

Modulatory effect of L-arginine on metabolic processes in the brain of depressed rats

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Depression is a widespread psychiatric disorder that negatively affects individuals' health and working capacity. Its global prevalence continues to rise, now exceeding 17% of the population, indicating the progressive nature of the disorder. This growing burden highlights the urgent need for intensified research into its underlying mechanisms and treatment strategies.

Currently, the primary therapeutic approach to depression involves the use of antidepressants, which increase synaptic concentrations of serotonin, dopamine, and norepinephrine. However, these drugs are often associated with significant side effects, such as metabolic disturbances, dependency, and the development of treatment resistance. As a result, there is a pressing need to identify novel compounds that are both more effective and better tolerated.

Recent studies have shown that depression is accompanied by impaired energy metabolism in brain neurons. Accordingly, compounds that enhance neuronal energy metabolism are being explored as promising agents for alleviating depressive symptoms.

The aim of our study is to investigate the effects of an endogenous compound with minimal side effects—specifically, the amino acid L-arginine—on brain energy metabolism in animal models of depression. L-arginine serves as a precursor for both nitric oxide (NO) and creatine, and is believed to have the potential to positively influence cellular energy processes.

Our findings demonstrate that oral administration of L-arginine for 14 consecutive days significantly improves energy metabolism in the brains of depressed rats. This enhancement correlates with a marked reduction in depression-like behavior, supporting the potential therapeutic role of L-arginine in the management of depression.