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A novel L-fucose-binding lectin from Fenneropenaeus indicus induced cytotoxicity in breast cancer cells

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Abstract

Lectins are omnipresent in almost all life forms, being the proteins which specifically bind to carbohydrate moieties on the cell surface; they have been explored for their anti-tumour activities. In this study, we purified a fucose specific-lectin (IFL) from Fenneropenaeus indicus haemolymph using fucose-affinity column and characterized for its haemagglutination activity, carbohydrate specificity, dependency on cations and cytotoxicity against cancer cells. The lectin showed non-specificity against human erythrocytes. It was a Ca^{2+}-dependent lectin which remained stable over wide pH and temperature ranges. The lectin showed effective dose dependent cytotoxicity against different human cancer cell lines and induced apoptosis in MCF-7 cells as evidenced by DNA ladder assay and PARP cleavage in a dose dependent manner. Moreover, an increased p21 level corresponding to cyclin D downregulation in response to IFL treatment was observed which might work as probable factors to inhibit cell growth and induce apoptosis of MCF-7 cells. Therefore, we report a novel lectin from the prawn haemolymph with high specificity for L-fucose and antiproliferative towards human cancer cells. However, further establishment of the modus operandi of this lectin is required to enable its biotechnological applications.

Keywords: Fenneropenaeus indicus; PARP cleavage; apoptosis; fucose-specific Lectin; p21.

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