Decrease of Amino Acid Level in Mice Brain by L-Lysine α-Oxidase

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L-lysine is an essential amino acid for humans. In recent years, several new effects of this amino acid have been discovered: the regulatory action of this amino acid and its protective effect on non-enzymatic glycosylation of proteins. Impaired L-lysine metabolism in the brain is associated with such diseases as glutaric aciduria type I and pyridoxine-dependent epilepsy. The specific pathway of L-lysine metabolism in brain is the oxidative deamination of α-amino group by L-amino acid oxidase. A similar enzyme was found in microscopic fungi of the genus Trichoderma. The aim of the work was to investigate the possibility of L-lysine α-oxidase from Trichoderma cf. aureoviride Rifai VKMF-4268D penetration through the blood-brain barrier and its effect on amino acids in brain. LO was injected into the tail vein of mice and determined in brain by enzyme immunoassay. Polyamines (PA) and amino acids were determined by HPLC. It is noteworthy that LO (two subunits of 60 kDa) crossed the blood-brain barrier in 15 min. The content of LO (87,2±10,6 ng/g of tissue) was significantly lower than in the liver (675,9±199,9 ng/g), but remained at the detectable level for 24 h. L-Lysine content in brain after 1 h was 69,1 % and reached minimum - 35,2 % in 6 hours and did not fully recover after 24 h. Since LO affects to a lesser extent structurally similar amino acids, the dynamics of their changes was studied. After 1 h, the content of ornithine and arginine was 80,4 % and 63 %, respectively, and even after 24 hours did not become normal (95,5 % and 76 %). Since ornithine is a precursor of PA, it was determined that their concentrations dropped down significantly. So, it is possible to conclude that LO may be in perspective investigated as a drug against serious brain diseases. The publication was prepared with the support of the “RUDN University Program 5-100”