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Graphene-reinforced calcium phosphate cements for bone tissue engineering

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For decades, natural calcium phosphate cements (CPCs) derived from sintered animal bone have been investigated to treat bone defects. However, they have low mechanical strength as a critical limit. Graphene not only improves the mechanical properties of scaffolds but promotes osteoinduction. To this end, reduced graphene oxide-incorporated natural calcium phosphate cements (RGO-CPCs) were fabricated for reinforcement of CPCs' characteristics. The fabricated RGO-CPCs showed distinct surface properties and chemical properties according to the RGO concentration. The mechanical properties of RGO-CPCs were significantly improved compared to those of CPCs. In in-vitro studies using a mouse osteoblast cell line and rat-derived adipose stem cells, RGO-CPCs were little toxic to the both cells although high concentrations of RGO decreased the cell adhesion rate and cell viability. Western blotting, immunocytochemistry, and the Alizarin red staining assay revealed that osteoinductivity of RGO-CPCs was highly increased with the increase of RGO. We conclude that RGO-CPCs can overcome the flaws of previously developed natural CPCs and be potential candidates as bone cements for clinical application of bone repair and regeneration.

Biography

Jong Hoon Chung completed his BS and MS from Seoul National University in 1981 and 1984, respectively, and PhD in Engineering Science from Louisiana State University in 1989. He is a Professor of Department of Biosystems and Biomaterials Science and Engineering, Seoul National University. He is the Editor-in-Chief of *Engineering in Agriculture, Environment and Food* and *Journal of Biosystems Engineering*. He has published more than 100 papers in reputed journals.

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