

Cancer in Golden Retrievers

Golden retrievers are affected by a number of different cancer types, including lymphoma, haemangiosarcoma and mast cell tumours, although there are several other tumours that occur relatively commonly in this breed (Box). This article discusses the 3 most common cancers in more detail below along with information on diagnosis, staging, clinical presentation and treatment options, with an emphasis on early, accurate diagnosis.

In the 2004 Kennel Club survey, almost 40% (360/927) of all golden retriever deaths were reported to be due to cancer by their owners. Although the 2014 survey was carried out using different methodology and reporting of results, it appears that at least 28% (107/377) deaths were due to cancer as each individual cancer was listed separately and only the top 20 causes of death are reported on the website. An American study, Golden Retriever Lifetime Study (GRLS) is a prospective longitudinal study that was launched in 2012 with enrolment of a cohort of 3000 dogs completed in 2015. This observational study will follow the cohort of golden retrievers throughout their lives via annual online questionnaires for owners, annual physical examinations and collection of biological samples in order to evaluate the effects of factors such as diet, obesity, exposure to different environments and genetics on the incidence of disease. Hopefully this study will be able to help answer the question as to why golden retrievers from the US are more likely to be diagnosed with haemangiosarcoma whilst those from the UK are more likely to be affected by lymphoma. The Animal Cancer Trust is doing all that it can to support those working to fight cancer in golden retrievers. We will be posting some new cancer and breed specific information sheets on our website in the near future.

Diagnosis and staging

It is important to give a complete history of your dog's health leading up to the onset of illness and as much detail as possible about the signs you have observed as these may provide clues as to which organs are being affected. A thorough physical examination is always an essential part of the diagnostic process (work-up) to help determine which further tests are required. Complete blood cell counts and biochemistry tests can help to reveal which organs are involved and whether there is any concurrent disease. Various imaging modalities, including radiographs, ultrasound studies and sometimes also CT or MRI scans may be helpful in determining the extent of the disease. A diagnosis of cancer is usually based on histopathological examination of a sample that is obtained by a fine needle aspirate (FNA) or by a biopsy. Once the diagnosis is made, further evaluation by a pathologist may be necessary to establish the grade of the tumour as this will affect prognosis and treatment options. At this point, the cancer should be staged. Staging is the process of determining to what extent the cancer has spread throughout the dog's body to ensure the best treatment possible is offered and to give a more accurate prognosis (expected outcome). Clinical staging using the TNM system to assess the primary tumour (T), metastasis to local and regional lymph nodes (N) and distant sites (M) is carried out as indicated by the biological behaviour of the tumour. If you are not happy with your vet/practice, please remember that it is your right and responsibility to seek a second opinion or referral to a specialist veterinary oncologist.

Lymphoma (lymphosarcoma) is a cancer arising predominantly in the lymph glands of the body. In some dogs this may occur at only one or two sites in the body although it is usually widespread or multi-centric, involving several lymph glands and internal organs. Multi-centric lymphoma is characterized by painless swelling of the lymph nodes, often with hepatosplenomegaly (enlargement of the liver and spleen) and/or bone marrow involvement. Most dogs do not show any distinctive signs of illness although hypo/anorexia (loss of appetite), weight loss, ascites (abnormal accumulation of fluid in the abdomen), dyspnoea (difficulty in breathing), polydipsia (abnormal thirst), polyuria (excessive passage of urine), fever, anaemia or haemorrhage may occur. There are many types and sub-types of lymphoma in humans although fewer are recognised in dogs. There are 2 main cell types of lymphoma in dogs: B-cell and T-cell with the latter being the most aggressive type and, sadly, the most common type in golden retrievers. Lymphoma requires a tissue biopsy examined by a veterinary pathologist for diagnosis and this may require surgery (and sometimes multiple surgeries) to be certain. Chemotherapy is the treatment of choice for dogs with lymphoma and there are several different protocols that are available. The choice of treatment and prognosis (expected outcome) both depend on several factors, including the particular type/sub-type of lymphoma, the age of the dog and presence of concurrent disease, the costs and time commitment required to travel for treatment and monitoring. You and your vet should discuss all options including end of life choices. It is important to remember that you can make a decision to start treatment and use your dog's response to treatment to help you decide on whether to continue with treatment. There is a growing awareness of the importance of palliative care for our canine companions suffering from cancer and other chronic diseases and there is much that

we can do to improve quality of life. Many dogs with lymphoma will initially respond when treated with chemotherapy although not all dogs will go into remission and most dogs will relapse and then a decision must be made about further treatment or euthanasia.

Haemangiosarcoma is a malignant tumour that arises from the vascular endothelial cells that line blood vessels. Typically, haemangiosarcoma forms in very vascular organs such as the spleen, liver, heart and lungs, although they can be found in almost any organ. The most common sites are the spleen, liver and the right atrium of the heart but can also include the skin and subcutaneous tissue. These tumours grow via infiltration into surrounding normal tissues as well as by metastasis or spread to distant organs. In an attempt at maintaining normal function, tumour cells form abnormal blood vessels that tend to be tortuous, causing blood cells tend to pool in them and form blood clots. These blood clots prevent blood and nutrients from reaching the tumour cells, causing them to die and this results in small ruptures in the tumour that allows blood to seep into the abdomen, heart sac, chest, or subcutaneous space. Affected dogs may show non-specific signs such as lethargy and weakness, although these may be temporary as dogs reabsorb the blood components and make new blood cells. Clinical signs may include weight loss, lameness, weakness, collapse, rapid heartbeat, pale mucous membranes, blood loss and a palpable abdominal mass. Whilst these clinical signs tend to recur, they may be subtle enough to go unnoticed for some time, depending on the amount of blood lost. Since these tumours arise in internal organs there is often little warning that they are present prior to time they cause severe clinical signs of disease. Even with a large hemangiosarcoma, dogs may show no clinical signs or evidence that they have a life threatening disease until they suffer a haemorrhage and collapse. Careful examination of blood samples by experienced pathologists may reveal the presence of chronic hemorrhage and blood vessel abnormalities that are suggestive of haemangiosarcoma. Histopathologic examination of tissue taken directly from the tumour, often at the time of surgical removal of the tumour, is the most conclusive method for making a diagnosis. When the diagnosis is made, metastasis to other organs including the lungs, liver, intestines and mesentery (membranous connective tissue that supports the intestines) has usually already occurred, whether it be macroscopic (grossly visible) or microscopic. The treatment options for haemangiosarcoma are limited due to the late diagnosis. Surgery to remove or de-bulk the primary tumour followed by intensive chemotherapy results in longer survival times compared to surgery alone. Dogs that undergo surgery to remove an intact splenic mass and where no metastases were detected achieve a slightly better than average survival compared to dogs who have suffered a ruptured splenic tumour.

Mast cell tumours (MCTs) are one of the most common skin tumours seen in dogs although there is great variation in what they look like and how they behave. Their behaviour varies from almost benign, slow growing, low-grade tumours at one end of the scale to very aggressive, high-grade cancers at the other end. MCTs at the least aggressive end of the scale are mainly potentially curable whereas the very aggressive ones are frequently fatal. Mast cells are a special type of cell that are typically found in the skin and their function is to coordinate inflammatory reactions. As a result, MCTs can show changes typically associated with inflammation such as swelling and redness and many owners will comment that a lump has been changing in size. When they are within the skin, MCTs may be raised, firm, hairless and sometimes reddened, swollen or ulcerated. Just below the skin surface, an MCT may be a soft and sometimes mobile mass that can feel similar to a lipoma (benign fat tumour). The size of MCTs can also vary enormously, from a few millimetres to 20-30 cm in diameter in extreme cases with most being about 2-3cm in diameter at diagnosis. A diagnosis of MCT is often made using a fine needle aspirate to obtain cells from a mass. The grade of the tumour must then be determined as this will affect the treatment decision making process. Histopathologic grading requires a biopsy to be obtained and submitted to a pathology laboratory. Low-grade MCTs are considered to be one of the most potentially curable of all cancers in that surgical removal with adequate margins of apparently normal tissue is appropriate. Intermediate-grade tumours require wider margins of excision whilst high-grade tumours require much wider margins. The higher the grade, the more likely it is that tumour cells will infiltrate into the surrounding tissues and the more likely it is to spread via the blood or lymph systems to other parts of the body. When surgical removal alone is not adequate or possible, additional treatment is necessary. Radiation therapy and/or chemotherapy can be used to manage tumours that cannot be completely removed or that have spread. There is also a licensed product called Masivet® that contains masitinib, a protein-tyrosine kinase inhibitor that blocks specific enzymes by selectively target tumour cells.

References and further reading

1. Animal Cancer Trust website www.animalcancertrust.co.uk/

2. Dobson JM. 2013. Open Access publication: Breed-predispositions to cancer in pedigree dogs. ISRN Veterinary Science Volume 2013, Article ID 941275, 23 pages. <http://dx.doi.org/10.1155/2013/941275> available at <http://www.hindawi.com/journals/ism/2013/941275/>
3. Report from the Kennel Club/British Small Animal Veterinary Association Scientific Committee. <http://www.thekennelclub.org.uk/health/breeding-for-health/inbreeding/>
4. Effective population size (EPS) available at <http://www.thekennelclub.org.uk/vets-researchers/publications-statistics-and-health-results/breed-population-analyses/>
5. Dog Breed Health website created by Carol Fowler of the Cavalier Matters registered charity, no. 1141674. Aimed at dog and puppy buyers who are choosing which breed (or cross-breed) to have as a pet available at <http://www.dogbreedhealth.com/>
 - a. A Guide to Genetic Health Issues for Dog Breeds – Golden Retriever. Available at <http://www.dogbreedhealth.com/golden-retriever/>
 - b. A Beginner's Guide to COI (Coefficient of Inbreeding) by Jemima Harrison. <http://www.dogbreedhealth.com/a-beginners-guide-to-coi/>
6. Masivet® Manufactured by AB Science. <http://www.masivet.com/>

Name or type	Description of tumour
Lymphoma	Neoplasia of the lymphatic glands and tissues
Haemangiosarcoma	Aggressive malignant tumour of the blood cells in soft tissues such as the spleen, liver or heart
Malignant histiocytosis	Rapidly progressive multi-system neoplasia
Osteosarcoma	Cancer of the bone
Soft tissue sarcoma	Often histiocytic sarcoma
Thyroid adenocarcinoma	Malignant cancer of the thyroid gland(s)
Mast cell tumour(s)	Vary from low-grade, almost benign to high-grade malignant
Melanoma	Can be benign or malignant; often in the eye or mouth
Trichoepithelioma	Usually a benign tumour of the hair follicle