PCV2 trigger apoptosis of PK-15 cells through the PLC-IP3R-Ca2+ signaling pathway

Shuo Wang[1], Chen Li[2], Panpan Sun[3], Jianli Shi[4], Xiaoyan Wu[3], Chang Liu[2], Zhe Peng[4], Hong Han[5], Shaojian Xu[4], Ying Yang[2], Yao Tian[2], JiaXin Li[2], Hong-bin He[6], and Jun Li[4]

[1]Affiliation not available
[2]Division of Swine Diseases, Shandong Provincial Key Laboratory of Animal Disease Control & Breeding, Institute of Animal Science and Veterinary Medicine Shandong Academy of Agricultural
[3]1 Shandong Provincial Key Laboratory of Animal Disease Control & Breeding, Institute of Animal Science and Veterinary Medicine, Shandong Academy of Agricultural Sciences, Jinan, China
[4]Animal Science and Veterinary Medicine
[5]Shandong Academy of Agricultural Sciences
[6]Shandong Academy of Agricultural science

November 20, 2020

Abstract

Phospholipase C (PLC) is a key enzyme in the cell membrane. PLC hydrolyses phosphatidylinositol 4, 5-bisphosphate (PIP2) to generateinositol 1,4, 5-triphosphate (IP3) and diacylglycerol (DAG) that regulates a variety of cellular processes. Evidence indicates the pivotal role of PLC and inositol 1,4,5-trisphosphate receptor(IP3R) in influencing Ca2+ release from the endoplasmic reticulum(ER).At the same time, the imbalance of Ca2+ will stimulate endoplasmic reticulum stress(ERS), leading to cell apoptosis. Viral infection could triggers host defense through apoptosis of the infected cells.However, it is not clear how porcine circovirus type 2 (PCV2) induces apoptosis by affecting Ca2+ homeostasis. We show here that PCV2 infection induces the increased cytoplasmic Ca2+ level and apoptosis.We also found that the ER swelling of PK-15 cells after viral infection by transmission electron microscopy. Furthemore, the activation of PLC-IP3R-Ca2+ signaling enhanced apoptosis in infected PK-15 cells. Taken together,our findings suggest that PCV2 infection trigger ERS of PK-15 cells via the PLC-IP3R-Ca2+ signaling pathway to promoted the release of intracellular Ca2+, and led to cell apoptosis.

Hosted file

`manuscripts_2020.11.19.pdf` available at https://authorea.com/users/374885/articles/494096-pcv2-trigger-apoptosis-of-pk-15-cells-through-the-plc-ip3r-ca2-signaling-pathway