Research spotlight/Review

Toward Physiology-based Sleep Assessment: The Emerging Clinical Role of Advanced RIP Technology

Bjarkason, S., Finnsson, E., Sigþórsson, S., Sigmarsdóttir, Þ., Hugosdóttir, R., Höskuldsson, S., & Ágústsson, J. S. (2026). Toward physiology-based sleep assessment: The emerging clinical role of advanced RIP technology. Current Pulmonology Reports, 15, Article 10. https://doi.org/10.1007/s13665-026-00410-w

Signal reliability depends on belt design.



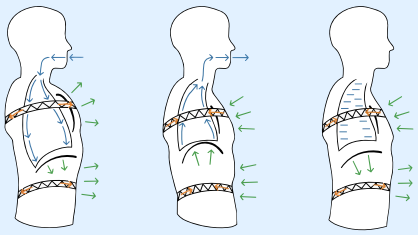
98.5% Volumetric snap-on belts

76.1% Non-volumetric folding belts

Evidence shows that RIP belt design has a significant impact on both signal reliability and quality.[1]

Dual-belt measurement is essential

(A) Inspiration (B) Expiration (C) Upper airway obstruction



During obstructive events, the rib cage and abdomen move out of phase. Only the combined thoracic and abdominal signals represent the true net change in respiratory volulme.

Adaptive calibration reduced overestimation of small breaths



Before calibration — After adaptive calibration

Adaptive calibration reduced event-level bias



Before calibration — After adaptive calibration

Adaptive calibration reduced overestimation for small breaths from ~12% to ~2% of eupnea and event-level bias from 9% to 1%.

Purpose:

This is a **narrative review evaluating recent literature about respiratory inductance plethysmography** across four themes:

- Physiological principles of RIP
- Volumetric vs. non-volumetric RIP systems
- Calibration strategies
- Clinical relevance in sleep-disordered breathing

Key definitions: volumetric RIP (inductance uniquely linked to thoracoabdominal cross-sectional area) vs. non-volumetric RIP (signals influenced by factors other than thoracoabdominal cross-sectional area).

Conclusion

RIP technology has the potential to do more than detect presence of breathing effort. But not all RIP is created equal.

Dual volumetric RIP + appropriate calibration can continuously measure respiratory effort and ventilation - enabling richer physiological assessment beyond event counting alone.

A dual volumetric RIP configuration can support a comprehensive physiological assessment of sleep apnea with a minimal sensor setup.

Disclaimer

This content summarizes findings from a review of recent literature and is intended for educational purposes only. Clinical decisions should be based on full clinical evaluation and established guidelines. This is a Nox-sponsored review, and the authors are Nox employees.