

One Health Initiative

We present an in depth profile of the **One Health Initiative** from one of its chief advocates, **Dr Laura Kahn**, physician on the research staff of the Woodrow Wilson School of Public and International Affairs, Princeton University

Could you offer an insight into the background of the One Health Initiative and its overall aims and objectives?

The concept that human and animal health is linked is not new. What is new is that in recent years, a number of like-minded individuals across professional spectrums began recognising it as an essential element for advancing research progress for human and animal health. The emergence of West Nile virus in New York City in 1999 was a seminal event. A veterinarian played a key role in recognising that the disease in humans and animals was linked by a newly emerged virus, emphasising the critical role for One Health principles in public health. At that time, I was researching the public health and animal health infrastructures in several U.S. states. One of the veterinarians in the study sent me some veterinary medical literature on bioterrorism, and it struck me how many of the bioterrorist agents and emerging infectious diseases are zoonotic (transmissible from animals to humans). Yet in my research, I found that physicians and veterinarians rarely, if ever, communicated or collaborated with each other.

I published a paper in *Emerging Infectious Diseases* on the need for medical and veterinary medical professionals to work together in April 2006. Dr Bruce Kaplan, a retired veterinarian and a former epidemiologist with the U.S. CDC and staff officer with USDA Food Safety and Inspection Service in Washington, DC, contacted me, and we formed a most productive One Health partnership which has now been established for over four years. A year after our inception, I approached Dr Tom Monath, an eminent medical virologist and physician, to join

us, after I heard him give a terrific speech at an American Society for Microbiology conference. He has worked with a number of veterinarian scientists over the years, and led a multidisciplinary team at CDC working on zoonotic infections, so he knows first-hand the benefits of a One Health approach in addressing disease(s). Dr Jack Woodall, a world-renowned PhD scientist and a co-founder of ProMED-mail, which is inherently One Health in its approach to disease reporting, joined our One Health team in February 2009.

Our foursome works together to promote One Health via newspaper and professional journal publications and through our One Health Initiative website at www.onehealthinitiative.com.

The aim of the One Health Initiative is to increase communication and collaboration between human, animal, and ecosystem health professionals.

Why have there been so few coordinated human and animal medical projects to date? Has there long been a desire for such a collaborative approach and how can this help in disease prevention and the development of new medications?

That's a very good question. First of all, it is important to recognise that there have been a number of successful collaborative projects in the past, and they do serve as models for future efforts. Examples include the Rockefeller Foundation Virus programme (1951-71), CDC's National Center for Zoonotic, Vector-borne, and Enteric Diseases, the Eden Project and efforts to control bovine spongiform encephalopathy and avian influenza.

An outstanding example is a livestock drug, Ivermectin, developed in 1981 to treat parasites in livestock,



which became important in the treatment of canine (dog) dirofilariasis (heartworms) and was subsequently approved for human use in 1987. It is now responsible for the elimination of river blindness from huge areas of Africa, and the treatment of lymphatic filariasis and pinworm.

With regard to One Health necessity, virtual elimination of rinderpest by livestock vaccination, supervised by veterinary medical epidemiologists, has improved nutrition for millions of people across sub-Saharan Africa, the Middle East and India. Drug treatment for bovine African trypanosomiasis has opened up huge areas of grazing land in Africa to pastoralists.

However, there are several factors that might explain the rarity of such projects. First, as humans we tend to be more focused on our own health needs than on other species. It is only natural, and so we forget that our health is intimately tied to animal and ecosystem health. Second, as medical knowledge has exploded in the past century, we have become increasingly reductionistic in our approach to health and disease. We are good at building areas of specialisation which certainly has its benefits, but narrows our scope so much that we stop seeing the forest for the trees. We're now looking at the veins of the leaves and don't even see the trees! We need to step back, look at the whole picture, which includes our individual health and public health, the health of other animals, and the health of the planet, if we want to survive. Disease prevention is far better than disease treatment, which is much more expensive.

A more integrated approach would identify the factors that promote infectious disease emergence as well as non-infectious diseases like cancer, cardiovascular disease, obesity, orthopaedic conditions like osteoarthritis; more specifically, human joint prostheses developed primarily by veterinarians in animals continue to serve as significant models for human surgical replacements of knees, hips and other joints. Also, the first flexible coil balloon expandable intracoronary stent was developed for humans by a research team including an interventional physician cardiologist (a former veterinarian) and a pathologist veterinarian in the early 1990s. Nearly 100 per cent of patients undergoing balloon angioplasty for 'heart attacks' from heart vessel blockages receive stents.

Are there any particular diseases or global regions that could benefit from your research? Is there a greater prevalence of disease transmission between humans and animals in less developed nations?

I do policy research, so I look at the big picture and develop recommendations on how we can improve our approach to disease control, treatment, and prevention. In the U.S., we've largely divorced ourselves from livestock and food animal production since the vast majority of the U.S. population lives in urban areas. I recently took my family to spend a few days on a dairy farm in rural Pennsylvania. My kids and I watched cows get milked, and it was a revelation for them to see where our milk comes from.

In much of the rest of the world, in contrast to the U.S., people live with their livestock. And they implicitly recognise the importance of animal health because if the animals die, then they starve. Of course, if humans live closer to the animals, there is a greater opportunity for disease transmission. The avian influenza (H5N1) illustrates this case. Most of the people who got sick with H5N1 were exposed to sick poultry. On the other hand, there is debate that the increasing incidence of allergic disorders and autoimmune diseases is due to living in

too clean an environment. Allergies and autoimmune diseases are rare in African and Asian populations. So perhaps it would be healthier for us if we were more exposed to animals and their parasites beyond just dogs and cats. Clearly, we need more research in this area.

Will the One Health Initiative play an active role in drug and vaccine development and implementation or is your role more of an advisory capacity?

I am not directly involved in drug and vaccine development, but clearly we need to develop therapeutic and preventive strategies in tandem between humans and animals. Our One Health team colleague Dr Tom Monath, a partner in the Pandemic and Biodefense Fund, Kleiner Perkins Caufield & Byers, and also Adjunct Professor, Harvard School of Public Health (USA), is involved in this area. He has emphasised the benefits that would result from a closer collaboration between animal and human health sectors of the pharmaceutical industry. Dr Monath directed research and development on vaccines against dengue, Japanese encephalitis, West Nile, yellow fever, Clostridium difficile, as well as smallpox vaccines for defence against bioterrorism. This speaks volumes for how the expansion of collaborative One Health principles would fast-forward drug and vaccine development worldwide!

All large companies separate these sectors physically and do not foster active collaborations. This is wasteful, since there are obvious cross-cutting concerns, overlapping expertise, and need for innovation in diseases that affect animals and humans including cancer, obesity, allergy, infectious diseases, and other areas.





How do you propose to increase awareness and which methods of dissemination have proved to be most useful thus far?

Educating political leaders and the public about One Health is absolutely essential for widespread support and adoption of the concept. Getting the word out takes time and patience. My colleagues and I have been reaching out to policy makers and the public, but it's been a challenge because of many other competing issues. The economic recession certainly hasn't helped, and healthcare reform has dominated the news in the U.S. One Health can have a potentially huge impact in preventing disease and ultimately cutting healthcare costs, but again, the challenge has been to get people to see beyond hospital and clinic walls. We have written newspaper Op Eds and letters-to-the-editor in newspapers



and magazines, written papers in professional journals, and given One Health talks. We have colleagues at the Florida Department of Health who have a One Health Newsletter available for free online. All of these efforts must continue. A blockbuster One Health book and movie would certainly help!

Could you elaborate on the training and educational efforts that you are promoting between human medical, veterinary medical schools and schools of public health?

At one time, a number of schools of medicine and veterinary medicine shared classes during the first two years of study. This practice has largely disappeared as faculties have grown. Schools of veterinary medicine certainly see the relevance of a One Health approach, but there just aren't that many of them to partner with the medical schools. In the U.S., there are only 28 schools of veterinary medicine compared to around 125 medical schools and only a handful of universities have veterinary and medical schools located in the same city. Globally, the ratio of veterinary and medical schools is about the same, so promoting increased communication and collaboration between them is a challenge from a logistical and geographic standpoint. Schools of public health could serve an important role as a common denominator, but not all physicians pursue additional education in public health. At the very least, medical schools should teach their students about zoonotic diseases and the importance of recognising veterinarians as important colleagues rather than merely as animal health technicians.

Ideally, there should be shared courses, electives, and clinical experiences between the two professions. Much could be learned from a comparative medicine approach to health.

Are there any particular cases that have proved to be a particular success thus far? Are there any areas in which you expect to make significant progress in the next few years?

There have been a number of successes. After U.S. officials recognised the important contributions that veterinarians made during the 1999 West Nile virus outbreak, the CDC established the National Center for Zoonotic, Vector-borne, and Enteric Diseases headed by a veterinarian, Dr Lonnie King. They also set up ARBOnet which is a West Nile virus surveillance system for humans, birds, mosquitoes, and other species. For the first time, scientists could watch the spread of a virus rocket across the U.S. in just a few years.

Another success has been avian influenza (H5N1). After a slow start, the World Health Organization, The Food and Agriculture Organization, and the World Organization for Animal Health recognised the impact of zoonotic diseases on human health and have been working hard to increase their communicative and collaborative efforts.

Furthermore, the Initiative is a keen advocate of collaboration to encourage progress. Who are the key collaborators and what has their inclusion brought to your work?

There have been a number of important advocates for One Health whom we have worked with. In Europe, Dr Jakob Zinsstag, a veterinarian at the Swiss Tropical Institute in Basel, Switzerland has been a tireless One Health advocate for many years. He has been studying the health of African pastoralists and their livestock. Dr Peter Rabinowitz, a physician at Yale University in New Haven, Connecticut, and Dr Lisa Conti, a veterinarian with the Florida Department of Health, recently published a landmark book titled 'Human-Animal Medicine. Clinical Approaches to Zoonoses, Toxicants and Other Shared Health Risks'. This is the first book of its kind co-edited by a physician and veterinarian.

Drs Kaplan, Monath, and I developed, wrote and edited copy for a One Health monograph published by Veterinaria Italiana in which many physicians, veterinarians, and others discussed why the One Health approach is so important in their work. (http://www.izs.it/vet_italiana/2009/45_1/45_1.htm).

In November 2009, the American Society of Tropical Medicine and Hygiene co-sponsored a One Health forum for the first time with the Society for Tropical Veterinary Medicine at the ASTMH's annual convention in Washington, D.C (USA).

The 1st International One Health Congress is being planned and scheduled for February 2011 in Victoria, Australia; it is entitled 'Human Health, Animal Health, the Environment, and Global Survival'.

And, as previously mentioned, the National One Health Commission had a summit last fall and is engaged in implementing One Health efforts in the U.S. and globally.

These efforts illustrate that there is much interest in One Health and the concept is diffusing outward. The challenge will be to implement and institutionalise it in government, academic, and industry settings. Some foundations are beginning to recognise the importance of this approach. For example, the Rockefeller Foundation has supported the One Health Commission. It's an important step.

How do you see the role and activities of the initiative changing in the future? Will climate change and overpopulation increase the need for multidisciplinary, collaborative programmes?

Much of the role and activities of the One Health Initiative concerns outreach and advocacy efforts. The One Health Initiative website has been serving as an important source of information on news, events, and publications relevant to One Health. I am currently looking to start a One Health journal and am seeking partners in establishing an academic forum for this new field. Climate change and increasing human populations will definitely increase the need for multidisciplinary, collaborative programmes. As the Earth's resources are strained with increasing demands for energy, food, shelter, and water, we must anticipate that a sustainable future will require a holistic approach to human, animal, and ecosystem health. A One Health approach will be critical if we hope to meet the challenges of the 21st Century and beyond.

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