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In vitro effects of organophosphorus pesticide malathion on the reactivity of rat aorta.

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Introduction: The organophosphorus (OF) compounds are chemicals present in pesticides and are known as acetylcholinesterase (AchE) inhibitors. The main toxic action of organophosphates includes the inhibition of cholinesterase enzyme promoting muscarinic, nicotinic and central effects. In the cardiovascular system, nicotinic manifestations are tachycardia and hypertension, while the muscarinic are bradycardia and hypotension. In the respiratory system cholinesterase, inhibition is characterized by increased bronchial secretions, bronchospasm and occurrence of paralysis of respiratory muscles. Although the effects of the organophosphates are best known due to inhibition of cholinesterase, in vitro studies have demonstrated its vasodilator effect and constriction of the airways, suggesting that these compounds may have a peripheral action independent of its effect on the enzyme that degrades acetylcholine. A better understanding of the toxic effects of organophosphates on the vascular system and respiratory systems, independent of cholinesterase inhibition, could open new perspectives for a more effective treatment directed to the major causes of death (respiratory failure and impaired cardiovascular function) in victims of poisoning these compounds. **Objective:** This study was carried out to evaluate the effect of the organophosphate Malathion, on the reactivity of isolated rat aorta as well as the mechanisms involved in this response, with special attention to the participation of nitric oxide (NO). **Material and Methods:** We studied vascular reactivity in aorta isolated from male Wistar rats, weighing between 250 and 300, by measuring isometric force "organ chambers" using log concentration-response curves obtained after administration of Fenthion and Malathion in rings with and without endothelium pre-contracted with phenylephrine (Phe). As part of the experimental protocol were also performed contraction curves to Phe in the presence and absence of organophosphates, in rings with and without endothelium, and finally, the relaxation curves to ACh in the presence and absence of organophosphates in rings with endothelium. Curves were also performed in the presence of indomethacin (cyclooxygenase inhibitor), and Nω-nitro-L-arginine methyl ester (L-NAME - nonspecific inhibitor of nitric oxide synthase). **Results:** the organophosphate Fenthion does not promote vasodilation and does not alter the vascular response induced by Phe or Ach. In contrast, the organophosphate Malathion had a relaxing effect only in rings with endothelium and, in rings with and without endothelium, induced a considerable decrease in Phe-induced contraction. From these results, we decided to continue the studies involving the organophosphate Malathion, which evoked endothelium-dependent relaxation. In the presence of indomethacin and L-NAME, Malathion relaxation in endothelium-rings was inhibited, and the reduction of the contraction to Phe, was reversed. **Conclusion:** Malathion promotes relaxation endothelium-dependent mediated by NO and prostanoids and reduces the ability of calcium-dependent vasoconstrictors to exert its effect. As the effects of L-NAME and indomethacin were similar and not shown a significant enhancing effect when used in combination, we can suggest the occurrence of a crosstalk between the pathways of cyclooxygenase and NO in the vascular effects induced by the organophosphate Malathion.

Keywords: organophosphorus, nitric oxide, Malathion, vascular reactivity.

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