



## Osteosarcoma

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### What is Osteosarcoma?

Osteosarcoma (OSA) is the most common form of bone cancer in dogs. Although OSA can occur in dogs of all ages, middle-aged or elderly large-breed dogs are most susceptible. Tumors can develop anywhere there is bone but about 80 percent of the time, they occur in the limbs, most commonly the front limbs (radius and humerus).

OSA of the limbs is called appendicular. The tumor develops deep within the bone and becomes more and more painful as it grows outward, essentially destroying the bone from the inside out. As the tumor grows it is replaced with tumorous bone, which is weaker than normal bone and can easily break. This type of break is called a pathologic fracture and it does not heal.

Appendicular **OSA is a very aggressive form of cancer**. In about 90 per cent of dogs diagnosed with this type of OSA, the cancer has already spread, most often to the lungs and sometimes to other bones.

Axial OSA refers to tumors that develop in other areas of the body, besides the limbs. The most common area is the jaw. This form of OSA usually affects smaller, middle-aged dogs and females twice as often as males. Also, axial tumors are not as aggressive as appendicular tumors. Dogs have been known to have axial OSA for as long as two years before being diagnosed.

### Causes of Osteosarcoma

As with most forms of animal cancers, the specific cause of OSA is not known. Certain breeds have a genetic predisposition to the disease including Irish Wolfhounds, Greyhounds, German Shepherds, Rottweilers, Great Danes, Great Pyrenees and Mastiffs.

Ionizing radiation such as x-rays, contact with chemical carcinogens and foreign bodies such as metal implants in dogs are thought to contribute to the development of OSA, as are previous fractures and chronic bone infections especially in large-breed dogs.

As OSA tumors often occur near growth plates, some veterinarians speculate that factors affecting growth rates such as diets that promote rapid growth in puppies, are linked to the development of OSA. Also, studies have shown that the risk of developing various cancers, including OSA, increases with spaying and neutering in dogs less than a year old, compared with those dogs left intact.



## What are the symptoms of Osteosarcoma?

- The most common symptom of appendicular OSA is lameness, which may, in some cases, be accompanied by swelling and/or the presence of an obvious mass on the limb.
- Lameness usually progresses from intermittent to persistent over about a three-month period of time.
- As the tumor grows unchecked, swelling becomes obvious.
- Dogs will experience pain, sometimes severe, and the area of the limb that's affected is tender to the touch.
- Dogs with axial OSA will show different [symptoms](#) depending on the location of the tumor. In the jaw, dogs will have difficulty swallowing; in the skull or vertebrae, dogs will show neurological problems; and in the pelvis, dogs will have trouble defecating.

## How is Osteosarcoma diagnosed?

In addition to a [complete](#) physical exam, dogs suspected of having OSA are given a series of x-rays, which is usually enough to confirm the diagnosis. Bone x-rays of dogs with OSA look like the bone has been eaten away where the tumor is and may show a “sunburst” effect caused by the tumor extending into the soft tissue. In some cases, a pathologic fracture may also be evident in the tumorous or replacement bone.

About 90 per cent of appendicular tumors will have spread to the lungs at the time of diagnosis, so most vets will also take x-rays of the dog's chest area at the same time, to see if the tumor has spread. This information will help determine the dog's treatment options.

Another diagnostic test that can be performed is a bone scan, which helps determine how much of the bone is affected at the site of the tumor and whether or not the cancer has spread to other bones.

For a definitive diagnosis of OSA, a biopsy is required. However, this procedure comes with some risks such as the possibility of fracturing the weak tumorous bone and the inability to get a good [sample](#) because of an inflamed tumor. As a result, many vets forego the biopsy and form their diagnosis based on evidence from x-rays and other tests.

In some cases, a biopsy may be necessary when it's unclear whether the patient has OSA or another condition that causes similar lesions in bone such as chondrosarcoma (cartilage tumor); squamous cell carcinoma (tumor of the external coating of the bone); and synovial cell sarcoma (tumor of the joint capsule lining).



## Treatment and prognosis

When treating OSA, pain relief and preventing the cancer from spreading are the two main goals. Amputation of the limb is standard treatment for a dog with appendicular OSA and resolves any pain issues in all cases. A biopsy is usually performed after amputation to [confirm](#) the diagnosis and help determine if any other treatment is required such as chemotherapy. Most dogs recover quickly from amputation and have no trouble running and playing as usual.

Chemotherapy is used in conjunction with amputation to help stem the spread of OSA. Since metastasis is the most common cause of death in dogs with OSA, chemotherapy is vital to prolonging the dog's life.

For some appendicular OSA pets such as those who have other orthopedic problems like osteoarthritis or those who are obese and may have difficulty getting around on just three limbs, amputation may not be possible.

Limb-sparing surgery is a possibility in some cases. In this procedure the tumor is removed and the bone is replaced either with another bone from the dog or with a bone from a bone bank. This operation cannot be performed in all tumor locations and the tumor must be relatively small at the time of diagnosis.

When amputation or limb-sparing surgery is not feasible, [pain management](#) and providing a good quality of life are the only treatment options. Radiation therapy is often used for pain relief. Within the first three weeks, pets will usually have improved limb function and this should last for about four months. Depending on how far the cancer has progressed, radiation can be re-administered if needed.

Unfortunately, pain relief usually results in a more active dog, which can lead to pathologic fractures. Also, about one-third of dogs find no pain relief through radiation therapy. Medications are considered a last resort if amputation or radiation therapy are not possible.

The average survival time following amputation of the limb alone is about five months, with most dogs succumbing to the disease because it has spread to the lungs. If pets are treated with chemotherapy following amputation, survival time increases to between eight and 18 months. When pets are only treated for pain (oral medication and/or radiation therapy), they will survive, on average, between two and four months.

Treatment for axial OSA is similar to that for appendicular OSA: surgery to remove the tumor followed by chemotherapy to help stop the cancer from spreading.

Immunotherapy for the treatment of Canine Osteosarcoma appears to be on the horizon. Using the dog's own immune system to fight the disease has progressed to where the US Food and Drug Administration (FDA) has approved clinical trials for a vaccine to be used in conjunction



with chemotherapy. Twenty-four veterinary specialty practices throughout the US (most are in the veterinary schools) have been given the vaccine and are conducting trials. Guardians whose pets have Osteosarcoma and are interested in possibly participating in the trials should contact their nearest university's veterinary college for more information.

#### Additional Resources:

<https://www.avma.org/News/JAVMANews/Pages/171201b.aspx>

<https://research.vetmed.ufl.edu/clinical-trials/small-animal/vaccine-study-for-dogs-with-osteosarcoma/>

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#### Sources:

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- *The Veterinary Cancer Center, [Canine Osteosarcoma](#), by Dr. Jennifer McDaniel, DVM.*
- *CanineCancer.com, [Osteosarcoma \(bone cancer\)](#).*