

Effect of Topically Applied Chlorpyrifos on Esterase and Acetylcholinesterase from German Cockroach, *Blattella germanica* (L.) (Dictyoptera: Blattellidae)

No Joong Park and Shripat T. Kamble

Department of Entomology, University of Nebraska, Lincoln, NE 68583-0816

The effect of topically applied chlorpyrifos on AChE and other esterases in heads and decapitated bodies of CSMA and Crawford German cockroaches was examined with spectrophotometric enzyme assay and native polyacrylamide gel electrophoresis. The toxicity of chlorpyrifos was greatly reduced in decapitated CSMA male cockroaches with LD₅₀ values 17.1-fold higher than those from normal CSMA roaches. The AChE activity from heads was significantly higher in Crawford strain than CSMA strain and did not change until 24h after chlorpyrifos *in vivo* treatment in both strains. The *p*-nitrophenyl butyrate esterase activities from both heads and decapitated bodies of the resistant Crawford strain were significantly greater than those in susceptible CSMA strain. The *p*-NPB esterase activity was significantly inhibited by chlorpyrifos *in vivo* treatment, and the total *p*-NPB esterase activity was significantly reduced in the decapitated body than that in the head of both strains. Native PAGE analysis of extracts solubilized with Triton X-100 from head and decapitated body revealed five major esterase bands and AChE band with a high capability of hydrolyzing α -naphthyl butyrate and acetylthiocholine, respectively. In the head of susceptible CSMA strain male cockroaches, the activity of mobile isozyme *d1* and *d2* were completely inhibited at 24 h after chlorpyrifos application, and isozyme *e* was partially inhibited. In contrast, isozyme *c1* and *c2* from the decapitated body of CSMA cockroaches were mostly affected at 24h after the topical application of chlorpyrifos. The activities of AChE and isozyme *a* and *b* from the decapitated body were remaining uninhibited in both strains. The inhibition of isozyme *d1* and *d2* seems to be more responsible to the chlorpyrifos intoxication than AChE.