CHARACTERIZATION OF MOSQUITO CYP6P7 AND CYP6AA3: DIFFERENCES IN SUBSTRATE PREFERENCE AND KINETIC PROPERTIES

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Abstract: Cytochrome P450 monooxygenases are involved in insecticide resistance in insects. We previously observed an increase in CYP6P7 and CYP6AA3 mRNA expression in Anopheles minimus mosquitoes during the selection for deltamethrin resistance in the laboratory. CYP6AA3 has been shown to metabolize deltamethrin, while no information is known for CYP6P7. In this study, CYP6P7 was heterologously expressed in the Spodoptera frugiperda (Sf9) insect cells via baculovirus-mediated expression system. The expressed CYP6P7 protein was used for exploitation of its enzymatic activity against insecticides after reconstitution with the An. minimus NADPH-cytochrome P450 reductase enzyme in vitro. The ability of CYP6P7 to metabolize pyrethroids and insecticides in the organophosphate and carbamate groups was compared with CYP6AA3. The results revealed that both CYP6P7 and CYP6AA3 proteins could metabolize permethrin, cypermethrin, and deltamethrin pyrethroid insecticides, but showed the absence of activity against bioallethrin (pyrethroid), chlorpyrifos (organophosphate), and propoxur (carbamate). CYP6P7 had limited capacity in metabolizing l-cyhalothrin (pyrethroid), while CYP6AA3 displayed activity toward l-cyhalothrin. Kinetic properties suggested that CYP6AA3 had higher efficiency in metabolizing type I than type II pyrethroids, while catalytic efficiency of CYP6P7 toward both types was not significantly different. Their kinetic parameters in insecticide metabolism and preliminary inhibition studies by test compounds in the flavonoid, furanocoumarin, and methylenedioxyphenyl groups elucidated that CYP6P7 had different enzyme properties compared with CYP6AA3. (C) 2011 Wiley Periodicals, Inc.

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