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ANTICANCER EFFECT OF ZERUMBONE-LOADED NANOSTRUCTURED LIPID CARRIER ON CANINE MAMMARY GLAND TUMOUR CELL LINE

Zerumbone (ZER) from the rhizomes of the wild ginger, *Zingiber zerumbet* (L.) Smith, is a natural dietary lipophilic compound with antitumour, anti-inflammatory, antioxidant, antimicrobial, antinociceptive, hepatoprotective and immunomodulatory properties^[1]. However, therapeutic application of ZER is plagued by poor water-solubility and subsequent poor absorption, bioavailability and delivery to target tissues^[2]. To overcome this limitation, ZER was loaded into nanostructured lipid carrier (NLC) (ZER-NLC). The objective of this study is to compare the anti-cancer effects of ZER and ZER-NLC on canine mammary gland tumour cells (CMT-stylo). It was hypothesised that ZER-NLC has cytotoxic effect on the CMT-stylo cell line via the induction of apoptosis and the incorporation of ZER into NLC does not alter the anticancer effect of ZER. Using MTT assay, the proliferation of CMT-stylo cells after treatment with ZER, ZER-NLC and NLC was determined at 24, 48 and 72 hr. The half maximal lethal dose (LD50), total growth inhibition dose (TGI) and growth inhibition dose (GI50) value were determined from the dose-response curve. The antiproliferative effect of ZER-NLC was compared with that of ZER and NLC. There was no significant difference ($p < 0.05$) in proliferation between CMT-stylo cells treated with ZER and ZER-NLC after 72hr. The anticancer effect of ZER and ZER-NLC was also visualised using the acridine orange/propidium iodide (AOPI) double staining method and, under fluorescent microscopy after 24, 48 and 72 hr incubation. Zerumbone- and ZER-NLC-induced apoptosis was evident by cell membrane blebbing, nucleus margination and chromatin condensation. This study showed that ZER-NLC has anti-cancer effects on the canine mammary adenocarcinoma cell line. The ZER-NLC can potentially be developed into an innovative, safe and effective therapy for the treatment of canine mammary gland tumours.

Keywords: Zerumbone, Nanostructured Lipid Carrier, Zerumbone-Loaded Nanostructured Lipid Carrier, Canine Mammary Gland Tumour, Anti-Cancer

References

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