ATS 2025 Highlights
Respiratory Structure and Function Early Career Professionals

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Get to know members of the RSF Assembly

Is your research clinical, basic science or translational?

Clinical and translational.

Tell us about your research?

As an integrative physiologist, I study relationships between cardiorespiratory structure and function, exertional dyspnea, and exercise limitation in humans with airway and/or vascular disease. Using non-invasive and invasive techniques, I assess how cardiorespiratory structure and function impact exercise responses and identify interventions to improve dyspnea, exercise capacity, and quality of life.

Where do you see yourself in 5 years?

I look forward to continuing my journey in academia and establishing my own research lab. My goal is to continue advancing our understanding of respiratory structure-function relationships by leveraging large epidemiological cohorts to identify novel treatment targets, with the aim of translating these findings into prospective clinical trials.

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

The RSF Assembly has supported me via abstract awards and has given me the opportunity to showcase my work at the International Scholars Colloquium, and the Science and Innovation Center. I am especially excited to continue learning from and connecting with leading experts in pulmonary research at upcoming ATS International Conferences.

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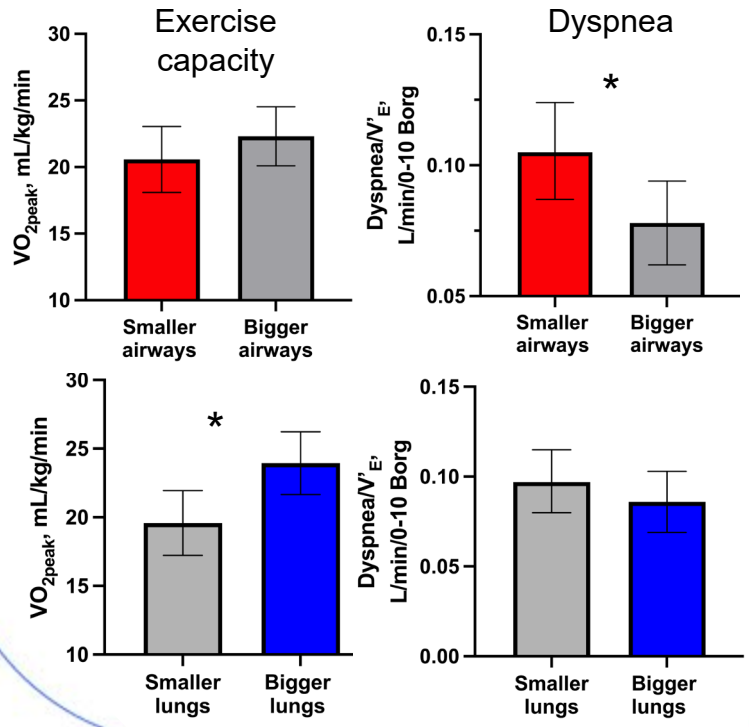

Smaller Airways or Bigger Lungs? Dysanapsis Etiotypes and Obstructive Pulmonary Physiology at Rest and During Exercise

Objective: Dysanapsis refers to a developmental mismatch between airway tree caliber and lung size. Smaller airway tree caliber relative to total lung volume (TLV) assessed by computed tomography (CT) is associated with obstructive lung physiology, but whether this association is related to smaller airways, or bigger lungs, is uncertain. This study used CT to evaluate associations of airway-to-lung ratio (ALR) and its structural components, airway tree caliber and TLV, with indices of obstructive pulmonary physiology at rest and peak exercise.

Methods: CanCOLD is a population-based cohort of adults ≥40 years old that underwent full-lung CT, spirometry, and symptom-limited incremental cardiopulmonary exercise testing to assess peak rate of oxygen uptake ($V'O_{2peak}$), and ratio of exertional dyspnea (Borg 0-10)-to-minute ventilation (V'_E). Participants with less than 1 pack-year of smoking (never-smokers), no history of asthma diagnosis, and a prebronchodilator FEV_1/FVC ratio of <0.7 were included (n = 161). Mean airway tree caliber, TLV, and ALR were quantified by CT (VIDA Diagnostics). Spirometric airflow obstruction severity was quantified using forced expiratory volume in 1-second (FEV_1). Regression models adjusted for sex, age, age^2, height and height^2.

Results: The mean age was 69 years (SD = 10); 34% were female; ALR was 0.030 (SD = 0.003); mean airway tree caliber was 5.15 mm (SD = 0.65); and TLV was 4.96 L (SD = 1.19). When partitioning smaller ALR into its components, smaller airway tree caliber was associated with lower FEV_1 and greater dyspnea:V'_E (both $p<0.05$), but not lower $V'O_{2peak}$; whereas, larger TLV was associated with higher FEV_1, and higher $V'O_{2peak}$ (both $p<0.05$), but not dyspnea:V'_E (see **Figure**).

Conclusion: When partitioning ALR into its structural components, smaller airway tree caliber was associated with indices of obstructive pulmonary physiology at rest and peak exercise, whereas larger TLV was associated with higher FEV_1 and $V'O_{2peak}$. Our findings suggest that not all pathways to dysanapsis are equivalent with respect to obstructive physiology.

Figure: Marginal means (95% CI) of peak exercise capacity ($V'O_{2peak}$) and ratio of exertional dyspnea (Borg 0-10)-to-minute ventilation (V'_E) adjusted for sex, age, age^2, height, height^2. *p<.05 in linear regression with continuous independent variable.

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