

ABSTRACT

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Title of bachelor thesis: Pathogenesis of infectious diseases caused by biofilm-forming microorganisms

Background: The aim of this thesis is to describe the importance of microbial biofilms in medicine and in pathogenesis of infectious diseases. This thesis includes specification of the concept of biofilm, its structure and chemical composition, formation, development and processes occurring in biofilm which are directly related to pathogenesis of infectious diseases. Briefly, the most common infectious diseases associated with the formation of microbial biofilms are also mentioned.

Main findings: Microbial biofilms are active layers of microorganisms and their metabolic products. Biofilm, unlike the planktonic phase, is sessile form of life. The microorganism first adheres to suitable substrate, then multiplies and produces metabolites, that create slime called matrix. Parts of the biofilm layer can tear off and colonize new environments. These environments include any natural niches with water access, industrial pipelines but host tissues, as well. Biofilms cause diseases such as otitis media, endocarditis, or pneumonia in patients with cystic fibrosis. Biofilms are highly resistant and show increased insusceptibility to antimicrobial substances. Treatment of biofilm-associated diseases is often highly troublesome and often unsuccessful, which resulted in the research of new therapeutical approaches..

Conclusions: Study of biofilm is the hot topic for researches, now. The pathogenesis of biofilm-associated diseases consists of sequential formation of a biofilm, that is hidden for the immune system for a long time. After acquisition of the critical cell density in biofilm, acute and aggressive manifestation of infection begins. Conventional treatment is usually not very effective. New strategies of treatments are proposed, focusing on biofilm formation mechanisms or on processes taking part in biofilm development.

Key words: microbial biofilm, pathogenesis of infectious diseases, mechanisms of biofilm formation, *quorum sensing* phenomenon