

THE ROLE OF C-DI-GMP IN THE *PSEUDOMONAS AERUGINOSA* RHAMNOLIPIDS BIOSYNTHESIS

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Bis-(3-5')-cyclic dimeric guanosine monophosphate (c-di-GMP) is in the spotlight of the scientists as the result of last achievement of microbial genomics and great interests in microbial communities. Cytoplasmic c-di-GMP is a bacterial secondary messenger, that regulates numerous of physiological processes: cell-to-cell communication, biofilm formation, motility, virulence, etc. Depends on concentration of this regulator bacteria shifts its life-form from motile to sessile (biofilm formation). It is found that c-di-GMP affects all stages of the biofilm formation process in *Pseudomonas aeruginosa* from the beginning of adhesion to biofilm decay. This compound regulates biosynthesis of matrix components, quorum sensing signal molecules, biosurfactants. That fact, that the direction of many processes change in bacterial cells depends on c-di-GMP, led to hypo- and hyperproduction strains construction. Their use allows extending knowledge in the role of this compound in many bacterial cells processes and the possibility to use this molecule as an instrument for biofilm formation control.

The aim of this work was to study the ability to produce rhamnolipids by *P. aeruginosa* strains with different levels of c-di-GMP synthesis. This was used mutant strains: PA01 pJN2133 with very low biosynthesis of c-di-GMP and PA01 wsp F1 with overproduction of this second messenger. For

comparison, using wild-type strain of *P. aeruginosa* PA01. The incubation was carried out in LB medium at 37 °C with shaking at 150 rpm/min.

The results show that during the first five days of incubation rhamnolipids content in the environment was maintained at a level that was reached after 24 hours. This pattern of accumulation of surfactant was inherent in all three strains. But for further incubation (the seventh day) the picture changed. When strains PA01 and PA01 pJN2133 rhamnolipids content increased significantly compared to the previous study period (5 days), 3 and 4 times, respectively. The level of surfactant biosynthesis strain PA01 wsp F1 has not changed. It should also be noted that the strain with low level of c-di-GMP in all study periods produces more rhamnolipids than *P. aeruginosa* PA01. On the seventh day the difference between them was 60%.

Previously we found that *P. aeruginosa* PA01 pJN2133 cell is more mobile in comparison to *P. aeruginosa* PA01 cell and have low adhesion and biofilm formation abilities. We assumed that these features of the strain PA01 pJN2133 are due to its ability to synthesize large amounts of rhamnolipids. This was confirmed in this study.

P. aeruginosa strains with reduced biosynthesis c-di-GMP are potential candidates for the biosurfactant production.