A novel breath analysis method for detection of interstitial lung disease

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Abstract

Exhaled breath volatile organic compounds (VOCs) have shown promise for patient diagnosis and classification in various lung diseases, including asthma, lung cancer and COVID-19. Recently, VOCs have been evaluated for detection of interstitial lung disease (ILD), which encompasses conditions involving the development of pulmonary fibrosis, with no cure and a high mortality. To further explore the role of breath VOCs in diagnosing and risk stratifying patients with ILD, we use a silicon microreactor technique for selective capture carbonyl compounds in exhaled breath and ultra-high performance liquid chromatography-mass spectrometry (UHPLC-MS) for quantification of carbonyl VOC. We collected breath samples from outpatients with Idiopathic Pulmonary Fibrosis (IPF) and Connective Tissue ILD (CTD-ILD) with stable lung function. A panel of carbonyl compounds was identified for separation of ILD patients from healthy controls and further differentiation of IPF patients from connective tissue ILD patients. Diagnosis of IPF and ILD diseases would significantly affect therapeutic treatment and patient lifetimes.

Biography of presenter

Zhenzhen Xie obtained her master's degree in chemical engineering Department at the University of Louisville in 2013 focusing on MOF-based catalytic performance and membrane for gas separation. Then she joined Dr. Xiaoan Fu's group at the University of Louisville where she obtained her Ph.D. degree in Chemical Engineering. She conducted research on gas sensors and microreactors to analyze trace volatile organic compounds in both environmental air and human exhaled breath samples. She is currently a postdoctoral research associate at the University of Louisville. Her research focuses on quantitative analysis of VOCs using ultra-high performance liquid chromatography-mass spectrometry (UHPLC-MS) and gas chromatography-mass spectrometry (GC-MS) in breath samples and determines the biomarkers of different diseases.