Synthesis, characterization and cytotoxic effect of silver nanoparticles made up with fucan


1 Laboratório de Biotecnologia de Polímeros Naturais – BIOPOL, Departamento de Bioquímica, Universidade Federal do Rio Grande do Norte-UFRN, Campus Universitário Lagoa Nova CEP 59078-970, Natal/RN, Brazil

Introduction and objectives: The synthesis of silver nanoparticles has attracted the interest of several researchers recently. These nanoparticles have physical, chemical and biological unique properties and have been used in numerous applications especially in the medical field. In recent years, an increasing number of marine natural products from several sources have been reported to display several activities. Among these compounds, sulfated polysaccharides extracted from seaweeds occupy a special place because they exhibit a wide range of activities like the fucans from the seaweed Spatoglossum schröederi. Thus, the aim of this study was to synthesize and characterize the silver nanoparticles using fucan A and evaluated their cytotoxic activity against tumor cells. Materials and Methods: The fucan A was extracted from seaweed S. schröederi after proteolysis, fractionation and purification by anion-exchange chromatography. The fucan obtained was used to synthesize silver nanoparticles for 1 h with shaking and protection of light. The nanoparticles were analyzed chemically and also by DLS, SEM and infrared (FTIR). In addition, the nanoparticles were subjected to MTT cell viability assay with human renal cell carcinoma (786-0) and normal cell (HEK 293). Results and conclusions: The silver nanoparticle (AgNP) showed a spherical shape with diameter of 196 ± 13 nm and zeta potential negative. Absence of proteins and phenolic compounds was confirmed by chemical analysis. In the FTIR, characteristic peaks for silver (3400, 1600 and 1364 cm^{-1}) were visualized on the synthesized nanoparticles. The AgNP were more cytotoxic to 786 tumor cells (80% inhibition) in the concentrations of 0.025 to 0.1 mg/mL while the fucan A inhibited 10% at the same concentrations. However, both fucan and AgNP showed no cytotoxicity against the normal kidney cell line. The present results showed that AgNPs might be a potential alternative agent for human kidney cancer therapy as also potentiated the cytotoxic effect of fucan A.

Keywords: Dictyotaceae, Chemical analysis, Cytotoxicity