# ATS 2024 Highlights

## Respiratory Structure and Function Early Career Professionals

### *Get to know members of the RSF Assembly*

**Kiran Kooner, PhD**

*(she/her)*
*Medical Physics Resident*
*Department of Radiation Oncology*
*Johns Hopkins Medicine*
*hkooner1@jh.edu*
*https://www.linkedin.com/in/kiran-kooner*


***Is your research clinical, basic science or translational?***

Clinical and translational

***Tell us about your research?***

The focus of my PhD research was on the use of hyperpolarized $^{129}Xe$ MRI and CT to evaluate the structure-function relationships in asthma and long-COVID. My work contributed to the growing body of evidence suggesting that the integration of imaging in clinical settings can help achieve the overarching goal of delivering the right intervention, to the right patient, at the right time.

***Where do you see yourself in 5 years?***

I am currently transitioning from my PhD research, which focused on pulmonary imaging, to a role in therapeutic radiation physics. Over the next five years, I aim to expand my work in integrating advanced imaging techniques into clinical settings to enhance patient outcomes. I look forward to continued collaboration with multi-disciplinary teams and to contribute to the development of future researchers in this dynamic field.

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

The RSF assembly provides a unique platform for networking with both emerging and established researchers in the field, fostering valuable connections. By bringing together diverse perspectives and expertise, the assembly creates numerous opportunities for knowledge exchange, sparking innovative ideas and driving the advancement of our research.

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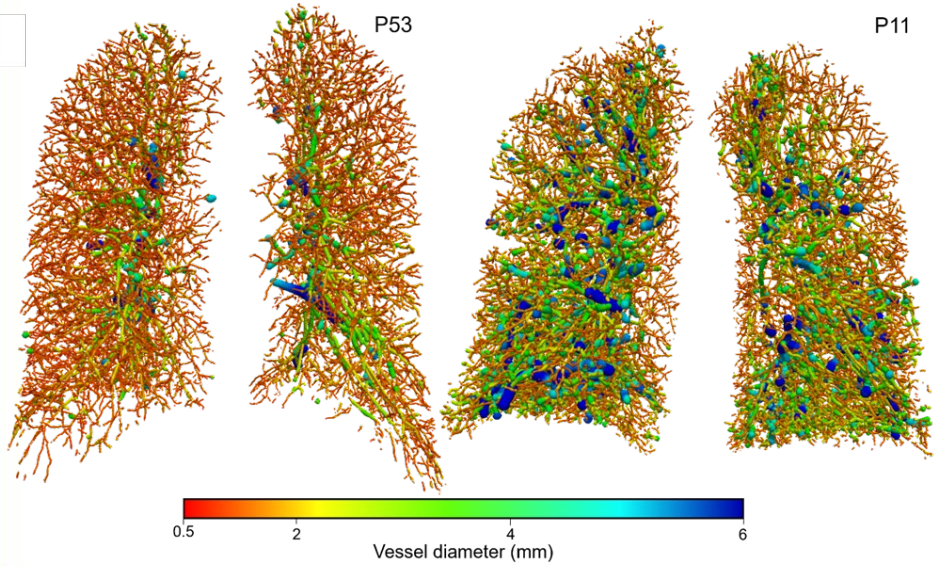


**Figure 1:** Three-dimensional CT pulmonary vessel tree for two participants where blue-green colouring indicates the larger vessels. P53 (left) is a 31-year-old female with GINA 4 asthma and P11 (right) is 67-year-old male with GINA 5 asthma.

### Are There Pulmonary Vascular Differences in GINA 4 and GINA 5 Asthma Severity?

**Objective:** Asthma severity is often defined using the Global Initiative for Asthma (GINA), statement, which does not include pathophysiological measurements in the step-up therapy decision-making tree. In fact, although asthma has long been considered primarily an airways disease, recent evidence has suggested a vascular component. In poorly controlled severe asthma, computed tomography (CT) imaging measurements have revealed vascular abnormalities, which were associated with acute exacerbations, asthma control, and eosinophilia. Previous work in severe asthma also showed differences in pulmonary vascular measurements following treatment with biologic therapy. Hence, here we aimed to investigate whether CT pulmonary vascular measurements differed across GINA severity.

**Methods:** Participants with asthma (n=58) provided written informed consent to spirometry, blood draw for eosinophil count, and thoracic CT. CT vasculature measurements were quantified using Chest Imaging Platform, to provide total blood volume (TBV), as well as the volume of blood vessels with a cross-sectional area <5mm$^2$ ($BV_5$), 5-10mm$^2$ ($BV_{5\text{-}10}$), and >10mm$^2$ ($BV_{10}$). Participants were dichotomized by GINA severity and compared against a healthy control group.

**Results:** The GINA groups were different for age (*P*=.04), eosinophil count (*P*=.02), forced vital capacity (*P*=.01), and $BV_{10}$/TBV (*P*=.049).

**Conclusion:** Differences in CT pulmonary vascular measurements across GINA severity adds to the mounting evidence for a pulmonary vascular component of asthma. Differences in large vessel volume ($BV_{10}$/TBV) may be early evidence of redistribution from the smaller vessels (or vascular pruning) in severe asthma. In addition to the goal of achieving asthma control outlined by GINA, pathophysiological measurements such as pulmonary vascular abnormalities contribute mechanistic insights and a framework for understanding response to therapy.

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