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Press Release



Targeting the bacterial protective shield

Research consortium set on developing new drugs that target bacterial biofilms

Slime-like and near impenetrable are biofilms built by a number of bacterial cells during the course of an infection. Typically, they are composed of long molecular strands called polymers. Many different species of bacteria, among them dangerous pathogens like *Pseudomonas* and *Staphylococcus*, use biofilms to shield themselves against the host's immune system attacks and antibiotics' pharmacological mechanism of action. In Germany alone, 100,000 infections annually are related to bacterial biofilms. A joint research initiative by the Helmholtz Centre for Infection Research (HZI) in Braunschweig, Germany, and the TWINCORE, Centre for Experimental and Clinical Infection Research, aims to target bacterial biofilms using Nature's own list of active ingredients.

The project, funded by the German Federal Ministry for Education and Research (BMBF), is coordinated by the pharmaceutical company Sanofi. Further research affiliates are the Helmholtz Institute for Pharmaceutical Research Saarland (HIPS), Germany, the Leibniz University Hanover (LUH), Germany, and the Fraunhofer Institute for Toxicology and Experimental Medicine (ITEM).

Biofilms represent a serious medical dilemma. The ones that result from bacterial infections and are not treatable are often responsible for the necessary replacement of knee and hip joint prosthetics and of artificial heart valves. Patient risks are often substantial, and costs are high. Serious illnesses like endocarditis, cystic fibrosis, or chronic obstructive pulmonary disease (COPD), in which biofilms play a central role, are often fatal because – to date – no drug exists that is capable of preventing biofilm formation or promoting biofilm dissolution. An important focus of the initiative is the planned introduction of the first ever official biofilm inhibitor into the preclinical trial stage. The research is supported by grants in the total amount of 7.2 million euros. Half of this amount has been granted by the BMBF; the balance is contributed by Sanofi.

The scientists involved may very possibly find answers by turning to Nature's own resources: together, Sanofi and HZI own one of the most extensive – and one of the most promising – collections of microorganisms and of chemical compounds that have been isolated from these. The substances' biofilm dissolving potential is to be characterized using a novel and unique biofilm test.

"We have developed a systematic test protocol that will enable us to qualitatively and quantitatively examine different substances for their biofilm inhibitory effect," explains Professor Susanne Häußler, HZI and TWINCORE work group leader. The most cutting-edge experimental techniques like automatic confocal microscopy are being used for the optic screening procedures. Besides searching for candidate active ingredients using in-depth screenings, the researchers are also hoping to investigate the formation and potential drug targeting of biofilms in the bodies of mice as part of the research initiative. "What makes our project especially promising is our ability to uniquely combine our screening protocol with

a murine model; the fact that neither has previously been available to us is what has largely prevented the development of biofilm inhibitors," explains Häußler.

Scientists at HIPS, HZI's satellite facility, have, under Professor Rolf Müller's leadership, developed a pre-screening protocol to allow them to limit – for now – the vast range of candidate natural substances. "At this point, we are hopeful that we may be able to identify candidate substances that can be optimized for clinical development rather quickly," says Müller. For the time being, however, the pathway to actually developing a new drug using these substances as active drug ingredients still lies in the very distant future.

The Helmholtz Centre for Infection Research (HZI):

The Helmholtz Centre for Infection Research contributes to the achievement of the goals of the Helmholtz Association of German Research Centres and to the successful implementation of the research strategy of the German Federal Government. The goal is to meet the challenges in infection research and make a contribution to public health with new strategies for the prevention and therapy of infectious diseases.

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