Description for the general public (in English)

Objective of the project

Biofilms are layers of bacteria that may infect medical equipment and prostheses that are placed in the human body and may also cause long-lasting, very difficult to treat infections in many locations in the body of the patients. The main problem with such infections is the fact that they are very difficult or impossible to treat, many times requiring removal of the implants or prostheses. Unlike drug resistant planktonic bacteria, there are no highly successful therapeutic strategies and the objective of this project is to propose substances which may in fact change this situation. The project is meant to test iminosugar anti-biofilm activity, as substances that could in the future be used to treat biofilm infections.

Description of the research to be carried out

Experiments will evaluate the activity of the tested iminosugar substances against typical biofilm forming bacteria which may often be isolated from patient infections. Different bacterial biofilms will be prepared in vitro and tested vs. iminosugars at different time intervals and observed using electron microscopy. Afterwards transcriptomic examination is planned, that will allow to show the bacterial cells reaction to iminosugars on a molecular level. Also planned are animal studies on murine and rat models of specific conditions, incl. wound infection and urinary tract infection.

Reasons for choosing the research topic

Currently, only antibiotics are available as substances to treat bacterial infections. Besides antibiotics, there are no highly successful biofilm treatment agents on the market. Nanotechnology which was viewed as a promising tool in treating infections and cancer (e.g. microrobots) before the turn of the millennium has not delivered that promise thus far. Therefore any project with a solid promise to improve that situation, considering the growing number of biofilm infections worldwide, should be viewed not as optional, but as necessary advancement of science and our medical knowledge. If successful, the study will lay foundations for future biofilm therapeutic agents.