

Hang Board Performance Time Across Multiple Hangs in Normoxia and Normobaric Hypoxia

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INTRODUCTION – The Affects of Altitude on Climbing Performance

- ▶ **Acute altitude exposure has the potential to decrement climbing performance** (Rusko et al., J Sports Sci, 2004)
- ▶ **Oxygen transport to working muscle is compromised** (Wilbur, HK, 2004)
- ▶ **Skeletal muscle, central nervous system, and cardiopulmonary tissues may under perform** (Rusko et al., J Sports Sci, 2004)

INTRODUCTION – The Affects of Altitude on Climbing Performance (continued)

- ▶ Many recreational climbers live and train at sea level
- ▶ They travel to altitude during climbing vacations



PURPOSE

- ▶ We sought to explain acute changes in select physiological variables during repeated, straight arm hangs to better understand the extent of potential performance decrements



New Jersey climbers (from SL) on the Grand Teton; sucking wind...

METHODS



Climber hanging on the hangboard in NMU's hypoxic chamber

- ▶ 13 total climbers volunteered as participants in this repeated measures, counter balanced format.
- ▶ In both conditions, participants believed they were in NH.
- ▶ Habituation session was held prior to data collection



METHODS (continued)

- ▶ HR and SpO₂
- ▶ RPE
- ▶ Total hang time
- ▶ Statistical analysis included paired t-tests with significance set at $p < 0.05$.

RESULTS

Table 1. Physiological Variables (mean \pm SD)

| Condition | Average Hang Time (sec) | PreHR (bpm) | PostHR (bpm) | RPE | PreSpO2 (%) | PostSpO2 (%) |
|-----------|-------------------------|----------------|-----------------|---------------|----------------|----------------|
| NH | 24.7 \pm 5.4 | 91.3 \pm 2.3 | 102.9 \pm 3.8 | 4.9 \pm 1.2 | 90.7 \pm 1.2 | 90.5 \pm 0.7 |
| NM | 23.3 \pm 5.6 | 92.0 \pm 1.6 | 127.7 \pm 2.2 | 5.2 \pm 1.1 | 97.1 \pm 0.3 | 96.9 \pm 0.4 |

RESULTS (continued)

Table 2. Participant Characteristics.

| | Ape Index (cm) | HT (cm) | WT (kg) | Age (yrs) | Climb Experience (yrs) | Climb Frequency (days \cdot wk ⁻¹) |
|---------------|-----------------|-----------------|----------------|----------------|------------------------|--|
| Mean \pm SD | 175.6 \pm 7.6 | 173.1 \pm 5.6 | 68.3 \pm 7.8 | 26.2 \pm 8.7 | 5.5 \pm 6.6 | 3.0 \pm 1.3 |

RESULTS (continued)



Figure 1. Hand position for hangs.

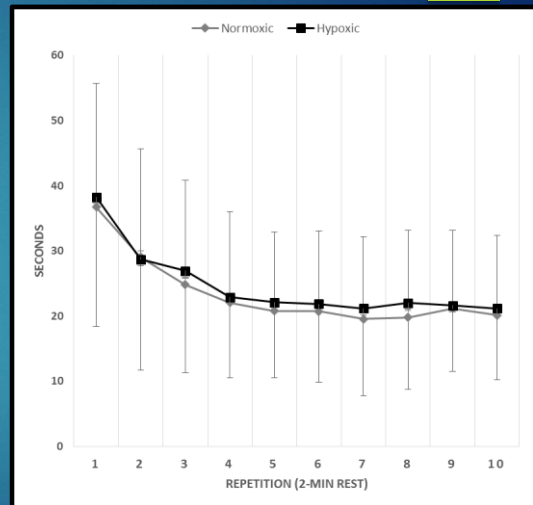


Figure 2. Mean \pm SD. Hang time (sec) across trials for N and NH.

DISCUSSION

- ▶ The primary purpose was to explain potential physiological differences between NH and NM during repeated, straight arm hangs.
 - ▶ A hypoxic environment was confirmed.
 - ▶ No significant difference in hang time, preHR, postHR, and RPE
 - ▶ Thus, NH had little effect on performance



DISCUSSION (continued)

- ▶ **Part of our hypothesis was not supported.**
- ▶ **The 2-minute recovery was sufficient during NH**
 - ▶ Allowed for overall slightly greater hang times across trials, vs. NM with no change in HR or RPE.

CONCLUSION

- ▶ **If a climber is considering acute or intermittent NH training prior to an altitude climbing excursion, they should not expect much of a training effect, especially if monitoring HR, which was actually lower post-hang in NH.**

THANK YOU

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QUESTIONS!



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