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Surface activity of Nanostructured Lipid Carriers (NLCs) on Meibomian lipid films

Pattravee Niamprem[1], Thomas J Millar[2], Srinivas S P[3], Burkhardt S Schuett[2], Pronnarin Teapavarapruk[1] and Waree Tiyaboonchai[1]
[1]*Naresuan University, Thailand*
[2]*Western Sydney University, Australia*
[3]*Indiana University, USA*

Blinking spreads a protective tear film over the exposed ocular surface. Defects in a lipid layer (TFLL) at its air interface can cause tear film instability: A major cause of dry eye. Some eye drops target repair of the TFLL but are transient. To obtain a more sustained effect, NLCs have been developed to slowly release their lipid contents. The interactions of differently formulated NLCs with films made from meibum (the major component of the TFLL) have been investigated. NLC formulations were injected into the aqueous sub-phase of a Langmuir trough and their surface activity or ability to alter surface pressure-area profiles of Meibomian lipid films was tested. Fluorescent markers and electron microscopy were also used to determine structural changes to the films due to adsorption of nanostructured lipid carriers (NLCs). Gelucire 43/01 and cetyl palmitate NLCs (40 nm) or glyceryl behenate NLCs (300 nm) were used. The 40 nm NLCs had greater surface activity (higher IImax) than the 300 nm NLCs. The nature of both the surfactant and the solid lipids used in the formulation affected the surface activity of NLCs. Fluorescence microscopy showed that the NLCs adsorbed to the Meibomian lipid films and were homogeneously spread throughout the film. This was confirmed with SEM. In conclusion, NLCs processes strongly surface active and can integrate with Meibomian lipid films. The type of interaction can be tailored by altering the surfactant and solid lipids used in the formulation of the NLCs which provides flexibility to develop efficient formulations for specific dry eye conditions.

Biography

Pattravee Niamprem is a PhD student of Pharmaceutical Sciences at Naresuan University, Thailand. She has received her Bachelor's degree of Cosmetic Science and completed her Master's degree in Pharmacology and Biomolecular Sciences from Naresuan University. Her research interests are nanoparticles drug delivery, drug delivery systems, ocular drug delivery system and pharmaceutical development.

mangvi@hotmail.com

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