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Phosphine oxide as a prospective intermediate of biological processes

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Abstract

In previous works, we demonstrated for the first time the biological conversion of a very hazardous environmental pollutant, an extremely toxic and reactive substance of first class danger – white phosphorus. Although the diversified symptomatology of both acute and chronic poisoning with this substance has been described in detail, the metabolic pathway of white phosphorus has virtually not been studied. In our studies, we sought to fill this gap by establishing the nature of white phosphorus metabolites by NMR and chromato-mass spectrometry. Some literary sources have reported on the formation of phosphine in a body, which has been poisoned with elemental phosphorus. There is an assumption that phosphine also exhibits toxic properties not in itself, but through its reactive metabolite, phosphine oxide. In this review, we have made efforts in gathering information on the toxicology of phosphine (and, to a lesser extent, elemental phosphorus) in order to find direct evidence for the formation of phosphine oxide in living cells. Observation on phosphine oxide in a living organism has not been done so far, but there is possibility of it's formation as a result of the oxidation of its precursor, phosphine. It is possible that the genotoxicity of white phosphorus, which was discovered in our studies is also due to the formation of phosphine oxide.

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