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## **Inhibition of growth and induction of apoptosis in human cancer cell lines by an ethyl acetate fraction from shiitake mushrooms.**

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### **Source**

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### **Abstract**

#### **OBJECTIVE:**

**Shiitake (*Lentinus edodes*) mushrooms** have been reported to have cancer-preventing properties. However, little research has been conducted verifying the antitumor activities of "mycochemicals" in shiitake mushrooms. In this study, potential roles of an ethyl acetate fraction from shiitake mushrooms were investigated by in vitro bioassays.

#### **DESIGN:**

The activities of an ethyl acetate fraction were evaluated by [3-(4,5-dimethylthiazol-yl)-2,5-diphenyltetrazolium bromide] (MTT), apoptosis bioassay, cell cycle analysis, and Western blot analysis using two human breast carcinoma cell lines (MDA-MB-453 and MCF-7), one human nonmalignant breast epithelial cell line (MCF-10F), and two myeloma cell lines (RPMI-8226 and IM-9).

#### **RESULTS:**

Concentration-dependent antiproliferative effects of the fraction were observed in all cell lines using the MTT assay. Approximately 50 mg/L concentration of the fraction induced apoptosis in 50% of the population of four human tumor cell lines and the fraction-induced apoptosis may have been mediated through the pro-apoptotic bax protein which was up-regulated. Cell cycle analysis revealed that the fraction induced cell cycle arrest by significant decrease of S phase, which was associated with the induction of cdk inhibitors p21 and the suppression of cdk4 and cyclin D1 activity. Compared to malignant tumor cells, nonmalignant cells were less sensitive to the fraction for the suppression of cell growth and regulation of bax, p21, cyclin D1, and cdk4 expression. A 51% antiproliferative effect occurred at the highest concentration of the fraction (800 mg/L).

#### **CONCLUSIONS:**

**These data suggest that inhibition of growth in tumor cells by "mycochemicals" in shiitake mushrooms may result from induction of apoptosis.**

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