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Toxicological Evaluation of Graphene-Family Nanomaterials

Linlin Chen [1], Jinxia Li [2], Zhaofang Chen [3], Zhanjun Gu [2], Liang Yan [2], Feng Zhao [2], Aiping Zhang [1]

Affiliations
PMID: 31492205   DOI: 10.1166/jnn.2020.17364

Abstract

With the extending applications, graphene-family nanomaterials begin to enter people's life via various ways, largely increasing the exposure frequencies. In spite of the increasing toxicological studies, the biosafety of graphene-based nanomaterials still remains elusive. Graphene oxide (GO), an oxidation derivative of graphene, is considered as one of the recently-emerging nanomaterials attractive for biomedical applications. Accompanied with the prospect of applications are the great concerns about its biosafety for human and environment. Herein, this review intends to systematically summarize the research on GO toxicity both *in vitro* and *in vivo* followed by deep discussions about the toxicological mechanisms. The currently reported toxicity of GO mainly includes inhalation toxicity, ingestion toxicity, dermal toxicity and hemocompatibility depending on exposure routes. The toxicity evaluation of GO using non-rodent organisms (zebrafish, *Caenorhabditis elegans* and drosophila, etc.) is also summarized, supplementary to *in vivo* toxicity of GO. Based on the comprehensive summary of the reported GO-induced toxicity, our review suggests considerable emphasis being put on the balance of benefits and risks when employing the nanotechnology.

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