

Inhibitory Effects of Extracts from *Agaricus brasiliensis* S. Wasser et al. (Agaricomycetideae) on Immediate Type Allergy Induced Compound 48/80 in ICR Mice

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The expression of interleukin (IL)-12 (a key role in Th1 differentiation) and IL-18 (a proinflammatory cytokine in enhancing Th1 immune response) mRNA in a macrophage-like cell line, RAW264.7, stimulated with a polysaccharide purified in *Agaricus brasiliensis* S. Wasser et al. (Agaricomycetideae) (ABSW), were investigated using RT-PCR. We have reported that mRNA expression in IL-18 indicated no drastic changes during stimulation with polysaccharide purified in ABSW for 12 hours, but its level rapidly increased to 5.6-fold at 24 hours as compared with the initial level. The level of IL-12 p40 mRNA expression was different from those of IL-18. After 6 hours of stimulation, its level had not been reached at all, but started to increase at 12 hours and continued to increase by 24 hours. Moreover, polysaccharides from ABSW changed the percentage of splenic Thy 1.2- and L3T4 (CD⁴)-positive cells in the T cell subsets in ABSW-treated mice. It was presumed from the results that this mushroom possessed the ability to differentiate from naïve T cells to T-helper type 1 (Th1) and showed antiallergic activity.

To test this hypothesis, in this study, extracts from ABSW (3.6 mg/mL) were dissolved in distilled water and ingested by 8-week-old male ICR mice as drinking water for 14 days. No drastic differences were observed in the body weights of the mice. The cumulative number of scratching behaviors for 30 minutes in saline-treated mice (control) was approximately 2300 after intradermal injection of

compound 48/80, which is a pruritogenic agent, whereas those in ABSW decreased to approximately 960. To determine the effects of ABSW on degranulation in mast cell activation, histamine contents in blood were measured. ABSW treatment suppressed histamine release (36% compared to the control). Similarly, suppression of degranulation from mast cells also was detected histochemically by toluidine blue staining.

The differentiation of naïve T cells to the Th1 and Th2 subset of effector cells was regulated by the cytokines to which T cells were exposed at the time of antigenic stimulation. Interferon (INF)- γ and IL-12 promote Th1 development, whereas IL-4 promotes differentiation to Th2. To confirm which ABSW could change the differentiation of naïve T cells to Th1 or Th2, contents of INF- γ , IL-12, and IL-4 in the spleen of mice were measured with or without Concanavalin A (Con A; T-cell mitogen). The cytokines did not show any difference without Con A. When splenocytes were incubated with Con A, contents of INF- γ and IL-4 secreted from T cells significantly increased compared with the control, but IL-12, which was produced from macrophages, did not. Moreover, ABSW induced INF- γ more potently than IL-12 in splenocytes incubated with Con A. These results indicate that ABSW possessed immunomodulating properties that might be involved in the development of Th1 cells, culminating in an inhibition of immediate type allergy caused by compound 48/80.