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Aloe derived nanovesicle as a functional carrier for indocyanine green encapsulation and phototherapy

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Abstract

Background: Cancer is one of the devastating diseases in the world. The development of nanocarrier provides a promising perspective for improving cancer therapeutic efficacy. However, the issues with potential toxicity, quantity production, and excessive costs limit their further applications in clinical practice.

Results: Herein, we proposed a nanocarrier obtained from aloe with stability and leak-proofness. We isolated nanovesicles from the gel and rind of aloe (gADNVs and rADNVs) with higher quality and yield by controlling the final centrifugation time within 20 min, and modulating the viscosity at 2.98 mPa S and 1.57 mPa S respectively. The gADNVs showed great structure and storage stability, antioxidant and antidetergent capacity. They could be efficiently taken up by melanoma cells, and with no toxicity in vitro or in vivo. Indocyanine green (ICG) loaded in gADNVs (ICG/gADNVs) showed great stability in both heating system and in serum, and its retention rate exceeded 90% after 30 days stored in gADNVs. ICG/gADNVs stored 30 days could still effectively damage melanoma cells and inhibit melanoma growth, outperforming free ICG and ICG liposomes. Interestingly, gADNVs showed prominent penetrability to mice skin which might be beneficial to noninvasive transdermal administration.

Conclusions: Our research was designed to simplify the preparation of drug carrier, and reduce production cost, which provided an alternative for the development of economic and safe drug delivery system.

Keywords: Aloe derived nanovesicles, Drug carriers, Stability, Indocyanine green, Cancer therapy

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