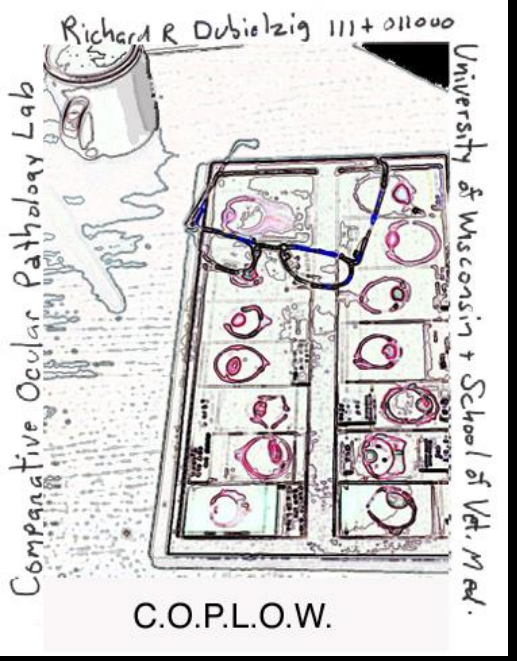
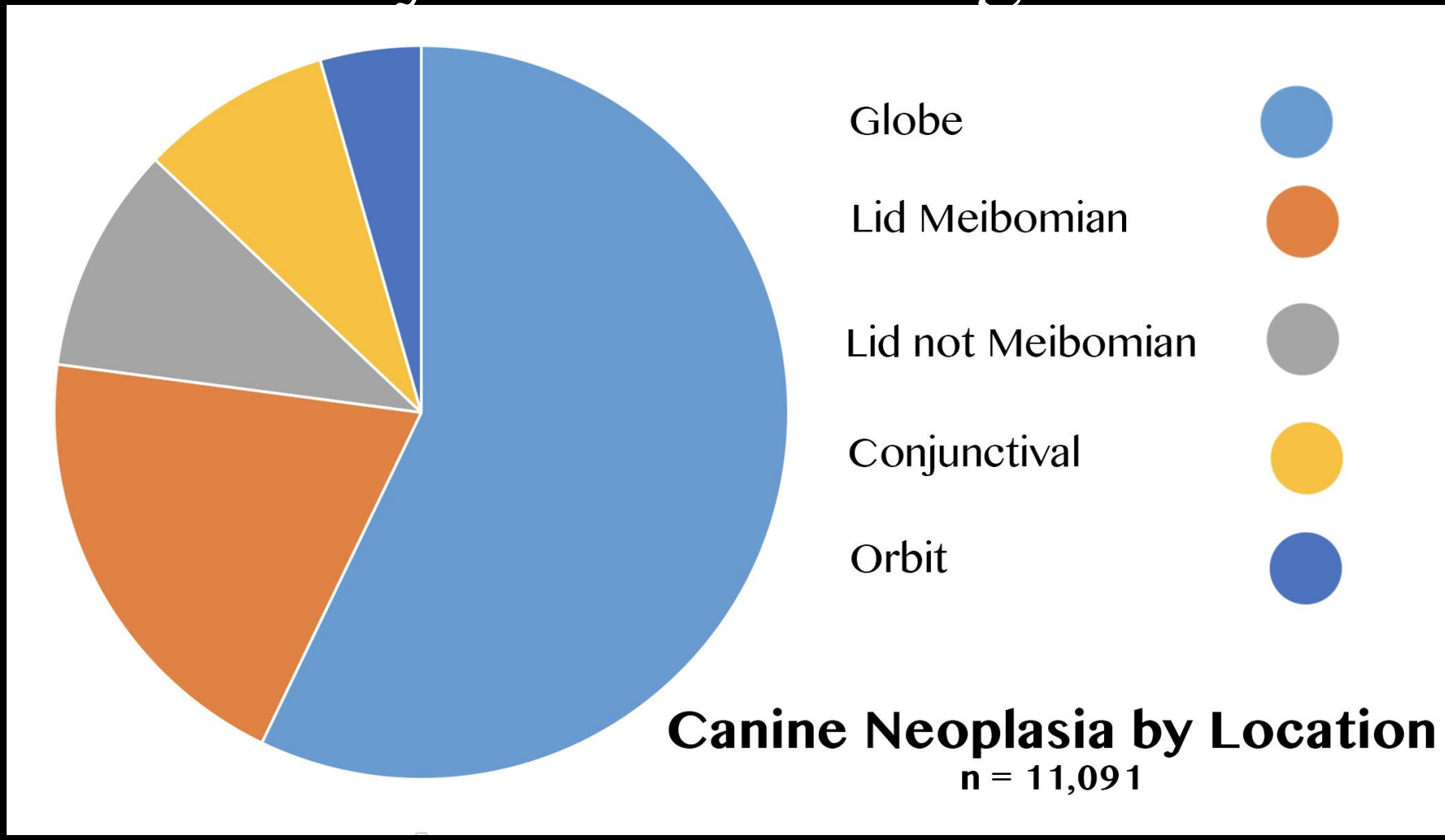


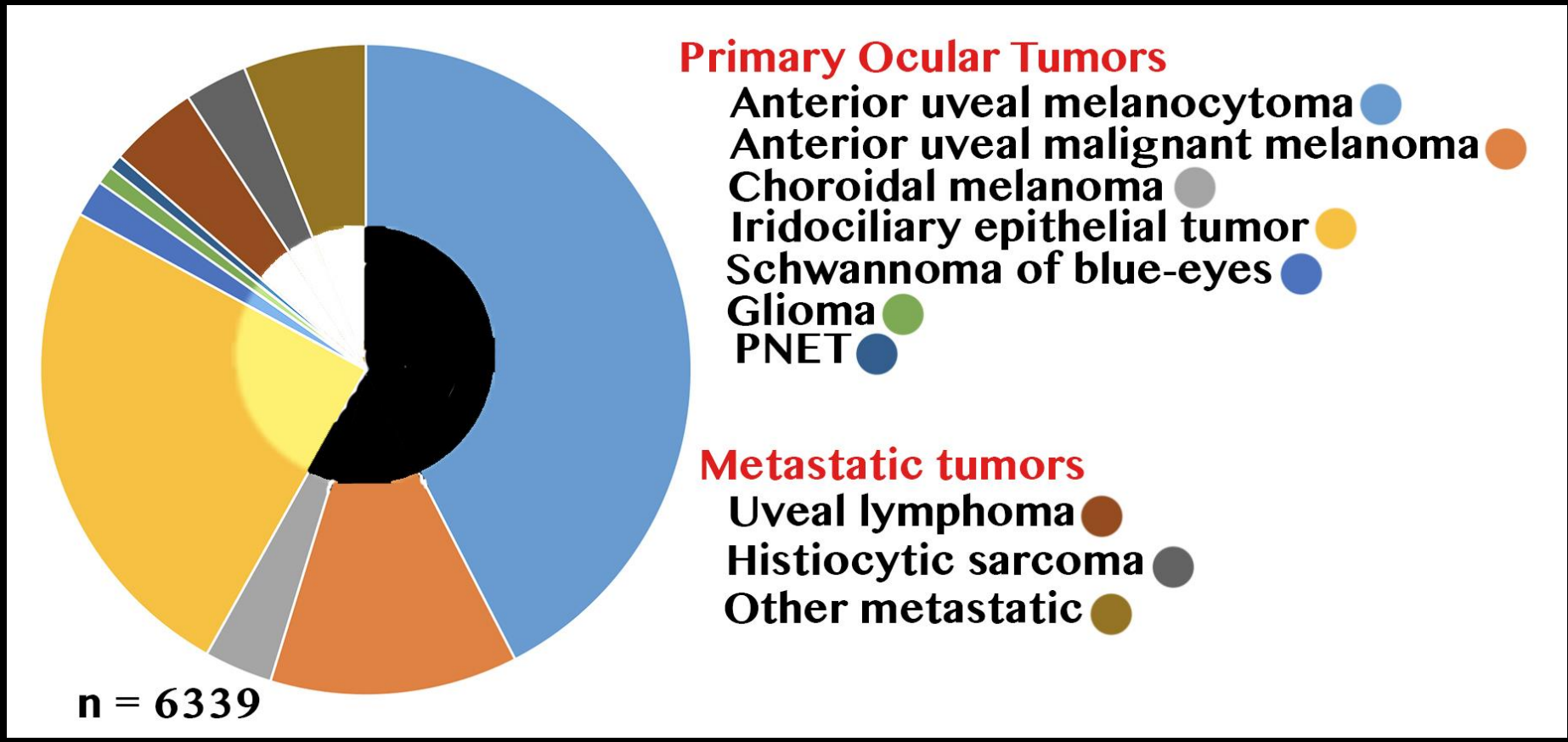
Tumors of the Canine Globe

Richard R Dubielzig

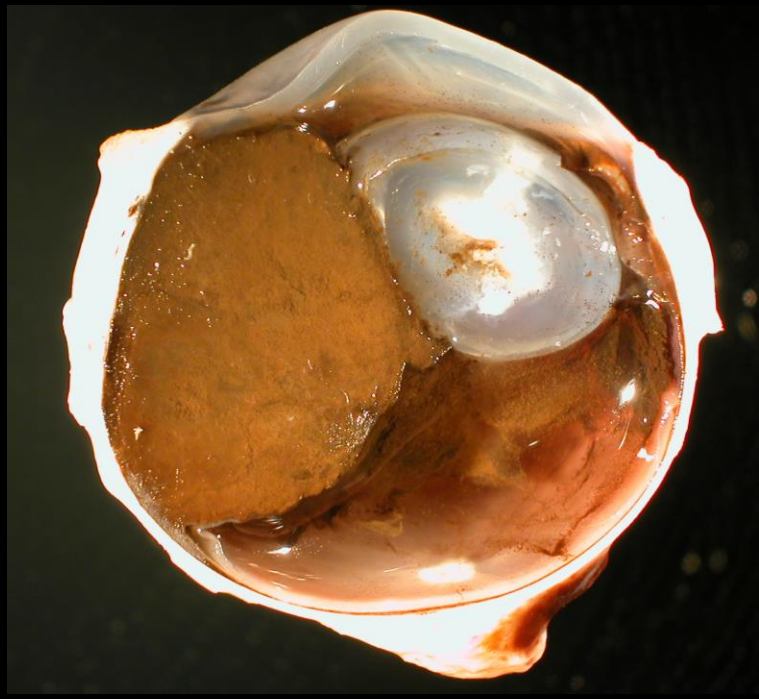
Dog Tumors in the COPLOW Database by Tissue of Origin



Dog Tumors in the COPLOW Database Globe



2135/5722 Canine Melanocytic Tumors *(numbers from 2012)*



- Outside the Globe: 264
  - Conjunctival: 159
  - Eye Lid: 72
  - Skin: 33
- Affecting the Globe: 1871
  - Anterior Uveal Melanocytoma: 1245
  - Anterior Uveal Malignant Melanoma: 312
  - Limbal Melanocytoma: 213
  - Choroidal: 86 Melanocytoma and 11 malignant Melanoma
  - Metastatic Melanoma: 15

Giuliano EA, Chappel R, Fischer B, Dubielzig RR. (1999) A matched observational study of canine survival with primary intraocular melanocytic neoplasia. *Vet. Ophthal*. 2: 185-190.

Anterior Uveal Melanocytoma
1245 Cases

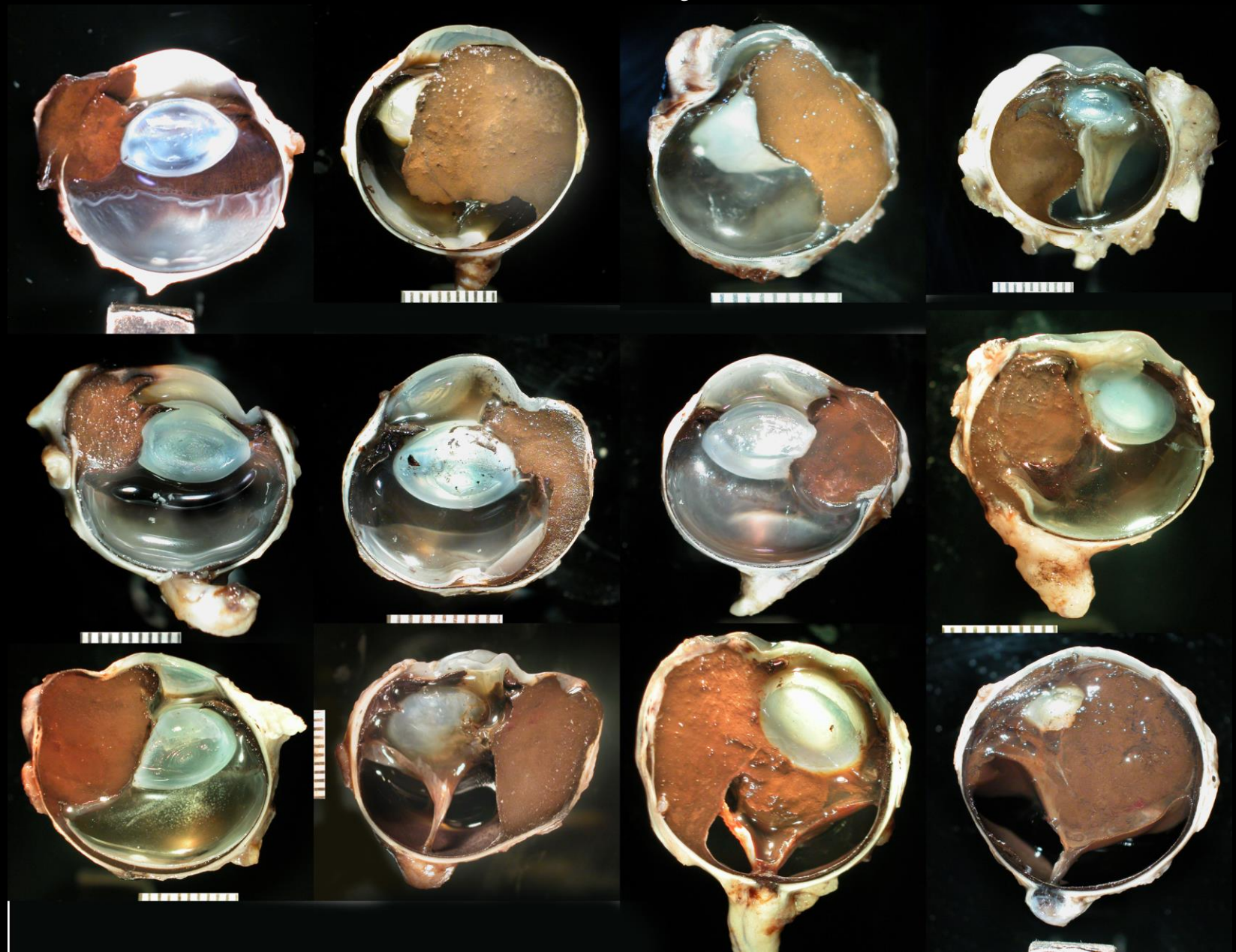
Many cases arise within ocular melanosis or heavily pigmented globes

Melanocytoma is distinguished from melanosis by the presence of a distinct mass lesion or by a double population of spindle and round cells

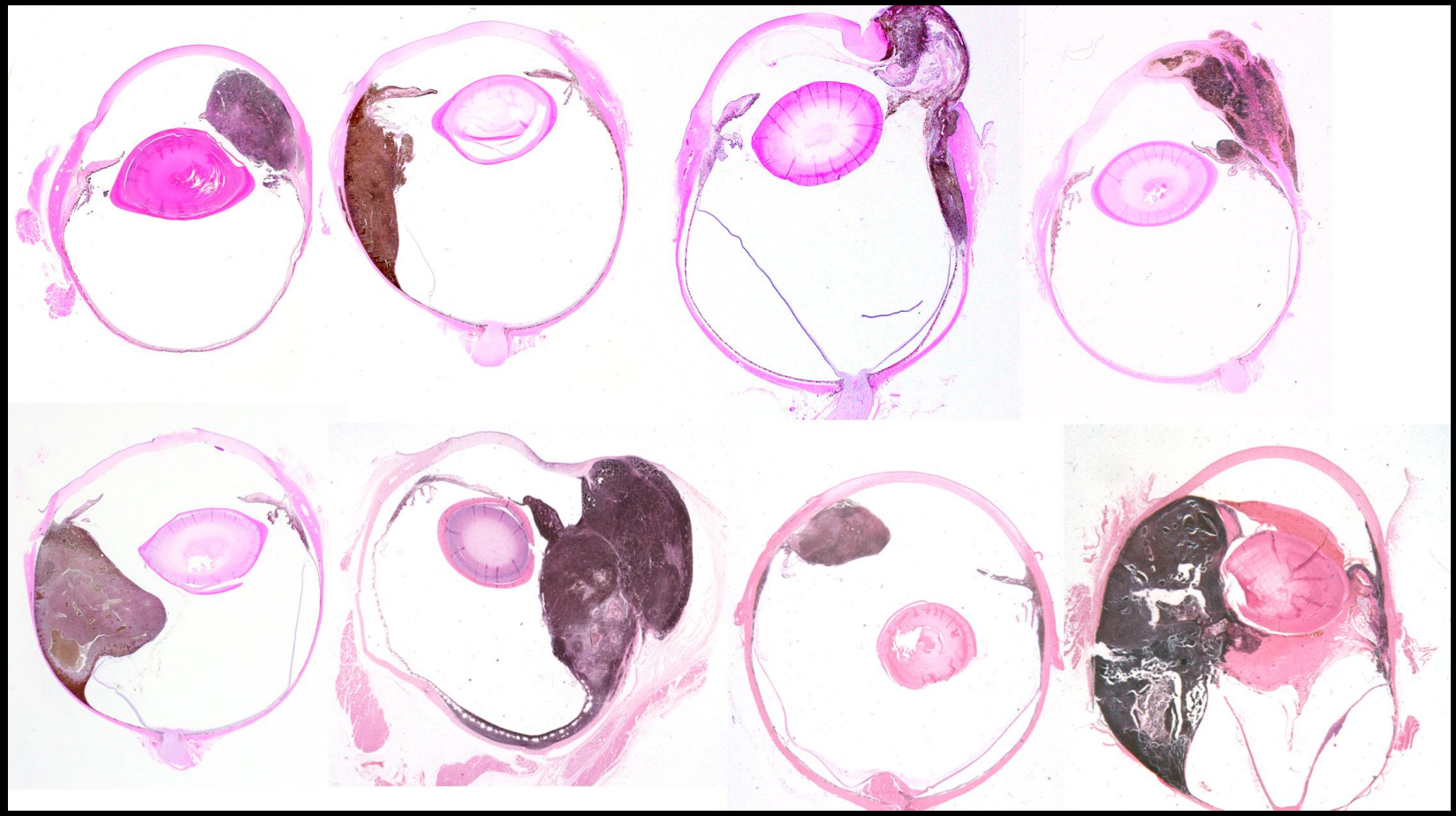
Melanosis

Melanocytoma

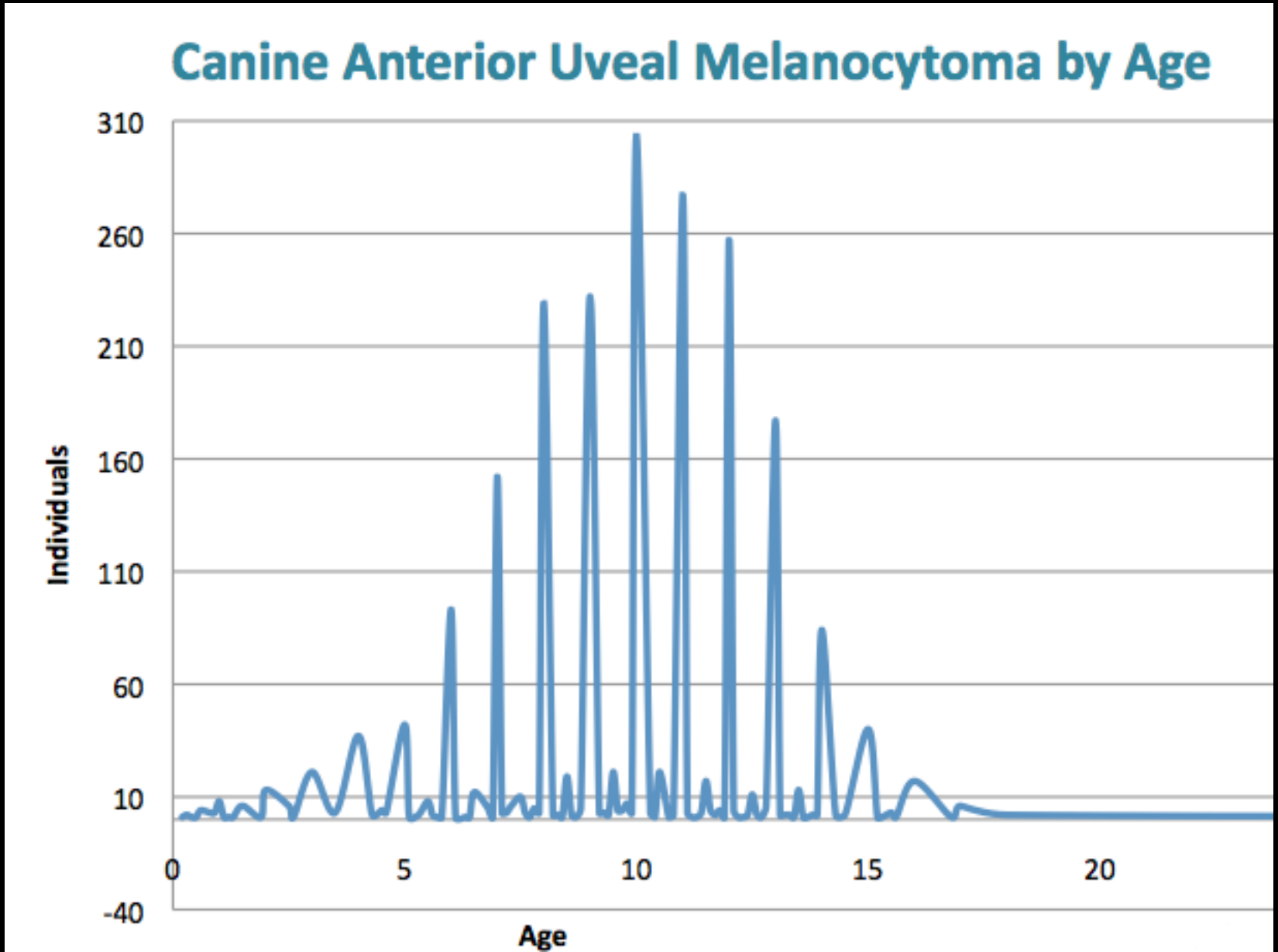
Melanocytoma



Melanocytoma

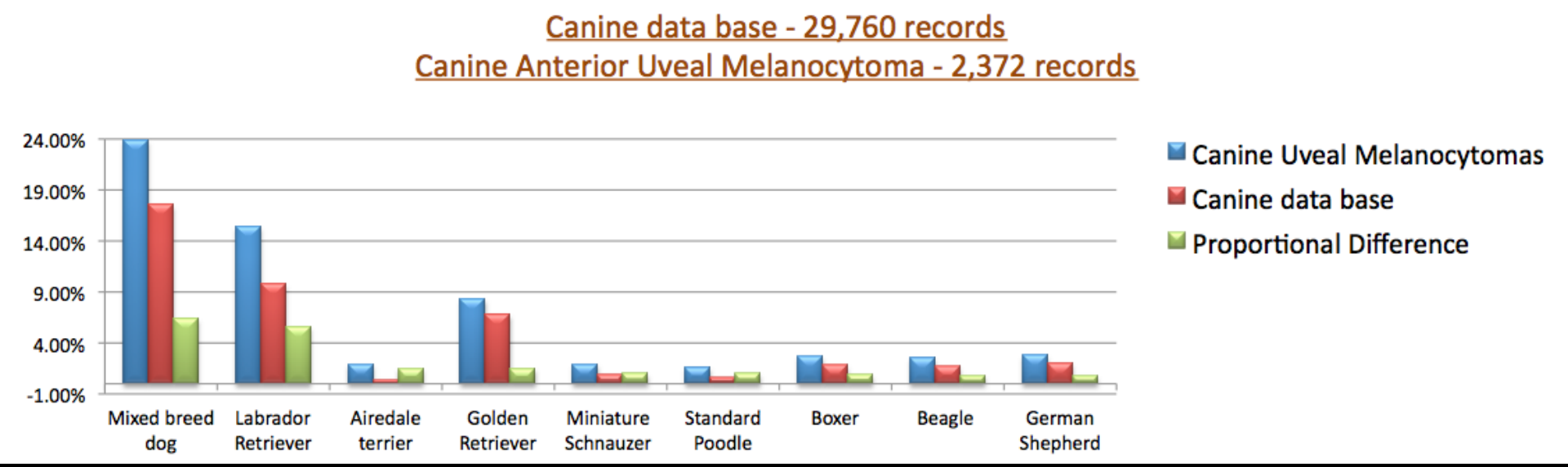


Melanocytoma



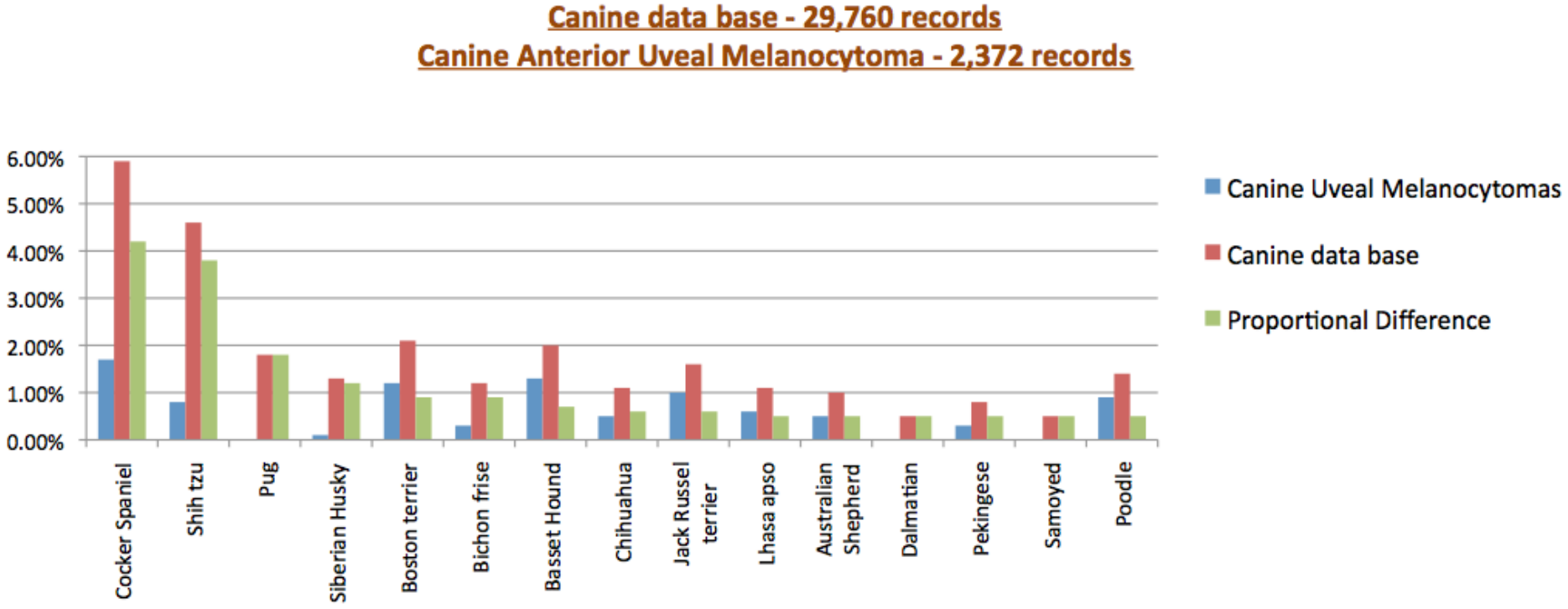
Melanocytoma

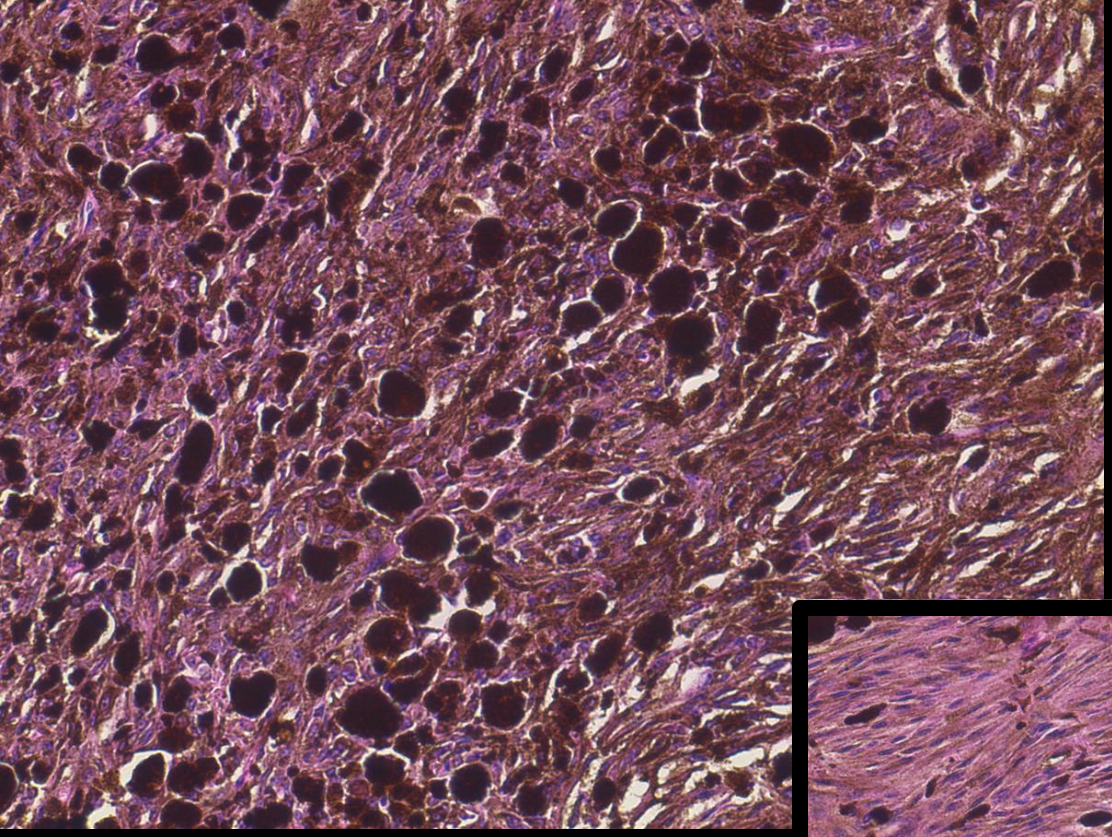
Over Represented Breeds



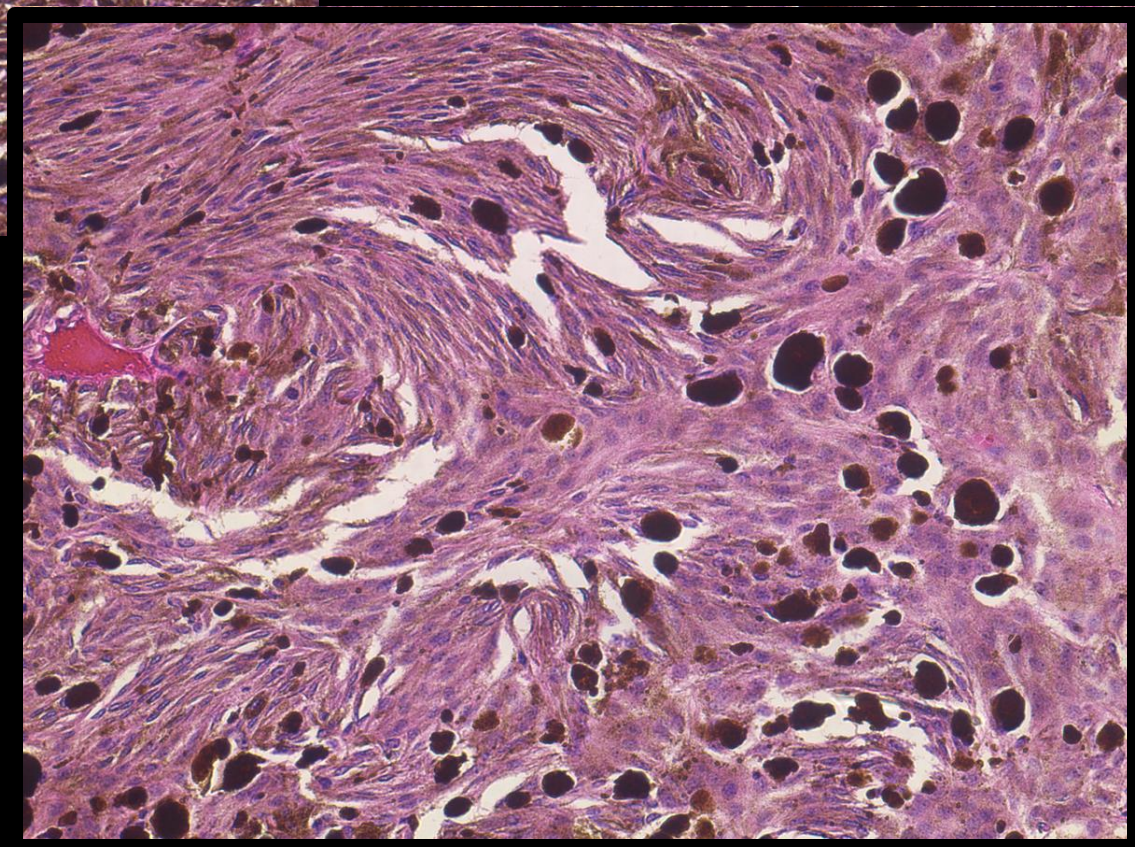
Melanocytoma

Under Represented Breeds



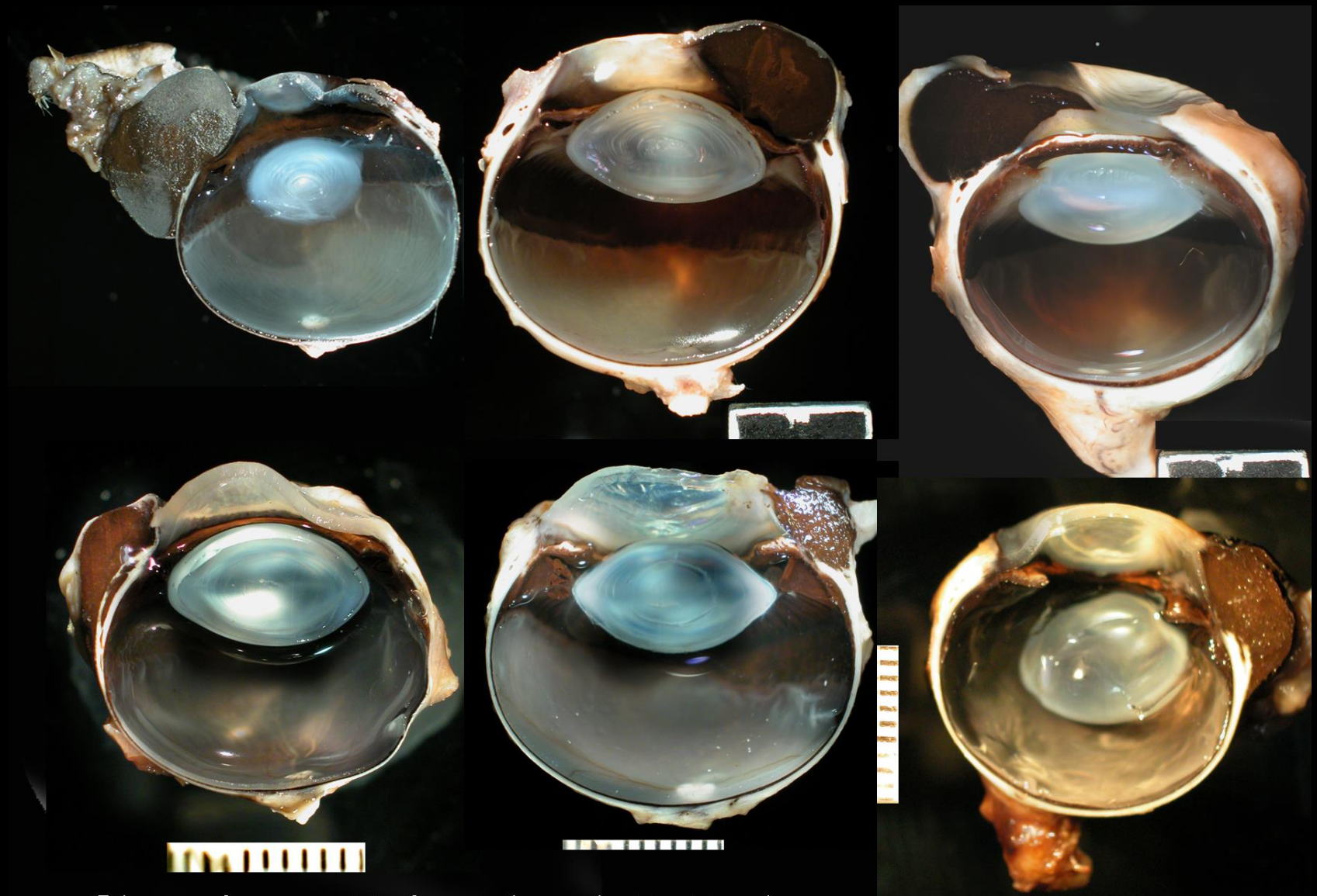


Heavily pigmented Round cells and Heavily pigmented Spindle cells

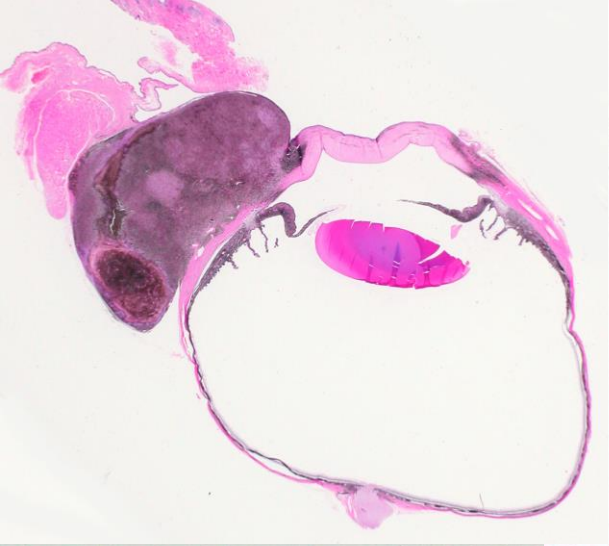


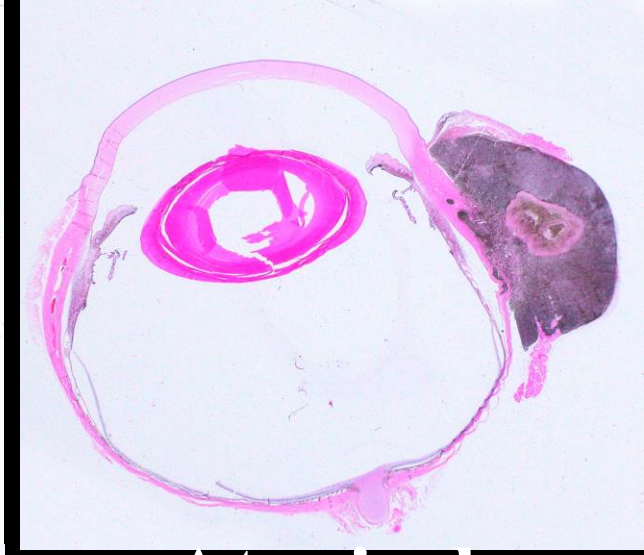
Limbal (Epibulbar) Melanocytoma 393 Cases

- 76 Labradors
- 65 Golden Retrievers
- 38 German Shepherds

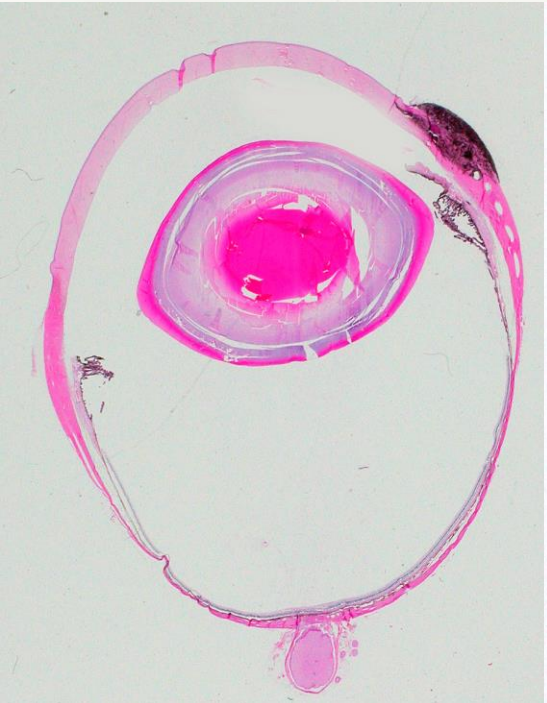


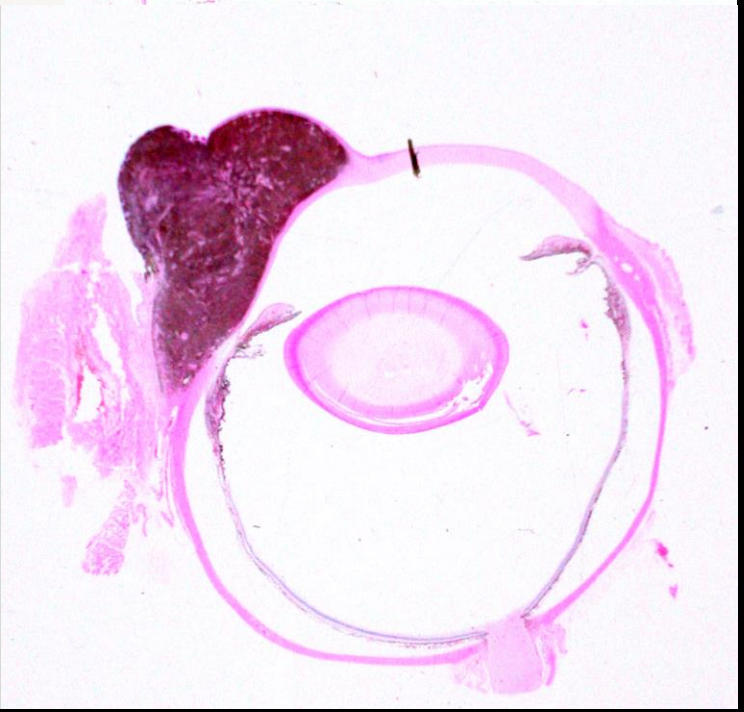
Canine Limbal Melanocytoma





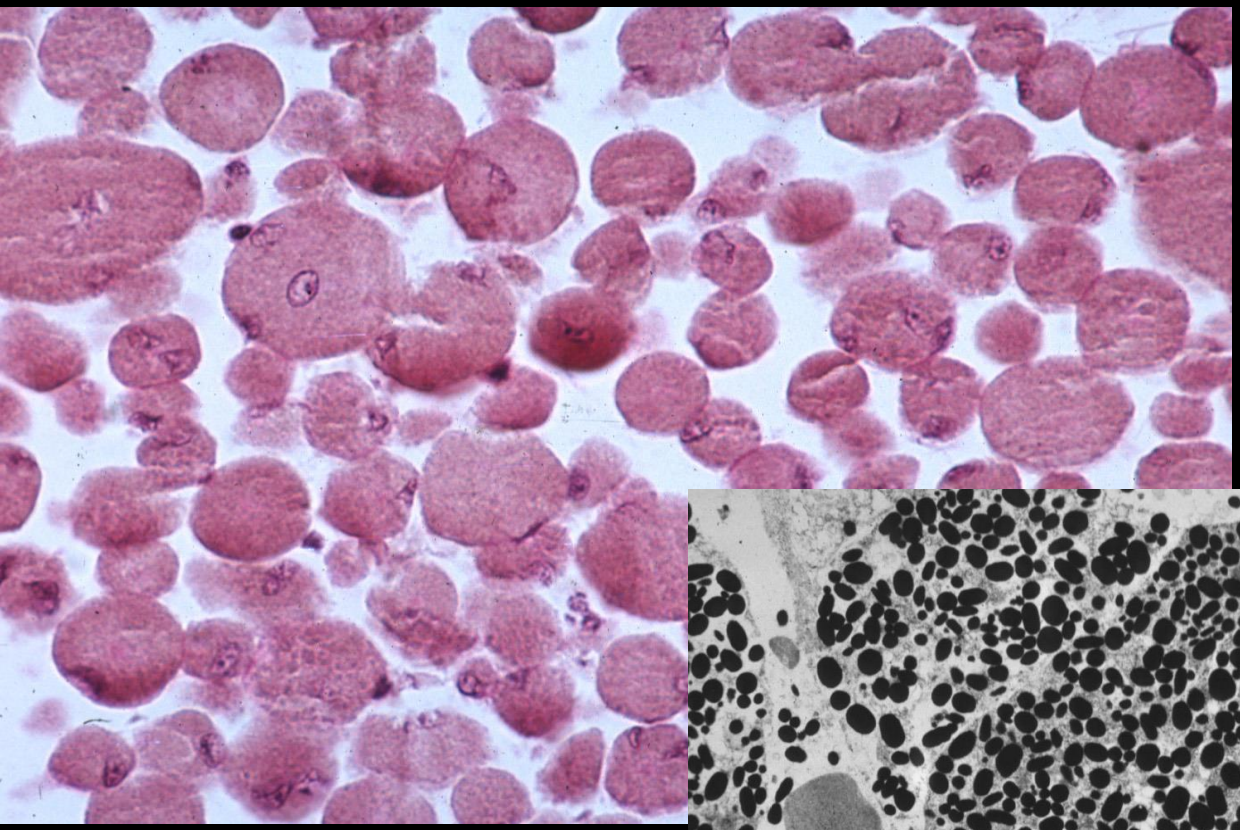
Atypical



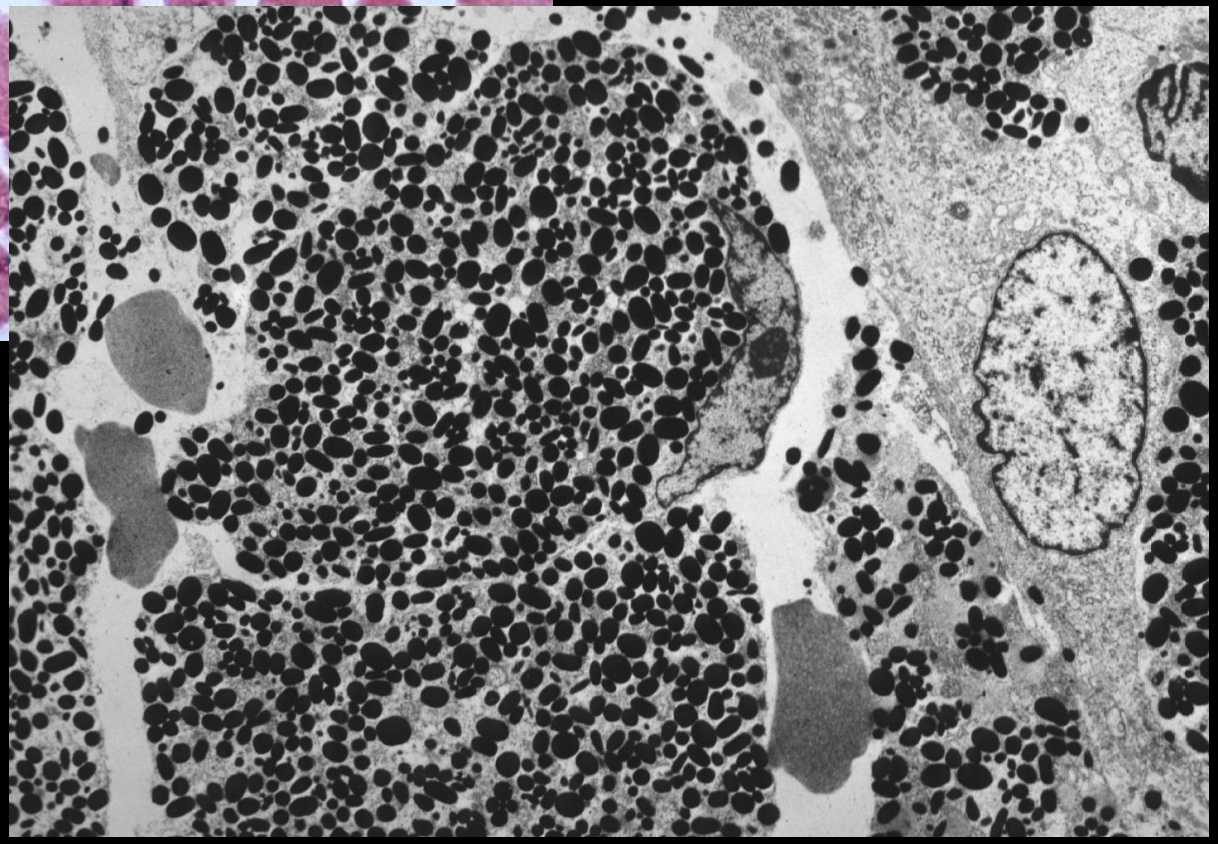


6-years

Typical Limbal Melanocytoma



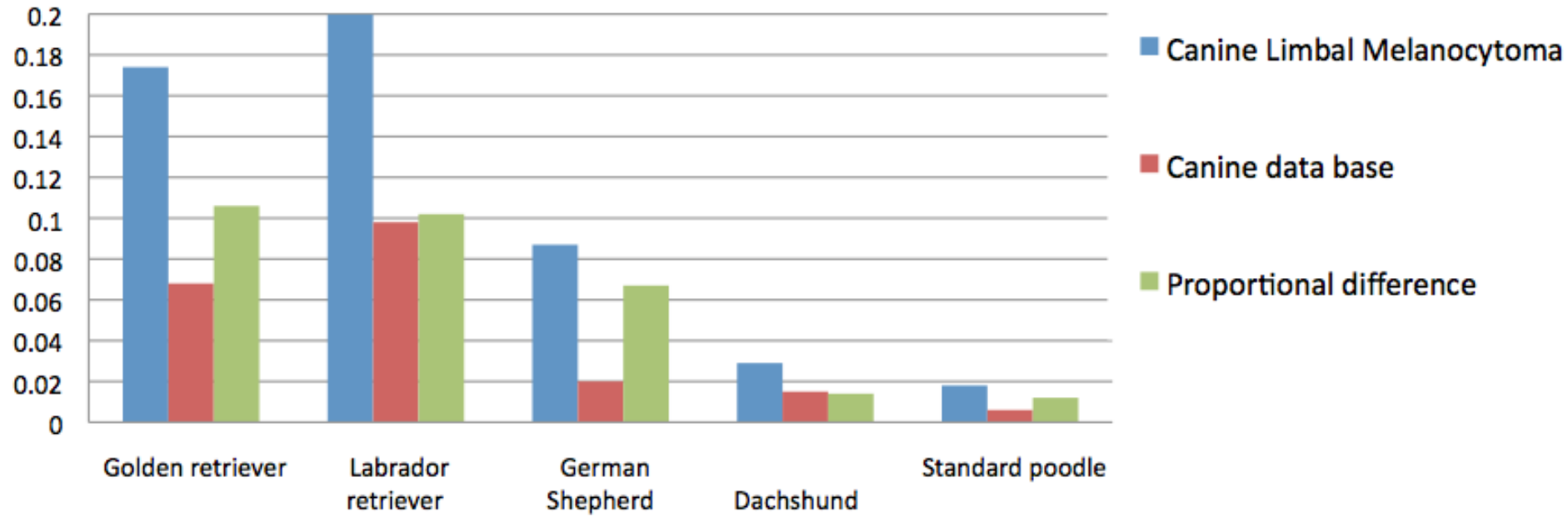
Round cells dominate



Electron Micrograph Melanocytes

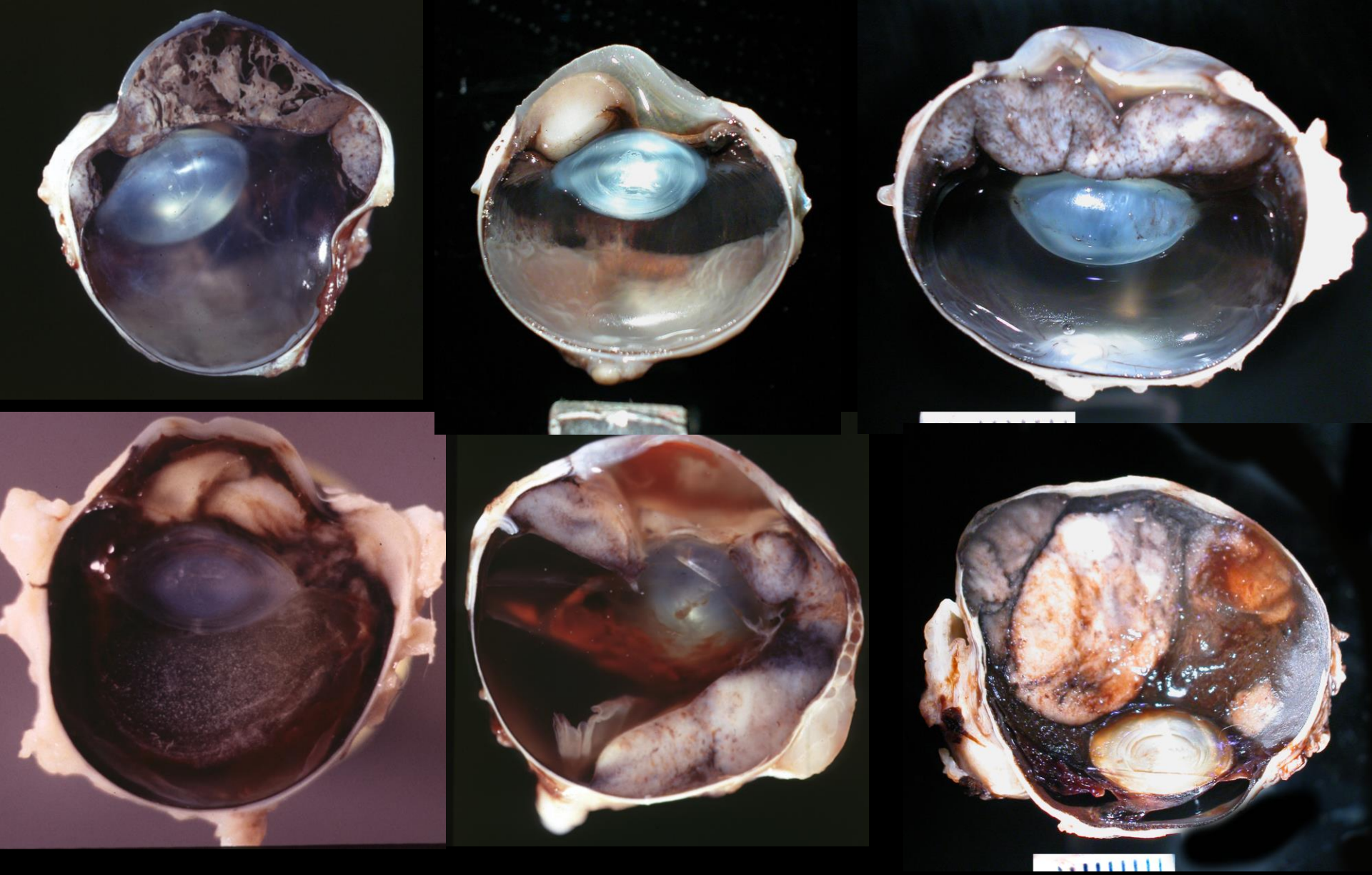
Limbal Melanocytoma

Canine data base - 29,760 records
Canine Limbal Melanocytoma - 380 records
Overrepresented

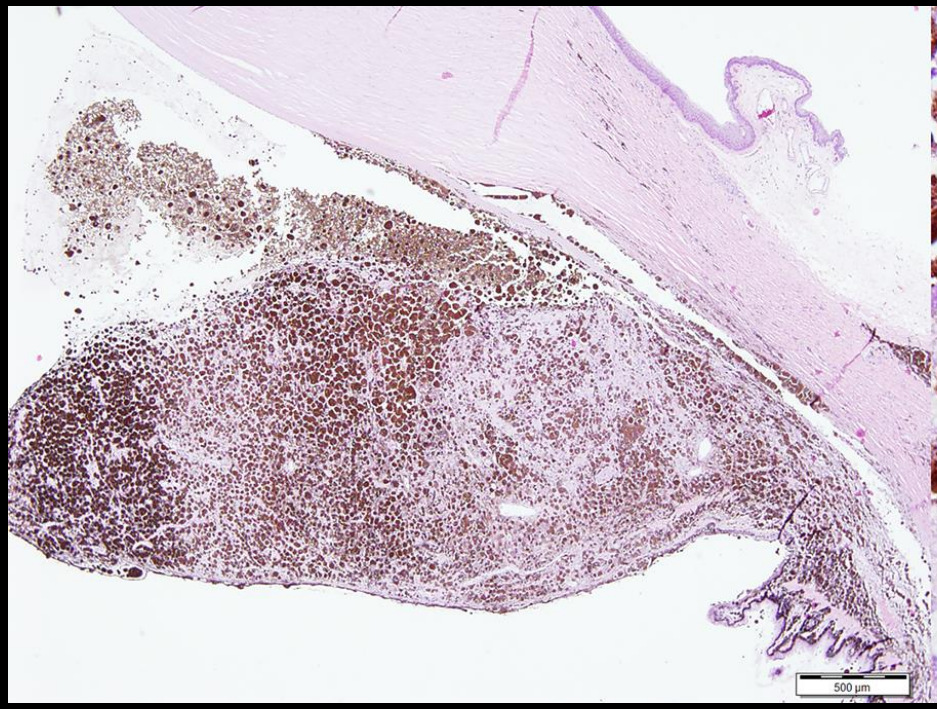


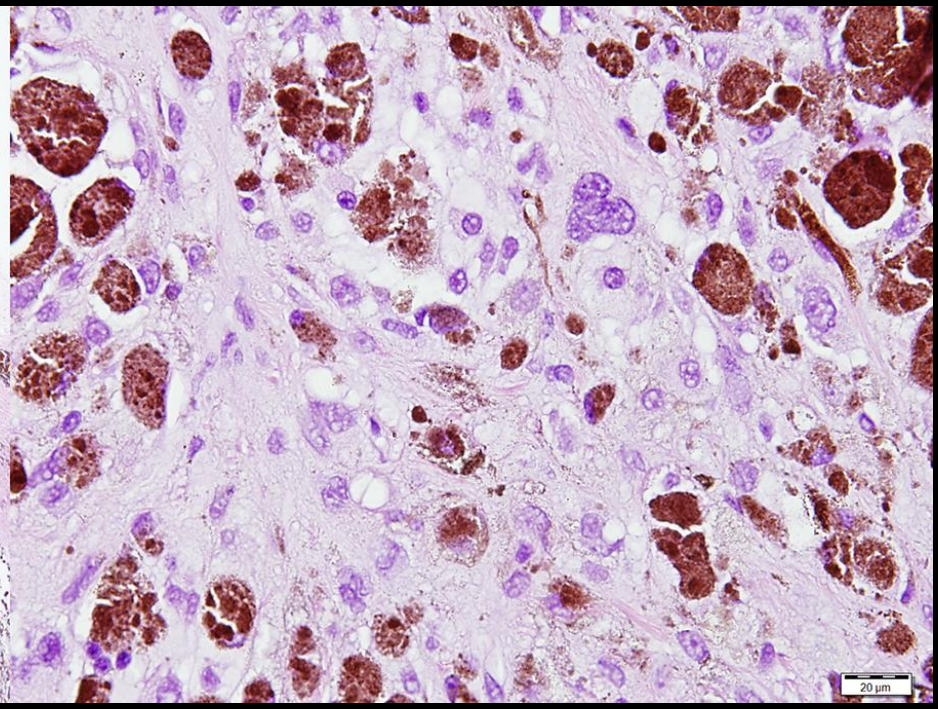
Anterior Uveal Malignant Melanoma
312 Cases

Many Cases arise from
Melanocytoma or Melanosis

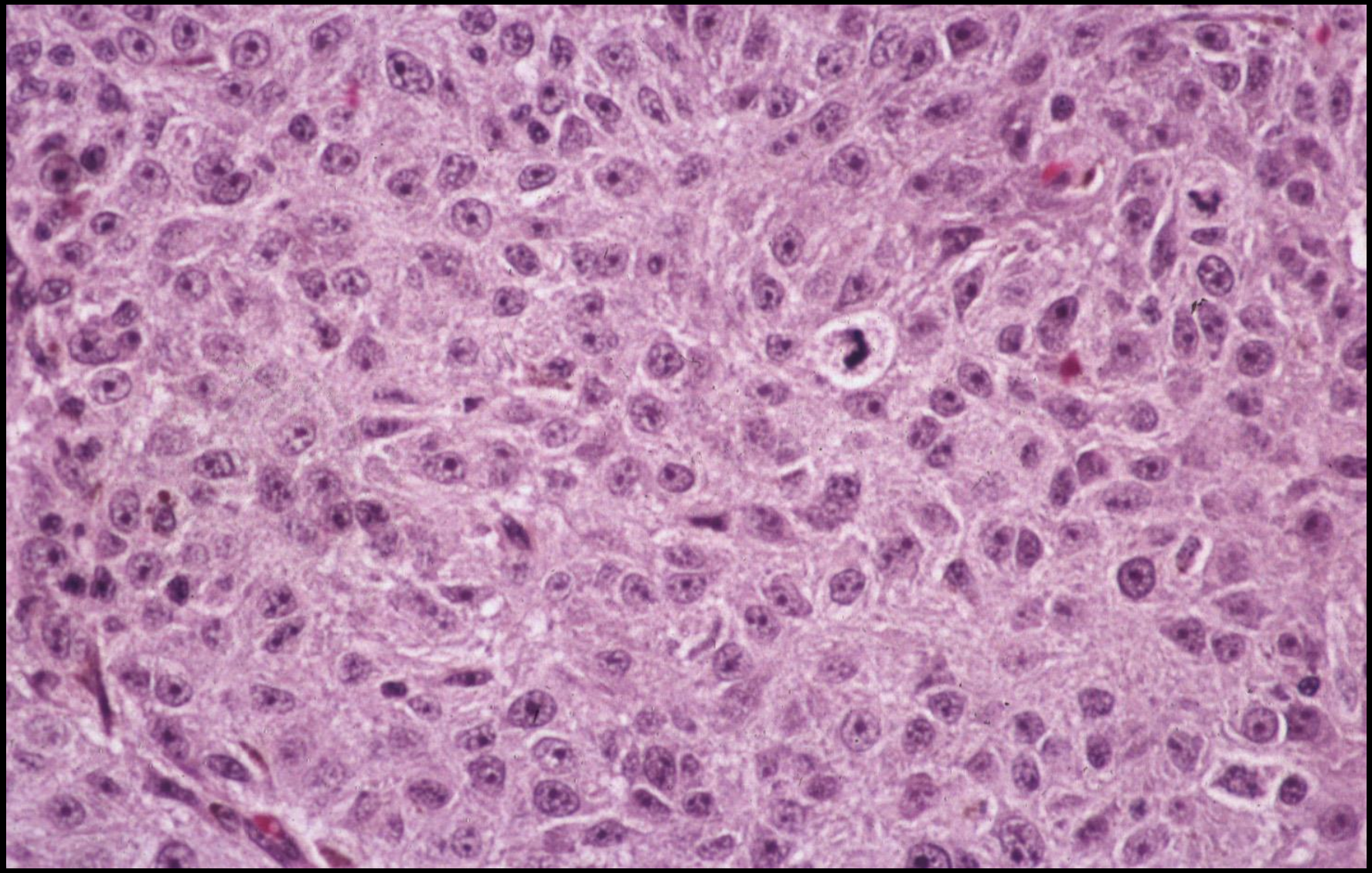


Malignant Uveal Melanoma



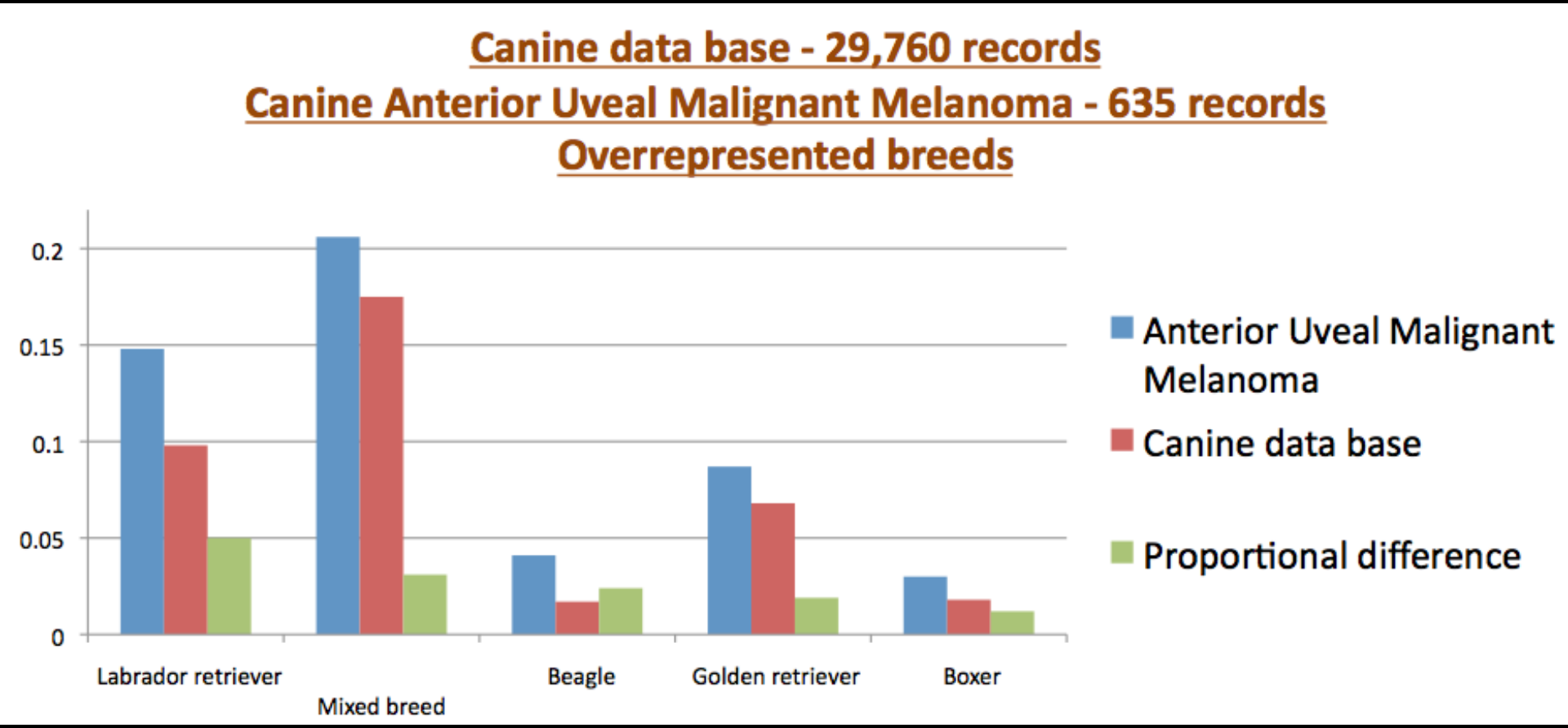


Malignant Uveal Melanoma
Pigmented Malignant Tumor

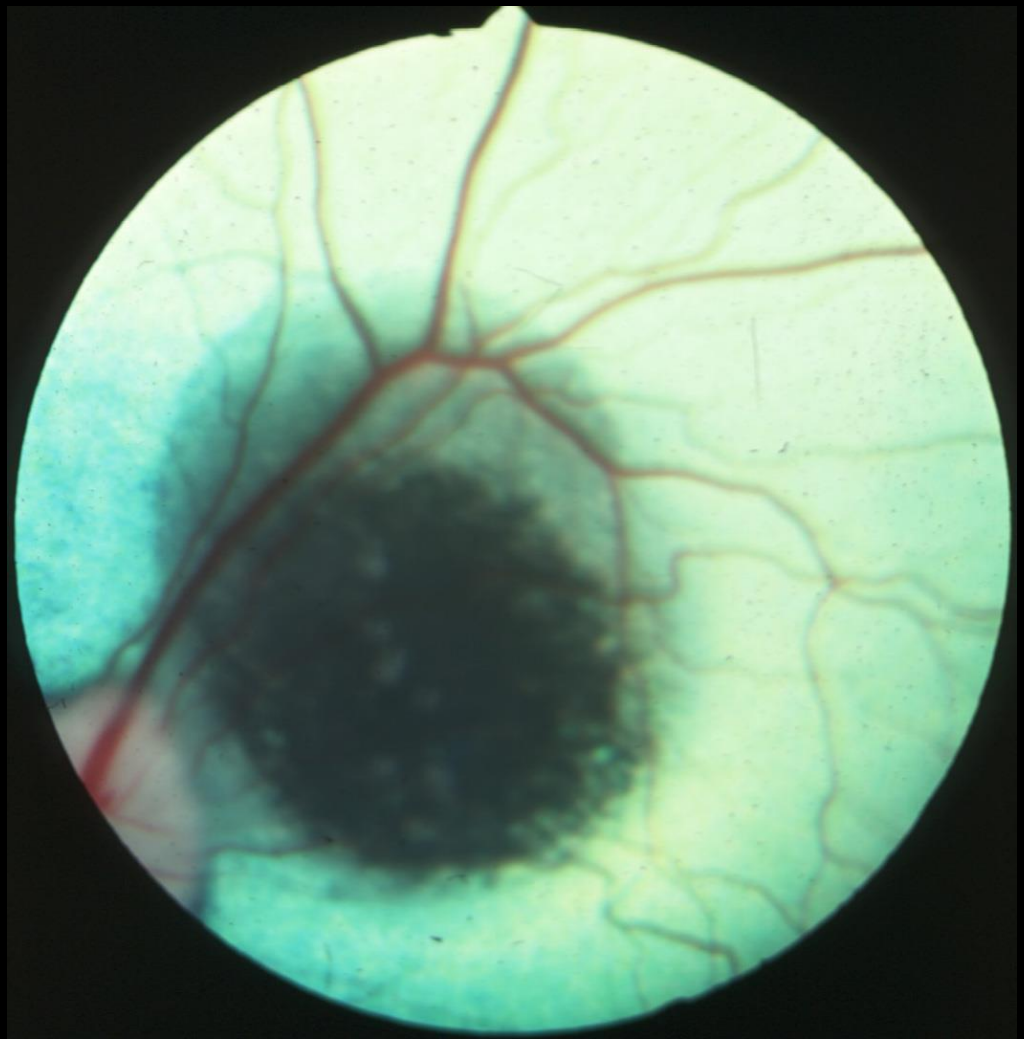


Malignant Uveal Melanoma

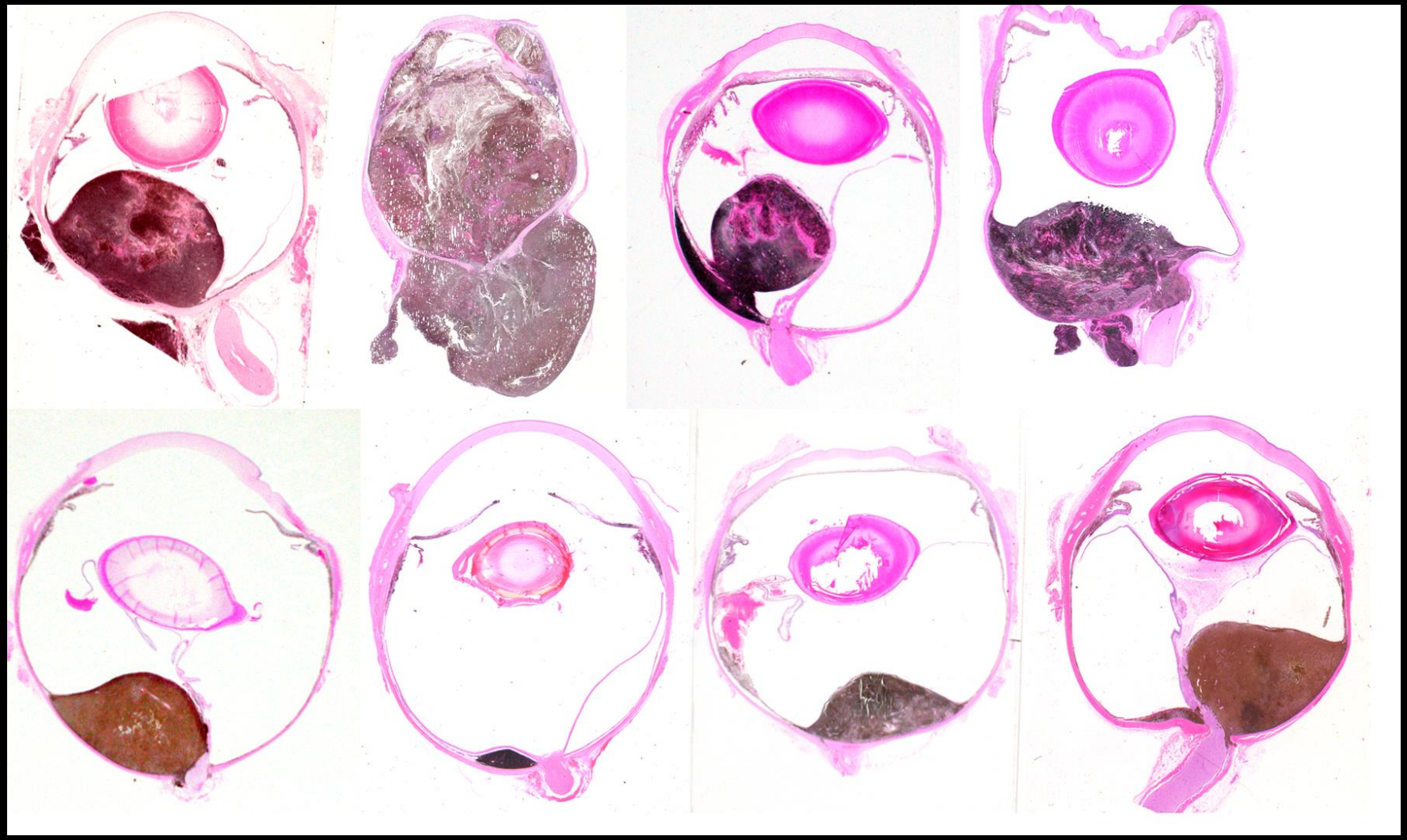
Malignant Melanoma

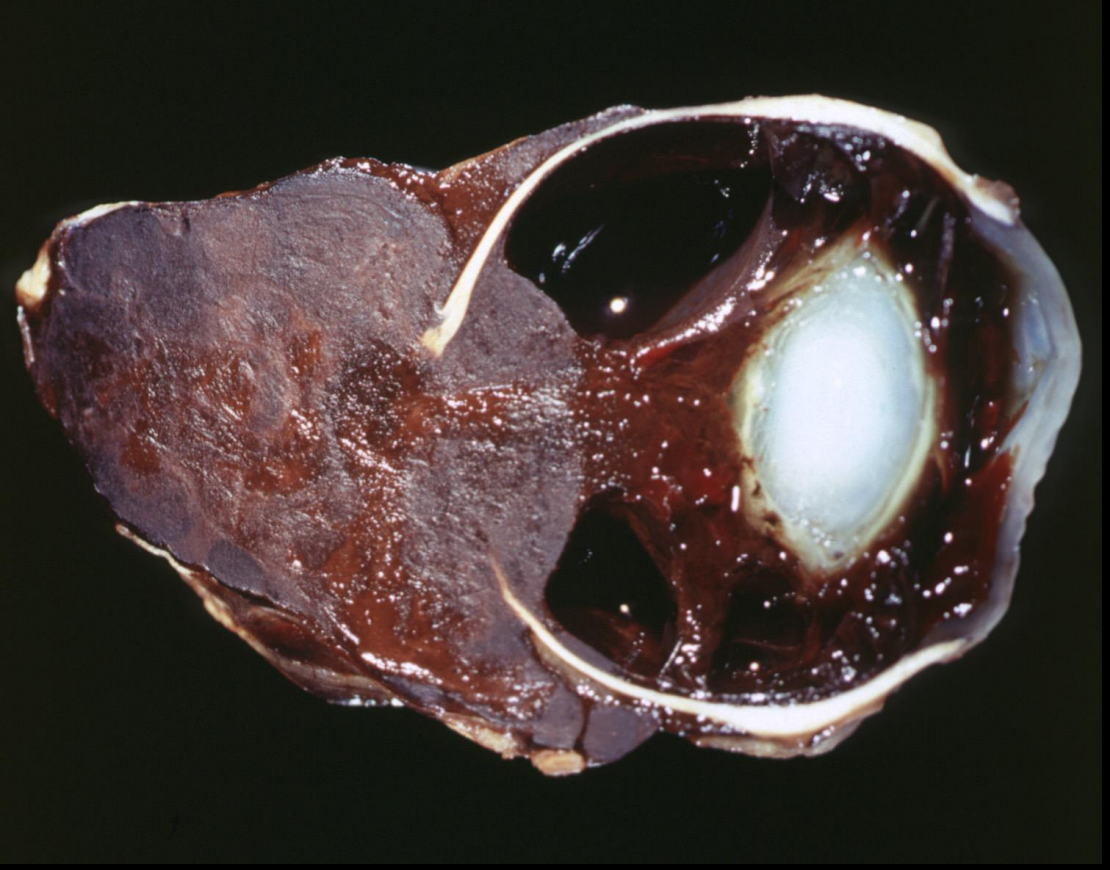


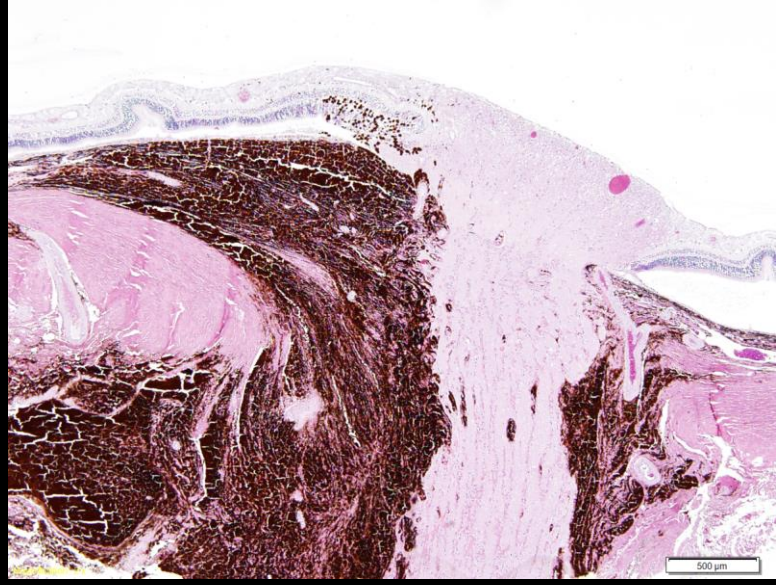
Choroidal Melanocytic Tumors
86 Benign & 11 Malignant



Choroidal Melanocytic Tumors



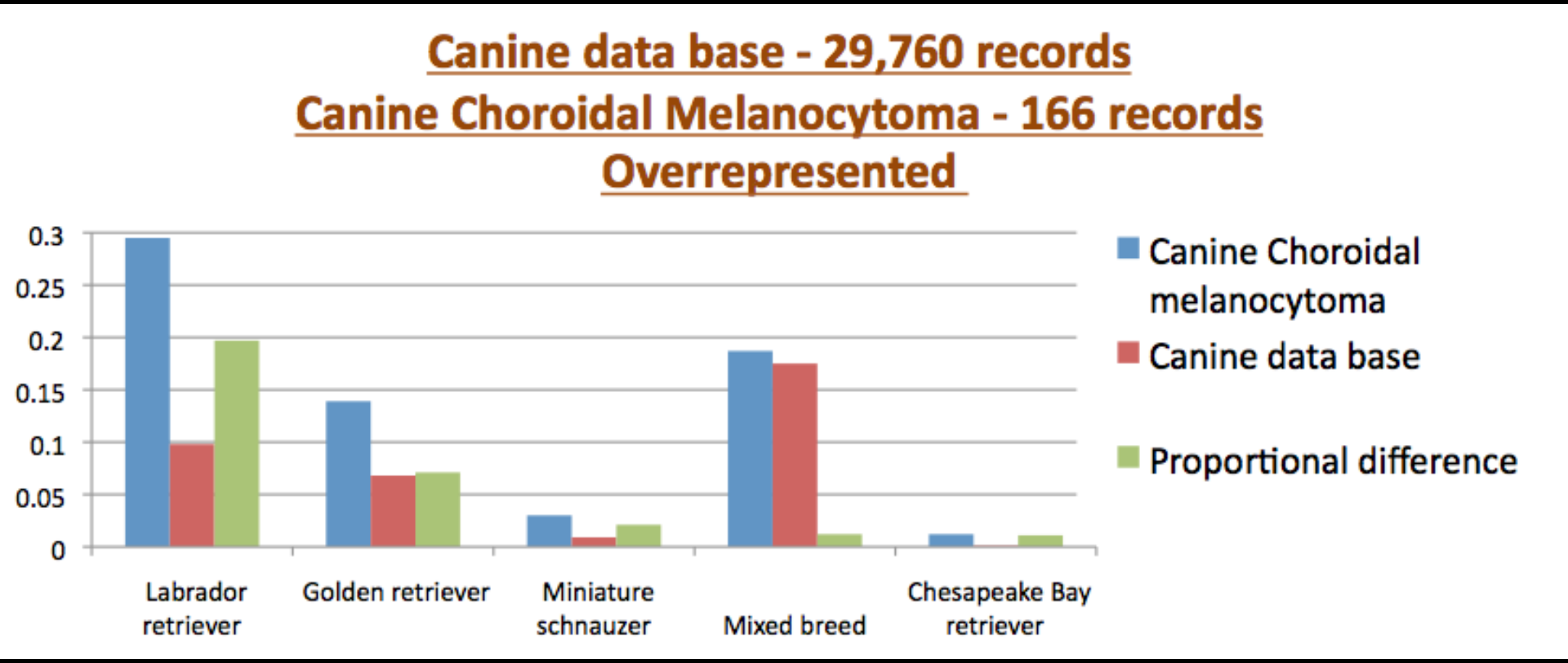




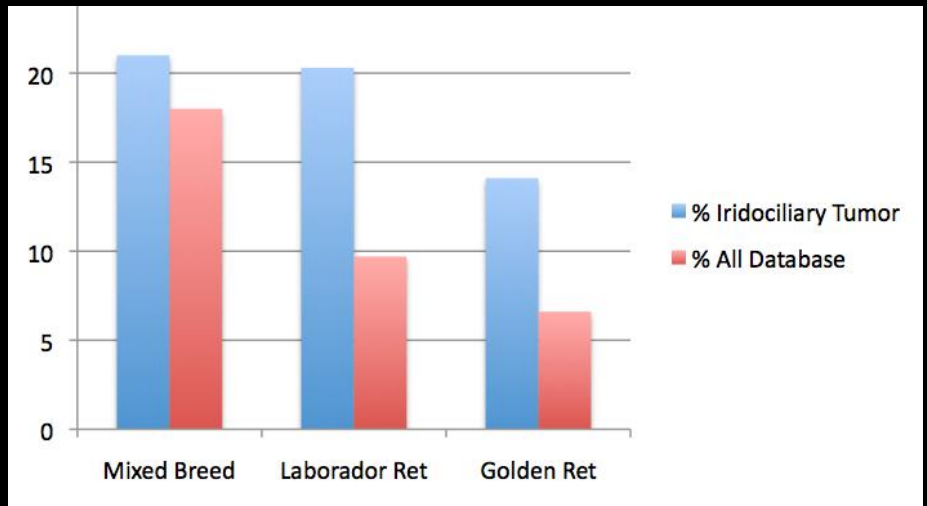
After 2.5 years this dog developed neruologic signs and was euthanized.

After 4 years the dog developed neurologic disease, presumed to be secondary to invasion of the optic foramen

Choroidal Melanoma

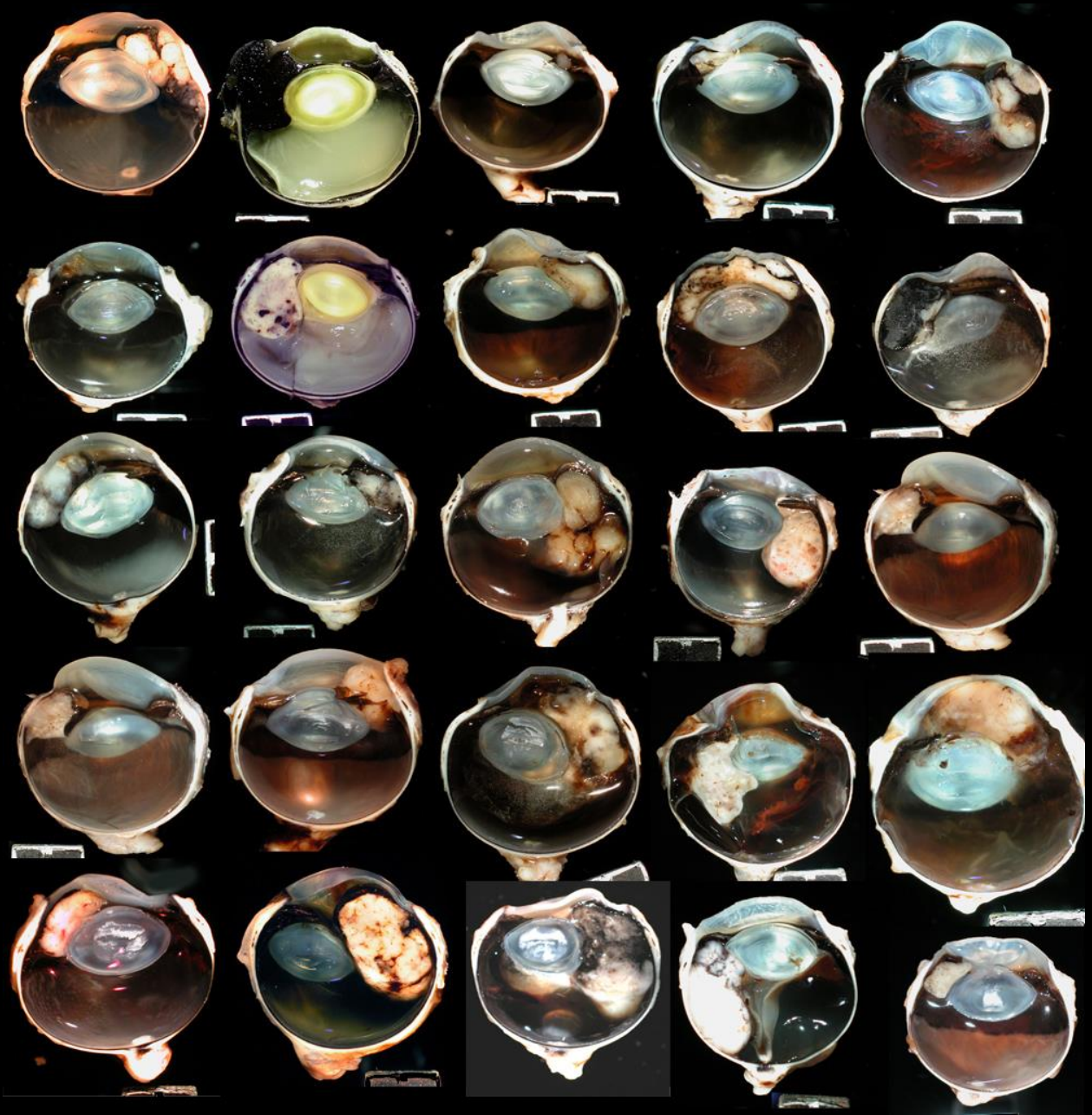


Canine Iridociliary Epithelial Tumors
1327 Cases
160 are Adenocarcinoma
16 Cases of Malignant Adenocarcinoma with features of Pleomorphic Adenocarcinoma

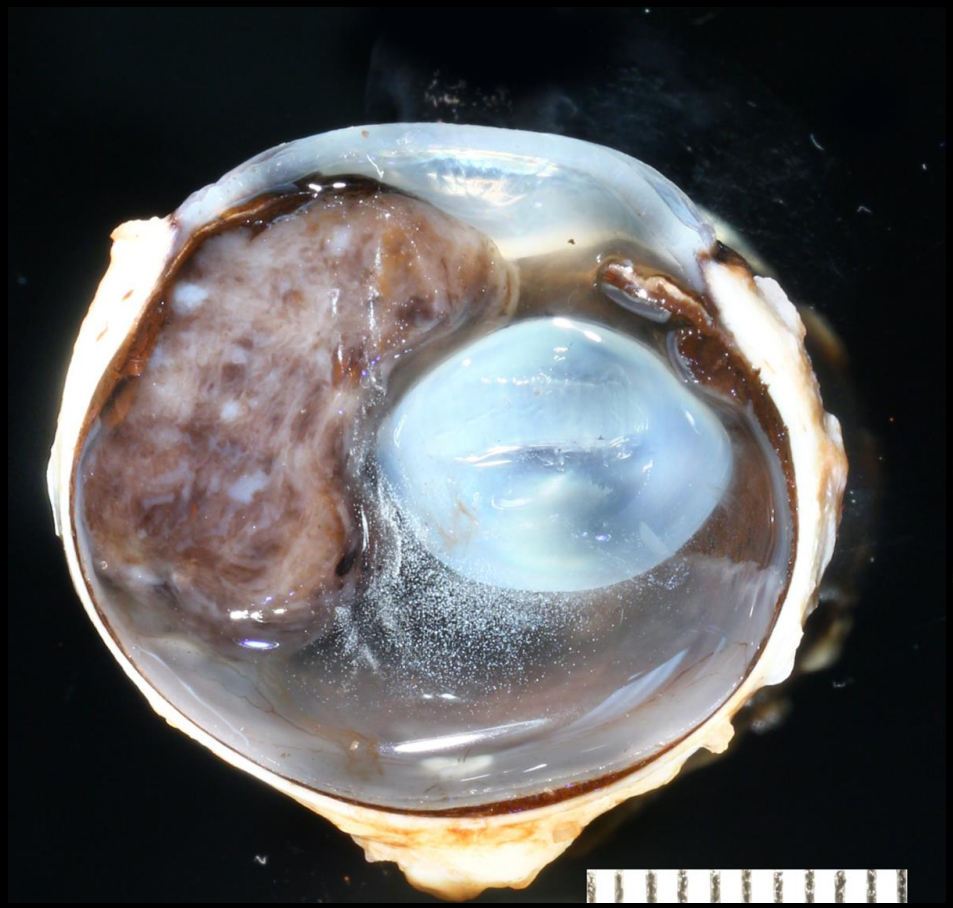


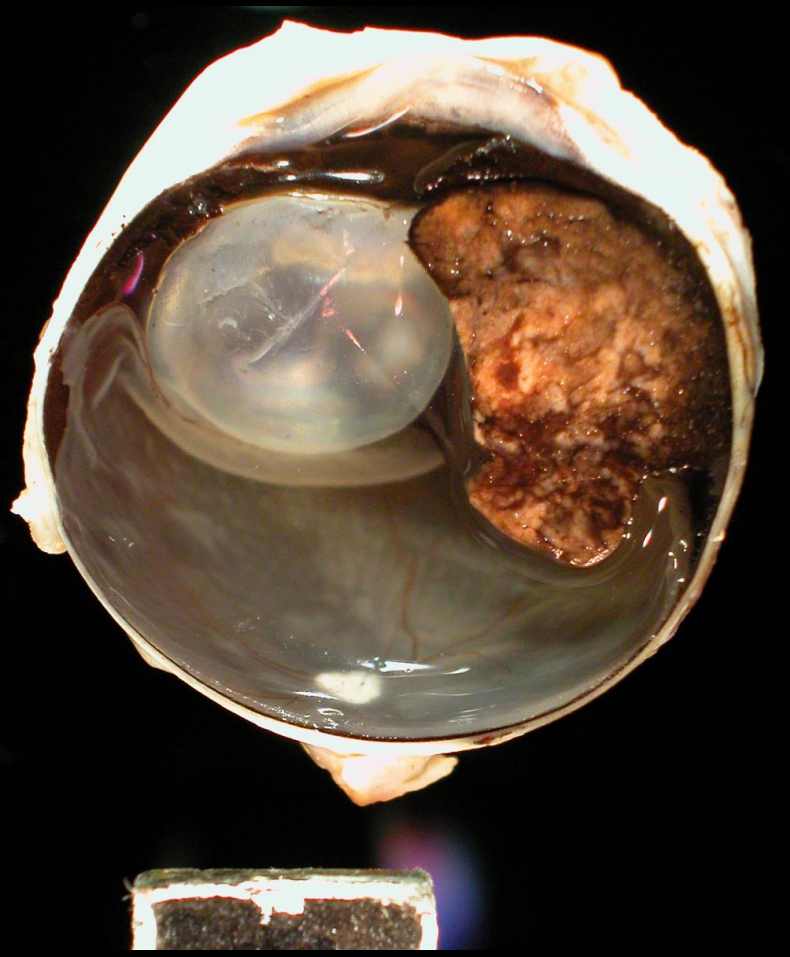
Dubielzig RR, Steinberg H, Garvin H, Deehr A.J, Fischer B. (1998) Iridociliary epithelial tumors in 100 dogs and 17 cats: a morphological study. *Vet. Ophthal*. 1: 223-231.

Canine Iridociliary Epithelial Tumors



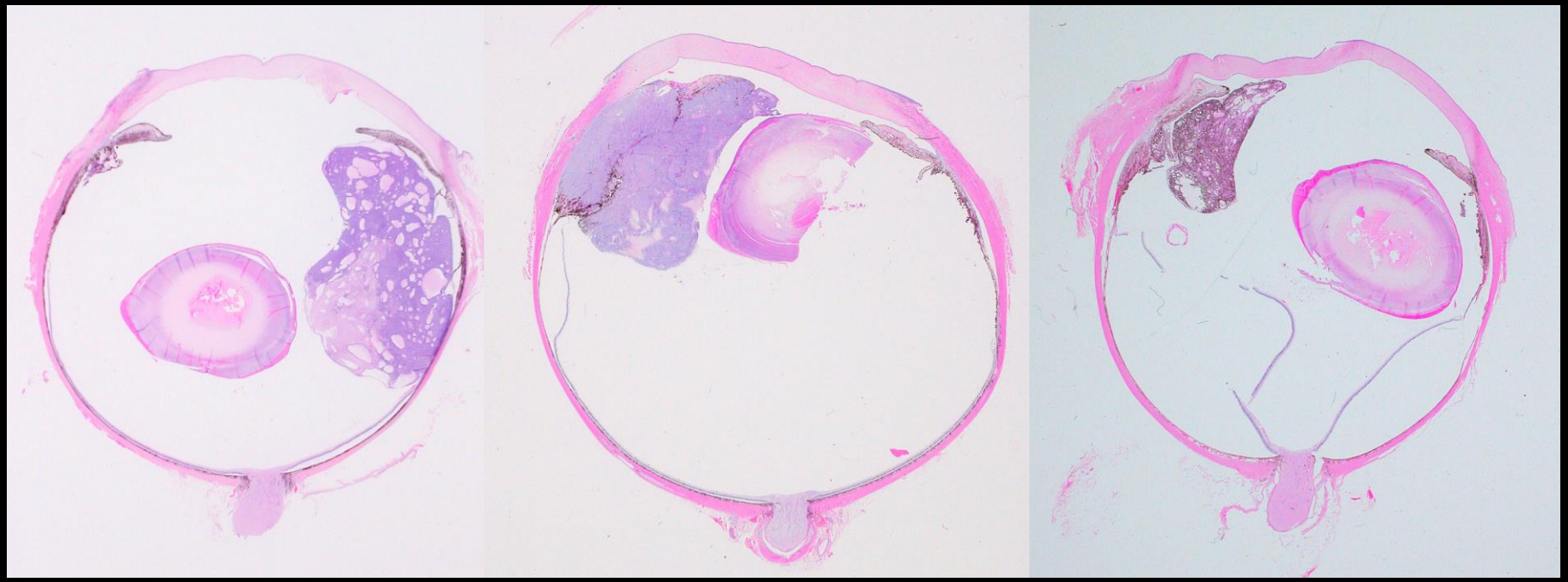
Pigmented Iridociliary Adenoma

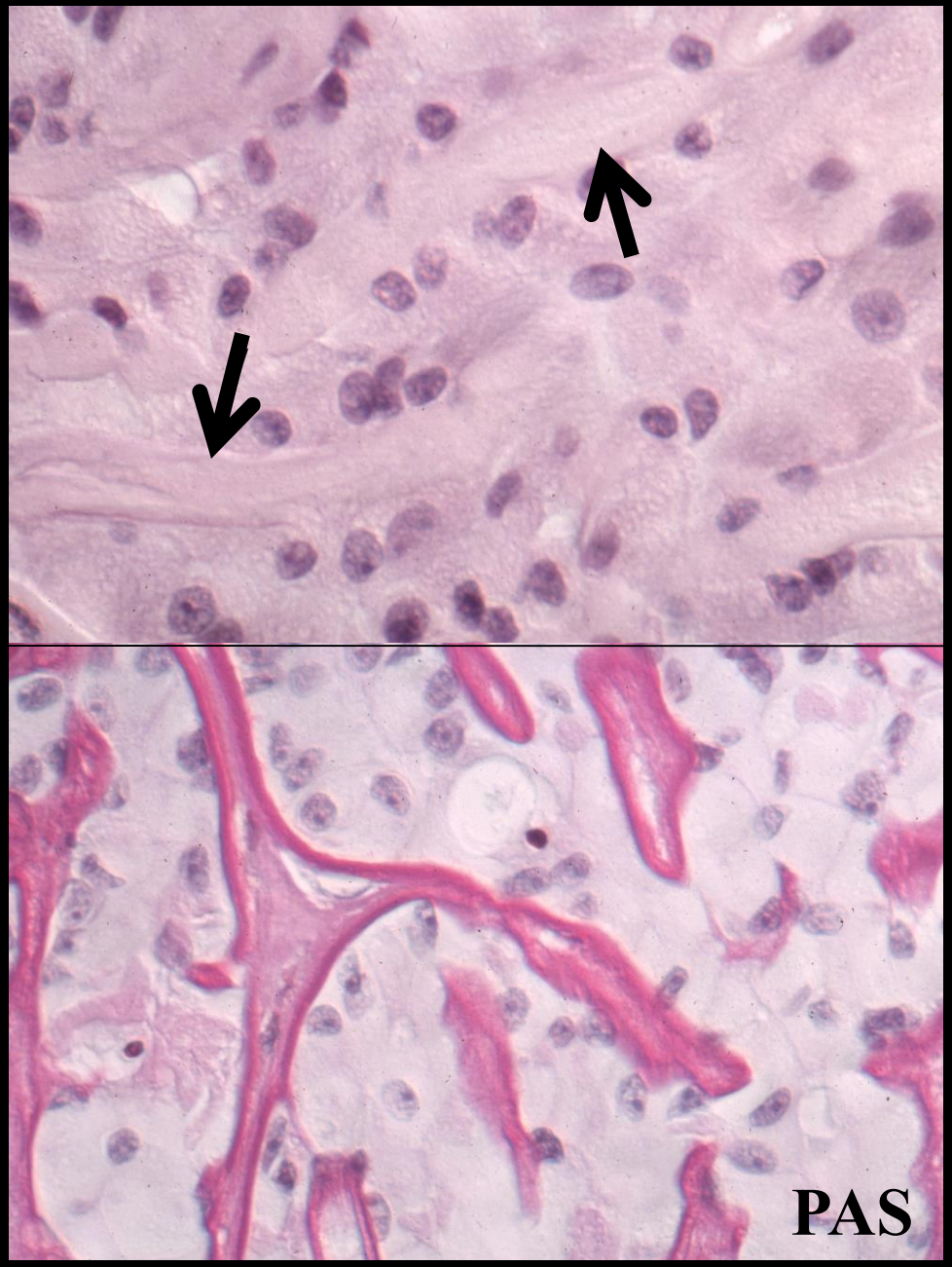




Pigmented tumors can look like melanocytomas

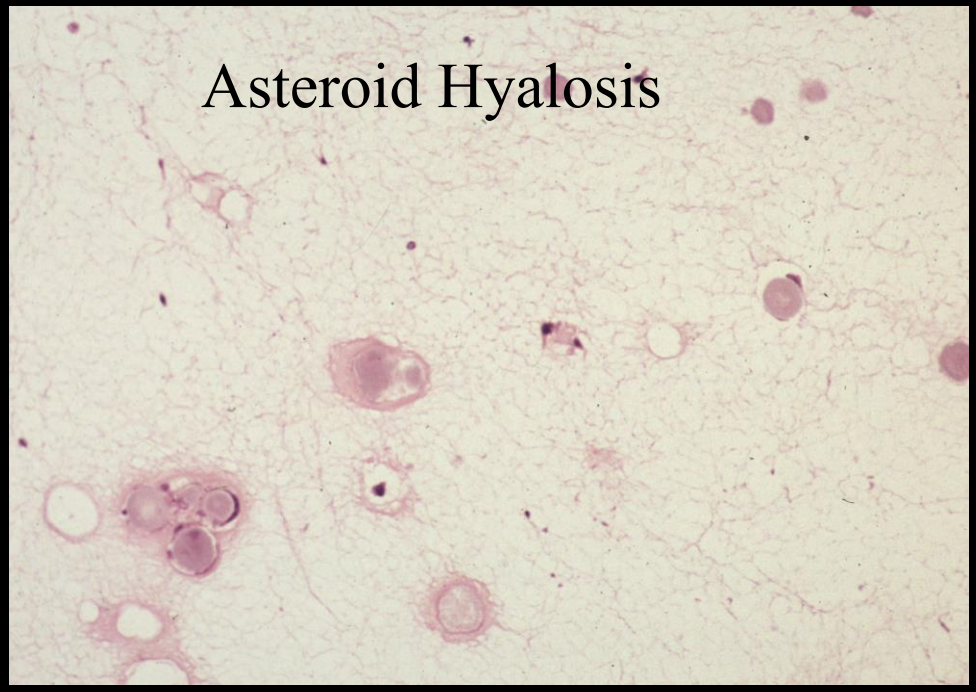
Iridociliary Adenoma

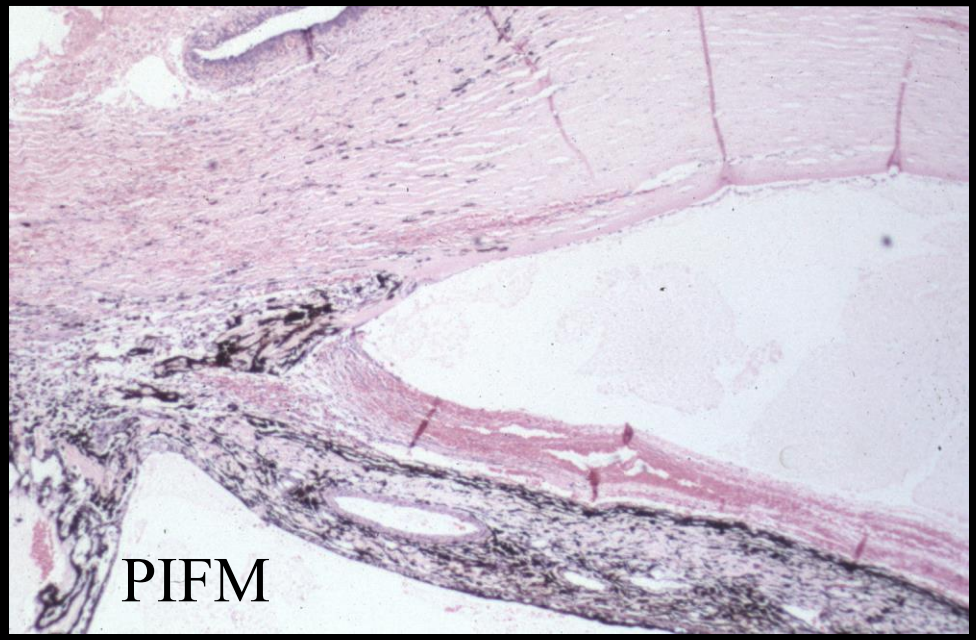




Iridociliary Adenoma

Basement Membranes

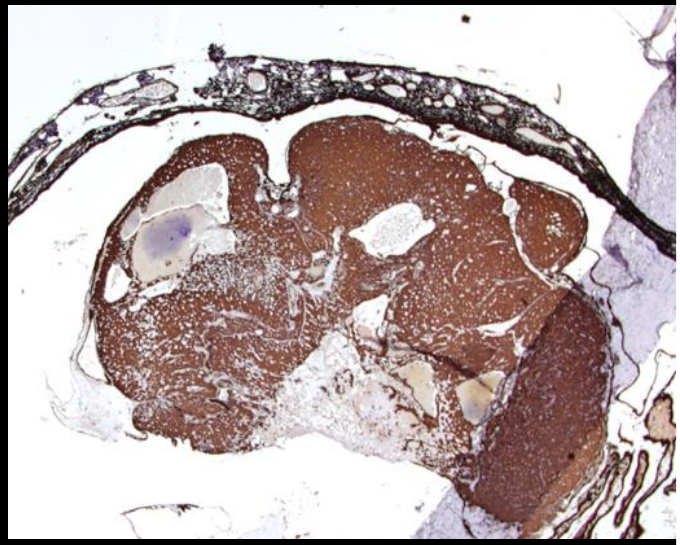
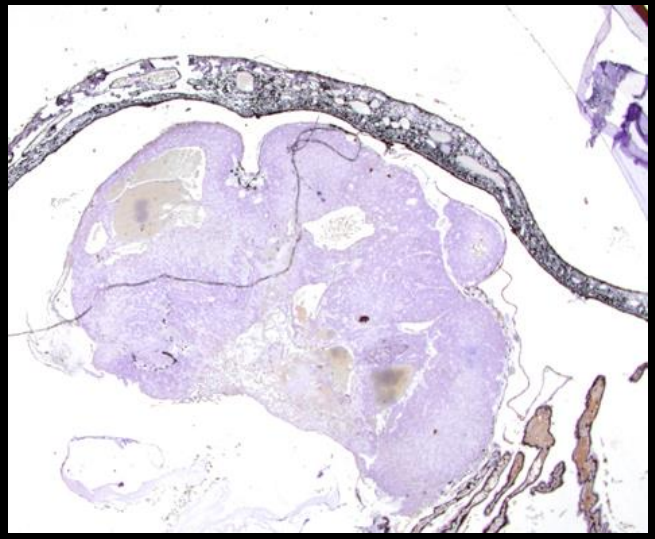
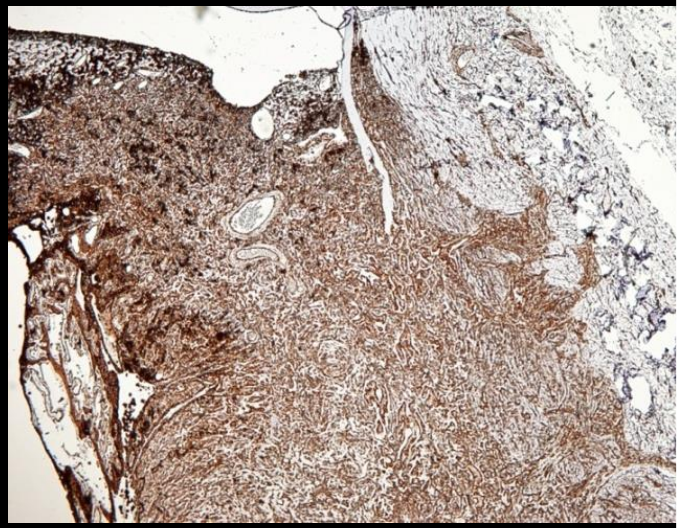
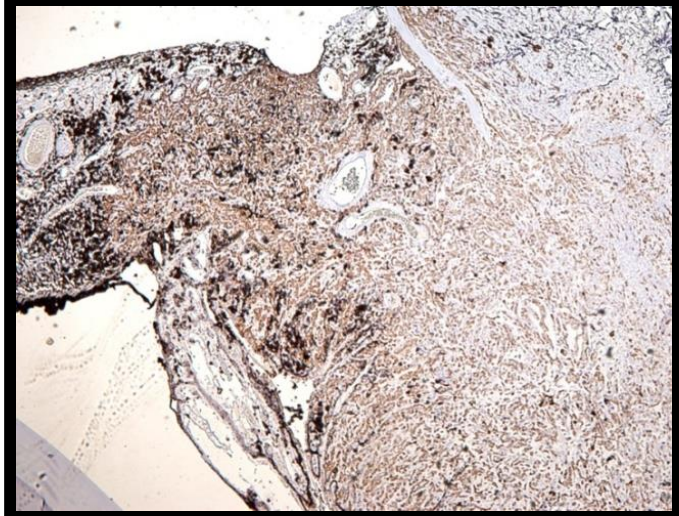




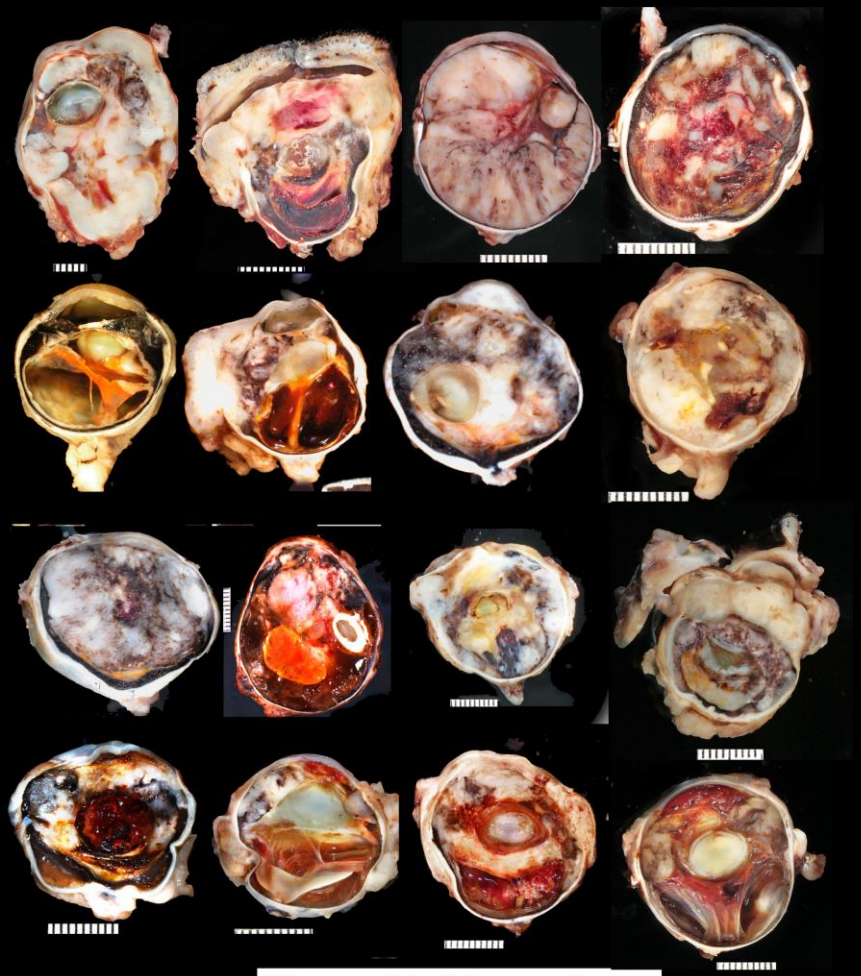
Iridociliary Adenoma

Immunohistochemistry of Canine Iridociliary Epithelial Tumors

- Vimentin+
- Cytokeratin- (Malignant tumors tend to become +)
- S100 +
- NSE +

	Vimentin	Pancytokeratin
Non-uveoinvasive (n = 7)	 100% positive	 14% positive
Adeno-CA (n = 7)	 100% positive	 57% positive

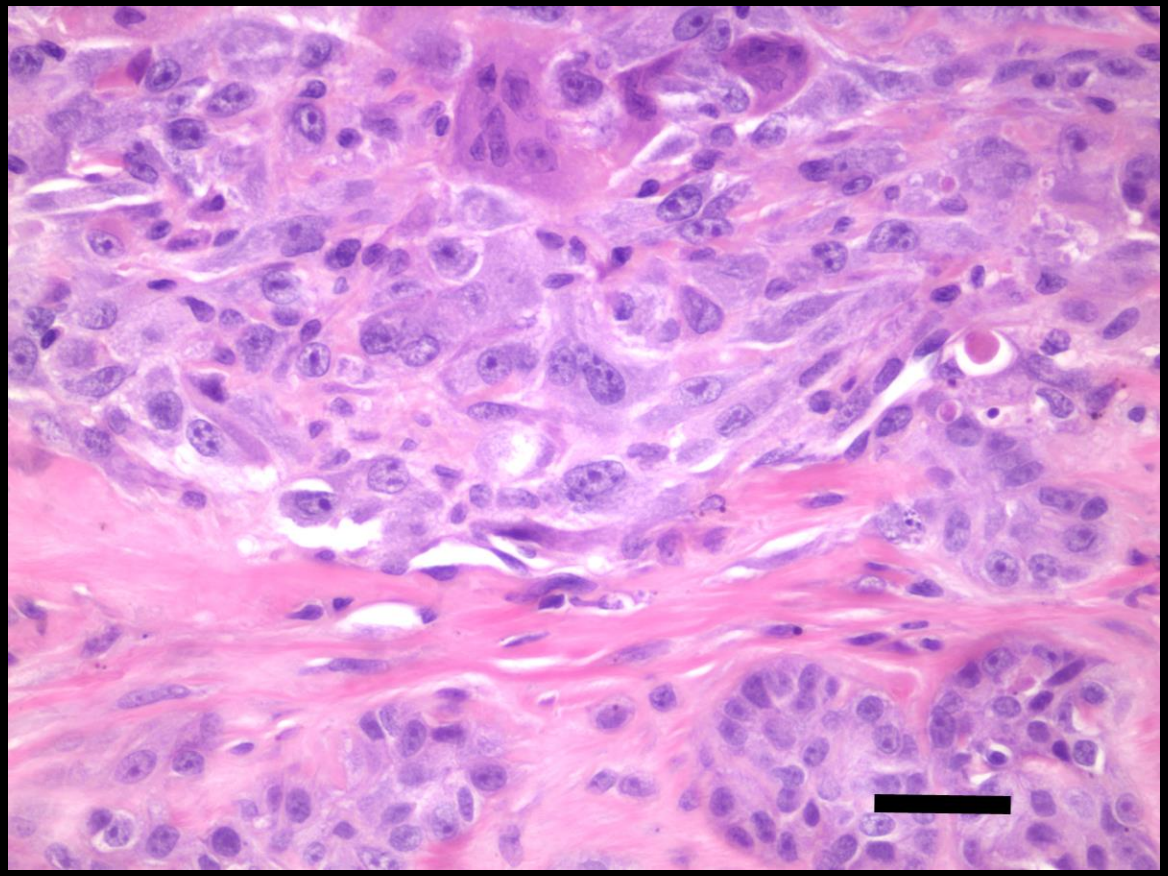
Malignant Variant of Iridociliary Epithelial Tumor (Pleomorphic Adenocarcinoma) 26 Cases



Pleomorphic Adenocarcinoma

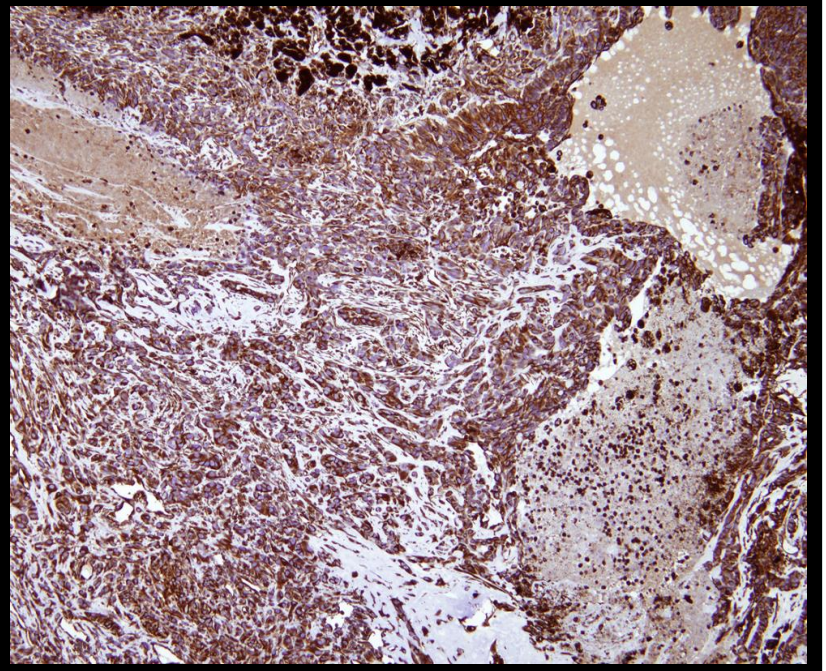
Zarfoss MK, Dubielzig RR. (2007) Metastatic iridociliary adenocarcinoma in a Labrador retriever. *Vet. Pathol*. 44: 672-676.

Pleomorphic Adenocarcinoma



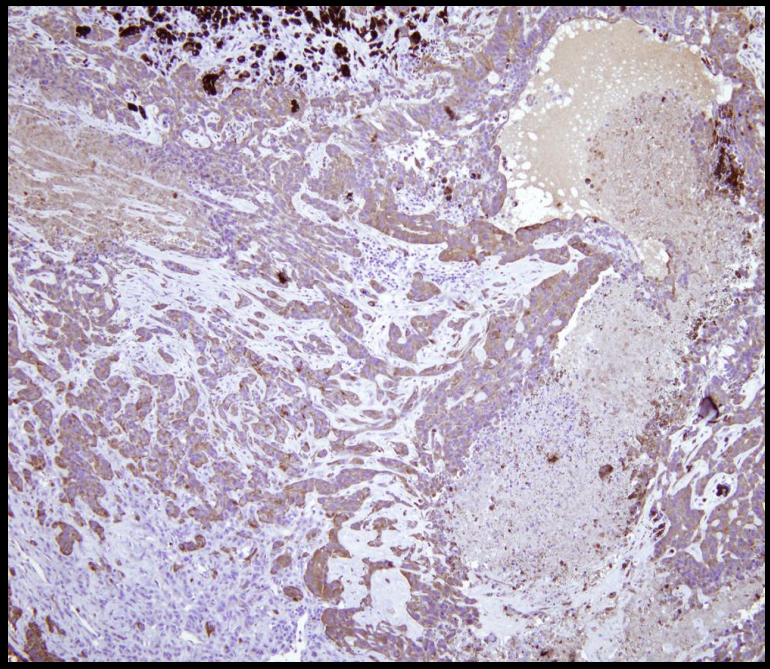
Pleomorphic Adenocarcinoma

Vimentin



100% positive (n = 16)

Pancytokeratin

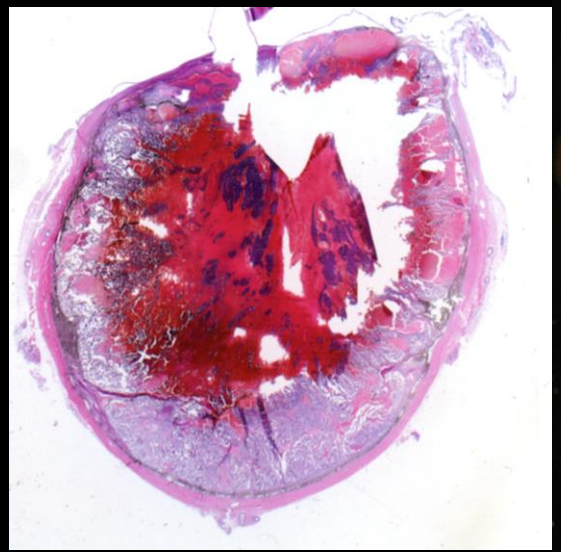


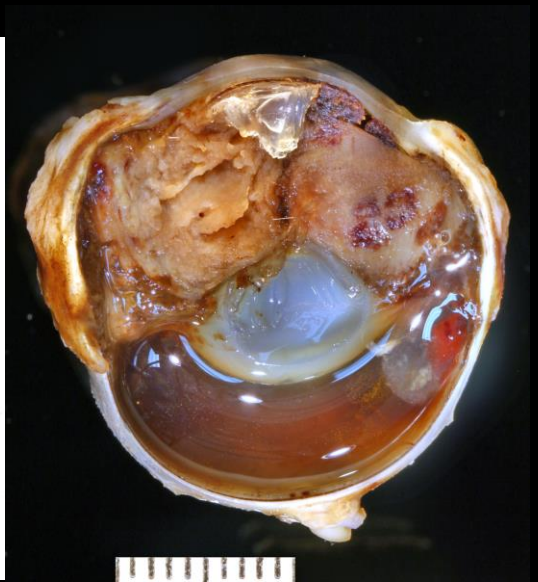
75% positive (n = 16)

Pleomorphic Adenocarcinoma

- 10/26 (38%) dogs had received an intraocular gentamicin injection 2-10 mo (ave 4.25 mo) prior to diagnosis
- 10 of 12 eyes with iridociliary epithelial tumors and Gentamicin injection were malignant. *The 2 benign tumors are illustrated below*
- All dogs had a history of chronic eye disease of at least one year

8 of 8 melanocytic uveal tumors in eyes injected with gentamicin were malignant



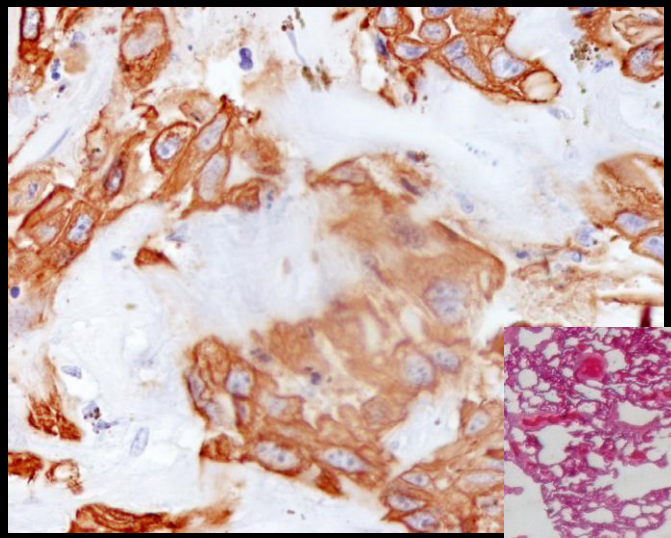


Pleomorphic Adenocarcinoma—
survival and outcome of 16 cases

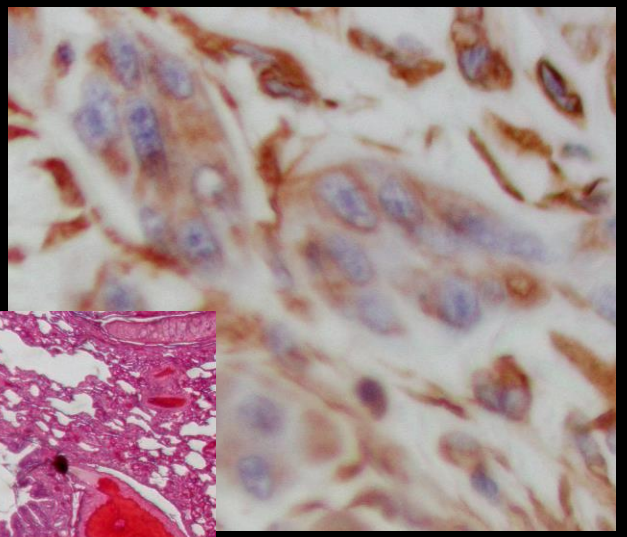
Outcome	# cases	Site of confirmed or suspected metastasis (#cases)	Survival (months)
Documented metastasis	2	Lung (2), kidney (1)	9, 30
Suspected metastatic disease	4	Lung (2), liver (1), abdominal mass (1)	4, 4, 7, 10
Dead for unknown reason	6	N/A	2, 3, 10, 22, 24, 39
Alive	2	N/A	2, 41
Lost to follow-up	2	N/A	N/A

Survival times in red are dogs that received gentamicin

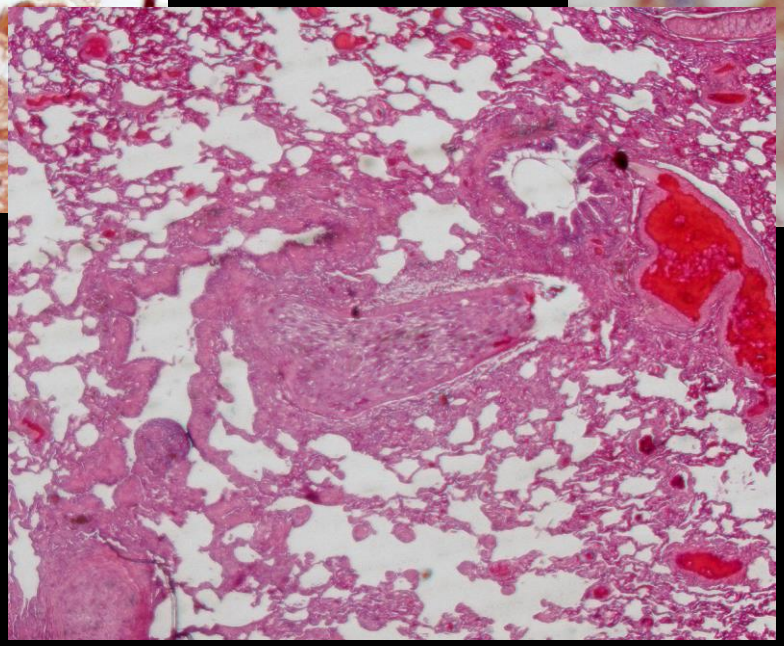
Malignant Variant of Iridociliary Epithelial Tumor (Pleomorphic Adenocarcinoma)



Cytokeratin



Vimentin



Lung Metastasis

Uveal Schwannomas of Blue-Eyed Dogs

Formerly, Spindle-cell tumor of blue-eyed dogs

97 cases

Zarfoss MK, Klauss G, Newkirk K, Kiupel M, Jones Y, Colitz CMH, Dubielzig RR. (2007) Uveal spindle cell tumor of blue-eyed dogs: an immunohistochemical study. *Vet Pathol*. 44: 276.

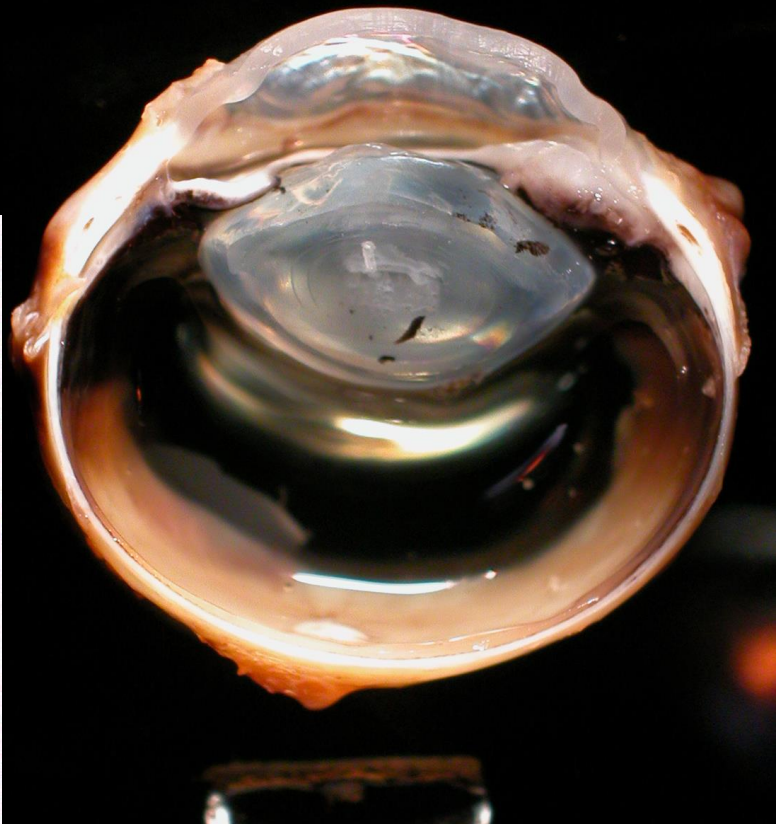
Uveal Schwannoma of Blue-Eyed Dogs

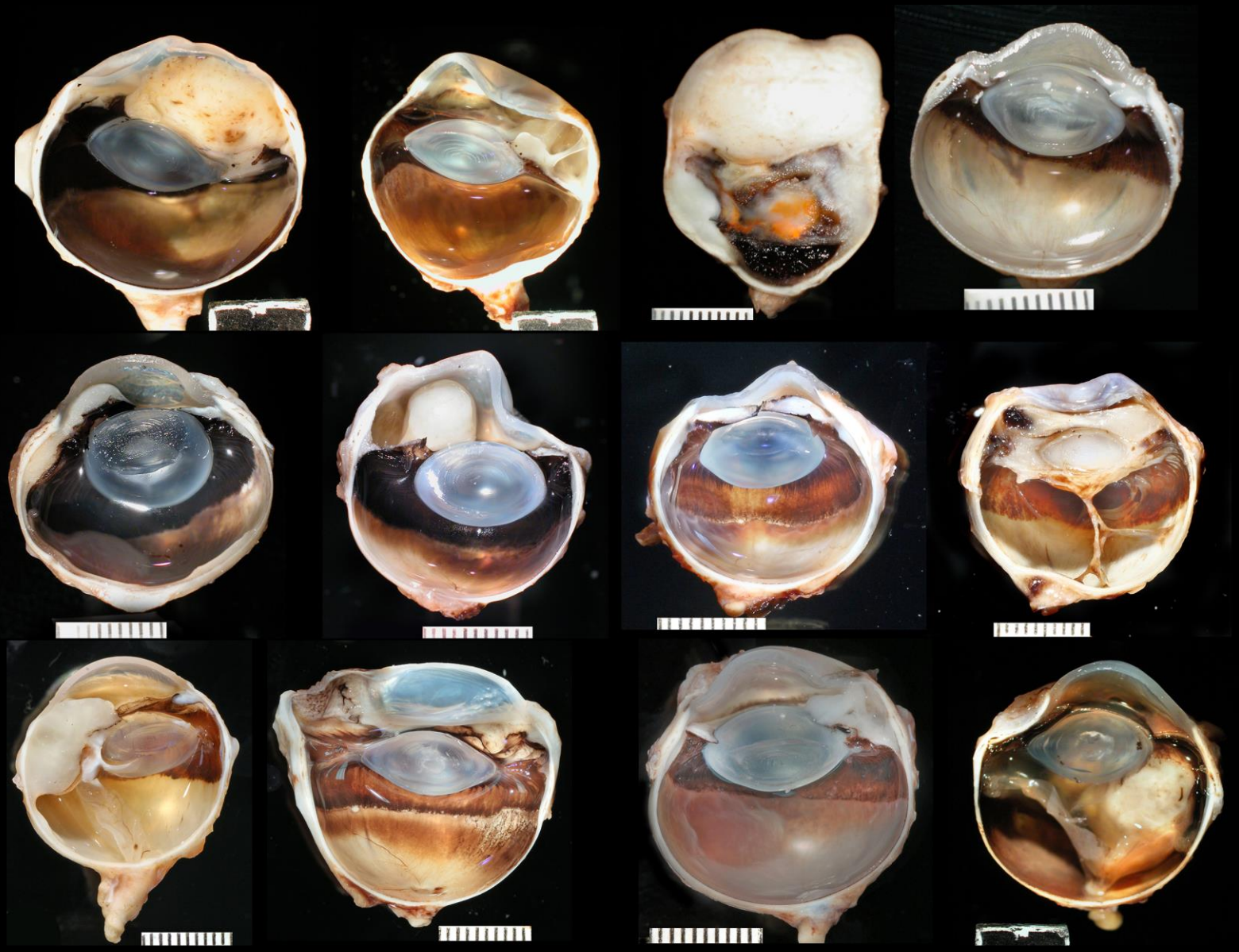
- Median age = 8.3 years
- Gender equal
- Laterality equal

Breeds Schwannoma Blue-eyed Dogs		
20.2%	22	1 mixed breed
0.9%	1	Alaskan Kei Kai
1.8%	2	Australian cattle dog
8.3%	9	Australian shepherd
1.8%	2	beagle
4.6%	5	border collie
4.6%	5	Catahoula leopard dog
1.8%	2	Dalmatian
1.8%	2	German shepherd
0.9%	1	golden retriever
2.8%	3	Husky
0.9%	1	miniature Australian shepherd
0.9%	1	pit bull
0.9%	1	rottweiler
1.8%	2	Shetland sheep dog
45.9%	50	Siberian husky

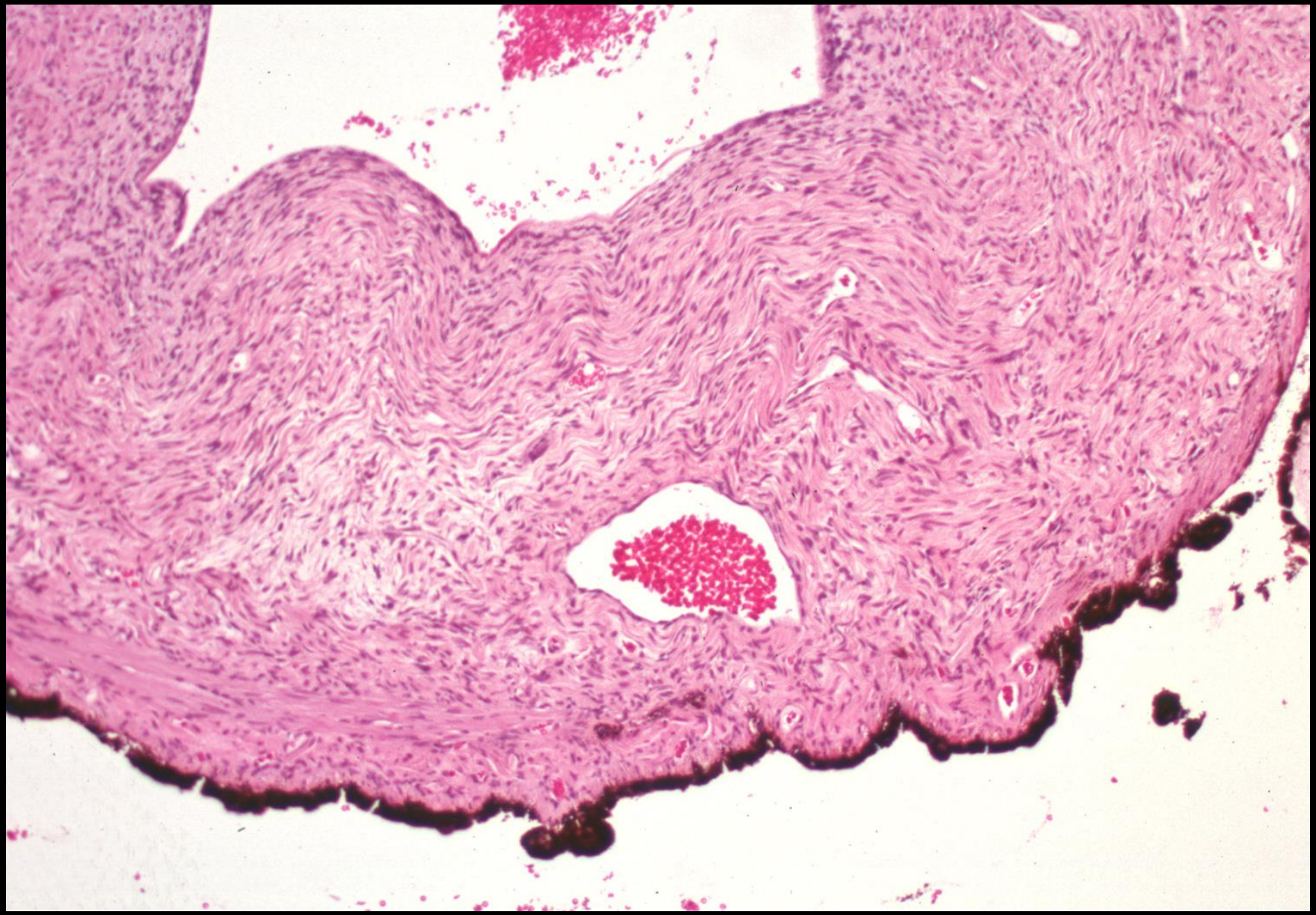
Courtesy of Dr. Kerry Ketring

USBED





Uveal Schwannoma of Blue-Eyed Dogs



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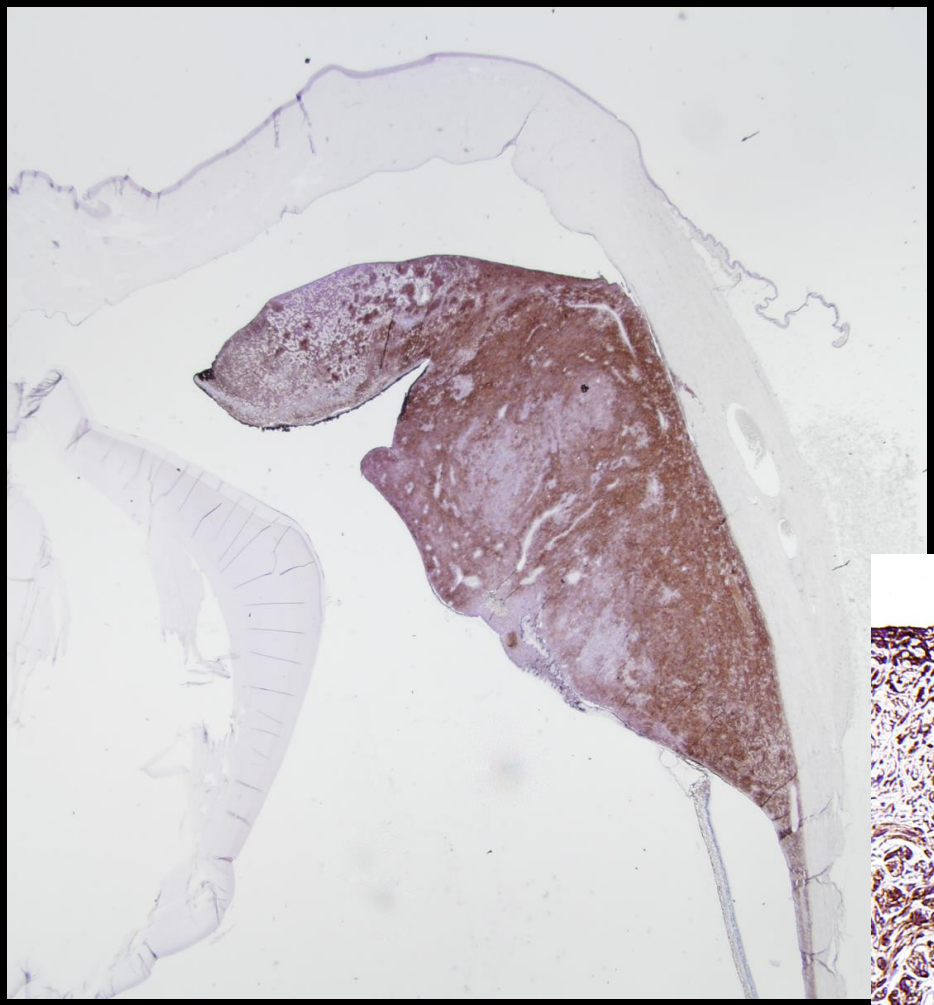
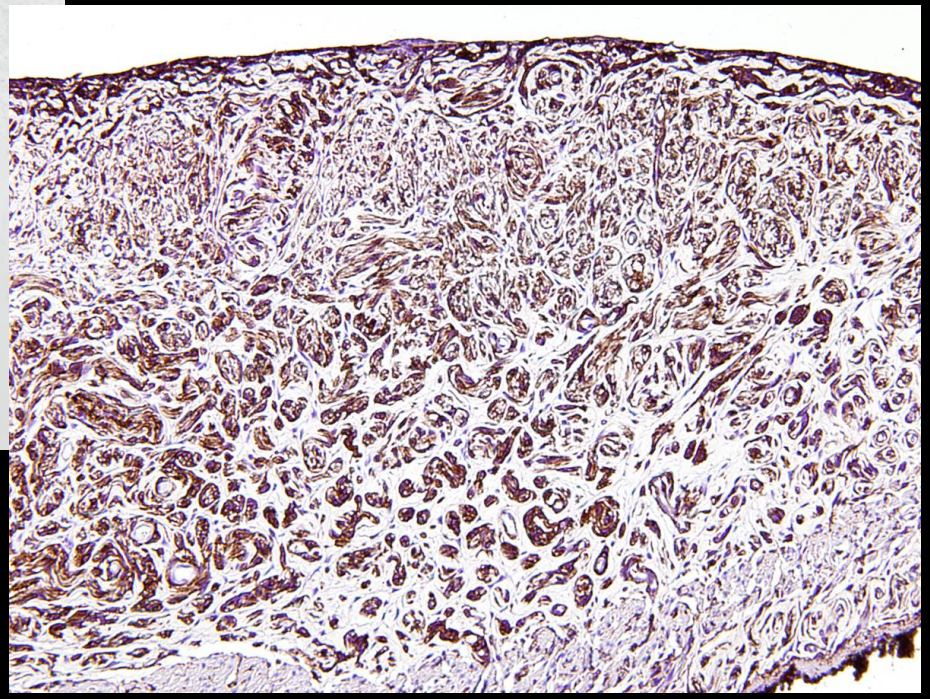
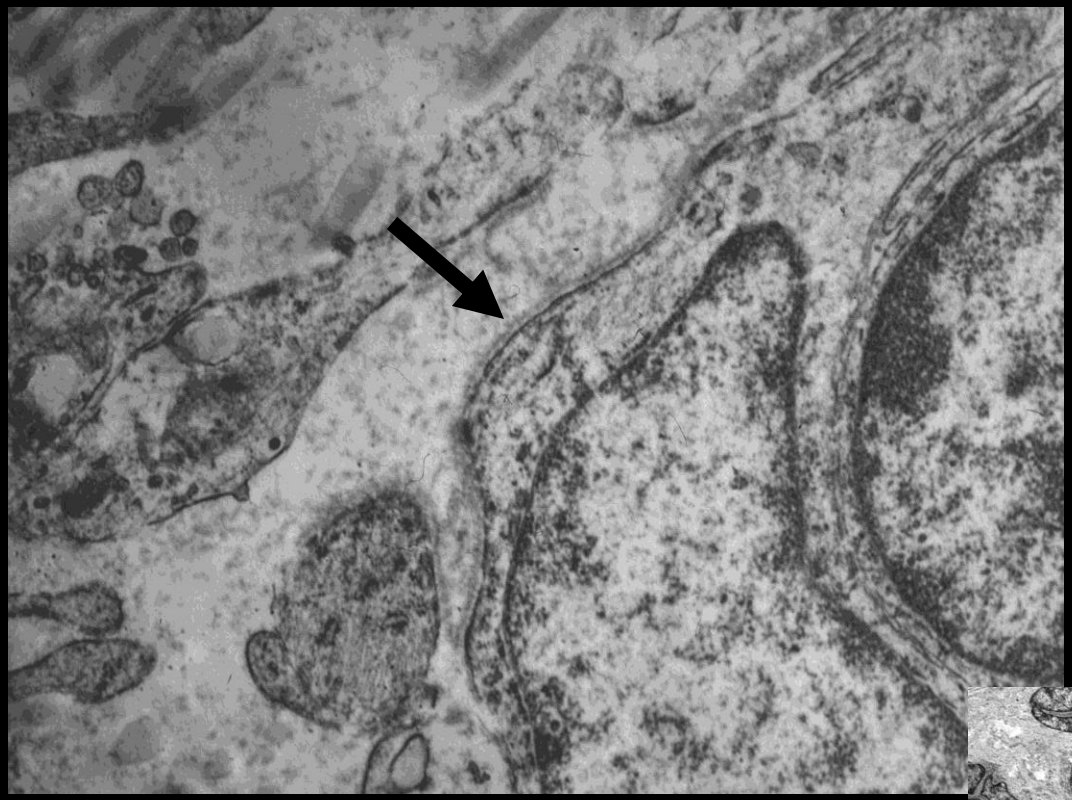


Uveal Schwannoma of Blue-Eyed Dogs



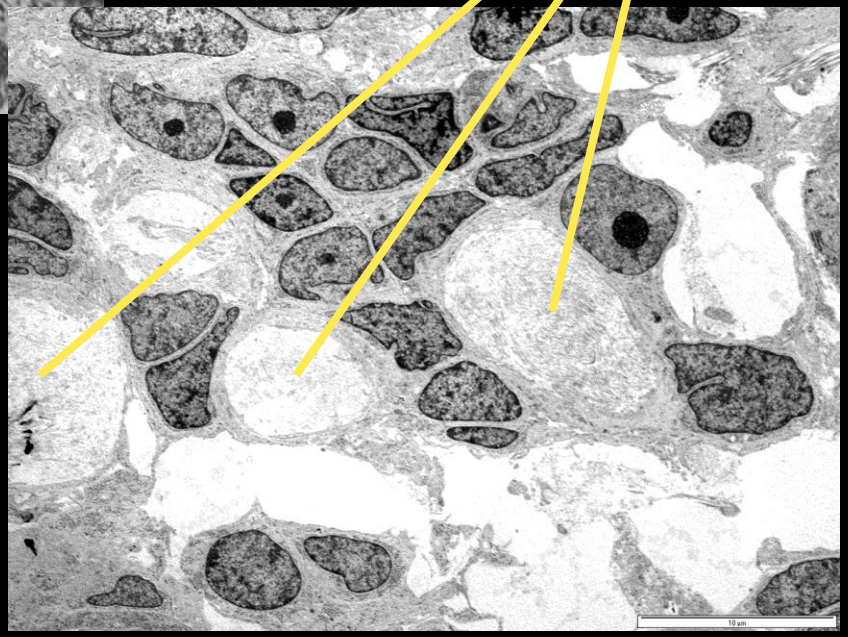
GFAP

Stains Schwann cells
of non-myelinating nerve fibers



Uveal Schwannoma of Blue-Eyed Dogs

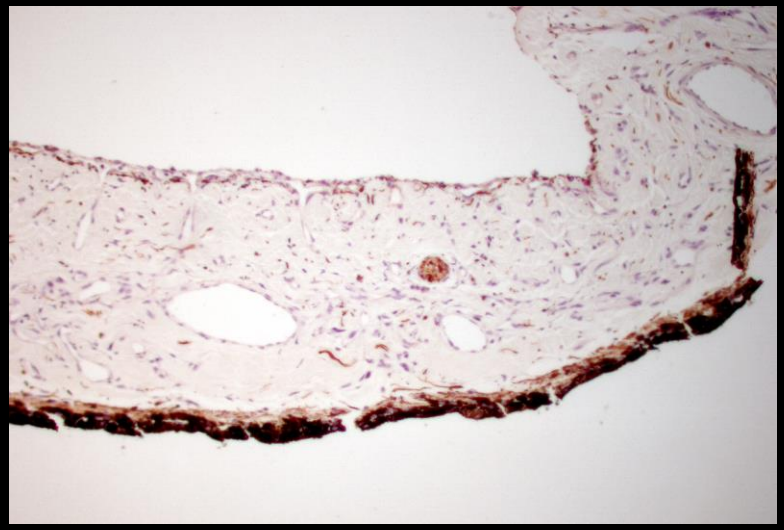
Collagen

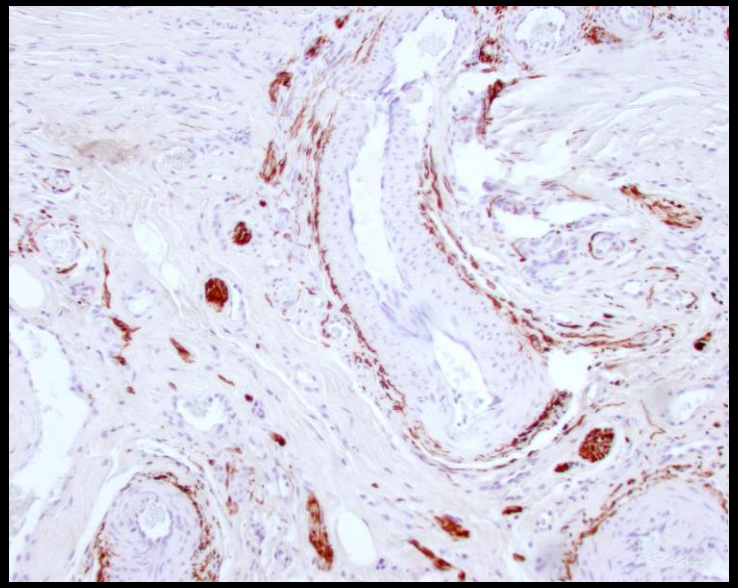


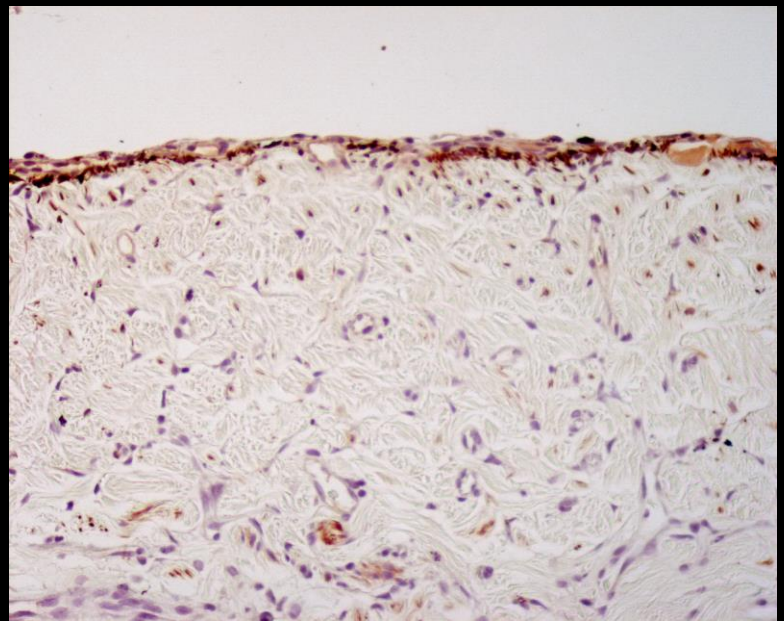
Basal Lamina

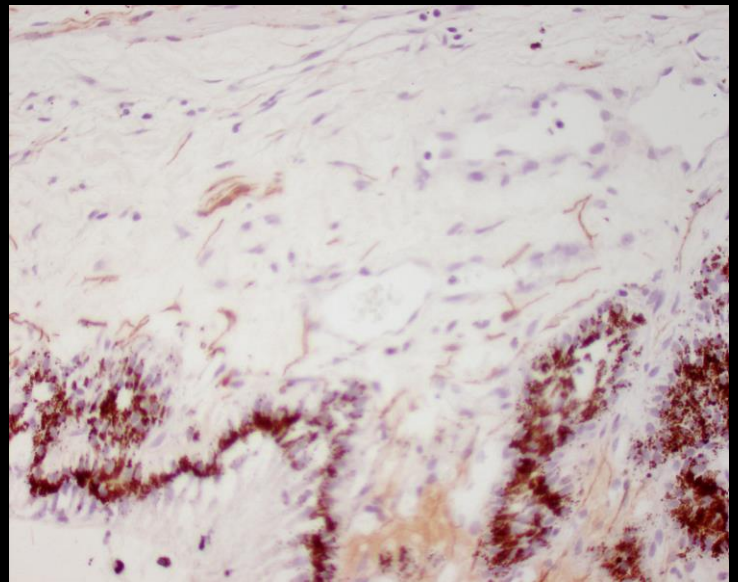
The blue-eye histology

Distribution of GFAP+ Cells in the Uvea of Blue-Eyed Dogs

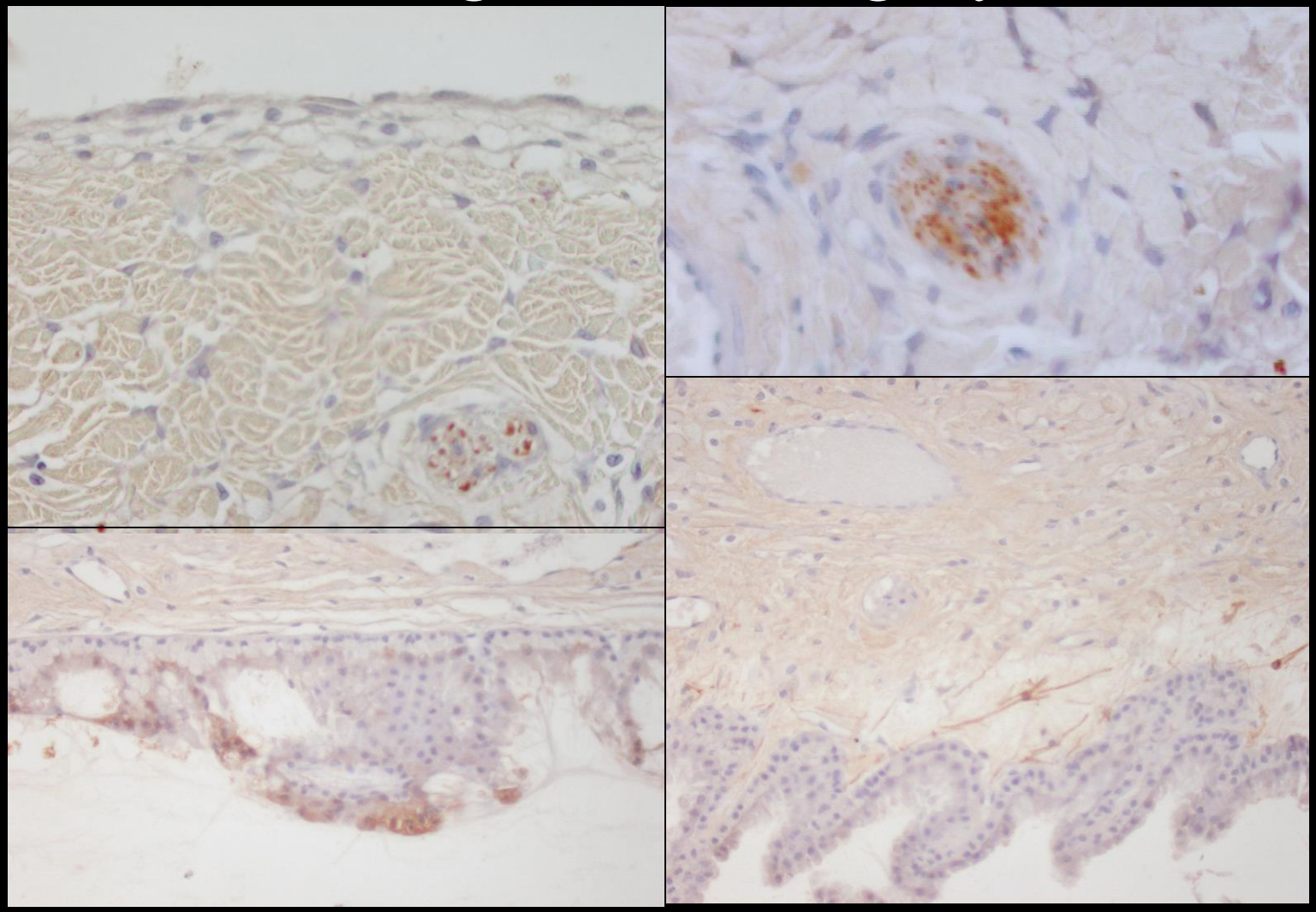








Distribution of GFAP+ Cells in the Uvea of Pigmented Dog Eyes

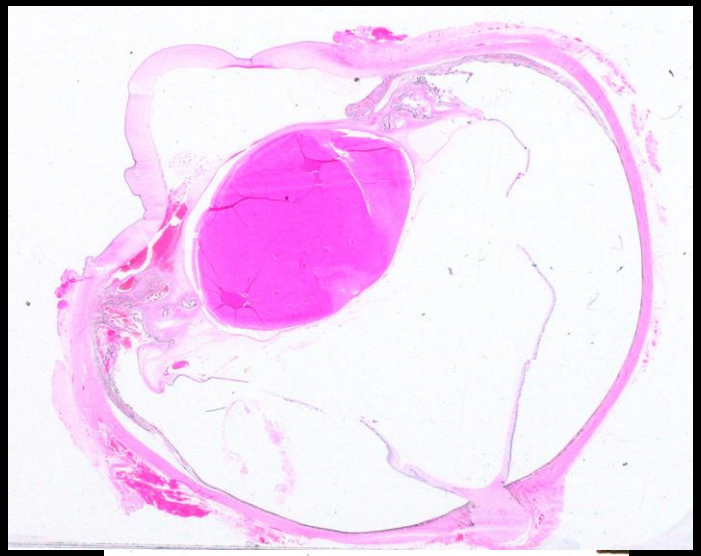


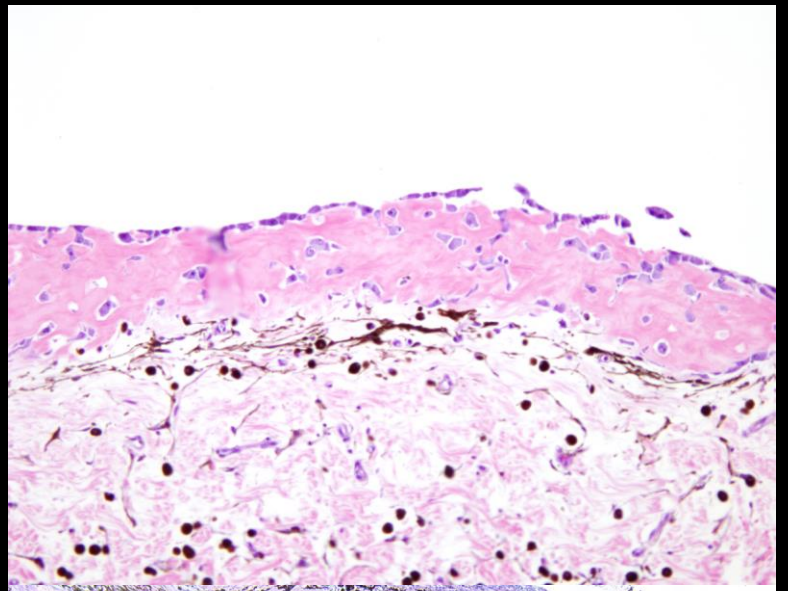
Primary Ocular Osteosarcoma +/or Chonsrosarcoma

- **Osterosarcoma: 7 cases**
  - **2 Collie and 2 Labradors**
- **Chondrosarcoma: 7 cases**
  - **All different breeds**

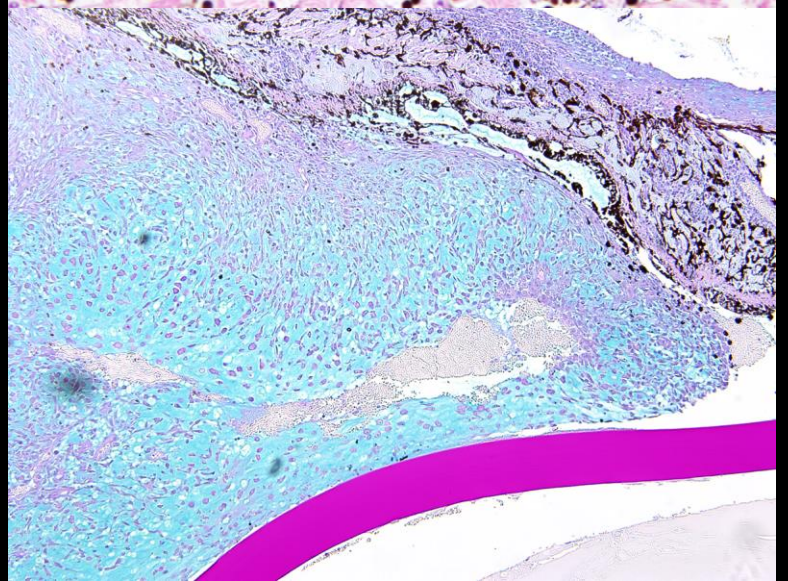
Primary Ocular Osteosarcoma +/or Chonsrosarcoma

OSA



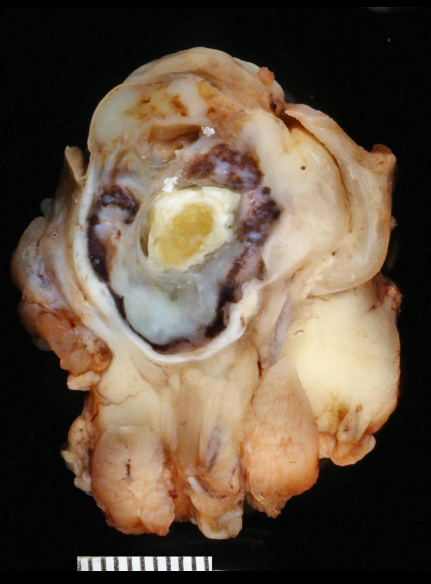


CSA

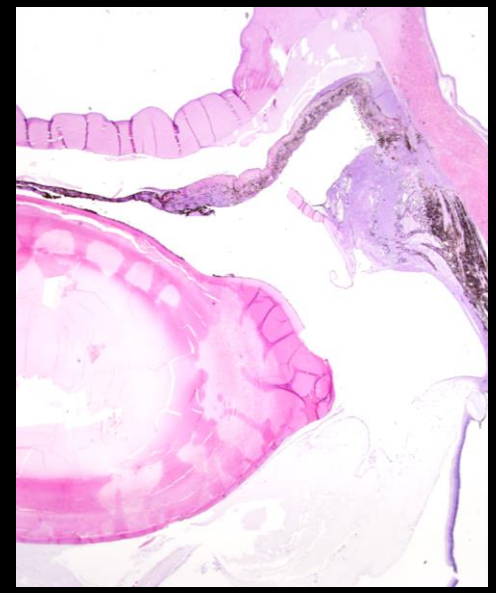


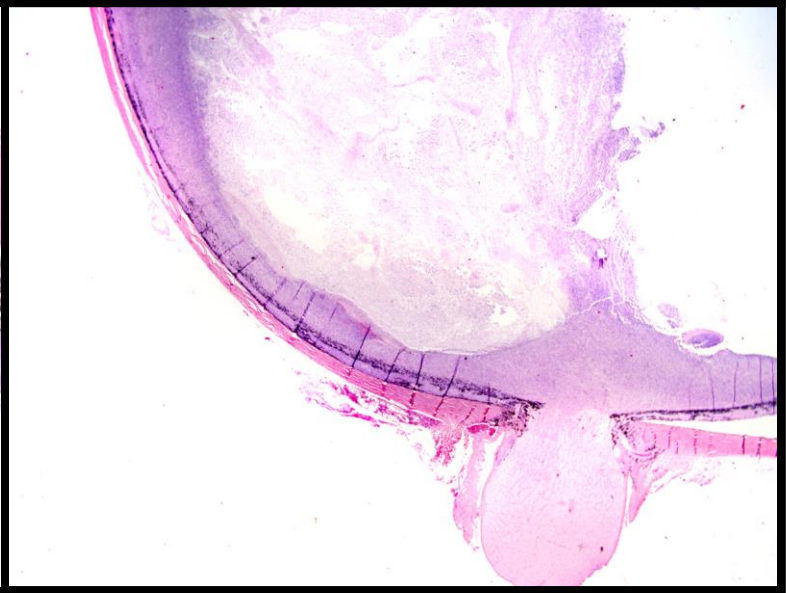
Canine Ocular Post-traumatic Sarcoma

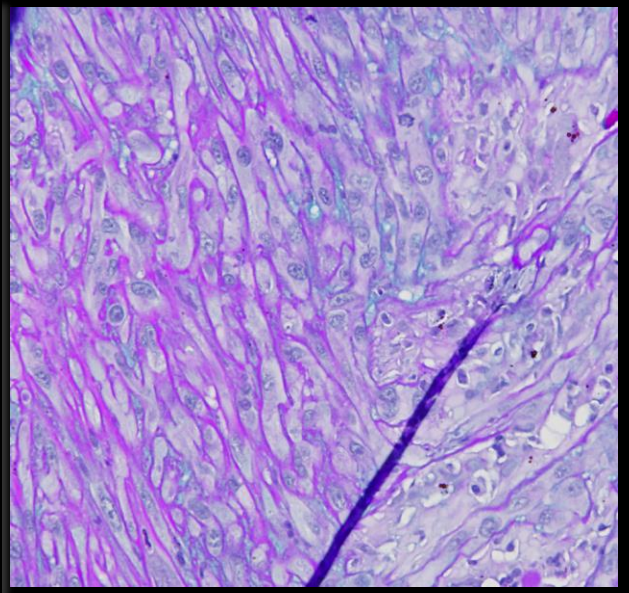
- There are 10 verified or suspect cases in the database
- All have chronic disease
- Most have identifiable lens capsule rupture
- The pattern of spread is the same as in cats
- Histologic pattern used to make the diagnosis
  - A history of long standing eye disease consistent with trauma
  - Tumor hugs the lens and spreads around the inner uvea
  - PAS + membranes
  - Smooth muscle actin + staining
  - A + cytokeratin staining is also helpful but not required
  - Avascular tumor in the early stages
  -

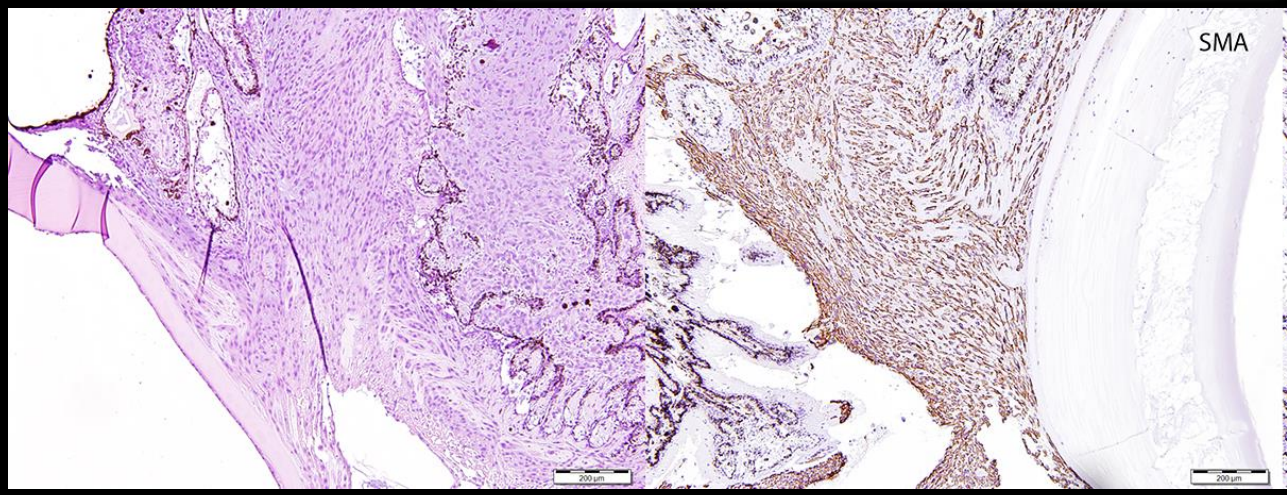


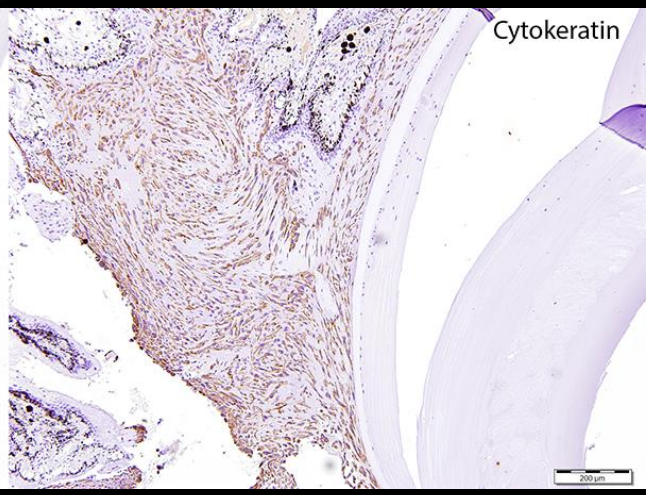
Canine Ocular Post-traumatic Sarcoma







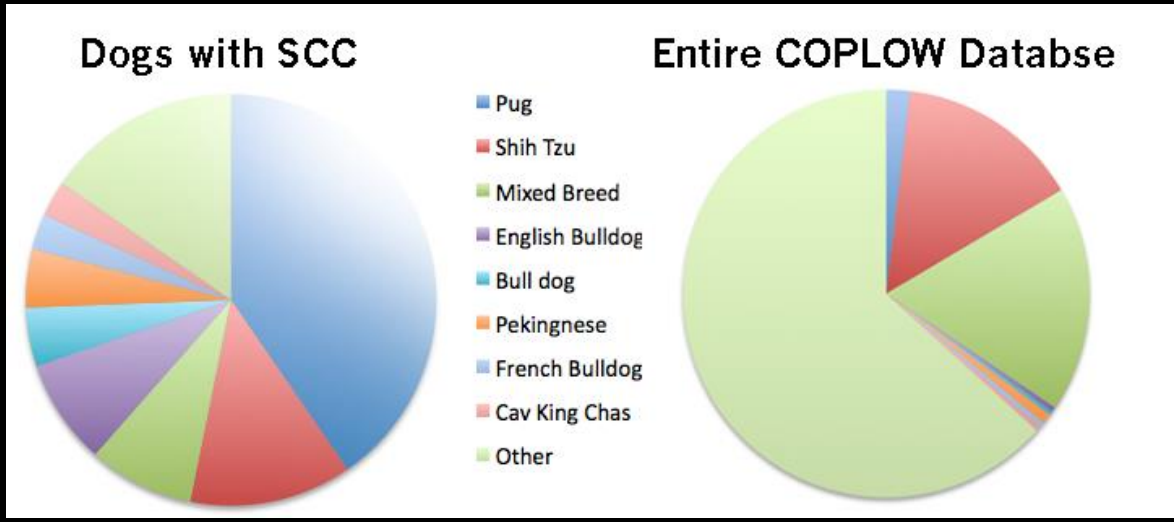




Corneal Squamous Cell Carcinoma

- 100 cases in the COPLOW Database

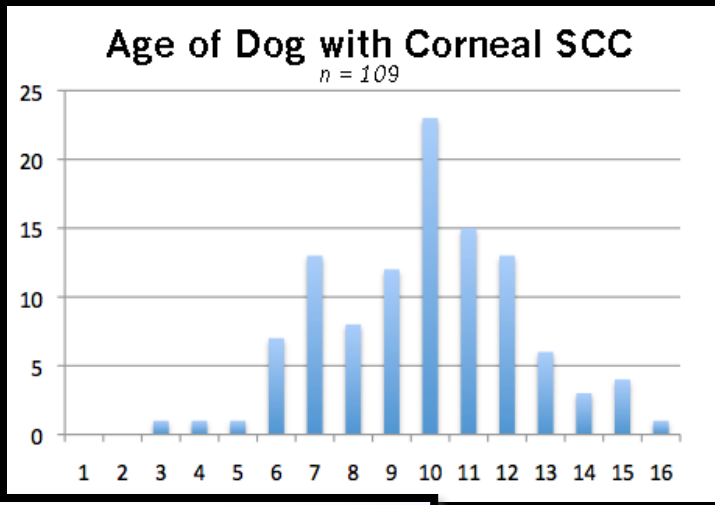
Breeds Corneal SCC N = 100		
8.0%	8	1 mixed breed
1.0%	1	basset hound
1.0%	1	bluetick coonhound
2.0%	2	border collie
1.0%	1	Boston terrier
2.0%	2	boxer
5.0%	5	bulldog
3.0%	3	Cavalier King Charles spaniel
1.0%	1	chow chow
2.0%	2	cocker spaniel
7.0%	7	English bulldog
3.0%	3	French bulldog
2.0%	2	golden retriever
1.0%	1	greyhound
1.0%	1	Jack Russell terrier
1.0%	1	Labrador retriever
4.0%	4	Pekingese
1.0%	1	Pembroke Welsh corgi
40.0%	40	pug
13.0%	13	shih tzu
1.0%	1	Welsh corgi

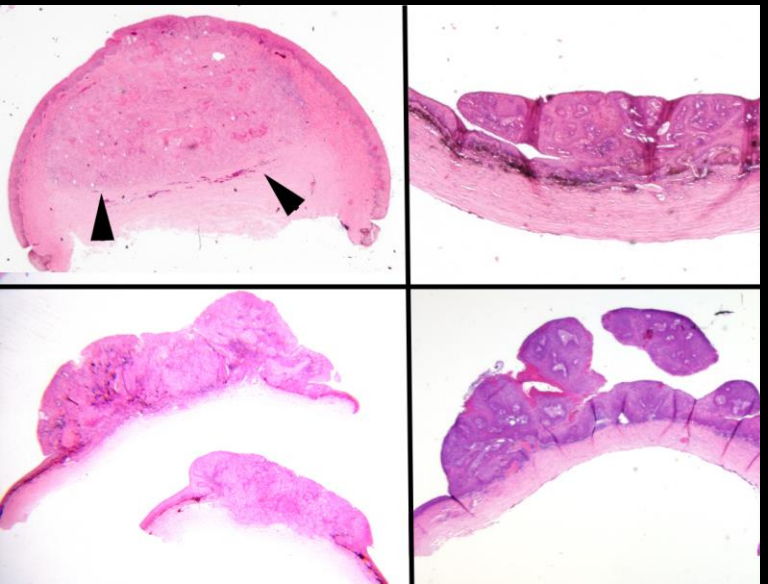


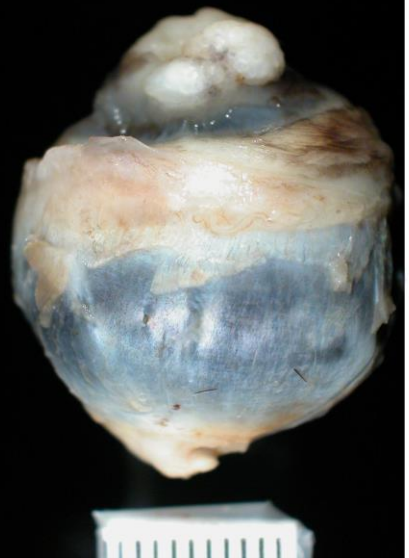
Dreyfus J, Schobert CS, Dubielzig RR. (2011) Superficial corneal squamous cell carcinoma occurring in dogs with chronic keratitis. *Vet Ophthal.* 14: 161-168.

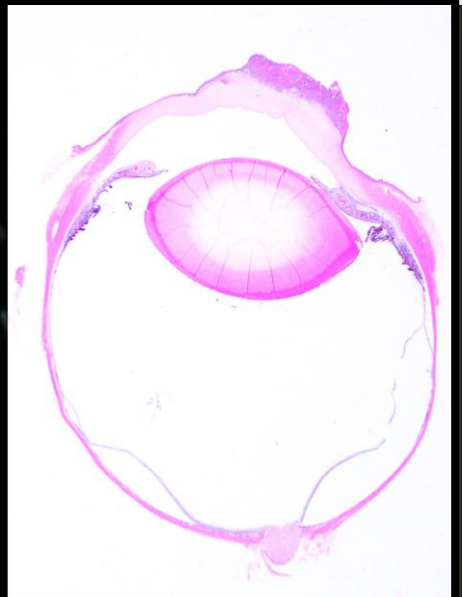
Corneal Squamous Cell Carcinoma

- All cases have superficial chronic keratitis
- Most but not all cases had prior treatment with either tacrolimus or cyclosporine
- Most cases develop axially
- Most cases superficial with little deep invasion
- Most cases treatable with superficial keratectomy

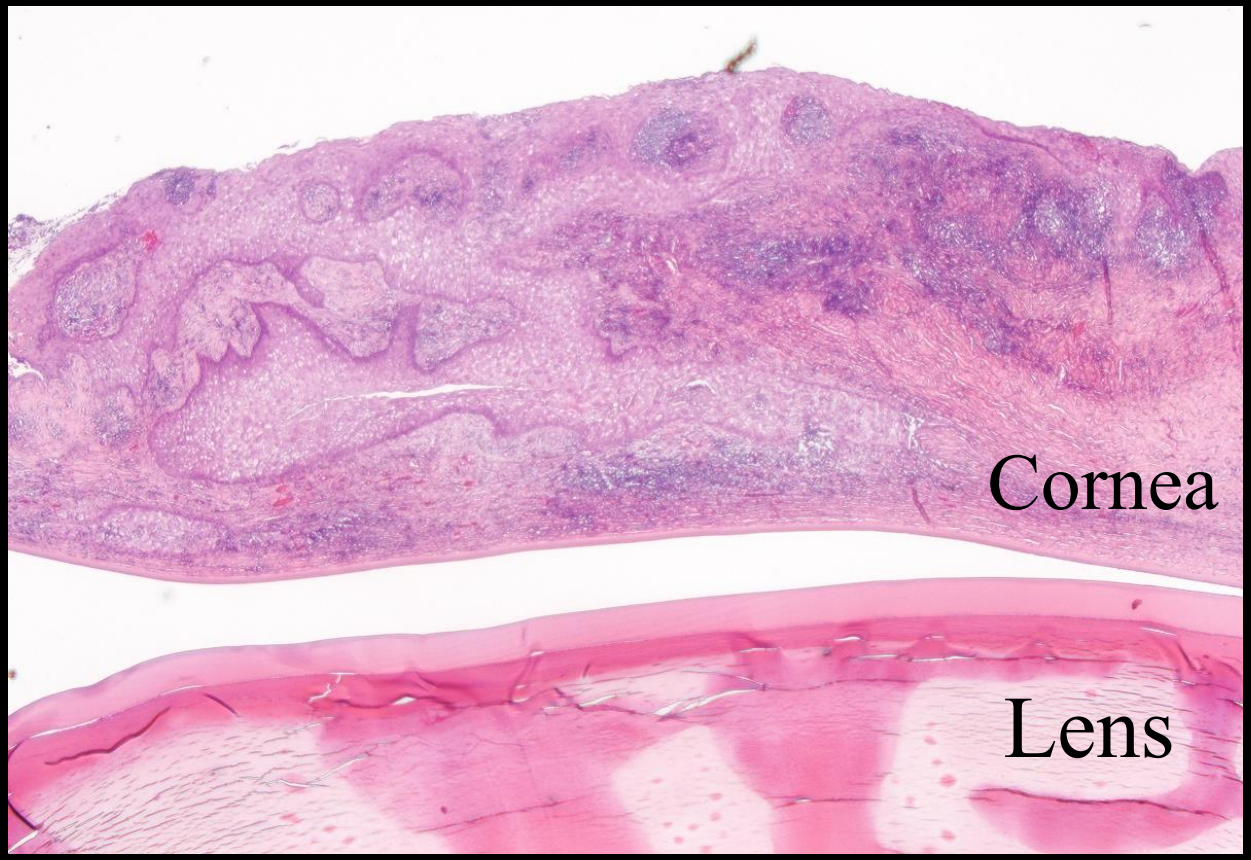








Corneal Squamous Cell Carcinoma

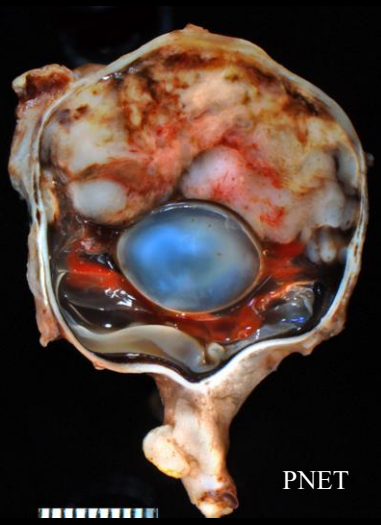


Multiple recurrences extending deep into the corneal stroma and requiring enucleation in this case

Canine Primitive Neuroectodermal Tumors (PNET) *45 cases*

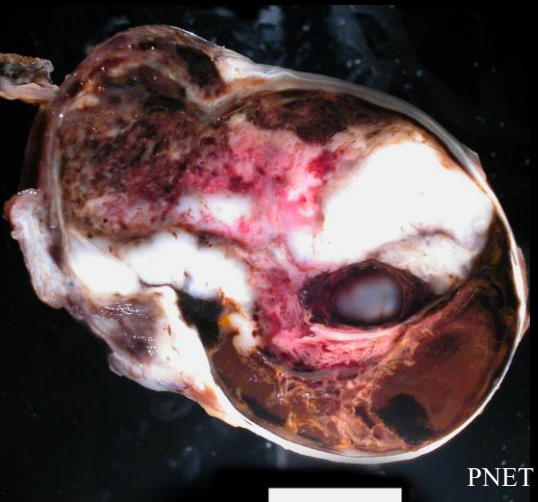
Medulloepithelioma, Retinoblastoma and Retinocytoma

Meduloepithelioma

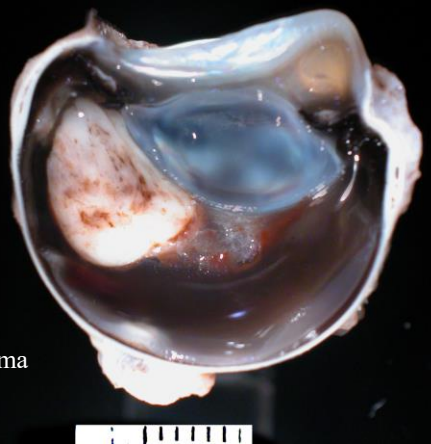


PNET

Retinocytoma

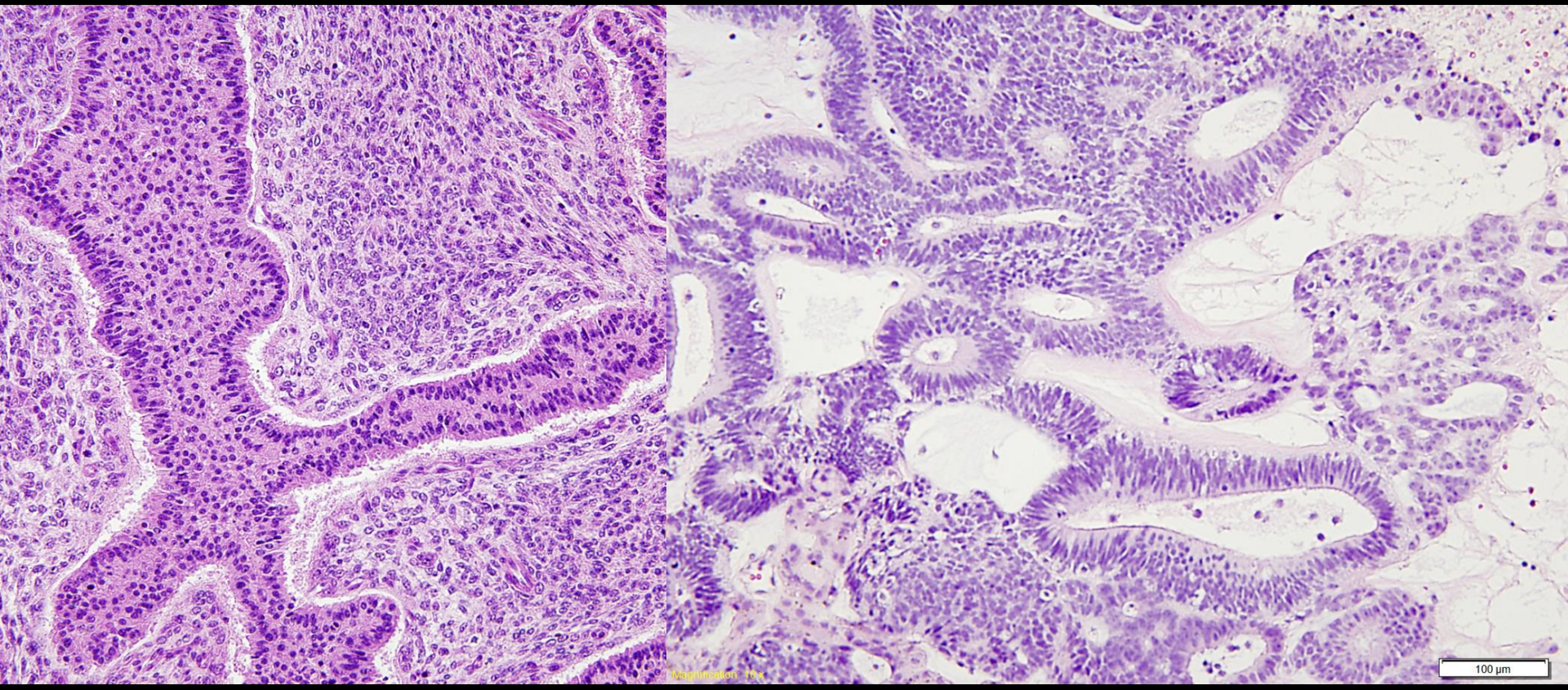


PNET

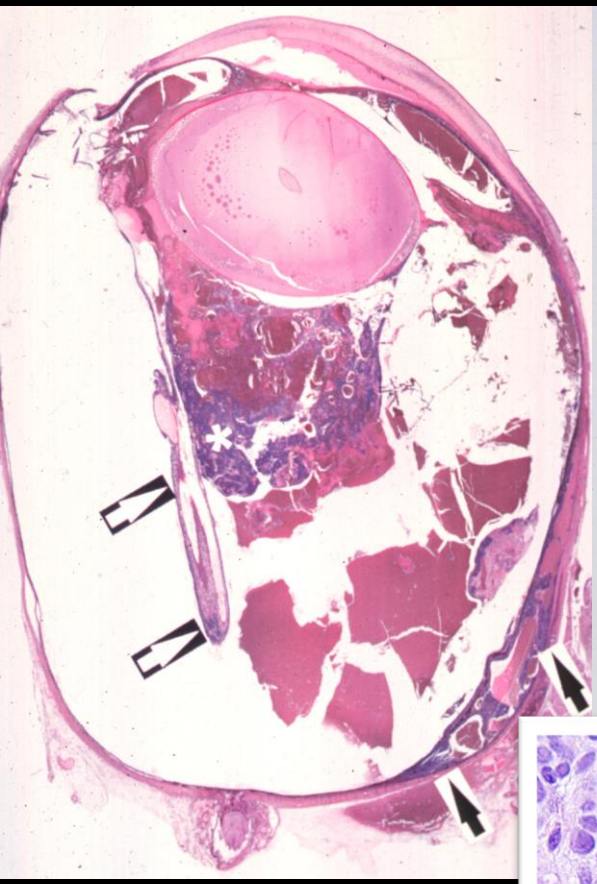


Meduloepithelioma

Medulloepithelioma

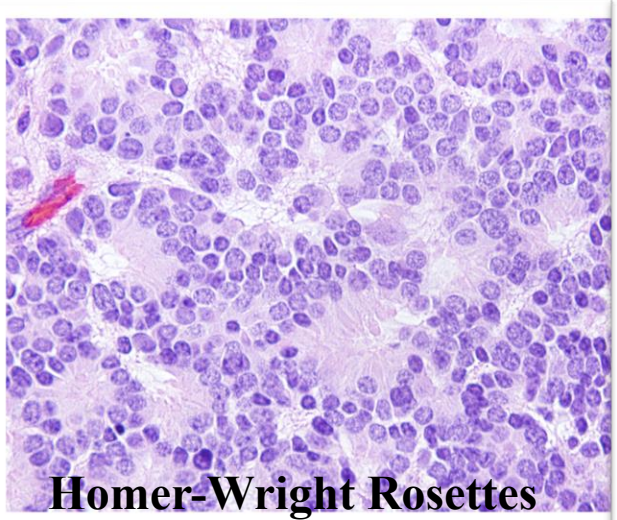


Retinoblastoma



Canine

Human

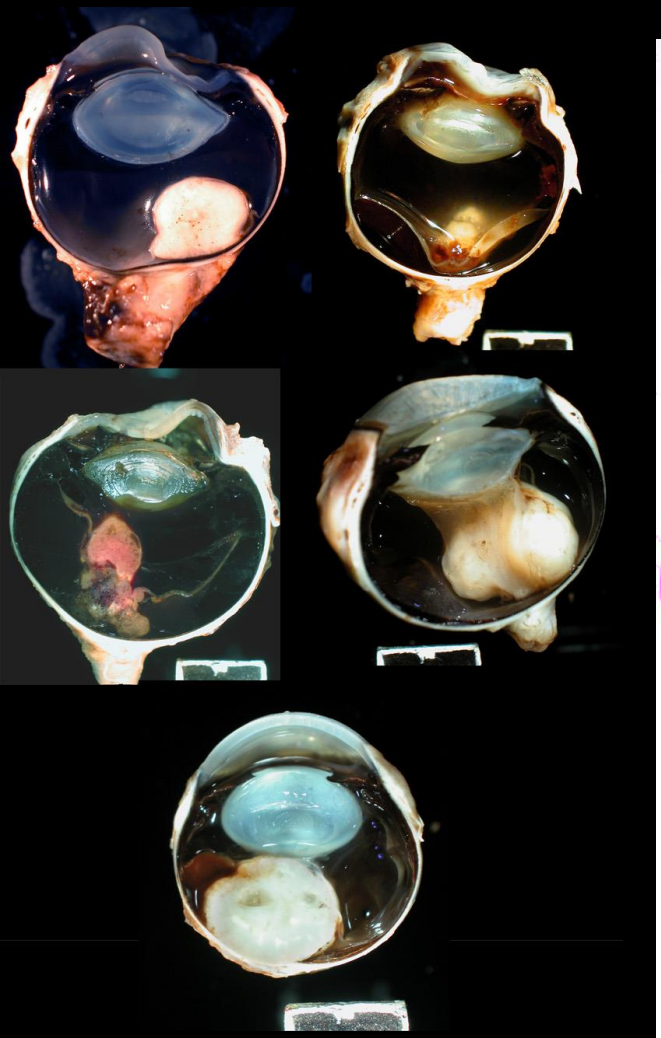


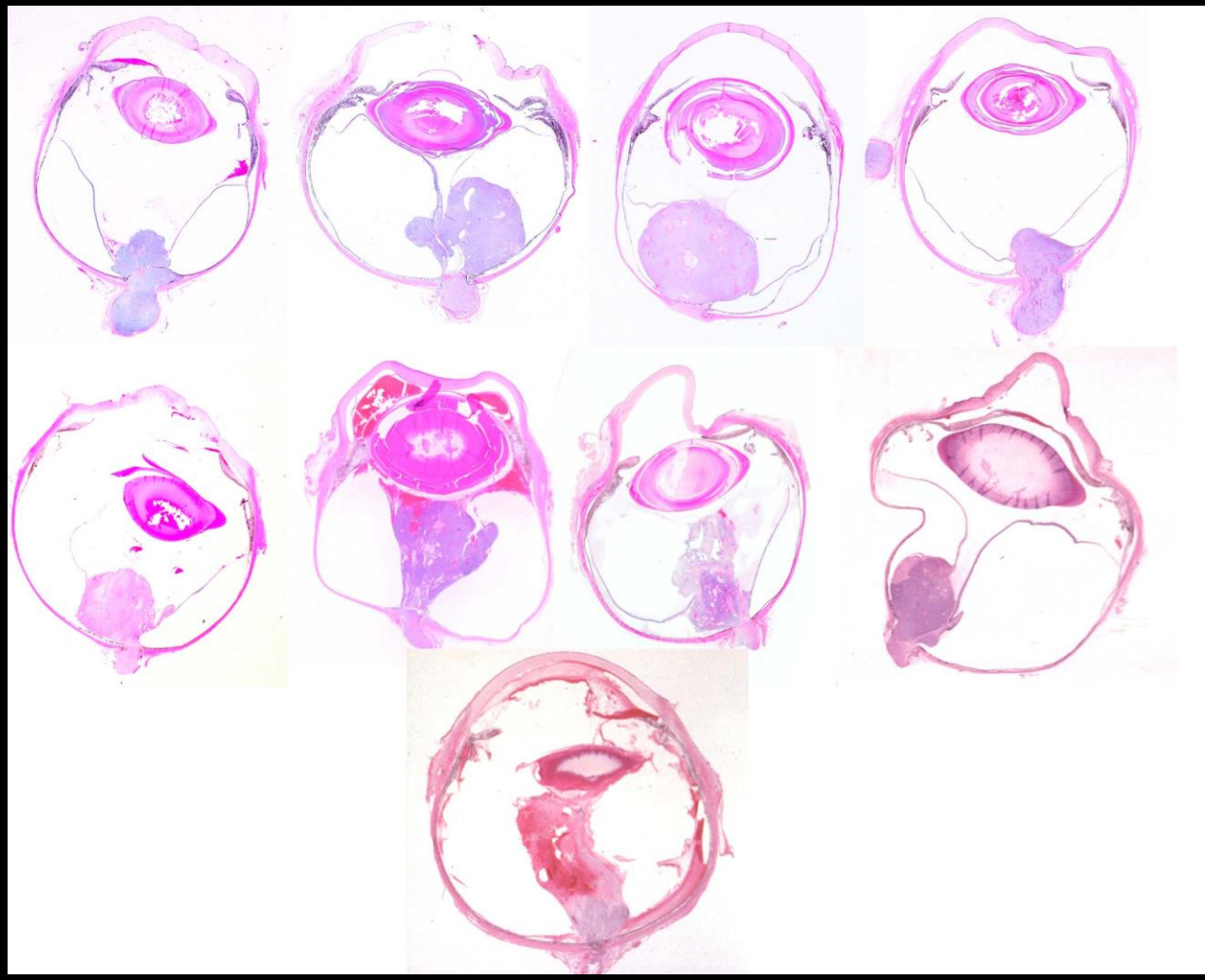
Homer-Wright Rosettes

Flexner-Wintersteiner Rosettes

Optic Nerve or Retinal Glioma

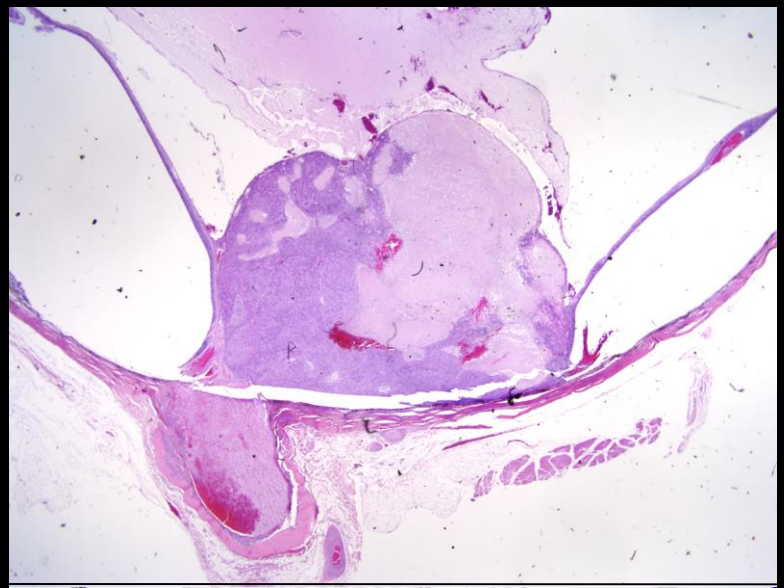
(19 cases)

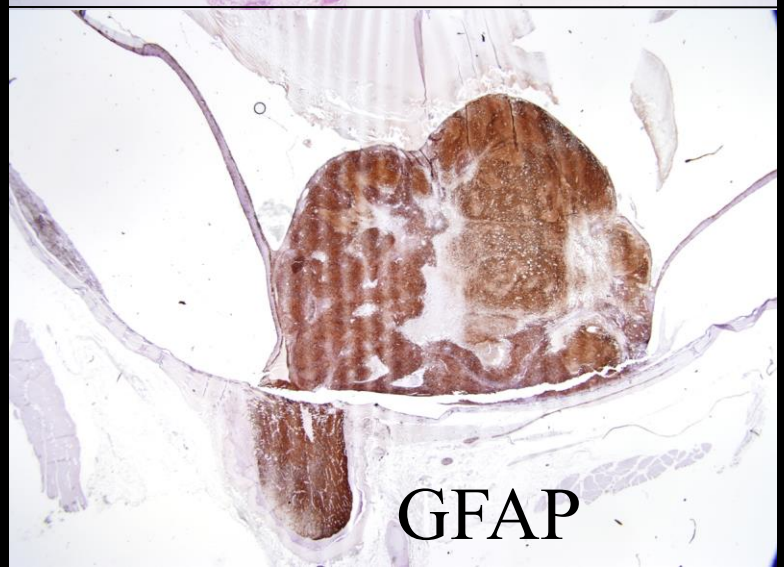




Naranjo C, Schobert C, Dubielzig RR. (2008) Canine ocular gliomas: a retrospective study. *Vet. Ophthalmol.* 11 (6): 356-362.

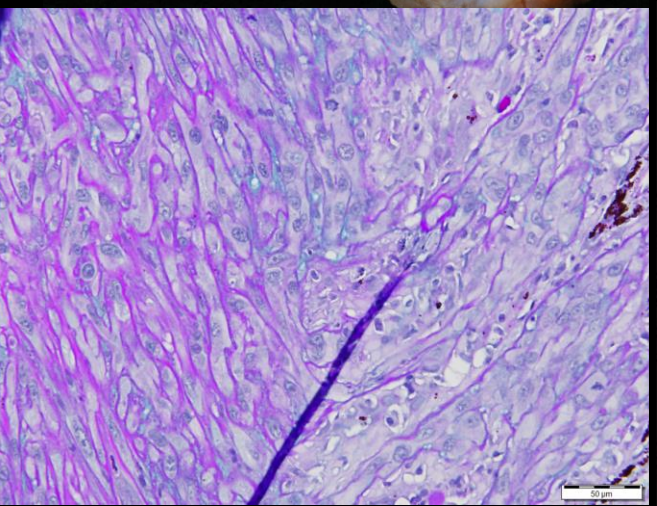
Optic Nerve or Retinal Glioma

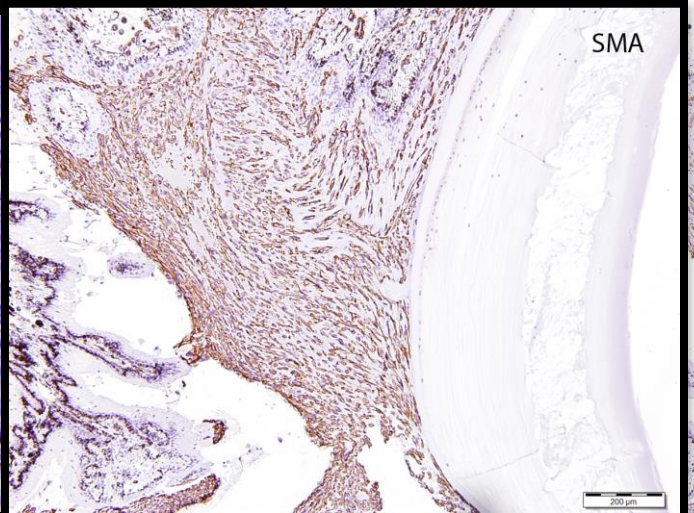


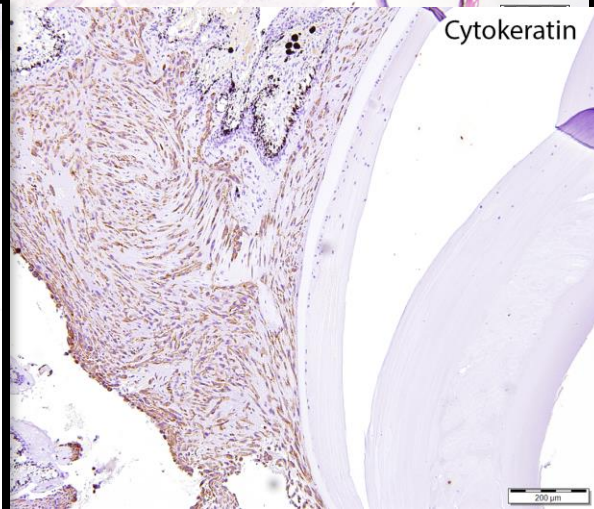


Canine Ocular Post-traumatic Sarcoma

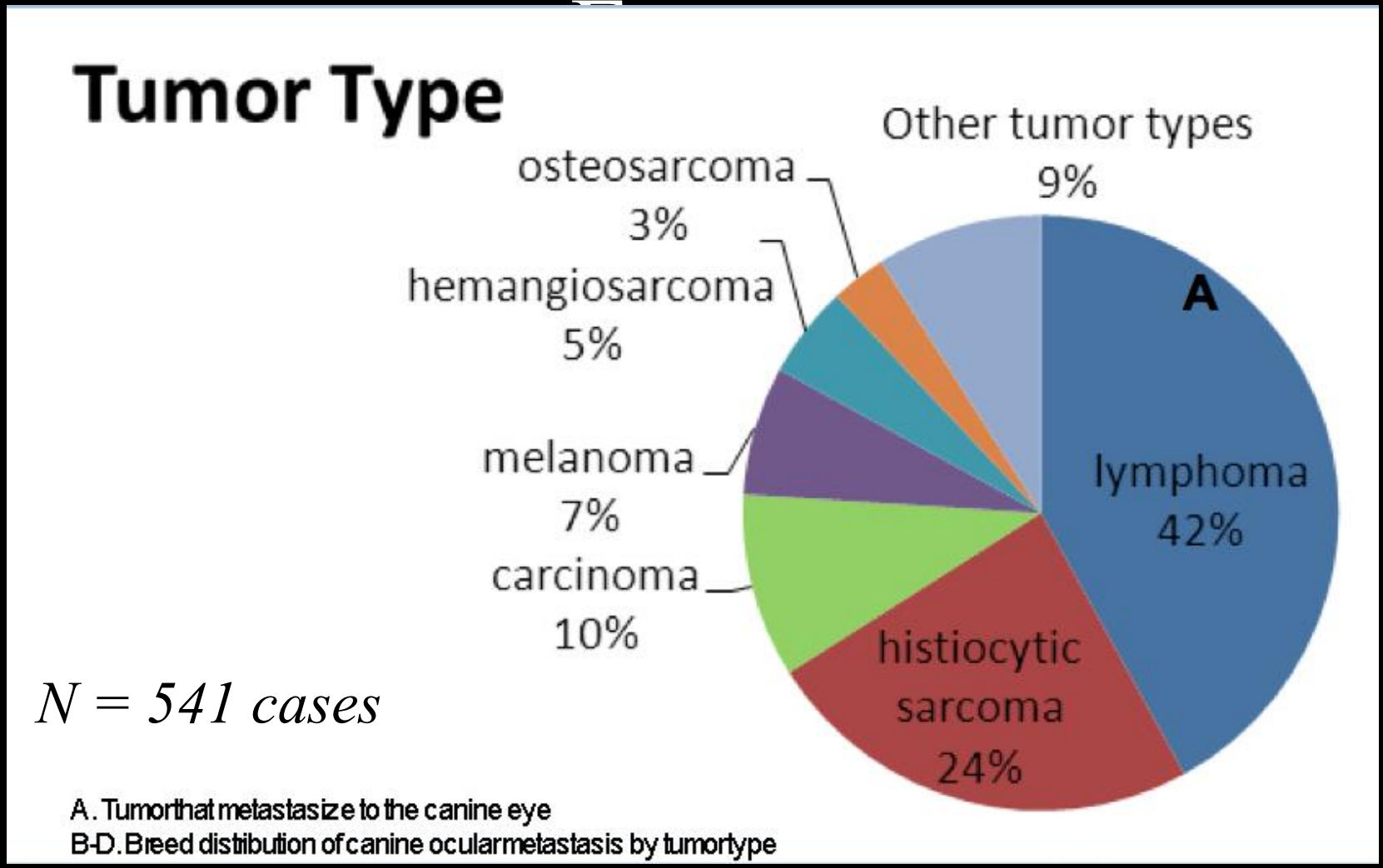
10 cases of Post-traumatic sarcoma in dogs



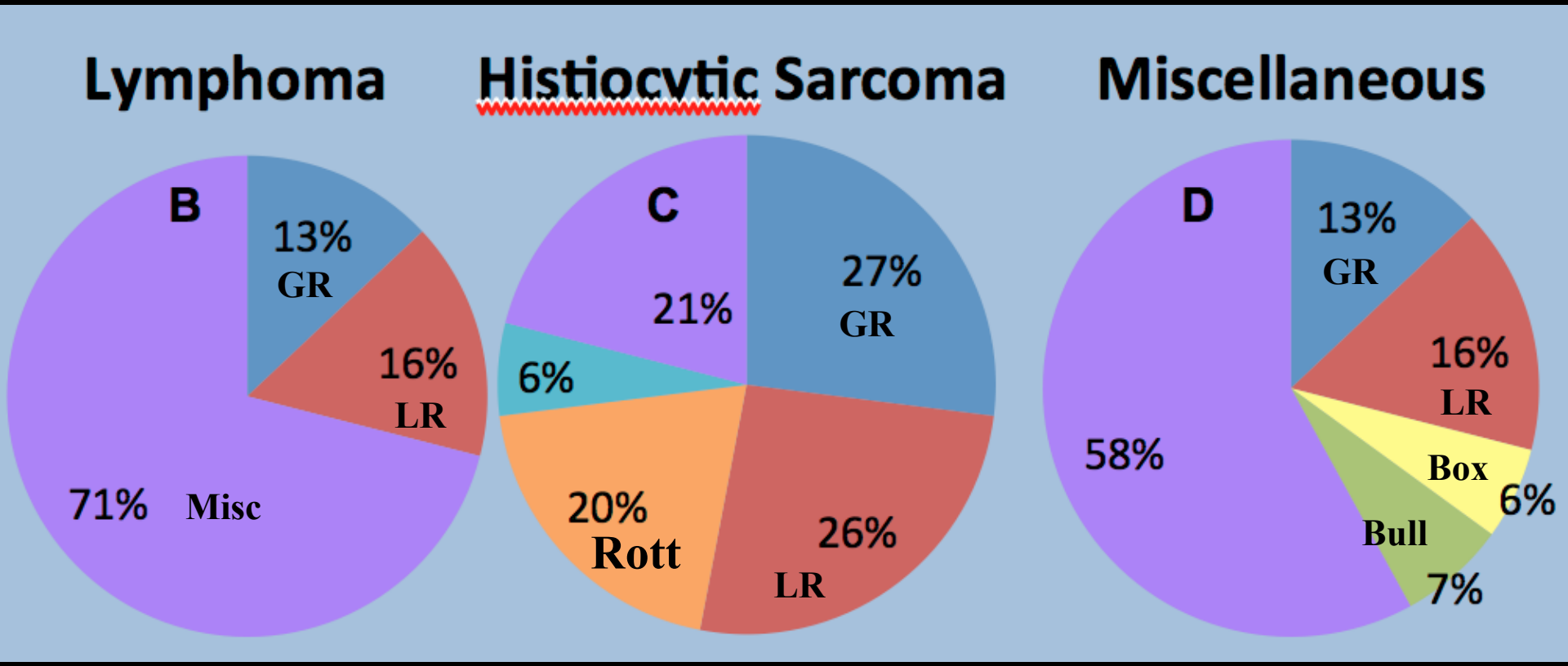




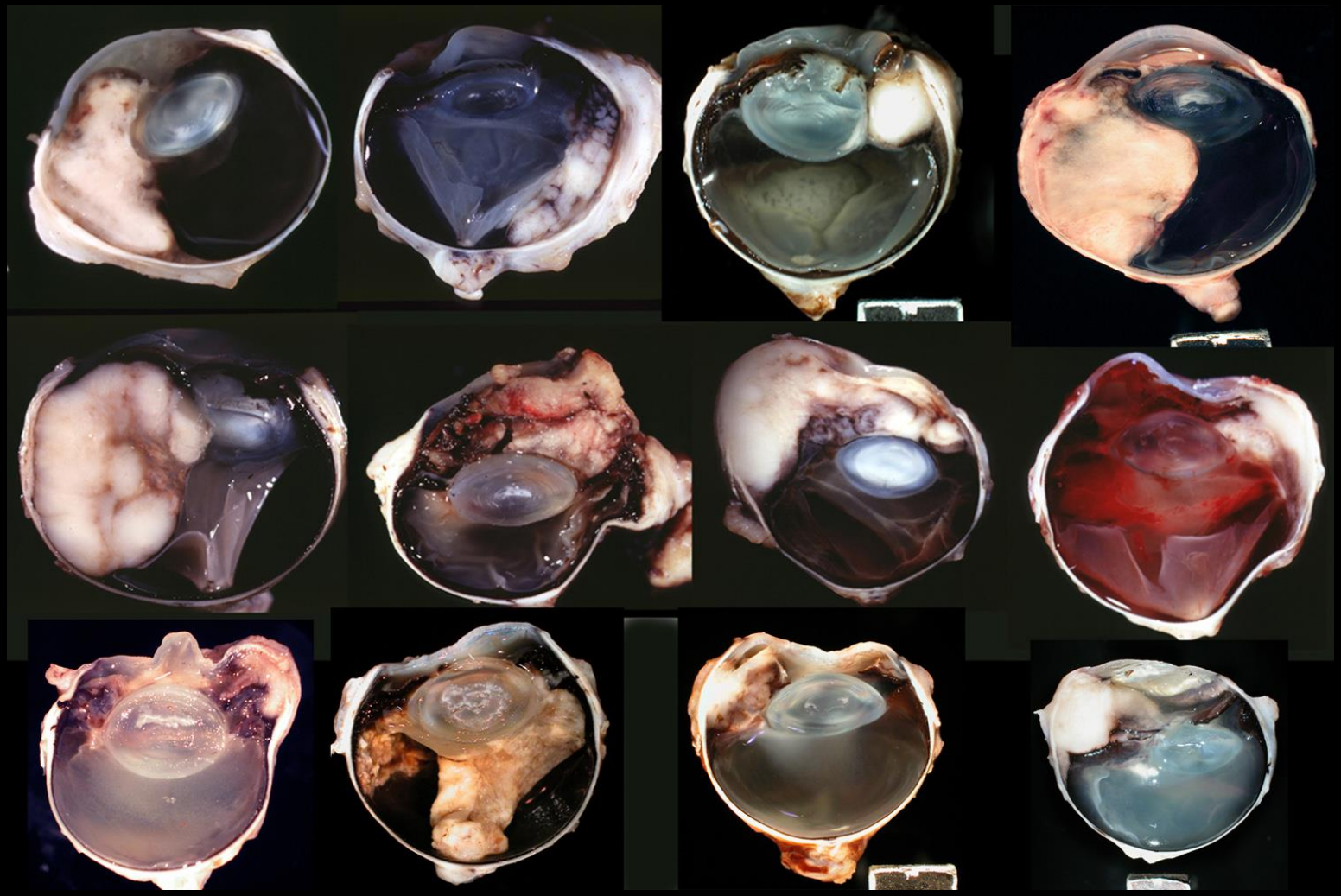
Metastatic Tumors to the Canine



Metastatic Tumors to the Canine Eye

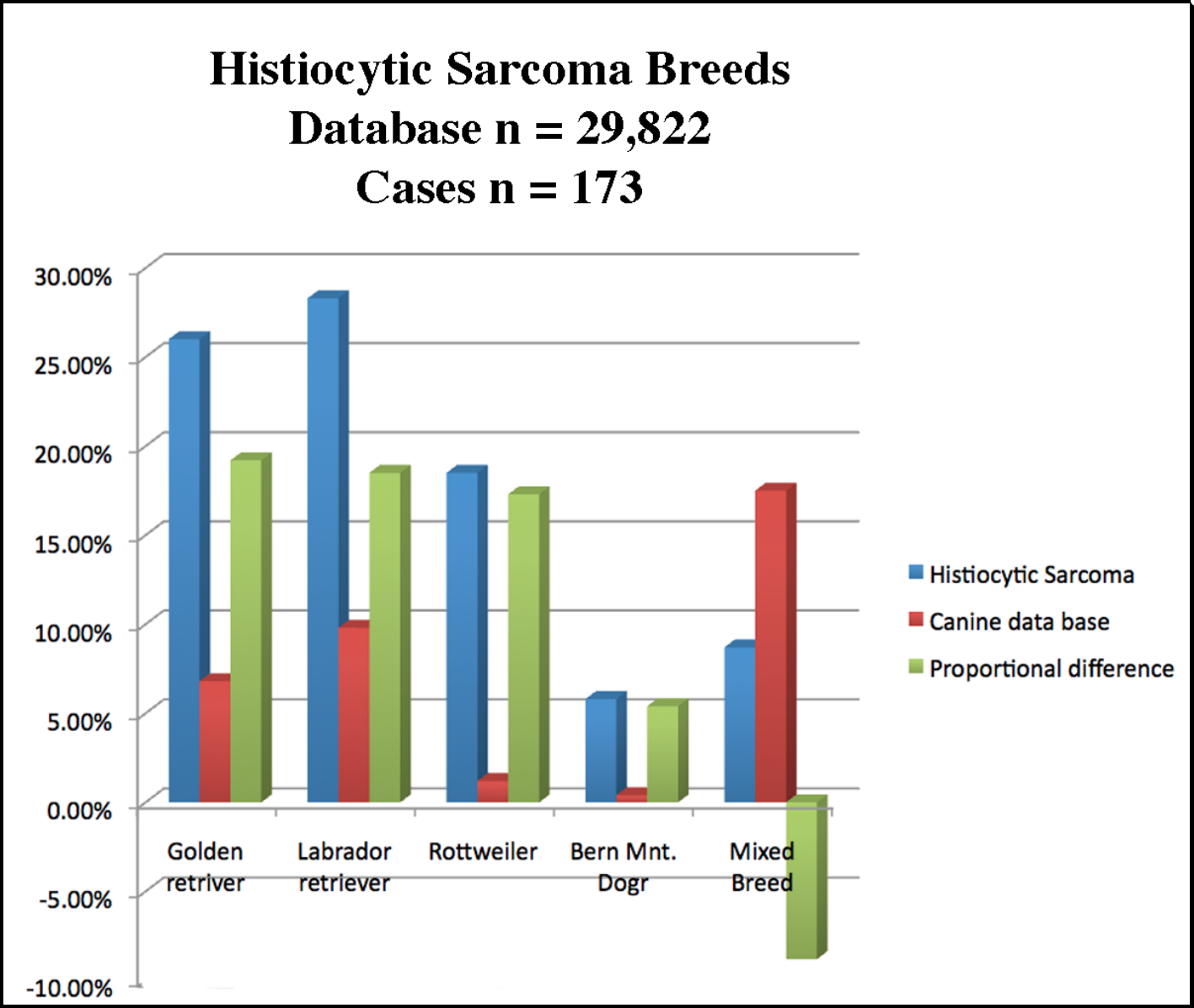


Metastatic Tumors to the Canine Eye



Histiocytic Sarcoma

Metastatic Tumors to the Canine Eye



Histiocytic Sarcoma Breeds