ISOLATION AND CHARACTERIZATION OF A BACTERIAL STRAIN ABLE TO DEGRADE 2-FLUOROPHENOL

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SUMMARY

The advance of industrial organic synthesis has led to the widespread production and release of xenobiotic compounds, whose fate in biological waste treatment processes and in the environment is often problematic. Especially halogenated compounds are frequently detected in waste streams, and their recalcitrant and toxic properties have stimulated studies on their microbial metabolism and mineralization. The behaviour of fluorinated compounds, such as fluorophenols and fluorobenzenes, has been less investigated, even though their use in agricultural and industrial processes is increasing, and cases of environmental contamination are becoming more frequent.

In order to obtain more insight in the bacterial degradation of fluorinated aromatics, we started with the enrichment of microbial cultures that are able to degrade fluorinated compounds. Selective enrichments with 2-fluorophenol (2-FP) were conducted in batch mode using a mineral medium supplemented with 50 mg l^{-1} of 2-FP. Cultures were inoculated with soil samples collected from a contaminated site in northern Portugal, which had received the discharge of chemical industry effluents for more than 50 years (fine chemistry, agrochemicals). After 4 months of selective enrichment and transfers, a pure bacterial strain capable of aerobic biodegradation of 2-FP as the sole carbon and energy source was isolated. This strain was named FP1. 16S rRNA phylogenetic analysis revealed that the strain FP1 was closely related to the genus *Rhodococcus*. Growth experiments revealed that strain FP1 was capable to degrade 50 mg l^{-1} of 2-FP in 3 days. The strain was shown to be able to use a range of other organic compounds, including other fluorinated and chlorinated compounds**.** To our knowledge, this is the first study reporting biodegradation of 2-FP, as the sole carbon and energy source, by a pure bacterium.

Growth kinetic studies and investigations of the 2-FP metabolic pathway are under way.