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Optimization of Cationic SLN for Gene Delivery

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Cationic SLN formulations were developed and optimized in terms of cationic lipid/surfactant ratio and production parameters. 5wt% of Compritol 888 ATO (COM, Gattefosse) or Imwitor 900(IMW,BASF) were used, 0.4–1.0wt% of cetyltrimethylammonium bromide (CTAB, Sigma) and 0.1–1.0 wt% of Lutrol F68 (BASF) were tested. Formulations were produced in triplicate. SLN were prepared by modified microemulsion method [1], which was further optimized in terms of velocity and time of high shear homogenization step. Freeze-drying was performed on DuraDry MP at −45°C/184 mT during 6 days. Samples were freeze-dryed with 5.0% or 10.0% of Glucose (Sigma) or Sucrose (BDH Chemicals) or without cryoprotectants. Reconsitution was performed by re-hydratation, vortexing during 3min and applying ultrasound during 30s. A Zetasizer NanoSeries (Malvern) was used to determine average hydrodynamic diameter (z-ave), polydispersity (PdI) and zeta potential (ZP)

Optimized formulation consisted of 5.0% solid lipid, 0.5% CTAB and 0.25% Lutrol F68, yielding particles with z-ave=159nm, PdI=0.34 and ZP=54.8 mV (IMW) and z-ave=180nm, PdI=0.272 and ZP=56.2 mV (COM). These parameters remained unchanged during 8 days of storage at 8°C. Samples dried without cryoprotectants yielded light powdery product which could be redispersed easily; freeze-dried samples with saccharides tested yielded solid products.

Cationic SLN formulations intended for gene delivery were designed and optimized. Particles with z-ave below 200nm and low PdI were produced. These SLN showed good stability of 15 days .Suitability of cationic SLN for freeze-drying without cryoprotectants was confirmed [2].

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