Antrodia cinnamomea (AC) is a popular Taiwanese folk medicine with numerous beneficial biological effects. The purpose of the present studies is to explore the potential activities of ethanolic extract of *Antrodia cinnamomea* (EEAC) in inhibiting cell growth and migration of human lung adenocarcinoma epithelial cell line (A549). A549 cells were treated with various concentrations of EEAC. Anti-proliferative effects of EEAC were analyzed by 3-[4,5-dimethylthiazol- 2-yl]-2,5-diphenyl tetrazolium bromide (MTT) assay and flow cytometry. Wound healing assay was used to examine anti-migration property. Antioxidation activity was measured by 1-diphenyl-2-picrylhydrazyl (DPPH) and malondialdehyde (MDA) assay. Western blot was employed for examining the molecular mechanisms of EEAC in anti-tumor. HPLC separation was applied to verify the potential bioactive compounds in EEAC.

EEAC has been found to decrease cell viability of A549 cells in a dose- and time-dependent manner, which might be caused by cell cycle arrest at G0/G1 and G2/M phase. In the regulation of the proliferation-associated proteins, EEAC could increase and activate AMPK protein but downregulate the proteins expression of p-Akt, Akt, p-ERK1/2and ERK1/2. EEAC also suppressed cell migration of A549 cells, and the expressions of migration-related proteins (MMP2 and MMP9). Their upstream regulators, p-ERK1/2, have been evidenced to be downregulated in A549 cells after EEAC treatment. Additionally, EEAC had potential activity in scavenging free radicals and significantly reduced free radical-induced MDA production during lipid peroxidation. The results of HPLC showed that both adenosine and cordycepin could be detected in EEAC. These results suggested that EEAC could be developed as potential clinical chemotherapy drug for lung cancer or nutraceutical supplements for preventing free radical-associated diseased conditions.