DESCRIPTION FOR THE GENERAL PUBLIC

Poland occupies a leading position in terms of sales and consumption of non-steroidal anti-inflammatory drugs (NSAIDs) available without a prescription. The most popular drugs of this group include paracetamol, ibuprofen, naproxen, diclofenac. After taking of NSAIDs they are excreted in unchanged or slightly changed form. Along with municipal sewage, they get into sewage treatment plants. Analyzes of treated sewage flowing out of the treatment plants indicate, however, that these drugs are still present in them. They are also detected in surface waters: rivers, lakes, seas. It is also known that they adversely affect organisms living in such polluted water environments. Therefore, it is extremely important to develop methods that enable the purification of waters and sewage from NSAIDs. One of the promising methods for removing pharmaceuticals is bioremediation, a process using bacteria with increased degradation capacity. The collection of the Department of Biochemistry at the University of Silesia in Katowice already contains several strains of bacteria (*Bacillus thuringiensis* B1(2015b), *Pseudomonas moorei* KB4, *Planococcus* sp. S5, *Stenotrophomonas maltophila* KB2) that are able to break down higher concentrations of paracetamol, ibuprofen, naproxen and diclofenac. However, during the degradation of pharmaceuticals, metabolites are formed, which are often more toxic than the parent compounds and negatively affect bacteria. Immobilization is a method that helps protect bacteria against such negative effects of metabolites. However, it is known that immobilization may also affect the metabolic properties of the immobilized strains.

The aim of the project is to determine the effect of immobilization on metabolic activity and sensitivity to non-steroidal anti-inflammatory drugs of selected strains of bacteria capable of decomposing them. First we plan examine whether the selected strains have characteristics that condition immobilization. Next, it is planned to determine how immobilization affects the metabolic activity of the immobilized strains and whether this process reduces the toxic effects of high concentrations NSAIDs and their metabolites on bacteria. The next stage of research is to determine whether the immobilization of individual strains, as well as their co-immobilization, increases the efficiency of NSAID degradation and whether the carrier microenvironment increases the survival of co-immobilized strains.

In the literature there is practically no information on the correlation between the efficiency of immobilization and bacterial phenotypic features, such as cell wall properties, the ability to create a biofilm, or the presence of fimbriae or pilli. Also little is known about the physiological response of bacteria to the immobilization and toxicity of intermediates arising during the microbial degradation of NSAIDs and the protective role of the carrier. Understanding the interactions between microorganisms and the carrier is crucial for efficient both immobilization as well as NSAIDs degradation. This knowledge will allow in the future design of biodegradation systems that will reduce NSAIDs pollution, which is important for the whole society.