

An In Vitro Study to Determine the Ability of Plasma Proteins and Albumin to Scavenge Organophosphate Compounds

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Introduction : Organophosphate pesticide poisoning is a common method of suicide in the developing world. Treatment with oximes is controversial and they might benefit only patients poisoned by specific organophosphates or patients with moderate poisoning. New treatments such as the use of fresh frozen plasma or albumin to scavenge organophosphates have been suggested, and the aim of this study was to determine *in vitro* if components of fresh frozen plasma, especially albumin, bind organophosphate compounds and thus help in scavenging these compounds in poisoned patients. **Methods** : Butrylcholinesterase was purified from serum by ion exchange chromatography. Inhibition of butrylcholinesterase by increasing concentrations (0 - 1.5 μM) of monocrotophos was used to generate an inhibition profile to determine free monocrotophos levels in test samples. For scavenging studies, albumin (16g %) was incubated with monocrotophos (40 μM) for one hour at 37° C, the albumin removed by Blue Sepharose affinity, and monocrotophos levels determined in the remaining solution by addition to pure butrylcholinesterase and assay of enzyme activity. Similarly, plasma was incubated with monocrotophos (40 μM), albumin removed and free monocrotophos levels estimated. **Results** : Butrylcholinesterase was purified 298 fold from serum and exhibited a specific activity of 4.5 Units/mg protein. Monocrotophos inhibited butrylcholinesterase in a dose dependent manner with 1.5 μM monocrotophos inhibiting butrylcholinesterase by 68%. Albumin (16g %) bound approximately 40 μM monocrotophos and albumin- bound monocrotophos could be separated from free, unbound monocrotophos. Monocrotophos bound to plasma containing 5g% albumin, plasma free of albumin bound to approximately 40 μM monocrotophos. **Conclusion** : The inhibition of butrylcholinesterase offers a functional assay to detect organophosphate levels. Albumin exhibits saturating binding of monocrotophos and monocrotophos bound to albumin can be separated from unbound monocrotophos. Monocrotophos binds not only to albumin but also to other components of plasma. *In vitro*, plasma and albumin exhibit the ability to scavenge organophosphates.