

24-hour Ambulatory Blood Pressure at Low vs. High Altitude

Before and After Partial Acclimatization (CHAMPS*)

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*Colorado High
Altitude Monitoring
Pressure Study



Background

- Acute high-altitude exposure may increase 24-hour ambulatory blood pressure (ABP), however, there is large individual variability in blood pressure changes with altitude¹⁻⁴.
- Prior studies have compared 24h-ABP between days 1-3 and days 9-12 at high altitude (HA)², but not acutely between day 1 and day 3 when acute ventilatory acclimatization is typically complete^{5,6}.
- In another study, peripheral and central (measured by PulsePen) systolic BP (SBP) did not differ between acute and 72h⁷, but 24h-ABP was not measured.

Objective

To compare 24h-ABP at low altitude (LA) to the first 24 hours at HA and after 72 hours at HA.

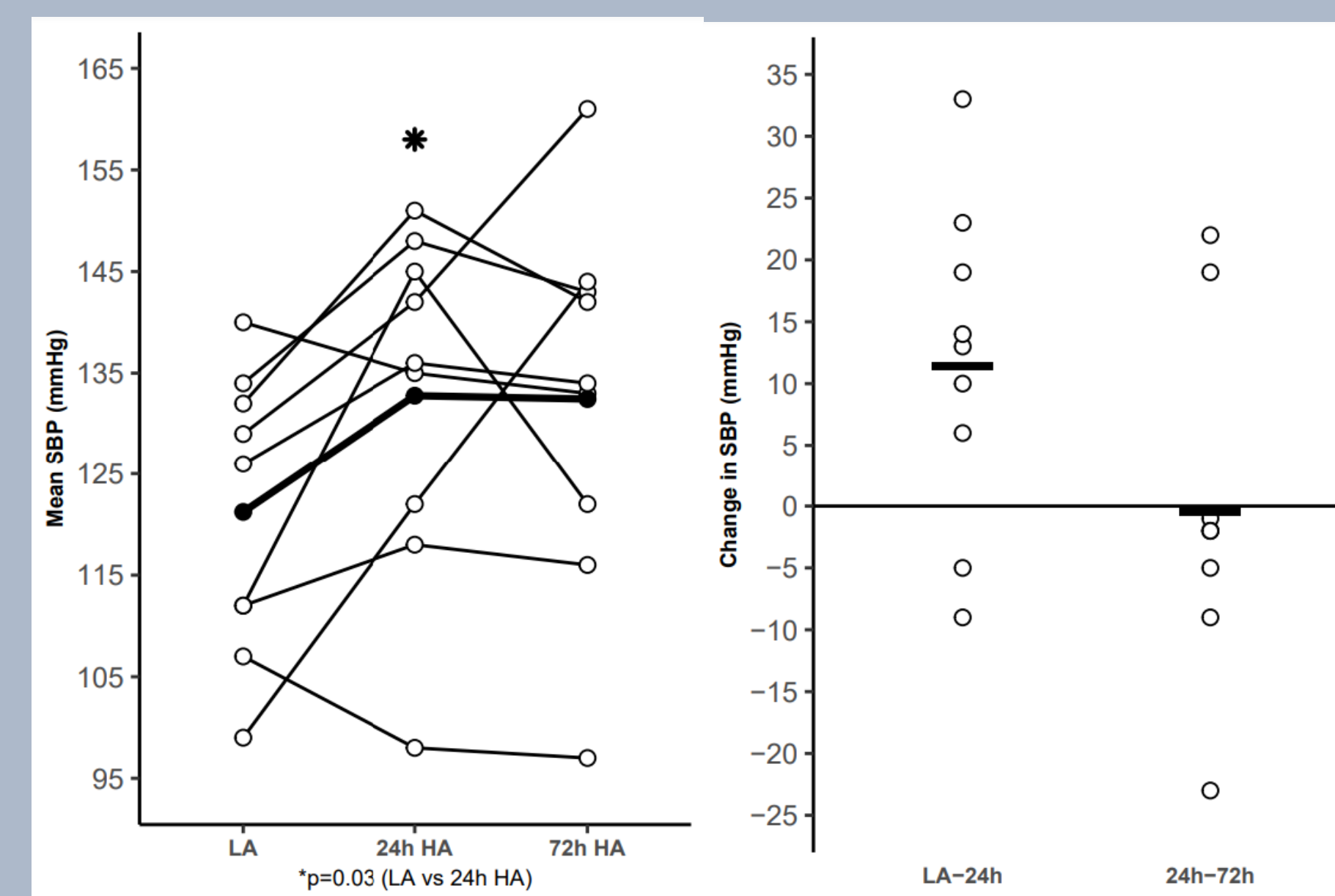
Methods

- Prospective observational cohort study of adult lowlanders comparing 24h ABP at LA (<1,000m) and HA (2,500-2,800m).
- Ascent profile was similar in all participants. Lowlanders flew to Denver and immediately ascended by motor vehicle to 2470-2800m. 24h-ABP monitoring began within 4-6 of hours of arrival at HA.
- 24h-ABP was monitored with Welch-Allyn 6100 ABP monitors every 30 minutes while awake and every hour overnight.
- HA data was collected during the first and third days at HA and compared with LA measurements.

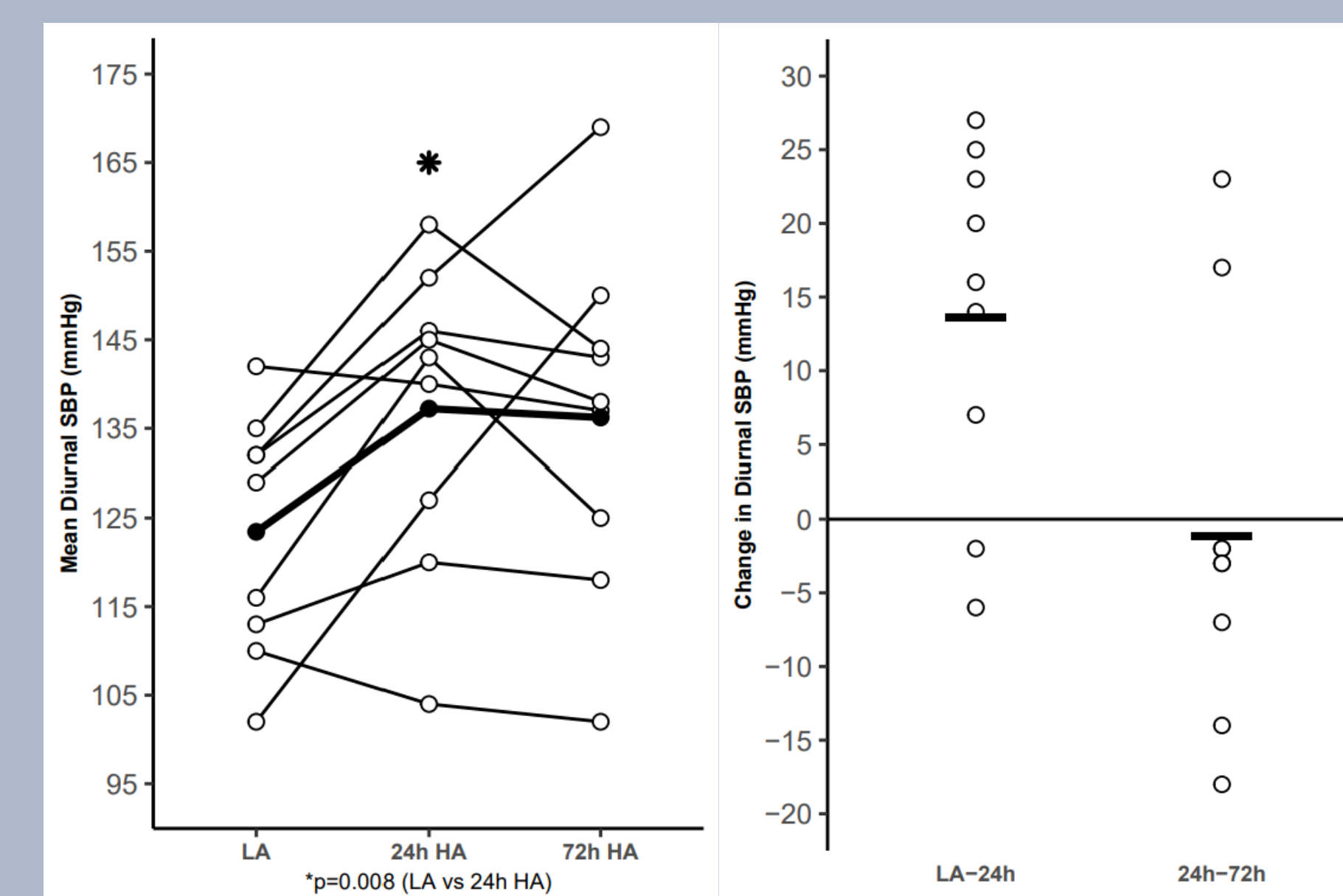
Results

Demographics	
Total enrolled	9
Mean age (years, range)	49 (34-70)
Female	6
Male	3
Hypertension Dx	2
Hypertensive Med*	2

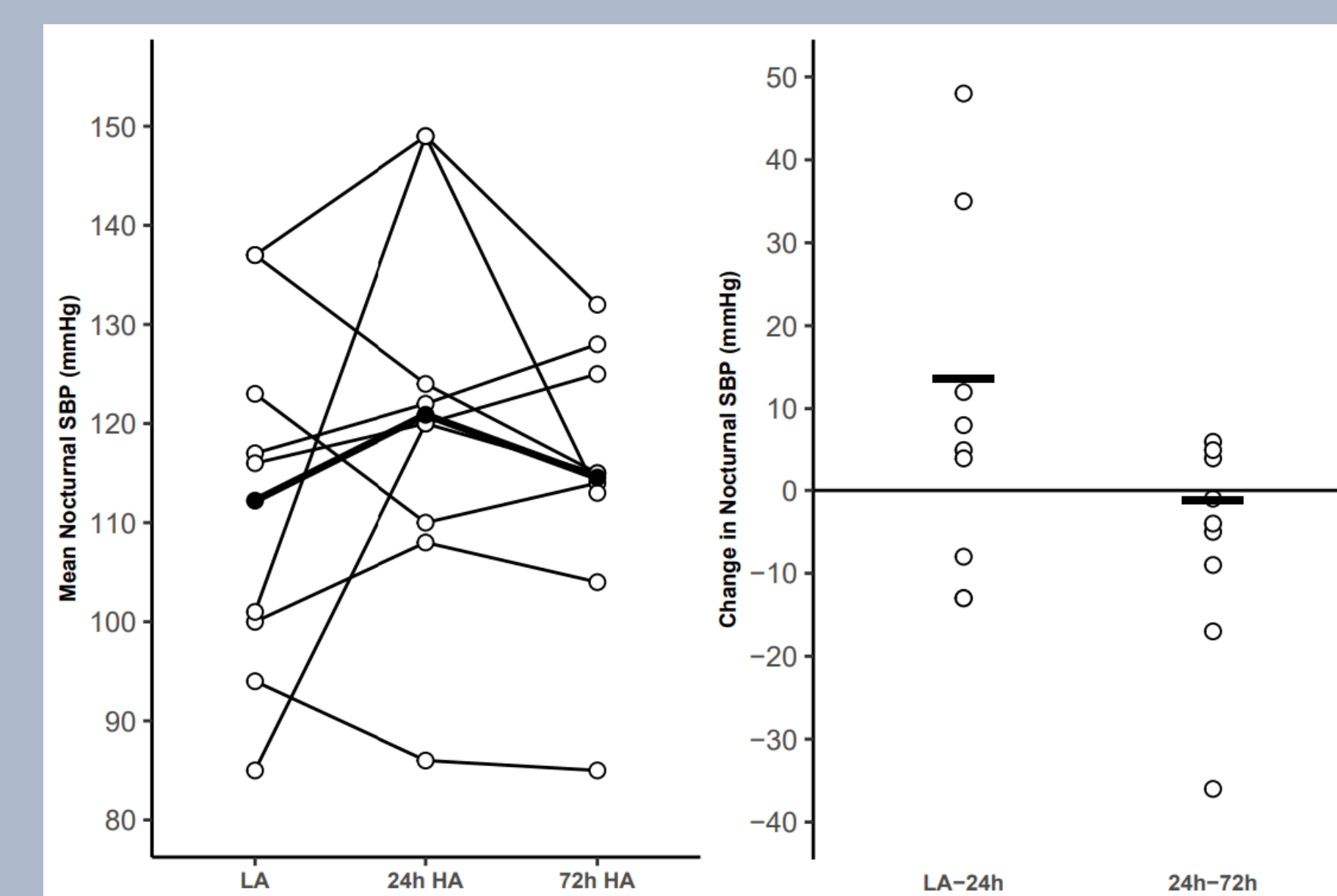
* ACE inhibitor and ARB



Average SBP increased in the first 24h at HA, but did not change further after 72h at HA.



Average diurnal SBP increased in the first 24h at HA, but did not change further after 72h at HA.



Average nocturnal SBP was similar in the first 24h at HA vs LA and 72h at HA.

HR and SpO2	LA	24h HA	72h HA
Mean HR (95% CI)	70 (63-77)	77 (70-84)	78 (69-87)
Mean Diurnal HR (95% CI)	72 (65-79)	78 (69-86)	79 (70-89)
Mean Nocturnal HR (95% CI)	63 (56-70)	71 (65-76)	71 (64-78)
Mean SpO2% on arrival to HA (95% CI)		91 (89.8-92.2)	
Mean SpO2% after 96h at HA (95% CI)		93 (91.8-93.7)	

SpO2 increased with acclimatization.
HR did not change with acclimatization.

Conclusions

- ABP was elevated at HA compared to LA.
- The difference was due to increases in diurnal BP.
- ABP remained elevated after 72 hours of acclimatization.
- Clinical effects of elevated ABP during high altitude sojourns still need to be elicited.
- These preliminary results need to be confirmed with a larger sample size.

Acknowledgements

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References

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