Preface

Immunology constitutes the study of an extremely powerful and dynamic system for sensing, containing, and eliminating foreign pathogens with minimal damage to the host. The success of this process is contingent on the activation and rapid clonal expansion of lymphocytes and accessory cells that participate in executing an effective, pathogen-tailored adaptive immune response. Moreover, the proper regulation and contraction of these potent immune cells during and after the immune response is just as important to the health of the host. Many questions remain unresolved as we continue to characterize and define the nature of normal immune homeostasis and determine how these processes are dysregulated in immunodeficiency, as well as in autoimmune and lymphoproliferative disorders.

This volume of Methods in Molecular Biology on "Immune Homeostasis" focuses on experimental techniques for measuring and analyzing immune cell dynamics, with a particular emphasis on examining lymphocyte programmed cell death in different contexts. Chapters 1–7 of the book aim to equip the researcher with detailed protocols for studying various pathways of apoptosis and necrosis in different types of hematopoietic cells, both in vitro and in vivo. Chapters 8–12 offer several methods for studying the maintenance of lymphocyte populations in the steady state or following infectious challenges in both mice and humans. Chapters 13–14 offer technical insights into state-of-the-art genomics tools for investigating gene sequence and expression variation, both in small subsets of lymphocytes and on a genome-wide scale, in individuals challenged with infections or inherited immune disorders. Chapter 15 provides an example of a flow cytometric assay employed for the diagnosis of specific immunodeficiencies. Finally, Chapter 16 outlines an assay for investigating regulatory T cell-mediated suppression of immune responses.

Although no single volume can encompass the full range of methods available for studying immune responses, this volume provides a valuable "starter" toolkit for basic and clinical scientists interested in examining various aspects of immune homeostasis in both normal and disease-related contexts. We hope the clever researcher will envision how the techniques outlined herein may be directly applied, altered, or combined to address his/her particular question of interest. With these techniques in hand, we wish you continued success in studying the dynamic processes that contribute to homeostasis of the immune system.

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