

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 : The purpose of this study was to evaluate 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 and other tissues. 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. Serum was taken from untreated healthy donors by separation 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 units were harvested and used as the source for the arginase enzyme. ASI alone or combined with varied levels of Inositol were tested as follows: ASI + inositol at 0.25 g, 0.5 g, 0.75 g, or 1.00 g. L-arginine was also tested as a positive control. All tests elicited changes in arginase activity demonstrating the efficacy of the method used. Adding L-arginine to serum from untreated subjects, 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 or to L-arginine alone. The outcome of this study demonstrates an interaction of the pairing of inositol with ASI on the activity of the enzyme arginase. We found that neither the maximum nor minimum amount of inositol tested in this study led to maximal arginase inhibition. Since the inhibition of arginase activity is desirable for product formulations looking to maintain arginine levels, the most effective amount of inositol was deemed preferred. Subsequent studies suggest this moderate level of inositol in combination with ASI leads to cognitive improvements including reaction time, executive function, and concentration.

Keywords : arginine, inositol, arginase, cognitive benefits

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