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SmartLipids formulation for “natural” skin whitening

Hanna Aljarada (1), Sung Min Pyo (1), Rainer H. Müller (1), Cornelia Keck (2,3)

(1) Freie Universität Berlin, Institute of Pharmacy, 12169 Berlin, Germany

(2) Philipps Universität, Institute of Pharmacy, Robert-Koch-Str. 4, 35037 Marburg, Germany

(3) PharmaSol GmbH, Stubenrauchstr. 66, 12161 Berlin, Germany

SmartLipids, developed in 2014 [1], are the 3rd generation of lipid nanoparticles, after the first generation of solid lipid nanoparticles (SLN, 1991) and the nanostructured lipid carriers (NLC, 1999). This carrier system was used to develop a “base formulation” for more effective whitening formulations. The special delivery properties of SmartLipids are beneficial for delivery of whitening agents: homogenous film formation on skin, adhesive forces and thus prolonged residence time on the skin, occlusion effect by this film, and subsequently increased penetration of actives into the skin. Besides, the SmartLipids have skin caring effects, such as restoration of natural protective lipid film of the skin, and thus anti-pollution effect.

An increasing number of chemical synthetic whitening agents has run into problems of regulatory acceptance. Thus there is a trend towards natural compounds with whitening effect. This ranges from whitening oils (e.g. lemon oil, lemongrass oil, carrot seed oil) to plant extracts, e.g. licorice extract (glabridin as main active). SmartLipids are composed of a complex mixture of solid lipids with optionally liquid lipids (= oil). To have highest loading with whitening agents, it would be ideal to use an oil as part of the particle matrix mixture which has already whitening properties. At the same time this oil should have good dissolution properties for whitening agents, in this case glabridin.

Intensive screening of oils identified lemongrass oil having high solubility for licorice extract. Many oils dissolved only <1-3%, in lemongrass oil >25% dissolved. Based on this SmartLipid carriers were produced from a mixture of lipids containing e.g. beeswax, carnauba wax, Compritol 888 ATO, Miglyol 812 and lemongrass oil. A series of skin-friendly stabilizers was investigated regarding their ability to stabilize the particle suspensions, e.g. various Plantacare, alkyl polyglucosides, but also Tween. Most efficient were Plantacare 2000 UP and Tween 20. The Tween 20 formulation had a mean particle size of about 180 nm (photon correlation spectroscopy), laser diffraction diameters 50% of 150 nm and 99% of 370 nm. The particle sizes are above the critical 100 nm for nanoparticles, thus the “SmartLipids Whitening” are a submicron carrier. The measured zeta potential of -36 mV (in original dispersion medium) is a sufficiently high particle charge for predicting good physical stability.

With this a base formulation is available which has already on its own a whitening effect due to the lemon grass oil, and in which customer-specific whitening agents (e.g. glabridin) can be loaded.



References:

1. Müller, R. H., Ruick, R., Keck, C. M., smartLipids® - the new generation of lipid nanoparticles after SLN and NLC, Abstract T3134, AAPS Annual Meeting, San Diego, 2-6 November 2014
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