

Graphene oxide-based hydrogels as a nanocarrier for anticancer drug delivery

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ABSTRACT

Graphene oxide (GO) possesses excellent mechanical strength, biocompatibility, colloidal stability, large surface area and high adsorption capability. It has driven to cancer nanotechnology to defeat cancer therapy obstacles, via integration into three-dimensional (3D) hydrogel network with biocompatible polymers as nanocomposites carrier, and controllable release of anticancer drugs. Specifically, the surface of GO affords π - π stacking and hydrophilic interactions with anticancer drugs. Additionally, modification of GO with various polymers such as natural and synthetic polymers enhances its biodegradability, drug loading, and target delivery. In this review, GO based hydrogels research accomplishments are reviewed on the aspects of crosslinking strategies, preparation methods, the model drug, polymer conjugation and modification with targeting ligands. Moreover, swelling kinetics, drug release profile and biological activity *in vivo* and *in vitro* are discussed. The biocompatibility of GO based hydrogels is also discussed from the perspective of its nano-bio interfaces. Apart from that, the clinical potential of GO based hydrogels and its major challenges are addressed in detail. Finally, this review concludes with a summary and invigorating future perspectives of GO based hydrogels for anticancer drug delivery. It is anticipated that this review can stimulate a new research gateway to facilitate the development of anticancer drug delivery by harnessing the unique properties of GO based hydrogels, such as large surface area, chemical purity, high loading capacity of drug, chemical stability, and the nature of lipophilic for cell membrane penetration.

KEYWORDS

Graphene oxide; Cancer nanotechnology; Hydrogel; Nanocarrier; Drug delivery

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