Zerumbone-loaded nanostructured lipid carrier induces apoptosis of canine mammary Adenocarcinoma cells

ABSTRACT

Canine mammary gland tumor (CMT) is the most common tumor in intact female dog. Zerumbone (ZER) has promising anticancer properties, but plagued with poor water solubility, poor absorption, bioavailability, and delivery to target tissues. To solubilize, ZER was loaded into nanostructured lipid carrier (NLC) to produce ZER-loaded NLC (ZER-NLC). Te objectives of this study were to determine the antiproliferative efect and the mode of cell death induced by ZER-NLC and ZER on a canine mammary gland tumor (CMT) adenocarcinoma primary cell line. Tere was no signifcant diference ($p>0.05$) between ZER-NLC and ZER treatments in the inhibition of CMT cell proliferation; thus, the loading of ZER into NLC did not compromise the cytotoxic efect of ZER. Microscopically, ZER-NLC- and ZER-treated CMT cells showed apoptotic cell morphology. ZER-NLC and ZER treatments signifcantly downregulated the antiapoptotic Bcl-2 and upregulated the proapoptotic Bax gene expressions in CMT cells. Both ZER-NLC and ZER-treated CMT cells showed signifcant ($p<0.0001$) increases in caspase-8, -9, and -3/7 protein activities. In conclusion, ZER-NLC induced CMT cell death via regulation of Bcl-2 and Bax gene expressions and caspase activations, indicating the involvement of both the intrinsic and extrinsic pathways of apoptosis. Tis study provided evidences for the potential of ZERNLC as an anticanine mammary gland adenocarcinoma chemotherapy.