MD627 994 Seminar in Medical Microbiology
Department of Microbiology, Faculty of Medicine, Khon kaen University

Thesis title: Development of antimicrobial peptide as therapeutic products synergist chitosan nanoparticle against methicillin-resistant *Staphylococcus aureus* (MRSA)
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Abstract

Nowadays, drug-resistance microorganism is known to be one of the most serious global public health threats of this century. This phenomenon has increased both mortality and morbidity as a consequence of treatment failures. Antimicrobial peptides (AMPs) have potential as a broad-spectrum activity, potent antimicrobial properties to reduce resistance. However, they have toxicity, relatively low stability and have short-term activities to reduce the bacteria. Chitosan nanoparticles are biocompatible, relatively non-toxic, biodegradable, and cationic in nature. Thus, they are well accepted in biomedical applications such as drug delivery for reduce the limitations.

In the first paper (Piras, 2015), they studied encapsulation of antimicrobial peptides (AMPs) temporin B (TB) into chitosan nanoparticles (CS-NPs) against *Staphylococcus epidermis* for increase peptide's antibacterial activity, while reducing its toxic potential based on the ionotropic gelation between chitosan and sodium tripolyphosphate. The research investigated release kinetics, cytocompatibility and bactericidal activity developed nanocarrier. The results showed that TB-loaded nanocarrier (TB-CS-NPs) can reduce cytotoxicity against mammalian cells, have a high bactericidal activity within 4 days and also against clinical isolates of *S.epidermis.*

In the second paper (Moghaddam, 2023), they aim to develop a concanavalin A (ConA) coated chitosan (CS) nanoparticles to target *H. pylori.* They prepare based on ionotropic gelation as same as first paper. The MIC of CM11-loaded ConA-CS-NPs were analysed in *in vitro.* The treatment of treatment efficiency *in vivo* and performed a gastric infection model of *H. pylori* was established in mice and histopathological studies and IL- 1β cytokine assay. The results showed that, the prepared CM11-loaded ConA-CS-NPs exerts antibacterial activity with a concentration of 32 μg/ml. The highest healing process was observed in synthesized CM11-loaded ConA-CS NPs treatments and can decrease in IL-1β was observed.

In conclusion, antimicrobial peptides loaded chitosan nanoparticles have a high potential to decrease cytotoxicity, increase antibacterial activity which have a long-lasting activity, and also can decrease IL-1β.

References

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