Paramyxovirus receptor interactions: Importance in understanding cross species infection, vaccine design and disease treatment

Viruses make use of cell receptors to both enter the cells and regulate cellular processes. We examined 2 important aspects of virus receptor interactions in members of the Paramyxoviridae, measles virus (MV), veterinary viruses (also in morbillivirus genus) and respiratory syncytial virus (RSV), a major cause of bronchiolitis in infants. MV can cause severe complications such as giant cell pneumonia and acute post measles encephalitis. More rarely fatal infections of the CNS, subacute sclerosing panencephalitis and in immunosuppressed individuals, measles inclusion body encephalitis occur. The World Health Organization (WHO) has set goals towards the complete eradication of MV in at least five WHO regions by 2020. We determined that both MV and RSV infection up-regulates TRPV1, TRPA1 and ASICS 3, airway receptors implicated in cough hypersensitivity and broncho-constriction in asthma and chronic obstructive pulmonary disease. We and others have also shown that veterinary morbilliviruses share common cell entry receptors with MV raising the risk of zoonotic infection. MV is thought to have evolved from the now eradicated cattle morbillivirus, rinderpest, by entering the human population during cattle domestication. This highlights the potential consequences of complete withdrawal of MV vaccination after eradication. MV vaccine is live attenuated and has very low risk of reversion, but is unlikely to be acceptable in a MV free world and may only give partial protection against morbillivirus zoonotic infection. Formalin fixed MV and RSV vaccines were used for a period in the 1960's, but induced an altered immune response and death of some children following later infection. Based on our understanding of cross species infection new vaccines will be required. In conclusion, receptors are important players in cross-species infection as well as drug targets. Approaches to inhibit airway receptors during virus exacerbations, cell entry receptors for MV and veterinary morbilliviruses and vaccine approaches will be discussed.

Biography

S Louise Cosby was appointed as the Head of Virology Branch at the Agri-Food and Biosciences Institute, UK, in 2015. She was the Chair of Microbiology in Queen’s University Belfast from 2002 and remains an Emeritus Professor. She is a Fellow of Royal College of Pathologists (London) and Fellow of the Royal Society of Biology, UK. She has served/currently serves on grant/editorial boards; BBSRC, UK; Chair/Member, Science Foundation Ireland; Deputy Chair Professional Development Committee, Microbiology Society, UK, Associate Editor, Journal of Neurovirology, USA; Review Editor, Frontiers in Microbiology; External Assessor for Appointments and Promotions in Medical Microbiology, University of Malaysia. Her research interests are: virus pathogenesis including, virus-receptor interactions, virus-induced immunosuppression and vaccine development. Her work has focused on paramyxoviruses of both human and veterinary interest, with publications/grant funding in this area.

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