



Chapter 6 - Metabolomic study of biofilm-forming natural microbiota of skin biofilm

Sakul Shankar Sabesan¹, Annie Jeyachristy Sam²

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Abstract

The microbiome that inhabits the human skin ecosystem is crucial in both normal health and diseases. The immobilized communities of the microbiomes, such as bacteria, fungi, and protozoa, form a biofilm on the skin through an attachment to the surface through their extracellular matrix. Several factors including the surface environment, host receptors, nutrition, and the immune system influence biofilm formation. Biofilms are advantageous to the organisms by protecting them from host defense, integrated metabolism, increased virulence, and increased resistance to antimicrobials, and differential gene expression. The role of biofilms has been studied in various dermatological conditions including diabetic wounds, chronic wounds, atopic dermatitis, candidiasis, acne vulgaris, hidradenitis suppurativa, onychomycosis, miliaria, and rosacea. The therapeutic approach varies according to the associated condition due to the resistance shown by the biofilms to the conventional antimicrobials. The therapeutic approach targeted toward the disruption of biofilms is advantageous. Studies on the effects of toxins, various enzymes, and other secondary metabolites secreted by the microbial biofilms of the skin are scarce and requires extensive knowledge on the nature of biofilms to focus on the therapeutic approach. Metabolomics is a systematic approach established to study the alterations in biological pathways that provide a revelation of facts in understanding the normal physiological and pathophysiological conditions in diseases and to identify the biomarkers in the diagnosis of diseases. It also aids in the better comprehension of the pathogenesis of different diseases. Metabolomics is crucial in the study of natural biofilm-forming skin microbiota to identify the pathophysiological alterations in skin diseases and hence facilitate the treatment of the condition. Metabolomics has also been implicated in a very important field of futuristic cosmetics, establishing its vital role in precision skincare. This chapter focuses on the characteristics of biofilms, their role in the various dermatological disorders, their role in the alteration of functional and metabolic pathways with an insight on the recent advances in the metabolomics of skin biofilm, and its implications in the therapeutic approach toward various diseases.