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The Characteristics of Porcine Immune Synapse via Flow Cytometry and Transmission Electron Microscope

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Abstract : An understanding of pathogens and the immune system has played an utmost important role in agricultural research for the development of vaccinations. The immunological synapse, cell to cell interaction play a crucial role in triggering the body's immune system, such as activation between antigen-presenting cells (APCs) and different subsets of T-cell. If these interactions are regulated appropriately, the host has the ability to defend itself against a wide spectrum of infectious pathogens. The aim of this study is to establish and to characterize a porcine immune synapse system by co-culturing T cell/APC. In this study, blood samples were collected from specific-pathogen-free piglets, and peripheral blood mononuclear cells (PBMC) were separated by using Ficoll-Pague. The PBMC were then stained with CD4 (FITC) and CD25 (PE) antibodies. Different subsets of T cells sorted by fluorescence-activated cell sorting flow cytometer were co-cultured for 24 hrs with alveolar macrophages, and the profiles of cytokine secretion and mRNA transcription levels of Toll-like receptors were examined after. Results showed that the three stages of immune synapse were clearly visible and identified under both transmission and scanning electron microscope (TEM and SEM). The significant interaction differences in toll-like receptor expressions within the co-cultured cell system were observed. The TLR7 mRNA expressions in CD4+CD25- cells were lower than those in CD4+CD25+ and CD4 -CD25+. Interestingly, the IL-10 production levels in CD4+CD25- cells (7.732 pg/mL) were significantly higher than those of CD4+CD25+ (2.636 pg/mL) and CD4 -CD25+ (2.48 pg/mL). These findings demonstrated that a clear understanding of the porcine immune synapse system can contribute greatly for further investigations on the mechanism of T-cell activation, which can benefit in the discovery of potential adjuvant candidate or effective antigen epitopes in the development of vaccinations with high efficacy.

Keywords : antigen-presenting cells, immune synapse, pig, T subsets, toll-like receptor
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