

## **Oxidative Characteristics of Omega-3 PUFA in Glyceroglycolipids**

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Due to their higher degree of unsaturation, omega-3 polyunsaturated fatty acids (PUFA) such as  $\alpha$ -linolenic (LN; 18:3n-3), eicosapentaenoic (EPA; 20:5n-3), and docosahexaenoic (DHA; 22:6n-3) acids are much more susceptible to oxidation than other PUFA such as linoleic acid (LA; 18:2n-6). On the other hand, a large amount of LN is present as glyceroglycolipids (GL) in photosynthetic membranes of higher plants. In algae, LN, stearidonic acid (18:4n-3; SDA), and EPA are also major constituents of the GL fatty acids. These GL have an important role in the biological systems, while the GL is always exposed to photooxidation in the thylakoid membrane. PUFA of GL in the photosynthetic membrane will be protected by antioxidants such as carotenoids and tocopherols. In addition, we have suspected that PUFA as GL form might be protective to the oxidation as compared with other lipid forms. The present paper made clear the oxidative stability of PUFA in GL from this viewpoint. The study showed that GL from green vegetable leaves contained high level of LN (>50-70%) and were oxidatively more stable than triacylglycerol (TAG) containing the same level of LN. High levels of SDA and EPA were found in algal GL. These GL showed the higher oxidative stability than those of fish oil TAG or fish egg phosphatidylcholine (PC), though fish TAG or fish egg PC had lower number of average double bonds in the molecule than those of algal GL. Some of algal GL showed the same oxidative stability as that of soybean oil TAG. GL and other lipid class used in this experiment were well purified with combination of different chromatographic techniques so that little antioxidant and prooxidant were detected in the lipids. Thus, the higher oxidative stability of omega-3 PUFA in plant and algal GL was not affected by minor lipid related compounds such as chlorophylls, tocopherols and others. The sugar moiety would be strongly related to the characteristic oxidative stability of omega-3 PUFA in the GL.