Benefits of Modifilan®

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Modifilan is a concentrated extract of the brown seaweed Laminaria japonica. This seaweed is gathered in the clean waters of the northwestern Pacific Ocean. Forty pounds of raw Laminaria japonica is needed to make just one pound of Modifilan. This unique patented technology “semidigests” the tough outer layer of seaweed fibers exposing, concentrating and making much more bioavailable the macro-and micronutrient-dense central vein of the Laminaria.

Although the nutritional and medicinal powers of seaweeds have been known for thousands of years the scientific basis of their health benefits has been established only recently.

One of the most impressive aspects of Modifilan that sets it apart from other types of seaweed products is its very high content of soluble polysaccharides like fucoidan, laminarin and alginate. The former compound is particularly rich in such simple sugars as glucuronic acid, mannose and fucose that give Laminaria its distinctive taste.

The ongoing research into fucoidan has conclusively demonstrated its ability to induce cancer cell apoptosis (programmed cell death) in leukemia, stomach and colon cancer cell lines. This biological data support epidemiological observations that Laminaria is an important factor contributing to the relatively low breast cancer rates reported in Japan.

The technology involved in processing Laminaria japonica preserves and at the same time concentrates this vulnerable thermolabile substance thus making Modifilan one of the richest sources of cancer-fighting fucoidan.

Another polysaccharide concentrated in Modifilan that may have anti-cancer properties is laminarin. It is known that tumor formation and growth require a highly charged extra-cellular matrix. Solid tumors provoke ongoing high-level fibrin leakage from surrounding capillaries. This fibrin clot gets invaded by various cells recruited by solid tumors including fibroblasts and endothelial cells. The former cells lay down a heavily charged matrix throughout the tumor and the later cells participate in tumor angiogenesis (vascularization). Angiogenesis is a prerequisite for tumor expansion and metastasis. It has been shown that laminarin sulfate inhibit the binding of basic fibroblast growth factor (BFGF) to an extra-cellular matrix leading to inhibition of fibrin clot invasion by tumor- recruited fibroblasts and endothelial cells suggesting a novel approach to tumor therapy based on blocking angiogenesis.

Cancer metastasis involves the tumor cell adhesion to host tissue basement membrane followed by tissue invasion facilitated by tumor cell surface (urokinaze-type plasminogen activator) associated plasminogen activation. Fucoidan interferes with cancer cells metastasis (anti-metastatic activity) by inhibition of physical interaction

between the tumor cells and basement membrane as well as suppression of the proteolytic cascade of plasminogen activation.

Interaction and organization of cells and tissue in general and tumor and host cells in particular may be mediated by the interactions between cell membrane polysaccharides and the corresponding protein receptor. Fucoidan, a sulfated fucopolysaccharide, inhibits the adhesion process (cell-cell interaction) by blocking lectin-like adhesion molecules (glycoproteins) on cell surfaces and therefore interfering with tumor cell colonization (metastasis).

Another mechanism of antiproliferative (anti-tumor) properties of fucoidan was shown in vitro and in vivo on a cell line derived from a nonsmall-cell human bronchopulmonary carcinoma (particularly chemoresistant tumor). Fucoidan exerted antiproliferative activity with a block observed in the G1 phase of the cell cycle.

It has also been demonstrated that fucoidan acts as a so-called activator of the reticulo-endothelial system, specifically as an enhancer of phagocytosis. This suggests another aspect of antitumor activity of fucoidan related to the activation of macrophage-mediated tumor cell killing.

There are also non-polysaccharide fractions from Laminaria that have been found to have a significant cancer-preventative anti-mutagenic (anti-DNA damage) activity against typical genotoxic substances.

Another promising use of the sulfated polysaccharides fucoidan and laminarin is in the prevention and treatment of cardiovascular disease. Several mechanisms are involved: the inhibition of smooth muscle cell proliferation (monoclonal hyperplasia) which is an important step in atherogeneses; activation of enzymes involved in the beta-oxidation of fatty acids which can be useful in the prevention and treatment of hyperlipedemia. Laminarin has been shown to have a hypotensive effect. It also exhibits 30% of the anticoagulant activity of heparin.

All of these properties of sulfated polysaccharides make Modifilan clinically applicable in the prevention and treatment of coronary heart disease, cerebrovascular disease, atherosclerosis, cancerogenesis and cancer metastasis.

Another extremely important area of Modifilan application is in the environmental medicine. Polysaccharide laminarin has been shown in four animal species (mice, guineapigs, dogs, and monkeys) to prevent acute radiation sickness and death (about LD90) when administered within 24 hours after radiation exposure. This research suggests that the brown seaweed Laminaria can be clinically useful in the treatment and prevention of the adverse effects of ionizing radiation.

The non-digestible polysaccharide alginate that comprises 50% of Modifilan’s total dry weight has the unique ability of binding heavy metals and radioactive substances to its own molecules. As the alginate is non-digestible it is excreted from the body together

with toxic compounds. This is particularly important for cadmium and mercury, as these metals are found at dangerously high levels in air, water and food. Alginate can also remove isotopes that have previously been absorbed by the human body from the environment. Even small amounts of radioactive pollution will expose surrounding cells to harmful radioactive emission. The way alginate facilitates the excretion of toxic substances that find their way into the body from the environment can be shown using, as an example, the elimination of radioactive strontium:

Sr 2+ (food)
↕
Sr 2+ (in GI tract) + alginate = strontium alginate → feces
↕
Sr 2+ (blood)
↕
Sr 2+ (bones)

A percentage of Strontium molecules stored in the bone structure (or any other toxic substance stored in the tissue) is constantly released and is traveling with the blood stream. As the blood feeds the saliva and bile, part of the released strontium or other toxic metal ends up in the large intestine. Most of the liquid in the large intestine is reabsorbed by the body including the radioactive isotopes and heavy metals which are redeposited back into the tissue. Alginate can break this process, as toxic substances are bound to the alginate molecules and released from the body with feces. Alginate binds to all heavy metals including lead, mercury, cadmium, cobalt, copper and radium.

Modifilan should be consumed over at least a four-month period to expedite removal of toxic substances stored in the body as a result of previous exposures.

Another interesting potential application of Modifilan as one of the best sources of fucoidan is for inflammatory conditions of the alimentary tract.

The inflammation process involves elevated synthesis of the proinflammotory mediators like adhesion molecules, white cell infiltration of gastrointestinal mucosa and altered mucosal integrity. Therapeutic use of heparin has produced clinical remission in the majority of patients with inflammatory bowel disorder. One of the mechanisms involved is restoration of the fibroblast growth factor activity that stimulates repair of the epithelium. Since fucoidan shares many properties with heparin including cell surfact activity one can expect similar therapeutic benefit with use of fucoidan.

Another mechanism of the beneficial effect of heparin, heparan sulphate and potentially fucoidan is their mucosal-protective properties as glycosaminoglycans. Gastrointestinal inflammation may cause alteration in the protective mucosal layer of glycosalminoglycans and may cause substances like heparin and fucoidan to become “conditionally essential” nutrients suitable for oral administration because they can be absorbed across the GI mucosa.