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The structural characteristics and anticancer activity of native and modified fucoidans from *Sargassum duplicatum and Safgassum feldmannii*

Key words: brown algae, fucoidan, anticancer activity

Brown algae contain three types of biologically active polysaccharides. Alginic acids are the most studied and successfully used for a long time in the medical, pharmaceutical and cosmetic industries. Other valuable polysaccharides – laminarans and fucoidans, are less studied in comparison with alginic acids. Thus, their study is actual task today. Fucoidans are most interesting for researchers due to a wide spectrum of diverse biological activity, including anticancer, immunomodulating, antiviral and other [1]. Obtaining individual fractions of fucoidans, determination of the characteristics of their structure and biological activity are important for establishment of relationship «structure-activity», which is needed for development of medicines based on investigated polysaccharides.

The aim of this work was the investigation of the structural characteristics and anticancer activity *in vitro* of native and modified fucoidans from two brown algae of the genus *Sargassum*.

Brown algae *S. duplicatum* and *S. feldmannii*were collected from Nhatrang bay (Socialist Republic of Vietnam) in June 2015. Samples of algae were defatted, dried and extracted by solution of diluted hydrochloric acid. Fucoidans were separated by anion-exchange chromatography and then purified from polyphenols to obtain fraction of individual polysaccharides.

From the data of the monosaccharide analysis, fucoidans were pure galactofucans with different ratios of fucose and galactose residues (51 and 49 mol % for fucoidan from *S. duplicatum* and 72 and 28 mol % for fucoidan from *S. feldmannii*, respectively. Obtained polysaccharides were sulfated (31.7 % for fucoidan from *S. duplicatum* and 25.3 % for fucoidan from *S. feldmannii*), fucoidan from *S. duplicatum* also was acetylated.

Non-carbohydrate substituents were removed from the fucoidans, and then the obtained fractions were investigated by 1D and 2D NMR spectroscopy. Main chain of modified galactofucan from *S. duplicatum* consisted of alternating 1,4-linked α-L-fucopyranose and β-D-galactopyranose residues with a small number of branches in the form of single α-L-fucopyranose [2]. The desulfated galactofucan from *S. feldmannii* contained monosaccharide residues of α-L-fucopyranose and β-D-galactopyranose linked by 1,3- and 1,4-bonds.

Soft agar method was selected for determination of the anticancer activity *in vitro* of native and modified fucoidans. The native fucoidans from *S. duplicatum* and *S. feldmannii* at the concentration of 200 μg/ml suppressed the colony formation of colon cancer cells DLD-1 on 70

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and 57%, respectively. Deacetylated fucoidan from *S. duplicatum* displayed the similar activity with native fucoidan. But desulfation leaded to significant decreasing of anticancer activity. Thus, the presence of sulfate groups in investigated galactofucans influenced on their anticancer effect.

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