Get to know members of the RSF Assembly

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Is your research clinical, basic science or translational?
Translational

Tell us about your research?
My lab is developing new ways to visualize & measure regional lung structure & function. One facet of this is hyperpolarized xenon gas magnetic-resonance imaging (MRI) to understand regional airflow obstruction & pulmonary diffusion. My research emphasizes rare-lung diseases where we need “every tool in the box” to understand disease processes & ultimately improve patient outcomes.

Where do you see yourself in 5 years?
Now is such an exciting time for lung MRI! I will continue to develop faster MRI techniques especially for younger children who are unable to do spirometry or other clinical tests. My lab will grow; I enjoy seeing my trainees “get the spark” for translational research & go on to do impactful science.

What do you find is the major benefit of RSF Assembly Membership?
Many of us in RSF come from diverse basic & physical science or engineering backgrounds but we are all united by the desire to see our science improve respiratory health. RSF is a great home to build the bridge from “bench to bedside” and to network and find new collaborators and mentors.
Ventilation and diffusion abnormalities in young people with cystic fibrosis using Xe gas-exchange MRI

Objective: We hypothesized Xe gas-exchange MRI would reveal novel diffusion features in cystic fibrosis (CF). Xe gas-exchange MRI is an emerging technique that capitalizes on the diffusion of inhaled Xe gas through the pulmonary tissues to generate maps of ventilation, diffusion-barrier (interstitial tissue & blood plasma) uptake, and red-blood cell (RBC) transfer, like a spatially-resolved diffusion-capacity measurement but with compartmental granularity.

Methods: Xe gas-exchange images were in 43 people with CF and 13 healthy controls, ages 5-30 years old. Gas-exchange maps for each compartment were generated using means ($\mu$) and standard deviations ($\sigma$) of a healthy-reference population.

Results: The CF group had more airflow obstruction; VentilationLOW was 18.4%±8.9% versus 12.5%±6.5% for controls ($p=0.02$). The CF group had more lung with abnormally-high Xe signal in the barrier compartment. BarrierHIGH was 56.5%±35.5% in CF versus 21.0%±33.1% for controls, $p=0.003$, but there were no significant differences in the RBC compartment ($p>0.2$).

Conclusion: Xe gas-exchange MRI is sensitive to both ventilation and diffusion abnormalities in people with CF. Elevated barrier Xe signal suggests abnormal diffusion-barrier features such as thickened alveolar-capillary tissue, fibrosis, or inflammation and a previously unrecognized early diffusion abnormality in mild CF.