Abstract

Staphylococcus aureus is human pathogen and is causative factor of many diseases with different character, from light infections of the skin to life-threatening sepsis. *S. aureus* often colonizes cystic fibrosis patient's lungs and causes long-standing pneumonia, which can cause death in these patients. Infection caused by *S. aureus* are, as most of the infections, treated with antibiotics. Failure in treatment is caused because of presence of resistant strains. It was shown, that treatment failure can be caused by different type of the antibiotic tolerance – by the persistence. Persisters are phenotypic variants of isogenic bacterial population, that is unaffected by antibiotic treatment even though they don't have genetics determinants of the resistance. The phenomenon of the persistence in bacteria is still relatively poorly understood.

The aim of my thesis was to contribute to the characterization of the persistence in *S. aureus.* We have optimized a method for rapid identification of persisters' amount in the bacterial population after treatment with antibiotics using the method of measuring the killing curves. We have found out, that exposure to osmotic stress causes increase in number of persistence in the bacterial population by 1 – 2,5 order. Using quantitative PCR method we have analyzed the alternative sigma factor *sigB* expression. We have found out, that sigB is expressed in growth conditions with antibiotics, and during osmotic stress. Using flow cytometry with fluorescence probes SYTOX green and C_{12}-resazurin we have identified numbers of live and dead cells in the population after antibiotic treatment. We primarily wanted to identify dormant population, which often represents persisters. We have not yet succeed in optimizing this method and this dormant population cannot be quantified. In the future, however, this method seems to be a useful tool for the rapid identification of physiological state population after treatment with antibiotics, and it may accelerate study of persistence.

Keywords: *Staphylococcus aureus*, persistence, antibiotic treatment, killing curve, *sigB*, stress response