Peptide agent against multi-resistant bacteria

Researchers from the University of Regensburg have developed a peptide with strong antimicrobial activity against carbapanem resistant gram-negative bacteria, which are responsible for a large number of deaths annually. The antimicrobial peptide kills bacteria within hours, also destroying non-replicating bacteria. The peptide strongly reduces inflammation and is therefore especially suitable to improve outcome in septic patients.

Strong anti-inflammatory effect, potentially beneficial in sepsis

IP RIGHTS
PCT application by University of Regensburg filed in 2022

Death by antibiotic resistant bacteria is not only caused by direct tissue destruction but also by systemic shedding of the endotoxic lipopolysaccharide (LPS) from the surface of the Gram-negative bacteria causing severe hyperinflammation, ultimatively leading to sepsis, organ failure and death.

01 especially promising for patients with autoantibodies against endogenous BPI (e.g. in cystic fibrosis, rheumatoid arthritis and SLE)

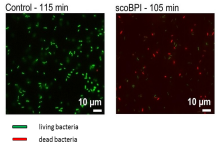
02 antibacterial agent for Gram-negative infections, including infections with multiple drug-resistant bacteria

03 fast action (hours), also bactericidal against non-replicating bacteria

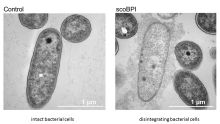
04 common resistance mechanisms do not affect the scoBPI-based antimicrobial agent

REFERENCES:

Holzinger et al, eLife 12:e86369 (2023)



scoBPI quickly eliminates MDR bacteria. Bacterial viability assay performed with a representative P. aeruginosa MDR strain. Viable bacteria are seen in green and dead bacteria in red.



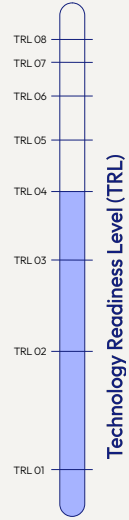
Transmission electron microscopy of the representative P. aeruginosa MDR isolate shown above, showing disintegrating bacterial cells.

CHALLENGE

Antimicrobial resistance (AMR) is globally rising over the last decades, partly due to over- or misuse of antibiotics. In 2019, over 3 million deaths were associated with AMR globally. Thereby, the Gram-negative bacteria Escherichia coli, Pseudomonas aeruginosa and Acinetobacter baumannii were within the top six pathogens causing death. Around 8% of patients infected with the aforementioned, resistant pathogens will not survive.

INNOVATION

The new peptide-based antimicrobial agent based on an optimized form of the scorpion fish protein BPI (scoBPI) shows very high anti-inflammatory potency towards the endotoxic activity of lipopolysaccharides and a bactericidal activity at nanomolar concentrations against carbapenem-resistant P. aeruginosa, E. coli and A. baumannii. Since the activity of the optimized scoBPI is mediated via membrane perturbation, common resistance mechanisms mediated by e.g. porin loss, efflux pumps and antibiotic-binding or -deactivating proteins do not affect the activity of the antimicrobial peptide.



01 Basic principles observed · **02** Technology concept formulated · **03** Experimental proof of concept · **04** Technology validated in lab · **05** Technology validated in relevant environment · **06** Technology demonstrated in relevant environment · **07** System prototype demonstrated in operational environment · **08** System complete and qualified

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