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Determination of the protein corona stability complex of nanoliposomes in physiological mediums

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INTRODUCTION: Due to nanosizing results in the creation of new interfaces and in a positive Gibbs free energy change, nanoliposomal dispersion is a thermodynamically unstable system with tendency of agglomeration or vesical growth. Also, upon the addition of nanoliposomes (NLs) to biological fluids, there is an almost immediate fouling of their surfaces with proteins and other cellular apparatus forming a layer known as protein corona (PC), which determines the eventual properties of NLs [1].

MATERIALS AND METHODS: In order to investigate the effect of LIPOID PE 18:0/18:0-PEG 2000 (PEG) on the in vitro stability of NLs and PC complex formation, two formulations (lechitin: cholesterol:PEG = 8.7:1:1.7 and 9:1:0.17 for S1 and S2, respectively) loaded with rosmarinic extract were prepared by the modified lipid film hydration technique [2]. Prepared NLs (200 μl) were incubated in 800 μl phosphate buffer pH 7.4 or human plasma at 37 OC for 2, 6 and 24h and analyzed in terms of particle size, particle size distribution and zeta potential (Zetasizer Nano-Series, Malvern Instr. Ltd., UK).

RESULTS: In physiological relevant medium with pH 7.4, the diameter (D) of freshly prepared NLs was 107.2 and 113.7 nm with a relatively narrow size distribution (PDI~0.27) and zeta-average of -18.5 and -45.1 mV, for S1 and S2, respectively. No significant differences were observed during the examined period of 24h. Obtained results showed that the concentration of PEG influenced the mean size and zeta potential of NLs. In human plasma, D of NLs was 111 and 123.6 nm with PDI=0.3 and zeta-average of -18.5 and -17.5 mV. S1 was stable during the period of 24h. In opposite, during the examination period of 24h, S2 showed slight reduction in the zeta potential (- 16.7 mV during first 2 h). After 6 h and gradually onto 24 h, the zeta potential became more negative (-20 mV). This could be due to PC complex formation. In late time intervals, probably there was a displacement of the plasma proteins present onto hard corona layer and formation of soft corona complex with the NLs [1].

CONCLUSION: Due to the steric stabilization, NL formulation prepared with sufficient amount of PEG showed satisfactory stability in relevant mediums and potential for prolonged circulation time, thus enabling effective drug deposition to the target site.

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Low-energy nanoemulsions with antioxidant red raspberry seed oil and fruit extracts – Influence of extract type and its quality and different polyols on EPI nanoemulsion formation and stability

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INTRODUCTION: Red raspberry seed oil is a rich source of anti-inflammatory polyunsaturated fatty acids and antioxidants while hydro-glycolic extracts made from raspberry fruit are known for carotenoids, vitamin C and tannins. To use their biological potential in effective skin care products we formulated low energy nanoemulsions (LE-