

A MULTIPLE MYELOMA

BASICS

OVERVIEW

- Plasma cells are specialized white-blood cells; plasma cells are lymphocytes that have been altered to produce immunoglobulin, an immune protein or antibody necessary for fighting disease
- A “clonal population of cells” is a group of cells descended from a single cell; all of the cells have the same genetic make-up
- Multiple myeloma is an uncommon cancer derived from a clonal population of cancerous (malignant) plasma cells in the bone marrow
- Three of four defining features must be present for diagnosis of multiple myeloma: immune protein from a single clone of cells (known as a “monoclonal gammopathy”), seen as a spike in the gamma region of a protein analysis (known as a “protein electrophoresis”) of blood; cancerous (malignant) plasma cells or high number of plasma cells in the bone marrow (known as “plasmacytosis”); destruction of areas of bone (known as “lytic bone lesions”); and a particular type of protein found in the urine (known as “Bence Jones [light-chain] proteinuria”)

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs and cats

Breed Predispositions

- German shepherd dogs and other purebred dogs more often than mixed-breed dogs

Mean Age and Range

- Primarily middle-aged or old dogs and cats (6 to 13 years)

SIGNS/OBSERVED CHANGES in the ANIMAL

- Attributed to bone infiltration and destruction of bone (lysis), effects of proteins produced by the tumor (such as increased protein in the blood leading to sludging of the blood [known as “hyperviscosity”] and kidney damage), and infiltration of organ(s) by cancerous cells
- Depend on location and extent of disease
- Weakness
- Lameness
- Pain
- Partial paralysis (known as “paresis”)
- Urinary incontinence
- Bleeding from the nose (known as “epistaxis”)—may involve one or both nostrils
- Bleeding in the back part of the eye (known as “retinal hemorrhage”) and blindness
- Bleeding from needle punctures to collect blood or to administer intravenous medications and/or fluids
- Dementia
- General discomfort or uneasiness (known as “malaise”)
- Labored breathing
- Increased urination (known as “polyuria”)
- Increased thirst (known as “polydipsia”)
- Bleeding involving the gastrointestinal tract

Dogs

- Bleeding—especially from the nose or mucous membranes (the moist tissues of the mouth, eyes, and other areas of the body)—seen in 36% of affected dogs
- Blindness, retinal hemorrhage, or dilated retinal vessels (35%); detached retina; glaucoma; inflammation of the front part of the eye, including the iris (known as “anterior uveitis”)
- Lameness (47%), bone pain and weakness (60%)—with destruction of areas of bone (lytic bone lesions)
- Dementia, generalized discomfort or uneasiness (malaise)—seen in 11% of affected dogs; and coma (rare)
- Increased thirst (polydipsia) and increased urination (polyuria)—seen in 25% of affected dogs—with increased levels of calcium in the blood (known as “hypercalcemia”) or kidney dysfunction
- Pale gums and other moist tissues of the body (mucous membranes)
- Fever
- Sluggishness (lethargy)
- Enlarged liver and spleen (known as “hepatosplenomegaly”)

Cats

- Lack of appetite (known as “anorexia”)
- Weight loss
- Generalized discomfort or uneasiness (malaise)
- Increased thirst (polydipsia)

- Increased urination (polyuria)
- Fever

CAUSES

- Unknown

TREATMENT

HEALTH CARE

- Consult a veterinary oncologist for latest information regarding treatment
- Inpatient treatment if animal has excessive levels of urea and other nitrogenous waste products in the blood (known as “uremia” or “azotemia”), high levels of calcium in the blood (hypercalcemia), a bleeding disorder or clinically important bacterial infection
- Plasmapheresis (medical process in which whole blood is removed from the body, the blood cells are separated from the fluid portion of the blood and then are put into a sterile fluid and transfused back into the body), when available, lowers protein burden
- Patient with signs of increased protein in the blood leading to sludging of the blood (hyperviscosity)—the veterinarian may perform phlebotomy (a medical procedure in which an incision is made into the vein, for the purpose of withdrawing blood) and replace the volume of blood withdrawn intravenously with an equal volume of fluids
- Radiation therapy may be used on isolated areas with the goal of cure (known as “curative intent”) or to control signs and improve the patient’s condition, but not to cure (known as “palliative intent”)
- Use sterile technique and be prepared to control bleeding from any site used for obtaining a blood sample or for administering intravenous medication of fluids
- Bacterial infection—treat aggressively with appropriate antibiotics
- High levels of calcium in the blood (hypercalcemia) and kidney failure—treat appropriately
- Affected animals may have low numbers of neutrophils or nonfunctional lymphocytes (neutrophils and lymphocytes are types of white-blood cells); take care to minimize exposure to infectious agents (such as viruses, bacteria, and fungi)
- Use sterile or very clean technique when performing any invasive techniques

ACTIVITY

- Treat animal as being unable to develop a normal immune response (known as “immune compromised”); take care to prevent bacterial infection (such as caused by puncture wounds from dog or cat fights)

DIET

- Dietary changes may be necessary, if animal is in kidney failure

SURGERY

- Areas nonresponsive to chemotherapy or single (solitary) lesions may be removed surgically

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.

- Chemotherapy is intended to improve the patient’s condition, but not to cure the multiple myeloma (palliative treatment), but long remissions are possible
- Dogs—melphalan and prednisone; cyclophosphamide can be used in addition to or in place of melphalan
- Liposome-encapsulated doxorubicin was reported to be effective in one dog
- Cats—melphalan and prednisone
- Cyclophosphamide—may be beneficial to substitute for melphalan with animals that have low platelet or thrombocyte counts (known as “thrombocytopenia”)
- Dogs—more aggressive combination chemotherapy protocol; cyclophosphamide, vincristine, melphalan, and prednisone

FOLLOW-UP CARE

PATIENT MONITORING

- Complete blood count (CBC) and platelet count—weekly for at least 4 weeks to assess bone-marrow response to chemotherapeutic drugs
- Blood tests with abnormal results should be repeated monthly to evaluate response to treatment
- Protein analysis of blood (protein electrophoresis) monthly for several months, until normal protein patterns are obtained, then monitor periodically for relapse
- Abnormal skeletal X-rays should be repeated monthly, then every other month until normal to evaluate response to treatment

POSSIBLE COMPLICATIONS

- Bleeding
- Secondary infections
- Fractures occurring at the site of weakened bone (known as “pathologic fractures”), due to the presence of multiple myeloma
- Chemotherapy may cause low white-blood cell counts (known as “leukopenia”) or low platelet or thrombocyte counts (thrombocytopenia); lack of appetite (anorexia); hair loss (known as “alopecia”); bloody inflammation of the bladder (known as “hemorrhagic cystitis”); and/or inflammation of the pancreas (known as “pancreatitis”)

EXPECTED COURSE AND PROGNOSIS

- Even with treatment, it may be several months before clinical signs resolve
- Continuous care must be taken to protect patients from secondary infection

Dogs

- Median survival with chemotherapeutic agents and prednisone—18 months
- Median survival with prednisone—7 months
- Complete response in 43%; partial response in 49%
- High levels of calcium in the blood (hypercalcemia), extensive destruction of areas of bone (bone lysis), or presence of a particular type of protein in the urine (Bence Jones proteinuria) often shorter survival

Cats

- Survival with chemotherapeutic agents and prednisone—2 to 9 months

KEY POINTS

- Chemotherapy is intended to improve the patient’s condition, but not to cure the multiple myeloma (palliative treatment), but long remissions are possible
- Relapse will occur
- Side effects are determined by the drugs used
- Most patients develop mild low white-blood cell counts (leukopenia) with chemotherapy

BASICS

OVERVIEW

- Metaldehyde—an ingredient of slug and snail baits; used as solid fuel for some camp stoves
- Baits—liquids, granules, wettable powders, or pelleted baits (pellets often mixed with grain); baits also may contain other poisons (such as arsenate or insecticides)
- Metaldehyde poisoning primarily affects the nervous system

SIGNALMENT/DESCRIPTION of ANIMAL

Species

- Dogs (most common) and cats

SIGNS/OBSERVED CHANGES in the ANIMAL

- May occur immediately after ingestion of metaldehyde or may be delayed for up to 3 hours
- Anxiety and panting are early signs
- Excessive salivation/drooling (known as “hypersalivation”) and/or vomiting or diarrhea may occur
- Wobbly, incoordinated or “drunken” appearing gait or movement (known as “ataxia”)
- Muscle tremors
- Seizures—may be intermittent early, but progress to continuous seizure activity; not necessarily set off by external stimuli
- Between seizures—may note muscle tremors and anxiety; may be overly sensitive to sounds, light, and/or touch
- Markedly elevated body temperature (known as “hyperthermia”)—temperature up to 42.2° C (108° F) common; probably caused by excessive muscle activity from seizures; hyperthermia may lead to a blood-clotting disorder (known as “disseminated intravascular coagulopathy” or “DIC”) or multiple organ failure, if uncontrolled
- Rapid heart rate (known as “tachycardia”) and deeper and more rapid breathing (known as “hyperpnea”) than normal
- Short, rapid movements of the eyeball (known as “nystagmus”) or dilated pupils (known as “mydriasis”) are possible; the “pupil” is the circular or elliptical opening in the center of the iris of the eye; the “iris” is the colored or pigmented part of the eye

CAUSES

- Ingestion of metaldehyde

RISK FACTORS

- Living in area with a high number of snails and slugs
- Metaldehyde poisoning is found more commonly in coastal and low-lying areas, which have a higher number of snails and slugs than other areas

TREATMENT

HEALTH CARE

- Emergency inpatient intensive care, until seizures cease and elevated body temperature (hyperthermia) is controlled
- Monitor to prevent aspiration of vomitus
- Fluids often are necessary to treat dehydration or possibly acidosis (a condition in which levels of acid are increased in the blood)

ACTIVITY

- Restricted, so that patient does not injure itself during seizures

DIET

- Do not feed patients that are vomiting, having seizures, or are sedated heavily

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.

- No antidote is available for metaldehyde poisoning
- The veterinarian will attempt to decrease absorption of metaldehyde in patients that have no clinical signs or that have been stabilized with medications to induce vomiting (known as “emetics”), flushing the stomach (known as “gastric lavage”), and/or administration of activated charcoal, as appropriate
- Seizures may be controlled with diazepam, barbiturates, and/or gas anesthesia; in addition, a muscle relaxant (methocarbamol) may be administered

FOLLOW-UP CARE

PATIENT MONITORING

- Periodically allow sedatives or anesthetics to wear off to re-evaluate seizure activity

PREVENTIONS AND AVOIDANCE

- Do not apply metaldehyde in areas accessible to pets
- Some manufacturers dye the product green or blue to assist with identification
- Some states require manufacturers to adjust the formulation to decrease the tastiness (palatability) to pets

POSSIBLE COMPLICATIONS

- Liver or kidney dysfunction are possible several days after recovery from the initial signs and probably are sequelae to the seizures and elevated body temperature (hyperthermia)
- Aspiration pneumonia is a concern with any patient that has seizures
- Elevated body temperature (hyperthermia) may lead to a blood-clotting disorder (disseminated intravascular coagulopathy or DIC) or multiple organ failure
- Temporary blindness or memory loss may occur

EXPECTED COURSE AND PROGNOSIS

- Prognosis—principally depends on the amount of metaldehyde ingested, time to treatment, and quality of care
- Delayed or non-aggressive treatment may result in death within hours of exposure

KEY POINTS

- Do not apply metaldehyde in areas accessible to pets
- Metaldehyde poisoning is found more commonly in coastal and low-lying areas, which have a higher number of snails and slugs than other areas
- Emergency inpatient intensive care is necessary, until seizures cease and elevated body temperature (hyperthermia) is controlled
- No antidote is available for metaldehyde poisoning
- Delayed or non-aggressive treatment may result in death within hours of exposure