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Nano hybrid bioceramics for maxillofacial reconstruction and repair

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The most common biomaterials for skeletal maxillofacial repair are bioceramics because of their compositional similarity to the mineral phase of the bone and biocompatibility. Different compositional ratios of bioceramics have been also developed to overcome disadvantages of single-phase materials by combination of two or more ceramic phases. However, many bioceramics suffer from disadvantages such as poor mechanical properties and lack of organic phase. Furthermore, the conventional bioceramics compose of microscale grain, whereas the bone inorganic phase is at the nanoscale level. Nano ceramic could promote osteoblast cells activity and enhance formation of new bone better than microscale bioceramics. Nanotopography and grain size rather than composition ratio, are the main factors influencing the biological properties of biomaterials that should be considered before clinical application. However, the superiority of natural bone is also due to the presence of collagen which adds strength and partial elasticity. Therefore, hybrid bioceramics of multiphasic origin including both organic and inorganic phase at nano-macro scale provides excellent alternatives for oral and maxillofacial applications. Many controversies with regards to the ideal properties of bioceramics and clinicians are left with much confusion in choice of ideal biomaterials from the market. Currently, there are no biomaterials that can simulate full properties of natural bone due to superiority and complexity of this structure. The aim of this paper is to provide the clinicians with basic necessary knowledge in bioceramics and introduce useful guidelines for proper selection of ideal biomaterials for maxillofacial bony repair based on clinical requirements.

Biography

Mehdi A Ebrahimi has completed his MSc in Maxillofacial Surgery from Prince of Songkla University (Thailand) at 2011 with honor merit. He started his work on biomaterials with special focus on biphasic nano bioceramics at 2010 and developed cost effective techniques for preparation of bioceramics. He presented his experiences at different local and international conferences and published his works in reputed journals. Currently, he is a Researcher and PhD candidate at University of Hong Kong. His recent focus is on preparation of hybrid nano bioceramics with incorporation of collagen in comparison to biomimetic self assembly biomaterials for enhanced bone regeneration.

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