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Active substance targeting dreaded hospital germs

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In the German Center for Infection Research (DZIF), scientists have conducted clinical studies on an active substance against the dreaded hospital pathogen Staphylococcus aureus: a highly effective protein from bacteriophages that rapidly kills the bacteria, which frequently occurs in the nose. The protein leaves natural microflora intact. Such prophylactic treatment of nasal colonization could counteract the spread of methicillin-resistant staphylococcus aureus (MRSA) in hospitals, and thereby prevent infections in patients.

Every third person, according to estimates, carries the bacterium Staphylococcus aureus in their nose - it is not dangerous in the case of healthy individuals, but quickly becomes a problem if the carrier is admitted to a hospital. There, the pathogen can enter into wounds in connection with surgery and potentially cause dangerous infections. In addition, there is a large risk of the spread of the pathogen as a hospital bug. Methicillin-resistant Staphylococcus aureus (MSRA) isolates are especially troublesome because of their resistance to many of the commonly used antibiotics.

"Rapid detection and effective elimination of MRSA colonization in the nose prior to a hospital stay is a crucial step in combating these hospital germs", says Prof. Dr. Karsten Becker at the University Hospital Münster. The bacteria in the nose are increasingly resistant to the commonly used antibiotic mupirocin, and the duration of the decolonization and follow-up control is around one week. Under such circumstances, no effective MRSA prevention is possible for patients

immediately in need of surgery.

Scientists at the University Hospital Münster have developed a phage lytic enzyme that is a protein from viruses that infect bacteria, and specifically attacks Staphylococcus aureus cells and dissolves them. The protein was synthetically produced and optimized as a "designer protein" with the working name HY-133. "We do like to describe it as an MRSA-killing protein, even if it sounds somewhat sensational," explains Dr. Wolfgang Mutter from Hyglos GmbH. In fact, all Staphylococcus aureus cells, whether resistant or not resistant, are killed by this new active substance very quickly, without destroying natural microflora in the nose or the development of resistant strains.

In cooperation with the microbiologist Prof. Dr. Andreas Peschel (University of Tübingen), the active substance will now be prepared for clinical testing.

More than 1.5 million euros will be provided for HY-133 development within the DZIF: The substance will first be manufactured under GMP guidelines and subsequently tested for preclinical toxicology. The pharmacist Prof. Dr. Gerhard Winter at the LMU Munich will develop a stable formulation so that the substance may be conveniently and safely administered as a gel or in any other form to the patient.

The project will be conducted in view of subsequent clinical trials, in which the rapid decolonization of Staphylococcus aureus strains will be studied in the nasal flora of volunteers. "In addition to new antibiotics and vaccines we urgently need specific agents for decolonization of problematic germs. The HY-133 protein is a highly innovative active substance for this purpose, which could lead to many similar development programs," Prof. Dr. Andreas Peschel says.

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