

# Effects of a “Holographic” disk on Delayed Onset Muscle Soreness and Performance: a Pilot Study

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## ABSTRACT

Zero Quantum, (Suwanee, GA) has developed a “holographic” disk that is placed on the traditional Chinese medicine (TCM) acupressure points. The “Relief” disk version is touted as an alternative to medicine proposed to relieve pain from muscle strains, sprains, and delayed onset muscle soreness (DOMS). In addition, any pain relief function should be reflected in better performance 24-hrs after a novel exercise. **PURPOSE:** To determine if “encoded holographic data disks” at TCM acupressure sites would alleviate the pain and discomfort commonly associated with DOMS, as well as enhance weight lifting performance. **METHODS:** Ten healthy men and women (n = 5 female, 5 male; 27 ± 3 years, 176.1 ± 8.3 cm, 78.2 ± 17.0 kg, 14 ± 7.5% body fat) performed three sets to failure of six different exercises in this counter-balanced, repeated measures, double blind placebo-controlled pilot study. After reaching volitional fatigue for three sets of either upper- or lower-body exercises, either a placebo (Pla) or real disc (DISC) was placed according to manufacturer’s directions for pain relief. Participants reported back 24-hrs later and repeated the protocol. After a 7-day washout period, participants returned and were tested with a different disc, with a different set of exercises, on a different part of the body. A pain scale, OMNI RPE and Rating of Perceived Recovery (RPR) and z-score for pre-post change in total reps were compared. **RESULTS:** A paired t-test revealed that DISC yielded significantly (p = .01) higher repetitions for all exercises combined (DISC z = 0.17 ± 2.12; Pla = -2.35 ± 2.77). RPR was higher (felt more recovered) (p = .03) for DISC (6.1 ± 1.9 vs. 4.7 ± 1.9) and OMNI RPE was lower (p = .04) (felt they didn’t have to work as hard) for DISC post (8.0 ± 0.9 vs. 8.9 ± 0.9); but pain sensations were not different (p = .21). **DISCUSSION:** Follow-up studies with larger samples examining pain, strength and recovery in trained weight lifters are needed to determine if this new approach to recovery is effective.

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## INTRODUCTION

Delayed-onset muscle soreness (DOMS) is the feeling of discomfort within the skeletal muscle occurring after a bout of unaccustomed exercise.

The most accepted treatment for DOMS is analgesics, e.g. Ibuprofen.

Home remedies typically include the use of topical lotions and creams, the application of heat, and deep tissue massage.

It is well accepted that DOMS impairs muscular performance.

In Asia acupuncture/acupressure has been an accepted form of medical treatment for pain relief for roughly 2000 years.

The company Zero Quantum, has developed a holographic data disc that is used on traditional Chinese medicine (TCM) acupressure points.

The company implies that with the use of their disc one can manage pain without the use of any drugs, when the discs are placed at the appropriate TCM acupressure points.

Because pain has been shown to impact performance, if the Zero Quantum “relief” disc is a viable recovery agent we hypothesize that compared to placebo, we will see significant recovery at 24 hours post unaccustomed exercise.

Therefore the purpose of this pilot investigation is to determine if the placement of encoded holographic discs at the appropriate TCM sites can alleviate the discomfort commonly associated with DOMS as well as enhance performance during 3 trials to failure.

## Statistical Analysis

An a priori alpha level of P ≤ 0.05 was established.

Power analysis revealed that 16 participants would be needed for a full study.

Because upper- and lower-body performance measures have different variances a composite Z-score was used to allow comparisons between placebo and disc treatments.

A paired t-test was performed to determine differences in pain, perceived recovery, rating of perceived exertion, and performance.

## METHODS

### Participants

- N = 10 (5 female, 5 male) Healthy Active individuals, not currently resistance training. Mean ± SD Age = 27 ± 3 y 176.1 ± 8.3 cm, 78.2 ± 17.0 kg, 14 ± 7.5% body fat.

### Procedures (3 Sessions, Lasting ~ 40 min each)

### Randomized, Double-Blind, Counterbalanced Placebo Controlled

- Session One – Determination of 10 rep max.
  - A light load of 15 repetitions was used for warm-up.
  - Initial load estimated by participant to determine 10 Rep max.
  - Following a 4-min rest period, weight was then adjusted by 2.3 to 5.6kg (depending on the machine).
  - Weights were adjusted till the participant reached volitional fatigue on the 10<sup>th</sup> repetition.
  - Exercises were acutely novel to the participants.

### - A seven day wash-out period was adhered to ensuring no lingering DOMS.

### - Session Two and Three – Induction of DOMS and Performance Testing

- After reaching volitional fatigue for three sets of either upper- or lower-body exercises, either a placebo or an encoded disc was placed according to manufacturer’s directions for pain relief.
- Participants reported back 24 hours later and were tested for performance.
- Participants completed the same exercise completing 3 sets to failure.
- The difference in number of repetitions completed was used to calculate the Z-scores for performance.
- After a 7-day washout period, participants returned and were tested with a different disc, with a different set of exercises, on a different part of the body.

### The Following Resistance Exercises were employed to induce DOMS. All exercises were completed using Cybex Selectorized Machines

- **Upper-body Exercises**
  - Bench Press
  - Triceps Curl
  - Biceps Curl
- **Lower-body Exercises**
  - Seated Leg-Press
  - Seated Leg-Extension
  - Prone Leg-Curl

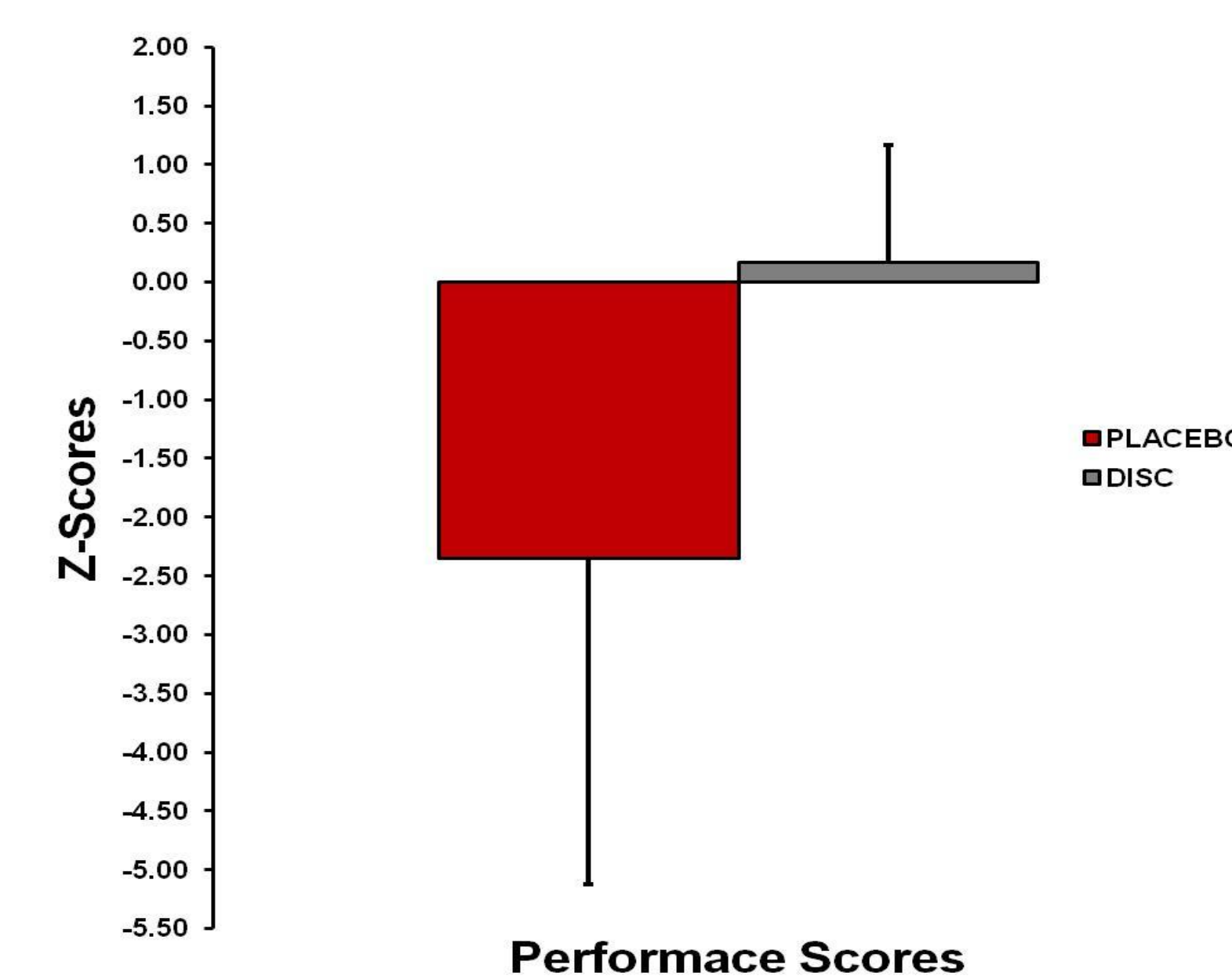
## RESULTS

**A Significantly (p = 0.01) higher number of repetitions for all exercises combined was observed for the disc condition when compared to placebo (Disc Z = 0.17 ± 2.12 vs. Placebo -2.35 ± 2.77) Figure 1.**

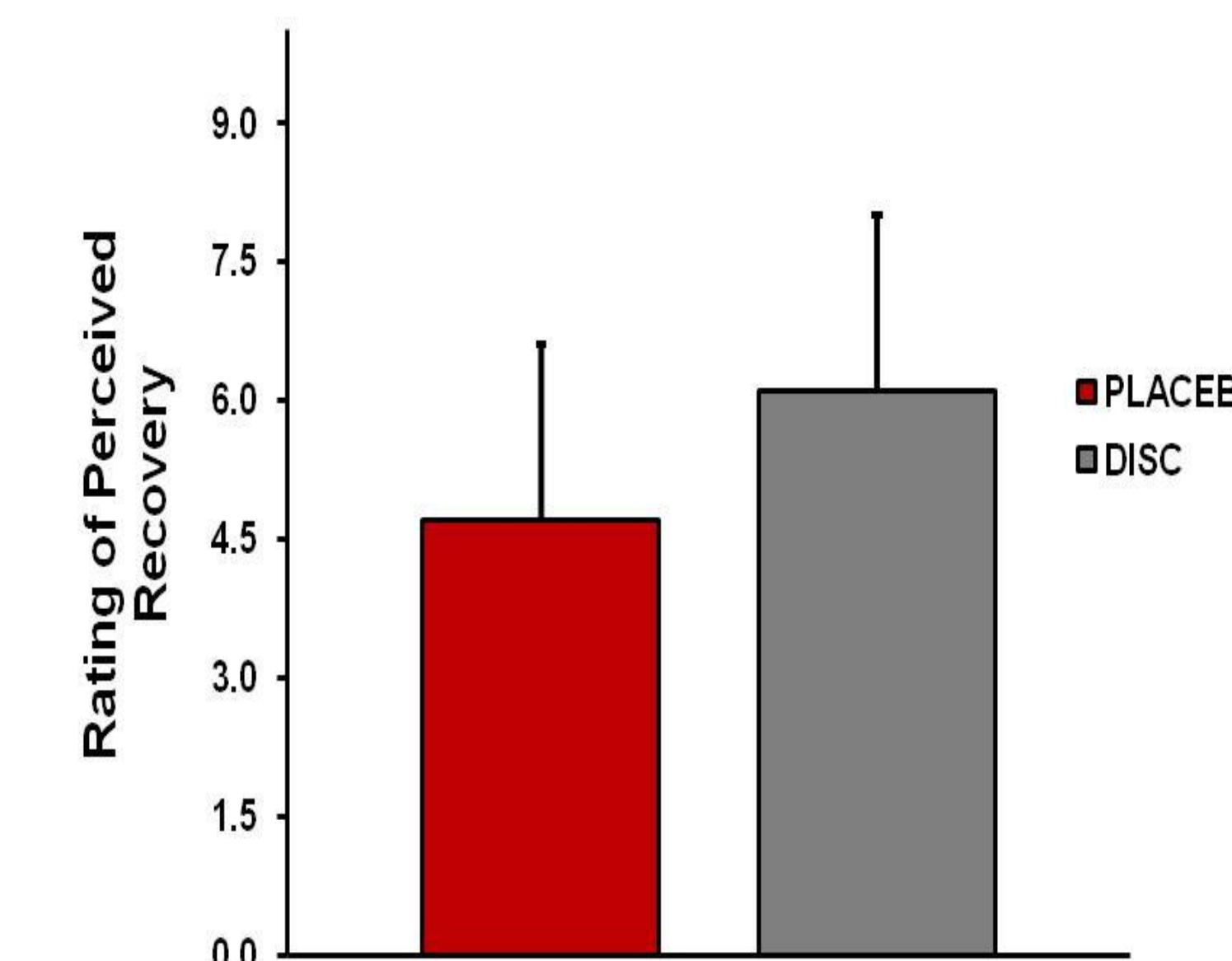
Rating of perceived recovery a subjective measure of how the participant thought they would perform was significantly higher (p = 0.03) for the disc condition when compared to placebo (Disc 6.1 ± 1.9 vs. 4.7 ± 1.9) Figure 2.

OMNI RPE was lower (p = 0.04) for the disc condition when compared to the placebo condition (8.0 ± 0.9 vs. 8.9 ± 0.9) Figure 3.

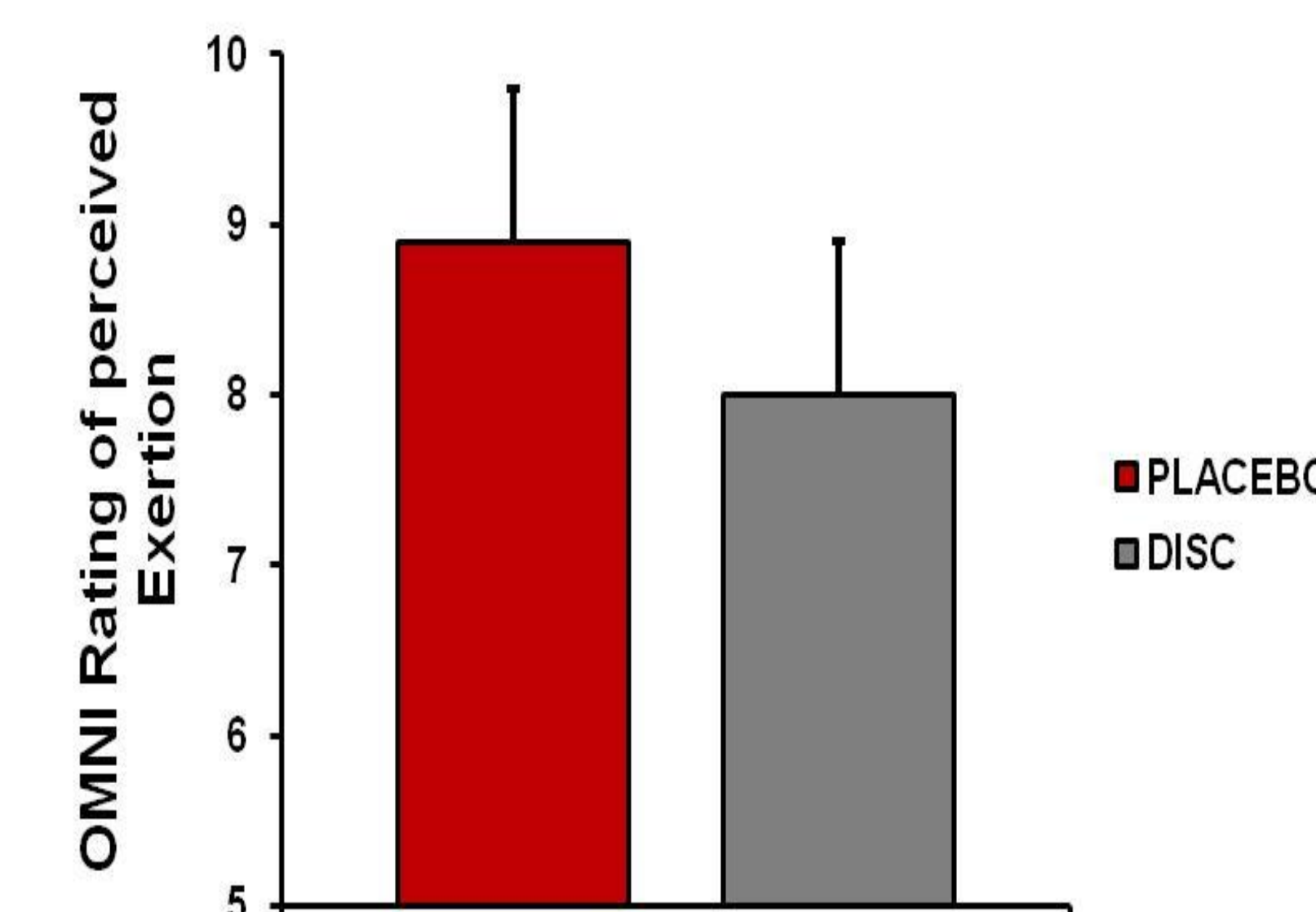
Rating of pain sensation was not statistically different (p = .21)



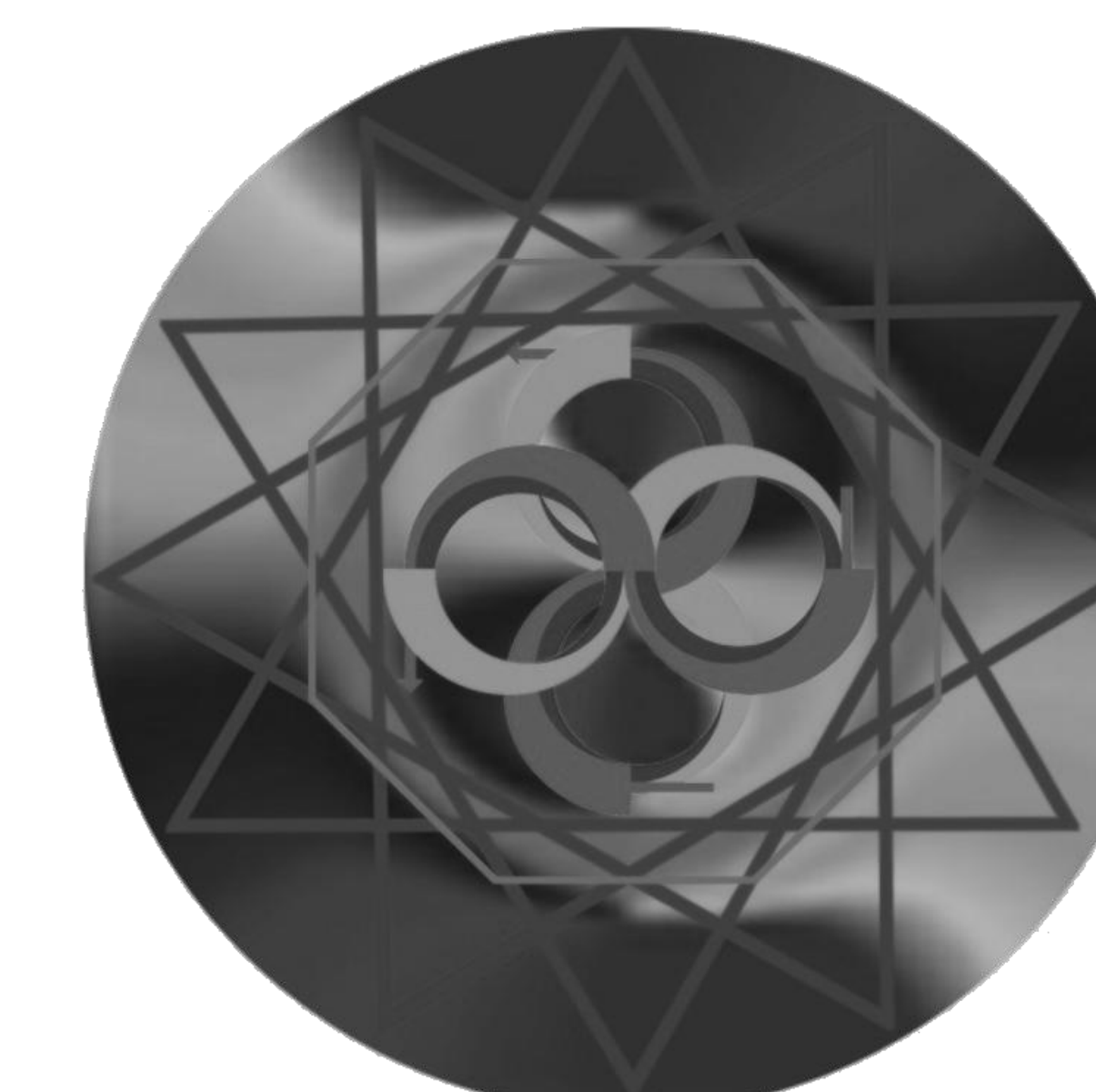
**Figure 1** Performance scores, (number of repetitions for all exercises combined) Scores are mean Z-scores plus or minus standard deviations. Conditions were significantly different (P = 0.01).



**Figure 2** Rating of perceived recovery scores, (subjectively how the participant thought they would perform) Scores are means plus or minus standard deviations. Conditions were significantly different (P = 0.03)



**Figure 3** OMNI rating of perceived exertion scores. Scores are means plus or minus standard deviations. Conditions were significantly different (P = 0.04)



**Figure 4** Graphical representation of the holographic imprint on the data recorded discs.

## DISCUSSION

We found that the “Holographic” disc significantly (P = 0.01) increased muscle endurance following a novel bout of exercise designed to induce DOMS, regardless of whether upper- or lower-body muscles were used.

Overall perception of effort was lower with the holographic discs relative to placebo.

Perceptions are important both in positive and negative aspects. Being less sensitive to effort may allow the participant to work harder, however, misperceiving effort may lead to over-training.

The greatest limitation to this study was the lack of a clear physiological mechanism for the results observed.

The results should be interpreted with caution. This is a small sample size and inferential statistics only state probability, not surety.

The results of this pilot study warrant a comprehensive follow-up study with larger samples examining pain, strength, endurance, and recovery in trained weight lifters to determine if this novel approach to recovery is effective.