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## Apoptosis Induction by Vinegar Produced from Boiled Extract of Black Soybeans in Human Monoblastic Leukemia U937 Cells : Difference in Sensitivity to Cell Toxicity Compared to Normal Lymphocytes

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The effect of vinegar produced from the boiled extract of black soybeans on apoptosis induction in human monoblastic leukemia U937 cells was investigated. The boiled extract of black soybeans obtained from a natto (traditional Japanese fermented soybean product) factory was employed as a novel raw material for vinegar production. An ethyl acetate-soluble fraction of this vinegar (EBV fraction) was shown to strongly suppress cell proliferation of U937 cells. Fragmentation of DNA and morphological changes showing apoptotic bodies, which are characteristic of apoptotic cell death, were observed in U937 cells treated with 10mg/ml of the EBV fraction. Flow cytometry analysis using an Annexin-V-FLUOS Staining Kit confirmed that cell death was due to apoptosis. On the other hand, the cell viability of lymphocytes separated from human blood was less affected by the EBV fraction, and fragmentation of DNA was not induced. These results suggest that the EBV fraction exerted cell toxicity via apoptosis in U937 cells but not in normal lymphocytes.

**Keywords:** [boiled extract of black soybeans](#), [vinegar](#), [EBV](#), [apoptosis](#), [normal lymphocytes](#)

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