

Acetylcholinesterase from *Puntius javanicus* for the detection of carbamates and organophosphates

ABSTRACT

A new alternative local source of acetylcholinesterase (AChE) has been found to be sensitive towards several insecticides. AChE was purified from the brain tissue of *Puntius javanicus* using affinity chromatography (procainamide hydrochloride coupled with sephacryl 6B) with the total recovery of 40% at 8.48 purification fold. All carbamate (CB) insecticides tested at the concentration of 1 mg/L were capable of lowering AChE activity to less than 30%; Bendiocarp (18.80%), carbaryl (5.96%), carbofuran (6.12%), methomyl (13.91%) and propoxur (15.851%). The *P. javanicus* AChE was found to be unaffected by several activated organophosphates (OP) such as acephate and dimethoate, while trichlorfon slightly inhibited the enzyme activity ($p < 0.05$). Chlorpyrifos, diazinon, malathion and parathion lowered AChE activity to 43.02, 40.97, 37.11 and 46.72%, respectively. Pesticides that inhibit AChE activities more than 50% were further tested in different concentrations to determine the half maximal inhibitory concentration (IC₅₀). Carbofuran and carbaryl showed the lowest IC₅₀ value at 0.035 and 0.031 mg/L, respectively, as both showed no significant differences ($p < 0.05$), followed by bendiocarp, propoxur, methomyl, malathion, diazinon, parathion and chlorpyrifos at 0.045, 0.076, 0.090, 0.063, 0.103, 0.151 and 0.202 mg/L, respectively. Based on these results, the sensitivity of AChE from brain *P. javanicus* brain tissue shows promise as an alternative biosensor for the detection of insecticides contamination.

Keywords: *Puntius javanicus*; Acetylcholinesterase; Carbamate; Organophosphate