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# Emerging Diseases and Virology: Towards New Approaches and Insights

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The ***Journal of Emerging Diseases and Virology*** is being launched at a fascinating time for virologists and the discipline of virology. Unfolding before our eyes is the appearance of many new emerging diseases that are significant health problems. Not surprising, viruses are the causative agents or cofactors of a significant number of these emerging diseases. With the advent and wide use of next generation sequencing, many previously uncharacterized viruses or viruses that do not grow well in cultured cells are being discovered. A number of viruses associated with emerging diseases are also zoonotic, which complicates virus transmission, controlling the spread of these viruses, and developing effective strategies to prevent their spread. As we continue to go where no man has gone, it is likely that more emerging viral diseases will be unleashed and transported to new areas.

Emerging viruses as well as many established viruses need to be studied more extensively to develop effective vaccines or better therapeutic strategies, including the development of antiviral drugs to control their spread and prevent disease. Even a virus such as influenza, which has been intensively studied, is still a challenge to accurately develop good annual vaccines against. HIV, which has also been extensively studied, continues to be a challenge to develop a vaccine that protects against all of the known variants that are circulating in the human population. Vaccinology will continue to be a growing enterprise because it may be the only means by which many viruses can be tamed and not pose a threat to their respective hosts. It is also of interest to better understand how the defense mechanisms of the host control viruses because these studies may lead to the development of novel antiviral therapeutic strategies. These studies may also lead to the identification of viral genes that interfere with immune responses. With the advent of new and improving technology, there is hope that the development of vaccines and antiviral drugs will be streamlined and become available to the public sooner than in the past.

It is becoming clear that viruses can also serve as cofactors in important poly-microbial diseases. Many human respiratory diseases are poly-microbial infections that involve multiple agents and include a stress-related predisposition to disease. Two examples of poly-microbial multi factorial diseases in the human respiratory tract are influenza-associated bacterial pneumonia and otitis media. Following infection with influenza virus, normal bacterial flora in the respiratory tract, including *Streptococcus pneumoniae*, *Haemophilus influenzae*, and *Staphylococcus aureus*, can cause clinical disease due to impaired immune functions and damaged mucosal surfaces in the respiratory tract. Bacterial infections were thought to cause otitis media (inner ear infections); however, bacteria cannot be cultivated from middle-ear fluid in many cases. It is now well established that predisposition to bacterial otitis is media by influenza virus, rhinovirus, respiratory syncytial virus, and newly emerging viruses such as human bocavirus and human metapneumovirus. Finally, bovine respiratory disease complex (BRDC) is a poly-microbial disease clinically characterized by acute bronchopneumonia, and is frequently observed in feedlots or dairy farms where cattle are found in high density. BRDC requires synergistic interplay between stress, viruses, and commensal bacteria. The viruses that are known or thought to be cofactors of BRDC include bovine herpesvirus 1, bovine viral diarrhea virus (a pestivirus), bovine respiratory syncytial virus, bovine corona viruses, and parainfluenza-3 virus. With respect to otitis media and BRDC, viruses cause changes in host pharyngeal epithelia that enhance bacterial adherence and colonization as well as affecting host immune function. Understanding the role that viruses play in poly-microbial diseases is an intriguing and exciting are of research.

All viruses (big and small, RNA or DNA) are complex intracellular organisms and as such are "alive" only after they infect a suitable host. We have learned much about gene functions of the host by studying viruses: for example oncogenes, tumor suppressor genes, signal transduction pathways, splicing, and mechanisms of transcription and replication. Original research articles that examine basic principles of molecular virology (genome replication, gene regulation, virus-host interactions, oncogenesis, assembly and transmission, genetic diversity and evolution, immune responses, and pathogenesis) in animals, plants, bacteria, fungi, and other single cell organisms are crucial because this basic knowledge has the potential to be translated into more effective vaccines and antiviral therapies. This basic knowledge may also be utilized to develop viruses as vectors or oncolytic therapeutic agents.

In summary,there are many aspects of viruses that have not been well characterized and require additional research to unravel their intricate and complicated biological properties. Although the ***Journal of Emerging Diseases and Virology*** has a focus on emerging diseases, it also welcomes studies that enhance our understanding of how viruses cause disease, evolve, and how we can interfere with their transmission and disease causing properties.

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