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Neurotoxic disorders of organophosphorus compounds and their managements (Review)

Balali-Mood, M.[a] , Balali-Mood, K.[b]
[a] **Medical** Toxicology Center, Imam Reza Hospital, **Mashhad University** of **Medical Sciences**, **Mashhad** ٩١٧٣٥-٣٤٨, Iran
[b] Structural Bioinformatics and Computational Biochemistry Unit, Department of Biochemistry, **University** of Oxford, South Parks Road, Oxford OX١ ٣QU, United Kingdom

View references (١٠٨)

Abstract

Organophosphorus compounds have been used as pesticides and as chemical warfare nerve agents. The mechanism of toxicity of organophosphorus compounds is the inhibition of acetylcholinesterase, which results in accumulation of acetylcholine and the continued stimulation of acetylcholine receptors. Therefore, they are also called anticholinesterase agents. Organophosphrus pesticides have largely been used worldwide, and poisoning by these agents, particularly in developing countries, is a serious health problem. Organophosphorus nerve agents were used by Iraqi army against Iranian combatants and even civilian population in ١٩٨٣-١٩٨٨. They were also used for chemical terrorism in Japan in ١٩٩٤-١٩٩٥. Their use is still a constant threat to the population. Therefore, medical and health professionals should be aware and learn more about the toxicology and proper management of organophosphorus poisoning. Determination of acetylcholinesterase and butyrylcholinesterase activity in blood remains a mainstay for the fast initial screening of organophosphorus compounds but lacks sensitivity and specificity. Quantitative analysis of organophosphorus compounds and their degradation products in plasma and urine by mass spectrometric methods may prove exposure but is expensive and is limited to specialized laboratories. However, history of exposure to organophosphorous compounds and clinical manifestations of a cholinergic syndrome are sufficient for management of the affected patients. The standard management of poisoning with organophosphorous compounds consists of decontamination, and injection of atropine sulfate with an oxime. Recent advances on treatment of organophosphorus pesticides poisoning revealed that blood alkalinization with sodium bicarbonate and also magnesium sulfate as adjunctive therapies are promising. Patients who receive prompt proper treatment usually recover from acute toxicity but may suffer from neurologic complications.

Reaxys Database Information

Author keywords

Anticholinesterase agents; Chemical warfare agents; Neurotoxic disorders; Organophosphate pesticides; Poisoning

Indexed Keywords

EMTREE drug terms: ١ (٤ carbamoylpyridinio) ١' (٢ hydroxyiminomethylpyridinio)dimethyl ether; ١ [٢,٤ bis(hydroxyiminomethyl)pyridinio] ١' (٤ carbamoylpyridinio)dimethyl ether diiodide; [(٣ benzoyl ١ pyridiniomethyl) (٢ hydroxyiminomethyl ١ pyridiniomethyl)] ether; acetylcholine; acetylcholinesterase; atropine; benactyzine; bicarbonate; cholinergic receptor; cholinesterase; diazepam; gacyclidine; magnesium sulfate; mesylic acid; obidoxime; organophosphorus compound; oxime; pesticide; physostigmine; pralidoxime; pralidoxime chloride; pralidoxime mesilate; pyridostigmine; trihexyphenidyl; trimedoxime

EMTREE medical terms: absorption; adjuvant therapy; anticholinergic syndrome; biotransformation; carbamoylation; central nervous system disease; chemical structure; chemical warfare; clinical feature; clinical trial; continuous infusion; convulsion; developing country; disease course; disease severity; drug blood level; drug choice; drug dose regimen; drug efficacy; dyspnea; enzyme activity; enzyme inhibition; excretion; gas chromatography; heart arrest; hemoperfusion; high risk population; human; intoxication; Iran; Japan; LD ٥٠; liver toxicity; loading drug dose; mass spectrometry; metabolic acidosis; metabolism; miosis; neurological complication; neuropathy; neuroprotection;