Abstract

Conventional compared to Biofilm Antimicrobial Susceptibility Testing for Stenotrophomonas maltophilia Isolates from Cystic Fibrosis Patients

Kitty Wu, Yvonne Yau, Larissa Matukas, Valerie Waters

Divisions of Pediatric Infectious Diseases and Microbiology, Hospital for Sick Children, University of Toronto, Toronto, Ontario, Canada

Objectives: Stenotrophomonas maltophilia is a multi-drug resistant organism that has been increasingly isolated from the lungs of patients with cystic fibrosis (CF). The objectives of this study were to compare biofilm to conventional planktonic antimicrobial susceptibility results for S. maltophilia and identify antibiotic combinations that would be most effective at inhibiting biofilm growth of S. maltophilia, which may occur in the CF lung.

Methods: A total of 185 S. maltophilia isolates from sputum and bronchoalveolar lavage specimens from predominantly CF patients from the Hospital for Sick Children and St. Michael's Hospital underwent planktonic and biofilm susceptibility testing against 9 different antibiotics, alone and in double antibiotics combinations.

Results: Significantly fewer S. maltophilia isolates were susceptible to fluoroquinolones, colistin, tobramycin, doxycycline, trimethoprim-sulfamethoxazole and β-lactams when grown as biofilms compared to when grown planktonically ($p<0.0001$). When S. maltophilia isolates were grown planktonically, 6 of the 10 most effective antibiotic combinations included high-dose (achievable by aerosolization) levofloxacin and 5 of the 10 combinations included colistin at doses achievable by aerosolization. When S. maltophilia isolates were grown as a biofilm, 4 of the 10 most effective antibiotic combinations included high-dose levofloxacin and 7 of the 10 combinations included colistin at doses achievable by aerosolization.

Conclusions: In conclusion, CF S. maltophilia isolates are considerably more resistant to antibiotics in vitro when grown as a biofilm compared to when grown planktonically. Antibiotic combinations that included either colistin or levofloxacin, at levels achievable by inhalation, were the most effective at inhibiting S. maltophilia growing as a biofilm.