

## Development of Aerosol Generation Systems for Nanoparticle Research

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The development and use of nanoscale technology is proceeding at a rapid pace. Nanotechnology includes the development of particles with dimensions in the 1–100 nanometer (nm) range. One distinction being used to define the difference between nanoparticles and ultrafine particles, which are also in the 1–100 nm size range, is that nanoparticles are engineered deliberately with special properties in this size range, while ultrafine particles are unintended byproducts that fall within this size range. Studies have been performed to elucidate the toxicological hazards of inhaled ultrafine particles. However, while nanoparticles have been developed recently and continue to be developed rapidly, few studies have been performed on the toxicology of nanoparticles. There is concern that due to the size of nanoparticles, they may exhibit greater toxicities than their bulk materials. In order to assist in studies of the potential toxicity of some nanoparticles, we are developing methods to aerosolize and characterize nanoparticles of carbon, radiolabeled iron, carbon nanotubes, zinc, and agglomerates of zinc nanoparticles,

**Implications:** This project will enable the conduct of separate animal studies of inhaled nanomaterials. At present, exposure methods are unrealistic and likely to produce results that cannot be used directly in risk assessments. Since inhalation is a significant pathway, having realistic exposure methods is essential. Once in place, these methods can be used in various inhalation studies with a variety of nanoparticles.

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### Presentations:

Nash, D. G., Moss, O. R., and Wong, B. A. (2007). Generation of agglomerates of nanoparticles for use in biological studies. Poster presentation at the American Association for Aerosol Research Annual Meeting, Reno, CA.

Wong, B. A., Tewksbury, E. W., Garcia, G. J. M., and Kimbell, J. S. (2007). Deposition efficiency of inhaled particles from 30 nm to 10  $\mu$ m in different individual human nasal replicas. *The Toxicologist* 96 (S-1): 167. (Abstract 809).

Wong, B. A., Tewksbury, E. W., and Asgharian, B. (2008). Nanoparticle deposition efficiency in rat and human nasal replicas. *The Toxicologist* 102 (S-1): 310. (Abstract 1512).

### Peer-reviewed publication(s):

Wong, B., Ross, P. W., and James, R. A. (2008). Development and use of a single-animal whole-body system for inhalation exposure. *Lab Animal* 37: 33-40.

**Other publication(s):** None to date.

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