Study shows dog DNA can help human cancer patients

18 March 2014, by Steve Yozwiak

(Medical Xpress)—Using genomic analysis to study cancer in dogs can help develop new therapies for humans with cancer, according to a proof-of-concept study led by the National Cancer Institute (NCI) and the Translational Genomics Research Institute (TGen).

Pure-breed dogs, whose genetics have been standardized by hundreds of years of human intervention, provide highly predictable genetic models useful in designing clinical trials, in which specific drugs are matched to the molecular profiles of human patients, according to the study published today in the scientific journal *PLOS ONE*.

"Our canine companions are not only 'Man's Best Friend,' but our study shows that dogs also can help human patients pursue battles against various types of cancer," said Dr. Jeffrey Trent, TGen President and Research Director and the study's senior author. "Not only do dogs with cancer benefit from this research, but people do, as well."

While there are, relatively, many genetic differences among humans with the same type of cancer, there are far fewer genetic differences among dogs of the same breed, making it vastly easier to identify and study the genes driving canine cancers.

The process of integrating naturally occurring cancers in dogs into the general studies of human cancer biology and therapy is known as comparative oncology. The identification of specific drugs to treat individuals based on their specific genetic or molecular make-up is often referred to as personalized medicine, or PMed.

Genetic samples from 31 dogs were analyzed in the proof-of-concept study organized under NCI's Comparative Oncology Trials Consortium (COTC). Genetic samples were derived for this study from tumor biopsy samples. No dogs were harmed in any way in this clinical study.

"Complex models are needed to effectively evaluate PMed study designs, and this proof-of-concept trial validates the dog with cancer as a model for clinical evaluation of novel PMed approaches," said Dr. Melissa Paoloni, the study's lead author and former director of the COTC. "Comparative oncology models have the potential to expedite this evaluation and lead advancements in personalized medicine."

The COTC study was organized according to the propensity of different breeds to develop particular types of cancer. The study included Scottish terriers with bladder transitional cell carcinoma, golden retrievers with lymphoma, American cocker spaniels with melanoma, and a fourth group of dogs open to all cancer types.

The study's 31 samples of dog tumors was compared to 40 normal canine tissues samples as a way of estimating the variance in gene expression. The target turnaround time for this analysis was 7 days, but the study averaged this process in less than 5 days.

"Overall the turnaround for sample analyses fit a relevant clinical window for future comparative oncology trials to model human PMed advancements," said Dr. William Hendricks, a TGen Staff Scientist and another author of the study. "Future comparative oncology studies, optimizing the delivery of PMed strategies, may aid cancer drug development."

"Data from this study serves as rationale to now include dogs with spontaneous cancers in the advancement and optimization of PMed for human patients," according to the study," Prospective molecular profiling of canine cancers provides a clinically relevant comparative model for evaluating personalized medicine (PMed) trials."

More information: Paoloni M, Webb C, Mazcko C, Cherba D, Hendricks W, et al. (2014) "Prospective Molecular Profiling of Canine Cancers Provides a Clinically Relevant Comparative Model for Evaluating Personalized Medicine (PMed) Trials." *PLoS ONE* 9(3): e90028. DOI: 10.1371/journal.pone.0090028

Provided by Translational Genomics Research Institute