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Laminaran scavenge reactive oxygen species and attenuate cytotoxicity derived clinical drugs

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The "2030 Agenda for Sustainable Development (SDGs)" adopted by the United Nations General Assembly in 2015 and the Paris Agreement have been promoting the effective use of resources and reduction of CO2 emissions around the world. One of the other problems in the world is noncommunicable diseases (NCDs). NCDs account for 40 million deaths annually, which represent approximately 70% of all deaths globally. Improve of lifestyle choices including dietary preferences is one of the key factors decreasing the risk of NCDs. To solve these problems, we have been evaluating the efficacy of microalgae and microalgae-derived compounds. Kelps, a large brown algae, are rich in minerals and vitamins, and are also known to produce fucoidan and fucoxanthin, which are highly physiologically active compounds. We focused our attention on laminaran, a β-1,3/1,6-glucan unique to kelp.

β-1,3/1,6-glucan possesses good efficacy for several diseases such as diabetes, cardiovascular diseases, immune regulation and blood pressure suppression. The commercial source of β-1,3/1,6-glucan is black yeast, but there are several disadvantages: production is unsustainable in fermentation processes that use organic carbon as a substrate, and black yeast cannot be ingested directly. On the other hands, using kelp has the advantage of reducing CO2 emissions by cultivating kelp and of providing polysaccharides through consumption of kelp.

Bioactivity studies on laminaran are limited, thus we evaluated whether laminaran can scavenge reactive oxygen species (ROS). Electron spin resonance assay revealed that laminaran scavenged singlet oxygen and superoxide anions, directly. Moreover, we evaluated the attenuation of cytotoxicity by clinical drugs such as indomethacin (Ind) and dabigatran (Dab). Ind is one of the most commonly prescribed nonsteroidal anti-inflammatory drugs to reduce inflammation. Dab is a novel oral anticoagulant with an advantage over other anticoagulants, such as warfarin, which can interact with food and drug metabolism. Administration of Ind or Dab increase the intracellular ROS production and induce the cytotoxicity. However laminaran scavenged ROS derived Ind and Dab and attenuated the cytotoxicity. These results indicated that laminaran can represent a functional food with anti-aging and disease prevention properties.

Biography

Hiromi Kurokawa is a senior researcher with a robust background in medical sciences and biotechnology. With experience at Japan's Pharmaceuticals and Medical Devices Agency, the University of Tsukuba, MoBiol Technologies, and now Phycochemy Corp., Kurokawa has contributed significantly to research in food, nutrition, and health.