

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Flow characteristics in the airways of a COPD patient with a saber-sheath trachea DOHYUN JIN, HAECHEON CHOI, Seoul National University, CHANGHYUN LEE, JIWOONG CHOI, Seoul National University College of Medicine, KWANGGI KIM, National Cancer Center — The chronic obstructive pulmonary disease (COPD) is a lung disease characterized by the irreversible airflow limitation caused by the damaged small airways and air sacs. Although COPD is not a disease of the trachea, many patients with COPD have saber-sheath tracheas. The effects of this morphological change in the trachea geometry on airflow are investigated in the present study. An unstructured finite volume method is used for the simulations during tidal breathing in normal and COPD airways, respectively. During inspiration, local large pressure drop is observed in the saber-sheath region of the COPD patient. During expiration, vortical structures are observed at the right main bronchus of the COPD airway, while the flow in the normal airway remains nearly laminar. High wall shear stress exists at convex regions of both airways during inspiration and expiration. However, due to the morphological changes in the COPD airway, relatively higher wall shear stress is observed in the patient airways.

Dohyun Jin
Seoul National University

Date submitted: 01 Aug 2016

Electronic form version 1.4