



Heat strain in professional firefighters: physiological responses to a simulated smoke dive in extremely hot environments and the subsequent recovery phase

Firefighters risk heat strain during occupational tasks when exposed to extremely hot environmental conditions and performing high-intensity work. Relevant training scenarios are therefore essential. This study investigated the effect of a single simulated smoke dive and the following recovery phase on physiological and perceptual responses.

Methods

Nineteen professional male firefighters performed a 15-min simulated smoke dive in a two-floor heat chamber (110°C to 272°C) (HEAT), followed by a 5-min stair walk outside the heat chamber. Heart rate (HR), core temperature and skin temperatures were registered continuously during the test.

Results

Core temperature increased from the start ($37.5 \pm 0.3^\circ\text{C}$) to the end of HEAT ($38.4 \pm 0.4^\circ\text{C}$) and further increased after the heat exposure ($39.6 \pm 0.5^\circ\text{C}$). The HR also increased from the start (92 ± 14 bpm) to the end of HEAT (185 ± 13 bpm) and after the heat exposure to a maximum of 190 ± 13 bpm. The simulated smoke dive induced high physiological strain on the firefighters, and the increase in core temperature and HR after the hot exposure must be considered during live fire events when repeated smoke dives are required.

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