The Effects Of Contrast With Compression Therapy On Muscle Recovery Post Exercise
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Intense eccentric exercise causes muscle damage that leads to a decrease in subsequent performance. Accelerating muscle recovery between bouts of exercise minimizes the risk of injury and is essential for optimal athletic competitive performance.

**PURPOSE:** The purpose of this study was to determine if the contrast with compression (CwC) therapy proprietary device by Solid State Inc was able to improve muscle recovery post intense eccentric exercise.

**METHODS:** Ten physically active men (age = 21.3 ± 2.1 years; height = 182 ± 8.5cm; weight = 88 ± 19.5kg; body fat = 17.2 ± 7%) completed two separate single-arm elbow flexor workouts on an isokinetic dynamometer. After one workout each participant received contrast with compression therapy immediately after, 24h and 48h after the workout. After the other workout the same person received no treatment (CON). Post-exercise recovery of selected characteristics were measured at 1h, 24h, 48h and 72h. Comparisons were made between the CwC and CON groups using a Mixed Model ANOVA with repeated measures to identify time effects and an ANCOVA was used to identify interaction effects. A Bonferroni post-hoc test was used to assess timepoint differences in between interventions in recovery post eccentric exercise. A p<0.05 was used for all analysis.

**RESULTS:** CwC therapy post exercise resulted in a significantly faster recovery rate of strength and power to baseline levels (p=0.00) as well as a greater recovery of overall relative strength (p<0.004). Treatment with CwC significantly suppressed the post-exercise inflammatory response (p=0.05) and significantly reduced the secondary muscle damage response as measured by levels of Creatine Kinase post exercise. CwC therapy also resulted in a significantly quicker recovery of the maximal elbow flexion range of motion (p=0.00) within the hour post exercise. Lastly, participants experienced significantly less soreness 48 hours and 72 hours post-exercise with CwC therapy.

**CONCLUSION:** Contrast with compression therapy significantly increases the recovery rate of muscle strength and power post eccentric exercise. CwC is also effective at reducing exercise associated muscle damage, delayed onset muscle soreness and mitigates the loss of range of motion post intense exercise.

An Examination Of The Effects Of Various Procedures To Improve Delayed Onset Muscle Soreness
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**PURPOSE:** To examine the acute effects of various recovery methods on delayed onset muscle soreness (DOMS).

**METHODS:** Following intense DOMS-inducing exercise, nine males (age = 23.6 ± 2.4 years) were exposed to three treatment conditions (foam rolling (FR); body tempering (BT); blood flow restriction (BFR)) or control in a random order. Resting blood pressures were observed and recorded each laboratory visit. Subjects warmed up with a 5-minute treadmill walk at a speed of 3.5 mph at 0% grade and performed three vertical jump (VJ) tests. The DOMS protocol consisted of 5 sets of leg extensions at 85% 1RM until failure. Each repetition required a one-second of concentric contraction followed by a four-second of eccentric contraction. Soreness levels were objectively (Force Gauge; FG) and subjectively (Likert Scale; LS) measured. Participants received a randomized treatment 24 and 48 hr. after their respective exercise session for a 20-minute period. VJ tests identical to the pretest were executed prior to treatment and 24 and 48 hr. after each treatment. A leg extension endurance test was performed until failure 48 hr. after treatment.

**RESULTS:** Significant time main effects (p<0.05) were indicated for subjective and objective pain perception. VJ values were significantly lower 48 hr. after inducing DOMS compared to the values recorded on the first day (p<0.05). Our results also demonstrated that FR significantly increased muscular endurance performance when compared to the BFR treatment (p<0.05) and there was a trend for improved endurance performance for FR compared to control (p=0.06). Furthermore, a trend for a better endurance performance existed when using BT treatment as opposed to control (p=0.06).

**CONCLUSION:** This study suggests that FR was a more effective treatment method compared to BFR. Prior research suggests that applying external pressure to muscle following DOMS may aid in muscle adhesion separation, promote vasodilation and O2 delivery, and stimulate mitochondria and energy production due to increased blood volume. Therefore, our findings also indicate that FR and BT may serve as practical modes of treatment for DOMS due to one or a combination of factors such as improved O2 delivery, increased waste product removal from the muscle, and augmented restoration of the muscles’ length-tension relationship.

Effects Of Different Non-pharmacological Methods On Recovery From Delayed Onset Muscle Soreness
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**PURPOSE:** To investigate the effects of diverse recovery methods on delayed onset muscle soreness (DOMS) and muscle performance.

**METHODS:** Ten physically active men (age = 21.4 ± 3.2 years; height = 173.3 ± 7.7 cm; weight = 81.5 ± 17 kg) participated in a crossover study with three randomized recovery treatment methods that were foam rolling (FR), Theragun (TGUN), or vibration platform (VP). The first session started with a 5-min seated rest, followed by the recording of the subjects’ resting systolic blood pressure (RSBP) and heart rate (HR) values. The subjects warmed-up on a treadmill at 4.5 mph, 0% gradient, for 5-min. Three trials of vertical jump (VJ) test were performed and the best jump performance was recorded. Subjects continued to leg extensions, which consisted of 1 warm-up set and then 4 sets at 80-85% of one repetition maximum (1-RM) until failure to induce DOMS. Rep tempo involved 1-sec concentric and 3-sec eccentric contractions. Subjects returned on day 2 which included 5-min rest followed by RSBP and HR measurements, then soreness levels were measured with Likert scale and Forge Gage. The subjects warmed-up on a treadmill, followed by the recovery method chosen for that session. VP consisted of 10 1-min sets with 1-min rest in between. FR and TGUN were used for 10-min on each side of the lower limb with 1-min rest in between. Following recovery methods, subjects repeated VJ test and leg extension exercises and number of reps were recorded. The exact procedure of day 2 was performed on day 3.

**RESULTS:** A significant main effect for condition with the VP method showing higher RSBP values than the TGUN (p<0.01). There were significant condition*time interaction and condition and time main effects for the total number of reps (p<0.03). A higher number of reps performed following TGUN compared to VP and higher number of reps were performed on day 1 compared to day 2 (p<0.03), with no contrast between day 1 and day 3. Significant time main effect was also seen in VJ values, suggesting day 1 values were higher compared to day 2 (p<0.05) and day 3 values (p<0.05).

**CONCLUSION:** The results suggest that TGUN is an effective recovery method for reducing soreness, which can be attributed to higher muscle adhesion breakdown, and/or increased blood flow and O2 delivery to the muscle, and/or reduced pain perception due to inhibition of nociceptor activity.