The BAAD Dog Study

Baseline Altitude Acclimatization after Donation in Dogs

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Defense Health Agency
RESEARCH & DEVELOPMENT

Disclaimer

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This work is supported by funding from the DoW.

The experiments reported herein were conducted in compliance with the Animal Welfare Act and per the principles set forth in the "Guide for Animal Care and use of Laboratory Animals," Institute of Laboratory Animal Resources, National Resource Council, National Academy Press, 1996. Animals were given appropriate analgesia and anesthesia when indicated.

Background

TRANSFUSION FOR THE MILITARY WORKING DOG

Publication Date: 10 Dec 2019, CPG ID:77

Photo credit: US Military Working Dog Teams National Monument, Lackland AFB, TX

BLOOD COLLECTION

- Do not collect blood from donors more frequently than every two months.
- Do not work or fly (via fixed wing aircraft) a donor for 24 hours following a donation to allow recovery from donation.
- Consider administering intravenous isotonic crystalloids to a donor following blood collection as needed to replace the volume donated.

Methods

1. Sedate and implant microchip

Day -2

2. Assess baseline detection performance

Day -1

3. Measure pre-donation physiologic parameters

4. Collect standard unit of whole blood

5. Simulate air transport at 8,000 ft

6. Measure physiologic parameters before, during and after simulated flight.

7. Assess post donation operational performance

8. Sedate and explant microchip

Day +1 to +2

VetChip

- Temperature
- Heart rate
- Oxygenation
- Respiratory rate
- ECG
- Location
- Trending health reports

Implantable miniature biosensor
20mm x 6mm VETCHIP TARGET SIZE

Certification Activities

- Obstacle course
- Obedience exercises
- Controlled aggression
- Detection

Blood Donation

430-450 mL whole blood collection

Flight Simulation

Flight Simulation

Date _____

MWD Name/Tattoo: _____

Vitals

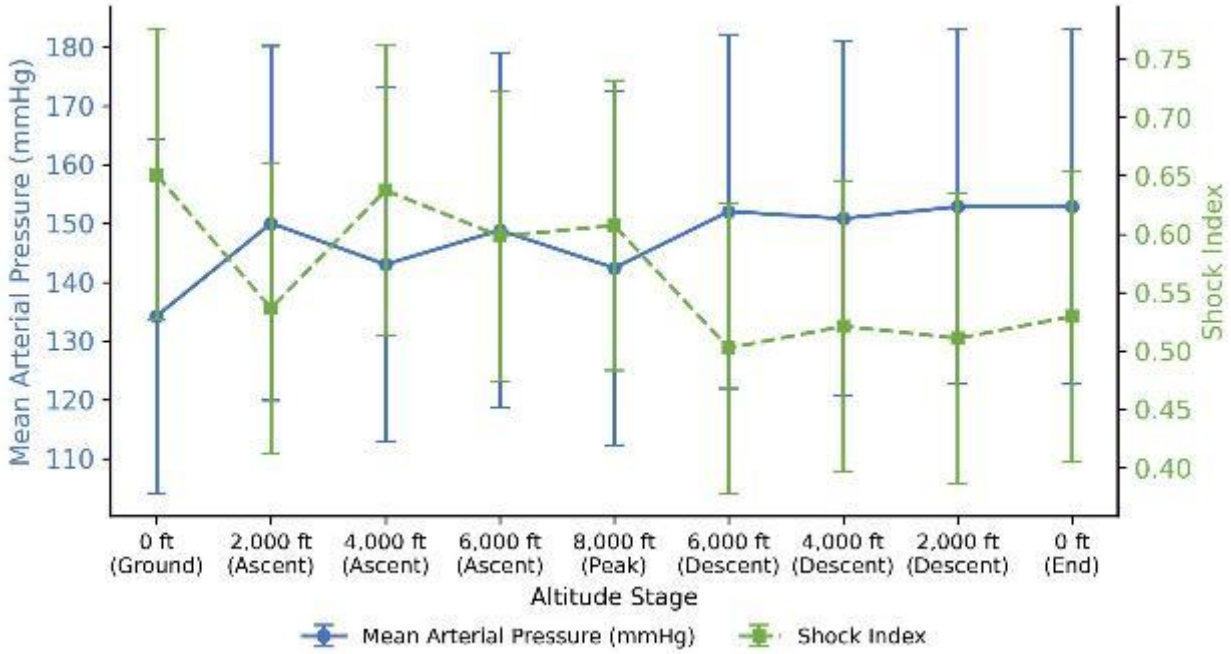
- Initial: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- 2000 ft: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- 4000 ft: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- 6000 ft: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- 8000 ft: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- 6000 ft: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- 4000 ft: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- 2000 ft: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____
- End: HR _____ RR _____ Temp _____ BP (S/D/MAP) _____ SI _____

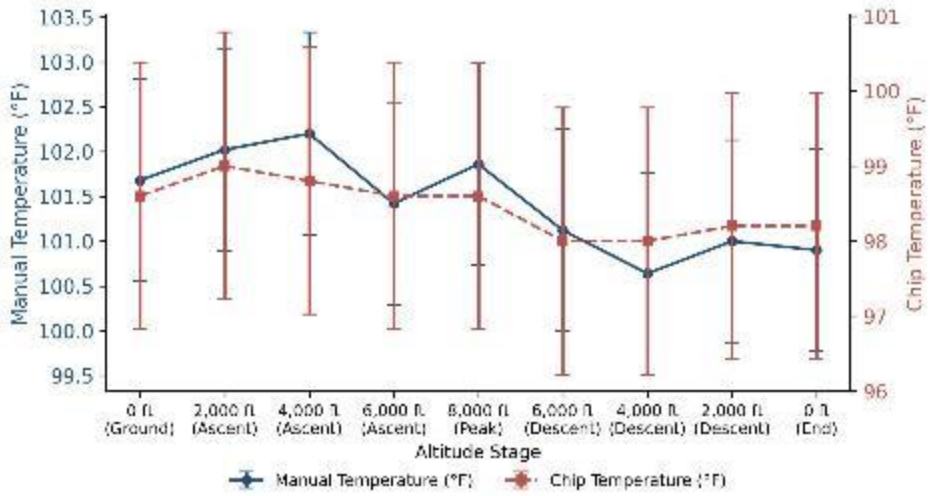
Shock index = HR/SBP; cutoff = 25% increase of SI from baseline.
Cruise at altitude for 30-60 minutes

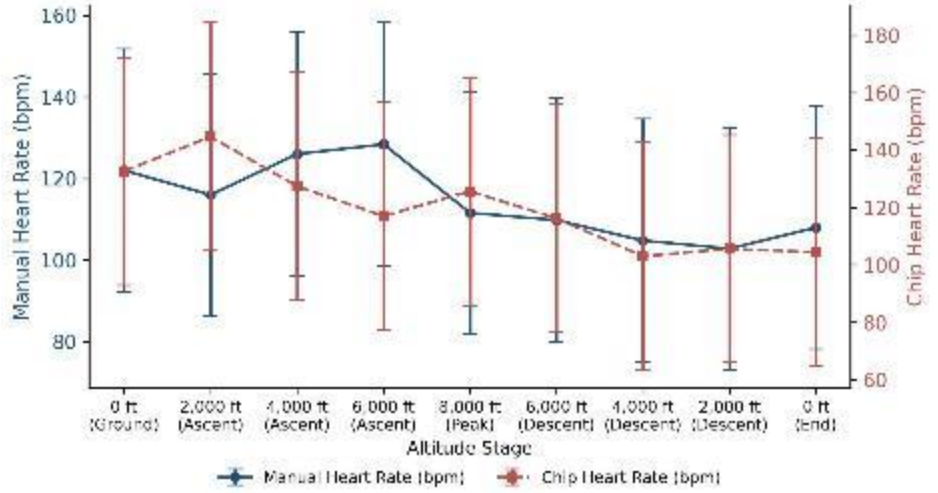
Results

- Certification-related activities unaffected
- Shock index remained stable during air transport
- VetChip had strong agreement with manual heart rate measurements

Results


Mean Arterial Pressure (mmHg)
Shock Index
0 ft (Ground)
2,000 ft (Ascent)
4,000 ft (Ascent)
6,000 ft (Ascent)
8,000 ft (Peak)
6,000 ft (Descent)
4,000 ft (Descent)
2,000 ft (Descent)
0 ft (End)
Altitude Stage
Mean Arterial Pressure (mmHg)
Shock Index


Manual Temperature (°F)
Chip Temperature (°F)
Altitude Stage
Manual Temperature (°F)
Chip Temperature (°F)


Manual Heart Rate (bpm)
Chip Heart Rate (bpm)
Altitude Stage
Manual Heart Rate (bpm)
Chip Heart Rate (bpm)

Conclusions

Immediate return to duty and air transportation may be feasible within 24 hours of donation in healthy conditioned MWDs.

VetChip has strong reliability for heart rate monitoring and utility for temperature trending.

Questions

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"Military medicine is not just about treating injuries; it's about ensuring the health and readiness of those who serve, so they can accomplish their mission and return home safely."

- MG Paula C. Lodi, Commanding General, USAMRDC