ATS 2025 Highlights

Respiratory Structure and Function Early Career Professionals

Ekamdeep Sandhu, BSc

MSc Candidate (he/him)
Department of Medicine, McMaster University
Firestone Institute for Respiratory Health,
St. Joseph's Healthcare Hamilton
Hamilton, Canada
sandhue@mcmaster.ca
LinkedIn: www.linkedin.com/in/ekamdeep-sandhu

Get to know members of the RSF Assembly

Is your research clinical, basic science or translational?

Translational.

Tell us about your research?

My research leverages advanced quantitative lung imaging to characterize the heterogeneity of luminal mucus plugging in severe asthma and investigate therapeutic responses to anti type-2 biologic and airway clearance therapies. It also focuses on developing and validating novel imaging metrics to quantify mucus burden that may serve as sensitive markers of treatment response in asthma management.

Where do you see yourself in 5 years?

In five years, I see myself having completed my PhD and progressing through medical school. My goal is to become a clinician-scientist, combining research and patient care to improve the understanding and treatment of airways diseases.

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

The opportunity to network and build collaborations with researchers who share similar interests.

ATS

Please follow us on LinkedIn and Bluesky

If you or someone you know would like to be featured as an ATS RSF ECP please email Carolyn Wang (carolyn.wang@hli.ubc.ca)

ATS 2025 Highlights

Respiratory Structure and Function Early Career Professionals

Ekamdeep Sandhu, BSc

MSc Candidate (he/him)

Department of Medicine, McMaster University

Firestone Institute for Respiratory Health, SJHH

Hamilton, Canada

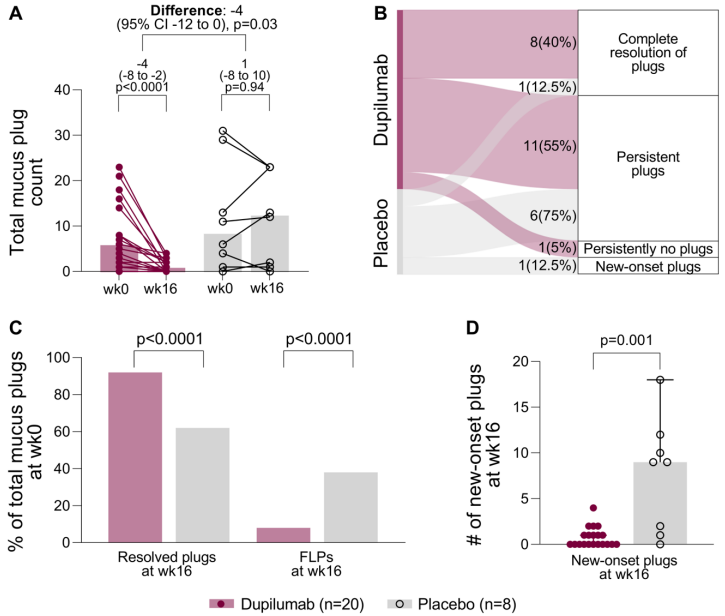

Figure 1. Temporospatial characterization of CT mucus plugs between baseline (wk0) and end of treatment (wk16) in patients who received dupilumab and the placebo.

Effect of Dupilumab on the Temporospatial Characteristics of Mucus Plugs in Patients With Moderate-to-Severe Asthma

Objective: Mucus plugs play a critical role in asthma pathophysiology, contributing to airflow obstruction and adverse clinical outcomes.[1] Dupilumab, an interleukin-4 and interleukin-13 pathway blocker, has been shown to reduce airway mucus burden, as quantified by the computed tomography (CT) mucus score.[2,3] However, the resolution of mucus plugs after treatment with dupilumab has not been fully investigated. Here, we characterized the effect of dupilumab on the spatial and temporal behaviour of mucus plugs.

Methods: This retrospective analysis included 28 adults with uncontrolled moderate-to-severe asthma; 20 received dupilumab, while 8 received placebo every 2-weeks for 16-weeks. At week-0 and week-16, full-inspiration chest CT scans were acquired as previously described.[2] CT scans were reviewed and annotated for all mucus plugs using VIDA|vision software (VIDA Diagnostics) to determine the total mucus plug count (TMPC) and the temporospatial behaviour of individual mucus plugs. Subsequently, patients were classified into the following groups: complete resolution of plugs (all plugs resolved at week-16), persistent plugs (≥1 plug resolved at week-16, but not all), persistently no plugs (no plugs at week-0 and week-16), and new-onset plugs (no plugs at week-0 and ≥1 plug at week-16). Individual mucus plugs were characterized as resolved, fixed-location persistent (FLP), or new-onset.

Results: Figure 1 summarizes the effect of dupilumab (13F/7M, age=50±14 years, week-0 TMPC=6[0-23]) in comparison to placebo (3F/5M, age=60±9 years, week-0 TMPC=9[0-31]) on the total mucus burden and temporospatial behaviour of mucus plugs. At week-16, the TMPC was decreased following dupilumab but not placebo (Figure 1A). Figure 1B shows that 40% of patients treated with dupilumab had complete resolution of mucus plugs (13% in placebo), 55% had persistent plugs (75% in placebo), and 5% had persistently no plugs (0% in placebo). Considering the temporospatial behaviour of individual mucus plugs, the proportion of resolved plugs was greater (92%, 141 of 154 plugs vs. 62%, 59 of 95 plugs; p<0.0001) and FLPs was lower (8%, 13 of 154 plugs vs. 38%, 36 of 95 plugs; p<0.0001) following dupilumab compared to placebo (Figure 1C). The number of new-onset plugs was lower following dupilumab compared to placebo (0[0-4] vs. 9[0-18], p=0.001 (Figure 1D)).

Conclusion: Treatment with dupilumab can reduce persistent plugs, decrease the formation of new plugs and completely resolve CT-evaluated mucus plugging in a subset of patients with asthma over a 16-week period.

[1]C Venegas *et al*. Allergol Int (2024); [2]S Svenningsen *et al*. AJRCCM (2023); [3]E Dunican *et al*. JCI.

ATS

Please follow us on LinkedIn and Bluesky

If you or someone you know would like to be featured as an ATS RSF ECP please email Carolyn Wang (carolyn.wang@hli.ubc.ca)