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Bone Marrow Tumors

These notes are provided to help you understand the diagnosis or possible diagnosis of cancer in your pet. For general information on cancer in pets ask for our handout "What is Cancer". Your veterinarian may suggest certain tests to help confirm or eliminate diagnosis, and to help assess treatment options and likely outcomes. Because individual situations and responses vary, and because cancers often behave unpredictably, science can only give us a guide. However, information and understanding about tumors and their treatment in animals is improving all the time.

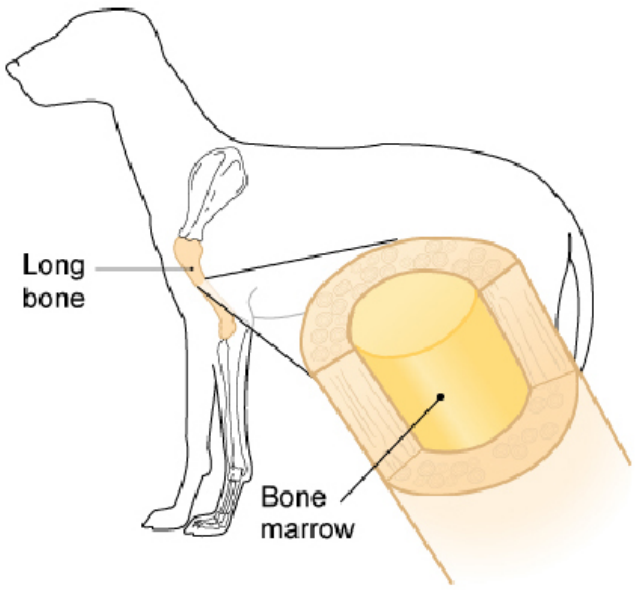
We understand that this can be a very worrying time. If you have any questions please do not hesitate to ask us.

What is the bone marrow?

The bone marrow is the soft tissue inside the bones. Before birth, the marrow contains the primary (stem) cells that from all the red and white blood cells. After birth, some types of blood cells, particularly lymphocytes, are made in other parts of the body. However, the marrow remains the main site for production of circulating blood elements including platelets (which are vital to stop bleeding and make the blood clot), red cells (which carry oxygen) and most white cells (which fight infections and clear up debris).

What types of tumors are found in the bone marrow?

Tumors of the blood cells found within the marrow are rare, with a continuum from dysplasias (abnormal growths) to cancers (**myeloproliferative disease**). Malignant tumors of the blood vessels within the marrow (**hemangiosarcomas**) are relatively common in dogs although the clinical disease usually shows elsewhere first. Cancer of the **lymphocytes** or **mast cells** may involve the bone marrow. Cancers of various types from other organs may spread (metastasize) to the bone marrow.



What do we know about the causes?

The reason why a particular pet may develop this, or any cancer, is not straightforward. Cancer is often the culmination of a series of circumstances that come together for the unfortunate individual.

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Cancer is non-lethal genetic damage of cells (mutations in the DNA genome). The more divisions a cell undergoes, the more probable is a mutation. The cause of many of these tumors such as '**multiple myeloma**' is still unknown but genetic predisposition, viral infection, chronic antigenic stimulation and exposure to environmental carcinogenic substances are all thought to contribute.

Feline leukemia virus (FeLV) causes cancers of the blood and lymphoid system in cats. Different strains of the virus cause cancers of different types and at different ages. If a cat is also infected with feline immunodeficiency virus (FIV), the risk of developing cancer increases.

Why has my pet developed this cancer?

Your pet may have a genetic tendency to cancer and then had an infection or contact with chemicals in the environment that initiated or promoted the cancer. Your cat may currently be infected with FeLV or FIV or have been exposed to viral infection.

Are these common tumors?

Tumors of the blood cells made in the marrow are rare, but are more common in cats than dogs. Hemangiosarcomas are common in dogs, particularly German Shepherd dogs. Multiple myeloma is a rare cancer of plasma cells, cells that develop from 'B' type lymphocytes.

Lymphoid cancer is common but does not often affect the marrow until late in the disease. In dogs, the risk of lymphoid cancer is 13-24 cases of lymphosarcoma per 100,000 dogs. Pups as young as four months may have these cancers but 80% occur between the ages of 5 and 11 years. Boxers have a higher incidence than other breeds. Malignant histiocytosis is common in the Bernese Mountain Dog.

"Lymphoid cancer is the most common cancer in cats making up approximately one in three cancer cases."

Lymphoid cancer is the most common cancer in cats making up approximately one in three cancer cases. In surveys, the incidence is 50-200 per 100,000 cats. Tumors are most common in mature cats aged 6-12 years. Involvement of the marrow is not common until late in the disease.

How will these cancers affect my pet?

Abnormalities in the blood will make your pet unwell. The clinical signs are variable and include lethargy, fever, loss of appetite, weight loss, diarrhea, increased urination, petechial hemorrhage (small bleeding points) and anemia. There may be shortness of breath and swelling of the abdomen due to increased size of the spleen. Lameness and fractures may be the first sign of multiple myeloma, which also affects kidney function.

Lymphoid tumors also induce signs that are not readily explained by local or distal spread of the tumors. These are known as paraneoplastic syndromes. Some are due to abnormal hormone production by the cancer. Examples include increased blood calcium levels and increased blood gamma globulin levels (immune system related protein). Both these elevations adversely affect kidney function and cause increased thirst and urination.

How are these cancers diagnosed?

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Your veterinarian may suspect cancer based on your pet's clinical signs. X-rays and ultrasound are often helpful to detect tumors. Blood tests often indicate abnormalities in myeloproliferative disease. To confirm the diagnosis, a sample of bone marrow, obtained by needle aspiration or needle biopsy, may be required to confirm the diagnosis. Your veterinarian will submit the samples to a specialized laboratory for microscopic examination by a veterinary pathologist. Cytology, the microscopic examination of cell samples, is one technique and is used for aspiration samples, but needle biopsies may also be examined by histopathology.

Lymphoid, plasmacytic, histiocytic and mast cell cancers may sometimes be diagnosed from bone marrow biopsy, but these usually have signs of cancer elsewhere and are diagnosed by biopsy of other sites. Diagnosis of blood vessel disease is difficult and often relies on finding tumors in other parts of the body.

What types of treatment are available?

"...used to induce remission and prolong life..."

In some countries, chemotherapy is used to induce remission and prolong life in lymphoid, blood and mast cell cancers. It rarely cures the disease. Significant remission is more likely for smaller and more rapidly dividing tumors. The drugs used are toxic to organs with dividing cells such as the intestine, bone marrow and skin. Some are also toxic to other organs such as the liver and induce generalized malaise. For these cancers, the optimal chemotherapy protocol is still uncertain.

Steroid drugs such as prednisolone may palliate blood, lymphoid and mast cell cancers for a few months. However, their use will promote resistance to other chemotherapy drugs and may shorten remission of subsequent multi-drug chemotherapy.

Can these cancers disappear without treatment?

Cancer rarely disappears without treatment but, as development is a multi-step process, it may stop at some stages. The body's own immune system can kill cancer cells but it is rarely 100% effective.

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How can I nurse my pet?

After biopsy, your pet must not interfere with the operation site, which needs to be kept clean and dry. Report any loss of stitches or significant swelling or bleeding to your veterinarian. If you require additional advice on post-surgical care, please ask.

If your pet is to have chemotherapy, you need to understand the risks involved in the use of these unlicensed and toxic drugs. The safety precautions required to protect yourself, other people and the environment when handling and disposing of them will be explained if you consent to their use.

How will I know how the cancer will behave?

Examination of blood or bone marrow, or other biopsy tissue will give your veterinarian the diagnosis that helps to indicate how it is likely to behave.

Sadly, when it affects the bone marrow, cancer is not a curable disease. However, there is significant variation between animals in their response to the tumors and therapy. If the tumors are diagnosed at an early stage, some pets may live for months (or very occasionally years). In others, the progress is very rapid and only weeks of reasonable quality life may remain.

Dogs with multiple myeloma may have high blood calcium and abnormal protein in the urine. These and destruction of bone reduce the probable survival time compared to dogs without these signs.

Are there any risks to my family or other pets?

Feline leukemia virus can cause cancers of both the blood and lymphoid system. The virus is occasionally transmitted from an infected queen to her kittens before birth, but is more commonly acquired from close contact with infected cats, which shed the virus in saliva, urine and feces. If your cat is infected, it can pass the infection to other cats. The infection is not transmissible to people. Similarly feline immunodeficiency virus, which is similar to HIV in people, only affects cats and cannot infect people or other species of animal such as dogs.

The other tumors are not infectious and are not transmitted from pet to pet or from pets to people.

This client information sheet is based on material written by: Joan Rest, BVSc, PhD, MRCPath, MRCVS