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Toxicity of Graphene-family Nanoparticles: A General Review of the Origins and Mechanisms

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Recent attention has focussed on the detrimental health impacts of graphene nanoparticles contained in the face mask as well as in the mRNA vaccine as documented in a scientific study by a groups of Spanish researchers.

This study was originally published in 2016.

Abstract

Due to their unique physicochemical properties, graphene-family nanomaterials (GFNs) are widely used in many fields, especially in biomedical applications. Currently, many studies have investigated the biocompatibility and toxicity of GFNs in vivo and in intro.

Generally, GFNs may exert different degrees of toxicity in animals or cell models by following with different administration routes and penetrating through physiological barriers, subsequently being distributed in tissues or located in cells, eventually being excreted out of the bodies.

This review collects studies on the toxic effects of GFNs in several organs and cell models. We also point out that various factors determine the toxicity of GFNs including the lateral size, surface structure, functionalization, charge, impurities, aggregations, and corona effect.

In addition, several typical mechanisms underlying GFN toxicity have been revealed, for instance, physical destruction, oxidative stress, DNA damage, inflammatory response, apoptosis, autophagy, and necrosis. In these mechanisms, (toll-like receptors-) TLR-, transforming growth factor β- (TGF-β-) and tumor necrosis factor-alpha (TNF-α) dependent-pathways are involved in the signalling pathway network, and oxidative stress plays a crucial role in these pathways. In this review, we summarize the available information on regulating factors and the mechanisms of GFNs toxicity, and propose some challenges and suggestions for further investigations of GFNs, with the aim of completing the toxicology mechanisms, and providing suggestions to improve the biological safety of GFNs and

facilitate their wide application.

Read the full report here.

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