

### TS37 Biomedical exploitation of squid chitosan using particle aggregation derived composite scaffolds

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In the last decades, marine organisms have been the focus of considerable attention as potential source of valuable materials. Some important examples are  $\beta$ -chitin isolated from the endoskeleton of squids and hydroxyapatite (HA) produced from fish-bones.  $\beta$ -chitin is a structural polysaccharide more reactive than the most common  $\alpha$  crystallographic form, thus allowing the production of chitosan with high deacetylation degree without a significant effect on molecular weight. HA ( $\text{Ca}_{10}(\text{PO}_4)_6(\text{OH})_2$ ), found in fish bones, has special importance in biomedical field due to its similarities with the mineral constituents of human bones. In this work, the biomedical potential of squid chitosan and fish hydroxyapatite was assessed by processing them into composite porous structures by particle agglomeration for tissue engineering scaffolding. For that,  $\beta$ -chitin was isolated from endoskeleton of giant squid *Dosidicus gigas* and further deacetylated to produce chitosan. Hydroxyapatite nanoparticles (nHA) were synthesized from fish bones by pulsed laser in deionized water. Subsequently, a solution of 2% chitosan and 3% nHA in 1% acetic acid was extruded through a syringe at a constant rate into a NaOH gelation bath to form chitosan/nHA particles. These particles were subjected to a crosslinking reaction using glutaraldehyde and further randomly packed into a mould to render porous structures by particle aggregation promoted by physical or thermal interaction. The developed structures are characterized by low porosity but high interconnectivity, being essentially semi-crystalline, with a compression modulus of 48 MPa. To examine cell behavior in the developed structures,  $1 \times 10^5$  human adipose derived stem cells

(hASC) were seeded in the nanocomposite scaffolds and in chitosan-alone scaffolds. Preliminary results after 7 days of culture have shown that the nHA scaffolds were more favorable for hASC proliferation in comparison with chitosan scaffolds, as reflected in the increase of 30% in the dsDNA quantity. These findings indicated that the chitosan/nHA structures can be a good candidate for biomedical applications, namely on bone regeneration.

### TS38 A cell spanning IKVAV expressing peptide for treatment of spinal cord injury

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Spinal cord regeneration following local treatment with a membrane spanning peptide (MSP) expressing the IKVAV epitope was assessed following compression injury in Balb-c mice. The day after hemilaminectomy and compression injury, mice were treated with one of the following: isoleucine-lysine-valine-alanine-valine (IKVAV), IKVAV-MSP, peptide and mannitol/saline (vehicle). Functional improvement in movement was assessed daily using Basso Mouse Scale (BMS) and spinal cord segments were studied histologically 28 days after injury. The BMS score for the IKVAV-MSP group increased significantly compared to IKVAV-control, and MSP-control groups beginning on day 13 ( $P < 0.05$ ). The number of protoplasmic astrocytes in the IKVAV-MSP mice was significantly increased compared to IKVAV, mannitol and normal groups but not with the MSP-control group ( $P < 0.001$ ). Neuron and muscle bundle size were also increased significantly ( $P < 0.05$  and  $P < 0.007$ , resp.) in the IKVAV-MSP group compared to other treatment groups. The observations in this study demonstrated that it is possible to promote functional recovery after SCI using bioactive IKVAV presenting cell membrane spanning peptides.