

Preface

Prostate cancer is common and kills people every day. Recently, understanding of the biology of adult tissue stem cells and their cognate cancers has identified striking similarities in normal stem cells and tumor-initiating cells, or the so-called cancer stem cells. The defining properties of a stem cell are self-renewal and multilineage differentiation. Many cancers possess tumor-initiating cells with these properties. Several groups have been investigating these principles in the prostate from multiple perspectives. *Stem Cells and Prostate Cancer* is meant to synthesize current directions in research on prostate stem cells and prostate cancer tumor-initiating cells.

Similarities between normal prostate stem cells and prostate tumor-initiating cells, for instance the ability for self-renewal and multilineage differentiation, have focused attention on normal stem cell biology. There are now very good data, summarized in this book, which demonstrate self-renewal and multilineage differentiation of populations of adult prostate cells from both mouse and humans. Although few studies have taken these experiments to clonal resolution, the mounting evidence is for one or more stem cell populations in the adult prostate. There is controversy regarding multiple aspects of prostate stem cell biology: Is it the cell of origin of prostate cancer or is it a more differentiated prostate cell that “gains” more stem-like properties, is there one prostate stem cell or multiple stem cells in different compartments, and what is the role of stem cells in castrate-resistant disease? These concepts and more are addressed by leaders in the field of *Stem Cells and Prostate Cancer*. The potential significance of the prostate stem cell in prostate cancer development and in the etiology of castrate-resistant disease makes this area of high clinical and translational significance for basic, translational, and clinical scientists interested in disease models.

The topics covered in *Stem Cells and Prostate Cancer* range from hormonal control of the prostate stem cell, methods of identification and characterization of prostate stem cells and prostate tumor-initiating cells, the role of the stem cell niche in differentiation, the tumor microenvironment, targeting the stem cell for prevention, and the use of stem cell models for validating prostate cancer genetics. The authors and topics were chosen to represent the spectrum of research in prostate stem cells from some of the best in the field. Each chapter represents a unique view on prostate

stem cells. In general, I have had a very light hand in editing these chapters so that the intent, tone, and perspective remain those of the contributing authors.

One underlying technique that is described in virtually all chapters is tissue recombination developed and refined by Jerry Cunha over several decades of pioneering research. In tissue recombination, fetal urogenital sinus mesenchyme, dissected from rodent embryos, is recombined with prostate epithelium and regrafted into a mouse host. This technique is described in multiple places in *Stem Cells and Prostate Cancer*. Originally these studies were used to demonstrate the instructive power of the mesenchyme in prostate epithelial development. Through multiple iterations of the model, this technique has guided our understanding of hormonal control of prostate development, endocrine targets in cancer, the contribution of tumor-associated fibroblasts to prostate cancer development and, most recently as described in this book, the use in evaluating prostate stem cells. The reader will find it clear that no definitive description of work on prostate stem cells is without discussion of the valuable contributions of tissue recombination to the field. My hat goes off to Jerry for his pioneering work that has facilitated our progress in the prostate stem cell field in uncountable ways.

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