

Dogs accelerate the advance of new cancer treatments for both pets and people

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A Science Translational Medicine review suggests integrating dogs with naturally occurring cancers into studies of new drug therapeutics could result in better treatments for our four-legged friends while helping inform therapeutic development for human cancers.

The review, conducted by the Institute of Medicine (IOM) of the National Academy of Science, including faculty at the Translational Genomics Research Institute (TGen), hopes to close the gap between human and canine [cancer](#) research, and accelerate the knowledge developed by studying cancer in both people and pets, a field known as comparative oncology.

"We are hopeful this analysis will be useful in developing and advancing an agenda for the field of comparative oncology," said Dr. Jeffrey Trent, TGen President and Research Director, and one of the authors of the study. "Many canine breeds develop naturally occurring cancers, such as breast cancer and melanoma, that share remarkable genetic similarities with their human equivalent. This allows us a unique opportunity to have what we learn in the human be of help to the dog, and what we learn in the dog to be of direct help to human patients with these cancers."

Dr. William Hendricks, an Assistant Professor at TGen specializing in canine research, agreed: "It has been remarkable to see first hand the similarity in genetic changes, called mutations, between a dog with melanoma and a human patient with the same disease. Looking through the lens of genetics is giving us new targets and offering new hope for

improving our treatment of humans and dogs."

This "gap analysis" is the result of a National Academies Institute of Medicine workshop—The role of Clinical Studies for Pets with Naturally Occurring Tumors in Translational Cancer Research—held June 8-9, 2015, in Washington, D.C.

"Low [cancer drug development](#) success rates and the associated high attrition rates of new drugs, particularly late in human [clinical trials](#), are indicative of a key shortcoming in the preclinical development path," said Dr. Chand Khanna, a former Senior Scientist at NCI's Center for Cancer Research, who holds both a Doctor of Veterinary Medicine and a Ph.D. in Pathobiology, an interdisciplinary field devoted to basic research into the mechanisms of disease.

"Strong similarities between the biology of cancer in dogs and humans have been shown, including patterns of response to therapies and cancer recurrence," said Dr. Khanna, the review's senior author. "Specific types of cancer are functionally identical between dogs and humans, and in some cases the cancers can be considered indistinguishable between the species."

Findings the authors report include:

- A limited understanding of the field of comparative oncology in the cancer drug development community.
- The value of comparative oncology can be seen not only in accelerating drug development and eventual FDA approval, but also in saving time, costs and risks to patients by providing early assessments of clinical trials that should be discontinued.
- Studying canines to answer questions about drug target biology—before and after exposure to novel treatments—should be a priority.

- Comparative oncology also should prioritize the development and validation of biomarkers in circulating blood, and guide decisions about optimal drug combination strategies.
- There is a need to include veterinarians in clinical practice and in the pharmaceutical industry, physician and veterinary medical associations, and aligned philanthropic groups, in the discussion of opportunities presented by comparative oncology.
- Tissue samples of canine cancers stored in tissue banks and biospecimen repositories "should now be leveraged in order to rapidly accelerate comparative oncology."

Importantly, this review found that the knowledge of genetic alterations that drive human cancers far exceeds knowledge of those same alterations in canine cancers. More than 30,000 human cancers have been genomically profiled, while genomic sequencing data has been published for fewer than 50 canine cancers.

"Our understanding of the genomic landscape of canine cancer is widely considered to be the single largest gap currently present in comparative oncology today," said Dr. Amy LeBlanc, Director of the Comparative Oncology Program at NCI's Center for Cancer Research, and the review's lead author.

Other recommendations included in the review: Veterinary schools are best positioned and prepared to successfully recruit and manage canine patients for comparative oncology studies; the successes in immunotherapy in [human](#) cancer treatments should be extended to canine clinical trials; and a centralized registry of canine clinical trials should be created, providing easy access for pet owners and veterinarians.

More information: A. K. LeBlanc et al. Perspectives from man's best friend: National Academy of Medicine's Workshop on Comparative

Oncology, *Science Translational Medicine* (2016). [DOI: 10.1126/scitranslmed.aaf0746](https://doi.org/10.1126/scitranslmed.aaf0746)

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