Turning photons into drugs: advanced photoactive compounds and interfaces in the resistance era

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Microbial resistance is currently a big challenge that researchers work hard to tackle. A promising and rapidly expanding therapeutic modality for the treatment of bacterial infections is photodynamic therapy (PDT). PDT exploits the interaction between light and a photosensitizing agent to generate reactive oxygen species that are able to destroy pathogens in a short time frame. Phthalocyanine (Pc) derivatives are shown to be efficient theranostic agents due to their low toxicity, high stability, efficient $^1O_2$ generation and intense red light absorption corresponding to the therapeutic window. Overall photosensitization efficiency of Pcs can be significantly influenced by the nature of the conjugated moieties[1] and readily tuned via host-guest complexation with supramolecular constract.[2] This presentation will introduce a new and innovative strategy for targeting polysaccharides found on the bacterial cell envelope and the biofilm matrix using boronic acid functionalized Pc (Fig.1). This strategy has been found to be successful in treating planktonic cultures and biofilms of Gram-negative *E. coli*. An additional advantage of boronic acid functionality is a possibility to anchor the tailor-made Pc to poly(vinyl alcohol) and to fabricate a self-disinfecting coating.[3]

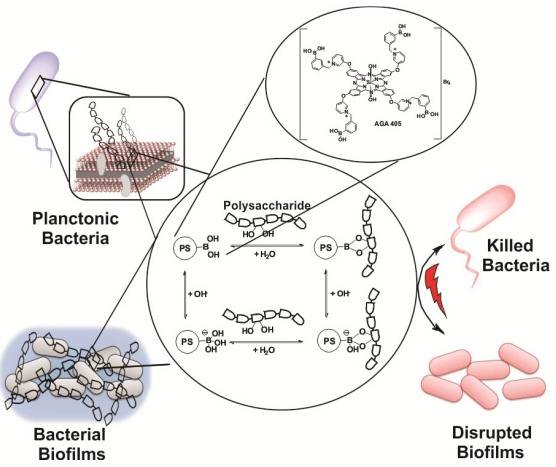

Figure 1. Schematic illustration of interaction between Pc and polysaccharides of the bacterial cell envelope and biofilm matrix.

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1. a) A. Galstyan,* D. Block, S. Niemann, M. C. Grüner, et al., *Chem. Eur. J.* **2016**, *22*, 5243–5252; b) A. Galstyan,* K. Riehemann, M. Schäfers, A. Faust, *J. Mater. Chem. B* **2016**, *4*, 5683 – 5691.
2. a) A. Galstyan, U. Kauscher, D. Block, B. J. Ravoo, C. A. Strassert, *ACS Appl. Mater. Interfaces* **2016**, *8*, 12631–12637; b) A. Galstyan,* J. Putze, U. Dobrindt, *Chem. Eur. J.* **2018**, *24,* 1178-1186.
3. A. Galstyan,* R. Schiller, U. Dobrindt, *Angew. Chem. Int. Ed.* **2017**, 56, 10362–10366; *Angew. Chem.* **2017**, 129, 10498–10502.