



Combination Treatment of Protease, DNase I, and Antibiotic for Biofilm-Involved Staphylococcus epidermidis Infections

Vincent Xin

Shanghai American School/Shanghai Renji Hospital, Shanghai, China, 201107

Abstract:

Biofilms play a key role in bacterial resistance against antibiotics. Formation of biofilms enables *S. epidermidis* to become established in hospital environments and be a major cause of nosocomial infections. 50% of clinical isolated *S. epidermidis* from inpatients at Shanghai Renji Hospital are biofilm-forming, 95% are methicillin-resistant. Formation of biofilms and antibiotic-resistant strains render *S. epidermidis* infections a serious health issue—single antibiotic treatment often fails and removal of the infected catheter or prostheses is required. The development of more effective methods of treating biofilm-involved *S. epidermidis* infections will be a major step forward to counter such infections. To simulate *S. epidermidis* biofilm-involved infections, the two chosen clinical isolates were the most prevalent strains at Renji: biofilm-forming and methicillin-resistant. This study confirmed the significant presence of eProteins and eDNA in *S. epidermidis* biofilms, and found that the most effective biofilm degradation (52.5%) is achieved by the dual degradation method of protease K 1U/ml, 2hrs, and DNase 20ug/ml, 12 hrs. Pre-treating biofilm with this method enhances bactericidal efficacy of Vancomycin and Linezolid by >90% ($P < 0.001$). This study proved the effectiveness of the novel Protease +DNase +antibiotic combination treatment for treating biofilm-involved infections by reducing biofilm biomass and enhancing the bactericidal effect of antibiotics.

Biography:

Vincent Xin is an 11th grade student at Shanghai American School Puxi with a passion for STEM, especially the field of microbiology. A member of the Science National Honor Society, Vincent has been conducting and presenting research for over 3 years. He spent two summers doing research projects in the clinical laboratory at Renji Hospital, which is affiliated with Shanghai Jiao Tong University, under the supervision of clinical microbiologist Qin Juanxiu, M.S.. With these research projects, Vincent participated in several international and na-



tional science fairs, earning a top 5 finish at 2019 Sichuan Intel Cup and attending Intel ISEF 2019 (International Science and Engineering Fair) as a finalist.

Publication of speakers:

1. Mu, Qinghui & Tavella, Vincent & Luo, Xin. (2018). Role of *Lactobacillus reuteri* in Human Health and Diseases. *Frontiers in Microbiology*. 9. 10.3389/fmicb.2018.00757.
2. Mu, Qinghui & Tavella, Vincent & Kirby, Jay & Cecere, Thomas & Chung, Matthias & Lee, Jiyoung & Li, Song & Ahmed, Ansar & Eden, Kristin & Allen, Irving & Reilly, Chris & Luo, Xin. (2017). Supplementary Material 3.
3. Mu, Qinghui & Tavella, Vincent & Kirby, Jay & Cecere, Thomas & Chung, Matthias & Lee, Jiyoung & Li, Song & Ahmed, Ansar & Eden, Kristin & Coy, Irving & Reilly, Chris & Luo, Xin. (2017). Antibiotics ameliorate lupus-like symptoms in mice. *Scientific Reports*. 7. 13675. 10.1038/s41598-017-14223-0.
4. Mu, Qinghui & Tavella, Vincent & Kirby, Jay & Cecere, Thomas & Chung, Matthias & Lee, Jiyoung & Li, Song & Ahmed, Ansar & Eden, Kristin & Allen, Irving & Reilly, Chris & Luo, Xin. (2017). Supplementary Material 2.

[11th International Conference on Clinical Microbiology and Infectious Diseases | April 19-20, 2021 | Tokyo, Japan](#)

Citation: Vincent Xin; Combination Treatment of Protease, DNase I, and Antibiotic for Biofilm-Involved Staphylococcus epidermidis Infections; *Euro Clinical Microbiology* 2021; April 19-20, 2021 | Tokyo, Japan