

BioSyM Seminar Series 2017

Mechanistic action of weak acid drugs on biofilms

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Time : 12 pm to 1 pm

Venue : Level 5, Perseverance Room

Abstract

Selective permeability of a biofilm matrix to some drugs has resulted in the development of drug tolerant bacteria. We have studied the efficacy of a weak organic acid drug, N-acetyl-L-cysteine (NAC), on the eradication of biofilms formed by the mucoid strain of *Pseudomonas aeruginosa* and investigated the commonality of this drug with that of acetic acid. We showed that NAC and acetic acid at $\text{pH} < \text{pKa}$ can penetrate the matrix and eventually kill 100% of the bacteria embedded in the biofilm. Once the bacteria are killed, the microcolonies swell in size and passively shed bacteria, suggesting that the bacteria act as crosslinkers within the extracellular matrix. Despite shedding of the bacteria, the remnant matrix remains intact and behaves as a pH-responsive hydrogel. These studies not only have implications for drug design but also offer a route to generate robust soft matter materials.

Short Biography

Dr. Binu Kundukad received her Ph.D. in Physics from the National University of Singapore in 2010 and is currently a research scientist in Biosystems and Micromechanics IRG of Singapore-MIT Alliance for Research and Technology (SMART). Her current research focuses on the development and the use of biophysical tools to study the mechanics of biofilms and the development of therapeutic strategies for biofilm eradication.