

Bicontinuous Microemulsions for Co-Delivery of Phycocyanin and Curcumin in Dermal Applications

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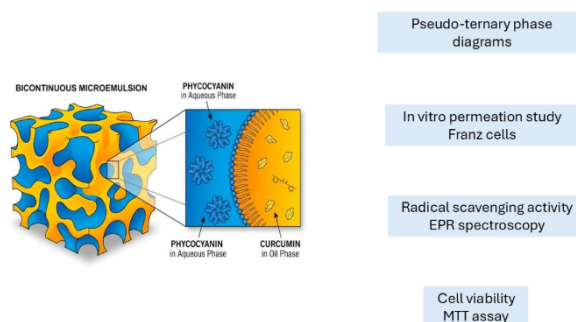
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This study focuses on the co-solubilization of two antioxidant bioactive compounds, namely phycocyanin - a hydrophilic pigment - and curcumin - a hydrophobic polyphenol - within a bicontinuous microemulsion (bi-ME) (1). Guided by pseudo-ternary phase diagrams, stable and transparent bi-MEs were developed to solubilize both hydrophilic and hydrophobic compounds (2). The radical-scavenging activity of curcumin and phycocyanin was assessed via EPR spectroscopy with galvinoxyl radicals, exhibiting % inhibition of approximately 75% and 60%, respectively, after 32 minutes. A further increase in % inhibition was observed upon co-loading both compounds in the bi-MEs, suggesting interaction between the two compounds. An *in-vitro* permeation study was performed using Franz-type diffusion cells equipped with a synthetic polycarbonate membrane to evaluate the ability of the bi-MEs to function as topical delivery systems. Curcumin displayed zero-order permeation, with ~5% total cumulative release over 6 h, whereas phycocyanin remained surface-bound. These findings highlight differing permeation behaviors relevant to topical delivery systems. To assess the potential toxicity of such systems and to determine the maximum safe concentration for administration, MTT assays in WM164 and Caco-2 cell lines were performed indicating the non-cytotoxic nature of the bi-MEs (3). Overall, these findings demonstrate the potential of bi-MEs as dual antioxidant delivery systems in topical and transdermal applications.

Keywords:

bicontinuous microemulsions, dual-drug delivery, antioxidant, radical-scavenging activity, EPR, in vitro release, MTT



Co-solubilization of phycocyanin and curcumin within a bicontinuous microemulsion. Phase behavior and biological performance.

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