

Letter to the Editor

Letter to Editors of Journal of Stem Cells Research, Reviews & Reports

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Letter to the Editor

As a member of Editorial board, I am very pleased to see the launch of the first issue of **Journal of Stem Cells Research, Reviews & Reports**. I believe this Open Access journal will provide a worldwide forum for the discussion of new discovery and progress at the frontier of stem cell research.

Over the past half century, great progress has been achieved in the field of stem cell research. For example, embryonic stem cells were first derived from mouse in 1981; blood stem cells were proven to be present in marrow of mouse in 1959, and were completely separated in 1990; adult stem cells of different origins were also discovered in the brain, retina, skin, as well as various cancer stem cells. In the first decade of the 21st century, techniques were developed to reprogram adult specialized cells, such as fibroblasts, into stem cells. Similar to embryonic stem cells (also known as ESCs), these induced pluripotent stem cells (also known as iPSCs) showed unlimited self-renewal and demonstrated pluripotency by contributing to lineages from all three germ layers in the context of embryoid bodies, teratomas, fetal chimeras. In 2007, the induced pluripotent stem cells were created from adult human cells, suggesting the possibility of clinical application of the induced pluripotent stem cells for repairing tissue damages in patients.

Capable of self-renewing and differentiating into specialized types of cells, stem cells have been widely acknowledged for their potential in cell therapy and regenerative medicine, providing possibility of repairing and replacing tissues damaged from diseases. Even before the discovery of stem cells, first bone marrow transplantation had been performed in human patient in the USA in 1956. In 2002, multipotent stem cells from mouse bone marrow was purified and injected for extended marrow regeneration in vivo, suggesting transplantation of stem cells could be used to treat diseases. And in 2004, dopaminergic neurons were derived from human embryonic stem cells, shedding light on the treatment of Parkinson's disease using stem cell therapy. In recent year, mounting evidence has shown the great potential of regenerative medicine using stem cells for repairing and replacement of damaged tissues or organs.

In the future, with the development of novel techniques, stem cell research and regenerative medicine will benefit patient suffering from various diseases. However, there will still be a long way to go before

safe, effective regeneration medicine could be widely used in clinical trials.

Transplantation of exogenous stem cells has been an effective method for the treatment of some diseases. However, there are limitations such as controlling of stem cells, immuno-rejection, and donor-matching.

Induced pluripotent stem cells would be a better option since the stem cells could be derived literally from any type of cells from the patients, thus avoiding the immuno-rejection and searching matching donors while providing much more flexibility to the choice of cells from the patients. However, efforts will be needed to ensure the safety of the induced pluripotent stem cells before clinical application in human, as the induced pluripotent stem cells generated by modifying certain genes, such as c-Myc and KLF4, were proven to be oncogenic.

Another direction of regenerative medicine is to take advantage of endogenous stem cells for repairing damaged tissues. Adult stem cells are present in discrete regions in adult mammals, including the central nervous system. It could be a shortcut and a safer way to use patients' own stem cells for the repairing of damaged tissues or organs. It would be ideal if the stem cells in the patient could be directed to migrate to the damaged tissue and differentiate into target types of cells for the repairing. For example, in the damaged brain areas after stroke, newborn neurons are generated from neural stem cells in the brain and migrate into the insulted regions for repairing and regain of functions. However, in most cases, the damaged regions may be far apart from the regions where stem cells locate, thus it would be necessary to culture the stem cells in vitro and infuse back to the damaged regions of the patient.

Cord blood stem cells are another good source of stem cells, which have been used in clinical regenerative medicine applications against diseases such as type 1 diabetes, cardiovascular repair as well as brain damages.

Stem cells could also be engineered to gain specific characteristics or differentiation direction in vitro for better therapeutic treatment for certain diseases. As reported recently, stem cells could also be used to make recellularized organs for the replacement of damaged organs. These stem cells could be from the patient's own endogenous stem cells or the induced pluripotent stem cells generated from the patients other types of cells.

Taken together, stem cells research and regenerative medicine have been developing rapidly during the past decades, and will keep making new progress in the coming future with advanced novel techniques. The new Journal of Stem Cells Research, Reviews & Reports will provide an international stage for in depth discussion of novel findings in this field. I believe future studies in stem cell research will further reveal mechanisms regulating self renew, migration and differentiation of stem cells, and provide new strategies for the clinical

application of regenerative medicine.

Finally, I am pleased that the Austin Publishing Group created this forum for the researchers in the stem cell field and physicians working on regenerative medicine. I am grateful to the members of the editorial board for contributing their time to this journal. I would

also like to thank the authors who submitted papers to the first issue of Journal of Stem Cells Research, Reviews & Reports. I believe this journal will become one of the most prestigious journals in the stem cell field with the support from the editors, authors and readers.