Cerebral Neuroprotective Effects of Green Tea Components, Theanine and Catechins

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Summary
The incidence of stroke was lower in populations with the habit of drinking green tea (Camellia sinensis) than those populations imbibing less green tea according to an epidemiological study. The incidence of cerebral infarction shows a high ratio in stroke, and the relationship between ischemic neuronal death and cerebral vascular dementia has become a focus of attention. In recent years, a relation has been reported between ischemic neuronal death and glutamate toxicity. Theanine (γ-Glutamylethylamide) is contained in Japanese green tea as a natural glutamate analog. Experimental studies have demonstrated that more than 400 μM of theanine prevented neuronal death induced by the application of 50 μM of glutamate on cultured rat cortical neurons. Ischemic neuronal death in field CA1 of the hippocampus in Mongolian gerbils was also significantly prevented in theanine-pretreated groups on a dose-dependent manner, with approximately 60% and 90% survival with doses of 125 μM and 500 μM of theanine, respectively. Also, low density lipoprotein (LDL) is oxidized with superoxide anion radicals, and this oxidatively modified LDL can be taken up easily by foam cell in macrophages so as to trigger the lipid peroxidation that is thought to be one of the causes of arteriosclerosis. On the other hand, the superoxide anion radical scavenging effects of tea catechins have been found, suggesting the tea catechins can protect arteriosclerosis. Based on these results, the cerebral neuroprotective effects of green tea, the neuronal protective effects of theanine and the effects of catechins to prevent arteriosclerosis, were discussed.