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Clinical Image

Title: Modified Hydroxyapatite-Shikonin System: A Multipurpose Biomaterial for Tissue Repair

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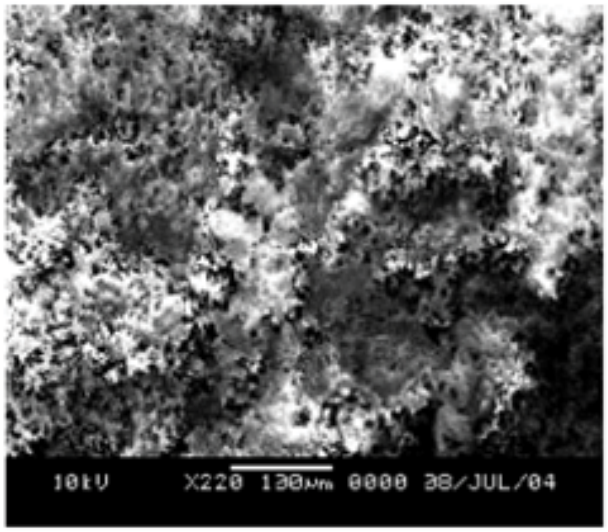

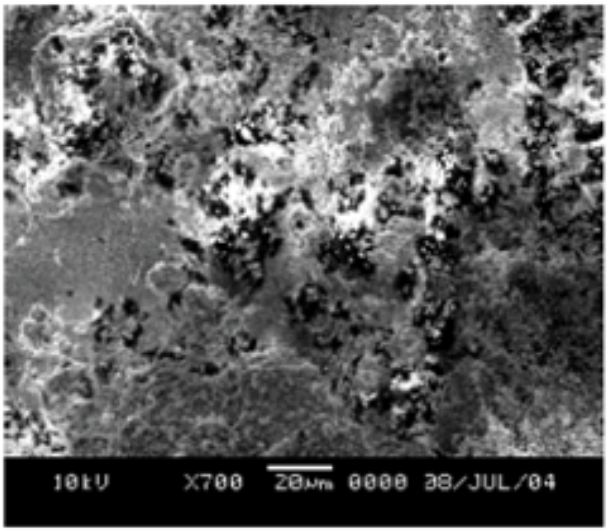

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The use of hydroxyapatite (HAp)-based materials as carriers for drug release has been extensively reported for several biomedical applications. In the present study a drug delivery system was prepared for shikonin, a plant-derived lipophylic substance with multiple biological/pharmaceutical properties, such as wound healing, antimicrobial, anti-inflammatory and anticancer properties. In order to produce a novel biomaterial with enhanced biological/pharmaceutical properties, a porous HAp-based biomaterial was developed. The novel biomaterial can be used in an implant or powder form for bone regeneration and repair, for bone tumors, but also for healing and repair of soft tissues, such as skin or intestine applications (ulcerative colitis, irritable bowel disease), and generally in tissue engineering for tissue repair. Microcapsules were prepared by the solvent evaporation method in order to enhance shikonin stability (reduce photo-oxidation and polymerization), decrease its hydrophobicity, and control its release rate. Shikonin was very efficiently incorporated into a porous HAp powder as shown by Scanning Electron Microscopy (SEM) imaging (Figure 1). Furthermore, in the present study, cylindrical blocks of HAp-shikonin powder (pellets) were prepared in an implant form and their surface morphology was evaluated. With the developed HAp-based delivery system, controlled release of shikonin was achieved (as verified experimentally by *in vitro* dissolution studies), a desirable characteristic for these systems when used for local treatments. Thus, in the present study a novel biomaterial/drug delivery system was prepared, employing porous hydroxyapatite powder to conduct sustained release of shikonin and utilize its wound healing, antimicrobial, anti-inflammatory and anticancer properties under various conditions requiring tissue healing and/or repair.

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