Hyeran Won et al., J Vaccines Vaccin 2018, Volume 9
DOI: 10.4172/2157-7560-C2-066

Cross-neutralization between vaccine and circulating wild-type mumps viruses in Korea

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Mumps is a contagious disease caused by the mumps virus and can be preventable with measles, mumps and rubella (MMR) vaccine. MMR vaccine effectiveness has been estimated at 79% for 1 dose and 88% for 2 doses according to the Immunological Basis for Immunization Series Module 16: Mumps, World Health Organization (WHO). Despite the high vaccination coverage, mumps outbreaks still occur globally in vaccinated populations suggesting waning immunity or antigenic differences between vaccine strains and circulating wild-type viruses. In Republic of Korea, after the introduction of the national immunization programs, cases of mumps have become sporadic. In addition, genotype I, H, and F have emerged since its initial isolation. To investigate this concern, we selected genotype I, H and F wild-type mumps virus strains circulated in Republic of Korea from 1998-2017 and analyzed amino acid changes in HN gene which is the major target for neutralizing antibodies. The analysis of HN amino-acid sequence data showed that there are no changes in their glycosylation sites but 4 or 5 differences in neutralizing epitope sites of haemagglutinin-neuramidase(HN) gene between Korean isolates and genotype A vaccine strain. Furthermore, we measured both mumps virus specific IgG titer and a rapid focus reduction neutralization test (FRNT) titres with Korean isolates and sera (n=50) obtained from children aged 1-2 years after receiving 1 dose of (MMR) vaccine. The FRNT titres after receiving 1 dose of MMR vaccine were significantly lower against genotypes I, H and F than against the genotype A vaccine strain [genotype F and H: $p<0.001$, genotype I: $p<0.01$]. This finding will possibly contribute to the recurrence of mumps outbreaks in vaccinated populations depending on the degree of conservation or genetic differences of HN gene. Further studies exploring this issue are needed to achieve the elimination of mumps.

Biography

Hyeran Won received his doctoral degree at Department of Biomedical Science from Kyung Hee University, Republic of Korea and worked as a postdoctoral researcher at Cambridge Institute for Medical Research, University of Cambridge, UK in a laboratory of Dr David C Rubinsztein focusing on the role of autophagy in neurodegenerative disease. Currently, he is working as a senior researcher at division of vaccine research, Center for Infectious Diseases Research, Korea National Institute of Health (KNIH), Korea Centers for Disease Control & Prevention, Republic of Korea. His main interests are: to understand the genetic characteristics of Mumps viruses in Korea: to develop the MMR vaccine.

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