Corticosteroids are hormonal messengers of emotional stress. In the brain, intracellular mineralocorticoid (MR or Type I) and glucocorticoid (GR or Type II) receptors are the targets of corticosteroids. Recently, it also appeared that stress affects the formation of neurosteroids which influence brain functions via membrane-bound GABA-A/BDZ or glutamnergic NMDA receptors. Our findings indicate the role of both cortico- and neurosteroid receptor-bound processes in the expression of emotional stress-induced behavior. It is concluded that the involvement of brain MRs and GRs is situation specific. Neurosteroid effects on emotional behavior are related to their agonistic or antagonistic characteristics on the GABA/BDZ or NMDA receptor. The findings with genetic, molecular biological and pharmacological manipulation of the receptors point to their involvement in the pathomechanism of emotional disturbances such as fear, anxiety panic, depression.

Immobilization stress induces stomach bleeding in rats. We found that oxidative damages to lipids, protein, and DNA were induced in rats by immobilization-induced emotional stress. Glutathione was effective to protect oxidative damages. These findings suggest that oxidants are involved in emotional stress, and that the oxidative damages by emotional stress is a major contributor to aging acceleration and degenerative diseases associated with aging such as cardiovascular disease and brain dysfunction. In many epidemiologic studies, the consumption of fruits and vegetables is associated with low incidence and low mortalities of these diseases. MANDA, a natural product made by yeast fermentation of many fruits and black sugar, has an antioxidant activity. We administered MANDA, as an example of healthy food antioxidant, by a canula into the stomach of rats from the start of the emotional stress experiment. The control rats all showed congestion and some degree of bleeding in the mucosa of the stomach. However the rats treated with MANDA showed only congestion and did not show erosion or hemorrhage.

Hypertension induces stroke or cardiac infarction. Thus, it is important to study the function of coronary and cerebral arteries under hypertension. We studied the responses to vasoactive agents in the coronary and basilar arteries of SHRSP. The ring preparations of coronary and basilar arteries of SHRSP and Wistar-Kyoto rats (WKY) at 6 months of age were used. Serotonin (5-HT) and angiotensin II induced contractions in both arteries. Noradrenaline (NA) did only the relaxation. Phentolamine did not contraction or relaxation. The contractions by angiotensin II and the relaxations by NA were not different between SHRSP and WKY. These results suggest the followings: (1) There is no alpha receptor in both arteries. (2) There exist 5-HT1 and 5-HT2 receptors in both arteries. (3) The responses to 5-HT in both arteries at lower doses in both arteries were greater in SHRSP than in WKY. The 5-HT-induced contractions were inhibited by 5-HT antagonist. Although the effects of 5-HT2 agonist were not different between SHRSP and WKY, the effects of 5-HT1 agonist were greater in basilar and coronary arteries of SHRSP than in those of WKY. These results suggest the followings: (1) There is no alpha receptor in both arteries. (2) There exist 5-HT1 and 5-HT2 receptors in both arteries. (3) In the basilar and coronary arteries of SHRSP, 5-HT induced contractions accelerates, which is due to the increased responses to 5-HT1 receptor.

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