

DVOJNI UČINEK KRONIČNE IZPOSTAVITVE KRANJSKE ČEBELE (*Apis mellifera carnica*) DIAZINONU NA AKTIVNOST MEMBRANSKO VEZANE IN VODOTOPNE ACETILHOLINESTERAZE V GLAVI IN OPRSJU

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Izvleček

Organofosfatni pesticidi (OP) se pogosto uporabljajo v kmetijstvu, zato lahko negativno vplivajo na čebele. Diazinon je kontaktni OP, ki v živčnem sistemu žuželk zavira delovanje encima acetilholinesteraza (AChE) in tako vpliva na prenos živčnega signala. Izkazalo se je, da diazinon negativno vpliva na zaznavanje in razlikovanje vonjalnih dražljajev, kakor tudi na preživetje in delitev dela pri čebelah. V tej študiji smo preučevali učinke 10 dnevne oralne izpostavljenosti diazinonu (0.2, 0.5, 1, 2.5 and 5 mgL⁻¹ - nominalni odmerki) na aktivnost vodotopne in membransko vezane oblike AChE v glavi in oprsju kranjske čebele. Ugotovili smo, da imajo višje testirane koncentracije diazinona dvojni učinek na aktivnost AChE. Kronična izpostavljenost diazinonu je namreč znižala aktivnost membranske AChE v glavi in oprsju, po drugi strani pa povečala aktivnost topne AChE v obeh delih telesa. Razmerje med aktivnostjo membranske in topne AChE v glavi kontrolnih čebel je bila precej višja kot v prsnem košu. Zato domnevamo, da je membranska oblika AChE verjetno nevronska, kar je v skladu s podatki iz drugih študij. Vloga topne oblike AChE ni poznana, vendar zvišanje njene aktivnosti po delovanju diazinona posredno kaže na možno razstrupljevalno funkcijo topne AChE. Sklepamo, da diazinon po kronični izpostavitvi višjim testiranim koncentracijam preko zaviranja membranske oblike AChE negativno vpliva na živčni sistem kranjskih čebel.

Ključne besede: organofosfatni pesticid, medonosna čebela, membranska acetilholinesteraza, topna acetilholinesteraza

DUAL EFFECT OF CHRONIC DIAZINON TREATMENT ON MEMBRANE AND SOLUBLE ACETYLCHOLINESTERASE IN CARNOLIAN HONEYBEE (*Apis mellifera carnica*) HEAD AND THORAX

Abstract

Organophosphorus pesticides (OPs) are widely used in agricultural activities, thus the possible negative impact on honeybees is inevitable. Diazinon is a contact OP that alters normal neurotransmission within the nervous system of the insects by the inhibition of acetylcholinesterase (AChE). It has been shown that diazinon has negative effects on acquisition and discrimination of odor stimuli as well as on longevity and division of labor in honeybees. In this study we investigated the effects of 10 days oral exposure to diazinon (0.2, 0.5, 1, 2.5 and 5 mgL⁻¹ nominal dose) on the activity of soluble and membrane forms of AChE in Carnolian honey bee head and thorax. The dual effect on AChE activity was shown for higher concentrations of diazinon tested. The chronic exposure to diazinon lowered the activity of mem-

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brane AChE in the head and thorax, but elevated the soluble AChE in both body parts. The ratio between the activity of membrane and soluble AChE in the head of control untreated honey bees was much higher than in the thorax. This indicates that the membrane AChE form is probably neuronal what is in accordance with the data from other studies. The function of soluble AChE form is unknown but the elevation of its activity after the treatment with diazinon could be predictive for the detoxifying function of this AChE. We conclude that diazinon by inhibiting membrane AChE form has negative impact on Carnolian honey bee nervous system at higher exposure doses tested and chronic exposure.

Key words: organophosphorus pesticide, honeybee, membrane acetylcholinesterase, soluble acetylcholinesterase