

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?

Translational and clinical

Tell us about your research?

My research applies pulmonary imaging to diagnose, measure, and predict outcomes in pulmonary diseases across the lifespan. My research includes applying ^{129}Xe MRI and CT to measure lung function changes in relation to poor quality of life in adults with long-COVID. I have recently focused on fetal imaging to track lung development in cases of pulmonary hypoplasia in-utero.

Where do you see yourself in 5 years?

My goal is to continue in pulmonary imaging research, leading a team of budding researchers. I hope to better connect the worlds of imaging and respirology so that the advances we make in imaging science can better help clinicians in matching patients to treatment and so patients can better see what is going on inside their lungs.

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

The RSF Assembly connects scientists such as myself to other scientists and clinicians with a deep understanding of the underlying physical processes of disease and dysfunction. The networking opportunities are unparalleled for getting crucial research insights from colleagues worldwide, and for finding eager collaborators to jumpstart new ideas.



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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)

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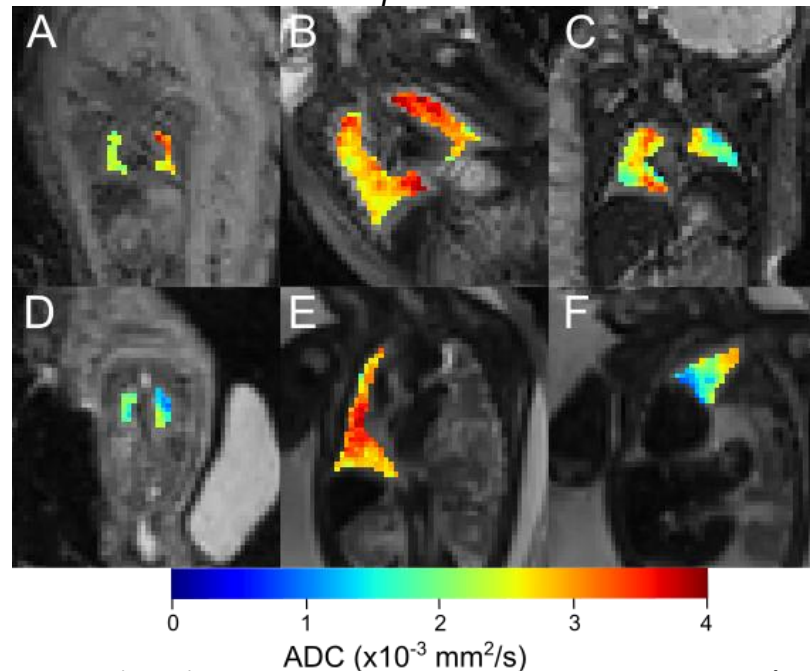
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Fetal Imaging of Abnormal Lung Microstructure in Pulmonary Hypoplasia

Objective: Fetal lung hypoplasia can result from abnormalities such as congenital diaphragmatic hernia (CDH) or oligohydramnios. High mortality makes early detection crucial, but ultrasound techniques only measure gross structure and not microstructure indicative of abnormal development. We aimed to use diffusion-weighted MRI to measure microstructural changes in fetuses with pulmonary hypoplasia.

Methods: Pregnant participants underwent structural MRI and DW-MRI. Images were manually segmented by a trained observer and lung apparent diffusion coefficients (ADCs) were calculated by fitting signal intensity to a monoexponential model.

Results: 45 fetuses were analyzed including 20 control fetuses, nine fetuses with CDH, ten with renal or urinary tract abnormalities and six miscellaneous cases of pulmonary hypoplasia. ADC correlated with gestational age in controls ($R^2=.46$, $p=.002$). ADC was lower in participants with oligohydramnios ($0.0021\text{mm}^2/\text{s}$) compared to controls ($0.0024\text{mm}^2/\text{s}$, $p=.04$). CDH fetuses had lower ADC in ipsilateral compared to contralateral lungs in five of nine participants.

Conclusion: ADC increased with gestational age, demonstrating sensitivity to development. ADC was diminished in fetuses with oligohydramnios pulmonary hypoplasia, suggesting that gross structural abnormalities are also reflected in microstructural development. DW-MRI may be useful for identifying fetuses at risk for hypoplasia and for poor post-natal outcomes in the absence of abnormal lung volume.

ADC maps (color) superimposed on structural, T2-weighted MRI **A**) A 21-week G.A. control fetus, **B**) a 31-week G.A. control fetus, **C**) a 32-week G.A. fetus with left diaphragmatic eventration and low ipsilateral ADC, **D**) a 21-week G.A. fetus with renal agenesis, showing low ADC, **E (contralateral)** and **F**) a 34-week G.A. fetus with left CDH with lower ADC on the ipsilateral side