

Cardiac Stem Cell Grafting

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The University of Vermont, Office of Technology Commercialization

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Overview

The heart is an important target for tissue repair because of the prevalence of heart disease, the limited capacity for the heart to repair itself, and the challenge associated with obtaining biopsy material to prepare adult stem/progenitors for cell therapy.

Recent discoveries in adult stem cell biology have demonstrated that stem/progenitor cells from one tissue can be used to influence the growth, migration and differentiation of stem/progenitor cells from a different adult tissue.

Dr. Spees' research focused on a type of bone marrow-derived progenitor cell that forms stromal cells. Stromal cells form connective tissue and also support the creation of blood cells. Molecules called ligands protect injured tissue, promote tissue repair and support stem and progenitor cells in culture.

Invention

Different ligands interact with specific receptors on the surface of a stem or progenitor cell, transmitting signals that can instruct the cell to adhere, divide, or differentiate into a mature functional cell. To confirm whether or not these types of ligands would protect a cardiac progenitor cell and help it graft, the group isolated a conditioned medium from human bone marrow-derived progenitor cells. They found that the medium contained Connective Tissue Growth Factor (CTGF) and the hormone insulin.

Spees and his colleagues compared the impact of sending a cardiac stem cell "naked" into a rodent heart with infarction to a cell that instead wore a "backpack" of protective ligands, created by incubating about 125,000 cardiac cells in a "cocktail" of CTGF and insulin on ice for 30 minutes. The cells were grafted sub-epicardially where the priming cocktail resulted in improved graft success.

Advantages

- Promotes vascular protection and repair
- May provide improved cardiac regeneration
- Clinically feasible (30 min. incubation on ice)



Applications

- Hospital cardiac units
- Research institutions

I.P. Status

- US Patent Application Filed

Learn more about Dr. Spees' research at:
<http://bit.ly/1bU2FDq>

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