



One Health links the medical and veterinary worlds (and more) to combat threats to the health of human, domestic animal, and wildlife populations, plus that of their environments.

One Health: A Shortcourse

By Sue M. Copeland

Learn how the global One Health movement can improve your dog's health – and yours

One Health. Those two simple words combine to describe a global initiative that aims to improve your health and that of your dog's (and other animals)—plus your environment.

The movement is based on the concept that humans, animals, and the world we live in are connected: What impacts one, impacts all. One Health is a collaboration of individuals working locally, nationally, and globally to address current and potential health and welfare issues. It links the medical and veterinary worlds, from doctors and veterinarians, to researchers and public health workers, to form a holistic approach to world health.

THE BACKSTORY

Seeds for One Health were planted in 1962, when an Institute of Medicine report described the threat of “zoonotic” disease (that which can spread between humans and animals, such as bird flu). Then in 1964, Dr. Calvin Schwabe, a former World Health Organization (WHO) member and

founding chairman of the Department of Epidemiology and Preventive Medicine at the University of California, Davis, School of Veterinary Medicine, developed the One Medicine theory.

With it, Dr. Schwabe called for collaboration between human and wildlife pathologists as a means of controlling and even preventing zoonotic disease spread. In his book entitled “Veterinary Medicine and Human Health,” he advocated a combined medical and veterinary approach to such diseases.

One Health builds on that collaboration. In 2004, the concept was advanced during a Wildlife Conservation Society conference on “One World, One Health: Building Interdisciplinary Bridges to Health in a Globalized World.” The conference outcome was to set priorities for an international, multidiscipline strategy for combating threats to the health of human, domestic animal, and wildlife populations, plus that of their environments. (See www.oneworldonehealth.org.) According to the Centers for Disease Control and Prevention (CDC; cdc.gov), One Health issues include not only zoonotic

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diseases, but also antimicrobial (antibiotic) resistance, food safety and security, vector-borne diseases, environmental contamination, and other health threats shared by people, animals, and the environment.

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CANINE CONNECTION

“The One Health concept, as it relates to canine health, can be broken into three major concepts,” explains Stephanie A. Montgomery, DVM, PhD, DACVP, Associate Professor at University of North Carolina School of Medicine and Chair of the American Kennel Club Canine Health Foundation’s (CHF’s) Scientific Review Committee (SRC). She explains that they are:

1. *Environment.* We share the same environment with our dogs. That means, for instance, any environmental chemicals, poor air quality, or disease-carrying insects (such as fleas and ticks) can impact the health of our dogs and us.

2. *Disease.* Some infectious diseases can affect both dogs and humans. Examples include rabies, salmonella, Lyme, and West Nile. Non-infectious disease, such as cancer, also affects dogs and humans.

3. *Research.* Because of shared environments and disease risk, scientific research that informs the health of one species has value for the other. When physicians, veterinarians, and other scientific-health and environmentally related disciplines work together, gains in scientific knowledge can occur more



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rapidly and efficiently. This can include cancer treatments, identifying genetic predisposition to disease, and more. (For examples of One Health-related CHF research, see “CHF and One Health,” at akcchf.org/research/research-priorities/one-health.html.)

WHY IT MATTERS

According to the CDC, three out of every four new or emerging infectious diseases in people are acquired from animals. For instance, COVID-19, the disease caused by the SARS-CoV-2 coronavirus, very likely crossed from bats, through another animal, to humans, based on a WHO study. Plus, animals can provide early warning signs of illnesses that can affect people. One

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example is that birds may begin to die of West Nile virus before it begins to infect humans, signaling presence of the disease in a region.

And, as the human population continues to increase, areas of overlap between human and animal habitats will also grow. (The world's population reached an estimated 7.7 billion in 2019, according to the United Nations.) With that comes a greater risk of exposure to new viruses, bacteria, and other disease-causing pathogens for animals and people. Between that growth and humans' ever-evolving relationships with animals, understanding the threads that bind people, animals, and the environment will become ever more critical.

One Health has garnered international attention as a conduit for identifying infectious disease outbreaks, and to address the interconnected threats affecting animals and humans, and their

environments.

“While CHF's focus will always be advancing the health of dogs, in recent years we've developed an appreciation for how interconnected our dogs' health is to our own health,” says Dr. Montgomery. “With CHF's commitment to One Health, we'll continue to address significant challenges impacting the health of dogs, and how it bridges with their human counterparts.”

HOW IT WORKS

So how does One Health connect multispecies medicine and research on a global scale? Thanks to electronic media, collaboration can happen in real time. “Much of the way data is shared across disciplines occurs electronically, in scientific and medical literature,” explains Dr. Montgomery. As a result, veterinary re-

CHF AND ONE HEALTH

According to the AKC Canine Health Foundation (CHF; akc-chf.org), One Health is a guiding principle in their mission to advance the health of all dogs and their owners. Recent discoveries by CHF-funded researchers demonstrate the power of this approach in fighting cancer in both dogs and humans.

According to Sharon Albright, DVM, CCRT, CHF's Manager of Communications and Veterinary Outreach, “Scientists are investigating the genomics of cancer—describing the structure, function, and editing of genetic material in tumors and normal tissue. Understanding the number, location, and variety of genetic mutations found in various cancers provides insight on how the cancer develops and progresses. If we block the effects of a mutation, we may be able to block cancer progression.”

Some promising examples from CHF-funded cancer research with One Health implications include the following:

Active Grants

Grant 02920: Continued Investigation into Tumor-permissive Collagen Signatures in Canine Mammary Gland Tumors: Development of Prognostic Markers and Targeted Therapies for Improved Outcomes

Principal Investigator: Susan W. Volk, VMD, PhD; University of Pennsylvania

Study of non-cancerous cells and networks of proteins including collagens found outside the cells also regulate mammary tumor growth and metastasis.

Grant 02890: Characterizing the LINE-1 Transcriptome in Canine High-grade Peripheral T-cell Lymphoma by RNAseq to Gain Insight into Mechanisms of Drug and Immune Resistance

Principal Investigator: Paul Hess, DVM, PhD; North Carolina State University

Study of an unexplored pathway used by cancerous T-cells to tolerate chemotherapy drugs and evade immune system detection.

Grant 02768: Defining the Functional Consequences and Therapeutic Vulnerability of Dystrophin Alterations in Canine Osteosarcoma

Principal Investigator: Cheryl A. London, DVM, PhD; Tufts University

Investigation of the incidence and role of dystrophin protein loss in canine bone cancer based on its importance in human bone cancer.

Completed Grants

Grant 01131: Genetic Background and the Angiogenic Phenotype in Cancer

Principal Investigator: Jaime F Modiano, VMD, PhD; University of Minnesota

Investigators identified mutations in canine hemangiosarcoma tissues that resemble mutations seen in human angiosarcoma tumors of the breast and viscera (internal organs).

Grant 00754A: Mapping of the Gene for Transitional Cell Carcinoma in the Scottish Terrier & West Highland White Terrier

Grant 01336A: Finding the Mutations that Increase Susceptibility to Transitional Cell Carcinoma in the Scottish Terrier, West Highland Terrier, and Shetland Sheepdog

Principal Investigator: Deborah Knapp, DVM, MS; Purdue University

Grant 01577: Identifying the Genes Conferring Risk for Transitional Cell Carcinoma

Principal Investigator: Elaine Ostrander, PhD; National Human Genome Research Institute

Investigators identified two clusters of dysregulated genes in canine bladder tumors that correspond with similar mutations in human bladder tumors.



2021
AKC CANINE HEALTH FOUNDATION
NATIONAL PARENT CLUB CANINE HEALTH CONFERENCE



YOU'RE INVITED:

CHF PARENT CLUB HEALTH CONFERENCE

“One Health will be a central theme at the 2021 AKC Canine Health Foundation National Parent Club Canine Health Conference,” says Andrea Fiumefreddo, MS, CHF’s Director of Programs and Operations. “The latest findings from CHF-funded research on allergic dermatitis, environmental toxin exposure and cancer risk, vector-borne disease, and more will be presented to highlight the importance of a One Health approach. The collaborative environment of this conference – bringing together researchers, veterinary professionals, dog owners, and students – has a lasting impact on canine health, which also benefits people in our shared and evolving landscapes.”

- **What:** AKC Canine Health Foundation National Parent Club Canine Health Conference, sponsored by Purina
- **When:** Friday, August 13 through Sunday, August 15, 2021
- **Where:** Hyatt Regency at The Arch, 315 Chestnut Street, St. Louis, MO 63102*
- **How:** Registration available through July 31 at akcchf.org/npccchc

**Slated for in-person attendance at time of publication; subject to change pending unforeseen updates in COVID-19 protocols.*

meetings in which physicians and veterinarians discuss their approaches to diseases that affect both humans and dogs. That’s exciting—we can learn a great deal from each other.”

Current knowledge of human research advancements can also be helpful to CHF when deciding what research to support. “When CHF’s Scientific Review Committee considers which proposals to fund,” says Dr. Montgomery, “what’s most important is whether the study addresses an important canine health concern, and whether the research is scientifically sound. But as we consider proposals, the One Health concept and current knowledge in human medicine can be helpful. Funding for human health research from federal agencies and the private sector dwarfs what’s spent on canine health. That means advances in human diseases are frequently ahead of where we are in veterinary medicine. We can use that to our advantage: If something has been proven to cure disease in humans, then it can be a promising avenue for us to explore in dogs.”

“Similarly,” she continues, “One Health can work the other way. If a researcher is tackling a significant issue in dog health that also impacts humans, such as cancer, epilepsy, or osteoarthritis, that’s added value from the SRC’s perspective.”

That’s the beauty of One Health partnerships: They work to help—and protect—us, our animals, and our world. To learn more, go to www.onehealthinitiative.com.

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searchers can actively keep up with the latest developments in similar fields of human medicine, and vice versa, she explains. Plus, there’s additional exchange of ideas, information, and data at scientific conferences.

“In my experience,” Dr. Montgomery continues, “what promotes One Health most effectively is when human and canine researchers, and health care providers, engage one another and build personal relationships. While it’s not easy to get everyone in the same room, we’ve seen progress on that front. During the COVID-19 pandemic, for instance, we’ve seen the emergence of recurring ‘virtual’ One Health online

