PS0506/ PE112 Synergistic interactions within polymicrobial biofilms formed by atypical and conventional species in cystic fibrosis

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A complex microbiome is present in Cystic fibrosis (CF)-airways, with uncommon species co-existing and establishing dynamic interactions with traditional pathogens. This study aimed to examine in vitro biofilm formation and susceptibility patterns of two CF-atypical bacteria, *Inquilinus limosus* (IL) and *Dolosigranulum pigrum* (DP), when associated to *P. aeruginosa* (PA), under oxygen-atmospheres resembling CF airways. The ability of IL and DP to form dual- and three-species biofilms with PA and to resist against antibiotics was evaluated under in vitro oxygen-restricted conditions. The fitness of biofilms was compared with monospecies consortia by individual species. Atypical species were able to develop biofilms with PA, presenting a great extent of adhesion in microtiter plate wells and achieving high cell-densities over 24h growth. Three-species populations were well-adapted to poor-oxygen environments, showing high growth rates. Both dual- and three-species biofilms were significantly resistant to most antibiotics, with minimum biofilm eradication concentrations in most cases not achievable (>1024 mg/L). Comparing with monospecies consortia, the presence of IL and DP did not disturb PA biofilms, resulting in most cases in polymicribial biofilms with increased biomass, activity and antibiotic resistance, which persisted under oxygen-restricted environments. This study evidenced the contribution of some atypical species to develop resilient polymicrobial biofilms with PA in CF-airway oxygen conditions. Hence,CF treatment will only be successful after recognizing CF-infection as polymicrobial and upon exhaustive modulation of ecological processes, which will be useful to predict the effects of new therapeutic interventions. Authors acknowledge financial support from IBB-CEB, FCT and FEDER, trough Program COMPETE (project-PTDC/SAUSAP/113196/2009/FCOMP-01-0124-FEDER-01601), grant-SFRH/BD/47613/2008.