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Oxidative Stress and Inflammation Induced by Nanoparticles

- Chapter
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Environmental Nanotoxicology

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Abstract

Due to their distinctive physicochemical characteristics, nanoparticles have drawn significant attention in a number of sectors and biomedical applications. However, worries about their potential negative impact on human health have been raised due to their growing use. This in-depth analysis observes the complex association between nanoparticles, oxidative stress, and inflammation, illuminating the underlying mechanisms and their ramifications. Additionally, it describes the sorts and origins of nanoparticles, highlighting their rising prevalence in commonplace goods and settings. The methods by which nanoparticles cause oxidative stress are then explored, illuminating the creation of reactive oxygen species (ROS) and their harmful impact on cellular materials such as lipids, proteins, and nucleic acids. The review also examines how nanoparticles contribute to inflammation by triggering pro-inflammatory signaling pathways and inducing cytokine responses. It also clarifies the functions of antioxidant enzymes in preventing the formation of free radicals generated by nanoparticles.

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