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Convective-diffusive particle transport in pulmonary acinar models PHILIPP HOFEMEIER, JOSUE SZNITMAN, Technion - Israel Institute of Technology — Much of our understanding of the transport and deposition of fine inhaled particles (≤ 1 μm) in the deep regions of the lungs results from numerical simulations that revolve around the central assumption that fine aerosols are mainly influenced by local convective airflows. Recently, it has been noted that aerosol transport in the pulmonary acinus relies however on the complex coupling between convective, diffusive processes, as captured by the appropriate dimensionless particle numbers (Sznitman, *J. Biomech.*, 2013). It is anticipated that for particles in the range of 0.5 – 1 μm, the coupling of intrinsic particle motion with acinar flow fields ultimately governs deposition outcomes. In an effort to address the influence of convective-diffusive mechanisms on aerosol transport and deposition, we present a detailed investigation of fine particle transport in the absence and presence of stochastic Brownian motion. Further, we study systematically the effects of particle properties (e.g., diameter) as well as acinar lung generation on the ensemble statistics of inhaled fine particles and their deposition. Our findings reveal the intimate coupling between local acinar flow structures and intrinsic particle motion leading to complex irreversible aerosol kinematics.

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