

## Reduced membrane fluidity of a SigX deficient strain results in altered carbon catabolic repression response in *Pseudomonas aeruginosa*

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The extracytoplasmic sigma factor SigX is a master regulator of bacterial adaptation that is involved in fatty acids biosynthesis and membrane homeostasis in *P. aeruginosa*. The growth of a *sigX* mutant was strongly affected in LB broth, but not in M9-glucose minimal medium. Through comparative transcriptomics and proteomics conducted in LB medium, we show that the absence of SigX results in strong dysregulation of genes, the products of which are mainly involved in transport, carbon and energy metabolisms. The CbrA/B two components system was strongly activated in a *sigX* mutant, leading to a higher production of *crcZ* and a reduced activity of the major translational repressors Hfq and Crc compared to the wildtype strain. Remarkably, growth as well as genes, the expression of which was dysregulated in the mutant strain, were restored when the C18 $\Delta$ 9-structurally related detergent Polysorbate 80 was supplemented to LB medium. Anisotropy data further showed that the *sigX* mutant displayed a less fluid membrane than the WT strain, a phenotype that was restored by adding Polysorbate 80. Altogether, our data show that the altered membrane of the *sigX* mutant strain was probably the leading cause of the strong metabolic alterations and the reduced carbon catabolic repression response (CCR) encountered by this mutant strain. Thus, by controlling membrane homeostasis, SigX behaves as a master regulator of the nutritional response, in addition to its involvement in *P. aeruginosa* adaptation, virulence and biofilm formation.