

Use of electro stimulation as a “Clean” method for stem cell's differentiation and cardiac tissue regeneration

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Electrostimulation (ES) is a well-known trophic factor for different tissues. We have shown the possibility to induce myocardiocytepredifferentiation of mesenchymalstem cells and embryonic and adult fibroblasts, applying ES during short-period compatibles with clinical translation. This process was associated with cytoskeleton rearrangement and multinucleated cell formation. Early expression of proteins associated with cell contraction, cell communication and angiogenesis were observed.

We have evaluated the effect of ES of post infarct scar in a rat model. After following induction of a myocardial infarction in rats, the treated group underwent non-pacing electrical stimulation (3 V pulse at a rate of 10 Hz) for 2 weeks. In the control group, electrodes were implanted but not activated. The functional evaluation was done by cardiac CT scan and echocardiography. After ES, the hearts were evaluated structurally, histologically and by immunocytochemistry. The gene expression level at the ES site was evaluated by RT-PCR.

Cells in the infarcted zone showed cytological changes similar to those observed in vitro. The elevated levels of VEGF and the increase of VEGF-mARN expression in the scar confirmed the generation of a proangiogenic environment. These changes were associated with an improvement of the ejection fraction in the treated animals.

These results confirmed the possibility to induce myogenic predifferentiation and changes in the paracrine activity of the infarct scar's fibroblasts by the application of ES as in the in vitro system. Scar's ES appears to have a beneficial effect on the early evolution of an experimental myocardial infarct.

Biography

Dr. Genovese obtained his M.D. and Ph.D. degrees at Buenos Aires University. Among other positions, in academic and private fields, he has been Research Professor of Surgery at Pittsburgh and Utah University and Faculty Member of the McGowan Institute for Regenerative Medicine. As the Head of CIREBIO he is involved in the study of basic aspects of adult stem cell differentiation, new biomaterials' application and translational tissue engineering.

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