

Objective

To develop new functional foods from novel algae species, the Martin-Luther-University of Halle-Wittenberg, the Universities of Jena and Leipzig, and Anhalt University of Applied Sciences have joined forces within the scope of the competence cluster for nutrition and cardiovascular health (nutriCARD) to initiate the collaborative project NovAL, which is funded by the German Federal Ministry of Education and Research (BMBF) with 1.2 million euros over three years.

The aim of the project NovAL is to examine microalgae species, which are previously not used in human nutrition with regard to their nutrient composition. Arranged on screening results, the establishment of suitable microalgae as a sustainable source containing essential and beneficial ingredients for human nutraceuticals will be provided. Therefore, algal biomass will be produced, which is enriched with functional health-promoting ingredients like omega-3-fatty-acids, vitamins B₁₂ to compensate diet-related bottlenecks. By using microalgae as a food element, the supplement profile of traditional products such as meat, baked goods, dairy products, sweets, and snacks are enhanced. This increases the nutritional value of the food.

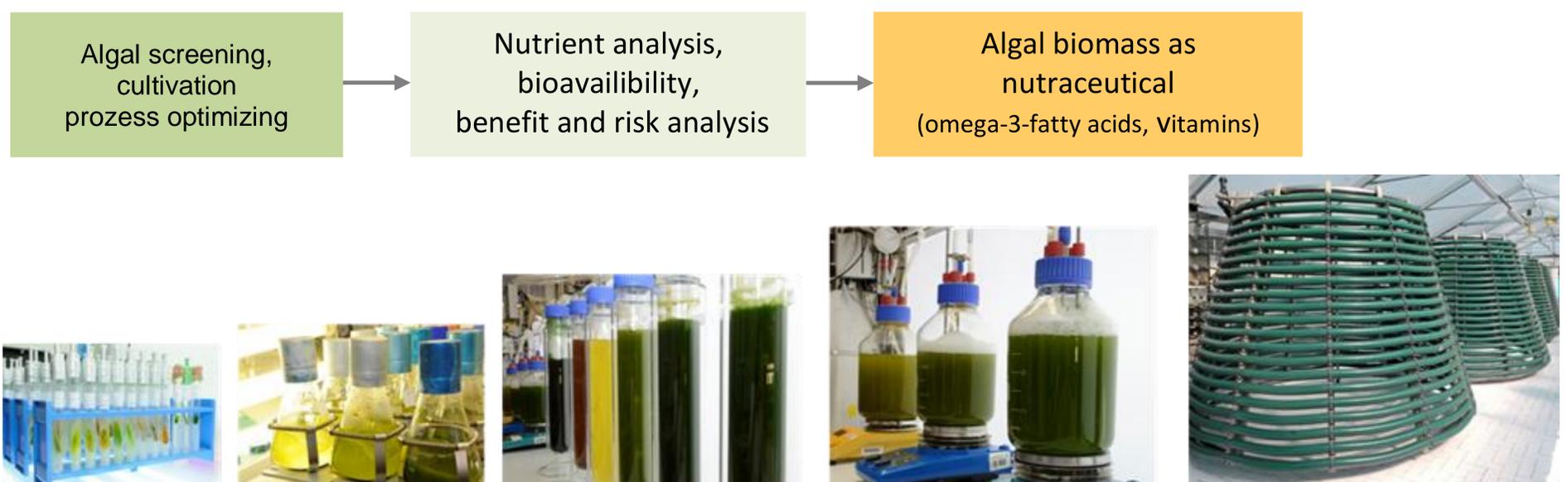


Figure 1: Algae screening and cultivational up-scaling to pilot scale.

Background

Microalgae comprise numerous valuable nutrients like multiple unsaturated fatty acids, vitamins, secondary phytochemicals (pigments and anti-oxidants), trace as well as macro elements in a balanced composition. Therefore, microalgae are a promising source for the production of valuable health-promoting nutrients for human nutrition. Until now, biomass from *Spirulina*- or *Chlorella*, which already are certified as food products, are used as food and dietary supplements. However, many microalgae species that are so far not commercially applied contain also a balanced composition of health beneficial molecules.

Using microalgae as food supplements in human nutrition, the risk of diet-related diseases can significantly be decreased. This is of particular importance for vegetarian and vegan diets, which often lack vitamins (B₁₂, B₂, or D), omega-3-fatty acids (EPA, DHA) and certain trace elements like Selenium.

Essential vitamins cannot be synthesized by the human metabolism but are nonetheless a crucial part of important metabolic processes. Vitamin-B₁₂-shortage can cause disorders of the blood system and increase the risk of neurological diseases. Vitamin D is involved in the regulation of the calcium level and is needed for calcium uptake from food. The intake of Vitamin D is especially recommended for low UV exposed regions. Polyunsaturated fatty acids (Omega-3-fatty acids, PUFA) are also essential for human metabolism and have to be ingested. Eicosapentaenoic acid (EPA) has five double bonds and Docosahexaenoic acid (DHA) six. Both belong to this important group.

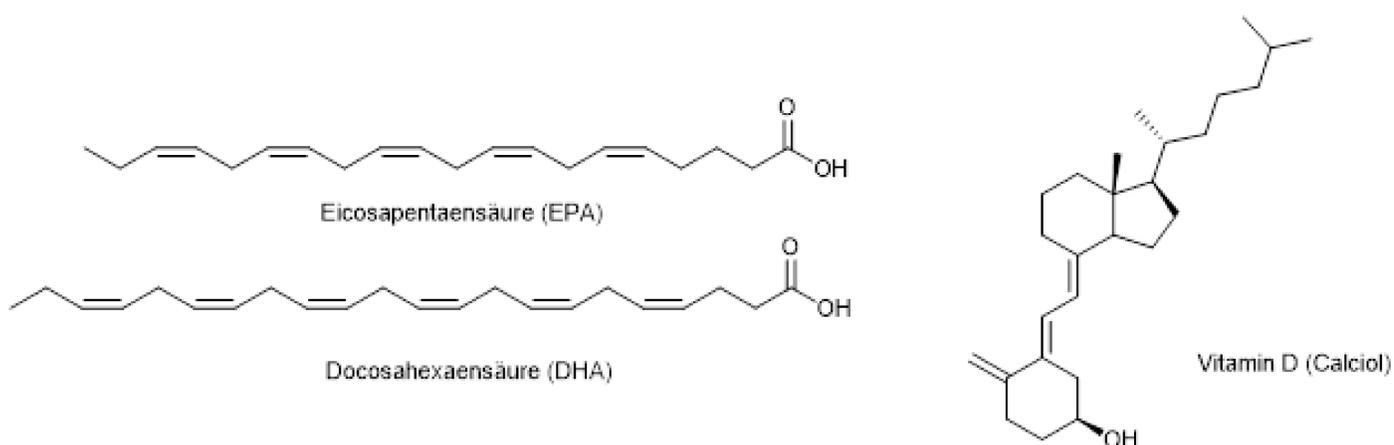


Figure 2: Chemical structure of EPA, DHA und vitamin D.

Omega-3-fatty acids are the precursors for the synthesis of hormone-like substances, that control inflammatory and immunological processes as well. Moreover, they promote the development of the brain, decrease the triglyceride level in the blood, improve the circulation, stabilize muscle cells of the heart, and decrease the risk of cardiac diseases.

Fish use microalgae as a food source, hence accumulate DHA and EPA in the body, are currently the most important source of these Omega-3-fatty acids. The demand for fish oil is gradually rising and could be complemented by algae to protect vulnerable fish population. DHA can only be produced by algae, while EPA occurs also in small amounts in higher plants. The most of the production is covered by the Dinoflagellates *Cryptocodinium cohnii* (Martek 2003) und *Schizochytrium* (Almega PL). The scope of applications are food supplements (50 %), Nutraceutical, and pharmaceutical products.

Project Partner



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HALLE-WITTENBERG



UNIVERSITÄT
LEIPZIG



FRIEDRICH-SCHILLER-
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Unser Weg zu einer bio-basierten Wirtschaft

