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Microbial Oxygenase Activities for the Biosynthesis of Novel Aromatic Antioxidant Compounds

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Aromatic hydroxylated compounds are ubiquitous in nature and are extensively used in the chemical and pharmaceutical industries. These compounds may act as antioxidants in human cells, preventing degenerative diseases caused by free radicals, such as cancer, heart disease and immune system decline.

The chemical synthesis of hydroxylated aromatic compounds is often hampered by severe reaction conditions, resulting in low yields and the formation of racemic mixtures. Thus, growing attention has been dedicated in the last years to the development of biotransformations, such as those catalyzed by Bacterial Multicomponent Monooxygenases (BMM).

In this work, the BMM ToMO from *Pseudomonas* sp. OX1, recombinantly expressed in whole cells of *E.coli*, strain JM109, was used for the production of novel hydroxylated aromatic compounds starting from commercially available precursors such as 2-phenoxyethanol, 2-indanol and phtalan. Both substituted phenols and catechols were obtained which were purified on HPLC, and identified by NMR and mass spectrometry analysis. The antioxidant potential of our novel hydroxylated compounds was assessed both *in vitro*, by using the DPPH chemical assay, and *ex vivo* on the cardiomyoblast cell line H9c2 subjected to a mild oxidative stress induced by sodium arsenite.

Not all compounds showed antioxidant activity in the DPPH assay; however, all compounds showed a differential protective effect on cells subjected to the mild oxidative stress. Our results highlight the potential of our novel compounds as antioxidant molecules that can be functionalized in the near future to obtain a wide array of new molecules for the pharmaceutical industry.