SEMINAR

The divisome but not the elongasome organizes capsule synthesis in *Streptococcus pneumoniae*.

The bacterial cell envelope is a complex, multi-layered structure. Precise coordination of its synthesis is required to ensure every layer is faithfully produced. Many gram-positive bacteria conceal peptidoglycan (PG) and underlying antigens with capsular polysaccharides (CPS). Yet, how CPS synthesis integrates with PG synthesis remains unclear. In *Streptococcus pneumoniae*, the peripheral and septal PG is produced respectively by the elongasome and the divisome. We show that CPS synthesis initiates from the division septum and propagates along the long axis of the cell, organized by the bacterial tyrosine kinase system CpsCD. CpsC and the rest of the CPS complex are recruited to the septum by proteins associated with the divisome but not the elongasome. The CPS complex assembly starts with CpsCD, then CpsA and CpsH, the glycosyltransferases, and finally CpsJ. Remarkably, targeting CpsC to the cell pole is sufficient to reposition CPS synthesis, leading to diplococci that lack CPS at the septum. We propose that septal CPS synthesis is important for chain formation and complement evasion, thereby promoting survival inside the host.

Speaker: Dr. Lok-To (Chris) Sham

Department of Microbiology and Immunology
Yong Loo Lin School of Medicine
National University of Singapore

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Contact:

Yasuhiko Horiguchi : Dept. Mol. Bacteriol., RIMD, horiguti@biken.osaka-u.ac.jp

Atsushi Taguchi : SANKEN, taguchi@sanken.osaka-u.ac.jp