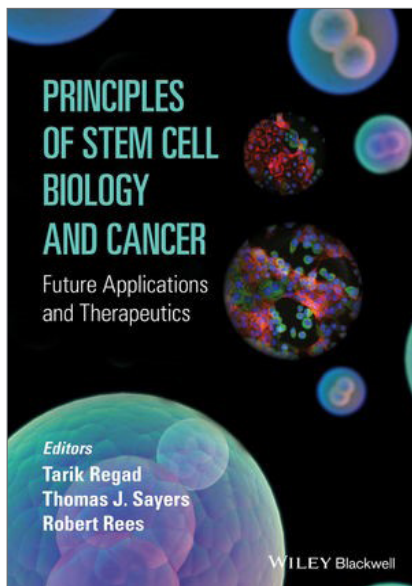


Principles of Stem Cell Biology and Cancer: Future Applications and Therapeutics

Khongorzul Batchuluun PhD

Department of Science and Technology, Mongolian National University of Medical Sciences, Ulaanbaatar, Mongolia



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Robert Rees

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In the field of cancer research, cancer stem cell studies are expanding rapidly with many groups focusing on isolating and identifying cancer stem cell populations. Though not providing therapeutic breakthroughs as fast as worldwide community desires, some progress has been made developing new effective stem cell cancer therapies, e.g. in bone marrow transplants, yet therapies targeting cancer stem cells remains largely unrealized and an area for development in the stem cell research community.

The book *Principles of Stem Cell Biology and Cancer* brings together original input from global scientists in the field of stem cell biology and its role in understanding and treating cancer. Divided into two parts, the book begins with a thorough explanation of the principles of stem cell biology, focusing on the characterization and advances in identifying stem cells, along with future therapeutic approaches based on an understanding of stem cell biology.

Part One focuses on the general principles of stem cells relevant to understanding cancer and consists of five chapters which cover a variety of topics beginning with the isolation and characterization of human embryonic stem cells and future applications in tissue engineering therapies. Epigenetics, stem cell pluripotency and differentiation and stem cell niche and microenvironment are discussed followed by the role of haematopoietic stem cells in cancer therapy. A description of the isolation and identification of neural stem/progenitor cells is also included.

Chapter 1 covers the development and derivation of human embryonic stem cells and their regulation, essential characteristics, and their significance in therapeutic applications. Yet it reminds us of the importance of handling them carefully and using methods of quality control, and the risk and obstacles that researchers face studying them.

The epigenetic mechanisms that are involved in the control of embryonic stem cell pluripotency and differentiation are presented in Chapter 2, and also the important role these play an important role in tumorigenesis. This is

followed by the evolution of the advances in the understanding of the harmony of microenvironment and instructive influence of the niche for controlling normal stem cell in Chapter 3 along with an explanation of cancer stem cell self-renewal and differentiation with novel cancer stem cell therapies that target the stem cell niche and microenvironment.

The established application of haematopoietic stem cell therapy is presented in Chapter 4, along with graft origin and ongoing efforts to improve haematopoietic graft composition. Chapter 5 is dedicated to discovery of stem and progenitor cells in the adult mammalian central nervous system and how it opened new avenues for medical research.

Part Two focuses on cancer stem cells and their role in cancer development, progression, and chemoresistance. This section outlines the latest progress regarding therapy targeting cancer stem cells and consists of eleven chapters. Its opening chapter explains the role of epithelial–mesenchymal transition in cancer metastasis followed by discussion of the regulation of breast cancer stem cells by mesenchymal stem cells in the metastatic niche. There is a chapter that covers the isolation and identification of neural cancer stem/progenitor cells followed by one which describes colon stem cells in colorectal cancer. There next chapters are on prostate cancer and prostate cancer stem cells, stem cells and pancreatic cancer. The role of NANOG, which is a transcriptional factor that helps embryonic stem cells

maintain pluripotency by suppressing cell determination factors, in cancer development is explained. The final chapters of this book cover liver cancer stem cells and hepatocarcinogenesis, the basic science of liver cancer stem cells and hepatocarcinogenesis, cancer stem cell biomarkers, and interactomic analysis of the stem cell marker NANOG in a prostate cancer setting.

In Chapter 6, the authors summarize the characteristics and importance of epithelial–mesenchymal transition and its role in cancer metastasis. Its significance in controlling and potentially eliminating the deadly metastasis is explained.

Chapters 7, 8, 9, 10, 11, 13, 14 and 16 are dedicated to roles of specific stem cells in specific organ cancers.

Chapter 12 is particularly important because it explains the importance of the core pluripotency transcription factor NANOG and its critical role in maintenance of normal stem cell as well as its involvement in cancer cell.

Finally, cancer biomarkers and recent discoveries of biomarkers for cancer stem cells and their possible uses for clinical applications are broadly explained in Chapter 15.

Over all, this book will be an invaluable investment for basic and applied scientists and clinicians engaged in developing cancer treatments and therapies, providing context regarding the latest issues and sketching our current understanding and inspiring future possibilities for stem cell research.