Univerza v Ljubljani
Fakulteta za farmacijo

V A B I L O

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bo predaval

Bringing out the old but powerful ammunition to tackle respiratory infections caused by superbugs

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CV:

Hak-Kim Chan, Professor in Pharmaceutics, is leading the Advanced Drug Delivery Group at the Faculty of Pharmacy, University of Sydney. He was involved with the product development of Genentech's Pulmozyme (inhaled rhDNase for cystic fibrosis), and Pharmaxis' Aridol and Bronchitol (inhaled mannitol for bronchoprovocation and mucus clearance). His research in pulmonary drug delivery has led to >400 scientific publications (with >10,000 citations) and seven patents. He is an executive editor of *Advanced Drug*

Delivery Reviews, a Fellow of the American Association of Pharmaceutical Scientists, and a Fellow of the Royal Australian Chemical Institute. He served as Vice President of the Asian Federation for Pharmaceutical Sciences.

ABSTRACT

Respiratory infections caused by multidrug-resistant (MDR) Gram-negative bacteria ('superbugs') is a major health problem worldwide. Colistin, an old drug effective against these 'superbugs' but with potential systemic side effects, has emerged as the only treatment option in life-threatening infections. Intravenous administration of colistin is known to cause serious side effects in most patients, including renal toxicity. Furthermore, the effectiveness of intravenous administration of colistin against lung infections is questionable, probably due to the sub-therapeutic drug concentrations achieved in the infected respiratory tract. Meanwhile, resistance to colistin in 'superbugs' has reached an alarming level.

Our research used aerosol formulation technology to reposition colistin for respiratory delivery to enhance the treatment outcome. This drug repurposing approach will shorten the drug development time normally required for a new antibiotic. Moreover, targeting antimicrobial therapy directly at the infection site may enhance clinical efficacy while minimizing systemic toxicity.

Besides antibiotics, bacteriophages ('bacteria-eaters') have been documented to be efficacious against MDR bacteria with minimal side effects. We have successfully produced powder aerosols suitable for respiratory delivery of colistin and phages. These powder formulations are stable, highly dispersible and inhalable, and capable of killing 'superbugs' in the lungs of infected animals. For the time being, our study provides promising formulation and pharmacological information on inhalation delivery for fast-tracking translational research into new therapy.

Za Katedro FT

prof. dr. dr.h.c. Stane Srčič