

# 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 and Irish wolfhounds
- Increased likelihood of developing osteosarcoma does occur in some breeds
- Breed size and rate of maturity may be more important than breed or family line

#### 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)—swelling, lameness, and pain common
- Axial skeleton (skull, spine, ribs, sternum)—localized swelling, detectable mass, pain
- Other complaints—lack of appetite (inappetence) and sluggishness (lethargy)
- A firm, painful swelling of the affected site common
- Degree of lameness—varies from mild to non-weight-bearing
- Buildup of fluid (known as “edema”) 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/neuter
- 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 condition, but not to cure (known as “palliative intent”)
- Pain management with medications such as nonsteroidal anti-inflammatory drugs (NSAIDs), opioids, or bisphosphonates 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: aspirin, piroxicam, or other 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 7–10 days after chemotherapy
- 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, bone, and soft tissue sites
- Hypertrophic osteopathy (a bone disorder that causes painful swelling of bone and lameness) with spread of cancer to lungs (lung metastases)
- Pets that undergo limb-sparing or limb-salvage procedures may develop infections, local recurrence of the cancer, or failure of the surgical implants
- Amputees rarely show complications secondary to arthritis in the other legs

### **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
- Median survival with surgery and chemotherapy—10 months

- Osteosarcoma of the lower jaw (known as “mandibular osteosarcoma”)—less aggressive than other sites; 1-year median survival time with surgery alone—71% reported in one study

#### **Cats**

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