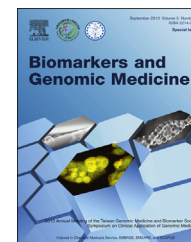


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ABSTRACT

The proliferative inhibitor and apoptosis mechanism of Linalool in breast cancer cells



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Background: Anti-cancer drugs can induce apoptosis in many tumor cells. However, researchers still put a lot of effort into finding the real mechanism of drug-induced cell death. Previous studies have demonstrated the anti-cancer activity of *Plantago major*, a kind of traditional medicinal plants.

Materials and Methods: The Linalool, a Monoterpenoid, and *p*-Coumaric acid, a Phenolic acid, are biologically active compounds isolated from *Plantago major*. This study investigated whether Linalool and *p*-Coumaric acid caused apoptosis by cell toxicity reaction, WST-1 analysis. After that, we intended to understand the mechanism of cytotoxicity by using DNA electrophoresis and flow cytometry, and analyse the immune activity by cytokine array.

Results: By using WST-1 analysis, the result showed that Linalool and *p*-Coumaric acid have good inhibitory effect against breast cancer cells. The IC_{50} of Linalool was 34.58 $\mu\text{g}/\text{mL}$ and the IC_{50} of *p*-Coumaric acid was 78.96 $\mu\text{g}/\text{mL}$. After treatment with Linalool and *p*-Coumaric acid for 70 $\mu\text{g}/\text{mL}$ and 80 $\mu\text{g}/\text{mL}$ respectively, we observed DNA fragment by electrophoresis. Cell cycle analysis also confirmed Linalool and *p*-Coumaric acid can lead to apoptosis. By using flow cytometry, treatment with Linalool rather than *p*-Coumaric acid significantly increased Sub-G1 phase and there were more cells concentrated in the G1 phase. Furthermore, we found Linalool can stimulate TNF- α , IFN- γ and IL-2 secretion by cytokine array analysis. Further analysis showed that TNF- α stimulation can lead to the activation of JNK, casepase-3 or other related proteins and enzymes to achieve its cell toxicity effect.

Conclusion: These results showed that Linalool had great potential for cancer therapy and we believed that it could provide an alternative way to against tumors.