Arginase Enzyme Activity in Human Serum as a Marker of Cognitive Function: The Role of Inositol in Combination With Arginine Silicate

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Abstract: Background: The purpose of this study was to evaluate different arginase activity levels in response to combinations of an inositol-stabilized arginine silicate (ASI; Nitrosigine®), L-arginine, and Inositol. Arginine acts as a vasodilator that promotes increased blood flow resulting in enhanced delivery of oxygen and nutrients to the brain. ASI alone has been shown to improve performance on cognitive tasks. Arginase, found in human serum, catalyzes the conversion of arginine to ornithine and urea, completing the last step in the urea cycle. Decreasing arginase levels maintains arginine and results in increased nitric oxide production. This study aimed to determine the most effective combination of ASI, L-arginine, and inositol for minimizing arginase levels and therefore maximize ASI’s effect on cognition. Methods: Blood was drawn from untreated healthy donors into serum separator vacutainer tubes. Serum was separated from clotted factors. Arginase activity of serum in the presence or absence of test products was determined (QuantiChrom™, DARG-100, Bioassay Systems, Hayward CA). The remaining ultra-filtrated serum in the top units were harvested and used as the source of arginase enzyme. ASI alone or combined with varied levels of Inositol were tested; ASI + inositol at 0.25 g, 0.5 g, 0.75 g, or 1.00 g. Results: All tests showed some changes in arginase activity, demonstrating the efficacy of the method used. Adding L-arginine to serum, with or without inositol, only had a mild effect. Adding inositol at all levels reduced arginase activity. Adding 0.5 g to the standardized amount of ASI led to the lowest amount of arginase activity as compared to the 0.25g, 0.75g, or 1.00g doses of inositol. Conclusions: These data show the pairing of inositol with ASI has direct effects on the extent of arginase enzyme activity. The level leading to the greatest suppression of arginase would logically be used in formulations. Formulations that incorporated this optimal level of inositol have been shown to led to significant improvements in cognitive tasks such as reaction time, executive function, and concentration.

Keywords: arginase, nitric oxide, brain blood flow, cognition, inositol, arginine

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