
Preface

In selecting the topics for this latest edition of *Mast Cells: Methods and Protocols* we quickly realized that the previous edition editors, Drs. Guha Krishnaswamy and David S. Chi, had established an exceptionally high standard in their 2006 edition (Vol. 315). Their edition remains a vibrant, valuable, and highly relevant compendium of essential mast cell methods and techniques with little need for modification. For that reason, we encourage readers to add this newest addition to their undoubtedly well-worn first edition. We consider this volume to be an *extension*, rather than a replacement, of their excellent first edition and have deliberately attempted to avoid duplication of their earlier work.

In the current edition we have invited some of the top investigators in mast cell biology to share their latest techniques, methods, and opinions. Importantly, we also asked for the authors to share their tips, tricks, and details that are often omitted in the materials and methods sections of original publications. Many of the participating authors herein present techniques and methods that take advantage of the technical innovations in primary cell isolation and analysis, the commercial availability of specialty reagents for immunobiology research, and the proliferation of transgenic animal strains and increasingly sophisticated animal models of human disease. Although the ethical debate of expanding the use of experimental animals is frequently contentious we feel the data gleaned from the behavior of mast cells *in situ* provide insights that are unattainable from studying cells *in vitro*. In addition, the accessibility of methods for the isolation of primary cells from ever-smaller quantities of tissue (human, rodent and other) permits more data to be obtained from fewer animals. Taken together, these innovations and the proliferation of specialty reagents are serving to expand the breadth and quality of information researchers can collect from each experiment. The challenge of so much information then becomes deciding which data are biologically relevant and assembling the relevant data into an explanatory model.

Mast Cells: Methods and Protocols follows the popular format of the *Methods in Molecular Biology* series by providing step-by-step instructions to the reader that can be directly applied or easily adapted to the design of their own experiments. In addition, we have solicited a broad selection of reviews that cover topics of interest to mast cell neophytes and *cognoscenti* alike. *Part I* consists of reviews aimed at the history of developments in the mast cell field, the phylogenetic profile of mast cells and their developmental ontology. In addition, *Part I* provides methods for the enumeration of tissue mast cells and isolation of mature mast cells and mast cell progenitors from mammalian tissues including lung, intestine, and peripheral blood. New to this edition, we are very pleased to include a chapter on the versatile and powerful *Danio rerio* (zebrafish) model in the study of mast cell development and function. In *Part II*, we present chapters covering the functions of mast cells in human health and disease and methods for the isolation, derivation, and activation of mast cells from primary human tissue. Methods for the investigation of the molecular mechanisms of mast cell activation and their effector functions are provided in *Part III*. Assays for the detection and analysis of mast cell secretory and cell surface phenotype and mast cell activation state (including high-throughput approaches) are presented in *Part IV*. The concluding and largest section of this volume, *Part V*, is dedicated to experimental mouse

models of disease that have been deemed useful for the assessment of mast cell functions in the regulation of innate and adaptive immune response in cancer, tissue fibrosis, auto-inflammation, and allergic disease. Clearly there are many more methods that merit inclusion in this volume and many additional experts in mast cell biology that we, regrettably, have not been able to include in this text. We therefore encourage the readers to view this volume as a “sampler” of useful methods and techniques and we hope that those experienced and new to the field will find this volume to be a well-rounded cross section of useful approaches in the study of mast cell biology.

Finally, we are very grateful to all authors who participated in this volume for sharing their methods, ideas, and scientific insights and generously giving their valuable time to this effort. We also wish to thank Humana Press and the Series Editor, Dr. John Walker, for the invitation to participate in this project as editors and for their patience awaiting the completed work. Finally, we greatly appreciate the helpful advice and encouragement of Dr. Guha Krishnaswamy, editor of the first edition, who graciously provides the introductory chapter for this volume.

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