

Hydrogelated Bacteria as Antibacterial Vaccines

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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 safety 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.

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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

- ▶ 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

Patent Pending

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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