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社会的ストレスがマウスの行動へ与える影響とストレスフリー療法の治療効果の評価

(The impact of chronic social stress on emotional behavior in mice and the therapeutic effect of peripheral mild heat stimulation)

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Abstract

Chronic social stress can cause mal-adjustment, depression and CFS (chronic fatigue syndrome) in humans and is regarded as a severe social problem. The traditional medicine treatment of acupuncture and moxibustion to the acupoints Zhongwan (CV12) and Taichong (LR3) has been helpful to ameliorate human anxiety and depression in Japan and China. To scientifically study the effect of the stimulation to the acupoints Zhongwan and Taichong, we used the chronic social stress model in mice and tested the above local heat stimulation on behavior. Male ddY mice of 4 weeks of age were divided into 4 groups; isolation-control, isolation-stimulation, group-housed-control, and group-housed-stimulation. The isolated mice underwent social isolation for 6 weeks. The 2 groups of stimulated mice received mild heat stimulation to the acupoints Zhongwan and Taichong for 5min, 3 times/week during the last 2 weeks of the isolation, by the use of the Stress Free Apparatus under isoflurane anesthesia. The 2 groups of control mice received isoflurane anesthesia without heat stimulation. To assess anxiety, we used the Light/Dark test box and counted the number of crossing from the dark to the light room and the time spent in the light room, 2 days after the last stimulation. Before and after the heat stimulation, we collected the serum from the fundus artery blood and measured corticosterone, IgE, and IL-6 in the serum.

The results showed that the time spent in the light room significantly reduced in the isolation-control group compared with the group-housed control group, suggesting that the social isolation induced anxiety. The time spent in the light room increased significantly in the isolation-stimulation group to the level indistinguishable from the group-housed control group. This suggests that the heat stimulation reduced the anxiety. The group-housed-stimulation group did not increase the time spent in the light room after heat stimulation. The serum corticosterone, IgE and IL-6 significantly increased in the isolation group compared with the group-housed group. The increases in these biomarkers were significantly reduced by heat stimulation. In addition, the dopamine and serotonin content in the frontal cortex were reduced by the social isolation and recovered by the heat stimulation.

These results suggest that chronic social isolation induces anxiety in mice and that brief mild heat stimulation to Zhongwan and Taichong can reduce this anxiety.