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# Ethanol Extract of *Dunaliella salina* Induces Cell Cycle Arrest and Apoptosis in A549 Human Non-small Cell Lung Cancer Cells

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**Abstract.** *The ethanol extract of Dunaliella salina (EDS) on proliferation and apoptosis in the A549 human lung cancer cell line and their associated protein expressions were investigated. After 24 and 48 h treatment, MTT assay showed that 25 μg/ml of EDS significantly reduced A549 cell proliferation by 25.2% ($p<0.05$) and 48.3% ($p<0.01$), respectively. To explore its molecular mechanisms in regulating cell proliferation, we first showed that EDS markedly reduced A549 proliferation via inhibition of BrdU incorporation at 25 μg/ml by 65.8% ($p<0.001$). By cytometric analysis, EDS was found to induce apoptosis and cell cycle arrest in the G0/G1 phase. In the DNA gel electrophoresis assay, EDS (25, 50 and 100 μg/ml) induced significant apoptosis at 48 h. Annexin V/Propodium iodide double staining demonstrated that administration of EDS (25 μg/ml) in 12, 24 and 48 h induces apoptosis of 27.7%, 30.7%, and 38.7%. Western blotting assay demonstrated that EDS significantly increased the expression of cyclin-dependent kinase (CDK) inhibitors p53 and p21 and death-receptor proteins Fas and FasL. Bax expression was also elevated by treatment with EDS. Our data suggested that EDS could influence the antiproliferative effects and induce cell cycle G0/G1 arrest and apoptosis of A549 lung cancer cells.*

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