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Cell wall stress response in *Pseudomonas aeruginosa*: Involvement of the ECF sigma factor SigX

The bacterial cell envelope is the first line of defense against environmental threats. Cell envelope stress responses (CESRs) detect cell wall integrity alterations and reprogram gene expression to ensure bacterial survival. Pathogens need CESRs to survive inside the host, where their envelopes face host immune system effectors and antimicrobials. The underlying signal transduction can be mediated by extracytoplasmic function (ECF) σ factors. *P. aeruginosa* displays two CESR ECF σ factors, AlgU and the recently described SigX. Using complementary approaches including OMICs, qRT-PCR, CLSM, anisotropy, FAME and phenotypic analyses, we have shown that i) SigX regulates directly or indirectly more than 300 genes being involved in numerous cellular processes (virulence, motility, adhesion, biofilm formation); ii) membrane fluidity alterations originating from a sigX mutation result in strong dysregulations of CbrA/B, Crc and Hfq networks, linking SigX to the metabolic pathways; iii) expression and activity of SigX are increased in response to numerous conditions (high sucrose or tobramycin sub-lethal concentrations, low osmolarity, cold shock); suggesting that SigX responds to envelope perturbations. ECF factors activity is usually regulated via sequestration by their cognate anti sigma factors. In sigX near vicinity, the cfrX-cmpX operonic structure is transcribed at least partly from a SigX-dependent promoter. Based on molecular tools and in silico analyses, we have shown that the hypothetical protein CfrX and the predicted mechanosensitive channel CmpX are involved in SigX activity. Future challenges will now put emphasis on the interactions linking SigX, CfrX and CmpX to get further insights into CESR in *P. aeruginosa*.

Biography

Sylvie Chevalier has completed her studies in Molecular Microbiology at Strasburg University (France) in 1994. She holds a faculty position as Associate Professor in 1995, and as Full Professor in 2010 at Rouen University (France). She is Vice Director of the Laboratory of Microbiology Signals and Microenvironment (LMSM), and has published 58 papers, aiming at deciphering the relationships and the molecular networks linking cell envelope homeostasis and biofilm formation, virulence, antimicrobials resistance/tolerance in bacteria, and in particular in the human opportunist pathogen *Pseudomonas aeruginosa*. Her focus is to unravel the mechanisms of stress responses, from signal perception to adaptation.

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