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α-Phellandrene triggers apoptosis in murine leukemia WEHI-3 cells and alters leukemic mice *in vivo*

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Alpha-phellandrene (5-isopropyl-2-methyl-1,3-cyclohexadiene) is an active compound and essential oil chemical constituents of several plants, including *Zingiber officinale* Roscoe., *Matricaria chamomilla* L. and so on. It is well known that α-phellandrene exhibits many biological properties (analgesic and anti-inflammatory action) but there is no available information regarding the anti-leukemia activities of α-phellandrene in vitro and *in vivo*. Hence, the objective of the current study is to explore the effects of α-phellandrene on a murine leukemia cell line (WEHI-3) in vitro and anti-leukemia activity and immune modulations *in vivo*. In in vitro study, we showed that α-phellandrene reduced cell viability and induced chromatin condensation in WEHI-3 cells. The productions of reactive oxygen species (ROS), Ca^{2+} release and loss of mitochondrial membrane potential ($\Delta\Psi m$) were observed using flow cytometric analysis. Additionally, the levels of caspase-3 and -9 activities were promoted in α-phellandrene-treated WEHI-3 cells. Owing to these findings, we concluded that α-phellandrene-provoked apoptotic death might be involved in the caspase cascade-dependent mitochondrial pathways. In *in vivo* model, α-phellandrene enhanced the levels of T (CD3) and B-cells (CD19) and reduced the spleen weight when compared with leukemia mice. α-Phellandrene promoted macrophage phagocytosis from peripheral blood mononuclear cells and peritoneal cavity in comparison to the leukemia mice group. Taken together, α-phellandrene induced apoptosis of WEHI-3 leukemia cells in vitro and improved the leukemic mice *in vivo*. α-phellandrene processes a potent anti-leukemia effect and could warrant being a targeting agent in the future.

Biography

Jen-Jyh Lin graduated from School of Chinese Medicine, China Medical University, Taichung, Taiwan, R.O.C. Right now, he is a Ph. D student at School of Chinese Medicine China Medical University, Taichung, Taiwan, R.O.C. In addition, he is interesting in basic medicine research for tumor research regarding the active compounds of traditional Chinese medicine (TCM). He also joined many medical associations and published more than 10 papers in reputed journals.