Current Trends in Pharmacology and Clinical Trials
ISSN: 2642-0848

Academic Strive
Researcher's perception is our reality

Editorial *Volume 4 Issue 1*

hPSCs: A Game Changer in Regenerative Therapy

Gupta S[1]* and Naik AA[2]

[1]Department of Pharmacology, University of Virginia School of Medicine, Charlottesville, USA

[2]Department of Neurology, University of Virginia School of Medicine, Charlottesville, USA

***Corresponding author:** Smriti Gupta, Department of Pharmacology, University of Virginia School of Medicine, Charlottesville, USA, Email: sg8sp@virginia.edu

Received Date: March 03, 2021; **Published Date:** March 29, 2021

Editorial

Holding enormous promises, regenerative therapy is the emerging and deepening commitment to an interdisciplinary approach bridging glorious milestones of medical science and tissue engineering with replacement therapy. If we try to step back and think about the question that we are trying to look forward to today, it was inevitable that we would incline towards interdisciplinary approaches. When it comes to replacing a tissue or organ, a huge challenge and constant threat of graft rejection always stays there. Regenerative therapy is an exciting component of the modern health-care paradigm, opening remarkable avenues that seek to replace tissue/organs either in congenital or trauma-damage cases. Regenerative therapy is a collaborative domain, harnessing breakthroughs in technologies such as genome editing, stem cell technology, cell therapy, and tissue engineering. Experts in medical science, computer science, robotics, engineering, and chemistry put their joint efforts to find the solution to this challenge faced by humankind. Regenerative therapy enabled us to understand how our body heals and harness its innate ability and provided treatment avenues.

Background

In the last few decades, we witnessed magic moments in science that pushed the regenerative therapy field to the next level. One such moment was when Human pluripotent stem cells (hPSCs) were promising live sources and thus a golden contributor to regenerative therapy. The source of hPSCs is either in vitro fertilized embryo (human embryonic stem cell or hESCs) or somatic cells followed by somatic cell reprogramming (human induced pluripotent stem cell or hiPSCs). As we all witnessed that using hESCs has many ethical concerns, the scientific community is inclined towards making use of hiPSCs via genetic reprogramming method. Contribution of hPSCs in therapies for retinal degeneration, heart infraction, cutaneous wounds, skeletal muscle regeneration is fascinating and daunting. On January 23rd 2009, President Barack Obama made a surprising decision and United States Food and Drug Administration (FDA) approved the first human trials of embryonic stem (hES) cells [1]. After that hPSCs brought a revolution in clinical research in the field of regenerative therapy. Although these trials have demonstrated safe use of regenerative therapy based on hPSCs derivatives, larger clinical trials are required to confirm the therapeutic efficacy.

Barriers

Limitations and challenges are always the other sides of a coin in any scientific discovery and the use of hPSCs in regenerative therapy is no exception. An immune reaction to donor cells is a major drawback that comes with this. Although autologous transplantation appears as a solution to this problem and eliminates the use of an immunosuppressive regimen, the higher cost of the procedure is a big constraint. Also, when our concern is to treat millions of patients, it is difficult to have patient-derived differentiated cell type pool ready in our hands. Derivation of hPSCs from patients and differentiation to specific cell types is time-consuming protocol and this approach is not viable when we are in urgent need of therapy. Graft rejection is another major challenge that can be handled by implementing two immunosuppressive regimens; 1. Matching human leucocyte antigen (HLA) of donor and recipient or generate

hypoimmunogenic hPSCs bank by genetic engineering. hPSCs cell bank with known HLA that matches with a large population of patients facilitated the treatment process with great relief. In a clinical trial in Japan, one such HLA matched hiPSC-RPE cell line worked for the treatment of five wet-age related macular degeneration patients [2].

Future

hiPSCs provided innovations in regenerative therapy and delivered revolutionary treatment approaches to treat a broad spectrum of debilitating diseases, which cannot be treated with conventional medicine. So far, we have passed a number of key steps in developing hiPSCs based regenerative therapy and ruled out any concerns related to this approach. We should not stick to simple cell therapy and move towards complex cell therapy taking advantage of cells, different biomaterials, bioconjugates that are structured as naïve tissue. Also, we are in need to have a vast range of hiPSCs cell banks where we have hiPSCs available with a broad spectrum of HLA. Our next and primary goal of this endeavor is to manifest patient-specific treatments that is rapid as well as safe. In this process, we should also stay concerned about keep harmony between industrialization as well as ethical issues using cell-based products.

Conflict of Interest

Authors declare no conflict of interest.

References

1. Klein RN, Doyle J, Siegel B (2009) It's about change. Regenerative medicine in the Obama era. Regen Med 4(1): 27-32.

2. Sugita S, Mandai M, Hirami Y, Takagi S, Maeda T, et al. (2020) HLA-matched allogeneic iPS cells-derived RPE transplantation for macular degeneration. Journal of clinical medicine 9(7): 2217.