STRUCTURAL CHARACTERIZATION OF AN ANTITHROMBOTIC CHONDROITIN SULFATE FROM PACIFIC WHITE SHRIMP WITH THROMBIN INHIBITION POTENTIAL AND ANTITUMOR PROPERTIES

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INTRODUCTION AND OBJECTIVES: Previous studies have demonstrated the thrombin importance on hypercoagulability-associated tumor progression. In this context, thrombin inhibitors can be effective in cancer treatment, especially if they also inhibit the tumor growth. This work reports the occurrence of a chondroitin sulfate-like compound from Litopenaeus vannamei shrimp heads (sChS) able to inhibit thrombin activity, proliferation and migration of melanoma cell.

MATERIAL AND METHODS: sChS was isolated by proteolysis and treatment with acetone, then purified by chromatography and structurally characterized by NMR spectroscopy. The effects on hemostasis were evaluated by thrombin inhibition, hemorrhagic and antithrombotic activities. For cell proliferation it was carried in vitro 2D and 3D clonogenic assays and primary tumor growth test in animal models. Finally, the cell migration done by Transwell assay and ability to tubular structures formation on Matrigel were carried. RESULTS: NMR spectra indicate the occurrence of a peculiar ChS-like compound. It was able to inhibit the action of thrombin. It also showed a low hemorrhagic effect and it was efficient to reduce in vivo thrombus volume (~70%). Furthermore, it can induce the antithrombotic heparan sulfate synthesis by endothelial cells in vitro, as well as a significant reduction of tumor cell proliferation in both clonogenic assays and in animal tests. Finally, both migration of tumor cells and tubular structures formation by endothelial cells was also affected by sChS. CONCLUSIONS: Given its efficacy in reducing the development and tumor progression and subsequent secondary complications, the research shows sChS as promising drug able of helping in cancer treatment.

Keywords: Litopenaeus vannamei, hemostasis, tumor development.

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