ATS 2026 Highlights

Respiratory Structure and Function Early Career Professionals

Daniel Genkin, PhD

(He/Him)

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This work was completed during the author's PhD training at Toronto Metropolitan University.

Get to know members of the RSF Assembly

Is your research clinical, basic science or translational?

Translational.

Tell us about your research?

I conduct translational imaging research focused on developing and validating quantitative imaging biomarkers to characterize abnormal structural and functional changes associated with lung disease. By integrating automated image analysis and machine learning techniques with established assessment tools, like spirometry, my work also evaluates the added clinical value of quantitative imaging biomarkers for disease phenotyping and outcome prediction.

Where do you see yourself in 5 years?

I aim to become an early-career faculty member at an academic institution with a research program focused on improving outcomes in patients with respiratory disease by translating quantitative imaging biomarkers into clinically actionable tools for disease assessment and prognostication.

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

The major benefit of my RSF Assembly membership is the unique opportunity it presents to engage with a world-renowned community of expert researchers and clinicians in pulmonary medicine. I particularly value the mentorship and networking opportunities, which have helped me form collaborations and gain insight into novel and impactful emerging directions for my research.

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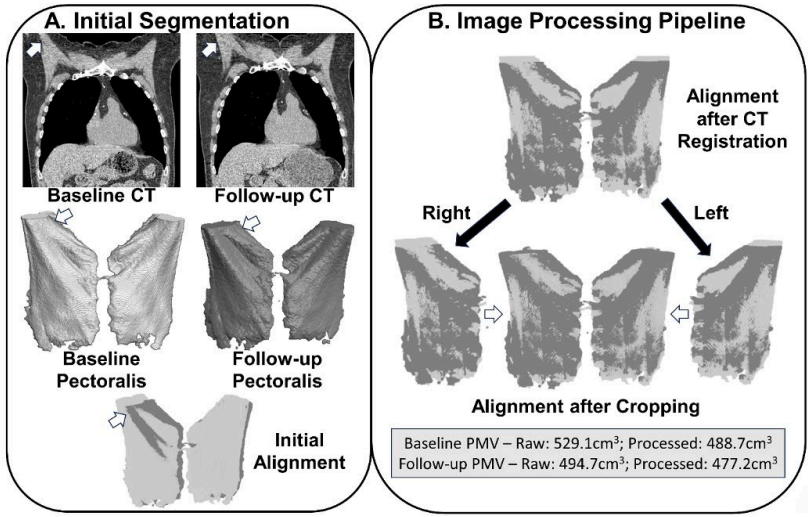

Figure 1. Pipeline to align pectoralis muscle measurements between baseline and follow-up chest CT scans. A: The pectoralis muscle was automatically segmented using a previously developed deep-learning model. **B:** Segmentations were aligned by rigidly registering both CT scans and cropping to the top-most slice of the smaller muscle.

CT-Measured Pectoralis Muscle Loss is an Extrapulmonary Biomarker Associated with Longitudinal COPD Morbidity

Objective: To determine whether the baseline or rate of CT-derived pectoralis muscle volume (PMV) loss is associated with emphysema progression, lung function decline, exercise capacity decline, and symptom burden worsening.

Methods: Data from ever-smokers without COPD and individuals with COPD (forced expiratory volume in 1-second-to-forced vital capacity ratio (FEV_1/FVC)<0.70) from the Canadian Cohort Obstructive Lung Disease (CanCOLD) study was analyzed. Annualized differences in volume-adjusted lung density (ΔV-LD15; g/L/year), FEV_1 (ΔFEV_1; mL/year), peak rate of oxygen consumption during cardiopulmonary exercise testing ($\Delta V'O_{2,peak}$; mL/kg/min/year), and St. George's respiratory questionnaire scores (ΔSGRQ; N/year) between baseline and 3-year follow-up were quantified. The pectoralis muscle was automatically segmented from chest CT scans using a previously developed deep-learning model. Longitudinal PMV measurements were extracted by co-registering and simultaneously cropping pectoralis segmentations to a matched field-of-view, before calculating their annualized difference (ΔPMV; cm^3/year). Associations between baseline PMV with changes in disease morbidity were evaluated using multivariable linear regression models adjusted for baseline age, sex, height, BMI, obesity, smoking-status, pack-years, and center ID. ΔPMV models were also adjusted for baseline FEV_1, baseline PMV, and the baseline outcome.

Results: Among 473 individuals included in this study, the mean±SD age was 65.7±9.5yrs, 190 (40.2%) were female, and 302 (63.8%) had COPD. Smaller baseline PMV was not associated with ΔV-LD15, ΔFEV_1, or $\Delta V'O_{2,peak}$ ($p>0.05$), but was associated with greater symptom burden as evaluated by SGRQ (ΔSGRQ: β (95% CI) = +0.027 (0, 0.053) per -10cm^3; $p=0.047$). Meanwhile, ΔPMV was not associated with ΔFEV_1, $\Delta V'O_{2,peak}$, or ΔSGRQ ($p>0.05$), but was associated with lung density decrease (ΔV-LD15: β (95% CI) = -0.235g/L/year (-0.403, -0.067) per -10cm^3/year; $p=0.006$).

Conclusions: CT-derived pectoralis muscle volume measurements showed prognostic utility as an extrapulmonary imaging biomarker that could potentially identify ever-smokers at risk of COPD and people with COPD susceptible to accelerated longitudinal COPD morbidity.

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