Heat Acclimation Protocol for Endurance Athletes to Improve Performance

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Heat Acclimation

Historically, it is known that heat acclimation, over 10-14 days upon arrival in a warmer and/or humid climate, can increase performance in the heat. In fact, heat acclimation provides more substantial environmental specific improvements in aerobic performance than altitude acclimation. Heat acclimation is documented to induce numerous physiological adaptations that theoretically could improve aerobic exercise performance in cool-temperate conditions. These physiological adaptations from heat acclimation include reduced oxygen uptake at a given power output, muscle glycogen sparing, reduced blood lactate at a given power output, increased skeletal muscle force generation, plasma volume expansion, improved myocardial efficiency, and increased ventricular compliance [1].

However, recently, a study has shown a significantly improved time trial performance (6% in 13C weather and 8% improvement in 38C environment). This supported a previous study showing similar effects with subjects just using a post-training sauna [2]. Furthermore, would appear to be further impactful when protein is taken immediately post heat exposure [3].

Targeted Events: Current data suggests any event longer than ~15min might benefit.

How: There are two studies that have shown positive heat acclimation:

1) Sauna study: 12 sauna visits over a ~3 week period, at ~90C sauna for 30min per visit [2].
2) Low-intensity exercise: 10 low-grade exercise exposures (>75min easy/moderate run) done at ~70 to 80% of HRmax over ~2 to 3 weeks at ~30 to 35C at >~50% humidity [1]. (this can easily be done by setting up a treadmill in a small room with a heater, while possibly wearing layers of clothing)

When to periodize: This is an acute intervention that would be implemented in the immediate weeks prior to a targeted competition. It is not necessary to implement this when already training in hot and humid conditions. This is only needed when training conditions are cool to temperate (<25C and ~50% humidity).

Further optimize: A recent study has shown that protein supplementation can help support the increase in blood plasma volume and accelerate adaptation to the heat [3]. Therefore, immediately post heat acclimation run or sauna, consume ~0.3g protein (e.g. whey) per kg BW (~20g of protein).

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References

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3. Goto, M., et al., *Protein and carbohydrate supplementation during 5-day aerobic training enhanced plasma volume expansion and thermoregulatory adaptation in young men.* Journal of Applied Physiology. **109**(4): p. 1247-55.

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