CHAPTER 1

Introduction

Streptococcus suis is a zoonotic bacterium and one of the most important pig pathogen worldwide. They can be divided into 33 serotypes according to the antigenic differences of capsular polysaccharide (Hill *et al*., 2005). The most prevalent serotypes of *S. suis* found in pigs and human is serotype 2 and other serotypes that can cause diseases including serotypes 1, 2, 3, 7, 9, 14 and 1/2 (Zhang *et al*., 2011). *S. suis* often localize in nasal cavities and tonsils of healthy pigs without symptom but sometimes *S. suis* can cause several diseases including septicemia, meningitis, endocarditis, and arthritis in piglets. Moreover, *S. suis* can be transmitted from pigs to humans and cause diseases in human such as meningitis, septicemia and streptococcal toxic-shock syndrome (STSS) (Perch and Lind, 1968; Lun *et al*., 2007). *S. suis* transmits to human via close contact or direct contact with pigs, consumption of raw pig blood or undercooked meat and though abrasions of the skin but the transmission between human to human has not yet been reported. Although many virulence factors of *S. suis* including cell-associated proteins or extracellular proteins have been proposed (Fittipaldi *et al*., 2012), the role of the mechanisms of these virulence factors are still uncertain.

The mechanism of pathogenesis of *S. suis* had been proposed that the bacteria can adhere and invade through the epithelial cells to reach the blood stream. *S. suis* can also be uptaken by monocytes and macrophages and entered to the bloodstream within circulating cells. After that, *S. suis* could migrate from the blood stream to the central nervous system (CNS) by 2 ways; firstly, in the form of monocyte-associated (bound and/or intracellular) bacteria and, secondaly, as free bacteria to cross the blood-brain barrier (BBB) by induced local cytokine production via other unknown mechanism that cause inflammation in membranes of brain (Gottschalk and Segura, 2000).

Previously, the proteomics of cell-associated as well as extracellular proteins of *S. suis* serotype 2 had been investigated as, whole proteins, secretory proteins, surface interacting proteins. However, none of those studies had investigated the proteins of *S. suis* when it encounters within phagocytic cells, which have been suggested to play a role in bacterial pathogenicity. In 2002, Segura and Gottschalk evaluated the capability of *S. suis* serotype 2 to adhere the murine macrophage cell line J774 and cytotoxic effects to macrophage cells. They hypothesized that attachment of bacteria to phagocytes could play an important role in the pathogenesis of *S. suis* infection by allowing bacterial dissemination and causing a bacteremia or septicemia. Therefore, investigation of *S. suis* interactions with phagocytic cells using proteomic approach would help clarifying the strategies of the bacterium used to counteract the host. In this study, the proteomes of intracellular bacteria invaded in murine and human macrophage cell lines (RAW 264.7 and U 937) were analyzed and compared with those of the bacteria grown in culture medium.

The aim of this study was to detect the important proteins of *S. suis* that may be associated with the pathogenesis of *S. suis* serotypes 2 and 14 in condition that encounters to the macrophages. Proteins or peptides isolated from bacteria were analyzed by using Liquid chromatography-mass spectrometry (LC-MS/MS) to identify proteins and analysis on database. The patterns of proteins or peptides produced by 2 serotypes were compared. The results demonstrated the types and functions of proteins that are differentially expressed under exposure to macrophages, which may lead to better understanding about the mechanisms or pathogenesis of *S. suis* and the interaction between this bacterium and host cells.