Osteosarcoma in dogs: A Very Big Dog problem

This study aimed to report the frequency and risk factors for osteosarcoma in dogs in the UK in 2016 using information from anonymised veterinary clinical records in the VetCompass™ Programme.

This study cements the concept that breed, number of dogs in the population, and human osteosarcoma often share similar characteristics, clinical timelines and links to skull shape and leg length implicate the idea of bone development with a combination of growth, development and tumour biology. This means that studies on canine osteosarcoma can be highly translational bioscience on osteosarcoma in dogs to improve our understanding of its origin and development.

Although not so common in dogs overall, osteosarcoma is very serious and a very big dog problem compared to the rest of the dogs in the UK.

<table>
<thead>
<tr>
<th>Osteosarcoma presence</th>
<th>Number of dogs in the study</th>
<th>Osteosarcoma prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cases (905,552)</td>
<td>18</td>
<td>0.037% (995 cases)</td>
</tr>
<tr>
<td>Non-cases (905,552)</td>
<td>905,552</td>
<td>0.50% (460 cases)</td>
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</tbody>
</table>

Some ideas are as follows:

- **There were 131 cases of osteosarcoma diagnosed in the study (0.84%) and 18,050 cases of osteosarcoma (0.62%) in 2016, compared to 9,055 cases (0.50 times the risk compared to crossbreeds overall) in 2017.**
- **The study could not include few individual cases overall in the study.**
- **Relative breed risk of osteosarcoma* (x 0.50).**
- **Age as a risk factor for osteosarcoma**
- **Conclusions**

*Breeds with the highest frequency of osteosarcoma

- Leonberger
- Scottish Deerhound
- Great Dane
- Rottweiler
- Greyhound

**Relative breed risk of osteosarcoma***

- Leonberger (2.72)
- Scottish Deerhound (1.48)
- Great Dane (1.48)
- Rottweiler (1.48)
- Greyhound (1.48)

**Age as a risk factor for osteosarcoma**

- **Breeds with the highest risk**
  - Breeds with chondrodystrophy (e.g. Labrador Retriever, German Shepherd).
  - Breeds with medium-length faces (mesocephalic skulls)
  - Breeds with long faces (dolichocephalic skulls)

- **Breeds with reduced risk**
  - Breeds with breeds with flat faces (brachycephalic skulls)
  - Breeds with breeds with medium-length skulls (mesocephalic)
  - Breeds with breeds with long skulls (dolichocephalic skulls)

**Relative risk of osteosarcoma diagnosis compared to crossbreeds overall**

- **There were 131 cases of osteosarcoma diagnosed in the study (0.84%) and 18,050 cases of osteosarcoma (0.50 times the risk compared to crossbreeds overall).**

**Links to skull shape and leg length implicate the biology of bone development**

- **Conclusions**
  - There is a strong association between osteosarcoma and long legs or long skulls.
  - Breeders can select towards breeds with lower risk factors for osteosarcoma while reducing clinical suspicion of osteosarcoma.
  - Owners of high-risk breeds should be alert and veterinarians can have higher clinical suspicion of osteosarcoma when they encounter these high-risk breeds.

**Methods**

- A retrospective cohort study of all dogs in the VetCompass™ programme with osteosarcoma (Cases) and without osteosarcoma (Non-cases) was performed.
- Data was collected on the age at diagnosis, breed, sex, and weight of the dogs.
- The results were then analysed using robust statistical analysis to determine the relative risk of osteosarcoma among the different breeds.

**Conclusion**

- The results of this study suggest that there is a strong association between osteosarcoma and long legs or long skulls.
- Breeders can select towards breeds with lower risk factors for osteosarcoma while reducing clinical suspicion of osteosarcoma.
- Owners of high-risk breeds should be alert and veterinarians can have higher clinical suspicion of osteosarcoma when they encounter these high-risk breeds.