عنوان مقاله:

Graphene oxide as delivery carrier in three dimensional hydrogels

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خلاصه مقاله:

Introduction: Tissue engineering with stem cells in three dimensional (3D) scaffolds is a promising future therapy to treat osteoarthritis and Intervertebral disc (IVD). However, this field faces the challenge to design delivery carriers to efficaciously deliver biological factors inside these 3D cell-containing scaffolds for appropriately-guided cell differentiation. Studying the role of Graphene oxide as growth factor delivery carrier in three dimensional is main goal. Materials and Methods: This essay are a systematic review of English articles published in PubMed, Science Direct since 2015. Being up to date, matching with keywords and accessing the full text were incoming metrics. Results: Graphene oxide (GO) have recently attracted interest for their biomedical feature as they can adsorb so much biological molecules, thus offering highpotential as delivery carriers. In one study found graphene oxide flakes to adsorb transforming growth factor β3 (TGF-β3), which were then incorporated into a collagenhydrogel. Human mesenchymal stem cells (hMSCs) were surrounded in the same gel and chondrogenic differentiation assessed. The study showed GO flakes adsorbed > 99% TGF-β3 with <1.7 % release. In other study explored the use of graphene oxide as nano-filler for the reinforcement of FEFKFEFK (β-sheet forming self-assemblingpeptide) hydrogels. Their results accept the presence of strong interactions between FEFKFEFK and GO flakes with the peptide coating and forming short thin fibrils onthe surface of the flakes. Conclusion: The results show GO flakes as highly-efficient for delivering carrier in 3D to guide cells in the same scaffold and induce tissue formation. The ability of GO flakes to provide sustained local delivery makes this material attractive for tissue engineering strategies, in particular for regionally-specific mesenchymal stem cells differentiation.

کلمات کلیدی:

graphene oxide, delivery carrier, three dimensional, hydrogels