

## Zerumbone-loaded nanostructured lipid carriers: preparation, characterization and antileukemic effect

### ABSTRACT

Zerumbone, a natural dietary lipophilic compound with low water solubility (1.296 mg/L at 25°C) was used in this investigation. The zerumbone was loaded into nanostructured lipid carriers using a hot, high-pressure homogenization technique. The physicochemical properties of the zerumbone-loaded nanostructured lipid carriers (ZER-NLC) were determined. The ZER-NLC particles had an average size of  $52.68 \pm 0.1$  nm and a polydispersity index of  $0.29 \pm 0.004$   $\mu\text{m}$ . Transmission electron microscopy showed that the particles were spherical in shape. The zeta potential of the ZER-NLC was  $-25.03 \pm 1.24$  mV, entrapment efficiency was 99.03%, and drug loading was 7.92%. In vitro drug release of zerumbone from ZER-NLC was 46.7%, and for a pure zerumbone dispersion was 90.5% over 48 hours, following a zero equation. Using the MTT (3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide) assay in human T-cell acute lymphoblastic leukemia (Jurkat) cells, the half maximal inhibitory concentration (IC<sub>50</sub>) of ZER-NLC was  $5.64 \pm 0.38$   $\mu\text{g/mL}$ , and for free zerumbone was  $5.39 \pm 0.43$   $\mu\text{g/mL}$  after 72 hours of treatment. This study strongly suggests that ZER-NLC have potential as a sustained-release drug carrier system for the treatment of leukemia.

**Keyword:** Zerumbone; Nanostructured lipid carrier; Leukemia