

Rat Cardiac progenitor cells and their application in cell therapy

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Cardiovascular diseases are characterized by the progressive loss of functional cells and the subsequent heart failure. When the pharmacological approach no longer complies with the disease evolution, organ transplantation appears to be the only treatment able to rescue the patient life. Cell therapy promises to be clinically efficient and would allow circumventing many limitations of organ transplantation, such as organ low availability, major surgical procedures, high costs and longterm immunosuppression [1].

We designed porous Poly-Lactic Acid (PLLA) and Fibroin scaffolds to deliver CPCs in the heart, we isolated and characterized CPCs for the expression of c-Kit, MDR-1 and Sca-1 by flow cytometry, we tested their degree of differentiation in vitro studying the expression of all known rat sarcomeric proteins by real-time PCR and their differentiated morphology on Electron Microscopy samples [2]. A particular attention was given to the expression of microRNA, because their role in the differentiation process of cardiac precursors is emerging.

We also tested the host reaction to scaffolds, CPCs, and CPCs/scaffolds. In vivo, almost all the used scaffolds induced a foreign body reaction in nude mouse and rats, but not in SCID mice. Cardiac stem cells a T cell-mediated immune response induced in nude mice, letting us suppose that, differently from Mesenchymal Stem Cells, they express MHC molecules on their surface.

The degree of differentiation, the expression of ECM and integrin proteins, and the expression of several sarcomeric proteins were dependent on the type of scaffold and the polymer used.

References

[1] Di Felice et al. (2013) Stem cell populations in the heart and the role of Isl1 positive cells. *Eur J Histochem.* 57 : e14.

[2] Di Felice et al. (2013) Silk fibroin scaffolds enhance cell commitment of adult rat cardiac progenitor cells. *J Tissue Eng Regen Med.* Apr 17 (published online).

Keywords

Cardiac progenitor cells, biomaterials, cell therapy.