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Two component systems and biofilm lifestyle in *Pseudomonas aeruginosa*

Sophie de Bentzmann

Aix Marseille University, France

Abstract

Pseudomonas aeruginosa, causing severe infections in humans, forms biofilms and is a fantastic example for fine-tuning of the transition between planktonic and community lifestyles through two-component systems (TCS).

The TCS PprA/PprB triggers a hyper-biofilm phenotype with a unique adhesive signature made of BapA adhesin, a T1SS substrate, CupE CU fimbriae, Flp Type IVb pili and eDNA without EPS involvement. This unique signature is associated with drug hyper-susceptibility, decreased virulence in orally infected flies and dissemination defect from the intestinal lumen toward the hemolymph compartment. This TCS PprA/PprB thus represents a key bacterial adaptation checkpoint of multicellular and aggregative behavior triggering the production of a unique matrix associated with antibiotic susceptibility, an interesting breach for therapeutic intervention on *P. aeruginosa* biofilm-associated infections.

The RetS/GacS/LadS histidine kinases (HK) are instrumental in the switch between planktonic and sessile lifestyle process where the TCS GasS/GacA uniquely activates the production of two sRNA RsmY and RsmZ. While RetS function is to block GacS autophosphorylation through formation of an heterodimer and LadS antagonizes the function of RetS, LadS controls both *rsm* gene expression through the GacS/GacA TCS through a phosphorelay implicating the transmitter H1 and receiver D1 domains of LadS with the H2 domain of GacS, rather than through the formation of an heterodimer between LadS and GacS or RetS. Thus the hybrid HK LadS forms with the GacS/GacA TCS a multicomponent signal transduction system, in which a unique output, i.e. the modulation of sRNAs levels, is controlled by a complex multi-sensing network working in concert.

Biography

Sophie de Bentzmann has completed her Ph.D at the age of 28 years from Nancy University and postdoctoral studies from Reims University and Loréal company. She is the director of the team "Sensing Environment and community lifestyle in *P. aeruginosa*", one of the 8 teams of the Research Unit UMR 7255. She has published more than 63 papers in reputed journals and serving as an expert in many scientific boards.