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## Nano encapsulation of stem cells and cell targeting

**Roberto Ebensperger**

Pontifical Catholic University of Chile, Chile

Cell nano encapsulation 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 nanometric 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 encapsulation 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 encapsulation 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 nanoencapsulation method of mesenchymal stem cells (MSC) is useful for cell targeting by conjugating a specific antibody. Increased cell attachment over HUVEC cells was observed by using a specific anti-CD31 conjugated on ADSC. Conjugation of a specific antibody to the nanolayer increases specific cell recognition and, possibly, tissue engraftment. Thus MSC, through cell nanoencapsulation, 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 Associate Professor of Clinical Pharmacology and Director of the Laboratory of Cellular Therapy and Regenerative Medicine in the Pontificia Universidad Catolica de Chile. He is a Pharmacist and PhD candidate in Biochemistry from the Universidad de Chile. He has had several Post-doctoral trainings in Molecular Cardiology at Medizinische Hochschule Hannover, hair follicle biology and pathology at Centre for Skin Sciences, University of Bradford, hematology and aging biology at Université Pierre et Marie Curie Paris VI. He was an invited Professor at Equipe Biologie Cellulaire du Vieillissement, Université Pierre et Marie Curie. Currently, he is interested in mesenchymal stem cell applications in wound healing. In 2013, he founded Plasticel, a spin-off company that initiated R&D activities in applications for cellular therapy for plastic surgery and baldness.

rebenspe@uc.cl

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