EDITORIAL

This edition of the New Zealand Medical Student Journal continues to showcase original student research from around the country and overseas. The interest and submissions directed toward the journal are evidence that we are fulfilling an important publication niche. Primarily, we see our role as an education tool for students seeking experience in writing and submitting research. Our submission and review process prepares students for future publications in other peer reviewed journals. We extend our sincere thanks to academic advisors and reviewers for their input to the submission process, and to Minister of Health, Right Honourable Annette King for the generous funding of two editions of the journal.

We also publish feature articles that are interesting, informative and thought provoking. In this issue we look at the new Green Prescription Scheme, explore the option of taking a year out of the undergraduate medical programme to conduct research, provide details on how to write academic articles, and find out about an elective in the Kingdom of Cambodia. Letters to the editor in response to any article are welcome.

We are also proud to announce the Inaugural New Zealand Medical Students' Journal Writing Competition. This new award recognises excellence in academic writing by New Zealand medical students. We look forward to presenting so of the high quality submissions in our next edition.

With best wishes for the new year and your continued studies,

NZMSJ Executive

REVIEW ARTICLE

Use of autologous skeletal myoblasts in cellular cardiomyoplasty

Juan de Dios Díaz-Rosales (†, *, ◊)
Omar F. Loera (*, ‡, ◊)
Jesús E. Romo (†, *, ◊)

† Internado Médico de Pre-grado, Instituto Nacional de Ciencias Médicas y Nutrición Salvador Zubirán.
* Departamento de Investigación, Escuela de Medicina del Instituto de Ciencias Biomédicas de la Universidad Autónoma de Ciudad Juárez.
‡ Departamento de Patología, Hospital General de Ciudad Juárez.
◊ México-Biomedical Research Group.

Correspondence:
JDD-R
México-Biomedical Research Group UACJ
Río Nazas 201, Col. Altavista
Atlixco, Pue. México, CP 74240
e-mail: juandedios@salud.gob.mx

INTRODUCTION

Discoveries of molecular aspects of cellular function are changing concepts of health and disease.[1] However despite recent advances in the treatment of myocardial infarction and heart failure, the heart's capacity for repair and regeneration is limited.[2] Restoring blood flow, improving perfusion, reducing clinical symptoms and augmenting ventricular function are currents goals of treatment after myocardial infarction. Other than replacing the whole heart (cardiac transplantation) no standard clinical procedure is available to restore or regenerate the damaged myocardium following a heart attack.[11]

The pharmacological therapy of heart failure includes many drugs, such as angiotensin-converting inhibitors, angiotensin II-receptors antagonist, diuretics , -adrenergic blockers and inotropic therapy. The emphasis of these therapies is on migrating the consequences of myocardial damage; they do not reverse the structural cause of heart failure, which is the permanent loss of myocardial tissue.[10] The ideal therapy would be to replace damaged tissue with healthy tissue.[2, 3, 5, 15] This is the goal of cellular cardiomyoplasty.

Cellular cardiomyoplasty consists of in situ cell implantation intended to induce the growth of new muscle fibers and the development of angiogenesis in the damaged myocardium.[3] The objective of cellular cardiomyoplasty is to limit the consequences of decreased contractile function and compliance of damaged ventricles following myocardial infarction.[3]

Current possibilities in myogenic and angiogenic cell therapy for myocardial regeneration are the transplantation of autologous cell lines into myocardium. These cells include autologous myoblasts from skeletal muscle (satellite cells), bone marrow-derived mesenchymal stem cells, smooth muscle cells, vascular endothelial cells, and embryonic stem cells. [3, 4, 6, 12]

Autologous Skeletal Myoblasts

Satellite cells, first identified in skeletal muscle in 1961, have been confirmed as myogenic precursor cell responsible for growth, repair, and adaptation to physiologic demands of skeletal muscle.[11] The identification of muscle satellite cells has led to major advances in our understanding of muscle regeneration.[14]

Although satellite cells have been considered as monopotential stem cells, recent in vivo and in vitro studies early indicate that satellite cells from adult mammalian skeletal muscle are multipotential stem cells.[11,14] The use of cultured autologous skeletal myoblasts, does not raise immunological, ethical, tumorogenesis, or donor availability issues. Cellular cardiomyoplasty using autologous myogenic cells offers a number of advantages: they avoid the need for immunosuppressive treatment[2] because they are allogenic organs; they are not transformed cells, and tumorigenesis is unlikely; they form gap junctions with cardiac moycytes and arrhytmia has not been a complication; they are not fetal tissue and will not engender ethical issues; they are readily available from all patients and donor availability is not a limitation.[11]

Satellite cells have been shown to proliferate and differentiate into new myotubes in culture. Myoblasts also have the capacity to form new muscle fibers or fuse to existing fibers when introduced directly into the skeletal muscle of a synergic host.[9] The communication between the grafted skeletal myocytes and native myocardial cell is probably the key for the acquisition of myocardial phenotypes from the skeletal cells .[10] Myoblasts have been shown to differentiate into skeletal myoblasts when injected in the center of the scar. In contrast, when injected into in the scar periphery (close to the healthy tissue) they differentiate into immature myocardial cells.[10]