



**Veterinary Emergency  
+ Referral Center**  
of Hawaii

**Ettinger: Textbook of  
Veterinary Internal Medicine, 7th Edition  
Mast Cell Tumors in Dogs  
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**What are mast cell tumors?**

Mast cell tumors (MCT) are one of the most common malignancies (cancers) found on and under the skin of dogs. Although certain breeds such as golden retrievers, Labrador retrievers, boxers, Boston terriers, pugs, and shar peis appear to be predisposed to this tumor, any breed or mixed breed can develop MCT. Some dogs appear to be genetically predisposed to developing MCTs but the cause of this common cancer is not known. Although MCTs most commonly afflict middle-aged to older dogs, they are also found with surprising frequency in pets that are young. Approximately 10% to 15% of dogs with this cancer develop multiple MCTs throughout their lifetime. When this unique behavior occurs, the tumors may seem to erupt simultaneously or develop over months to years.

**What are the signs of mast cell tumors?**

A wide range of signs are associated with MCT. Most common are variably sized skin swellings. Other signs that are commonly associated with MCT are related to the unique role that normal mast cells play in animals and humans. If you look at a normal mast cell under the microscope, you will often see a number of purple "granules" within the cell. Histamine and other substances that play important roles in inflammation are within these granules and are responsible for many of the signs that you might see in people with allergic reactions after a bee sting or asthma attack. Therefore if the contents of these granules are released from a MCT, their symptoms may include the following:

- Swelling, itching, redness, skin ulceration, or bruising at the tumor site
- Changes in size and shape of mass, particularly after it has been manipulated
- Abdominal discomfort and vomiting may indicate ulceration of the gastrointestinal (GI) tract, caused by histamine release from the granules
- Anemia, caused by extensive bleeding into the stomach or intestines

**What tests are needed?**

When making decisions regarding a dog with MCT, three questions should be addressed:

**1. Is there evidence that the tumor has spread in my dog?**

Mast cell tumors tend to spread first to lymph nodes that are near the tumor. For that reason, the most valuable diagnostic tests that may be recommended are the following:

- Aspiration cytology (withdrawal of a small tumor sample via placement of a small needle into the tumor) of such "regional" lymph node
- Biopsy (surgical removal of a sample of the tumor) of such "regional" lymph node.

After lymph nodes, MCT may spread to the spleen, liver, and bone marrow. Whether testing of these additional sites is indicated will be based upon the ease of obtaining a good sample from the lymph node, the apparent aggressiveness of the pet's MCT, and the clinical judgment of your veterinarian. In most

circumstances, testing of blood, liver, spleen, and bone marrow will be associated with a lower yield of helpful information. This is explained by two facts: first, small numbers of normal mast cell tumors may be found in these particular organs. Therefore it may be difficult to differentiate an increased number of normal mast cells in these organs from similar looking cells that represent tumor spread. Recall that normal mast cells are part of the response to allergic diseases. Secondly, the incidence of tumor spread to internal organs (spleen, liver, bone marrow) is quite uncommon with low-grade or well-differentiated mast cell tumors. Unfortunately, if evidence of MCT spread is documented in lymph nodes or internal organs, the chance for cure is reduced. Instead of common treatments, your veterinarian may discuss different types of therapy with you.

## **2. What is the grade of my dog's MCT?**

After a biopsy or tumor removal, the pathologist will evaluate the tumor tissue and report if it fits the criteria that best describes an MCT that is

- **Grade I:** A more well-differentiated or lower grade tumor
- **Grade II:** A tumor with intermediate differentiation that extends more deeply into surrounding tissues
- **Grade III:** A higher grade, poorly differentiated tumor that may replace the skin and underlying tissues

This report will be important in providing information that is useful for predicting how aggressively this tumor may spread and whether additional therapy such as chemotherapy should be added to the treatment plan. As the tumor grade increases, the chance for spread to internal organs is also higher. The pathologist will also determine whether the entire tumor was removed or if tumor cells remain behind. If tumor cells remain behind, you may be provided with additional options for treatment including a second surgery, radiation therapy, or chemotherapy.

## **3. Are there other MCTs or clinical factors that may affect decision-making?**

It is certainly possible to remove more than one mast cell tumor from a dog. However, some dogs develop dozens of tumors almost simultaneously or develop new tumors with such rapid frequency that local treatment options such as surgery or radiation become less effective. Other medical conditions may impact decisions in such dogs, particularly if your pet is so sick that anesthesia itself becomes life threatening.

## **What treatment is needed?**

The treatment options that may be prescribed for a MCT include the following:

- Surgery
- Radiation therapy
- Chemotherapy
- Supportive medical care

Appropriate treatment choices for each individual pet will be made based upon your preferences and answers to the three questions discussed above. The unpredictable behavior of MCTs must always be kept in mind when making therapeutic decisions. For Grade I or II MCTs, complete surgical resection is typically the treatment of choice. With these more well differentiated tumors, the chance of spread to other organs is lower and the primary focus is to effectively treat the tumor locally.

Because MCTs are often more extensive than they would initially appear, your veterinarian may remove more tissue and leave a longer incision than you would have anticipated. This is often necessary if the surgery is done with curative intent. Sometimes, the tumor is located in an area that would be difficult to completely remove. In this case, a large portion of the tumor may be removed with the option of following with another type of therapy, such as radiation, after the surgical incision has healed. The most common reason to recommend radiation therapy would be in cases where all of the MCT could not be removed, tumor cells were left behind, and further surgery is not deemed possible.

For dogs with high-grade, poorly differentiated tumors, surgery and radiation may be used as local therapies, but these treatments will not address the high risk of cancer spread. For Grade III tumors, which have a high likelihood of spreading to other organs, and in cases with documented metastasis, regardless of the grade, chemotherapy may be offered as a palliative treatment alternative. Response to chemotherapy is somewhat unpredictable, but in most reports, it is suggested that approximately 30% to 40% of cases will have some response to the drugs that are currently most commonly used. Supportive medical care is appropriate for all patients and can include antihistamines, gastrointestinal protectants, and in some circumstances, corticosteroids.

**What is the prognosis?**

The clinical course of MCTs is somewhat unpredictable, but all tumors are considered potentially malignant because of their ability to metastasize, or spread. Generally the spread potential for well-differentiated tumors is low (<10%) and that of intermediate grade tumors is low to moderate. Poorly differentiated tumors are associated with the greatest risk of metastasis and the shortest survival times.