

AUTHORS: Warheit DB

TITLE: WHAT IS CURRENTLY KNOWN ABOUT THE HEALTH RISKS RELATED TO CARBON NANOTUBE EXPOSURES?

PUBLISHED: May-06

CITE: CARBON 44 (6): 1064-1069 MAY 2006

ABSTRACT: This manuscript summarizes our recently published in vivo studies [Warheit DB, Laurence BR, Reed KL, Roach GA, Webb TR. Comparative pulmonary toxicity assessment of single-wall carbon nanotubes in rats. *Toxicol Sci* 2004;77(1):117-25] and contains an updated discussion of these results and their relation to the most recent literature. Carbon nanotubes have excellent mechanical, electrical and magnetic properties. However, the potential hazards of inhalation exposure to carbon nanotubes have not been sufficiently evaluated. The pulmonary toxicity of intratracheally instilled single-wall carbon nanotubes (SWCNT) was compared with positive and negative control particle-types i.e., quartz, and carbonyl iron particles, respectively. After exposures, the lungs of PBS and particle-exposed rats were evaluated for pulmonary injury biomarkers and histopathology of lung tissue at 24 h, 1 week, 1 month and 3 months post-instillation exposure.

The results indicated that 5 mg/kg dose exposures to SWCNT produced mortality in similar to 150/0 of instilled rats within 24 h post-instillation, due to mechanical blockage of the large airways. Exposures to quartz particles resulted in sustained pulmonary inflammation, cytotoxicity, alveolar cell proliferation and fibrotic effects. Pulmonary exposures to SWCNT in rats produced multifocal mononuclear granulomas. The physiological relevance of these findings remains to be determined since the SWCNT have a strong tendency to agglomerate following intratracheal exposures. Thus, it is critical that the pulmonary effects of SWCNT in rats be assessed by generating SWCNT aerosols in an inhalation toxicity study.