Poster Presentation

MS054.P03

Sigma anti-sigma factors involved in Iron homeostasis in pseudomonas aeruginosa

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The condition cystic fibrosis (CF) is the most common genetic lethal disease among the Caucasian population. CF is physiologically characterised by viscous secretions in the lungs, with chronical lung disease being the leading cause of mortality among people with CF. The environment in the lung of CF patients is conducive to bacterial infection, with the bacterium Pseudomonas aeruginosa being the most common isolate. Pseudomonas aeruginosa infections of the CF lung correlates with a progressive decline in patient health and often persists despite extensive antibiotic treatment. Bacteria like P. aeruginosa must acquire significant quantities of iron in order to generate critical molecules as an energy currency of the cell. To do that, P. aeruginosa synthesises siderophores such as pyoverdine which enable the acquisition of iron required for in vivo growth and pathogenesis.

As in many bacterial species, the expression of genes in P. aeruginosa is controlled by sigma factor (σ factor) proteins. In P. aeruginosa the activities of two sigma factors: FpvI and PvdS are controlled by a single anti-sigma factor, FpvR. PvdS has been characterised as responsible for the biosynthesis of pyoverdine and FpvI for the expression of the pyoverdine receptor (the FpvA protein).

The aim of this project is to structurally and functionally characterise the sigma factors involved in the pyoverdine-mediated acquisition of iron by P. aeruginosa (FpvI and PvdS) in complex with the anti-sigma factor FpvR. Critical to this investigation is the biophysical characterization of the protein-protein interaction that underpins these complexes. Of particular interest is the molecular mechanism by which a single anti-sigma factor, like FpvR, can complex two different sigma factors. I will describe the progress toward the characterization of the biophysical properties of the interaction within these complexes by the technique of analytical ultracentrifugation and reveal a model by which iron acquisition is controlled by P. aeruginosa in order to establish and maintain infection

[1] Cornelis, P., et al. (2009) BioMetals 22(1): 15-22.
[2] Draper, R. C., et al. (2011) Molecular Microbiology 82(6): 1444-1453.
[3] Llamas, M. A., et al. (2009 PLoS Pathog 5(9): e1000572.

Keywords: Iron transport, Interactions between proteins and nucleic acids, Mechanism of bacterial resistance