Editorial

Stem cell research and regenerative therapy: towards a bright future

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Rokhsareh Rohban
Department of Internal Medicine, Division of Endocrinology and Metabolism, Medical University of Graz, Austria

Correspondence: Rokhsareh Rohban, Department of Internal Medicine, Division of Endocrinology and Metabolism, Medical University of Graz, Austria Tel +43 31 63857 2896, Email rokhsaren.rohban@medunigraz.at

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Stem cell research and therapeutic application of stem cells referred to as "regenerative medicine" has grown with an enormous rate within the past few years. It was only in 1978 that stem cells were discovered in human cord blood,[1] followed by the development of first *in vitro* stem cell line in mice (1981),[2,3] generation of embryonic stem cell lines from hamster (1988)[4] and later from primate (1995).[5] A huge progress was achieved in 1998 when cells from the inner cell mass of early embryo were isolated and first embryonic stem cells were developed.[6] Later the same year, the story continued by generating germ cells from fetal gonad tissue as well as manipulating adult mouse tissues resulting in generation of different cell types.[7] This meant an open hand toward immeasurable possibilities for stem cell scientists, by using bone marrow or umbilical cord cells to establish neurons or pancreatic cells and using brain cells to give rise to other cell types. That was exciting enough to attract more interest in terms of finance, (life)-time and energy investments towards stem cell research and regeneration with the promise of greater scientific achievements and a better control over stem cell proliferation and commitment. However, as science is always about, restrictions and undesired results were unavoidable aching points which attenuate the enormous progress in the field of stem cells and regenerative medicine.

There have been abiding concerns in terms of moral and ethical implication of stem cells, which resulted in a huge attempt from governments to regulate stem cell research while defining policies for donating research fund to this challenging and promising scientific field. As diverse the cultural points of view and opinions amongst inhabitants of different countries are, as big is the variety of rules and regulations to acquire stem cell based knowledge, and no unique set of rules to govern stem cell research and application exist to date.[8] Rather, every country has governed its own policy and opinion towards stem cell research, which is far from ideal and could potentially hamper the efficacy of international scientific communication and cooperation in stem cell field. One cause for the concerns about clinical application of stem cells may lie in the variability of stem cell behavior in transplantation,[9,10] where stem cells have been shown to act as double-edged swords. They have the capability to ensure survival of leukemia patients who are in need for bone marrow transplantation; regretfully however, stem cells are sometimes prone to show their other half by developing graft versus host disease in patients who have already undergone the overwhelming medical procedure of stem cell transplantation.

These were only a few examples of the obstacles scientists in stem cell research have to face during their attempts to unravel novel therapeutic approaches. Nevertheless, stem cell related investigations have progressed dramatically based on a countless number of studies published each year in scientific journals. There are numerous clinical trials involving adult stem cells aiming to treat a variety of conditions such as leukemia, heart disorders and multiple sclerosis.[11–13] Nonetheless, there are still many crucial steps for researchers to be taken to enable a better control of stem cell regulation. The interest and will to overcome these barriers are overwhelmingly high and with continued research and support, the full power of stem cells will be harnessed by scientists who aim to treat diseases that many people all over the world suffer from.

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Conflict of interest

The author declares no conflict of interest.

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