

# Phytonutriance®

Natural antioxidant solutions with a proven efficacy

## A Natural Ingredient for Cardiovascular Prevention

HealSea™  
by Phytonutriance®



- > Seaweed extract powder
- > Standardized to phlorotannins
- > Powerful antioxidant
- > Cardiovascular health support
- > Strong scientific documentation

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# A SEA OF HEALTH

In most other Western countries, **atherosclerosis** is the leading cause of **illness** and **death**.

*World Health Organization*



## Phlorotannins and health benefits

Seaweeds have been consumed in Asia since ancient times and are well known for their various health benefits. More recently marine algae have been used in Japan as raw materials in the manufacture of many seaweed food products, such as jam, cheese, wine, tea, soup and noodles and in Western countries for food and pharmaceutical uses.

Brown seaweeds and more specifically, ***Fucus vesiculosus***, also called *bladderwrack*, are rich in a specific class of polyphenols: **phlorotannins**.

Algal phlorotannins differ from the tannins derived from terrestrial plants in their biosynthesis pathway. In brown algae, the low-molecular weight polyphenols appear to have **antifungal, antiviral, antibiotic** and **antialgal properties**. They are also thought to play a protective role against UV radiation. Finally, phlorotannins are strong antioxidants. Polyphenols of high molecular weight contained in the crude extract of *Fucus vesiculosus* are thought to be potent inhibitors of enzymes involved in oxidative stress.

Diana Naturals has explored the health benefits of phlorotannins in numerous scientific studies and has confirmed the **strong antioxidant properties** of its HealSea™ fucus extract. Advanced research also highlighted the efficacy of HealSea™ in atherosclerosis prevention.

### HealSea™ Key Features

- 100% natural
- Standardized
- Extracted from seaweeds sourced in France
- Strong antioxidant
- Clinical study support
- Suitable for dietary supplements and functional foods
- Highly stable
- Water soluble
- Food grade

### Development of atherosclerosis

Atherosclerotic mechanism happens in the artery wall and includes:

- LDL oxidation
- Inflammation process
- Formation of foam cells leading to atheroma plaques
- Stenosis

Scientific evaluation of HealSea™ efficacy has identified cardiovascular health improvements at every stage of the mechanism.

## Frequently Asked Questions

### What is HealSea™?

HealSea™ is a fucus extract designed for cardiovascular health. Based on *fucus vesiculosus*, a brown algae rich in phytotannins, HealSea™ extract is standardized to phlorotannins.

### What can HealSea™ do for me?

HealSea™ has been clinically proven in human and animal *in vivo* studies to significantly increase the production of aortic nitric oxide, well known for its vasorelaxant effect. It also has been proven to reduce the susceptibility of VLDL and LDL cholesterol-rich lipoproteins to oxidation *ex vivo*, and to significantly reduce atheroma plaque formation. A patent has been filed in France.

### What are phlorotannins?

Phlorotannins are part of the polyphenol family, and are specific to brown seaweeds such as *fucus vesiculosus*. Algal phlorotannins differ from terrestrial plant tannins in their biosynthesis pathway and in their chemical structure.

### How can HealSea™ promote my cardiovascular health?

HealSea™ has been proven to significantly reduce the development of atherosclerosis in animal studies. It is also a powerful antioxidant that can help to promote cardiovascular health.

### Is HealSea™ proven effective?

Clinical and *ex vivo* studies have been conducted by the University of Milan (Italy), and the University of Barcelona (Spain) to demonstrate efficacy of HealSea™ in atherosclerosis prevention.

### Is HealSea™ safe?

HealSea™ has been evaluated in toxicity studies and has been proven safe. France was also the first European country to establish a specific regulation concerning the use of seaweed for human consumption as non-traditional food substances. Currently, 12 macroalgae, including *fucus vesiculosus*, and two microalgae are authorized as vegetables and condiments. Additionally, HealSea™ is certified GRAS and applicable for use in dietary supplements under DSHEA.

### What is the daily dosage recommendation for HealSea™?

Scientific studies conducted with HealSea™ suggest a 500 – 600 mg daily dosage.

### Where is HealSea™ produced?

HealSea™ is produced in France, close to seaweed producers. It is produced in a NF EN ISO9001:2000 certified facility.

These statements have not been evaluated by the Food and Drug Administration.  
This product is not intended to diagnose, treat, cure or prevent any disease.

# A STRONG SCIENTIFIC BACKGROUND

HealSea™ antioxidant activity and preventive efficacy in atherosclerosis have been evaluated in partnership with the University of Milan (Italy), the University of Barcelona (Spain) and the CEVA (French National Center of research on seaweed)<sup>1</sup>.

## > Reduction of LDL oxidation risk

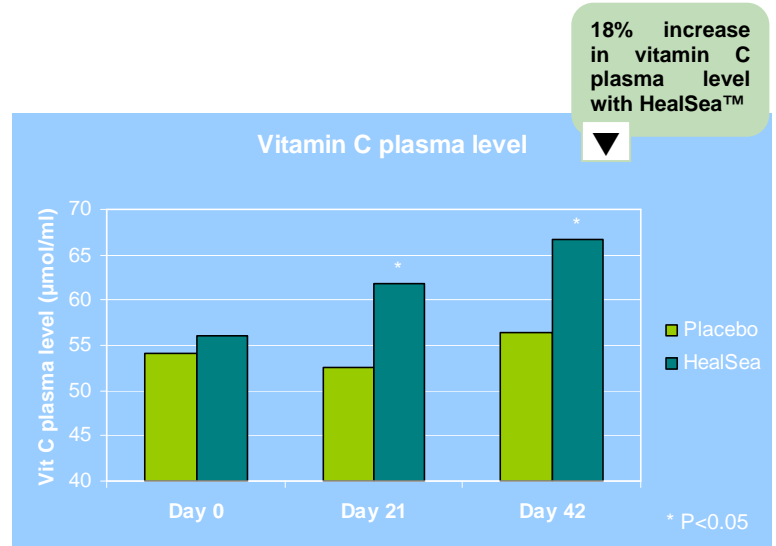
### Vitamin C plasma level

In a cross-over human clinical trial, 40 healthy people had a daily intake of 500 mg of HealSea™ supplement or a placebo. Plasma levels of vitamin C were analyzed after 21 and 42 days. Results are shown at right.

### Susceptibility of lipoproteins to oxidation

In an *ex vivo* study, LDL and VLDL were obtained from control and treated healthy rats (200 mg/kg/day of HealSea™ or placebo during 4 weeks) and their susceptibility to oxidation was measured.

- Lag time after  $\text{Cu}^{2+}$  induced oxidation was **increased by 20%**
- Oxidation rate was **decreased by 22%**

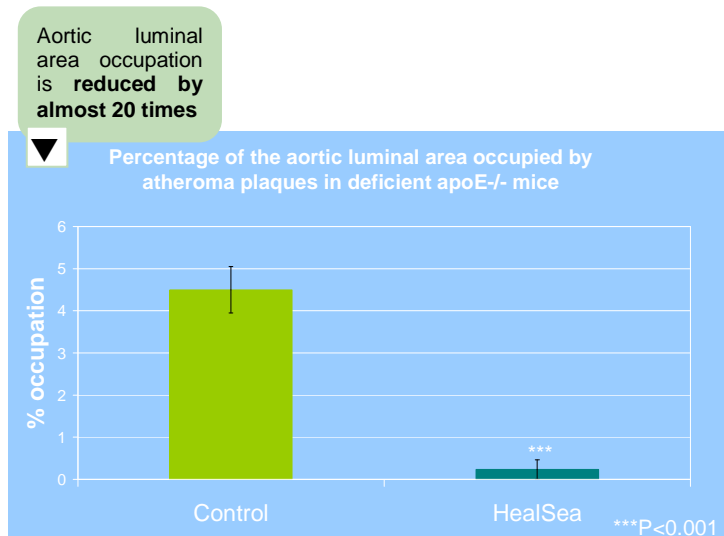


## > Reduction of stenosis risk : modulation of nitric oxide (NO) production by aorta

Nitric oxide plays a major role in healthy endothelium and in vascular homeostasis. In response to atherosclerosis or its risk factors, positive effects of nitric oxide are attenuated.

Nitric oxide production by aorta was monitored in healthy control and treated rats (200 mg/kg/day of HealSea™ or placebo during 4 weeks): **Basal NO generation was increased by 48%** (P<0.001).

## > Reduction of atheroma plaque



ApoE<sup>-/-</sup> mice received (included in a semisynthetic diet) 200 mg/kg body weight of the HealSea™ extract or 43 mg/kg body weight of phloroglucinol for 12 weeks. Results were compared to a control group (shown at left).

### Thoracic aorta occupation of ApoE<sup>-/-</sup> mice :



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Additional technical information and references available upon request.