Hydrogelated Bacteria as Antibacterial Vaccines

Tech ID: 34329 / UC Case 2025-422-0

ABSTRACT

Researchers at the University of California, Davis have developed a vaccine platform utilizing non-replicating, metabolically active Cyborg Bacterial Pathogens to combat multi-antibiotic-resistant bacteria.

FULL DESCRIPTION

This vaccine technology employs a novel approach called intracellular hydrogelation to create Cyborg Bacterial Pathogens. These engineered pathogens are non-replicating yet remain metabolically active, allowing them to stimulate a robust immune response without the risk of causing infection. Designed to target formidable pathogens like Pseudomonas aeruginosa, Klebsiella pneumoniae and Staphylococcus aureus, the platform merges the superior efficacy of live vaccines with the safety of killed vaccines, offering a promising solution to antibiotic resistance.

APPLICATIONS

- Prophylactic vaccines for hospital-acquired infections caused by Pseudomonas aeruginosa, Klebsiella pneumoniae, and Staphylococcus aureus.
- Vaccines for populations at high risk of infections due to chronic conditions, such as cystic fibrosis, diabetes, or pulmonary diseases.
- Platform technology for the development of vaccines against a broad range of bacterial pathogens beyond the initial targets.

FEATURES/BENEFITS

- Combines live vaccine efficacy with killed vaccine safety through non-replicating, metabolically active bacterial pathogens.
- Capable of expressing multiple antigens, enhancing immune response breadth and potency.
- Eliminates the risk of infection or disease reversion, addressing a significant saftey concern and the high cost of live attenuated vaccines.
- Minimizes autoimmune risks by trapping cytosolic proteins within bacterial cells.
- Demonstrates over 80% survival against Pseudomonas aeruginosa infection in mouse models with a single dose.
- Rapid and cost-effective production, enabling quick scalability.
- Potential for broad application across various bacterial pathogens.
- Addresses the critical need for effective vaccines against multi-antibiotic-resistant bacteria.
- Overcomes limitations of traditional antibacterial vaccine platforms by ensuring safety and maintaining metabolic activity for immune stimulation.
- Solves the challenge of rapid and cost-effective antibacterial vaccine production against a backdrop of evolving bacterial resistance.
- Reduces the risk of autoimmune responses often associated with other vaccine types.

PATENT STATUS

Country	Type	Number	Dated	Case
Patent Cooperation Treaty	Published Application	WO2026/060208A1	03/19/2026	2025-422

Additional Patent Pending

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OTHER INFORMATION

KEYWORDS

antibacterial vaccines, antibiotic resistance, infectious diseases, Pseudomonas aeruginosa, Staphylococcus aureus, bacteria, pathogens, Klebsiella pneumoniae

CATEGORIZED AS

- **Biotechnology**
  - Health
- **Medical**
  - Disease: Infectious Diseases
  - Vaccines

RELATED CASES

2025-422-0

ADDITIONAL TECHNOLOGIES BY THESE INVENTORS

- A New Cell-free Protein Expression System with three-fold higher protein yield in batch and continuous mode than existing systems
- Protein Translation Machinery One Shot (TraMOS) Tool

- Hydrogelated Cells for Regenerative Medicine Applications
- Generalizable and Non-genetic Approach to Create Metabolically-active-but-non-replicating Bacteria

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