

# *In Vitro* and *In Silico* Models of Aerosol Drug Delivery

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Therapeutic aerosols delivered to the lungs are widely used in the treatment of local and systemic respiratory diseases. The deposition pattern of inhaled particles and droplets within the airways of the respiratory tract determines initial regional drug doses. Thereafter, disposition processes including drug release or dissolution, mucociliary clearance, and absorption influence local and systemic exposure to inhaled drugs over time.

In this presentation, pros and cons associated with use of empirical correlations, *in silico* numerical simulation, and *in vitro* airway geometries to predict extrathoracic and lung deposition fractions will be described and discussed. Recent efforts to link deposition models with pharmacokinetic models predicting lung and systemic exposure to inhaled drugs over time will be reviewed. These efforts are improving predictive understanding of lower respiratory drug delivery, and are expected to aid the development of new inhaled drugs and drug delivery devices.

*Martin, A.R., Moore, C.P., and Finlay, W.H. (2018) "Models of deposition, pharmacokinetics, and intersubject variability in respiratory drug delivery." Expert Opinion on Drug Delivery. 15(12): 1175-1188.*