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Spray vs freeze-dried solid lipid microparticles: Challenges in development

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Lipid particles appeared as an alternative carrier to traditional polymeric microparticles and nanoparticles. Although lipid microparticles (LMs) can be delivered by common routes (oral, topical and parenteral), LMs can take advantage over other carriers due to their size, and be the most appropriate for specific administration routes (e.g. pulmonary) [1]. For the purpose of this study, QbD approach was applied in formulation and production of solid lipid microparticles (SLMs) using glyceryl dibehenate or stearyl alcohol. SLMs were prepared by melt emulsification method in conjunction with freeze or spray-drying, in order to obtain water-free particles. Ishikawa diagram was constructed to identify the parameters that could affect the quality of SLMs. SLMs size, morphology, density, drug content, dissolution rates and *in vitro* aerosol performance were evaluated for selected samples. Results have indicated that spray-dried SLMs had smaller particle size and higher drug content than freeze-dried SLMs. In addition, spray-dried samples were porous particles with lower true density (approximately 1 g/cm^3). Consequently, aerodynamic performance of several spray-dried samples was satisfactory since they exhibited fine particle fraction (FPF) > 20%, which is a respectable percentage for this type of formulations, where FPF values of 20-30% were usually observed. Dissolution studies showed that slower drug release can be achieved when glyceryl dibehenate was used regardless of the drying method.
It can be concluded that spray-dried SLMs can be potential formulations for pulmonary drug delivery whereas freeze-dried SLMs are more suitable for other administration routes.

References

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