

Stem Cells in Clinical Applications

Series editor

Phuc Van Pham

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Stem Cells in Clinical Applications brings some of the field's most renowned scientists and clinicians together with emerging talents and disseminates their cutting-edge clinical research to help shape future therapies. While each book tends to focus on regenerative medicine for a certain organ or system (e.g. Liver, Lung and Heart; Brain and Spinal Cord, etc.) each volume also deals with topics like the safety of stem cell transplantation, evidence for clinical applications including effects and side effects, guidelines for clinical stem cell manipulation and much more. Volumes will also discuss mesenchymal stem cell transplantation in autoimmune disease treatment, stem cell gene therapy in pre-clinical and clinical contexts, clinical use of stem cells in neurological degenerative disease, and best practices for manufacturers in stem cell production. Later volumes will be devoted to Safety, Ethics and Regulations, Stem Cell Banking and Treatment of Cancer and Genetic Disease. This series provides insight not only into novel research in stem cells but also their clinical and real-world contexts. Each book in Stem Cells in Clinical Applications is an invaluable resource for advanced undergraduate students, graduate students, researchers and clinicians in Stem Cells, Tissue Engineering, Biomedical Engineering or Regenerative Medicine.

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Neurological Regeneration

 Springer

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Preface

Neurological diseases are disorders in the central nervous system or the peripheral nervous system that is caused by structural, biochemical, and electrophysiological dysfunctions or abnormal functions of neurons or glial cells. There are some groups of neurological diseases including neurodegenerative diseases such as Parkinson's disease, Huntington's disease, and amyotrophic lateral sclerosis, and others related to dysfunctional blood circulation such as ischemic and hemorrhagic strokes or cancer such as glioma.

Although there are different symptoms, all neurological diseases are results from the significant loss of neurons or glial cells. The regeneration of these cells is considered as the promising strategy to treat diseases. Stem cell therapy draws attention as a promising regenerative option for the treatment of various neurologic diseases.

In recent years, stem cell therapies are moved to the clinic with exciting results. There are at least three ways that stem cells can correct injured neurological tissues including cell replacement, paracrine factors, and immunomodulation. Indeed, some kinds of stem cells, such as embryonic stem cells, induced pluripotent stem cells, neural stem cells, or mesenchymal stem cells, are easily differentiated or trans-differentiated into neural cells. Transplantation of these stem cells or differentiated cells from these stem cells can supply new neural cells to regenerate injured or degenerative tissues. In addition to direct cell replacement, stem cells can secrete various cytokines and growth factors that elicit a variety of beneficial effects such as neural cell protection and induction of the endogenic recovery system. Recently, mesenchymal stem cells are proved as effective immunomodulatory factors. By direct communication or via cytokines, mesenchymal stem cells can suppress the inflammatory process, inhibit the autoimmune reactions, etc.

This volume of *Stem Cells in Clinical Applications* book series entitled *Neurological Regeneration* aims to provide updated invaluable resource for advanced undergraduate students, graduate students, researchers, and clinicians in stem cell applications for neurological regeneration.

This book with 13 chapters covers almost the present applications of stem cells in the central and peripheral nervous system regeneration. Chapter 1 introduces and

updates recent applications of stem cells in neurological regeneration. Chapters 2, 3, 4, 5, 6, 7, 8, and 9 introduce some recent approaches of stem cells in brain regeneration, and spinal injury healing, respectively. And Chaps. 10, 11, 12, and 13 focus on peripheral nervous system regeneration including tympanic membrane, retina, and cornea.

We are indebted to our authors who graciously accepted their assignments, and who have infused the text with their energetic contributions. We are incredibly thankful to responsible editor Aleta Kalkstein, and the staff of Springer Science + Business Media that published this book.

Ho Chi Minh City, Vietnam

Phuc Van Pham

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Biography

Phuc Van Pham received his Ph.D. in Human Physiology from Vietnam National University, Ho Chi Minh City, Vietnam. He is currently a Professor of Biology at Vietnam National University and Director of the Laboratory of Stem Cell Research and Application. He is a longstanding lecturer and translational scientist at the University and is a member of several societies and journal editorial boards focused on stem cells.

Dr. Pham and his colleagues have established one of the first multidisciplinary stem cell centers in Vietnam, and he has successfully launched an array of technologies in stem cell isolations. His research interests include stem cell isolation, stem cell therapy, mesenchymal stem cells, cancer stem cells, immunotherapy, and regenerative medicine, and he has published extensively in these areas.

After many years of experience as an embryologist, cell biologist, and molecular biologist, collaborating with leading researchers in Singapore, Japan, and the United States, Dr. Pham is a student again, keen to reach beyond the traditional boundaries of biology.

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