Investigation of the growth inhibitory effect of *Ixeris chinensis* on breast cancer cells *in vitro* and *in vivo*

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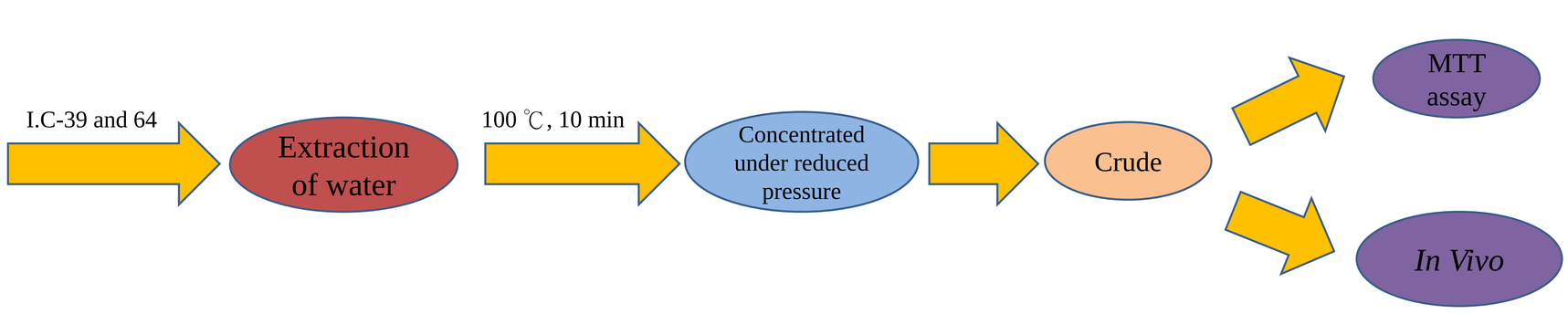
Abstract

Breast cancer is a leading cause of cancer-related deathsin women, with ultimate treatment failure often related to resistance inconventional drug therapy. An association between breast cancer and hormone use is plausible, since the incidence of breast cancer is increased by hormone factors stimulating breast epithelial growth, such as early menarcheand delayed menopause. *Ixeris chinensis* (Asteraceae) is a medicinal Chinese herb used for treatment of bronchitis, pneumonia, dysentery as well as for its antipyretic, analgesic and anti-inflammatory effects. Among the many Asteraceae plants, this species is rich in sesquiterpene lactones with diverse biological activitiessuch as immune-modulator and cytotoxic effects. However, the effect of *I. chinensis* crude extracts on the growth of breast cancer cells has not been investigatedyet. In the present study, No.39 and No.64 of *I. chinensis* (grown in different areas) were extracted with water to obtain crude extracts. The water extracts were evaluated for their ability to inhibit the growth of MDA-MB-231 and 4T-1 breast cancer cells via MTT assay.

We also used two kinds of water extracts when evaluating the anti-tumor activity in the mouse. The results showed that both the water extracts had no effect on MDA-MB-231 breast cancer cells. On the other hand, No.64 of *I. chinensis* water extract exhibited higher cytotoxic activity against 4T-1 cells compared to the No.39 water extract. Both water extracts of No.39 and No.64 inhibited the 4T-1 cells growth in the mouse. We further will explore the mechanism of anti-tumor activity from the water extracts of *I. chinensis.*

Experimental procedures

Ixeris chinensis



Results

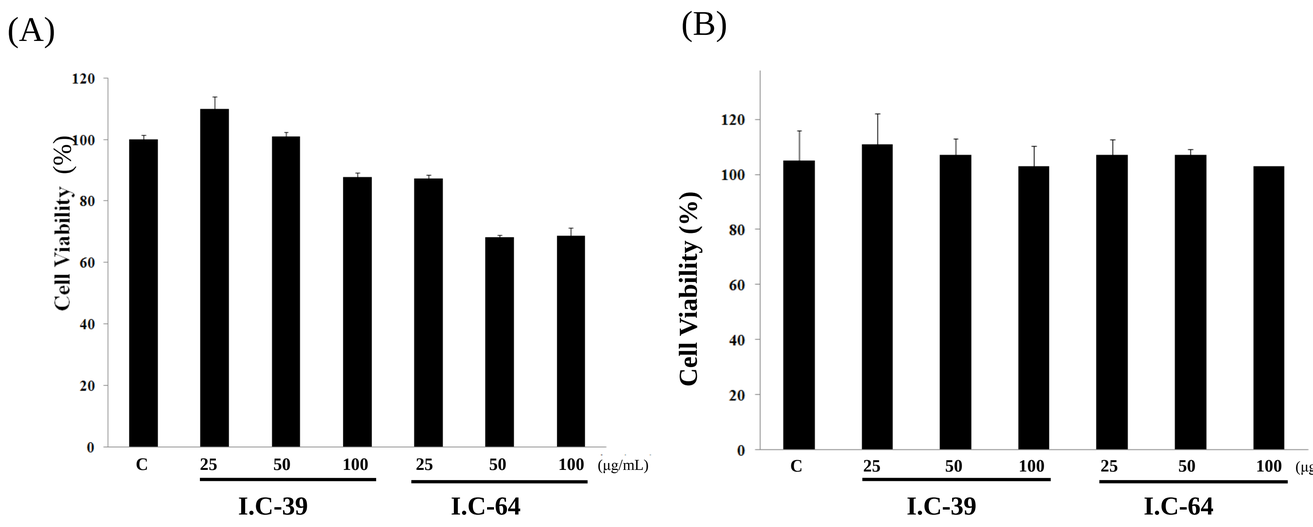


Figure 1. Effect of cell viability from water extraction of *I. chinensis.* Effect of *I. chinensis* on the cell viability of A) 4T-1 and B) MDA-MB-231 breast cancer cells. Cells were treated with various concentrations of *I. chinensis* for 24 h, and cell viability was determined by 3-(4,5-cimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) assay.

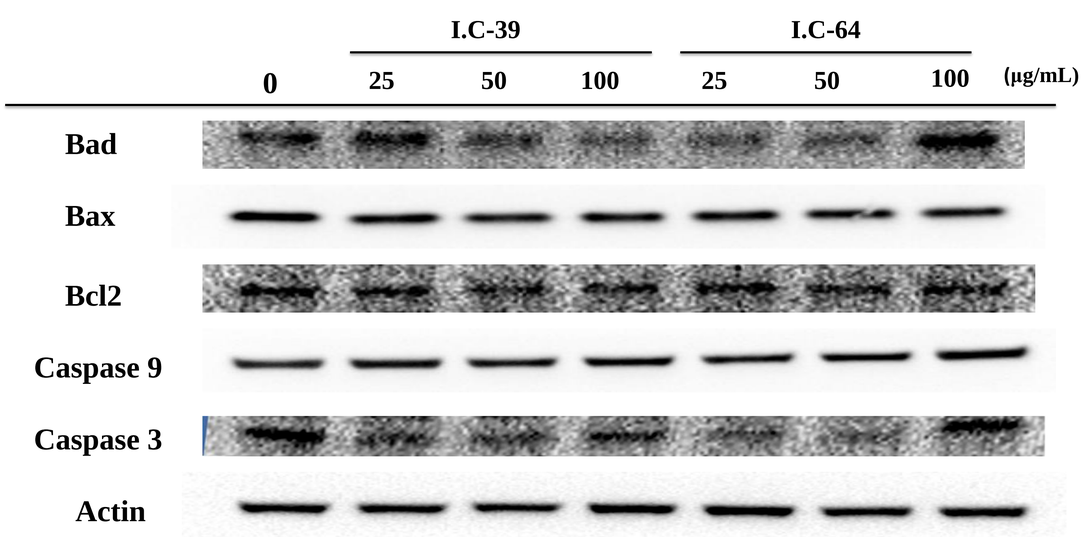


Figure 2. Expressions of apoptosis proteins in 4T-1 cells with crude of *I. chinensis*. Western blotting data show the changes in Bad, Bax, Bcl-2, caspase-3 and 9 expressions in 4T-1 cells treated with *I. chinensis* at different concentrations (0–100 μg/mL) for 24 h.

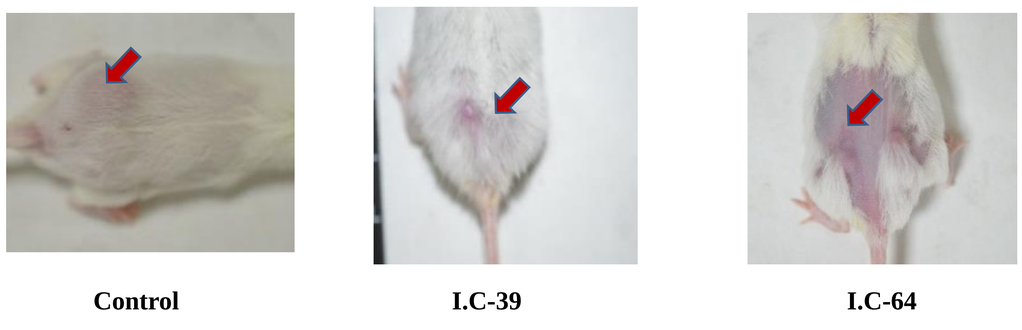


Figure 3. The inhibition tumor growth effect of I.C-39 and 64 on mice. Test animals were intraperitoneally (i.p.) injected with phosphate-buffered saline (PBS) containing 50 mg/kg of I.C-39 and 64 every day. For the comparative study, the same dosages 50 mg/kg, were delivered i.p. at seventh day.

Conclusion

This study obtained I.C-**39** and **64** from different areas, and them exhibited inhibit tumor growth on mice. Accordingly, our results can provide the scientific basis for development of anti-breast cancer drugs. We further will explore the mechanism of anti-tumor activity from the water extracts of *I. chinensis.*