

Nanotoxicology : An Emerging Discipline

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Abstract

Nanotoxicology refers to the study of the interactions of nanostructures with biological systems with an emphasis on elucidating the relationship between the physical and chemical properties of nanostructures with induction of toxic biological responses. Nanotoxicology is aimed at providing information on the potential toxicological effects, risk assessment and safety evaluation of nanostructured materials on human health. Nanoparticles present possible dangers, both medically and environmentally. They are also able to pass through cell membranes in organisms and their interactions with biological systems are relatively unknown. Animal studies have shown that nanoparticles can penetrate cells and tissues, move through the body and brain and cause biochemical damage. The greater chemical reactivity of nanomaterials result in increased production of reactive oxygen species which may contribute to similar patterns of cell injury and alterations at the molecular level by initiation, propagation and autocatalytic chain reactions. Intracellular signaling activation and inactivation of enzymes, stimulation, secretion and release of pro-inflammatory cytokines, chemokines and nuclear factor activation and alteration are also common events.

Keywords: Nanotoxicology, Nanomaterials, Reactive oxygen species.