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Pseudomonas-Candida interaction in dual-species biofilms

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Bacteria and fungi co-inhabit in a wide variety of environments and the interactions between them can result in huge medical and economic impacts. *Pseudomonas aeruginosa*, a Gram-negative bacterium, and *Candida albicans*, a dimorphic fungus, are two important opportunistic pathogens frequently identified as the major causes of nosocomial infections, mainly due to their ability to form virulent biofilms. A pathogenic interaction between *P. aeruginosa* and *C. albicans* was recently identified and, it was also found that *C. albicans'* morphology and virulence are significantly affected in the presence of *P. aeruginosa*. In the present work, the interaction between *P. aeruginosa* and *C. albicans* in dual-species biofilms was studied. Biofilm formation was carried out in 24-well microplates containing 1 ml of Yeast Peptone Dextrose medium and 10 µl of each cellular suspension with an OD_{600nm} of 1. Biofilms were formed during 24 and 48 hours with medium renewal every 12 hours.The results revealed that in mixed biofilms *C. albicans* proliferation was inhibited by the presence of both *P. aeruginosa* ATCC 10145 and PAO1 strains. The number of *C. albicans* viable cells was reduced by 2 and 3 logs in 24 and 48 hours old biofilms compared to single *C. albicans* biofilms. Conversely, *P. aeruginosa* was not influenced by the presence of *C. albicans* and so, the amount of viable cells of *P. aeruginosa* was similar in single and dual-species biofilms for both *P. aeruginosa* strains studied. To better understand the cause of *C. albicans* inhibition, biofilms of *C. albicans* with *P. aeruginosa* LPS mutant strains were also studied. These results showed that the LPS chain of *P. aeruginosa* has a great impact on *C. albicans* proliferation – mutants with full LPS chain inhibit the greatest while mutants with truncated A and B chains and also truncated outer core allow the growth of *Candida*. According to this study, the inhibition of *C. albicans* biofilm formation is directly correlated with the composition of the *P. aeruginosa* LPS chain.