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Current and emerging strategies for organophosphate decontamination: special focus on hyperstable enzymes

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Abstract

© 2016, Springer-Verlag Berlin Heidelberg. Organophosphorus chemicals are highly toxic molecules mainly used as pesticides. Some of them are banned warfare nerve agents. These compounds are covalent inhibitors of acetylcholinesterase, a key enzyme in central and peripheral nervous systems. Numerous approaches, including chemical, physical, and biological decontamination, have been considered for developing decontamination methods against organophosphates (OPs). This work is an overview of both validated and emerging strategies for the protection against OP pollution with special attention to the use of decontaminating enzymes. Considerable efforts have been dedicated during the past decades to the development of efficient OP degrading biocatalysts. Among these, the promising biocatalyst SsoPox isolated from the archaeon *Sulfolobus solfataricus* is emphasized in the light of recently published results. This hyperthermostable enzyme appears to be particularly attractive for external decontamination purposes with regard to both its catalytic and stability properties.

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Keywords

Bioremediation, Chemical warfare agent, Decontamination, Enzyme, Organophosphorus, Pesticide, Phosphotriesterase, SsoPox