



Canadian Association  
of Physicists

Association canadienne  
des physiciens et physiciennes

Contribution ID: 3287 Type: **Poster Competition (Graduate Student) / Compétition affiches (Étudiant(e) 2e ou 3e cycle)**

## **(G\*) (POS-54) The Feasibility of the Xenon Ventilatory ADC Approach Using <sup>129</sup>Xe MRI**

*Tuesday 7 June 2022 17:48 (2 minutes)*

Hyperpolarized <sup>129</sup>Xe lung MRI(1,2) is an efficient technique used to investigate and assess pulmonary diseases. The technique provides physiologically-relevant-biomarkers of obstructive lung-disease including emphysema, bronchopulmonary-dysplasia, congenital lobar emphysema and alpha-1-antitrypsin-deficiency.(3) However, the longitudinal observation of the emphysema progression using hyperpolarized-gas MRI-based Apparent-Diffusion-Coefficient (ADC) can be problematic, as the disease-progression can lead to increasing unventilated-lung-areas, which likely excludes the largest ADC estimates.(4)

Five patients, underwent spirometry and <sup>1</sup>H/<sup>129</sup>Xe (Static-Ventilation and ADC) MRI scans. <sup>129</sup>Xe imaging was performed at 3.0T (MR750, GEHC, WI) using whole-body-gradients (5G/cm) and a commercial <sup>129</sup>Xe quadrature-flex RF coil.(5) Hyperpolarized <sup>129</sup>Xe gas (polarization=35%) was obtained from a turn-key, spin-exchange-polarizer-system (Polarean-9820 <sup>129</sup>Xe polarizer).(6) Calculated ADC values were normalized on the corresponding ventilation-defect-percent ((VDP), calculated as previously described(7) estimates to obtain vADC.

The generated global-mean VDP estimates for the study-subjects were between 5% and 18%. The generated global-mean ADC/(vADC) estimates for the study-subjects were between 0.034s/cm<sup>2</sup>/(0.034s/cm<sup>2</sup>) and 0.048s/cm<sup>2</sup>/(0.048s/cm<sup>2</sup>).

The <sup>129</sup>Xe DW data reconstructed with the key-hole-technique had sufficient SNR to generate reliable ADC maps and reasonable matching with the Static-Ventilation data. For the first time the feasibility of the vADC <sup>129</sup>Xe MRI-based approach was demonstrated and shown that this method can be used to accurately evaluate the emphysema-progression in a small-group. The study results suggest that the diffusion data reconstructed with the key-hole-technique(8) had sufficient SNR to generate reliable ADC maps and showing reasonable matching with the static-ventilation-data. For future work, we plan rescan the study-participants in twelve-months and normalize the ADC by VDP for an accurate-assessment of the emphysema-progression over the year-interval.

1.Mugler, J.P., et al. JMRI,2013,37(2):313-31 5.Ouriadov et al. MRM,2020, 84:416-426.

2.Driehuys, et al., Radiol,2012,262(1):279-89 6.Kaushik, et al. MRM,2016,75(2):1434-1443

3.Young, H. M., Clinbiomech,2017:09.016 7.Kirby, M. et al. Radiol,2012.19(2):141-152

4.Westcott, A., et al. JMRI,2019,49(2):311-13 8. Barker, A. L. et al. ISMRM 19th,2019.

**Primary authors:** PARNIYANY, Elnaz; WOODWARD, Elise; Mrs WU, Tingting (Western university); FOX, Matthew S. (Lawson Health Research Center); OURIADOV, Alexei (The University of Western Ontario)

**Presenter:** PARNIYANY, Elnaz

**Session Classification:** DPMB Poster Session & Student Poster Competition (17) | Session d'affiches DPMB et concours d'affiches étudiantes (17)

**Track Classification:** Technical Sessions / Sessions techniques: Physics in Medicine and Biology /

