



síbiotech

Science and technology
transfer – ideas acquired
from the cosmos

síbiotech

natural bioactive compound research
and extraction company

síbiotech is one of the leading biotechnology companies in Latvia that specialises in the research, extraction and production of bioactive compounds using innovative and sustainable technologies.

síbiotech is a subsidiary of "SISTEMU INOVACIJAS" – the joint stock company with more than 15 years of experience in clinical research of pharmaceuticals and medical devices. In close collaboration with leading cardiologists, scientists and pharmacists, it is committed to advancing the field of biotechnology to improve human health and well-being.

To produce high-quality products from biologically active compounds, *síbiotech* uses innovative and sustainable solutions, including supercritical fluid extraction (SFE) with carbon dioxide (CO₂) and lyophilisation (freeze drying).

Because we grow sea buckthorn, our first product line started with a bioactive compound combination – **HIPPCOR**[®] sea buckthorn seed-derived lipid extract (Omega-3,6,9) and berry pulp extract.

Recently our team has started to research opportunities to cultivate microalgae in photobioreactors to grow raw material for extraction in a more sustainable and eco-friendly way.



Supercritical fluid extraction with carbon dioxide (CO₂)

In supercritical fluid extraction technology, CO₂ is exposed to pressure and temperature above its critical limits; entering a supercritical state, CO₂ acquire effective solvent properties for fat-soluble bioactive compounds. This innovative technology does not use organic solvents and is considered efficient and gentle, ensuring that all active nutrients are preserved and concentrated in the final product.

sibiotech uses this technology to obtain lipid extracts from sea buckthorn seeds and pulp, flaxseeds, birch bark and microalgae.

Advantages of the supercritical CO₂ extraction technology



Lyophilisation (freeze-drying)

Lyophilisation (freeze drying) is a dehydration process at low temperatures under vacuum conditions. The advantage of lyophilisation technology is that the raw material retains up to 98% of its biologically active compounds.

sibiotech uses lyophilisation technology for drying raw material before extraction to ensure low moisture content for an enhanced extraction process. This technology is also used to produce dry extracts.

HIPPOCOR®

Using supercritical fluid extraction with CO₂, the team of sibiotech's researchers has developed sea buckthorn seed lipid extract – dietary supplement HIPPOCOR®. The product is rich in Omega – 3,6,9 fatty acids and beta-sitosterol, which promotes the health of the cardiovascular system and the functioning of the body's immune system.

One product capsule corresponds to about 50 grams of fresh sea buckthorn berries.

Active nutrients:

Sea buckthorn seed oil (Hippophae rhamnoides)	1 capsule 1000 mg	2 capsules 2000 mg
Linoleic acid (Omega-6 fatty acid)	370 mg	740 mg
Alpha-linolenic acid (Omega-3 fatty acid)	300 mg	600 mg
Oleic acid (Omega-9 fatty acid)	170 mg	340 mg
Beta-sitosterol	7 mg	14 mg



A clinical trial of HIPPOCOR®

In 2021, the Research Institute of Cardiology and Regenerative Medicine of the University of Latvia started a clinical trial of the sea buckthorn seed lipid extract product HIPPOCOR® (Omega-3,6,9 fatty acids from sea buckthorn seeds).

Patients with an increased residual risk of cardiovascular disease were included in the trial. In addition to standard medical therapy and medications, enrolled patients took 2000 mg (two capsules) of the HIPPOCOR® dietary supplement.

Of the 59 patients included in the trial, 39 completed a full three-month follow-up. The preliminary results concluded that the product is safe for use (no adverse side effects observed).

A statistically significant reduction of systolic blood pressure, low-density lipoprotein cholesterol and blood glucose level has been observed after three months of use of HIPPOCOR®. Furthermore, preliminary findings show improved metabolism. The clinical trial of HIPPOCOR® continues, and it is planned to include more than 100 patients.



Bioavailability assessment of HIPPOCOR®

To determine the sea buckthorn seed lipid extract potential to affect the blood lipid profile, in 2023, sibiotech, in cooperation with the University of Latvia and the Institute of Food safety, Animal Health and Environment "BIOR" conducted an absorption assessment of sea buckthorn seed lipid extract HIPPOCOR®.

Five healthy subjects were recruited in this pilot study. Blood samples were taken from each subject before administration, after 1, 6, 24 and 31 hours, respectively.

During this assessment, study subjects avoided consuming any lipid-containing products.

The assessment results showed that before and 6 to 24 hours after administration of HIPPOCOR®, there was an increase in unsaturated fatty acid levels by 10% and a decrease in saturated acid by 5%.

It is planned to continue the trial at the end of 2023.

Research & Development

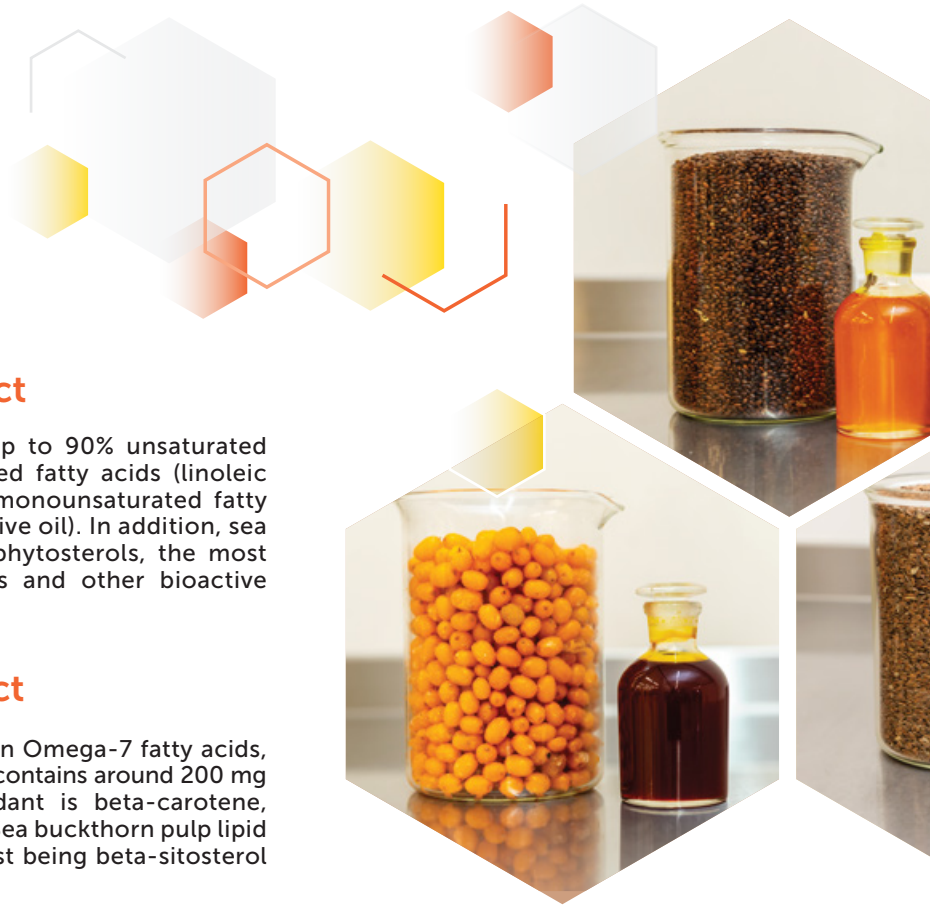
sibiotech develops and searches for new technologies and solutions in extracting and processing biologically active substances.

Sea buckthorn seed lipid extract

Sea buckthorn seed lipid extract contains up to 90% unsaturated fatty acids, of which 75% are polyunsaturated fatty acids (linoleic acid and alpha-linolenic acid) and 15% are monounsaturated fatty acids (oleic acid, the main ingredient of the olive oil). In addition, sea buckthorn seed lipid extract also contains phytosterols, the most abundant being beta-sitosterol, tocopherols and other bioactive compounds.

Sea buckthorn pulp lipid extract

Sea buckthorn berry pulp lipid extract is rich in Omega-7 fatty acids, containing up to 40 g per 100 g extract. Also, it contains around 200 mg per 100 g of carotenoids; the most abundant is beta-carotene, followed by lutein, zeaxanthin, and lycopene. Sea buckthorn pulp lipid extract also contains phytosterols, the greatest being beta-sitosterol 2 mg/1 g extract.





Microalgae extracts rich in Omega-3 and antioxidants

Microalgae are in the spotlight of our research, as some species can produce valuable polyunsaturated fatty acids beneficial for human health.

Microalgae-derived Omega-3 fatty acids, such as eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), are the same long-chain fatty acids in fish. This is one of the most sustainable ways of producing Omega-3-rich products without impacting the environment.

Microalgae also contain other valuable bioactive compounds, including a powerful antioxidant - carotenoid astaxanthin.

sibiotech has started developing the process to cultivate microalgae in a photobioreactor system and further processing using freeze drying and supercritical fluid extraction to obtain lipid extracts rich in Omega-3 fatty acids and antioxidants. Using these sustainable technologies, it is possible to extract pure and vegan Omega-3 fatty acids for nutraceutical and food applications.

Flaxseed or linseed lipid extract

We have optimised technology to extract the flaxseeds. Flaxseed is a rich source of plant-origin Omega-3 alpha-linolenic acid (ALA). Our flaxseed lipid extract contains more than 60% of ALA, followed by linolenic acid (Omega-6) and oleic acid (Omega-9). In addition, flaxseed lipid extract contains less than 10% saturated fatty acids (stearic and palmitic acids). In addition, flaxseed lipid extract contains about 5% tocopherol.

We are investigating the co-extraction process of flaxseed and birch bark to develop a synergistic bioactive compound product containing ALA and betulin. Betulin is a compound found in birch bark with various health benefits, including reducing low-density lipoprotein. ALA with betulin could be a potentially effective combination to promote cardiovascular health.



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