香港獸醫專科服務

HONG KONG VETERINARY SPECIALTY SERVICES

What is a mast cell tumour?

Mast cells are normal immune cells that live in the skin and many organs (especially the spleen, liver, and intestines). They're loaded with granules containing histamine and other chemicals that help with allergic responses and healing. In mast cell tumours (MCTs), some of these cells become cancerous and multiply in a lump (or sometimes many lumps). When these tumour cells are disturbed, they can "degranulate," spilling histamine and related chemicals into nearby tissues and the bloodstream. That's why MCTs can shrink and swell, get red and itchy, and occasionally trigger vomiting, stomach ulcers, or—rarely—whole-body reactions.

How common are they?

- Dogs: MCTs are the most common malignant skin tumour in dogs, making up roughly 11–21% of canine skin cancers. Certain breeds (Boxers, Boston Terriers, Bulldogs, Pugs, Labradors, Golden Retrievers) are over-represented.
- Cats: MCTs are a top skin cancer in cats and are also common in the spleen and intestines.

Why do mast cell tumours form?
No single cause is known, but several tumour "driver" changes have been identified:

c-KIT gene mutations (tyrosine-kinase receptor):

In dogs, internal tandem duplications (ITDs) in exon 11 appear in about 20–30% of cutaneous MCTs and are linked with more aggressive behaviour—higher recurrence rates and shorter survival—while also predicting benefit from targeted drugs (tyrosine-kinase inhibitors, TKIs). ITDs in exon 8 are less common (around 2–5%).

"Degranulation" chemistry: Tumour mast cells can release histamine and other vasoactive substances. This explains local redness/itching, why tumours can wax and wane in size, and why some pets develop stomach ulcers or, very rarely, anaphylactoid-type reactions. Antihistamines (H1) and antacids (H2 blockers) are used to blunt these effects, especially around biopsy or surgery.

How vets judge behaviour (grading & other lab tools)
Your pathology report will almost always include a grade:

- **Kiupel 2-tier system:** Low-grade vs high-grade. High-grade tumours have a median survival <4 months without effective additional therapy; low-grade tumours commonly exceed 2 years.

- **Patnaik 3-tier system:** Grade I (well-differentiated), Grade II (intermediate), Grade III (poorly differentiated). Many grade II tumours behave like low-grade in Kiupel; a minority behave like high-grade.

- Other helpful markers your pathologist may report include mitotic count (how fast the cells are dividing), Ki-67 (a proliferation index), and KIT staining patterns; all refine prognosis and may guide whether to add chemo/targeted therapy.

First steps after finding a lump

- Fine-needle aspirate (FNA): A quick needle test often diagnoses an MCT without surgery.
- Staging (when needed): Depending on grade, size, and location, vets may recommend lymph-node sampling (sometimes by "sentinel" mapping), chest imaging, abdominal ultrasound, and blood tests. In dogs, even some low-grade tumours can spread regionally (low percentage, but not zero), so lymph-node evaluation is increasingly considered.

- Pre-treatment meds: Many pets get diphenhydramine (H1) and an H2-blocker such as famotidine or omeprazole to reduce histamine-related effects; short courses of prednisone are sometimes used for shrinkage and to reduce inflammation.

Treatment overview (dogs & cats)

Surgery is the **backbone of treatment for most skin (cutaneous/subcutaneous) MCTs,** especially when the tumour is in an area where a wide removal is feasible. When surgery alone cannot fully control the cancer—or when tumours are high-grade, metastatic, or in tricky places—radiation therapy and/or systemic therapy (chemotherapy or targeted drugs) may be added.

A note on goals

- Local control = removing/controlling the main lump (surgery ± radiation).
- Systemic control = treating cells that may have travelled (chemotherapy or TKIs).

Surgery: the star of the show (and what "margins" mean)

How wide should the surgeon cut?

For most low-grade canine skin MCTs, modern evidence supports conservative but adequate margins. Traditional teaching was 3 cm in all directions, but a 2020 systematic review shows 2 cm and 3 cm margins produced similarly low rates of incomplete excision and local recurrence for low-grade tumours. Many surgeons also remove one deep fascial plane under the tumour.

Other approaches include proportional margins based on tumour diameter (helpful on limbs/face where tissue is limited); even though this can increase the rate of "narrow/dirty" histologic margins, true local recurrence was still uncommon in several series of mostly low-/intermediate-grade tumours.

Typical local-recurrence rates after surgery (dogs):

- Low-grade, complete margins: very low—~2–5% in multiple modern cohorts.
- Incomplete/dirty margins (any grade): reported ~23–38% local recurrence if no further local therapy is added. Re-excision or radiation sharply improves control.
- For high-grade canine MCTs, even a "clean" excision carries meaningful risk of local regrowth and spread: one recent multi-center study reported ~26% local recurrence despite complete margins, and ~58% if margins were incomplete. This underscores why adjuvant therapy is usually advised for high-grade disease.

Where margins are hard (face, lower limbs), what then?

When wide margins would cause unacceptable function/cosmetic loss, surgeons may perform a planned narrow (marginal) excision followed by post-operative radiation if pathology shows tumour cells close to or at the cut edge. This strategy provides strong long-term control in dogs.

What does the pathology report mean?

After surgery, your pathologist measures whether the tumour is completely excised (no tumour cells at the cut edge) and how many millimetres of normal tissue separate tumour from the margin. Your clinical team weighs grade + margins + location + node status to decide whether to observe, re-excise, or add radiation/systemic therapy.

Surgical complications: what can happen, and how often?

Most pets do well after MCT surgery. The two categories of complications are wound-related and histamine-related.

1) Wound-related problems

Overall wound complication rates after MCT excision are usually in the low-to-mid teens and are not higher than for similarly handled soft-tissue sarcomas (one large series: 13% for MCT vs 14% for soft-tissue sarcoma). Another study found roughly 20% overall wound-complication rate across a large mixed cohort—very similar to non-MCT tumour surgeries.

When margins are very narrow by design (e.g., distal limb "marginal" excisions), wound-healing issues can be somewhat higher in some reports (~29–31%), reflecting the difficulty of closures in tight locations, not the tumour type per se.

What are the issues? Seroma (fluid pocket), swelling, incisional dehiscence (wound opening), infection; these are usually manageable with standard wound care, drains, or short additional procedures.

2) Histamine-related reactions

Local swelling/redness/itching around the tumour is common from degranulation; your vet often starts diphenhydramine (H1) and an H2-blocker before biopsy or surgery and continues briefly afterwards.

Systemic reactions (low blood pressure, vomiting, "anaphylactoid" signs) during surgery are uncommon with modern premedication and monitoring; precise incidence is hard to quantify from published studies, but the risk is well-recognized and proactively managed with antihistamines, acid suppression, IV fluids, and careful anaesthesia.

When surgery alone is enough (dogs)

If your dog has a single, low-grade cutaneous MCT with clean margins and no spread, surgery is often curative, with very low risk of the tumour coming back in the same spot. Many such dogs do not need chemotherapy or radiation.

When we add radiation (dogs)

Radiation therapy (RT) is most often used after surgery when margins are incomplete or very close and re-excision isn't feasible (e.g., face, distal limb). Multiple studies support excellent local control with this approach. Acute side effects are typically limited to temporary skin irritation in the treatment field; modern planning techniques have reduced these further. In one contemporary analysis, adjunctive RT achieved durable control of incompletely or narrowly excised canine MCTs. Reported acute side effects vary by protocol and planning; an academic comparison noted ~25–50% acute effects depending on technique (more with older 3DCRT than IMRT), and specialty practice summaries emphasize that side effects are often mild and self-limiting.

When we add drugs (dogs)

1) Traditional chemotherapy
Vinblastine + prednisone is the classic backbone. It's used mostly for microscopic disease after removal of high-risk tumours, or for gross (measurable) disease when surgery/radiation is not enough. In prospective dosing work, grade 3–4 toxicities occurred after ~4% of vinblastine doses; older series reported ~6.5% severe neutropenia requiring hospitalization. The most

common side effects are temporary GI upset or lower white blood cell counts, typically manageable with dose holds/reductions.
Response rates for vinblastine-based protocols in dogs with measurable MCT vary by study and case selection; in a small prospective series combining vinblastine and toceranib, a 71% best observed response was reported, though such results are not universal (and combinations are not first-line for most dogs).

2) Targeted therapy (TKIs)
Toceranib (Palladia®) is FDA-approved for non-resectable canine MCT. In the pivotal double-blind trial, the overall response rate was ~43% (complete + partial responses) in dogs with measurable MCT. Median duration of response was about 12 weeks; many non-responders still gained "clinical benefit" with stable disease. Common side effects include diarrhoea, decreased appetite, weight loss, lameness, and blood in stool, generally manageable with dose holds and supportive care.
Who benefits most? Dogs whose tumours carry c-KIT ITD mutations (especially exon 11) tend to respond better—another reason your oncologist might recommend molecular testing in certain cases.

3) Intratumoural therapy (for selected non-resectable skin MCTs)
Tigilanol tiglate (Stelfonta®) is an injected drug that causes tumour necrosis. Published data suggest high complete-response rates (often quoted ~75–88% after one treatment) with ~89% of responders remaining recurrence-free at 12 months in selected cases. Not every tumour is a candidate (location/size matters), and wound-like cavities form as the tumour sloughs, so after-care is essential.

Special notes for cats
Cats get MCTs in the skin, spleen, and intestines.

1) Feline cutaneous (skin) MCTs
These often behave less aggressively than canine counterparts. Even so, tumour recurrence after surgery is reported in a meaningful minority: older and broader reviews cite up to ~33%, while specific series reported ~16–19% recurrence at 1–3 years. Clean margins are ideal, but some cats do well even after narrow excisions depending on tumour type and location.
Treatment: **Surgery is the mainstay**; many cats are cured with a single, well-planned excision. Adjuvant radiation or systemic therapy is uncommon unless margins are non-resectable or disease is multifocal.

2) Feline splenic MCT (visceral)
These cats may present with lethargy, weight loss, big spleen, and sometimes circulating mast cells. Splenectomy (removing the spleen) is the cornerstone treatment and significantly prolongs survival. In a multi-institutional series of 64 cats, median tumour-specific survival was ~856 days (~28 months) with splenectomy (with or without chemo) vs ~342 days without splenectomy. Many summaries quote ~12–19 months median survival after splenectomy; the newer multi-center analysis suggests outcomes can be longer in some cohorts. Chemotherapy did not clearly add to survival after surgery in that study.

3) Feline intestinal MCT
Intestinal MCTs can be more aggressive and prone to spread. Historically, survival was often measured in months; however, contemporary series with surgery ± chemo report variable but sometimes extended survival (median figures around ~390–531 days in some cohorts). Outcomes vary widely by completeness of excision, overall health, and whether disease has spread.

What to expect before, during, and after surgery

Premedication: Most pets receive diphenhydramine and an H2-blocker (famotidine/omeprazole) to minimise histamine-related swelling and protect the stomach. Some receive prednisone for a short pre-op "debulk."

Anaesthesia & monitoring: Your team will be prepared for potential blood-pressure changes from tumour degranulation and will treat any dips promptly with fluids and medications. Serious systemic degranulation is uncommon with these precautions.

Margins & reconstruction: On the trunk, 2-cm lateral margins plus a deep fascial plane are often chosen for presumed low-grade tumours; on the limbs or face, surgeons balance cancer control with function and may plan narrower margins plus adjuvant RT if needed. Skin flaps, grafts, or staged closures may be used to achieve closure.

Pathology report: Expect details on grade, margins (mm), and sometimes proliferation indices and KIT status. Recommendations for re-excision, radiation, or observation will be tailored to these findings.

Recovery & rechecks: Most pets go home the same or next day. Rechecks remove sutures (10–14 days) and review pathology. You'll also learn how to monitor the surgical site and the rest of the skin for new lumps—dogs, in particular, can develop additional MCTs over time.

Complications beyond surgery (with typical frequencies)

Radiation therapy: Most side effects are temporary skin changes where the radiation passes. Reported rates vary with technique and schedule; older techniques reported ~50% acute effects in some small cohorts, while modern planning (e.g., IMRT) reduces this (e.g., ~25%). Late effects (fibrosis, pigment changes) are less common and depend on dose/field. Your radiation oncologist will personalize the plan to minimise risk.

Chemotherapy (vinblastine/prednisone): The majority of dogs tolerate therapy well. In a prospective dose-intensity study, ~4% of doses produced grade 3–4 toxicity; an older series reported ~6.5% severe neutropenia requiring hospital care. Most side effects (mild vomiting/diarrhoea, low white cells) are temporary and manageable.

Targeted therapy (toceranib): In the registration trial, the response rate was ~43% for measurable MCTs; common side effects were GI upset, loss of appetite/weight, lameness, and blood in stool—usually controlled by dose adjustments and supportive meds per the FDA label.

Putting it all together: practical scenarios

1) Dog, single small skin MCT, FNA suggests low grade, trunk location
   Plan: Surgery with ~2 cm lateral margins + one deep fascial plane; histopathology to confirm grade/margins.
   If clean margins & low grade: Observation only—local recurrence ~2–5%.

2) Dog, distal limb MCT where 2–3 cm margins would be disabling
   Plan: Marginal excision to preserve function → If pathology shows close/dirty margins, add post-op radiation. Long-term local control is typically excellent with this combined approach. Wound-complication risk reflects the tight location (rates roughly ~13–31% across series), but is usually manageable.

3) Dog, high-grade MCT or node-positive disease

Plan: Wide excision of primary + lymph-node evaluation/removal as indicated; adjuvant therapy strongly considered. Even with clean margins, local recurrence ~26% has been reported; with incomplete margins ~58%—hence the push for RT and/or systemic therapy. TKIs or vinblastine-based chemo are common choices.

4) Cat, solitary cutaneous MCT
Plan: Surgical excision; many are cured. Recognise recurrence can occur (reports range ~16–33% depending on series), so monitoring is wise.

5) Cat, splenic MCT
Plan: Splenectomy (with supportive meds). Expect a significant survival benefit compared with no surgery (median ~856 vs 342 days in a large multi-center study). Chemotherapy hasn't clearly extended survival beyond splenectomy in that analysis.

6) Cat, intestinal MCT
Plan: Surgery when feasible (to prevent rupture/bleeding/obstruction) ± chemo (e.g., lomustine or chlorambucil protocols). Survival is variable—contemporary data suggest medians from many months to >1 year in some cohorts, but behaviour can be aggressive.

Home care & quality of life tips

- Protect the incision (e-collar, activity restriction) and watch for swelling or discharge; call if you see problems.
- Give pre- and post-op meds exactly as prescribed (antihistamines, antacids). These reduce discomfort and protect the stomach.
- PMC
- Skin checks: once a month, run your hands over your pet to catch new lumps early. Many new lumps are benign, but MCT patients (especially dogs) can develop additional tumours, and early evaluation makes treatment simpler.

Key takeaways

- Dogs: Most low-grade MCTs are curable with surgery (recurrence in the same spot is ~2–5% with complete excision). High-grade tumours need multimodal therapy even after "clean" surgery because recurrence and spread risks are significant. Adjunct radiation is excellent insurance when margins are narrow/dirty and more tissue can't be removed. TKIs (toceranib) and vinblastine-based chemo are useful tools for non-resectable, recurrent, or high-risk disease.

- Cats: Skin MCTs often have a good outcome with surgery (but recurrence can still occur). Splenic MCTs live significantly longer with splenectomy. Intestinal MCTs are more variable and can be aggressive; surgery ± chemo can still provide meaningful time and comfort.

- Complications: Wound problems run ~13–20% in many series (higher in tight sites), serious histamine-related crises are uncommon with standard premeds and monitoring. Radiation side effects are usually temporary skin irritation (rates vary by technique), and most chemo/targeted-therapy side effects are manageable and reversible.

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