

The One Health Initiative's Bruce Kaplan, DVM, contents manager and editor of the One Health Initiative website and co-founder of the One Health Initiative team and website, describes some of the achievements of the initiative's Dr Thomas P Monath, who is also launching a new and exciting vaccine company

Vaccines for zoonoses: a One Health paradigm

One of the One Health Initiative team's co-founders and leaders is an internationally-recognised eminent physician virologist and vaccinologist, Thomas P Monath, MD. From 2014-2017, Monath was chief scientific officer and chief operations officer of the Infectious Disease Division at NewLink Genetics Corporation, a cancer immunotherapy company. He currently serves as a consultant to BioProtection Systems/NewLink Genetics Corp. In September 2014 VaccineNation.org identified Monath as second among the 50 most influential people in the vaccines industry.^{1,2}

Before joining NewLink Genetics, Monath had 24 years of pharmaceutical experience including 14 years as chief scientific officer and executive director at Acambis, Inc., where he pioneered numerous vaccines including those to combat dengue, West Nile, and yellow fever.

Prior to his pharmaceutical work, Monath was on duty for 24 years in the US Army in the uniformed services (Army and US Public Health Service). He was director of the Division of Vector-Borne Viral Disease at the US Centers for Disease Control and Prevention (CDC), and chief of the Virology Division at the US Army Medical Research Institute of Infectious Disease (USAMRIID).

After earning his undergraduate and MD degrees from Harvard, Monath received training in internal medicine at Peter Bent Brigham Hospital. He has published over 425 papers and six books about vaccine development and the epidemiology, immunology, and pathogenesis of arboviruses. Monath has also served as adjunct professor at Harvard School of Public Health.

This One Health pioneer physician is the originator (his 'brain child') and sponsor of the One Health Initiative website. Frankly, without Monath, there would have most likely never been a One Health Initiative team website.

One Health website

The site was launched on 1 October, 2008 and has been called 'the international clearing house for significant One Health information' and by some the '*New York Times* of One Health'. Its worldwide circulation has been strengthened by its up-to-date One Health news, publications and upcoming events postings relative to animal, human and environmental health.

It is currently estimated to be accessed each month by approximately 30,000 or more individual visitors from over 160 countries. The OHI website is now known to have had at least 119 reciprocal links,³ like CEEZAD and others,⁴ from within the US and internationally.

Further evidence of national and international One Health informational website status is demonstrated amongst the recognised high profile search engines,⁵ with the top ones – Google, Bing, Yahoo and others – list the One Health Initiative website first or among the first when either keywords 'One Health Initiative' or 'One Health' are typed in.⁶

Notably, Monath was also an unheralded former influential member of the American Veterinary Medical Association's (AVMA) One Health Initiative Task Force (OHITF)⁷ and its current successor, the US One Health Commission.⁸

The intersection of humans, animals, and the environment

Early on, Monath presented his classic PowerPoint slides entitled 'One Medicine/One Health: Personal reflections of a true believer'.⁹ He was lead co-author of a widely recognised, important general introductory discussion about 'One Health: The intersection of humans, animals, and the environment' in the landmark issue of the Institute for *Laboratory Animal Research* (ILAR) Journal, 2010, Volume 51 Number 3.^{10,11}

Principles of utilising the One Health approach via multidisciplinary/interdisciplinary collaborations between animal health and human health researchers, industries and regulators can definitely help develop immunisation products for such purposes. An exemplary bellwether model has existed for decades and continues to work admirably against animal-to-human rabies disease transmission worldwide.

In 2013, Monath published two visionary One Health articles: 'Hendra virus vaccine: a classical example of one health' by Thomas P Monath, MD – Posted on the One Health Initiative website's news section on Saturday, June 01, 2013.¹²

In this article, he began: 'In November, 2012, Pfizer Animal Health launched Equivac[®]HeV, a vaccine for the prevention of Hendra virus disease of horses in Australia. Since horses are a major source of contact spread of Hendra virus to humans, the vaccine promises to make an important contribution to human health as well...'

Zoonoses vaccines

His more comprehensive 'Vaccines against diseases transmitted from animals to humans: A



one health paradigm' piece elaborated in a brilliant commonsense/technical fashion:¹³

- Three frameworks for development and use of vaccines for control of zoonoses are provided;
- Framework I vaccines target dead-end human and livestock hosts;
- Framework II vaccines target infections of domesticated animals as a means of preventing spread to humans;
- Framework III vaccines target wild animal reservoirs; and
- Collaboration of animal and human health disciplines (One Health) may accelerate new approaches to disease control.

Animal immunisation

The abstract to this journal article reads: 'This review focuses on the immunisation of animals



Left to right: [The late] Charles O Thoen, DVM, PhD, President, American Veterinary Epidemiology Society, Thomas P Monath, MD, and Georgette D Wilson, DVM, Director, Scientific & Medical Affairs, The Hartz Mountain Corporation

as a means of preventing human diseases (zoonoses). Three frameworks for the use of vaccines in this context are described, and examples are provided of successes and failures. Framework I vaccines are used for protection of humans and economically valuable animals, where neither plays a role in the transmission cycle. The benefit of collaborations between animal health and human health industries and regulators in developing such products is discussed, and one example (West Nile vaccine) of a single product developed for use in animals and humans is described.

'Framework II vaccines are indicated for domesticated animals as a means of preventing disease in both animals and humans. The agents of concern are transmitted directly or indirectly (e.g. via arthropod vectors) from animals to humans. A number of examples of the use of Framework II vaccines are provided, e.g. against brucellosis, *Escherichia coli* O157, rabies, Rift Valley fever, Venezuelan equine encephalitis, and Hendra virus.

'Framework III vaccines are used to immunise wild animals as a means of preventing transmission of disease agents to humans and domesticated animals. Examples are reservoir-targeted, oral bait rabies, *Mycobacterium bovis* and Lyme disease vaccines.

'Given the speed and lost cost of veterinary vaccine development, some interventions based on the

immunisation of animals could lead to rapid and relatively inexpensive advances in public health. Opportunities for vaccine-based approaches to preventing zoonotic and emerging diseases that integrate veterinary and human medicine (the One Health paradigm) are emphasised.'

One Health in action

Monath's fundamental premise represents a valid dynamic large scale 'One Health in action' proposal for implementing the One Health approach through a visionary preventive global public health process and gives reasonable guidelines to make it happen sooner rather than later.¹⁴

In an era when the threat of ever-increasing antimicrobial resistance and the under-development of new efficacious antibiotics and antibacterial remedies are possibly heralding a frightening post antibiotic epoch, this model promises to offer some welcomed global health safeguards.

Other potential examples of such vaccines are include West Nile, brucellosis, *Escherichia coli*, O157:H7, rabies, Rift Valley fever, Venezuelan equine encephalitis, Hendra virus, *Mycobacterium bovis*, and Lyme disease.

Coincidentally, another September 2013 publication was published that discussed the dramatic food safety potential for using a vaccine in cattle to protect against human foodborne illness caused by *E. coli*, O157.¹⁵



Multidisciplinary/interdisciplinary collaborations between animal health and human health researchers, industries and regulators can definitely help develop immunisation products for such purposes

Barriers against infection

In simple terms, the idea is to develop vaccines that protect domestic animals and wildlife thereby establishing effective barriers against human infections. Developing animal vaccines are less expensive and are less strictly regulated than are those for humans. Hopefully this common sense One Health approach will be recognised and can go forward.

Monath received the prestigious American Veterinary Epidemiology Society (AVES) Gold Headed Cane Award at the July 10-14, 2015 annual American Veterinary Medical Association (AVMA) convention in Boston, Massachusetts (USA).

'This AVES Gold Headed Cane award is in recognition of Monath's heretofore unheralded monumental achievements in the advancement of One Health – maximising the collaboration of human, animal and environmental professionals to achieve optimal health for humans'.¹⁶

Monath is currently engaged in beginning a new company as managing partner and chief scientific officer for Crozet BioPharma LLC, Devens, MA (USA) to develop vaccines against virus diseases like Lassa and Nipah.^{17,18,19} More information about

this promising One Health oriented endeavour is expected to be forthcoming in the near future.

This unsung hero's influence upon the national and international One Health movement cannot be over-emphasised.

One might also compare Monath's contributions to One Health with a similarly low profiled (little known) historical figure of the past, Dr John McFadyean.^{20,21} McFadyean, a remarkable Scottish veterinarian/physician, is now credited by many with having a profound influence on the modern day One Medicine-One Health concept/approach.

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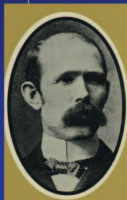
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Kaplan has also contributed to the last edition of Pan European Networks: Science & Technology, with a special feature entitled 'Challenges and Opportunities' on One Health and AMR, discussing the importance of a worldwide One Health approach.

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"Founder Modern Veterinary Research"



- Veterinarian and physician
- Brought veterinary profession in the UK into scientific era
- Expanded discipline of veterinary pathology
- Founded *Jour Comparative Pathology & Therapeutics*
- Built bridges across human and veterinary fields in infectious disease and comparative medicine