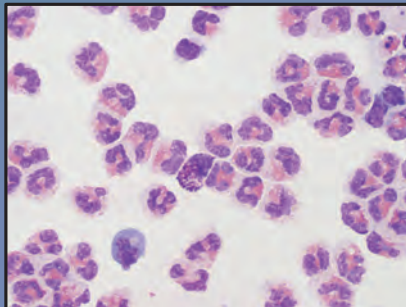
- Macrophages containing nonstaining, rod-shaped bacteria



## Inflammation

### Eosinophilic

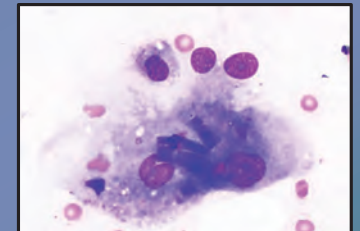
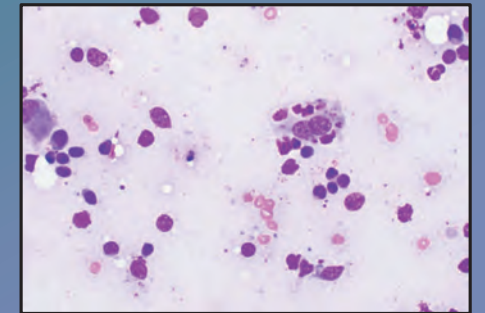
- Arthropod Bite
- Eosinophilic granuloma/plaque
- Paraneoplastic response
  - Mast cell neoplasia
  - T-cell lymphoma



## Inflammation

### Mixed

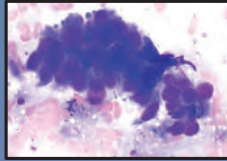
- Vaccine or Injection site reaction
  - Lymphocytes, plasma cells, and macrophages typically seen
  - Macrophages contain magenta or blue material
- Foreign body reaction
  - Variable cellular response
  - Can occasionally visualized foreign material within macrophages



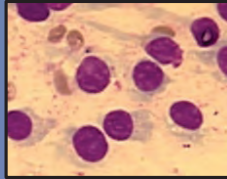


# Neoplasia

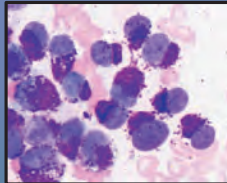
Epithelial



Mesenchymal

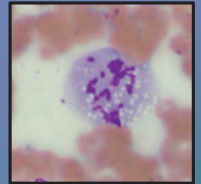
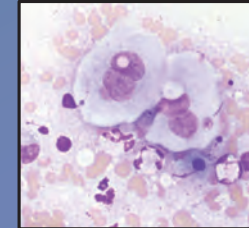
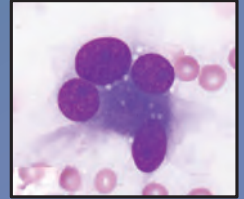
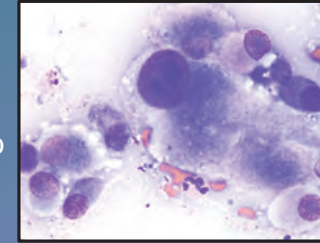


Round Cell



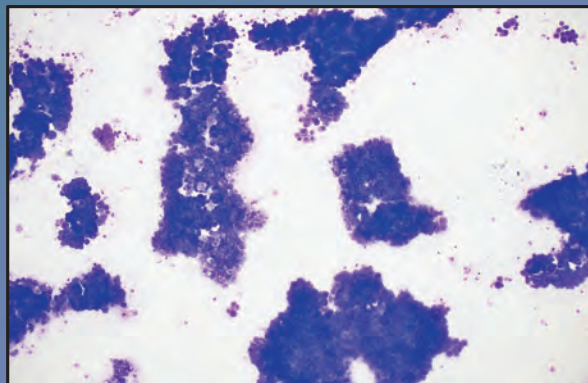
## Cytologic Criteria of Malignancy

- Anisocytosis
- Anisokaryosis
- Variability in nuclear to cytoplasmic ratio
- Bizarre mitotic figures
- Nuclear molding
- Binucleation/Multinucleation
  - Anisonucleoliosis



## Epithelial Neoplasia

- Cohesively clustered cells
  - Discernible intercellular junctions
- Polygonal/angular cell shape
- Variably exfoliative



## Epithelial Neoplasia: Common Ddx

Trichoblastoma/Basal Cell Tumor

Hair follicle tumors (i.e. trichoepithelioma)

Sebaceous adenoma/epithelioma

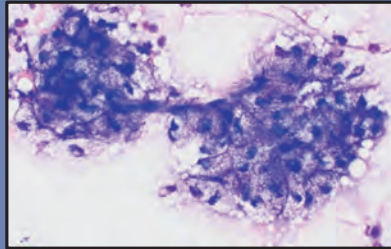
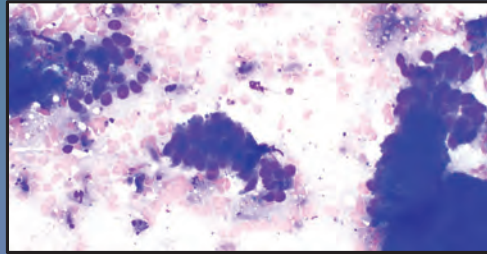
Squamous Cell Carcinoma

### Perianal tumors

- Perianal gland tumor (hepatoid tumor)
- Apocrine gland adenocarcinoma of the anal sac (AGASACA)

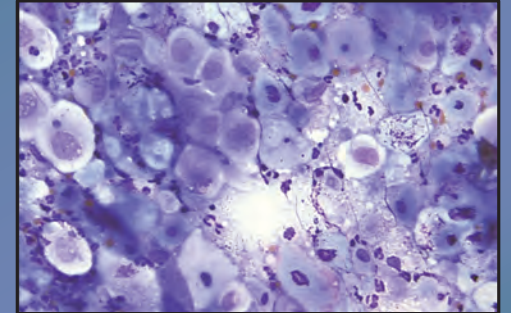
## Benign epithelial neoplasia

- Trichoblastoma
  - Uniform cells with high N:C ratio
  - +/- pink extracellular matrix
- Follicular tumors
  - Often indistinguishable from follicular cyst
- Sebaceous adenoma
  - Heavily vacuolated cytoplasm



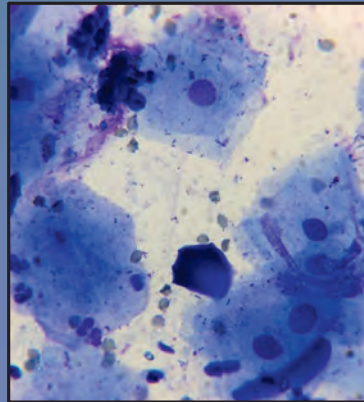
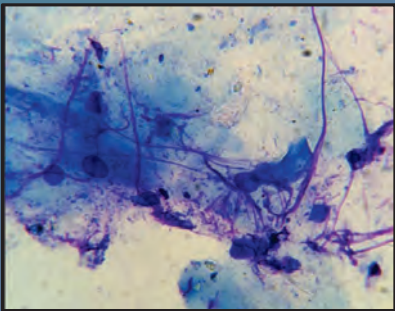
## Squamous Cell Carcinoma

- Polygonal to tadpole-shaped
- Individualized to clustered
- Keratinized cytoplasm with large nuclei
  - "Dyskeratosis"
- Often contain secondary neutrophilic inflammation



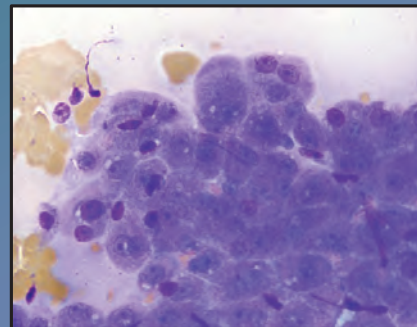
## Not SCC!

Mature squamous epithelial cells from impression smear

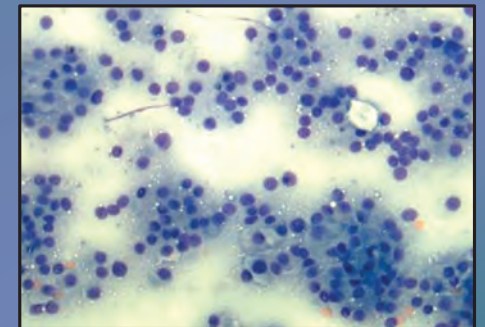


## Perianal tumors

Perianal Gland Tumor (Hepatoid Tumor)



Apocrine Gland Adenocarcinoma of the Anal Sac (AGASACA)



## Mesenchymal Neoplasia

- Poorly exfoliative in many cases
- Individualized to aggregated cells
- Often spindloid to stellate in shape
- Wispy cytoplasmic extensions

## Mesenchymal Neoplasia: Ddx

Lipoma

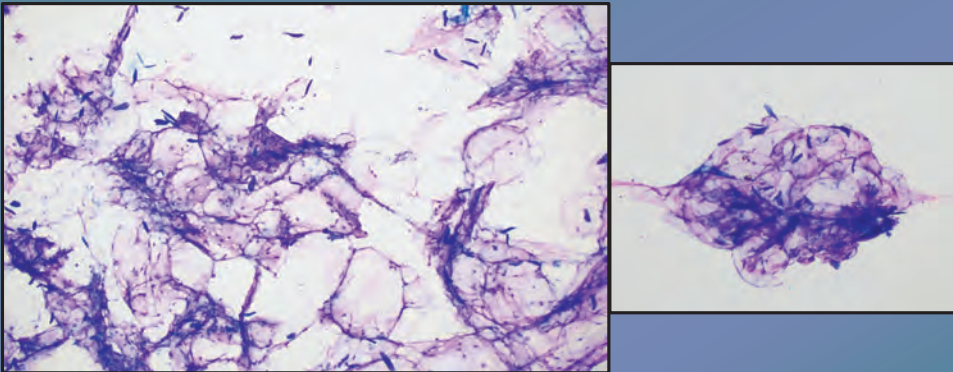
Melanoma

Fibroma

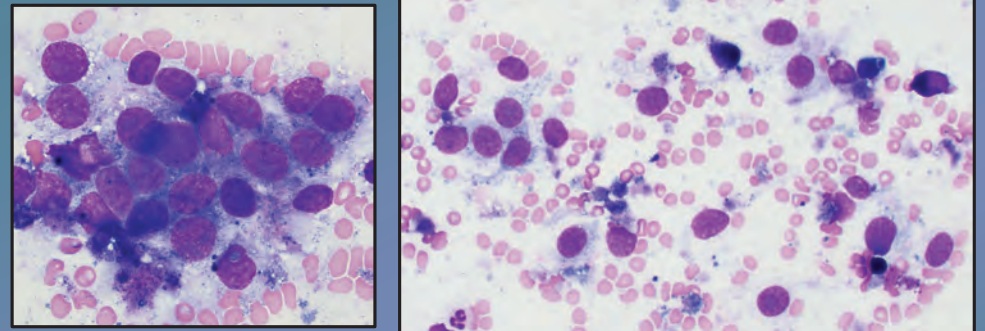
Soft tissue sarcoma  
• i.e. peripheral nerve sheath tumor, perivascular wall tumor, fibrosarcoma, etc.

Hemangiosarcoma, osteosarcoma, chondrosarcoma, etc.

## Mature Adipose Tissue/Lipoma

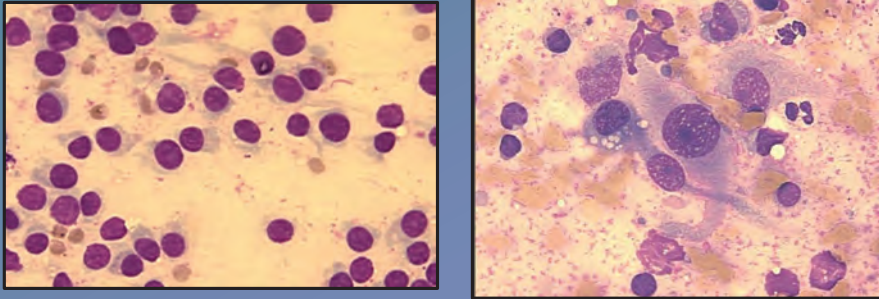


## Melanoma

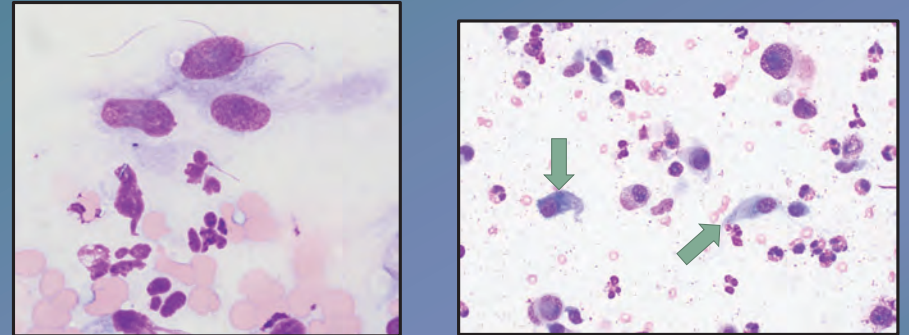




## Soft Tissue Sarcoma



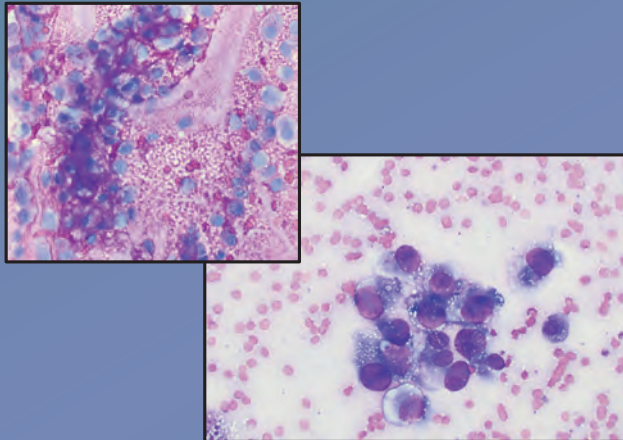
Mesenchymal cells may also represent reactive fibroplasia...



...especially if there is concurrent evidence of inflammation

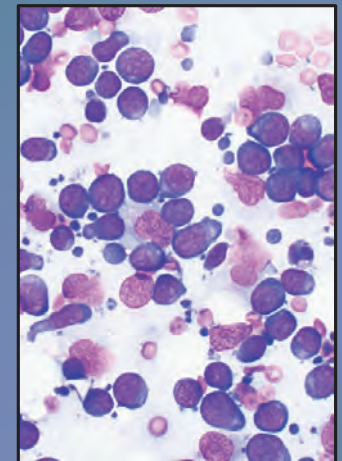
## Other sarcomas less commonly present as skin/subcutaneous lesions

- Hemangiosarcoma
- Chondrosarcoma
- Osteosarcoma

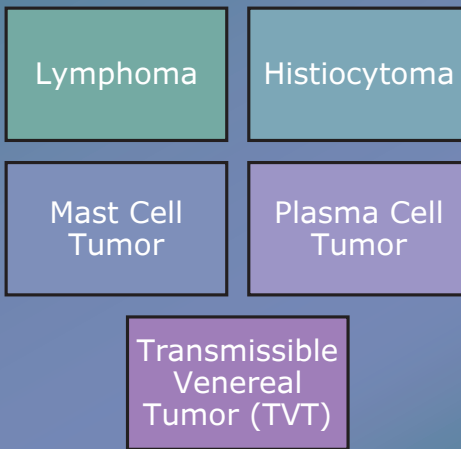


## Round Cell Neoplasia

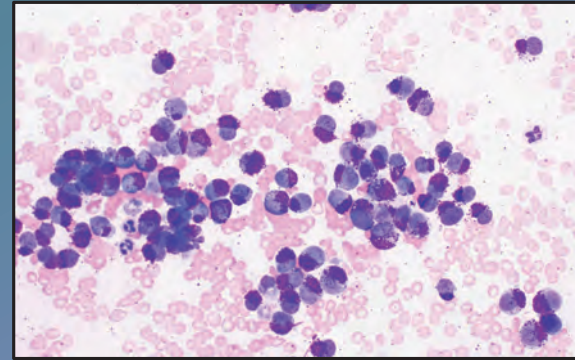
- Similar cytologic appearance
  - Individualized to aggregated cells
  - Round in shape
  - Discrete cytoplasmic margins
- Often similar clinical appearance
  - Raised, hairless cutaneous masses
  - May be red or ulcerated



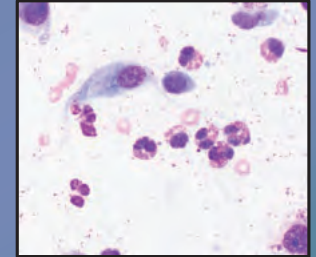
## Round Cell Neoplasia: Ddx



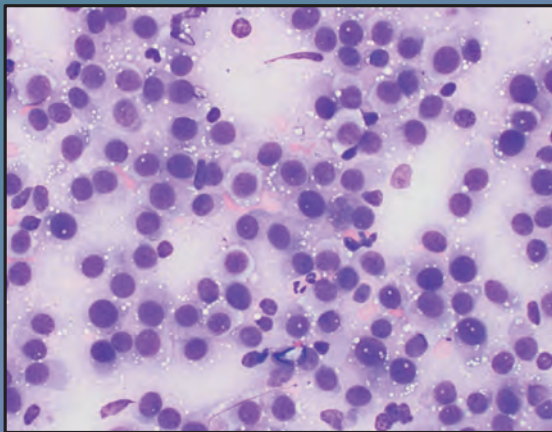
## Mast Cell Neoplasia



- Purple (metachromatic) cytoplasmic granules
- Eosinophils
- Reactive fibroblasts
- Collagen

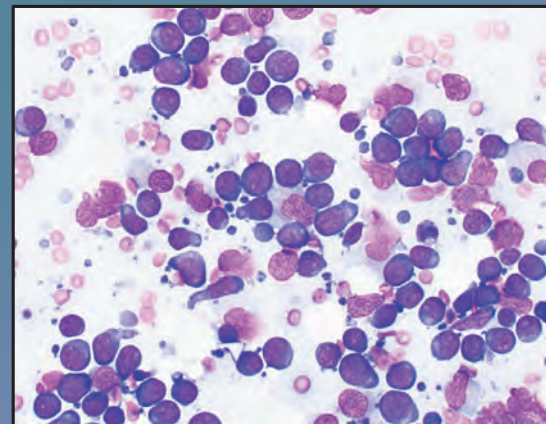


## Transmissible Venereal Tumor



- Discrete cytoplasmic vacuoles
- **Dogs only**

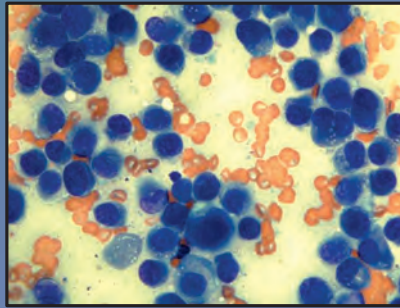
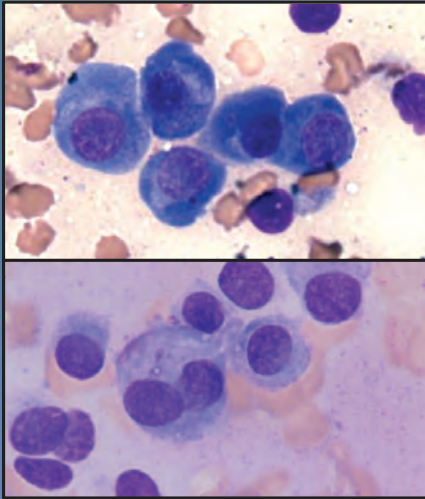
## Lymphoma



- Small amount of cytoplasm (High N:C ratio)

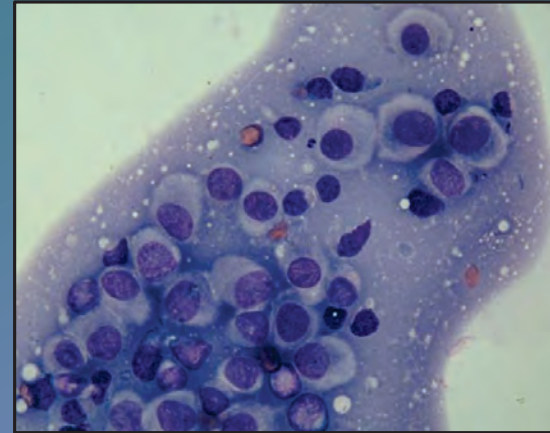


## Plasma Cell Tumor



- Eccentrically placed nucleus, **commonly binucleated**
- Golgi apparatus may be observed

## Histiocytoma



- “Fried egg” appearance, younger dogs
- +/- lymphocytic inflammation

# Questions?

Remember to **download the CE certificate** in the handouts panel of the webinar control panel.

NOTE: CE certificate not available for watching the recording.

**Questions about CE?**  
[events@heska.com](mailto:events@heska.com)

**Thank you for joining us!**



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