

Abstract Submitted
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Flow measurement in an in-vitro model of a single human alveolus¹ SUDHAKER CHHABRA, AJAY PRASAD, Department of Mechanical Engineering, University of Delaware, Newark, DE 19716 — The alveolus is the smallest and most important unit in the acinar region of the human lung. It is responsible for gas exchange between the lungs and the blood. A complete knowledge of the airflow pattern in the acinar region is necessary to predict the transport and deposition of inhaled aerosol particles. Such knowledge will benefit the pharmaceutical community in its effort to deliver therapeutic aerosols for lung-specific as well as system-wide ailments. In addition, it can also help to assess the health effects of the toxic aerosols in the environment. We have constructed an in-vitro model of a single spherical alveolus on a circular tube. The alveolus is capable of expanding and contracting in phase with the oscillatory flow through the tube. Realistic breathing conditions are reproduced by matching Reynolds and Womersley numbers. Experimental methods such as particle imaging velocimetry and laser induced fluorescence are used to study the resulting flow patterns. In particular, recirculating flow within the alveolus, and the fluid exchange between the alveolar duct and the alveolus are important for better understanding the flow in the acinar region.

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