

In the last decades an increasing production and use of pharmaceuticals is observed. Especially the easily accessible OTC (*over-the-counter*) drugs are very often purchased in quantities that exceed actual demand and are released to the households wastes and municipal wastewaters. Additionally, the significant amounts of pharmaceuticals are used as supplements in farm animal feed. One of the group of chemotherapeutics of such very wide use are derivatives of nitrofurans like furazolidone, nitrofurantoin, nitrofurazone and furaltadone. Because drugs belonging to this group during oral usage are almost entirely eliminated through kidneys in unchanged form, they are widely applied in treatment of urinary tract infections. As a result both their wide employment and limited metabolism result in growing contamination of the environment.

In the literature there is practically no information about the biodegradation of nitrofurans by environmental bacteria as well as changes in bacterial cell structure and metabolism caused by the contact with such class of chemical compounds. As it could be noticed, the contemporary knowledge about impact of nitrofurans on environmental microorganisms is scarce and insufficient. That shows the need for intensive research that will allow to supplement the knowledge on this issue.

The aim of the project is a broad investigation of biodegradation of nitrofurans chemotherapeutics by environmental bacteria. Firstly, the biodegradation of the nitrofurans derivatives: furazolidone, nitrofurantoin, nitrofurazone and furaltadone in model aqueous systems by selected bacterial cultures coming from research team collection that possess potential abilities to biodegrade nitrofurans, as well as by isolated strains from the environment was performed. The biological degradation of nitrofurans will also be conducted with the strains after long-term contact with this group of compounds and by microbial consortia, e.g. river biocenosis or activated sludge. Moreover, the modifications in cell surface properties, enzymatic activity as well as cell membrane structure will be investigated as well. Finally, the changes in the gene material and proteomic profile of bacteria cells will also be measured.

The realization of the project could provide valuable information, which allows to evaluate the impact of this important group of pharmaceuticals on the bacteria present in the environment. The planned experiments will broaden the knowledge about the processes of biodegradation of the medicaments like the nitrofurans derivatives. Moreover, the research project could bring the information about bacterial cell modification after interaction with such chemical compounds. The presence of nitrofurans derivatives can also lead to deeper adaptation changes in cells physiology and structure. Understanding these changes of bacterial strains is crucial for a correct determination of the capacity of the individual strains of bacteria for degradation of nitrofurans derivatives. All collected information will also help to prepare methods, which will allow to decrease the pharmaceuticals pollution of the environment, what is important for the whole society.