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Stem Cell Biology and Regenerative Medicine

Editors
Charles Durand & Pierre Charbord

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Charles Durand & Pierre Charbord (eds.)

The study of stem cell biology is under intensive investigations. Because stem cells have the unique capability to self-renew and differentiate into one or several cell types, they play a critical role in development, tissue homeostasis and regeneration. Stem cells also constitute promising cell candidates for cell therapy.

The aim of this book is to provide an accurate knowledge on stem cell biology and regenerative medicine. This book will cover many topics in the field and is based on seminars given by recognized scientists involved in the international master program on stem cell biology at the University Pierre and Marie Curie (UPMC) in Paris.

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Volume 3

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Preface

This book takes its origin in the international master program 'The Biology of Stem Cells' we have founded at the University Pierre and Marie Curie in Paris in 2008. Students enrolled in this course are coming from different european countries, Canada, United States of America, South America and South Africa. They are dedicated one year of their education to the study of stem cells and are trained with stem cell concepts and methods at the theorical and practical levels. Together with doing a 6-month internship in a host laboratory, master students follow a cycle of conferences coupled with a 3-week practical workshop allowing them to observe and manipulate hematopoietic, neural and muscle stem/progenitor cells. The conferences are given by worldwide recognized scientists in stem cell biology and they cover many facettes in the field: embryonic stem cells, induced pluripotent stem cells (iPS), adult stem cell biology, stem cell niches, systems biology, cancer stem cells and therapies using stem cells. Students also participate to lectures on the regulatory and ethical aspects related to stem cell research and have the opportunity to discuss about what is biology in general. We thought that this high level educational program should be of particular interest for young and confirmed scientists interested in stem cell biology and regenerative medicine. We hope that master students, scientists in the field of stem cell biology, researchers in molecular and cellular biology and clinicians will find this book useful and informative for their research. We also hope that this book will be valuable for lawyers and laymen interested in regulatory and philosophical issues.

This book contains five chapters. Chapter 1 is related to concepts of critical importance for the study of stem cells: transcriptional regulation, DNA repair, epigenetics, ontology and phylogeny of stem cells, stem cell niches, regeneration and systems biology. Chapter 2 is dedicated to the biology of pluripotent stem cells with a particular emphasis on iPS. Chapter 3 gives a large overview on adult stem cells in different tissues. Chapter 4 presents the concept of cancer stem cells using leukemias as models as well as the applications of stem cells or their derivatives in the treatment of blood, cardiovascular

and skeletal muscle diseases. Finally, chapter 5 discusses regulatory and philosophical aspects of stem cell biology.

We are very grateful to River Publisher and more particularly to Rajeev Prasad for accepting to consider this book proposal and to publish it, and to Junko Nakajima for the editing process. We would like to thank all the contributors of this book for their participation at the international master program and for accepting to write a chapter on their current research. We also would like to thank all the members of the master stem cell committee for the time, support and advices they provide to the students enrolled in this international master program.

Paris, September 30 2014
Charles Durand and Pierre Charbord

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