



Infectious  
Diseases Labs

A\*STAR IDL

## Prof Cynthia B Whitchurch

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and Life Sciences Engineering (SCELSE)  
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**Tuesday 10<sup>th</sup> February 2026**

**02:00 PM to 03:00 PM (SGT)**

**Venue: Cistron A & B, Matrix Level 5**



## Morphing Microbes: Understanding and exploiting bacterial shapeshifting

The cell envelope of Gram negative bacteria is comprised of a thin layer of peptidoglycan enclosed by an outer-membrane that together provide structural strength, and the determination and maintenance of cell shape. The outer-membrane is also highly impermeant and provides a significant barrier to the entry of antibiotics. We have found that the Gram negative pathogen *Pseudomonas aeruginosa* undergoes morphological transitions from normal rod-shaped cells to spherical cells via two different mechanisms. One of these mechanisms is extremely rapid and occurs in only a sub-set of cells that subsequently undergo explosive cell lysis. This process releases cellular contents including eDNA and membrane vesicles that contribute to the biofilm matrix and sequester antibiotics. The other spherical cell morphotype transition is slower, reversible, and occurs en masse in response to cell-wall targeting antibiotics. This leads to the formation of robust cell wall deficient (CWD) cells that survive and proliferate in the presence of high concentrations of the inducing antibiotic. Whilst shapeshifting appears to be a super-power of *P. aeruginosa* that contributes to the antibiotic tolerance, we are exploring whether shapeshifting can be exploited to develop novel therapeutic approaches to combat infections by *P. aeruginosa* and other Gram-negative pathogens.

Professor Cynthia Whitchurch is the Research Director of the Biofilm Biology cluster in the Singapore Centre for Environmental Life Sciences Engineering (SCELSE). Her research aims to understand the contributions and interplay of alternative bacterial lifestyles to infection, persistence and antimicrobial resistance and to exploit this knowledge to develop innovative approaches to combat infection. Over the course of her career she has made a number of seminal discoveries in understanding how bacteria build biofilms, co-ordinate collective behaviours, share genetic information through natural transformation and the role of extracellular DNA in these processes. She also explores how bacteria survive antibiotic treatment by lifestyle switching. The outstanding quality of her research has been recognised through prestigious fellowships and awards including Fellowship of the Australian Academy of Science.

**Hosted by: Dr Stefan Oehlers**

**Seminar is open to all. No registration required.**

Questions? Contact us at [seminars@idlabs.a-star.edu.sg](mailto:seminars@idlabs.a-star.edu.sg)

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