

Canine Tumor Genome Atlas will map DNA in pets to help people with cancer

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Pioneering work in comparative oncology continues at UC Davis with the launch of a Canine Tumor Genome Atlas, the first genomic data bank of its kind outside of one developed by the National Cancer Institute. Eventually it may store hundreds of gene samples from companion dogs diagnosed with osteosarcomas, oral melanomas and gliomas.

These three cancers are remarkably similar to the same cancers found in humans, and sadly, they can be uniformly fatal in both species. Through comparative oncology, scientists seek to find cures that work in [dogs](#) in the hope that similar therapies may work in people. In fact, [canine](#) clinical trials are underway at UC Davis to test an immunotherapy agent to fight [cancer](#).

As part of its joint cancer research with the UC Davis School of Veterinary Medicine, UC Davis Comprehensive Cancer Center is building an extensive genome catalog in order to map why certain canines are genetically predisposed to cancer. Researchers hope that by helping find cures for pets with cancer, the atlas may also unlock similar breakthroughs for people with cancer.

John McPherson, deputy director of the cancer center, and Christine Toedebusch, assistant professor in surgical and radiological sciences at the UC Davis veterinary school, are leading the research initiative.

"These genomics studies will show how tumors mutate and what's driving those mutations in the [cancerous cells](#)," McPherson said.

The Canine Tumor Genome Atlas will house a collection of biological samples that contain mutations and alterations in [tumor](#) gene expressions. The atlas will allow researchers to mine the data after the genetic makeup of the tumors is analyzed and sequenced.

"Think of it this way," McPherson said. "A genome is like an encyclopedia set. Every volume of the encyclopedia is a chromosome and inside every volume are chapters and paragraphs. Sequencing is reading the words and letters of the genome. As a genomic researcher, I'm looking at misspelled words. These are changes that alter the function of proteins encoded by the genes."

McPherson said that this research approach, which is called oncogenetics, will draw upon the atlas to identify gene variants that stick out like sore thumbs, and then track those patterns to see if they can be mapped to certain cancers.

"Our canine companions share genetic and environmental complexity with us and have an intact immune system, unlike laboratory mice," Toedebusch said. "Many canine tumors progress similarly and share many features with human tumors. While [laboratory mice](#) are vital to initially understand and test mechanisms of cancer progression, they have repeatedly demonstrated limited success in therapeutic translation to human cancer patients. Naturally occurring canine cancer may serve as a bridge for therapeutic translation between rodents and humans."

For example, Toedebusch said, gliomas are fatal brain tumors in dogs and humans, causing death of patients within a year to 18 months of diagnosis.

"It has been more than 20 years since a new therapy has been effective at extending this meager survival time in humans," Toedebusch said.

"Companion canines with glioma are becoming more readily acceptable

as a translational model for human glioma, creating funding opportunities to study the canine disease and allowing for the possibilities of breakthroughs in treating canines and humans, alike."

The Canine Tumor Genome Atlas will be shared nationally with other cancer researchers.

Provided by UC Davis

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