

## **12. EFFECTS OF SOME REVERSIBLE CHOLINESTERASE INHIBITORS ON THE REACTIVABILITY OF SOMAN-INHIBITED HUMAN ERYTHROCYTE ACETYLCHOLINESTERASE IN VITRO**

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The reactivation of Soman-inhibited acetylcholinesterase (AChE) by oximes can occur, but is known to be time sensitive. We have examined the effects of four tertiary compounds (physostigmine, carbaindoline, tacrine and huperzine A) and one quaternary compound (decamethonium) on this reactivation. Toxogonin and HI-6 were used to reactivate Soman-inhibited human erythrocyte AChE in vitro. All five compounds (effectors) are reversible inhibitors of human erythrocyte AChE, and their inhibitory powers (IC<sub>50</sub>) are quite different (from 5.06).

All reactivation experiments could be divided into four steps (inhibition, aging, reactivation, and AChE assay). AChE activity inhibited by Soman after these steps was less than 10% of the uninhibited AChE. Also, none of the five compounds alone could effectively reactivate the inhibited enzyme. However, adding these compounds at the start of aging increased the portion of AChE that could be reactivated by HI-6 or toxogonin, if those oximes were added no later than 3 min after aging. The maximal increase in the reactivatability of HI-6 or toxogonin was found in the addition of mol/L huperzine A (the AChE activity is 45.6, a 4.1% increase by toxogonin or 38.3 a 12.5% increase by HI-6). When either HI-6 or toxogonin was added 5 min after aging started, the effectors were no longer able to increase the reactivatability of the two oximes.

Our results indicated that some tertiary compounds, with relatively lower toxicity than quaternary ones, also could enhance the oxime-induced reactivation of Soman-inhibited AChE. Further investigations of more practical tertiary drugs for the increasing the reactivatability of oximes might improve the treatment of Soman poisoning.

**Key Words:** Soman, acetylcholinesterase, reactivation, cholinesterase inhibitor, human erythrocyte