

# METHODS IN MOLECULAR BIOLOGY

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# Germline Stem Cells

**Second Edition**

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## Preface

Adult stem cells maintain tissue homeostasis by producing progeny that replace cells lost through the course of normal cellular turnover or because of injury. Germline stem cells are unique amongst stem cells because they produce daughter cells that develop into gametes, which ultimately serve to give rise to the next generation. Thus, germline stem cells are essential for the continued propagation of many sexually reproducing organisms.

Germ cells are imbued with several unique properties. They are the only cells to undergo meiosis. Germ cells across species express many of the same markers and experience extensive epigenetic reprogramming. These cells have specialized mechanisms that help maintain the integrity of the genome and prevent the integration of selfish DNA elements. Several somatic tumors express genes normally specific to germ cells and germ cells themselves can give rise to specific types of cancer. Therefore, a better understanding of germ cells will have a broad impact across many fields of biology.

Germline stem cell biology has witnessed an explosion of new findings and techniques since that last edition of *Germline Stem Cells* in the Methods in Molecular Biology series. The optimization of live-cell imaging techniques, improved cell purification protocols and the identification of germ cells in a number of genetically tractable organisms now allows for the characterization of germ cells at a greater depth and higher resolution than previously attainable. This new edition of *Germline Stem Cells* is intended to provide researchers with selected genetic, molecular, biochemical, and cell biological techniques used in germ cell research. While the focus here is on primordial germ cells and germline stem cells, many of the techniques and principles presented in the chapters of this issue may be applicable to many different types of adult stem cells.

I would like to thank Prof. John M. Walker and the staff at Springer for their invitation, assistance, and patience during the preparation of this book. I would like to thank Nevine Shalaby for her help throughout this entire process. I would also like to express my sincere appreciation and gratitude to the various contributors for sharing their insights and expertise with the germline stem cell research community.

*Dallas, TX, USA*

*Michael Buszczak*

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