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In-vitro evaluation of new chitosan-based materials

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The chitosan is a promising material for biomedical application due to nontoxicity, biodegradable, biofunctional, biocompatible properties in addition to having antimicrobial characteristics. We synthesized a series of new one step co-preparation materials based on chitosan for bone, skin and dura mater replacement. The best way to selection materials with satisfactory properties is in-vitro evaluation on cell cultures.

We used 3 different types of materials – chitosan films (200, 500 and 700 kDa), chitosan sponge and composite (chitosan-chitin and chitosan-apatite). All experiment was conducted in Department of Materials Science and Engineering, University of Sheffield, UK. For chitosan films and sponge and chitosan-chitin composite we used Murine long bone osteoblast (MLO) and for chitosan film and chitosan-apatite composite - Human oral mucosal fibroblasts (OF). We seeded 20 000 cells on each scaffold and evaluated cell viability

(material toxicity) on 1, 4, 7 and 14 days for MLO and on 1, 4 and 7 days for OF. Also we evaluated collagen production on the end time-point of experiment.

Results show that all materials are non-toxic and allow for cells growth and stimulate collagen secretion by the osteoblasts and fibroblasts. But the chitosan with high molecular weight (700 kDa) and chitosan-chitin composite have better biological response.