Combating Multidrug-Resistant Bacteria Using Chemokine-Derived Antimicrobial Peptides

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Multi-drug resistant (MDR) bacteria

- Anti-microbial resistance occurs when bacteria adapt to antibiotics they are exposed to, making antibiotics ineffective and allowing for persistent infections.
- New resistance mechanisms are emerging and spreading globally, threatening our ability to treat common infectious diseases, resulting in prolonged illness, disability, and death.

- **Clinical Problem:**
  - Worldwide, MDR causes >700,000 deaths/year.
  - If left unchecked, it is estimated that by 2050, MDR will be responsible for ~10 million deaths/year with reduction in world’s GDP by trillions of dollars annually.

Some of most challenging MDR Gram-positive and Gram-negative bacterial pathogens:

- *Enterococcus faecium*
- *Staphylococcus aureus*
- *Klebsiella pneumoniae*
- *Acinetobacter baumannii*
- *Pseudomonas aeruginosa*
- *Enterobacter* spp.
CXCL10 as Novel Antimicrobial Agent

Solution: Researchers at the University of Virginia have determined that CXCL10-derived peptides have direct antimicrobial activity against a variety of pathogens

- Very potent at recruiting immune cells to sites of inflammation via interaction with its mammalian receptor CXCR3
- Provides a new treatment strategy for combating infections caused by MDR pathogens and potentially assists in promoting host defense
CXCL10 kills MDR Gram-negative clinical isolates

Survival of MDR bacteria following exposure to recombinant CXCL10 or buffer alone. Viability was measured by CFU determination, as demonstrated.
CXCL10-derived peptides were tested for bactericidal activity against Gram-negative and Gram-positive organisms (Y=antimicrobial activity (85-95% killing), N=no antimicrobial activity). Peptide 1 exerted broad-spectrum bactericidal activity against all organisms and Peptide 9 was effective at killing Gram-negative bacteria.
Ongoing Development

- Optimization of combinations and formulations of CXCL10-derived peptides 1 and 9

Relevant Publications


Intellectual Property

- US Patent 9,937,234 issued April, 10, 2018
  - Compositions And Methods For Using And Identifying Antimicrobial Agents
- Subsequent provisional application under development