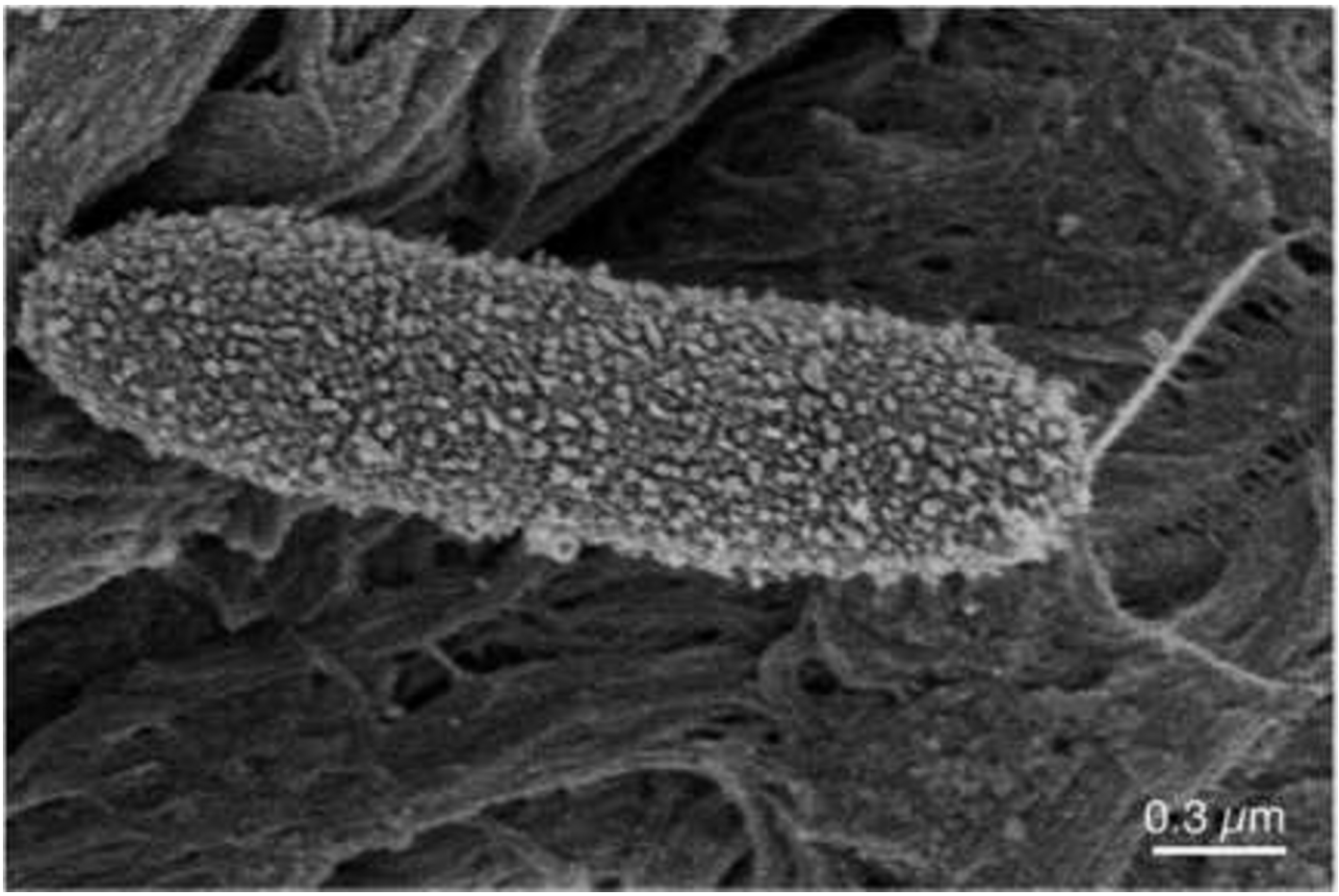
Miniature proteins for safe implants

Every year, between 50 and 100 million people around the world are provided with implants. Between 1 and 7 % of these patients experience serious complications due to infections, hence the prevention of implant-related infections is of great importance. Scientists at the Institute for Biological Interfaces (IBG) at the KIT - Karlsruhe Institute of Technology have succeeded in identifying highly effective protein chains which have the potential of being used as part of an anti-inflammatory protection layer on implants.

The IBG scientists, working with their colleagues from the University of British Columbia, have developed a new screening method. This enables them to test a large number of compounds in a very short time to discover whether the compounds are able to fight off an infection while tethered to a surface. The researchers investigated what are known as anti-bacterial peptides, protein fragments consisting of a short chain of amino acids. "Antibacterial peptides are fascinating molecules. They still harbour many mysteries," said Dr. Kai Hilpert, head of a group of young researchers at the IBG.



Modified surface: Upon contact with a surface-active protein, small bubbles and bulges develop on the surface of the bacterium Pseudomonas aeruginosa.

The peptides, which consist of between 12 and 50 amino acids, are very interesting tools for the treatment of infections because they can destroy both gram negative and gram positive bacteria, as well as fungi, viruses and parasites. In addition, they also have important immunological functions. Although they have been known since the 1960s, exactly how they operate is still unknown. This is also true for the short peptide chains being studied by Kai Hilpert's research group.

Bacteria are surrounded by a protective layer above the actual cell membrane. It is about 10 times thicker than the miniature proteins. "We are able to show that the peptides have an effect on the bacterial membrane, though it is perhaps surprising that they cannot enter the membrane," said Kai Hilpert. The IBG scientist and his team are currently working on optimising and automating the screening method which will later be used to screen 8,000 to 10,000 substances per week. The IBG researchers hope that this screening will then provide them with highly effective substances capable of fighting off infections while attached to the surface of implants.

Press release

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