The aim of this project is to analyse the impact of phage therapy in combination with antibiotics (ciprofloxacin and fluconazole) on dual-species (*Staphylococcus aureus* and *Candida albicans*) biofilm eradication. Initially the optimization of time intervals and order of application of therapeutic factors will be established both in liquid co-culture and biofilm conditions. In the next step of research changes in biofilm's architecture and biochemistry, dynamics of ratio of *S. aureus* and *C. albicans* in this structure and their transcriptomes adjustments in response to treatment will be investigated. Moreover, the effectiveness of combined therapy will be evaluated in the condition of human urine and blood, and on an *in vivo* model (*Galleria mellonella*).

The present state of knowledge indicates that bacteria and yeast resistant to well-known drugs are becoming an increasing worldwide problem. Pathogens that cause serious infections are frequently isolated from biofilms which are definitely harder to eradicate than planktonic forms of microorganisms. There are still no alternative therapies which might be safely used against polymicrobial biofilms. What is more, the influence of phage-antibiotic therapy against polymicrobial biofilm is not sufficiently investigated so far. One of the most frequently observed dual-species biofilm is *S. aureus* and *C. albicans* biofilm.

Bacteriophages – natural enemies of bacteria, are promising therapeutic agents against multidrug resistant bacteria. Nowadays, bacteriophages are used e.g. in veterinary, environment protection or food industry. Their usefulness in medicine is currently deeply analysed and one of the most auspicious approaches is to use them with antibiotics in what is called Phage Antibiotic Synergy (PAS). Multiagent therapy is more efficient due to different, complementary mechanisms of action of drugs and phages. This issue belongs to the microbiological field of research and requires usage of methods that belong to fields as follows: molecular biology, virology and biotechnology.

Project's hypothesis is that the results confirm the effectiveness of phage antibiotic therapy based on ciprofloxacin, fluconazole and bacteriophages against dual-species biofilm formed by *S. aureus* and *C. albicans.* Moreover, it is assumed that proposed therapy will be adequate in case of *ex vivo* and *in vivo* models.

Final effect of this project assume that obtained results will bring new information about changes in dual-species biofilm in response to combined therapy. Crucial goals of this project will be realized according to the basic microbiological and molecular methods which are used for experimental research about biofilms submitted for treatment which in turn will lead to the verification of set aims. Experimental research conducted in this project broadens the knowledge about how phage-antibiotic synergistic therapy influences the architecture and biochemistry of dual-species biofilm as well as the biomass and viability reduction of the structure. Furthermore, the awareness about changes in the ratio of microorganisms and differences in their gene's expression will be gained. Acquisition of information about all described issues and finding new therapeutic approaches are important due to the urgent need for alternative solutions against drug resistant bacteria and yeast.