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Universal viral vectors for prophylactic vaccines against infectious diseases and for therapeutic vaccines against persistent viral infections

Vaccination against infectious agents has proven to be the best way to prevent infectious diseases. We have created genetically modified recombinant M gene mutants of the Indiana serotype of vesicular stomatitis virus (VSVInd) and of the New Jersey serotype of VSV (VSVNJ) as universal vectors for the development of recombinant virus vaccines. The priming vaccine vector should be antigenically distinct from the boost vaccine vector in order to maximize the boost effects. rVSVInd with the mutations of G21E/M51R/L111A in the M protein (VSVIndGML) and rVSVNJ with the mutations of G22E/M48R+M51R in the M protein (rVSVNJGMM) was attenuated to a degree that mice injected with one million of these genetically modified infectious viruses directly into the brain showed no neurological signs or any other adverse effects. In contrast, 1,000 infectious wild-type VSV kills mouse within 4 days. Foreign genes inserted into these VSV vectors elicit strong B cell and T cell immune responses against the inserted gene products when we prime animals with rVSVInd(GML) followed by boost immunization with rVSVNJ(GMM) carrying the same genes of interest. Animals can tolerate over 109 PFU of recombinant infectious VSVInd(GML) and recombinant infectious rVSVNJ(GMM) and showed high levels of gene expression and adaptive immune responses. Our results show clearly that rVSVInd (GML) priming and rVSVNJ (GMM) boosting is the best way to induce ultimate humoral and cellular immune responses. I will describe the advantages of these dual serotype VSV vectors for future vaccine development against infectious diseases. This is a platform technology applicable for many types of vaccine development.

Speaker Biography

C Yong Kang has received his PhD from McMaster University in Canada in 1971 and his DSc degrees from McMaster University and from Carleton University. He took his three-year Postdoctoral training at the University of Wisconsin, Madison, USA. He has served as a Professor of Microbiology at the University of Texas, Southwestern Medical School in Dallas, Professor and Chairman of the Department of Microbiology and Immunology at University of Ottawa, Faculty of Medicine, Dean of Science at the University of Western Ontario, and currently is serving as Professor of Virology in the Department of Microbiology and Immunology, Schulich School of Medicine and Dentistry at the University of Western Ontario. His research in molecular virology includes the development of antiviral therapeutic agents and efficacious vaccines against various human viral diseases. He has published 297 scientific papers in fields of virology, medicine, and molecular biology. He holds nine international patents. He has received numerous prizes including Ho-Am Prize in Medicine in 1999 and Queen Elizabeth II Diamond Jubilee Medal of the Governor General of Canada in 2012. He is an elected Life-time Fellow of the Royal Society of Canada, Academy of Science and an elected Life-time Member of the Korean Academy of Science and Technology.

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