

Risk Assessment of Nanomaterials-Are they safe?

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Recent developments in nanoparticles (NP, <100nm in diameter) technology and their commercial production have raised concern regarding NP risk to health and the environment. Since some NP have already been produced and introduced into the market before a suitable risk assessment and framework for risk management has been firmly established, toxicological studies, especially carcinogenesis studies, of NP which are not subordinate to their introduction to the market are of the highest priority. Subchronic toxicity data indicate that the major lesion induced by various particles including NP is foreign body-induced inflammation, possibly related to continuous generation of reactive oxygen species (ROS) by macrophages in the deposition site. In addition, carbon black (CB) and titanium dioxide (TiO₂) of NP size were shown to be carcinogenic primarily in female rats. Available chronic inhalation and intra-tracheal instillation studies indicate that CB and TiO₂ particles larger than NP induced chronic inflammation and neoplastic lesions in the rat lung, also primarily in female rats. Thus, larger size and NP size CB and TiO₂ particles cause inflammatory lesions and exposure can lead to carcinogenesis. However, with regard to other NP such as fullerene and carbon nanotubes, we are currently suffering from a lack of information regarding carcinogenicity and whether NP are safe in the workplace or the market. Clearly, it is indispensable to quickly conduct toxicological and carcinogenesis studies and forward the finding to a management framework.