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Monospecies and polymicrobial biofilms in static and flow environment
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Abstract
Microbial interactions are strongly associated with the formation of polymicrobial oral biofilms. Candida spp. has been implicated in being involved in both intra-kingdom and inter-kingdom interactions. Intra-kingdom interaction refers to communication between microorganisms within the same kingdom, such as yeast to yeast. In contrast, inter-kingdom interaction relates to communication between at least two different kingdoms, such as yeast and bacteria. These interactions can occur during planktonic growth and within the biofilm. The importance of polymicrobial biofilm infections in medicine is becoming more evident. This chapter described in detail the step-by-step methodology to characterize the growth of C. albicans, Actinomyces naeslundii, and Streptococcus mutans as both monospecies and formation and development in static and flow cell environments. A single-track flow cell milled from a high-density polyethylene block was used to examine biofilm formation and was shown to simulate the conditions encountered by microorganisms in the oral cavity, such as shear stress rates due to salivary flow. The expected outcomes of this method are to access the biofilm biomass, biofilm roughness coefficient, biofilm biomass, average thickness, maximum thickness, and percentage surface colonization. All the data gathered will be analysed using SPSS software version 22.0 using a chi-square test to compare the categories (high, medium, and low) for each assay. Meanwhile, the biometric data of a flow-cell biofilm were statistically analysed using SPSS software version 22.0 by applying ANOVA with a post hoc Tukey test to compare biometric parameters. In conclusion, yeasts and bacteria can form polymicrobial biofilms in a static and flow environment. © 2023 Elsevier Ltd

Author Keywords
Biofilms; Flow; Monospecies; Polymicrobial; Static

Index Keywords
crystal violet, polyethylene; Actinomyces naeslundii, bacterial colonization, bacterium culture, biofilm, biomass, Candida albicans, comparative study, confocal laser scanning microscopy, fluorescence in situ hybridization, image analysis, in situ hybridization, microorganism, mouth cavity, nonhuman, salivation, shear stress, Streptococcus mutans, XTT assay, yeast

Chemicals/CAS
crystal violet, 467-63-0, 548-62-9; polyethylene, 9002-88-4

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