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Research

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Therapeutic Efficacy of Cellular Transplantation for Cardiac Repair in iranian patient

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ABSTRACT

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Keywords :

Introduction

Stem cells are proliferative cells having self-renewal ability. Because of their promising regenerative potential, these cells have been applied to treat number of diseases. According to the US clinical trials registry database (www.clinicaltrials.gov), near about 30,000 clinical studies regarding cell therapy has been registered and stem cells account for 5000 studies. A multitude of factors have been studied carefully like cell homing, viability, engraftment, safety profile, cellular delivery time and retention (3). Poor survival, very low homing, possible teratogenic effect, massive apoptosis of transplanted cells, low cellular retention and viability have questioned the effectiveness of stem cell therapy and controversies flawing its clinical potential are in discussion .

In spite of having such type of limitations, stem cell therapy has gain a monumental advances for a number of clinical problems like cardiac regeneration (Le Huu et al., 2012). Stem cell-based cardiac regeneration is under studies for a wide range of diseases such as acute and chronic ischemic myocardial damage, cardiomyopathy, etc.

Technical developments in last decades to solve cellular transplantation problems have been seen and cells are engineered or modified for enhanced grafting and improved regeneration (Pendyala et al., 2008). Cellular engineering or modifications have gained considerable attention and scientists could developed techniques for enhanced pluripotent behavior, increased stem cell homing and retention etc (Ruvinov et al., 2012).

2. Cardiovascular Problems and Treatments

Cardiovascular diseases (CVD) are the causing 30% global deaths every year. So far, 17 million cases of coronary heart diseases are being registered in United States only, out of which 5.3 have lost their cardiac functions (Loughran et al., 2013). The most common cause of cardiac failure is ischemic heart in which oxygen supply is limited and depletion of adenosine triphosphate (ATP) happens. This cardiac failure occurs in three major steps i) coronary occlusion, 2) angina pectoris and 3) coagulative necrosis (Soonpaa et al., 1994).

CVDs consist of group of diseases that have been shown in Figure 1. This figure also demonstrate US prevalenceofeach categories.

Cell type	Angiogenesis	Myogenesis	Therapeutic Potential	Potential Advantages	Disadvantages	References
Mesenchymal Stem Cells (MSCs)	+	+	1. Can be differentiated towards cardiomyocytes	1. Have immunomodulatory behavior for allogeneic transplantation	1. Lineage restriction 2. Cases of bone or cartilage formation in the myocardium	(Dominici et al., 2006;Heng et al., 2009;Gálvez-Montón et al., 2013;Pittenger et al., 1999;da Silva Meirelles et al., 2006;Shake et al., 2002;Amado et al., 2005;Miyahara et al., 2006;Toma et al., 2002)
Embryonic Stem Cells (ESCs)	+	+	1. Pluripotent stem cells 2. Efficient cardiogenic diffe 2. Have clinical agents for cardiac regeneration 3. Multipotent stem cells located in almost all organs of body	1. Renewable source of donor cardiomyocytes 2. Enhanced integr 2. Their multilineage differentiation potential		(Xu et al., 2002;Kehat et al., 2001;Kolossov et al., 2006;Joh

			rentiation i.e. differentiated cells show rhythmic beating, action potential etc. 3. Multiple doublings without phenotypic change.	ation with the host cardiomyocytes 3. Easy to expand		kura et al., 2003)
Cardiac Stem Cells	+	+	1. More effective in making new myocardium than stem cells from other organs inclu	1. Multipotent 2.Autologous 3. Without ethical issues	1. Under 1%, CSCs are unable to completely remedy the massive loss of tissu	(Beltrami et al., 2003;Dawn et al., 2005;Linke et al., 2005;Malliaras et al., 2013

			ding the bone marrow 2. Capable to maintain normal cardiac homeostasis		e after 2. Their location in heart is restricted to the right atrium in the adult heart 3. Differentiate towards lineages other than myocardial cells such as endothelial, endocardial, smooth muscle etc (Bi-pote	;Mollova et al., 2013;Laugwitz et al., 2007)

					nt cells).	

Materials and methods

Results

Disc./Cons

Acknowledgment

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