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[abstract only]**

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# Efficacy of intermittent cooling strategies during tennis-specific treadmill exercise in hot, humid conditions

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Environmental conditions  $\geq 30^{\circ}\text{C}$  wet-bulb globe temperature (WBGT) increases thermoregulatory and physiological demands for tennis players increasing the risk of heat related medical callouts (Smith et al. 2018, *Journal of Science and Medicine in Sport*, 21(5), 467-472). The aim of this study was to assess the efficacy of cooling strategies in alleviating thermal strain during simulated tennis match-play in a hot environment. Following institutional ethics approval, nine healthy, male amateur tennis players (mean  $\pm$  SD: age  $26 \pm 5$  years, stature  $180 \pm 45$  cm, body mass  $77.7 \pm 6.9$  kg;  $\dot{V}\text{O}_2\text{max}$   $52 \pm 6$  ml $\cdot$ kg $^{-1}\cdot$ min $^{-1}$ ) completed the tennis-specific treadmill protocol (TSTP) (Debney et al. 2018, *Journal of Sport Sciences*, 36:sup1, 1-94) five times in hot, humid conditions ( $36.3 \pm 0.7^{\circ}\text{C}$ ,  $51.3 \pm 1.5\%$ ,  $30.8 \pm 0.4^{\circ}\text{C}$  WBGT): cold water (CW); ice slurry (SLU); ice towel (TWL); ice towel and slurry (TWL+SLU); and a control (CTL). After every odd game, participants ingested 2 g $\cdot$ kg $^{-1}$  thermoneutral water in CTL and TWL ( $34.8 \pm 0.4^{\circ}\text{C}$ ); cold water ( $10.7 \pm 2.5^{\circ}\text{C}$ ); or ice slurry ( $-0.5^{\circ}\text{C}$ ) in SLU and TWL+SLU. When appropriate, the ice towel was worn until 30 s before the next game beginning. After games 3, 5, 7 and 9 in all 3 sets of the TSTP, rectal temperature ( $T_{\text{c}}$ ), mean skin temperature ( $T_{\text{sk}}$ ), and thermal sensation (TS) were assessed; perceptual responses were assessed again after the rest. A three-way ANOVA (condition  $\times$  time (set)  $\times$  time (game)), with Bonferroni post-hoc analysis was used to assess statistically significant differences ( $P < 0.05$ ) between conditions. Hedges  $g$  was used to assess effect size. There were no statistically significant differences between conditions until set 3, when thereafter, there was a lower  $T_{\text{c}}$  in SLU ( $P = 0.009$ ,  $g = -0.83$ ) and TWL+SLU ( $P = 0.014$ ,  $g = -1.07$ ) compared to CTL.  $T_{\text{c}}$  ( $P = 0.034$ ,  $g = -0.66$ ) and  $T_{\text{sk}}$  ( $P = 0.007$ ,  $g = -1.10$ ) were lower in TWL+SLU than CW. TS was lower after rest periods in all experimental conditions ( $P < 0.05$ ) compared to CTL. Importantly, participants felt cooler before the rest period in TWL+SLU ( $P = 0.002$ ,  $g = -0.80$ ) compared to CTL. Combined cooling (TWL + SLU) was the most efficacious strategy, attenuating both physiological and perceptual thermal strain. If only one strategy can be implemented, internal cooling using SLU is likely more effective than external cooling at attenuating thermal strain during tennis-specific exercise in hot humid conditions.