Chemopreventive Effect of *Doenjang*, Korean Fermented Soybean Paste

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Doenjang (Korean fermented soybean paste) is one of important fermented foods in Korea. *Doenjang* has been traditionally manufactured from *meju* which is fermented rectangular shape of crushed cooked soybeans. The main microorganisms involved for *meju* fermentation are *Bacillus subtilis* and molds such as *Rizopus* sp., *Mucor* sp. and *Aspergillus* sp.. We have been already reported that *Doenjang* is safety from mycotoxin, especially, aflatoxin B1 contamination during the manufacturing process of the *Doenjang*. We have demonstrated that the *Doenjang* extracts showed strong antimutagenic activities against various carcinogens/mutagens including aflatoxin. *Doenjang* extracts also exhibited strong anticancer activities *in vivo* and *in vitro* experimental systems. The active compounds that identified were genistein, linoleic acid, trypsin inhibitors, saponins, etc. The traditionally fermented soybean paste showed higher antimutagenic activity than the raw soybean, cooked soybeans, *meju* and other fermented soybeans in the Ames test. The active compound(s) and other fractionated samples from the *doenjang* exerted high anticancer activities in C3H10T1/2 cells, and in the cell cycle system and induction of apoptosis in various human cancer cells. *Deonjang* hexane fraction (DHF) to human breast carcinoma MCF-7 cells induced a G1 phase arrest of the cell cycle, the expression of D-type cyclins was decreased, but did not affect the levels of cyclin-dependent kinases(cdks), cyclin E and cyclin A protein. However, the activity of cdk2 and cyclin E- associated kinases was decreased in a time-dependent manner. The tumor suppressor p53 and cdk inhibitor p21 were markedly induced in DHF-treated cells. Genistein, one of the active compounds from the *doenjang*, suppressed the proliferation of p53-null

human prostate carcinoma cells and human breast carcinoma cells. The inhibitory effects of genistein on cell growth proliferation were associated with a marked inhibition of cyclin B1 and an induction of cdk inhibitor p21(WAF1/CIP1) in a p53-independent manner. The induction in the protein level of cyclin B1 correlated with a decrease in the level of cyclin B1 mRNA. Genistein induced expression of p21 and the increased levels of p21 were associated with increased binding of p21 with cdc2 and cdk2.