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Pheromonicin: A fusion-protein against drug-resistant pathogens

Xiao Qing Qiu^{1,2}¹West China Hospital-Sichuan University, China²Pheromonicin Biotech-Engineering Center, China

A new strategy in the development of antibiotics against the threat of antibiotic resistance is to simply adopt defense strategies of bacteria themselves. Bacteriocins, antimicrobial peptides produced by bacteria, are an essential entity of such strategies. Colicins are channel-forming bacteriocins produced by *Escherichia coli*. They are bactericidal to other *E. coli* strains by forming a voltage-activated channel in the cell membrane. Here we constructed a peptide consisting of a 28-residue antibody mimetic fused to the channel-forming domain of colicin Ia and named it pheromonicin. By altering native targeting of colicins, antibody mimetic targets fused colicin to form a lethal channel in the cell membrane to lead the leak/death of targeted pathogens. Pheromonicins have nano-molar efficacy against thousand clinical isolates of antibiotic-resistant Gram-positive and -negative pathogens while they left enteric probiotic bacteria, *Lactococcus*, *Lactobacillus* and *Bifidobacterium* unaffected at the dosages that effectively killed pathogens. In thousand rodents, poultries, ungulates and non-human primate models, pheromonicin-treated animals survived administration of MRSA, or VRE, or MDR *P. aeruginosa*, or MDR *M. tuberculosis* at doses that were lethal to controls. With the inheritance of colicin's native advantages, nano-molar efficacy, the ability to act in the host circulation, no toxicity and easy genetically engineered, pheromonicin application cleared fatal bacterial infections *in vivo* that did not respond to currently employed antibiotics (vancomycin, amoxicillin, oxacillin, carbapenem, etc.). Pheromonicin may be of value as a novel antibiotic against MDR pathogens with targeted bactericidal and cytokine modulating activities.

Biography

Xiao Qing Qiu has completed his PhD in 1991 from Emory University and Postdoctoral studies from Albert Einstein College of Medicine at NYC in 1996. He is the Director of Lab of Biomembrane & Membrane Proteins and also Full Professor of Sichuan University. He has published more than 10 papers in reputed journals. He is mainly engaged in developing a novel fusion-peptide antibiotic, pheromonicin, against drug-resistant pathogens. His 56 related patents have been approved by China, US and other countries' patent offices.

491607484@qq.com

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