Bacteriophages (phages), are viruses which specifically infect and destroy bacterial cells without adversely affecting eukaryotic cells. One of their very important features is the ability to kill antibiotic-resistant bacteria. In fact, bacteriophages are currently considered one of the most promising alternatives to combat multidrug-resistant bacteria. While the interactions of phages and bacterial cells have been studied in great detail, relatively less is known about other effects of this group of viruses.

The main purpose of this project is to extend our original observations strongly suggesting that aside from its well-known antibacterial action phage therapy may have also anti-inflammatory and/or immunomodulatory function. Observations initially made in our patients indicated that phage therapy can reduce inflammatory indices even though eradication of infection has not been achieved. Further work has revealed that phages may influence viral infection, inhibit production of pro-inflammatory cytokines, decrease reactive oxygen species and dampen inflammatory cell infiltration in experimental animals. Thus, phages may indeed function „beyond the anti-bacterial action" which should open novel options for their application in medicine. The above mentioned data and considerations derived from our earlier studies has allowed us to formulate new concepts of phage therapy which could be useful not only to eradicate antibiotic-resistant bacterial infections, but also could be applicable in treating autoimmune diseases, sepsis, allergy, graft-versus-host disease.

Therefore we plan to conduct a wild basic study on the influence of two model phages (*Escherichia coli* T4 phage and therapeutic *staphylococcal* A5/80) on the function of different populations of immune cells (neutrophils, monocytes, B cells, NK cells, T lymphocytes, CD4- and CD-8 positive cells). We will study the impact of bacteriophages on expression of their genes coding different pro- and anti-inflammatory factors, as well asses phage influence on synthesis of different intracellular and extracellular cytokines. We expect that the current project will provide further support to our hypotheses and contribute to the development of novel forms of therapy in diseases in which current treatment is inadequate. It may provide also novel insights on the safety of phage therapy.