Colloidal (-)- epigallocatechin-3-gallate vesicular systems for prevention and treatment of skin cancer: A comprehensive experimental study with preclinical investigation

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Abstract

Skin carcinogenesis is a common malignancy affecting humans worldwide, which could benefit from nutraceuticals as a solution to the drawbacks of conventional skin cancer treatment. (ī)-epigallocatechin-3-gallate (EGCG) is a promising nutraceutical in this regard; however, it suffers chemical instability and low bioavailability resulting in inefficient delivery. Therefore, EGCG encapsulation in ultradeformable colloidal vesicular systems, namely: penetration enhancer-containing vesicles (PEVs), ethosomes and transethosomes (TEs) for topical administration has been attempted in this study to overcome the problems associated with the use of free EGCG. The prepared vesicles were characterized for their entrapment efficiency, TEM visualization, chemical compatibility, antioxidant properties, ex-vivo skin deposition, photodegradation and physical stability after storage. Most of the prepared vesicles exhibited reasonable skin deposition and preservation of the inherent antioxidant properties of EGCG with good physical stability. EGCG-loaded PEVs and TEs exhibited an inhibitory effect on epidermoid carcinoma cell line (A431) in addition to reduced tumor sizes in mice, confirmed with histopathological analysis and biochemical quantification of skin oxidative stress biomarkers; glutathione, superoxide dismutase and catalase, as well as lipid peroxidation. EGCG PEVs succeeded in offering an effective delivery system targeting skin cancer, which is worthy of further experimentation.

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