

Antimicrobial Peptides Against Bacterial Pathogens

Technology #20757

Applications

This technology is a novel antimicrobial peptide with applications as a therapeutic antibiotic drug.

Problem Addressed

Antibiotic resistant bacteria are an urgent threat to modern medicine. Worldwide there are 30 million new antibiotic-resistant infections diagnosed every year and 5 million of these cases will result in death. Furthermore, the emergence of antibiotic resistant bacteria currently outpaces new drug development, and there is therefore a desperate need to develop new antibiotic therapies. Antimicrobial peptides (AMPs) have been proposed as a promising new antibiotic modality. AMPs are small naturally occurring proteins with potent antimicrobial properties; however, most AMPs either display only limited antimicrobial activity or are highly toxic to human cells. This technology is a panel of new rationally-designed AMPs that display both improved toxicity profiles and improved potency.

Technology

This technology is a panel of derivatives of the wasp-derived AMP polybia-CP. While wild type polybia-CP is a potent antimicrobial, it is also highly toxic to human cells. These inventors rationally designed changes that stabilize the helical structures and tune physicochemical properties of the polybia-CP parent compound, which respectively resulted in increased antibiotic activity against bacteria and decreased toxicity in human cells. The two lead compound derivatives are highly effective in treating *P. aeruginosa* infections in an *in vivo* mouse model. A single dose of the top polybia-CP derivative is five orders of magnitude more effective than the parent compound and was able to nearly eradicate *P. aeruginosa* in the skin of infected mice within 4 days.

Advantages

- Highly effective rationally designed antimicrobial peptide
- Effective against Gram-positive and Gram-negative bacteria
- More stable, more effective, and less toxic than the parent antimicrobial peptide

Categories For This Invention:

[Life Sciences](#)

[Clinical Applications](#)

[Infectious Disease](#)

[Therapeutics](#)

[Peptide](#)

[Protein](#)

Intellectual Property:

Methods of physiochemical-guided peptide design and novel peptides derived therefrom
PCT
2020-061306

Inventors:

Timothy Lu
Cesar de la Fuente Nunez
Vani X. Oliveira Jr.
Marcelo Der Torossian Torres

Publications:

Peptide Design Principles for Antimicrobial Applications
Journal of Molecular Biology
August 23, 2019, p. 3547-3567
Structure-Function-Guided Exploration of the Antimicrobial Peptide Polybia-CP Identifies Activity Determinants and Generates...
Communications Biology
December 7, 2018, Article No. 211 (2018)

External Links:

Lu Lab
<http://synbio.mit.edu/2015/12/timothy-lu/>