
Preface

Migration of stem cells is critical during early development and adult life for the organization of the embryonic body as well as tissue homeostasis and regeneration of organ function. During early development, the formation of functional organs depends on the migration of stem cells from the site of their specification toward the region where the corresponding organ develops. Similarly, the ontogeny of hematopoiesis is characterized by a temporal migration and thus spatial distribution of hematopoietic stem cells throughout embryogenesis until adulthood. During adult life, stem cells mostly migrate in response to tissue regeneration and thus are regarded as being central to regenerative medicine. Hematopoietic stem cells are the best characterized adult type of migrating stem cells. However, although still controversial, it is believed that in general tissue regeneration via stem cell migration and differentiation to a site of tissue injury is not limited to the hematopoietic system. Based on the concept of cancer stem cells, metastatic/migrating cancer stem cell might assume a critical role in the dissemination of the disease. Therefore, stem cell migration represents a great area of research in the fields of development, regenerative medicine, and cancer.

In spite of its importance in development, regeneration, and disease, research on migration of especially adult stem cells remained, until recently, difficult. This owes to the low frequency of these cells *in vivo*, problems in identifying and prospectively purifying tissue-specific stem cells near homogeneity, and mostly because of a lack of adequate technologies and protocols to study stem cell migration *in vivo*.

It is therefore the focus of this book to compile and highlight the standard and novel techniques that allow the studying of the migration of stem cells in a succinct manual. It includes protocols with respect to germ, neuronal, and hematopoietic stem cells, during development and adulthood with a clear emphasis on *in vivo* technologies. In addition, several developmentally conserved signaling pathways that have emerged as important control devices of stem cell migration are discussed, and the book reviews the *in vitro* approaches that are available to study these pathways. In summary, this book provides state of the art information on experimental techniques for studying stem cell migration both at a cellular and molecular level in development, regeneration, and disease.

We would like to thank Jessica Williams for her great administrative assistance.

***Marie-Dominique Filippi
Hartmut Geiger***

Stem Cell Migration

Methods and Protocols

Filippi, M.-D.; Geiger, H. (Eds.)

2011, XII, 326 p. 60 illus., 10 illus. in color., Hardcover

ISBN: 978-1-61779-144-4

A product of Humana Press