Graphene Oxide: A Novel Approach to Wound Healing

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ABSTRACT
In diabetic patients delayed wound healing and chronic wounds are major complications that have been a reason for serious concern. As reported in the literature, the underlying causes for such wounds are due to reduction of proliferation and migration of different cells like keratinocytes and fibroblasts. Therefore, there is a high demand to bring a wound dressing patch which could provide the advantages of ideal dressings with gaseous exchange, absorption of wound exudate along with release of incorporated therapeutic at sustained action which could support cell proliferation and migration. Such dressing environment ultimately can assist diabetic wound healing. Due to their excellent biocompatibility, effective cell penetration, high fluorescence and specific adsorption of nucleotides, graphene oxide (GO)-derivatives have been identified in a wide range of biomedical applications. The two main methods for producing GO-based wound dressings are solvent blending method and in-situ polymerization. Several in-vitro and in-vivo study reports indicated that application of graphene oxide and its reduced form could promote wound healing by the enhancement of migration and proliferation of keratinocytes. Simultaneously, GO has also shown its potential to induce angiogenic properties that have an active role in any inflammatory event.

Keywords: graphene oxide; reduced graphene oxide; hydrogel; biocompatibility.

INTRODUCTION
Delayed healing or non-healing of wounds in case of DFUs is due to multiple factors including the reduction of growth factors and cell proliferation, which leads to reduced peripheral blood flow and decreased angiogenesis. Recently, Graphene and Graphene oxide (GO) have attracted great interests in biomedical applications due to its potential to enhance angiogenesis in wound healing applications.1 It has been observed the angiogenic property of graphene oxide (GO) and reduced graphene oxide (rGO) through several invitro and in-vivo angiogenesis assays. It was found that GO and rGO exhibit pre-angiogenic applications due to its potential to enhance angiogenesis in wound healing applications.2

Graphene is a carbon crystalline hexagonal lattice with amazing physical and chemical properties comprising of high tensile strength and extreme chemical stability. It is used in different form to improve the wound healing, enhancing the rate of wound contraction and reducing scar formation. Toxico logical studies on biomaterial such as dermal toxicity, carcinogenic toxicity, allergenicity, genotoxicity is yet to be performed in most of discussed graphene based nanomaterial.

REFERENCES