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Perspective

STEM CELL THERAPIES IN CARDIOVASCULAR DISEASE

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PERSPECTIVE

Despite significant medical improvements, cardiovascular disease continues to rise, with ischemic heart disease being the leading cause of death and disability globally. As a result, significant efforts are still being made to develop effective therapy modalities that would improve the quality of life and survival of this patient population. Novel therapeutics are presently being researched to protect the myocardial from ischemia-reperfusion damage as well as regenerate the heart. Stem cell therapy, such as the utilisation of human mesenchymal stem cells, induced pluripotent stem cells, and their exosomes, would allow researchers to not only investigate the molecular principles of cardiac conditioning, but also to create new treatments for ischemic heart disease.

Despite all of the research and advancement done in the previous 15 years, stem cell treatment for cardiovascular disease is still in its early stages. Despite the high hopes, the data show that the majority of clinical studies are tiny and the outcomes are unclear. Because of the numerous unfavorable outcomes, there is skepticism that cardiac cell treatment will provide any significant benefits in the next decade or two. Early failures are not uncommon in new technology, and they can be followed by spectacular success. Nonetheless, clinical investigators have paid close attention to safety, as adverse events associated with stem cell treatment have been quite infrequent. In conclusion, while regenerative biology may not be able to aid cardiovascular patients in the near future, it is certain to do so in the next decades.

Stem cell therapy has been proved to be a potential therapeutic method for the treatment of cardiovascular disorders in several clinical studies. Several stem cell types have been used in this field from the initial transplantation into human patients, including bone marrow derived stem cells, cardiac progenitors, and embryonic stem cells and their derivatives. Clinical study outcomes, on the other hand, are inconclusive, and stem cell-based improvements in heart function and cardiac re-modelling have been shown to be rather limited. It is critical to

understand the underlying processes that mediate the favorable benefits of stem cell transplantation in order to maximize stem cell efficiency.

Researchers have proposed several improvement tactics based on these pathways in order to increase the efficacy of stem cell repair and create the "next generation" of stem cell therapies. Furthermore, because cardiovascular illnesses are complex disorders with many disease patterns and pathophysiological causes, providing a consistent treatment solution for all subgroups of patients may be problematic. As a result, future tactics should focus on more individualized SC therapy, in which individual illness characteristics determine the cell type, dose, and delivery method used.

After a myocardial infarction, stem cell therapies are a promising therapeutic option for regenerating myocardium and improving heart function. Several distinct types of cells have been investigated, each with its own set of advantages and disadvantages. Because induced pluripotent stem cells have an embryonic-like condition, they have high proliferation ability, but they also carry the danger of becoming teratomas. Both bone marrow and adipose tissue have been studied for mesenchymal stem cells. Allogeneic cells may be used as universal donor cells in the future due to their immunomodulatory properties. Finally, studies have repeatedly demonstrated that cardiac stem cells are superior to other cell types at expressing cardiogenesis markers and improving heart function.

The best stem cell source is determined by a number of parameters, including ease of extraction/isolation, engraftment efficacy, capacity to develop into cardiac lineages, and influence on heart function. Despite the fact that several studies have highlighted the benefits and limits of each cell type, as well as the effective prospective use of these cells to repair injured myocardium, additional research is needed to directly compare cells from different sources. It's worth noting that stem cell therapy research is developing to treat various cardiovascular disorders, such as non-ischemic cardiomyopathies.

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