

CANINE MAST CELL TUMORS



Mast cell tumors (MCT) are very common in dogs, accounting for about 20% of skin tumors. They are rare in cats and extremely rare in humans. ***MCT can look and feel like many other tumors***, so it is impossible to know if a lump is a MCT without looking at cells under the microscope. We can easily identify mast cells under the microscope here at Best Friends.

If we need to know whether the tumor is likely to be benign or “low-grade” versus cancerous or “high grade,” we would send slides to a pathologist. Fewer than 20% of mast cell tumors are high grade ones, but it’s confusing because many fall in between these two broad categories. In the majority of cases, the cancer does not come back once removed, but not every dog is that lucky.

Cancerous mast cell tumors can be locally invasive, which means they can extend outward and invade nearby tissues, even if they feel like a single, solid lump. They also can metastasize (spread) to other areas of the body. The most common sites of spread are the lymph nodes, bone marrow and liver/spleen.

Tumors are named for the type of cell they originated from. Mast cells are a special type of immune system cell normally involved in allergies and inflammation. A tumor arises when one or more mast cells become abnormal and start multiplying to form a lump. Most occur within the skin (cutaneously) but occasionally they are found underneath the skin (subcutaneously) or in other tissues or organs.

Mast cells contain substances including histamines (what we take antihistamines to counteract). Histamines may be released from MCT cells, which can cause redness, swelling, pain or itching around the tumor. Histamines can also be released from MCTs into the bloodstream, which can cause effects distant from the immediate area around the tumor. These might include stomach ulcers, bleeding and/or allergic reactions (anything from swelling around the tumor to life-threatening shock).

The initial evaluation of a dog with a MCT requires a biopsy or fine needle aspirate, wherein either the entire tumor or some cells from the tumor are sent to the laboratory for analysis. If the lump seems invasive or is growing quickly, a complete blood count, serum chemistry profile, urinalysis, lymph node aspirate and abdominal ultrasound (to look especially at the liver and spleen) may be done as well. In some cases, we may also X-ray the chest. The purpose of all this testing is to make sure that cancer has not already spread beyond the tumor and other organs have not been affected. If so, that changes what treatment should be selected.

The cytology and/or biopsy sample can be sent to a pathologist. The pathologist

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assigns a “grade” to the tumor based on its appearance under the microscope. We use the grade to help predict how the tumor will behave. There are a few locations on the body associated with a higher likelihood of spread of cancer, such as the mouth and the anus. We may treat tumors more aggressively if they are in one of these areas.

Dogs that have had one MCT are at greater risk for the development of additional MCTs in the future. Any future lumps found should be evaluated with a fine needle aspirate. Early diagnosis, followed by injection or removal of these tumors, will increase the likelihood of successful treatment.

Treatment Options

Intratumoral injection:

Tigilanol tiglate, brand name Stelfonta™, is a new medication called an intratumoral therapy. Instead of surgically removing it, as we have always done in the past, we can now inject Stelfonta into the tumor to kill the cancer cells. Stelfonta received FDA approval in November. It was released for sale in March, 2021.

Stelfonta is a protein kinase C activator derived from the blushwood plant in the Australian rain forest.

Stelfonta is used for tumors located within the skin (cutaneous) which have not spread (metastasized) to any other part of the body. It can also be used for subcutaneous tumors located on the lower limbs. It stimulates rapid tumor destruction, within 7 days of the injection. The dose we use is based on tumor volume, as measured on the day of administration. The maximum treatable tumor volume is 10 cm³, so if it's too large we would have to surgically remove it.



Tigilanol tiglate (Stelfonta) is injected intratumorally for the treatment of nonmetastatic cutaneous MCTs in dogs.

The treatment protocol includes some additional medications.

Prednisone, a steroid, is administered on a tapering course beginning 2 days prior to Stelfonta injection, and is continued on a tapering course for 10 days.

Beginning on the day of injection, a histamine-1 blocker, such as diphenhydramine, and a histamine-2 blocker, such as famotidine (Pepcid) are administered and continued twice daily for 7 days.

The intratumoral injection causes swelling and tissue reaction that begins a few hours after injection. The medications help to decrease the

swelling. Pain medication may be needed as well. In most cases, we would use gabapentin.

The death of the tumor results in an open wound several days after injection – the tumor literally dies and falls off, leaving a hole. Unlike standard wounds, the Stelfonta injection wound generally does not need to be covered or protected. Pets are even permitted to lick the wound site! The wound heals slowly but in most patients

studied, the wound was fully healed by 4 to 6 weeks. By 12 weeks, 98% of patients were fully healed.

A study of 123 dogs receiving Tigilanol showed that 75% had a complete response 28 days after the single-dose treatment – the tumor disappeared. 5% had a partial response. The 20% of treated dogs that did not have their tumors resolve completely were able to receive a second injection, after which the response rate increased to 87%. At 12 months, 88% of dogs remained disease free.

Adverse effects from Stelfonta were generally mild. The majority of these effects were pain and/or lameness. Additional side effects that occurred were vomiting, diarrhea, and inappetence. These can be addressed with medication if needed.

Surgical removal:

For cutaneous MCT, surgery, radiotherapy, chemotherapy and symptomatic treatment may all be part of the plan. Surgery is usually our first and best treatment choice if a tumor is too large or not in the right location to use Stelfonta. Because these tumors are invasive, the surgeon must remove the tumor along with a large area of normal appearing tissue both around and underneath it to ensure complete removal. *MCT are deceptive, and sometimes what we can see and feel represents only a small part of the tumor.*

Even when a large margin is taken, sometimes tumor cells are still left behind. These would be seen by the pathologist examining the tumor under the microscope after surgery. If tumor cells extend to the edge of the tumor, the margin is said to be “dirty.” If the edges of the sample show no tumor cells, the margin is termed “clean.”

When the margin is dirty, and it is suspected that not all of the cancer was removed, additional treatment is needed; otherwise, there is a high likelihood that the tumor will regrow. Options include further surgery, radiotherapy or chemotherapy. It may not always be possible to perform additional surgery depending on the location of the tumor. For some limb cancers, amputation may be the only surgical option.

Histamines can be released in large amounts when the tumor site is handled, squeezed or bumped. This includes when it is clipped and scrubbed for surgery, or during or after surgery itself. This can cause low blood pressure and shock during surgery, and/or swelling and poor healing after surgery. We administer antihistamines prior to surgery or tumor injection but your dog still could have complications that could cause the cost of surgery or aftercare to be higher than expected.

If the surgery incision fails to heal properly, long term care with bandages, rechecks and antibiotics may be needed. This doesn't mean that surgery shouldn't be performed, just that it has a higher risk than most tumor removals for problems afterward.

Radiation and chemotherapy:

If surgery is not possible, another option is the use of a local form of radiotherapy, or radiation treatment. This involves the local application of a powerful form of radiation directly onto the tumor area. This treatment is most effective when treating *microscopic* tumor cells left over after surgery, but can be used against larger tumors as well.

Lakeshore Veterinary Specialists in Glendale and the UW- Madison School of Veterinary Medicine are currently the only places in Wisconsin where this treatment can be done. There are a couple of veterinary hospitals in Illinois that do radiation as well.

It is important to remember that Stelfonta, surgery and radiotherapy are **local** treatments and have no effect on tumor cells that may have spread beyond the original tumor location. Tumors with a higher chance of spreading are those arising from the mouth, toenail, perianal (rectal) region and scrotum, or tumors that have spread to a lymph node. These may be treated with chemotherapy in addition to surgery. Stelfonta is not used for cancers that have already metastasized.

Prednisone ("cortisone") is useful as a chemotherapy agent, combined with another drug, vinblastine, given as an injection. Sixty percent of dogs with high-risk MCT will live two years with a combination of surgery and chemotherapy, compared with only 50% alive after eight months with surgery alone.

MCT can occasionally arise inside the body, in the spleen or other organs. For those MCT that have already spread, cannot be removed or that occur in locations other than the skin, the prognosis is more guarded. The goal of treatment for these patients is to attempt to shrink the tumors with chemotherapy, and to maintain a good quality of life for as long as possible by controlling symptoms caused by the presence of mast cells in the body.

If you would like more information about mast cell tumors or your pet needs cancer treatment, we will usually refer you to a board certified oncologist (cancer specialist), at Lakeshore Veterinary Specialists, Wisconsin Veterinary Referral Center in Waukesha or the veterinary school at the University of Wisconsin in Madison.