Contribution ID: **208** Type: **Poster**

The Effect of NAtural Antioxidiants in Thiyl Radical-Induced Lipid Modification Processes

Thursday, 27 April 2017 14:15 (2 hours)

Background of the study. Polyunsaturated fatty acids (PUFA), major constituents of biological membranes are sensitive to a free radical attack. The reactions of PUFA with free radicals are known to occur via two main processes: (i) lipid peroxidation and (ii) *cis–trans* isomerization. Lipid peroxidation can be inhibited by thiols, due to their H-donation ability. On the other hand, thiyl radicals are known to catalyse the double bond isomerization in PUFA. Both processes have damaging potential that must be carefully considered for its consequences in a biological systems. Therefore, the protection against lipid degradation under oxidative and free radical conditions is of special interest. The aim of this study is to elucidate the influence of different naturally occurring antioxidants on lipid peroxidation and *cis–trans* isomerization processes in biomimetic model system under different conditions.
Methodology. Model system containing mixed surfactant micelles and buffer was prepared by slow solubilization of linoleic acid (LH) in non-ionic surfactant micelles previously formed by mixing Tween®-20 and PB, pH 6.5. The composition of the investigated systems was typically 0.5 mM LH, 0.28 mM Tween®-20 and 5 mM PB (pH ˜ 5). Ascorbic acid (AscH), α-tocopherol (α-TOH) and resveratrol (ResOH) of defined concentrations were added during preparation of model systems. The addition of the amphiphilic 2.8 mM 2-mercaptoethanol was added to previously prepared micelles just before irradiation. Model lipid systems were irradiated up to the dose of 400 Gy, in equilibrium with air or after saturation with N2O at room temperature using panoramic 60Co source at the Ruđer Bošković Institute. Accurate dose rates in the irradiating positions were established with the ethanol-chlorobenzene dosimetry system (ISO/ASTM 51538:2009). The concentrations of hydroperoxides of linoleic acid were determined by the spectrophotometric ferric thiocyanate method, and the geometrical isomerization of LH methyl ester was studied by capillary gas chromatography.
Results. Under air-equlibrated conditions the addition of different natural occuring antioxidants retarded the process of lipid peroxidation among which ResOH showed the best antioxidative property. In model systems where process of *cis–trans* isomerization prevailed, the presence of antioxidants influenced on a decrease of the *trans* isomerization level; AscH was the the most effective inhibitor of radiation-induced *trans*-isomer formation. Among the natural compounds analyzed in this work an amphiphilic ResOH has proven to be the most effective antioxidant, also significant inhibitor for *cis–trans* isomerization process at the low formation rate of initial radical species.

Conclusion. Results indicate that the *cis–trans* isomerization and lipid peroxidation processes level could be dependent on the hydrophilic/lipophilic properties of particular antioxidant and its localization in model lipid system. This study contributes to the understanding of the role of antioxidants in radical processes which are not only able to prevent peroxidation but can also behave as anti-isomerizing compounds.

Country/Organization invited to participate

Croatia

Primary author: Ms TARTARO BUJAK, Ivana (Ruđer Bošković Institute, Croatia)

Co-author: Ms MIHALJEVIĆ, Branka (Ruđer Bošković Institute, Croatia)

Presenter: Ms TARTARO BUJAK, Ivana (Ruđer Bošković Institute, Croatia)

Session Classification: P-A2

Track Classification: FUNDAMENTAL AND APPLIED RADIATION CHEMISTRY RESEARCH