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# Preface

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The recent surge in stem cell research has ignited a field of discovery into many human diseases including diabetes, neuropathologies, and cancer. Stem cell therapy is a promising approach to the treatment of many debilitating diseases to replace specific differentiated cells that have been lost or died. Although stem cells may provide therapeutic benefit under certain conditions, stem cells are often implicated in the initiation, progression, and therapeutic resistance of malignant disease.

This first edition of *Stem Cells and Cancer* is intended to give a current perspective on the role of stem cells in cancer and strategies for novel therapies directed toward tumor stem cells. Cancer stem cells remain a controversial topic and the criteria that define cancer stem cells are continuing to evolve. The current cancer stem cell hypothesis is presented in several chapters with distinctions made between the hierarchical and stochastic models of tumor cell development. “Stemness,” self-renewal, pluripotency, clonality, and tumorigenicity are important concepts applied toward defining cancer stem cells. Signaling pathways such as Wnt, Sonic Hedgehog, Notch, and Bmi-1 that are involved in differentiation, proliferation, and survival are implicated in the malignant process. Additional chapters address the identification of cancer stem cell populations through the evaluation of molecular markers such as CD133, CD44, and CD24, for example, or by Hoechst dye exclusion to recognize “side populations.” Mesenchymal and hematopoietic stem cells are described as well as mouse models that are employed to elucidate the properties and functionality of stem cells in cancer and the stem cell niche. This book encompasses a wide variety of human cancers that include but are not limited to leukemia, gliomas, breast, and prostate cancers. Resistance to conventional therapies, genetic vs. epigenetic changes that affect therapeutic response, and strategies to prevent disease recurrence are challenges that have been incorporated into this volume. *Stem Cells and Cancer* represents a compendium of cutting edge research by experts in the field and will be instrumental in the study of this intriguing line of investigation for many years to come.

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