

Impact of a 10km cold water swim on Norwegian Naval Special Forces recruits

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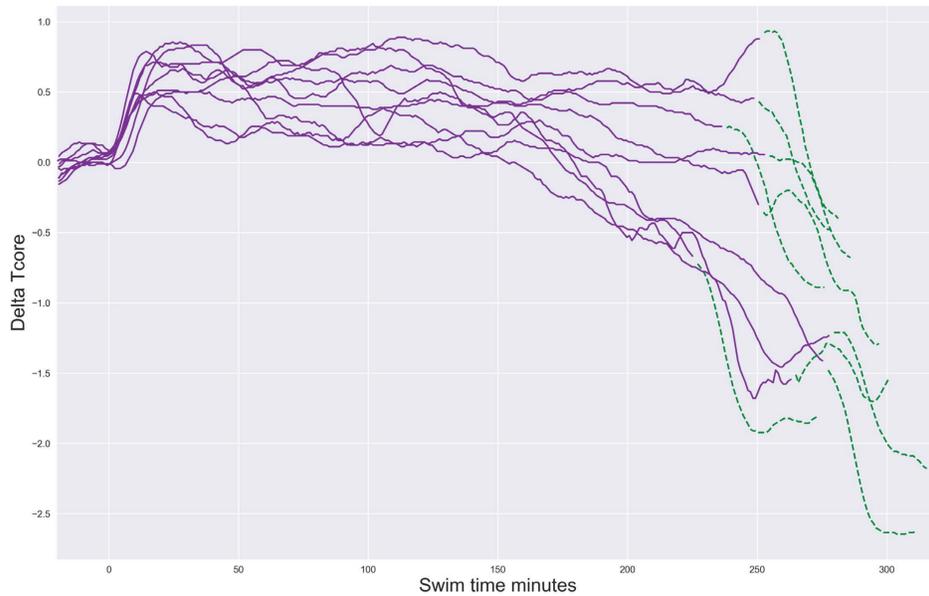


Fig. 1. Delta core temperature during the exercise. Green dotted line is after exiting the water.

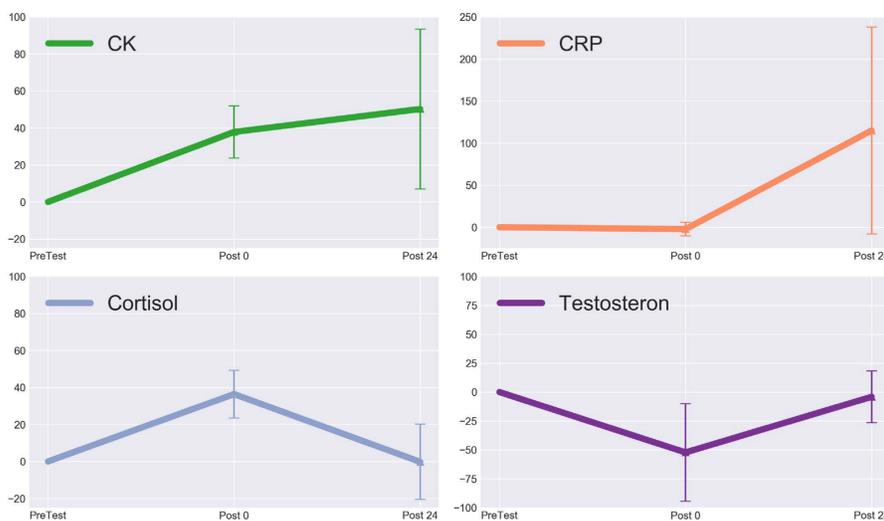


Fig. 2. Biomarkers change in %. Before swim start (Pre Test), immediately out of the water (Post 0) and the day after the swim (Post 24)

Background

Special forces operators are often exposed to extreme environmental conditions. Exposure to cold water increase stress, and can lead to potentially harmful reduction in core body temperature. However, the knowledge is limited about how cold water induced hypothermia affect performance in special forces operators.

Material and Methods

Nine (age=23.9±2.1 years and weight=83.3±6.8 kg) recruits at the qualification program for the Norwegian Special Operations Command (NORNAVSOC) volunteered to participate in the study. As part of their their training in the qualification program, participants completed a 10,000m open water swim. Average water temperature was 5°C, and the swim was performed with dry suit, fins and diving mask. Body core temperature (Body Cap) and skin temperature at the left arm (iButton) was measured continuously and sampled at 1-min intervals during, and 30 min after the swim. Before the swim, immediately after, and 24 hours after the swim, grip strength of both hands, and countermovement jump height was measured. Blood samples were collected at the same time points, and analysed for Creatinine Kinase (CK), C-Reactive Protein (CRP), Cortisol and Testosterone. Dexterity was tested with the participants assembling two separate, different sized pairs of washers, nuts and bolts in the fastest possible time. Reaction time was measured with the STROOP test. Body composition was measured before the swim (InBody 720). Statistics was performed with Magnitude-based Inference (MBI) method.

Results

The main findings were: 1) There was a clear reduction in core temperature during the exercise (-1,5±0,8) (Fig.1). 2) Dexterity was decreased after the swim, with the time taken to assemble the washers, nuts and bolts increasing by 249%. 3) Immediately after the swim, testosterone was reduced by 52%, and cortisol elevated by 36.4%, but both returned to baseline levels after 24h. CRP did not change after the swim, but increased by 114% after 24h. CK was elevated by 37% after the swim, and then continued to increase to 50% after 24h. 4) Hand grip strength and jump height were both reduced after the swim (37.2% and 14.4%, respectively), both returned to baseline levels within 24h. 4) There was a negative correlation between body fat percentage and the reduction in core temperature (r=0.39), and between the reduction in core temperature and post-swim jump height (r=0.54).

Conclusion

The results show a decline in several variables after the swim, which could have a meaningful impact on the planning of the training and operations of special forces. Hence, a gradual reductions in core temperature seem to affect the operators immediate performance. However, higher body fat may prevent against a large drop in core temperature.