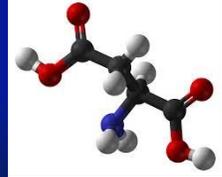


D-Aspartic Acid Supplementation in Athletes

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Background

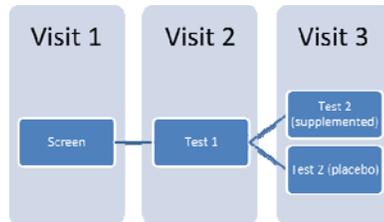
Dietary supplements are currently used to increase athletic performance for many types of athletes. Many new supplements come to the market every year with little research done on their efficacy in improving athletic performance. Dietary protein supplements have become a large portion of the type of supplements used and even singling out specific types of amino acids alone for improvement of athletic performance. D-aspartic acid (Aspartate) is one such amino acid that is being sold as a supplement used to improve muscle function in athletes. L-aspartate is a non-essential amino acid which is found in various foods. Foods with the highest concentration include soy and some meat products. Aspartate in the "L" form is stored in the brain. [1].

Mechanism of Action

In the active D form, aspartate acts as an endogenous neurotransmitter on NMDA and AMPA receptors. Aspartate is localized in the pituitary, which is the gland that secretes hormones such as Luteinizing Hormone which controls testosterone production in gonads. D-Aspartic acid also accumulates in Leydig cells, located in the testes, where they have a catalyzing role in the synthesis of testosterone [2]. Previous studies have shown that elevated testosterone in the body leads to an increase muscle strength and faster recovery, as well as acquisition of lean body mass. [3].

Objective

The primary aim of the study will be to observe the effect of supplementing 3 grams of aspartate per day, over a 14 day period, on luteinizing hormone and testosterone. The secondary aim of the study will be to study the effect of aspartate supplementation on athletic performance.



Design

The study is a double blind, placebo controlled, parallel arm study that will be completed over a 2 week period. During Visit 1 (screening), subjects will perform VO₂ peak, 1RM Bench press, and 1RM Squat testing. The subjects will repeat the strength tests during the second visit as well, thus eliminating the potential of a learning effect. After visit 2, subjects will receive the Aspartate or the Placebo and take their supplement for 14 days. Fasting blood samples will be collected and analyzed to determine the effect on hormones, and strength measures will be looked at by observing trends the performance tests. Data will be analyzed using a 1 way repeated measures analysis.

Anticipated Results

After 2 weeks of Aspartate supplementation, we expect to see a significant increase in testosterone and luteinizing hormone levels in the athletes. Consequently, we should observe a significant increase in strength due to the elevated circulating levels of these hormones.

Previous studies have shown that aspartate supplementation has a significant effect on elevation of serum hormone levels [1].

Figure 2. LH Changes

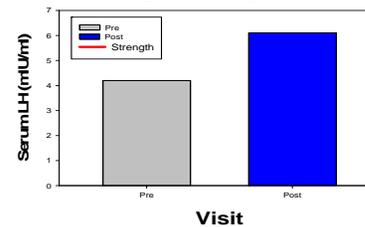


Figure 3. Testosterone and Strength Changes

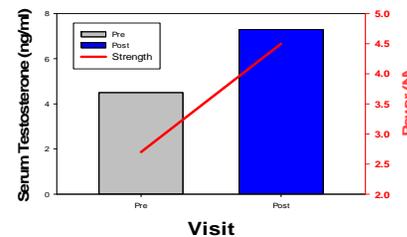


Fig.2-Courtesy of E. Topo PubMed (2009), these are our anticipated findings on LH

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Anticipated Results

Table 1
Effects of D-aspartate on LH and testosterone release in human serum

	Basal levels treatment	After 8 days of D-Asp treatment	After 12 days of D-Asp treatment	3 days after the suspension of D-Asp
LH (mIU/ml serum)				
Subjects treated with Na-D-aspartate	4.2 ± 0.5	4.5 ± 0.6	5.6 ± 0.9*	4.8 ± 0.8
Subjects treated with placebo	4.2 ± 0.4	4.3 ± 0.7	4.2 ± 0.6	4.1 ± 0.5
Testosterone (ng/ml serum)				
Subjects treated with Na-D-aspartate	4.5 ± 0.6	5.2 ± 0.7	6.4 ± 0.8*	5.8 ± 0.6*
Subjects treated with placebo	4.6 ± 0.5	4.5 ± 0.7	4.7 ± 0.7	4.6 ± 0.7

Table 3
Endogenous occurrence of D-aspartate in rat tissues and accumulation after treatment with sodium D-aspartate

	Basal levels of D-Asp	Levels of D-Asp after 12 days of D-Asp treatment	Levels of D-Asp 3 days after the suspension of D-Asp treatment
Pituitary	129 ± 12	880 ± 45*	145 ± 12
Testes	109 ± 8	780 ± 45*	205 ± 14*
Thyroid	90 ± 6	350 ± 19*	110 ± 9
Hippocampus	62 ± 5	108 ± 9*	78 ± 7
Frontal cortex	41 ± 4	85 ± 7*	55 ± 5

Discussion

Positive results from this study may be beneficial to a variety of people. First, athletes will have a safe way to enhance their ability and performance. This will result in a higher level of competitiveness amongst all sports and athletic training. Secondly, significant results may show that aspartate could be used therapeutically for people with low testosterone levels. Supplementation could be a safer alternative to boost hormone levels in not only athletes, but sedentary people as well.

References

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2. Wiloughby, Daryn. "D-Aspartic Acid Supplementation Combined with 28 Days of Heavy Resistance Training Has No Effect on Body Composition, Muscle Strength, and Serum Hormones Associated with the Hypothalamic-pituitary-gonadal Axis in Resistance-trained Men." *Nutrition Research* 33 (2013): 893-10. Print.
3. Bhasin S, Storer TW, Berman N, Callegari C, Clevenger B, Phillips J, Bunnell TJ, Tricker R, Shirazi A, and Castaldi R. The Effects of Supraphysiologic Doses of Testosterone on Muscle Size and Strength in Normal Men. *New England Journal of Medicine* 335: 1-7, 1996.

Figure 1. Effects of Testosterone

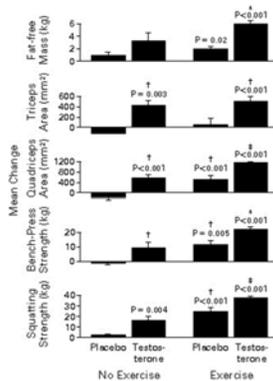


Fig.1- Previous studies have shown that testosterone has positive effects on strength and body composition
Bhasin S et al. N Engl J Med 1996; 335:1-7

