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Curcumin loaded PEGylated nanoemulsions: development and physicochemical characterization towards in vivo pharmacokinetic experiments

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PEGylated nanoemulsions (NEs) can increase target site concentration of the incorporated active by increasing circulation time of the oil droplets [1]. Using experimental design approach best preparation conditions were chosen for further research. Curcumin was used as a model drug and incorporated into formulations selected by experimental design. The aim of this study was to follow the stability of PEGylated and the non-PEGylated NEs and to assess the impact of PEGylated phospholipids' (PEG-PLs) addition on nanoemulsions' long term stability. Additionally, the impact of PEG-PLs on drug release was assessed through *in vitro* drug release studies in order to choose the best candidates for *in vivo* pharmacokinetic study.

NEs were prepared by high pressure homogenization [2]. Nanoemulsions' stability was followed for 12 months by measuring mean droplet size (Z-ave), polydispersity index (PDI) and zeta potential (ZP). Drug release was studied by reverse dialysis bag method.

Initial Z-ave of all NEs (103–106 nm), PDI (< 0.2) and ZP around –40 mV, suggested they are adequate for parenteral application. After 12 months these parameters did not significantly change. During in vitro release study the biggest release of curcumin was from the formulation containing 0.3% of PEG5000DPPE (43.38%) vs the lowest with 0.1 % of PEG2000DSPE (25.88%).

This study showed the usefulness of D-optimal factorial design in NEs development. Formulations containing 0.1 % of PEG2000DSPE/PEG5000DPPE were chosen for further step - a pharmacokinetic study.

References

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