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GMMA-based vaccine candidate to fight Glässer's disease

ABSTRACT *Glaesserella parasuis* is a major swine pathogen causing Glässer's disease, which leads to significant economic losses in the swine industry. This study investigates the potential of glycoconjugate vaccines utilizing outer membrane vesicles (GlycOMVs) to induce protective immunity against *G. parasuis*. GlycOMVs were generated by expressing *G. parasuis* capsular polysaccharides (CPS) in *Escherichia coli* strain JH8033 resulting in three formulations: OMV-CPS4, OMV-CPS5, and OMV-CPS14, along with a trivalent formulation (OMV-TRI) containing all three CPS types for a vaccine trial in a mouse model. OMV-TRI provided the most robust protection, achieving 100% survival against serovars 5 and 14, and 60% survival against serovar 4. Complement-mediated bactericidal assays confirmed the functional activity of antibodies induced by GlycOMVs, with significant bactericidal effects observed for OMV-CPS4 and OMV-CPS5. Enhanced macrophage uptake of *G. parasuis* indicated that these antibodies facilitate pathogen clearance through opsonization. Additionally, cytokine profiling revealed that GlycOMVs induced strong Th1, Th2, and Th17 responses, indicating comprehensive and multifaceted immune activation. In conclusion, this study demonstrates the efficacy of GlycOMVs, particularly the OMV-TRI formulation, in providing protective immunity against diverse *G. parasuis* serovars. These findings support GMMA based vaccine as a promising vaccine delivery system, offering a strategic approach to control *G. parasuis* infections.

SPEAKER

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Prof. Yung-Fu Chang completed his veterinarian training at National Pingtung University of Science and Technology, Taiwan. He then spent five years working as an assistant Veterinary Pathologist at Taiwan Provincial Institute for Animal Health. Prof. Chang received his M.S. in veterinary science from the University of Idaho and his Ph.D. in Veterinary Microbiology from Texas A&M University, College of Veterinary Medicine. After that, he spent 5 years as a research associate and an assistant research scientist at Texas A&M University, College of Medicine. In 1987, he became a diplomat of the ACVM, certified in Bacteriology/Mycology, Immunology, and Virology subspecialties. In 1989, he joined Cornell University, College of Veterinary Medicine as an assistant professor and became a full professor in the Department of Population Medicine and Diagnostic Sciences in 2003. In 2003, he spent a sabbatical leave at Dr. Gary Schoolnik's laboratory at Stanford University, School of Medicine. Prof. Chang performs research on infectious diseases of animals (including zoonotic diseases), resulting in over 290 publications in referral journals. His research focused on a spectrum of research from basic bacterial pathogenesis, animal modeling of infectious diseases, vaccine development, host defense mechanisms, functional genomics & proteomics, and molecular diagnosis. Recently, he has focused on the development of a nanoparticle vaccine delivery system for mucosa immunity. Prof. Chang has trained many graduate students and postdoctoral research associates, and most of them are in faculty positions at an academic institute. He has also trained more than 50 visited scientists from various countries. He currently serves as an Editorial Board member of *Mbio*, *PLoS NTD*, *PLoS ONE*, *Bioengineered*, and the *Journal of Veterinary Science*.