

Abstract

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Study program: Pharmacy

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Biofilms are a default mode of growth for most bacteria. Microbes encapsulate themselves within a matrix, composed mainly of extracellular polymeric substances. A biofilm can be composed by multiple species. Matrix environment induces various physiological shifts, such as switch to dormant state or expression of biofilm-specific genes. Mature biofilm's heterogeneous, due to differences in spatial microbe distribution and spatial nutrient utilization across the matrix. Matrix provides many advantages to bacteria, like nutrient capture and transfer or protection against extreme conditions.

Washbasin U-bend multi-species biofilms were investigated with a special focus on *Pseudomonas aeruginosa*. This opportunistic pathogen causes nosocomial infections, mainly in immunocompromised patients, with considerable health and socio-economic impacts. A link between sinks and environmental *P. aeruginosa* contamination has been established. Environmental decontamination may be an approach to lessen aforementioned impacts.

A new methodology to describe the ability of bacteria to perform vertical movement *via* biofilm spreading was developed.