

## Nanostructured lipid carriers (NLC) for efficient delivery of palm phytonutrients

### ABSTRACT

Palm phytonutrients found in crude palm oil consist of carotenes and tocopherols as well as other minor components including sterols, squalene, ubiquinones, coenzyme Q10 and phospholipids. Palm phytonutrients contain all the naturally occurring phytonutrients present in crude palm oil, whereas commercially available individual phytonutrients, such as Gold-tri E and Tocomin 50% mainly consist of palm tocopherols. The encapsulation of palm phytonutrients by nanostructured lipid carriers (NLC) was investigated using Transmission Electron Microscopy. NLC was proven to effectively encapsulate palm phytonutrients in oil droplets. Based on the particle size analysis and rheological study, NLC was found to be the most physically stable delivery system when compared to the macro-emulsion and the nano-emulsion carriers. The long-term chemical stability of the palm phytonutrient using  $\beta$ -carotene as the prototype active in NLC was also determined. The degradation of  $\beta$ -carotene in NLC was lower when compared to the macro-emulsion and the nano-emulsion carriers. The efficacy of NLC as a delivery system and the effect of the addition of lecithin and propylene glycol to the NLC formulation were also studied. The parameters investigated were skin hydration and trans-epidermal water loss (TEWL). NLC with the presence of 1% lecithin and 2% propylene glycol were found to enhance skin hydration and prevent water loss.

**Keyword:** Chemical stability; Efficacy; Nanostructured lipid carriers; Palm phytonutrients; Physical stability