

NANOPARTICLES AS AN EMERGING ENVIRONMENTAL AND OCCUPATIONAL HAZARD: DOES OXIDATIVE STRESS MATTER?

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Advancements in nanotechnology and broad applications of nanomaterials raise the issue of their potential adverse health effects particularly in occupational and environmental settings. Among different nanomaterials, carbonaceous nanotubes (CNT) including Single/Multi-Walled Carbon Nanotubes and Nanofibers – with their unique physico-chemical, electronic and mechanical properties – are emerging as important objects of toxicological studies. However, toxic effects of CNT have not been well characterized, especially with respect to pulmonary and immune outcomes. By employing proteomics and lipidomics analyses, *in vivo* ESR spin-trapping technology, redox assessments of antioxidant balance, and quantitative morphometry (including collagen) in wild-type and genetically manipulated mice, we were able to reveal the major pathways through which CNT - in doses relevant to potential occupational exposures - exert their toxic effects in the lung/distant organs of exposed animals. Overall, we found that an unusual and robust inflammatory and fibrogenic responses are closely associated with the progression of oxidative stress in the lung. Because realistic exposures to SWCNT are likely to occur in conjunction with other pathogenic influences, e.g., microbial infections, our finding of compromised bacterial clearance in the lungs of CNT-exposed mice are of great practical importance. The talk will also address important issues of comparative respiratory outcomes of CNTs and asbestos, particularly with regards to pulmonary injury and potential carcinogenicity. Finally, the mechanisms of toxicity will be discussed in the context of current regulations of protection and their sufficiency in environmental and occupational settings.

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