Anti-Tumor Activity Expressed through Immunopotentiation by a Mixture of *Agaricus blazei* Murrill and Chlorella Extracts

Published in Medicine and Biology

[Objectives]

Agaricus blazei Murrill and Chlorella have been reported to enhance immune function and thus exert anti-tumor activity. The mechanism for such action involves many unresolved questions. The present study in mice was conducted to elucidate part of such a mechanism.

[Methods]

Tumor cells-implanted mice were divided into the control group and the ABM-C group (receiving a mixture of *Agaricus blazei* Murrill and Chlorella extracts). The tumor burden, cytokines [1)], NK cell activity [2)] , CTL activity[3)] and flow cytometry analysis[4)] of blood were analyzed.

[Results]

Proliferation of two tumor cell lines, i.e., sarcoma cell (S-180) and fibroblastic sarcoma cell (Meth-A), was significantly suppressed. Malignant melanoma cells (B16) tended to be suppressed but this change was not significant (Fig. 1).

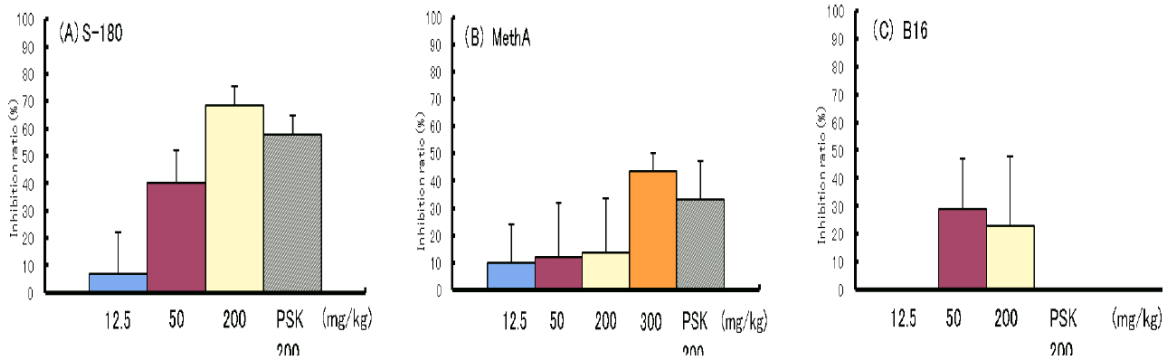

Fig.1. Anti-tumor activity of ABM-C against tumor cell lines implanted to mice

In analysis of cytokines, IFN-γ increased 3 days after tumor cell implantation and IL-1 increased 18 days after implantation (Fig. 2A). In mice treated with ABM-C after tumor implantation, IFN-γ and IL-12 increased markedly 3 and 18 days after implantation, respectively (Fig. 2B).

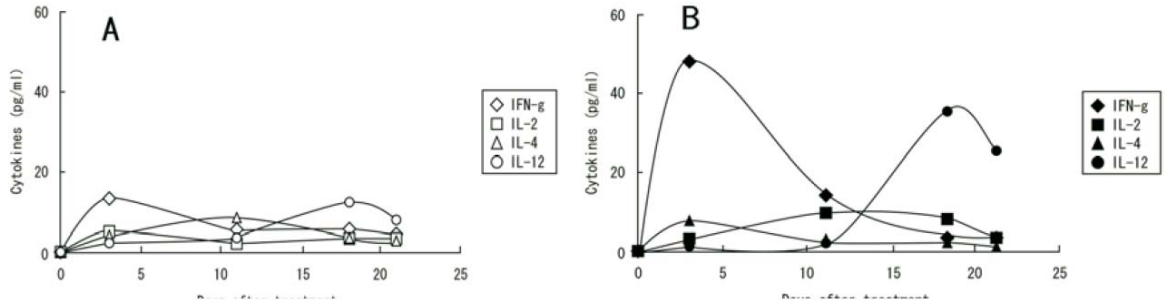

Fig.2. Effects of ABM-C on blood cytokine levels in Meth-A carrying mice

In analysis of NK cell activity, the splenocytes had higher NK activity in the ABM-C treatment group than in the control group, although this difference was not significant (Fig. 3A). CTL activity was significantly increased by ABM-C treatment (Fig. 3B).

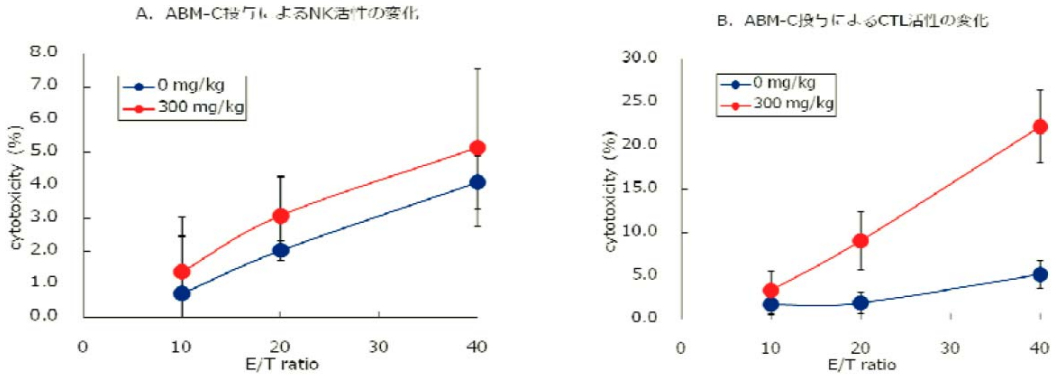

Fig.3. Changes in immune activity following ABM-C treatment

INF-γ production by the splenocytes removed from the group receiving ABM-C treatment after Meth-A implantation was about 4 times larger than in the other groups (Fig 4).

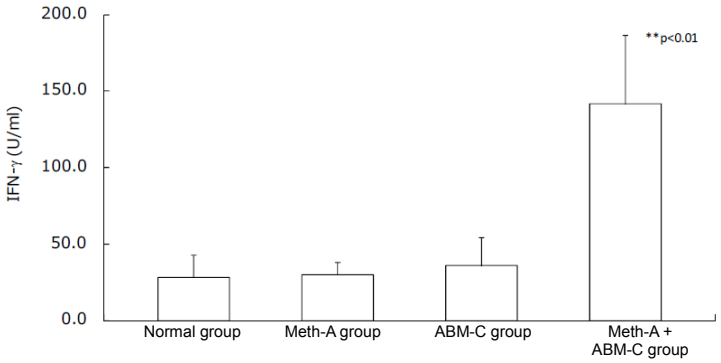

Fig. 4. Effects of ABM-C treatment on IFN-γ production by splenocytes

In flow cytometry analysis , the percentage of mature type macrophages (Cass II expressed cells) in peripheral blood was significantly higher following ABM-C treatment.

These results suggest that ABM-C exerts anti-tumor activity and that not only CTL activation but also macrophage activation plays an important role in the mechanism for this action of ABM-C.

<<Details>>

Journal	:	Medicine and Biology Vol.156 No.1 (2012) 26-34
Title	:	Anti-Tumor Activity Expressed through Immunopotentiation by a Mixture of *Agaricus blazei* Murrill and Chlorella Extracts
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<<Terminology>>

1) Cytokine: Low-molecular-weight protein produced by cells in response to stimuli. Binding of cytokine to the receptor on other cells leads to activation, differentiation and proliferation of the cells.

2) NK cell (natural killer) cell: A type of lymphocyte which attacks and eliminates pathologic cells non-specifically. This cell plays an important role in the early stage of infection.

3) CTL (cytotoxic T cell, killer T cell): A cell which specifically recognizes one's own somatic cells which have become pathologic, attempting to attack and eliminate such cells. CTL is diverse and possess high recognizing function.

4) Flow cytometer: A device capable of distinguishing among immunocytes which have different functions although looking similar to each other. This study used a flow cytometer for analysis of mononucleated cells (macrophages).