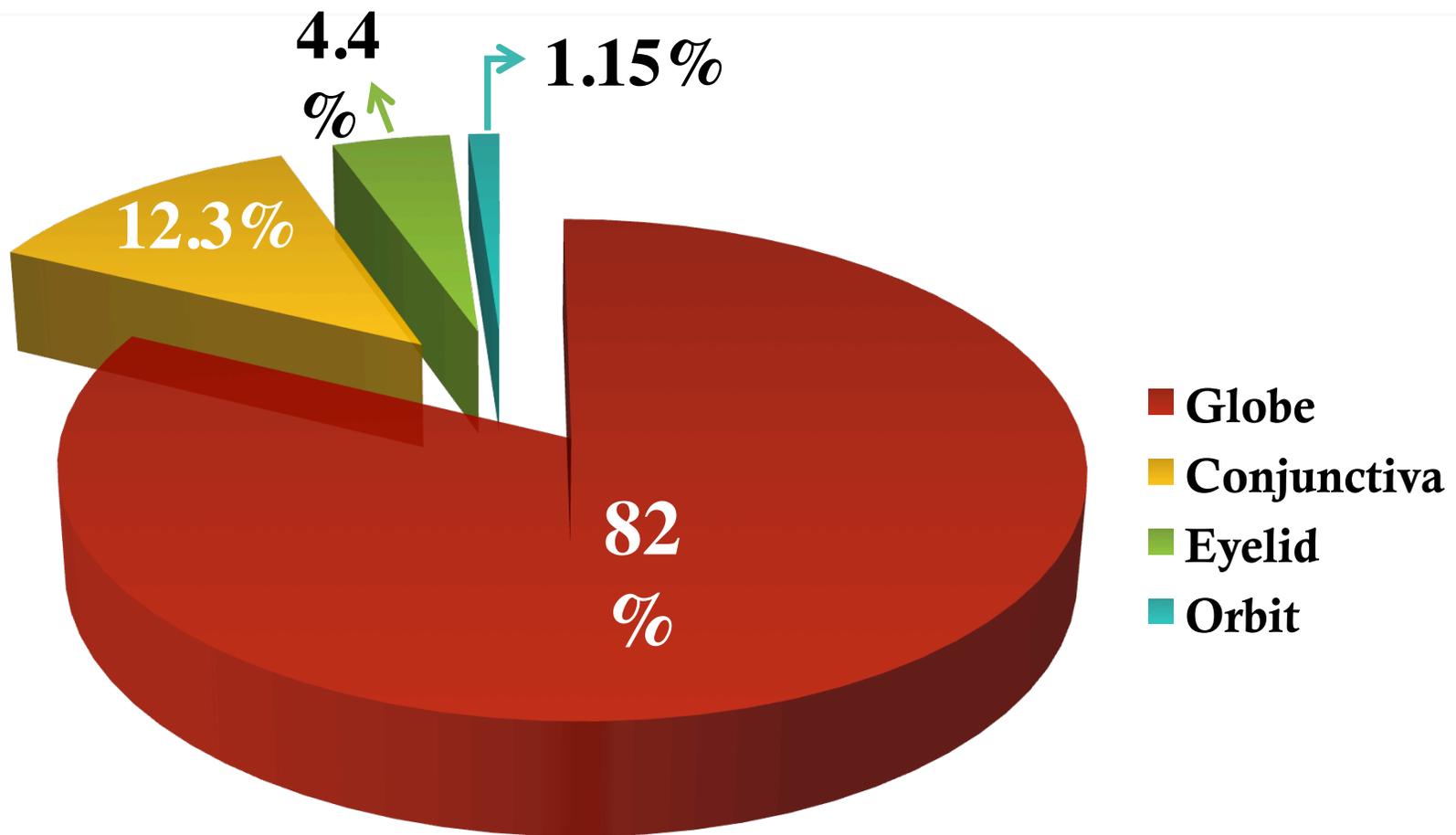


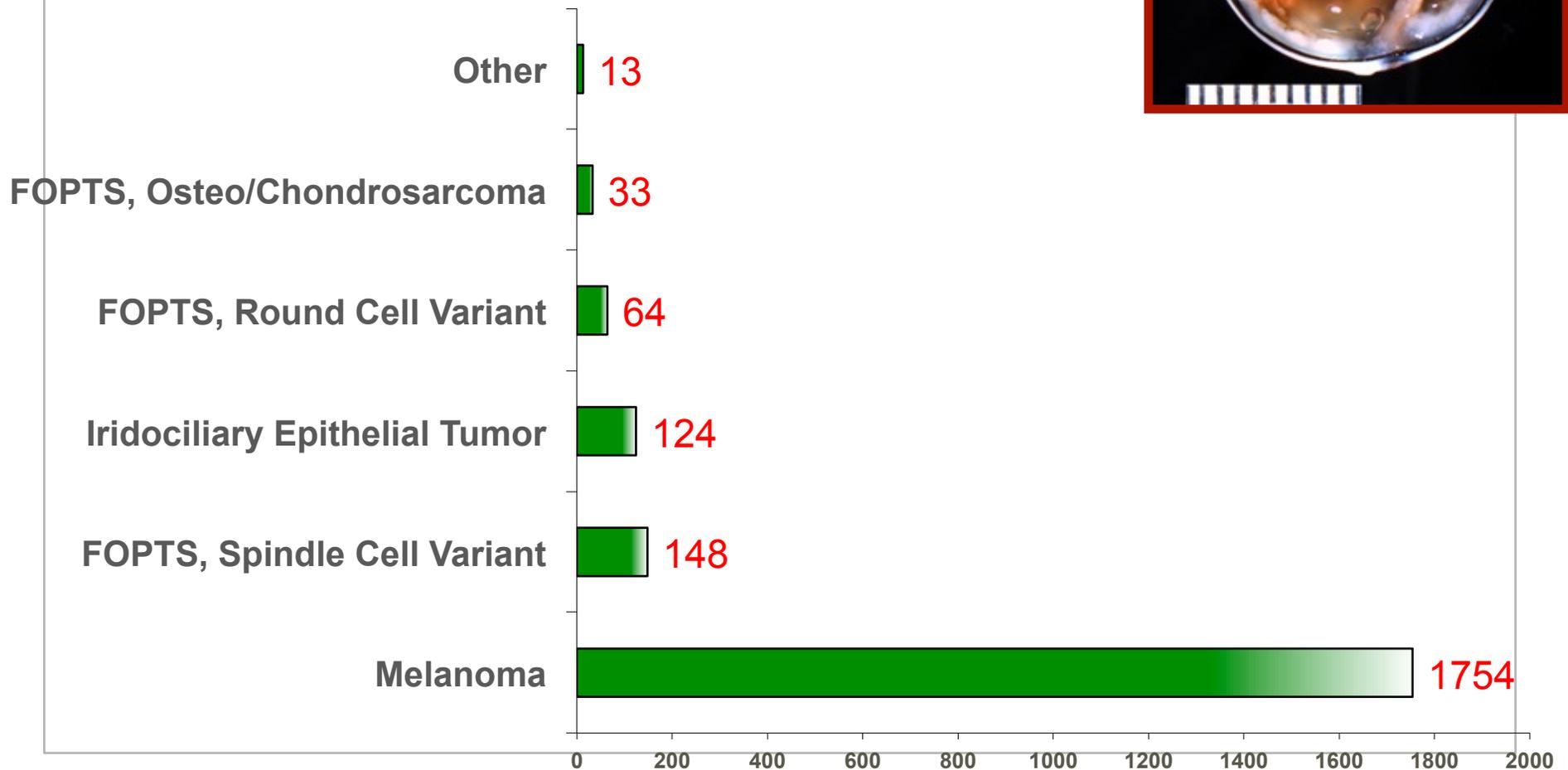
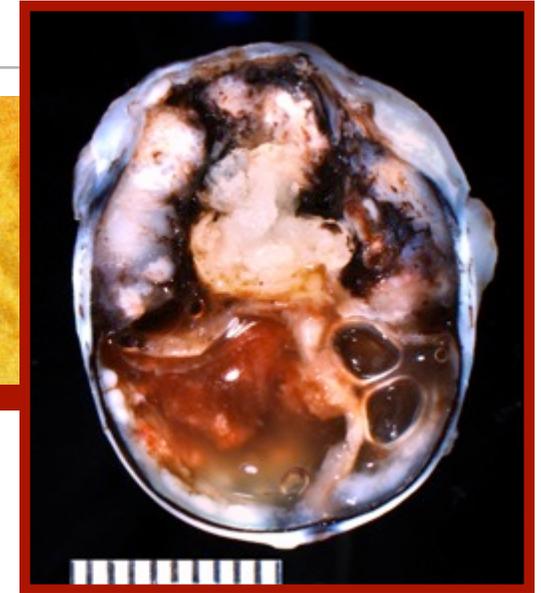
Tumors of the Feline Globe and Periocular Tissues

Richard R Dubielzig

Anatomic distribution of feline primary ocular neoplasia (n = 2599)



Feline tumors of the Globe (n = 2136)



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. Ophthalmol.* 1: 25-29.

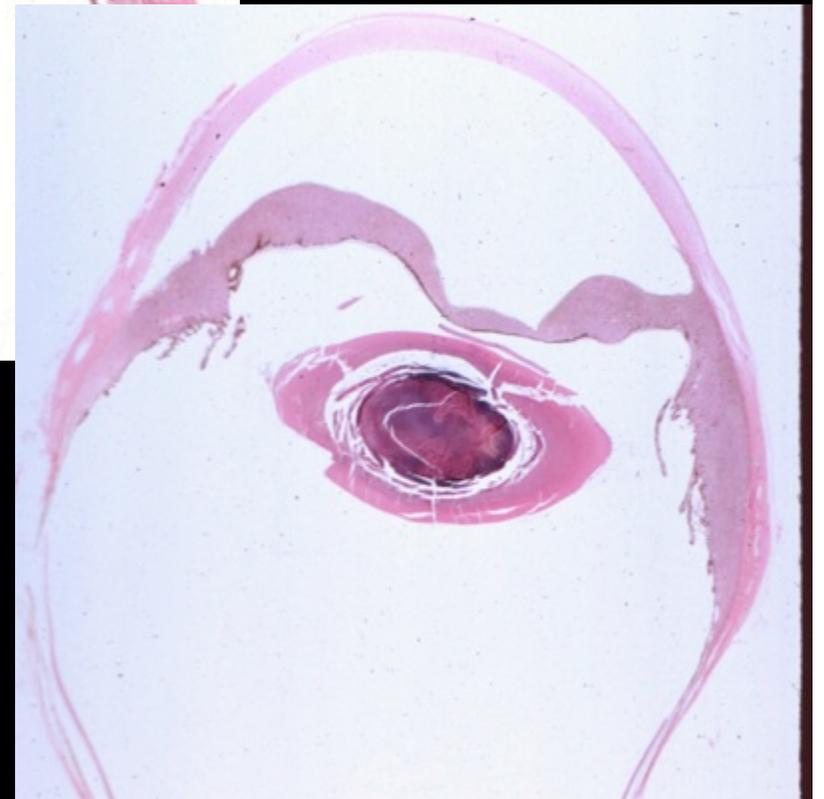
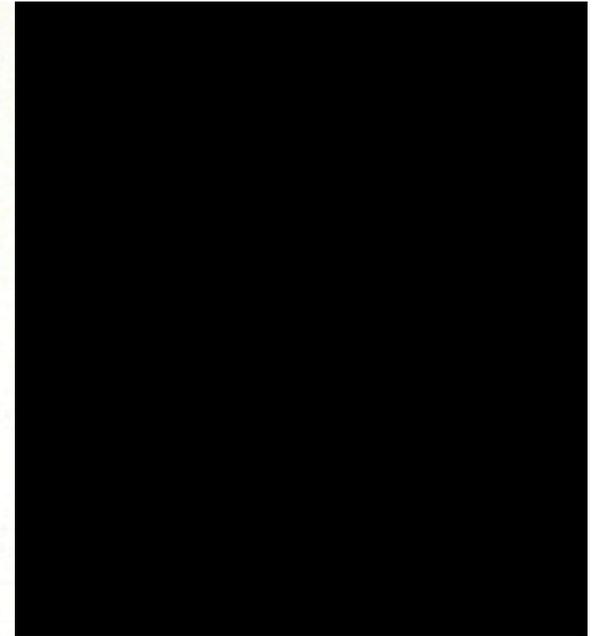
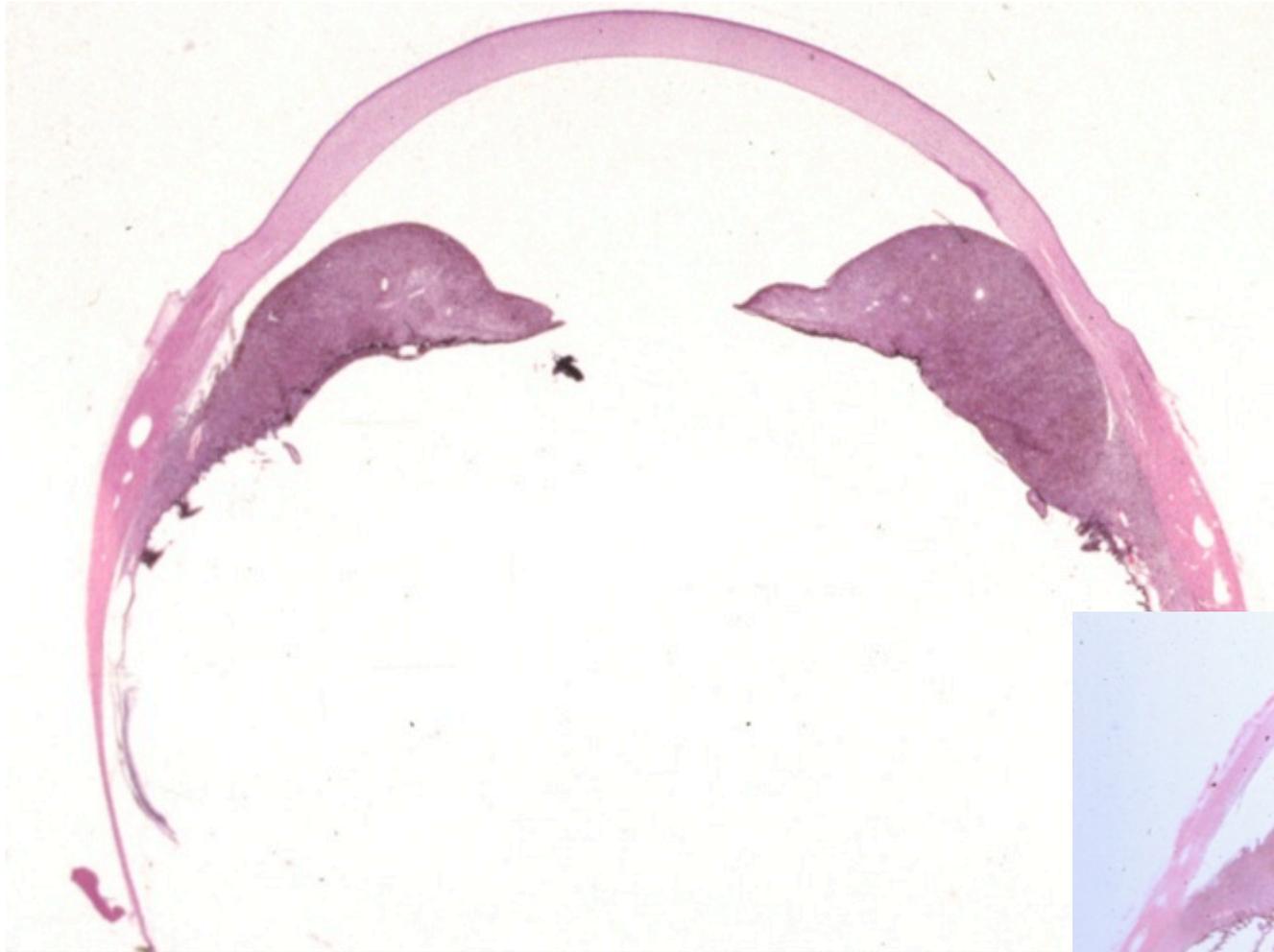
Typical Clinical Appearance of Feline Diffuse Iris Melanoma



Photos by Chuck Stuhr

Asymmetrical Darkening of the Iris

This process can occur rapidly
or it can take years

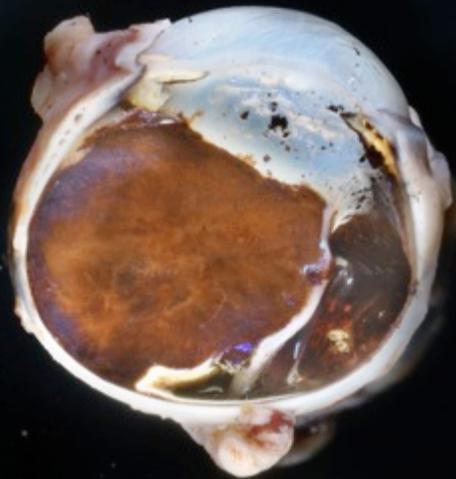


Typical Histopathologic Appearance of
Feline Diffuse Iris Melanoma

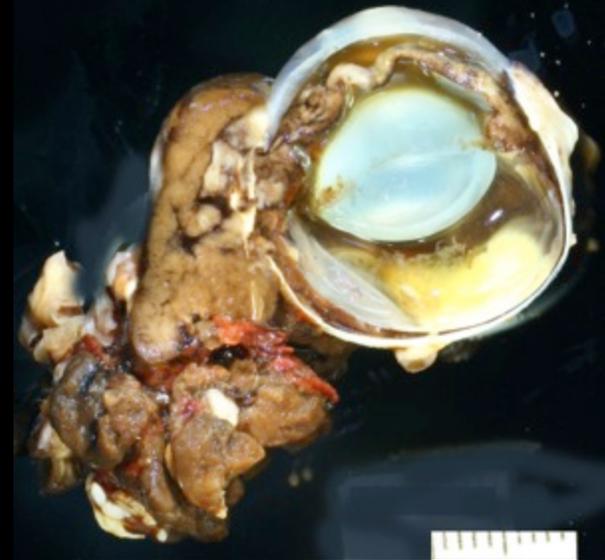
Gross Appearance of Feline Diffuse Iris Melanoma



Typical



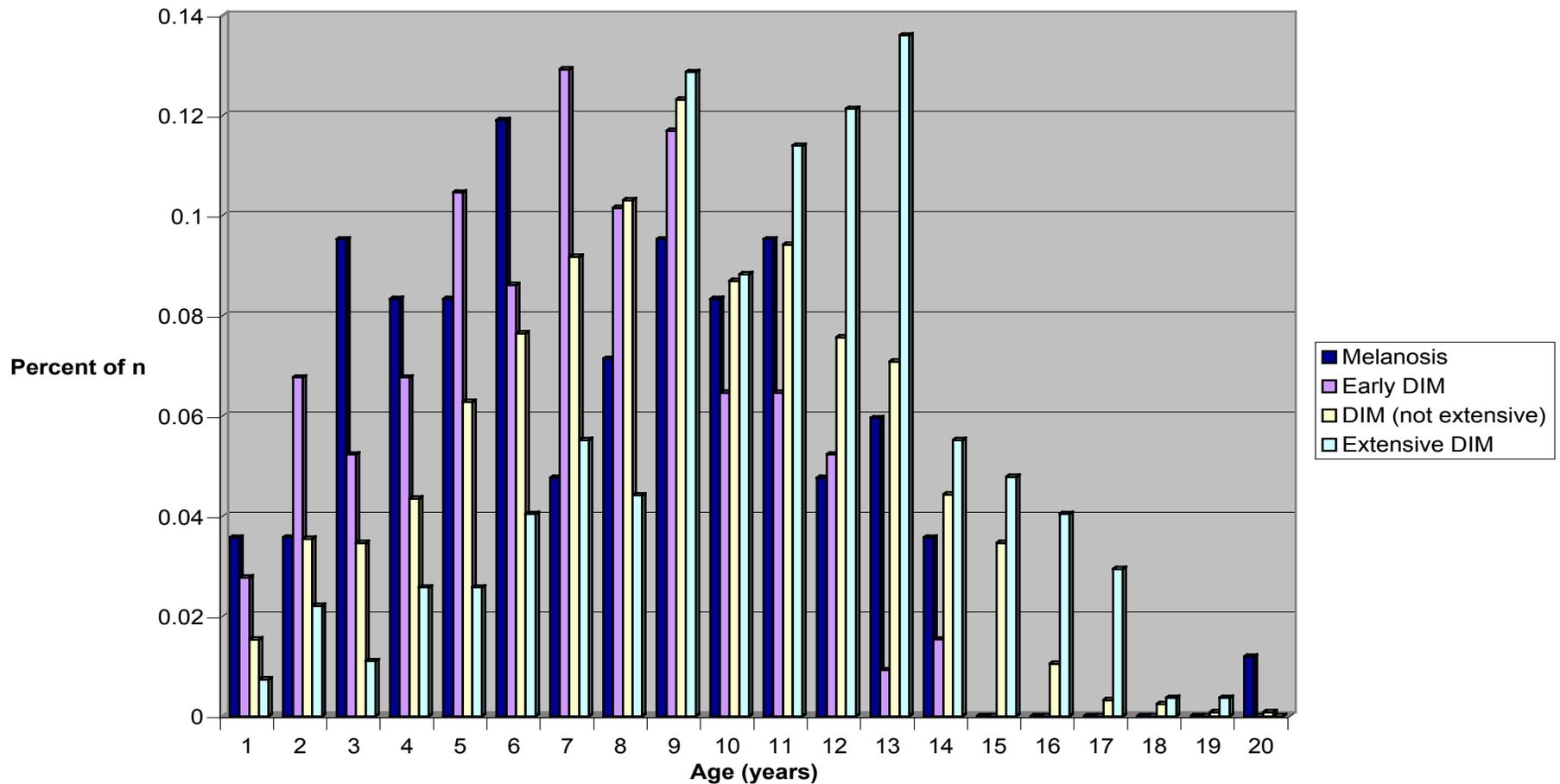
Atypical



Typical Extensive

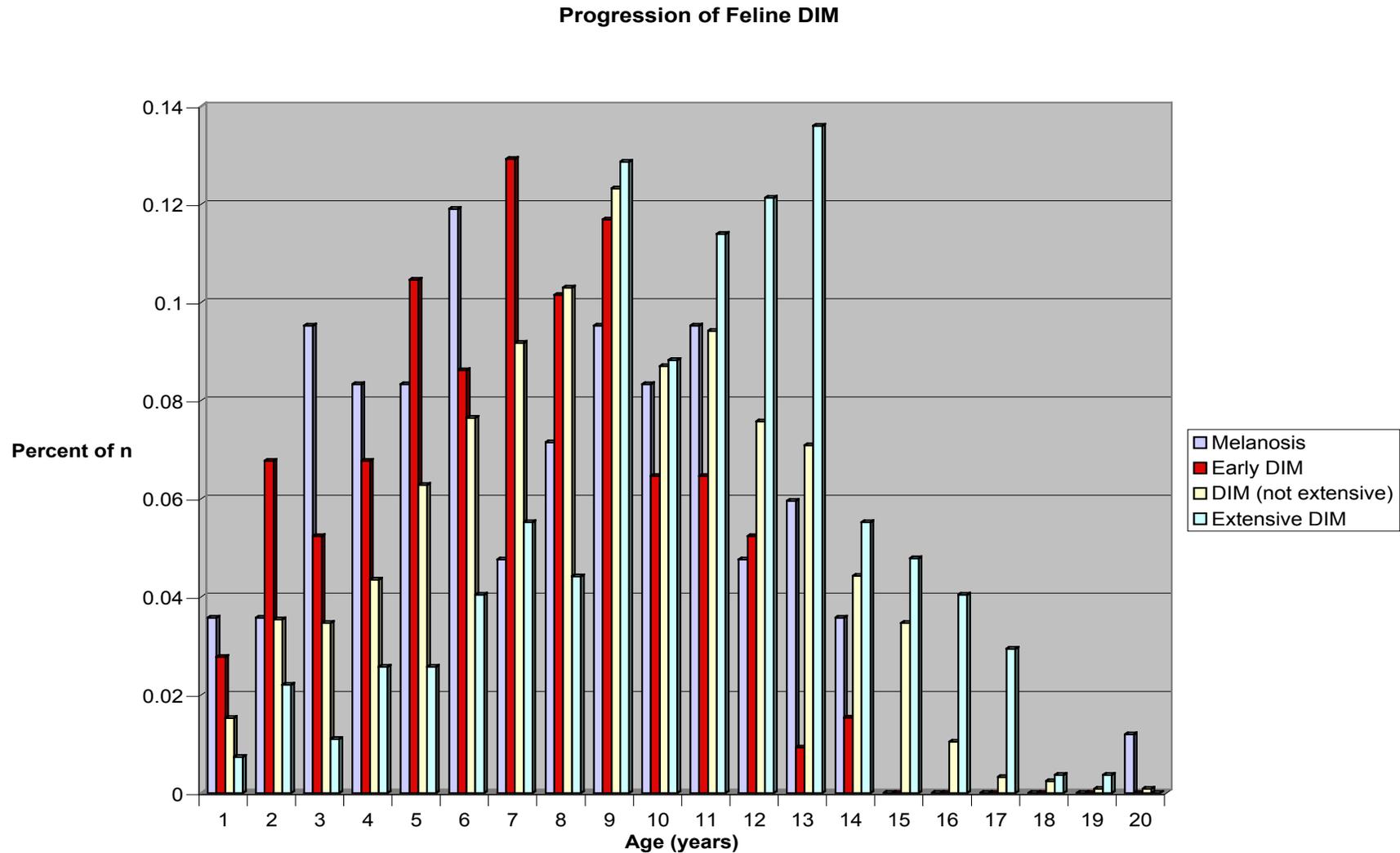
Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma

Progression of Feline DIM



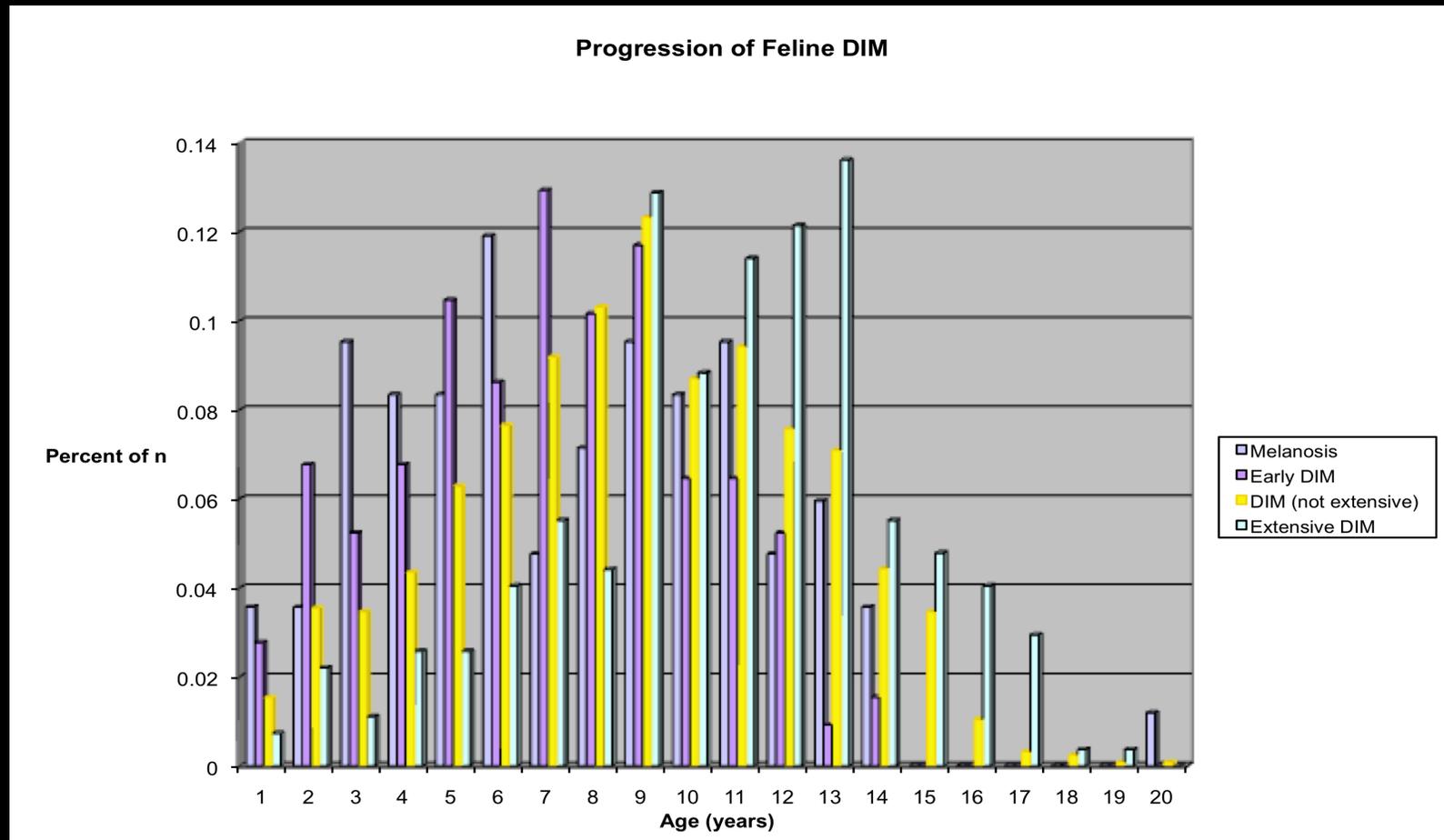
Melanosis n = 84

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



Early Melanoma n = 325

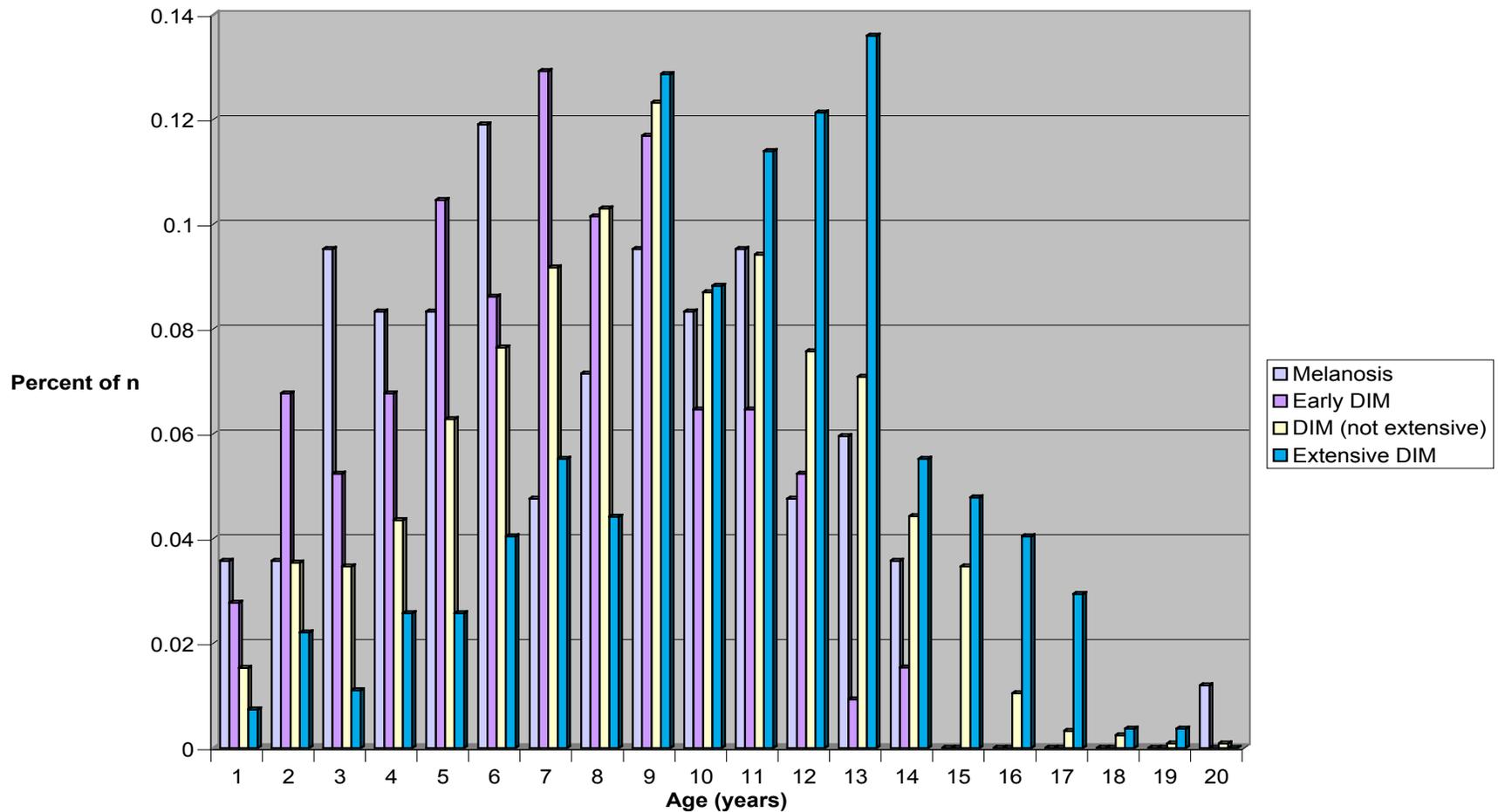
Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma



Melanoma (not extensive) $n = 1242$

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

Progression of Feline DIM



Extensive Melanoma n = 272

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

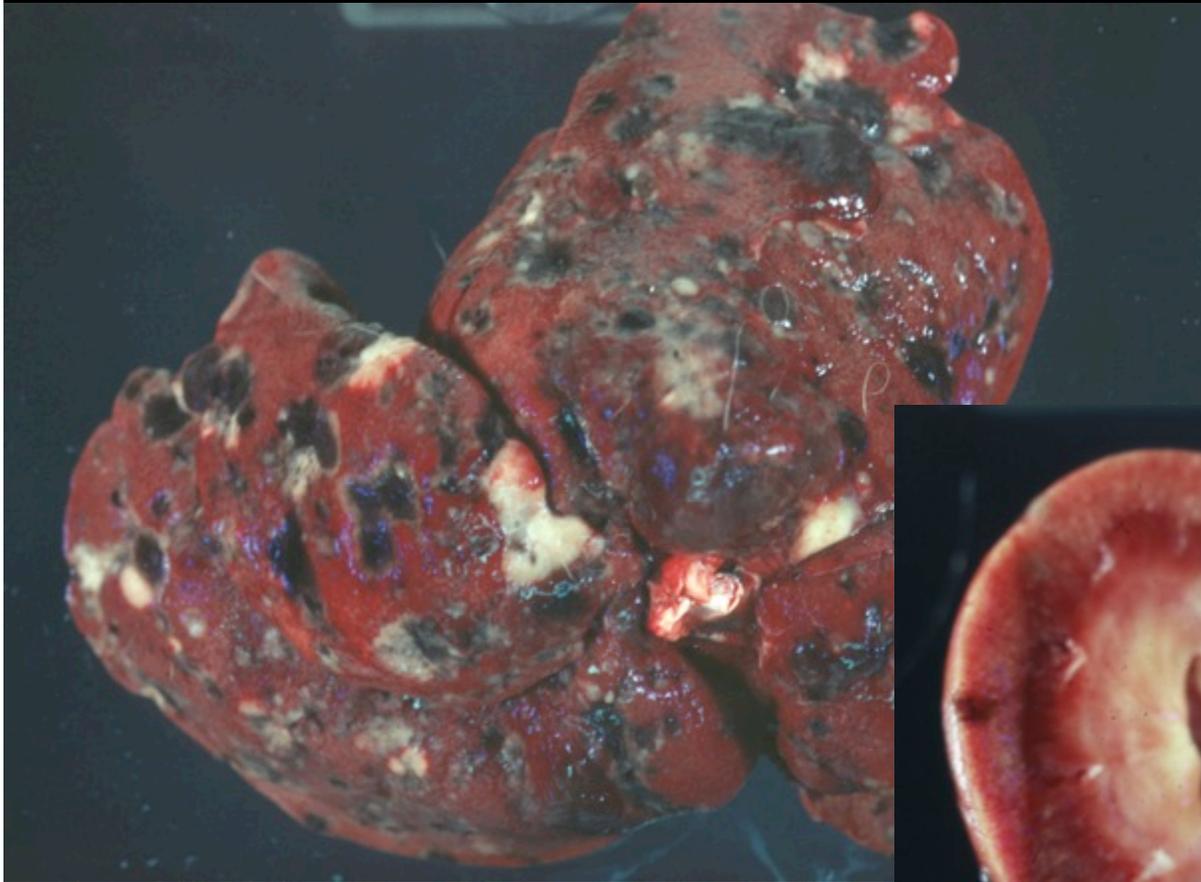
On average, there is about a 4 year difference in age between cats who have had the eye removed in the earliest stage of disease and the latest stage.

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.

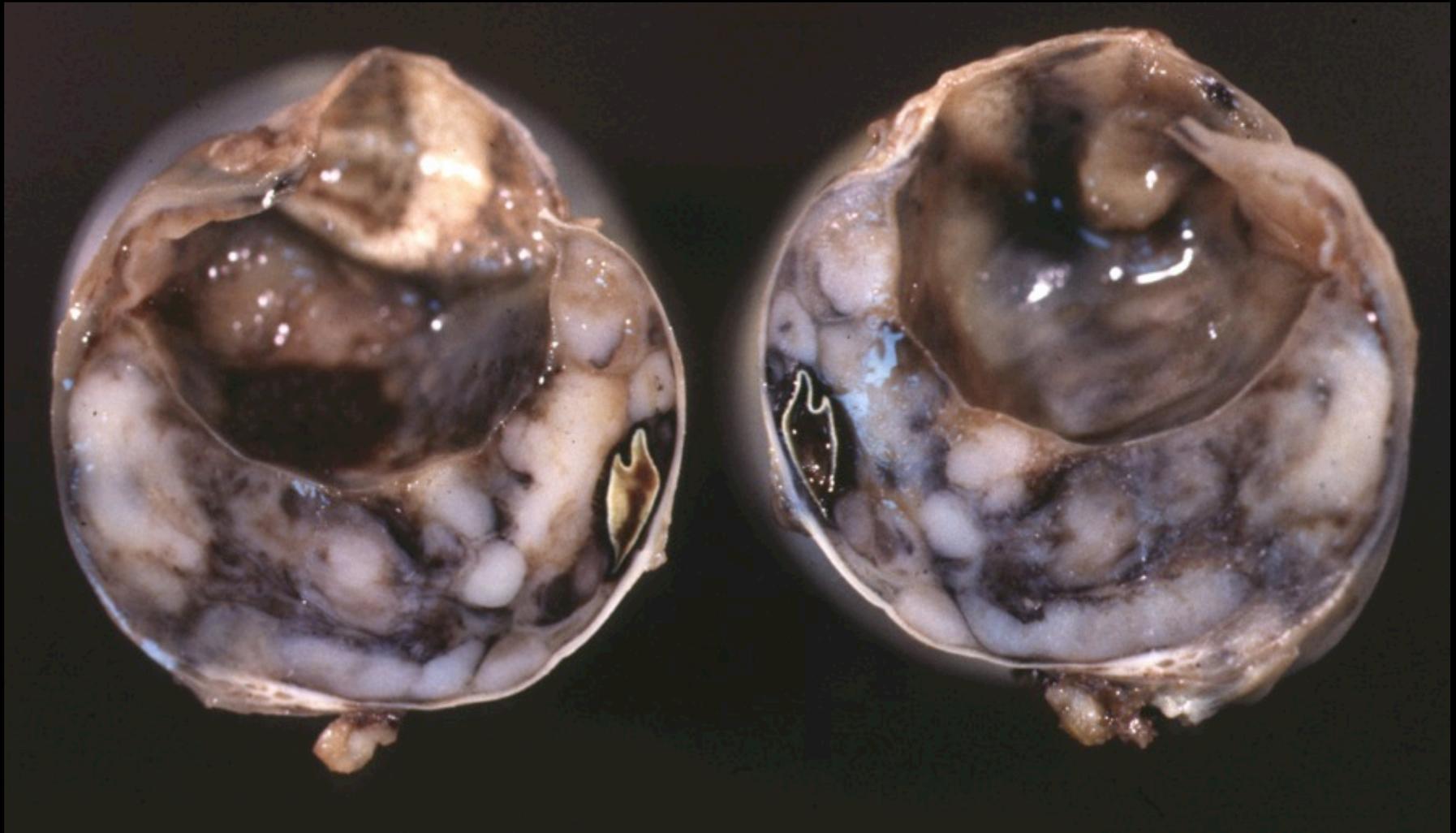
Metastatic Potential of Feline Diffuse Iris Melanoma



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



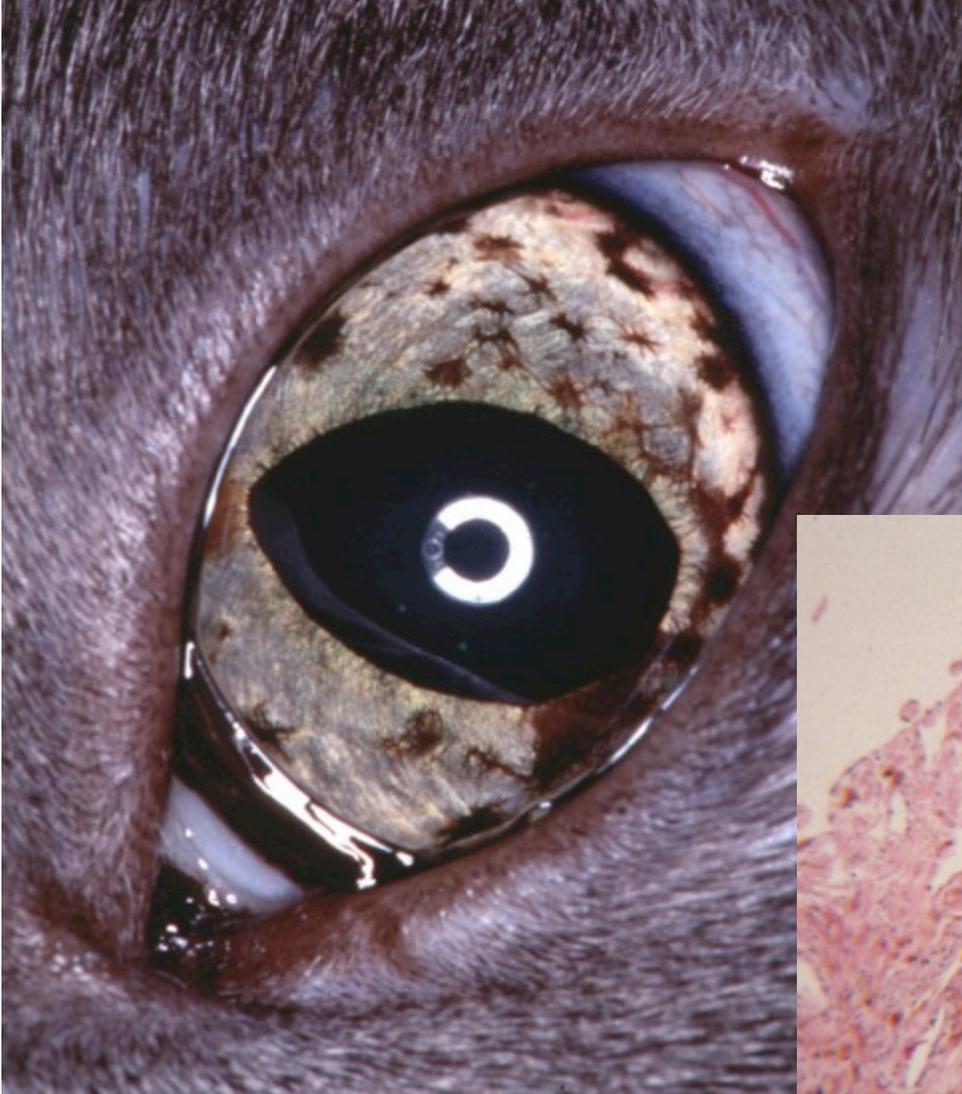
Evisceration Followed by Intrasccleral
Prosthesis is **Not Recommended**
in Cats with FDIM



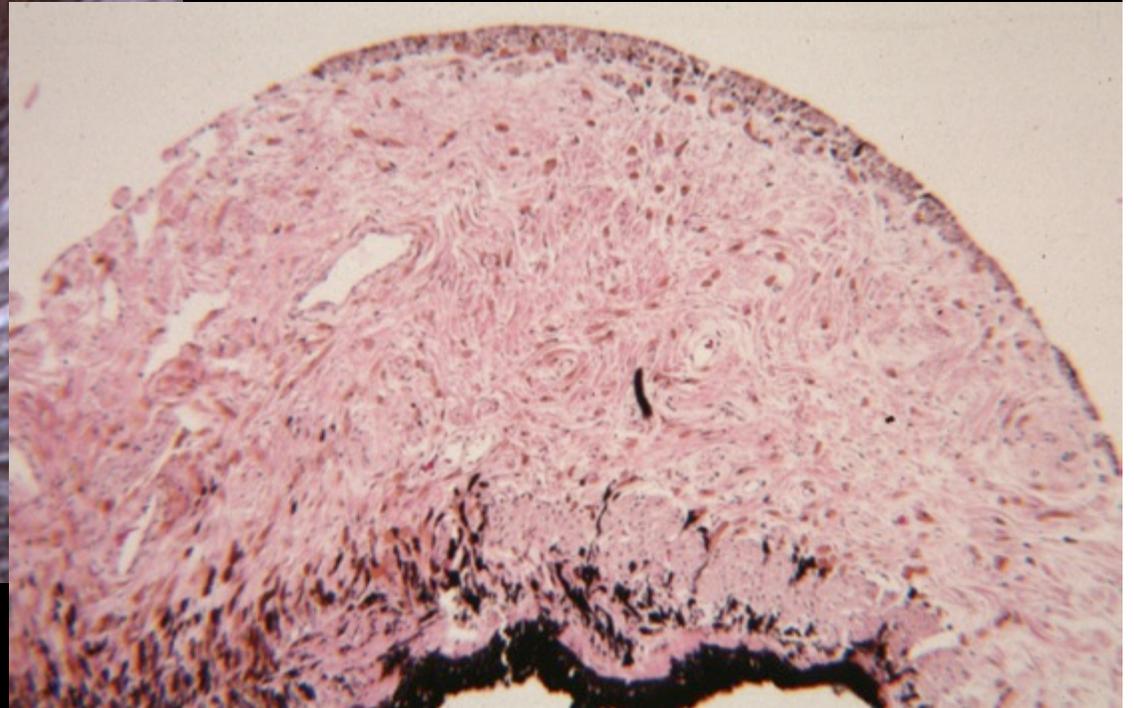
Early Stages of Feline Diffuse Iris Melanoma:

- Melanosis
- Early Melanoma

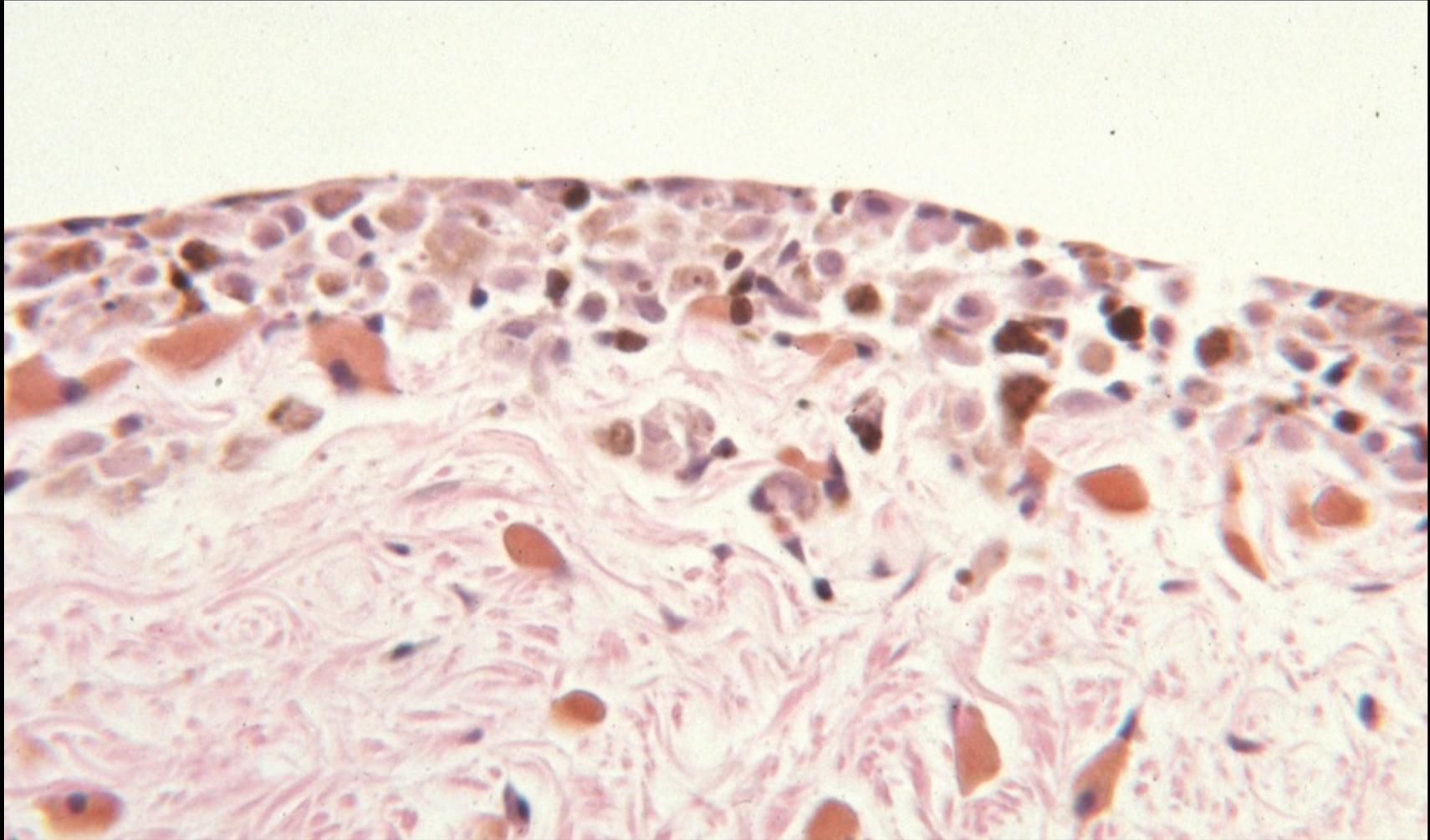
Melanosis



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

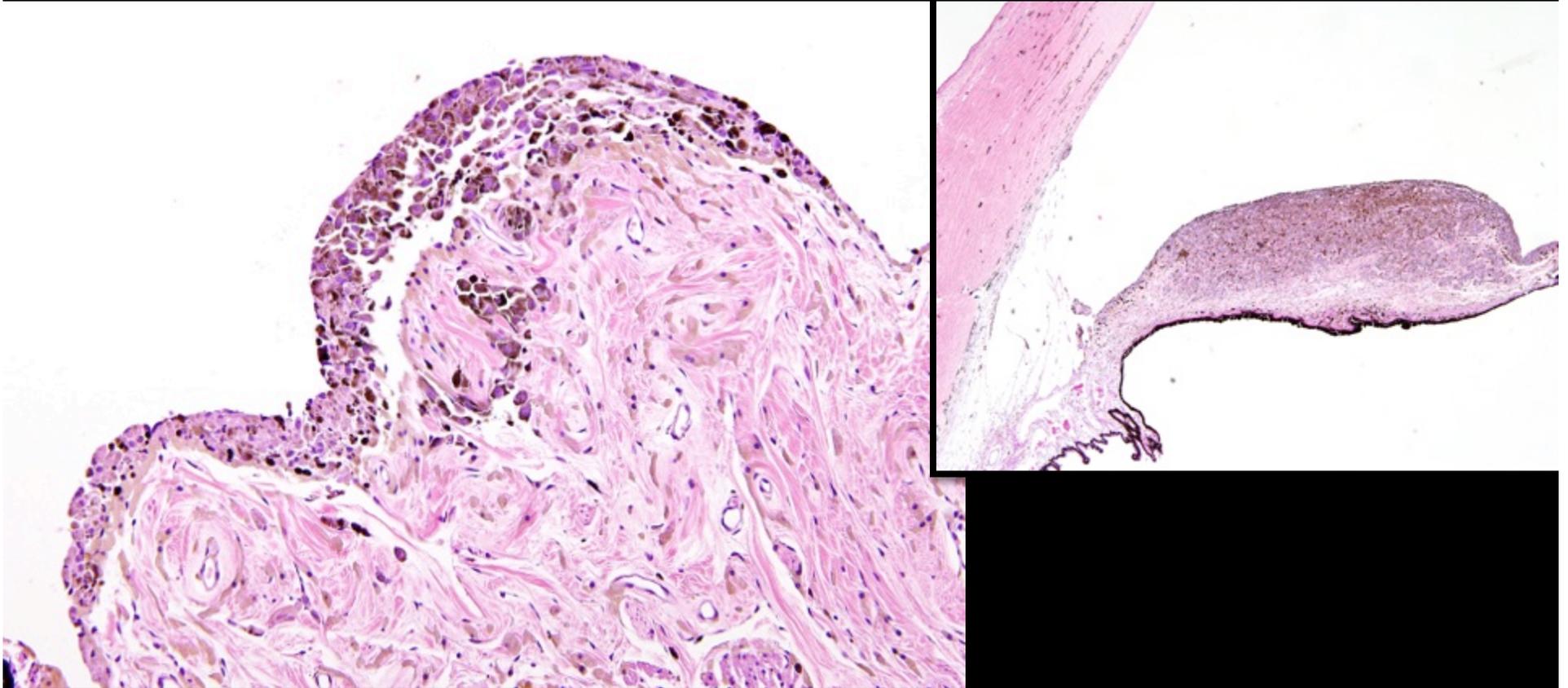


Melanosis



Early FDIM

Tumor confined to the iris



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

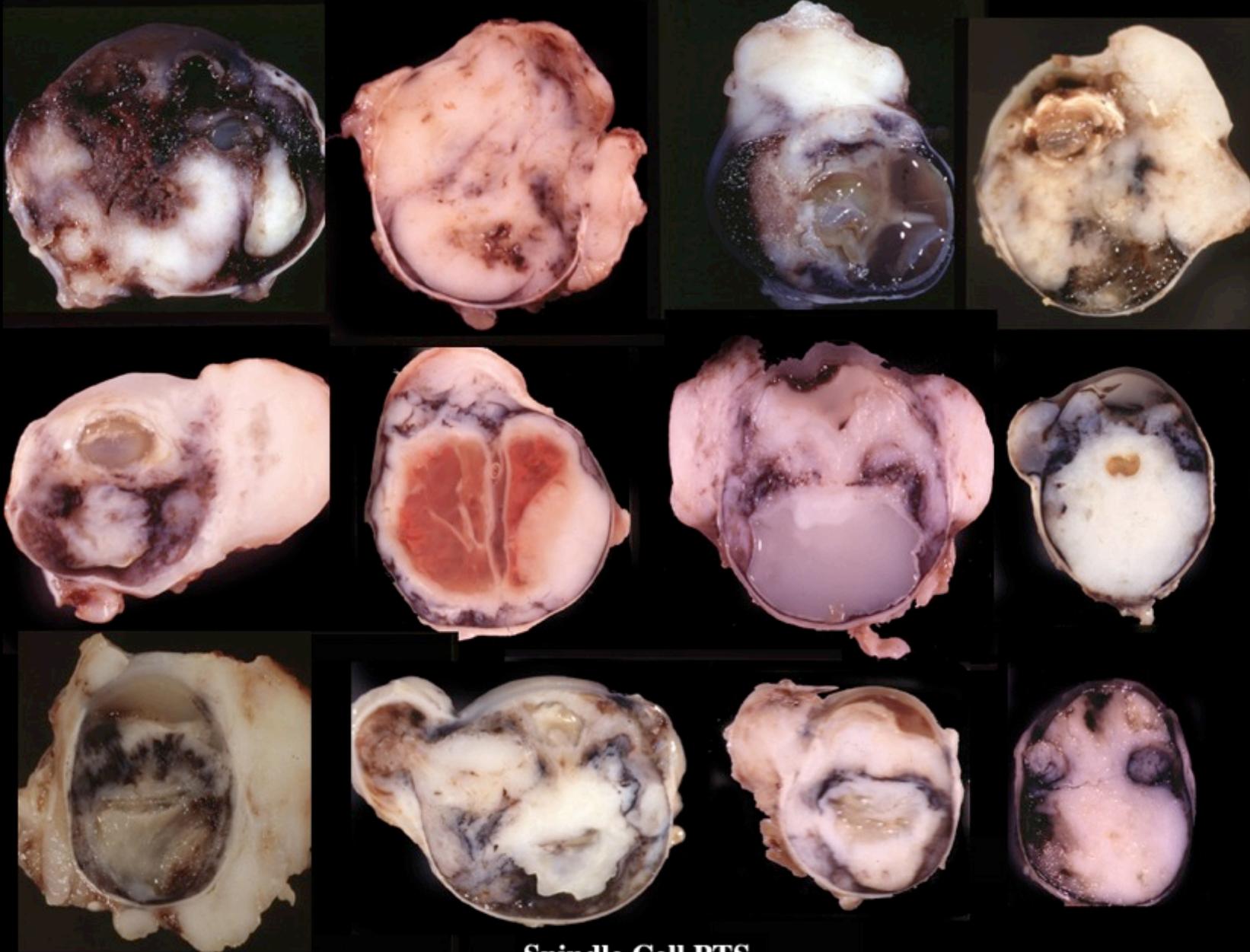
- **Spindle cell variant, 67%**
 - 241 cases, 43 “early”
 - Lens epithelial origin
- **Round cell variant, 21%**
 - 91 cases, 9 “early”
 - Variant of B-cell lymphoma
- **Osteosarcoma/Chondrosarcoma, 10%**
 - 45 OSA cases, 2 “early”
 - 8 Chondrosarcoma cases
 - Unknown cell of origin

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

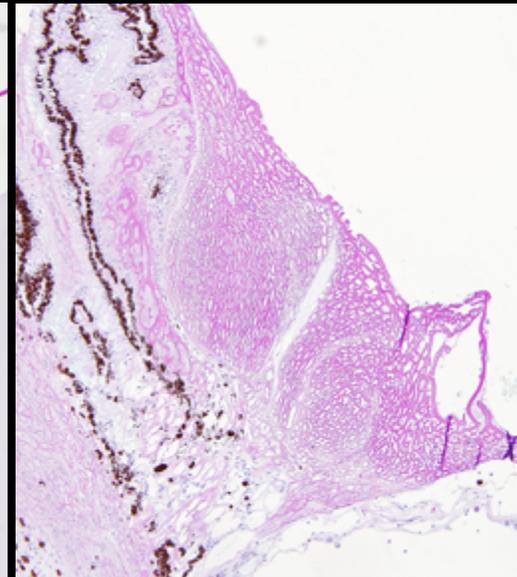
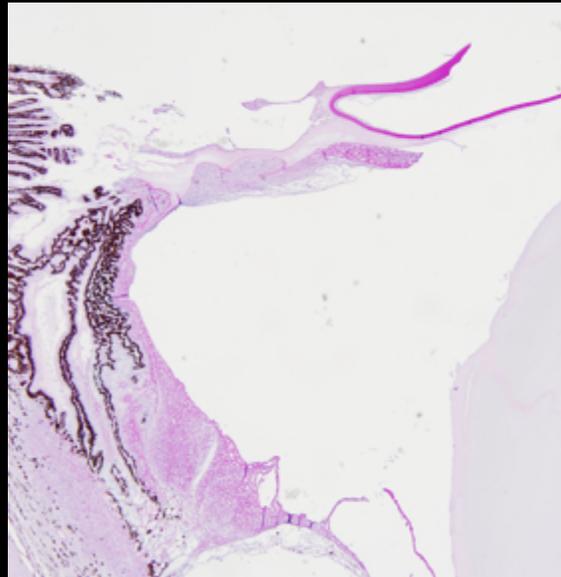
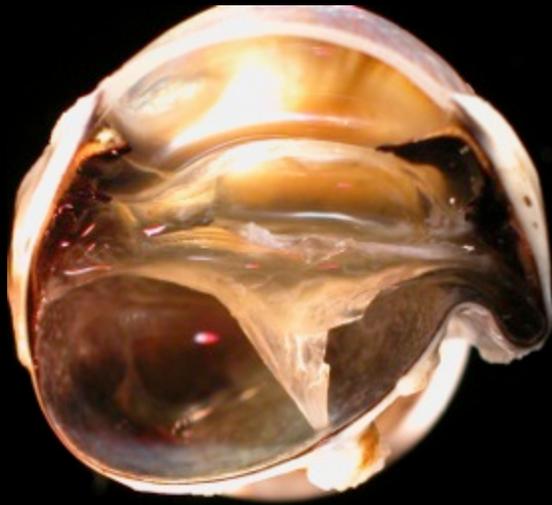
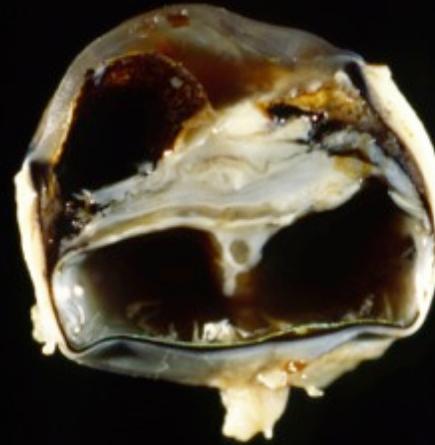
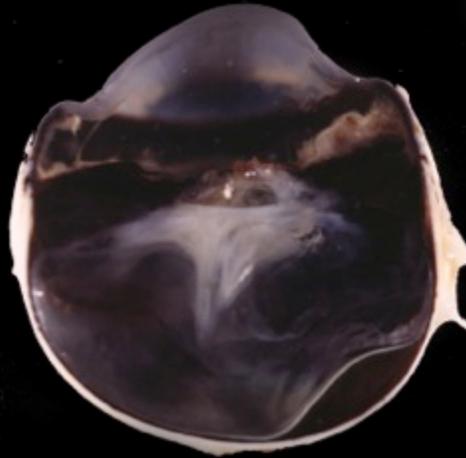
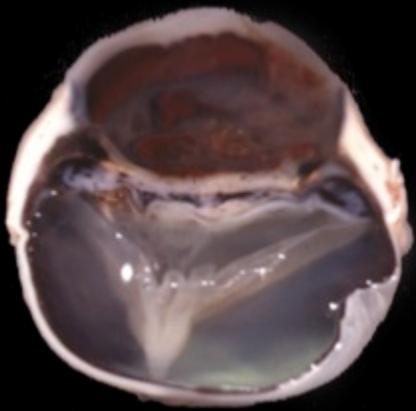
Reasons to believe FOPTS is related to trauma

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

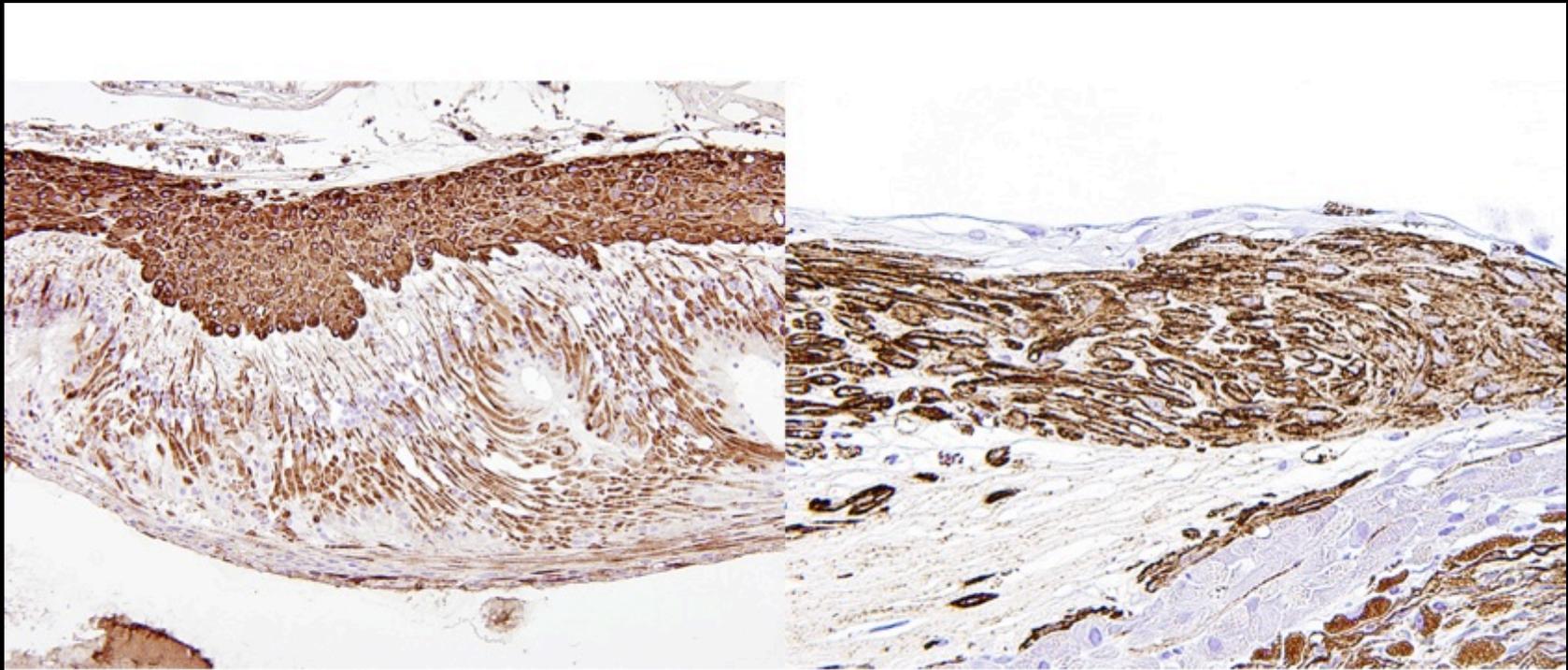


Spindle Cell PTS

Early Spindle Cell Variant FOPTS



Early Spindle Cell Variant FOPTS

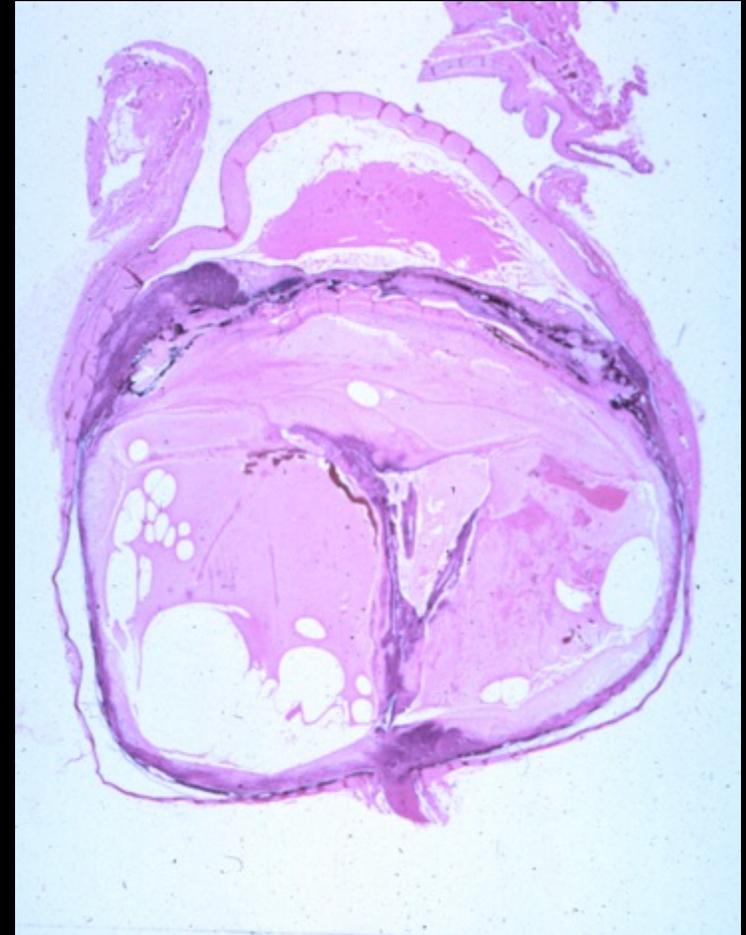


Cytokeratin

Smooth Muscle Actin

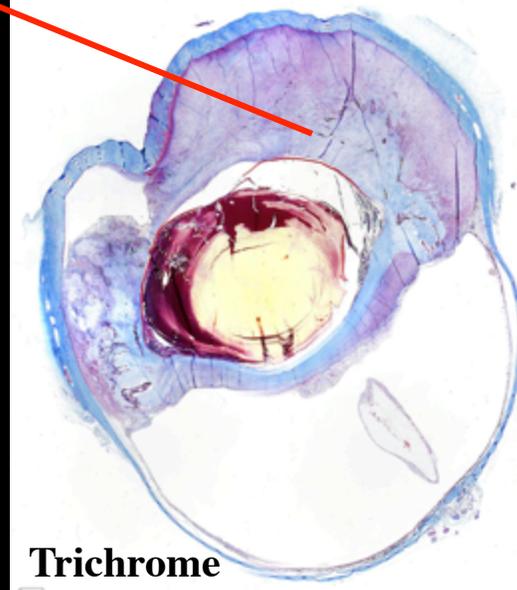
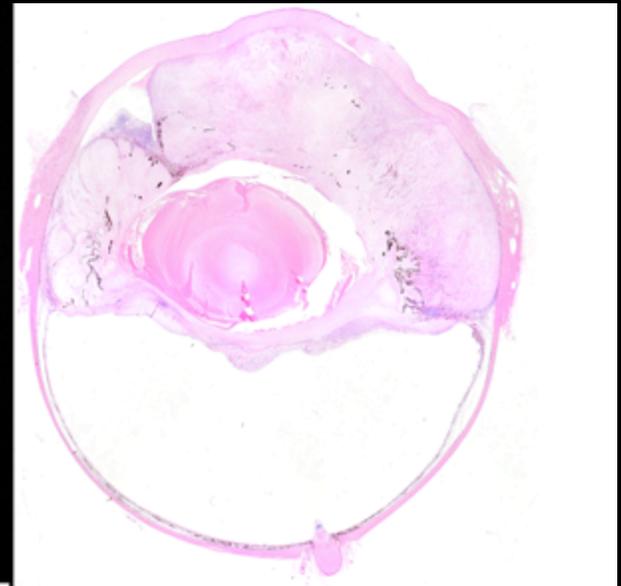
Early tumors are more likely to be cytokeratin + and SMS + and to be totally avascular

Tumor Distribution in the Spindle Cell Variant

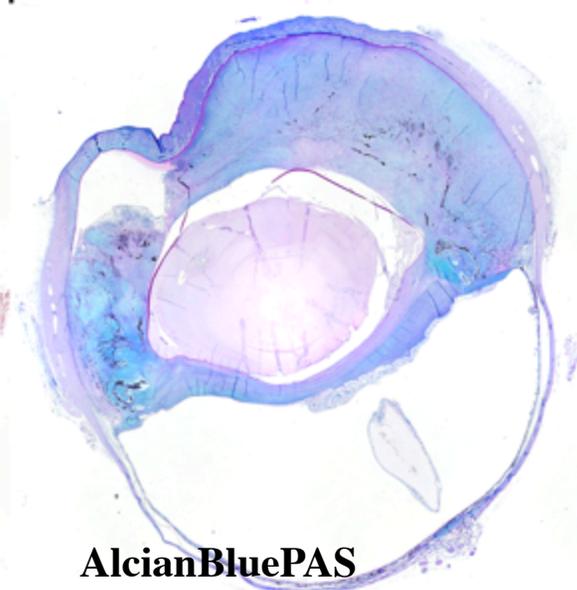


Tumor Distribution in the Spindle Cell Variant

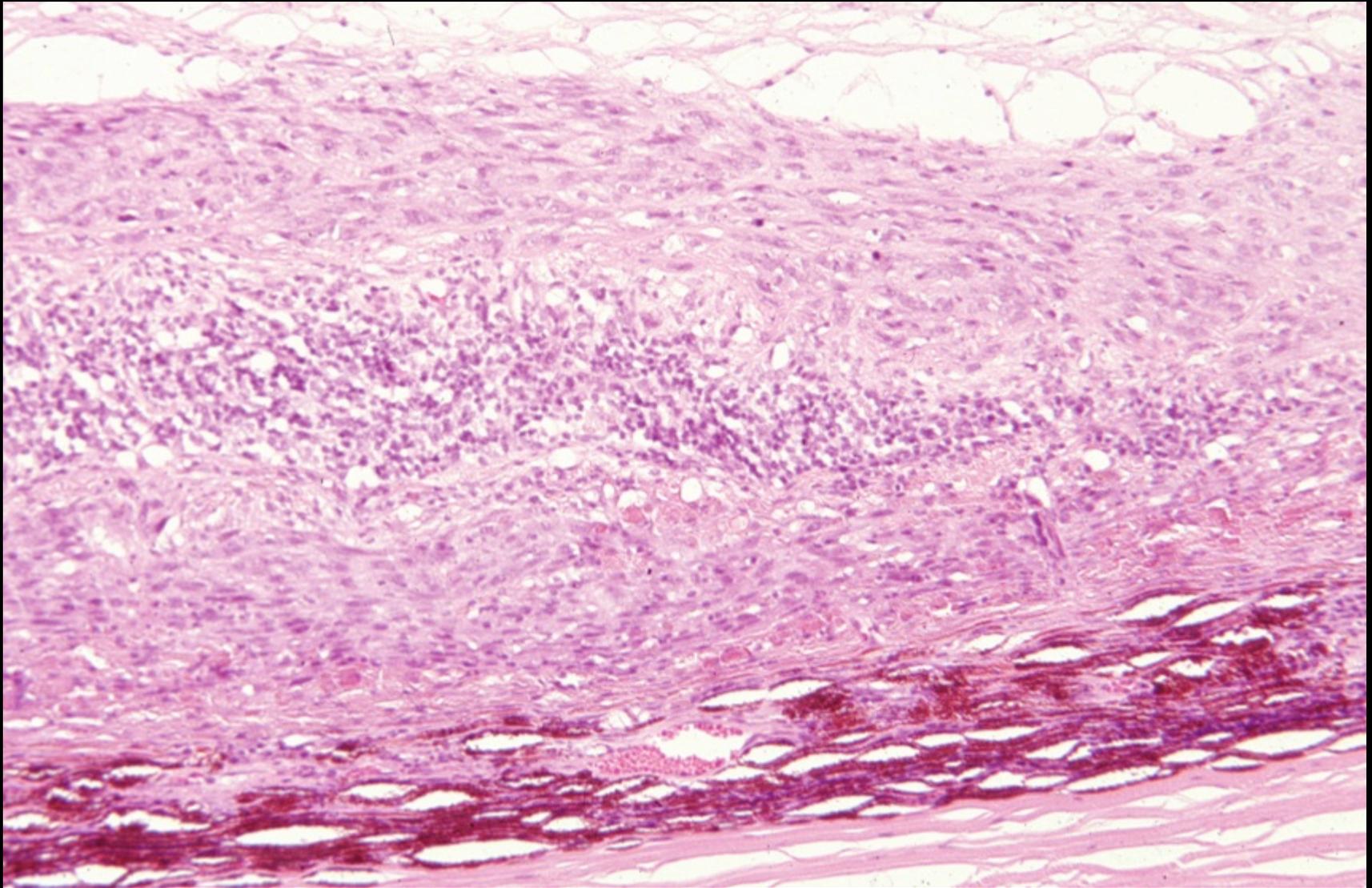
Adjacent to the wrinkled lens capsule the tumor is often acellular and collagen rich



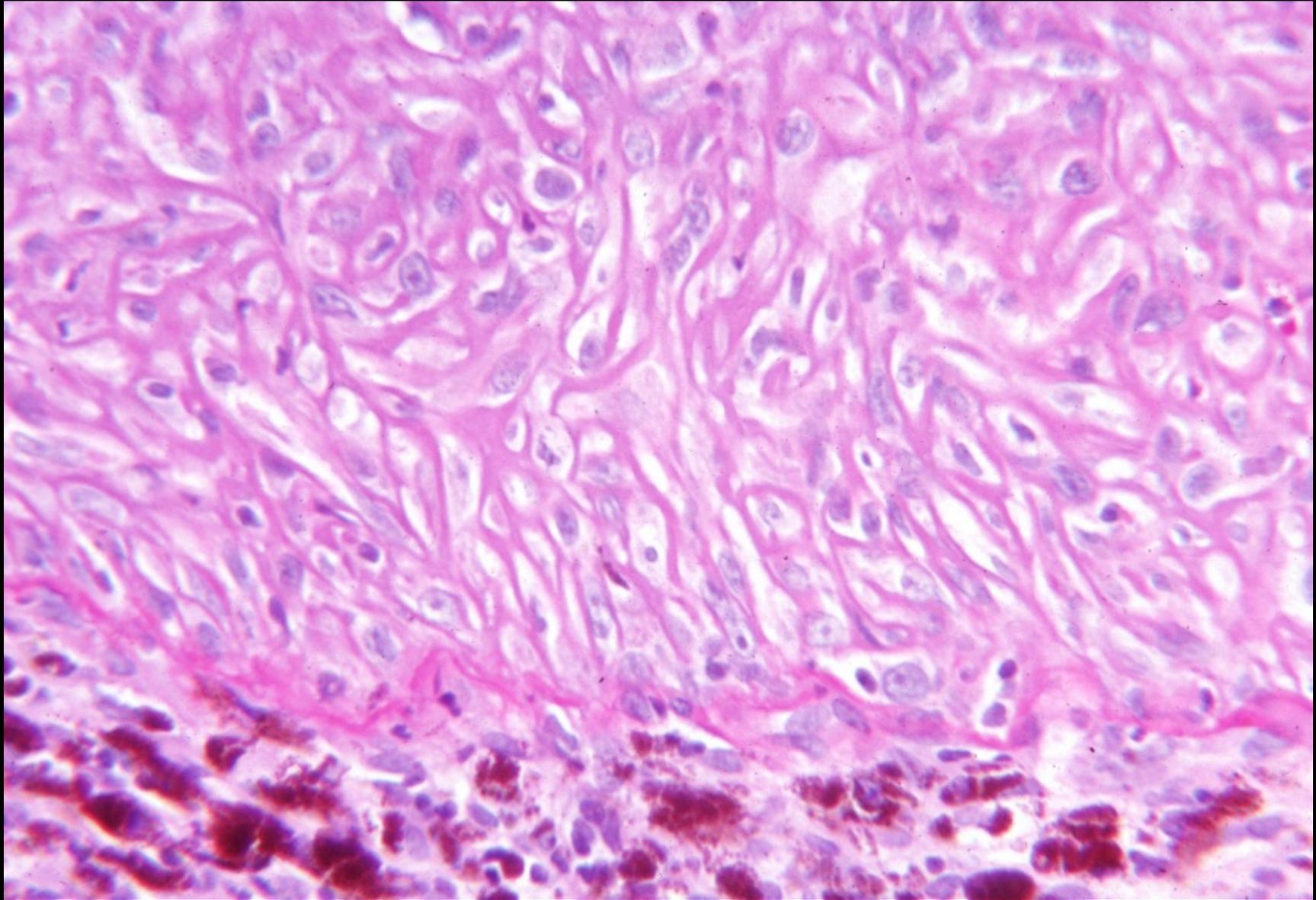
Trichrome



AlcianBluePAS

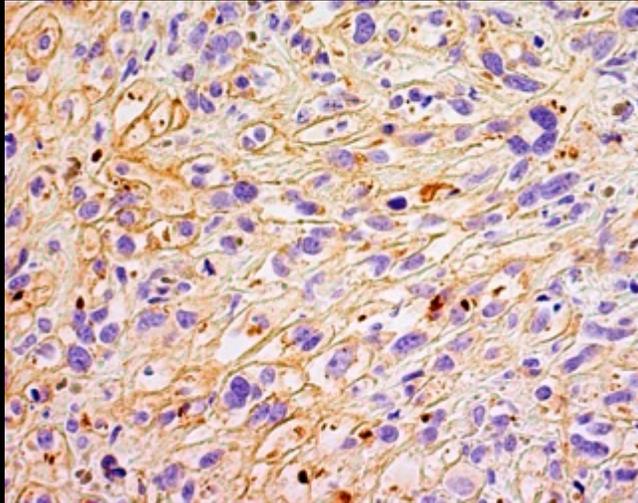


Feline Ocular Post-traumatic Sarcoma,
Spindle Cell Variant

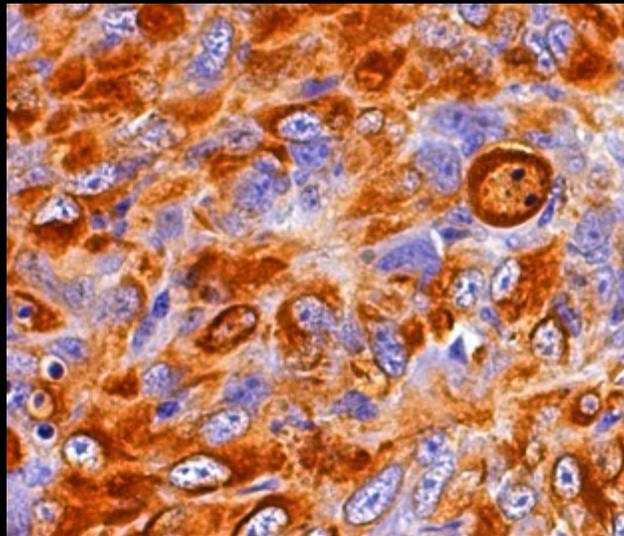
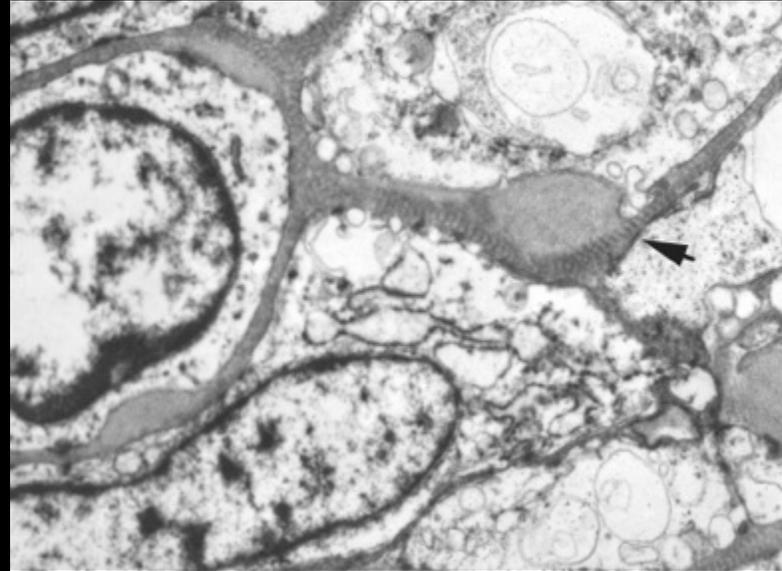


Feline Ocular Post-traumatic Sarcoma,
Spindle Cell Variant

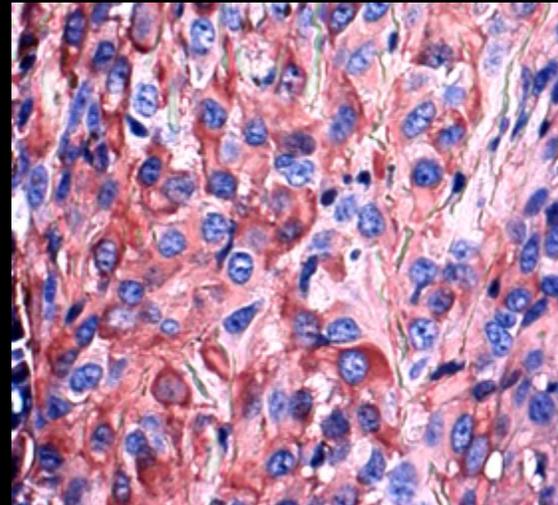
Cellular Features of Spindle Cell FOPTS



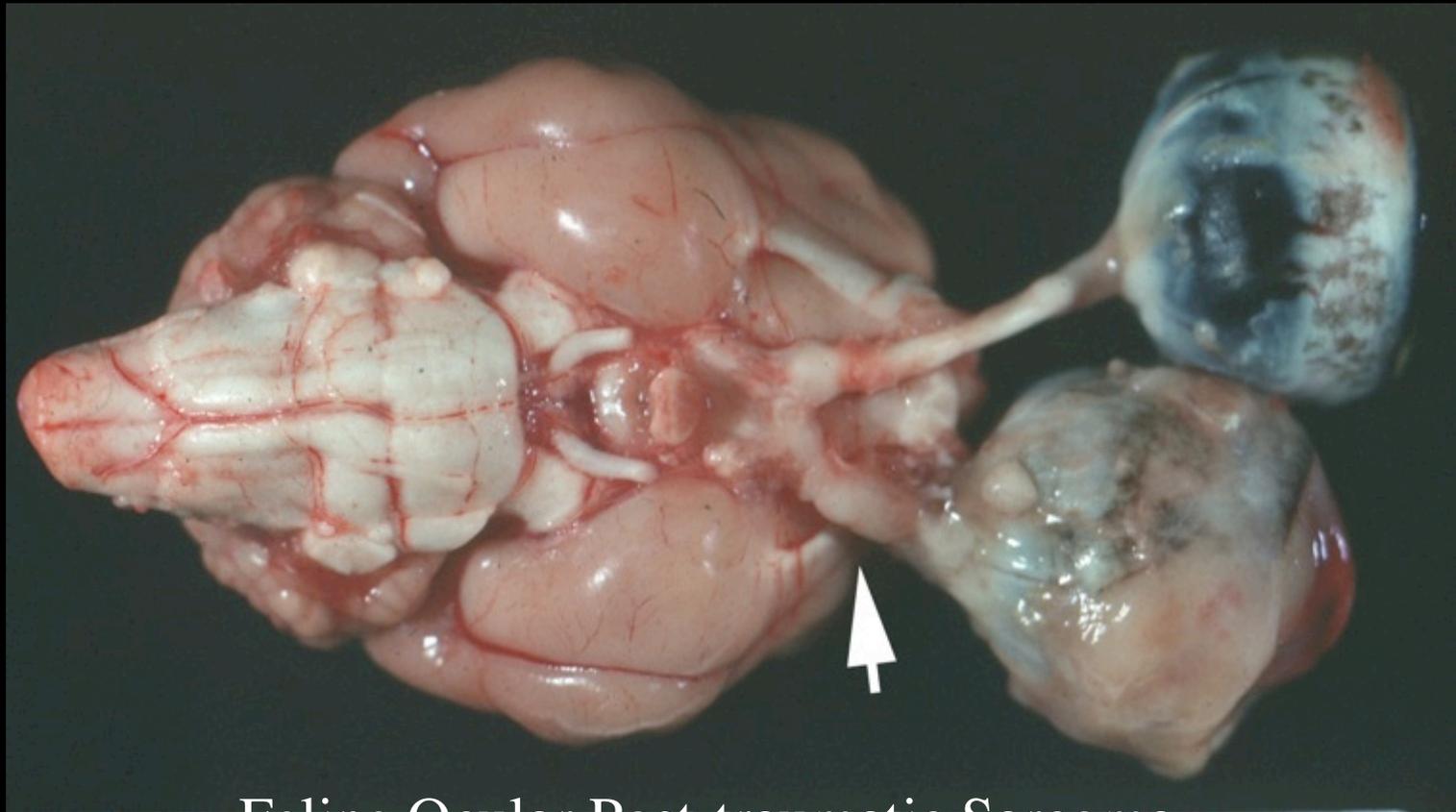
Collagen 4



Vimentin



α A Crystallin

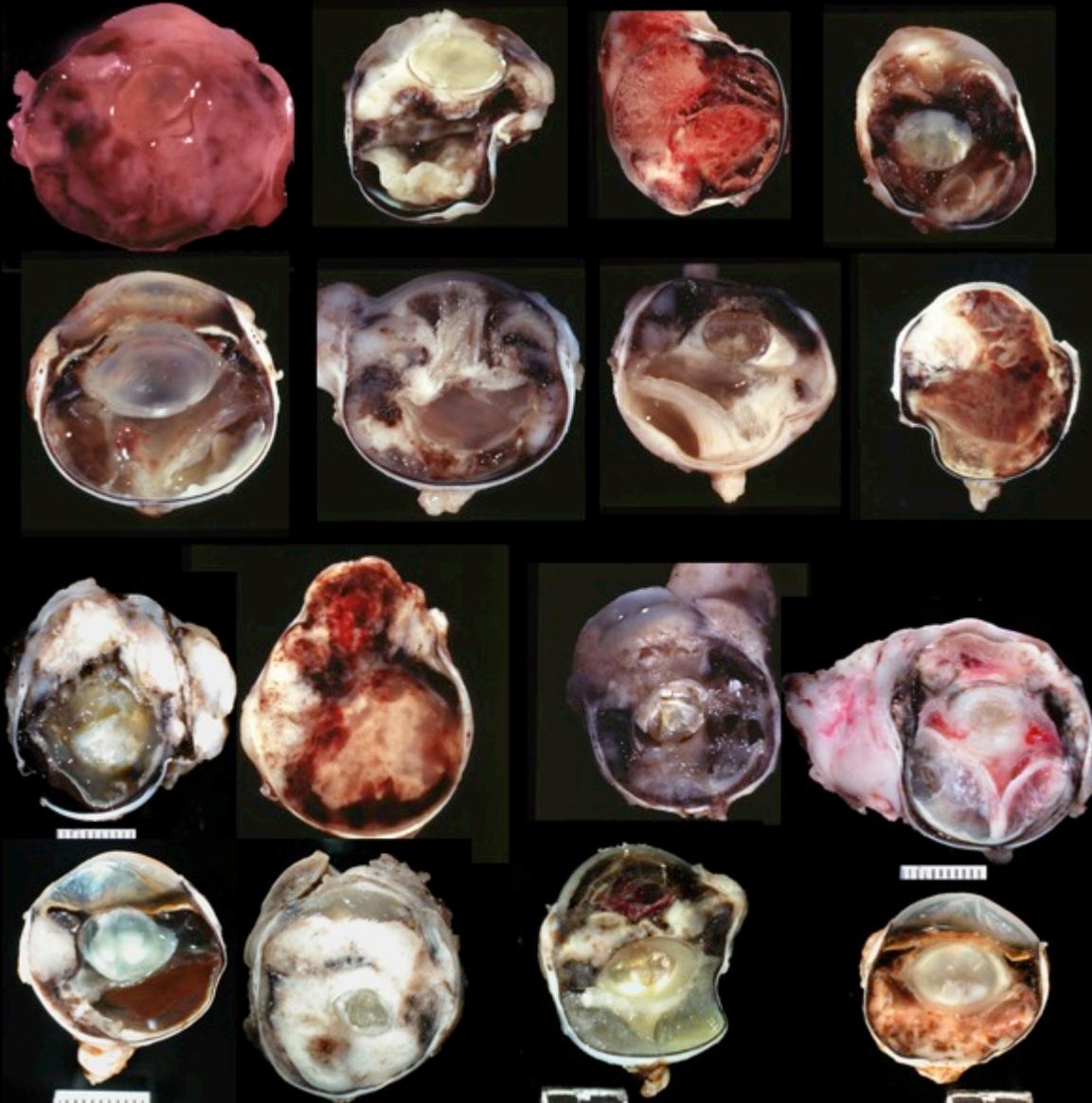


Feline Ocular Post-traumatic Sarcoma,
Spindle Cell Variant

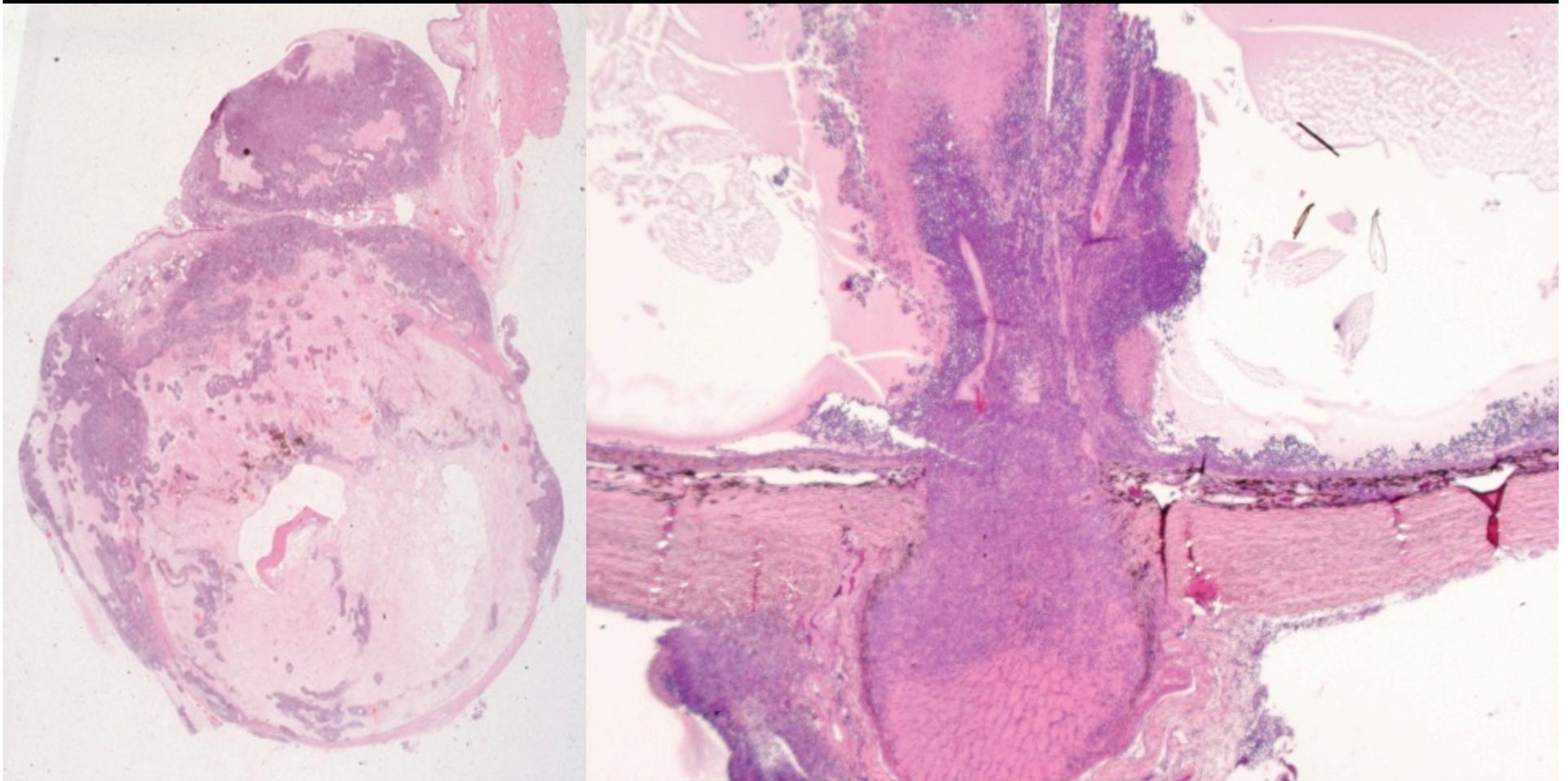
Follow-up Spindle Cell Variant

- 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

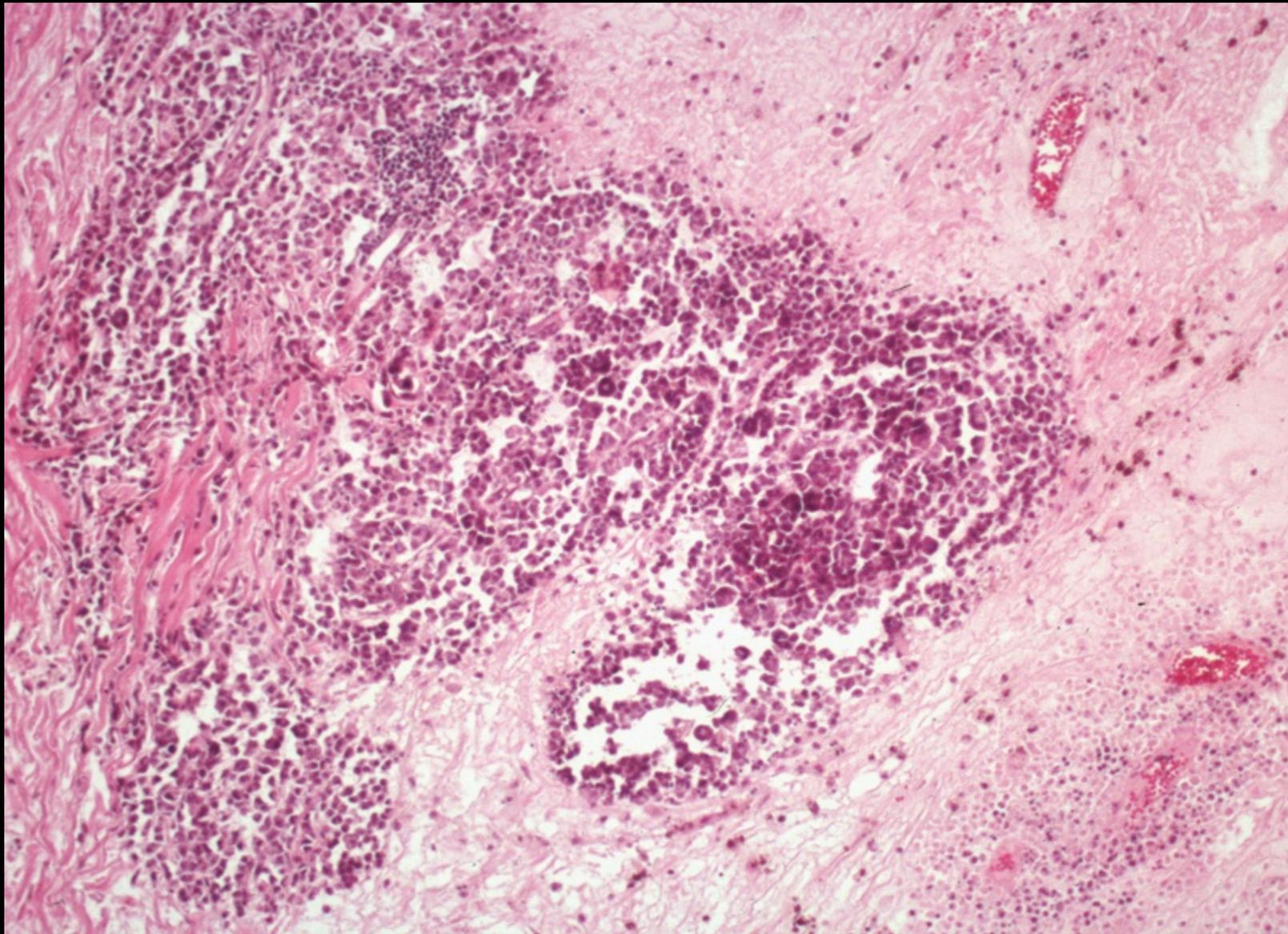
Round Cell Variant FOPTS



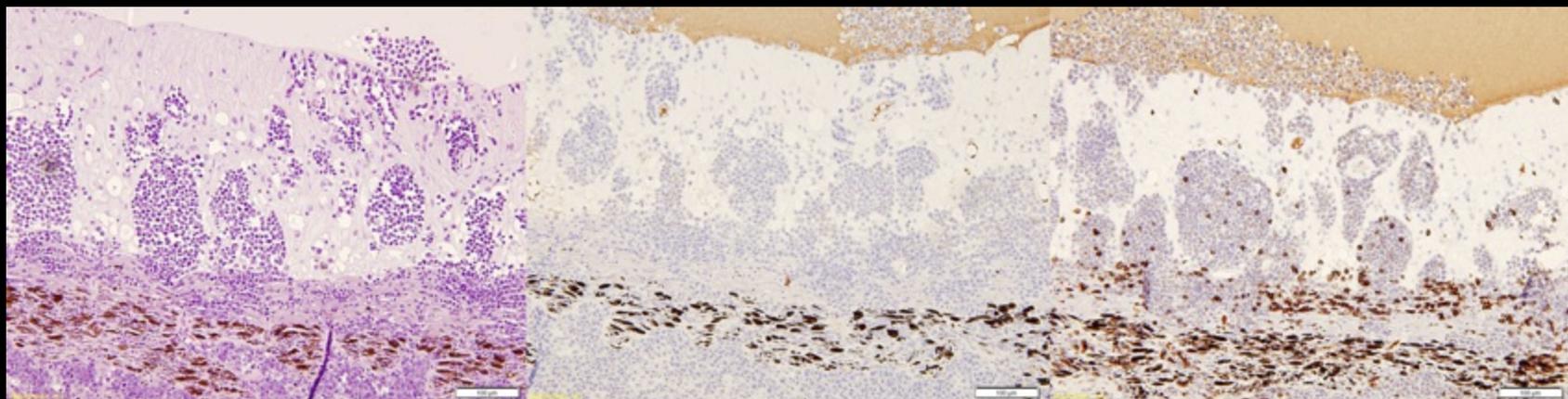
Round Cell Variant FOPTS



Round Cell Variant FOPTS



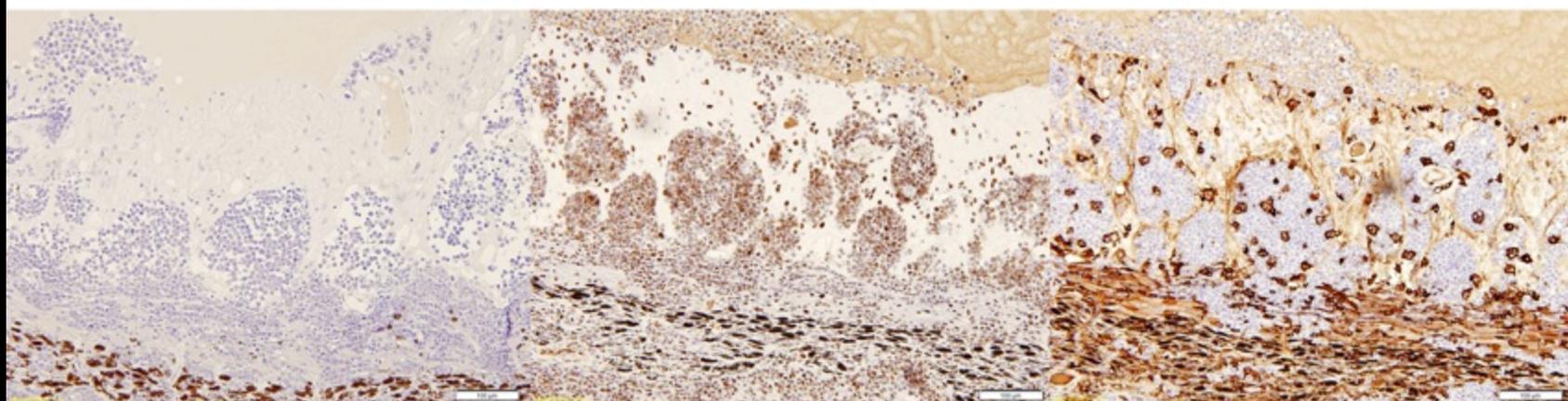
Round Cell Variant FOPTS



H&E

Negative Control

CD3



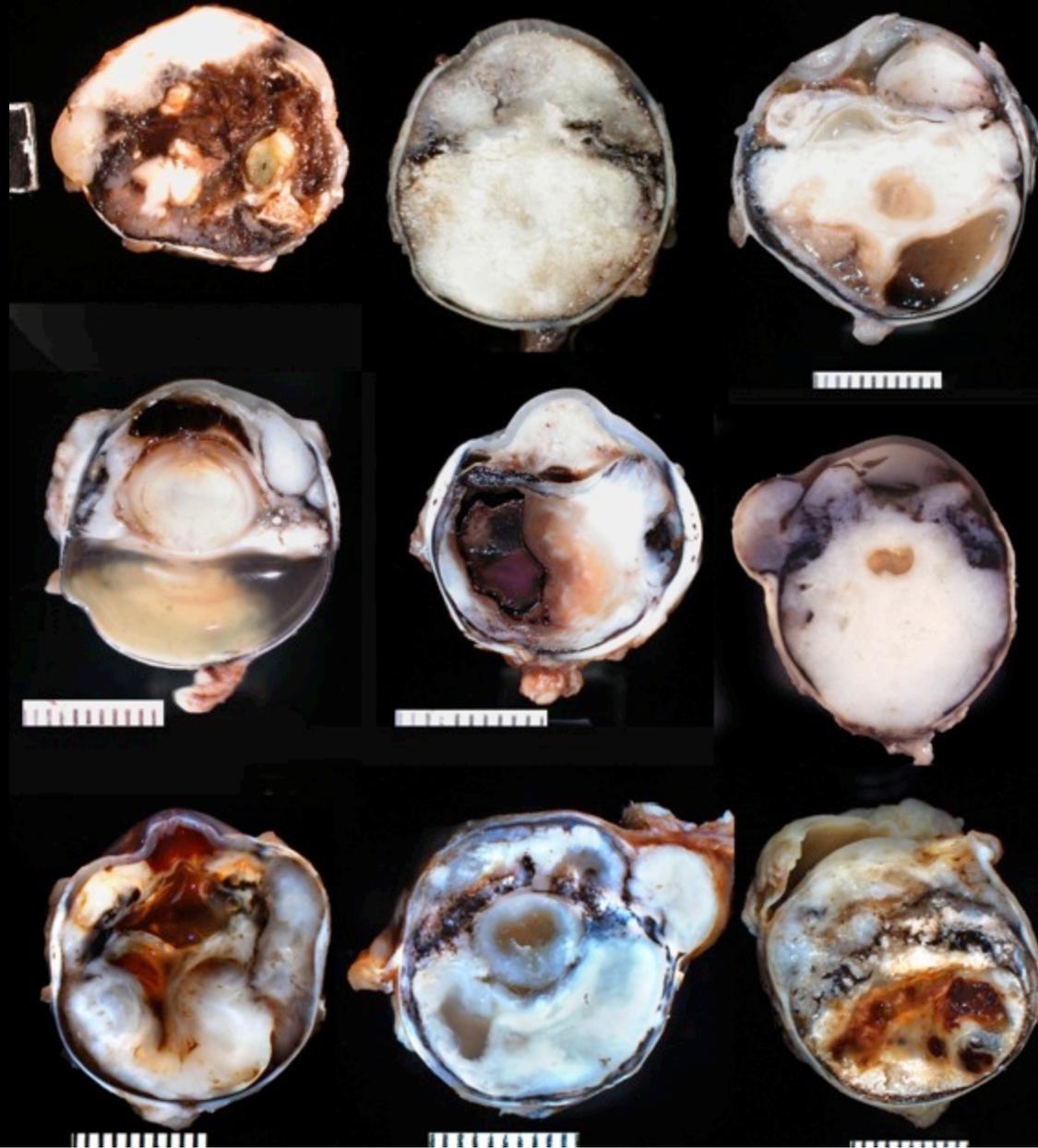
CD20

CD79a

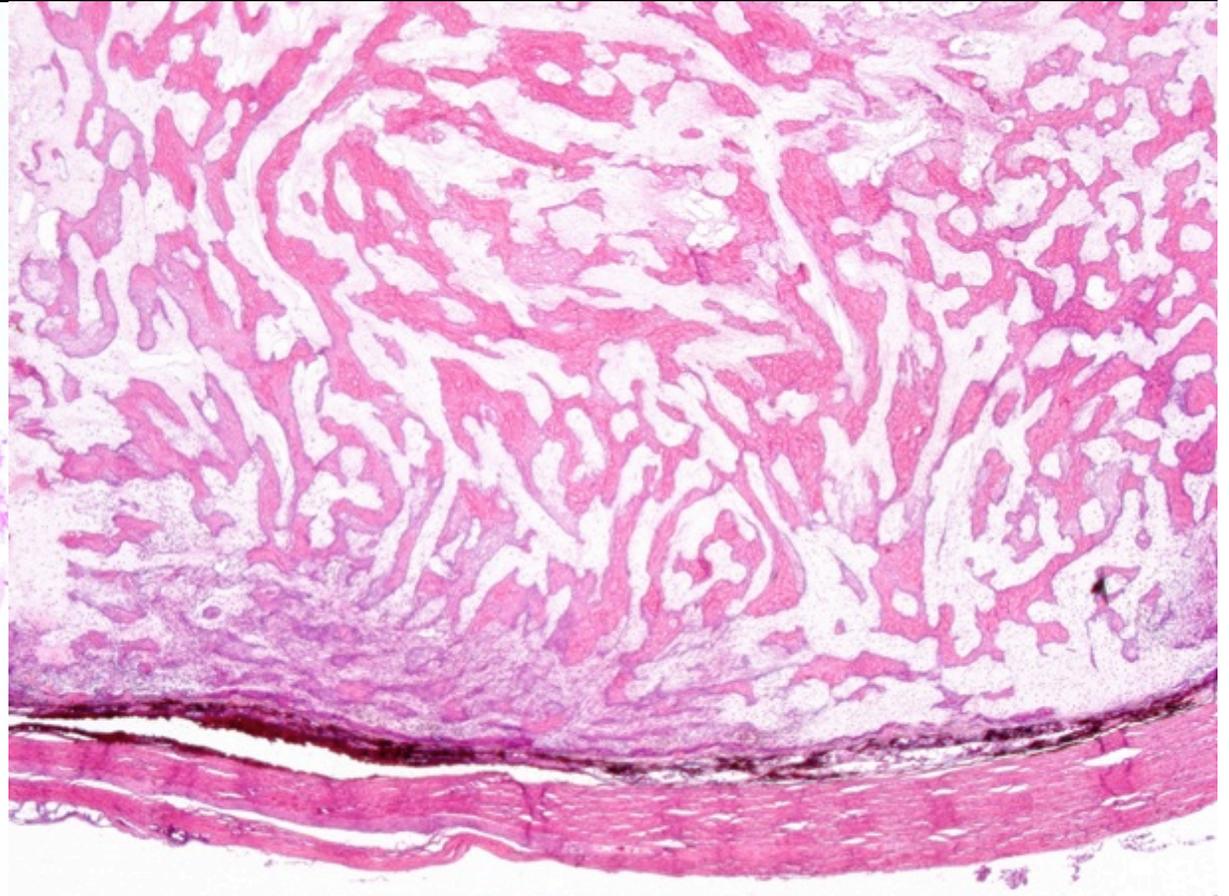
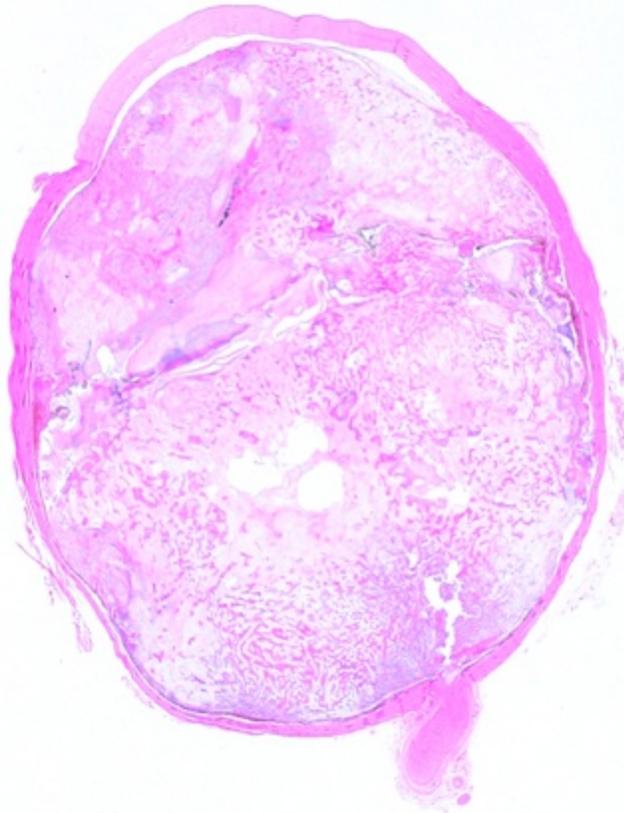
MHC2

12rd1946 FOPTS RCV

FOPTS Osteosarcoma

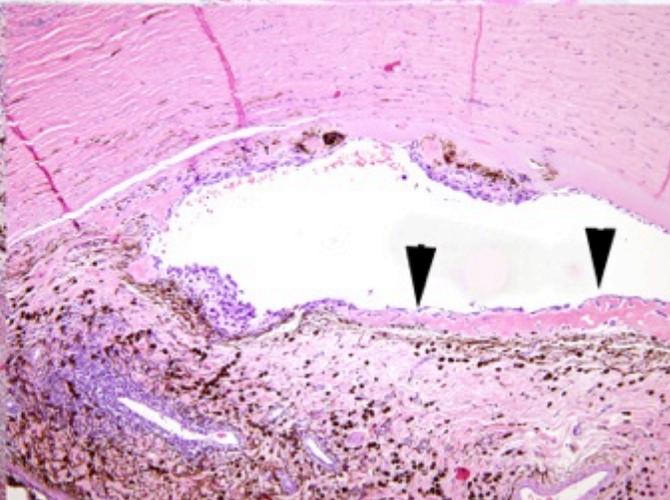
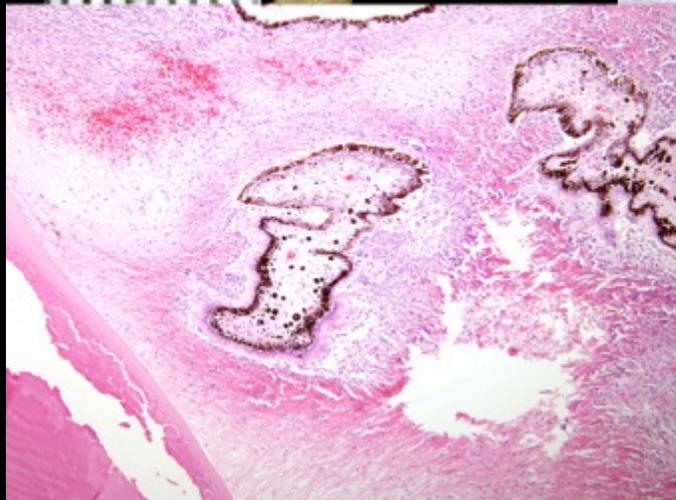
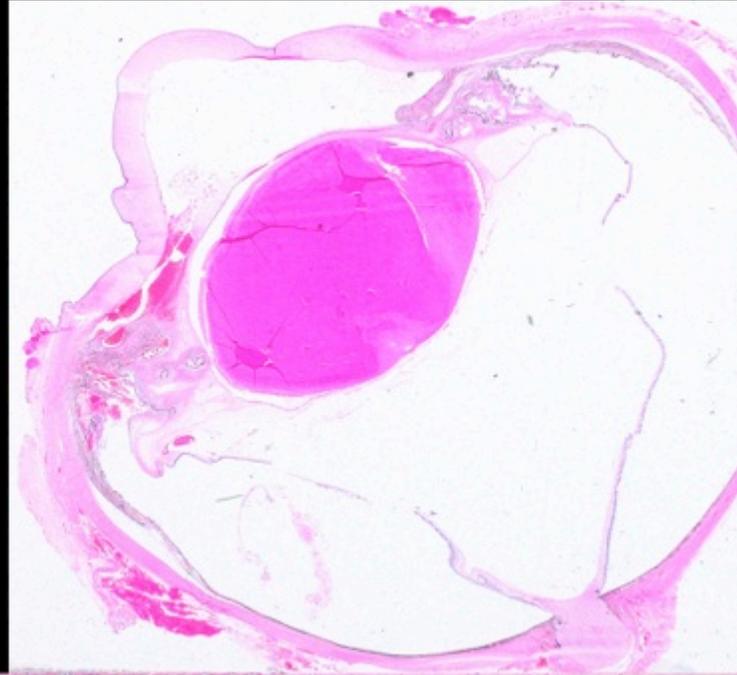


Feline OPTS: Osteosarcoma



Primary Osteosarcoma or Chondrosarcoma

4 in Cats and 12 in Dogs



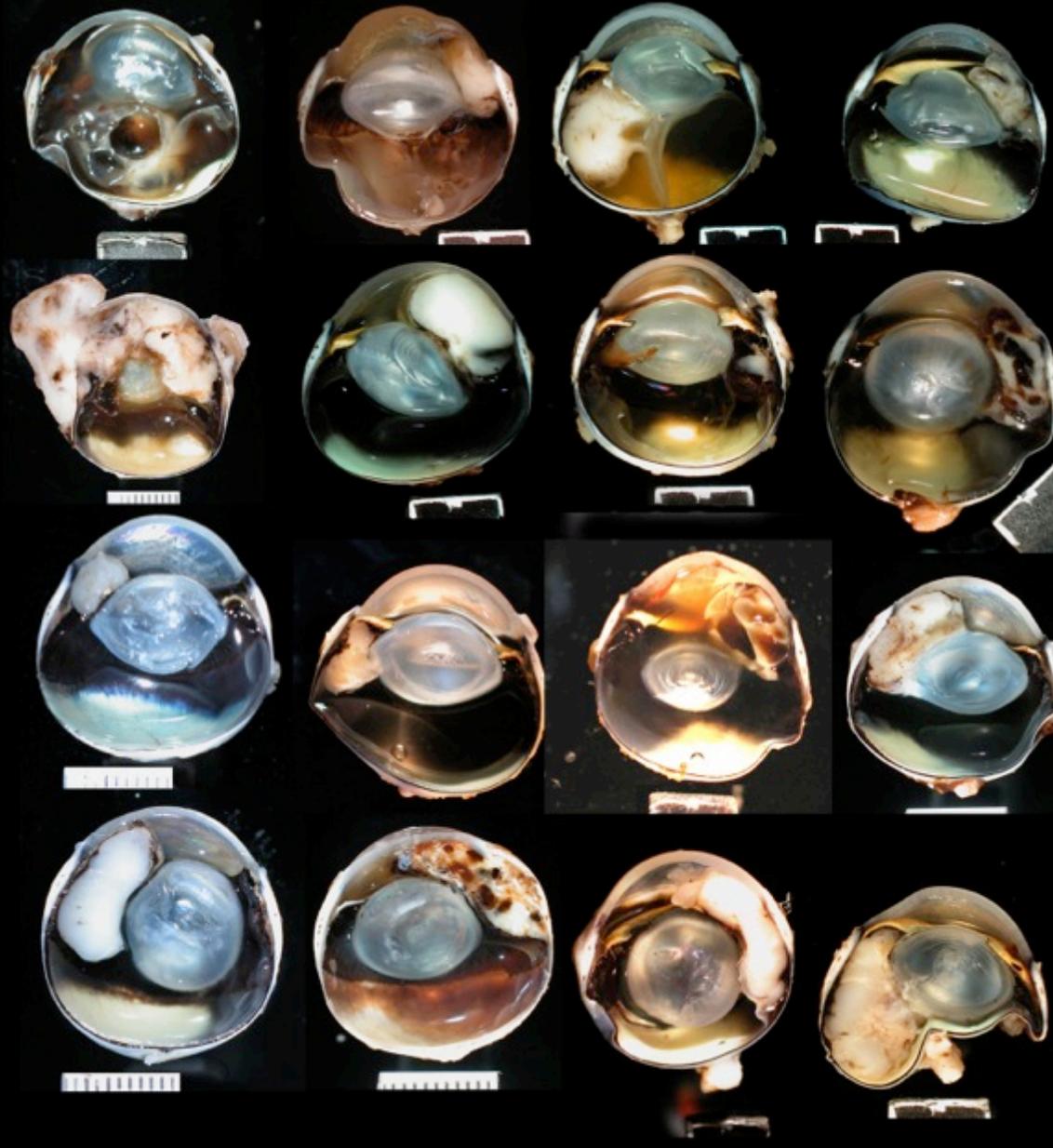
Feline Iridociliary Epithelial Tumors

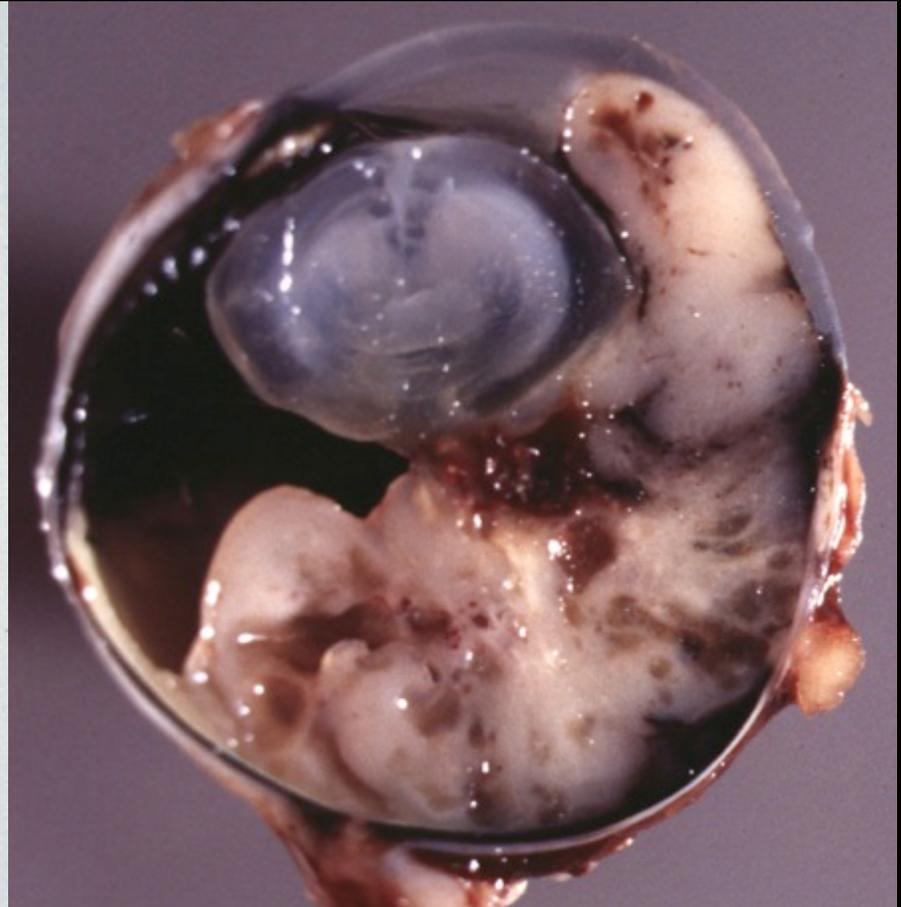
- 166 of 4721 neoplastic cases, ~3.5%
- Tend to be non-pigmented
- Solid
- Cavitated spaces are typical
- Vimentin+, Cytokeratin-

Neglected Feline Iridociliary Adenoma

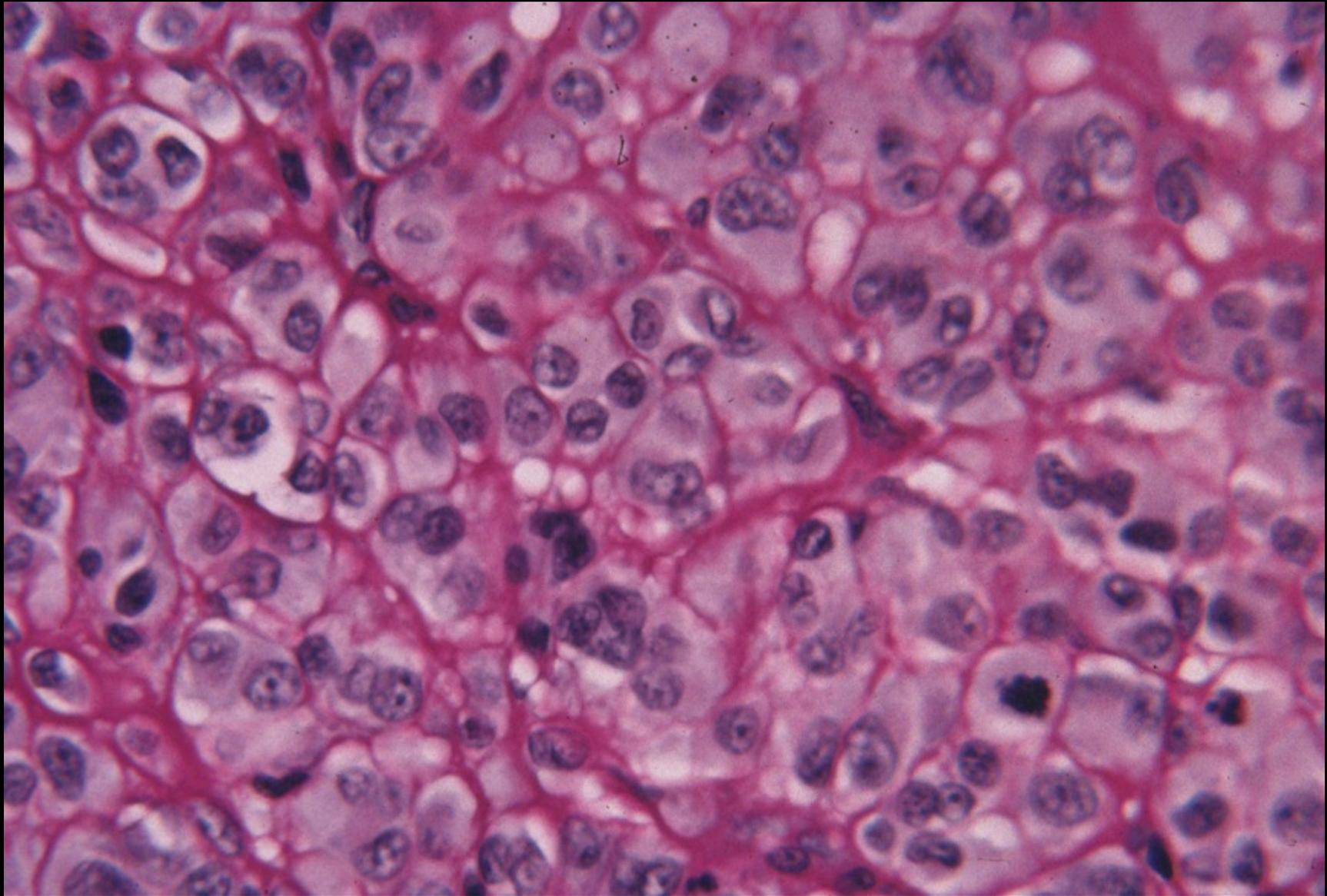


Feline Iridociliary Epithelial Tumors

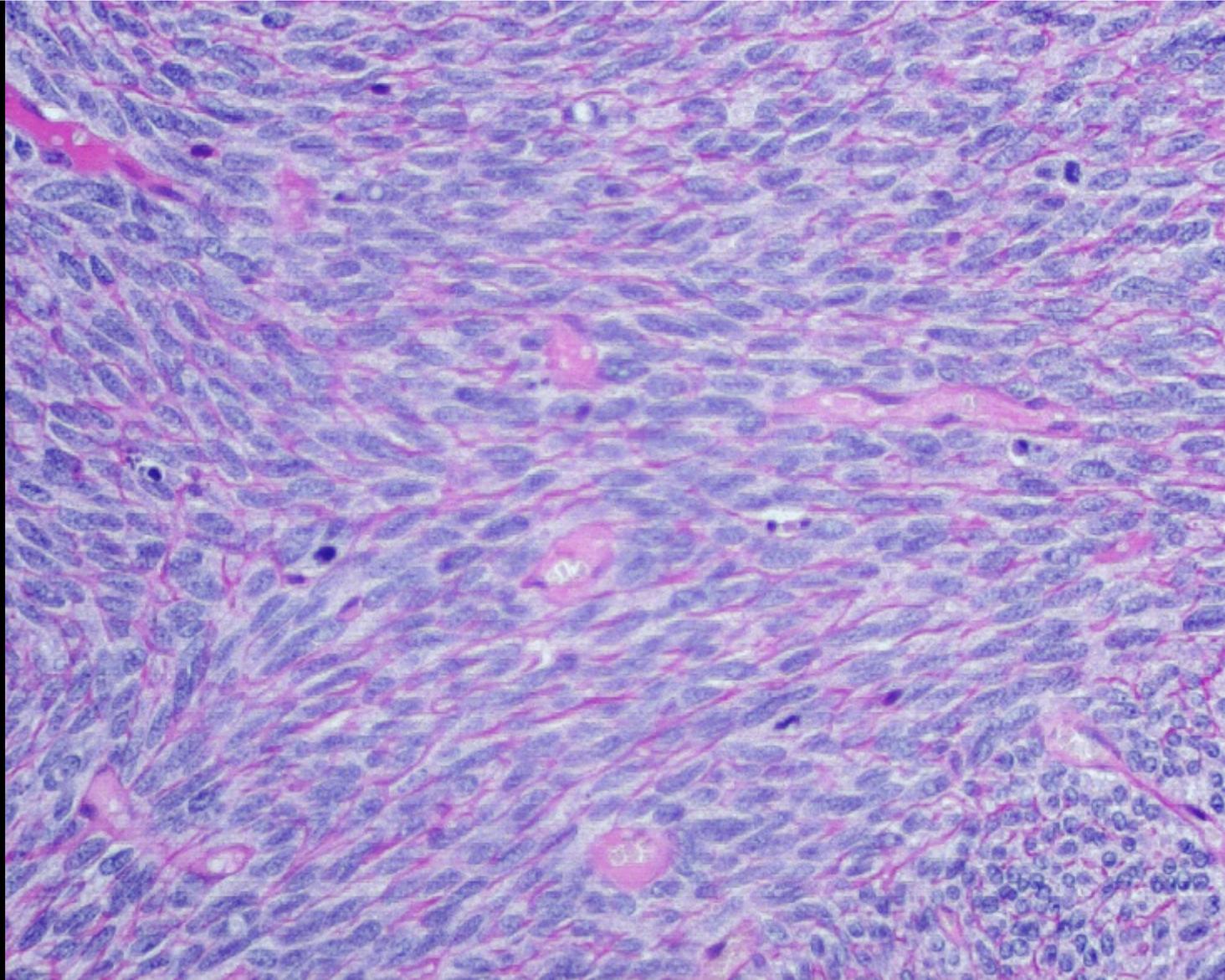




Feline Iridociliary Adenoma



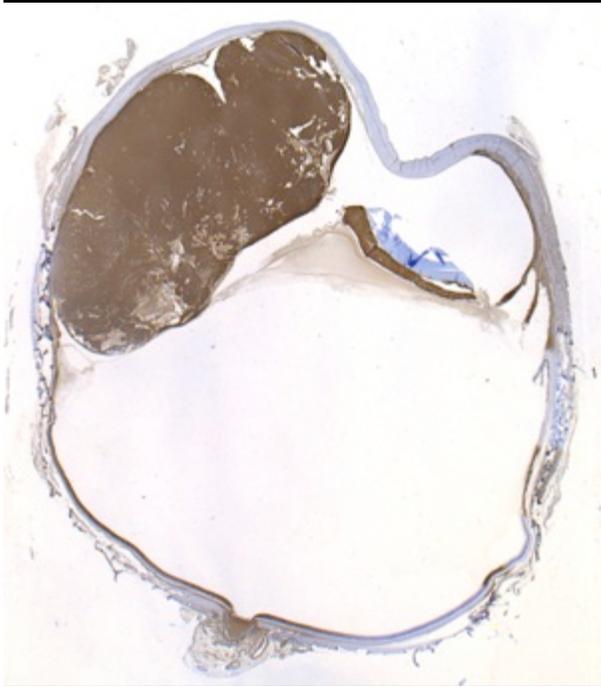
Feline Iridociliary Adenoma



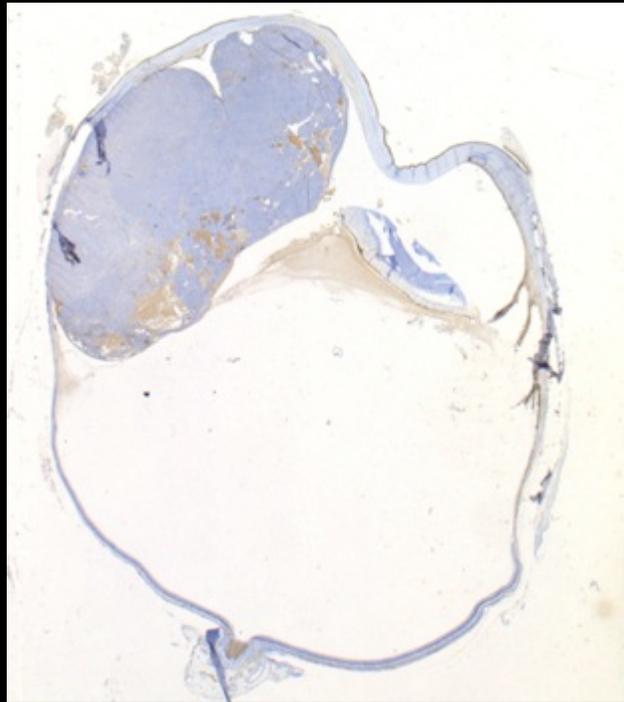
Feline Iridociliary Adenoma
Spindle Cells

Feline Iridociliary Epithelial Tumors

Immunohistochemistry



Vimentin+ 34%

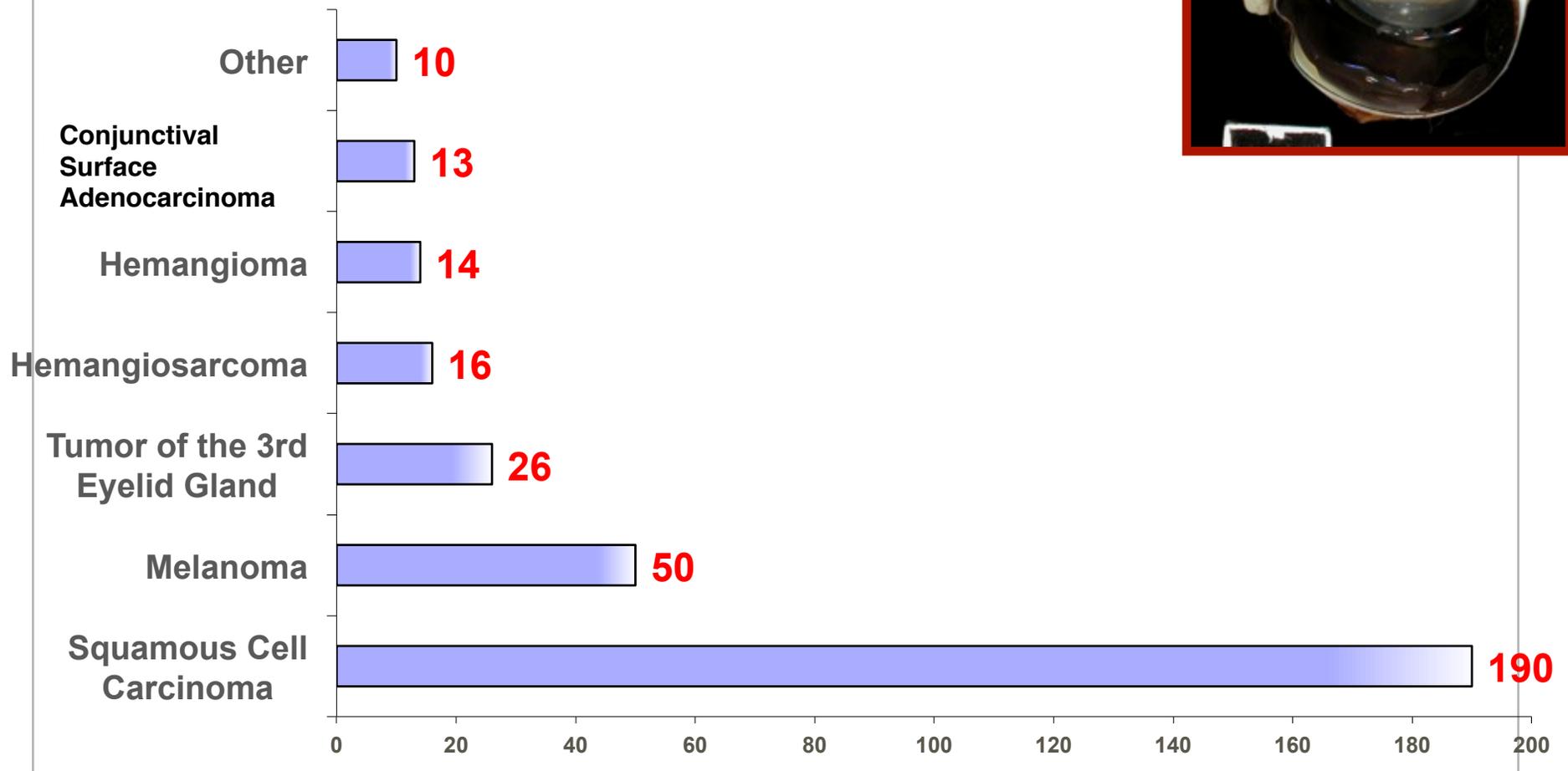
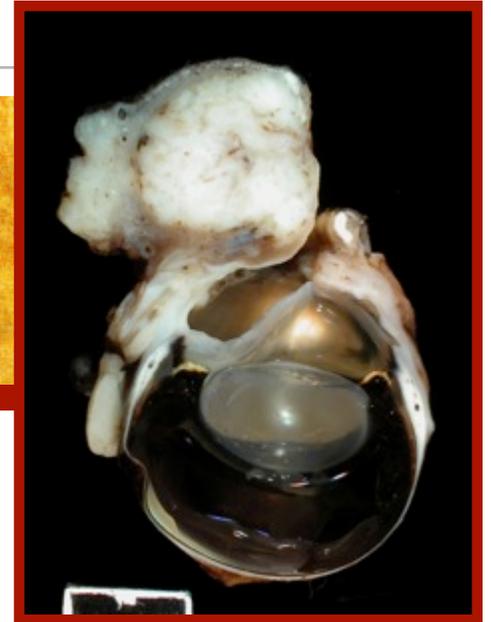


Cytokeratin+ 20%
Not related to tumor type



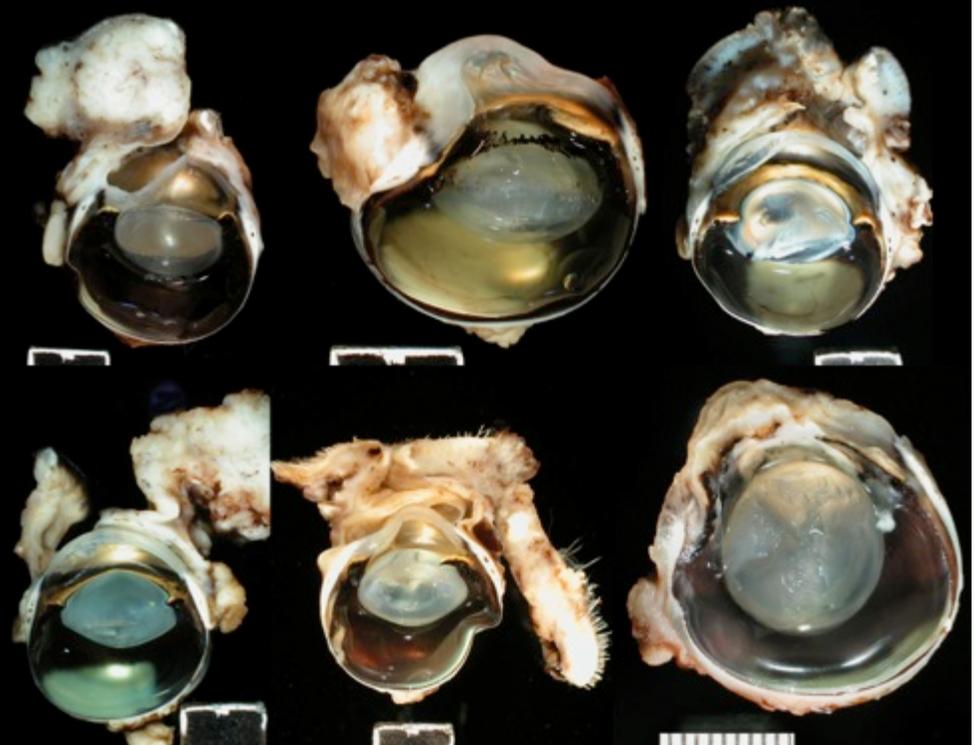
NSE+ 100%

Feline Conjunctival Tumors (n=319)

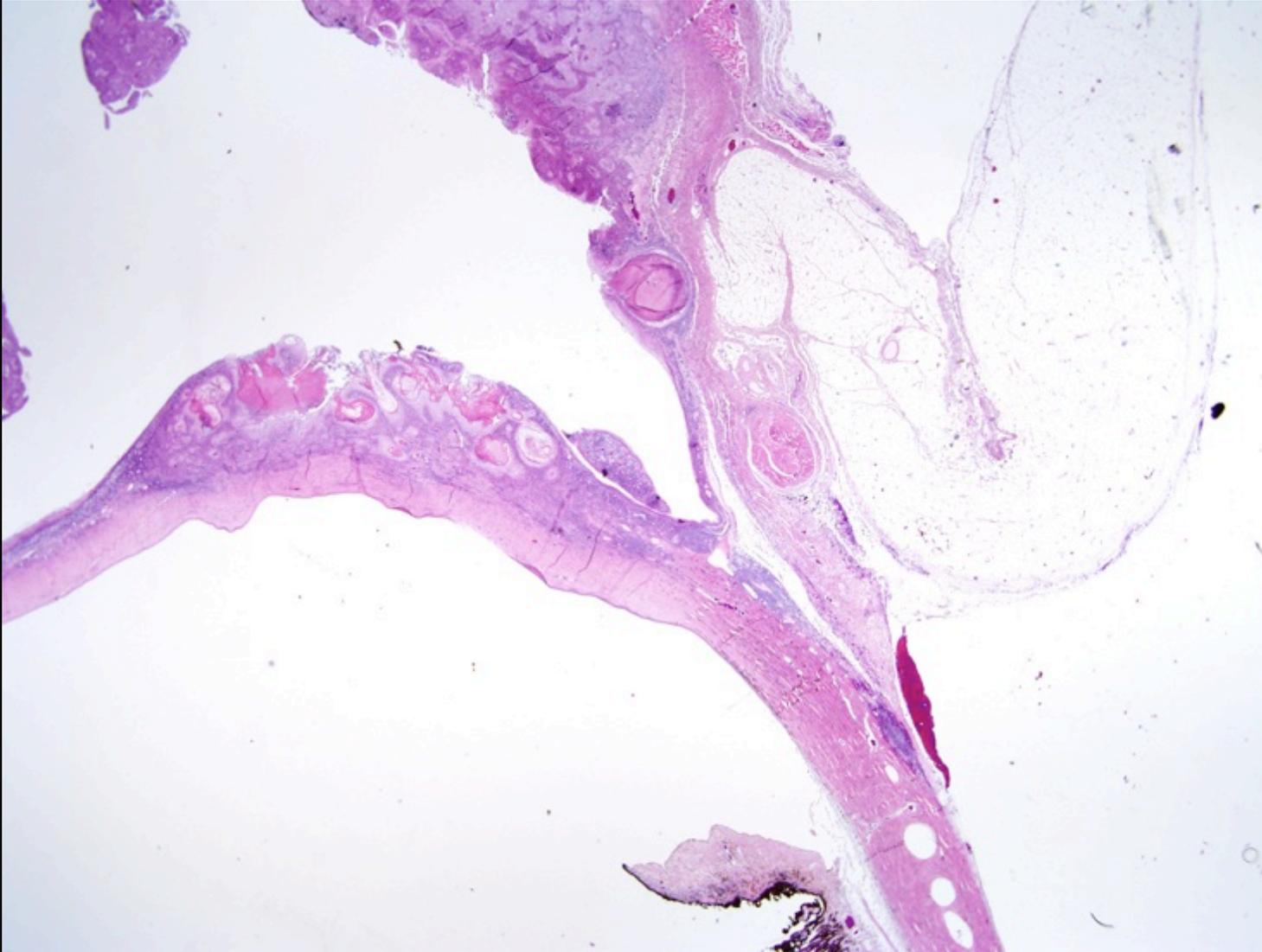


Feline Conjunctival and Lid Squamous Cell Carcinoma

- Total SCC in the Database: 233
- Multifocal (Bowenoid): 15
- Orbital: 30
- Associated with lymphocytic inflammation: 53
- No age or breed associations

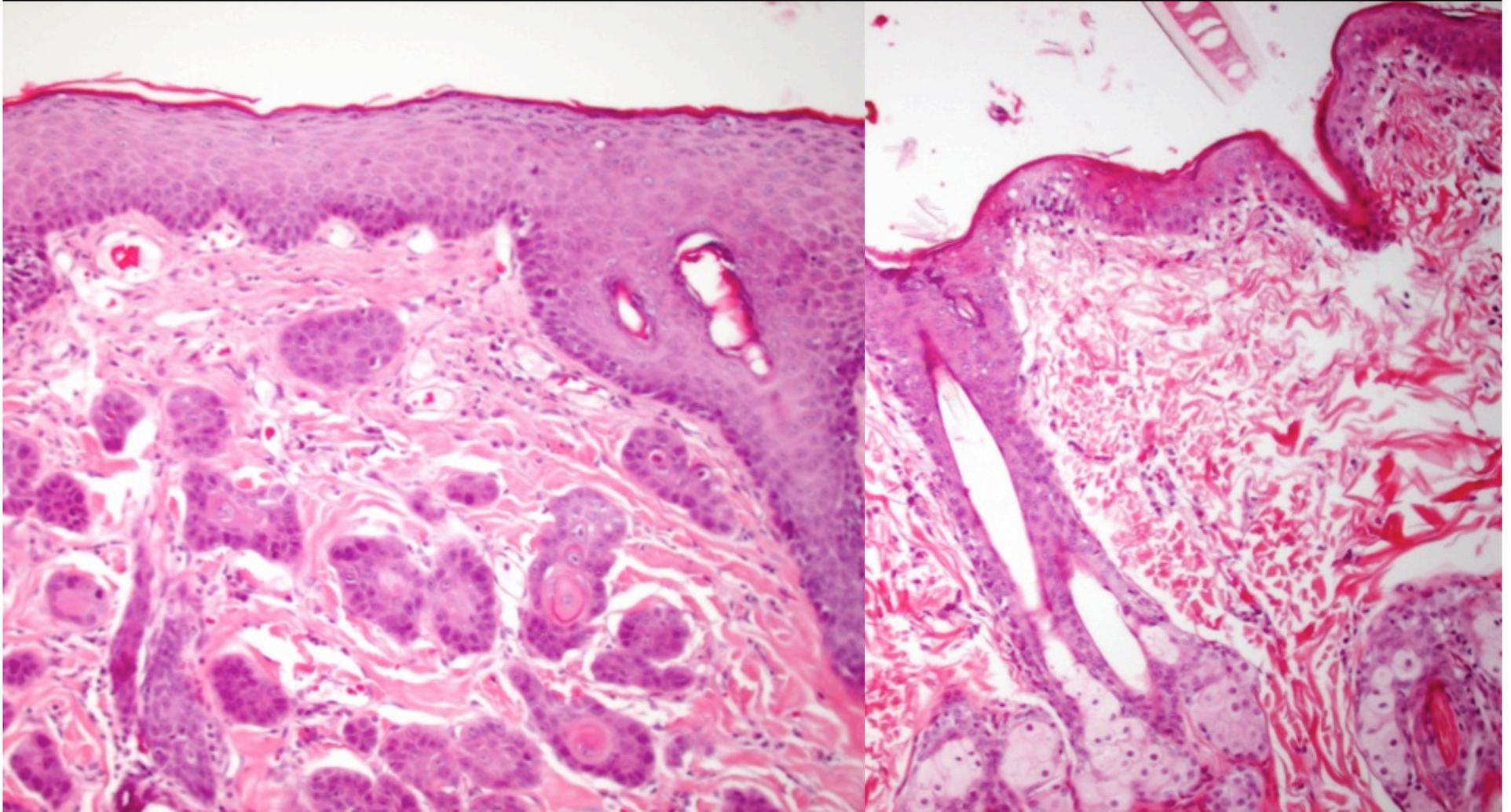


Feline Conjunctival and Lid Squamous Cell Carcinoma



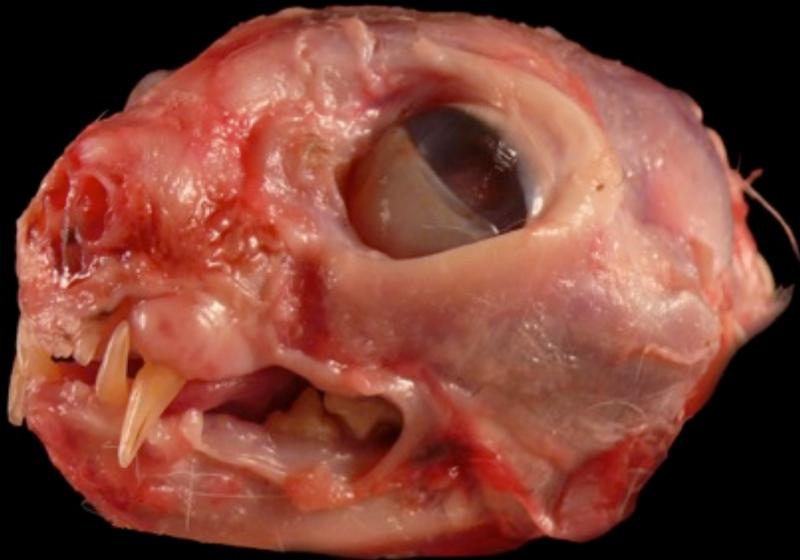
Feline Conjunctival and Lid Squamous Cell Carcinoma

Multifocal or Bowenoid



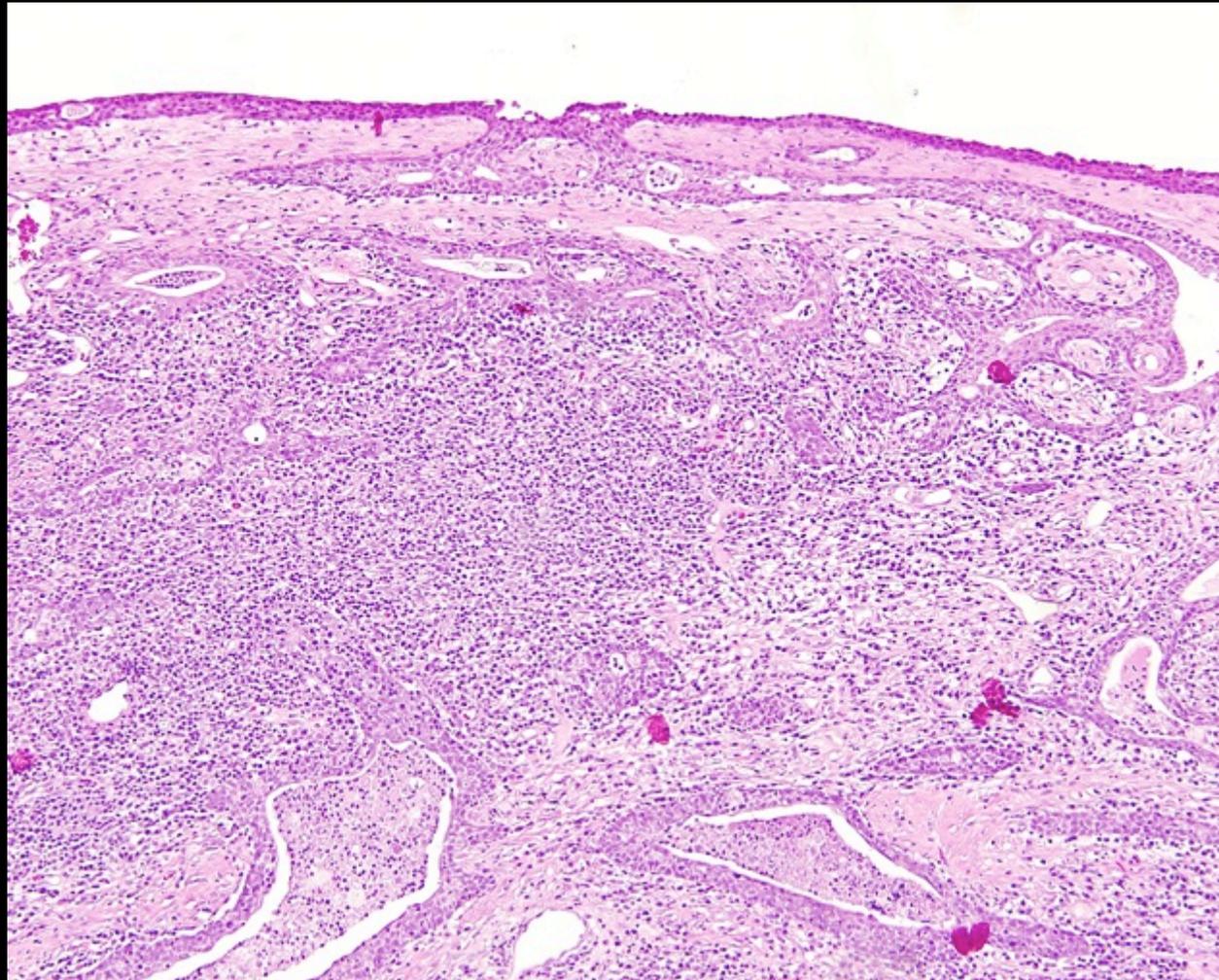
Feline Orbital Squamous Cell Carcinoma

DDx Feline Restrictive Orbital Myofibroblastic Sarcoma



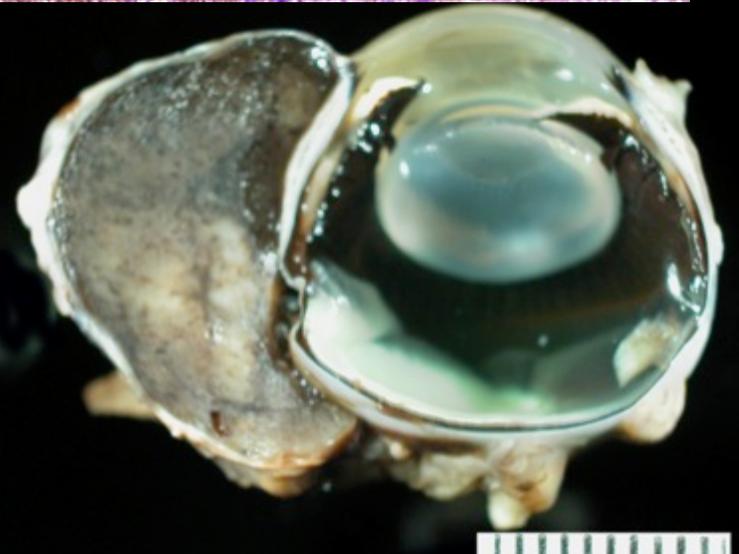
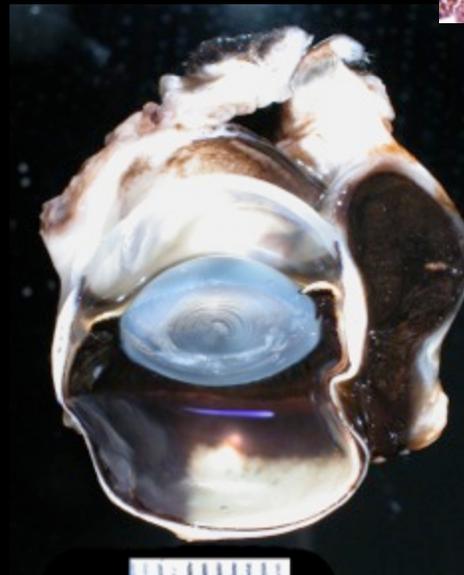
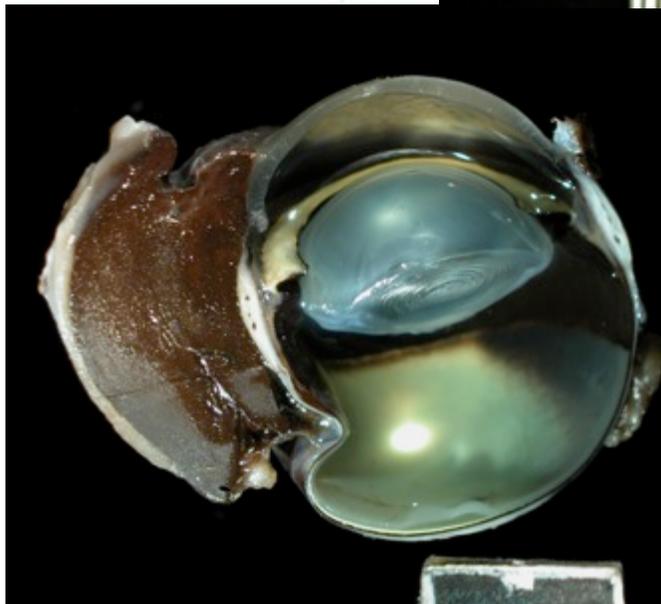
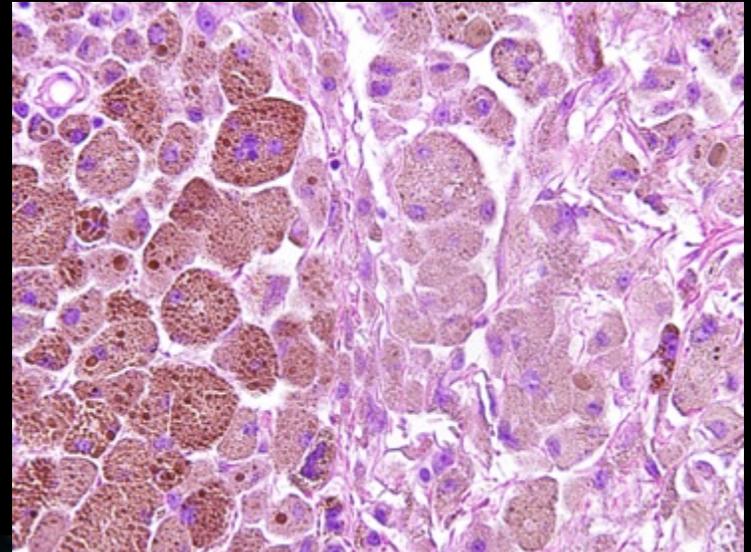
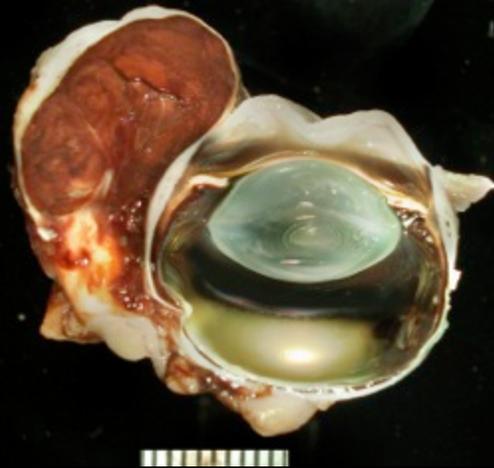
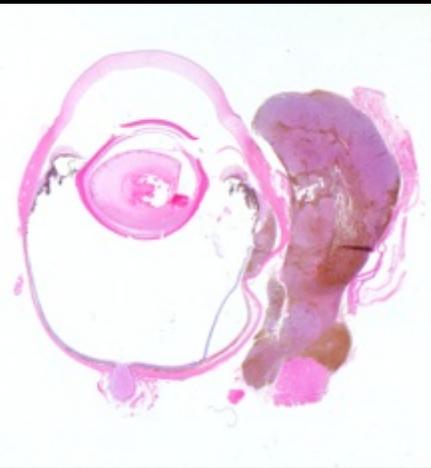
Feline Conjunctival and Lid Squamous Cell Carcinoma

Severe Lymphocytic Inflammation



Feline Conjunctival Melanoma

- 50 cases in the COPLOW database

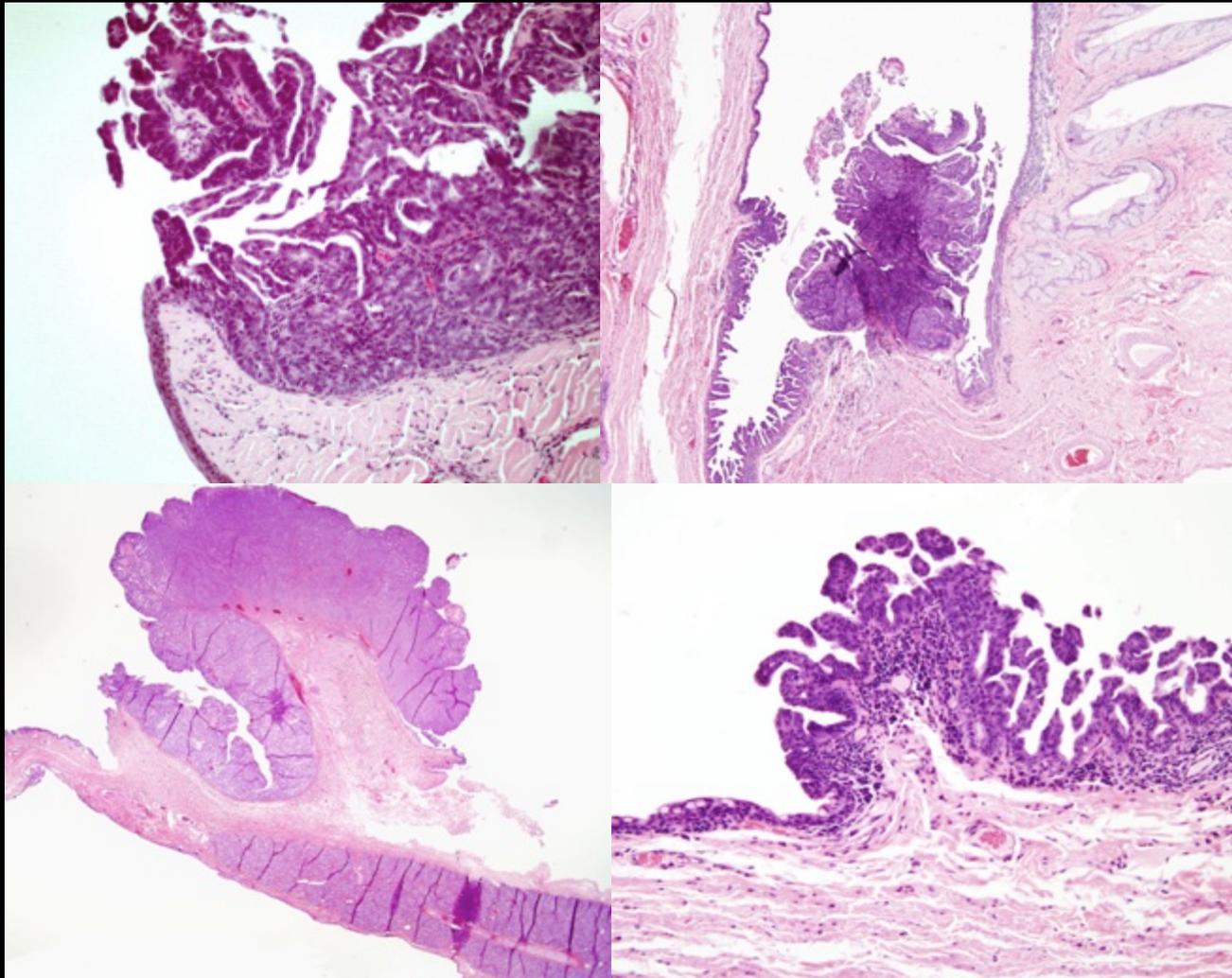


Feline Conjunctival Surface Adenocarcinoma

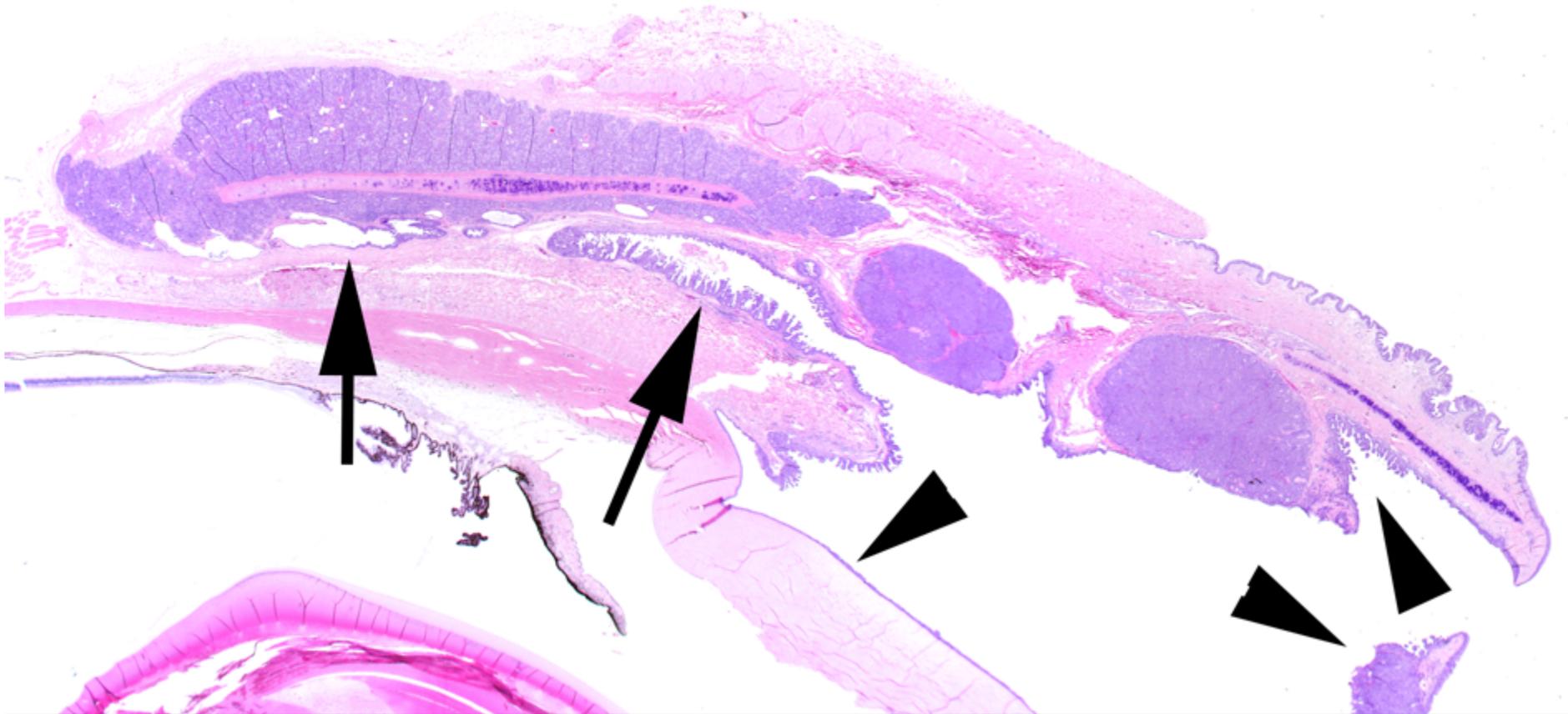
- Formerly Mucoepidermoid Carcinoma
- 30 cases in the COPLOW database
- Malignant potential



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

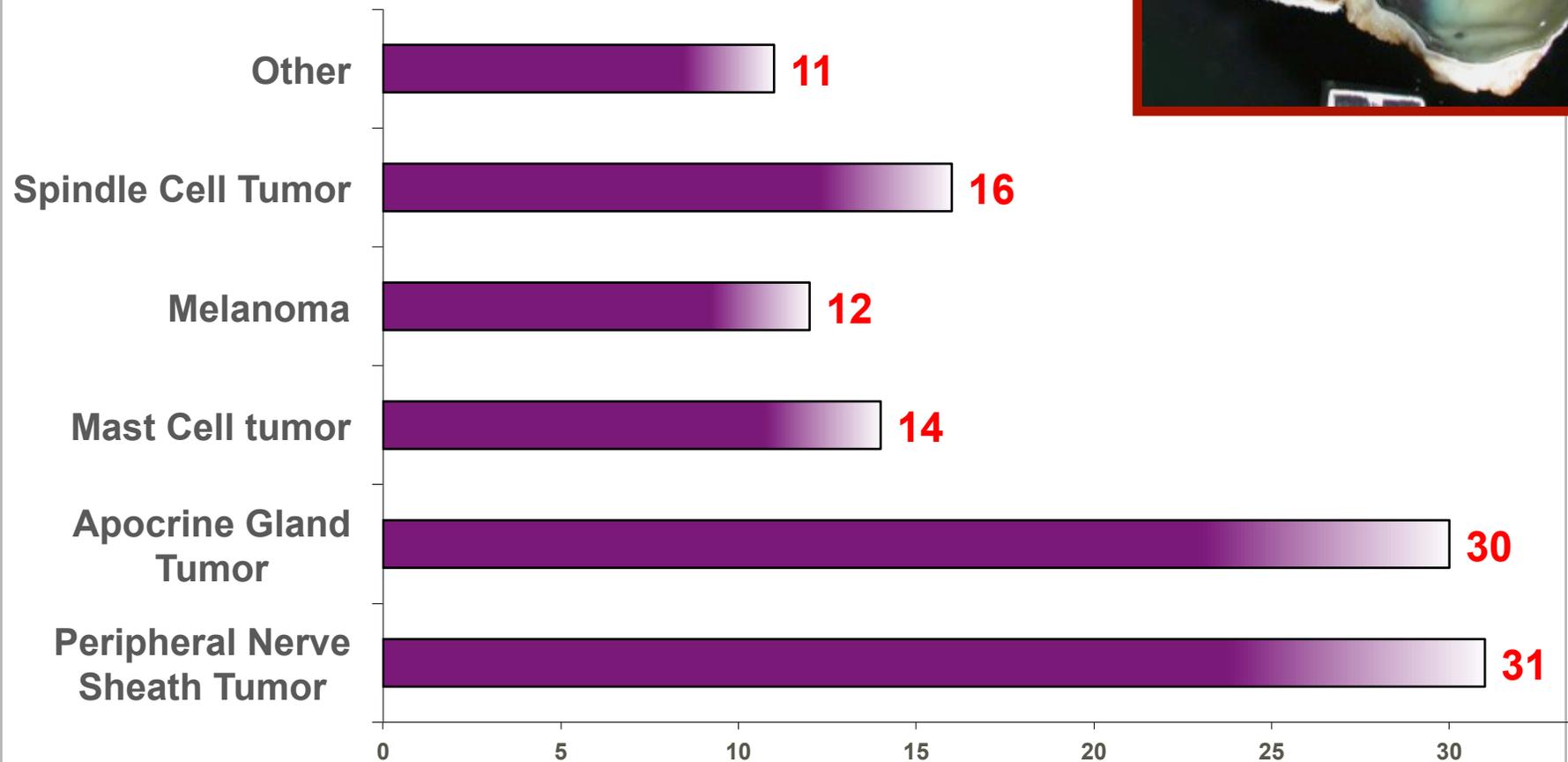
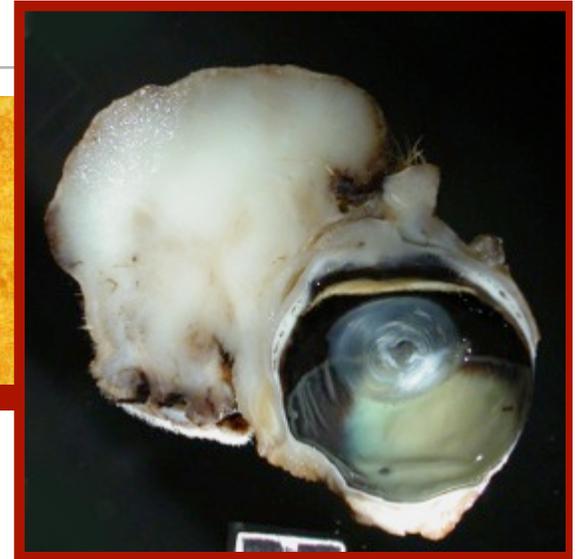
Feline Conjunctival Surface Adenocarcinoma

Metastatic Potential



Lungs

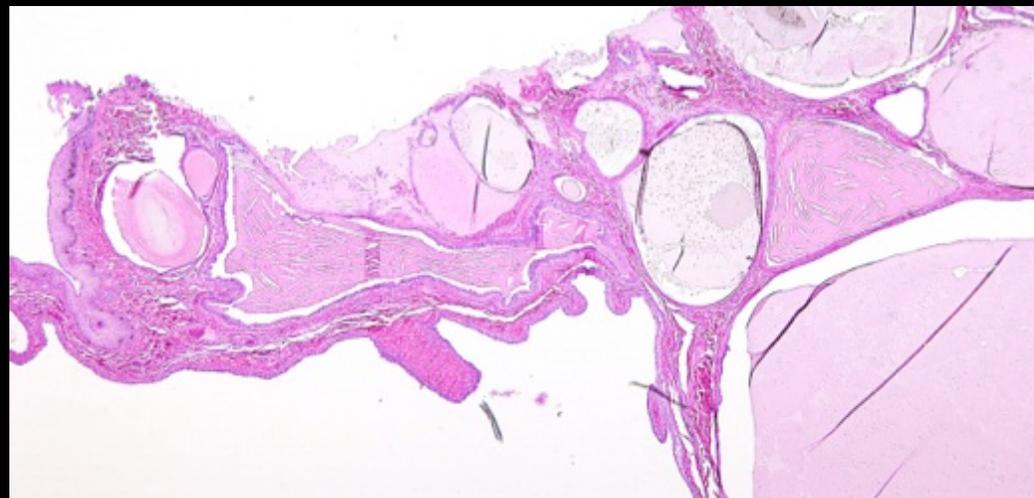
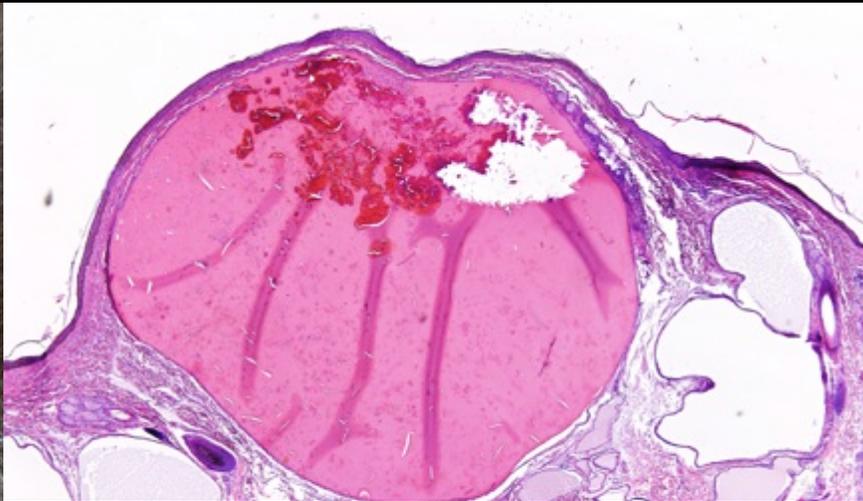
Feline Eyelid Tumors (n = 114)



Feline Hidrocystoma

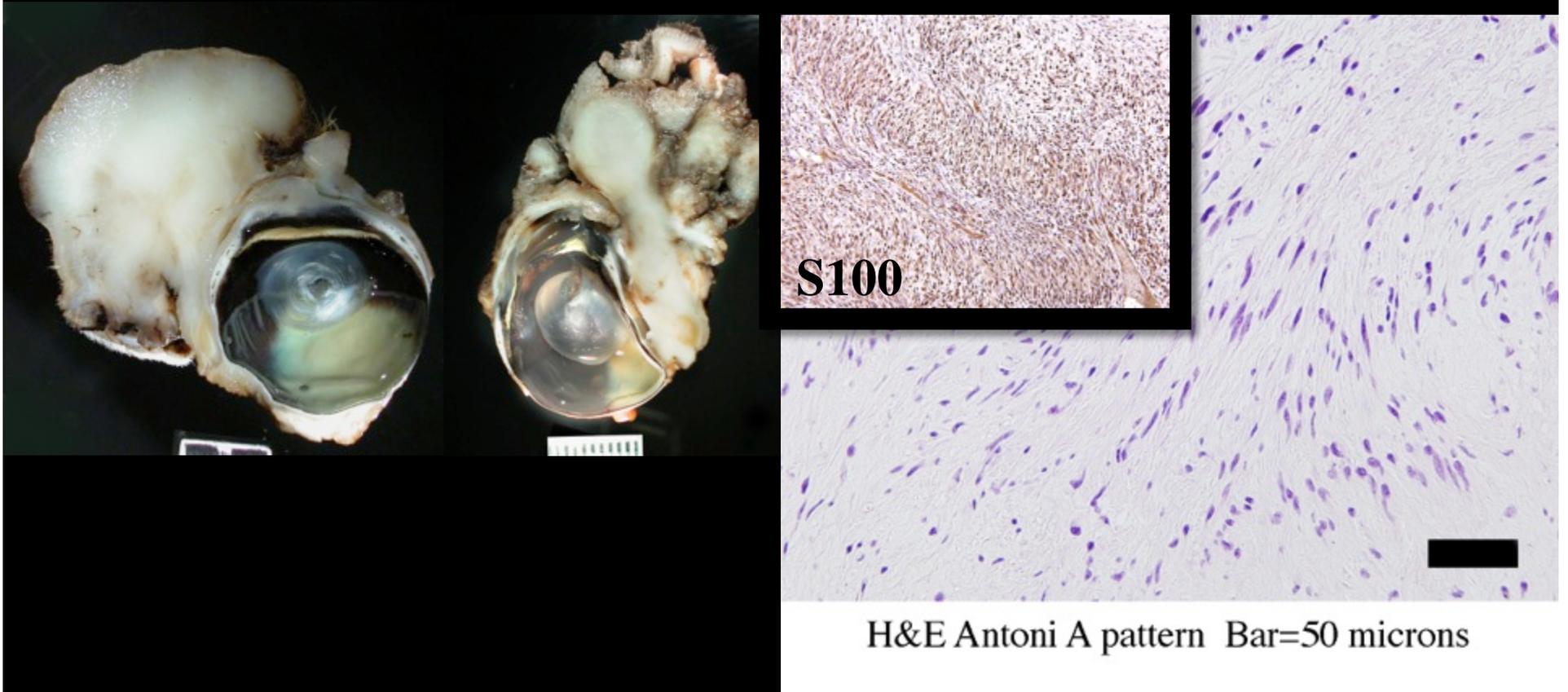
Apocrine gland origin

Siamese predilection



Feline Eyelid Peripheral Nerve Sheath Tumor

45 cases in the COPLOW Database



H&E Antoni A pattern Bar=50 microns

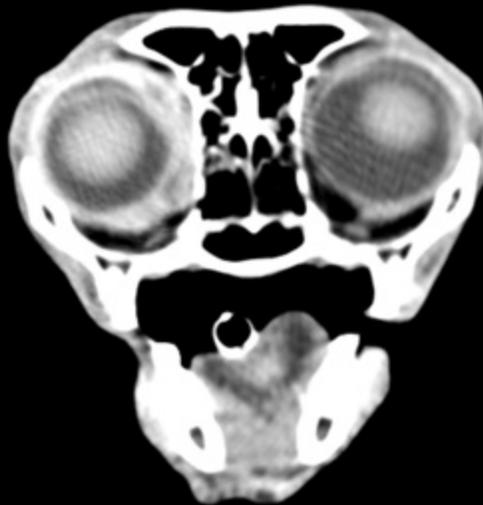
Feline Eyelid or Conjunctival Mast Cell Tumors

63 Cases in the COPLOW Database

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



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.

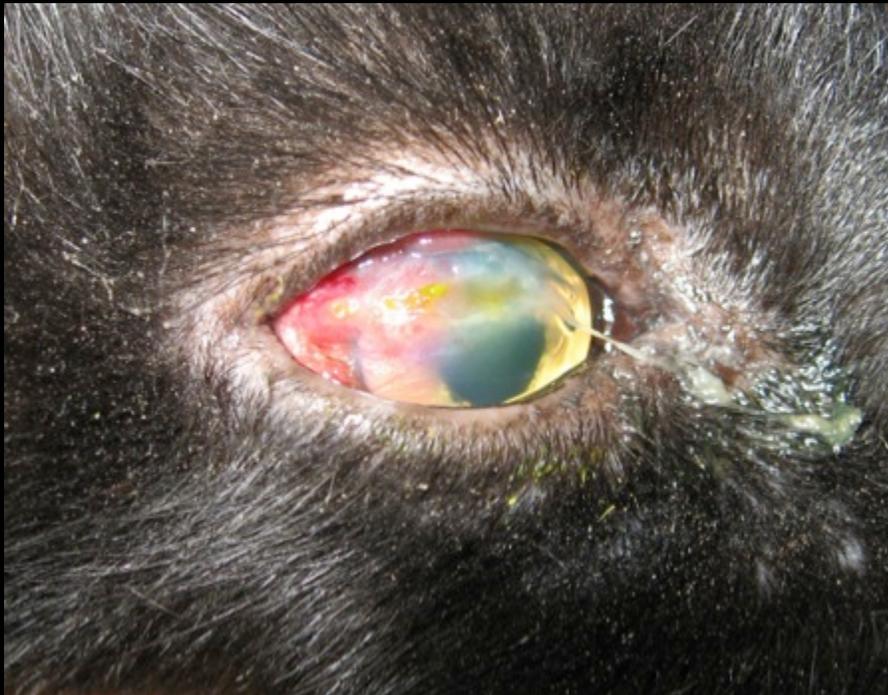
54 cases of FROMS

- 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**

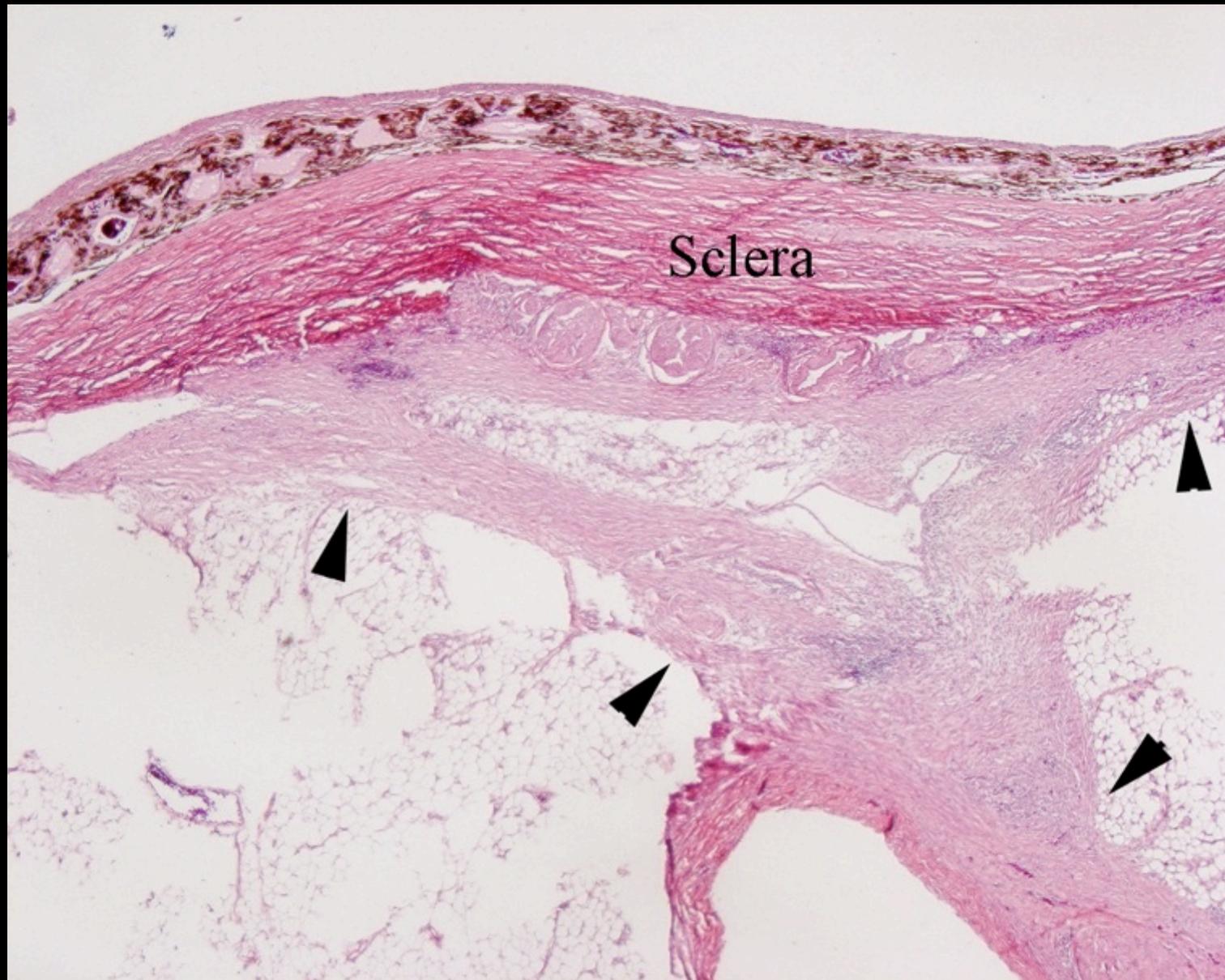
- **Thickening and effacement along fascial planes**



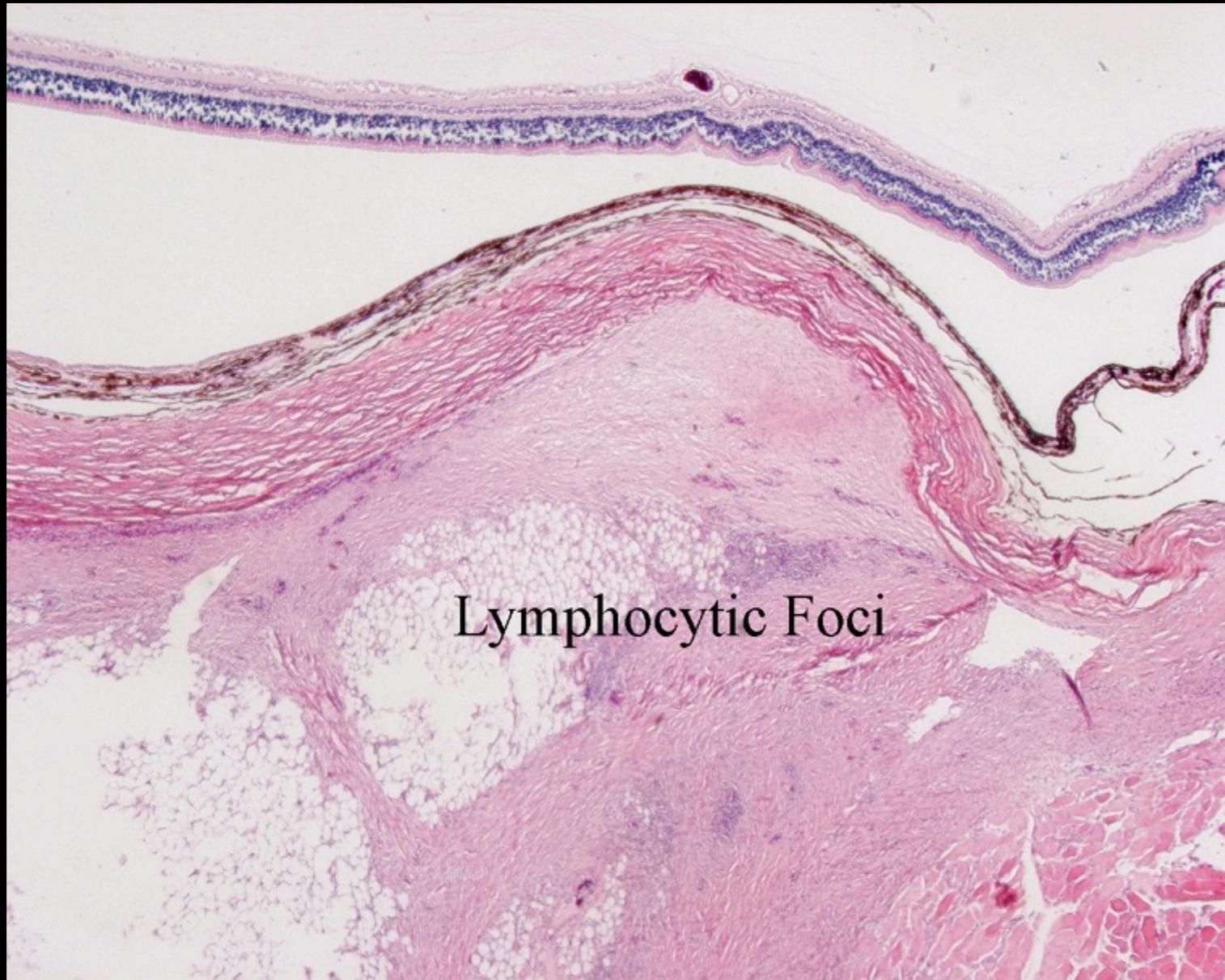
Feline Restrictive Orbital Myofibroblastic Sarcoma

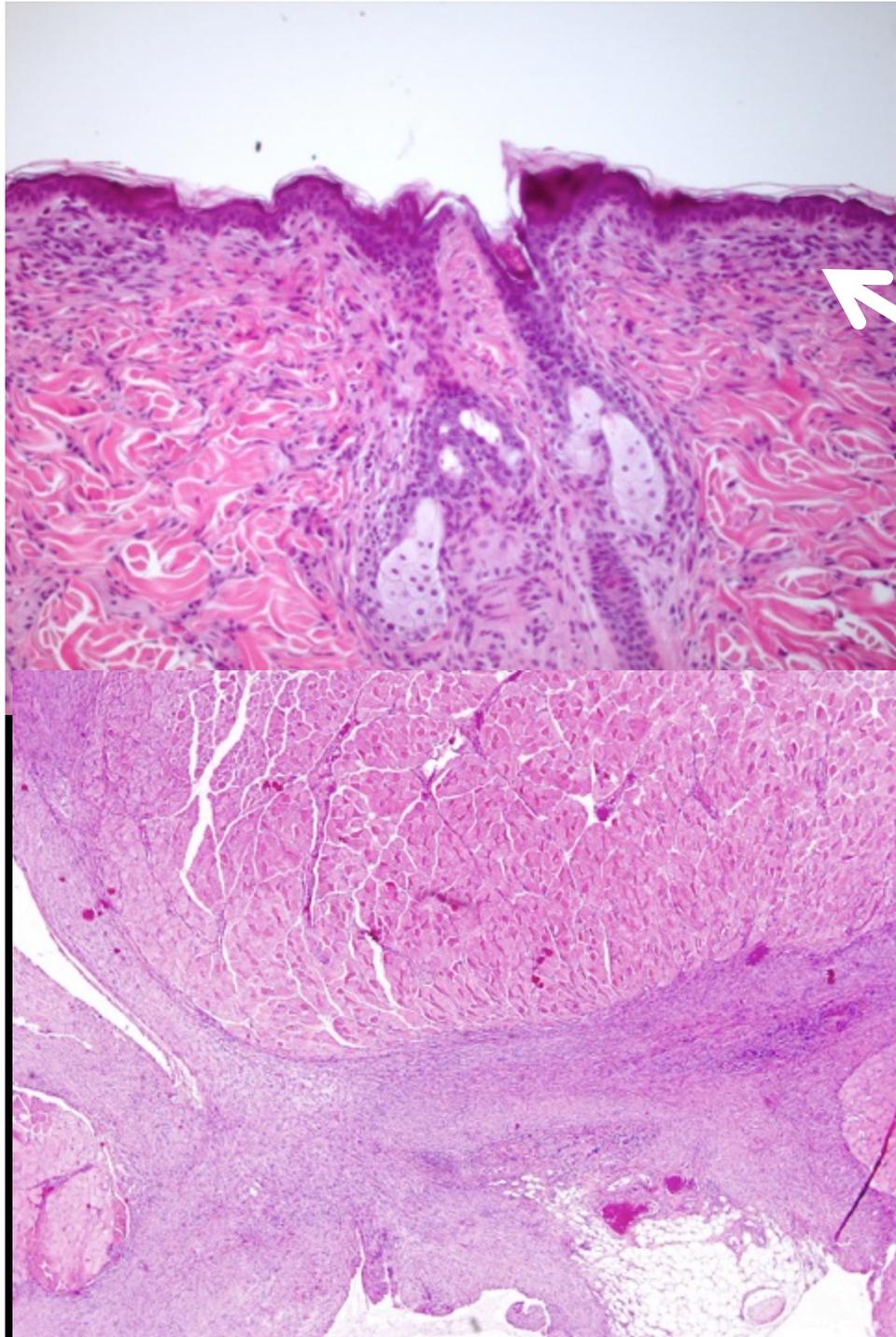


Feline Restrictive Orbital Myofibroblastic Sarcoma



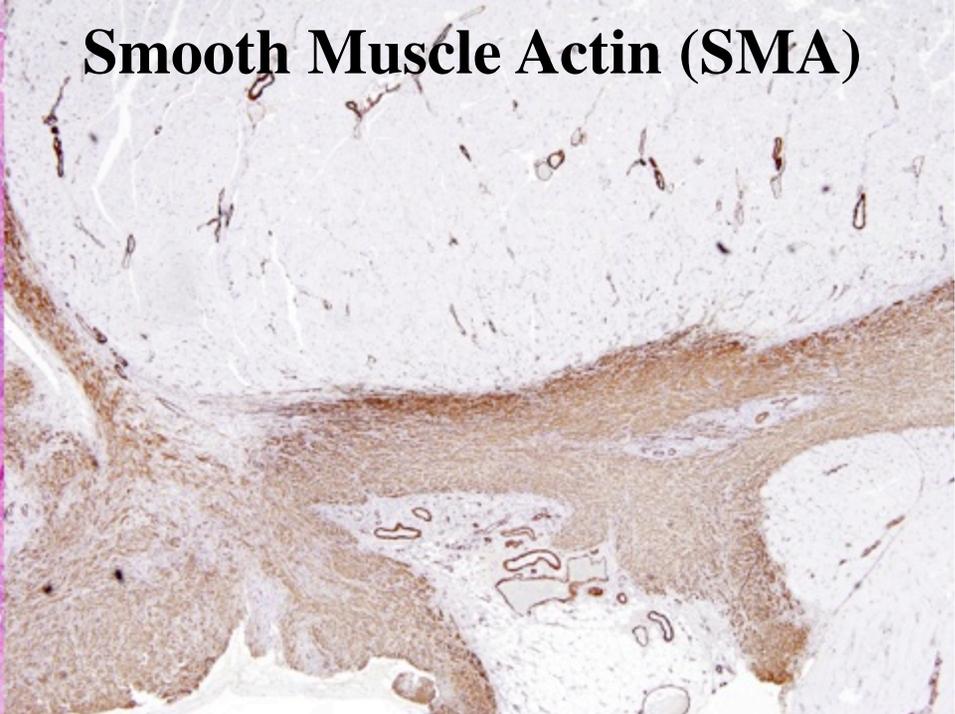
Feline Restrictive Orbital Myofibroblastic Sarcoma



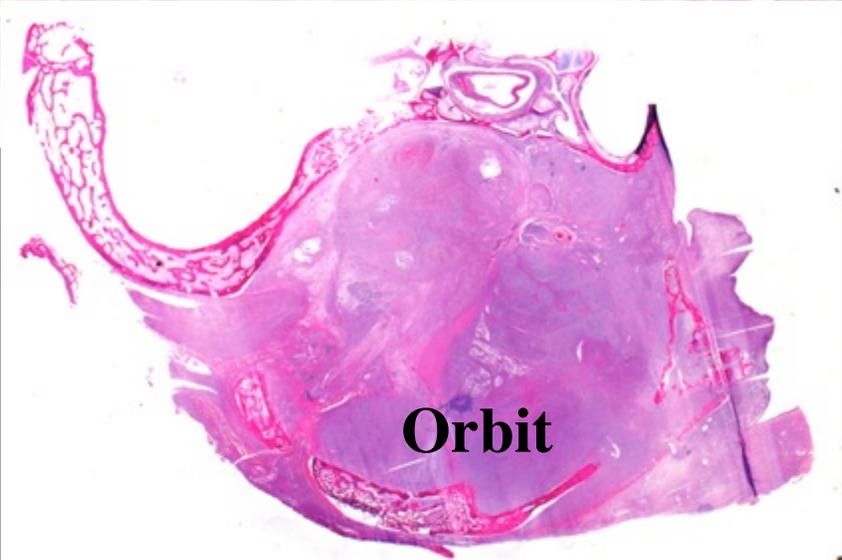
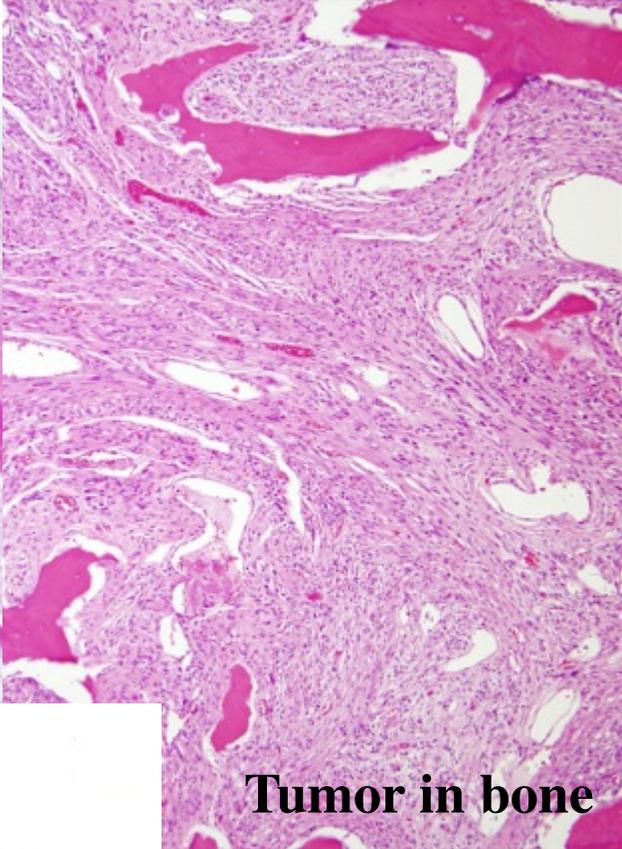
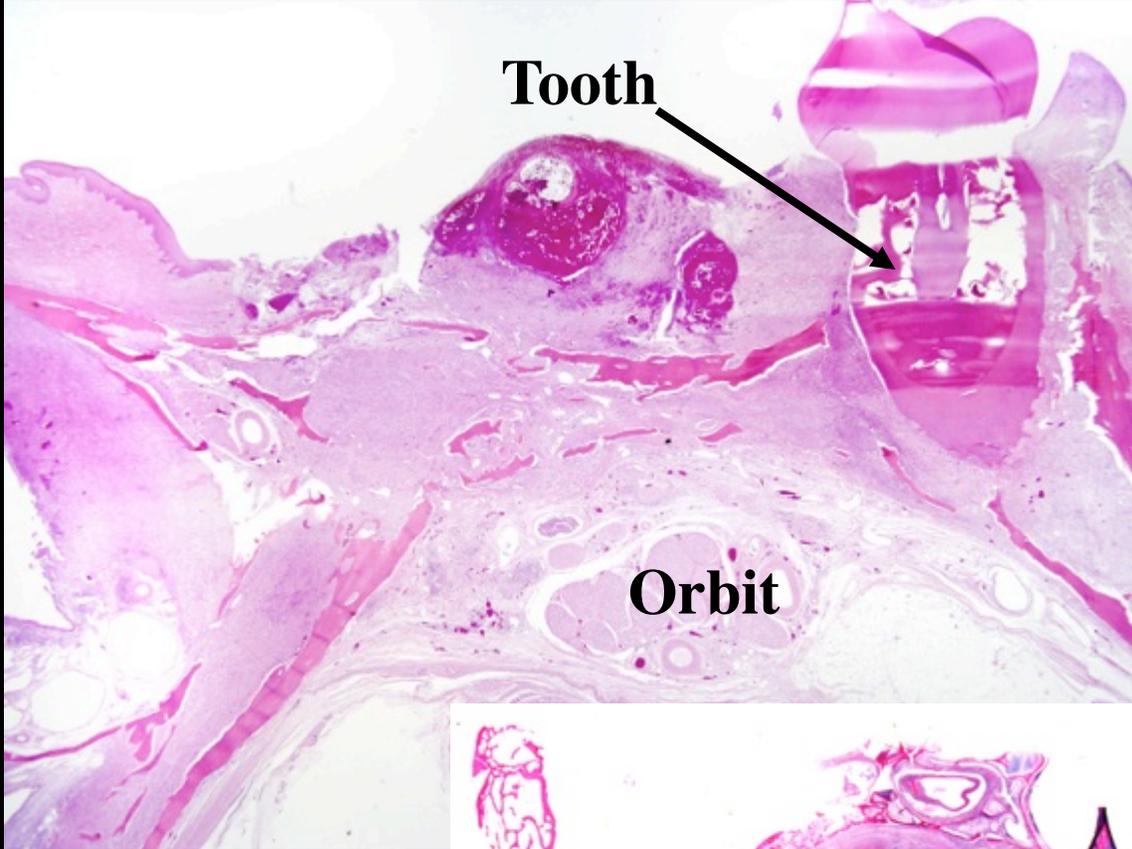


Subepithelial neoplastic cells are not SMA+, unlike the remainder of the tumor

Smooth Muscle Actin (SMA)

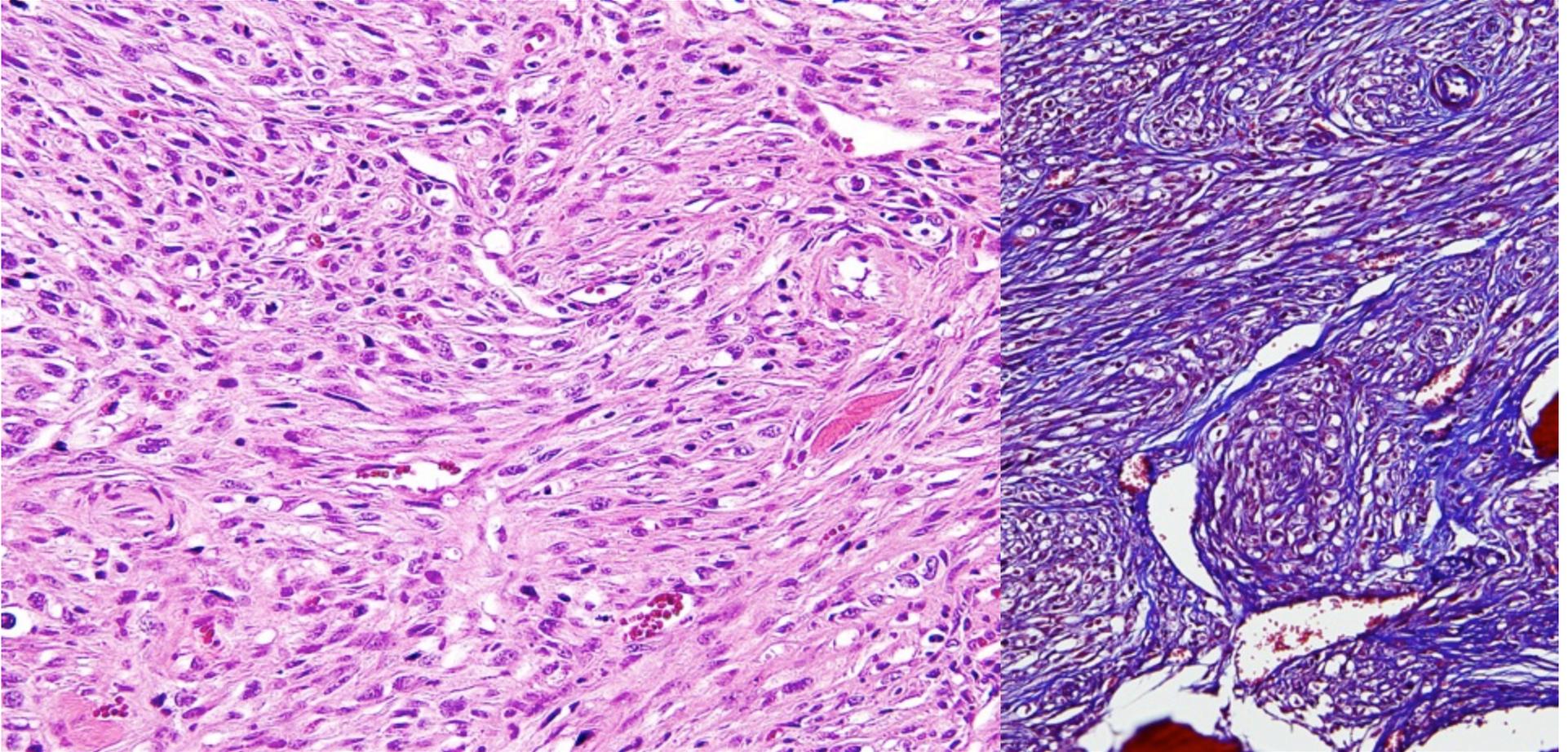


Orbit from necropsy specimen



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

