

Effects of tea catechins on gene expression in the liver of experimental animals

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Green tea is known to have a variety of beneficial effects against cancer, obesity, and cardiovascular diseases. We recently reported that dietary supplementation of green tea affects the expression of gluconeogenesis-related genes in the mouse liver, suggesting its anti-diabetic effect. Green tea has also been shown to suppress galactosamine-induced liver injury in rats and mice. In the present study, we examined the effects of catechins-rich green tea beverage and green tea components on hepatic gene expression.

When the liver of the galactosamine-treated rats, an experimental model of hepatitis, was examined by the DNA microarray technique, green tea with a high catechin content was shown to attenuate galactosamine-induced up-regulation of the expression of inflammatory cytokines, suggesting protective effects of green tea on hepatitis. In addition, the results indicated that the ingestion of green tea for 2 weeks in normal rats caused the decrease in the gene expression of gluconeogenic enzymes in the rat liver. After 4 weeks, the lower level was maintained in the glucose-6-phosphatase (G6Pase) gene expression when compared to that in water-given rats, while up-regulation of the gene expression of phosphoenolpyruvate carboxykinase (PEPCK) was noted.

The present study also showed that ingestion of catechin-rich green tea or epigallocatechin gallate (EGCG) in Balb/c mice for 4 weeks gave the results similar to those from the experiment in the rats as examined by RT-PCR. Previously, we revealed that the gene expression of both PEPCK and G6Pase was down-regulated in the liver of C57BL/6 mice given green tea powder or EGCG for 7 days. These results suggest that EGCG contributes to chronic effects on lowering the G6Pase gene expression of green tea. By contrast, green tea and EGCG do not appear to have chronic down-regulating effect on the PEPCK gene expression. A recent epidemiological study by Iso *et al.* has revealed the preventive effect of green tea on diabetes.

Thus, the present study provides the molecular basis for indication that green tea has a preventive effect on diabetes mellitus as well as a hepatoprotective effect in hepatitis.