

**28 Oct 2025****12-1pm****MD9-01-02H****MD9 Physiology –
Workshop 1 and 2****A/Prof Chng Shu Sin**Department of Chemistry
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Mechanisms for maintaining bacterial outer membrane lipid homeostasis and asymmetry

Abstract

Diderm bacteria, such as Gram-negative bacteria and mycobacteria, contain two lipid bilayers in their cellular envelopes – an inner membrane (IM) comprising mostly of phospholipids (PLs), and an outer membrane (OM) that additionally contains unique glycolipids (lipopolysaccharides (LPS) in Gram-negative bacteria and mycolic acids in mycobacteria). The OM is essential for growth in these organisms. Furthermore, the OM serves as an effective permeability barrier that in part allows Gram-negative bacteria and mycobacteria to survive in harsh environments, and renders them intrinsically resistant to many antibiotics. Despite the importance of the OMs in these bacteria, the processes that assemble these bilayers, in particular lipid transport, are not well understood. In this seminar, I will describe our work in understanding and characterizing lipid trafficking pathways in *Escherichia coli*, and discuss how these systems function in maintaining lipid homeostasis in the Gram-negative OM.

Bio

Associate Professor Shu-Sin Chng completed his Ph.D. degree in Chemistry and Chemical Biology at Harvard University. Following a short postdoctoral stint at the Harvard Medical School, Shu-Sin returned to the National University of Singapore (NUS) in 2011 as an Assistant Professor in the Department of Chemistry, and was appointed Principal Investigator at the Singapore Center for Environmental Life Sciences Engineering (SCELSE) since 2012. In 2018, Shu-Sin was promoted to Associate Professor with tenure. His research group has established a strong reputation and interest in elucidating the mechanisms of cell envelope biogenesis and inter-membrane lipid trafficking in Gram-negative bacteria and mycobacteria, and in characterizing relevant protein machines in these bacteria for the development of new antibiotics. For his exceptional work, Shu-Sin has received the 2019 Walter Shaw Young Investigator Award in Lipid Research, a recognition conferred by the American Society of Biochemistry and Molecular Biology. Beyond research, Shu-Sin is a passionate educator who adopts an active learning classroom approach in his courses, and has won multiple NUS Annual Teaching Excellence Awards, including the Honour Roll. In addition, he currently serves as Vice Dean (Student Life and Alumni Relations) at the Faculty of Science, and the NUS Associate Director for SCELSE.