



NEWS LETTER

ONE HEALTH



No. I

February 27-28, 2016

"You can't have Good Public Health unless you have Good Animal Health and you can't have Good Animal Health unless you have Good Public Health"-James H Steel (Source: JAVMA Vol. 232 No. 12, 15th June 2008)

MESSAGE

February 10, 2013

The One Health Initiative Autonomous pro bono Team: Laura H. Kahn, MD, MPH, MPP Bruce Kaplan, DVM Thomas P. Monath, MD Jack Woodall, PhD Lisa A. Conti, DVM, MPH greatly appreciates the One Health activities of the Indian Association for the Advancement of Veterinary Research (IAAVR). Congratulations on your outstanding program developments and achievements!

Warm personal regards from Drs. Kahn, Kaplan, Woodall and Conti...
www.onehealthinitiative.com



John (Jack) Woodall



Bruce Kaplan



Thomas P. Monath, M



Laura H. Kahn

Vision Statement

One Health (formerly called One Medicine) is dedicated to improving the lives of all species- human and animal- through the integration of medicine and veterinary medicine.

Mission Statement

Recognizing that human and animal health and mental health (via the human-animal bond phenomenon) are inextricably linked, One Health seeks to promote, improve, and defend the health and well-being of all species by enhancing cooperation and collaboration between physicians and veterinarians, and by promoting strengths in leadership and management to achieve these goals.

QUOTES

"The One Health Initiative is a unique opportunity to further advance collaboration between human and veterinary medicine for the benefit of people, animals and their environment. As a physician and regulator, I believe joining forces with partners with a wide range of expertise is absolutely essential in helping to smooth the path of discovery for quality health care products and safe foods for the public and the animals under our care." Commissioner of Food and Drugs, USA. – **Andrew C. von Eschenbach, M.D.**

In the past, the Veterinary Profession has had to remind the Medical Profession of its responsibilities in the field of TB Control. Perhaps the time has come for it to do so. **J.M. Grange**, National Heart & Lung Institute, Imperial College, London, Br. Vet. J. (1996) 152: 3

The Concept of "One Health-One Medicine" is not a new entity as leaders in Medicine such as physician and pathologist, Rudolf Virchow (1821-1902) and William Osler, a medico in the late 19th and early 20th centuries embraced the concept that human and animal health were inextricably linked

What is One Health

- Cooperation between Human and Veterinary Medicine in selected endeavors
- Building on common pool of knowledge physiology, pathology, epidemiology, etc.
- Simultaneous study of zoonotic diseases in people, domestic and wild animals

Example of One Health

- To quote some examples of "One Medicine", retrospectively, in 1893, a physician and veterinarian research team, Drs. Theobald Smith and F.L. Kilbourne, respectively, discovered that the cause of cattle fever, *Babesia bigemina*, was transmitted by an arthropod vector (ticks).
- Their work helped set the stage for the discovery by Walter Reed and his colleagues of the transmission of yellow fever.
- Drs. Rolf Zinkernagel and Peter C. Doherty, a physician and veterinarian, respectively, discovered how the immune system distinguishes normal cells from virus-infected cells.
- They received the 1996 Nobel Prize in physiology or medicine.
- Together, medicine and veterinary medicine can generate new scientific insights across species, which is exactly what is needed to meet today's challenges



Chief Editor

Dr. Rishendra Verma, B.Sc., B.V.Sc. & A.H., M.V.Sc., M.Sc. (Immunol,UK), M.V.M. (Biosecurity), New Zealand, Ph.D. Dip. Journalism (Mysore), FIAAVR, FISVIB, FIVPHS, FAVPHS, FNAVSc, FNAASc, FNASc, Former Joint Director, Centre for Animal Disease Research & Diagnosis, Indian Veterinary Research Institute, Izatnagar & Former Joint Director (Research), National Dairy Research Institute, Karnal is an eminent veterinary microbiologists in the field of Mycobacteria and other infectious diseases. A renowned researcher, academician and administrator, Dr. Verma has been involved in One Health Project Programme in context of his M.V.M. from Massey University, New Zealand. His credentials are available on website www.iaavr.org

**Co-Editors:**

Dr. Sarman Singh, BSc, MBBS, MD, DHA, FAMS, FIMSA, FRSTMH, FATP, an eminent medical scientist, Professor & Head, Clinical Microbiology & Molecular Medicine, All India Institute of Medical Science, New Delhi. He has been recipient a number of prestigious awards: Dr. BC Roy Award of Medical Council of India, Product, process & Commercialization Award of DBT, Vigyan Ratna Samman of Council of Sci. & Tech, U.P., Prof. BK Aikat Award of ICMR and others. He was trained in epidemiology of infectious diseases at the Univ. of Michigan, USA & International Research Ethics at Harvard Medical School, USA and Univ. of Natal, South Africa. His major research interests are Leishmania, Toxoplasma and HIV-TB infection. Further details of Dr. Singh may be seen at his website www.drsarmansingh.com



Dr. Sheetal Verma, Assitt. Prof., Deptt. Microbiology, King Georges' Medical University (KGMU), Lucknow (UP) completed her M.B.B.S. (2006) from KGMU with distinction of Hewett Gold Medal and several Gold Medals and completed her M.D. (2011) in Microbiology from KGMU and she was awarded best thesis Gold Medal. She has worked as Senior Resident at Sanjay Gandhi Post Graduate Institute of Medical Sciences (S.G.P.G.I.M.S), Lucknow, for three years. Her main areas of interest is Public Health Infections, Hospital Infection Control, Antibiotic Drug Resistance, Mycobacterium tuberculosis, HIV, Dengue, Chikungunya and Japanese Encephalitis.

**One Health & India****Dr. Lingard, Headed Imperial Bacteriological Laboratory**

Dr. Alfred Lingard, M.B.,M.S., D.P.H., born in 1849, a medical scientist headed Imperial Bacteriological Laboratory at Pune, India in 1890. This laboratory was established in 1889 to conduct research for the protection of Indian livestock from the dreaded diseases. Initially, Dr. Lingard devoted much attention to the manufacture and distribution of anthrax vaccine. He was also instrumental in arranging visit of three noted German Bacteriologists: Dr. Robert Koch, Pfeiffer and Gaffky to Mukteswar in 1897 after shifting of the Imperial Bacteriological Laboratory to Mukteswar in 1893.

**Vet & human experts diagnosed *Trypanosoma lewisi* like infection in Indian Infant**

Trypanosomes were observed in the peripheral blood smear of a 37-day-old Indian infant admitted off feeds, with fever and convulsions. *Trypanosoma* (Herpetosoma) *lewisi* was identified in the blood. The species identification was confirmed by morphometry, polymerase chain reaction, and sequencing. Human infection with this organism is rare. Only seven cases of this infection have been reported previously in humans. Experts from Medical and Veterinary belong to Department of Paediatrics, St. Stephens Hospital, Delhi, Department of Pathology, St. Stephens Hospital, Delhi, India; Division of Parasitology, Indian Veterinary Research Institute, U.P., Institute of Tropical Medicine Antwerp, Belgium; National Centre for Disease Control, Delhi.

[Source: Case Report: *Trypanosoma lewisi* or *T. lewisi*- like Infection in a 37-Day-Old Indian Infant. Archana Verma, Samiksha Manchanda, Nirmal Kumar, Archana Sharma, Masha Goel, Partha Sarathi Banerjee, Rajat Garg, Brahma Pal Singh, Fatima Balharbi, Veerle Lejon, Stijn Deborggraeve, Udai Veer Singh Rana, and Jacob Puliyl. Am. J. Trop. Med. Hyg., 85(2), 2011, pp. 221-224.].

**Visit of German Bacteriologist (1890)**

Some Examples: One Medicine-One Health

1994 = Plague: District Surveillance with VPH, IVRI.

2004 = *T. evansi* from human identified by Parasitology Div., IVRI

2006 = *T. lewisii* from man identified by Parasitology Div., IVRI

Leptospira = antibodies in human serum samples tested in B&M, Div., IVRI, Izatnagar

Mycobacteria = Sputum Microscopy for human at Mycobacteria Laboratory, IVRI

Avian Influenza = Medical team with Veterinarians Collaboration between IVRI and NIV, Pune

Fifth Annual Conference on Zoonotic Diseases Control held on 5th July, 2015 organized by Millennium India Education Foundation at Indian Medical Association Headquarter ITO, New Delhi.

That molecular-guided cooperation between human and veterinary health services can improve detection of zoonoses *M. bovis* and *M. tuberculosis*.

Dr. Rishendra Verma made a power point presentation on "**Tuberculosis and Risk Factors**". Dr. Verma referred reports of evidence of presence of *Mycobacterium tuberculosis* in bovine samples.

[Multiplex PCR: Possible Relevance to Reverse Zoonosis (2014) M. Mittal, S. Chakravarti, V. Sharma, B. S. Sanjeeth, C. P. Churamani and N. S. Kanwar-Transboundary and Emerging Diseases Volume 61, 97–104]

The presence of *M. tuberculosis* in all the positive samples raises the possibility of human-to-cattle transmission and possible adaptation of this organism in bovine tissues.

Occurrence of Overlooked Zoonotic Tuberculosis:

In 2.8% (6/212) of the samples, *M. tuberculosis* was detected, and in 17% (36/212), *M. bovis* was detected. Mixed infection was observed in 22 samples. Indian J Med Res 128, July 08, pp 26-31

M. tuberculosis and *M. bovis* are genetically and antigenically very similar and cause identical clinical disease in humans both pulmonary and extrapulmonary diseases. Strikingly, the genome sequence of *M. bovis* is >99.95% identical to that of *M.*

tuberculosis (Thierry et al., PANAS, 2003 vol. 100 no. 13 7877-7882)

Tuberculosis caused by *M. tuberculosis* in humans is clinically, radiologically and histopathologically indistinguishable from TB caused by *M. bovis* (Wedlock et al., 2002).

However, *M. tuberculosis* in cattle cause non progressive disease but will cause tuberculin sensitization. The reasons for later condition in cattle are not exactly known.

Differentiation depends upon laboratory isolation and identification Transmission

- Transmissions of tuberculosis in humans are mainly by inhalation and ingestion of raw milk or unpasteurized dairy products or meat from an infected animal (Srivastava et al., 2008).
- Aerosol exposure to *M. bovis* is considered to be the most frequent route of infection of cattle, but infection by ingestion of a contaminated material also occurs (Biet et al., 2005).

M. bovis infection

Symptoms:

- Human: Fever, night sweats, weight loss, poor appetite, weakness, chest pain, swollen glands and breathing problems, a general sick feeling are the general symptom in human
- Cattle: In cattle, the early stages of TB, clinical signs are not visible.
- In later stages, clinical signs may include: emaciation, lethargy, weakness, anorexia, low-grade fever, and pneumonia with a chronic, moist cough. Lymph node enlargement may also be present (Radostis et al., 2000)

In many developed countries, the possibility of TB due to *M. bovis* infection, instead of *M. tuberculosis*, is considered unlikely or even disregarded by microbiologists and clinicians. Distinction of *M. bovis* from *M. tuberculosis* has significant relevance to patient management.

Intrinsic resistance of *M. bovis* to pyrazinamide, beyond its use for specific *M. bovis* identification, this natural resistance is particularly important to consider.

Pyrazinamide is usually given in the classical first-line TB treatment, as it is an

effective sterilising drug that helps to shorten TB therapy due to its synergistic effect with rifampicin. Thus, in case of *M. bovis* infection, pyrazinamide would be ineffective if implemented in a patient's anti-TB regimen.

Burden of *M. bovis* in India is not known precisely.

Detection of *M. bovis* in human cerebrospinal fluid in India by the PCR and smear examination but not isolation (Shah et al., 2006) has once again alarm the significance of *M. bovis* infection in human beings and retaliate public health significance.

First probably authentic report of *M. tuberculosis* zoonosis in India (Inian Veterinary J. 75: 1034-35)

Human infection due to *M. tuberculosis* complex

- A 25 years old women developed delicacy from the consumption of unpasteurized raw milk.
- Biopsy from a potato-sized cervical nodule and milk sample of cow, both yielded *M. bovis* on culture.
- PCR on biopsy material using IS 1081 for *M. bovis* showed positive result on Southern hybridization.

Both of *M. bovis* isolates were found to be identical on genetic fingerprinting with conserved insertion sequence thus supporting possible milk borne infection.

When to suspect that human is infected with *M. bovis*

- When in contact with infected animals (Cattle)
- When drink unpasteurized milk
- When associated with assistance to veterinarians at Farm
- When involved in slaughter of animals
- When associated with handling of meat

In one example from U.K., two siblings were diagnosed with *M. bovis*. Both lived on farm. The brother assisted veterinarian in examination of cattle, both drank pasteurized milk and sister had no contact with cattle. When the brother was diagnosed, he had a positive smear fro AFB and chest radiograph had a cavity. Two years previous to siblings cattle were diagnosed positive to *M. bovis* and were slaughtered. Genotyping proved that isolated of siblings identical and matched with cattle strain (Smith et al., *M. bovis* infection. United Kingdom Emerg Infect Dis. 2004 Mar; 10(3): 539–541.

The molecular epidemiology was able to confirm the transmission from cattle to human and from human to human.

That absence of specific identification of *M. bovis* may have adverse consequences for TB patient management.

Even in high-income countries, human TB due to *M. bovis* is underestimated, because of frequent use of identification techniques that do not specifically distinguish *M. bovis* from the rest of the *M. tuberculosis* complex, and because susceptibility to pyrazinamide is not systematically tested. Therefore, clinical laboratories should routinely use molecular tests to differentiate *M. bovis* from *M. tuberculosis* and/or systematically check resistance to pyrazinamide.

Joint educational efforts between human medical, veterinary medical schools, and schools of public health; One Health shall be achieved through:

A Medical Scientist Dr. Soparkar investigated bovine TB in India at IVRI, Mukteswar

At the Second Meeting of Veterinary officers in India held at Calcutta in February-March, 1923, a resolution was passed urging the necessity for the prosecution of research into the problem of bovine tuberculosis in India. The information available would appear to show that it was a very rare disease of cattle in India, but some very important questions remained to be solved in that there was not sufficient knowledge available as to whether this rare incidence was due to a relatively high resistance of indigenous breeds of cattle, or to a low virulence of the infective organisms, or merely to the natural limitations towards the spread of the disease in the conditions of cattle raising that obtain in India. The

Indian Research Fund Association and the Director General, Indian Medical Service deputed Dr. M.B. Soparkar, M.D. in 1923 to conduct enquiry into the problem. Dr. Soparkar did the work upon the resistance of indigenous cattle to virulent infection and his results showed variability in animals for their resistance to infection. The arrangements were made for a preliminary experiment upon the relative susceptibility of the indigenous breeds vis-à-vis European strain of bovine virus. Buffaloes were found to be much resistant than the ox calves. Some of the calves of both breeds, however, were found to exhibit nearly as high a degree of susceptibility as was possessed by the average British calf. During his course of studies, a strain isolated from tuberculous cervical gland of a girl aged 14 was found to belong to the avian type. The finding was of interest on account of the rarity with which infection with the avian tubercle bacillus is found in human beings. In another case a strain was isolated from tuberculous glands from a patient from Bombay was found to be of the bovine type. This was the first instance in which a case of surgical tuberculosis in man in India has been found to be caused by the bovine bacillus. Researches upon the identity of strains of tubercle bacillus isolated from pigs in India were continued by Dr. Soparkar, and of 11 strains studied, one was found to belong to the bovine type and eight to the human type, while two were under study. These findings were in marked contrast to those recorded in Europe, where the majority of porcine strains have been found to belong to the bovine type, while in America a very large proportion belongs to the avian type [Annual Report, IVRI, Mukteswar, p.

20]. Dr. Soparkar left Mukteswar for Kasauli on the 29.3.1928 in accordance with the decision of the Advisory Committee of the Association to close enquiry at Mukteswar and to divert his attention to human side of the problem under enquiry. [Source: Annual Reports, IVRI, Mukteswar, 1924, 1927, 1928, 1933].

How to achieved one health

1. Joint educational efforts between human medical, veterinary medical schools, and schools of public health;
2. Joint communication efforts in journals, at conferences, and via allied health networks;
3. Joint efforts in clinical care through the assessment, treatment and prevention of cross-species disease transmission;
4. Joint cross-species disease surveillance and control efforts in public health;
5. Joint efforts in better understanding of cross-species disease transmission through comparative medicine research;
6. Joint efforts in the development and evaluation of new diagnostic methods, medicines and vaccines for the prevention and control of diseases across species and;
7. Joint efforts to inform and educate political leaders and the public sector through accurate media publications.

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