Abstract

The subject of my PhD thesis focuses on one of the bacteria from "ESKAPE" group – *Pseudomonas aeruginosa.* This opportunistic human pathogen is responsible for many, often fatal, nosocomial infections. Due to its many virulence factors, complex quorum sensing signalling system, ability to movement and biofilm formation *P. aeruginosa* appears as a one of the challenges for modern medicine. Nowadays, scientists conclude that with actual resistance-gaining rate by *P. aeruginosa*, appearance of Pan Drug Resistance, untreatable with standard antibiotic strain is inevitable. This fact shows that alternative antimicrobial therapies concerning multidrug resistant strains, are urgently needed. One of the promising method against *P. aeruginosa* is antimicrobial Blue Light (aBL) where light of the approximate wavelength ($\lambda \geq 405 – 411$ nm) is used. Results obtained during my PhD project indicate high effectiveness of aBL, not only in eradication of the pathogen, but also against secreted virulence factors, Quorum Sensing signalling molecules, as well as in decrease of biofilm formation rate. Moreover designed and developed *in vivo* models of *Mus musculus* and *Caenorhabditis elegans*, confirmed efficacy of used therapy against *P. aeruginosa.* The most promising result shows synergistic effect between blue light therapy and resistance to the antibiotics, resulting in 64. fold reduction of chemotherapeutic minimal inhibitory concentration.

Results obtained during PhD project were presented in three publications attached to the thesis, which are thematically coherent set of articles published in indexed scientific journals.