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Measles virus: Complications of infection and future threats from related veterinary viruses

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The World Health Organisation has set regional elimination goals for measles virus (MV) eradication to be achieved by 2020 or earlier. A major question is whether an opportunity for veterinary virus infection of humans may arise when MV is eradicated and if vaccination is discontinued. Lessons have been learned from animal to human virus transmission i.e. human immunodeficiency virus (HIV) and more recently from severe acute respiratory syndrome (SARS) and avian influenza virus infections. We are therefore alerted to the risk of zoonosis from the closely related veterinary viruses in the same morbillivirus genus as MV. Of most concern with regard to zoonosis is the recently reported fatal infection of primates with canine distemper virus (CDV). These animals displayed neurological symptoms and pathology similar to CDV infection in dogs.To allow a morbillivirus to initially infectanother species, specific cell entry receptors must be present in relevant cell types and tissues of the host. Signalling lymphocyte activation molecule (SLAM) found on immune cell types has been identified as a receptor for all morbillviruses. More recently poliovirus receptor related 4 (PVRL4, also known as nectin 4), found on the basolateral surface of polarised epithelial cells, has been identified as a receptor for MV and for CDV in dogs. We have recently reported that PVRL4 is up-regulated in human brain endothelial cells in culture following MV infection(Abdullah et al. 2013, J. NeuropatholExpNeurol 72: 681-696).and therefore could have a role in cell entry into the CNS through the blood brain barrier. However, a further receptor would be required to allow neuronal infection. By screening a phage antibody library for antibodies which block MV infection of human neuronal cells we have identified a putative receptor (molecule X) in neuronal cells.When non-permissive Vero cells were transfected to express this molecule they became susceptible to WT MV. We have also carried out immunostaining in MV infected and non-infected regions of human brain tissue. Molecule X is highly expressed in the human CNS. We are currently investigating if this molecule can also be used as a receptor by CDV. If both PVRL4 and receptor X are used by CDV for CNS infection this will raise major concerns for possible human infection with this highly neurovirulent veterinary virus.

Biography

Sara Louise Cosby is a graduate (B.Sc. and Ph.D. in Microbiology) of Queen's University Belfast and a member of staff for over 20 year. She is a Fellow of the Royal College of Pathologists (London) and a Fellow of the Society of Biology (UK). She was a visiting associate professor in Cornell University USA and a visiting scientist at the institute of Animal Health, Pirbright, UK. She was appointed to the Chair of Microbiology in 2002.); Previous/present board membership of the Biochemistry and Cell Biology Committee, BBSRC, UK; Biochemistry Board, Science Foundation Ireland (previous chair of a Bioscience panel); Infections and Immunity and Host Defence Panel, Health Research Board, Ireland; GersonLerman's Group's Healthcare Advisor's Board, USA. SLC is an Associate Editor for the Journal of Neurovirology;a review editor for Frontiers in Microbiology; an external assessor for appointments and promotions in Medical Microbiology, University of Malaysia; assessor for grant applications for the European Commission.

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