

Lysins are enzymes produced by bacteriophages (bacteria-killing viruses). Bacteriophages use lysins at the end of their lytic cycle to release progeny virus from the bacteria. These enzymes destroy the peptidoglycan layer, lysing and killing the bacteria. Studies results indicate recombinant lysins added to bacteria also induce osmotic lysis and destruction of the bacteria. Lysins have been successfully used against MRSA, *Listeria monocytogenes*, *Staphylococcus* strains, *Pseudomonas aeruginosa*, and in bacterial infections of various organs and tissues. In addition, lysins demonstrated a synergistic effect with other antibacterial agents. It may indicate that lysins are able to increase their effectiveness. The subject of the project is *Rothia* spp. specific lysin, that may reduce the severity and persistence of *Pseudomonas aeruginosa* lung infections by inhibiting *Pseudomonas aeruginosa* metabolism and creating an unfavourable environment for it.

New drugs or new treatment strategies discovery is an extremely important, time- and money-consuming process. During the mounting threat of antibiotic resistance the development of new antibacterial therapies is of particular importance. Only 12 antibiotics have been approved since 2017, however 10 of them belong to existing classes with established mechanisms of antimicrobial resistance. These data indicate that intensive research to overcome antibiotic resistance is urgently needed. Lysins are promising antibacterial agents, however despite the great interest of scientists in these enzymes, the data about them are still limited.

Respiratory diseases, as reported by WHO, are prevalent worldwide, impacting people of all ages and societies. Antibiotic resistance in *Pseudomonas aeruginosa* is a significant concern, and requires exploring alternative therapeutic approaches. The project will focus on the novel bacteriophage-derived lysin, examining its bacteriolytic effects on *Rothia mucilaginosa* and *Pseudomonas aeruginosa* - bacteria implicated in severe and chronic respiratory disorders.