BioInSys: Development of Biofilm Inhibitors Using a Systems Biology Approach

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Description:

This project aims at obtaining **a systems level understanding of biofilm inhibition** by small molecules to **develop new anti-biofilm drugs** which are not toxic and thus could be applied for preventive medicine.

Specifically, we first focus on the recently discovered biofilm inhibitor **Carolacton**, a secondary metabolite from the Myxobacterium *Sorangium cellulosum*, which inhibits biofilm formation of the caries bacterium *Streptococcus mutans* at nanomolar concentrations. Reverse engineering of regulatory networks from functional genomics data will be applied to reveal the molecular targets and the underlying metabolic and regulatory networks attacked by this promising biofilm inhibitor. Dynamic modelling will be done on key pathways or networks (such as quorum sensing) to obtain more detailed mechanistic and kinetic information about the efficacy of the inhibitor. The study will be expanded to clinical isolates of *Streptococci* and to other biofilm forming bacteria important for diseases in the human body. Total synthesis and hypothesis driven chemical modification of Carolacton will be done to optimize the inhibition activity, and to couple it to clinically relevant material, e.g. implants, tubes, and tooth fillings, which will be tested in animal models.

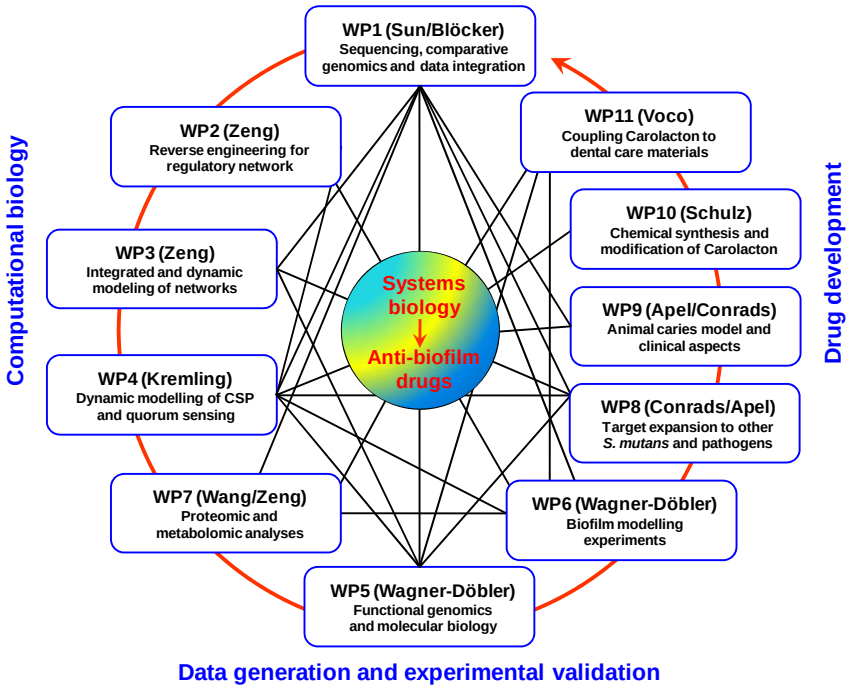

Figure 1. The workpackages and their interaction

Table 1. The project partners

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Prof. Dr. Georg Conrads	RWTH University Hospital, Aachen
Dr. Andreas Kremling	Max Planck Institute Magdeburg
Prof. Dr. Stefan Schulz	TU Braunschweig
Dr. Jibin Sun	TUHH
Prof. Dr. Irene Wagner-Döbler	**HZI (coordinator, microbiology)**
Dr. Wei Wang	HZI
Prof. Dr. An-Ping Zeng	**TUHH(coordinator, systems biology)**

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