The importance of the citrate mediated iron import pathway in Pseudomonas aeruginosa

Anne-Eloïse Revillot—schmidt*[1,2]

[1]Biotechnologie et signalisation cellulaire – université de Strasbourg, Institut de recherche de l'Ecole de biotechnologie de Strasbourg (IREBS), Centre National de la Recherche Scientifique, Centre National de la Recherche Scientifique : UMR7242 – France

[2]Isabelle Schalk – CNRS, University of Strasbourg, UMR7242 Biotechnology and Cell Signaling, Illkirch 67412, France, Biotechnologie et Signalisation Cellulaire – France

Résumé

Pseudomonas aeruginosa poses a significant threat to both animals and plants, particularly in the context of hospital-acquired infections. This bacterium engages in a crucial struggle with the host for iron, an essential nutrient in both human and bacterial physiology. To enhance iron acquisition, *Pseudomonas aeruginosa* employs siderophores which are small molecules adept at sequestering and importing iron into the cell. It can produce its own siderophores like pyoverdine and pyochelin, as well as utilizing siderophores produced by other microorganisms called xenosiderophores or molecules like citrate, a naturally abundant iron chelator.
Ferric citrate uptake is mediated by the TonB-dependent transporter (TBDT) FecA, yet the regulatory conditions controlling this pathway remain incompletely understood.

This work aims to unravel the mechanisms underlying citrate-dependent iron uptake in *P. aeruginosa* and to determine how this pathway integrates within the broader network of iron acquisition strategies. We combine differential proteomics, targeted gene expression analyses, mutant strains deficient in specific TBDTs, and fluorescent transcriptional reporters to monitor *fecA* expression under varying iron and citrate concentrations.

These approaches allow us to investigate the contribution of FecA, to explore potential alternative transport systems involved in ferric citrate utilization, and examine how ferric citrate uptake competes with endogenous siderophores and various xenosiderophores under iron-limited conditions.
Altogether, this study provides new insights into the regulation and hierarchy of iron acquisition pathways in *P. aeruginosa*, highlighting the adaptability of this pathogen to fluctuating environmental conditions and providing essential knowledge for targeted intervention.

Mots-Clés: iron, Pseudomonas aeruginosa, citrate

*Intervenant