

## Letter

# Potential therapeutic agents in the management of organophosphorus poisoning

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This letter is a response to the report by Sungur and Güven [1] on intensive care management of organophosphate insecticide poisoning, which was recently published in *Critical Care*.

Insect damage costs the world loses approximately 6 billion pounds sterling every year. Use of pesticides has increased food production in parallel with population growth in many parts of the world. Many insect-borne diseases have been eliminated or controlled by the use of insecticides. Organophosphorus compounds are widely used as insecticides and as agents of chemical warfare. According to the World Health Organization [2], 1 million serious accidental and 2 million suicidal poisonings with insecticides occur worldwide every year, and of these approximately 200,000 die, mostly in developing countries.

Atropine and oximes are traditionally used in the management of such poisonings but they have failed to reduce the attendant mortality and morbidity. Some agents have been found to reduce the toxicity of organophosphorus compounds in animal experiments, and they have potential as therapeutic agents in the management of organophosphorus poisoning. These agents are magnesium, clonidine and fluoride.

Kiss and Fazekas [3] reported control of premature ventricular contractions with intravenous magnesium. Magnesium was considered to counteract the direct toxic inhibitory action of organophosphorus compounds on sodium-potassium ATPase. It also inhibits acetylcholine release [4]. Singh and coworkers [5] found that intravenous magnesium reversed the neuro-electrophysiological effect of organophosphorus poisoning.

Pretreatment of mice with clonidine (0.1–1 mg/kg) resulted in protection against toxic manifestations of soman – an organophosphorus compound [6]. Increased survival rates, reduction in centrally mediated symptoms such as tremor and straub tail, and reduction in excessive salivation were noted.

The protective effects of clonidine are probably due to blockade of acetylcholine release and postmuscarinic receptors, together with transient inhibition of acetylcholinesterase. Thus, clonidine may prove useful in the management of organophosphorus poisoning.

Pretreatment of mice with atropine and sodium fluoride resulted in greater antidotal effect than atropine alone against the toxic actions of soman and sarin [7,8]. It was hypothesized that the antidotal effect of fluoride is due to its antidesensitizing action at the nicotinic receptors in the neuromuscular junction and sympathetic ganglia [9]. Increased cholinesterase levels were observed in workers handling fluorine compounds in a plastics factory [10]. The role of fluoride in management of poisoning with organophosphorus must be studied further.

Although the role of the above compounds in the management of organophosphorus poisoning must be studied further, I feel that it is worth using them (particularly magnesium and clonidine) in intensive care management of such patients to control excessive acetylcholine activity. The potential health problems associated with the organophosphorus compounds calls for collaborative research between medically advanced countries and those developing countries where most of the poisoning occurs.

## Competing interests

None declared.

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