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Growth Suppression and Apoptotic Cell Death of Human Lung Carcinoma A549 Cells by an Aqueous Extract from the Roots of *Platycodon grandiflorum*

Jae Hun Lee¹, Sung Yeoul Lee², Byung Tae Choi³, Dong Il Park²
and Yung Hyun Choi¹

¹Department of Biochemistry

²Department of Internal Medicine

³Department of Anatomy, Dong-Eui University College of Oriental Medicine
and Research Institute of Oriental Medicine, Busan 614-052, Korea

Platycodi Radix, the root of *Platycodon grandiflorum*, commonly known as Doraji, is used as a traditional oriental medicine. Extracts from the roots of *P. grandiflorum* have been reported to have wide ranging health benefits. In Korea, the root of *P. grandiflorum* is used as a food and employed as a folk remedy for adult diseases. In the present study, we investigated the effects of an aqueous extract from the roots of *P. grandiflorum* (AEPG) on the growth of human lung carcinoma A549 cells. The cell growth and migration inhibitory effects of AEPG in A549 cells were associated with induction of G1 phase arrest of the cell cycle. AEPG inhibited the phosphorylation of retinoblastoma proteins (pRB) and the levels of several cell cycle regulatory proteins including cyclin D1 and cyclin-dependent kinase (Cdk) 2. However, the Cdk inhibitor p21 was significantly increased which appears to be tumor suppressor p53 dependent. AEPG treatment also resulted in induction of apoptosis as determined by fluorescence microscopy and flow cytometric analysis. Immunoblot and quantitative RT-PCR analyses indicated that the expressions of Bcl-2 was down-regulated but Bax was up-regulated in AEPG-treated A549 cells. The expression of active form of caspase-3 by AEPG was markedly increased, and the levels of poly(ADP-ribose) polymerase (PARP) and β -catenin, its target proteins, were decreased in a concentration dependent manner. In addition, human telomerase reverse transcriptase (hTERT) and human telomerase RNA (hTR), the regulatory factors for maintenance of telomere length, were slightly decreased by AEPG treatment. Taken together, these findings suggest that *P. grandiflorum* has strong potential for development as an agent for prevention against human lung cancer.

Keyword : *Platycodon grandiflorum*, lung cancer, growth inhibition, apoptosis