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The impact of influenza virus ecology on pandemic preparedness

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It is now recognized that the global reservoirs of influenza A viruses are in the aquatic birds and bats. For many years there was reluctance to accept the relevance of influenza viruses in natural reservoirs as the source of genes for influenza viruses that are of relevance to veterinary and human public health. Since the early 1990s, there have been multiple events, including emergence of highly pathogenic H5N1 and low pathogenic H7N9, the emergence of pandemic 2009 H1N1 influenza viruses in humans and the detection of multiple reassortants in swine and more recently the detection of multiple different reassortants of the H5 clade of influenza viruses in domestic poultry. These events leave no doubt about the relevance of the influenza gene pool in natural reservoirs. The rapid intercontinental transmission of clade 2.3.4.4 H5 influenza viruses raises the question of whether there has been a paradigm shift in the ecology of influenza viruses in wild waterfowl. The available evidence suggested that highly pathogenic influenza viruses were not perpetuated in wild aquatic birds. Has this changed? Long term surveillance of influenza viruses in wild aquatic birds in Alberta, Canada and Delaware Bay, United States showed peaks of H7N3 activity in wild birds before the emergence of highly pathogenic H7N3 viruses in Chile, Canada and Mexico. Genomic studies of the H1N1 influenza viruses from aquatic birds at Delaware Bay suggest that the H1N1 influenza viruses from shorebirds may have the unique property of ferret to ferret aerosol transmissibility. The importance of influenza viruses from natural reservoirs in pandemic preparedness is still grossly under-appreciated. Genomic analysis of the influenza viruses in natural reservoirs is needed for future pandemic preparedness.

Biography

Robert G Webster received his BSc and MSc in Microbiology from Otago University in New Zealand. In 1962, he earned his PhD from the Australian National University and spent the next two years as a Fulbright Scholar working on influenza in the Department of Epidemiology at the University of Michigan, Ann Arbor. He is the Rose Marie Thomas Chair of the Virology Division, Department of Infectious Diseases, St. Jude Children's Research Hospital, Director, WHO Collaborating Center on the Ecology of Influenza Viruses in Lower Animals and Birds. He is Professor in the Division of Virology, Department of Infectious Diseases at St. Jude Children's Research Hospital, and Director of the World Health Organization Collaborating Center for Studies on the Ecology of Influenza in Animals and Birds. His interests include the emergence and control of influenza viruses, viral immunology, the structure and function of influenza virus proteins, and the development of new vaccines and antivirals. The major focus of his research is the importance of influenza viruses in wild aquatic birds as a major reservoir of influenza viruses and their role in the evolution of new pandemic strains for human and lower animals. His curriculum vitae comprise over 480 original articles and reviews on influenza viruses. He has trained many scientists who now contribute to our understanding of the evolution and pathogenesis of influenza.

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