Description and analysis of gonadectomy in a cohort of Golden Retrievers
Missy Simpson
Morris Animal Foundation, Denver, CO

The Golden Retriever lifetime study
The Golden Retriever Lifetime Study (GRLS) consists of approximately 3,000 privately-owned
dog living through the lower 48 United States. The goal of the study is to define the incidence of and
identify risk factors for hemangiosarcoma, osteosarcoma, lymphoma, and high grade mast cell tumors.

Once a year, dog owners complete and annual questionnaire that asks in-depth questions about
the dog’s lifestyle, environment, behavior, and nutrition. Veterinarians complete a questionnaire detailing
the dog’s health history and physical examination results. At the same annual appointment, routine
clinical pathology is performed and blood, hair, feces, toenails, and urine are collected and banked for
future research.

In addition to annual routine visits, if suspicion of malignancy exists, veterinarians are asked to
complete an additional questionnaire about the dog’s health as well as submit tumor tissue samples and
collect the same samples as required during the routine annual visit.

We will present descriptive data about the health status of our cohort with special focus on
clinically relevant reproductive data including gonadectomy rates, reported breeding activity, infertility,
and reproductive diagnoses.

Gonadectomy and health outcomes
As a practicing veterinarian, counseling owners about the reproductive status of their dogs is a
common and important discussion. The prevailing wisdom is that, if the owner is interested in keeping
this dog as a pet, gonadectomy is indicated. This recommendation is in wide use in spite of a paucity of
data regarding health risks or benefits associated with said procedure and is based largely in anecdotes
and dogma.

Current veterinary research has demonstrated an association between gonadectomy and
overweight and obesity (O/O) but to this point, studies have not been able to examine whether the age at
which gonadectomy occurs is associated with the occurrence, timing, or severity of O/O. Because of its
prospective nature, the GRLS study will be able to elucidate this important question in veterinary
medicine. At this presentation, preliminary data about this association will be presented. In addition,
there is conflicting evidence about the health consequences (either positive or negative) associated with
gonadectomy. Data from GRLS regarding the association between gonadectomy and chronic non-
traumatic orthopedic injuries will be presented.

Methods
This study was conducted using prospective data collected from the GRLS. Golden Retriever
Lifetime Study is a cohort of privately-owned Golden Retrievers who live throughout the contiguous 48
states assembled to identify the incidence and risk factors for osteosarcoma, hemangiosarcoma, mast cell
tumors, and lymphoma. Owner- and veterinarian- reported data and biological samples are collected
annually. Because of the prospective nature of the study, we can study multiple exposures and outcomes.

To study the associations of interest, we performed survival analysis to estimate hazard ratios
(HR) and 95% confidence intervals (95% CI) on the entire cohort. The outcomes of interest are the first
occurrence of veterinarian-reported O/O (defined on the Purina Body Condition Score scale of >6/9) and
the first occurrence of veterinarian-reported cranial cruciate ligament rupture or clinical osteoarthritis.
The exposures of interest are age at gonadectomy (in four categories: < 6 months, 6 months – 1 year, > 1
year and intact) and the first diagnosis of O/O. All analyses were performed using SAS v9.2 (Sas Inc,
Cary, NC).
Results

We started with 3,044 dogs at the completion of enrollment and have 84% compliance at the following annual visits. In the analysis of the association between age at gonadectomy and O/O all age categories of gonadectomy were associated with increased risk for O/O compared to intact dogs (≤ 6 months HR: 1.6, 95% CI: 1.3-2.0; 6 months to 1 year HR: 1.6, 95% CI: 1.3-1.9; > 1 year HR: 1.4, 95% CI: 1.1-1.6).

The youngest age category of gonadectomy was associated with increased risk for orthopedic injury (HR: 4.0, 95% CI: 1.8-9.0). Neither of the older age at gonadectomy categories were associated with the risk for orthopedic injury (6 months to 1 year HR: 2.0, 95% CI: 0.9-4.6; > 1 year HR: 0.8, 95% CI: 0.3-2.2). Overweight/obesity was not associated with the risk for orthopedic injury (HR: 0.97, 95% CI: 0.39-2.38).

Discussion

This study is additional evidence that earlier age at gonadectomy is associated with O/O and non-traumatic orthopedic injury and provides further evidence of the importance of counseling dog owners about the both the positive and potentially deleterious outcomes associated with gonadectomy.

Interestingly, we did not find an association between O/O and the risk for orthopedic injury. However, this is a relatively young cohort and this association may become apparent as the cohort matures. In addition, we were unable to include measures of severity of orthopedic injury. It may be possible that O/O is not an early risk factor for orthopedic injury but could be associated with severity of disease.

Finally we will discuss future research plans regarding examining exposure to reproductive hormones and the risk for important chronic health outcomes such as cancer, metabolic disorders, and osteoarthritis.