

Influence of Post Electro-Induced Free Radicals on Chemiluminescence of Liposomes

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Purpose: In the present paper, we use a chemiluminescence method to study the influence of the electro-induced free radicals on liposomes that can be regarded as model membranes.

Materials/Methods: The chemiluminescence method is used as a method to study the free radical interactions. Phospholipids isolated from a bull brain by Muller method are used for liposome preparation [1]. Liposomes were prepared by ultrasonic treatment of 0,01mg/ml phospholipid suspension in 0,1M KCl solution [2, 3, 4]. A 3ml 0,1M KCl solution is chosen as an environment for free radical induction. Induction of free radicals is implemented by applying a 15V, 250mA direct electric current through point-like platinum electrodes inserted into an optical cuvette. The distance between electrodes is 20mm. Chemiluminescence intensity is measured by a quantometric device, equipped with a FEU-140 photo multiplier.

Results: Induction of free radicals by direct electric current causes an explosive growth of chemiluminescence intensity followed by an exponential fall down to the pre-steady-state level,

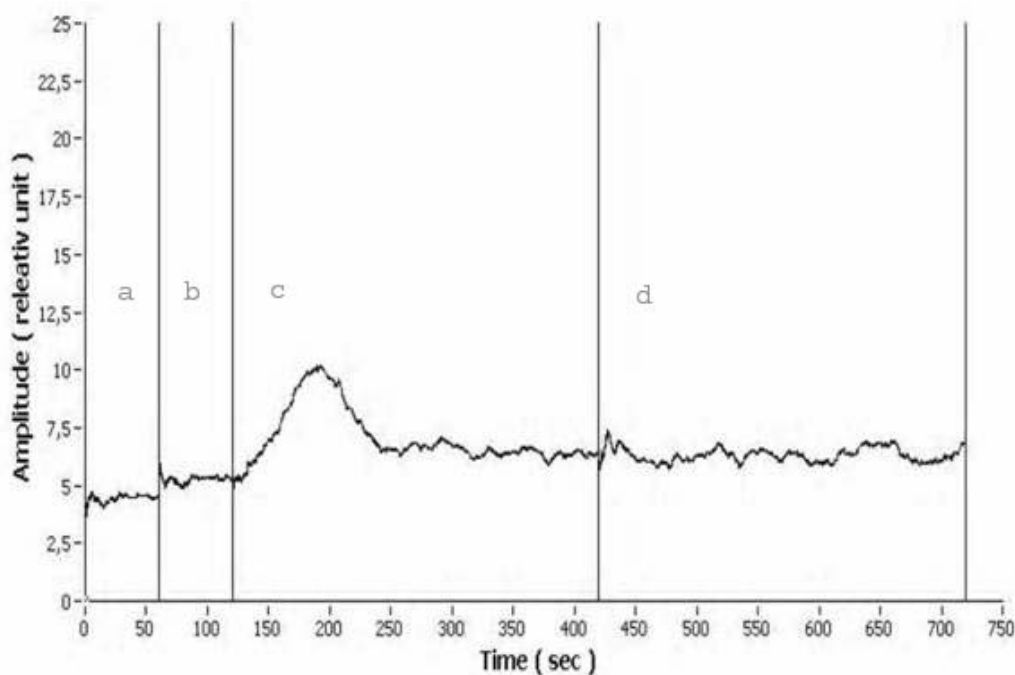


Figure 1. Electro-induced chemiluminescence and post electro-induced chemiluminescence of 0,1M KCl solution. (a) Background luminescence; (b) Spontaneous chemiluminescence of 0,1M KCl solution; (c) Electro-induced chemiluminescence 0,1M KCl solution; (d) Chemiluminescence of 0,1M KCl solution.

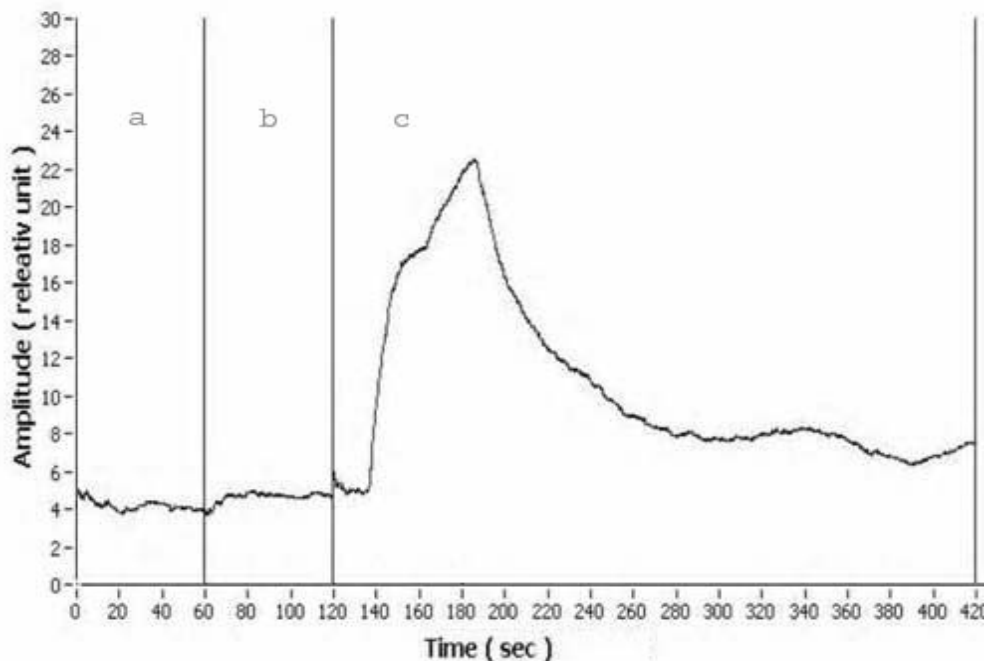


Figure 2. Chemiluminescence of liposome suspension after adding of post electro-induced free radical solution. (a) Background luminescence; (b) Spontaneous chemiluminescence of 3ml liposome suspension; (c) Chemiluminescence of 3ml liposome suspension after adding 0,5ml post electro-induced free radical solution.

that is still higher than the intensity of spontaneous chemiluminescence of the 0,1M KCl solution (Figure 1c). After turning off the electric current during the steady state electrochemiluminescence a post-electro-chemiluminescence is observed (Figure 1d). The registered post-electro-chemiluminescence is an indicator of post electro-induced free radicals. The adding of 0,5 ml post electro-induced free radical solution onto the 3ml liposome suspension causes explosive growth of chemiluminescence intensity followed by an exponential fall down to the pre-steady-state level (Figure 2).

Conclusions: The obtained results testify that post electro-induced free radicals interact with liposomes that appear as lipid bi-layer structures and cause lipid peroxide oxidation through a free radical chain mechanism.

References

1. Muller P., Rudin D., Tien H., Wescott W., J. Phys. Chem., **67**, 534, 1963.
2. Kagava Y., Biomembranes.-M.: High. Sch., 1985.
3. Huang C., Biochemistry, **8**, 1, 344, 1969.
4. Talsma, H. & Cormmelin, D.J.A., Liposomes as Drug Delivery Systems, Part I: Preparation. - Pharmaceutical Technology; **16**, 96-106, 1992.