



Canine Mast Cell Tumor

What is a mast cell tumor?

Mast cells are immune system cells. They are part of the body's immune system and serve as part of the body's defense against foreign invaders, such as parasites. Under the microscope, mast cells are characterized by having dark blue granules in their cytoplasm. These granules contain inflammatory mediators that are released when mast cells are stimulated. Mast cells can be stimulated by parasites, but they are also stimulated in response to pollen, bee stings, and other common allergens. Mast cell stimulation and release of the contents of their granules create many of the symptoms we associate with allergies and allergic responses – itchiness, redness, and swelling.

Mast cell tumors are formed by gazillions (many, many trillions) of malignant mast cells. These cells are malignant because they have mutated in a way that allows them to escape the normal processes of cell aging and death and to multiply and grow unchecked. They are less stable than normal mast cells, and manipulation of a mast cell tumor can cause massive release of inflammatory mediators and result in symptoms even without the presence of any allergens or parasites.

Mast cells are found in many organs in the body, including the lymph nodes, liver, spleen, intestines, and skin. Most commonly, however, mast cell tumors arise in the skin and are the most common malignant skin tumor in dogs.

What causes mast cell tumors?

It's hard to pinpoint a single factor, but genetics probably play a role as certain breeds are at increased risk. Some of these breeds include Boxers, Bulldogs, Boston Terriers, Shar peis, Labrador Retrievers, Golden Retrievers, Schnauzers, and Cocker Spaniels. Ten to twenty percent of dogs diagnosed with mast cell tumor have more than one at diagnosis.

How do you know a skin bump is a mast cell tumor?

There is no particular look that distinguishes one of these from any other lump or

bump in the skin, but they may have a history of growth and shrinkage, redness, and itchiness. To distinguish a mast cell tumor from any other lump or bump, a needle aspirate must be performed. This is where a veterinarian collects a small sample of cells with a small needle and then examines those cells on a slide under a microscope. These cells often have a very characteristic appearance and are easy to identify. However, it is best to have a cytologist trained in interpreting slides make the final diagnosis.

If a needle sample gives you a diagnosis, why is a biopsy necessary?

After diagnosis, biopsy is recommended. This is because biopsy provides additional information that helps us determine how best to stage and treat a patient. It also provides useful information about how aggressive the mast cell tumor is likely to act. When we submit a biopsy sample, the pathologist not only confirms the diagnosis but also grades the tumor.

Grade I tumors behave in a benign fashion 95% of the time. They need to be completely removed with surgery but are unlikely to spread to the lymph nodes or other organs. Adequate surgical removal is usually curative, and in most cases, chemotherapy is not needed. Grade II tumors are most commonly diagnosed. They usually are locally invasive but do not usually spread to the lymph nodes or other organs, although they have a higher potential to do so than grade I tumors (approximately 88% remain localized to one site). In most cases, surgery that completely removes the primary tumor with wide margins is curative, and chemotherapy is not needed. Grade III tumors are the bad actors. They are locally invasive and have a higher potential to spread to the lymph nodes and other organs. Because of this, complete staging is almost always recommended, and surgery is usually followed with chemotherapy.

What do we mean by staging?

Staging means we perform a series of diagnostic tests to assess the health status of a patient prior to treatment and determine the stage of the cancer, which is to say we determine where it has spread in the patient's body. This is important to determine optimal treatment for an individual patient, provide information to you about expected benefits and risks and help us monitor a patient's progress.

What staging do we do for a mast cell tumor?

A clinician will tailor staging recommendations to meet the individual patient's situation. Minimal staging should include routine blood work, urinalysis, and lymph node evaluation by palpation or cytology. Complete staging would also include a

buffy coat examination (additional blood work), ultrasound, and potential aspiration and cytology of certain internal organs. Staging recommendations are based on clinical signs, size of the tumor, location of the tumor, grade of the tumor, lymph node status, number of tumors present, and health of the patient.

How well will my dog do with treatment?

This depends on many factors, including tumor grade, tumor stage, clinical signs at diagnosis, location of tumor, and tumor growth rate. In general, lower grade and stage tumors enjoy better outcomes. Patients with large tumors, clinical signs at diagnosis, and fast growing, aggressive tumors do worse. Tumors in certain sites also do better or worse.

How do we treat?

Except for rare cases where the tumor has spread systemically or the tumor is too big to remove, surgery is almost always part of the treatment plan. Mast cell tumors are invasive and tend spread beyond what you can feel or see, so we recommend removal with wide margins all around to ensure the entire tumor is removed. Even with best efforts however, sometimes it is not completely removed. If a second surgery is possible, we recommend performing one if this occurs. If a second surgery is not possible, recommend radiation to “mop up” the few million or billion cells that might have been left behind at the tumor site. Either way, local control of the tumor is important and potentially curative for smaller, solitary grade I and II tumors and even small grade III tumors that have not spread beyond the primary site. If the draining lymph node is involved, often we will remove it or treat it with radiation as well.

Depending on many of the factors discussed, chemotherapy may be recommended. This is recommended for patients with large, aggressive tumors, tumors that are too big to be removed by surgery, tumors that have spread to local lymph nodes and other organs, and tumors that are in “bad” locations. Chemotherapy is often recommended in addition to surgery, either before or following it, but it can also be used to palliate patients with large, invasive tumors that cannot be removed. The optimal combination of treatments depends on many factors, and our goal is to tailor our recommendations to best meet your pet’s needs.

What if my dog needs chemotherapy?

Three anti-cancer drugs are known to be effective in treating mast cell tumors: corticosteroids (like prednisone), lomustine (CCNU), and vinblastine. Sometimes, cyclophosphamide (cytoxan) has also been used. New ones are being developed and

introduced and will be available in the future. The optimal protocol has not been determined, so we design a protocol using a combination of drugs that will best minimize toxicity and maximize treatment effectiveness for the individual patient.

We treat canine patients differently than doctors treat human patients in that we consider quality of life imperative for our patients as we cannot ask them permission to treat. There are always risks associated with chemotherapy, but we aim to minimize those risks through preventive measures (blood work, preventive anti-nausea drugs). In general we aim to keep the risk of your pet becoming sick enough from chemotherapy to require a hospital visit at 5% or less.

Is there anything else?

Yes, as explained, mast cell tumors release inflammatory mediators. One of these is called histamine, which can be released and then circulate through the body. Histamine attaches to parietal cells in the stomach lining and stimulates an increase in the secretion of stomach acid. With constant stimulation from a mast cell tumor, this can lead to stomach ulcers. As long as a patient has a mast cell tumor still present on or in the body, we recommend the daily administration of histamine blockers. The most common one we recommend is a histamine 2 receptor blocker, such as Pepcid AC®. However, we also recommend a histamine 1 receptor blocker, such as Benadryl®, on a case-by-case basis.