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**Transient Particle Deposition Simulations in a Human Whole-Lung Model** KAMRAN POORBAHRAMI, JESSICA OAKES, Northeastern University — Efficiency of aerosol therapeutic delivery to treat pulmonary disease is correlated to particle characteristics, respiration waveforms, and delivery method. Targeted delivery may enable delivery of medications directly to areas in need, while alleviating adverse side effects. In this work, we performed CFD and particle transport simulations in an image-based human 3D lung model by employing multi-domain methods. The particle trajectories were calculated by coupling Maxey-Riley and advection-diffusion equations. Near wall transport effects were included within the framework. The influence of respiration parameters (e.g. steady, sinusoidal and realistic respiration waveforms) coupled with particle diameters (1, 3, and 5micron) on regional deposition was studied. To identify times of enhanced deposition efficiency, we recorded regional particle deposition over time and correlated with the particle bolus injection time. Simulation results highlight the link between boundary conditions, particle size, and particle release time with regional particle deposition concentrations.

Kamran Poorbahrami
Northeastern University

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