Hypermune Egg Protein Supplementation Stimulates the GH→IGF-I Axis

Timothy P. Scheett, Charles G. Boland, Leslie E. Rivera, Tyler D. Martin, Benjamin M. Carr, and Michael J. Webster

Human Performance Laboratory, College of Charleston, Charleston, SC, Laboratory for Applied Physiology, University of Southern Mississippi, Hattiesburg, MS

Abstract

Antihypertensive hyperimmune egg protein (HIE) is a powderized, pure egg product derived from chicken hens immunized with more than 26 killed pathogens (e.g., Shigella, Staphylococcus, Escherichia coli, Salmonella, Pseudomonas, Pneumoniae, Haemophilis, and Streptococcus of human origin). Prior research has documented significant increases in muscular strength, muscular endurance and anaerobic power, decreased muscle soreness and submaximal heart rate, and enhanced recovery with oral supplementation of HIE. The purpose of this study was to determine if the significant improvements observed following 10 d of oral HIE supplementation may be explained by alterations in the growth hormone (GH)→insulin-like growth factor-I (IGF-I) axis.

Methods

Twenty-four male participants were randomly assigned to one of two groups that orally supplemented with 4.5 g·d⁻¹ for 2 d, 9 g·d⁻¹ for 2 d and 13.5 g·d⁻¹ for 6 d of either Hyperimmune Egg protein (HIE) or an egg protein placebo (PLA). HIE and PLA supplements were identical in appearance and taste before and after mixing with 237 mL of low carbohydrate milk. On days 1, 8, 9, and 10, participants performed 3 min submaximal exercise bouts on a treadmill at 0%, 3%, and 6% grade with constant speed (i.e., 6 mph) for each participant. Subsequently, the subjects performed 1RM strength tests and 70% of 1RM muscular endurance tests for the bench press, squat, bent over row and should press. Following 15 min recovery each participant performed a 30 sec Wingate test using 75% of their own body mass. Participants abstained from their regular exercise routine for the duration of the study. Participants were monitored for 2 d, and statistical analyses were performed using an ANCOVA with initial differences between groups serving as a covariate. This analysis was used to determine significant main effects and significant main effects were further explored using Tukey's *HSD* post-hoc test. Significance was set at 0.05.

Results

Figure 1. Blood samples were collected on Days 1, 8, 9, 10, and 11. Blood samples were analyzed in duplicate for GH, IGF-I, IGFBP-1, IGFBP-2, and IGFBP-3 via ELISA. The data from this study indicate that hyperimmune egg protein represents an effective protein-based supplement that enhances recovery through altering the GH→IGF-I axis. The enhanced recovery presumably is due to significant increases in muscular strength, muscular endurance and anaerobic power, decreased muscle soreness and submaximal heart rate, and enhanced recovery. Effects of long-term utilization remain to be identified.

Discussion

The supplement dosing was titrated over 5 d in an effort to prevent previously reported gastrointestinal disturbances. No subjects in PLA and only one subject in HIE reported any signs or symptoms of gastrointestinal disturbance and no subjects in either group reported any other changes in health status during their 10 d study period.

Supplementation with hyperimmune egg protein for 7 d resulted in significant (P<0.05) increase in GH. The significant decrease in GH at Day 9 may have occurred due to an increased uptake by the liver.

Supplementation with hyperimmune egg protein for 7 d resulted in significant (P<0.05) increase in IGFBP-3. However following exercise IGFBP-3 was significantly (P<0.05) decreased for 48 hours which corresponded with a non-significant but expected decrease in circulating IGF-I. This decrease in circulating IGF-I most likely represents an increase in receptor binding at the muscle cell. This data provides the foundation for future research necessary to fully understand the interactive mechanisms involved with stimulating the immune system and the hormonal agents related to muscle repair. These results provide support that HIE protein supplement may have caused greater recovery through the GH→IGF-I axis. The enhanced recovery, measured by improved performance on repeated exercise tests, is most likely attributing to the significant increases in exercise performance (HIE vs. PLA: Submax HR: 6%, anaerobic peak power: 9%, muscular strength 3 kg and Muscular endurance 1.2 reps).

Practical Application

The data from this study indicate that hyperimmune egg protein represents an effective egg protein-based supplement that enhances recovery through altering the GH→IGF-I axis. The enhanced recovery led to significant increases in muscular strength, muscular endurance and anaerobic power, decreased muscle soreness and submaximal heart rate, and enhanced recovery. Effects of long-term utilization need to be identified.

Subject Characteristics

<table>
<thead>
<tr>
<th>Group</th>
<th>n</th>
<th>Age (years)</th>
<th>Height (cm)</th>
<th>Mass (kg)</th>
<th>Body Fat (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PLA</td>
<td>12</td>
<td>23.5 ± 1.2</td>
<td>175 ± 6.2</td>
<td>80.1 ± 4.25</td>
<td>18.2 ± 2.5</td>
</tr>
<tr>
<td>HIE</td>
<td>12</td>
<td>23.8 ± 1.2</td>
<td>175.9 ± 2.3</td>
<td>78.10 ± 2.58</td>
<td>16.1 ± 1.7</td>
</tr>
</tbody>
</table>

Figure Legend. Serum concentrations for Growth Hormone (Figure 1), Insulin-like Growth Factor-I (Figure 2), IGF Binding Protein 1 (Figure 3) and IGF Binding Protein 3 (Figure 4) during 10 days of Hyperimmune Egg (HIE) protein or Placebo (PLA) supplementation (mean ± SE). § denotes HIE significantly different (P<0.05) from Day 1. $ denotes HIE significantly different (P<0.05) from Day 8. ¶ denotes PLA significantly different (P<0.05) from Day 1.