O-05.4 Short talk

Understanding the forces transmitted to the outer membrane during bacteriocin import

Veronika Dzupponova [1], Haowei Wang [1], Dominika Gruszka [1], Colin Kleanthous [1]

[1] University of Oxford, Oxford, UK

The outer membrane (OM) of Gram-negative bacteria acts as a selective barrier, limiting the uptake of many antibiotics and contributing to antibiotic resistance. Unlike the inner membrane, which is energised by the proton motive force (PMF), the OM does not have an inherent energy source for active transport. However, bacteriocins, protein-based antibiotics, have evolved to exploit bacterial transport systems, such as the Ton and Tol complexes, to cross this barrier. These systems couple inner membrane energy to OM translocation, yet the structural and mechanical factors governing this process remain poorly understood.

Here we present two approaches to investigate these mechanisms, we use chimeric bacteriocins with modified guest protein domains to examine how structural stability and flexibility influence translocation efficiency. Single-molecule techniques, such as bead displacement assays and optical tweezers, allow for precise measurement of the forces involved in bacteriocin import. This research provides valuable insights into the energy transduction processes across the bacterial envelope and could contribute to the development of novel strategies to overcome antibiotic resistance.