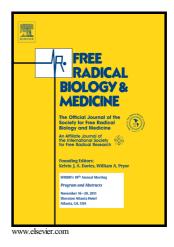
Author's Accepted Manuscript

Interaction of plasmenylcholine with free radicals in selected model systems

A. Broniec, A. Żądło, A. Pawlak, B. Fuchs, R. Kłosiński, D. Thompson, T. Sarna



 PII:
 S0891-5849(17)30090-4

 DOI:
 http://dx.doi.org/10.1016/j.freeradbiomed.2017.02.029

 Reference:
 FRB13222

To appear in: Free Radical Biology and Medicine

Received date: 13 September 2016 Revised date: 10 January 2017 Accepted date: 13 February 2017

Cite this article as: A. Broniec, A. Żądło, A. Pawlak, B. Fuchs, R. Kłosiński, D Thompson and T. Sarna, Interaction of plasmenylcholine with free radicals in selected model systems, *Free Radical Biology and Medicine* http://dx.doi.org/10.1016/j.freeradbiomed.2017.02.029

This is a PDF file of an unedited manuscript that has been accepted fo publication. As a service to our customers we are providing this early version o the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain

ACCEPTED MANUSCRIPT

Interaction of plasmenylcholine with free radicals in selected model systems.

A.Broniec^{1*}, A.Żądło¹, A.Pawlak¹, B.Fuchs², R.Kłosiński¹, D.Thompson³, T.Sarna¹

¹Biophysics Department, Biochemistry, Biophysics and Biotechnology Faculty, Jagiellonian University, Krakow, Poland ² Institute of Medical Physics and Biophysics, Medical Faculty, University of Leipzig, Germany

³Department of Chemistry, Purdue University, West Lafayette, IN, USA

^{*}Correspondence to: Biophysics Department, Biochemistry, Biophysics and Biotechnology Faculty, Jagiellonian University, Cracow, Poland. Tel.: +4812 664 65 26. agnieszka.broniec@uj.edu.pl

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 physicochemical 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 peroxyl 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-methylpropionamidine)dihydrochloride; AMVN, 2,2'-Azobis(2,4dimethylvaleronitrile); Asc, ascorbate/ascorbic acid; BHT – butylated hydroxytoluen; BME, (1-biphenyl-4yl-1-methyl-ethyl)-tert-butyl diazene; BME[•], 1-biphenyl-4-yl-1-methyl-ethyl radical; ChOOH– cholesterol Download English Version:

https://daneshyari.com/en/article/5501794

Download Persian Version:

https://daneshyari.com/article/5501794

Daneshyari.com