ATS 2024 Highlights

Respiratory Structure and Function Early Career Professionals

Get to know members of the RSF Assembly

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Is your research clinical, basic science or translational?

Basic science and translational.

Tell us about your research?

I am studying the contribution of sex differences to small airways disease in Chronic Obstructive Pulmonary Disease (COPD). Using high-resolution micro-computed tomography (micro-CT) imaging, I aim to determine if small airways are lost more rapidly in women who develop COPD. By measuring small airways down to the single-cell level, I hope to improve our understanding of the disease process in COPD. The results of this project will provide the evidence needed to bring us closer to early diagnosis and treatment for both men and women with COPD

Where do you see yourself in 5 years?

In five years, I see myself making significant progress in lung disease research, with the aim of discovering new treatment targets that can greatly improve patient care. Whether I'm working in academia or industry, I aim to contribute to collaborative efforts that combine various fields of research to better understand the different factors behind respiratory conditions. My dedication lies in advancing diagnostic and therapeutic innovations that can positively impact the lives of those dealing with lung diseases, while also helping to guide the future of research in this field.

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

The RSF Assembly offers great benefits, especially for early career researchers and students like me. It's a strong community where I can network, find mentorship, and collaborate with experts in respiratory research. The opportunities to share my work, receive feedback, and connect with others have made and will continue to make, a significant difference in my career development. Being part of this group has been a valuable experience, helping me grow and feel supported in my research journey.

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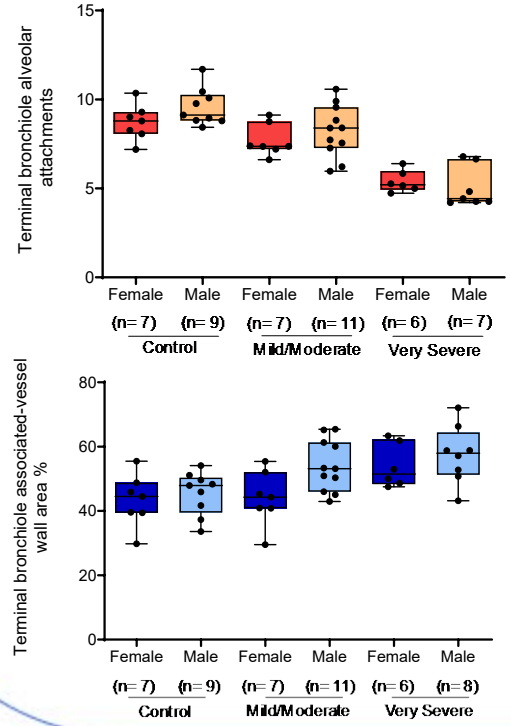

Investigating the Contribution of Sex Differences to Small Airways Disease in COPD Using Ultra-High Resolution Imaging

Objective: Over 380 million people with chronic obstructive pulmonary disease (COPD) are challenged every day with the simple task of breathing. In developed countries, the number of hospitalizations and deaths due to COPD is now greater for females than males. Females are more susceptible to developing severe early-onset COPD, have increased FEV1 decline, more symptoms, and are less likely to be treated than males. We recently demonstrated that over 41% of the smallest conducting airways (terminal bronchioles) are destroyed by the time a patient is diagnosed with mild COPD. In this study, we aimed to test if female smokers have greater remodeling of their terminal bronchioles and associated terminal bronchiole vessels than males, making them more predisposed to developing severe early-onset COPD.

Methods: A cross-sectional cohort of 100 lungs from female and male ex-smokers with a matched smoking history and normal lung function will be compared to matched donors with mild/moderate, and very severe COPD. Lungs were inflated at a consistent pressure of 10 cm H2O, frozen, and eight systematic uniform random samples were taken per lung. Samples were scanned using microCT, and all the stereology-based image analyses of the microCT scans were performed in ImageJ. Our custom Airway Analyzer software was used to assess the wall area, wall thickness, luminal area, and alveolar attachments of terminal bronchioles (TB) and terminal bronchiole-associated vessels (TBV).

Results: Our preliminary results presented are from 34 donors within the study. The wall area of TBs was thicker in males with mild/moderate COPD compared to females with a matched smoking history. Furthermore, there was a trend that TB alveolar attachments were reduced in females with mild/moderate COPD compared to males. Moreover, the wall area of TBVs was thicker in the males with mild/moderate COPD compared to females. In the TBVs, female patients with mild/moderate COPD had fewer alveolar attachments tethering the TBV wall open than male patients with mild/moderate COPD.

Conclusion: Our data suggest that female smokers with COPD may have fewer alveolar attachments on TBs and TBVs, which could explain why females have worse airflow obstruction and experience more symptoms compared to male COPD patients with the same smoking history. Further, male smokers with mild/moderate COPD have thicker TB and TBV airway walls than females, which may promote the survival of small airways.

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