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Title :

Structured Lipids From Virgin Coconut Oil As Permeation Enhancers And Emollients In Cosmetics

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The influence of novel triacylglycerols (TAGs) on the topical delivery of α -tocopherol and their role as emollients was investigated. For topical application, TAGs as enhancers were developed to improve the delivery of actives across the skin as the skin barrier limited their use. Medium chain triacylglycerols (MCTs) have previously been used as carriers and enhancers for fat soluble vitamins and other actives as they work efficiently in delivering the active through the skin by modifying properties of the stratum corneum (SC) barrier. However, little published data are available concerning the permeation and effects of MCTs following topical application. The first part of the study was aimed to: i) develop and validate an assay method for determining α -tocopherol in methanolic solution and rat skin extract; ii) develop and validate an assay method for determining fatty acids methyl esters using gas chromatography; and iii) validate the automated diffusion equipment for *in vitro* experiment. The second part of the study was to produce novel TAGs namely structured virgin coconut oil (SVCO), by lipase catalysed acidolysis of caprylic acid and the virgin coconut oil (VCO). The percentage of caprylic acid finally incorporated

in the reaction products was optimized using the central composite design (CCD). It was suggested that the highest incorporation of caprylic acid (68.07%) would be achieved by: caprylic acid to VCO ratio of 1.70 (w/w); an enzyme load of 22.60%; at 63.4°C; a water content of 3.53%; and at 96 h. Using the predicted optimum conditions, pentaplicate experiments gave a good result ($64.11 \pm 1.14\%$) that coincided with the predicted value and the model was deemed to be adequate. The third part of the study looked at the effect of permeation enhancer formulations on the permeation of α -tocopherol, a model permeant, *in vitro* and *in vivo*. Both approaches revealed that SVCO was a significantly better permeation enhancer than VCO. This probably indicated that the shorter carbon chain SVCO might be a better permeation enhancer. The final part of the study investigated the emollient properties of the newly developed enhancers. These were determined using

instrumental measurement and sensorial perspective by trained panels. Skin biophysical studies on various skin parameters such as moisture and transepidermal water loss (TEWL) contents, skin firmness and elasticity and surface evaluation on the living skin (SELS) from topical application to human healthy volunteers showed statistically significantly improved effects by both SVCO creams and VCO creams compared to the skin before creams application. In conclusion, novel permeation enhancers were successfully developed by acidolysis of VCO and caprylic acid. The SVCO was found to exert better skin permeation enhancing effect on α -tocopherol than VCO. Both VCO and SVCO gave emolliency effect when applied topically