

# Improving Prediction of Mast Cell Tumor Behavior

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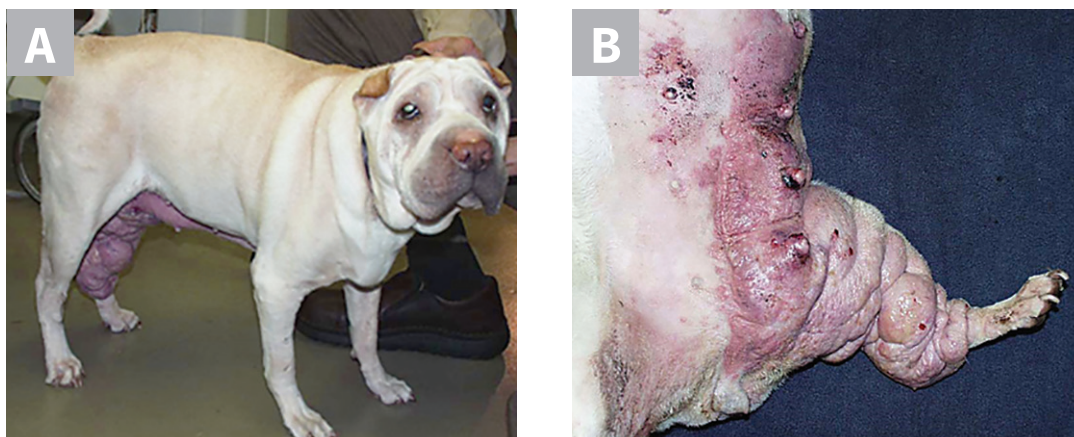
## In the Literature

Reynolds BD, Thomson MJ, O'Connell K, Morgan EJ, Gummow B. Patient and tumour factors influencing canine mast cell tumour histological grade and mitotic index. *Vet Comp Oncol.* 2019;17(12):1-7.

## FROM THE PAGE ...

Collectively, mast cell tumors (MCTs) are the most common malignant neoplasms diagnosed in dogs, accounting for less than ≈20% of all skin cancers.<sup>1</sup> Significant clinical and research efforts have been made to better understand the biologic behavior of MCTs, which, in turn, informs clinical prognosis and helps guide treatment options for affected patients.

Although several variables have been evaluated in the prediction of canine MCT behavior,<sup>2,3</sup> histopathologic evaluation remains a cornerstone for assessing whether MCT biology is benign or aggressive and includes



▲ **FIGURE** A severe, expansive, and infiltrative MCT involving the inguinal region in a geriatric female shar-pei demonstrating supportive correlation of a high histopathologic grade (ie, III) MCT with identified clinical variables, including host-centric (ie, breed [shar pei]) and tumor-centric (ie, anatomic location [inguinal]) factors. *Images provided by Dr. Fan*

histopathologic grade and proliferative indices.<sup>4-6</sup> Although valuable, histopathology alone is an imperfect predictor of MCT biologic behavior, and the synergistic integration of clinical factors, along with pathology, can provide improved MCT biology prediction. As such, correlative investigations can provide actionable findings and should be conducted to identify new—and strengthen previously observed—associations between histopathologic grade and unfavorable clinical variables of the host (eg, breed) and tumor (eg, location). Findings derived from such studies offer opportunities to combine traditional pathology with clinical acumen for the best clinical management practices for canine MCTs.

Over a 15-year period, this retrospective study examined tumor and host variables of dogs that had MCTs. Of 400 MCTs identified, 90 were categorized as having a high histopathologic grade (via the Patnaik, Kiupel, and/or mitotic index classification) and were associated with a variety of tumor and host factors identified through physical examination and owner–clinician communication. Tumor-specific variables included lesion size and anatomic location, and host factors focused on patient signalment (eg, breed, age, sex, neuter status).

Although tumor size was not identified to be associated with a high histopathologic grade, MCTs arising from the inguinal or head regions had an increased risk for having a high histopathologic grade. In addition, MCTs arising from collective “unfavorable” sites, termed *PIMP* (ie, perineal, inguinal, mucocutaneous junctions, and perianal)

locations, were also more likely to have a high histopathologic grade. Of the host factors examined, the shar-pei breed had an increased risk for being diagnosed with histopathologically high-grade tumors. In aggregate, MCT location and patient breed were also correlated with high histopathologic grade pathology findings.

### ... TO YOUR PATIENTS

Key pearls to put into practice:

- 1** MCTs are common skin cancers that can be benign or malignant.
- 2** Histopathology remains the gold standard for disease prognostication but is imperfect and should not be used as a sole predictor of biologic behavior.

### References

1. Bostock DE. Neoplasms of the skin and subcutaneous tissues in dogs and cats. *Br Vet J*. 1986;142(1):1-19.
2. Horta RS, Lavallo GE, Monteiro LN, Souza MCC, Cassali GD, Araujo RB. Assessment of canine mast cell tumor mortality risk based on clinical, histologic, immunohistochemical, and molecular features. *Vet Pathol*. 2018;55(2):212-223.
3. Sledge DG, Webster J, Kiupel M. Canine cutaneous mast cell tumors: a combined clinical and pathologic approach to diagnosis, prognosis, and treatment selection. *Vet J*. 2016;215:43-54.
4. Kiupel M, Webster JD, Bailey KL, et al. Proposal of a 2-tier histologic grading system for canine cutaneous mast cell tumors to more accurately predict biological behavior. *Vet Pathol*. 2011;48(1):147-155.
5. Patnaik AK, Ehler WJ, MacEwen EG. Canine cutaneous mast cell tumor: morphologic grading and survival time in 83 dogs. *Vet Pathol*. 1984;21(5):469-474.
6. Berlato D, Murphy S, Monti P, et al. Comparison of mitotic index and Ki67 index in the prognostication of canine cutaneous mast cell tumours. *Vet Comp Oncol*. 2015;13(2):143-150.

**Mast cell tumors arising from the inguinal or head regions had an increased risk for having a high histopathologic grade.**