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DICLOFENAC: EXPLORING THE MICROBIAL DEGRADATION PATHWAY

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A wide range of unique chemicals of emerging concern (CECs), including pharmaceuticals, are continuously introduced into natural environment including water and soil matrices, mainly from hospital and municipal wastewater or manufactures. Currently, diclofenac (DCF; [2-(2,6-dichloroanilino)phenyl] acetic acid), classified as nonsteroidal anti-inflammatory drug (NSAID) constitutes one of the most serious problem worldwide. Due to its frequent occurrence in wastewaters and natural waters diclofenac is even proposed as a suitable marker for anthropogenic pollution, which confirmed the great importance of NSAIDs environmental pollution. Moreover, as a consequence of its environmental significance, diclofenac is currently classified in the watch list, which contains the most important candidates for a supplemented list of priority substances for the WFD (European Water Framework Directive). Up to now, only a few bacterial strains able to DCF decomposition have been described. Moreover, so far only a few of the initial metabolites of the microbial degradation of diclofenac (including hydroxylated and lactam derivatives) have been identified. Structural and metabolic changes occurring in the bacterial cells under the influence of this drug also remain poorly characterized. The main aim of this research was to describe the microbial degradation pathway of DCF in *Pseudomonas* strains. The analysis include high performance liquid chromatography, gas chromatography coupled with mass spectrometry, measurement of specific enzymes activity presumably involved in diclofenac degradation e.g. hydroquinone 1,2-dioxygenase, hydroxyquinol 1,2-dioxygenase, catechol 1,2-dioxygenase, catechol 2,3-dioxygenase, protocatechuate 3,4-dioxygenase and protocatechuate 4,5-dioxygenase. The influence of diclofenac on bacteria was determined by analysis of the composition and content of fatty acids (FAME, fatty acid methyl esters), which build the bacterial membrane. Toxicity of DCF was evaluated by calculation of EC_{50} value.

Biography

Joanna Żur has studied the microbial degradation pathways of nonsteroidal anti-inflammatory drugs since the beginning of her PhD studies, realized in the Department of Biochemistry, Faculty of Biology and Environmental Protection, University of Silesia in Katowice under the supervision of Urszula Guzik. The second main direction in her work is immobilization of whole bacterial cells. Recently, our research group described the microbial degradation pathway of paracetamol, the most important analgesic drug worldwide. Up to now, the most important scientific achievements in her career is the authorship and co-authorship of review and research articles from the Philadelphia list of journals. Besides this, she worked as the Leader or Executor in eight scientific grants, including national and international projects. She is a Member of Polish Society of Microbiologists.

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