Kun Qing, J Pulm Respir Med 2018, Volume 8
DOI: 10.4172/2161-105X-C1-026

Kun Qing

University of Virginia, USA

A new COPD phenotype characterized by hyperpolarized Xenon-129 MRI

Purpose: Airway-predominant Chronic Bronchitis (CB) and alveolar-predominant Emphysema (EM) were regarded as major phenotypes of smoke-induced COPD. Routine clinical tools, including Pulmonary Function Tests (PFTs) and Computed Tomography (CT), have their limitations to characterize COPD. This study will characterize COPD phenotypes using a new imaging tool - hyperpolarized Xenon-129 (Xe129) MRI.

Methods: 13 healthy and 33 COPD subjects were recruited and underwent PFT, CT. COPD patients were phenotyped into three groups by PFT percent diffusion capacity (%DLCO) and CT percent of EM lung tissue (%EM): 1) EM: low %DLCO and high %EM, 2) CB: high %DLCO and low %EM and 3) mixed indeterminate (IND) phenotype: low %DLCO but low %EM. Xe129 MRI was subsequently administered to determine airflow limitation by measuring percent of ventilation dead space (%VD) and alveolar gas uptake by measuring Xe129 diffused into interstitial tissue (tissue/gas ratio, reflecting lung tissue integrity) or into red blood cells (RBCs) (RBC/tissue ratio, reflecting gas exchange and pulmonary perfusion).

Results & Discussion: Using the criteria described above, 18% of patients (6/33) were EM predominant; 21% (7/33) were CB phenotype and surprisingly, 61% (20/33) were IND phenotype. The IND group had %FEV1 substantially overlapped the CB group ($p>0.05$) and did not show significantly higher %VD than the control group ($p>0.05$). Also, no statistical differences were found in Xe129 tissue/gas ratios among the control, CB and the IND groups ($p>0.05$). However, the RBC/tissue ratios, measuring gas transfer from the interstitium further to the blood stream, were much lower in the mixed group as compared to all other groups ($p<0.05$).

Conclusion: There seemed to be a new mixed phenotype of COPD identified in a majority of COPD patients, which had minimal emphysematous tissue destruction, but impaired gas exchange to the blood as indicated by Xe129 MRI.

Biography

Kun Qing is an MR scientist with more than nine years of experience working in the medical imaging research field. Currently, he is serving as an Assistant Professor of Radiology and Medical Imaging at University of Virginia (UVa). His research has primarily focused on development and optimization of MR and image processing techniques to provide better depiction of lung structure and function. Also he served as PI or Co-Investigator on multiple research projects and performed MR imaging studies to investigate patients with pulmonary diseases and their responses to treatments.Dr. Wang has also served as the editorial board member and/or section editor for the Clinical and Translational Medicine, Pulmonary Circulation and several other journals.

kun.qing@virginia.edu