

## Particle Transport and Adhesion in Human Vasculature

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To quantify the transport and adhesion of drug particles in a complex vascular environment, multiscale computational fluid particle dynamics (MCFPD) simulations of blood flow and drug particulate were conducted in three different geometries representing the human lung vasculature. A receptor-ligand model was used to simulate the particle binding probability. The results indicate that realistic unsteady flow significantly accelerates the binding activity over a wide range of particle sizes and also improves the particle deposition fraction in bifurcation regions. Furthermore, surface imperfections and geometrical complexity coupled with the pulsatility effect can enhance fluid mixing and accordingly particle binding efficiency. The primary outcome of this work provides a better understanding of drug delivery mechanisms in the human lung vasculature tree.