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**Modulations of Bcl-2/Bax Families were Involved in The  
Chemopreventive Effects of Licorice Root in Mcf-7 Human  
Breast Cancer Cell**

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Recently, cancer chemoprevention with strategies using foods and medicinal herbs has been regarded as one of the most visible fields for cancer control. The genistein in soy, the American ginseng and the resveratrol in a grape are well known as that has antiproliferative properties in human breast cancer.

In this study, the root of licorice, *Glycyrrhiza uralensis* Fisch also inhibit cell proliferation in human breast cancer cell. Licorice root is a botanical, a shrub native to southern Europe and Asia, the roots of which have primarily desirable qualities such as sweetening and herbal medicine. By a cell proliferation assay, we demonstrated that licorice root reduced the proliferation in a dose- and time-dependent manner in MCF-7 cells. The extracts were fractionated in CHCl<sub>3</sub>, EtOAc, C<sub>6</sub>H<sub>14</sub> and CH<sub>3</sub>OH -H<sub>2</sub>O (70:30), and these fractionated extracts of licorice root (50µg/ml) induced DNA fragmentation demonstrated by Hoechst 33258 staining. Apoptosis were also determined the sub-G1 accumulation by flow cytometry analysis. These results were associated with specific cleavage of PARP and anti-apoptotic protein Bcl-2 and up-regulation of pro-apoptotic protein Bax demonstrated by Western blotting.

Our findings suggest that root of licorice root may have anti-cancer effects against human breast cancer through the modulation of the expression of the Bcl-2/Bax family of apoptotic regulatory factors.

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