

ESSR Journal Club

Covered Article: “Heat Versus Altitude Training for Endurance Performance at Sea Level”

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Definitions:

- **heat training** = The practice of supplementing usual training in temperate conditions (5-18°C) with ≥ 90 minutes/ day of exercise completed at an intensity that elicits a core body temperature $\geq 38.5^\circ\text{C}$ on ≥ 10 consecutive days.
 - **altitude training** = The practice of living at an elevation of 2,000-2,500 m and training at elevations $< 1,250$ m (“live high-train low) for ≥ 3 weeks.
- 1) Explain the similar and distinct mechanisms by which heat training and altitude training may elevate hemoglobin mass.
 - 2) What are some reasons why plasma volume expansion may provide a greater performance benefit to an untrained vs. an endurance-trained individual?
 - 3) How do heat training and altitude training influence the variables included in the Fick equation ($\dot{V}O_2 = \dot{Q} \times a-vO_2$ difference)? How might the time course of these adaptations differ for the two training modalities?
 - 4) Prepare a list of considerations for advising an endurance athlete on whether (or not) they should undertake altitude training or heat training in preparation for competition.
 - 5) Discuss the challenges (e.g., accessibility, time) to *natural* heat training and altitude training practices. Can you think of any strategies to overcome these challenges?
 - 6) When would be an optimal time for an athlete to compete following altitude training and heat training? Explain why.
 - 7) Discuss the importance of the non-hematological mechanisms associated with heat training vs. altitude training for improving endurance sea-level performance in temperate conditions.
 - 8) Alamosa, Colorado is situated at an elevation of approximately 2,299 m and reaches temperatures that exceed 30°C in the summer months. Do you think training in this type of environment could result in a synergism or additive benefits for performance or would the two likely detract from overall performance gains? Explain why.
 - 9) Draw a figure detailing the specific mechanisms contributing to plasma volume expansion following heat training and elevated hemoglobin mass following altitude training, respectively.