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Editorial

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Use of Nanomaterials for Bone Regeneration-an Overview

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Worldwide incidences of bone disorders and conditions are increasing. Bone is a nanomaterials composed of organic (mainly collagen) and inorganic (mainly nano-hydroxyapetite) components, which have a graded structure from nanoscale to macro scale. In the idea of serious limitations in traditional medicine, nonmaterials provide some new strategies in the regeneration of bones. Nanostructured scaffolds provide structural support approximation near the core bone architecture for cells, and regulate cell proliferation, differentiation, and migration, which is in the formation of functional tissues.

Nowadays, bone diseases such as bone infections, bone tumors, and bone loss for the reproduction of bones are more. Bone tissue engineering is a complex and dynamic process that begins with the recruitment of osteoprogenitor cells followed by their diffusion, discrimination, matrix formation, with remodeling of migration and bone. Bone scaffold is generally made of porous biodegradable material which provides mechanical support during the repair and regeneration of damaged or diseased bones. Research over bone tissue engineering has inspired novel materials, processing techniques, performance evaluation and innovation in applications over the past decades. Significant progress has been made towards scaffold materials for structural support for the desired osteogenesis and angiogenesis capacity. Bio-resorbable scaffold is possible with controlled porosity and tailored properties due to innovation in the construction of prohibition using advanced technology. Natural bones get a unique combination of mechanical properties from a mechanical design that extend nanoscale to macroscopic dimensions, with fine and carefully engineered interfaces. Many different groups manipulate mechanical properties (such as stiffness, strength and toughness) to mimic the natural nanocomposite architecture of nanostructures (for example, nanoparticles or nanophobern reinforums to be included in the polymer matrix) Have tried.

Inside the stem cell space, micro/nanoscale interactions with extracellular matrix (ECM) components constitute another source of passive mechanical forces that can affect stem cell behavior. ECM is composed of a broad spectrum of structural proteins and polysaccharides that are spread over a different length scale, with the varieties of collagen fibers leading to nanometer levels, diameter between 35 and 60 nm and extension to one micron range can do. This is done through stem cells and their microscopic/nano-environment through such good-choreographed spatiotemporal dialog which regulates long-term maintenance and stem cell behavior. The advent of refined mini-level technologies has made researchers possible to create platforms that can be used to obtain valuable insights into stem cell biomechanics. In addition, imitation of substrates with bio-induced and micro/nanofeatures has been employed to understand and control stem cell differentiation. Despite this, despite the importance of stem cell mechanization, how mechanical stimuli control the behavior of stem cells, in which *in vivo* and *ex vivo* both are still fully understood. In order to better imitate the nanostructure in the natural ECM, in the last decade, Scofield produced by nanofibers, nanotubes, nanoparticles, and hydrogels has recently emerged as candidates for the production of Scaffold like ECM and effectively change the defective tissues. Because natural tissues or limbs are nanometers in dimension and let cells interact directly with (and create) nanostructured ECMs, excellent geographic properties of biomimetic features and nonmaterial's play an important role in stimulating cell growth as well as guide tissue regeneration.

Nanomaterials components are smaller than 100nm in less than one dimension, with the ability to create new materials and devices with a large range of applications in medicine, electronics and energy production in the study of nanotechnology-control on nuclear and molecular scale is. Nanotechnology has attracted much attention to the prevention, diagnosis, and treatment of disease. Random nanotopography in many types of construction techniques such as electrospinning, phase separation, self-assembly procedures, thin film deposition, chemical Vapor deposition, chemical etching, nanotechnology, photolithography, and electron beam or nanosphere lithography. Nano material can be made of metal, ceramic, polymers, organic materials and composites. These include nanoparticles, nanoclusters, nanocrystals, nanotubes, nanofibers, nanwires, nanorods, nanofilm, etc. Nanomaterials promise for bone, cartilage, vascular, nerve and bladder tissue engineering applications. Nanofibers can accurately amplify the dimensions of natural entities, such as bone and collagen. Due to reducing physical size in nanoscale, superior physical properties such as mechanical, electrical, optical, catalyst, and magnetic properties can be generated. As a result, nanomaterials have been widely investigated in a wide range of biomedical applications, especially regenerative medicine. Since the natural tissue has nanometers in the dimension and cells have interacted directly with the extra cellular matrix (ECM) containing the nanostructure, the physical properties of biomimetic features and nanomaterials have played an important role in the excitation of the cell and the tissue regeneration. The ability to properly control and integrate inorganic and organic nanostructures is a promise of a completely new generation of modern composites and applications in the medical field.