

Investigation the cytotoxicity of cartilage-derived protein of White-check shark (*Carcharhinus dussumieri*) against the colon cancer cell line SW742 and its stimulating effects on blood natural killer cells

Fatemeh Arjmand¹

Abdolkarim Sheikhi^{2*}

Pargol Ghavam Mostafavi³

Ehsan Ramezani-Fard⁴

Zuhair Muhammad Hassan⁵

1. Department of Marine Science, Faculty of Natural Resources and Environment, Science and Research Branch, Islamic Azad University, Tehran, Iran.

2. Department of Immunology, Faculty of Medicine, Dezfoul University of Medical Sciences, Azadegan, Dezfoul, Iran.

3. Department of Marine Science, Faculty of Natural Resources and Environment, Science and Research Branch, Islamic Azad University, Tehran, Iran.

4. Department of Marine Science, Faculty of Natural Resources and Environment, Science and Research Branch, Islamic Azad University, Tehran, Iran.

5. Department of Immunology, Faculty of Medical Sciences, Tarbiat Modares University, Tehran, Iran.

***Corresponding author:**

sheikhi.a@dums.ac.ir,

Received date: 2021.06.08

Reception date: 2022.02.03

Abstract

Therapeutic properties of shark cartilage for the treatment of incurable diseases such as cancer and rheumatoid arthritis have been proven in many studies. Therefore, the present study investigates the effect of white chin shark cartilage protein on the expression of NKG2D, CXCR3, NKP46, and NKP44 genes in natural killer cells and their activity against colon cancer cell lines (SW742). The crushed cartilage sample was stored at -20 °C and finally lyophilized. PBS buffer solution was used for the solubilization of samples and ammonium sulfate for precipitation. Protein weighing 14.5 kDa was determined by SDS-PAGE method. Peripheral blood of healthy individuals was examined to determine survival after exposure to the extracted protein using trypan blue dye. The toxicity activity of natural killer-activated cells against the cell line used in this study was assessed by MTT assay. Results showed that the concentration of 3 µg / ml of extracted protein with a volume of 15 µl had the highest cytotoxic activity ($P < 0.05$). Also, the cytotoxicity of natural killer cells increased significantly so that in 18 hours exposure time and volume of 15 µl protein with a concentration of 3 µg / ml had the highest lethal activity. The expression of NKG2D, CXCR3, NKP46 and NKP44 genes after 4, 8 and 18 hours of exposure of natural killer cells with different concentrations of protein 14.5 kDa showed a significant difference at the level of 5% ($P < 0.05$). In conclusion, shark cartilage protein can improve the quality of the immune system and this improvement in function can occur following the increase in the function of natural killer cells against cancer cells, but this protein cannot affect the expression of receptor genes on T cells.

Keywords: Natural killer cells, Cytotoxicity, Gene expression, Extracted proteins, White-check shark.