

Mesenchymal stem cells targeting endothelial cells

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Abstract

Cell nano-capsulation is a novel delivery system based on a self-assembly technique mediated by electrostatic interactions called Layer-by-Layer (LbL) deposition, that do not significantly increase cell/implant volume because of the nano-metric thickness of its layers. LbL depositions could coat the entire surface of individual cells, providing mechanical resistance to cells against manipulation and storage conditions prior to implantation in the patient. LbL nano-capsulation are formed over the cell by the sequential deposition of layers of polymers, which are mediated by opposite electrostatic interactions when alternating polymers of opposite charge over an, also charged, template. Using this technology, nano-capsulation of single-cells of human adipose-derived mesenchymal stem cells (ADSC) was possible and experimental factors to successfully preserve viability and functionality of cells, in order to be used in regenerative medicine applications, were assessed. Additionally, our Nano encapsulation method of mesenchymal stem cells (MSC) is useful for cell targeting by conjugating a specific antibody. Increased cell attachments over HUVEC a cell was observed by using a specific anti-CD31 conjugated on ADSC. Conjugation of a specific antibody to the nano-layer increases specific cell recognition and, possibly, tissue engraftment. Thus MSC, through cell Nano encapsulation, may serve as a promising platform for cell-based tissue engineering and targeted cell delivery, in the regenerative medicine and cell therapy.



Layer-by-Layer nano-encapsulation and potential practical applications. As indicated in the figure, Nano encapsulation of MSC could be useful for example for: A) cell targeting by conjugating a specific antibody; B) tissue engineering by incorporating a matrix protein that could be used as

scaffold; and C) immunoisolation when using multilayer nano-encapsulation.

Biography

Roberto Ebensperger is a pharmacist and associate professor from the Faculty of Chemistry and Pharmacy in the Pontificia Universidad Católica de Chile, with a PhD in Biochemistry from the Universidad de Chile (2000). With experience through postdoctoral stays in Germany, France and the UK in the biopharmaceutical field, specializing in pharmaceutical formulation of cellular and biological products for Regenerative Medicine. Ebensperger research areas are linked to cardiovascular physiopathology, cell therapy and regenerative medicine. His current line of research is associated with basic science research in adult stem cells from adipose tissue and the search for potential clinical applications of them in cell therapy and regenerative medicine. Additionally, investigates the atherogenic process associated with endothelial dysfunction and insulin resistance.

Publications

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