Alpha-Toxin Neutralization Significantly Impacts Staphylococcus aureus Biofilm Formation

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Abstract

Background: Staphylococcus aureus is a common cause of biofilm-related infections. We have shown previously that S. aureus biofilm formation on porous materials is significantly reduced with anti-alpha toxin antibody treatment. Further, the alpha toxin neutralization has been shown to reduce antibiotic resistance. This study extends these results by examining the impact of anti-alpha toxin treatment on the relative persistence of S. aureus biofilms in vivo.

Methods and Materials

Atox Neutralization Significantly Impacts Staphylococcus aureus Biofilm Formation in a Mouse Subcutaneous Catheter Model infected with S. aureus RN6390

Panel 1: Anti-Atox (ATOX) Treatment Reduces Hemolytic Activity of 18x4 S. aureus RN6394 Cultures

Panel 2: S. aureus RN634 In Vitro Biofilm Density is Significantly Reduced with Anti-Atox (ATOX) Treatment

Panel 3: Alpha-Toxin (ATOX) Treatment Decreases Early in Vitro Biofilm Formation in a Mouse Subcutaneous Catheter Model infected with S. aureus RN6390

Panel 4: Minimum Inhibitory Concentration (MIC) of *Vaccinum* against S. aureus NRS234

Panel 5: Anti-Atox (ATOX) Treatment Increases In Vitro Vancomycin Sensitivity of S. aureus NRS23424 to Biofilms

Panel 6: Anti-Atox (ATOX) Treatment Enhances In Vivo Vancomycin Efficacy in a Rat Model of Experimental Endocarditis infected with S. aureus NRS234

Summary and Conclusions

This study extends previous findings that alpha toxin neutralization reduces biofilm persistence in vitro and in vivo. Further, we show that anti-alpha toxin treatment also reduces biofilm-mediated antibiotic resistance in vitro and in vivo. These data suggest that further investigation of clinical trials targeting alpha toxin neutralization may be warranted for the prevention of S. aureus biofilm-related infections.

References


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