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The present study reports the use of non-porous, "smart" and stimulus responsive chitosan-based scaffolds with the capability of gradual *in situ* pore formation for bone tissue engineering applications. Biomimetic calcium phosphate (CaP) coatings were used as a strategy to incorporate lysozyme at the surface of chitosan-based materials the main objective of controlling their degradation profile as a function of immersion time. In order to confirm the concept, degradation tests with concentration similar to those incorporated into CaP chitosan-based scaffolds were used to study the degradation of the scaffolds and the formation of pores as function of immersion time. Degradation studies with lysozyme (1.5 g/L) showed the formation of pores, indicating an increase of porosity (~5% - 55% up to 21 days) resulting in porous 3-D structures with interconnected pores. Additional studies investigated the influence of CaP biomimetic coating on osteogenic differentiation of rat marrow stromal cells (MSCs) and showed enhanced proliferation and differentiation of rat MSCs seeded on the CaP coated chitosan-based scaffolds with lysozyme incorporated with bone matrix production and mineralization as demonstrated by calcium deposition measurements. The ability of these CaP coated chitosan-based scaffolds with incorporated lysozyme to create an interconnected pore network *in situ* coupled with demonstrated positive effect of these scaffolds upon osteoblastic differentiation of MSCs and mineralized matrix production illustrate the strong potential of these scaffolds for application in bone tissue engineering strategies.

(OP 313) "Smart" and Stimulus Responsive Chitosan-Based Scaffolds/Cells for Bone Tissue Engineering: Influence of Lysozyme Upon Scaffold Degradation and Osteogenic Differentiation of Cultured Marrow Stromal Cells Induced by Cap Coatings

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