

## Press Release

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### **BACTERIA ENGAGE IN A HAZARDOUS HIDE-AND-SEEK STREPTOCOCCUS PYOGENES PENETRATES INTO A DEEP CELL LAYER AND THUS EVADES THE IMMUNE SYSTEM**

**Tonsillitis, scarlet fever or life-threatening infections such as necrotising fasciitis – skin and tissue necrosis of dramatic extent - are caused by the bacterium, *Streptococcus pyogenes*. This pathogen manages to penetrate into the wall lining of blood vessels. This was shown by scientists of the Helmholtz Centre for Infection Research (HZI) in Braunschweig, Germany, in a study published in the "Journal of Innate Immunity".**



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Streptococcus pyogenes (rot) dringt in humane Endothelzellen (HUVEC) ein

Some people experience relapses of streptococcal infections time and again interrupted by only brief intervals. Despite treating the infections with antibiotics - which appears to be successful. The underlying reason: Streptococci colonise the inside of human cells and thus evade the immune system until it stops its defence. "Until now it was thought that streptococci penetrate into epithelial cells, which is the external layer of cells, and survive in these cells," says Prof Manfred Rohde, head of the Central Microscopy Unit at the HZI. "We were the first to show that they are also viable in endothelial cells."

Endothelial cells line the inside of blood vessels and are an important barrier. "They prevent pathogens from migrating from the bloodstream into the tissue. But *Streptococcus pyogenes* manages to do just that," says Anja Ochel, the first author of the study. Applying their most important virulence factor, the so-called M protein, the bacteria enter endothelial cells where they fuse with so-called lysosomes. This special region of the cell serves for disposal of foreign and harmful substances. These bacteria also should get killed there, but it does not occur fully in this specific case: Some of the bacteria survive. "The streptococci basically find a niche in which they are protected from the human immune system," says Rohde. "This is very dangerous, especially because many antibiotics, in particular penicillin, cannot kill them there."

"In necrotising fasciitis, for example, previously occult streptococci can again come to play a role," says Dr Susanne Talay, who is the head of the research project. This rare soft tissue infection can lead to total necrosis of the skin, subcutaneous tissue and connective tissue and may even have a fatal outcome. Occult streptococci might be one reason for this extreme response of the body.

It remains to be elucidated exactly how the ability of the pathogen to penetrate into the innermost part of the cell affects the course of various diseases. "But in any case, we demonstrated that *Streptococcus pyogenes*, contrary to long-held belief, is not an extracellular pathogen," says Talay.

Originalpublikation

Ochel A., Rohde M., Chhatwal G.S., Talay S.R., The M1 Protein of Streptococcus pyogenes Triggers an Innate Uptake Mechanism into Polarized Human Endothelial Cells, J Innate Immun 2014;6:585-596, DOI:10.1159/000358085

At the **Helmholtz Centre for Infection Research** (HZI) in Braunschweig, scientists are studying microbial virulence factors, host-pathogen interactions and immunity. The goal is to develop strategies for the diagnosis, prevention and therapy of human infectious diseases.

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