Synthesis of new potential inhibitors of biofilm formation for multivalent interaction

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Pseudomonas Aeruginosa is a Gram-negative bacterium and a common cause of hospital-acquired infections. It is characterized by a high resistance toward antibiotic therapies, due to its ability to generate protective biofilm. These processes depend on the interactions between lectins, carbohydrate-binding proteins expressed on bacterial surface, and the glycans expressed on cellular surface. It has been demonstrated that glycomimetics are able to inhibit LectinB and block biofilm growth by P. Aeruginosa[1], representing a promising new class of drugs. In addition, multivalency is known to be a strategy, commonly employed by nature, to increase the binding affinity of a lectin receptor to its sugar ligand. Therefore, multivalent interactions between glycomimetics and LecB can exponentially increase the efficacy of biofilm-formation inhibition and their synergic action be exploited by employing multivalent inhibitors as novel treatments. Mimetics of L-fucose, obtained with a multi-step synthesis starting from D-Mannose, have been synthetized and will be conjugated to natural and synthetic polymers. Subsequently, antibacterial nanomaterials and nanoparticles will be differently formulated and their interaction with lectinB and ability to inhibit biofilm formation will be studied.

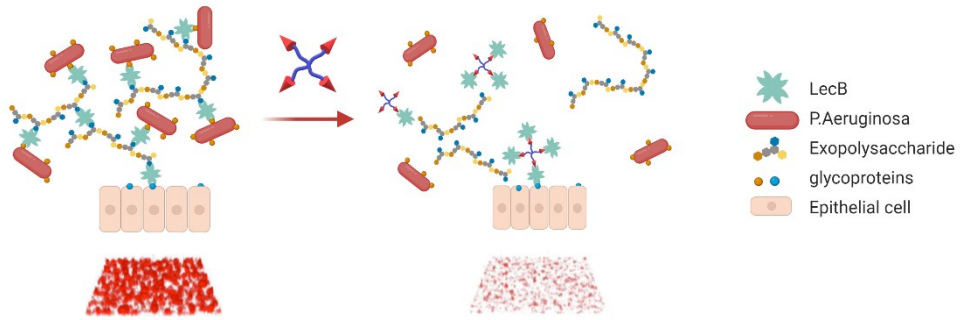

Figure 1 - Inhibition of biofilm formation by multivalent glycomimetics

References:

[1] Roman Sommer, Stefanie Wagnerc et al., *Journal of the American Chemical Society*, **2018**, 140, 7, 2537-2545