Effects of glycosaminoglycans in the degeneration and regeneration of the central nervous system of the ascidian *Phallusia nigra*

Evelyn M. Reis¹, Bianca N. S. P. Medina¹, Flávia Borges Mury, Mauro S.G. Pavão⁴, Silvana Allodi³ & Cintia M. de Barros¹

¹Laboratório Integrado de Morfologia NUPEM/UFRJ, ³ Laboratório de Neurobiologia do Desenvolvimento IBCCF/UFRJ, ⁴Laboratório de Tecido conjuntivo IBqM/UFRJ, ⁵Laboratório Integrado de Bioquímica Hatisaburo Masuda LIBHM/UFRJ

Introduction. Ascidians belong to the phylum Chordata, subphylum Urochordata being the closest group of vertebrates, and sharing similarities between their central nervous system (CNS). However, unlike vertebrates, ascidians have the ability to completely regenerate their CNS after complete ablation in adults. Besides, is knowledge that vertebrates partial recovery their CNS in assays which glicosaminoglicans (GAGs) are degraded by chondroitin lyases (Bradbury et al. 2002). In this study, we induced the degeneration of *Phallusia nigra*’s CNS using the neurotoxin 3-acetyl-pyridine (3-AP), which promote chemical injury in neurons of vertebrates animals (Lopez-Garcia et al., 2002). In addition, we investigated the profile of GAGs regeneration of the ascidian CNS. Material and Methods: Neurotoxin 3-AP was injected into ascidian systemic circulation. Then, the animals were kept in aquarium with controlled conditions. At 24 hours after drug application the animals were killed, CNS dissected and stained with hematoxylin and eosin. Immunohistochemistry assays were performed with anti-synaptophysin (labeling presynaptic vesicles), anti-heparan sulfate (HS) and anti-chondroitin sulfate (CS).

Results and Discussion: At 24 hours after 3AP it was observed intense vacuolization and neuronal disorganization when compared to the control animals. Immunohistochemistry with anti-synaptophysin, at 24 hours, showed reduction of neurons localized at neural cortex. We also observed decreased of CS staining at the same area and increased of HS staining in CNS after the drug application. Conclusions: We were able to show the effect of 3AP in *Phallusia nigra*’s CNS. Also, the profile of GAGs is changed in the normal and degenerated ganglion. These results taken together that HS and CS are involved in the ascidian CNS regeneration.
Key Words: Ascidian, central nervous system, glicosaminoglicans, neurotoxin, 3-acetyl-pyridine

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