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The aim of this study was to develop a bone tissue engineering scaffold with an inherent bone morphogenetic proteins BMP-2 and BMP-7 sequential delivery system. BMPs were encapsulated in poly(3-hydroxybutyrate-co-3-hydroxyvalerate) (PHBV) and poly(lactic acid-co-glycolic acid) (PLGA) nano/microparticules which are then introduced to a chitosan matrix by two methods: embedding in the chitosan fibers and then forming the scaffold or by forming the chitosan scaffold and then introducing the nano/microparticules.

Nano/microparticles loaded with BSA (model protein) or BMPs were prepared by double emulsion/solvent evaporation technique. The structure, encapsulation efficiency and BSA release were studied. Chitosan-based fiber mesh scaffolds were prepared by wet spinning. Incorporation of nano/microparticles into fiber mesh scaffolds was achieved by two methods: incorporation within the fibers and by post-seeding. For incorporation within the fibers, particles were mixed with chitosan solution and wet spun as presented above. Post-seeding was obtained by adding a particle suspension in dH_2O onto the scaffold followed by the application of vacuum-pressure cycle.

Among the particles prepared, 20% PLGA nano/micro spheres and 20% PHBV nano/micro capsules were chosen as the rapid and slow release components of the sequential delivery system, respectively. Wet spun chitosan scaffolds produced from 4% chitosan (w/v) revealed smooth surfaces and used for further studies. Presence of particles within the fibers was shown by SEM analysis for the first incorporation method. Post-seeding did not influence the final release pattern, but suppressed the burst release. Incorporation of BMP-2 and BMP-7 carrying particles and the effect of GF release on MSCs are being studied.

(OP 199) Nano/Microparticle Incorporated Chitosan Fibers as Tissue Engineering Scaffolds

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