



EFFECT OF ORAL IMMUNOGLOBULIN AND CYTOKINES ON SERUM CREATINE KINASE AND DELAYED ONSET MUSCULAR SORENESS



Bert H. Jacobson (FACSM), John H. Sellers, Taylor Monaghan
Health and Human Performance, Oklahoma State University, Oklahoma, USA

ABSTRACT

Delayed onset muscular soreness (DOMS) results from a combination of contractile tissue micro trauma, osmotic pressure changes, alteration calcium regulation, and inflammation. Muscle damage elevate the muscle-specific enzyme creatine kinase (CK). Immunoglobulin (IgY) mediates tissue inflammation which may serve to reduce the effect of exercise induced muscle soreness. **PURPOSE:** To compare the effect of oral consumption of IgY and placebo (Pl) on CK levels and perceived pain following induced DOMS. **METHODS:** Healthy college aged subjects (N=20) were randomly divided into an experimental group and a control group. On day 1 blood draws for CK were done followed by 14 days of supplementation of either IgY or Pl at the following doses: days 1-2 =4.5g, days 3-5 =9.0g, and days 6-14 =13.5g. Following the 14 d, DOMS was induced using both eccentric Biodex contractions (4x10 eccentric 300°/sec). and d lunges (3x10 at 65% BWT). Morning and evening perception of soreness was recorded via visual analog scales. After 48 hours, subjects reported for a second blood draw and strength assessment. **RESULTS:** The IgY group posted significantly ($p<0.05$) lower post-test CK levels than the Pl group (59.3 – 114.7 IU/L vs. 66.0 – 186.1 IU/L). Furthermore, the IgY group experienced significantly less post test perceived soreness than the Pl group. **CONCLUSION:** IgY supplementation lessens muscle CK levels and perceived muscle soreness following exercise, possibly due to an anti-inflammatory effect. Such an effect may facilitate the continuation of training intensity.

INTRODUCTION

DOMS results from microscopic tissue damage, and inflammation. Serum CK is an enzyme mainly found in striated muscle tissue and is elevated as a result of muscle damage, thus triggering an inflammatory response. Immunoglobulin (IgY) is an antibody formed by the immune system which mediates inflammation by acting as an anti-inflammatory agent. IgY Max Performance™ is natural, commercially available product developed from hyperimmune chicken egg yolks resulting from the hens being immunized. The hens pass their immunity (IgY) in a concentrated form into their eggs. IgY works through the immune system, decreasing the cytokine production via cytokine inhibitory factor (CIF), thus decreasing the inflammatory response so muscles can recover more quickly after acute bouts of exercise. In summary IgY provides the body with the immunoglobulin proteins and non-protein cytokine inhibitory factors so the body can recover faster, lessen the effects of DOMS, and increase strength, power, and endurance.

METHODS

College-aged subjects (N=20) were randomly divided into either a treatment or control group. Following blood samples, data was collected for peak muscular strength and endurance and subjective muscle soreness (DOMS). On a double blind format, subjects received a 2wk supply of either Igy or placebo. After 2 weeks, DOMS was induced by performing 4x 10 eccentric repetitions at 77-120°/sec. on a Biodex Dynamometer and 3x10 lunges (30%BWT). Subjects continued dosing with either IgY or placebo supplements for the next 2d. Subsequently, a post blood draw was conducted along with post muscular strength and endurance measures and subjective DOMS rating

RESULTS

One-way ANOVA statistical procedures yielded a significantly ($p<0.05$) lower post-exercise serum CK level in the IgY group when compared to the PL group (Figure 1). The PL group experienced a 182.0 % pre- to post- gain in serum CK while the experimental group increased only about half that amount (93.4%) (Fig 1). With respect to subjective ratings of perceived soreness the IgY group noted less soreness for each of the observations. The IgY group demonstrated significantly ($p<0.05$) lower DOMS than the placebo group for observations 3 and 4 (Fig 2). On the final day of observation the difference in DOMS from baseline was 97% (35 points) and 18% (6 points) for the PL and IgY groups respectively.

CONCLUSIONS

Several previous studies have attempted to attenuate the increase of CK and the onset of DOMS after an acute bout of exercise by pre-ingestion of selected anti-inflammatory supplements. Indeed, researchers have tried several substances such as ginger, cinnamon, curcumin, black currant nectar, Panax notoginseng, and branch-chain amino acids, all with varied results .Based on these data it appears that IgY mediates the inflammatory response following induced muscular soreness by reducing the volume of post exercise serum CK. Paralleling the attenuation of post exercise CK was the reduction of perceived muscular soreness in the treatment group, but not in the placebo group. These data appear to support the use of immunoglobulin supplementation prior to exercise in order to reduce DOMS. A reduction in DOMS may allow the participant to continue training at a higher level.

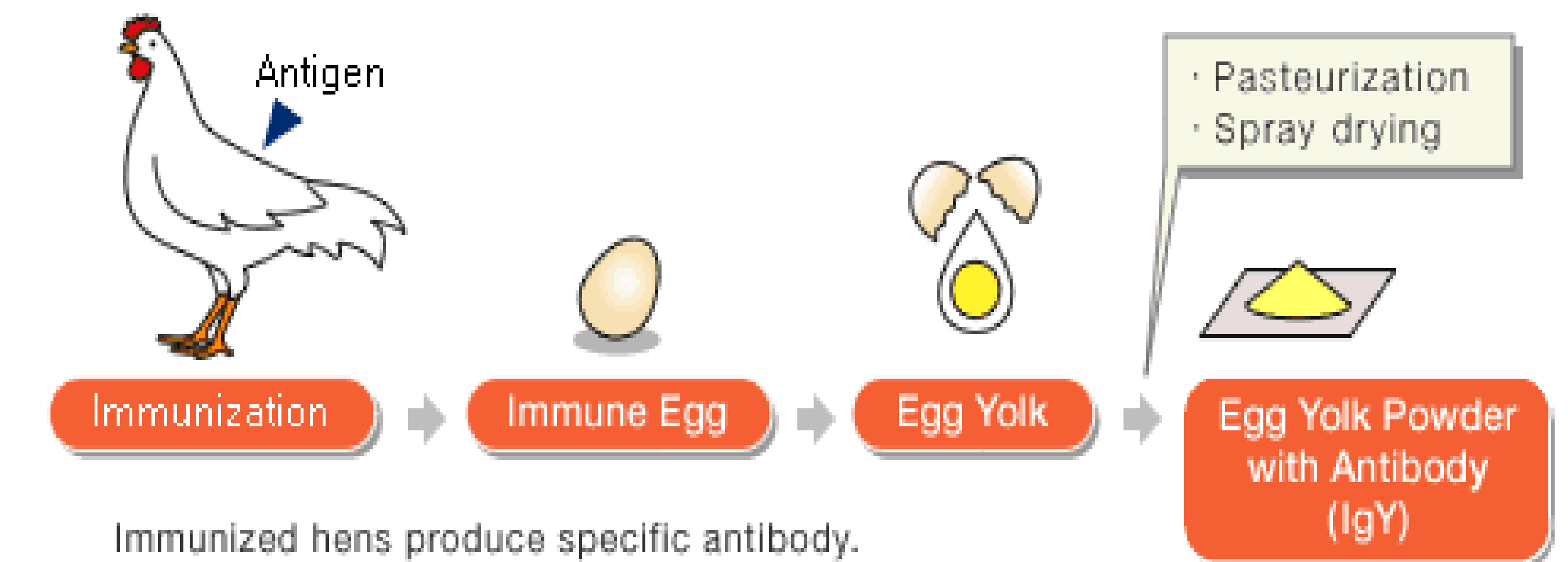


Figure 1. Pre- and Post-test serum creatine kinase (U/L) by group following induced DOMS.

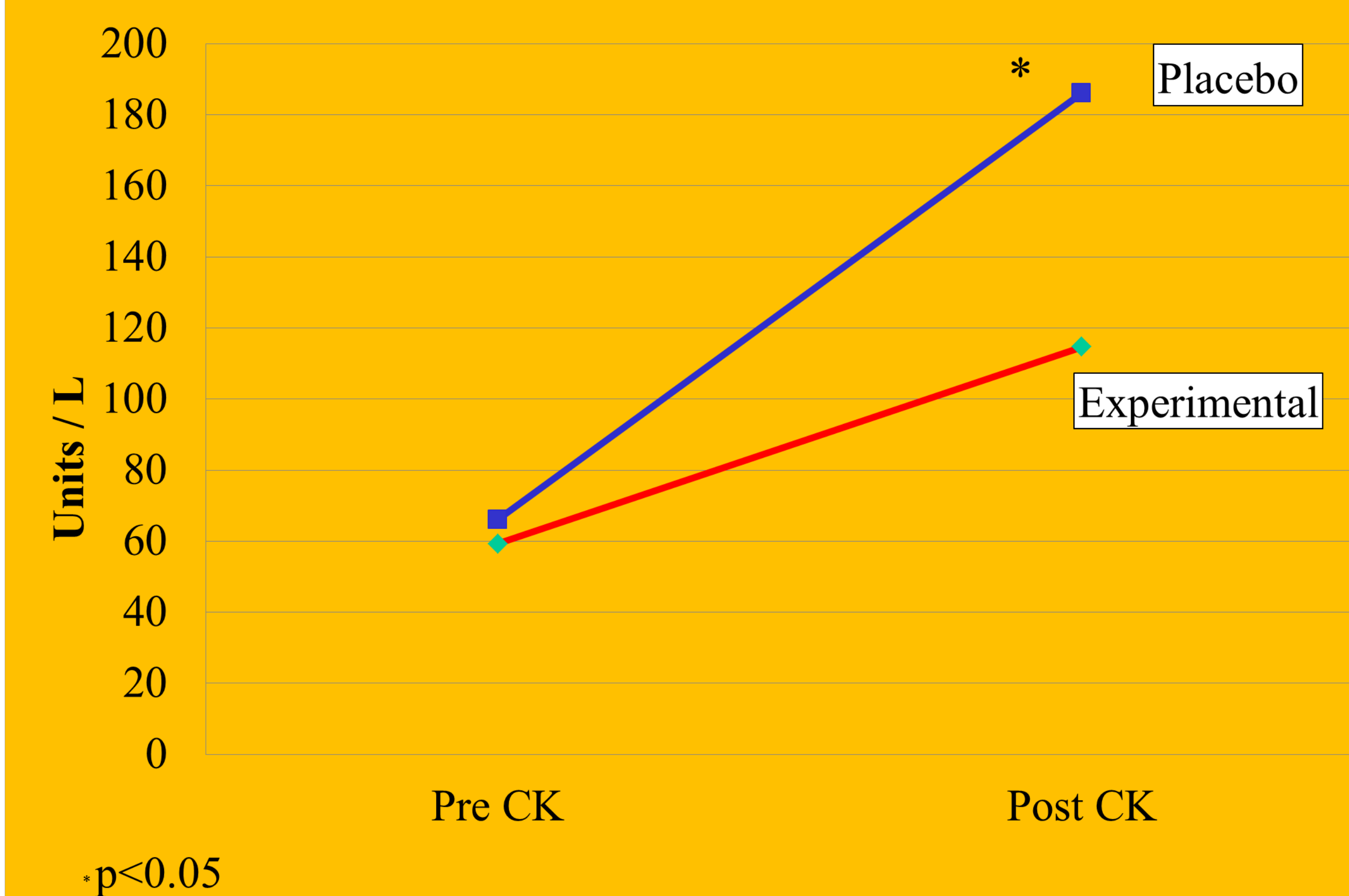


Figure 2. Rating of DOMS over time by group.

