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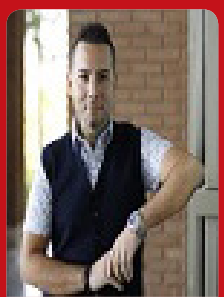

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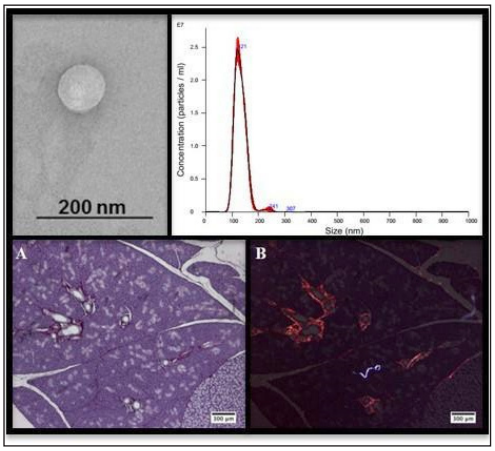
Novel nanoparticulate protein therapy for salivary gland radio-protection to improve the quality of life of head and neck cancer patients: A BioMAT'X approach



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, Sjogren'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, IV) often choose to terminate their radiotherapy course prematurely as they become severely malnourished and experience a significant deterioration in their QoL, mainly owing to hyposalivation.

Aim: Aim is to evaluate the radioprotective effect of core-shell nano capsules designed for sequential/timely proteins release, following a single local injection into murine submandibular salivary glands pre-irradiation.

Method: Loaded core-shell nano capsules with the proteins 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 3 months. Period post-treatment of 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: 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.

Biography

Ziyad S Haidar is a Professor of Biomaterials and Tissue Engineering and the Scientific Director of the Faculty of Dentistry, Universidad de los Andes in Santiago de Chile. He is the Founder and Head of the Biomaterials, Pharmaceutical Delivery and Cranio-Maxillo-Facial Tissue Engineering Laboratory/Research Group BioMAT'X Chile. He also serves as the Head of Innovation at the Center for Research and Innovation Biomedical and a Faculty Member in the Doctoral Program at the Faculty of Medicine. He is a Visiting Professor at Division of Maxillo Facial Surgery at the Universidad de la Frontera in Temuco. He is a trained Dentist, Implantologist and an Oral and Maxillofacial Surgeon with a PhD in Nano-biomaterials, Pharmaceuticals and Tissue Engineering from McGill University, Montreal, 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.

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