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The expression of β -endorphin in the periaqueductal gray by exercise

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Introduction: It is reported that excessive sports increase β -endorphin in the serum, but there are few reports about the expression of the opioid in the brain. Therefore, we investigate a change of β -endorphin secreted in the rat brain after exercise.

Method: With male Wistar rats, we investigated the expression of β -endorphin in the periaqueductal gray (DM: Dorsomedial, DL: Dorsolateral, L: Lateral, VL: Ventrolateral) immune histologically. The conditions are control group (only in a rota-rod treadmill), high-speed exercise group (11 m/min), low-speed exercise group (6.6 m/min). They exercise twice a day 7 days for 30 minutes. After 7 days, the corticosterone density in the rat blood was measured. The brain tissue of 20 μ m was immune stained by the free-floating method using an antibody of β -endorphin. Immuno-stained section was photographed by a digital camera and immuno positive amount in a square of 100 μ m was determined by using software.

Result: The median of corticosterone density was control group 294 μ g/ml, high-speed group 349 μ g/ml and low-speed group 345 μ g/ml. The significant difference was recognized between control and both exercise group. The median of endorphin expression in the periaqueductal gray is 27.9 μ m², 51.0 μ m², 23.5 μ m². The significant difference was recognized between high-speed group and low-speed group or control group. By the part distinction, the expression of β -endorphin in DM and DL increase in particular when rats ran in high-speed.

Conclusion: The present findings suggest that stress after exercise in the rota-rod treadmill might increase regardless of the speed. However, the sedative effect is strong at vigorous exercise.

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