# MECHANICAL PROPERTIES AND LONG-TERM STABILITY OF NOVEL LIPID FORMULATIONS WITH SIMVASTATIN

**Zora Ćetković[1*], Ivana Vasiljević[2], Sandra Cvijić[2], Dragana Vasiljević[2]**

[1]University Clinical Center of Serbia, Belgrade, Serbia
[2]University of Belgrade – Faculty of Pharmacy, Department of Pharmaceutical Technology and Cosmetology, Belgrade, Serbia

*zora_cetkovic@yahoo.com

Mixing selected liquid SMEDDS with polymethacrylate polymers (Eudragit®) led to solidification of the samples to form solid, ductile, transparent systems (1). The purpose of this study was to define mechanical properties and long-term stability of novel simvastatin-loaded SMEDDS-based drug delivery systems. SMEDDS-based formulations were prepared by adding liquid SMEDDS (10% oleoyl macrogol-6 glycerides and 90% caprylocaproyl macrogol-8 glycerides/macrogol-15-hydroxystearate, in 3 ratios: 1:1, 2:1 and 3:1) to Eudragit® S100 or Eudragit® S100/Eudragit® L100 combination (in 1:1 ratio), until SMEDDS/polymer ratio 2:1 w/w was reached. SMEDDS-based formulations with simvastatin (SV) were prepared by dissolving SV (5%) into liquid SMEDDS and mixing with polymethacrylate polymers in the same ratio. Prepared formulations were evaluated in terms of their mechanical properties and long-term stability. The results indicated that the increase in the caprylocaproyl macrogol-8 glycerides concentration resulted in higher penetration force (F1 S100–F3 S100 = 5.83-7.22 N and F1 SL100-F3 SL100 = 4.20-5.99 N). However, addition of SV was negatively correlated with the hardness, i.e. samples with SV were softer in comparison to unloaded samples. Moreover, it was noticeable that formulations with Eudragit® S100 had greater penetration force values compared to formulations containing Eudragit® S100/Eudragit® L100. After six months of storage at room and elevated temperature, only slight decrease in SV content (less than 5%) was observed in these samples. This study demonstrated that novel SMEDDS-based formulations with higher concentration of caprylocaproyl macrogol-8 glycerides and those with Eudragit® S100 were more robust, which may further serve as a guide for formulating tailor-made formulations.

**References**

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# MEHANIČKA SVOJSTVA I DUGOTRAJNA STABILNOST NOVIH LIPIDNIH FORMULACIJA SA SIMVASTATINOM

**Zora Ćetković[1*], Ivana Vasiljević[2], Sandra Cvijić[2], Dragana Vasiljević[2]**

[1]Univerzitetski klinički centar Srbije, Beograd, Srbija
[2]Univerzitet u Beogradu – Farmaceutski fakultet, Katedra za farmaceutsku tehnologiju i kozmetologiju, Beograd, Srbija

*zora_cetkovic@yahoo.com

Mešanje odabranih tečnih samomikroemulgujućih sistema (SMEDDS) sa kopolimerima metakrilne kiseline (Eudragit®) dovodi do očvršćavanja uzoraka i formiranja čvrstih, rastegljivih, transparentnih sistema (1). Cilj ovog rada je bio ispitivanje mehaničkih svojstva i dugotrajne stabilnosti novih lipidnih sistema sa simvastatinom (SV). Lipidne formulacije su izrađene mešanjem tečnih SMEDDS (10% oleoil makrogol-6 glicerida i 90% kaprilokaproil makrogol-8 glicerida/makrogol-15-hidroksistearat, u 3 odnosa: 1:1, 2:1 i 3:1) i Eudragit® S100 ili kombinacije Eudragit® S100/Eudragit® L100 (u odnosu 1:1). Odnos SMEDDS/polimer bio je 2:1, m/m. Uzorci sa SV su izrađeni rastvaranjem SV (5%) u tečnim SMEDDS i mešanjem sa kopolimerima metakrilne kiseline u navedenom odnosu. Sprovedena su ispitivanja mehaničkih osobina i dugotrajne stabilnosti izrađenih lipidnih formulacija. Rezultati su pokazali da povećanje koncentracije kaprilokaproil makrogol-8 glicerida dovodi do povećanja vrednosti sile penetracije (F1 S100–F3 S100 = 5,83-7,22 N i F1 SL100-F3 SL100 = 4,20-5,99 N). Uzorci sa SV su bili mekši, u poređenju sa uzorcima bez lekovite supstance. Takođe, uočeno je da uzorci sa polimerom Eudragit® S100 imaju veće vrednosti sile penetracije, u poređenju sa formulacijama koje sadrže kombinaciju Eudragit® S100/Eudragit® L100. Posle šest meseci skladištenja uzoraka na sobnoj i povišenoj temperaturi, sadržaj SV je neznatno smanjen (manje od 5%). Ova studija je pokazala da nove lipidne formulacije izrađene sa većom koncentracijom kaprilokaproil makrogol-8 glicerida i sa Eudragit® S100 polimerom imaju veće vrednosti sile penetracije i prihvatljivu dugotrajnu stabilnost, što je od značaja za razvoj lipidnih formulacija željenih karakteristika.

**Literatura**

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