OPEN ACCESS Freely available online

ISSN: 2157-7633
Journal of
Stem Cell Research
& Therapy

Commentary

Advantages and Disadvantages of Currently Used Stem Cells for Cardiovascular Repair

Assan Erraoul*

Department of Medical Genomic Research, Stem Cells and Cell Therapy Laboratory, Pasteur Institute of Morocco, Casablanca, Morocco

DESCRIPTION

The aim of cardiac stem cell therapy is to reinstate or revive myocardium. The challenge was to recognize a suitable source for generating adequate and phenotypically confirmed cardiomyocytes. Over the past decade, fast progress has been made in identification, derivation, and characterization of progenitor cells. Among these, the Embryonic Stem Cells (ESCs) have attracted attention due to their exclusive properties. ESCs are pluripotent stem cells which are derivated from the inner cell mass of the blastocyst-stage embryo. Precisely, these cells remain in an indistinguishable state in culture for a long period but retain the potential to differentiate into all cell types in the human body, including cardiomyocytes.

Human ESCs (hESCs) were known by Thomson et al. more than a decade after the first isolation of Mouse ESCs (mESCs) in 1981. Since then, the potential for using these endless multipotent cells to treat congenital and degenerative diseases has stimulated great interest. Tentatively, the hESCs are able to differentiate all three germ layers; endoderm, ectoderm, and mesoderm, so it is significant to investigate the signaling pathways and transcription factors that direct its exact differentiation process. From a large number of studies, researchers have identified several signaling molecules that are involved in initial cardiac differentiation. Over-expression of transcriptional factors such as GATA4, Nkx2-5, or MEF2C can induce variation of hESCs into cardiomyocytes, while inhibition of these factors halts the development of cardiomyocytes. Other factors like growth factors TGFβ1 and FGF2, cardiotrophin, Reactive Oxygen Species (ROS), and Dimethyl Sulfoxide (DMSO) might also disturb the differentiation process.

In spite of the exciting achievements of hESCs-differentiated cardiomyocytes in both murine and human models, a number of pressing issues limit its clinical application. First of all, hESCs research has elevated some serious ethical troubles due to the fact that the formation hESCs required the damage of early human embryos, which was considered crimes against humanity. Moreover, the ESCs are generated from embryos and do not retain the same genome with the patients, thus has potential risk of immune rejection after transplantation. Also, grafted ESCs in mice only generated a minor population of cardiomyocytes, which was even less in the human model. Since the number of differentiated cardiomyocytes expressively compromises the ultimate success of future cell-grafting processes, strategies to improve the generation of myocytes by ESCs is of crucial importance. Finally, *in vivo* grafting of hESCs gave rise to formation of teratocarcinomas although the malignant tumorigenic potential of ESCs is not well defined yet, this finding raises concern about the safety of its clinical use.

CONCLUSION

The use of Human Inducible Pluripotent Stem Cells (hiPSCs) overcomes the limits and ethical concerns of hESCs and the hiPSCs are derived by reprogramming somatic cells to a pluripotent state. Some research teams have compared hESCs and hiPSCs and their differentiated progeny. Stem cell therapy for cardiovascular disease has been studied expansively at both clinical and experimental levels. Pluripotent stem cells and mesenchymal stem cells are proven to be active for cardiac functional restoration, myocardial regeneration, angiogenesis and substantial progress has been made over the last decade about stem cells in cardiovascular regeneration, many challenges lie ahead before the therapeutic potentials of stem cells can be entirely known.

Correspondence to: Assan Erraoul, Department of Medical Genomic Research, Stem Cells and Cell Therapy Laboratory, Pasteur Institute of Morocco, Casablanca, Morocco, E-mail: assanerraousal@gmail.com

Received: 29-Jun-2022, Manuscript No. JSCRT-22-17683; **Editor assigned:** 04-Jul-2022, PreQC No. JSCRT-22-17683 (PQ); **Reviewed:** 20-Jul-2022, QC No. JSCRT-22-17683; **Revised:** 29-Jul-2022, Manuscript No. JSCRT-22-17683 (R); **Published:** 05-Aug-2022, DOI: 10.35248/2157-7633.22.12.545

Citation: Erraoul A (2022) Advantages and Disadvantages of Currently Used Stem Cells for Cardiovascular Repair. J Stem Cell Res Ther. 12:545.