Can Maitake MD-Fraction Aid Cancer Patients?

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Abstract

Maitake mushroom (*Grifola frondosa*) MD-fraction containing beta-1,6 glucan with beta-1,3 branched chains has previously exhibited strong anticancer activity by increasing immune-competent cell activity.[1,2] In this non-random case series, a combination of MD-fraction and whole maitake powder was investigated to determine its effectiveness for 22- to 57-year-old cancer patients in stages II-IV. Cancer regression or significant symptom improvement was observed in 58.3 percent of liver cancer patients, 68.8 percent of breast cancer patients, and 62.5 percent of lung cancer patients. The trial found a less than 10-20 percent improvement for leukemia, stomach cancer, and brain cancer patients. Furthermore, when maitake was taken in addition to chemotherapy, immune-competent cell activities were enhanced 1.2-1.4 times, compared with chemotherapy alone. Animal studies have supported the use of maitake MD-fraction for cancer.

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Introduction

Prior to 1980, maitake mushroom was foraged but could not be cultivated in medium. Since 1981, however, this mushroom has been commercially cultivated in Japan and elsewhere. Cultivation and development of standardized products, such as the MD-fraction, have provided opportunities to study its various medicinal properties: antitumor,[1-5] antidiabetic,[6] antihyperlipoid,[7] and antihepatitis.[8] There is a growing consensus that maitake MD-fraction strongly enhances immune-competent cell activities.

Animal Studies

C3H mice bearing MM-46 carcinoma (breast tumor) were given either 0.5 mg/kg MD-fraction by intraperitoneal (i.p.) injection or 1.0 mg/kg MD-fraction by oral administration for 10 days. After day 20, solid tumors were extirpated and weighed to determine the tumor growth inhibition ratio. Tumor regression of 75-85-percent was observed. Treatment with the MD-fraction increased the activities of natural killer cells, cytotoxic T cells, macrophages, and delayed-type hypersensitivity T cells by 1.23-2.5 times. The production of interleukin-1 (IL-1) from macrophages and of interleukin-2 (IL-2) from helper T cells was potentiated by 1.7-3.4 times. From these results the conclusion may be drawn that the immune-competent cell abilities to inhibit tumor growth were enhanced by MD-fraction.[1,2]

Doses of 10-50 mg MD-fraction and 250 mg powdered whole maitake containing 5 mg vitamin C were tested to investigate acute and chronic toxicity. Maitake was administered at a dose of 50 mg MD-fraction to mice i.p. for 50 days. By day 60, 10 days after ceasing treatment, no abnormal liver, kidney, or spleen tissue was found and blood tests were within normal ranges. These findings indicate MD-fraction does not

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appear to be toxic to animals. The toxicity of powdered whole maitake administered orally was also examined by feeding mice maitake tablets for 50 days. No toxicity to mouse organs was detected.

Clinical Application

Having concluded that both the MD-fraction and whole maitake tablets were safe and nontoxic, a non-randomized clinical trial using a combination of MD-fraction and maitake tablets was conducted to determine its effectiveness for advanced cancer patients. A total of 36 cancer patients in stages II-IV, from 33 to 68 years old, participated in the trial. The data were collected with the cooperation of the patients' medical doctors in Japan. Patients were given tablets containing MD-fraction and whole maitake powder after discontinuing chemotherapy due to side effects. Cancer regression or significant symptom improvement was observed in: (1) 11 of 16 breast cancer patients; (2) 7 of 12 liver cancer patients; and (3) 5 of 8 lung cancer patients.

To judge the effectiveness of the treatments, a positive response was defined as occurrence of one of the following:

1. The size of the cancer on CT or MRI scanning was reduced 1/2-3/4.
2. The value of the tumor marker was decreased 1/3-1/2.
3. T, N, or M factors were reduced or remained unchanged (Table 1 defines these factors).
4. The number of immune-competent cells (natural killer cells, macrophages, T lymphocytes, etc.) was increased to normal levels.
5. The production of cytokine (IL-1 and IL-2) was enhanced.

Table 1. *Factors Involved in Tumor Staging*

T refers to the size of the tumor.
T1 = tumor less than 2 cm
T2 = tumor 2-4 cm
T3 = tumor > 4 cm
T4 = tumor metastasized to at least one other organ

N refers number of cancerous lesions
N0 = no metastasis
N1 = 1 cancer site observed
N2 = 2 cancer sites observed

M refers to extent of metastasis
M0 = no metastasis
M1 = metastasis to other organs

Case Series

The following cases represent patients with various types of cancer treated with maitake.

Case History A

A 57-year-old male presented with lung cancer (epidermoid carcinoma). He was diagnosed as stage IV (any T, any N, M_1) but refused chemotherapy. The first cancer had been diagnosed as colloid carcinoma in 1985. It metastasized to a lung in April 1989 and presented with 1.5 cm and 3.8 cm cancer foci. At this time he was administered 100 mg MD-fraction and 6 g whole maitake tablets daily for five years. He died 60 months later in May 1994. However, his condition showed an improvement and was diagnosed as stage III-A before he passed away. After administration of MD-fraction and maitake tablets, both T factor 2

and N factor 2 were observed. The larger cancer was reduced to 3 cm and the smaller cancer disappeared completely. However, his cancer had metastasized to the lymph nodes (homolateral mediastinum).

Case History B

A 47-year-old female presented with hepatocellular carcinoma, stage II (T_1, N_1, M_0). Beginning in March 1994 she was treated with 80 mg/m^2 of cisplatin (CDDP) four times daily. In January 1995, however, her treatment was changed to 50 mg MD-fraction and 4 g whole maitake tablets daily and the cisplatin treatment was discontinued. After 2.5 years (June 1997), IL-2 production was increased 2.2-fold by maitake administration. IL-2 from T-helper cells is a reflection of activation of cytotoxic T-cells. By July 1999 the tumor had completely disappeared.

Case History C

A 54-year-old male presented with hepatocellular carcinoma, stage III (T_3, N_1, M_0). He had been treated with percutaneous ethanol injection treatment (PEIT) and 20 mg adriamycin (ADM), also by injection, daily from April 1995 to January 1996. He refused to continue the treatment because of lack of effectiveness and severe side effects from ADM. He began a regimen of 40 mg MD-fraction and 5 g maitake tablets per day with the PEIT. After one year, the level of bilirubin was reduced from 3.2 mg/dL to 1.6 mg/dL; albumin also improved from 3.1 mg/dL to 1.9 mg/dL.

Case History D

A 45-year-old female presented with hepatocellular carcinoma stage III (T_3, N_1, M_0). Before treatment with maitake, she had a serum bilirubin of 3.2 mg/dL, albumin of 2.1 mg/dL, and prothrombin activation of 43 percent. She received transcatheter arterial embolization (TAE) 10 mL lipiodol (iodized poppy seed oil), 15 mg ADM, and 100 mg cisplatin from May 1995, but discontinued in January 1996 at which time she began daily doses of 100 mg MD-fraction and 4 g maitake tablets daily, along with 100 mg of the chemotherapy drug 5-fluorouracil (5-FU). As of September 1997, the value of bilirubin was 2.1 and albumin was 3.0, while prothrombin activation increased to 72.2 percent. Since February 1998 she has received only maitake products and is now diagnosed as stage I.

Table 2. *Immunopotentiating Improvements Experienced by Various Cancer Patients Taking Maitake*

	IL-2 Production		CD4+ Cell Count	
	Before	After	Before	After
Liver cancer (9 patients)* (hepatocellular carcinoma)	1.00	1.29	1.00	1.42
Lung cancer (8 patients)* (epidermoid carcinoma)	1.00	1.37	1.00	1.51
Leukemia (3 patients)*	1.00	0.83	1.00	0.74

*Average value of patients before is indicated as 1.00

Case History E

A 56-year-old male presented with hepatocellular carcinoma stage IV, preceded nine years earlier by lung cancer (epidermoid carcinoma). He had had half of his left lung surgically removed and begun treatment with chemotherapy; but in March 1994 a metastatic cancer focus was observed in the liver. The patient was then administered 150 mg MD-fraction and 6 g whole maitake tablets daily. In August 1999, the value of IL-2 production was enhanced 1.7-fold and counts of CD4+ cells were increased 1.3-fold. The tumor, however, remained unchanged. As of February 2002, there has been no tumor growth or metastasis.

Case History F

A 41-year-old female presented with estrogen-receptor positive (ER+) breast cancer (intraductal carcinoma) stage III (T_1, N_{1b}, M_0). Tumors were measured at 2.4 cm and 0.7 cm in diameter. In September 1996, two of the solid cancers were surgically removed. The patient then began taking 10 mg of the anti-estrogen tamoxifen (TAM) and 100 mg 5-FU until December 1996. A cancer metastasis of 1.3 cm, however, was found in a lung in June 1997. The patient was then administered 125 mg MD-fraction and 4 g whole maitake tablets daily for 20 months. In March 1999 it was confirmed that the lung tumor had disappeared. While taking maitake, IL-2 production and CD4+ cell counts were increased by 1.5 and 1.3 times, respectively. As of early 2002 the tumor had not reappeared.

Conclusion

Table 2 summarizes the immune-potentiating effects of maitake in cancer patients in this study. Although the data are preliminary, this case series illustrates the immune-enhancing properties of maitake MD-fraction and whole powdered maitake. It also appears that maitake may have the potential to decrease the size of lung, liver, and breast tumors. Further study comparing the effects of maitake with conventional treatment outcomes seems warranted. For more information on mechanisms of action and clinical applications of maitake, see *Alternative Medicine Review* 2001;6(1):48-60.

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