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Selection and Characterization of Suitable Lipid Excipients for use in the Manufacture of Didanosine-Loaded Solid Lipid Nanoparticles and Nanostructured Lipid Carriers

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ABSTRACT

This research aimed to evaluate the suitability of lipids for the manufacture of solid lipid nanoparticles (SLNs) and nanostructured lipid carriers (NLCs) loaded with the hydrophilic drug, didanosine (DDI). The crystalline state and polymorphism of lipids with the best-solubilizing potential for DDI was investigated using differential scanning calorimetry (DSC) and wide-angle X-ray scattering (WAXS). DSC and WAXS were also used to determine potential interactions between the bulk lipids and DDI. Precirol® ATO 5 and Transcutol® HP showed the best-solubilizing potential for DDI. Precirol® ATO 5 exists in the β-modification before heating; however, a mixture of both α- and β-modifications were detected following heating. Addition of Transcutol® HP to Precirol® ATO 5 changes the polymorphism of the latter from the β-modification to a form that exhibits coexistence of the α- and β-modifications. DDI exists in a crystalline state when dispersed at 5% (w/w) in Precirol® ATO 5 or in a Precirol® ATO 5/Transcutol® HP mixture. DSC and WAXS profiles of DDI/bulk lipids mixture obtained before and after exposure to heat revealed no interactions between DDI and the lipids. Precirol® ATO 5 and a mixture of Precirol® ATO 5 and Transcutol® HP may be used to manufacture DDI-loaded SLN and NLC, respectively.