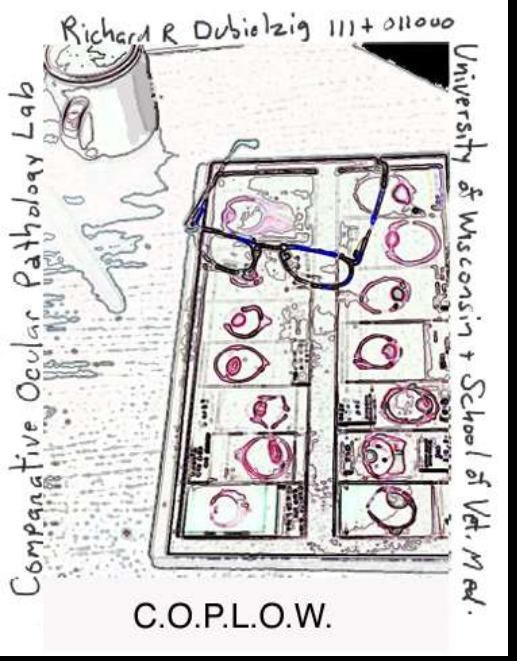
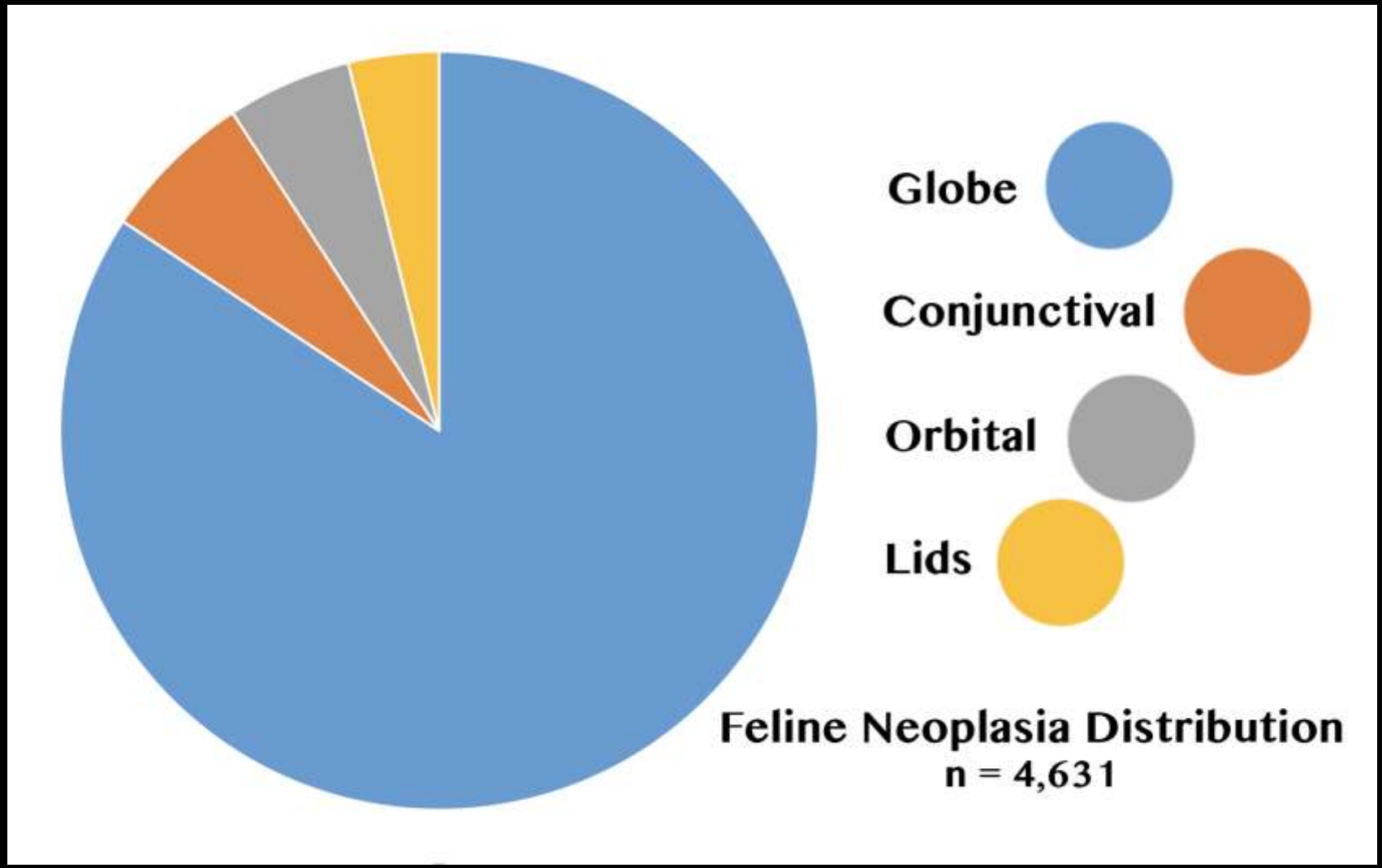


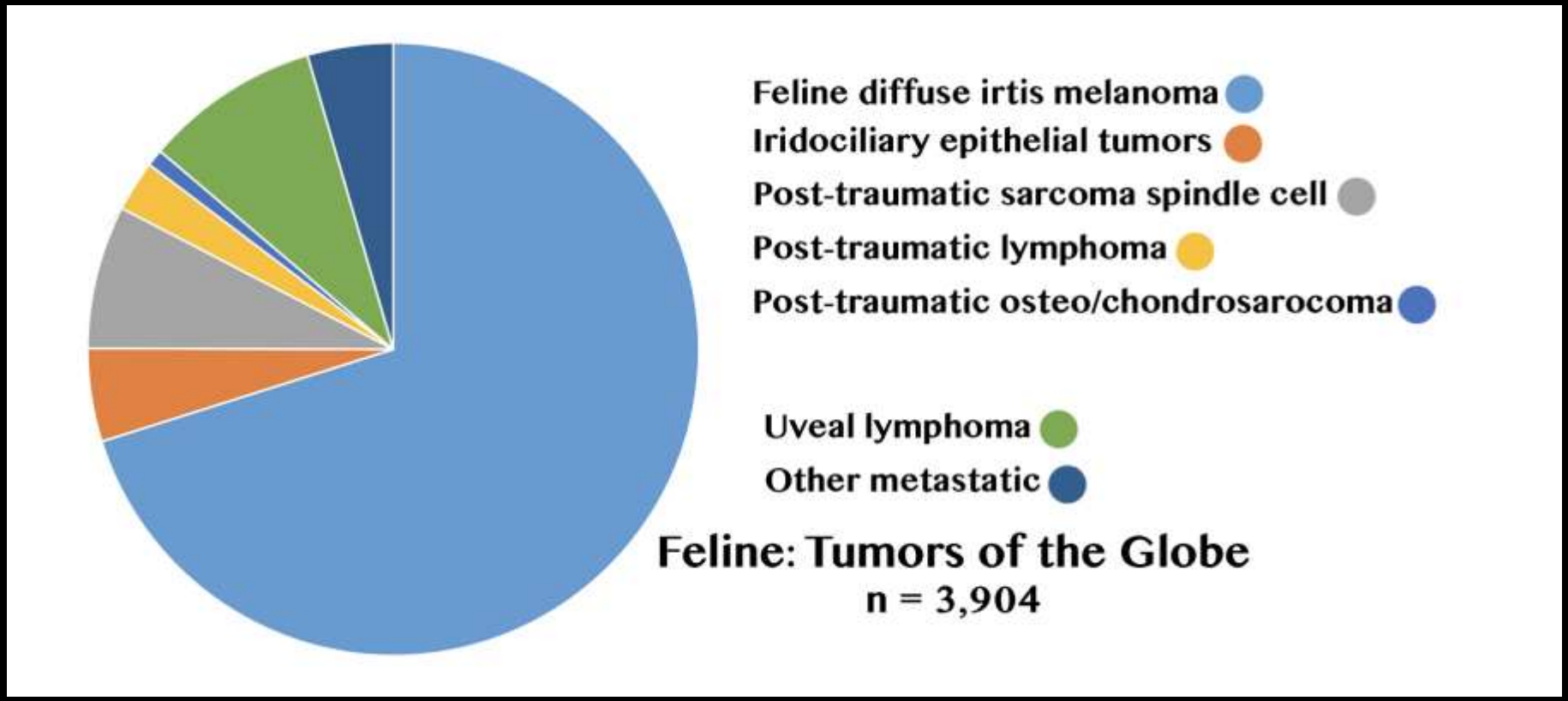
Tumors of the Feline Globe and Periocular Tissues

Richard R Dubielzig

Feline Neoplasia
Distribution of Tumors



Feline Tumors of the Globe



Melanoma:
2625 of 4721 tumors or 5%

- Diffuse Iris Melanoma ... 2393
- “Atypical” ….. 43
- Limbal …… 58
- Conjunctival… 53
- 120 mostly DIM improperly labeled

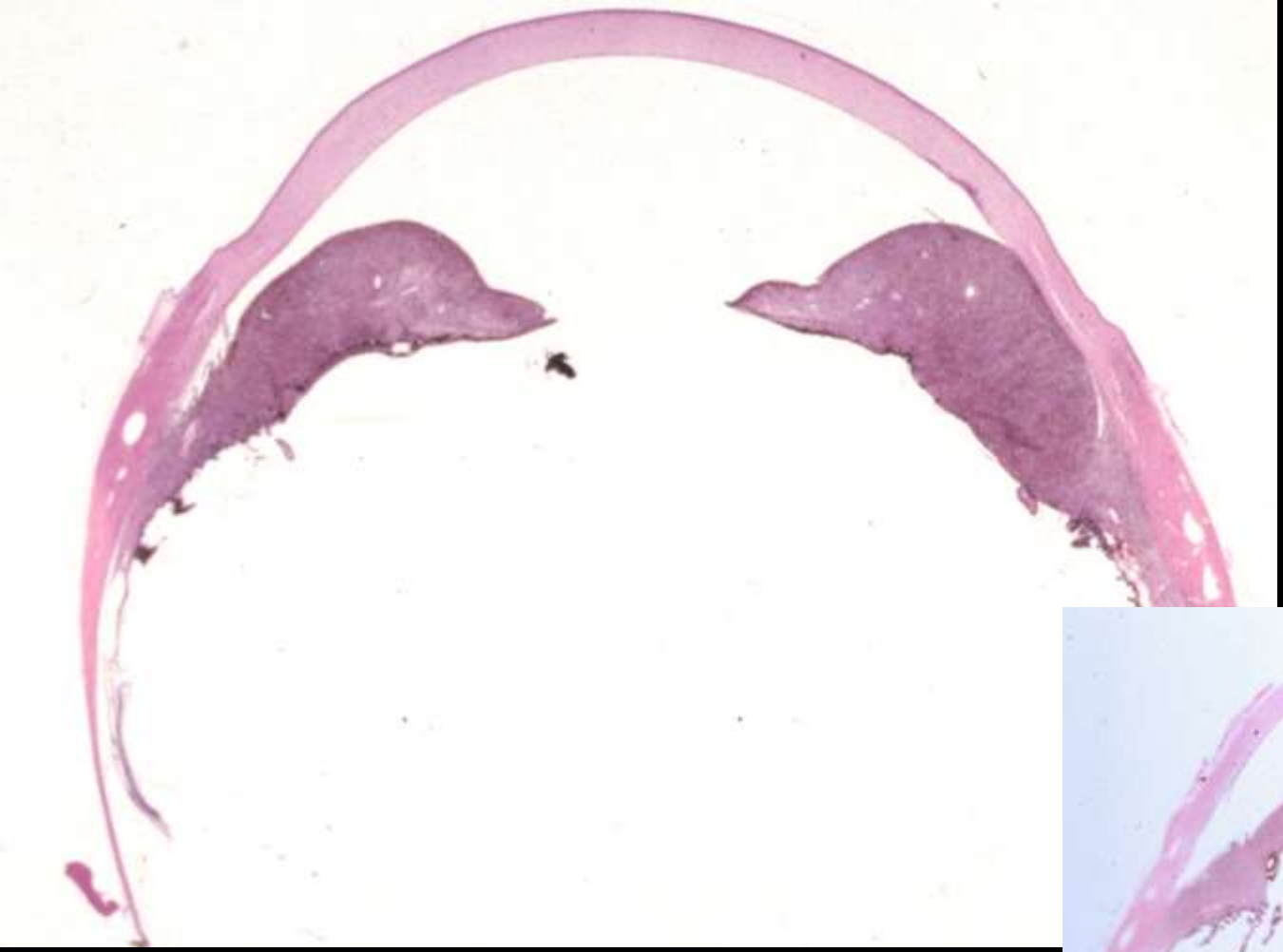
Kalishman JV, Chappell R, Flood LA, Dubielzig RR (1998). A matched observational study of survival in cats with enucleation due to diffuse iris melanoma. *Vet. Ophthal*. 1: 25-29.

Typical Clinical Appearance of Feline Diffuse Iris Melanoma

Photos by Chuck Stuhr

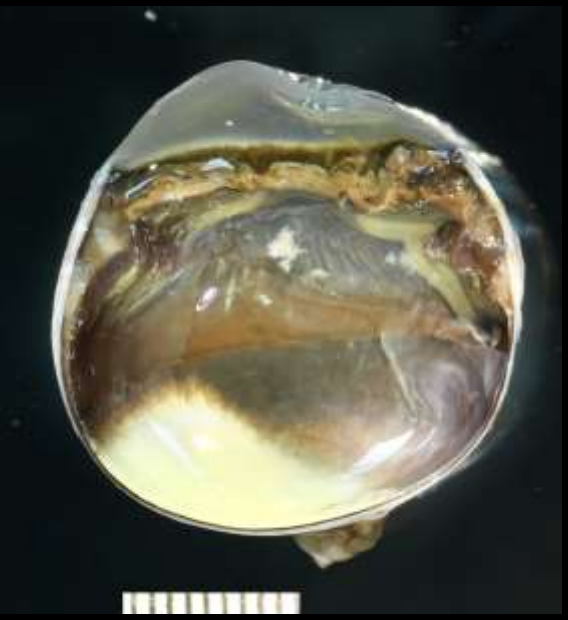
Asymmetrical Darkening of the Iris

This process can occur rapidly
or it can take years



Typical Histopathologic Appearance of Feline Diffuse Iris Melanoma

Gross Appearance of Feline Diffuse Iris Melanoma

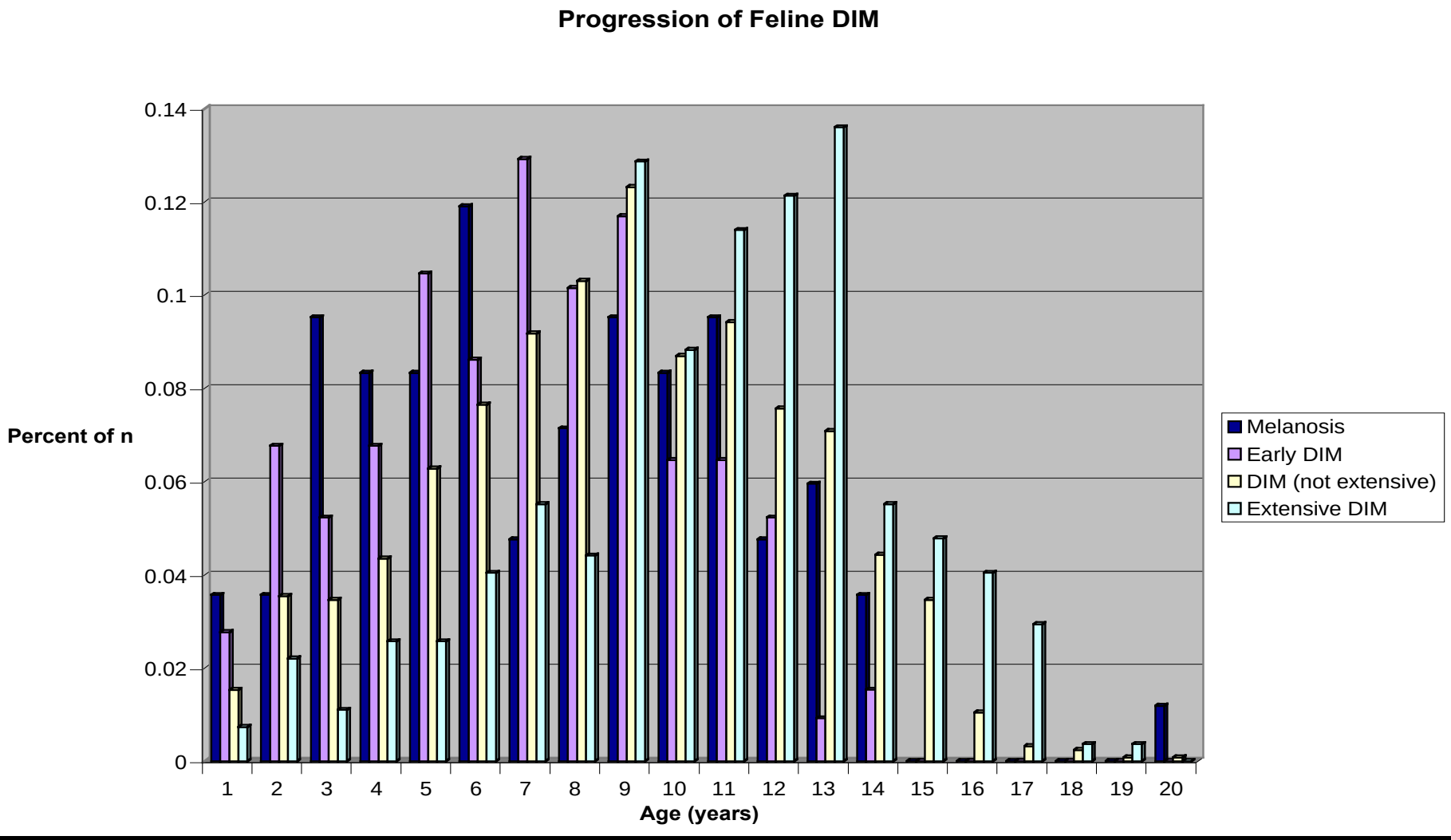


Typical

Atypical

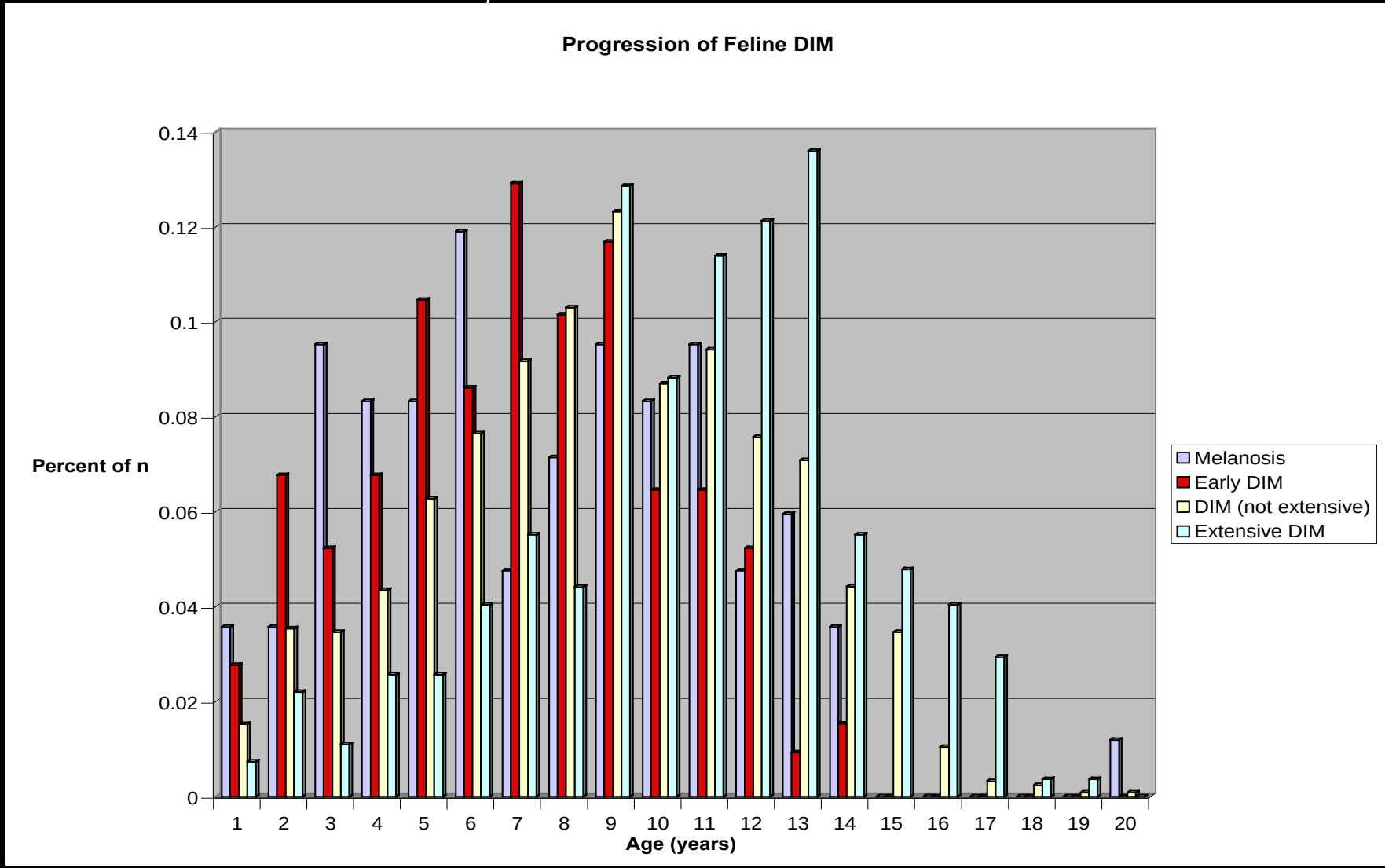
Typical Extensive

Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma



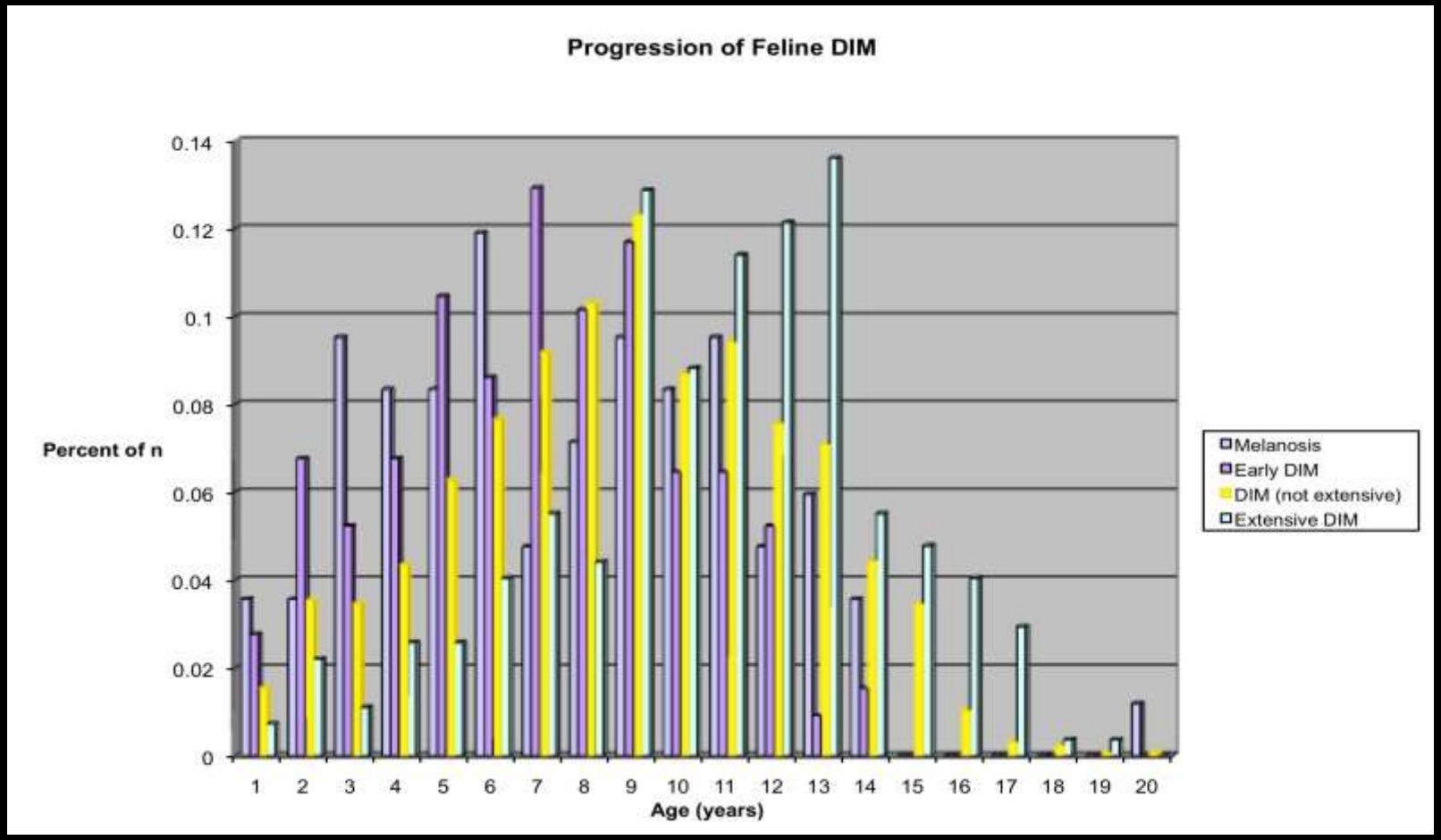
Melanosis n = 84

Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma



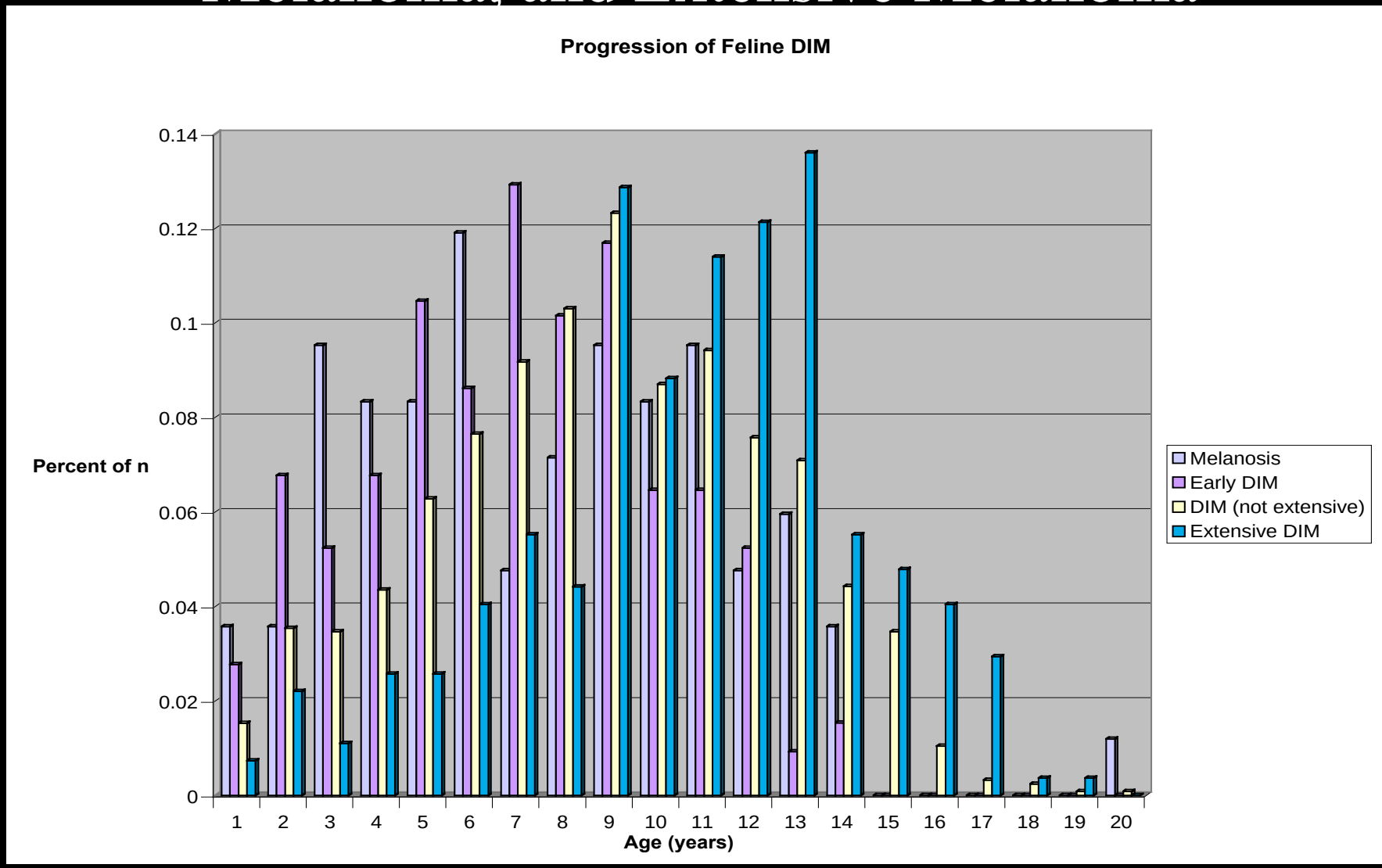
Early Melanoma n = 325

Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma



Melanoma (not extensive) n = 1242

Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma



Extensive Melanoma n = 272

Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma

On average, there is about a 4 year difference in age between cats who have had the eye removed in the earliest stage of disease and the latest stage.

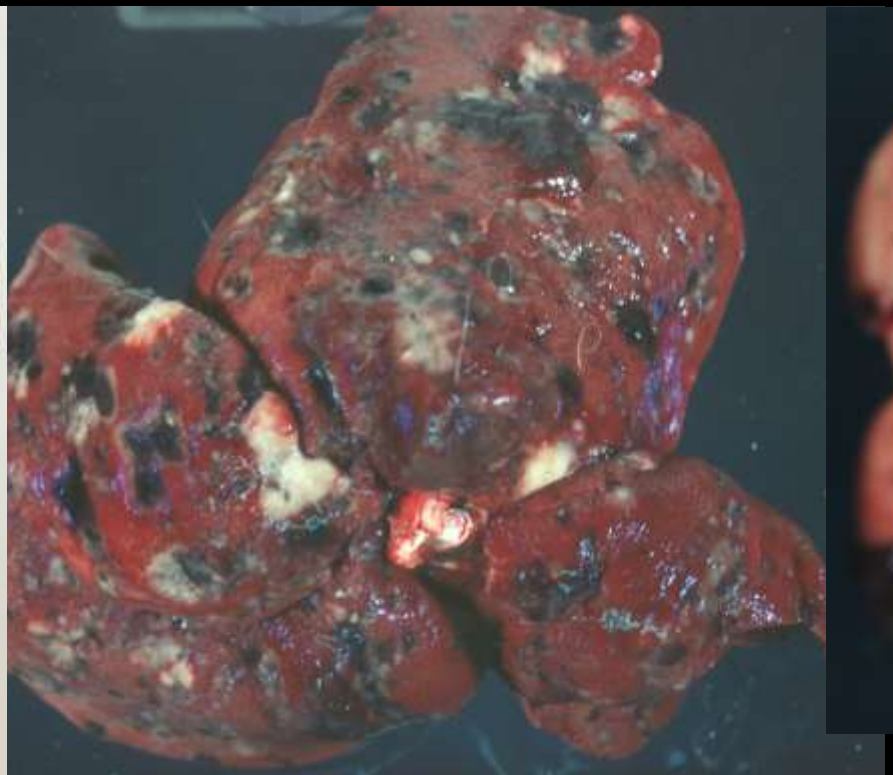
This suggests that, on average, the tumor takes about 4 years to progress to advanced levels.

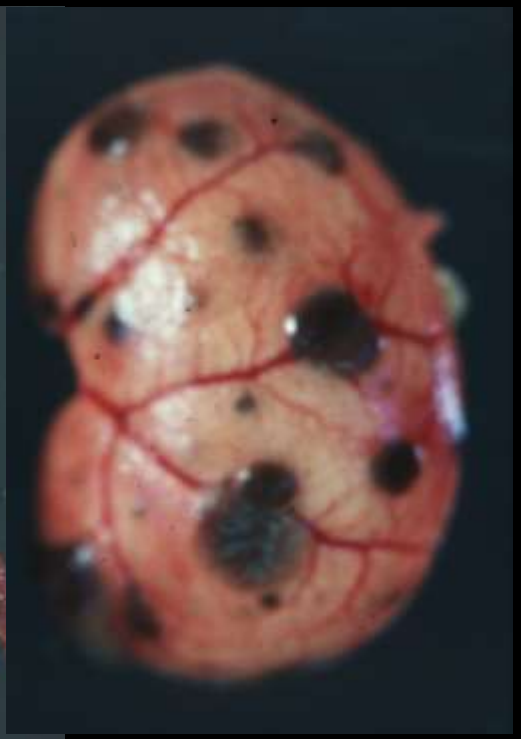
In practice the rate of progression is highly variable with some cases taking decades and never Becoming extensive.

We do not know how to predict this variability except by recorded and frequent observation.

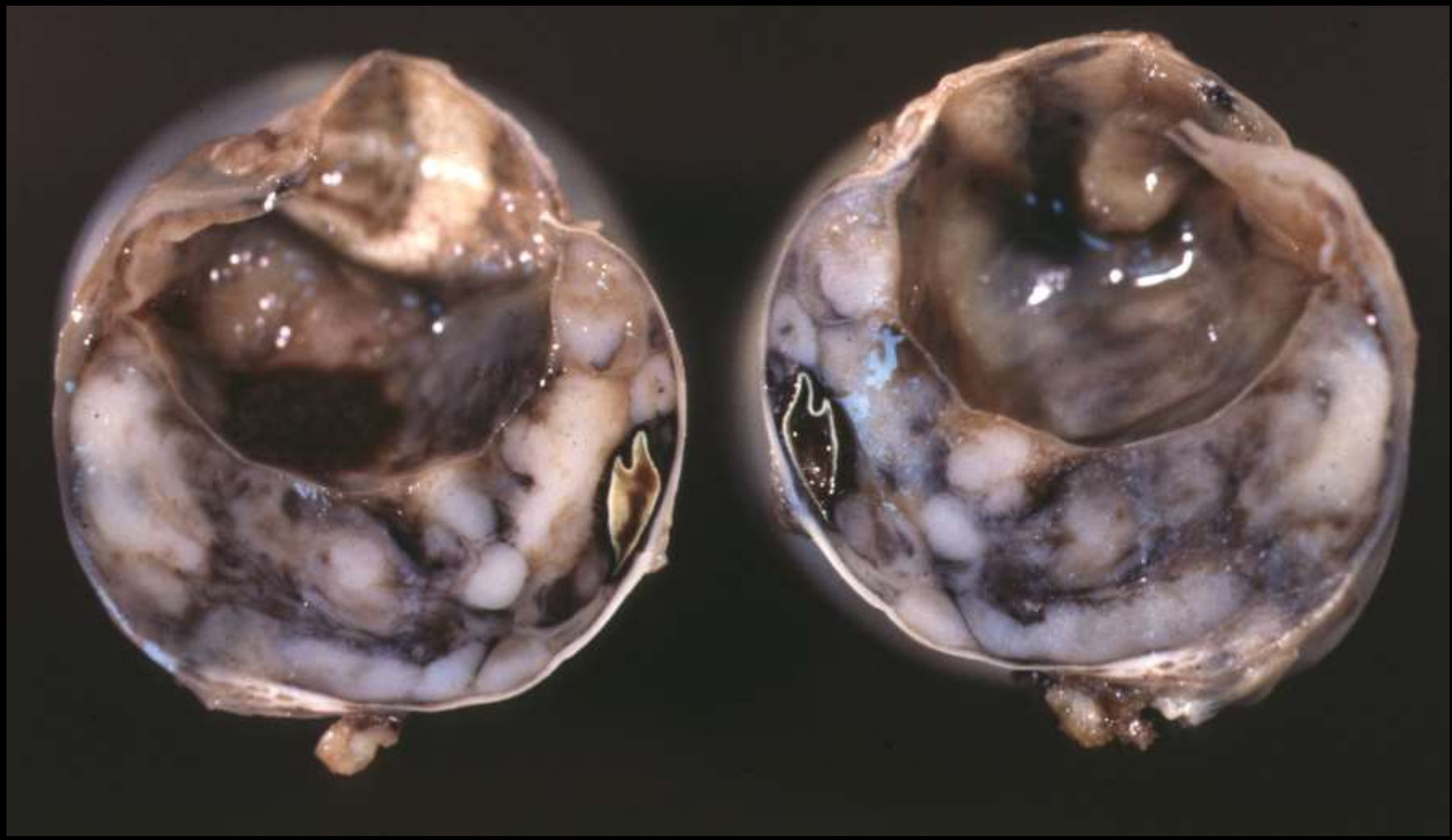
Metastatic Potential of Feline Diffuse Iris Melanoma

All of the cases with metastasis in the COPLOW collection were extensive in the original enucleation





Evisceration Followed by Intrascleral Prosthesis is Not Recommended in Cats with FDIM

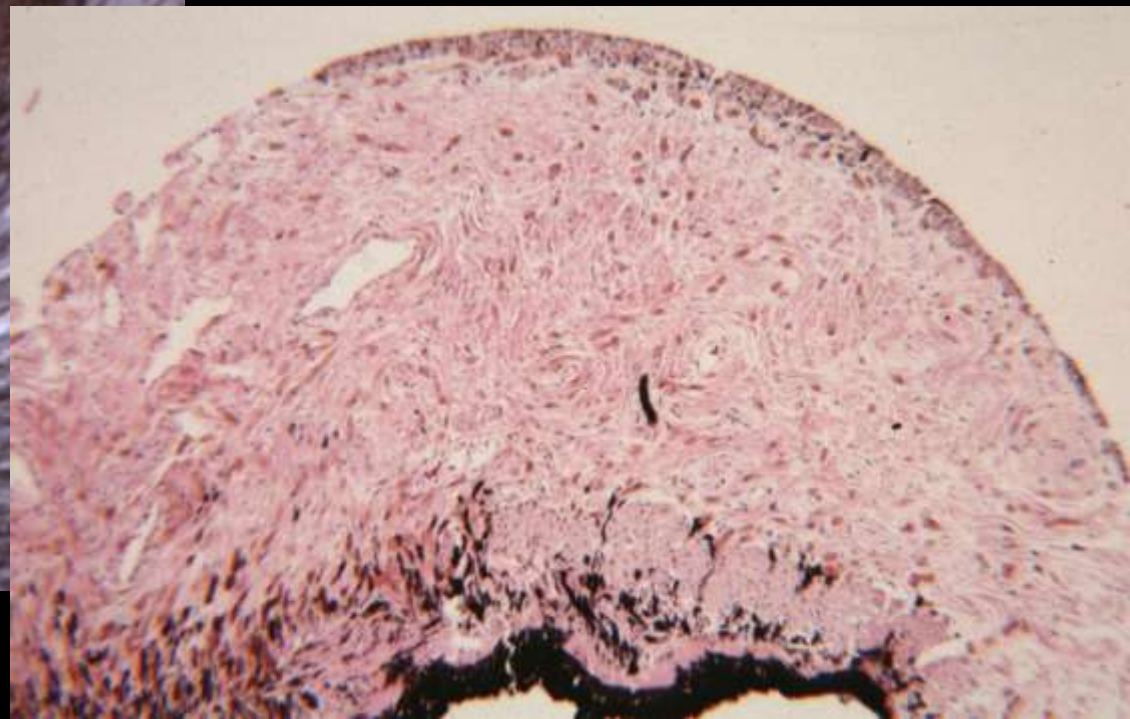


Early Stages of Feline Diffuse Iris Melanoma:

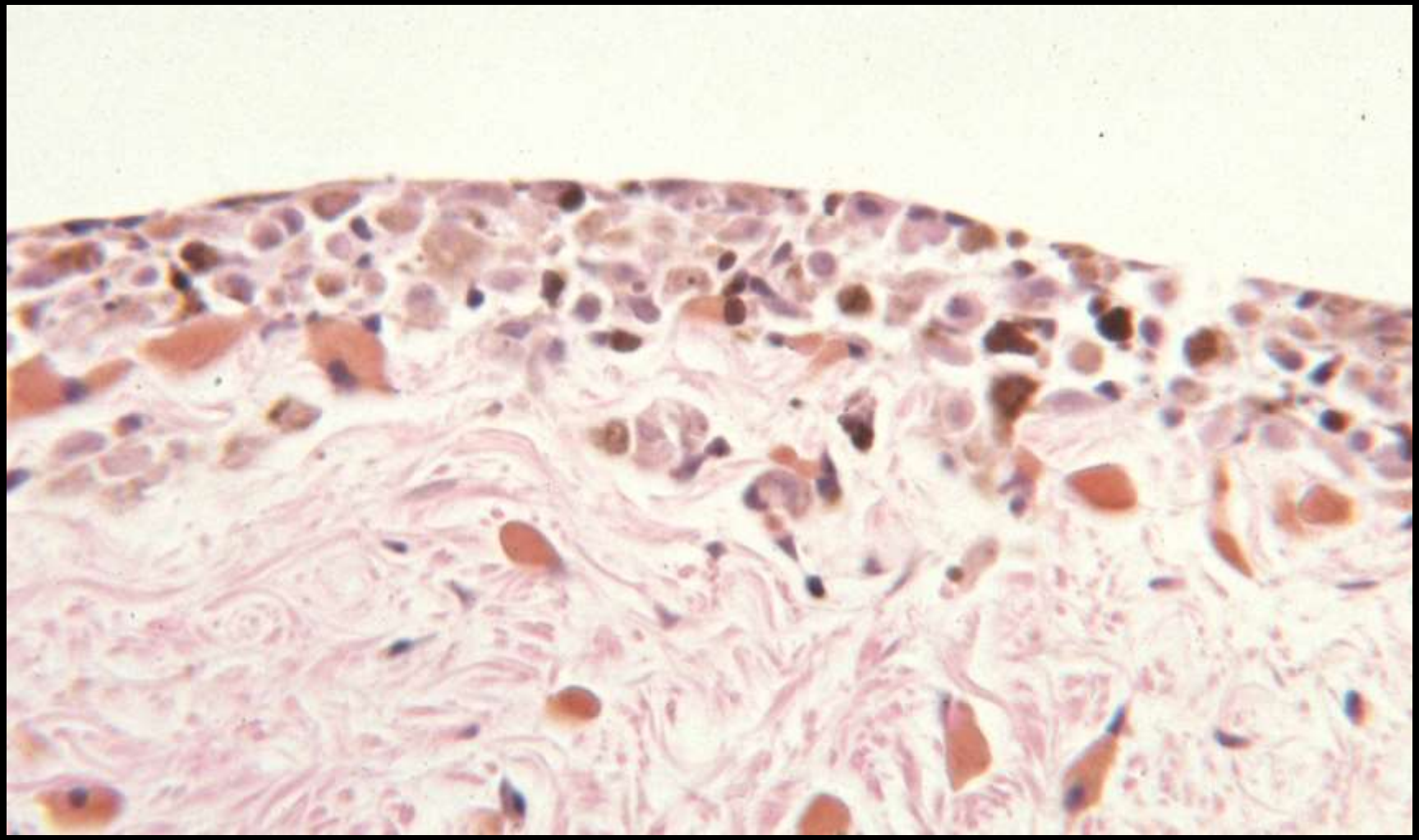
- Melanosis
- Early Melanoma

Melanosis

Proliferating melanocytes are entirely limited to the anterior surface of the iris

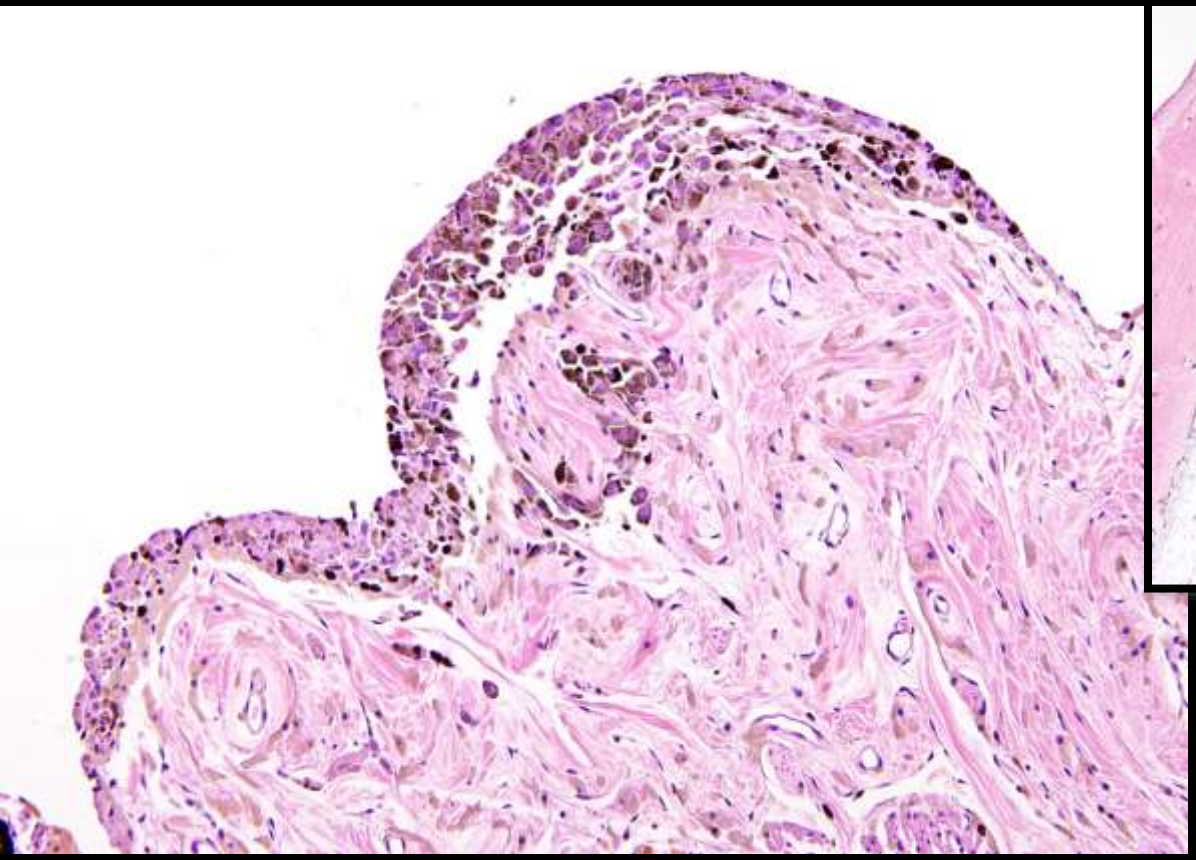


Melanosis



Early FDIM

Tumor confined to the iris



Feline Ocular Post-traumatic Sarcoma: 377 of 4721 tumors, or 8%

Male Bias

- Spindle cell variant, 67%
  - 241 cases, 43 "early"
  - Lens epithelial origin
- Round cell variant, 21%
  - 91 cases, 9 "early"
  - Variant of B-cell lymphoma
- Osteosarcoma/Chondrosarcoma, 10%
  - 45 OSA cases, 2 "early"
  - 8 Chondrosarcoma cases
  - Unknown cell of origin

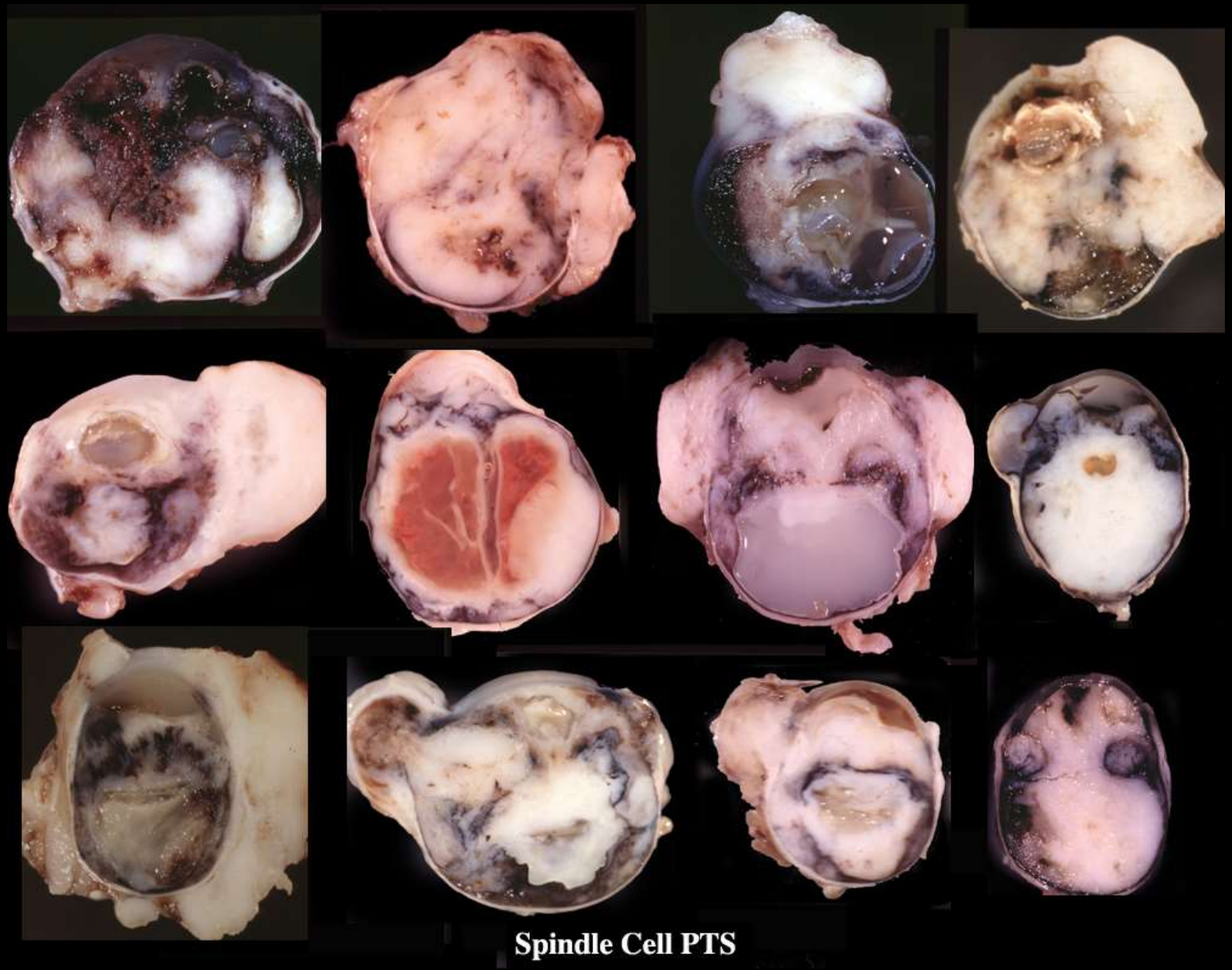
Feline Ocular Post-traumatic Sarcoma

- Almost all cases have documented chronic eye disease
  - 81 cases have a documented traumatic event
  - Time between trauma and enucleation
    - 60 cases have the dates recorded
    - Average time is 6.35 years
    - Range is 1 to 17 years

Reasons to believe FOPTS is related to trauma

- Lens capsule rupture
- History of trauma or abnormal eye
- Time between trauma and tumor
  - Between 2 months and 15 years

Feline Ocular Post-traumatic Sarcoma



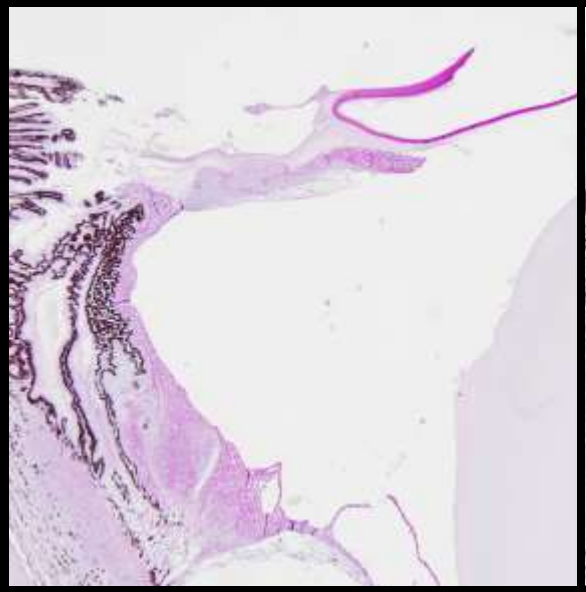
Feline Ocular Post-traumatic Sarcoma

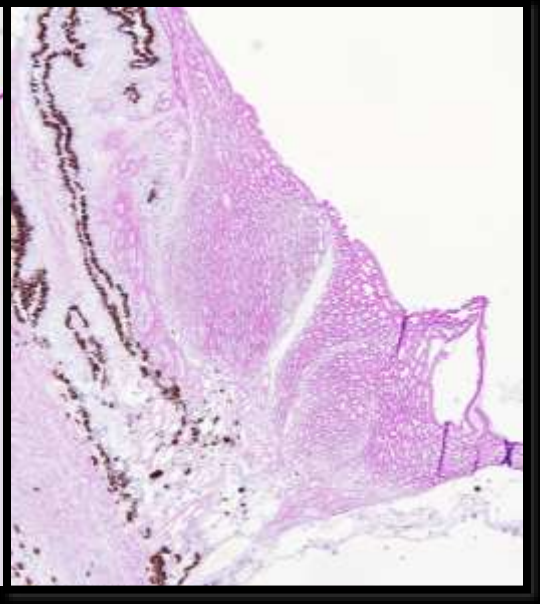
Clinical Images



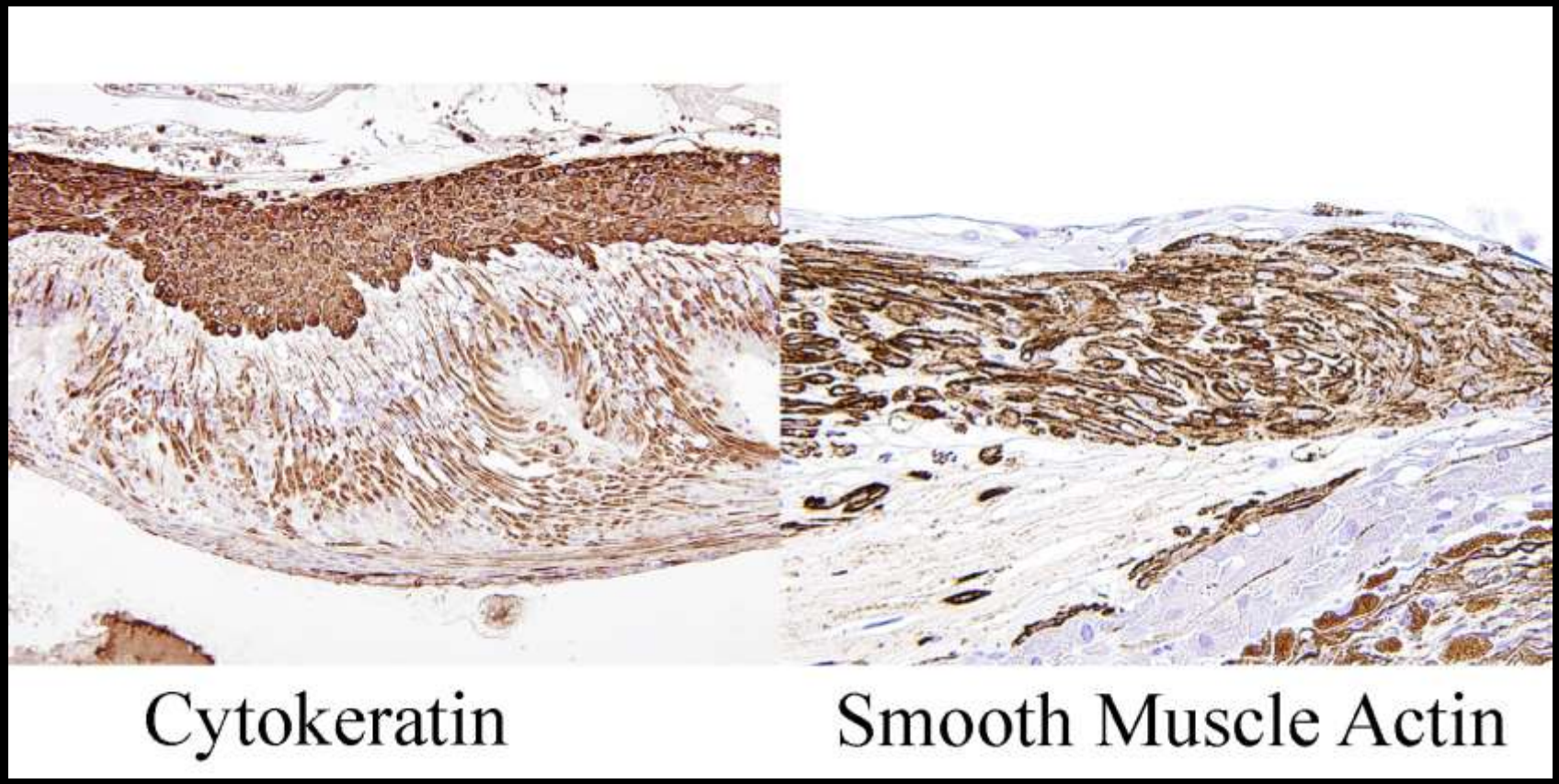



Early Spindle Cell Variant FOPTS





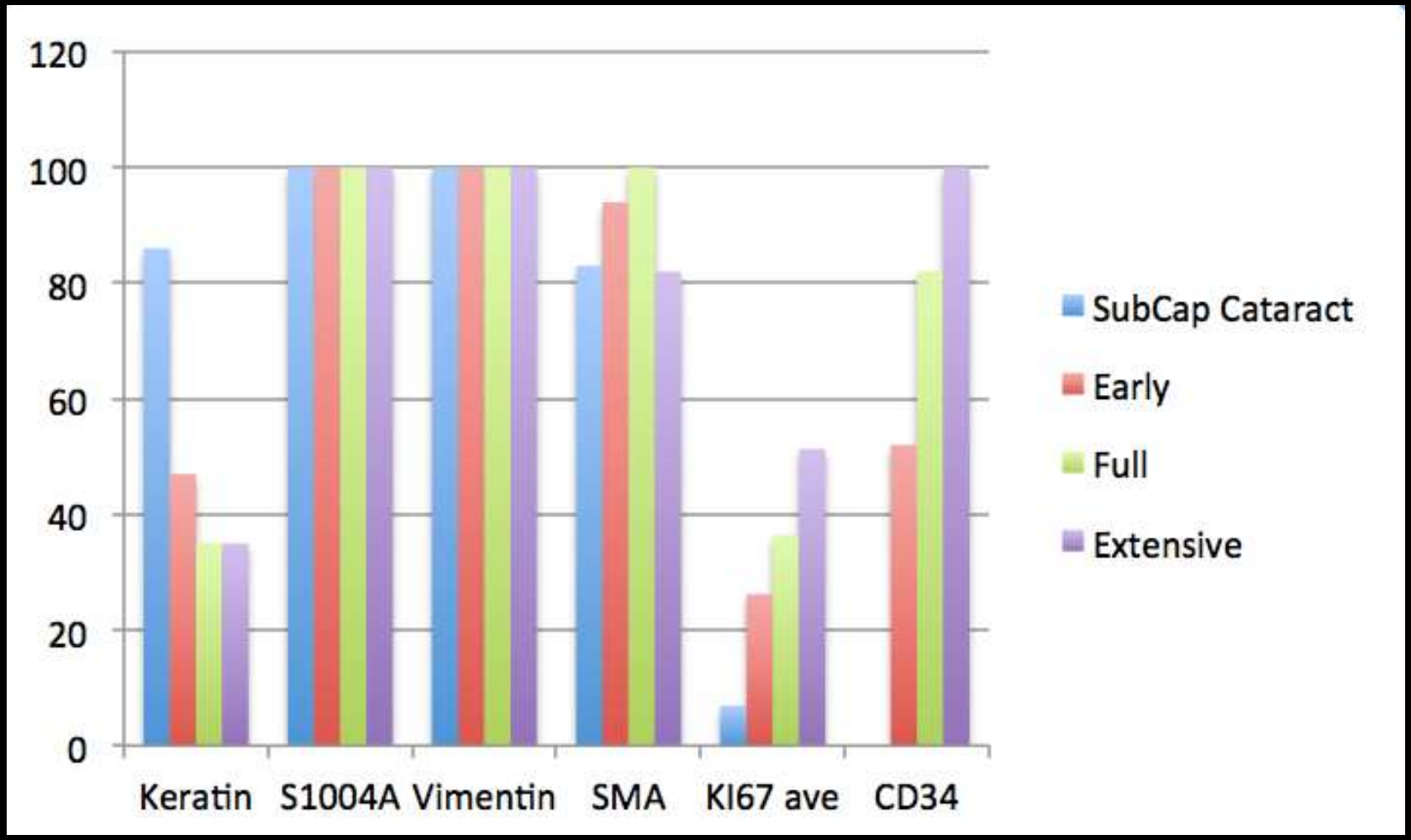
Early Spindle Cell Variant FOPTS



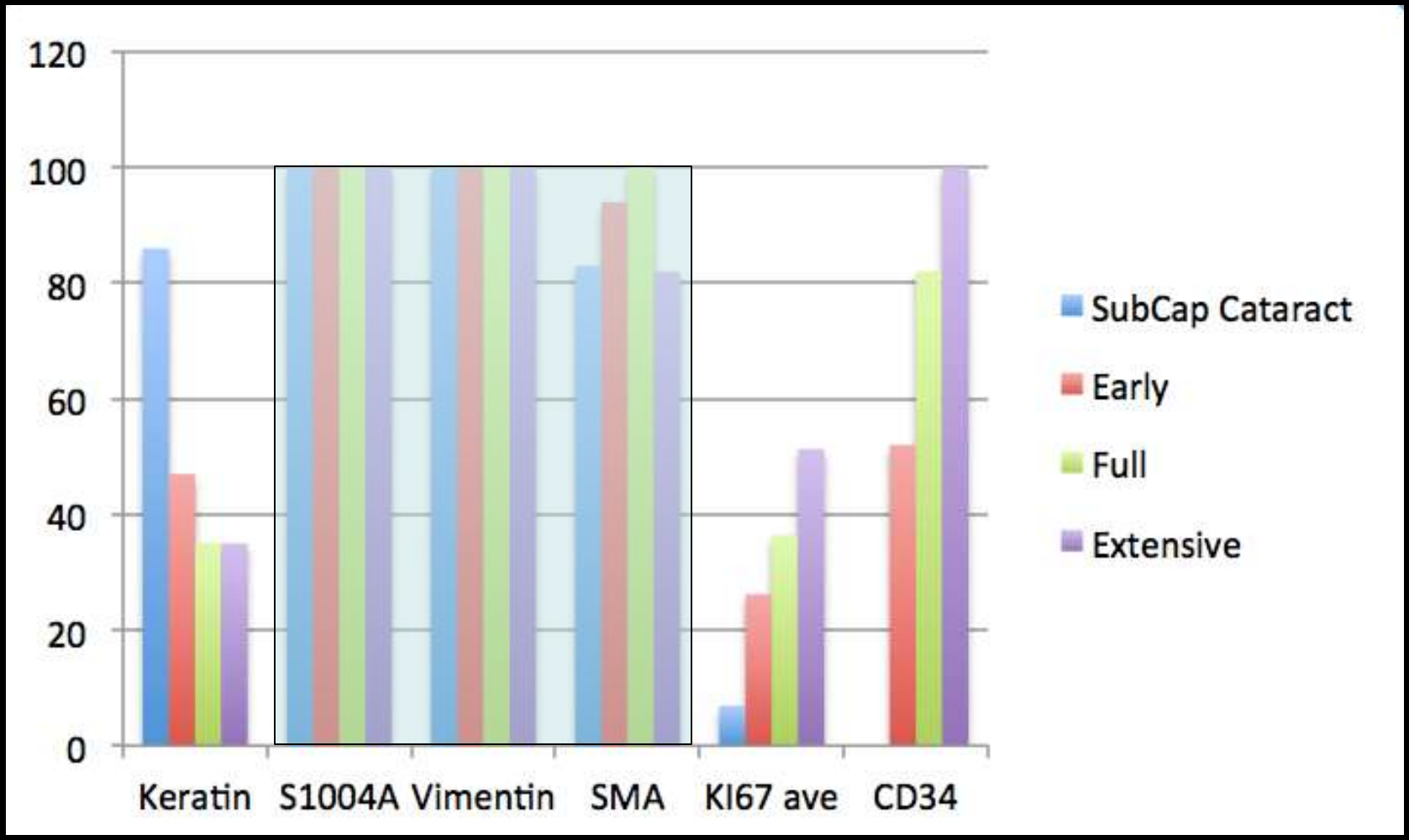
Early tumors are more likely to be cytokeratin + and SMS + and to be totally avascular

Spindle Cell Variant FOPTS

Hiroki Takahashi's Work 2014

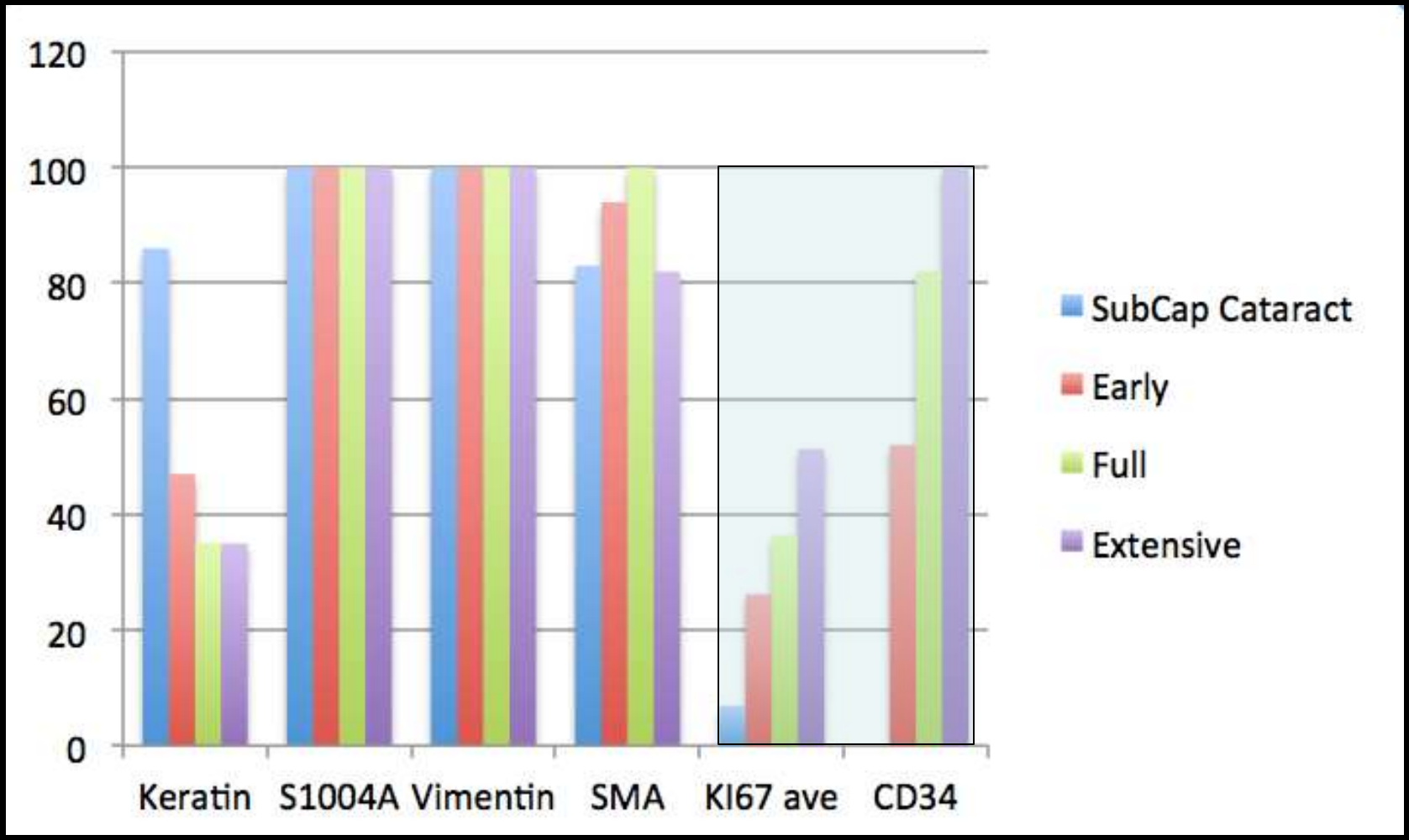


Spindle Cell Variant FOPTS



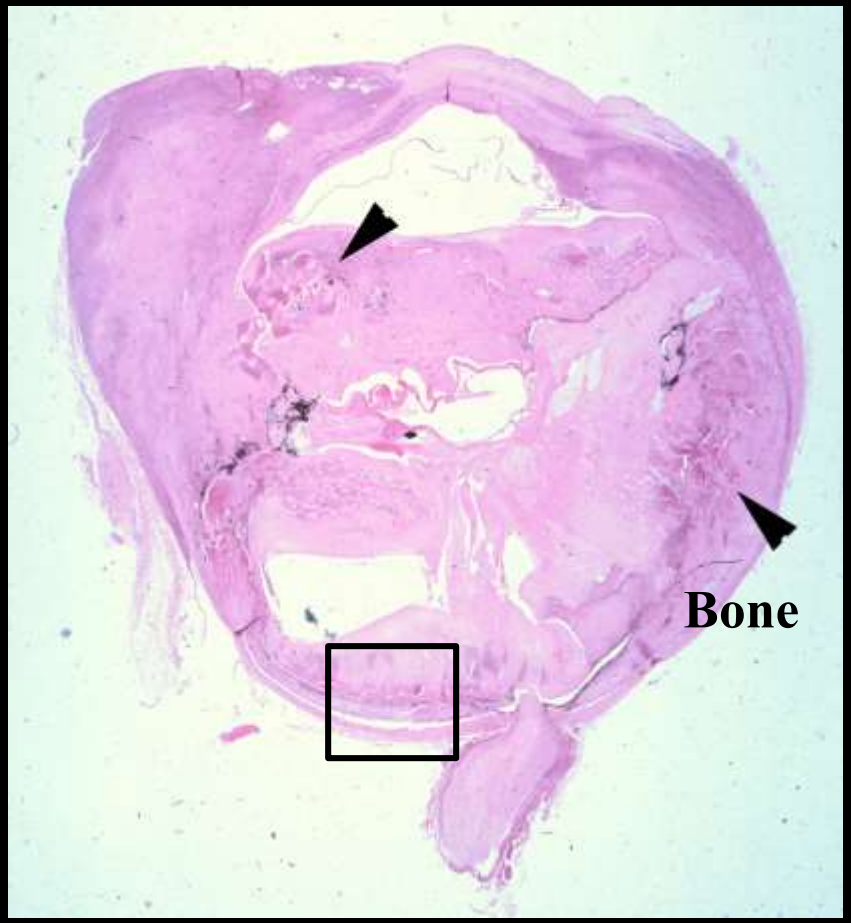
Epith. Mesenchymal Transformation

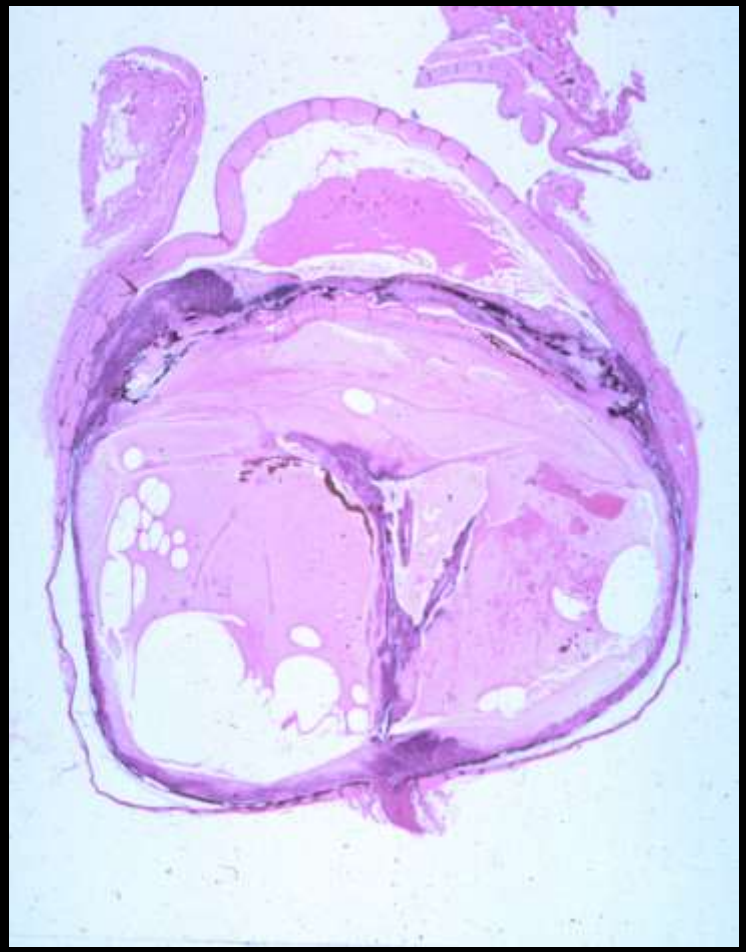
Spindle Cell Variant FOPTS



Progressive Malignancy

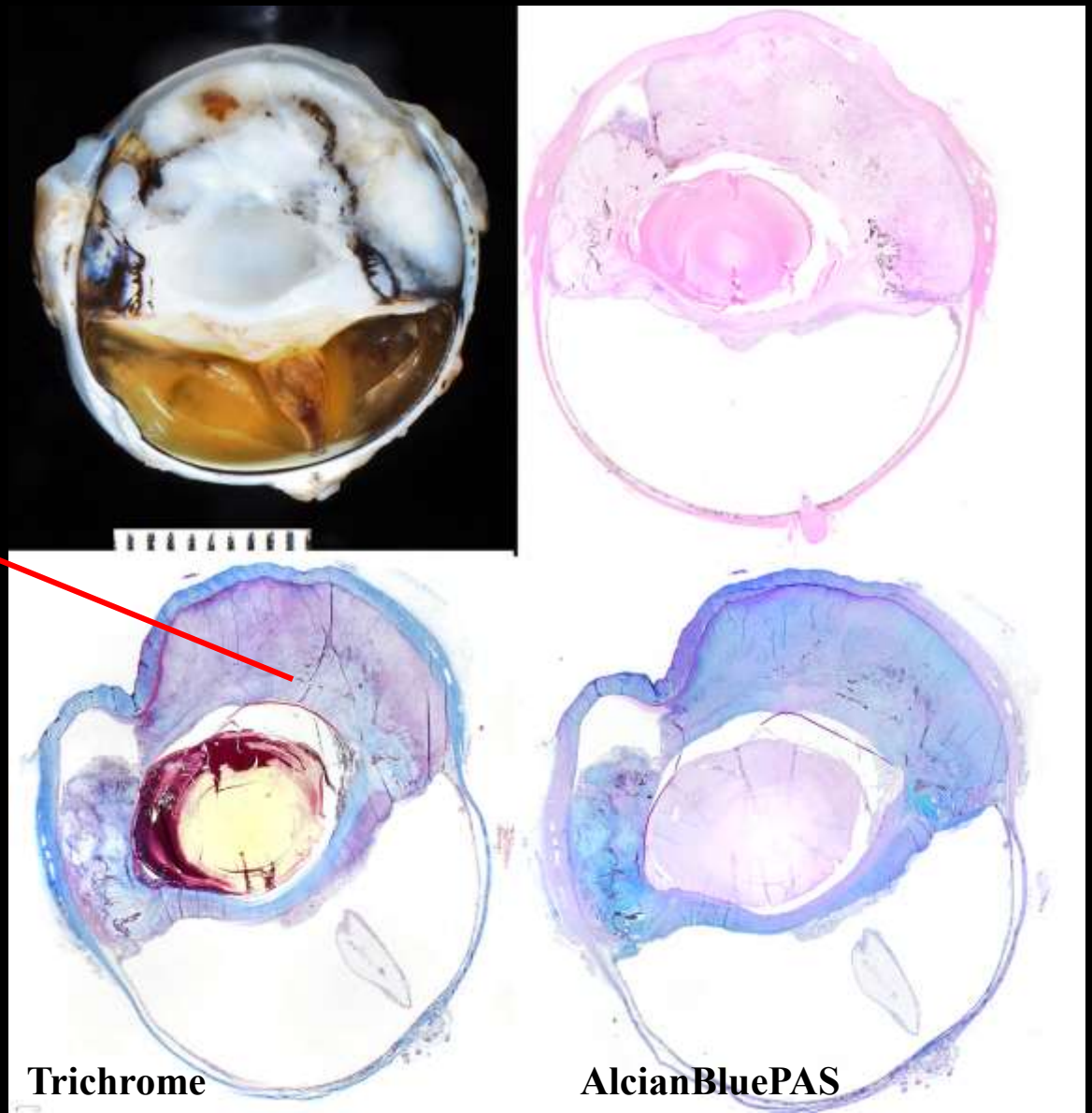
Tumor Distribution in the Spindle Cell Variant

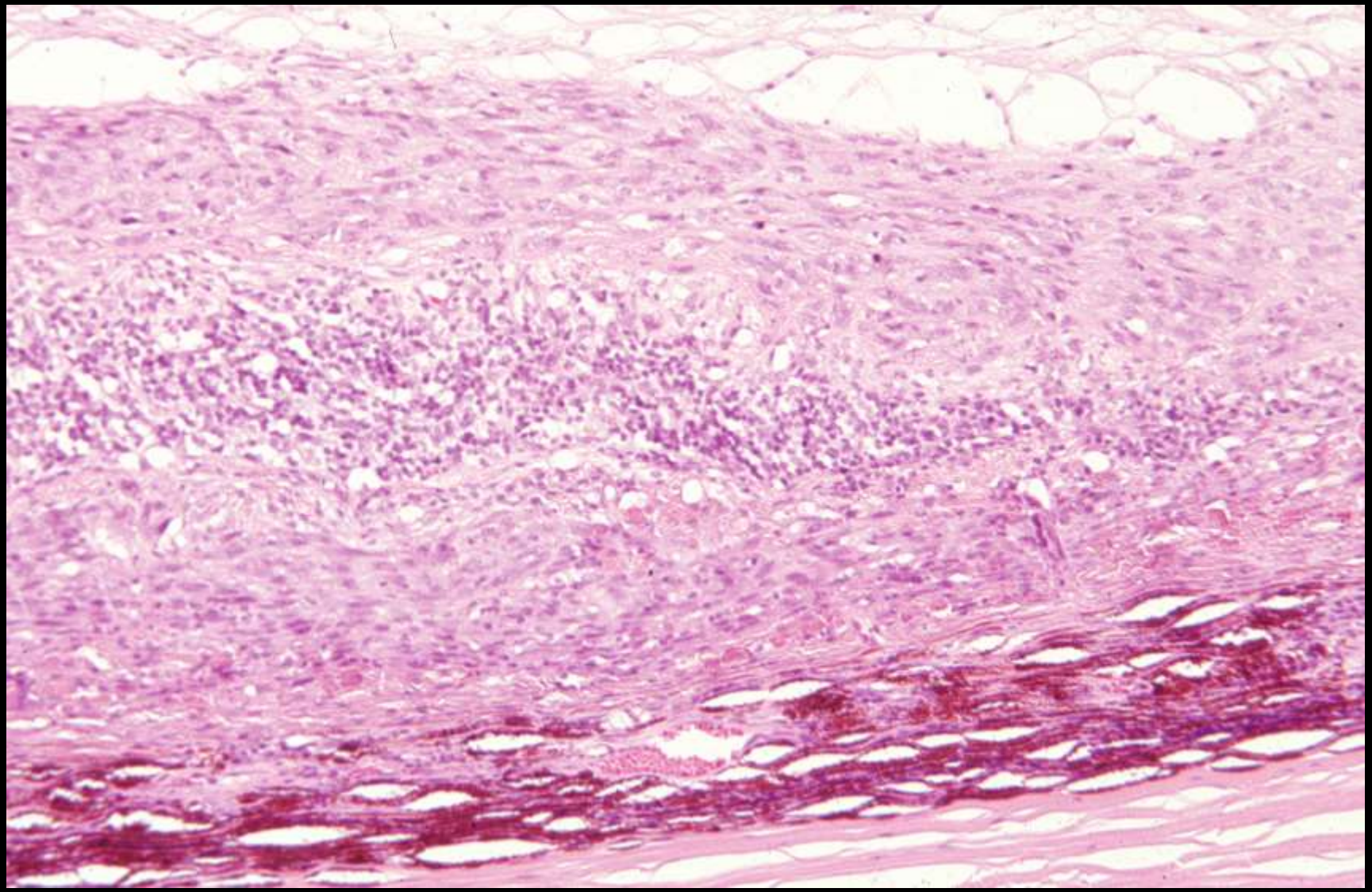




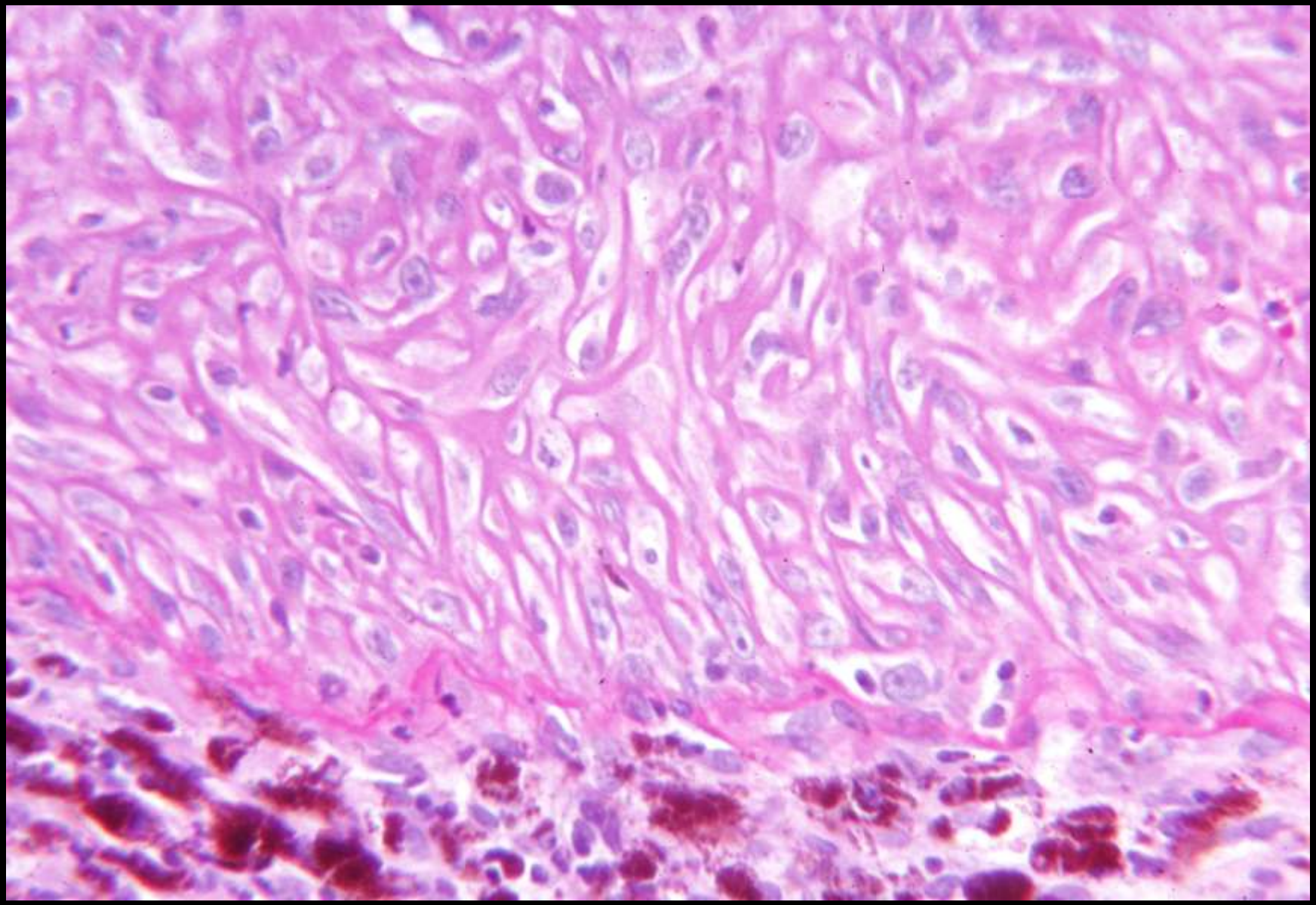
Tumor Distribution in the Spindle Cell Variant

Adjacent to the wrinkled lens capsule the tumor is often acellular and collagen rich



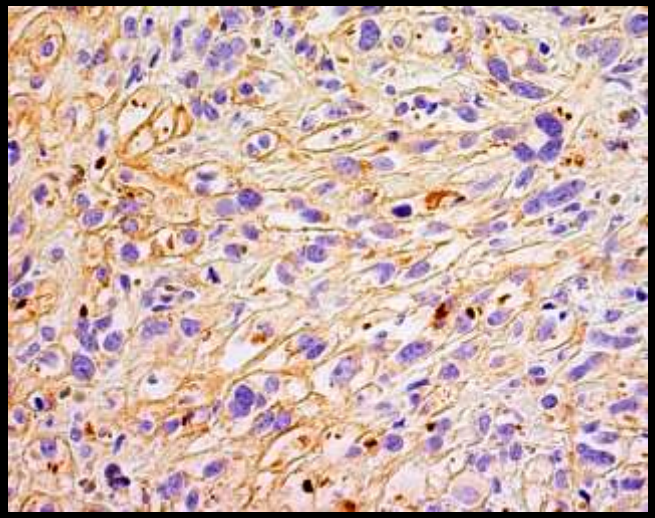


Feline Ocular Post-traumatic Sarcoma,
Spindle Cell Variant

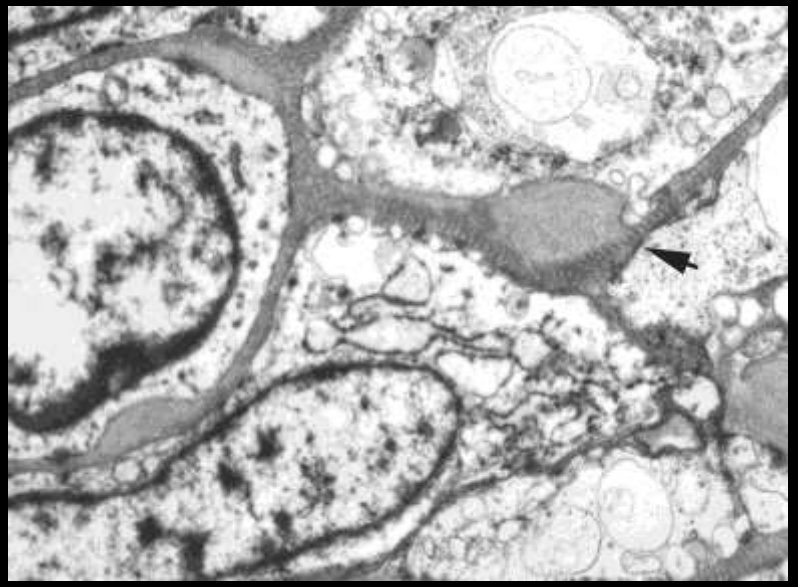


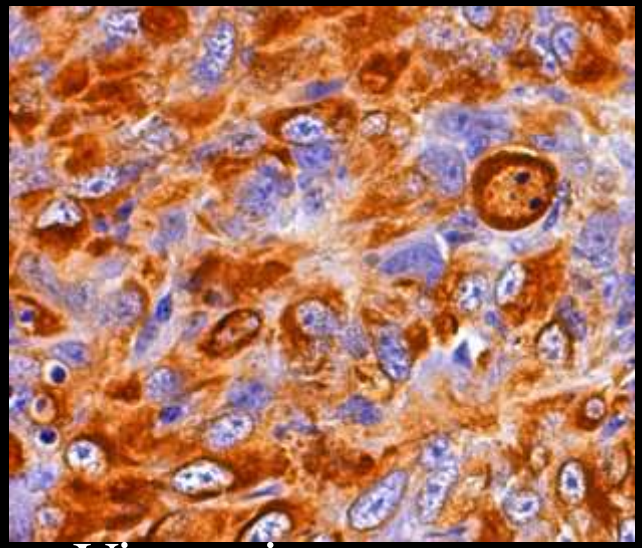
Feline Ocular Post-traumatic Sarcoma,
Spindle Cell Variant

Cellular Features of Spindle Cell FOPTS

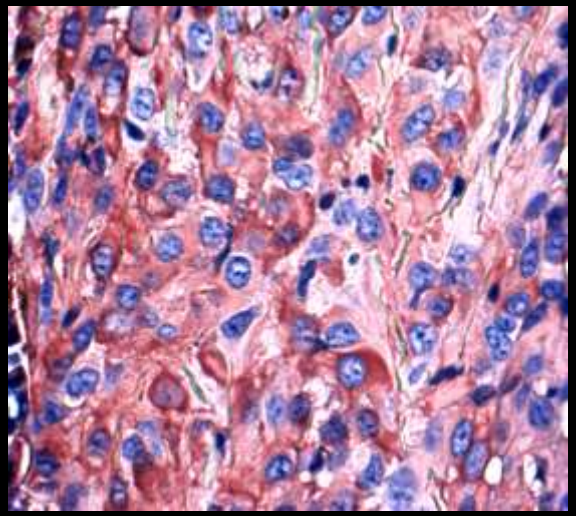


Collagen 4

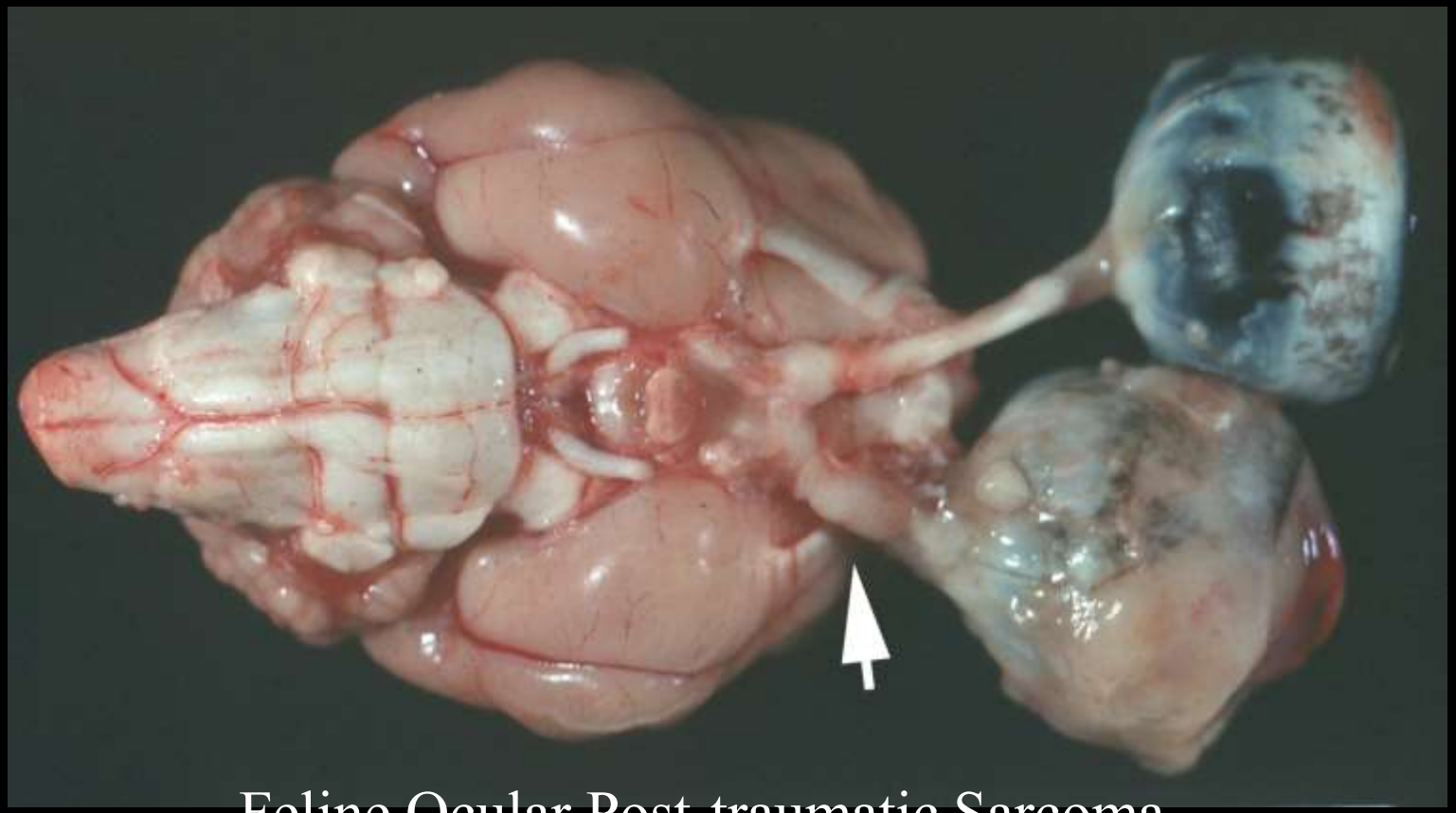




Vimentin



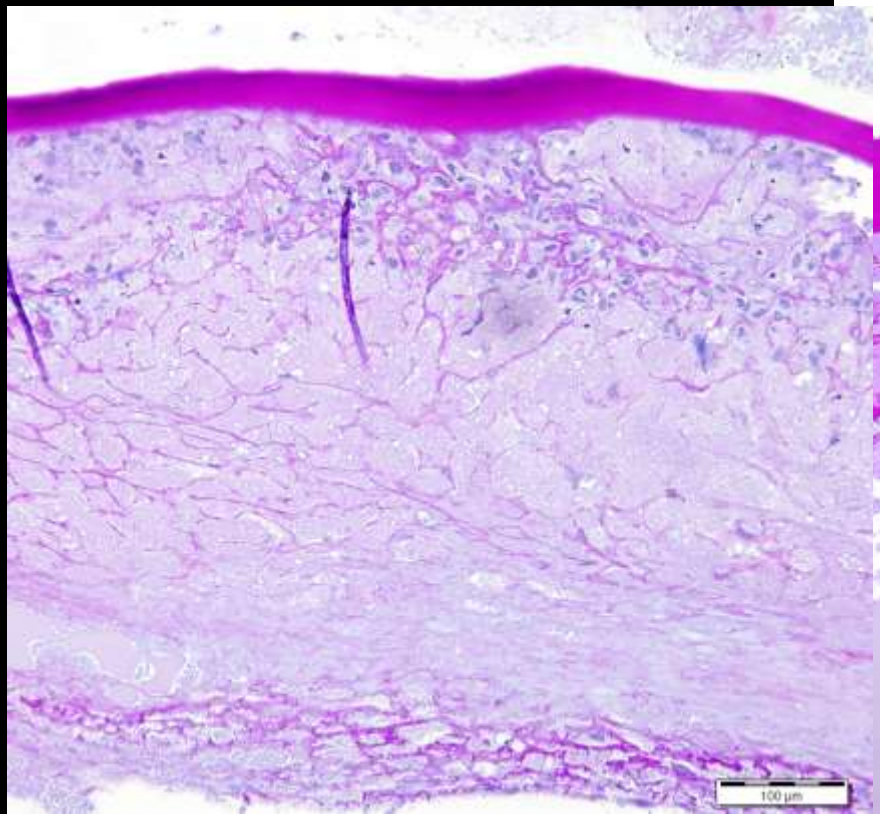
αA Crystallin

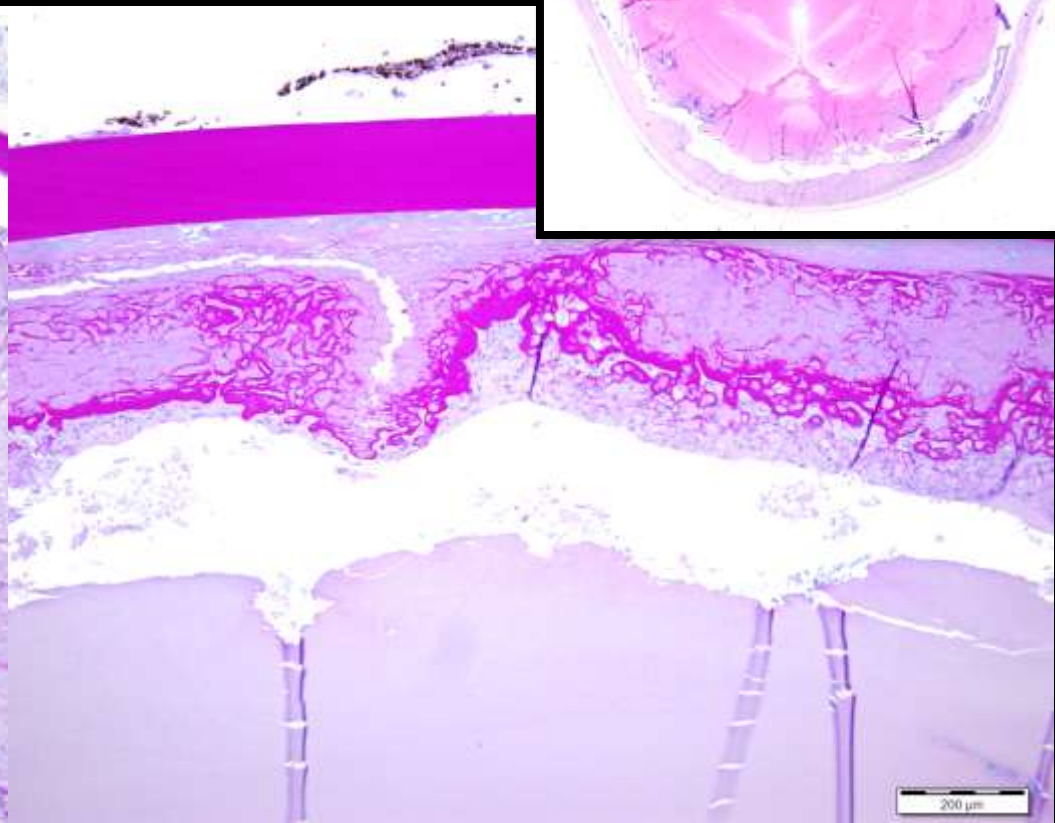


Feline Ocular Post-traumatic Sarcoma,
Spindle Cell Variant

Feline Ocular Post-traumatic Sarcoma, Spindle Cell Variant

Intra-lenticular tumor





Follow-up Spindle Cell Variant

- Cases which have extended beyond the sclera have a bad prognosis
  - Local recurrence
  - Extension towards the brain
- Cases removed within the sclera have a good prognosis
- 8% of traumatized globes removed prophylactically have early FOPTS

Spindle-cell variant FOPTS

Male bias

Sex (306 with recorded sex)

Females: 101 (33%) 43% for database

Intact: 15

Spayed: 86

Males: 205 (67%) 57% for database

Intact: 16

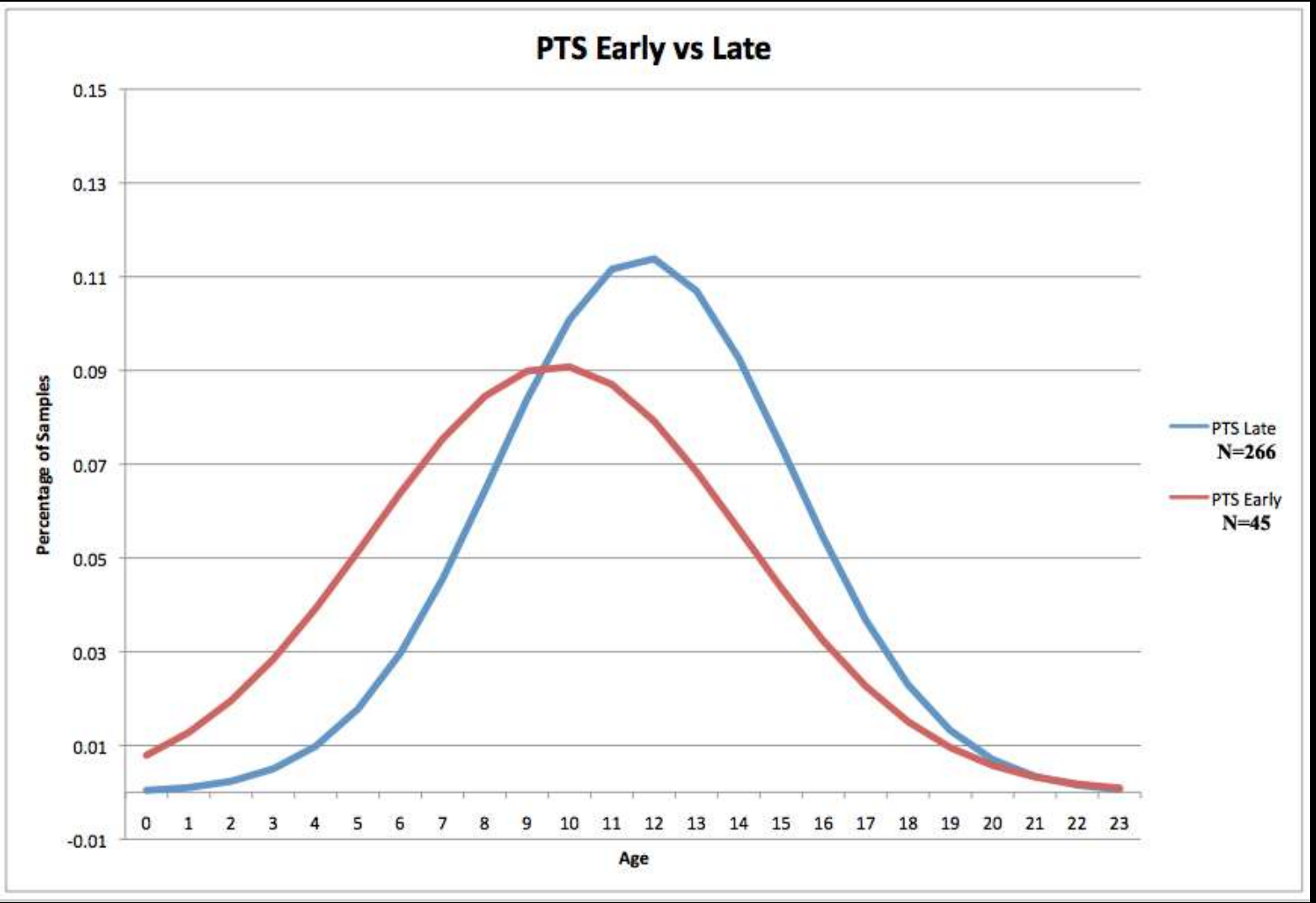
Neutered: 189

Feline trauma (excluding PTS) 391 cases

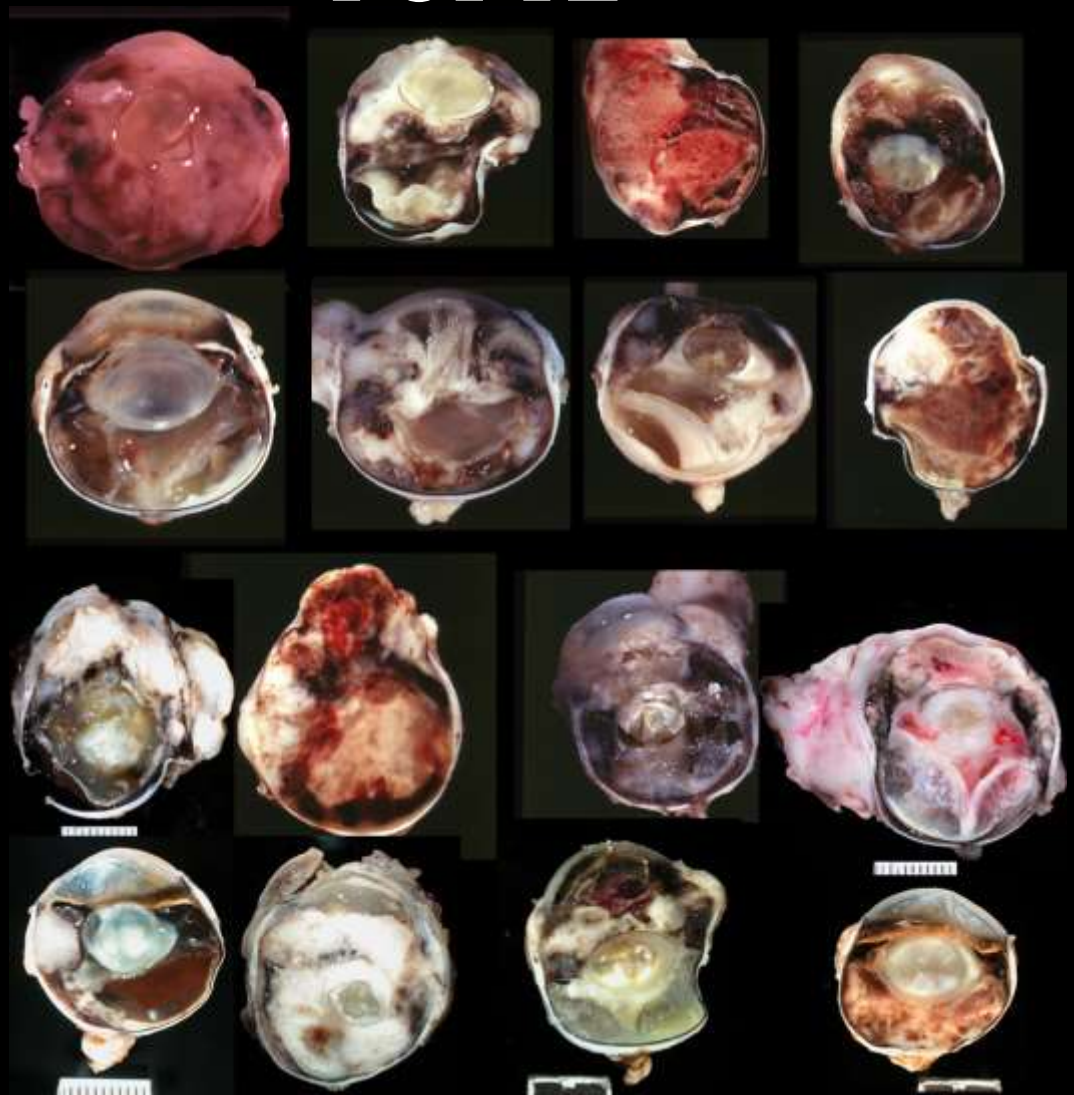
Females: 42%

Males: 58%

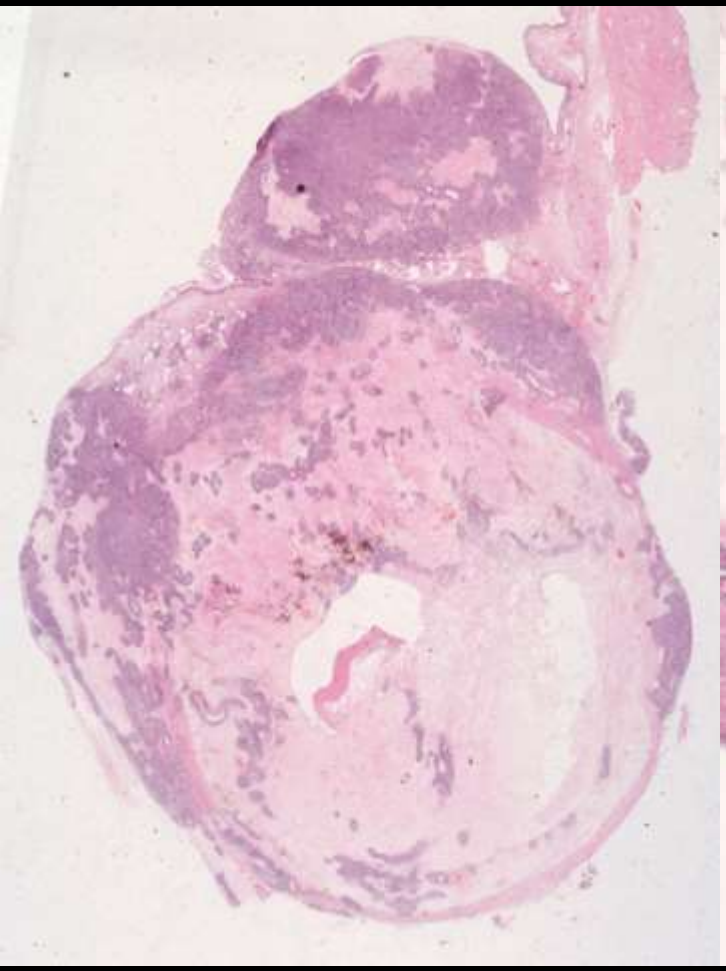
Ages of cats with early vs late FOPTS

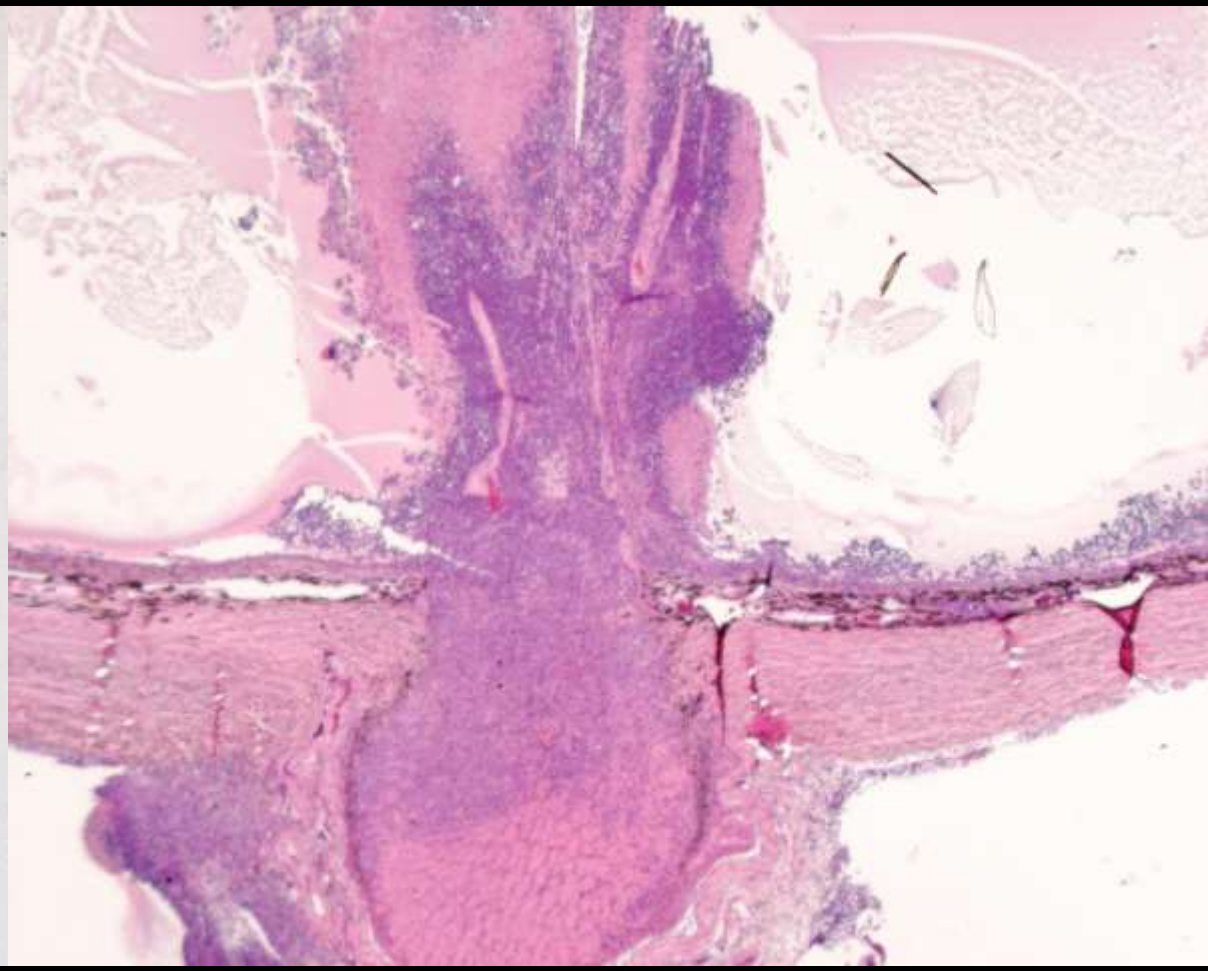


Round Cell Variant FOPTS
Feline Ocular Post-traumatic Lymphoma
FOPTL

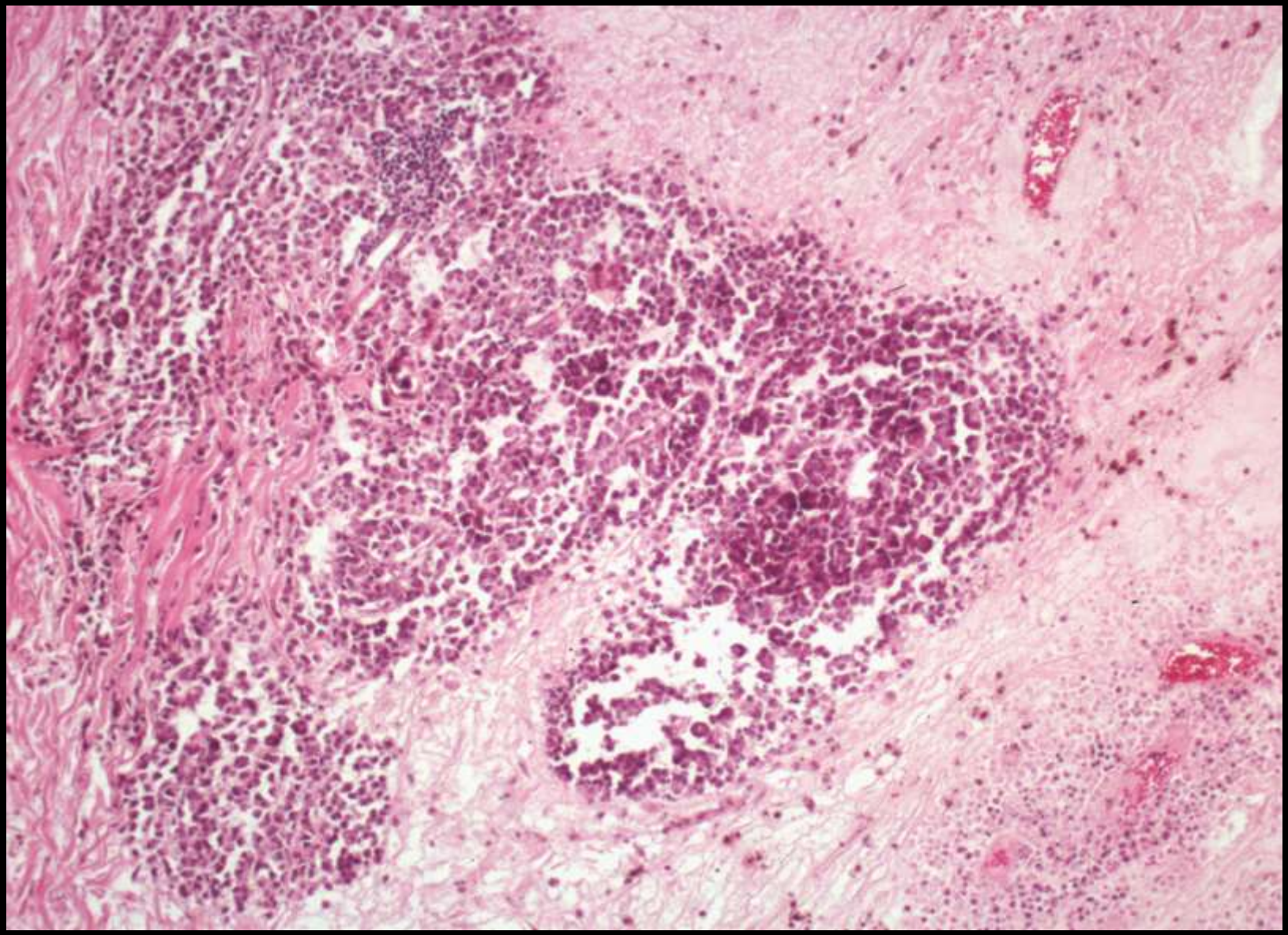


FOPTL





FOPTL

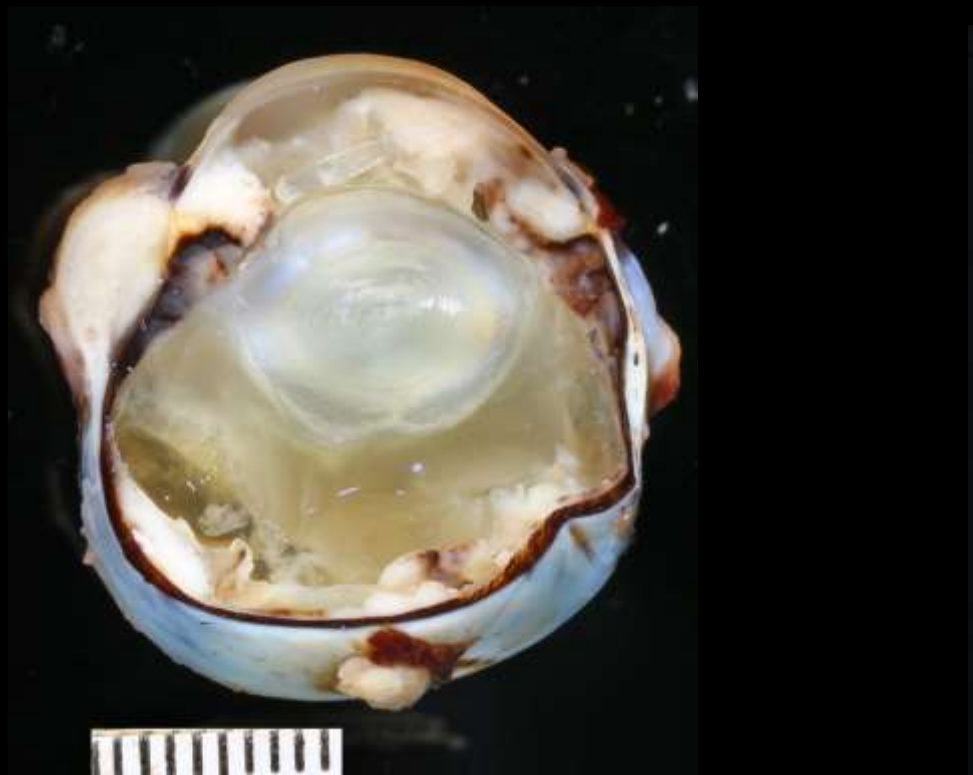


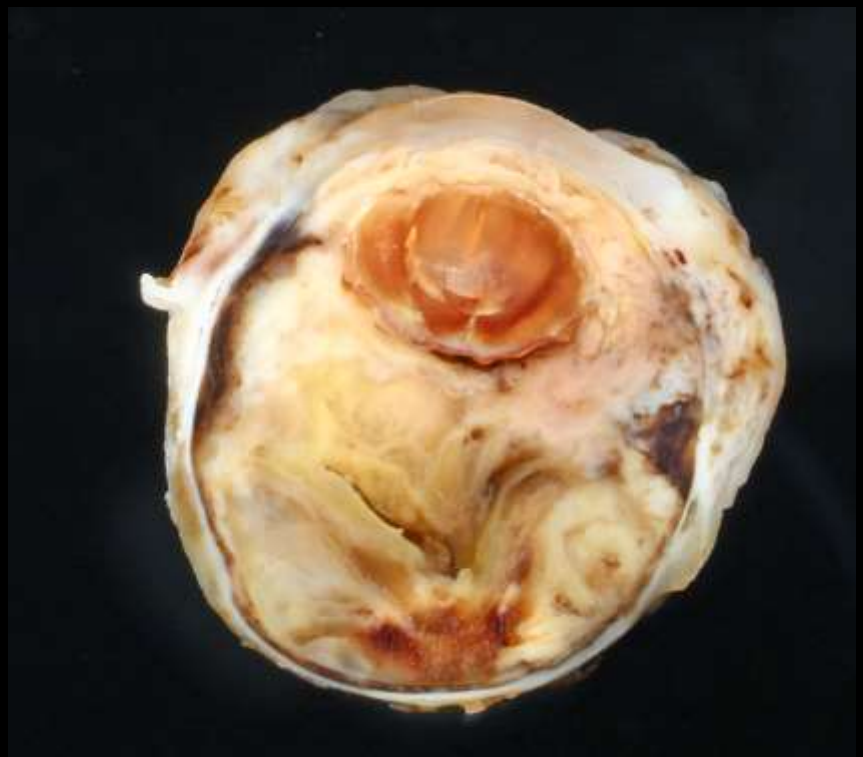
FOPTL

CD79a CD20 CD3

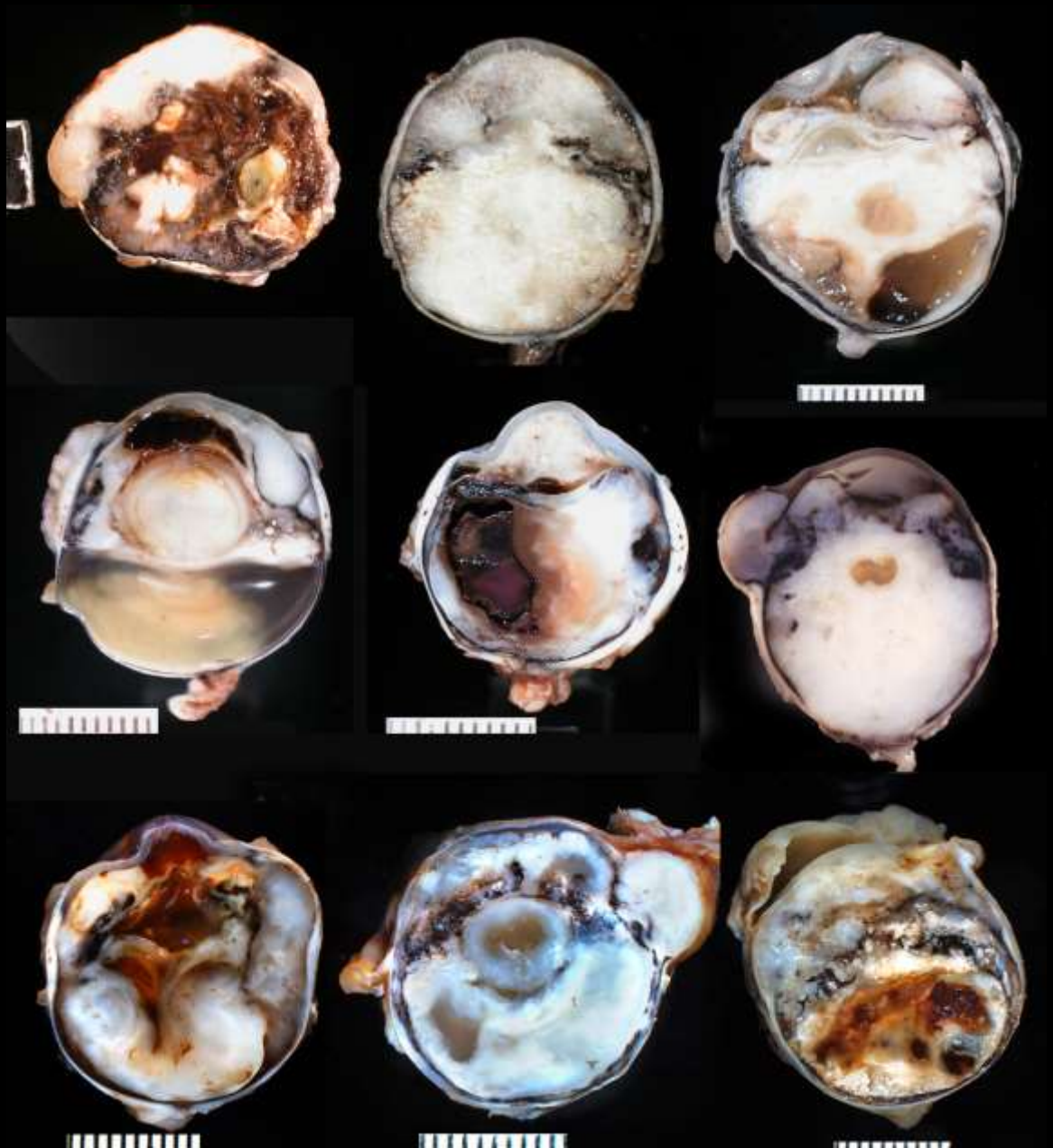
Follow-up FOPTL

- Cases which have extended beyond the sclera have a shorter survival

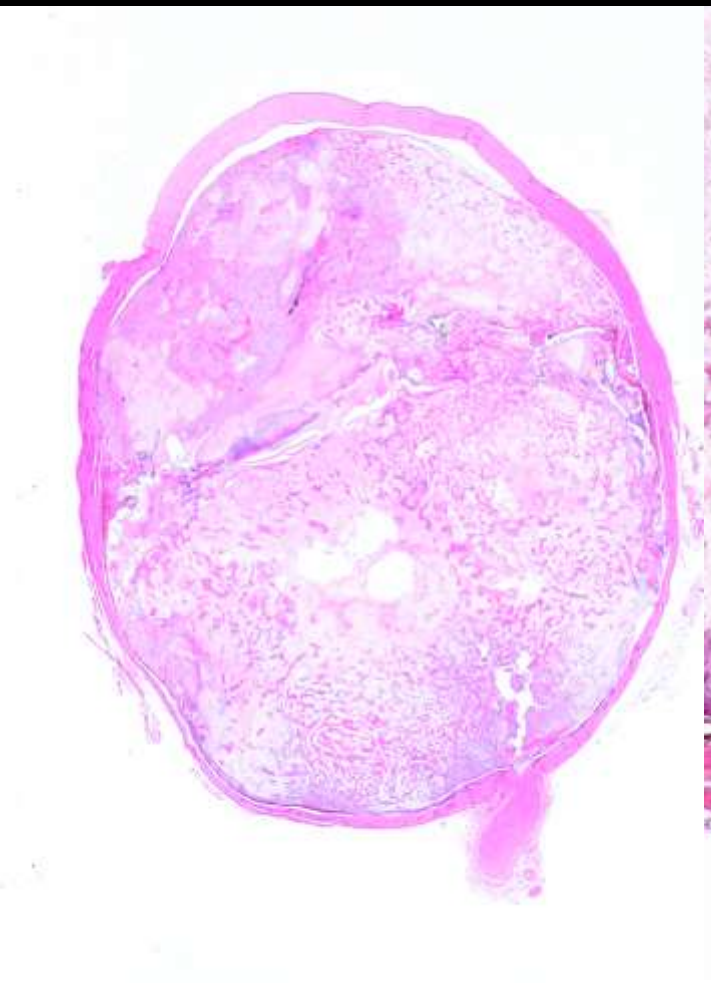


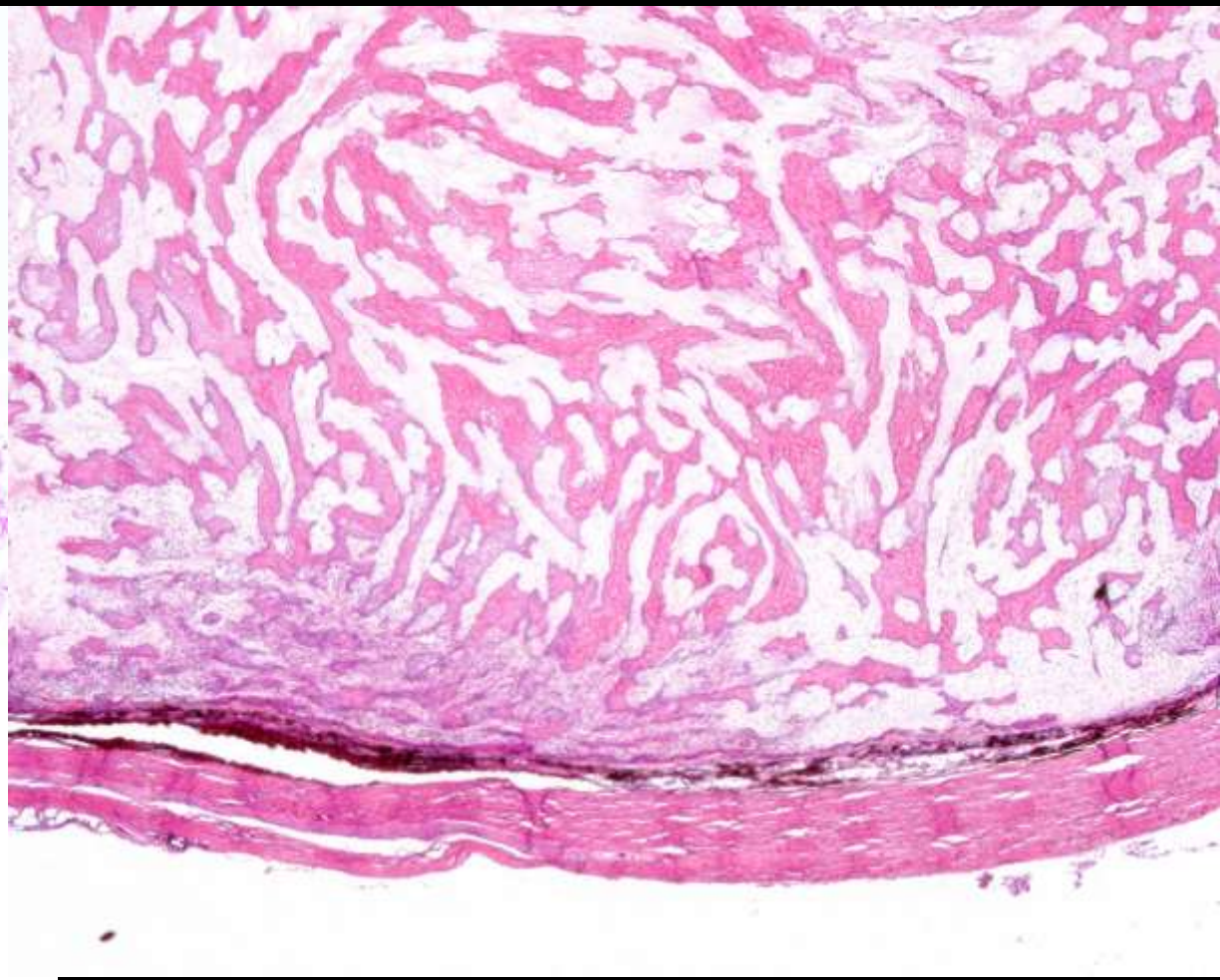


FOPTS Osteosarcoma



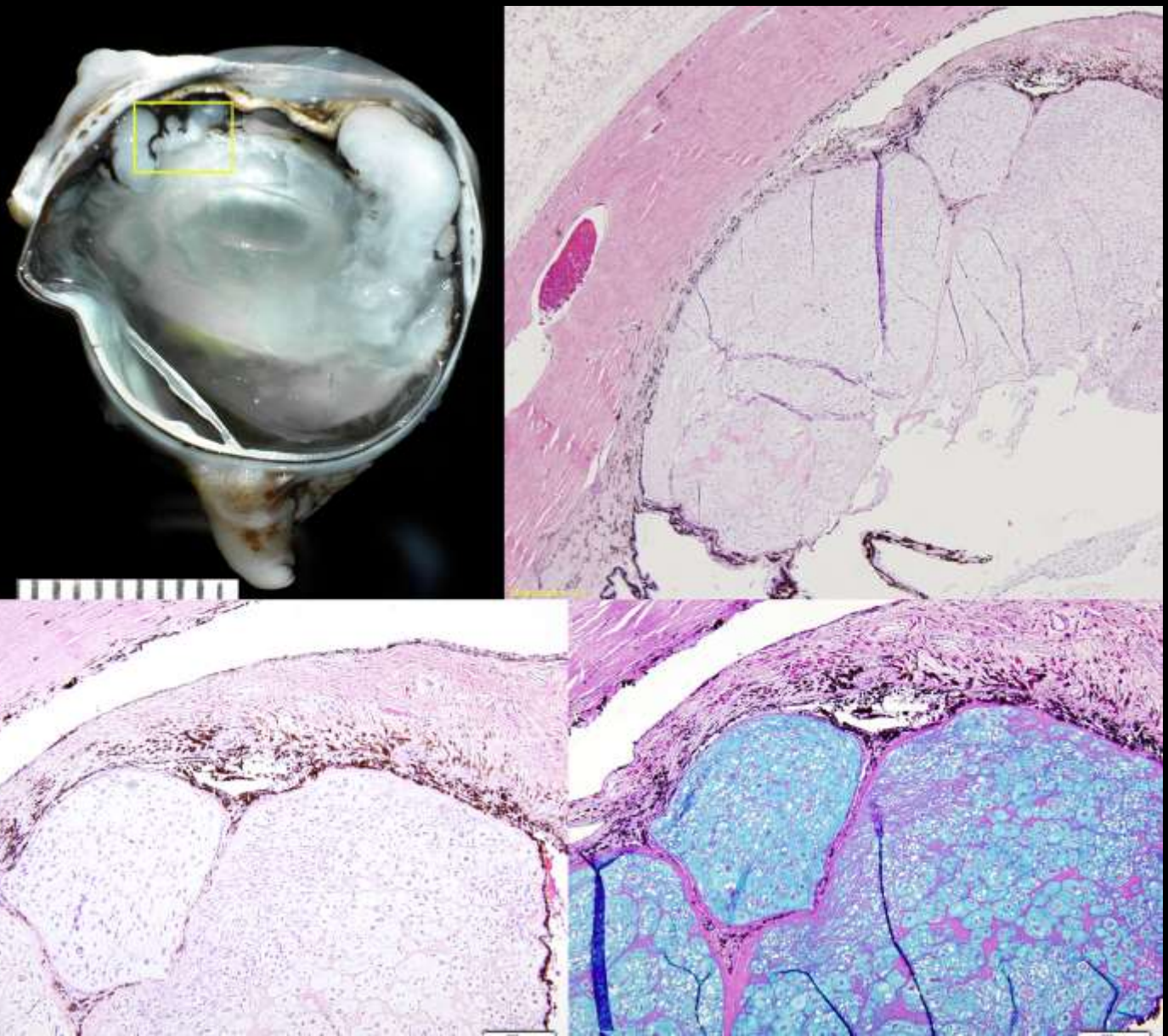
Feline OPTS: Osteosarcoma





Primary Chondrosarcoma

5 in Cats

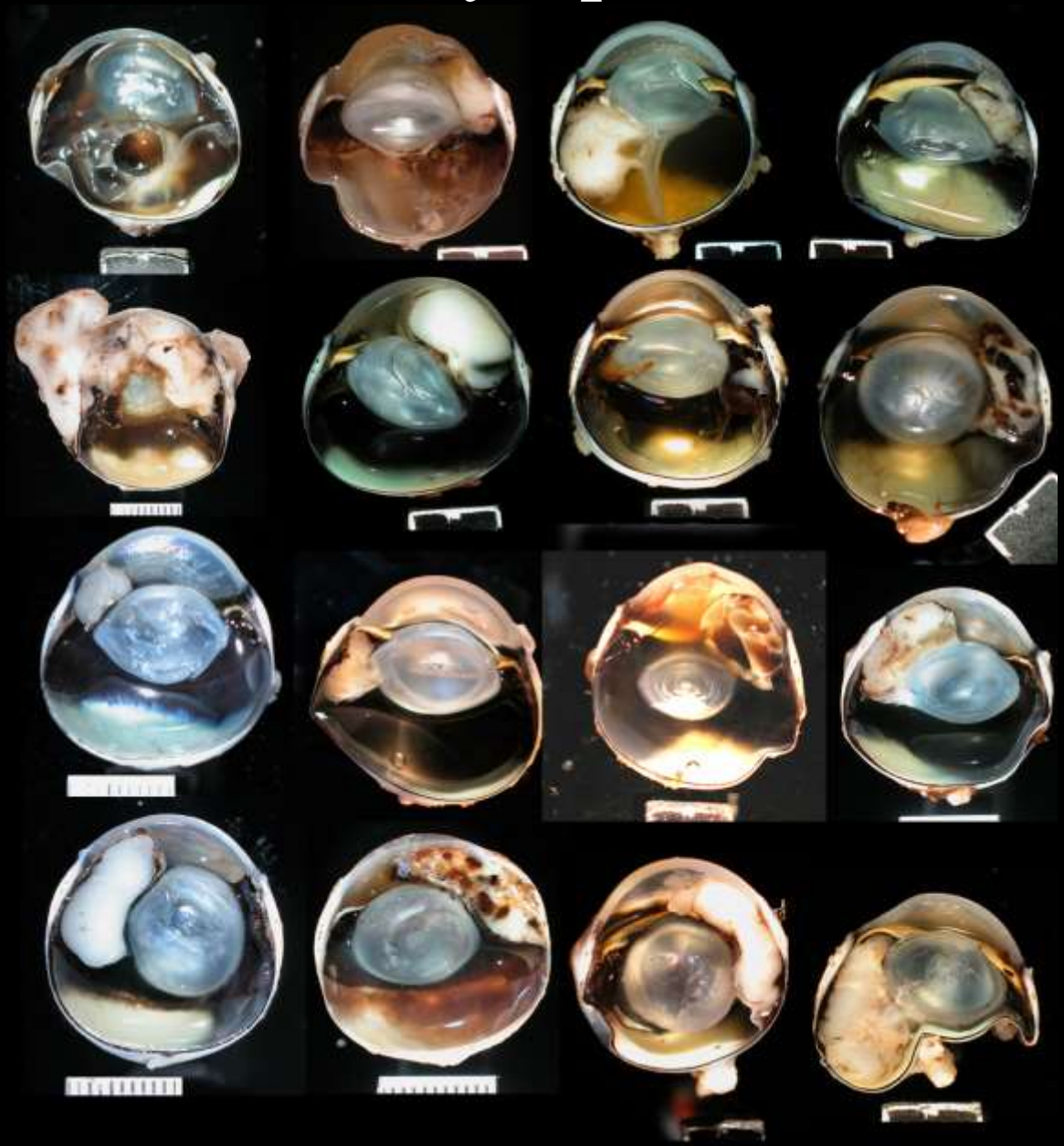


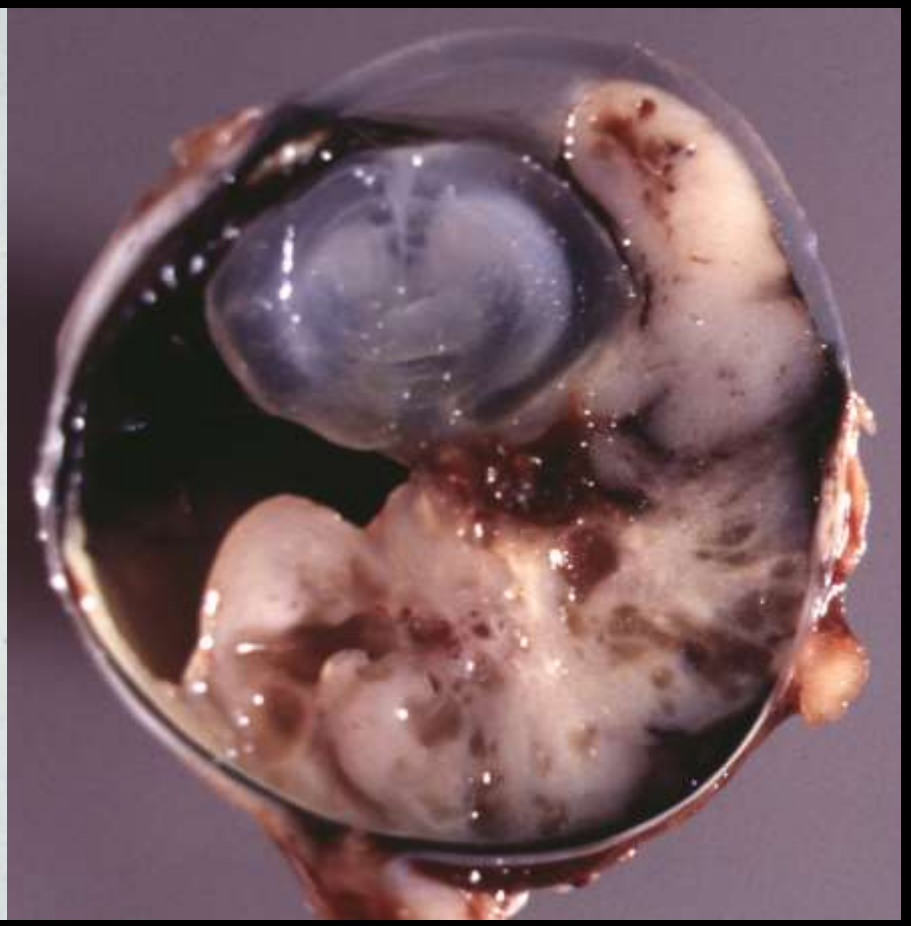
Feline Iridociliary Epithelial Tumors

- 166 of 4721 neoplastic cases, ~3.5%
- Tend to be non-pigmented
- Solid
- Cavitated spaces are typical
- Vimentin+, Cytokeratin-

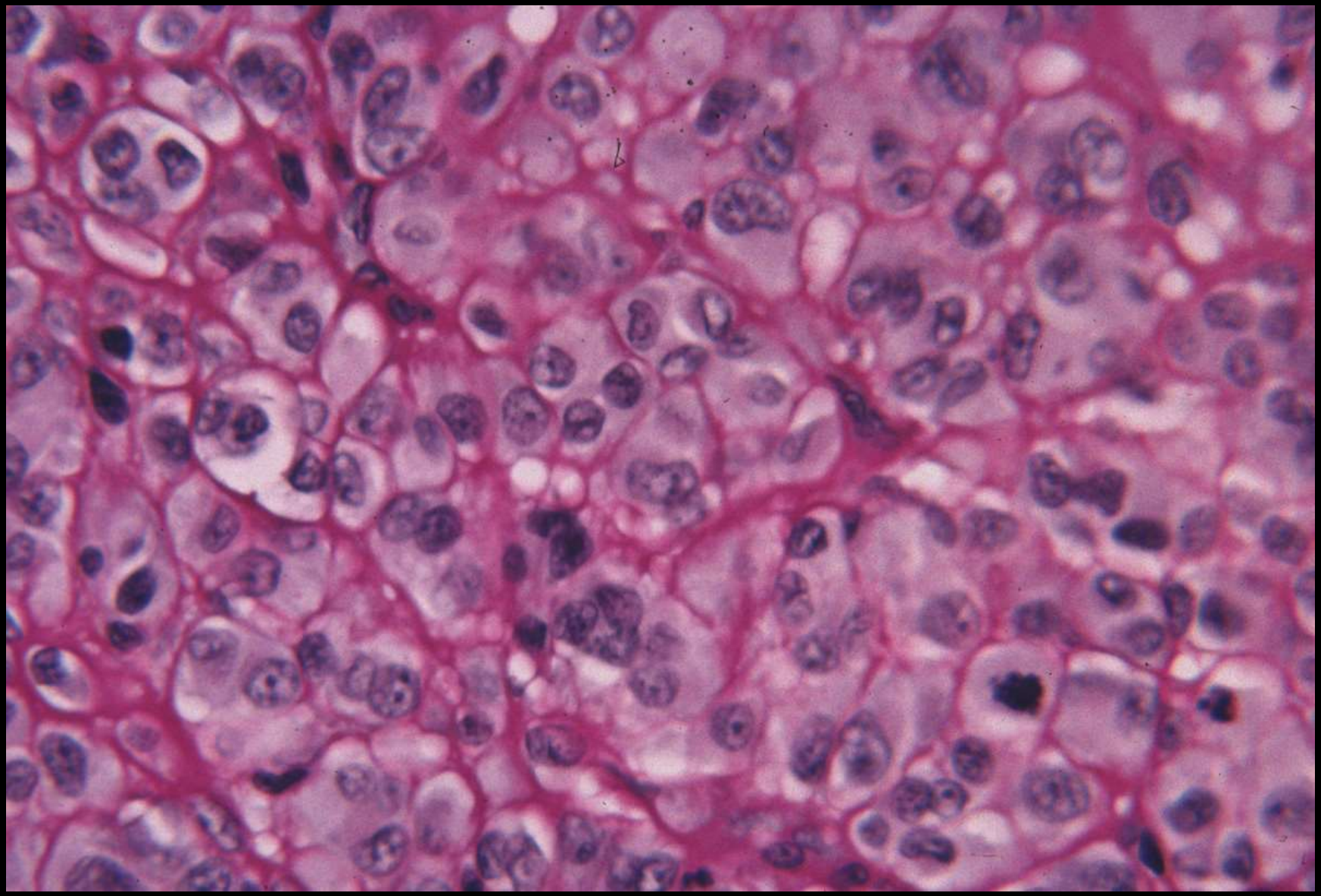
Neglected Feline Iridociliary Adenoma

Feline Iridociliary Epithelial Tumors

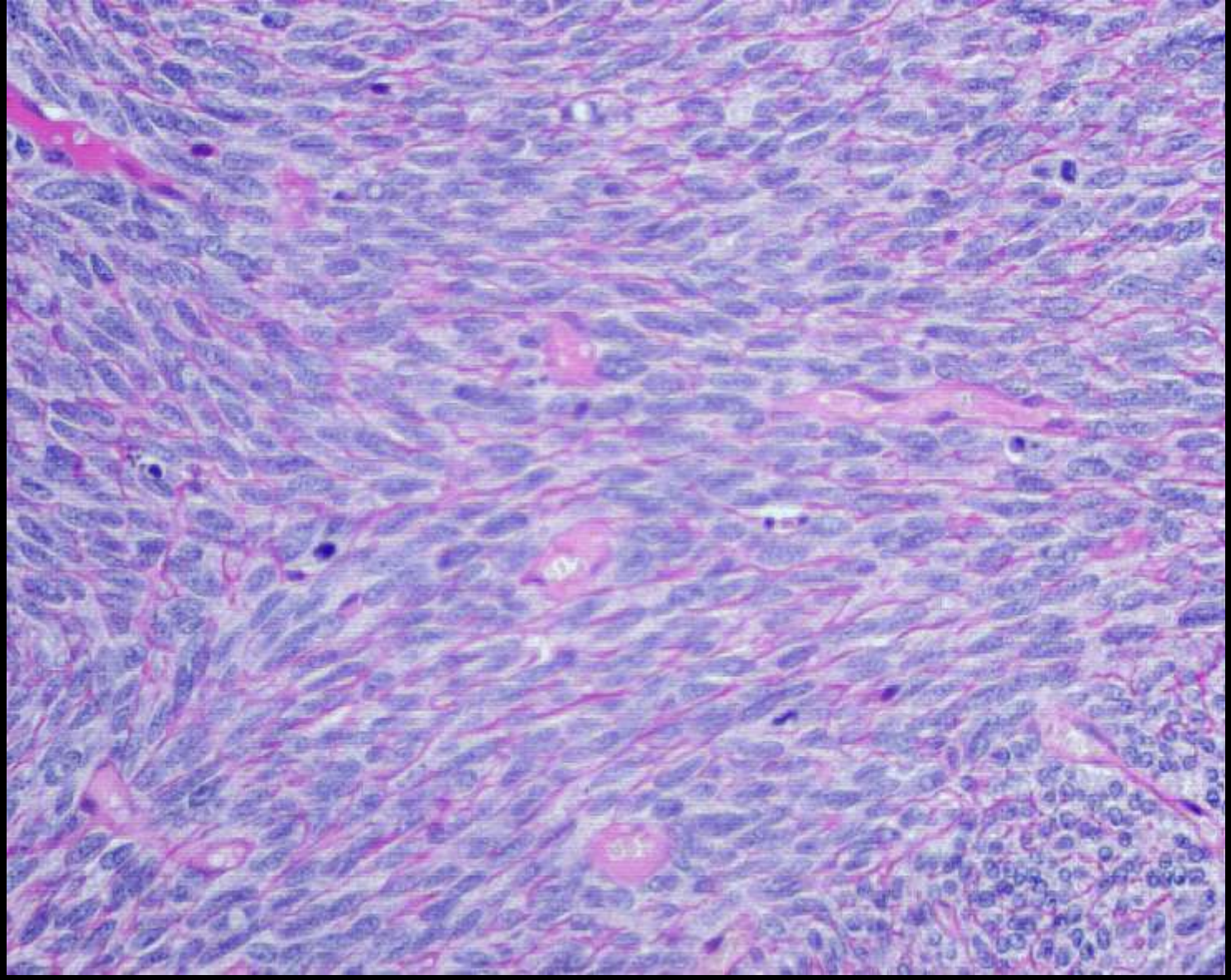




Feline Iridociliary Adenoma



Feline Iridociliary Adenoma



Feline Iridociliary Adenoma
Spindle Cells

Feline Iridociliary Epithelial Tumors
Immunohistochemistry

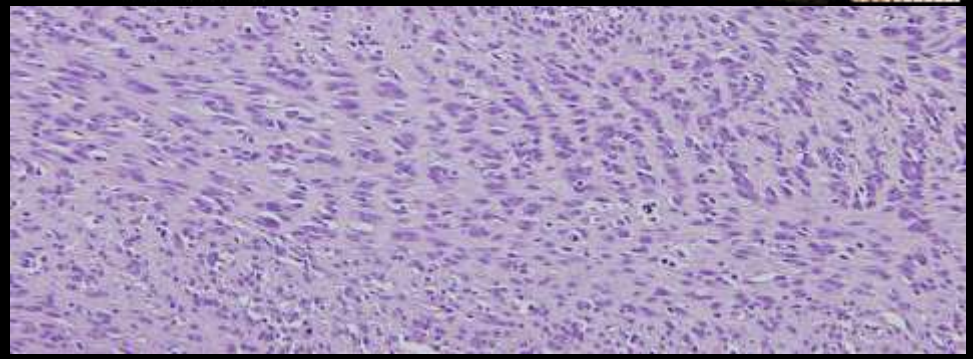
Vimentin+ 34%

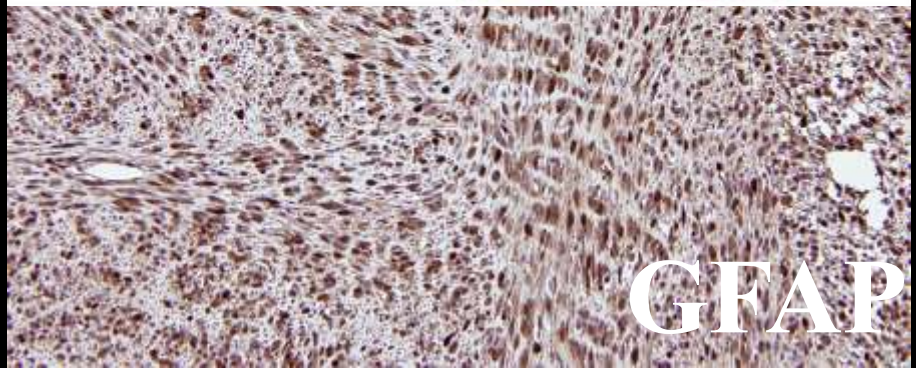
Cytokeratin+ 20%
Not related to tumor type

NSE+ 100%

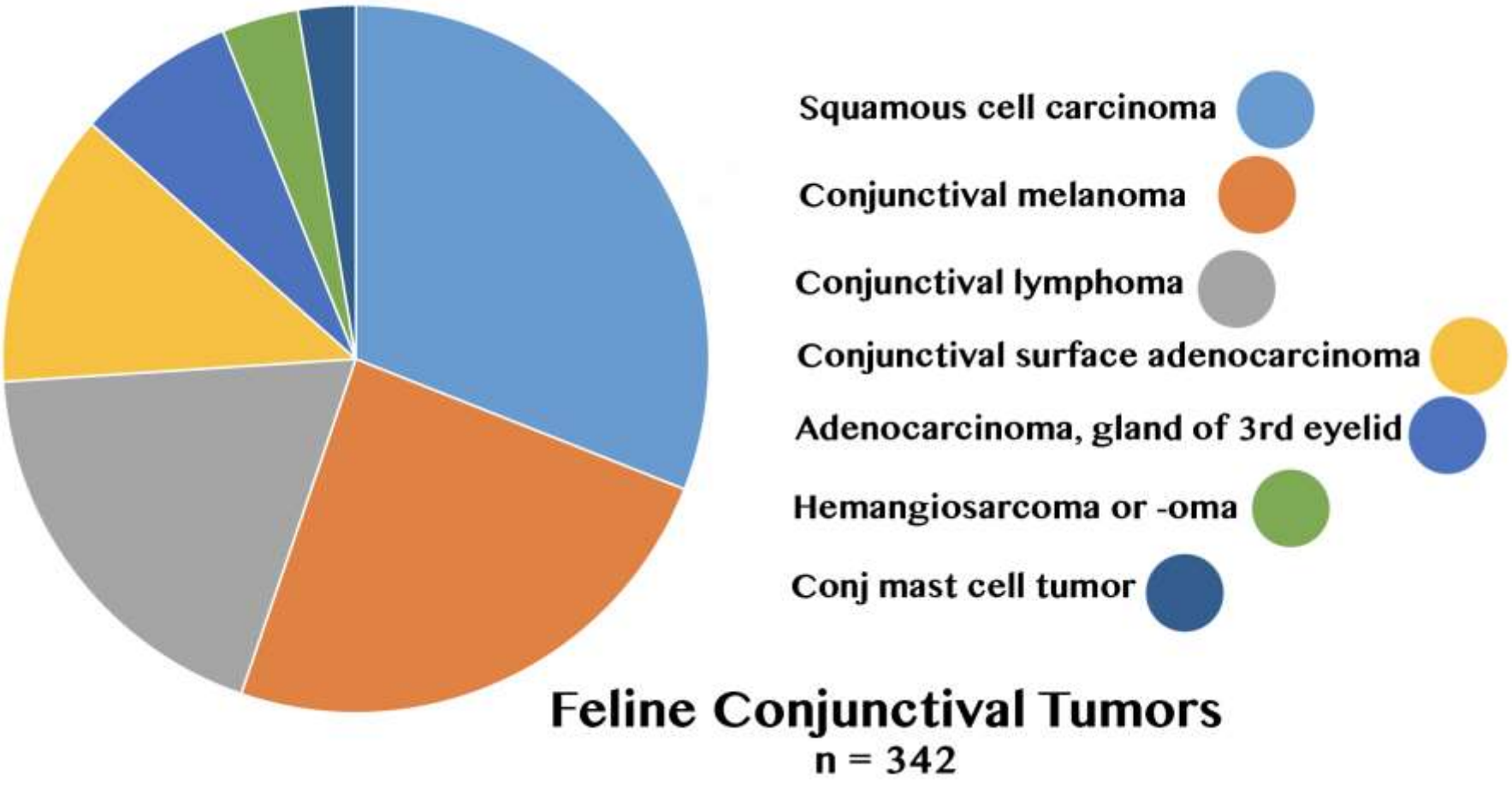
Feline Uveal Peripheral Nerve Sheath Tumor (Schwannoma)

12 Cases

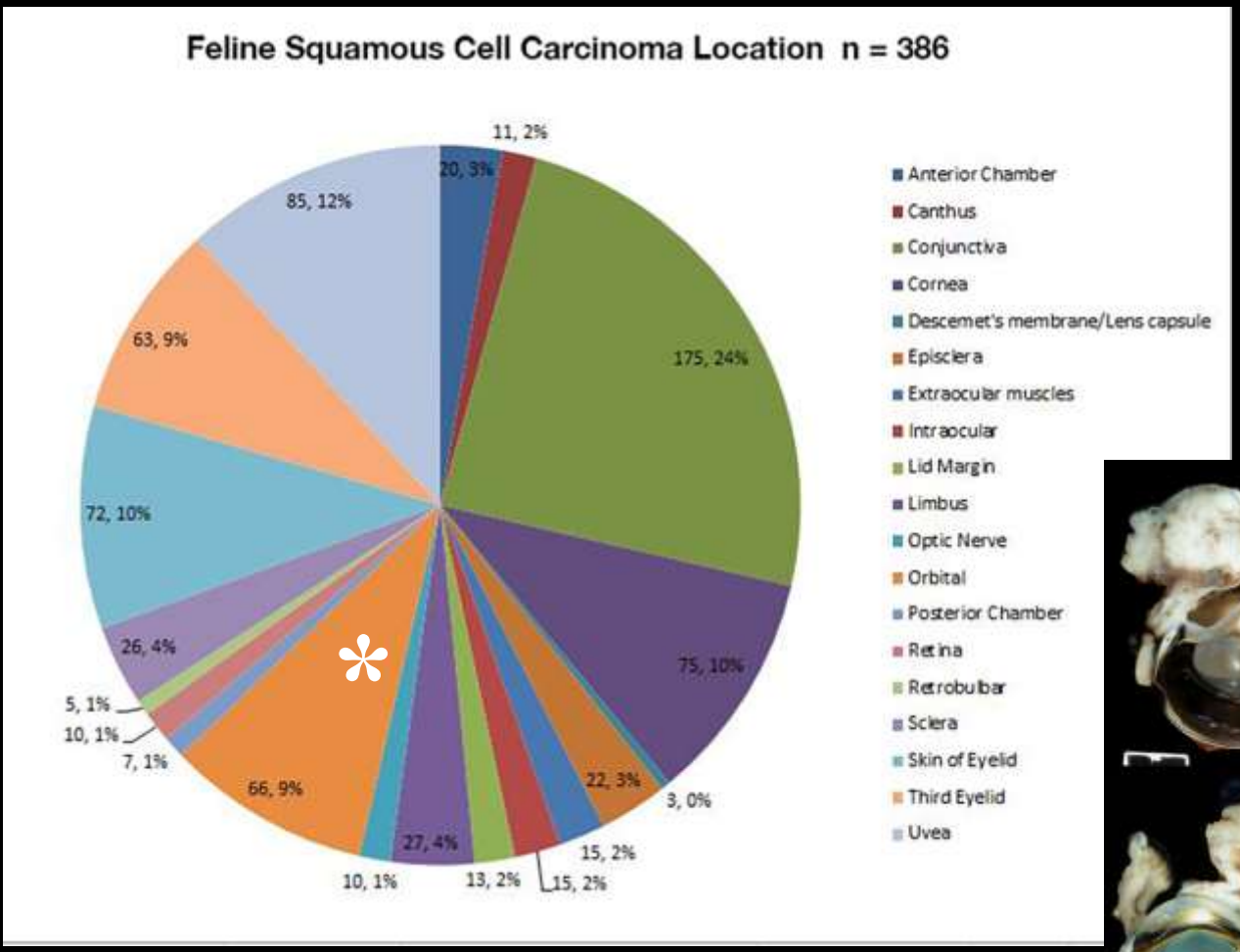


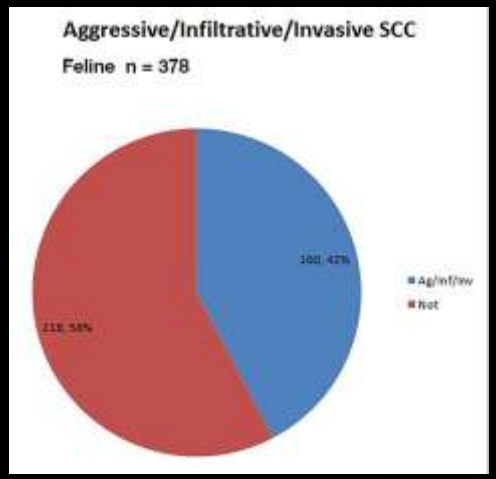


Feline Conjunctival Tumors



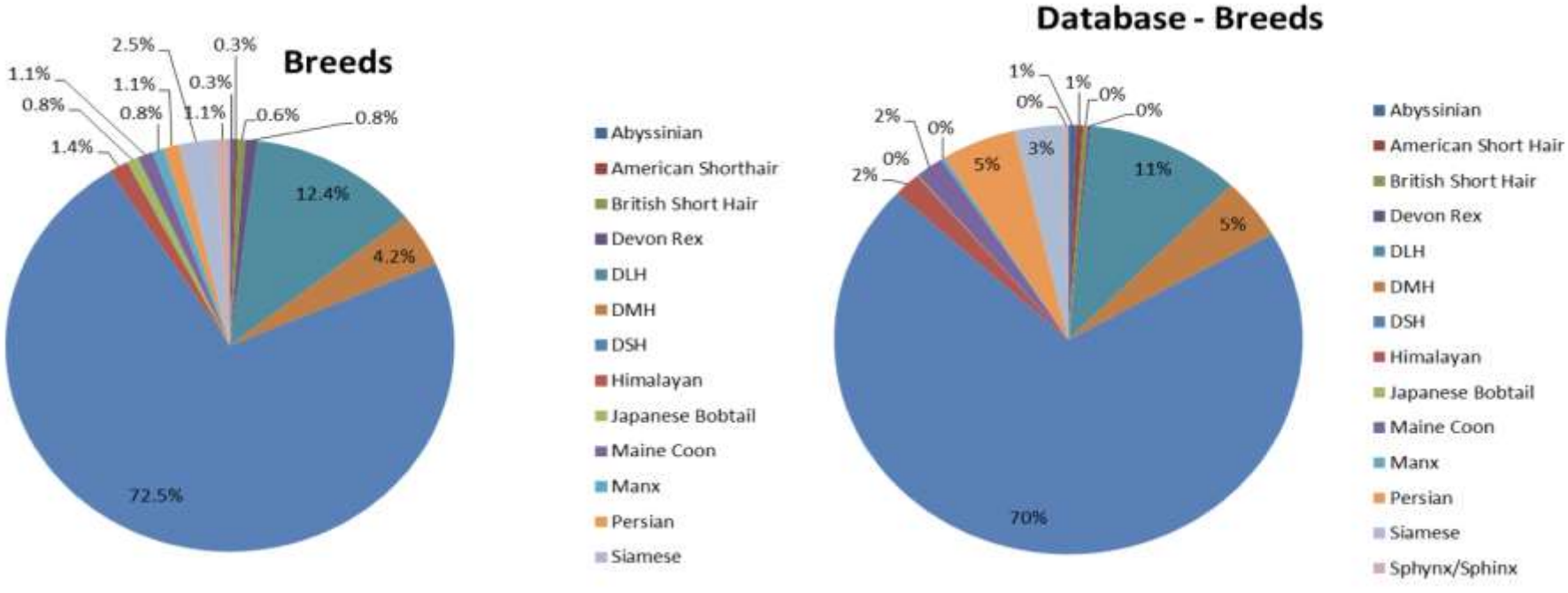
Feline Conjunctival and Lid Squamous Cell Carcinoma

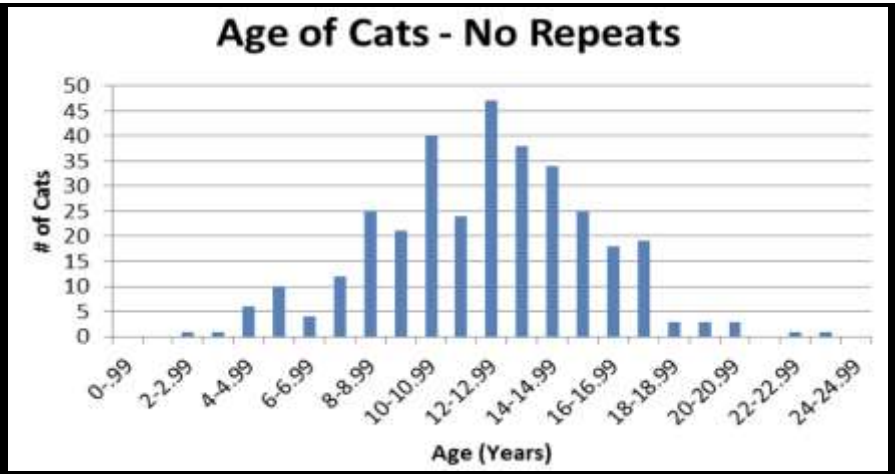




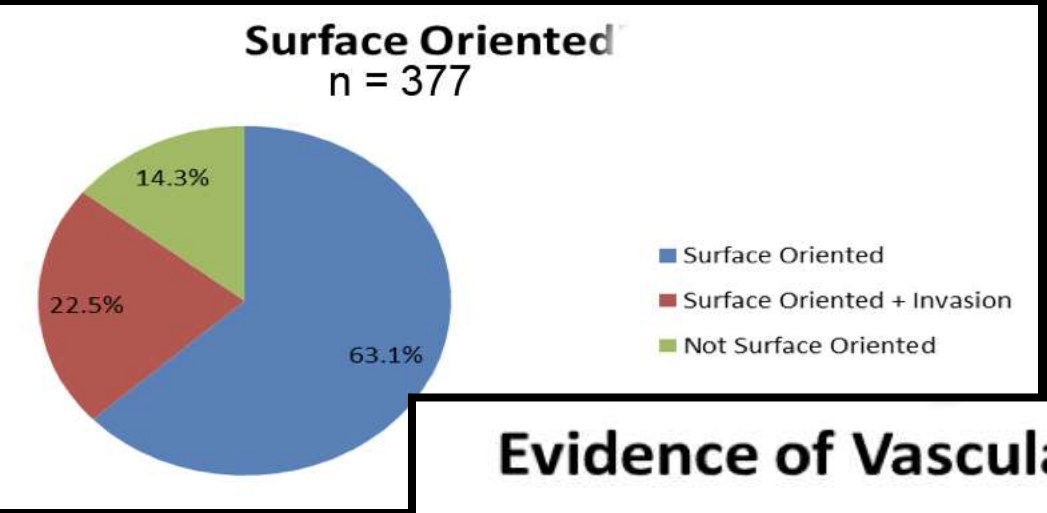
Alisia Weyna 2016

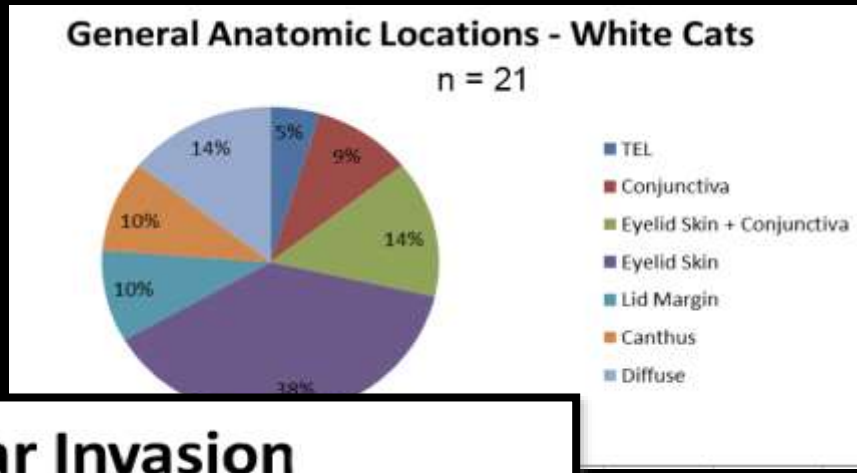
Feline Conjunctival and Lid Squamous Cell Carcinoma

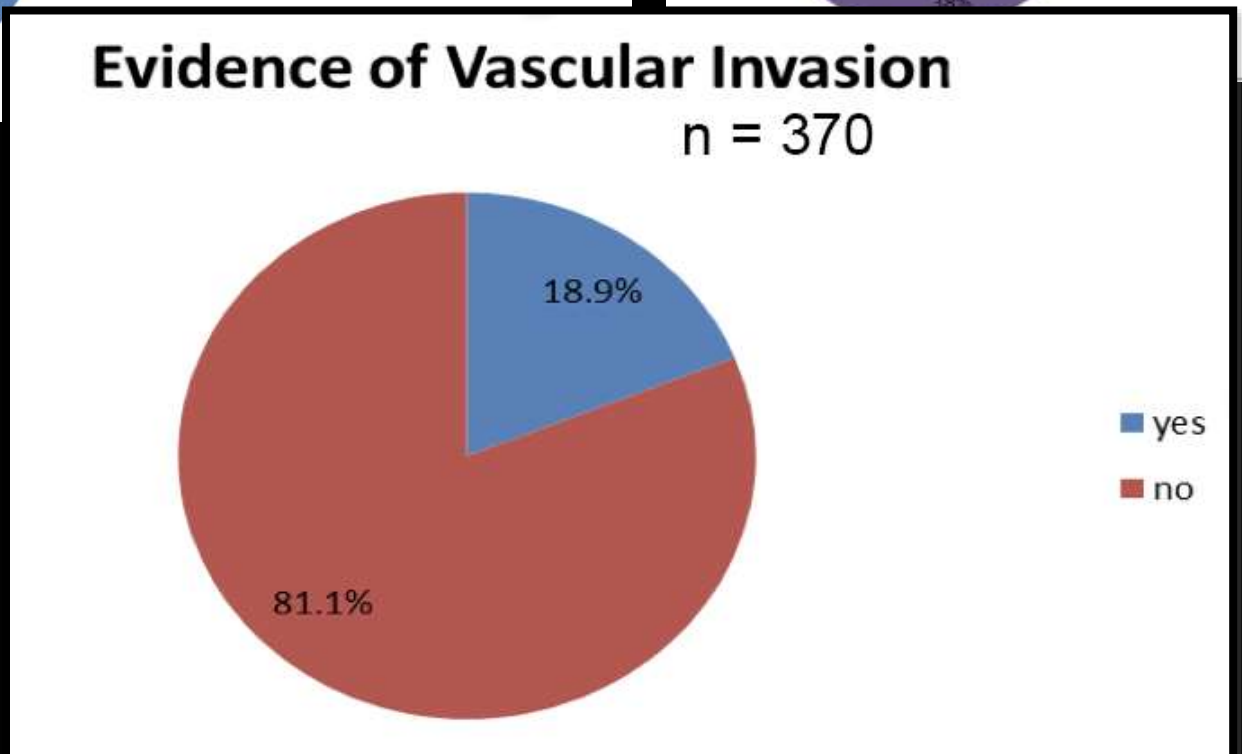




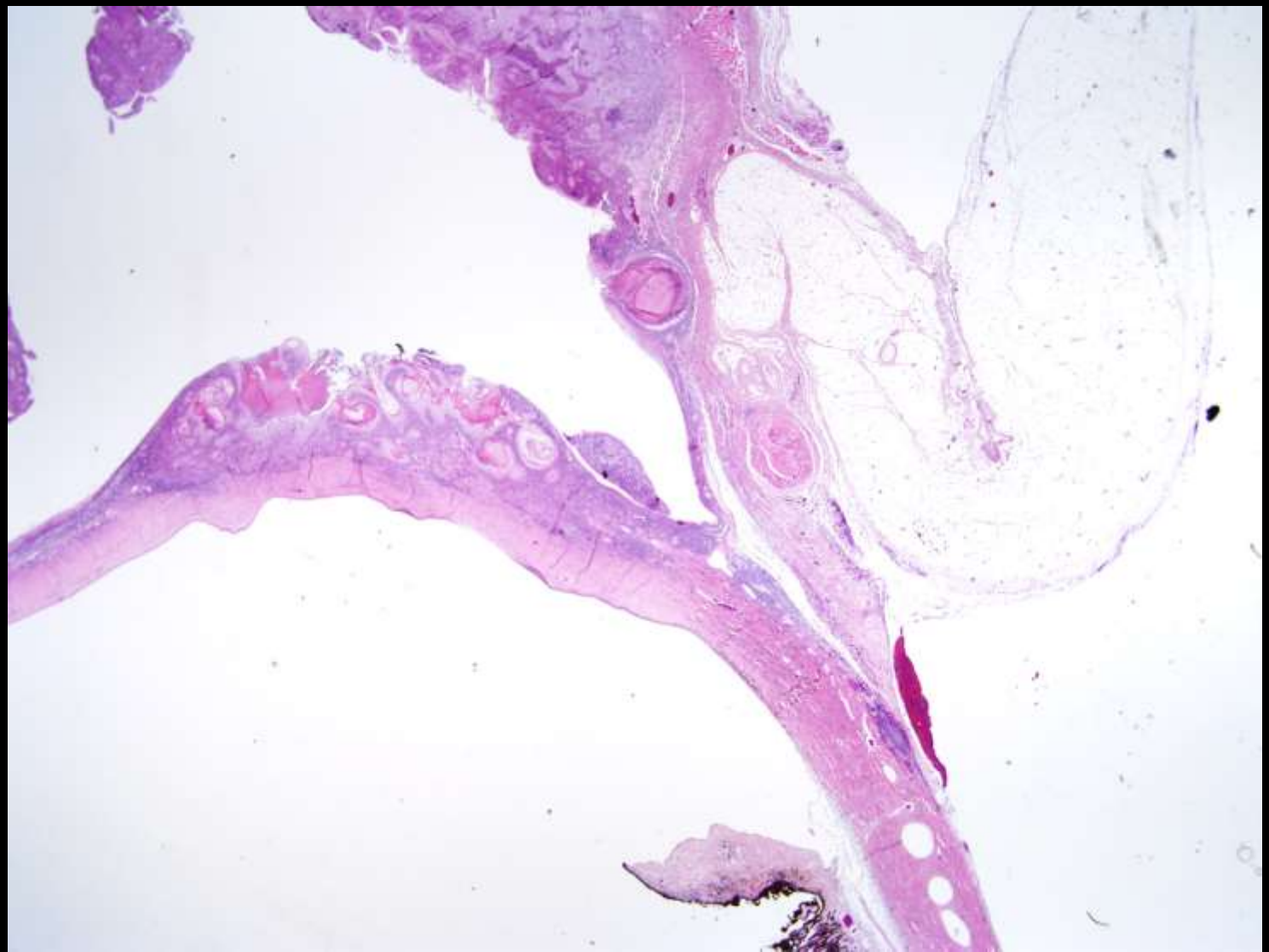
Feline Conjunctival and Lid Squamous Cell Carcinoma





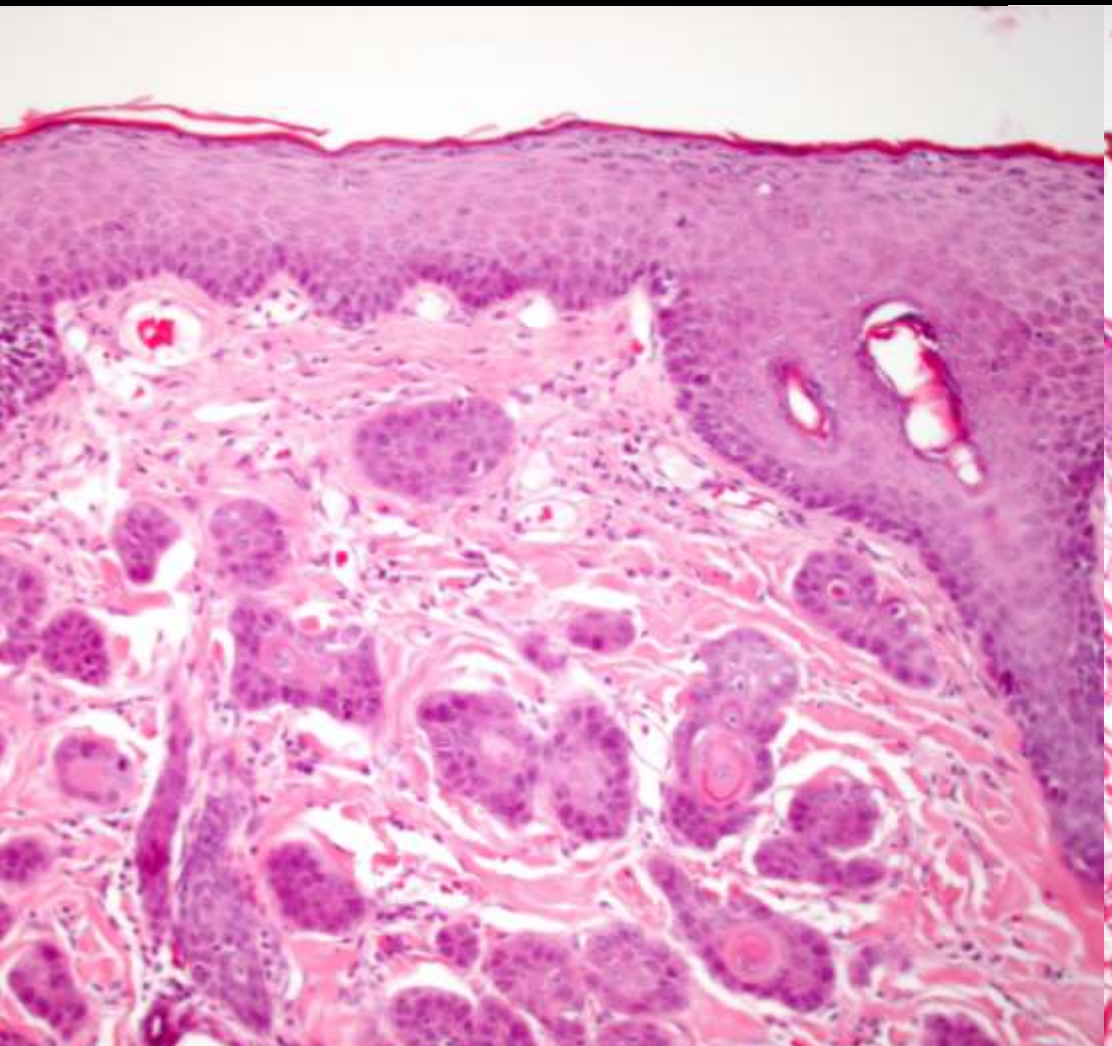


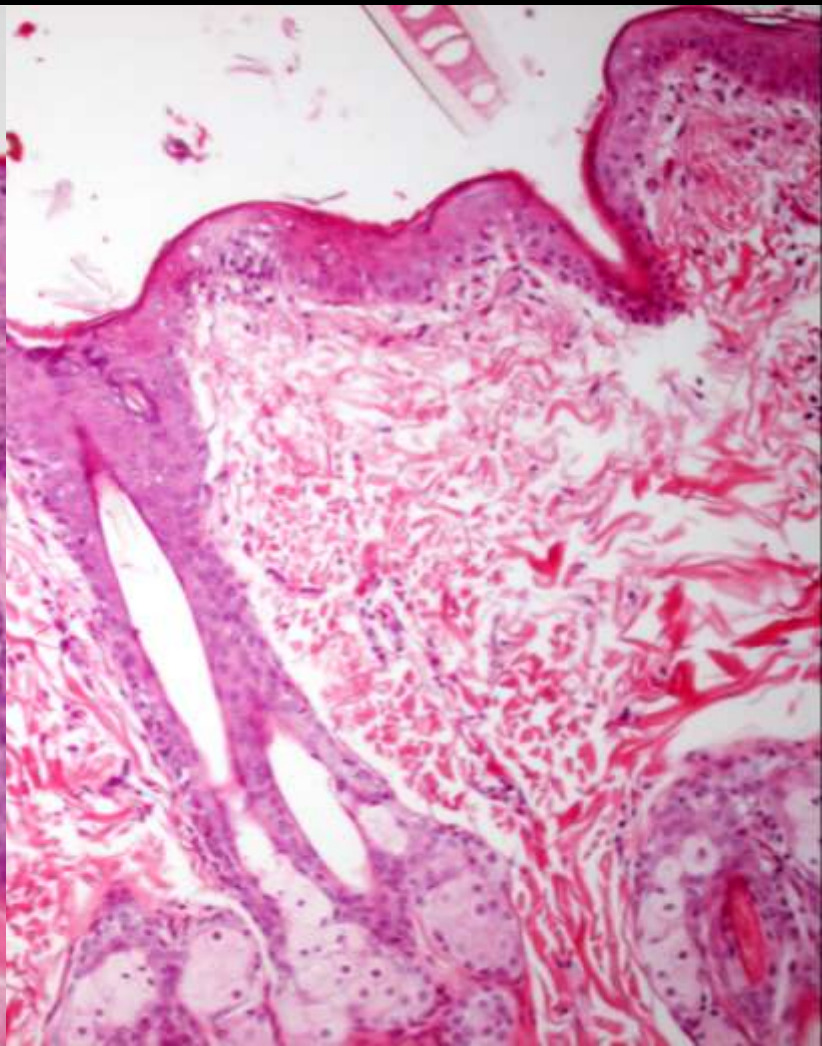
Feline Conjunctival and Lid Squamous Cell Carcinoma



Feline Conjunctival and Lid Squamous Cell Carcinoma

Multifocal or Bowenoid



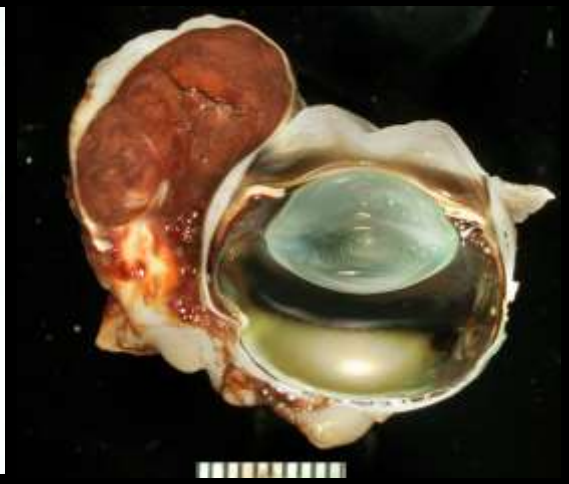


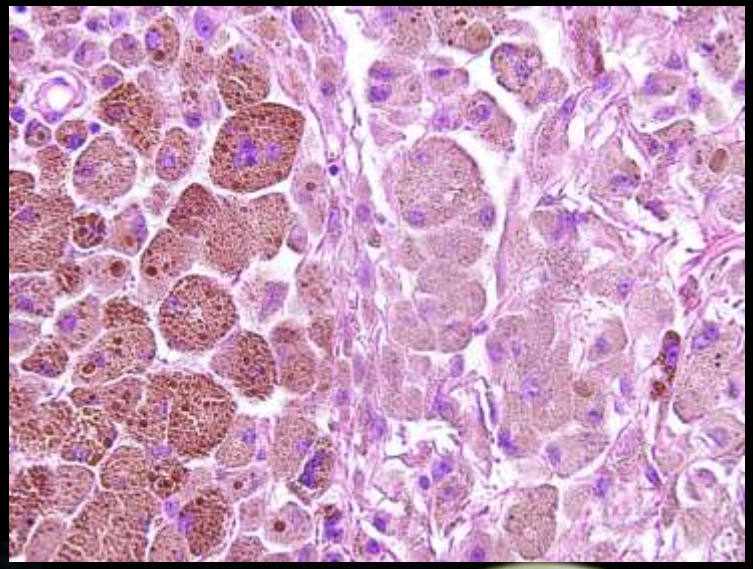
Feline Orbital Squamous Cell Carcinoma

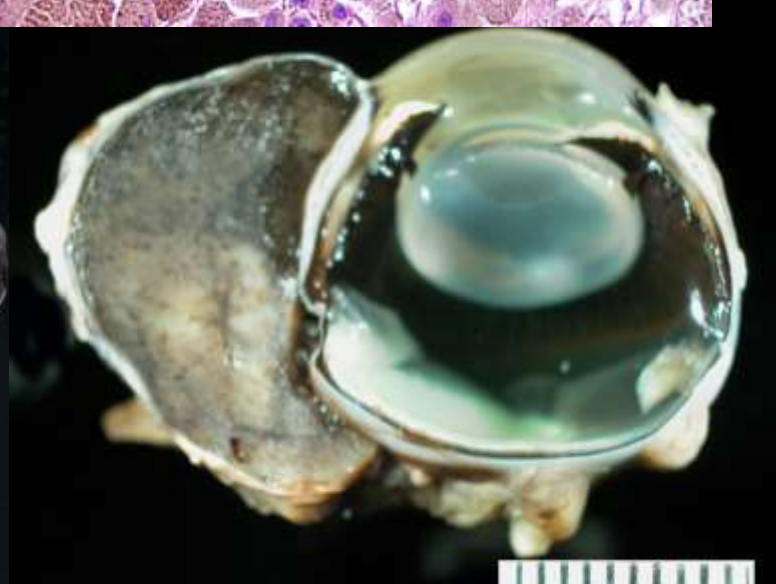
DDx Feline Restrictive Orbital Myofibroblastic Sarcoma

Feline Conjunctival Melanoma

- 50 cases in the COPLOW database



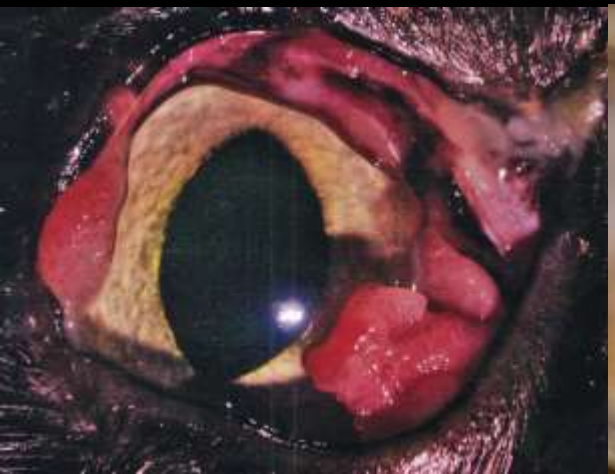




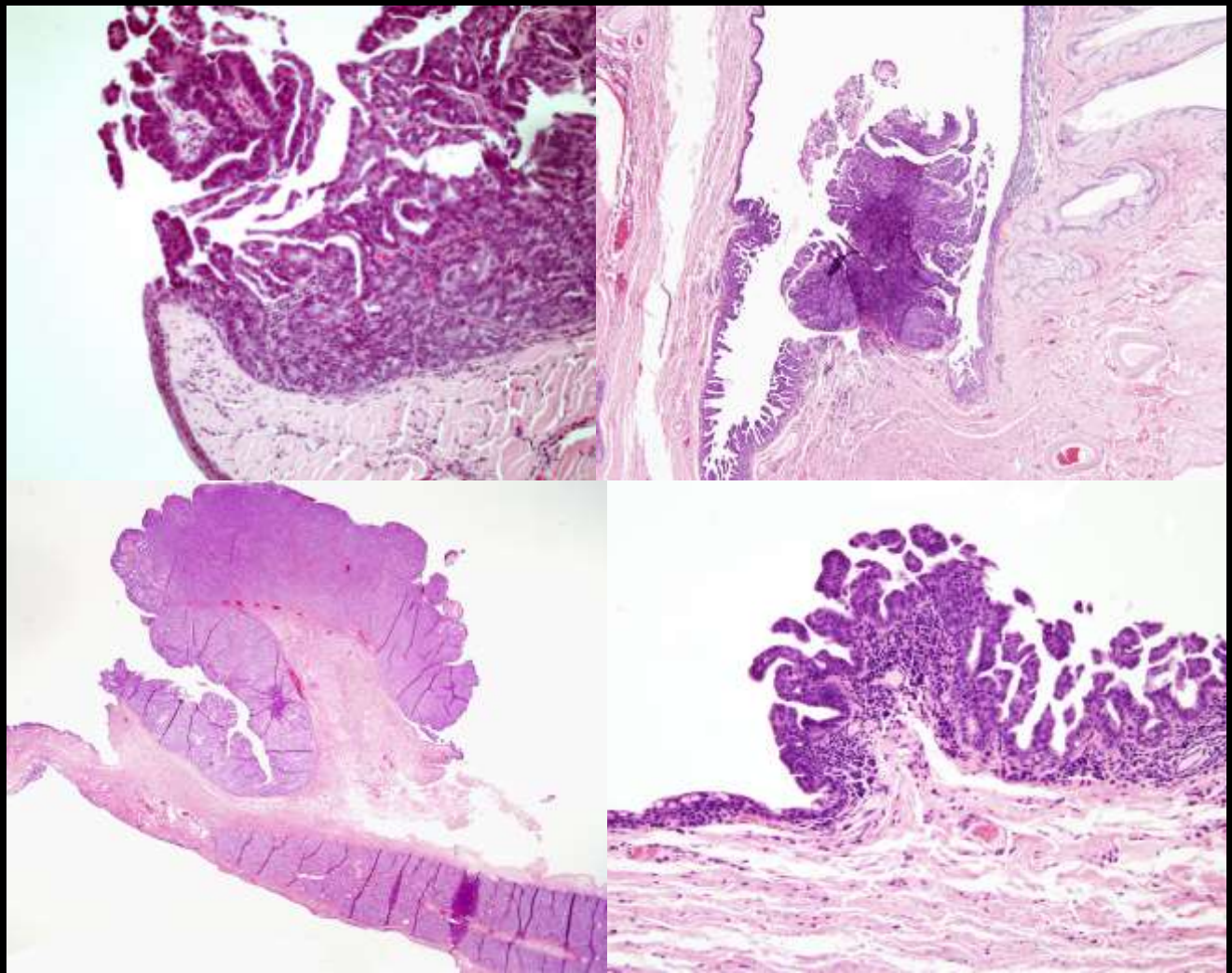
Feline Conjunctival Surface Adenocarcinoma

Formerly Mucoepidermoid Carcinoma

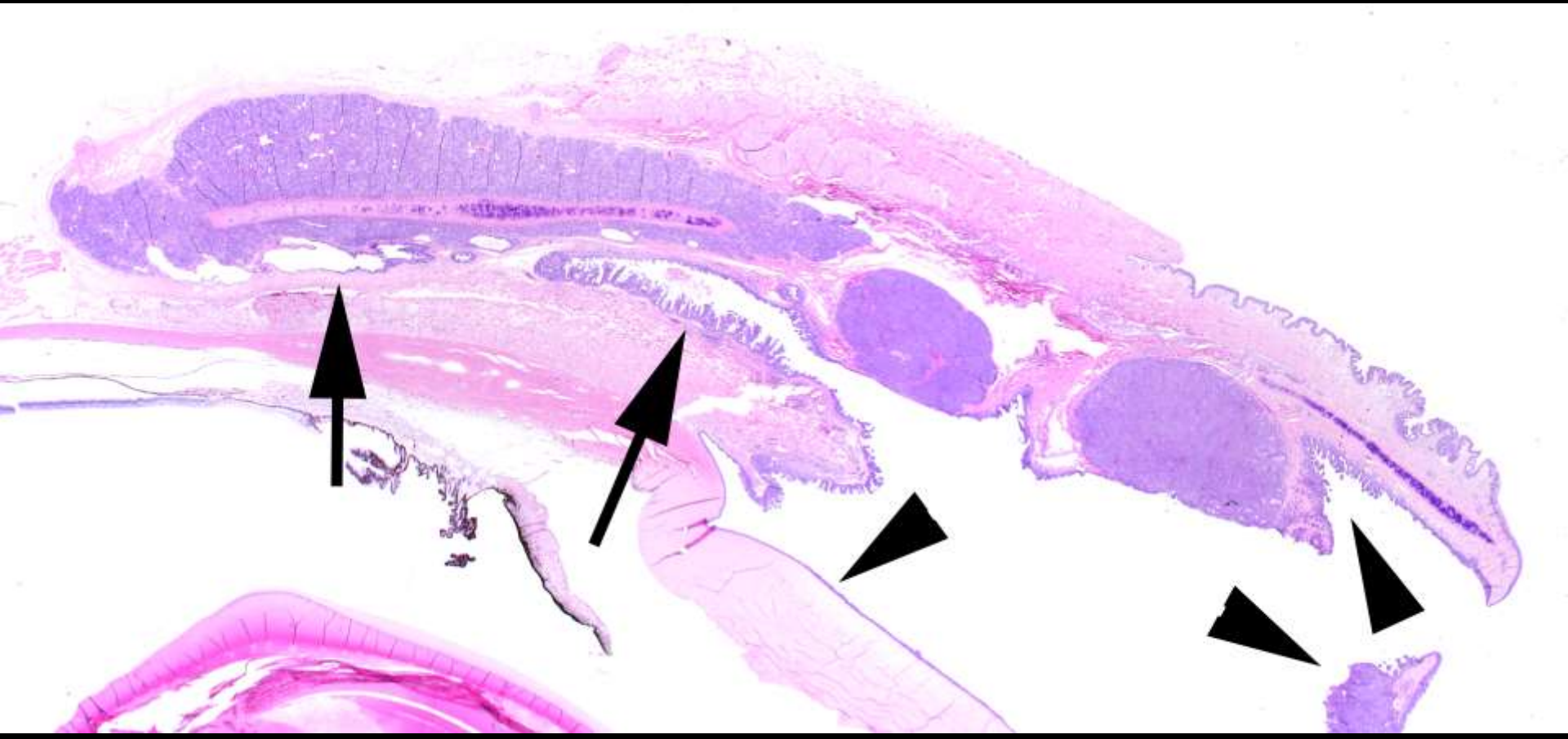
- Formerly Mucoepidermoid Carcinoma
- 30 cases in the COPLOW database
- Malignant potential



Feline Conjunctival Surface Adenocarcinoma



Feline Conjunctival Surface Adenocarcinoma



Tumor appears to arise in the ducts of the gland of the TEL and spread across the surface

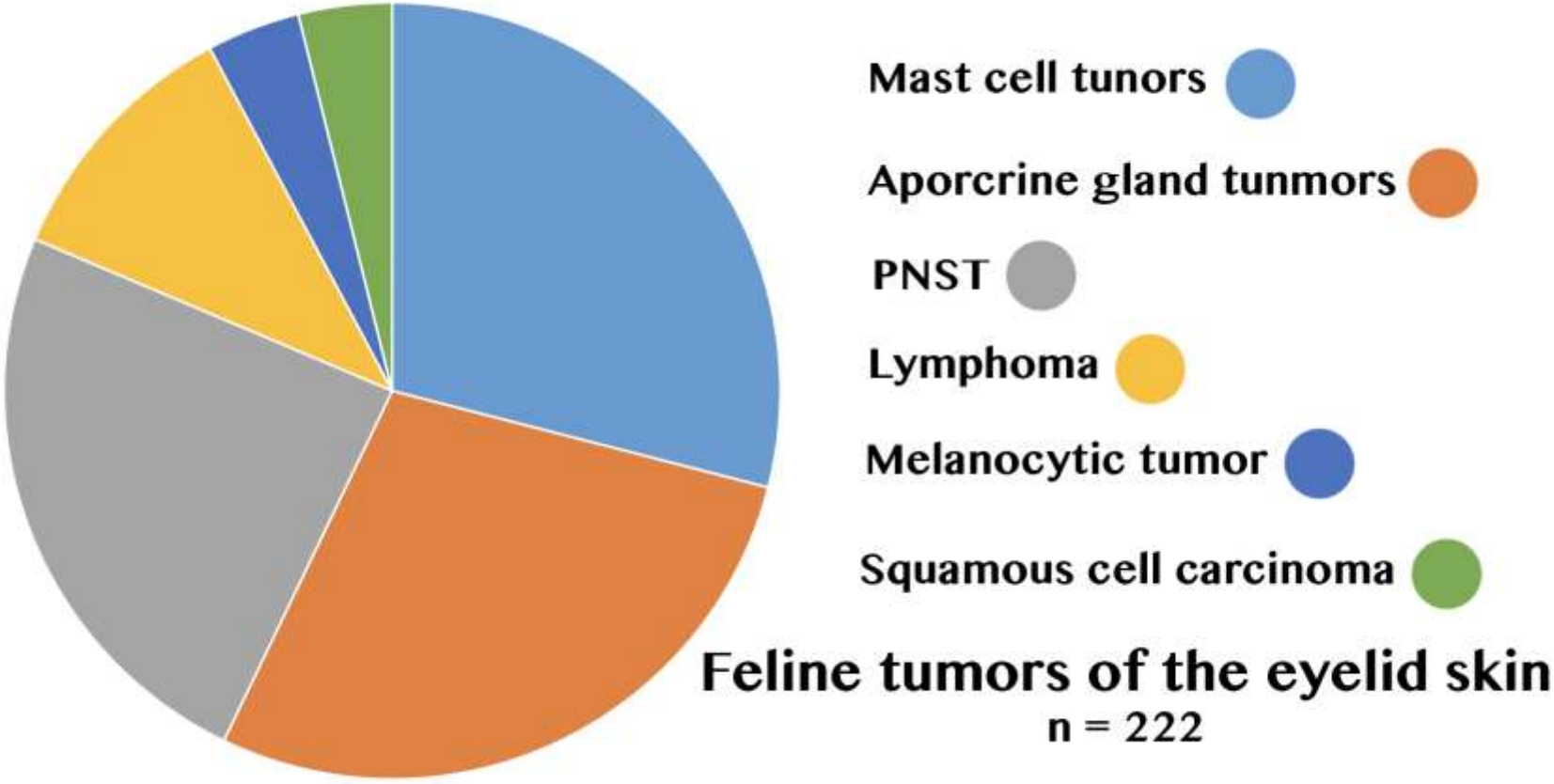
Feline Conjunctival Surface Adenocarcinoma

Metastatic Potential

Adenocarcinoma of the Gland of the Third Eyelid

29 cases

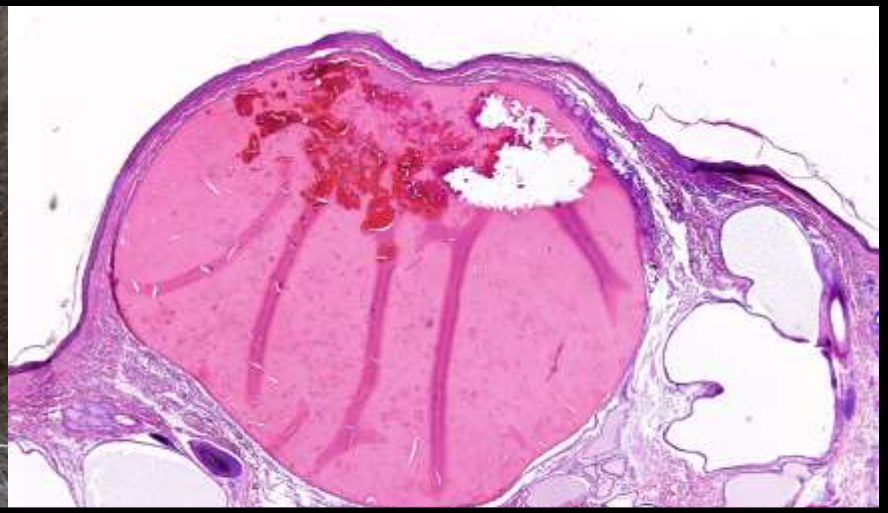
Tumors of the Feline Eyelids

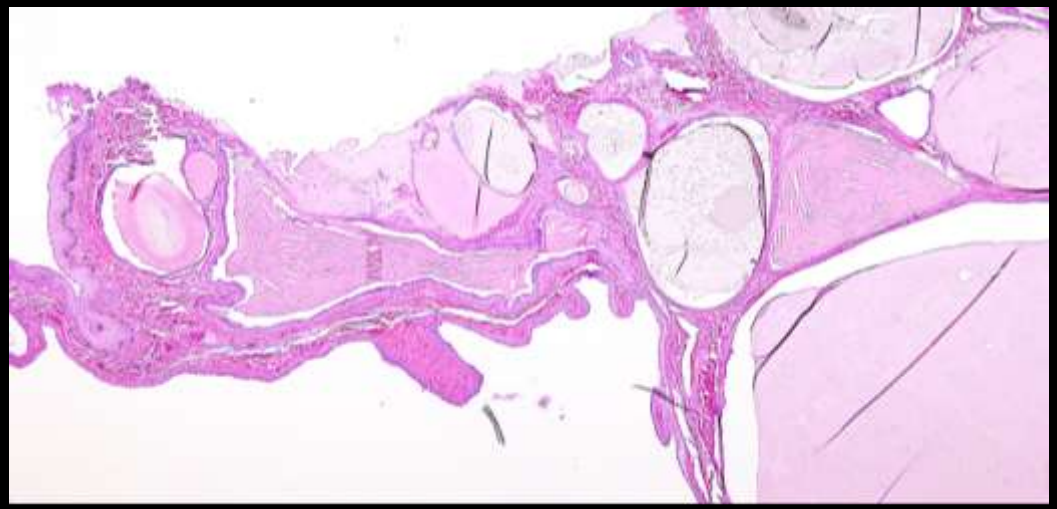


Feline Hidrocystoma

Apocrine gland origin

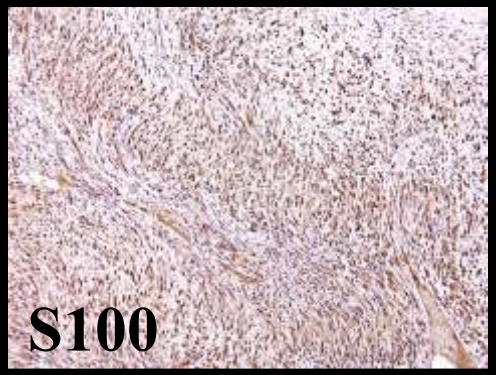
Siamese predilection





Feline Eyelid Peripheral Nerve Sheath Tumor

45 cases in the COPLOW Database



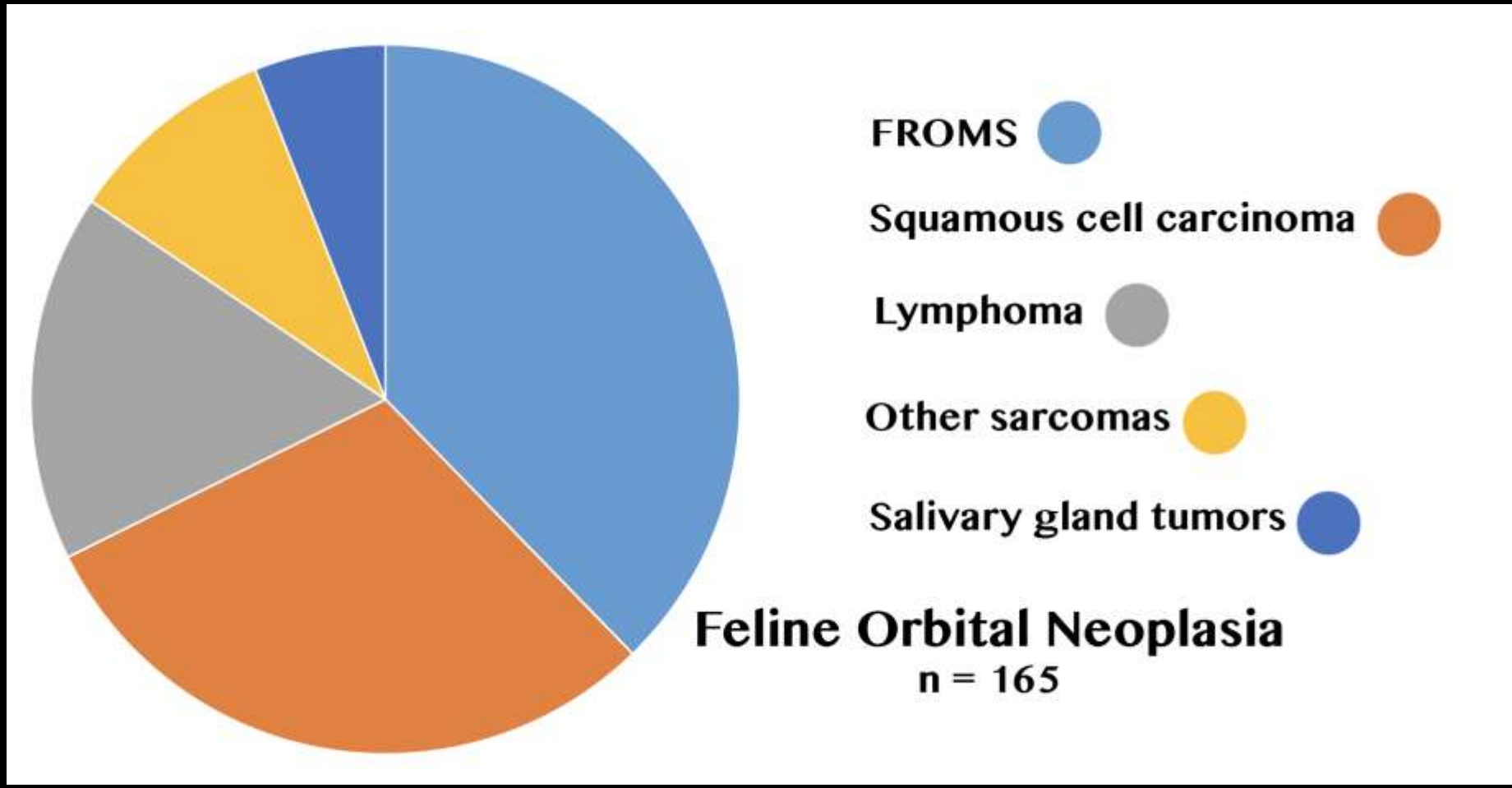
H&E Antoni A pattern Bar=50 microns

Feline Eyelid or Conjuctival Mast Cell Tumors

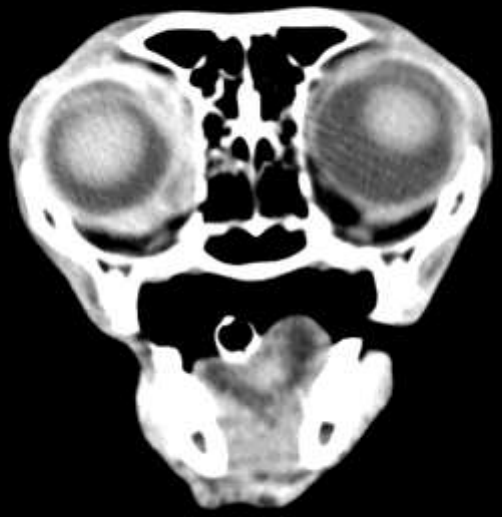
63 Cases in the COPLOW Database

- All but 3 are cutaneous
- Most common at medial canthus

Feline Orbital Tumors



Feline Restrictive Orbital Myofibroblastic Sarcoma
FROMS
(formerly, Feline Orbital Pseudotumor)



Bell CM, Schwarz T, Dubielzig RR. (2011) Diagnostic Features of Feline Restrictive Orbital Myofibroblastic Sarcoma. *Vet Pathol*. 48: 742-750.

54 cases of FROMS

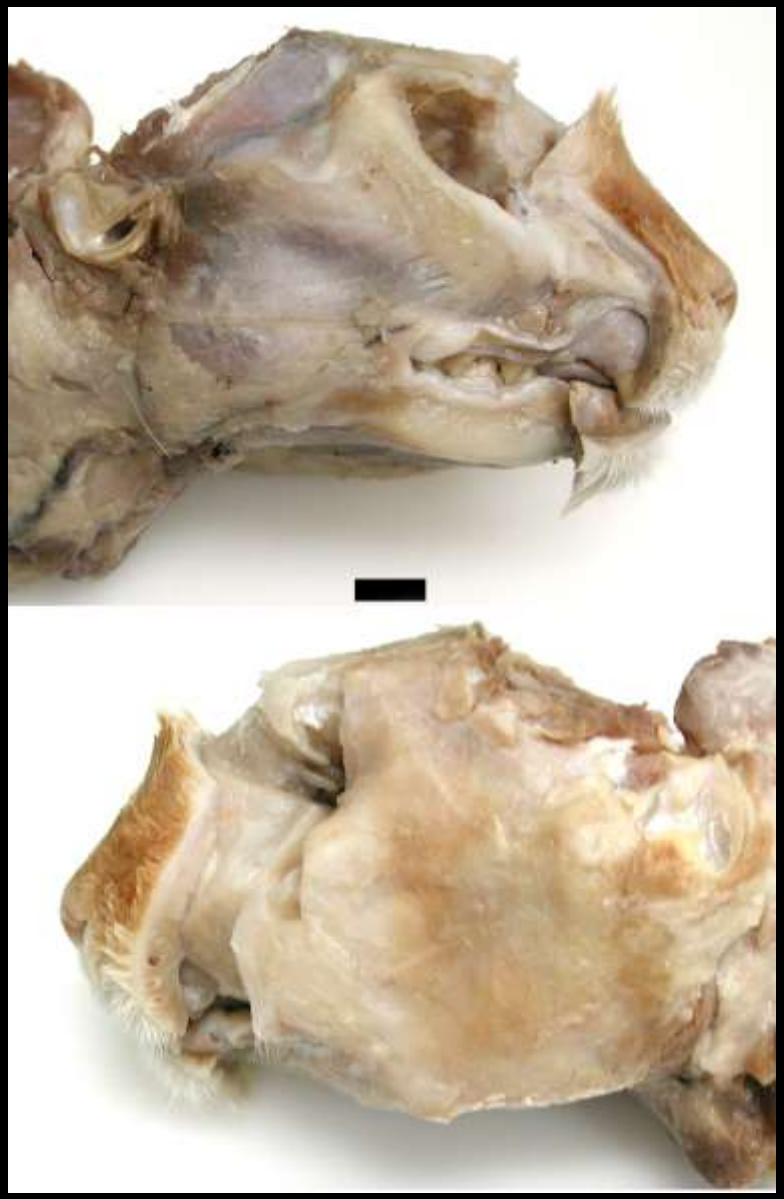
- Breed:
  - 34 DSH
  - 7 DLH
  - 4 Maine Coon
- Gender
  - Male = 26 FS = 24 (2 intact)
- Age
  - Mean = 10.5 years, Median = 10 years
  - Range = 4 - 16 years

Clinical Characteristics

- Restricted mobility of globe and eyelids
- Thickened and distorted eyelids
- Profound corneal disease

FROMS Clinical Characteristics

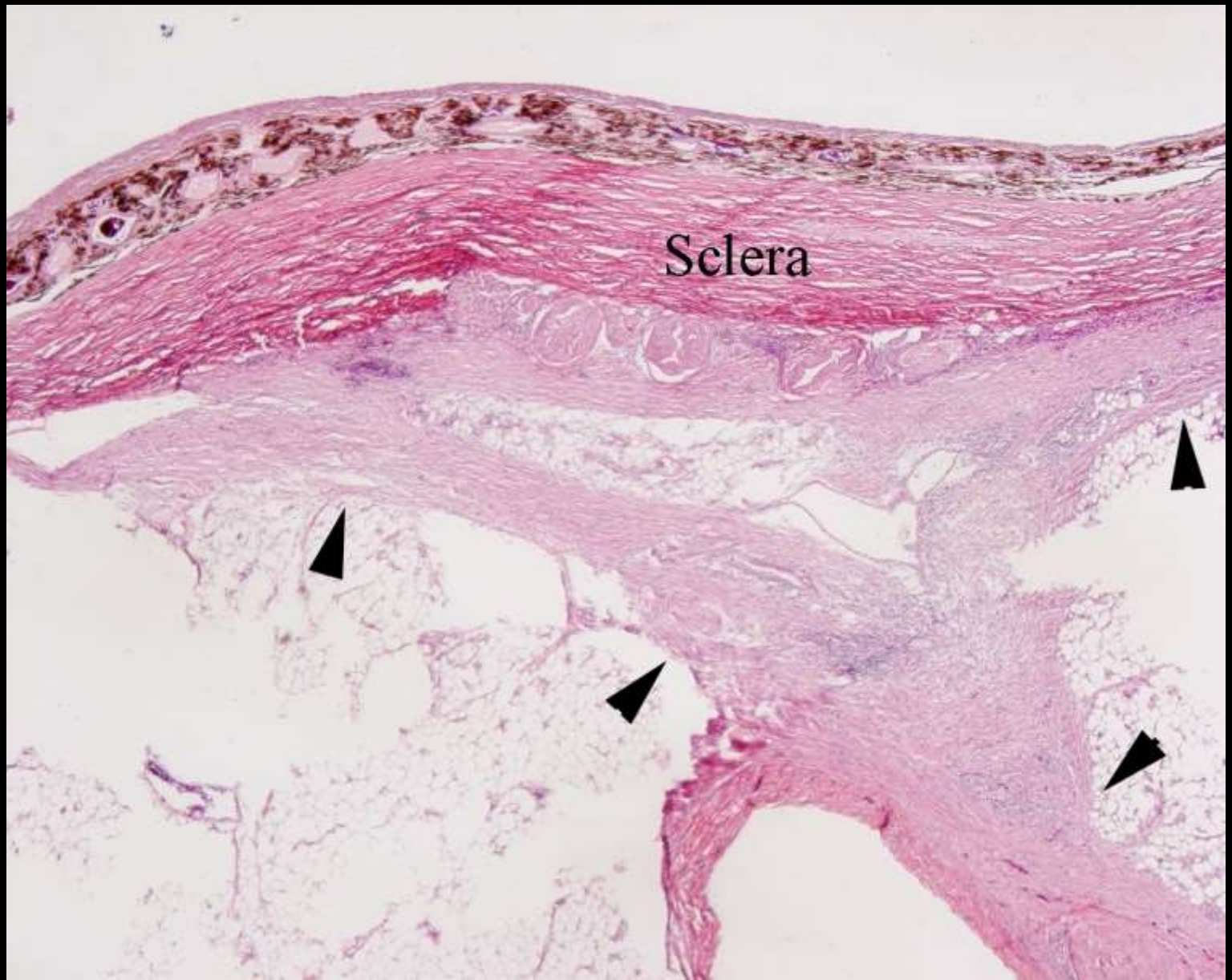
- Thickening +/- ulceration of lips
- Proliferative gingival lesions (neoplastic?)



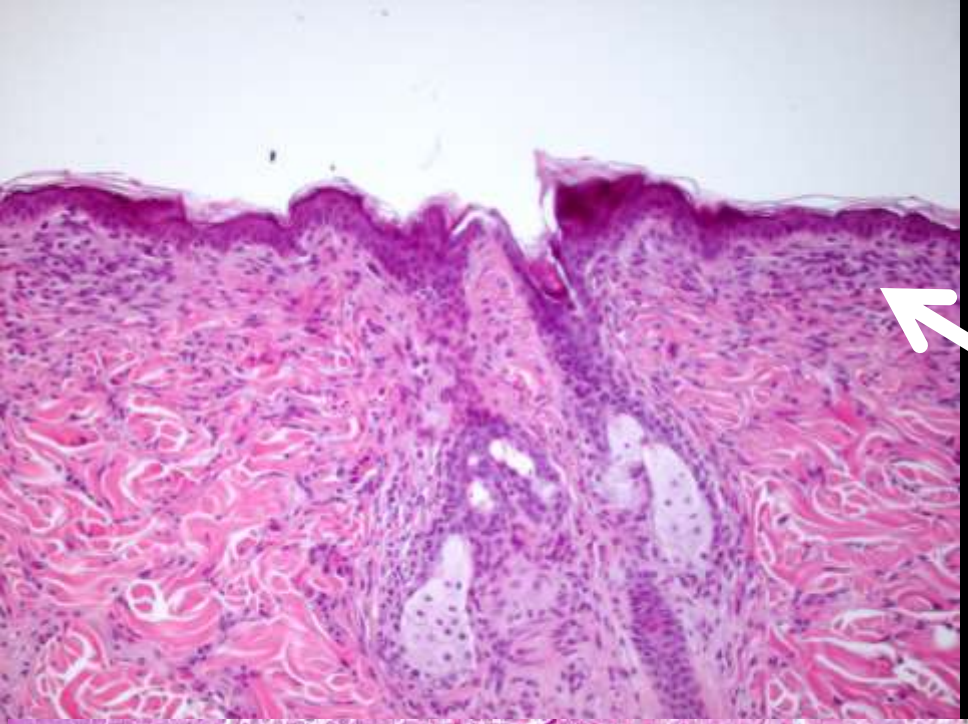
- Local extension to adjacent tissues
- Thickening and effacement along fascial planes

Feline Restrictive Orbital Myofibroblastic Sarcoma

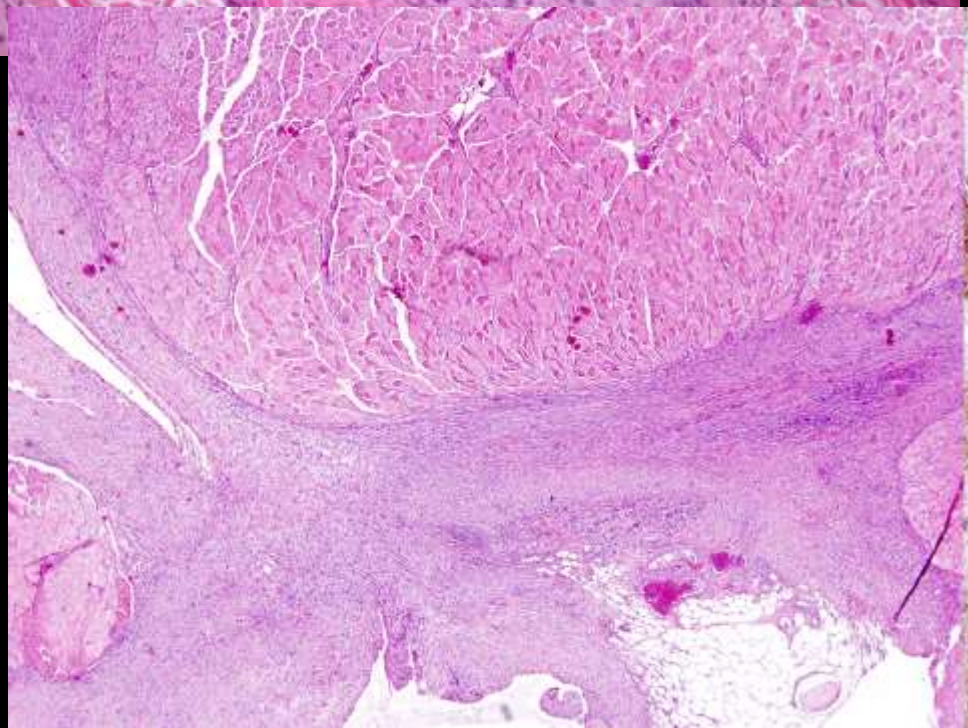
Feline Restrictive Orbital Myofibroblastic Sarcoma



Feline Restrictive Orbital Myofibroblastic Sarcoma

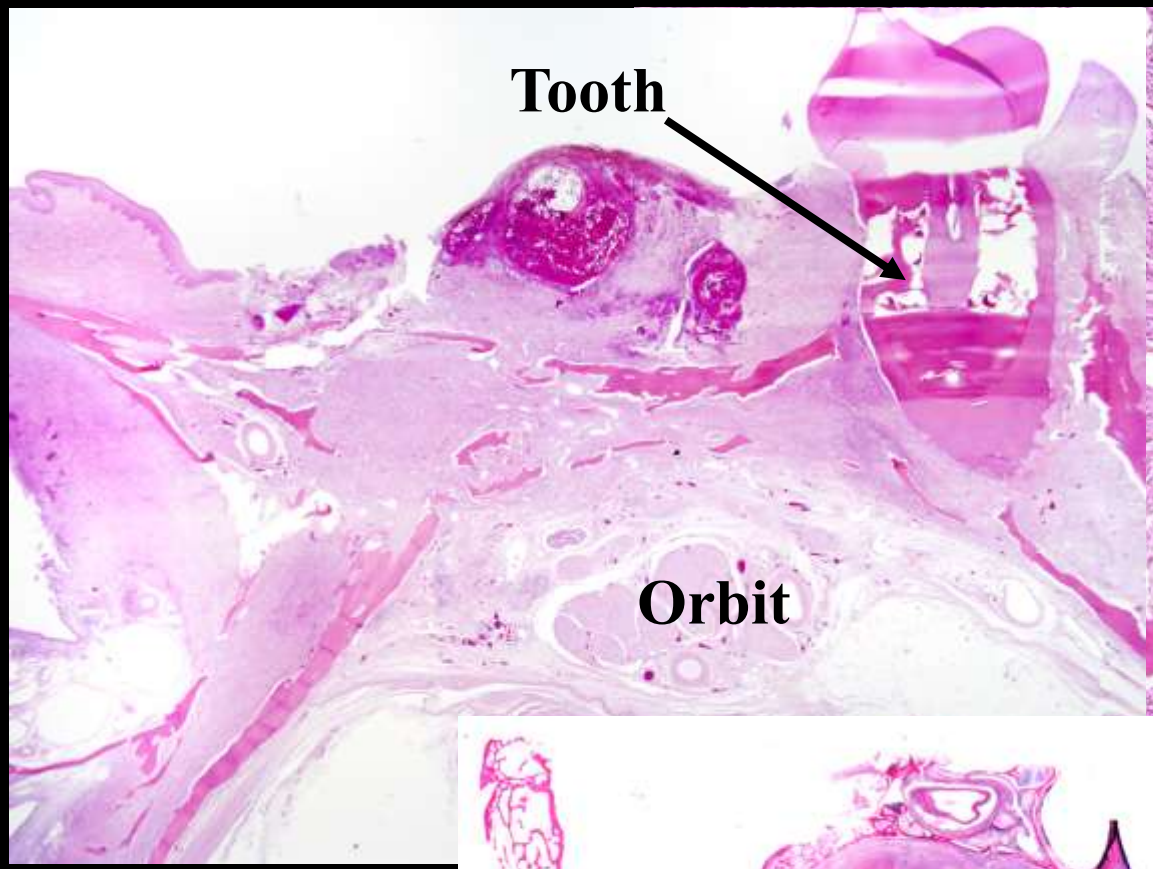


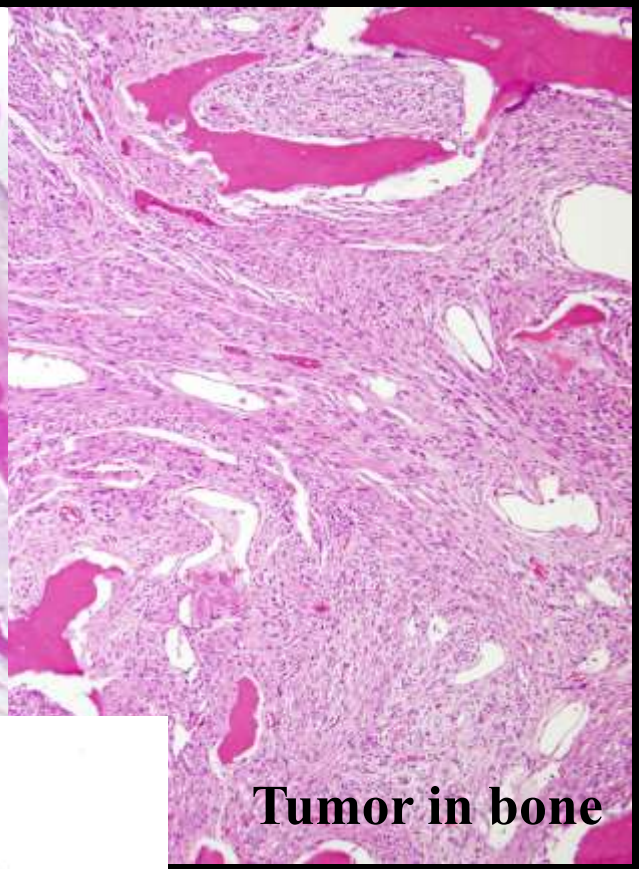
Subepithelial neoplastic cells are not SMA+, unlike the remainder of the tumor

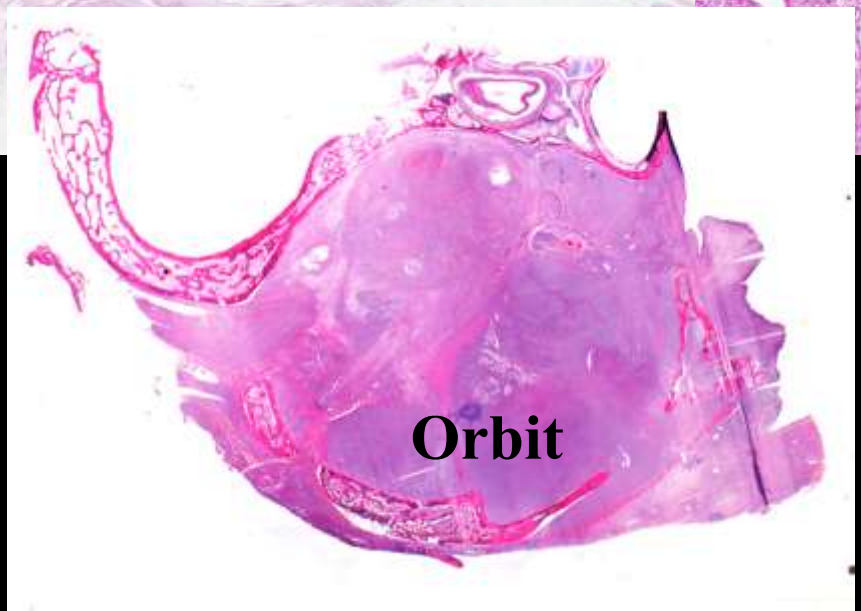


Smooth Muscle Actin (SMA)

Orbit from necropsy specimen

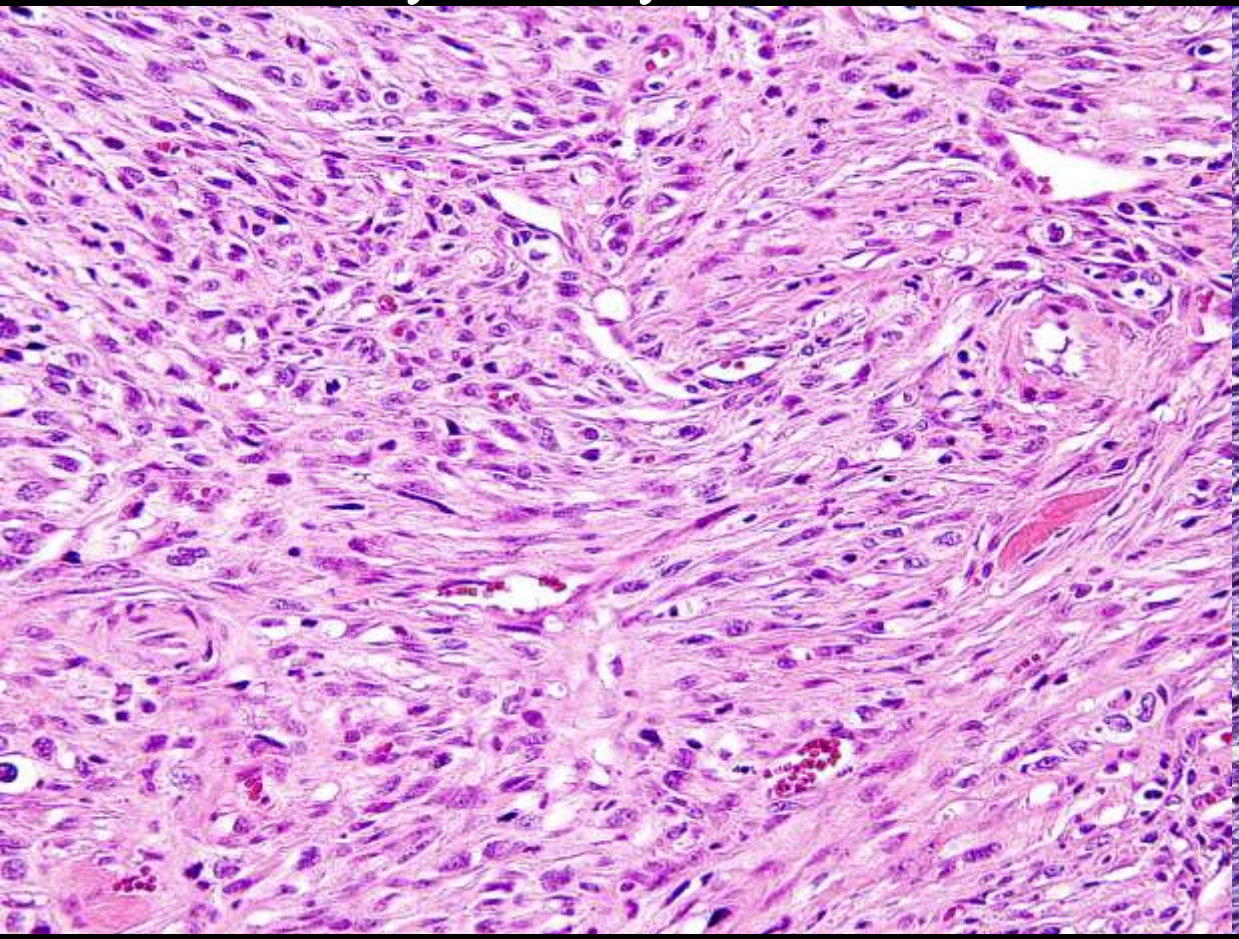


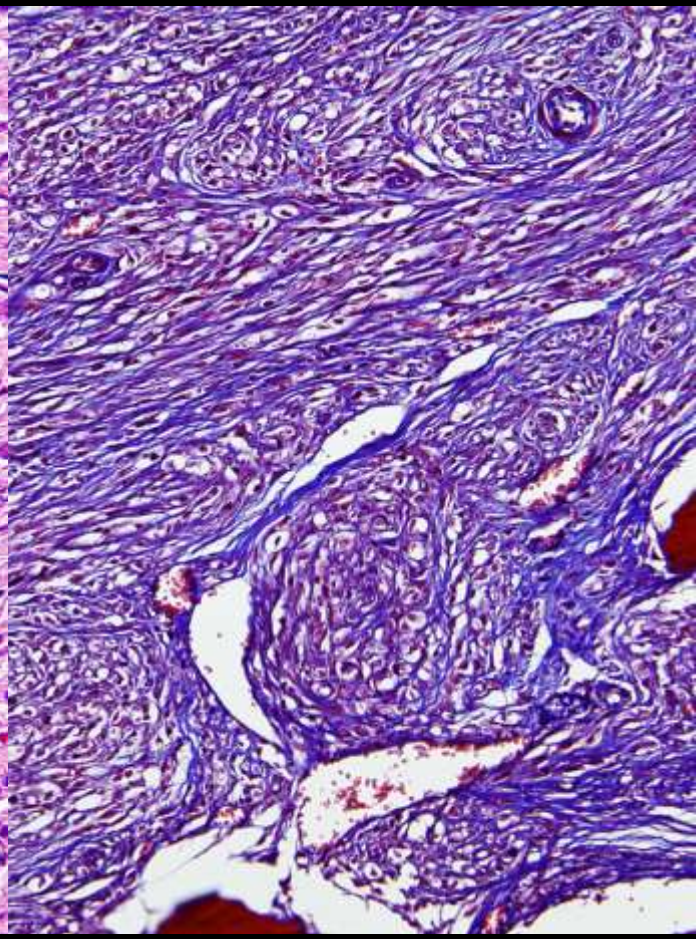




FROMS Histopathology:

- Spindle cells in irregular short bundles with collagenous matrix
- Bland nuclear profile
- Mitotic activity virtually absent





Trichrome

FROMS Immunohistochemistry

	Total	+	-
Vimentin	8	8	0
S-100	8	8	0
SMA	8	8	0
Melan A	2	0	2

Clinical Progression & Survival

- **9 of 10 cases with adequate follow-up had spread to the contralateral eye and/or oral cavity/lips**
- **All cats (5) that were confirmed deceased were euthanized due to progressive FROMS**
- **Of 3 cats currently living, 2 have signs of progressive FROMS**

Feline Restrictive Orbital Myofibroblastic Sarcoma: Summary

- FROMS behavior is locally invasive and severely restricts the mobility of globe, eyelids and lips
- Morphology suggests an infiltrative myofibroblastic sarcoma, seldom forms a mass lesion, lacks cellular atypia
- Diagnosis requires histopathology plus clinical picture
- Distribution and extent in the oral cavity and elsewhere in the head is not obvious at the first diagnosis but becomes very apparent at necropsy

Squamous Cell Carcinoma masquerading as FROMS