

Exercise-dependent preference for a mixture of branched-chain amino acids and homeostatic control of brain serotonin in exercising rats.

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In this article we discuss studies showing that rats are able to regulate their intake of BCAA depending on the level of exercise, and that they will choose a solution of BCAA over water during times of intense exercise. We found that the voluntary intake of a solution made of BCAA, L-arginine and L-glutamine positively correlated with the timing and volume of exercise during the dark (active) period of the circadian rhythm. In the second behavioral protocol in which rats were fed BCAA fortified diet (2.0%, wt:wt), we observed voluntarily increased volume of physical activity beginning from d 4 of feeding on. In the second, neuro-behavioral, part of the study we measured the brain content of 5-hydroxytryptamine (5-HT) as well as plasma amino acid profiles in well-trained exercising rats to test a hypothesis that BCAA may alleviate central aspects of fatigue. A solution made of BCAA, L-arginine, and L-glutamine applied before running elevated the BCAA/tryptophan plasma ratio at the end of and after running, and decreased 5-HT release in the lateral hypothalamus and amygdala after running, when compared with the controls. The exercise-related shift in the fluid preference toward a BCAA-based solution suggests an ergogenic benefit. The forced-running study shows the lateral hypothalamus and possibly amygdala might be the critical brain regions implied in the central effects of a BCAA-based solution.