International Journal of Medicinal Mushrooms, Vol. 3, p. 228 (2001)

Antitumor Effect of a Combination of *Agaricus blazei* Murr. Extract and Propolis

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Agaricus blazei Murr. extract has been reported to have many physiological actions such as immunostimulatory effects, anticancer effects, preventive effects on cancers, improvement of liver function, and antiallergic effects.

In this study, we investigated the antitumor activity of a combination of acid-treated *Agricus blazei* extract with aqueous or ethanol extract of propolis.

The experiments were performed according to the method reported by Edina et al. Using BALB/c mice groups (6 weeks of age, male) consisting of eight animals, 1×10^6 or 2×10^5 Meth-A fibrosarcoma cells derived from an isogenic mouse were transplanted into the right and left lower abdominal regions in normal mice. The control group received administration of physiological saline three times: 3, 4, and 5 days after tumor transplantation, and the sample groups were administred a mixture (2 m/0.1 ml) of equivalent volumes of acid-treated *Agaricus blazei* extract (after treatment of *Agaricus blazei* with 1 *N* HCl for 24 hr, the pH was adjusted to 7.0 with 1 *N* NaOH, and the extract was salted out and freeze-dried) and aqueous extract of propolis, or a mixture (0.02 mg/0.1 ml) of equivalent volumes of acid-treated *Agaricus blazei* extract and ethanol extract of propolis directly into the tumor in the right lower abdominal region. Starting at 3 days after tumor transplantation, the major and minor diameters were measured on the skin surface every other day, 12 times in total, using calipers. The tumor weight was measured 25 days after transplantation, and when a significant level of 5% or below was obtained by *t*-test, the treatment was regarded as effective.

The weight 25 days after transplantation was 0.39 ± 0.10 g in the physiological saline group and 0.19 ± 0.15 g in the acid-treated *Agaricus blazei* extract group, showing no significant difference. When acid-treated *Agaricus blazei* extract and aqueous extract of propolis were concurrently administered, the weight was 0.12 ± 0.06 g, and when acid-treated *Agaricus blazei* extract and ethanol extract of propolis were concurrently administered, the weight was 0.09 ± 0.05 g, showing significantly lower values ($p < 0.05$). The direct effect of the substance and the synergistic effect with the host immune function may have been exerted against the primary tumor in the combination treatment groups.

1521-9437/00/$5.00