

# Osteosarcoma

## (Bone Cancer)

### Basics

#### OVERVIEW

- Most common primary bone tumor in dogs
- “Appendicular” is an adjective relating to the limbs; “axial” is an adjective relating to the head and trunk of the body
- Osteosarcoma typically affects the appendicular skeleton of large- to giant-breed dogs; may be seen in the axial skeleton (composed of skull, spine, ribs, and sternum)
- Cancerous (malignant) tumor, with spread to the lungs (known as “lung metastases”) in more than 90% of dogs at the time of diagnosis; lung metastases may be microscopic
- Osteosarcoma may spread to soft tissues, such as the skin, kidney, and liver
- Osteosarcoma accounts for up to 85% of primary bone tumors in dogs
- Cats—less common; biologic behavior is less malignant than in dogs



#### GENETICS

- Appears to be inherited in giant breeds, such as Scottish deerhounds, Rottweiler, golden retriever, and Irish wolfhounds

#### SIGNALMENT/DESCRIPTION OF PET

##### Species

- Dogs
- Cats

##### Breed Predilections

- Dogs—large- to giant-breed dogs
- Cats—domestic shorthair

##### Mean Age and Range

- Dogs—bimodal peak at 2 years and 7 years; reported as young as 6 months of age
- Cats—average age, 8.5 years; range, 4–18 years of age

##### Predominant Sex

- Dogs and cats—no strong indication that a particular sex is more likely to develop osteosarcoma than the other sex

#### SIGNS/OBSERVED CHANGES IN THE PET

- Depend on site
- Signs may be subtle
- Appendicular skeleton (limbs)—firm swelling, lameness, and pain common

- Axial skeleton (skull, spine, ribs, sternum)—variable, depends on site
- Other complaints—lack of appetite (inappetence) and sluggishness (lethargy)
- Degree of lameness—varies from mild to non-weight-bearing
- Buildup of fluid (known as “edema”) or due to tumor infiltration, bleeding around affected area
- Fractures occurring at the site of weakened bone (known as “pathologic fractures”) are rare

## CAUSES

- Unknown

## RISK FACTORS

- Dogs—large- to giant-breed dogs
- Metallic implants at fracture-repair sites
- History of exposure to ionizing radiation
- Dogs—early spay/castration
- Cats—unknown

# Treatment

## HEALTH CARE

- Diagnostic evaluation—outpatient
- Surgery and the first chemotherapy treatment—inpatient
- Subsequent chemotherapy—outpatient
- Manage pain, as needed
- Radiation therapy will decrease pain effectively in dogs and cats

## ACTIVITY

- Restricted after surgery, until adequate healing has occurred

## DIET

- Dietary management is not required
- Weight lost may benefit amputees in general

## SURGERY

### Dogs

#### ***Appendicular Sites (Relating to the Limbs)***

- Amputation of affected limb—limb amputated at the forequarter (including the scapula and shoulder joint) or hip
- Limb-sparing or salvage therapy—used for osteosarcoma of the distal radius (bone in the lower front leg); available at a limited number of referral hospitals
- Chemotherapy—recommended after either surgical procedure

#### ***Axial Sites (Relating to the Head and Trunk of the Body)***

- Aggressive surgical removal (excision) of the tumor, depending on location of the tumor
- Chemotherapy—recommended after surgery
- Osteosarcoma of the lower jaw (known as “mandibular osteosarcoma”) may have less aggressive biologic behavior than other sites; however, the cancer can still spread (metastasize); therefore, chemotherapy is still indicated

#### ***Soft Tissue Sites (Tissues Other than Bone)***

- Aggressive surgical removal (resection) of the tumor
- Chemotherapy recommended after surgery

#### ***Metastasectomy (Surgical Removal of Metastasis)***

- Surgical removal of metastasis to the lungs (known as “pulmonary metastasectomy”)—has been described; indicated in dogs that: (1) had a long disease-free interval (over 300 days) after diagnosis; (2) have only 1–2 detectable lung nodules based on computed tomography scan (CT scan)

### Cats

### ***Appendicular Sites (Relating to the Limbs)***

- Amputation of affected limb
- Chemotherapy generally not necessary

### ***Axial Sites (Relating to the Head and Trunk of the Body)***

- Attempt aggressive surgical excision—depending on site of lesion
- Local recurrence—main reason for treatment failure

### **Both Species**

- Inoperable cancer—radiation therapy to control signs and improve the pet's comfort, but not to cure (known as “palliative intent”)
- Pain management with medications such as nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, or combinations may improve quality of life and thus prolong survival

## **Medications**

Medications presented in this section are intended to provide general information about possible treatment. The treatment for a particular condition may evolve as medical advances are made; therefore, the medications should not be considered as all inclusive

- Post-surgical chemotherapy with either platinum-based protocol (cisplatin, carboplatin), or doxorubicin is the current standard of care
- Palliative medication is intended to improve the pet's condition and quality of life, it is not a cure for the cancer; these drugs are used to control pain and/or decrease inflammation; options include: nonsteroidal anti-inflammatory drugs; acetaminophen with or without codeine, tramadol or a fentanyl patch—not all of these drugs can be used in combination or in cats; always consult your pet's veterinarian for the most appropriate pain management for your pet

## **Follow-Up Care**

### **PATIENT MONITORING**

- Monitor for reduction of bone-marrow activity (known as “myelosuppression”), resulting in low number of red blood cells, white blood cells, and/or platelets; should have a complete blood count (CBC) performed 10–14 days after chemotherapy
- Monitor heart if using doxorubicin (ultrasound, ECGs)
- Take chest x-rays (radiographs) every 2–3 months after surgery
- Take x-rays (radiographs) of graft site for cases with limb-sparing or salvage therapy every 2–3 months after surgery, because local recurrence is possible after limb salvage

### **POSSIBLE COMPLICATIONS**

- Spread of cancer (metastasis) to lungs, other bone, and soft tissue sites
- Pets that undergo limb-sparing or limb-salvage procedures may develop infections, local recurrence of the cancer, or failure of the surgical implants

### **EXPECTED COURSE AND PROGNOSIS**

- Prognosis is poor; achievable goals should be to relieve discomfort and prolong life

#### **Dogs**

- Median survival without treatment, with amputation alone, or with palliative radiation therapy alone—approximately 4 months; 10 months with surgery and chemotherapy
- Median survival with radiosurgery and chemotherapy with aminobisphosphonates and analgesia—10-12 months; 15% of patients have long-term survival

#### **Cats**

- Appendicular (involving the limbs)—median survival with surgery: greater than 2 years
- Axial (involving the head and trunk of the body)—median survival with surgery of 5.5 months

## **Key Points**

- The most common primary bone tumor in dogs
- This disease has an aggressive biologic behavior; therapy should be directed at the painful bone tumor (using

either surgery or radiation therapy) as well as at metastatic disease (using chemotherapy)

- Prognosis is poor; achievable goals should be to relieve discomfort and prolong life
- Cure is unlikely

*Blackwell's Five-Minute Veterinary Consult: Canine and Feline, Sixth Edition*, Larry P. Tilley and Francis W.K. Smith, Jr. © 2015 John Wiley & Sons, Inc.