PROCEEDING

Approach to novel functional foods for stress control
3. Establishment of stress-resistant rat model and its mechanism

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Abstract : A stress-resistant rat model was introduced. SPORTS (Spontaneously-Running-Tokushima-Shikoku) rats showed significantly shorter time of immobility in the forced swim test compared to control Wister rats. Increase norepinephrine concentration secondary to decreased activity of monoamine oxidase A (MAOA) in hippocampus was observed in this model rats. This model rats are considered to be useful for studying the mechanism of psychological stress. J. Med. Invest. 52 Suppl. : 244, November, 2005

Keywords **:** *exercise, hippocampus, monoamine oxidase A, stress*

OBJECTIVE

To clarify mechanism of psychological stress, we examined the regulation of norepinephrine (NE) system in the hippocampus of SPORTS (Spontaneously-Running-Tokushima-Shikoku) rats, a new animal model of hyper-wheel running[(1)] and resistant to stress.

METHODS

SPORTS rats

SPORTS rats showed the higher activity in the water, where the time of immobility was significantly lower for SPORTS rats than that for control rats. In the hippocampus of SPORTS rats, the levels of NE in the extracellular fluid were augmented, whereas those of NE concentration in the whole homogenate of the tissue whereas decreased. There was little change in the level of dopamine in the striatum. The protein expression and the activity levels of monoamine oxidase A (MAOA) , a critical enzyme for the degradation of monoamines, were decreased in the hippocampus of SPORTS rats. This depression of MAOA was not attributed to the impaired transcriptional activity or to the increased protein breakdown for the gene. Thus, the inhibition of MAOA activity in normal Wistar rats markedly increased wheel running activity as well as decreased immobility in the water. These results suggest that the elevation of extracellular NE and the depression of MAOA in hippocampus determine the neural basis of the psychological regulation of exercise motives and motivation to move in the SPORTS rats.

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