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Studies of L-theanine on nutritional-physiological functions: Mechanism of action and neurochemistry

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The effect of theanine, γ -glutamylethylamide, one of the major components of amino acids found in Japanese green tea, on brain neurotransmitters was examined. Theanine administration led to a significant increase in dopamine release in the brain striatum using a microdialysis technique. The mechanism leading to the up-regulated dopamine release by theanine was studies using several antagonists for receptors concerned with dopamine release.

For next study, some behavioral effects of theanine have been researched. Locomotion, standing, hole-poking, and grooming analyzed by the open-field hole-poke apparatus, were unaltered by the administration of theanine. However, cognition was influenced by theanine: a passive avoidance, active avoidance test, Morris water maze test or transfer test etc. For the results of avoidance tests, rats show a general tendency whereby they move to a dark place from a light one. In the “passive avoidance” test, an electric shock is applied soon after a rat moves from a light to a dark room. Animals administered theanine hesitated to move into the dark, showing a tendency to remain in the light room longer than the control group. In the “active avoidance” test, the behavior of rats to escape from electric shock was examined. The avoidance reaction rate in the theanine group was higher and increased in proportion to the number of tests. A relatively high reaction frequency in a series of memory and leaning ability tests was observed in the group administered theanine solution (1 g/100 ml water) for a prolonged period (five months). These results showed the positive effects of theanine on memory and learning ability. We show several results of the cognition caused by theanine.

Recently, for human volunteers, the improvement of emotional stress caused by theanine was examined by determining the activity of autonomic nerves.