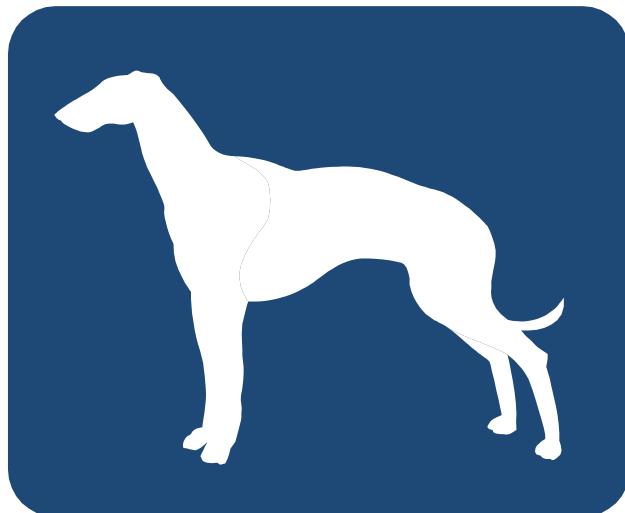


# Osteosarcoma and your Greyhound



This packet is made available through Greyhound Adoption of Ohio Inc. by  
William E. Feeman III, DVM.

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# What is Osteosarcoma?

Osteosarcoma is the most common form of bone cancer in dogs. A recent study performed at the University of Florida (UF) showed that Greyhounds had a greater incidence of osteosarcoma than any other breed (1). Osteosarcoma can develop in any bone but most commonly affects the proximal humerus (close to the shoulder), distal radius (the ‘forearm’) or the proximal tibia or distal femur (close to the knee) (figure 1).

The most common clinical sign associated with osteosarcoma is pain which results in limping. There are many other causes of limping other than osteosarcoma, so if your pet is limping it does not mean your Greyhound has osteosarcoma. As the disease progresses, swelling may develop at the affected area. Some dogs may show no signs of disease until they break the affected leg. The cancer weakens and erodes healthy bone and replaces it with weaker cancerous bone. This bone can fracture with normal everyday activity (this type of fracture is termed ‘pathologic’). This type of fracture cannot be splinted, cast or repaired.

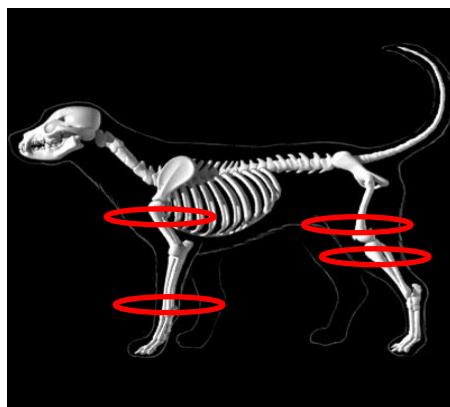


Figure 1. The four most common sites of osteosarcoma

# How is osteosarcoma diagnosed?

**Radiographs (x-rays):** osteosarcoma causes some classic radiographic changes. The bone has a region that appears eroded (boney lysis). This area may appear “moth eaten” or as a “dark shadow” (figure 2). There is also typically a region of new bone production. The bone lesions do not cross a joint space to affect other bones associated with a joint. A pathologic fracture may also be noted.



Figure 2. Two radiographs from dogs diagnosed with osteosarcoma.

**Biopsy/Aspiration:** a bone biopsy or aspiration can be performed to confirm diagnosis prior to treatment. Aspiration is less painful than biopsy and will provide an answer in approximately 70% of patients. Aspiration may only require mild sedation or no sedation at all whereas bone biopsy requires general anesthesia.

# How is osteosarcoma treated?

There are two main aspects to treatment of osteosarcoma: pain control and slowing the spread of cancer.

## **Pain control**

1. **Pain medications:** There are many different combinations of drugs that can be used to control pain. Osteosarcoma is one of the most painful conditions to treat and thus it must be emphasized that any combination of drugs will only control pain, not eliminate it. A combination of medications is typically required.
  - a. Non-Steroidal Anti-Inflammatory Drugs (NSAIDs; Rimadyl, Deramaxx, Metacam, Zubrin, Etogesic, Previcox): these drugs are anti-inflammatories and pain relievers.
  - b. Opioids (Fentanyl, Tramadol, Butorphanol, Codeine): these are potent pain relievers.
  - c. Others: Duralactin, Amantadine, Acetaminophen
2. **Radiotherapy:** radiation can be applied to the tumor site at a referral hospital that can lessen the pain of the tumor. Pain relief from radiation therapy can last for up to 4 months. Approximately 30% of patients undergoing radiation therapy will not show a significant response to treatment. The improved function in the limb associated with the lessened pain may also predispose the dog to pathologic fracture of the leg.

3. **Surgery:** this is the only treatment option that will relieve the pain of the tumor in 100% of cases. There will be some immediate post-operative pain but that is normally well managed with pain medications (see above) and is only temporary.
  - a. **Amputation:** most Greyhounds adjust to life on 3 legs within just a few days or weeks.
  - b. **Limb-sparing surgery:** this treatment is performed at very few hospitals and the patient must meet several specifications. In this surgery, the diseased section of bone is removed and a donor bone is implanted in its place allowing the limb to be “spared” and not amputated. Complications of this surgery can include bone infection, implant failure, tumor recurrence and fracture.

### **Slowing the spread of cancer**

1. **Chemotherapy:** this is used to treat the spreading of cancer. Unfortunately most all cases of osteosarcoma have already spread by the time of diagnosis so chemotherapy is necessary to extend life beyond a few months. **Unlike humans, only 20% of animals experience significant side effects associated with chemotherapy.** Most of those side effects consist of short term diarrhea, vomiting or anorexia which can be resolved with medications or a reduction in chemotherapy dose. Hair loss is an extremely rare side effect.

# What is the prognosis?

**Medical management (no surgery):** 1-4 months average; inability to control pain results in euthanasia

**Radiation therapy (no surgery):** 1-6 months average; inability to control pain or spread of cancer results in euthanasia; increased risk of pathologic fracture

**Amputation/Limb sparing surgery (no chemotherapy):** 4-6 months average; spread of cancer results in euthanasia

**Surgery + chemotherapy:** 10-12 month average; spread of cancer results in euthanasia

# Medical Protocols

**Chemotherapy:** Doxorubicin, Cisplatin or Carboplatin can all be used to treat osteosarcoma with similar results. Cisplatin is rarely used today as it must be given by an intravenous infusion. Doxorubicin is significantly less expensive than Carboplatin (approximately 1/10th of the cost) but also more likely to result in mild side effects such as vomiting, diarrhea or anorexia (20% vs. <1%). Doxorubicin also cannot be used in patients suffering from heart disease.

Doxorubicin: 1 treatment every 2 weeks for a total of 5 treatments

Carboplatin: 1 treatment every 3 weeks for a total of 4 treatments

**Nausea and diarrhea:** a small percentage of dogs may experience nausea or diarrhea from chemotherapy. These signs can often be managed with over-the-counter (OTC) medications such as Pepto-Bismol ® or Pepcid AC ®. You should consult your veterinarian prior to using any OTC medications. In more severe cases of nausea or diarrhea, drugs such as Metoclopramide, Chlorpromazine, Prochlorperazine, Dolasetron, Ondansteron, Metronidazole or Tylosin may be necessary.

*Our practice most commonly uses the combination of Metoclopramide or Chlorpromazine and Famotidine (Pepcid AC ®) to control nausea. In more severe cases, injections of Dolasetron (Anzemet) are used. Diarrhea is most commonly managed through the combination of probiotics, fiber supplementation and Pepto-Bismol ®.*

**Pain Medication:** a combination of an NSAID and opioid are the most common first choices.

*Our practice most commonly uses the combination of Rimadyl ® and Tramadol.*

\*\*\* Dr. Guillermo Couto at The Ohio State University Veterinary Teaching Hospital has been researching the use of the medication Suramin prior to Doxorubicin for treatment of osteosarcoma and has had some promising results.

# **Nutritional management**

**The single most important thing about nutrition and cancer is that the dog eats and maintains its body condition (not just weight but muscle mass, etc.).** There are no published studies showing the effects of diet or any dietary ingredient on the outcome of dogs with osteosarcoma. There are many theories regarding nutrition and cancer but nothing definitive relating to osteosarcoma. Some professionals believe that supplementing the diet with a purified form of DHA (a long chain polyunsaturated fatty acid) can help augment radiation or chemotherapy. A study published in 2000 showed dogs with stage III lymphoma fed a diet supplemented with fish oil and arginine had a longer disease free interval and survival time than dogs fed the same diet without arginine or fish oil (2). Other professionals believe that feeding a low carbohydrate diet can be of benefit for cancer patients. If you are considering changing your dog's diet (especially to some form of a home-made diet), consultation with a veterinary nutritionist is recommended ([http://www.aavn.org/site/view/58440\\_NutritionResources.pml](http://www.aavn.org/site/view/58440_NutritionResources.pml)).

# Alternative therapies

**Acupuncture:** can be used to help manage the pain before or after surgery.

**Colostrum:** a study was published in 1989 showing that colostrum suppressed growth of human osteosarcoma cells in the laboratory (3). This finding has never been studied in animals or verified in humans with osteosarcoma.

**Maitake/DMG:** a study published in 2004 reported the efficacy of maitake d-fraction on inhibiting growth of or killing canine cancer cells (4). There are no studies available that document any increase in quality of life or in survival time for dogs affected with osteosarcoma that were treated with maitake.

**Probiotics:** live bacteria ingested to supplement normal gastrointestinal flora. Many products are available and this can help to prevent or manage diarrhea which can be a side effect of chemotherapy and promote intestinal health. Probiotics can be found in most yogurts and in purified forms such as Culturelle® or Acetylator®.

**Ginger:** ginger supplementation has been shown to help control nausea associated with chemotherapy (5). It was shown to be less effective than prescription anti-nausea drugs, however.

**Artemesia/Artemesinin:** an herbal antimalarial medication that has shown to be effective in the laboratory against some forms of human and canine cancer cells (6, 7). There are no studies available that document any increase in quality of life or in survival time for dogs affected with osteosarcoma that were treated with artemesia/artemesinin.

# Support Groups and Information

1. **Circle of Grey:** a place for greyhound owners to seek solace and support during times of illness and grief. <http://groups.yahoo.com/group/CircleofGrey/>
2. **Greytalk:** Greytalk has been on the internet since August of 2000. The community is over 2000 members strong and growing, and represents a rich and varied diversity with members from many countries throughout the globe.  
[www.greytalk.com](http://www.greytalk.com)
3. **Hope for Hounds:** Fund raising for cancer research in Greyhounds; pictures and video tribute. [http://www.casualbling.com/Hope\\_for\\_Hounds.html](http://www.casualbling.com/Hope_for_Hounds.html)
4. **Paws Up 4 Greys:** A place to hang your hat and chat about the hounds we love so dearly and the family we have found along this wonderful journey.  
<http://www.pawsup4greys.com/>
5. **AOL Greyhounds as Pets and Companions board:** There's more to Greyhounds than racing. Discuss this breed with others.  
<http://messageboards.aol.com> (From this site select the following: 1. Pets 2. Dogs 3. Dog Breeds C to G 4. Greyhounds as Pets and Companions)
6. **GreytHealth:** A comprehensive Greyhound health website put together by Dr. Suzanne Stack. <http://www.greythealth.com/>

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# Testimonials

“I treated Sky with amputation and chemotherapy. It was the only treatment option that gave him a realistic chance of living longer than a few weeks or months. The first few days post-surgery were challenging as he adjusted to life with 3 legs; but he adjusted very well and I knew we made the right decision. He had some short term nausea and anorexia about 48-72 hours after chemotherapy that lasted for about 2 days which were hard but he always bounced back very well. If I had to do it all over again, I would do it all over again.” -Bill Freeman

“We opted for radiation treatments first. Ally had this protocol - 2 days of treatments - she got this twice about 3 months apart- when she began to limp again. The final time was 6 months after dx but we just got one radiation treatment (one day). It did not help. She was swelling in the limb so we amped. We did not do chemo. We used high protein feed, Artemisinin, Antioxidants, and salmon oil. I have never regretted any choices. We have enjoyed Ally almost a full 2 1/2 years since her initial dx. I would not have changed anything except the OS but even that brought me closer to her.” -Anne Sweeney

“Max was 6 when he was dx'd in Feb last year. It was found when he fractured his front left leg. It was amputated within the week and chemo that was sent by Dr Couto was started asap. It was Doxycylicin (forgive the spelling). He had 5 treatments spaced 3 weeks apart. He is chasing one of my other dogs right now. His quality of life is wonderful and I am thankful for every minute I have with him.

Sweet Pea was 9 when dx'd in Aug. last year. It was misdx'd for 2months as a torn acl, in her left rear leg. When they finally realized that it was osteo that amputated the next day. She suffered greatly for the last 4 weeks before the amp. Again Dr Couto sent Doxycylicin and she had 6 doses 2 weeks apart. I Lost her Feb 8 at 3 am of this year when she suddenly became in great pain and could no longer move her body from her hips down. I still agonize whether something else could have been done for her and find it hard to even speak of her without crying. All in all I would have to say that I would do it again.” -Kathleen Jordan

“Here are my OS hounds.

Gums, (M), 1959-1966, diagnosed 1966, compound fracture left humerus, euthanized immediately.

Fred, (M), 1964-1974, diagnosed 1974, right humerus, amputation with shoulder, survived 7 months.

Gwen, (F), 1977-1990, diagnosed 1987, left femur, amputation with an early chemo agent, survived 3 years!

Happy, (M), 1989-2002, diagnosed 2002, left femur, amputation with shoulder plus 4 carboplatin infusions, survived 9 months.

The three amputees navigated very well until their last few days. The chemo agents didn't seem to bother them for more than a day. I fabricated wide slings for all three to assist them with stairs. In all three instances the dogs survived better than I did. Dr. Couto is right, Greyhounds have three legs plus a spare!" -Paul Lepkowski

"We amputated, did chemo, and then did radiation when she got another bone tumor. Would I do it again? I do not regret a thing, but I got everything at 75% off because I work at an animal hospital. If money is a concern, I wouldn't do it. There is no way to change the final outcome, but you may be able to buy some time. Whatever decision you make, never look back. You love your dog, and he or she is lucky to have you. There is no shame in choosing not to treat an incurable disease. If you don't treat aggressively, do be sure to let her go before she is too painful." -Sarah Norton

"I had Tonka who died in Oct 2004 at the age of 13.5 years. I came home one day in September and she started down the stairs to greet me at the door. She slid and broke her front leg. That is how she was diagnosed. She had barely a limp that truly seemed to be arthritis as she still went for walks daily and showed no pain. Because it was broken and she was such a champ, I decided to amputate as opposed to putting her to sleep. She never fully recovered. She had a horrible time with it and never made it to the two week post amp chemo appt. When she had the amp, the cancer spread, externally on her skin (I was told this was extremely rare) and then internally in her brain resulting in seizures. I could not bare to see her in pain. I put my angel to sleep peacefully in October 2004. With Tonka, if I had to do it over again I obviously would not have picked to amputate as what she went through for the almost 2 weeks after was too awful.

Just 10 short months later, this past Aug, Otto(born Nov 1997)started limping and I knew, just knew what I was dealing with. I was extremely anxious about doing another amputation due to my previous experience which was extremely fresh in my mind. However after research and consults with oncologists and surgeons, I decided to have Otto's left back leg amputated (instead of limb spare). I followed with chemo starting just 5 days after his amp. He had 8 treatments - 4 adriams and 4 carbos. Thursday he will be 9 months post amputation. I had an amazing surgeon, a wonderful vet, and a great oncologist and I am very happy for the time I've had with Otto (and I hope for much more!!). He amazes me every day." -Lisa

# Thank You

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**Figure 3. Sky Runner, 6 weeks post-amputation.**