The Supplementation of Vegetable SDA-rich Echium Oil Effectively Increased EPA and DPA in Plasma and Blood Cells of Humans

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**Background:** To improve the supply of n-3-LC-PUFA in human nutrition vegetable oils containing potential n-3-LC-PUFA precursors such as SDA have to be tested.

**Aim:** The objective of this study is to investigate the conversion of the land-based precursors ALA and SDA into n-3-LC-PUFA (EPA, DPA and DHA) in humans by oral supplementation of Echium oil.

**Design:** The Echium oil (17 g/d) from *E. plantagineum* (CRODA, Health Care) was supplemented to the diet to investigate an accumulation of LC-n-3-PUFA (EPA, DPA, DHA) in different blood fractions (plasma, erythrocytes, peripheral blood mononuclear cells; PBMC) during an eight weeks period. Three test groups with different mean age, BMI and baseline blood lipids were included in this study. All subjects consumed no n-3-rich foods, e. g., sea fish and flaxseed oil (10 wks).

**Results:** All subjects (test group 1, n = 20: 28 y & BMI 22; test group 2, n = 20: 59 y & BMI 23; test group 3, n = 20: 60 y & BMI 30; equal female and male ratio) showed higher portions of fatty acids from Echium oil (ALA and SDA) in plasma, erythrocytes and PBMC. Furthermore, their endogenous elongation and desaturation products ETA, EPA and DPA were increased (2- to 3-fold). However, the DHA was unchanged in plasma and erythrocytes while the DHA even decreased in PBMC. In PBMC the highest increase of ALA, SDA, ETA, EPA and DPA was observed already after the first week, comparable with plasma.

The serum total cholesterol, LDL-cholesterol and triacylglycerol concentrations were significantly decreased after the eight weeks Echium oil supplementation, especially in those subjects with metabolic syndrome. Those subjects had higher blood lipid concentrations at baseline, which was associated with an average BMI at 30, a higher waist circumference (104 cm) and a higher body fat mass (32%).

**Conclusion:** The daily consumption of 17 g Echium oil can improve the n-3-LC-PUFA status in humans. In addition, the concentration of cardiovascular risk factors in serum, such as LDL-cholesterol and triacylglycerols, were decreased, especially in subjects with metabolic syndrome.

ALA, alpha-linolenic acid; DPA, docosapentaenoic acid; DHA, docosahexaenoic acid; EPA, eicosapentaenoic acid; ETA, eicosatetraenoic acid; SDA, stearidonic acid.