Mining the COPLOW database

Retrospective study of Feline neoplasia, 1994-2009

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2599 cases of feline primary ocular neoplasia submitted from 1994 to 2009

- Anatomical location
- Tumor type
- Breed predilection for specific tumors
- Description of relevant cases
<table>
<thead>
<tr>
<th>Breed</th>
<th>Number of Cats</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other</td>
<td>96</td>
</tr>
<tr>
<td>Abyssinian</td>
<td>10</td>
</tr>
<tr>
<td>calico</td>
<td>18</td>
</tr>
<tr>
<td>Burmese</td>
<td>18</td>
</tr>
<tr>
<td>tabby</td>
<td>19</td>
</tr>
<tr>
<td>mixed breed</td>
<td>39</td>
</tr>
<tr>
<td>Himalayan</td>
<td>46</td>
</tr>
<tr>
<td>Maine coon</td>
<td>52</td>
</tr>
<tr>
<td>Siamese</td>
<td>71</td>
</tr>
<tr>
<td>breed not specified</td>
<td>97</td>
</tr>
<tr>
<td>domestic mediumhair</td>
<td>121</td>
</tr>
<tr>
<td>Persian</td>
<td>158</td>
</tr>
<tr>
<td>domestic longhair</td>
<td>349</td>
</tr>
<tr>
<td>domestic shorthair</td>
<td>2065</td>
</tr>
</tbody>
</table>

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

- Globe: 82%
- Conjunctiva: 12.3%
- Eyelid: 4.4%
- Orbit: 1.15%
Feline tumors of the Globe (n=2136)

- Melanoma: 1754
- FOPTS, Spindle Cell Variant: 148
- FOPTS, Round Cell Variant: 64
- Iridociliary Epithelial Tumor: 124
- FOPTS, Osteo/Chondrosarcoma Variant: 33
- Other: 13
Feline Conjunctival Tumors (n=319)

- Other: 10
- Mucoepidermoid Carcinoma: 13
- Hemangioma: 14
- Hemangiosarcoma: 16
- Tumor of the 3rd Eyelid Gland: 26
- Melanoma: 50
- Squamous Cell Carcinoma: 190
Feline Eyelid Tumors (n = 114)

- Other: 11
- Spindle Cell Tumor: 16
- Melanoma: 12
- Mast Cell tumor: 14
- Apocrine Gland Tumor: 30
- Peripheral Nerve Sheath Tumor: 31
Table 9. Comparison of the prevalence of eyelid tumors in this study with that in previous studies.\textsuperscript{17}

<table>
<thead>
<tr>
<th>Tumor Type</th>
<th>UTCVM*</th>
<th>VMDP</th>
<th>PCOP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hemangioma</td>
<td>1/43 (2%)</td>
<td>1/86 (1%)</td>
<td>–</td>
</tr>
<tr>
<td>Apocrine hidrocystoma</td>
<td>3/43 (7%)</td>
<td>–</td>
<td>1/36 (2.8%)</td>
</tr>
<tr>
<td>Lymphoma</td>
<td>3/43 (7%)</td>
<td>–</td>
<td>4/36 (11.1%)</td>
</tr>
<tr>
<td>Malignant peripheral nerve sheath tumor</td>
<td>3/43 (7%)</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Adenocarcinomas</td>
<td>4/43 (9%)</td>
<td>3/86 (3.5%)</td>
<td>–</td>
</tr>
<tr>
<td>Hemangiosarcoma</td>
<td>6/43 (14%)</td>
<td>2/86 (2.3%)</td>
<td>–</td>
</tr>
<tr>
<td>Mast cell tumor</td>
<td>11/43 (26%)</td>
<td>–</td>
<td>4/36 (11.1%)</td>
</tr>
<tr>
<td>Squamous cell carcinoma</td>
<td>12/43 (28%)</td>
<td>56/86 (65%)</td>
<td>13/36 (36.1%)</td>
</tr>
</tbody>
</table>

\* UTCVM = University of Tennessee College of Veterinary Medicine; VMDP = Veterinary Medical Data Program; PCOP = Purdue Comparative Oncology Program.

Newkirk and Rohrbach Vet Pathol 46:5, 2009

Melanomas 62/433 (14.3%)
EYELID AND CONJUNCTIVAL TUMORS

- SCC usually in older cats
  - Average age 12 years [Newkirk & Rohrbach 12.4y]
    - Average tumor pop. age 10.6y
  - No color information

- Mast cell tumors
  - Average age 10.5 [Newkirk & Rohrbach 6.5y]

- Male x Female
  - COPLOW - M 1642 X F1389
  - Newkirk & Rohrbach - M 27 X F 16
Feline Tumors of the Orbit (n = 30)

- Other: 2
- Liposarcoma: 2
- Chondroma: 2
- Meningioma: 2
- Lacrimal Adenocarcino...: 3
- Osteosarcoma: 4
- Anaplastic Sarcoma: 6
- Fibrosarcoma: 9
Specific Breed predispositions

- Odds ratio calculation

- Persians:
  - Apocrine tumors
    - (8/30) $5x$ general population frequency
  - Apocrine Hidrocystoma
    - (7/9) $56x$ general population frequency

- Feline diffuse iris melanoma
  - (132/1754) $2x$ general population frequency
Feline Diffuse Iris Melanoma

Classification

- Melanosis
- FDIM early
- FDIM
- FDIM extensive
- FDIM atypical presentation
- Atypical melanoma
Feline Diffuse Iris Melanosis

Classification

- FDIM early
- FDIM
- FDIM extensive
- FDIM atypical presentation
- Atypical melanoma
Feline Diffuse Iris Melanoma

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**FDIM atypical presentation**

- Atypical melanoma
Feline Diffuse Iris Melanoma

Classification

- Melanosis
- FDIM early
- FDIM
- FDIM extensive
- FDIM atypical presentation

Atypical melanoma
Melanosis  Early FDIM  FDIM
FDIM Extensive  FDIM Atypical presentation  Atypical melanoma
<table>
<thead>
<tr>
<th>Extensive</th>
<th>Atypical presentation</th>
<th>Atypical</th>
</tr>
</thead>
</table>

[Images of tissue samples representing extensive, atypical presentation, and atypical cases.]

Atypical presentation indicates a deviation from normal tissue structure or function.
Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma

Progression of Feline DIM

- **Melanosis**
- Early DIM
- DIM (not extensive)
- Extensive DIM

Age (years):
- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20

Percent of n:
- 0.02
- 0.04
- 0.06
- 0.08
- 0.10
- 0.12
- 0.14
Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma

Progression of Feline DIM

N= 325
Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma

Progression of Feline DIM

N=1242
Ages of Cats with Melanosis, Early Melanoma, Melanoma, and Extensive Melanoma

Progression of Feline DIM

N = 272
FDIM and metastasis

- Survival in cats with more extensive melanomas is shorter (Kalishman, Chapel, Flood and Dubielzig, 1998)
- Little know about metastatic disease
  - Metastasis more common than in dogs
  - Infiltrative and anaplastic cases tend to metastasize more often
- Difficult follow up
Distribution of Metastatic FDIM base on the histological subtype (n:20)
Frequency of metastatic sites on FDIM (n:20)

<table>
<thead>
<tr>
<th>Site</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Liver</td>
<td>35%</td>
</tr>
<tr>
<td>Spleen</td>
<td>25%</td>
</tr>
<tr>
<td>Lymph nodes</td>
<td>15%</td>
</tr>
<tr>
<td>Orbit</td>
<td>15%</td>
</tr>
<tr>
<td>Lung</td>
<td>15%</td>
</tr>
<tr>
<td>Omentum</td>
<td>5%</td>
</tr>
<tr>
<td>Urinary bladder</td>
<td>5%</td>
</tr>
</tbody>
</table>
Frequency of metastatic sites on FDIM (n:20)

- One Widely metastatic
- One recurred on the suture line
- Early FDIM presented lung mets
Feline Eyelid Apocrine tumor

• 2nd most common tumor in the eyelid
  – 30/114 (26%)

• Persian cats (8/30) 5x more at risk than general population frequency

• Multiple recurrent lesion
Feline Eyelid Apocrine tumor

Classification (Sugiyama et al. 2007)

- **Apocrine Hidrocystoma**
  - Non-proliferative cystic lesion
  - Flattened lining epithelium
  - No papilliferous projections

- **Apocrine Cystadenoma**
  - Proliferative cystic lesion
  - Multiple epithelial layers
  - Papilliferous projections
Apocrine Hidrocystoma
Apocrine Cystadenoma
<table>
<thead>
<tr>
<th>Classification</th>
<th>Apocrine tumors (n= 30)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>•</strong> Apocrine Cystadenoma 18/30 (60%)</td>
<td></td>
</tr>
<tr>
<td><strong>•</strong> Apocrine Hidrocystoma 9/30 (30%)</td>
<td></td>
</tr>
<tr>
<td>– Persian 7/9 (77%)</td>
<td></td>
</tr>
<tr>
<td>– 56x general population frequency</td>
<td></td>
</tr>
<tr>
<td><strong>•</strong> Apocrine carcinomas 3/30 (10%)</td>
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</tr>
</tbody>
</table>
Acknowledgment

Thanks,

• Dr. Richard Dubielzig & Dr. Cynthia Bell
• Coworkers and students at COPLOW
• Pictures: RRD/COPLOW archives