



Cancer, Animals and People

Cancer strikes animals as well as people. Comparative oncologists in the school are working with physician-scientists at medical schools to reveal new knowledge about the root causes of this challenging disease – tumor genetics, molecular targets, biological behavior and response to therapy. With a One Health approach that takes into account animal, human and environmental factors, veterinary faculty are translating scientific discovery into effective treatments for animals and humans.

Cross-disciplinary excellence – Experts in chemotherapy, radiation oncology, surgery, imaging, genetics, pathology and other disciplines pioneer new veterinary treatments while providing outstanding patient care at the William R. Pritchard Veterinary Medical Teaching Hospital.

Tackling canine and human lymphoma – Treating dogs with naturally occurring cancers such as lymphoma, which also affects humans, provides a bridge to discovery to benefit both species. In 2011, veterinary and medical colleagues identified the protein that may promote the formation of lymphoma and other cancers by inhibiting a tumor-suppressing gene. The protein may be a potential target for diagnosis and treatment of lymphoma in humans and animals.

Bold treatment for brain tumors – Results from specialized veterinary studies in dogs enabled physician-scientists at UC San Francisco to introduce a novel therapy for glioblastoma into phase-one clinical trials in humans. The technique, which involves neurosurgery, a specialized infusion machine and simultaneous guidance from magnetic resonance imaging, has safely and effectively delivered liposomal drugs directly to inoperable tumors inside the brains of canine patients with naturally occurring tumors.

Injection-site sarcomas – Veterinary epidemiologists reported in the early 1990s that a small number of cats that had received multiple vaccination injections over time developed sarcomas at the injection sites. This team joined a national task force that investigated and updated veterinary vaccination guidelines to reduce vaccine-associated sarcomas in cats.

Viruses, contaminants and cancer in wildlife – Veterinary pathologists discovered in 1996 that a striking 18 percent of deaths in stranded adult sea lions resulted from tumors in their reproductive and urinary tracts. Faculty observed viral particles later identified as herpesvirus and found that this virus is twice as common in adult male sea lions – infecting 45 percent of them – as in females. This team also explored whether chemical contaminants (PCBs) interact with hormone receptors in the reproductive tracts to promote tumor growth because animals with higher concentrations of PCBs in their blubber were more likely to have died of this type of cancer.

Novel virus in raccoons linked to brain tumors – In 2012 veterinary pathologists at the teaching hospital and the California Animal Health and Food Safety Laboratory discovered a novel polyomavirus and determined that rare brain tumors in raccoons in Northern California and Oregon may be linked to the virus. Polyomaviruses can cause cancer under laboratory conditions; raccoons may provide a valuable model for studying how these viruses spread

outside the laboratory.

Feline leukemia vaccine – The cat has the highest incidence for lymphoma of any species. Faculty specialists developed a vaccine to protect against feline leukemia virus, which can cause lymphoma in cats.

Canine skin cancer – Veterinary faculty and graduate students teamed up to explore possible links between certain papillomaviruses and cancer. They have isolated in a single dog at least five canine papilloma viruses – one of which may be associated with skin cancer in dogs.

Meeting client demand – The opening of the privately funded Center for Companion Animal Health in 2004 tripled the teaching hospital's capacity to treat cancer in pets, enabling the school's veterinary oncologists to meet increasing client demand for oncology services/

Bovine papillomavirus infections lead to equine tumors – Veterinary research supports the conclusion that infection with bovine papillomavirus is important in the initiation or progression of sarcoid tumors in horses.

New protocols extend survival in cats – Clinical researchers confirmed that several new combinations of chemotherapy and radiation prolonged survival times in cats with different types of malignancies, including cancers related to feline immunodeficiency virus.

Stereotactic radiosurgery – The radiation oncology team, using a linear accelerator that the school adapted especially for small animals and horses, developed the school's protocol for stereotactic radiosurgery. This precise, non-surgical treatment delivers a single, high dose of targeted x-ray beams to a brain tumor while minimizing radiation to healthy tissue. A specialized frame device and computerized treatment planning ensure the utmost accuracy. Since 2009 when the approach was introduced, scores of patients have benefited from this therapy.

Bringing minimally invasive surgery to hospital patients – Introducing minimally invasive procedures and specialized imaging to locate and remove tumors, the school's veterinary surgeons now treat animal cancers considered inoperable just a few years ago. Patients recover more quickly and experience fewer complications. Endoscopy and urethral stenting, for example, are being explored in depth only at the School of Veterinary Medicine. Chemoembolization and intraarterial chemotherapy are other innovative approaches to life-saving cancer therapy.

Publication and education – In the late 1970s, veterinary faculty published one of the first books to deal with animal cancers and therapies, *Veterinary Cancer Medicine*.

Seminal research – Original research into the relationships between viruses and cancers in dogs, cats and horses helped establish the school's reputation as a center for veterinary cancer research.

Pivotal findings in cellular biology – Faculty investigators found that a protein critical for cell cycle regulation serves a dual role in cell proliferation and differentiation – and a possible association with certain lymphomas and carcinomas in cats.

Proving the value of comparative studies – Veterinary oncologists provided the first evidence that an experimental oral drug could inhibit the growth of several kinds of malignancies in dogs. The study gave oncologists in human

medicine relevant information sooner than could have been learned in human clinical trials. In 2009, the US Food and Drug Administration approved the drug, now known as Palladia, as the first medication developed specifically for the treatment of mast cell tumors in dogs.

UC Davis Veterinary Center for Clinical Trials – In 2013, the school expanded its longstanding comparative clinical trials program into a national initiative, the Veterinary Center for Clinical Trials. The goal is to enhance the quality of life in companion animals while reducing the time required to bring novel therapies, diagnostics and preventive strategies into much-needed human clinical trials. This center takes advantage of the hospital's large and diverse clinical caseload. Clients whose animals have naturally occurring disease may choose for their pets to receive new drugs, minimally invasive surgical techniques and radiation technology. The coordinator contacts clients across the country and reaches out to pharmaceutical companies interested in partnerships with veterinary scientists.

National recognition – Translational researchers received acknowledgment in 2013 by the National Cancer Institute for "unique and noteworthy scholarly contributions in the field of cancer drug development." The clinicians are members of the NCI's Comparative Oncology Trial Consortium, which includes 20 veterinary schools across the US and Canada.

Contact: Trina Wood, (530) 752-5257
4/2013