“One Medicine, One Health:” A Brief Overview

Bruce Kaplan, DVM, Dipl. AVES (Hon.)

Introduced by Paul R. Minton, MD, FACC, FACP

Senior Friendship Center, Inc. — Medical Conference

Some Slides Laura H. Kahn, MD, MPH, MPP - Princeton University

Courtesy: Thomas P. Monath, MD - Partner, Kleiner Perkins Caufield & Byers, Pandemic & Biodefense Fund

Lonnie J. King, DVM, MS. MPA - Centers for Disease Control & Prevention

January 11, 2008
What is “One Health”? 

- Integrating Human and Veterinary Medicine in selected endeavors
- Collaborations/Coalitions/Communication (MDs, DOs, DVMs/VMDs, PhDs, etc.)
- Synergistic efforts lead to improved health for both humans and animals.
Results of “One Health”

- Dramatic, rapid increase in scientific knowledge
- Improved medical education & clinical care
- Enhanced public health efficacy
- Accelerated biomedical research discoveries
One Health in the 18th Century

- Dr. Edward Jenner and Vaccination
"One Health" in the 19th Century

"Father of comparative medicine, cellular biology, and veterinary pathology"

- Rudolf Virchow (1821-1902), German physician-pathologist said, "between animal and human medicine there are no dividing lines--nor should there be."

Coined term "Zoonosis"
Sir William Osler
(1849-1919)
“Father of Modern Medicine”

- Studied in Berlin with Virchow
- Helped promote “One Health”; taught at Montreal Veterinary College in Canada
- Established veterinary pathology as an academic discipline in North America
Sir John McFadyean, Dip Vet, BM, MS
(1853-1941)
“Founder Modern Veterinary Research”

- Veterinarian and physician
- Brought veterinary profession in the UK into scientific era
- Expanded discipline of veterinary pathology
- Founded *Journal Comparative Pathology & Therapeutics*
- Built bridges across human and veterinary fields in infectious disease and comparative medicine
Daniel E. Salmon, DVM (1850-1914)

Made a number of important discoveries:

- while studying hog cholera with Theobald Smith MD (1859-1934), discovered that pathogens killed by heat could immunize animals against live pathogens
- Bovine tuberculosis spread to humans
Theobald Smith, MD (pictured) and F.L. Kilbourne, DVM discovered the cause of cattle fever. Babesia bigemina was transmitted by the cattle tick. (http://www.ars.usda.gov/is/timeline/tick.htm)
Dr. Calvin W. Schwabe (1927-2006)
“Father of Veterinary Epidemiology”

- DVM (Auburn Univ.) and DSc (Harvard) in parasitology and tropical public health in 1956.
- Coined the term “One Medicine”
Joint FAO/WHO Efforts

- Joint FAO/WHO Expert committee on zoonoses identified more than 150 zoonotic diseases in 1967.
- By 2000, more than 200 diseases were occurring in humans and animals that were known to be transmitted mutually.
- Represents a recognition and/or emergence of >30% increase of zoonotic diseases in the last third of the 20th century.
"One Health" at the turn of the 21st century

- Outbreaks such as the West Nile Virus epidemic in NYC in 1999, bovine spongiform encephalopathy in the 1990s, SARS in 2003, and H5N1 avian influenza in 1997-present demonstrate that animal health profoundly impacts on human health.

- Five of top six bioterrorism agents are zoonotic per CDC including anthrax, plague, tularemia, viral hemorrhagic fevers, and botulism.
  - 60% of all human pathogens are zoonotic
  - 80% of animal pathogens are multihost pathogens
In the 20th century, human and animal diseases have been largely treated as separate entities. Physicians and veterinarians communicate and work together episodically. Ecology of microorganisms is generally not emphasized in medical schools while schools of veterinary medicine do. Medical students might not see the importance of zoonotic diseases and their impact on human and animal health.
“One Health” in the 21st Century

AVMA/AMA “One Health” Liaison

Some very encouraging signs …

June 2006, **Dr. Roger Mahr**, President of AVMA formed collaborative liaison with **Dr. Ron Davis**, President-elect of AMA now President.

AVMA recently established 15 member task force to devise strategy for implementing “One Health.”

**AMA passed a “One Health” resolution June 2007.**
AVMA “One Health” task force in progress today

- Strategy development for implementation
- Representatives from American Medical Assoc., Veterinary Medicine, American Public Health Assoc. et. al.
- 13 Cross-professional leaders brainstorming
Additional movement forward

- CDC established a Center for Zoonotic, Vector Borne, and Enteric diseases in 2007 headed by a veterinarian, Dr. Lonnie J. King
- Society of Veterinary Tropical Medicine approved “One Health” resolution June 2007.
- World Association of Veterinary Laboratory Diagnosticians Endorsement November 2007.
- Delta Society (Human-Animal bond) November 2007
- American Association of Veterinary Laboratory Diagnosticians
Can animals - like canaries in coal mines - warn humans about chemical, infectious, and physical environmental hazards?

Yes...they can and do for arbovirus infections in humans and others

Dr. Rabinowitz and Dr. Lisa Conti, a veterinarian are currently writing “One Health” book: tentatively titled “A Manual for Human and Veterinary Health Care Providers”

(Lisa Conti, DVM, MPH, Dipl. ACVPM, CEHP, Director, Division of Environmental Health, Florida State Health Department)

http://canarydatabase.org/
Some specific major potential outcomes of “One Health”

- Integrated surveillance: improved early recognition and control of zoonoses with Syndrome Reporting Surveillance System (SYRIS)

- Integrated vaccination campaigns: improved coverage rates in third world nations

- Integrated biomedical research: improved development of diagnostics, therapeutics, devices
Examples of diseases that regularly emerge as animal pathogens in advance of human outbreaks

- Monkey deaths in forest
  - Yellow fever
  - Kyasanur Forest disease
- Swine epizootic
  - Nipah virus
- Wild & captive bird deaths
  - West Nile
- Ape deaths in forest
  - Ebola
- Equid epizootic
  - Eastern equine encephalitis
  - Venezuelan equine encephalitis
Plants Diseases e.g. Citrus Canker, etc.
Human Diseases e.g. Arboviruses, etc.
Animal Disease e.g. Avian Influenza, etc.
Food Safety e.g. E. coli 0157:H7

J. Glenn Morris, Jr., MD, MPH & TM
Director, Emerging Pathogens Institute
University of Florida
P.O. Box 1000009
Gainesville, FL 32610-0009

www.epi.ufl.edu

*January 2008 Florida Department of Health
News: 1st Issue-’One Health Newsletter’

Mary Echols, DVM, MPH, Editor
www.doh.state.fl.us/Environment/community/One_Health/OneHealth.html
More Movement ...

- 270 prominent physicians, veterinarians and other medical health scientist supporters from the U.S. and 18 other countries (see ‘Kahn-Kaplan-Monath’ supporter list)

- Three contemporary Nobel laureates’ endorsements: Prof. Rolf M. Zinkernagel, MD, PhD; Peter C. Doherty, DVM, PhD; and Joshua Lederberg, PhD.

- Eight national and international organization endorsements

- 400 individuals on ‘Kahn-Kaplan-Monath’ international e-mail distribution list in the U.S. and 20 other countries
Medical School & Veterinary Medical School curricula closely coincide -- basic sciences, medicine, surgery etc.

Colleges of Veterinary Medicine and Veterinarians have traditionally concentrated clinical teaching and research activities toward zoonoses along with other animal diseases.
... a multidisciplinary strategy to prevent, control, and, where possible, eliminate infectious diseases within a larger ecological context that includes humans, animals, and plants interacting in a complex, ever-changing natural environment.
Bioterrorism
Biodefense
Agroterrorism
# Bioterrorism

## Agents/Diseases

Most are Zoonoses

<table>
<thead>
<tr>
<th>CDC Category A (Highest Priority)</th>
<th>CDC Category B (2nd Highest)</th>
<th>CDC Category C (3rd Highest)</th>
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<tbody>
<tr>
<td>Anthrax</td>
<td>Brucellosis</td>
<td>Nipah</td>
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<td>Botulism</td>
<td>Glanders</td>
<td>Hantavirus</td>
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<td>Plague</td>
<td>Melioidosis</td>
<td>West Nile Fever</td>
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<td>Tularemia</td>
<td>Psittacosis</td>
<td>Hendra</td>
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<td>Viral Hemorrhagic Fevers</td>
<td>Q Fever</td>
<td>Rift Valley Fever</td>
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<td>Smallpox</td>
<td>Typhus Fever</td>
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<td>Viral Encephalitis</td>
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<td>Toxins (Ricin, <em>C. perfringens</em>, <em>Staph. Aureus</em>)</td>
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<td>Others</td>
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Mosquito-borne diseases
- West Nile virus
- Equine encephalitides
- Dengue fever
- Yellow fever
- Japanese encephalitis
- Chikungunya

Flea-borne diseases
- Plague

Tick-borne diseases
- Lyme disease
- Tularemia
- Relapsing fever
- Encephalitis
Division of Viral & Rickettsial Diseases

- Special Pathogens
  - Hantaviruses, Viral Hemorrhagic Fever and other high hazard viral pathogens

- Prion disease, including CJD

- Poxvirus and Rabies
  - Monkeypox, Smallpox, Rabies, Lyssaviruses
Tip of the iceberg!

- Cancer research...sharks rarely get it, spontaneous cancers (dogs etc.)
- Obesity in dogs...may shed light on human obesity problems
- Second hand smoke...animal exposures may advance knowledge of human exposure (AMA President quote)
- Others?
1996 Nobel Prize

Physiology or Medicine
Rolf M. Zinkernagel, MD, PhD and Peter C. Doherty, DVM, PhD

Knowledge/Basic Science Answers:
Discovered how the body’s immune system distinguishes normal cells from virus-infected cells.

Combine Physician & Veterinarian Immunologists: Collaboration!
March 23, 2007
Dear Dr. Kaplan,

I thank you for your kind e-mail of 13 March. You probably know that I am not a DVM but only an MD. Of course what you formulate in your letter is and has been always my conviction. Nevertheless I will first contact Peter Doherty [DVM, PhD] and ask him how we should proceed.

With best regards
Sincerely yours

Rolf Zinkernagel, [MD, PhD]

OTHERS: Smallpox Eradication Legend, D.A. Henderson, MD — AMA President, Ron Davis, MD, MS — CDC Director, Julie Gerberding, MD, MPH — Former U.S. Senate Majority Leader, Bill Frist, MD
Present & Former Surgeons General

Supporters of “One Health”

- General Gale S. Pollock, Acting Surgeon General of the U.S. Army

- Richard H. Carmona, MD, MPH, FACS
  USPHS Surgeon General 2002-2006

- C. Everett Koop, MD, ScD
  USPHS Surgeon General 1981-1989
Conclusions:

- The concept of “One Health, One Medicine” has been around for several centuries.
- Collaboration was considerable in the 18th and 19th centuries. It languished in the 20th century.
- The challenges of the 21st century demand that the different professions work together so we can reinvigorate “One Health”.

Implementation will protect and/or save untold millions of lives during our generation and in future generations!
Please join us...

One World – One Health

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