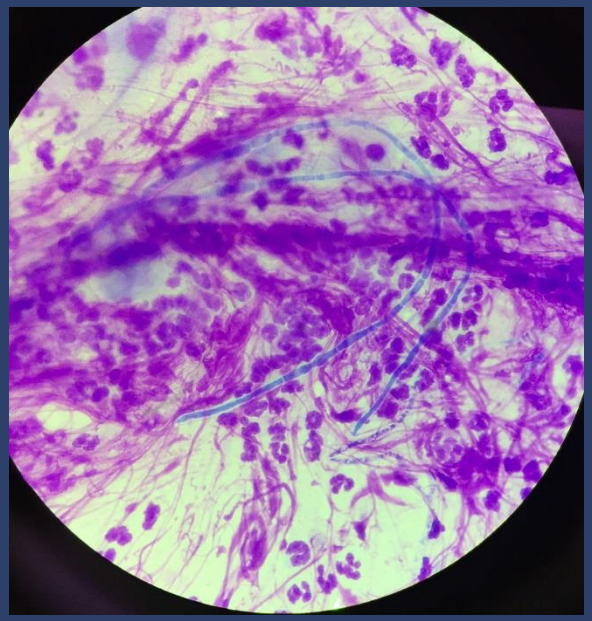
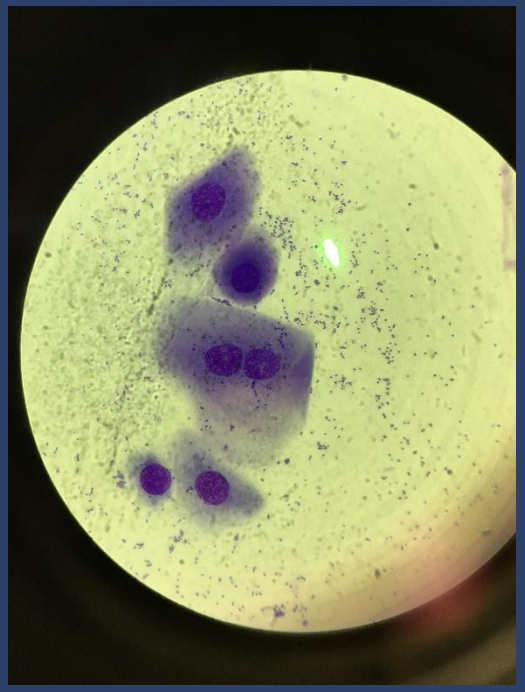
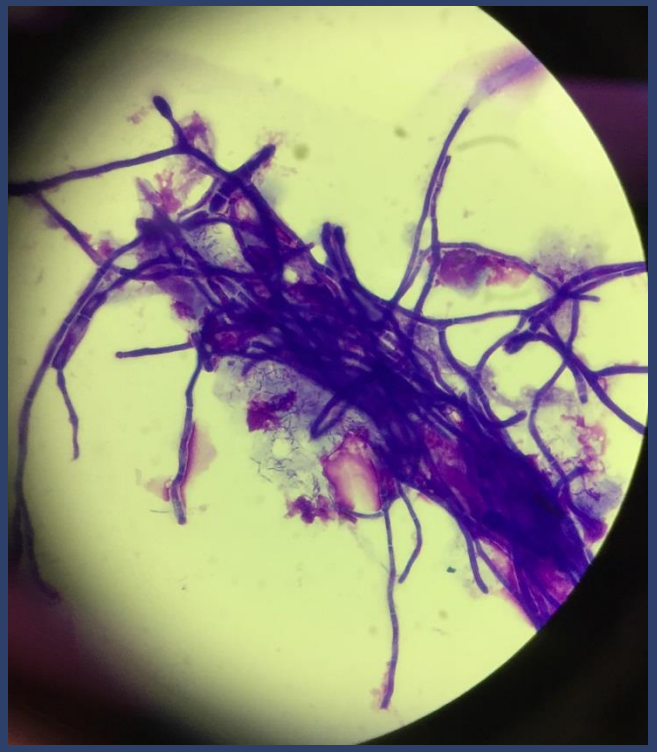






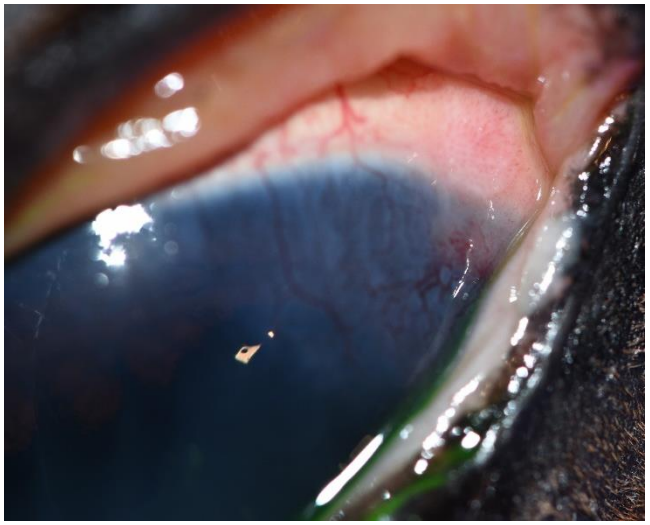
AUBURN UNIVERSITY

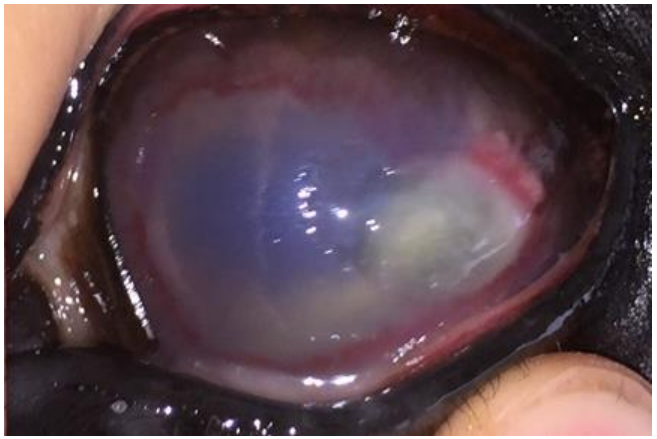
OCULAR CYTOLOGY

Ethan Hefner, DVM
Ophthalmology Resident

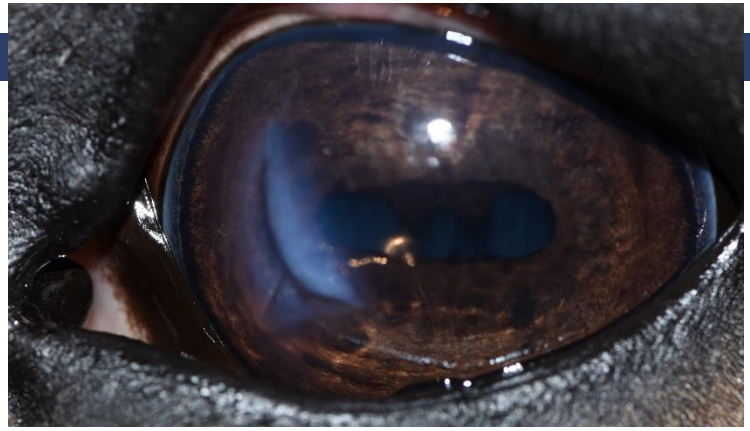
Uses for cytology

- Cornea-ulcers/infectious keratitis
- Conjunctiva-Eosinophilic keratitis/keratoconjunctivitis
- Eyelids/Adnexa-mass/neoplasia





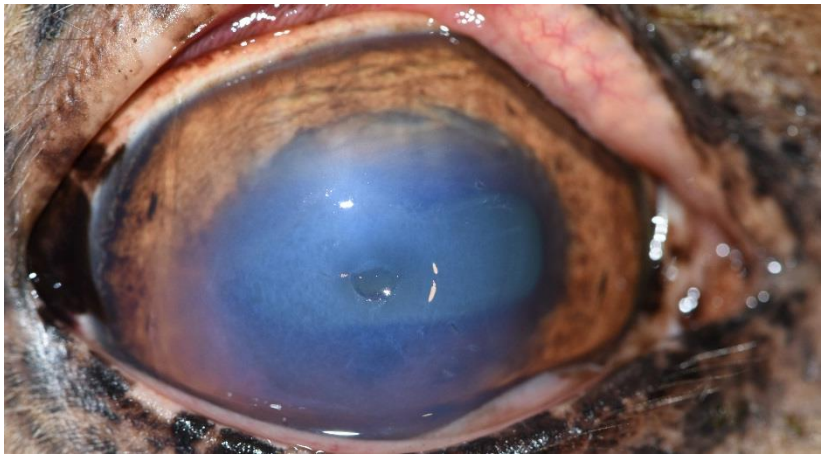
Advantges of cytology



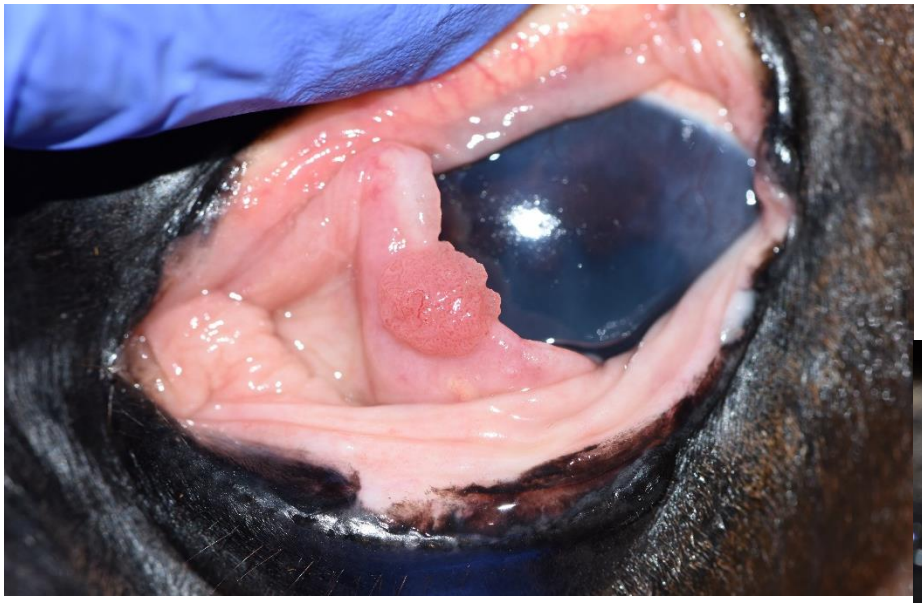
- Safe
- Inexpensive
- Immediate results
- Guide therapeutic treatment
- In-vivo assessment of treatment efficacy
- Culture/Sensitivity-In-vitro assessment of treatment efficacy

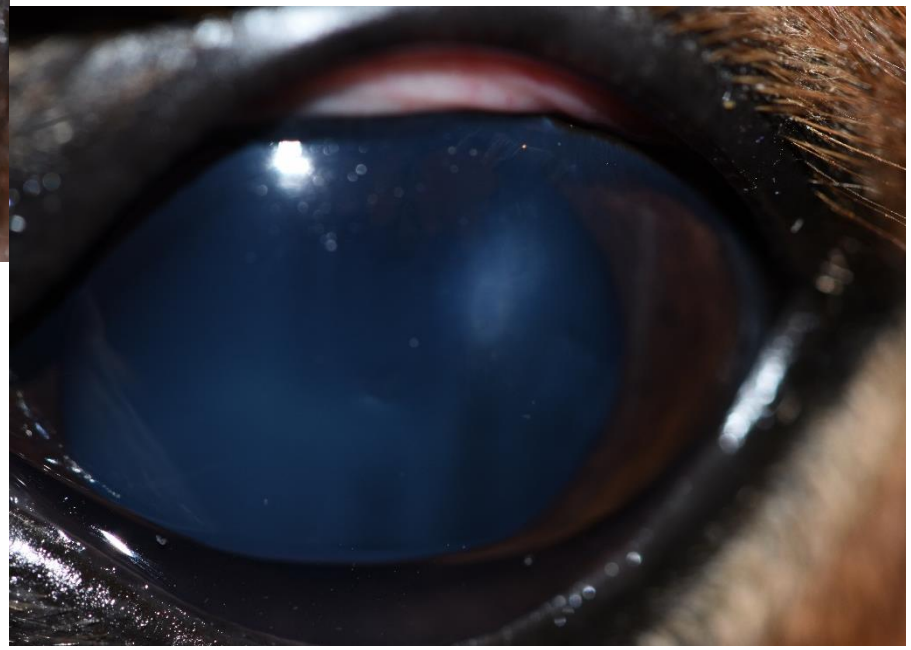
When to use?

- Initial evaluation for infectious keratitis, nonhealing, or complicated ulcer
- Clinical signs indicating use?
  - CORNEA-complicated ulcer
  - Conjunctiva- hyperemia, chemosis, follicles, mass
- Contraindications?
  - Deep stromal ulcer
  - Descemetocele
  - Perforation



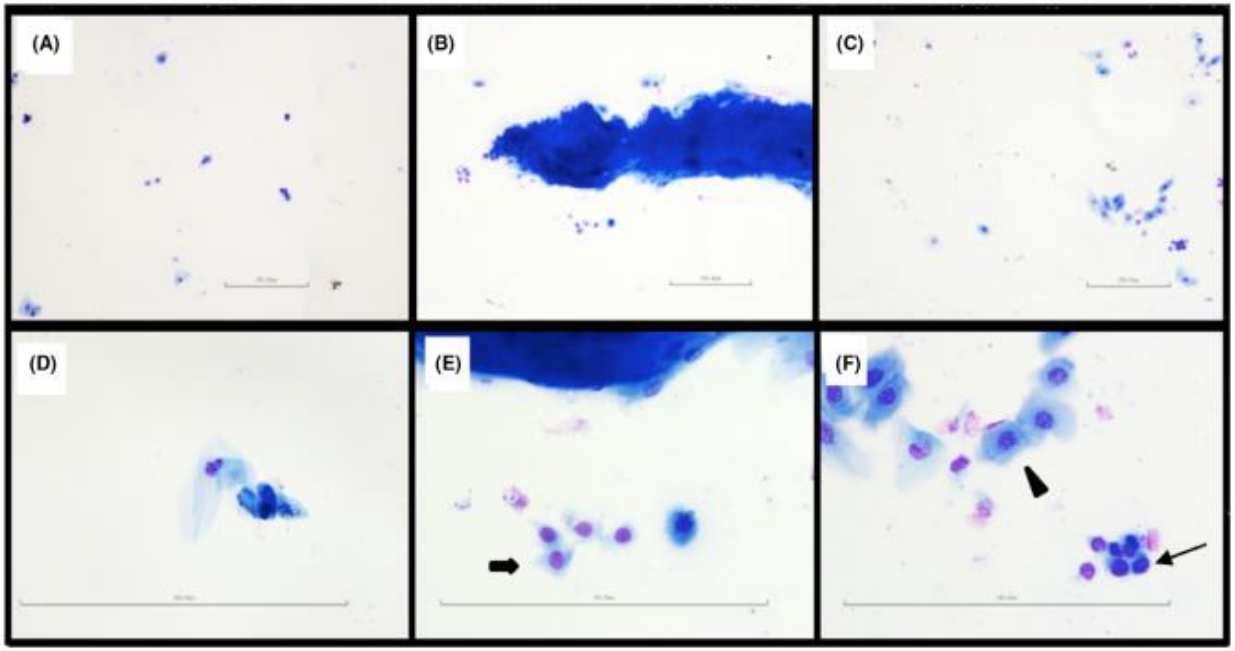
Sampling of these tissues?





Ideal Cytology Sample

- Cellular! (Monolayer-well preserved)
- Representative of lesion (intermediate, cornified, mature epithelial cells)
- Minimal irritation to patient

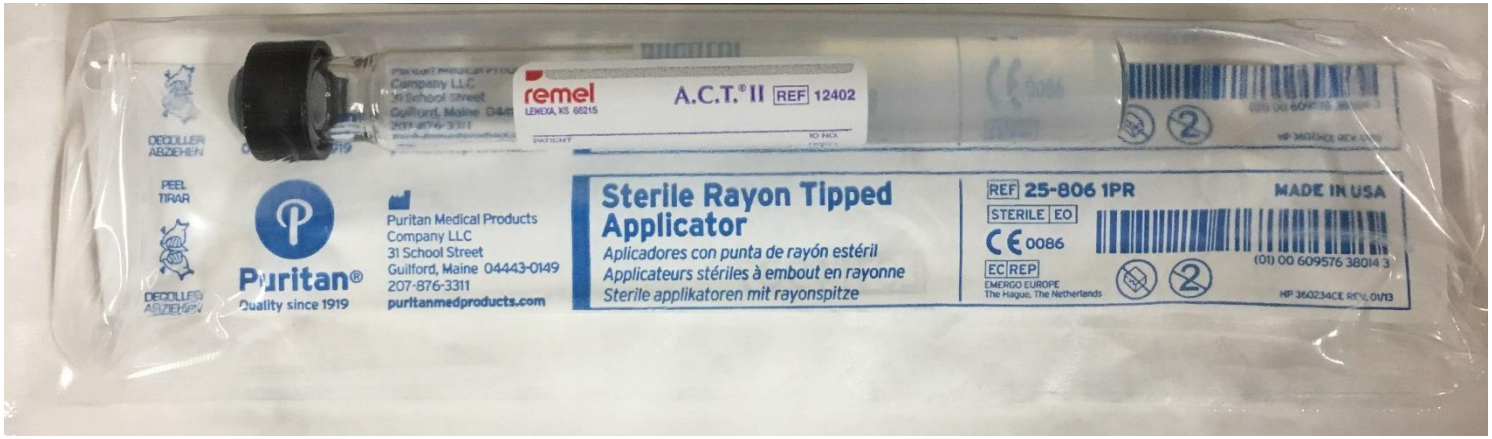


Collection Methods

- Cotton Tipped Applicator (CTA)
- Cytobrush (CB)
- Kimura Spatula (KS)
- Scalpel Blade (SB)

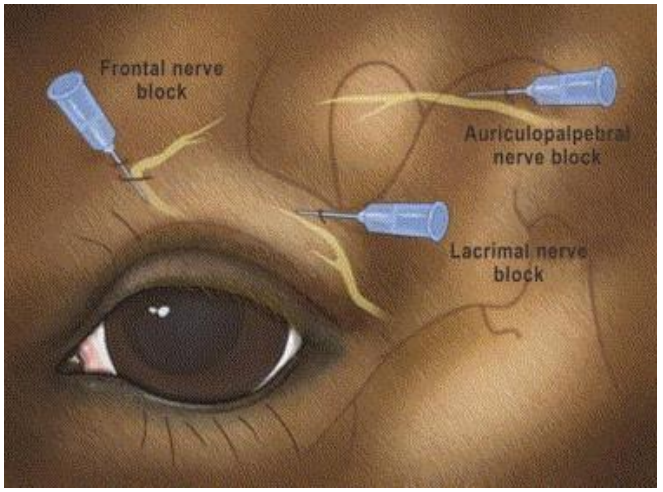
Equipment Required

- Instrument of choice
- Clean glass slides
- Culture tubes (ACT II)



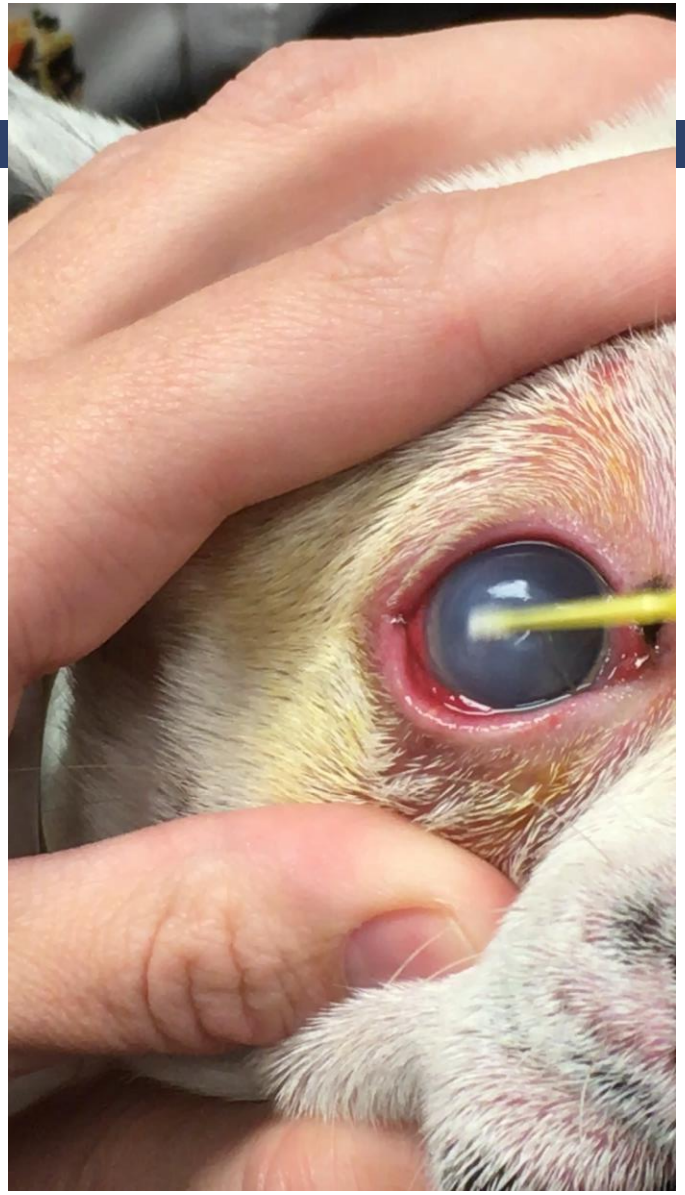
Patient Preparation

- Sedation- detomidine 0.01-0.03 mg/Kg or xylazine (0.02-1mg/kg IV) +/- butorphanol (0.02mg/kg IV)
- Auriculopalpebral and supraorbital/frontal block- Lidocaine or carbocaine
- Proparacaine



Sample collection

- Area of infiltrate
- Periphery of ulceration
- Not within center-necrotic debris

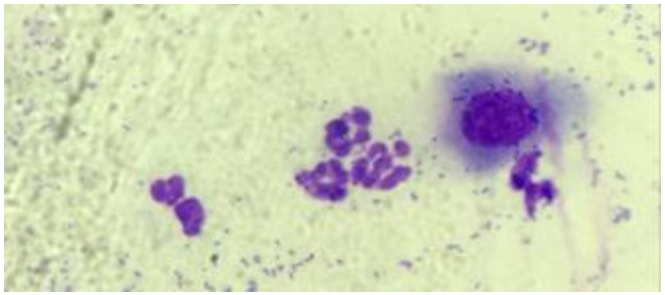


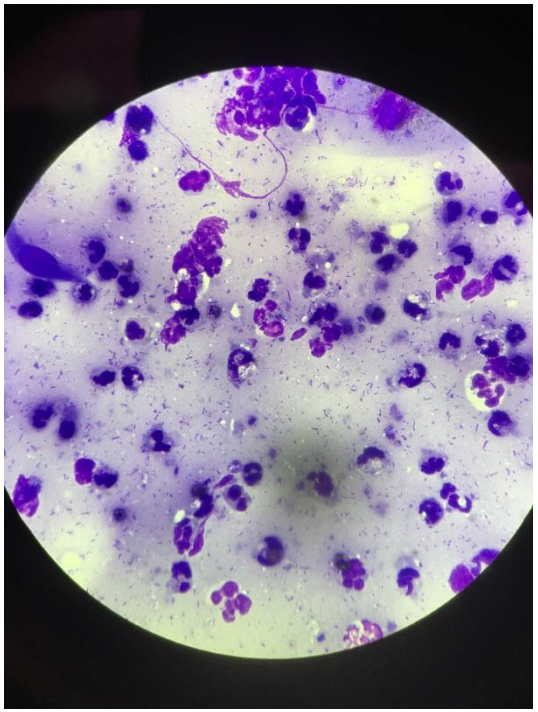
Preparing Cytology

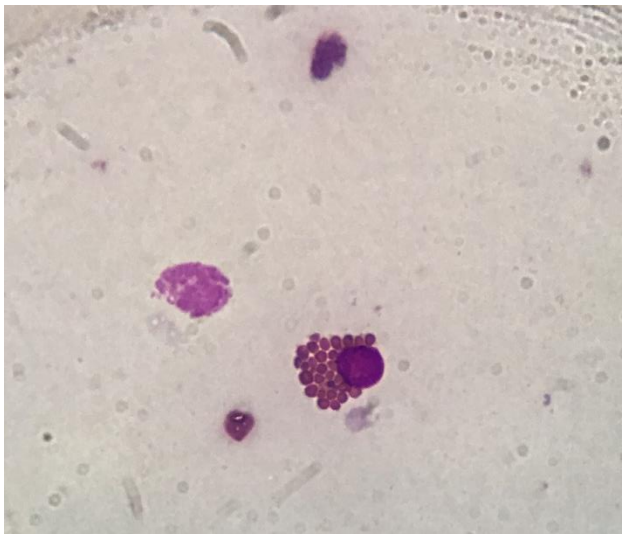
- Clean glass slides-distribute evenly-monolayer
- Romanowsky Stains
  - Wright Giemsa
  - Diff Quick
- Gram stain
- Special stains (FUNGUS)
  - Periodic Acid Schiff (PAS)
  - Gomori's methanamine silver stain
  - Clinical Pathologist review

Interpreting cytology

- Cellular elements
  - Epithelial cells
  - White blood cells

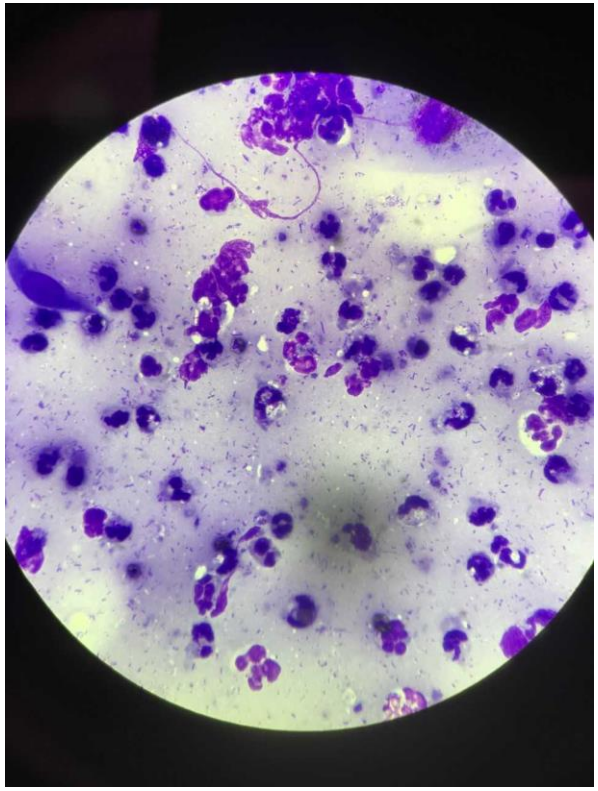


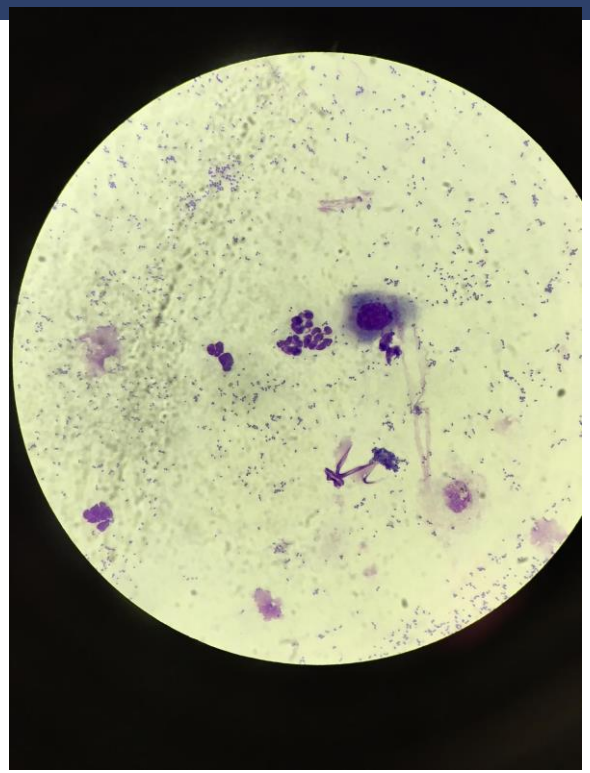




Interpreting cytology

- Microbial elements
- Bacteria
  - Rods
  - Cocci
  - Bipolar rods

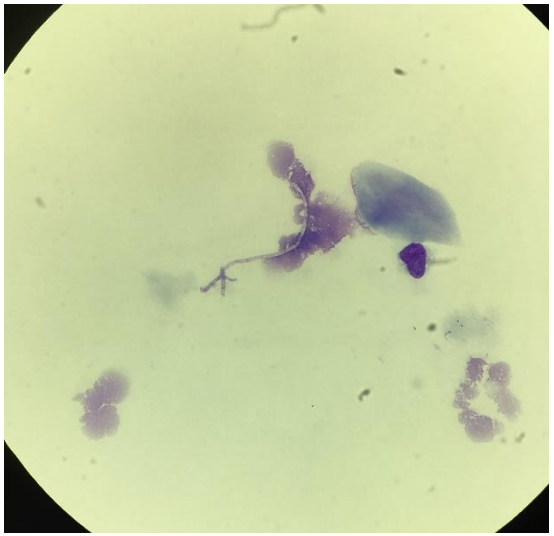


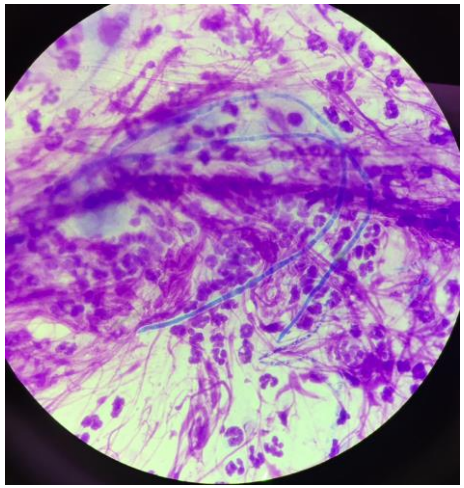


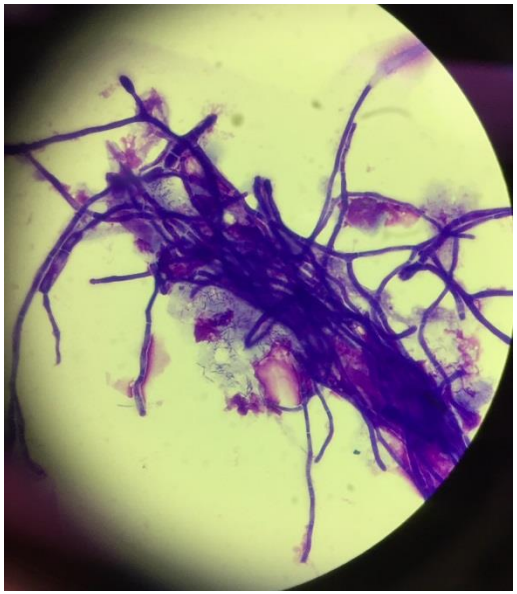
Interpreting cytology

- Microbial elements
- Fungi
  - Hyphae-spaghetti like within epithelial cells

  Negative staining, parallel walls, septae







Interpreting cytology

- Nuclear streaming
- Melanin granules
- Foreign Bodies
- Mineralized crystals

ORIGINAL ARTICLE

WILEY

Comparison of 3 corneal cytology collection methods for evaluating equine ulcerative keratitis: Cytobrush, kimura platinum spatula, and handle edge of scalpel blade

Laura Proietto[1] | Sarah S. Beatty[2] | Caryn E. Plummer[1]

- 20 horses with ulcerative keratitis evaluated with KS, SB, and CB in random order.
- Cellularity greatest with scalpel blade
- 28/120 samples non-diagnostic- 23%, most common with kimura spatula (15/40)
- No difference in technique and maturity
- No difference in sample quality (intact to fragmented cells)
- Multilayers more prominent in CB and SB
- 12/20 animals had positive culture
- Culture and cytology consistent in 18/20 animals

TABLE 3 SB has the highest sensitivity and negative predictive value (NPV), and KS has the highest specificity and positive predictive value (PPV) compared to results of bacterial and fungal culture after analysis of 10 serial monolayer cell populations under 50× oil immersion

Technique	Sensitivity % (Mean ± 95% CI)	Specificity % (Mean ± 95% CI)	PPV % (Mean ± 95% CI)	NPV % (Mean ± 95% CI)	Nondiagnostic %
Cytobrush CB	60.87 ± 19.42	87.5 ± 10.95	87.5 ± 8.88	60.87 ± 11.83	25
Kimura spatula KS	50 ± 20.88	100 ± 20.59	100	57.14 ± 9.41	37.5
Scalpel blade SB	70.83 ± 16.55	93.75 ± 6.09	94.44 ± 4.70	68.18 ± 12.01	12.5

KS produced the most nondiagnostic samples.

- SB most diagnostic samples but all three techniques are clinically useful in evaluating equine ulcerative keratitis

- Cytology for detecting microbial keratitis
  60.7% sensitivity
  93.75 % specificity

- Cytology reported to correlate with culture results with a PPV and NPV of 73% and 52% in the horse

- Culture results
  50% bacterial
  25% fungal
  25% mixed population

Conclusions

- Safe
- Inexpensive
- Quick
- May improve case outcome or expedite treatment
- Scalpel blade yields most diagnostic sample with highest cellularity
- Establishes baseline for case progression

Resources

- Gelatt, K. N., Gilger, B. C., & Kern, T. J. (2013). *Veterinary ophthalmology*. Ames: Wiley-Blackwell.
- Gilger, B. C., & Gilger, B. C. (2017). *Equine ophthalmology* (3rd ed.). Ames, IA: Wiley Blackwell.
- Proietto, L., Beatty, S. S., & Plummer, C. E. (2018). Comparison of 3 corneal cytology collection methods for evaluating equine ulcerative keratitis: Cytobrush, kimura platinum spatula, and handle edge of scalpel blade. *Veterinary Ophthalmology*. doi:10.1111/vop.12574