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Antitumor Immunity in *Agaricus* sp., *Paffia paniculata,* and Propolis

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We investigated the antioxidant activity, lymphocyte versus polymorphonuclear leukocytes enhancement activity (L/P activity), and antitumor activity of three simple substances (*Agaricus* sp., *Paffia paniculata,* and Propolis) as well as a mixture of these three kinds of substances (ABP).

A powdered mixture (ABP) of these three substances were prepared using an agate mortar. For the extraction, 2000 mL of water was added to 300 g of finely powdered *Agaricus* sp. and then stirred for 2 hours in a water bath of 40 °C. After centrifugation for 10 minutes at 5000 rpm, the supernatant was filtered using folded filter paper. Distilled water (2000 mL) was added to the precipitates, and extraction was repeated in the same way. Dried *Agaricus* sp. was obtained by combining the supernatant from the first extraction with the supernatant from the second extraction (yield: 48.0 g, recovery: 16%). Propolis (100 g) was powdered, and 300 mL of 70% ethanol was added. After drying at room temperature, filtration was carried out using folded filter paper. The filtrates were dried using an evaporator. Dried Propolis was obtained by freezing and thawing (yield: 53.5 g, recovery: 53.5%). Distilled water (2000 mL) was added to 200 g of finely powdered *Paffia paniculata*. Dried *P. paniculata* was obtained by the same technique (yield: 83.6 g, recovery: 41%).

With respect to radical scavenging activity, water and *P. paniculata* had no radical scavenging activity and showed no marked difference, whereas *Agaricus* sp. showed slight radical scavenging activity. Both ABP and Propolis showed greater radical scavenging activity than 0.2 mM Trolox, which was used as a positive standard.

Ten neonatal Swiss-Webster mice were divided into two groups. Saline was injected intraperitoneally into one group, and *Agaricus* sp. was injected intraperitoneally into the other group at a dose of 200 μg/mouse. L/P ratios after the administration of ABP (200 μg/mouse) were 0.91 ± 0.07 (day 6), 3.23 ± 0.39 (day 10), and 4.82 ± 0.46 (day 14), whereas L/P ratios in the control group were 0.43 ± 0.04 (day 6), 0.96 ± 0.08 (day 10), and 1.43 ± 0.39 (day 14). The L/P ratio after the administration of Propolis was significantly elevated ($p < 0.01$), as compared to the control group.

When the ABP mixture was administered at a dose of 400 μg/kg for 34 consecutive days, remarkably high antitumor activity (suppressive ratio: 85.1%, $p < 0.01$) was shown.

In Sarcoma 100 solid carcinoma, when *Agaricus* sp. (200 mg/kg B.W./day), *Paffia paniculata* (60 mg/kg B.W./day), and Propolis (80 mg/kg B.W./day) were orally administered for 34 consecutive days, suppressive ratios were 60.3% ($p < 0.05$), 54.8% ($p < 0.05$), and 62.6% ($p < 0.05$), respectively. When the ABP mixture was administered at a dose of 400 mg/kg B.W./day for 34 consecutive days, remarkably high antitumor activity (suppressive ratio: 83.5%, $p < 0.01$) was shown.