



Halogenases: A Biotechnological Alternative for the Synthesis of Halogenated Pharmaceuticals

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Abstract

The role of halogen atoms in pharmaceutical compounds has been recently revised, due to the weak interaction through the so called "halogen bond" between small molecules and proteins or other biomacromolecules, which could be fundamental for binding at a particular site within the macromolecule. Moreover, thousands of natural halogenated compounds have been described to date, pointing to a functional role of halogen atoms in these compounds, as well as a diversity of halogenating enzymes involved in the synthesis of these halogenated metabolites. In this mini-review the different halogenases described to date are presented, particularly those catalyzing halogenation reactions with potential applications in the pharmaceutical field. Oxidative halogenases following an electrophilic halogenation mechanism are the oldest and best characterized halogenases; however, novel halogenases following a nucleophilic halogenation mechanism have been recently described. The catalytic properties as well as the selectivity of some of these enzymes can be modulated through protein engineering, both by single point mutations or by directed evolution; on the other hand, metabolic pathway engineering has been used to improve the production of halogenated metabolites, as well as to produce novel halogenated compounds, potentially important in the pharmaceutical field. Recent advances and prospective on the field of enzymatic halogenation are covered.

Keywords: Biocatalysis, electrophilic biohalogenation, halogenase, halogenated pharmaceutical, nucleophilic biohalogenation.

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Atentamente

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