

# Characterization of bioactive fucoidan polysaccharides from Icelandic *Fucus vesiculosus* algae

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## Background

Prior studies have shown diverse biological activity of sugars isolated from algae. However, little has been done with the isolated compounds from marine algae harvested in the cold waters surrounding Iceland. The structure of polysaccharides is highly complex and depends on the environment and species of the seaweed used. Therefore, it is important to study those species found on the coast of Iceland to evaluate their characteristics compared to same species from other parts of the world.

## Aim

The aim of this study is to investigate the structure and biological activity of sugars in *Fucus vesiculosus*, a type of brown algae harvested on the coasts of Iceland.

## Methods

Different extraction processes were developed to extract sugars from *Fucus vesiculosus*. Monosaccharide composition of the isolated polysaccharides was analyzed with ion chromatography (IC) and thin-layer chromatography (TLC) to identify the types and levels of fucoidans extracted. Fucoidan products were tested for their bioactivity, which included various antioxidant tests as well as testing their effects in a Hep-G2 cancer cell model.

## Results

Results confirmed high amounts of the monosaccharide fucose in the samples, which is the main monosaccharide found in fucoidan polysaccharides. The different extraction methods yielded extracts with different compositions and activity. Purified fucoidan samples showed high cellular antioxidant activity with minor differences between different extraction processes. The yield of purified fucoidan was however very different between different extraction processes. Purified samples did not show any antioxidant activity in ORAC, DPPH or TPC assays after the removal of polyphenols from the samples. The fucoidan samples demonstrated anticarcinogenic effects in the cell model.

## Conclusions

Significant levels of highly bioactive fucoidan polysaccharides were successfully extracted from *Fucus vesiculosus* using mild extraction techniques. The polysaccharides demonstrated high bioactivity. These products may be of significant interest to the nutraceutical and functional foods industry.

