乳酸菌と酵母による豆乳発酵産物に関する研究

(Studies on soybean milk fermented with lactic acid bacteria and yeast)

学位論文の内容の要旨（英語）

新　良一

Abstract

This study evaluated the functionality and mechanisms of a soybean milk-fermented product (SFP) made with lactic acid bacteria and yeast on maintaining health. The occupation rate of *Bifidobacterium* and the concentration of salivary secretory IgA were significantly increased by ingestion of SFP in human volunteers being fed a traditional Japanese diet. An increase in the occupation rate of *Bifidobacterium*, decrease in the occupation rate of *Clostridium*, and suppression of β-glucuronidase activity were all observed by ingestion of SFP when the subjects were changed to a Western diet. SFP also suppressed the growth of colon tumors induced by 1, 2-Dimethylhydrazine and syngeneic Meth-A tumors in mice, which indicated the induction of potent anti-tumor immune cells in the spleen and suggested that the suppressive effect of SFP on tumorigenesis was mediated by host immune responses stimulated by intestinal microbiota.

Lactobacillus plantarum BF-LP284 (LP284) was selected for SFP fermentation based on its high cytokine inducibility properties. Suppression of syngeneic Meth-A tumors by oral administration of heat-killed LP284 (H-Lp) was greater than that by live LP284 in a murine model. H-Lp stimulated IFN-γ production in Peyer's patch (PP) and spleen cells and increased the ratio of CD3+ cells among peripheral blood mononuclear cells in Meth-A tumor-bearing mice, implicating an H-Lp-mediated anti-tumor mechanism whereby immune cells that are activated by H-Lp in PP and acquire anti-tumor activity in the spleen migrate to tumor sites through cytotoxic lymphocyte homing to inhibit tumor growth.

SFP and soluble fraction of SFP (SFP-s) suppressed systolic blood pressure in spontaneously hypertensive rats, and the isolated saccharide fraction of SFP-s inhibited angiotensin I-converting enzyme. Hepatic and renal dysfunction induced by administration of oral deoxycholic acid or intraperitoneal D-Galactosamine were improved by SFP-s supplementation in a rat model. Thus, the anti-oxidative activity of SFP-s might improve

hepatic and renal disorders by suppressing membrane peroxidation. Lastly, the anti-arthritic effects of SFP-s on immune system modulation were investigated for bovine type II collagen-induced arthritis in mice. A combination of SFP-s and glucosamine was additively effective in reducing disease severity.

In conclusion, SFP may alleviate intestinal disorders, enhance immune function, suppress cancer, regulate blood pressure, and improve hepatic and renal disorders and arthritis, and therefore appears useful for maintaining health in humans.