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## Interaction of plasmenylcholine with free radicals in selected model systems.

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**Abstract:**

Plasmalogens (Plg) - naturally occurring glycerophospholipids with the vinyl-ether group in the *sn-1* position are generally viewed as physiological antioxidants. Although there are numerous examples of antioxidant action of plasmalogen in cell cultures and in experimental animals, this hypothesis is far from being satisfactorily proven due to substantial limitations of such studies. Thus, plasmalogen reactivity in cells results in the accumulation of toxic byproducts and the experimental design is usually too complicated to evaluate the protective function of solely one type of lipid molecular species. In this study, experiments were performed in homogenous and heterogeneous model systems consisting of solutions in organic solvents as well as micelles and liposomes containing pure synthetic plasmenylcholines. Under the experimental conditions used, chemical reactivity of plasmalogens could be attributed to specific fatty acid esterification pattern. This is important because the chemical reactivity cannot be separated from physico-chemical properties of the lipids. Time-dependent formation of phospholipid and cholesterol hydroperoxides were determined by iodometric assay and HPLC-EC. EPR oximetry and Clark electrode were employed to detect the accompanying changes in oxygen concentration. Oxidation of the studied lipids was monitored by standard colorimetric TBARS method as well as MALDI-TOF mass spectrometry. Our data indicate that the reactivity of *sn-2* monounsaturated vinyl ether lipids in peroxy radical-induced or iron-catalyzed peroxidation reactions is comparable with that of their diacyl analogs. In samples containing cholesterol and plasmalogens, oxidative processes lead to accumulation of the radical oxidation product of cholesterol. It can be concluded that the antioxidant action of plasmalogens takes place intramolecularly rather than intermolecularly and depends on the degree of unsaturation of esterified fatty acids. Thus, it is questionable if plasmalogens can really be viewed as “endogenous antioxidant”, even though they may exhibit, under special conditions, protective effect.

**Abbreviation**

AAPH, 2,2'-Azobis(2-methylpropionamide)dihydrochloride; AMVN, 2,2'-Azobis(2,4-dimethylvaleronitrile); Asc, ascorbate/ascorbic acid; BHT – butylated hydroxytoluen; BME, (1-biphenyl-4-yl-1-methyl-ethyl)-tert-butyl diazene; BME<sup>•</sup>, 1-biphenyl-4-yl-1-methyl-ethyl radical; ChOOH– cholesterol

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