HD-GYP domain proteins regulate biofilm formation and virulence in Pseudomonas aeruginosa - DTU Orbit (14/12/2018)

HD-GYP domain proteins regulate biofilm formation and virulence in Pseudomonas aeruginosa

HD-GYP is a protein domain involved in the hydrolysis of the bacterial second messenger cyclic-di-GMP. The genome of the human pathogen Pseudomonas aeruginosa PAO1 encodes two proteins (PA4108, PA4781) with an HD-GYP domain and a third protein, PA2572, which contains a domain with variant key residues (YN-GYP). Here we have investigated the role of these proteins in biofilm formation, virulence factor synthesis and virulence of P. aeruginosa. Mutation of PA4108 and PA4781 led to an increase in the level of cyclic-di-GMP in P. aeruginosa, consistent with the predicted activity of the encoded proteins as cyclic-di-GMP phosphodiesterases. Mutation of both genes led to reduced swarming motility but had differing effects on production of the virulence factors pyocyanin, pyoverdin and ExoS. Mutation of PA2572 had no effect on cyclic-di-GMP levels and did not influence swarming motility. However, PA2572 had a negative influence on swarming that was cryptic and was revealed only after removal of an uncharacterized C-terminal domain. Mutation of PA4108, PA4781 and PA2572 had distinct effects on biofilm formation and architecture of P. aeruginosa. All three proteins contributed to virulence of P. aeruginosa to larvae of the Greater Wax moth Galleria mellonella.

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