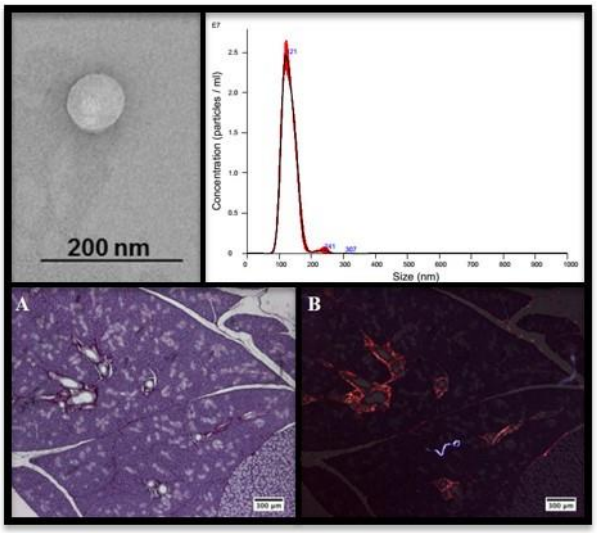
Novel Nanoparticulate Protein Therapy for Salivary Gland Radio-Protection to Improve the Quality of Life of Head & Neck Cancer Patients: A BioMAT'X Approach.

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Abstract

Statement of the Problem: Saliva plays a major role in maintaining oral health. This becomes more apparent when the amount and quality of saliva are reduced, often due to medications, Sjögren's syndrome and especially ionizing radiation therapy for tumors of the head and neck, during which the salivary glands are included within the radiation zone. While temporarily alleviated via "intensive" regimens of palliative home and professional care, many Head and Neck Cancer patients are unable to maintain the diligence required to be effective. More considerably, those affected by irreversible salivary gland dysfunction (and/or using amifostine, I.V.) often choose to terminate their radiotherapy course pre-maturely as they become severely malnourished and experience a significant deterioration in their QoL, mainly owing to hyposalivation. **Aims:** Evaluate the radioprotective effect of core-shell nanocapsules designed for sequential/timely protein(s) release, following a single local injection into murine submandibular salivary glands pre-irradiation. **Materials and Methods:** Loaded core-shell nanocapsules with the protein(s) were directly administered into the salivary glands of the experimental group 24 hours before radiation and PBS was injected into the glands, likewise, for the controls. Salivary flow rates and salivary protein excretion/content were evaluated using ELISA over a 3mons. period post-treatment. Histological evaluation of structures and analysis of apoptosis/proliferation were performed. Timely bio-distribution assays followed. **Findings:** Experimental animals demonstrated increased salivary flow rates compared to controls. Protein content was comparable to that of pre-radiation level. Histological evaluation revealed acinar cells with less vacuoles and nuclear aberrance in experimental group compared to controls and the amount of mucin stained by alcian blue was larger, in the latter. Protein therapy resulted in less apoptotic activities detected by TUNEL assay and similar proliferative indices as in controls. **Conclusion & Significance:** Biocompatible, stable, reproducible and *customizable* core-shell nanoparticulate layer-by-layer self-assembled delivery system is presented. Our findings suggest that the local sequential release of a protein cocktail (in specific dosage and order) into murine salivary gland highly prevents radiation-induced damage via reducing apoptosis. This approach also promotes the *in situ* proliferation of salivary gland cells.

Image



Recent publications

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Biography



Ziyad S. Haidar is a Full Professor of Biomaterials and Tissue Engineering and the Scientific Director of the Faculty of Dentistry, Universidad de los Andes in Santiago de Chile. Concurrently, he is the Founder and Head of the Biomaterials, Pharmaceutical Delivery and Cranio-Maxillo-Facial Tissue Engineering Laboratory/Research Group (BioMAT'X Chile; please visit: http://www.uandes.cl/facultad-de-medicina/biomaterials-pharmaceutical.html). Haidar also serves as the Head of Innovation at the Centro de Investigación e Innovación Biomédica and a Faculty member in the Doctoral Program (BioMedicine) at the Facultad de Medicina. He is a Visiting Professor at several institutions, such as the Division of MaxilloFacial Surgery at the Universidad de la Frontera in Temuco. Haidar is a trained dentist, implantologist and an oral and maxillofacial surgeon with a PhD in nanobiomaterials, pharmaceuticals and tissue engineering from McGill University, Montréal, Canada. He is an international speaker with more than 125 publications, conference proceedings, text-books and patents and is an editorial board member of several national and international peer-reviewed scientific journals / periodicals. Email: zhaidar@uandes.cl