6th International conference on
Stem Cell, Tissue Engineering and Regenerative Medicine
March 14-15, 2024 | London, UK
Volume: 14

Bacterial Inhibition and Osteogenic Potentials of Sr/Zn Co-Doped Nano-Hydroxyapatite-PLGA Composite Scaffold for Bone Tissue Engineering

Mozan Osman Hassan
United Arab Emirates University, UAE

Bacterial infection associated with bone grafts is one of the major challenges that can lead to

implant failure. Treatment of these infections is a costly endeavor; therefore, an ideal bone scaffold should merge both biocompatibility and antibacterial activity. Antibiotic-impregnated scaffolds may prevent bacterial colonization but exacerbate the global antibiotic resistance problem. Recent approaches combined scaffolds with metal ions that have antimicrobial properties. In our study, a unique strontium/zinc (Sr/Zn) co-doped nanohydroxyapatite (nHAp) and Poly (lactic-co-glycolic acid) -(PLGA) composite scaffold was fabricated using a chemical precipitation method with different ratios of Sr/Zn ions (1%, 2.5%, and 4%). The scaffolds' antibacterial activity against Staphylococcus aureus were evaluated by counting bacterial colony-forming unit (CFU) numbers after direct contact with the scaffolds. The results showed a dose-dependent reduction in CFU numbers as the Zn concentration increased, with 4% Zn showing the best antibacterial properties of all the Zn-containing scaffolds. PLGA incorporation in Sr/Zn-nHAp did not affect the Zn antibacterial activity and the 4% Sr/Zn-nHAp-PLGA scaffold showed a 99.7% bacterial growth inhibition. MTT (3-(4,5-Dimethylthiazol-2-yl)-2,5 diphenyltetrazolium bromide) cell viability assay showed that Sr/Zn co-doping supported osteoblast cell proliferation with no apparent cytotoxicity and the highest doping percentage in the 4% Sr/Zn-nHAp-PLGA was found to be ideal for cell growth. In conclusion, these findings demonstrate the potential for a 4% Sr/Zn-nHAp-PLGA scaffold with enhanced antibacterial activity and cytocompatibility as a suitable candidate for bone regeneration.

Biography

Mozan Hassan is a final year PhD student in Anatomy Department, College of Medicine and Health Sciences, United Arab Emirates University. Her current research project focus on bone regeneration and tissue engineering using composite scaffold from different biomaterials mainly collagen and zinc/strontium doped nano-hydroxyapatite to enhance bone regeneration investigating different scaffold fabrication methods such as supercritical CO2 and electrospinning. She obtained a full scholarship from UAE university program for advanced research (UPAR) to complete her current research.