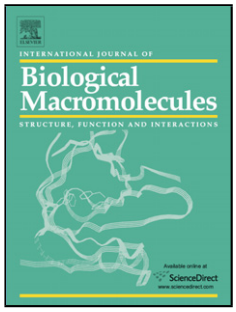

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Biologically anchored chitosan/gelatin-SrHAP scaffold fabricated on Titanium against chronic osteomyelitis infection

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Abstract

The obstacles faced to treat chronic osteomyelitis infection clinically led to the search for an ideal biomaterial, resulted in combining two major aspects of bone tissue engineering namely surface modified metallic implant and polymer nanocomposite scaffold. In the present study Gelatin – Strontium incorporated Hydroxyapatite (SrHAP) forming HG scaffold, vancomycin loaded chitosan – gelatin polyelectrolyte complex incorporated gelatin-SrHAP, forming HV scaffolds (HV1 – 0.5 wt% and HV2 – 1 wt% vancomycin) were investigated. The HG, HV1 and HV2 scaffolds were successfully fabricated on Cp-Ti through anchoring by treatment with dopamine, which forms a bidentate co-ordination through NH bonding. Interconnected porous morphology of the scaffolds was confirmed, besides the globular Sr-HAP found in HV2 scaffold. The total amount of vancomycin encapsulation for HV1 and HV2 scaffolds were determined to be 47.55±1.6 µg and 82.45±3.5 µg respectively. Among the scaffolds studied HV2 scaffold were found to have a significant antibacterial activity for both MRSA and MSSA strains compared to Cp-Ti, HG and HV1 scaffolds. The HV2 scaffold also had significantly higher % of cell viability compared to Cp-Ti, HG and HV1 scaffolds. Furthermore, the presence of the drug vancomycin had no toxic effect on the cells, rather it aided in enhanced cell proliferation and spreading.

Keywords: Osteomyelitis; Metallic Implants; Polymer Nano-composites