

## DISTINGUISHED SPEAKER SERIES

### Structural and Mechanical Factors Governing the Progression of Chronic Obstructive Pulmonary Disease

Chronic Obstructive Pulmonary Disease (COPD) is a progressive disease that gradually destroys the normal structure of the lung resulting in airspace enlargement and subsequent loss of lung function including tissue elasticity and gas exchange. Currently, the mechanisms driving the progression of COPD is not fully understood and there is no cure. In this presentation, I will review several studies from our laboratory, which provide experimental evidence that mechanical forces in the lung play a critical role in COPD; namely, the enzymatically weakened tissue under mechanical forces ruptures which redistributes the load around the rupture site increasing the risk of further rupture. This represents a positive feedback mechanism that can explain the progressive nature of COPD. Incorporating these ideas in a network model provides results that are consistent with lung structure on histologic images at the microscale as well as clinically measurable CT images of COPD patients at the macroscale. We have also developed a novel personalized computational network model that allows spatiotemporal simulations of mechanical stresses and hence predicting the location of tissue deterioration. Our approach may find implications for predicting the personalized rate of decline of lung structure and function in response to interventions such as drug treatment or lung volume reduction.

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**ZOOM**

**11:00 AM - 11:50 AM**



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Béla Suki received his PhD from the University of Szeged (Hungary) in 1987 and currently is a professor of Biomedical Engineering at Boston University. He has published 240 peer-reviewed articles and 12 book chapters. He is an elected Fellow of the American Institute for Medical and Biological Engineering and the Biomedical Engineering Society. He also received a presidential award from the National Institutes of Health. His current research interests include complexity, respiratory physiology, biomechanics, modeling nonlinear and network phenomena in physiology and biology as well as development of medical devices one of which has been tested in a clinical trial.