

## **Subcritical lipophilic extracts from *P. tricornutum* - impact on diet-induced obesity in C57Bl/6J mice**

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### Abstract:

In our study, the diatom *Phaeodactylum tricornutum* was selected to develop a holistic phototrophic process for the production of lipophilic extracts, which provide a high content of eicosapentaenoic acid (EPA), polyphenols as well as fucoxanthin, a carotenoid known for a variety of health promoting properties. Since both, up- as well as downstream processing can have a crucial impact on the amount of these compounds in *P. tricornutum* extracts (PTE), we investigated the influence of different cultivation parameters (e.g. relative light availability) and identified suitable parameters for cell disruption and extraction, aiming to preserve the nutritional quality and functionality of all compounds. For extraction, subcritical liquids were used, which meet the requirements of food and feed applications.

The impact of PTE on diet-induced obesity was investigated in C57Bl/6J mice. Therefore, the mice orally received the PTE (solved in oil/water (2/1, v/v) and a high fat diet at the same time. The PTE was well accepted by the mice. We observed no differences in food intake, whereas body weight gain, adipose mass and adipocyte size slightly decreased. Chromatographic analysis revealed a modification of the carotenoid and fatty acid profile due to the PTE supplementation. At the molecular level, PTE supplementation was associated with an increased expression of genes key to thermogenesis and fatty acid oxidation in inguinal white adipose tissue, whereas in brown adipose tissue the expression of genes related to lipid metabolism were affected after PTE uptake.

### Keywords:

*P. tricornutum*, pressurized liquid extraction, fucoxanthin, eicosapentanoic acid, anti-obesity