THE NEW ARMENIAN MEDICAL JOURNAL
Volume19 (2025), Issue 1 p.50-60

DOI: https://doi.org/10.56936/18290825-1.v19.2025-50

THE ROLE OF RESIDENT BACTERIAL-FUNGAL INTERACTIONS IN BIOFILM FORMATION DURING WOUND INFECTIONS: DOES BIOFILM FORMATION IN ECOLOGICAL NICHES CONTRIBUTE TO NORMAL FUNCTIONING IN VERTEBRATE MAMMALS?

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Received 29.04.2024; Accepted for printing 11.02.2025

Abstract

Recent discussions have focused on the distribution of opportunistic-pathogenic and pathogenic microorganisms that migrate from their biological ecological niches to internal organs and tissues under pathological conditions. Resident gram-negative and gram-positive microorganisms colonize soft tissues, providing optimal conditions for their persistence. Apparently, a similar migration process occurs with resident pathogenic and opportunistic-pathogenic fungi. Resident microorganisms persisting in the soft tissues of wounds begin to form new structures, so called biofilms, which foster new functional interactions between bacteria and fungi. Simultaneously, the role and relative proportion of biofilm-forming microorganisms in the wound inflammatory process have not yet been fully established. Fungi within the biofilm, through their mycelia and pseudohyphae, provide an optimal surface for the adhesion of resident bacteria.

Such an interaction between bacteria and fungi, through biofilm formation, can be realized in three ways under pathological conditions: 1) By simultaneously activating the pathogenic potentials of both fungi and bacteria, 2) By activating only one type of microorganism, while preserving the principle of commensalism with others. 3) By activating only one type of resident microorganisms while inhibiting the activity of another.

Apparently, the formation of biofilms enhances the pathogenic potentials of both resident bacteria and fungi simultaneously, which has a negative effect on the nature and progression of the wound process, especially when it becomes chronic.

Our previous studies have shown that many resident-pathogenic bacteria, including E. coli, play an active role in maintaining immune homeostasis, cardiovascular activity and gastrointestinal function under normal conditions by modulating the production of biologically active factors with immunomodulatory, endocrine-stimulating and cardiostimulating effects.

We believe that the activity of resident opportunistic-pathogenic bacteria in a healthy organism follows the only evolutionarily justified mechanism: the maintenance of their existence by utilizing the energy resources of the macroorganism, while simultaneously participating in the activity of integrative systems at all levels of structural organization. In this regard, we pose the following question: Does bacterial-fungal biofilm formation occur in their ecological niches under normal functioning of vertebrate mammalian organisms?

Keywords: *wound, bacteria, fungi, biofilm, bacterial-fungal interactions in normal and pathological conditions.*

Cite This Article as:

Zilfyan A.V., Avagyan A.S., Muradyan A.A. *(2025).* The role of resident bacterial-fungal interactions in biofilm formation during wound infections: Does biofilm formation in ecological niches contribute to normal functioning in vertebrate mammals?. The New Armenian Medical Journal, vol.19(1), 50-60; DOI: https://doi.org/10.56936/18290825-1.v19.2025-50

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