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*This newsletter was created to lend support to the One Health Initiative and is dedicated to enhancing the integration of animal, human, and environmental health for the benefit of all.*

## Efficacious “One Health” implementation

Bruce Kaplan, DVM

*“I am a firm believer in the people. If given the truth, they can be depended upon to meet any national crisis. The great point is to bring them the real facts.” Abraham Lincoln*

This One Health Newsletter (OHN) essentially preaches to a growing choir of visionary medical (physicians), veterinary medical (veterinarians) and other co-equal scientist colleagues (and professional organizations) who recognize and advocate the need to obtain a synergistic collaborative “One Health” implementation strategy free from narrow limitations. Bottom line: untold millions of lives will be protected and saved, as a result, for present and future generations.

Interdisciplinary mind melding is a proven strategy for “**Accelerated biomedical research discoveries—Enhanced public health efficacy—Expanded scientific knowledge base—Improved medical education and clinical care**”. If we “Multiply the past and present enlightened collaborations and imagine the advanced developments and rewards ... *human and animal health care will be accelerated so that those of the present can receive benefits otherwise afforded only to those of the future!*” Some specific examples include many basic sciences, zoonoses, cancer, obesity, orthopedics, heart disease, metabolic disease, biomechanical devices, genetics, etc. etc. etc.

Excellent articles have been and are being published in OHN issues by perceptive authors from a variety of scientific disciplines. They help reinforce the significance and value of expanding the powerful “One Health” concept to those among us already on board and to the uninitiated. Many more publications are yet to come.



Ronald Davis, Roger Mahr and Laura Kahn  
June 2007 (Courtesy Joseph L. Murphy, MD)

The “One Health” movement has expanded exponentially within the scientific communities over the past two years since American Veterinary Medical Association (AVMA) past President, Roger Mahr, DVM urged AVMA and others to adopt a “One Health Initiative”. This was followed by an historic liaison between AVMA and the American Medical Association via Dr. Mahr and AMA President, Ronald M. Davis, MD and others. Subsequently, AMA adopted an historic “One Health” resolution in June 2007; several other national and



*The American Veterinary Medical Association and the American Medical Association joined forces to collaborate on the One Health Initiative in 2007.*



*But the concept of “One Health” remains generally unfamiliar to the majority of veterinarians, physicians, other medical professionals and political leaders.*



*Taking “One Health” to the next level will require a national and international public relations (public affairs) campaign.*



international organizations including many prominent individuals have joined this advocacy movement.

Many publications have expounded upon “One Health” and its history (Please see some selected references below). Nevertheless, despite becoming widely disseminated within public health and various academic circles, “One Health” remains generally unfamiliar to the majority of practicing physicians, veterinarians, other medical professionals and political leaders. It is basically obscure to the general public.

The AVMA formed a “One Health” task force designed to develop a strategic action-plan for implementation with adequate funding. This has made considerable progress under the guiding hand of its Chair, Lonnie J. King, DVM, MS, MPA, Director of the CDC’s Center for Zoonotic, Vectorborne, and Enteric Diseases and its outstanding members.

Most of you are aware of all of the above and favor continuance. But, have you thought about the political realities of ingraining such a visionary life protecting-life saving movement into society—of institutionalizing it into the U.S. and the worldwide scheme of health care goals? The only way this will happen is through a consistent, repetitive educational campaign directed towards the general population of all nations. The public and their political and governmental leaders must be included ASAP.

Reaching the next plateau will require a public relations (public affairs) campaign via national and international media exposure. All of this is under consideration by the AVMA task force and others. However, doing so is not mutually exclusive or limited to one centralized entity. The evolution of this movement becoming front and center in the public eye can and should be started now, by each of us.

A call-to-arms would include those in the scientific community to begin communicating with local, state and national media as well as political leaders. In the past, such publicity activities have been primarily below the radar screens of many individual scientific professionals due to concerns about ethical propriety. Nonetheless, public affairs staffs are routinely employed or maintained by public health governmental agencies, higher institutions of learning, public corporations and many others. “One Health” demands the same consideration and action-plan for all wishing to contribute.

Print and broadcast media must be involved. News articles in local, state, national and international media are to be pursued and encouraged. Opposite Editorial Page commentaries, i.e. Op-Eds in sufficient numbers and repetitively published by those of you so inclined—educators, governmental, public health and scientific research leaders—would serve as a valuable reservoir for expeditious change.

“One Health” is a bold, old vision that has regained new energized inspiration in the 21<sup>st</sup> century. Organizational and individual leadership can



Bruce Kaplan, DVM



One World, One Health



*ProMED has been living out the concept of One World, One Health for the past 14 years, providing reports of emerging diseases and toxins in humans and animals, including:*



Tigers and avian influenza

expand the development and implementation of the concept by educating all intelligent target audiences ... not just the esoteric.

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***Dr. Bruce Kaplan, a retired veterinarian, practiced veterinary medicine for over 22 years, has been an epidemiologist with CDC as an Epidemic Intelligence officer, worked for USDA-FSIS as a staff officer in Washington, DC, served as the USDA-FSIS California based western regional public affairs specialist, and has been a columnist writer/editor. Dr. Kaplan promotes "One Health" collaboratively with Laura H. Kahn, MD, MPH, MPP and Thomas P. Monath, MD.***



## Wildlife disease reports on ProMED

Jack Woodall, PhD

ProMED, the Program for Monitoring Emerging Diseases, has been living out the concept of One World One Health for the past 14 years, by sending out free of charge publicly accessible reports of outbreaks of emerging diseases and toxins in humans, animals – pets, livestock, free and captive wildlife -- and food crops via ProMED-mail. Some of the more interesting and exotic reports are recounted below.

Currently, the big deal is, of course, avian influenza, which ProMED has been tracking closely since the first case ten years ago. We have now posted more than 2,000 reports on its spread and on whether the poultry trade or migrating water birds are the most to blame. It seems to be a standoff so far. Sadly, rare tiger species in Indian zoos, as well as other captive felines, have died from it, after unintentionally being given infected fowl to eat.

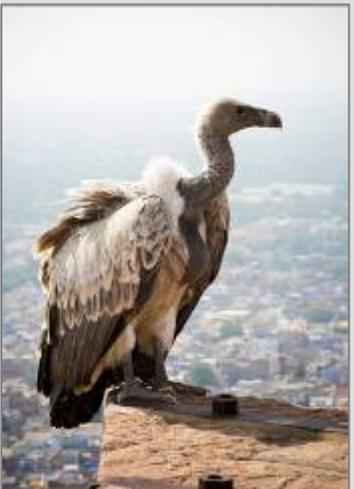
Other heavily reported zoonoses have been rabies, SARS (severe acute respiratory syndrome) and its connection with wildlife (palm civets), bovine spongiform encephalopathy and the human variant, and anthrax in both wildlife and livestock. Ebola and Marburg viruses in Africa, with a suspected bat reservoir, and hantaviruses harbored by wild rodents worldwide, have also been prominent. There have been recurrent reports over the years of salmonellosis in owners of pet turtles and lizards, and of a deadly strain of the bacterium *E.coli* in



*Petting zoos  
and E. coli*



*MFA poisoning of  
endangered species  
at the São Paulo Zoo*



*A mass die-off of  
vultures due to  
diclofenac, a  
painkiller used in  
treating cattle*

petting zoos. An outbreak in 2003 in humans in the USA, which started a smallpox scare, turned out to be monkeypox originating from African giant rats imported for sale as pets, which spread to American prairie dogs also sold as pets.

There was strange episode of poisoning of rare and expensive species in the São Paulo Zoo in 2004. In all, 73 animals died, including elephants, chimpanzees, porcupines, a pygmy anteater and 2 rare golden-faced tamarin monkeys. At the 2007 One World One Health (OWOH) Workshop in Brasilia, Brazil, a veterinarian from the zoo told us that the case is still under investigation by the Brazilian Federal Police. A diagnosis of sodium-monofluoracetate (MFA) toxicosis was confirmed by the CEATOX laboratory of São Paulo State University at Botucatu City. MFA is used in rat poison, and it was considered for use as a chemical warfare agent during World War II, to poison water supplies. It is colorless, odorless, soluble, stable, highly toxic, and has a delayed action which prevents early detection; it is one of the most toxic non-protein substances known. The use of MFA in the United States is regulated and it is not available to the general public. No perpetrator of the zoo massacre has yet been identified. I surmise it must have been deliberately added to the animal feed in quantities to suit the weight of the target animal, because simply spreading rat poison around an elephant's enclosure would not result in the ingestion of a lethal dose for such a large animal.

There have been a number of mysterious outbreaks in wildlife reported on ProMED. A series of reports in 1995 was entitled "What's killing American eagles?" As far as I know, this mystery was never solved, in contrast with the mass die-off of vultures in India, Pakistan and Nepal in 2003, which led to serious problems in carcass disposal, and even of the human remains in the Parsee religious community's Towers of Silence in India, in which the bodies of their dead are placed specifically to be eaten by carrion-eating birds. That outbreak was traced not to a mysterious disease but to a common painkiller, diclofenac, given to sick cattle. If an animal treated with this drug dies and is eaten by vultures, a single meal can be enough to kill the birds.

Just this year (2008) there have been so far undiagnosed die-offs of mallard ducks and bats (white-nose syndrome) in the USA, of starfish in the UK and fish in Taiwan. Thousands of hibernating bats have been dying in caves in New York, Connecticut and Vermont, threatening the important pollination and mosquito control activities they would normally perform in 2008. In 2007, unsolved die-offs occurred of blue whales, several species of terrestrial and marine birds, honeybees (also essential for pollination, let alone honey production) and various fish in the USA, of flying foxes and multiple terrestrial avian species in Australia, seabirds in the Bahamas, mallard ducks and carp in Canada, and pelicans in Costa Rica.

Choroid Blindness Syndrome, a disease causing blindness in kangaroos, had been known for at least 20 years in 1995, when a report on ProMED of a new outbreak elicited the information from the Australian Chief Veterinary Officer that no infectious agent had yet been conclusively linked to the condition. Laboratories had consistently isolated and detected two viruses of the Orbivirus family from the



### **Devil Facial Tumour Disease and the Tasmania Devil**

eye tissues of affected kangaroos. These viruses had been known for many years to infect marsupials, but neither had ever before been incriminated as the cause of any disease in any species. Experimental studies in kangaroos were planned, but we have not seen a result.

In 1996, a localized but locally important disease is Devil Facial Tumour Disease, which is transmitted by bite between animals of another marsupial species, the Tasmanian Devil, on the island of Tasmania, Australia. It results in large tumors of neuroendocrine origin, mainly on the face. As of November 2007, the disease had spread to more than 60 separate sites covering almost 60% of the State. Across Tasmania there has been a more than 50% decline in average sightings over the last decade, while in the original focus in the north-east region there has been a 90 per cent decline in average spotlight sightings from 1992-95 to 2002-05. The western part of the state has, mysteriously, remained disease-free, and resistance may be appearing.

For keeping an eye on emerging disease threats to wildlife, along with those to humans and our food crops, there is no better public, free source than ProMED <[www.promedmail.org](http://www.promedmail.org)>.

**Dr. Jack Woodall is co-founder and Associate Editor of ProMED.**



### **Discovery of Streptomycin for the Treatment of Tuberculosis**

**Charles Orel Thoen, DVM, PhD, David Eugene Williams, MD , MS and Tyler Charles Thoen, MD**

Tuberculosis is an infectious disease that has plagued humans and animals for several centuries. Health care workers recommended rest to allow the immune system of the host to combat *Mycobacterium tuberculosis*, an acid fast bacterium, before the discovery of antituberculosis drugs. Patients were most often isolated, or quarantined and placed in sanitoriums for rest and to reduce transmission of the infectious agent from contagious individuals by coughing or aerosol exposure.

A major advance in the management of tuberculosis patients occurred with the discovery of streptomycin by Albert Schatz and Selman Waksman. The laboratory research work to demonstrate the efficacy of streptomycin in the treatment of tuberculosis in guinea pigs exposed to *M. tuberculosis* was conducted by Dr. William H. Feldman, a veterinarian working in the Section of Comparative Medicine and Dr. H. Corwin Hinshaw a medical doctor in the Medicine Section at the Mayo Clinic. The results of their initial investigations demonstrated that guinea pigs exposed to *M. tuberculosis* H37RV



**Testing guinea pigs for tuberculosis 1962 - (Courtesy CDC/Merle J. Selin)**



***Mycobacterium tuberculosis***  
(Courtesy CDC/George P. Kubica)

**A major advance in the management of tuberculosis occurred with the discovery of streptomycin.**



*Veterinarian William Feldman and medical doctor H. Corwin Hinshaw's joint research demonstrated the efficacy of streptomycin in the treatment of tuberculosis.*



**Pulmonary tuberculosis**  
(Courtesy CDC)



(neotype strain) or another isolate of *M. tuberculosis* obtained from a patient, and subsequently treated with streptomycin failed to develop advanced tuberculous lesions although the organism could be isolated from some tissues collected at necropsy. Additional investigations in guinea pigs receiving streptomycin at the time of inoculation of *M. tuberculosis* for extended periods failed to develop grossly visible lesions and were negative on cultures conducted on tissues collected on necropsy 6 months later.

On November 20, 1944, Patricia Thomas (Patsy) a nineteen year-old patient with far advanced tuberculosis was treated with streptomycin by Dr. Hinshaw. Since Patsy had developed a cavity in her right upper lobe she also received a right phrenic crush and 4 staged thorocoplasties beginning November 1, 1944 and completed January 24, 1944 by Dr. O. T. Clagget. Her progression to recovery seemed virtually miraculous after receiving 5 courses of intramuscular injection of streptomycin that lasted for 10 to 18 days.

Review of serial chest X- rays through March 20, 1945 was interpreted by a radiologist that significant regression of disease had occurred. Streptomycin treatment was discontinued on April 7, 1945. Finally Patsy's sputum cultures became negative while on strict bed rest and she was released from the sanatorium on July 13, 1947. She married her childhood sweetheart, delivered 3 children and died of "severe bronchitis" and corpulmonale on June 10, 1966.

It is important to note that streptomycin was used alone and later in combination with paraaminosalicylic acid (PAS) as well as in multidrug regimens for the treatment of tuberculosis in humans. This followed the early investigations that demonstrated the clinical value of streptomycin by Drs. Feldman and Hinshaw. Information obtained from *The Proceedings of the Mayo Clinic Staff Meetings* in 1944 and 1945 was used in preparation of this report in addition to personal communications Dr. Williams had with Dr. Hinshaw.

This report presents an excellent example of where a medical doctor, Dr. H. C. Hinshaw, a surgeon, Dr. Theron Clagget and a veterinarian, Dr. W. H. Feldman worked together to evaluate a drug used to improve the health care of patients suffering from a serious life threatening infectious disease.

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## **Animals provide wakeup call on community poisons**

**Patrick Ryan, DVM, MPH**

In the last century, canaries were commonly carried by coal miners to detect the presence of dangerous and highly lethal gases, such as methane and carbon monoxide. The birds are highly sensitive to the presence of these odorless and colorless gases. Miners used to take canaries with them to the mines in small wooden or metal cages.

*Coal miners would carry canaries with them to detect the presence of dangerous and highly lethal gases.*



*Today, animals still make excellent community sentinels for poisons and toxins*



**“Canaries of the Ocean”**  
California sea lions

Any sign of distress from the canary was a clear signal the conditions underground were unsafe and miners should be evacuated from the pit and the mineshafts made safer. Canaries were not the only animals which were used to detect the presence of dangerous gases underground - mice were too. But tests conducted by the British Bureau of Mines showed canaries were favored because their reaction to carbon monoxide was more apparent even if small quantities of the gas were present. Alerted to the potential for injury and death, the miners would then leave the mine quickly. Without such early warning, the presence of these gases would be known only when either an explosion occurred or the miners succumbed to the lack of oxygen.

In 1986, more than 200 canaries were phased out of Britain's mining pits by the government. The birds had been used in mines since 1911 when two canaries were employed by each pit. Modern technology is being favored over the long-serving yellow feathered friend of the miner in detecting harmful gases which may be present underground. New electronic detectors replaced the bird because they are said to be cheaper in the long run and more effective in indicating the presence of pollutants in the air otherwise unnoticed by miners. The hand-held gas detectors carry a digital reading which appears on a screen alerting miners to the extent of the gases. Miners missed their feathered guardians. They had become so ingrained in their culture that, miners would whistle to the birds and coaxed them as they worked, treating them as pets.

Today, the expression “canary in a coal mine” is used to refer to an indicator or event which serves as a warning that a potentially detrimental change has taken place and immediate intervention is required.

#### **Toxic chemicals in the environment are a problem for people and other animals**

Other animals also make excellent community sentinels for poisons and toxins. “Dancing cat disease” (cats exhibited severe neurologic disturbances) in Minamata, Japan was due to methylmercury contamination of their food supply. Marine life accumulates methylmercury, and fish are now monitored for contamination. “Dancing cat disease” presaged the outbreak of organic mercury poisoning in people by 50 years.

Over the years, sea lions in southern California have shown a high prevalence (17%) of urogenital cancer. Thus, sea lions have been called “canaries of the ocean”. A herpes virus has been associated with the neoplasia. However, polychlorinated biphenyls (PCBs) may also be related. Perhaps we have an example where a viral agent and toxin have a synergic impact on the host.

Last spring saw the nation's largest recall of pet foods. The food was contaminated with toxic ingredients from China. Typically, by the time the owner realizes there was a problem; over 75% of the kidneys have been damaged. The cases in cats and dogs reported to Los Angeles County Public Health had a case fatality proportion of 31%. Cats died (48%) more than twice as often as dogs (17%). The pets provided a wakeup call to the FDA that improvements are needed in their inspection system. This spring saw contaminated heparin suspected of killing dozens of people. FDA investigators believe the tainted ingredient was imported from China.

*Changing disease patterns in animals provide an alert to potential health risks to humans.*



*Brown pelicans and sea lions served as sentinels for presence of domoic acid in shellfish, sardines and anchovies along the California coast.*



### Changing disease patterns are first alerts

Changing disease patterns in animals provide a lead-time to instigate control measures to prevent human involvement. Some advantages of using animals as sentinels include: lower cost, shorter latency of disease development and greater ease of obtaining tissue samples and autopsy data. Sentinel animals have shorter life spans than people and diseases with long latency periods will manifest themselves in sentinel animals before people.

When a field investigation is started by Veterinary Public Health, usually only sick dying animals are reported. In the beginning, it is a mystery with an unknown etiology. For example, over 30 California Brown Pelicans were reported sick or dead in 2006. Laboratory investigation revealed the cause to be domoic acid poisoning. Domoic acid is a heat stable, water soluble, neuroexcitatory amino acid that can cause seizures and death in animals. Certain microscopic algae produce domoic acid. Algae blooms function as food sources for marine life, such as fish and mussels. Consumption of toxic algae by marine life creates potential health problems for birds, mammals, and people feeding off the marine life. The first suspicions of domoic acid poisoning appeared in February 2006 among sea lions which also eat fish.

The toxicity in people is referred to as amnesic shellfish poisoning. It causes severe gastroenteritis, associated with confusion, memory loss, headaches, and coma. Toxic algae blooms can be harmful simply by drinking the contaminated water, but most commonly, marine life consumes the toxic algae and becomes contaminated, affecting the food chain. Poisoning usually occurs during warm seasons when the algae blooms are more intense and of longer duration.

The California Department of Health Services periodically detects elevated levels of domoic acid in mussels and the viscera of sardines along the Southern California coast and issues press releases advising consumers not to eat some shellfish and viscera of sardines, anchovies and crab from southern California coast.

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*What does HIV/AIDS have to do with veterinary medicine?.....*



*More than most people think!*



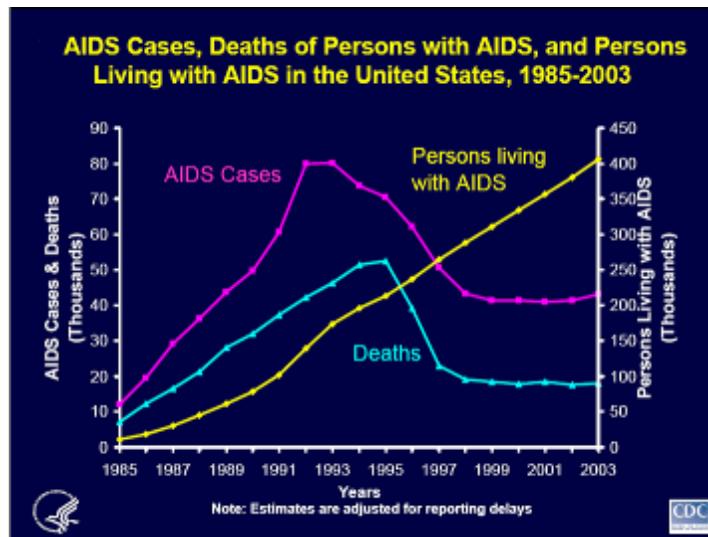
*Thanks largely to new medications, people with HIV/AIDS are living longer.*

## HIV/AIDS and the Veterinary Practitioner—Making a Difference

Radford G. Davis, DVM, MPH, DACVPM

Of the many diseases that vie for the top spot in causing global human suffering and death, few, with perhaps the exception of now-eradicated smallpox, can match the effect of HIV/AIDS. The fourth leading cause of death worldwide, HIV/AIDS has claimed the lives of more than 22 million people, and nearly 40 million people are living with infection, including more than 1 million in the United States.<sup>1</sup> And while the AIDS pandemic does show signs of slowing, its full impact has yet to be felt in many areas. What does HIV/AIDS have to do with veterinary medicine? The short answer: more than most people think.

HIV/AIDS is only one of the many immunocompromising diseases and conditions that afflict humans, but it is unique and demands veterinary attention for several reasons. Its many routes of transmission, the high susceptibility of people with AIDS to recurrent opportunistic infections and demonstrable zoonotic threats, the enduring myth of animal transmission, and the unique liability issues surrounding exposure and confidentiality are but a few. In the future, demonstration of HIV/AIDS education may become part of state licensing requirements for veterinarians, as it is already in Washington State.

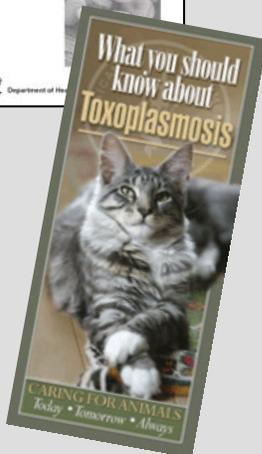
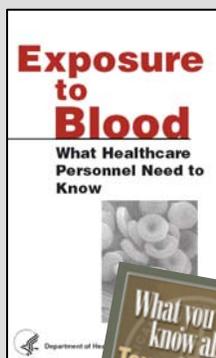


(Slide added courtesy of CDC)

Thanks largely to new medications, people with HIV/AIDS are living longer—today, the life expectancy of someone with HIV under medical care is 24 years—which means that veterinarians are more likely than ever to have HIV-infected individuals as clients, coworkers, and employees. These individuals may or may not choose to disclose their status, or they may not know their status: 25% of those infected in the United States don't know they are infected.<sup>2</sup> Those with AIDS, the immunosuppressed and later stage of HIV infection, face significant health risks from zoonotic pathogens, more so than immunocompetent individuals. Veterinarians are considered experts on zoonotic diseases and, in keeping with our public health commitment, should be addressing the needs of clients with HIV/AIDS through proper education and communication. Educational measures



*To run a safe workplace, understanding and implementing the CDC's universal precautions is critical.*



*Veterinarians should address the needs of clients with HIV/AIDS through education on how they can reduce their risk of exposure to certain zoonoses.*

could include explaining how clients can reduce their risk of exposure to certain zoonoses, discussing pet retention or adoption, or dispelling myths about HIV transmission: a recent survey showed that 22% of Americans still believe HIV can be transmitted by sharing a drinking glass. Sometimes, communication duties must include speaking to the physician of an HIV-infected individual to assuage concerns about the risks of owning a pet or to reverse unjust recommendations, such as getting rid of a pet.

As veterinarians and public health professionals, we must also oversee the running of a safe, threat-free workplace. HIV/AIDS in the workplace is an issue that requires a proactive approach on the part of the clinic owner and management to limit liability and protect the health of clients as well as employees. Dog bites and needlestick injuries are not uncommon in a veterinary practice setting. How many workers in your clinic are certified in human first aid? They all should be. Clients and employees who are bitten can put others at risk for exposure to bloodborne pathogens such as HIV and hepatitis B and C. Veterinarians and their staff need to know how to prevent their own exposure to these pathogens while addressing the immediate medical needs of the victim. Understanding and implementing the federal standards governing protection against exposure to bloodborne pathogens (29 CFR 1910.1030) as well as the Centers for Disease Control and Prevention's universal precautions is critical.<sup>3,4</sup> Implementing training and developing standard protocols within your clinic to prevent infection of veterinary staff with zoonotic diseases is also of paramount importance, regardless of HIV concerns. Publications are available to help you accomplish these tasks.<sup>5</sup>

Allaying staff fears surrounding HIV/AIDS and ensuring that those with HIV/AIDS do not face discrimination or harassment in the workplace are other essential aspects of addressing HIV in the veterinary clinic. People with HIV are protected under the Americans with Disabilities Act (ADA). Employers must provide those covered under the ADA with "reasonable accommodations" and maintain the confidentiality of their medical information. Suspending, reassigning, firing, or denying employment to a person with HIV brings with it serious legal ramifications that few employers can defend in a court of law.

Addressing HIV/AIDS is a nontraditional role for most veterinarians, but it is one well within our purview. What can you do to meet it? I have a few suggestions:

- Take time to learn more about HIV/AIDS so that you can discuss it intelligently with clients when approached.
- Keep HIV/AIDS brochures and posters on the topic of pets and zoonoses in your waiting room.
- Add a line to the new client form that allows the client to discreetly ask for more information about HIV and the risks of pet ownership.
- Train your staff in human first aid, universal precautions, and zoonosis prevention.

Unfortunately, seminars on HIV/AIDS in relation to veterinary medicine are rare, but go to them when you have the opportunity.

More than 25 years since it was first identified, HIV/AIDS is more than a healthcare issue, more than a disease. It affects families, communities, nations,



Dr. Radford Davis

*“As veterinarians, we can make a difference in helping those with HIV lead happier, healthier, safer lives.”*

*Lyme disease is the most frequently reported arthropod-borne disease in the United States.*



**Figure 1.** Erythema migrans lesion on upper arm of Florida Lyme disease patient, November 2007

and economies, has generated millions of orphans, and casts a shadow of fear everywhere it is found. In some countries, such as Botswana, the rate of infection is as high as one in four. As veterinarians, we can make a difference in helping those with HIV lead happier, healthier, safer lives. Veterinarians must reach out to clients with HIV/AIDS and make an effort to educate themselves on what is arguably the most important disease of our time. Our role in public health demands it.

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## Lyme Disease in Florida: What You Need to Know

Kerry Clark, MPH, PhD

### What is Lyme Disease?

Lyme disease (LD) is the most frequently reported arthropod-borne disease in the United States (1). It occurs worldwide and is caused by several species of spirochete bacteria within the *Borrelia burgdorferi* sensu lato genogroup (2). *B. burgdorferi* sensu lato includes at least 12 species, four of which are present in North America: *B. andersonii*, *B. bissettii*, *B. californiensis*, and *B. burgdorferi* sensu stricto (3, 4, 5, 6). Thus far, only *B. burgdorferi* sensu stricto has been proven responsible for human disease in the U.S. In the northeastern U.S., *B. burgdorferi* sensu stricto spirochetes are transmitted to humans by the blacklegged tick, *Ixodes scapularis* (7), and maintained in nature primarily by small rodents (8,9).

LD signs and symptoms include fever, headache, fatigue, and a skin rash called erythema migrans (EM) that sometimes presents like a bullseye (Figure 1.). If left untreated in early stages, infection can spread to joints, the heart, and the nervous system (neuroborreliosis). Lyme disease is diagnosed based on symptoms, physical findings (e.g., rash, facial palsy, arthritis), and the possibility of exposure to infected ticks. Commonly used laboratory tests for LD may give equivocal, false negative, or false positive results. Although laboratory testing may be helpful for confirmation of infection, and for diagnosis during the later stages of disease, it is not presently necessary and generally not recommended for diagnosis of patients with EM (10). Most cases of LD can



***Borrelia burgdorferi***  
(Courtesy CDC)

*Clinicians in Florida should consider Lyme disease in the differential diagnosis of patients with signs, symptoms, clinical history, and environmental exposure compatible with tick-borne illness.*



**Blacklegged tick,**  
*Ixodes scapularis*  
adult male (L), adult female (R)

*Although different tick species have specific seasonal activity patterns, at least some tick species is active anytime of the year in Florida.*

probably be treated successfully with several weeks of antibiotics if diagnosed promptly and therapy is initiated in the early stages of infection. The success rate for treatment of late stage illness is less certain. Therefore early recognition and treatment may be critical. Links to additional information on the presentation, diagnosis, treatment, and prevention of LD can be found at the Centers for Disease Control and Prevention (CDC) Division of Vector-Borne Infectious Diseases Lyme Disease webpage (10).

#### Does *B. burgdorferi* occur in Florida?

*B. burgdorferi* group strains, including *B. burgdorferi* sensu stricto, have been isolated from birds, rodents, and ticks in southern states including Florida (9, 11). In the southeastern U.S., immature stages of *I. scapularis* feed on many different species of vertebrates, but primarily on lizards (12, 13). *B. burgdorferi* group spirochetes (several species) have also been detected by molecular methods in ticks from numerous sites in northern and central Florida (14), and in wild lizards in Florida and South Carolina (15). Therefore, it is documented that *B. burgdorferi* group strains are established in Florida and other southern states. However, despite hundreds of reported cases of human Lyme disease from southern states each year, *B. burgdorferi* group spirochetes have still not been isolated from a human case in this region. Possible reasons for this are the lack of studies aimed at isolating the organism from human patients in the Southeast, geographic differences in the genetics of the spirochetes making it more difficult to cultivate some strains using standard methods, or as-yet-unknown reasons.

#### Complicating the matter.

Since the first report describing molecular detection of the hard tick relapsing fever *Borrelia* species *B. lonestari* in lone star ticks (*Amblyomma americanum*) (16), numerous additional studies have reported its presence in lone star ticks throughout the eastern U.S. (17, 18, 19, 20, 21). Since its initial discovery, *B. lonestari* has been investigated as the possible cause of Lyme-like illness, often referred to as southern tick associated rash illness (STARI), in humans in the southern U.S. (18, 20, 21, 22, 23). However, despite the efforts to date, very little evidence supports the notion that *B. lonestari* is the primary cause of STARI. To date only one published case report documented evidence of *B. lonestari* in association with Lyme-like illness and an EM-like skin lesion in a patient with an attached lone star tick (22). Alternatively, *B. burgdorferi* sensu lato DNA has been detected in host seeking adult lone star ticks in Florida (14), but evidence conclusively linking lone star ticks to human LD cases is also currently lacking.

#### So, does LD occur in Florida?

Yes. Since the standard case definition began in 1991, over 700 cases of LD in Florida have been reported to the CDC (10), and many of them were laboratory confirmed. Some of those infections may have been acquired in other states, but many of them were from patients who do not have a history of travel outside Florida. Nevertheless, awareness of the presence of risk for LD in Florida may still be poor overall. And, although the incidence of LD in Florida is much lower than in hyperendemic areas of the northeastern U.S., the public and clinicians in Florida need to be aware that LD should be considered in the differential diagnosis of patients with signs, symptoms, clinical history, and environmental exposure



**DNA extraction area,**  
Environmental Epidemiology Lab,  
University of North Florida

### Recommended steps to prevent Lyme disease and other tick-borne infections include:

- > **Improve awareness**
- > **Avoid tick-infested habitat**
- > **Use insect/tick repellent**
- > **Check for and remove attached ticks promptly**



**PCR thermal cycler,**  
Environmental Epidemiology Lab,  
University of North Florida

compatible with tick-borne illness. The possibility of other tick-borne infections or co-infections such as Anaplasmosis, Babesiosis, Ehrlichiosis, and Rickettsiosis should be considered, since their respective pathogens have also been identified in humans, wild vertebrates, or ticks in Florida (24, 25, K. Clark unpublished data). Also, keep in mind that although different tick species have specific seasonal activity patterns, at least some tick species is active anytime of the year in Florida. Some recommended steps to prevent Lyme disease and other tick-borne infections include improving awareness, avoiding tick-infested habitat, using insect/tick repellent, and checking for and removing attached ticks promptly.

#### What else should we know about LD in Florida?

The author of this article is presently conducting studies to determine the cause of Lyme-like illness in human patients with suspected LD based upon EM-like skin lesions and/or symptoms consistent with early or late stage Lyme borreliosis in the southeastern U.S. The aims of the research include genetically characterizing pathogenic strains of the causative microorganisms and determining the tick or other arthropod vector species involved. Using polymerase chain reaction assays (PCR) followed by DNA sequencing, the study has thus far confirmed Lyme group *Borrelia* spp. DNA in blood samples from several patients in Florida and other states throughout the country, but no evidence of *B. lonestari* infection. Furthermore, the evidence shows that both *B. burgdorferi* sensu stricto, and a previously undetected group of *B. burgdorferi* sensu lato strains, are associated with Lyme disease-like signs and symptoms in patients from the southern U.S., as well as states outside this region. Additionally, the findings thus far suggest that some cases of Lyme-like illness in Florida and other states that do not meet the criteria for positive tests on the traditional *B. burgdorferi* ELISA and Western Blot antibody tests may be attributable to this previously unnamed group of *B. burgdorferi* sensu lato. Those interested in learning more about or collaborating in this study can contact the author by email at [kclark@unf.edu](mailto:kclark@unf.edu).

#### What do we still need to learn about LD?

LD spirochetes are complex organisms, and many controversies exist related to their ecology, pathogenicity and virulence, clinical spectrum, recognition and treatment, reservoir hosts, and arthropod vectors in natural transmission cycles and to humans. Especially relevant is the need to develop better diagnostic tests that identify genetically variable strains of *B. burgdorferi* sensu lato associated with human disease, more research on the treatment of late stage illness, and studies to determine conclusively the tick and/or other arthropod species involved in transmitting LD spirochetes to humans in Florida and other southeastern states.

#### References

[www.doh.state.fl.us/environment/community/One\\_Health/LDrefs\\_Summer2008.pdf](http://www.doh.state.fl.us/environment/community/One_Health/LDrefs_Summer2008.pdf)

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## Joint DVM/MPH Program at the University of Florida Enters Second Year

Sarah Carey, MA, APR and Tara Anderson, DVM, MPH



*The University of Florida offers a joint DVM/MPH program to help meet the national and international need for veterinarians trained in the disciplines of public health.*

*The joint DVM/MPH program may be completed in four years plus one summer by students who enter both programs concurrently.*



The University of Florida Colleges of Veterinary Medicine (CVM) and Public Health and Health Professions (PHHP) welcome the second class of joint DVM/MPH students this summer semester. Five entering students will join the ten currently completing their first year of the program. Like many collaborative efforts at universities across the country, UF is offering this program to help meet the national and international need for veterinarians trained in the disciplines of public health.

Envisioned and established by former CVM dean Joseph DiPietro and former PHHP dean Robert Frank, the program has been implemented with considerable input from the joint DVM/MPH committee (Drs. Mary Peoples-Sheps, Nabih Asal, and Natalie Freeman of the PHHP and Drs. Paul Gibbs and Tara Anderson of the CVM) as well as from the administrative offices of each college. Last fall Dr. Traci Krueger was officially hired as the joint DVM/MPH program coordinator.

The DVM and MPH programs at UF are 150 and 48 credits, respectively. Through the sharing of some course credits, the joint DVM/MPH program may be completed in four years plus one summer by students who enter both programs concurrently. The MPH program offers six potential concentrations of study (biostatistics, environmental health, epidemiology, public health management and policy, social and behavioral sciences, and public health practice). Students in the joint DVM/MPH program may pursue any of these concentrations in conjunction with their DVM curriculum; however, students will be encouraged to enroll in the public health practice concentration to allow greater flexibility in course scheduling. For the most up to date information on the joint DVM/MPH program requirements please see the Web site at <http://mph.ufl.edu/programs/collaborative/vet.htm>.

Students entering the joint degree program this summer can look forward to a variety of public health training opportunities over the coming years. The first class of DVM/MPH students established a public health and service club at the CVM this spring. The group provides additional learning and outreach opportunities for participants, and is also being integrated into the CVM's disaster preparedness efforts.

These students will also hopefully be able to participate in future "CDC Vet Student Days," as several of the first year joint degree students did last January. Organized by the Centers for Disease Control and Prevention, the event was held at CDC headquarters and was aimed at educating veterinary students from all over the country and Canada about the CDC's mission, and introducing them to the fields of public health and epidemiology. Three hundred students and nearly 60 faculty members attended the event. Dr. Paul Gibbs, a professor of infectious diseases, and Krueger led 14 students from UF. On the agenda were several veterinarians who spoke about their roles in public health and how students can get involved at CDC.

*Students in the joint DVM/MPH program learned more about the role of veterinarians in public health during a visit to the CDC.*



“This event is just one more example of activities here at the college which are focused on ‘One World, One Health, One Medicine,’” Gibbs said. Carrie Lawson, who recently completed her first year in the DVM/MPH program, said the CDC trip allowed her to meet students from other universities with similar interests, as well as professors and CDC employees.

“It was also a great chance to ask people in the field what it’s really like and why they made the career choices they did,” Lawson said. “Internship opportunities were also presented, so we can start planning ahead. They have several amazing international opportunities for students.”

Lawson began the DVM/MPH program because she is interested in international work and possibly disaster relief. “I think the recent global disasters such as Katrina and the Indonesian tsunami showed us the need for trained disaster relief veterinarians,” she said. “UF has done a wonderful job of providing the DVM/MPH students with a good idea of the scope of career opportunities for public health veterinarians.”

In conjunction with collaborators at the state, national, and international levels, the UF CVM and CPHHP look forward to the continuing evolution of the joint degree program in order to effectively contribute to the needs of the public health workforce.

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**New Orleans - an abandoned dog post Hurricane Katrina –**  
(Courtesy FEMA/Andrea Booher)

*The recent global disasters such as Katrina and the Indonesian tsunami showed the need for trained disaster relief veterinarians.*



**A veterinarian from the National Veterinarian Response Team examines a dog in Beaumont, TX, post Hurricane Rita.**  
(Courtesy FEMA/ Bob McMillan)



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## Coming Events:

- **AVMA 145th Annual Convention**

New Orleans, Louisiana

July 19 - 22, 2008

<http://www.avmaconvention.org/>

PREVENTION for ONE HEALTH ONE MEDICINE FORUM:  
Two Day Program  
Monday, July 21 and Tuesday July 22

- **International EcoHealth Forum 2008**

Mérida, México

December 1– 5, 2008

[www.ecohealth2008.org](http://www.ecohealth2008.org)

“EcoHealth: Healthy Environments, Healthy People”

- **International Meeting on Emerging Disease and Surveillance (IMED 2009)**

Vienna, Austria

February 13 – 16, 2009

<http://imed.isid.org>

## Recent One Health Publications:

- **Linking human and animal health.** Laura Kahn, Bruce Kaplan and Thomas Monath. The San Diego Union-Tribune. May 19, 2008.  
[http://www.signonsandiego.com/uniontrib/20080519/news\\_mz1e19kahn.html](http://www.signonsandiego.com/uniontrib/20080519/news_mz1e19kahn.html)
- **Multistate Outbreak of Human *Salmonella* Infections Caused by Contaminated Dry Dog Food --- United States, 2006—2007**  
MMWR May 16, 2008 / 57(19);521-524  
<http://www.cdc.gov/mmwr/preview/mmwrhtml/mm5719a4.htm>
- **Public Health Reports** Volume 123, Issue Number 3 May/June 2008.  
Several articles on zoonoses and One Health issues.  
<http://www.publichealthreports.org/archives/issuecontents.cfm?Volume=123&Issue=3>
- **Putting Meat on the Table: Industrial Farm Animal Production in America. The Pew Commission on Industrial Farm Animal Production's final report.**  
The executive summary and the full report can be accessed at [www.pcifap.org](http://www.pcifap.org).

