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**FILE: ■Medicinal Mushrooms
■Cancer
■Chemoprevention**

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RE: Medicinal Mushrooms Show Cancer Treatment and Prevention Properties

Ikekawa T. Beneficial effects of edible and medicinal mushrooms on health care. *International Journal of Medicinal Mushrooms* 2001;3:291-298.

In 1996, studies on the antitumor activity of mushrooms began at the National Cancer Center Research Institute of Japan. This paper is an overview of their findings to date. Original research focused on hard mushrooms such as Polyporaceae (saruno-koshikake) but the findings were not satisfactory. Researchers then focused on Japanese edible mushrooms. Aqueous extracts of the following mushrooms had high (91 to 72%) inhibition against solid Sarcoma 180 tumor growth in an animal model: *Lentinus edodes* (shiitake), *Flammulina velutipes* (enokitake), *Pleurotus ostreatus* (hiratake), *Pleurotus spodoleucus* (kantake), *Pholiota nameko* (nameko), *Tricholoma matsutake* (matsutake), and *Hypsizygus marmoreus* (bunashimeji). Whole edible shiitake, enokitake, and hiratake mushrooms had no antitumor activity in the original animal models when they were injected intraperitoneally (into the abdominal cavity). *Trametes versicolor* extract was approved as an anticancer drug in Japan and *Phellinus linteus* extract was approved in Korea; neither is very active in oral form.

Polysaccharides and the low molecular weight protein-bound polysaccharide (EA6) were isolated from the fruiting bodies of enokitake mushrooms. EA6 had antitumor activity in vivo when given orally. Oral EA6 prevented reoccurrence or metastasis of tumors after surgery in mice. Similar studies were conducted on bunashimeji, another popular Japanese mushroom. Mice were fed dried fruiting body of bunashimeji along with regular food. Control mice received regular food only. Tumors developed in 21 of 36 mice in the control group. However, only 3 of 36 mice in the mushroom treated group had tumors. Thus, intake of mushrooms was effective in cancer prevention and growth inhibition. The mechanism of action may be attributed to antioxidant activity of the mushroom or immunomodulation activity.

Interestingly, there is an epidemiological study showing that cancer death rate among farmers producing enokitake mushrooms as their main occupation was remarkably lower (p-value not

indicated) than the death rate of other people in the Japanese Nagano Prefecture. It was suggested that quantity and frequency of intake of the mushroom was related to the lower cancer death rate. A more detailed controlled study is ongoing.

In Oriental medicine there is a saying that medicine and food have the same origin. The edible mushroom's potential to prevent or treat "lifestyle-related diseases" is proof the saying's validity.

—Heather S. Oliff, Ph.D.

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