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Review

Polysaccharides from the Marine Environment with Pharmacological, Cosmeceutical and Nutraceutical Potential

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Abstract: Carbohydrates, also called saccharides, are molecules composed of carbon, hydrogen, and oxygen. They are the most abundant biomolecules and essential components of many natural products and have attracted the attention of researchers because of their numerous human health benefits. Among carbohydrates the polysaccharides represent some of the most abundant bioactive substances in marine organisms. In fact, many marine macro- and microorganisms are good resources of carbohydrates with diverse applications due to their biofunctional properties. By acting on cell proliferation and cycle, and by modulating different metabolic pathways, marine polysaccharides (including mainly chitin, chitosan, fucoidan, carrageenan and alginate) also have numerous pharmaceutical activities, such as antioxidative, antibacterial, antiviral, immuno-stimulatory, anticoagulant and anticancer effects. Moreover, these polysaccharides have many general beneficial effects for human health, and have therefore been developed into potential cosmeceuticals and nutraceuticals. In this review we describe current advances in the development of marine polysaccharides for nutraceutical, cosmeceutical and pharmacological applications. Research in this field is opening new doors for harnessing the potential of marine natural products.

Keywords: cosmeceutics; marine polysaccharides; nutraceutics; pharmaceutics

1. Introduction

Marine species represent about one half of the global biodiversity, containing different and representative species and belonging to the main *taxa* also comprising a vast number of microbes and viruses. About 70% of the Earth's surface is covered by the oceans, which correspond to about 90% of the biosphere and offer a great source of novel compounds. In the last decades, marine organisms have been extensively explored as potential sources of novel bioactive compounds [1]. During their evolution the different marine organisms such as bacteria, macro- and microalgae, sponges and fish have developed various kinds of defense mechanisms, based on the use of a great variety of specific and potent natural molecules, which enable them to survive a hostile environment that includes