In vitro antimicrobial susceptibility of single and mixed populations in Cystic Fibrosis: the role of novel microorganisms

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Pseudomonas aeruginosa is the dominant pathogen associated with bacterial infections occurring in Cystic Fibrosis (CF) patients, resulting in 80% of mortality in adults. However, pulmonary infection has recently been defined as polymicrobial, involving classical and other unusual bacteria, which may play a crucial role when associated with the conventional ones. This work aims to evaluate the susceptibility patterns of mono and dual-species biofilms encompassing traditional and emerging microorganisms from CF.

The traditional pathogen*, P. aeruginosa* PA14, and two novel microorganisms, *Inquilinus limosus* M53 and *Dolosigranulum pigrum* CIP104051 were used to form single and dual-species biofilms. These were developed on the Calgary Biofilm Device and their susceptibility profiles were estimated against eight antibiotics (Tobramycin, Gentamicin, Levofloxacin, Ciprofloxacin, Clindamycin, Cefotaxime, Chloramphenicol and Rifampicin), by measuring the minimum inhibitory concentrations (MIC) and minimum biofilm eradication concentration (MBEC).

Data showed that most antibiotics were effective in inhibiting planktonic bacterial growth at low concentrations, mainly in mono-populations. Single biofilms involving novel bacteria were more sensitive to virtually all antibiotics than *P. aeruginosa*. However, when in mixed biofilms, those organisms acted synergistically with *P. aeruginosa*, attaining additional antibiotic resistance and requiring higher doses of antibiotics to eradicate them. From these results, it can be concluded that the presence of unusual bacteria and their complex interactions with conventional organisms might not be ignored thereby enabling to develop suitable therapy strategies to combat CF.

Keywords Cystic fibrosis; *Pseudomonas aeruginosa*, antimicrobial susceptibility

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