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Efficient expression of porcine circovirus type 2 virus-like particles in Escherichia coli

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Porcine circovirus 2 (PCV2) is considered to be the etiologic agent responsible for porcine circovirus associated disease (PCVAD) that frequently affects growing pigs at 5-18 weeks of age and can lead to significant negative impacts on profitability of pork production. The capsid (Cap) protein of PCV2 is a major candidate antigen for development of recombinant vaccine and has been successfully used as a vaccine to control porcine circovirus associated disease (PCVAD). In our study, full-length *ORF2* gene with codon-optimized for *E. coli* was synthesized and inserted into the PTF9 (+) expression vector to improve expression of recombinant Cap protein (rCap). A large amount of soluble rCap protein was obtained. The recombinant Cap protein expressed by *Escherichia coli* (*E. coli*) has the ability to self-assemble into virus-like particles (VLPs) *in vitro*; it is particularly an opportunity to develop the PCV2 VLPs vaccine in E coli. In this report, a highly soluble Cap-tag protein expressed in E coli was constructed with a p-TF9 expression vector with a fusion tag of TF9. The recombinant Cap was purified using Ni2+ affinity resins and the tag was removed by the TEV protease. Simultaneously, the whole native Cap protein was able to self-assemble into VLPs *in vitro* when viewed under an electron microscope. The Cap-like particles had a size and shape that resembled the authentic Cap. The result could also be applied in the large-scale production of VLPs of PCV2 and could be used as a diagnostic antigen or a potential VLP vaccine against PCV2 infection in pigs. We have, for the first time, utilized the Fh8 fusion motif to successfully express the complete Cap protein of PCV2 in E coli. After the cleavage of the fusion motif, the nCap protein self-assembled into VLPs, which can be used as a potential vaccine to protect pigs from PCV2-infection.

Biography

Guanggang Qu is interested in Preventive Veterinary Medicine, Veterinary Biotechnology and Biological Products. He is particularly interested in developing innovated vaccines by *E. coli* expression system. Currently, he is an Assistant Professor at Shandong Binzhou Animal Science & Veterinary Medicine Academy and Vice Director at Shandong Binzhou Research and Development Centre of propolis vaccine for livestock and poultry. He was a Visiting Scientist at Bhabha Atomic Research Centre and at U.S. Department of Agriculture of USA from 2011 to 2013. He completed his Doctoral Degree at Jilin University, China.

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