

Dosimetry of Inhaled Particles in Children

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Epidemiological studies have shown that the inhalation of airborne material (e.g., particles, ozone) poses a potential health threat to children. Information on the deposition and fate of particles in the lungs of children is needed to allow formulation of risk assessment models for setting National Ambient Air Quality Standards (NAAQS) for airborne particulate matter (PM) as well as for assessing residual risk from air toxic particles. Limited experimental data are available on the deposition and clearance of particles in the respiratory tracts of children. The overall goal of this project is to develop realistic models of particle deposition in the lungs of children as part of a larger goal of assessing potential health impacts on children when exposed to various concentrations of airborne particles. In the initial phase of the project, typical-path models of the lung geometry in growing children were constructed from morphometric measurements of the lung airways. A deposition model was developed of the lung geometries to calculate particle deposition in different regions of generations of the lung. Efforts are underway to construct anatomically accurate models of human lung geometry at different ages based on morphometric measurements available in the published literature. We will also develop mathematical models suitable for growing lungs that use lung geometry information to calculate site-specific deposition of particles and to compare these predictions with data obtained in children by scientists at the U.S. EPA, University of North Carolina at Chapel Hill, and University of California at Irvine.

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Presentation(s):

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Asgharian, B. and Miller, F. J. (2003). Dosimetry of inhaled particles in children. Poster presentation at first annual science meeting of the Long-Range Research Initiative, American Chemistry Council, Herndon, VA, June 24–25.

Peer-reviewed publication(s):

Asgharian, B., Ménache, M. G., and Miller, F. J. (2004). Modeling age-related particle deposition in humans. *J. Aerosol Med.* 17, 213–224.

Other publication(s):

Asgharian, B., Hoffman, W., and Miller, F. J. (2005). Age dependent dosimetry of particles in humans: From children to adults. In *Toxicology of the Lung* (Gardner et al., eds.), CRC Press, NY. In press.

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