

Translational aspects of cardiac cell therapy.

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Public Summary:

This is a comprehensive review of the use of different types of stem cells for cardiovascular regeneration.

Scientific Abstract:

Cell therapy has been intensely studied for over a decade as a potential treatment for ischaemic heart disease. While initial trials using skeletal myoblasts, bone marrow cells and peripheral blood stem cells showed promise in improving cardiac function, benefits were found to be short-lived likely related to limited survival and engraftment of the delivered cells. The discovery of putative cardiac 'progenitor' cells as well as the creation of induced pluripotent stem cells has led to the delivery of cells potentially capable of electromechanical integration into existing tissue. An alternative strategy involving either direct reprogramming of endogenous cardiac fibroblasts or stimulation of resident cardiomyocytes to regenerate new myocytes can potentially overcome the limitations of exogenous cell delivery. Complimentary approaches utilizing combination cell therapy and bioengineering techniques may be necessary to provide the proper milieu for clinically significant regeneration. Clinical trials employing bone marrow cells, mesenchymal stem cells and cardiac progenitor cells have demonstrated safety of catheter based cell delivery, with suggestion of limited improvement in ventricular function and reduction in infarct size. Ongoing trials are investigating potential benefits to outcome such as morbidity and mortality. These and future trials will clarify the optimal cell types and delivery conditions for therapeutic effect.

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