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21434 | Exploring the possible link between fluoride sensitivity and bacterial defluorination

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Background & Aim: Fluoorganic compounds are ubiquitous environmental pollutants due to their widespread use and high environmental persistence, mostly attributed to the stability of their carbon-fluoride bonds. The biotransformation of these compounds has been observed in some microorganisms, but defluorination (cleavage of carbon-fluorine bonds) remains the limiting step. Intracellular accumulation of fluoride occurs during microbial defluorination, which can cause several toxic effects. This work hypothesizes that intracellular fluoride stress may potentially affect the defluorination process in bacteria, limiting this critical catabolic step for the eventual mineralization of fluoroorganic pollutants. **Methods:** Fluoride sensitivity was first ascertained in defluorinating bacteria *Labrys portucalensis* F11 and *Delftia acidovorans* MFA5 (known degraders of fluorobenze[1] and fluoroacetate[2], respectively), with an *Escherichia coli* strain as the non-defluorinating control. Sensitivity was tested for increasing concentrations of fluoride (0-0.6 mM NaF) both in oligotrophic (minimal salts medium with acetate) and mesotrophic media (Nutrient Broth), based on bacterial growth inhibition for 48 hours at 28 ºC. After ascertaining their sensitivity thresholds, these strains are now being tested for their defluorination ability, against their preferred fluorinated substrates, when exposed to the NaF concentration with the highest observed growth inhibition. **Results:** Results showed that fluoride stress was more severe in oligotrophic media, with 0.4 mM NaF presenting the highest growth inhibition among tested strains. Strain MFA5 was also shown to be the least sensitive to fluoride, while F11 was the most affected. **Conclusions:** Fluoride can exert cytostatic effects even in bacterial strains with proven ability to biodegrade fluorinated compounds. These results will allow to enlighten the ties between fluoride sensitivity and bacterial defluorination, thus broadening the knowledge on influencing factors of a critical catabolic reaction.

Keywords: Fluoride, Toxicity, Defluorination, Fluorobenzene, Fluoroacetate.

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