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Slide #2

Thank you Dr. Minton. I would appreciate it if you would please hold any questions you might have until the end of this presentation.

The “One Health” concept has been referred to as “One Medicine”, “One Health-One Medicine”, “One Medicine-One Health” and One World-One Medicine-One Health. They all mean the same thing. This is just semantics.

“One Health” implementation would mean closer collaborations and more coalitions between these two scientific disciplines of human and veterinary medicine as well as including all other medical scientists such as PhDs, dentists, nurses, biomedical engineers and so on . Elimination of artificial barriers and old turfs will result in co-equal achievements of great importance. While the “One Health” philosophy has been limited or non-existent in the past century, when utilized it invariably resulted in a synergistic effect. “One Health” facilitates better understanding by a comparative medicine approach. This applies to public health, biomedical research, and clinical medicine & surgery.

Collaborations across disciplines peaked in the 19th century and then declined in the 20th. We need to renew those collaborations in the 21st century. It is important to understand up-front that the aim of OH/OM is NOT to support one profession over another or to interlope into traditional affairs of either profession, but rather to support the recognition that the times call for all inclusive collaborations, coalitions and communications between physicians, veterinarians, osteopaths, PhDs and all other affiliated health professionals. Barriers that exist to impede this closer co-operation for the benefit of mankind must fall.

Slide #3

The bottom line has been dramatic and more rapid acquisition of scientific knowledge, improved medical education and clinical care, enhanced public health efficacy, and accelerated biomedical research discoveries.

Slide #4

Dr. Edward Jenner recognized the value of cowpox in vaccinating people against smallpox. This shows how animals of the 18th Century played an early role in helping provide relief from serious diseases in humans. Another modern day physician, my “One Health” colleague and collaborator, Dr. Tom Monath is credited with developing a modern day smallpox vaccine that was recently approved by the FDA for bioterrorist emergency use.

Slide #5

Many “One Health” advocates consider physician, Dr. Rudolf Virchow’s contributions to medicine ... and his lifelong support for incorporating veterinary medicine into the scheme of health care as being the most prominent beginning of the “One Health/One Medicine” concept in the 19th Century.

Virchow is considered by many to be the father of comparative medicine, father of cellular biology, and the father of veterinary pathology.

He was quoted as saying “between animal and human medicine there are no dividing lines- nor should there be.” This holds true to this day. Virchow also coined the term “zoonosis” for a disease transmissible from animals to man.

Slide #6

Sir William Osler, called the “Father of Modern Medicine”, was influenced greatly by Rudolf Virchow when Osler studied under him in Berlin. Virchow conveyed to the young Osler the importance of including veterinary medicine into health care concerns of people. Subsequently, Osler returned to Canada and although not generally known, taught parasitology and physiology at the Montreal Veterinary School (1876-1884), in addition to his duties at the McGill University medical school. He also conducted research on several animal diseases like hog cholera, verminous bronchitis in dogs and others. He did this in collaboration with his most prominent veterinary medical student, Albert Clement and later published case reports with him upon his graduation.

Slide #7 Dr. John McFadyean’s first love was veterinary medicine, receiving his veterinary medical diploma from Edinburgh veterinary school in 1876. He graduated from medical school in 1882 and received his science degree in 1883. McFadyean wanted degrees in Medicine and Science to prepare himself for an academic career in pathology and microbiology, grounded in the work of Robert Koch and Louis Pasteur. Although enthralled with the genius and discoveries of Koch, e.g. the famous Koch’s postulates ... McFadayeay respectfully challenged Koch’s erroneous assertion that Bovine TB was of little, if any concern in its transmission to humans via milk and milk products. Over a ten year span, Dr. McFadyean was proved correct and he was subsequently knighted in 1905 for his service to veterinary science and agriculture and for his brilliant work on the royal commission on TB. He devoted his life to teaching pathology and anatomy, developing the field of veterinary research and administering the London veterinary school. To this day, laboratory diagnosis of Anthrax can be confirmed by demonstrating the organism in blood, lesions or discharges using McFadyean’s methylene blue stain for the bacillus capsule.

Slide #8 *Salmonella typhi* is the old name for the Typhoid Fever organism and the new name is now *S. enterica*...*S. enteritidis* causes foodborne illness from ingesting contaminated undercooked eggs and egg products... The organism causing various forms of Salmonellosis including foodborne illnesses was named after Dr. Daniel Salmon, a veterinarian. Dr. Salmon hired physicians to work for him at the early USDA's Bureau of Animal Industry, now called APHIS (Animal and Plant Health Inspection Service). Salmon's physician research employees, made important discoveries working jointly with veterinarians. Dr. Salmon, himself and Dr. Smith's landmark discovery of how pathogens destroyed by heat could serve to immunize animals (and humans) against live pathogens was a monumental discovery.

It was the foundation for development of the vaccine against typhus and for Jonas Salk's production of polio vaccine.

Slide #9 Employees of Salmon, the Physician Smith and the veterinarian Kilborne discovered that ticks cause the transmission of Babesiosis in cattle. Their seminal work has been credited as helping to set the stage for Walter Reed's subsequent study and discovery of Yellow Fever's transmission via mosquitoes. Again, my "One Health" colleague Dr. Monath has developed a vaccine for Yellow Fever with FDA approval currently pending.

Slide #10 Dr. Calvin Schwabe was a noted epidemiologist and parasitologist. Dr. Schwabe proposed and advocated a unified human and veterinary approach against zoonotic diseases in his seminal textbook editions of 'Veterinary Medicine and Human Health'. He coined the term "One Medicine".

Much of the essential history of the "One Medicine" movement is contained in one of your handouts. Most of the historic figures mentioned previously were written about in the recent *Veterinaria Italiana* piece co-authored by Dr. Laura Kahn, my "One Health" physician colleague-collaborator, veterinarian, Dr. James H. Steele, the founder of the CDC's veterinary public health division and myself.

Slide #11 In 1967, 150 zoonotic diseases were identified. By 2000, there was recognition of 200...this represented a 30% increase in the last third of the 20th Century.

Slide # 12 The 21st Century has brought about the realization that zoonotic diseases need to be addressed in a more comprehensive fashion. With 60% of all human pathogens being zoonotic and 80% of animal pathogens being multihost pathogens, all available resources must be used including an interdisciplinary approach. Emerging pathogens like Avian Influenza H5N1 virus and SARS and re-emerging pathogens like drug resistant forms of TB, human monkeypox, dengue fever and malaria are expanding faster than medical science had previously expected.

Serious unexpected human disease outbreaks from animal origins such as the re-emergence of a West Nile Virus epidemic in NYC in 1999 is an example. WNV mainly infects birds but also many other species. It is an arbovirus that is spread to humans by the bite of an infected mosquito. Bovine spongiform encephalopathy or BSE, commonly known as Mad Cow disease evolved in the 1990s. SARS or Severe acute respiratory syndrome came on the scene in 2003. Studies indicate a high probability that this coronavirus disease originated in bats and crossed the xenographic barrier spreading to humans either directly from bats or from civet cats. And then there was and is the very high profile H5N1 avian influenza virus in 1997 to date with its pandemic potential and all that portends. These diseases have demonstrated that animal health profoundly impacts on human health.

Slide #13 These are some conclusions that my physician “One Health” collaborator Dr. Laura Kahn considers important in the current status of “One Health”. She has written extensively about zoonotic diseases and the need for veterinary medical collaborations. In your handouts, I have included her widely distributed Emerging Infectious Disease Journal article published in April of 2006. My other physician “One Health” colleague, Dr. Tom Monath agrees with her assessment as do I and many others.

Slide #14 In June 2006, a sea change occurred when the President of the American Veterinary Medical Association [Dr. Roger Mahr]---the AVMA---and the President-elect of the American Medical Association [Dr. Ron Davis] began developing a liaison. This culminated in June 2007 with a historic AMA “One Health” resolution passed unanimously in the AMA House of Delegates at their Chicago meeting. My “One Health” colleague Laura Kahn was the primary author while AMA President Ron Davis, my other “One Health” team mate, Tom Monath and I helped with the final draft. This final draft is in your handouts.

Interestingly, Dr. Davis is the first preventive medicine physician to head the AMA in its entire history. Among many other things, he does research on the effects of second hand smoke on dogs.

Slide # 15 The adoption of the AMA “One Health” resolution was followed by an AVMA Task Force formation where 13 prominent health professionals including physicians and veterinarians plus a medical student and a veterinary medical student were appointed. They have since met in late November 2007 and expect to do so again this month on Jan 31 & Feb 1, 2008. Their charge is to develop strategies for implementation of “One Health”. Dr. Monath serves as one of the physicians on the task force.

Slide #16 Some other milestone events this past year of 2007 included formal appointment of a veterinarian administrator, Dr. Lonnie King for the New CDC’s National Center for Zoonotic, Vector Borne and Enteric Diseases. The Director of CDC, Dr. Julie Gerberding, a physician and staunch “One Health” supporter along with others recognized the critical need for this type of progressive leadership.

There are now eight (8) national and international organizations that have endorsed the “One Health” philosophy. After the AMA “One Health” resolution others followed in rapid succession: Among those you see listed, the non-profit Delta Society is the leading national organization promoting the Human-Animal bond concept referred to as the Human-Animal Health connection with elaboration upon its health benefits for people owning pets, both physiological and psychological.

Slide # 17 For many years, it has been known that animals serve as early warning systems or sentinels for human diseases. The Canary Database project is directed by “One Health” physician advocate, Dr. Peter Rabinowitz. He is Associate Professor of Medicine at Yale University School of Medicine in the Yale Occupational and Environmental Medicine Program.

Dr. Rabinowitz in an exclusive paper written for our “One Health” e-mail distribution said, “Since more than 50% of U.S. households have pets, a “One Health” approach to prevention of lead poisoning involves awareness that lead poisoning in an animal could indicate risk of lead poisoning in an asymptomatic child sharing the household ...”.

The Canary Database aims to overcome scientific barriers which limit the use of animal sentinel data for early recognition of human environmental health hazards by making pertinent scientific literature more accessible in a single location. A significant barrier is the lack of communication between human health and animal health professionals.

Dr. Rabinowitz and Dr. Lisa Conti, a veterinarian and the director of the Florida State Health Department’s Division of Environmental Health are currently writing a “One Health” book: tentatively titled “A Manual for Human and Veterinary Health Care Providers”.

Slide #18 Some other specific major outcomes expected from “One Health” would involve closer collaboration between surveillance activities of veterinary medicine with those events occurring in the human population. This would improve early recognition and help alert physicians in advance of imminent zoonotic disease outbreak possibilities for people in their vicinity. An outstanding surveillance tool for accomplishing this is the Syndrome Reporting Information System (SYRIS). This is a Real-time, Web-based Early Warning System that enables Early Identification Of and Response To Outbreaks of Infectious Disease and Bioterrorism. Unfortunately, it is only used now in West Texas.

By integrating vaccination campaigns for people and animals in some third world nations, like Nigeria, the coverage rates will dramatically increase. For example, many people in the Nigerian countryside readily have their livestock vaccinated in mass programs but are reluctant to do so for themselves and their families. Drs. Kahn, Monath and I have joined with a veterinary virologist in Nigeria on a letter-to-the editor to be published soon in the Lancet discussing this method of improving more widespread immunization protection for humans.

Integrated biomedical research with co-equal inclusion of all valuable professional resources have improved and will improve development of diagnostics, therapeutic drugs, biomechanical devices and vaccine development. Dr. Monath prepared this slide and has had first hand experience with the validity of this visionary approach.

Slide #19 Examples of diseases that regularly emerge as animal pathogens in advance of human outbreaks include how yellow fever frequently occurs in forest monkeys before humans come down with yellow fever in epidemic proportions; epizootics in pigs from Nipah virus are often preludes to human epidemics; wild and captive birds die from West Nile virus prior to human epidemics; and forest Apes begin dying from Ebola before outbreaks in humans.

Slide #20 Our Kahn-Kaplan-Monath team has been in touch with the physician director of the new Emerging Pathogens Institute at the University of Florida, Dr. Glenn Morris. We consider EPI to be a significant and important “One Health-One Medicine” model for the U.S. and indeed worldwide. Dr. Morris, a “One Health” advocate on our supporter list, partners with the disciplines of medicine, veterinary medicine, public health and agriculture throughout the state of Florida. The Florida legislature funded the Institute last year with \$60 million dollars.

More news on the “One Health” front that happened early this month was the publication of a new quarterly “One Health Newsletter” on the FDOH website with West Palm Beach Country Florida public health veterinarian, Dr. Mary Echols as Editor. We have worked with Dr. Echols and others who conceived this Newsletter. The lead article was written by Dr. Kahn.

Slide #21 Our Kahn-Kaplan-Monath team currently has 270 listed “One Health” supporters in the U.S. and 18 other countries. Among these, we have three Nobel Laureates including a physician, a veterinarian, and a PhD, Dr. Joshua Lederberg. We are sending out periodic e-mail distribution messages with “One Health” news to 400 individuals in the U.S. and 20 other countries. These two lists expanded exponentially over this past year.

Slide #22 The One Health concept recognizes the enormous value of combining collaborative efforts to explore all aspects of the microbiology, pathogenesis, epidemiology, pathophysiology, treatment and prevention methodologies ---by marrying medicine with veterinary medicine where applicable. While the curricula at medical schools and veterinary medical schools closely coincide with near identical course outlines and scientific information transmitted, there are obviously specific, important differences between species.

It has been known for many years that defining the differences and sharing them in tandem where applicable can open new vistas for understanding and expanding many areas of scientific knowledge.

For example, in biochemistry, the Krebs cycle and Glycolysis are taught the same. Purine metabolism works the same in all mammals including humans and dogs but not quite the same in Dalmations. Their hepatocytes cannot absorb uric acid where conversion to allantoin occurs. This predisposes Dalmations to uric acid stones. Clinical management of Diabetes mellitus is similar in dogs and cats compared to humans. But diabetic neuropathy which I heard discussed several weeks ago in this room by a physician neurologist, is uncommon in cats and rare in dogs. Surgical entry into the abdominal cavity of domestic animals is generally identical to that of humans since the anatomy is virtually the same. Therefore a human surgeon and a veterinary surgeon incise through skin, fascia, the linea alba, and muscles with the same names, origins and insertions. Ligation of bleeders and closure of peritoneum along with other tissues is nearly identical. I saw this first hand when I used to scrub in with a physician surgeon acquaintance over 35 years ago while I was in the private practice of veterinary medicine in Louisville, KY. However, cholecystectomy in a human is easier than it is in dogs and it is much easier in cats than in humans or dogs but it is impossible in horses.

Slide #23 The Director of CDC’s New Center for Zoonotic, Vector-borne and Enteric Diseases, Dr. Lonnie King provided us with some of these slides. This one and the others were used in a “One Health” symposium presentation at the American Society of Tropical Medicine and Hygiene in Philadelphia last November 7, 2007. This organization is comprised mostly of physicians with some veterinarians and other health professionals. The slide depicts the importance that CDC holds for a multidisciplinary strategic approach to preventing, controlling and eliminating diseases. This means using professional expertise available from physicians, veterinarians and other health professionals when applying epidemiological and research concepts to our changing world. This enhances the efficacy of public health surveillance and all the other aspects previously mentioned.

Slide #24 Many in the intelligence community in Washington, D.C. have said it is not a question of if but when terrorists, like al Qaeda, in the U.S. will employ one or more bioterrorist disease agents. We all remember the tragic Anthrax attacks that occurred in NYC, Washington, and here in Florida following 9/11. Anthrax, a zoonosis, is a high profile threat.

Slide # 25 There are many others. This is the CDC's list of Categories A, B, and C potential bioterrorist agents. All are potential threats and most are zoonoses.

The typical routes of Anthrax transmission include contact directly from infected animals, ingesting contaminated food products and inhalation. Humans are potentially affected with septicemia, respiratory, intestinal, cutaneous, ocular and neurological manifestations. The incubation period is approximately 1 to 7 days. Prominent clinical features that physicians, like yourselves, might encounter in suspected patients are flu-like signs, pustules, scabs, respiratory distress, a widened mediastinum on radiographs which is considered pathognomonic, bloody vomit and diarrhea, abdominal distress, sepsis, shock and death.

Practicing veterinarians are generally aware of the human signs and particularly those that occur in animals. Cattle, sheep, goats, and horses experience the most severe symptoms while pigs, dogs and cats have moderate presentations. A high index of suspicion would occur in animals having sudden death from septicemia with lack of rigor mortis and their blood fails to clot along with unexplained bleeding from the nose, mouth and anus plus edema especially around the neck, shoulders and throat. Diagnoses of unexpected anthrax cases in animals might portend human illness. In other words, this is another example of how animals can serve as sentinels for predicting outbreaks in humans in a widespread distribution of weaponized anthrax spores into the environment.

Slide #26 The CDC employs approximately 90 veterinarians today. Since 1953 there have been 228 veterinarians who have completed the Epidemic Intelligence Service Training at CDC. The EIS classes are composed primarily of physicians with a modest number of veterinarians. Other professionals in the EIS program have included statisticians, nurses, dentists, sanitary engineers, and microbiologists.

They contribute to understanding and protection against vector-borne diseases like those listed on this slide. Primarily veterinarians work in close coordination and liaison with public health physicians and other health professionals in areas of epidemiology, infectious diseases, environmental health, chronic diseases, immunization, HIV/AIDS and foodborne illnesses. The team approach has proven to be synergistic over the years. More rapid and precise evaluations allows for more efficacious control.

Slide #27 The same ‘life protecting-life saving’ strategy holds for viral, rickettsial and parasitic pathogens— “One Health”—. A prime example of “One Health” has been described in Richard Preston’s book, “The Hot Zone.” Among other items of interest, it describes how two of our current “One Health” supporters, both eminent virologists, Dr. Frederick A. Murphy, a veterinarian [DVM, PhD] and Dr. Karl M. Johnson, a physician [MD] worked closely together (along with others) to help unravel the mystery surrounding the initial outbreak of Ebola hemorrhagic fever and how they discovered its etiologic agent, the Ebola virus. Fred and Karl worked with us last year to draft a concise two page paper about their many productive years of synergistic collaborations. This paper was distributed to our worldwide e-mail distribution. It is also available upon request.

The current Chief of the Special Pathogens Branch at CDC and their main spokesperson for Ebola virus, e.g. the recent new strain of WHO concern in Uganda, is a veterinarian, Dr. Tom Ksiazek.

The prion disease, bovine spongiform encephalopathy or BSE that I mentioned previously has been in the news for over a decade. It has been found to be transmitted to humans by ingesting infected beef producing new variant CJD. Much of the epidemiology of BSE has been attributed to veterinary epidemiologists at the U.S. Department of Agriculture’s Animal and Plant Health Inspection Service or APHIS.

Rabies control methods have been elucidated in the 20th century by joint collaborations between veterinarians and physicians working together at CDC, state health departments and in various Universities. Animal vaccines have been perfected by veterinary medical scientists to the point where, for many years, immunization of pet dogs and cats has served as a significant barrier against human exposure and possible subsequent death. This significantly reduces the need for human prophylaxis following animal bite exposures.

Slide #28 We have only touched on highlights of what is expected in the future if the “One Health” approach is properly implemented. There have been studies at Mote Marine laboratory here in Sarasota regarding why Sharks rarely get cancer. The question is “How might this help humans and other species in our quest for cures”?

Cancer, in the pet population, is a spontaneous disease. Therapeutic modalities for veterinary cancer patients are similar to those for humans, including surgery, chemotherapy, radiation therapy, and biotherapy.

The Comparative Oncology Program at the National Cancer Institute of the National Institutes of Health serves as an example of an integrated comparative oncology program and will provide a mechanism by which naturally occurring cancer models can be used to generate new information about cancer, translate biological concepts regarding the disease to relevant *in vivo* models, and bring novel therapeutic options to the management of human cancers. ----- One of your handouts quotes AMA President and strong “One Health” advocate, Ron Davis about potential benefits to comparative research on canine obesity and second hand smoke exposure which I mentioned before that he studies. The iceberg runs deep and wide!

Slide #29 A relatively recent significant example of how collaboration between these two disciplines works was demonstrated by the awarding of the 1996 Nobel Prize for an important basic science discovery by two immunologists, a physician Rolf M. Zinkernagel from Switzerland and a veterinarian Peter C. Doherty from Queensland, Australia . Dr. Doherty, the veterinarian, is currently Chair, Department of Immunology at St. Jude's Children's Hospital in Memphis, Tennessee.

Zinkernagel and Doherty discovered how the body's immune system distinguishes normal cells from virus-infected cells. There is no need to explain to this audience how such a monumental basic science discovery might affect the future of modern medical intervention against various pathogenic virus infections in humans and animals.

Slide #30 This is Dr. Zinkernagel's testimonial endorsement in March of this past year. This is included in your handouts plus 4 other brief "One Health" testimonials by Dr. D. A. Henderson who is credited with leading and completing the eradication efforts against smallpox worldwide in 1980. There are also written endorsements from the AMA President, Ron Davis; CDC Director Julie Gerberding and a non-partisan endorsement from Former U.S. Senate Majority leader Dr. Bill Frist. Many others are available.

Slide #31 Statements of "One Health" support have been issued by Army Acting Surgeon General Gale Pollock, former USPHS Surgeon General, Dr. Rich Carmona and former USPHS Surgeon General, Dr. C. Everett Koop.

Slide #32 The Bottom line message that I would like to leave with you today is that proper implementation of an expanded "One Health" program is a strategy for **PROTECTING AND SAVING UNTOLD MILLIONS OF LIVES FOR THE NEAR FUTURE AND FOR OUR POSTERITY --**

Slide #33 I hope you will consider the "One Health-One Medicine" concept and join with us in the expanding cadre of supporters, advocates and activists in order to get it implemented sooner rather than later. This will provide a long overdue strategy for protecting and saving lives in the near future and beyond.

Thank you very much for your attention and consideration.

I will be happy to answer any questions about the "One Health" movement and how you can help by getting involved if interested.