MMSL Military Medical Science Letters Since 1925

Mil. Med. Sci. Lett. (Voj. Zdrav. Listy) 2018, 87(supplementum 1)
ISSN 2571-113X (Online)

MEETING ABSTRACTS

A NEW ANIMAL MODEL TO INVESTIGATE ORGANOPHOSPHORUS POISONING AND ENZYMATIC DECONTAMINATION

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Freshwater planarians from Platyhelminthes, harboring a mammal-like cholinergic nervous system, have emerged as a promising in vivo model for investigating neurotoxicity. Moreover a large proportion of stem cells provide planarian an unconventional capacity of regeneration allowing for developmental disruption studies. *Schmidtea mediterranea (Smed)* was used as model for organophosphorus (OP) poisoning and for evaluating the efficacy of detoxifying enzymes.

Acetylcholinesterase and butyrylcholinesterase from planarian (*Smed*-AChE and *Smed*-BChE) share 35% identity with their human counterpart (*Hs*-AChE and *Hs*-BChE). Structural predictions revealed strong similarities between planarian and human enzymes. Cholinesterase activities were detected in crude planarian homogenates after grinding and were inhibited after organophosphorus exposition. *In situ* Hybridization was further used to localize cholinesterases in planarians and showed two different patterns, *Smed*-AChE being mainly detected in cephalic ganglion and ventral nerve cords while *Smed*-BChE distribution was diffuse.

Survival, behavior and regeneration were analyzed in whole planarian exposed to four OP [1]. The toxicity of OP degradation products generated by enzymatic hydrolysis with the robust phosphotriesterase enzyme *Sso*Pox, from the archea *Sulfolobus solfataricus* [2], was further evaluated. OP were found to be highly toxic to planarians causing severe mortality and behavior disruption at sublethal concentrations as well as growth disruption during regeneration after cutting. Enzymatic decontamination drastically reduced toxicity and enhanced both mobility and development. These results underline that degradation products have a lower impact than initial organophosphorus substrates. A biotechnological application based on a filtration column incorporating detoxifying enzymes was developed to decontaminate wastewater with planarian as biosensor.

Keywords: Organophosphorus poisoning; Planarian; Cholinesterase; Pesticides; Bioremediation

Acknowledgement

This work is supported by Direction Générale de l'Armement (DGA)

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