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Editorial

Towards the Correct Path for the Development of an Antidote for Phosphine Poisoning

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Like Organophosphorus pesticide poisoning, aluminium phosphide (AlP) poisoning is a public health concern https://pubmed.ncbi.nlm.nih.gov/37805177/ [1]. It is commonly used for grain storage and is available to the public in the open market. Therefore, suicidal, homicidal, and accidental poisoning due to aluminium phosphide is often heard. The culprit of AlP is phosphine which is liberated from aluminium phosphide inside the human body. Phosphine is known to cause mitochondrial toxicity. It is generally lethal without any known antidote https://doi.org/10.1016/j.cca.2021.05.026 [2] https://pubmed.ncbi.nlm.nih.gov/24508992/ [3].

However, phosphine-resistant pests are emerging, making aluminum phosphide insufficient for long-term food grain storage. Therefore, aerobic pests can develop phosphine resistance https://doi.org/10.3390/cimb45030161 [4]. Does it mean that mitochondrial inhibition of phosphine is preventable? When we searched the literature to get answers to this question, we found that people had reported that mitochondria isolated from phosphine-resistant pests, and phosphine-sensitive pests behave similarly. Phosphine inhibited mitochondrial electron transport chain enzymes in mitochondria isolated from resistant and sensitive pests. Therefore, phosphine likely does not reach the mitochondria in phosphine-resistant pests. https://doi.org/10.3390/cimb45030161 [4]. The mechanism of such a phenomenon is completely unknown at present. Hypotheses have been published to address the issue from mechanistic viewpoints. However, there is no published report to learn about a specific antidote for phosphine poisoning https://doi.org/10.1016/j.jmhi.2012.03.011 [5].

We believe that if mankind knows how phosphine-resistant pests are overcoming the toxicity of phosphine and maintaining aerobic respiration, a clue for developing an antidote for phosphine intoxication will be obtained (Figure 1) https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6214862/ [6] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3555759/ [7]. Without knowing details of mechanistic aspects of phosphine poisoning the trial of antidote development for phosphine toxicity is beating around the bush https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4339895/ [8]. Now it's high time to win the bush by knowing the correct mechanism of toxicity https://www.researchgate.net/publication/51508788_Mechanisms_of_Phosphine_Toxicity [9].

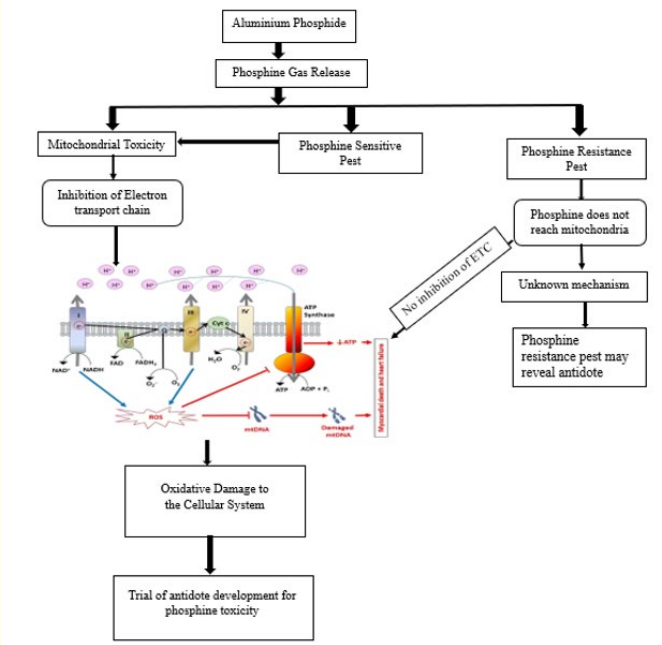

Figure 1: Hypothetical mechanism of phosphine resistance in aerobic pests and its implications for antidote development for phosphine poisoning.

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