**THE AFFECTS OF CARTILAGE RINGS ON AIRFLOW AND PARTICLE DEPOSITION IN THE TRACHEA AND FIRST GENERATION AIRWAYS.**

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Determining particle deposition in the lungs is critical when trying to understand the affects of airborne diseases and inhaled medications. In most computational fluid dynamic (CFD) analysis of the human lung, it has been assumed that the trachea and branches of the lung have smooth walls. In order to determine if this is a valid assumption, the affects of cartilage rings on airflow and particle deposition of the lungs is determined through conducting simulations with two CFD packages, Fluent and CFX. A base line smooth walled model and a ringed model of the trachea and first generation airways were created based on idealized models with realistic characteristics. Turbulent velocity profiles were implemented at the inlet of the trachea to account for the laryngeal jet at 15, 30 and 60lpm's, while random and uniform distributions of particles were injected into the airways. Deposition of particles through sedimentation and impaction were recorded and compared for each model at each flow rate. The results of this work show that the affects of cartilage rings increase with the size of particle and flow rate.