

Effects of DhamaSPORT™ Cooling Band Technology on Recovery from Exercise-Induced Heat Stress Associated with Firefighting Personal Protective Equipment (PPE)

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The cardiovascular strain associated with firefighting can be extreme due to the high work demand, environmental heat stress, and impaired heat dissipation associated with wearing PPE. Thus understanding ways of enhancing recovery from firefighting is paramount. Recent work in the field suggests that use of the novel DhamaSPORT™ cooling bands might enhance recovery from live firefighting, but has yet to be tested in a controlled environmental setting. **PURPOSE:** To determine the effects of the DhamaSPORT™ cooling bands on recovery from Exercise-Induced Heat Stress associated with wearing PPE. **METHODS:** 8 male participants (23 ± 5 years old, 176 ± 4 cm tall, 84 ± 12 kg mass, BMI 27 ± 3 kg/m²) completed two trials, in which they walked for 30 min at 3 mi/hr, 5% grade while wearing full firefighter personal protective equipment (PPE; pants, jacket, hood, helmet, gloves, and self-contained breathing apparatus (SCBA)), while heart rate (HR, Polar H7), core temperature via telemetry pill (T_{CO}), thermal sensation (TS, 0-8), and rating of perceived exertion (RPE, 0-10) were recorded. Immediately after exercise, the jacket, gloves, helmet, and SCBA were removed, they were seated, and a DhamaSPORT™ cooling band was placed on their wrist during the recovery period of each trial. The band was only activated during one trial, and the order in which trials were completed was randomized. HR, and T_{CO} were recorded every 30 sec until HR returned within 15% of resting. Pre- and post-exercise, indices of heart rate variability (i.e. RMSSD, LnRMSSD, SDNN, NN50, and pNN50) were recorded (Elite HRV). **RESULTS:** During exercise there were no significant differences in HR, T_{CO} , TS, or RPE between trials ($p > 0.05$). Time to recovery was not significantly different with the band active (473 ± 299 vs. 484 ± 295 sec, control vs. cooling, $p > 0.05$). During recovery, there was no significant differences in T_{CO} or HR ($p > 0.05$). At recovery, T_{CO} tended to be lower (37.7 vs. 37.5°C), HR (Figure below), NN50, and pNN50 also tended to be lower with the band active. These trends may reach significance with a larger sample size. Participants tolerated and enjoyed the cooling band during recovery. **CONCLUSION:** Use of the DhamaSPORT™ cooling band after exercise-induced heat stress might contribute to enhancing recovery of core temperature, HR, and some indices of heart rate variability. Thus, using the DhamaSPORT™ cooling band is an acceptable means of improving comfort and recovery from exercise.

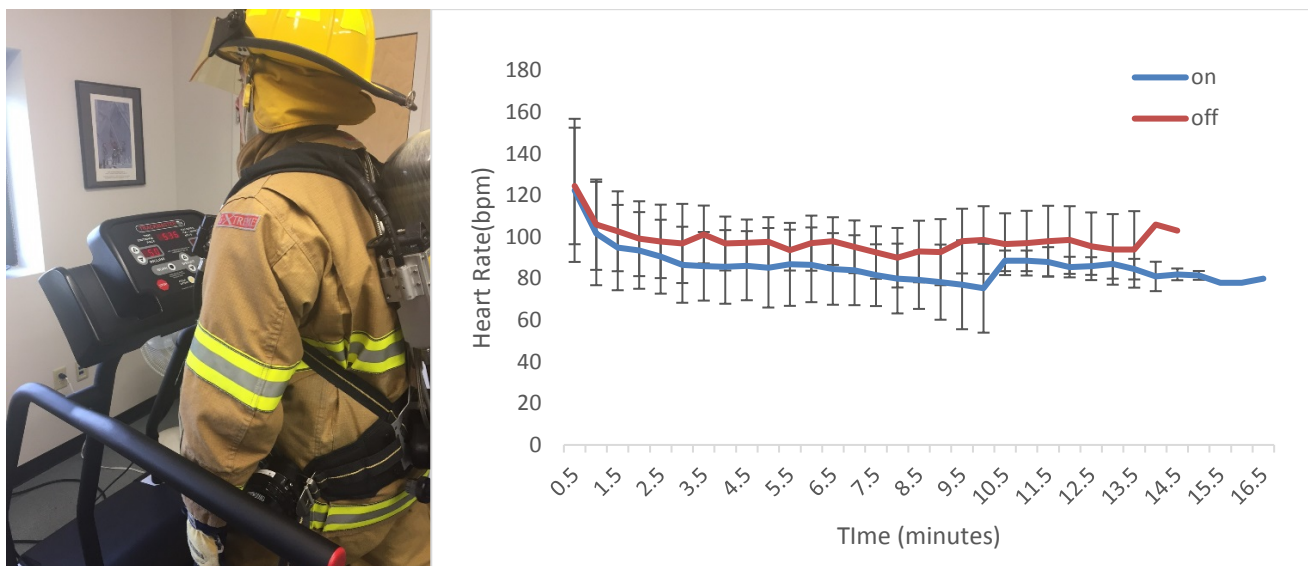


Figure 1. Left Panel: Participant During Exercise Trial, and Right Panel: Heart Rate During Recovery from Exercise in Full Fire Fighting PPE (n=8).