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### **Nanostructured lipid carriers for ophthalmic use**

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The development of ophthalmic formulations is a major challenge. The most commonly used ophthalmic formulations are eye drops which have low bioavailability due to the complex structure and the elimination mechanisms of the eye [1].

Nanostructured lipid carrier (NLC) is the term used for the second-generation solid lipid nanoparticles that contain a lipid matrix of mixed solid and liquid lipids. These systems are ideal to incorporate low water-soluble active substances such as corticosteroids [2].

The aim of this work was to create a dexamethasone (DXM) loaded NLC formulation to increase the bioavailability of DXM, which is a lipophilic drug with poor solubility in water. As a preformulation study, lipid screening (visual observation, XRD, DSC measurements and investigation of blank NLCs) were applied to choose the most suitable excipients for the formulation of the system. A 2<sup>3</sup> factorial design was used to investigate the effects of the excipients on zeta potential, mean particle size, PDI and entrapment efficacy. The independent factors were lipid, DXM and surfactant concentration. Based on the one-month stability test, a lower surfactant and lipid concentration could be beneficial. The ophthalmic toxicity was investigated on human cornea cells and the results show that the measured NLC formulations have good ophthalmic tolerability. The *in vitro* drug release study suggests that the NLC formulations increase the diffused amount of DXM in the acceptor phase, while the penetration study on porcine cornea with Raman mapping predicted a higher amount of nanocarriers in the stroma layer.

#### References

1. J. das Neves et al., Eds., New York: Springer (2014)
2. Kovacs A. et al., Eur. J. Pharm. Sci., 99, 246-257 (2017)

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