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## Preface

Biobanking and stem cell technology are relatively new fields in science and are increasingly bound to one another through a myriad of biotechnology, business, basic science, and medicinal networks. Both fields are growing every year, and the global expansion estimate for both is approaching an astonishing investment of close to \$200 billion. Inevitably, such a large expansion creates its own challenges that require comprehensive and orderly studies, optimal methods and devices, and standardization of bioprocessing.

Rules governing stem cell growth, stability, preservation, and storage are different from normal cells. Any permanent alterations in the genetic makeup of stored cells could change cell fate and drastically impair discovery research and clinical outcome if therapy is an objective. Current widely used protocols for cryopreservation to some extent are regarded as an “old school” discipline that needs to be revised and revisited for an emerging new field such as stem cell technology. This has put enormous pressure and demands on both the biobanking industry and stem cell technology to adopt new strategies and methodologies.

This book has been prepared with a focus on these challenges and to provide a comprehensive overview of what directions industry and academia need to take to overcome the problems of cryopreservation. To accomplish our objectives a diverse group of researchers and clinicians agreed to contribute their expertise to this book. This volume contains 17 chapters which provide an in-depth study, analysis, and reviews by experts from many research centers and laboratories with different scientific disciplines around the world.

The first three chapters take a more general theoretical approach toward understanding the principles of banking and integrity of the banked specimens at the molecular level. In the fourth chapter, the authors provide resources available for precision medicine in glioblastoma. The next two chapters, Chaps. 5 and 6, in contrast, discuss in detail the protocols and methodology used for human pluripotent stem cells and alternative cryopreservation procedures in the preparation of cord blood cells. Chapters 7, 8, 9, 10, 11, 12, and 13 discuss some of the most promising topics in stem cell research such as mesenchymal stem cells, adipose tissue-derived stem cells, pluripotent stem cells, and oocyte cryopreservation for fertility preservation. Regenerative medicine, which has developed extremely rapidly over the last few years, has generated much excitement among scientists and clinicians, as well as the public. The final four chapters deal with current approaches using stem cells in tissue engineering and regenerative medicine in a variety

of tissues or organs such as cardiac regenerative medicine, ocular epithelial limbal stem cells, hair-follicle-associated pluripotency, and banking of dental stem cells.

We express our sincere gratitude to all those who agreed to contribute and assist us in preparing this publication.

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Biobanking and Cryopreservation of Stem Cells

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2016, XIV, 238 p. 23 illus., 20 illus. in color., Hardcover

ISBN: 978-3-319-45455-9