

Therapeutic effects of nutraceuticals from the red microalga *Porphyridium* sp.

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Abstract

Our laboratory is developing biotechnology techniques for the production of valuable products from the cell wall sulfated polysaccharides of red microalgae, which exhibit anti-inflammatory and antiviral activities in addition to being strong anti-irritants. These novel polysaccharides are already being marketed as active cosmetic ingredients. A large-scale cultivation system, comprising polyethylene bioreactors, was developed.

The cells of red microalgae contain a unique combination of functional sulfated polysaccharides (including dietary fibers), polyunsaturated fatty acids, the carotenoid zeaxanthine, vitamins, minerals, and proteins, giving them strong potential for health food applications. A series of feeding experiments was performed on mice and rats to elucidate algal product toxicity, nutritional value, metabolic and morphological effects, and mechanism of action. Rodent diets were enriched with algal cells or polysaccharides in amounts of 5-10%.

Significant feeding experiments findings included:

Cholesterol metabolism improvements: Reduction in total serum cholesterol, triglyceride and hepatic cholesterol levels, increase in HDL/LDL ratio, fecal excretion of neutral sterols and bile acids.

Metabolic changes: Lower gastrointestinal transit time, lower serum and mucosal cholecystokinin levels, and increased hepatic HMG-CoA reductase levels.

Morphological changes: Increases in small intestine and colon lengths, increase in mucosa and muscularis cross-sectional area of the jejunum and hypertrophy of the muscularis layer were observed in polysaccharide-fed rats.

These results suggest that red microalgae have potent hypocholesterolemic properties at low concentrations in the diet, illustrate the special value of the unique algal biomass combination of sulfated polysaccharides and unsaturated fatty acids (n-3), and show the potential inherent in red microalga development for novel nutraceuticals.

Biography

Irit Dvir has completed her Ph.D. from Ben-Gurion University of the Negev, Israel in 1999 and she is a Senior Lecturer since 2008. She is the head of Industrial Management Department and head of Chemistry and Life Sciences program in Sapir Academic College, Israel. She is a member of the Council of Young Israeli Entrepreneurs. She has published papers in reputed journals and she does her research in the fields of red microalgae, diabetes and obesity.