

# Researchers assess diagnostic criteria for canine glioma

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A multi-institutional team led by North Carolina State University researchers has found that using recently released criteria for the diagnosis of canine glioma resulted in strong diagnostic consensus among pathologists. The findings not only pave the way for more standardized diagnostic criteria for dogs with brain tumors, but also create a useful baseline to support larger inter-institutional studies that

could aid dogs and humans with glioma.

Gliomas are a family of tumors that occur in the brain and spinal cord and comprise 30-40% of intracranial tumors in dogs. Humans can suffer from these same tumors; however, in human medicine, physicians have a diagnostic algorithm based on molecular and microscopic features that help them identify and agree on the subtype and grade (or severity) of glioma.

Dogs did not have a similar set of [standards](#) until 2018, when the Comparative Brain Tumor Consortium (CBTC) created a set of [diagnostic criteria](#) aimed at helping veterinary pathologists achieve diagnostic consensus.

"The CBTC system of diagnostic criteria could be very useful not only in the clinical diagnosis of canine patients, but also in enabling inter-institutional research collaboration, since it has everyone speaking the same language, diagnostically speaking," says Gregory Krane, co-lead author of the paper, a veterinary pathologist currently working at Moderna and former Ph.D. student at NC State. "To that end, we wanted to conduct a real-world assessment of the system."

Krane obtained 85 glioma samples taken from dogs examined at NC State between 2006 and 2018. Five pathologists—one M.D. neuropathologist, two veterinary neuropathologists, and two veterinary pathologists without subspecialty training in neuropathology—separately examined the samples using the CBTC guidelines.

There are three types of canine glioma: oligodendroglioma, astrocytoma and undefined glioma. Each of these subtypes can be further classified as low- or high-grade based on certain microscopic features. The pathologists utilized both microscopy and immunohistochemistry to analyze the samples.

Consensus was defined as three or more of the five pathologists agreeing on the subtype and grade of the tumor. A consensus diagnosis was achieved for 71 out of 85 (84%) cases.

Keith Shockley, co-first author of the study and a biostatistician at the National Institute of Environmental Health Sciences (NIEHS), helped perform an advanced statistical analysis on the diagnoses to obtain a kappa statistic, which estimates the degree to which different raters agree beyond what would be predicted by chance alone.

The kappa statistic is regularly used in human studies to quantify diagnostic consensus, predominantly in the fields of pathology and radiology. Agreement levels for the kappa statistic are defined as poor, slight, fair, moderate, substantial, almost perfect, and perfect. The kappa statistic for the CBTC criteria was moderate, which was similar to that for most human glioma studies.

"These results show that the CBTC system is similarly reliable to those used in human studies," Krane says. "Hopefully this will support multi-institutional studies with large case numbers, so that we can start leveraging our data to help advance diagnostic and treatment options for both canine and human glioma patients.

"The study also shows that even with detailed diagnostic criteria, pathologist consensus is often not 100%. For a clinical setting, practitioners should be comfortable talking with their pathologist if the diagnosis is not compatible with the rest of the clinical picture, and in the research setting, investigators can strengthen their studies by incorporating groups of pathologists into the diagnostic review."

The study appears in *Veterinary and Comparative Oncology*.

**More information:** Gregory A. Krane et al, Inter-pathologist

agreement on diagnosis, classification and grading of canine glioma,  
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