Novel Bioactive Nano-constructs For Treatment Of Chronic Wound Infections

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Therapy - Infectious Disease

> Pre-Clinical

Problem
The rampant misuse and overuse of antibiotics have accelerated the rise of antimicrobial resistance globally, with resistant pathogens posing significant threats to health systems. These resistant bacteria, often found in hospitals, can resist antibiotics and evade immune defences. Infections such as diabetic foot ulcers and complications with orthopaedic implants highlight the inadequacy of current treatments which fail to simultaneously inhibit bacterial growth, prevent biofilm formation, modulate immune responses, and facilitate tissue repair. Current strategies, which often target only one aspect like bacterial growth or biofilm disruption, lack comprehensive action against infections and do not support infected tissue functionality recovery. An integrated approach that combines antimicrobial activity with immune activation and tissue repair is critically needed to combat these resistant infections effectively.

Solution
Our team have developed a novel phage-extracellular vesicle (EV) conjugate designed to promote tissue repair in individuals with bacterial infections, which is particularly beneficial for those with compromised healing. The conjugate is designed to be cleaved under specific conditions, enabling targeted therapeutic action. It is intended to treat a range of bacterial pathogens and can be modified to include additional therapeutic agents. This innovation also covers methods for its synthesis and pharmaceutical compositions comprising it. The conjugate's therapeutic applications include enhancing tissue repair, reducing inflammation, treating infections, minimizing damaged tissue, expediting healing, and initiating tissue repair mechanisms, making it suitable for various tissues and particularly useful for chronic wounds or those associated with diabetes.

Commercial Opportunity
Our novel phage-EV conjugate represents a significant advancement in treating bacterial infections and promoting tissue repair, especially in patients with impaired healing. Its targeted delivery system, adaptable for various pathogens and therapeutic agents and potential capacity to accelerate healing and reduce inflammation, would be potentially beneficial for chronic and diabetes-related wounds. The innovation includes synthesis methods and pharmaceutical compositions.

Intellectual Property Status
Provisional patent application.

Inventors
Wojciech Chrzanowski, Hien Thi Duong

Potential Commercial Applications
These novel phage-EV conjugates have potential to be developed as therapies for chronic wound infections as well as in food science, agriculture and veterinary applications.

Contact Commercialisation Office
Name: Julius Juarez
Position: Commercialisation Manager
Email: julius.juarez@sydney.edu.au | Phone: +61 403 181 295
sydney.edu.au/innovation-and-enterprise