ATS 2026 Highlights

Respiratory Structure and Function Early Career Professionals

Get to know members of the RSF Assembly

Eriko Hamada, MD, PhD

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Is your research clinical, basic science or translational?

Basic science.

Tell us about your research?

We studied how pharyngeal muscle and nerve injury alters respiratory flow in conscious rats. Bilateral stylopharyngeus transection caused transient inspiratory flow flattening with prolonged inspiratory time. These abnormalities largely resolved within several days, indicating short-term neural adaptation. Pharyngeal nerve transection alone had minimal effects, but combined transections caused unstable recovery. This suggests distinct roles of CN IX and CN X, with combined loss impairing airway control resilience.

Where do you see yourself in 5 years?

In five years, I see myself as an independent physician-scientist studying human respiratory structure and function in obstructive sleep apnea (OSA). Building on my prior work using animal models of upper-airway physiology, I aim to translate mechanistic insights into human sleep and breathing studies. My research focuses on physiological signal analysis to characterize airflow limitation and airway stability in humans, with the goal of defining upper airway health and dysfunction underlying OSA.

What do you find is the major benefit of RSF Assembly Membership?

The RSF Assembly has provided opportunities to engage with the international scientific community and has stimulated my research interests. RSF membership offers access to a community of researchers to discuss novel ideas, establish research collaborations, and receive expert feedback on my own research findings. I am excited to continue developing my research with support from the RSF Assembly.

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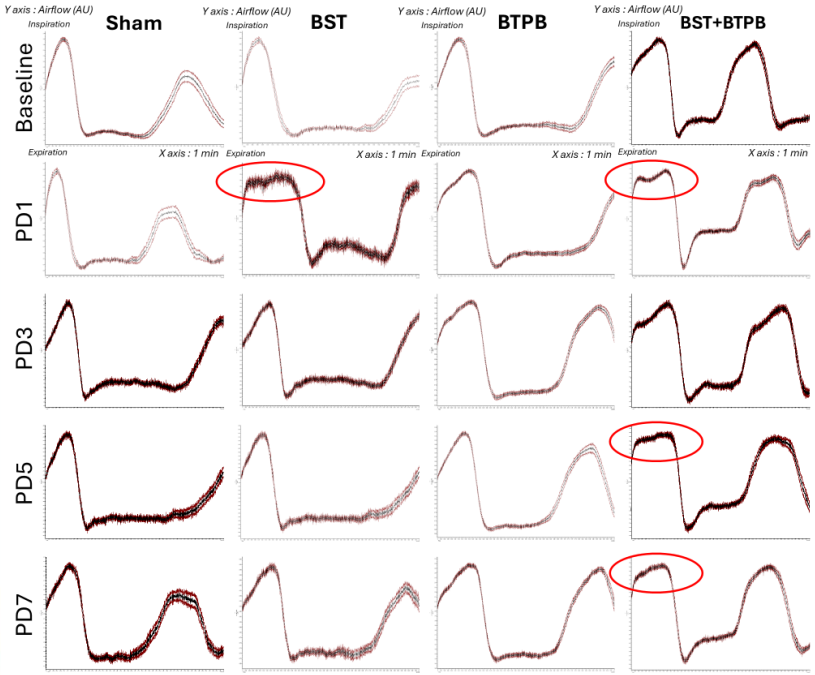

Figure 1. Cycle-triggered average of respiratory waveforms. Representative cycle-triggered average of to respiratory waveforms from 50 breaths at baseline and post day (PD) 1, 3, 5, and 7 in sham, BST, BTPB, and BST+BTPB groups.

Impact On Respiratory Flow In Conscious Rats Following Pharyngeal Nerve And Stylopharyngeus Transection

Eriko Hamada, Kingman P. Strohl, Isabella C. Hsieh, Thomaz Fleury Curado, Denise Dewald, Yee-Hsee Hsieh

Objective: Upper airway patency depends on the coordination of multiple pharyngeal muscles. We previously demonstrated that bilateral transection of stylopharyngeus (an upper airway dilator) in conscious rats produced a flattening of the inspiratory waveform flow consistent with inspiratory flow limitations. This study aimed to assess whether the impairment persists or whether the network of pharyngeal muscles can adapt and restore the normal inspiratory waveform. Furthermore, we examined the system's resilience with an additional transection of the pharyngeal nerve of the vagus (Ph-X) which innervates the pharyngeal constrictor muscles.

Methods: Adult male Sprague-Dawley rats underwent one of four interventions: 1) Bilateral stylopharyngeus transection (BST, n = 10), 2) Bilateral transection of Ph-X (BTPB, n = 5), 3) Bilateral transection of both (BST+BTPB, n = 5), and 4) Sham (n = 5). Respiratory airflow was obtained using whole-body plethysmography (3-5 h/session). 50 stable breaths were identified and inspiratory time (T_I), expiratory time (T_E), total breath duration (T_{TOT}), and respiratory frequency (fR) were measured at prior to surgery (baseline) and postoperative days (PD) 1, 3, 5, and 7. Inspiratory airflow waveforms were captured by cycle-triggered averaging. Statistical analysis included Friedman with Wilcoxon post-hoc tests and Kruskal-Wallis with Mann-Whitney U tests.

Results: BST and BTPB groups exhibited significant difference in the percentage change from baseline in T_I compared to sham group on PD1. The BST+BTPB group exhibited significant percentage changes in T_I compared to sham group on PD5. The BST+BTPB group exhibited significant percentage changes in T_E, T_{TOT}, and fR compared to the BST group on PD3. Cycle trigger averages showed initial flattening of the inspiratory waveform exhibited by BST on PD1 diminished by PD3–5. The BST+BTPB group exhibited the same recovery by PD3–5; however, the flattened inspiratory waveform presented on PD7.

Conclusion: Bilateral stylopharyngeus transection and bilateral Ph-X transection each induced a transient prolongation of inspiratory time that resolved within days, indicating short-term adaptation possibly mediated by brainstem mechanisms. In contrast, combined bilateral transection of the stylopharyngeus muscle and Ph-X produced inspiratory waveform flattening from PD1 without acute prolongation of inspiratory time. Further, the flattening of the inspiratory waveform initially diminished through PD3, but re-emerged on PD5 and persisted through PD7. This return to the pathologic waveform suggests that although the system can adapt to the acute loss of one effector on the pharyngeal muscles, the combined loss of both effectors disrupts the system's inherent resilience.

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