Inflammatory potential and antimicrobial susceptibility of bacteria in the cultivatable CF lung microbiome

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Introduction and Objectives: Recent studies indicate a diverse and evolving CF lung microbiome, but the interaction of these organisms with the host, and the impact of antimicrobial therapy are poorly understood. Here we study the inflammatory potential and antimicrobial susceptibility of newly identified bacteria compared to “typical” CF pathogens.

Methods: CF BAL or sputum was obtained and cultured in Belfast, Chapel Hill and Dublin and 8–14 isolates each from multiple bacterial genera including Pseudomonas, Fusobacteria, Haemophilus, Prevotella, Streptococcus and Veillonella were studied. The isolates were assessed for activation of the NF-kB pathway in human airway epithelial cells and for susceptibility to a range of antibiotics (Etest®).

Results: There was profound variability in NF-kB activating potential between and among genera. Gram negative bacteria including Fusobacteria and Veillonella tended to be highly stimulatory, similar to Pseudomonas or Burkholderia, while Prevotella and Gram positive bacteria tended to be less stimulatory. Differences in antibiotic susceptibility within and between genera and species were apparent with overall susceptibility ranging from 38% (tobramycin) to 94% (piperacillin/tazobactam).

Conclusion: We demonstrate wide variability in pro-inflammatory potential and antibiotic susceptibility among the diverse array of bacteria that may be present in the CF lung. We speculate that these newly identified organisms influence the overall inflammatory status of the CF lung, and that these effects are variably modulated by different antibiotic therapies.

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