ANALYZING THE IMPACT OF THE OIL PHASE SELECTION AND CURCUMIN PRESENCE ON THE NANOEMULSION STABILIZING LAYER USING ELECTRON PARAMAGNETIC RESONANCE SPECTROSCOPY

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The stabilizing layer of nanoemulsions impacts their stability and destiny upon *in vivo* administration (1). The aim of this work was to gain information about the dynamics of the surfactants' monolayer when different oils (soybean / fish) were used, and obtain data regarding the localization of curcumin (2), an active compound with many potential health benefits, using electron paramagnetic resonance (EPR) spectroscopy. Formulations were analysed using EPR technique with three different spin probes: 5-, 12- and 16-doxyl stearic acid (DSA), to investigate membrane dynamics at different depths. The results indicated that the oil type played a crucial role, not only on the structure, but also in the localization of the bioactive compound. The addition of curcumin changed the rotational correlation time (τ_R) values, most notably for 5-DSA, both in soybean oil and fish oil nanoemulsions, indicating its localization in the stabilizing layer, but with opposite effects. In the soybean oil nanoemulsion the addition of curcumin increased spin probe mobility, with τ_R decreasing from 2.18±0.60 ns to 1.66±0.61 ns, indicating a less rigid stabilizing structure, while in the fish oil formulations it resulted in a more rigid structure reflected in τR increase from 1.19±0.10 ns to 2.96±0.81 ns and 1.63±0.13 ns to 2.27±0.19 ns, for 5-DSA and 12-DSA, respectively. This study concluded that the curcumin is located in the stabilizing layer of nanoemulsions, but its impact on stabilizing layer structure depended on the oil phase selection, with particular stabilizing effects on fish oil nanoemulsions.

References

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ANALIZA UTICAJA IZBORA MASNE FAZE I PRISUSTVA KURKUMINA NA STABILIZACIONI SLOJ NANOEMULZIJA KORIŠĆENJEM ELEKTRON PARAMAGNETNE REZONANTNE SPEKTROSKOPIJE

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Stabilizacioni sloj nanoemulzija utiče na njihovu stabilnost i sudbinu nakon *in vivo* primene (1). Cilj ovog rada je bilo proučavanje dinamike monosloja surfaktanata u nanoemulzijama sa različitim masnim fazama (sojinim / ribljim uljem), kao i dobijanje informacija o lokalizaciji kurkumina (2), aktivne supstance sa brojnim potencijalnim benefitima, korišćenjem tehnike elektron paramagnetne rezonantne (EPR) spektroskopije. Formulacije su analizirane EPR metodom uz pomoć tri različite spinske probe: 5-, 12- i 16-doksistearinske kiseline (DSA), kako bi se istražila dinamika stabilizacionog sloja na različitim dubinama. Rezultati su pokazali da izbor masne faze ima krucijalnu ulogu ne samo na strukturu nanoemulzionih kapi, već i na lokalizaciju aktivne supstance. Dodatak kurkumina doveo je do promene rotaciono korelacionog vremena (τR), naročito kod 5-DSA spinske probe, kod nanoemulzija sa obe masne faze, ukazujući na lokalizaciju u stabilizacionom sloju, ali uz suprotan efekat. U nanoemulzijama sa sojinim uljem, dodatak kurkumina povećava mobilnost spinske probe, što je praćeno padom τR vrednosti sa $2,18\pm0,60$ ns na $1,66\pm0,61$ ns, ukazujući na nastanak manje rigidnog stabilizacionog sloja, dok je u nanoemulzijama sa ribljim uljem doveo do formiranja rigidnije stabilizacione strukture, uz povećanje τR sa $1,19\pm0,10$ ns na $2,96\pm0,81$ ns i sa $1,63\pm0,13$ ns na $2,27\pm0,19$ ns, kod 5-DSA i 12-DSA, respektivno. Zaključak ove studije je da se kurkumin nalazi u stabilizacionom sloju nanoemulzija, ali da njegov uticaj zavisi od izbora masne faze, kao i da ima posebni stabilzacioni efekat u nanoemulzijama sa ribljim uljem.

Literatura

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Zahvalnica