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# THE VETERINARIAN AND HUMAN DISEASE

This afternoon, I would not pretend to offer a global vision of the veterinarian's role vis-a-vis human health. Rather, I should like to offer certain personal reflections on my own interactions with the veterinary world and to offer some thoughts as to what I perceive to be one important area which urgently demands a common agenda and cooperative effort.

My introduction to veterinary medicine coincided with my induction into the Public Health Service. The site was the Communicable Disease Center and the year 1955. The senior veterinarian at CDC was a memorable giant of a man, a former lineman for Michigan State whose friendly handshake and affectionate bear hug left one breathless--literally. What soon became apparent, however, was that this was a man with an intellect and breadth of knowledge even more awesome than his physical stature. As Chief of Surveillance and Chief of the Epidemic Intelligence Service, I found myself coping with a far broader array of infections and problems than I had even guessed existed. The one reassuring factor was that I knew that when faced with an apparently insoluble problem, I could always go to one Jim Steele and immediately get not only a current summary of all that was known about a disease but a status report of research in progress at virtually every research center and, finally, a discussion not only of the

manifestations of the disease in animals but the implications of veterinary findings to human disease as well. He certainly broadened my world and firmly impressed on me that the host range of microbes was seldom limited to we human primates, that there was much to be learned from comparative pathology and that much that was useful to know was not contained in the standard textbooks on human medicine. I was also surprised to discover that veterinarians thought much more in epidemiological terms than did my medical care colleagues. Terms like "attack rates" and "herd immunity" were far more familiar to the veterinary community than the medical one.

Now, not infrequently, I would challenge Jim with the assertion that this or that disease problem was of no concern to or had no parallel in veterinary medicine only to be refuted every time. But one day, the unbelievable occurred. As we embarked on the global smallpox eradication program, the one overriding concern we had was the question of whether there might be an animal reservoir. If there were, eradication of the disease would be difficult and probably impossible. Surprisingly, prior to deciding on a global smallpox eradication program, no one had sought to systematically probe this question. We discovered there were reports in the 19th century literature and in some journals of the 1920s and 1930s describing large die-offs of monkeys, many with pustular rash said to be smallpox-like and there were reports of captive orangutans and chimpanzees developing an illness which resembled smallpox. The reports were distressingly meager in detail and none had virological confirmation. It was known that variola had a limited mammalian host range but even the question of host range had not been extensively

challenge, rather than as a problem unique to humans or, conversely, solely as a problem of other mammals. We all are the poorer because of this.

Illustrative of the deficit related to poor communication is reflected in the history of the concept of disease eradication itself. The term "eradication" as applied to a disease found use nearly 200 years ago in expressing a wishful hope that smallpox might someday cease to exist but no effort was made until the 1950s to describe a definitive program. Indeed, the term "eradication" as applied to a specific program in human medicine dates back to 1909 when John D. Rockefeller funded a sanitary commission for the eradication of hookworm in the United States and later elsewhere in the world. Most persons have quite forgotten about this remarkable but ill-conceived effort. Suffice it to say that the program was eventually extended to 11 southern states of the U.S. and 52 countries on six continents and continued into the 1920s before it became quite clear that hookworm control, let alone eradication, was quite out of the question given the tools and resources then available.

This effort, strange though it was, was the first definitive effort to eradicate a human disease. But, it followed by 25 years the first effort to eradicate an animal disease--bovine contagious pleuropneumonia. That disease had been brought from Europe to the U.S. in 1843. Gradually it spread to the large mid-western cattle-growing areas and other countries began to embargo importations of livestock from the U.S. To deal with the problem, the U.S. Congress in 1884 created the Bureau of Animal Industry

whose specific responsibility it was to eradicate this disease over a five-year period. The term "eradication" appeared in the charter. Amazingly, the effort was successful and within the time period stipulated. Following this, one by one, a variety of other diseases were similarly dealt with--including such as glanders and piroplasmosis in the United States and rinderpest and sheep pox in Europe. What is impressive as one reads the different accounts of these initiatives is how well those responsible did their scientific homework before beginning and how well they laid out an appropriate strategy specific to the disease in question. The need for a sound science base for eradication was a lesson the medical world might well have heeded but generally failed to do.

Clearly, those engaged in eradicating an animal disease have certain advantages that we human disease eradicators do not. I'm afraid that were we to attempt to isolate large infected herds of humans for long periods there would be impossible logistical problems and probably civil revolt. And the more drastic measures of wholesale slaughter of infected herds would not be well-received by the public, I'm afraid. The point, however, is that the eradication of animal diseases became an accepted option long before this was even discussed in human medicine. For human diseases of international concern, specifically smallpox, cholera, plague and yellow fever, quarantine regulations were adopted and enforced but no mention was made of eradicating any of these four diseases until 1915 when a newly-minted Rockefeller Foundation took as its first challenge, the eradication of yellow fever--again proclaiming a global program. That campaign was destined to fail, as you know, because of the jungle reservoir of the virus.

Surprisingly, nothing whatsoever was said about the possibility of eradicating smallpox until the 1950s.

The lessons which I derive from all of this is that veterinary medicine and its practitioners have long taken a greater interest in the infectious diseases and have been better grounded in and actively supportive of epidemiology, of public health programs and of prevention generally. A most blatant local illustration is the fact that there probably aren't a dozen pediatricians in all of Baltimore who send reminder notices to their patients when immunizations are due. If there is an internist who regularly contacts patients to remind them of checkups or immunizations, I haven't met one. In contrast, I always receive a notice from my veterinarian telling me when to bring in my cat. The human medical community seems remarkably disinterested in even the simplest of prevention measures.

But because of events of the past decade, we find a markedly heightened interest in those subject areas I have noted--infectious diseases, epidemiology, surveillance and prevention. Why?

We have witnessed, particularly over the past decade, a disturbing number of new or newly emergent microbial agents including such as the human immune deficiency virus, canine parvovirus, Lyme disease, a new strain of cholera, E. Coli 0:157, Ebola, Marburg and Hanta viruses and, indeed, many more. Some, such as HIV, have proved

extremely difficult to control and have so far defied efforts to develop either a vaccine or an effective drug. Parenthetically, had we not had a number of scientists already studying the sheep scrapie virus when AIDS cases first surfaced, who knows what greater delays in diagnosing this infection might have occurred. But then we have to ask--what might we be witnessing today if HIV had been transmissible by aerosol?

The critical point which is now beginning to be appreciated is the fact that we can expect over the coming decades to have a continuing stream of new or mutant microbial agents which can inflict serious harm on humans and animals as well. It would seem probable that increasing numbers of such agents are fueled by three principal factors: 1) Throughout the world, previously remote and inaccessible habitats are being penetrated by man as never before in history as population pressures result in the settlement of new lands and as technologies for travel and exploration improve; 2) Population growth and migration is resulting in alarming rapid growth of urban areas across the world and massive crowded slums where disease organisms have unusually favorable opportunities to spread from person to person; and 3) Long distance air transportation is growing rapidly permitting the transfer of infection from one part of the globe to another in hours or days rather than weeks. In brief, we are contending with a whole new set of circumstances, unique to this age. Now, as never before, we are compelled to take an active interest in people and problems throughout the world--if not for humanitarian reasons, for reasons germane to our own survival. As Dr. Josh Lederberg, formerly President of Rockefeller University, pointed out: "Man's only

competition for dominion of the planet are the microbes--and the outcome is by no means a foregone conclusion."

If we are to deal effectively with the challenges posed by the new and emerging infections, several initiatives will be needed: First, we will need to develop far more effective mechanisms to detect at the earliest possible time, unusual disease problems and to characterize them quickly. This will require the development of much more elaborate and responsive surveillance networks than we now have and networks which span diseases of both animals and man. As you know, for a number if diseases, animals may serve as a sentinel host. The arthropod-borne encephalitides are illustrative. And recently, we have had the report of a new morbilli virus in Australia causing serious illness in horses and at least two such cases in man. But even when illness in animals is not apparent, the natural reservoir and mammalian host range must be elaborated quickly if appropriate preventive measures are to be taken. The speed with which the Hanta virus problem was sorted out was exemplary, and this occurred because of a joint effort involving epidemiologists, mammologists, veterinarians and virologists.

A second initiative will address the need for creation of an appropriate private-public sector partnership which will facilitate the rapid development, testing and production of vaccines and/or drugs appropriate to the threat posed by a new microbial agent. Why a public sector part? The cost of developing and bringing to market a new vaccine or drug for humans is very great indeed, amounting to as much as $100 to $200

million. Manufacturers, understandably, are reluctant to make such a commitment unless there is reasonable certainty that they can realize a return on their investment. Thus, there is little inclination to invest much in basic and developmental research until a disease threat has grown large enough to indicate that there would be a large enough market. By then, it is very likely too late. Some sort of solution through a public-private partnership is needed which would include manufacturers for obvious reasons but also because of veterinary products. Some, in fact, may have important human applications which we have not explored. One wonders how many other ivermectin-like products there might be which could have a far wider application. Ivermectin, as you know, has long been used as a prophylactic against dog hookworm and for treatment of a variety of animal parasites but within the past decade, it has been found to be highly effective against onchocerciasis, the so-called river blindness. Recent publications document its effectiveness in treating filariasis (one form being the elephantiasis). This month's New England Journal of Medicine documents its effectiveness in treating scabies!

Finally, an initiative needs to be mounted to strengthen our base of research and training across the spectrum of specialties dealing with microbial agents. Over recent decades we as a nation, like most other industrial nations, have operated on the premise that the microbial diseases are effectively problems of the past. Accordingly, we have channeled a large proportion of our research and training dollars into programs designed to deal with cancer and various chronic and debilitating diseases. Surely, this is a needed investment but, in so doing, those activities which were primarily responsible for the

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longevity and good health we now enjoy have been allowed to languish--specifically, microbiology, epidemiology, and public health. The epidemic of AIDS has caused us to reexamine our assumptions. The recognition of the threat of other more serious agents is causing now a serious reexamination of priorities. In my view, there is now cause for the development of teams of professionals within the broader encompassing disciplines of epidemiology/microbiology/public health using DVMs and MDs alike. We can't afford the luxury or potential risks of dealing with these problems in different compartments of human and veterinary medicine. We must jointly address the agenda which encompasses the world of microbes and our defenses against them.