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Deciphering the transport mechanism of PQS across cell envelope of *P. aeruginosa*

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Host: Dr Bi Xuezhi

Seminar Abstract

Pseudomonas Quinolone Signal (PQS) is a quorum sensing signal of *Pseudomonas aeruginosa* which plays a vital role in virulence regulation and the development of antibiotic resistant biofilms. While it is known that PQS can induce the formation of outer membrane vesicle as a vehicle for its trafficking in the bacterial communities, very little is known about the bidirectional transport of PQS between the bacterial inner and outer membranes. Due to the hydrophobic nature of PQS, we hypothesized that its transmembrane transport would require specific protein machineries. To understand the uptake and export processes of PQS, we generated bifunctional PQS (bPQS) analogs through metabolic labelling for the profiling of PQS-binding proteins. Through preparative HPLC, we have successfully isolated a bPQS probe which is biologically active and binds the PQS receptor, PqsR *in vitro*. The probe captured several putative PQS transporters and proteins from diverse functional families from a pool of DDM-solubilised membrane proteins. Functional validation studies performed on selected groups of putative PQS transporters showed that a probable ABC transporter and two RND efflux systems are involved in the uptake and export process of PQS respectively. Besides, we have also established that the uptake and export of PQS are both active processes and require energy generated from ATP hydrolysis and PMF, respectively. Altogether, these experiments have provided a greater understanding of the transport pathways of PQS and revealed potential targets for the development of novel antivirulence.

About the Speaker

Bau Yi is a chemist from a multidisciplinary educational background. She obtained her Bsc. (Hons) in applied chemistry (drug) from National University of Singapore, where she did metabolomics study on human liver cells. She completed her PhD in the same university, followed by a research fellowship with SCELSE-NUS working on bacterial quorum sensing. Her postgraduate research focused on the understanding of PQS-mediated signalling mechanism via affinity-based protein profiling and protein-protein interaction studies. Her works have unravelled several novel proteins involved in PQS transport, which can be used as potential drug targets in combating multi-resistant biofilms. After her research fellowship, she joined a biopharmaceutical company as a bioanalytical scientist working on the R&D of therapeutic biologics and biosimilars. Here in BTI protein analytics, Bau Yi will continue to work on mass spectrometry-based characterisation of therapeutic biologics and the development of improved strategies in proteomics.

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