NOVA SCOTIA Health Research FOUNDATION

PROJECT FACT SHEET

Exploring New Therapy for Heart Repair

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The healthy human heart is a strong muscular pump that beats about 100,000 times each day, moving up to 7,200 litres of blood to the organs, tissues and cells of the body. But heart disease and stroke are our country's leading cause of death, claiming the lives of almost 75,000 Canadians in 2002.

The heart's myocardial function, its ability to pump blood, can be severely compromised by several forms of heart disease. These diseases cause the loss of cardiomyocytes (heart muscle cells) and the accumulation of replacement scar tissue. The scar formation decreases the heart's pumping action, restricting blood flow to the body and leading, ultimately, to heart failure.

Ms. Nichole McMullen, a doctoral student at Dalhousie University's Department of Pharmacology, investigated whether transplanting healthy cells into a damaged heart could improve its ability to contract and pump blood.

Cardiac progenitor cells (CPCs) serve as the basis for the formation of healthy cardiac tissue. They have been shown to graft successfully with the mature heart muscle tissue *(myocardium)* of a host and exhibit a high degree of cell division after grafting. The problem? These cells exist almost exclusively during embryonic development, and, therefore, isolating them in sufficient numbers for cardiac repair is problematic. In contrast, *embryonic stem cells (ES)* can be grown in large scale in vitro and can serve as a valuable source of *CPCs*.

“My objective was to isolate *CPCs* from embryonic stem cell cultures and find a way to use them as an alternative source of donor heart muscle cells for myocardial repair,” says Ms. McMullen.

Under the leadership of Kishore Pasumarthi, she used specific genetic markers to identify and isolate *CPCs* from more mature cells. Although these immature *CPCs* were not functional (for example, they did not exhibit calcium transients) they were shown to have the ability to mature with time and/or in the presence of various growth factors.

The research team discovered that isolated *cardiac progenitor cells* are capable of dividing and renewing themselves into mature cardiac tissue, and transplanted fetal heart-muscle cells remain viable for at least seven days post-transplant.

It is hoped that the findings of this study will lead to the development of new cell-based intervention therapies for patients suffering from heart disease.

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