

Validation of a Novel Method for Identifying Sleep-Disordered Breathing in Spinal Cord Injury



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BACKGROUND: Sleep-disordered breathing (SDB: Involuntary breath-holds during sleep causing reduced oxygen levels) is a prevalent concern after spinal cord injury (SCI) that progressively worsens functions of daily living and overall health. There is significant need for improved models evaluating SDB in populations with SCI. Astroskin provides noninvasive vital signs monitoring.

METHODS

Simultaneous **Astroskin** recordings against:

- Digital thermometer
- Pulse oximeter
- Respiration band
- Finometer (beat-to-beat blood pressure)

Evaluated **signal quality** of:

- Electrocardiogram (ECG)
- Orientation

PRELIMINARY RESULTS

Skin Temperature

$p < 0.0001$
 $r = 0.997$
Bias: $-0.3 \pm 0.4^\circ\text{C}$

Blood Oxygen Level

$p < 0.0001$
 $r = 0.943$
Bias: $-2.95 \pm 2.7\%$

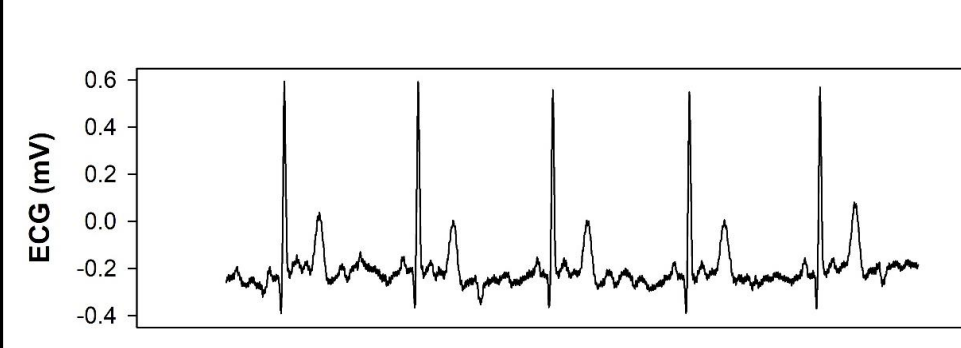
Blood Pressure

$p = 0.004$
 $r = 0.117$
Bias: $-4.46 \pm 7.7\text{mmHg}$

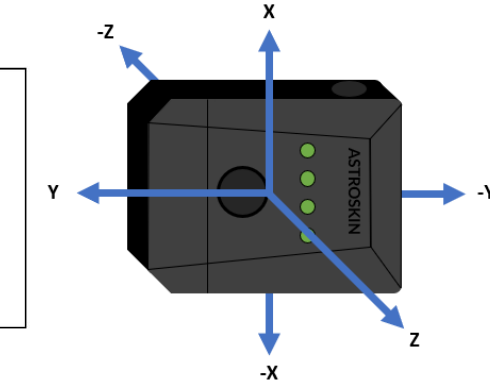
Respiration Trace

$p < 0.0001$
 $r = 0.967$

Electrocardiogram (ECG)



Orientation



DISCUSSION

Applying validated measures to overnight sleep recordings using **stacked filters** in 2 people with SCI and 2 healthy controls.

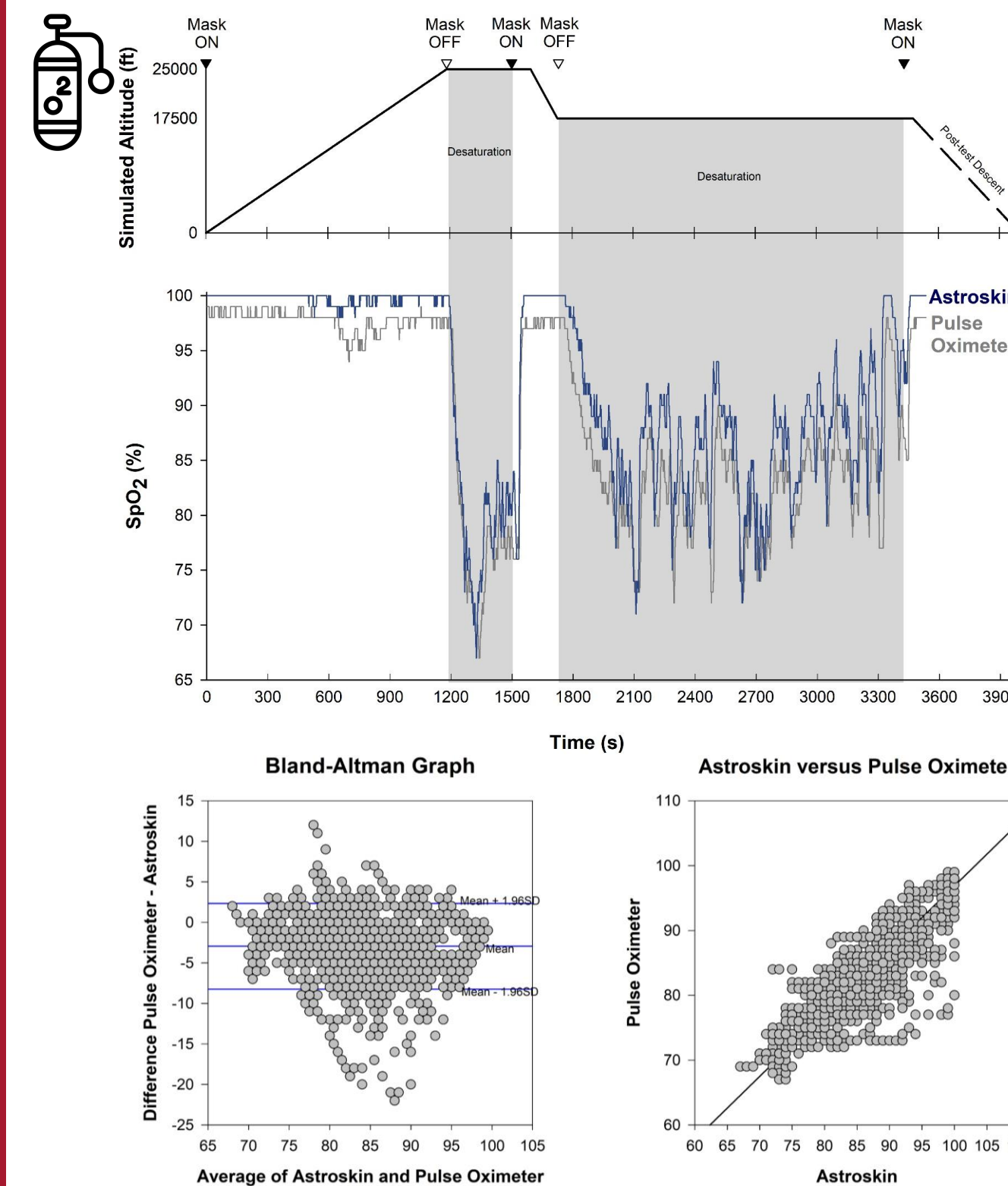
These data will pave the way for **accessible at-home evaluation** of SDB in people with SCI.

Astroskin may be a useful tool for assessing sleep-disordered breathing.

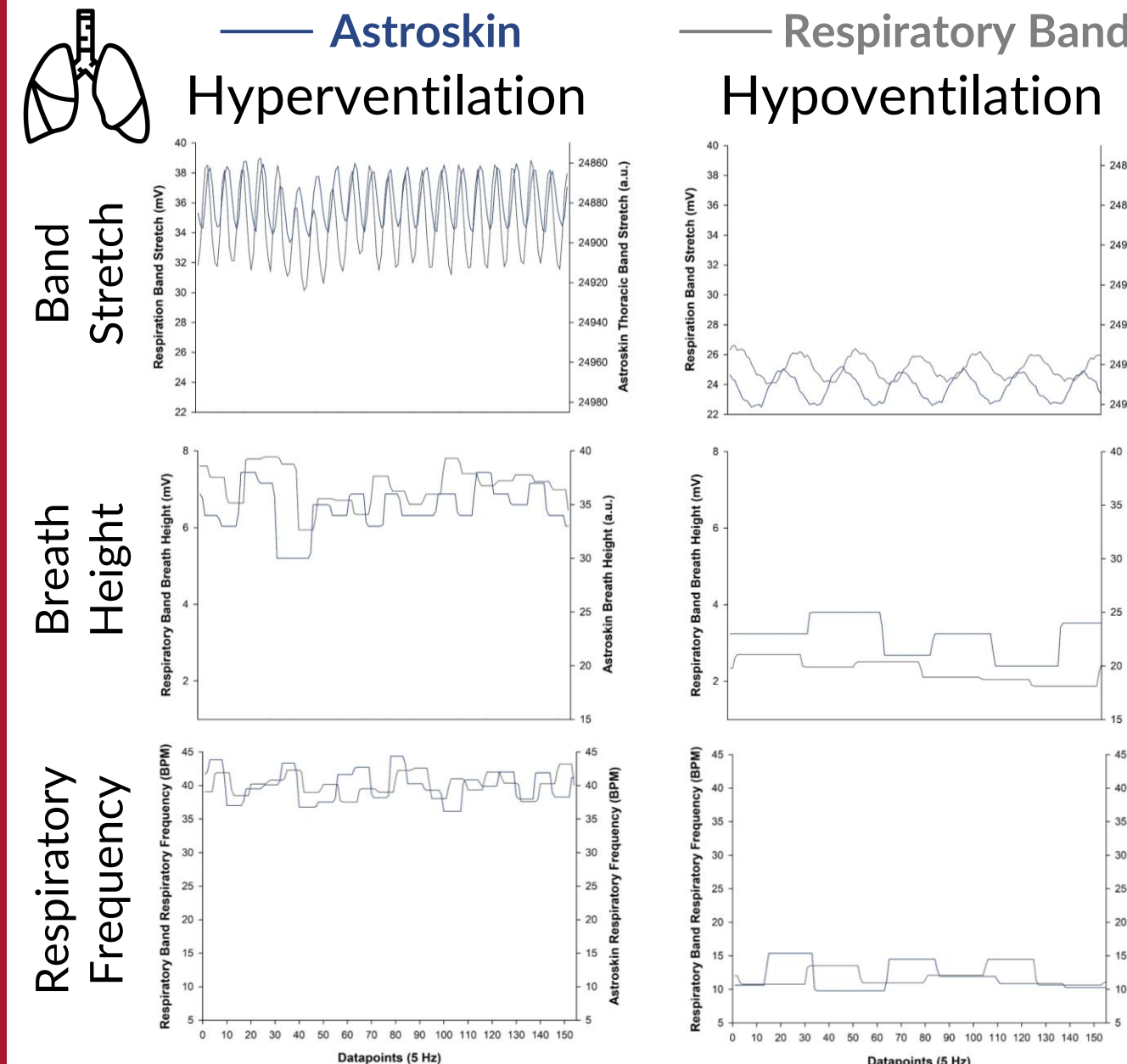
	Skin Temperature	✓ Well-correlated
	Blood Oxygen Level (SpO₂)	✓ Well-correlated
	Baseline Blood Pressure	○ Approximate
	Respiration	✓ Well-correlated
	Electrocardiogram (ECG)	✓ Good Quality
	Orientation	✓ Good Quality



ADDITIONAL INFORMATION



Dynamic changes in blood oxygen levels track well.



Derived respiratory metrics faithfully track changes in breathing on a breath-by-breath basis.

Despite meeting industry standards for a low accuracy device ($4\text{-}6 \pm 8\text{mmHg}$)¹, baseline blood pressure was poorly-correlated and insensitive to dynamic changes.

REFERENCES

1. Stergiou (2018) *Journal of Hypertension* **36**: 472–478.

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