

**TITLE**

The Effect of a Periodized Contrast Water Therapy Protocol on Muscle Recovery Following a Bout of High Volume Resistance Training: Pilot Study

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## INTRODUCTION

Contrast water therapy (CWT) has become a common post exercise recovery strategy among athletes to alleviate the delayed onset of muscle soreness and promote recovery. During CWT athletes alternate between cold and hot water immersion after a strenuous exercise bout. CWT can induce rapid changes intra-muscular hydrostatic pressure, which may alter blood flow in immersed musculature and improve the removal of metabolic waste products. However, a number of authors have concluded that further investigation of CWT is required to discover the optimal cold:hot ratio, temperature, duration and frequency practice (Vaile et al., 2008).

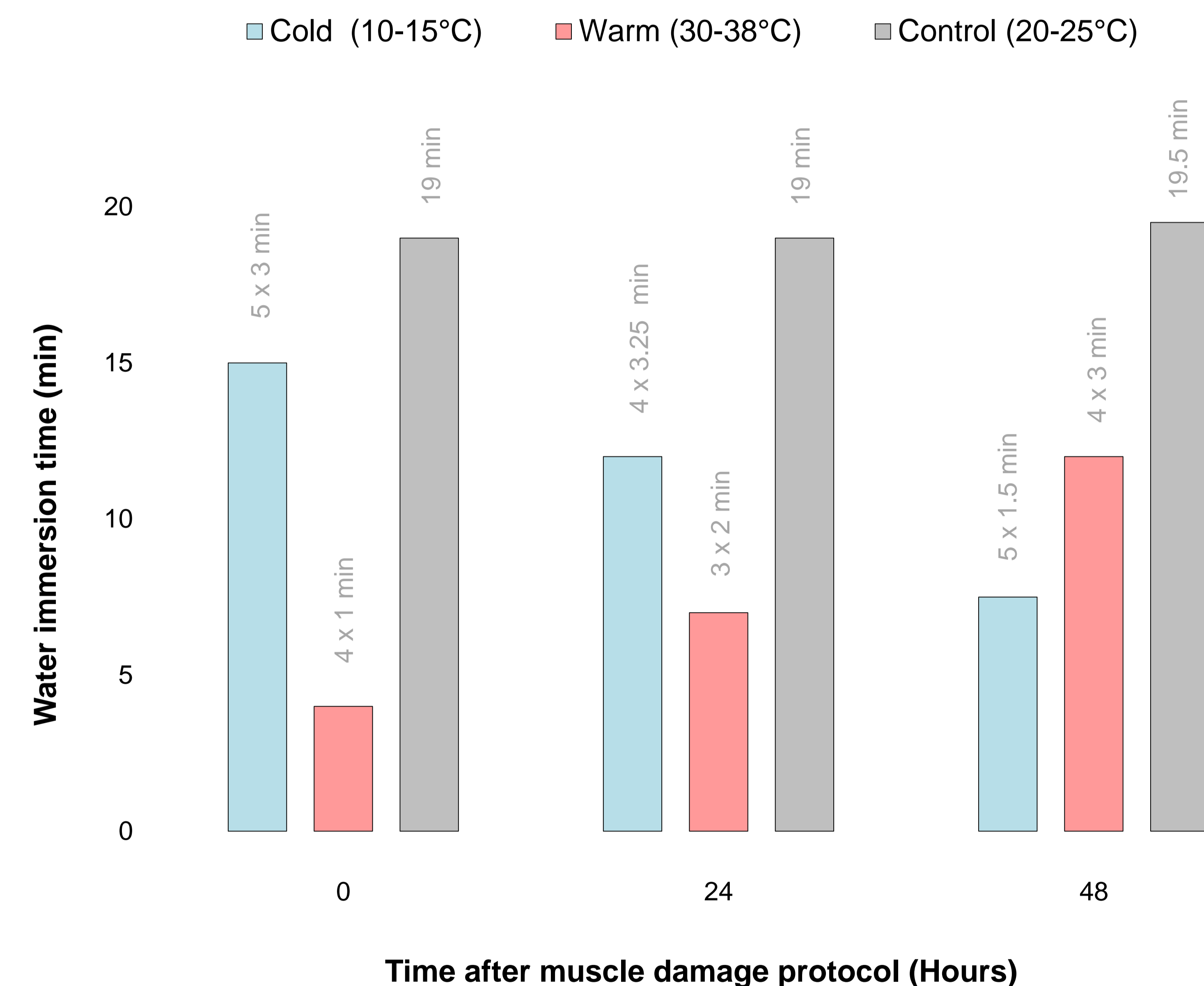
The aim of the present study was to investigate the effect of a periodized CWT approach, whereby the ratio of cold:hot water exposure was modified between sessions by systematically increasing hot and decreasing cold exposure durations.

## METHODS

Twenty healthy male subjects (aged 18-30 years) were alternately allocated to the control or CWT group. Following a resistance training protocol of 10 x 10 repetitions of calf raises, with a load equating to 10% of the subjects body mass, the participants underwent their recovery protocol immediately, 24 and 48 hours post exercise. Creatine kinase (CK), muscle soreness (visual analogue scale) and swelling (calf circumference) was measured before each recovery protocol. Both protocols involved the complete immersion of the gastrocnemius within water tanks during seated rest.

The total immersion time for each session was 19±0.5 minutes in both groups. The CWT protocol alternated between cold (10-15°C) and hot (30-38°C) water. The cold:hot ratio was decreased between sessions. The control group remained within the thermo-neutral (20-25°C) water during all sessions.

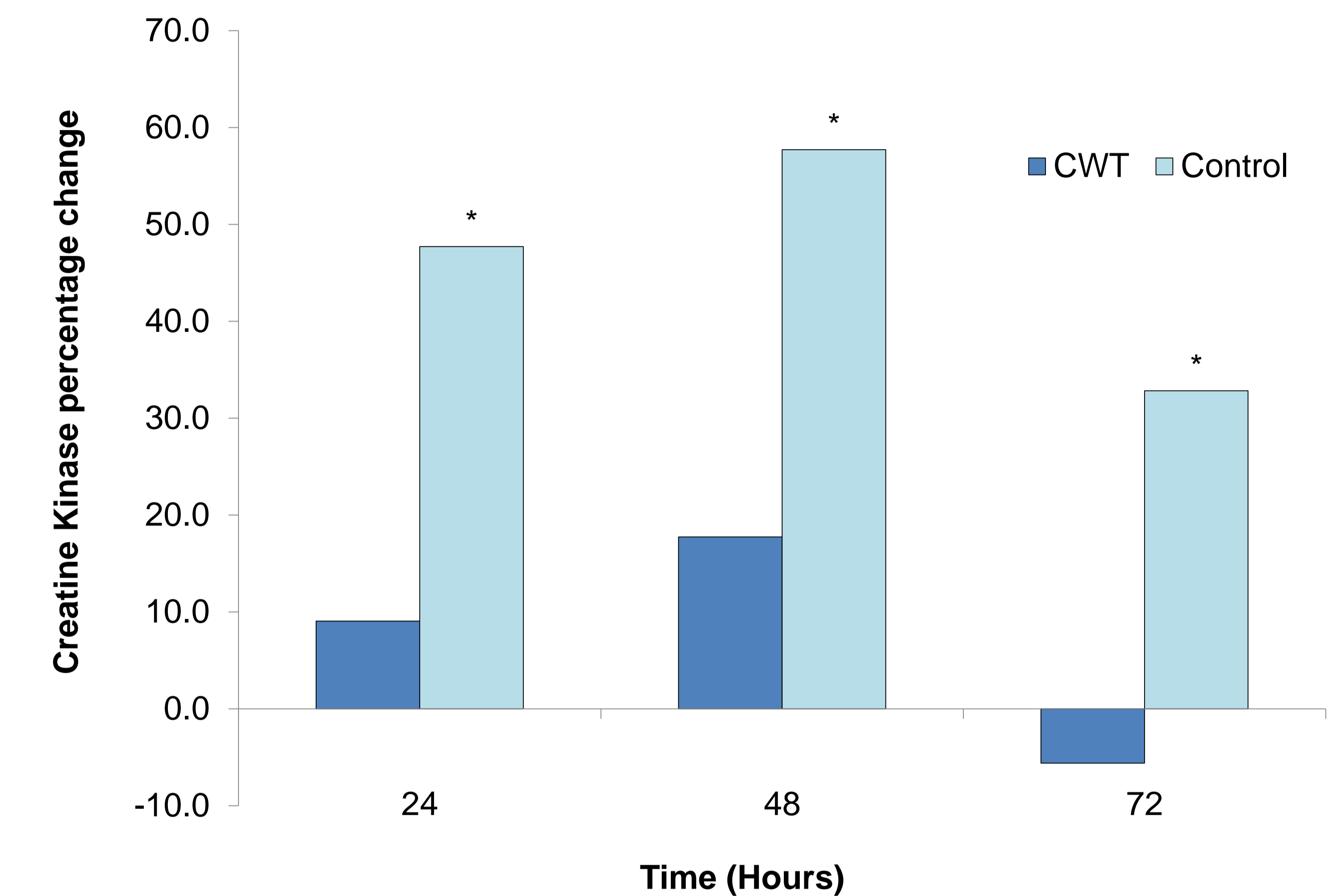
Figure 1. Periodized CWT protocol



## RESULTS

CK and perceived soreness values were significantly reduced ( $p < 0.05$ ) in the CWT group at 24, 48 and 72 hours in comparison to the control group. However, there was no significant difference in calf circumference (swelling) between conditions.

Figure 2. Creatine kinase percentage change mean from baseline



\*Significant difference between CWT and control conditions ( $p < 0.05$ )

## CONCLUSIONS

A periodized CWT protocol promotes a greater localised muscle recovery response compared to a thermo-neutral water immersion protocol following a high volume resistance training protocol.

## REFERENCES

Vaile, J., Halson, S., Gill, N., & Dawson, B. (2008). Effect of hydrotherapy on the signs and symptoms of delayed onset muscle soreness. *European Journal of Applied Physiology*, 102, 447-455.

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