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## Preface

Inflammation is part of a complex defense reaction of live tissues to injury. It is triggered by harmful stimuli, including pathogens, physical trauma, radiation, and chemical irritants. Inflammation is largely mediated by innate and adaptive immune cells in their efforts to eliminate the initial cause of tissue injury, clear out dead or infected cells, and facilitate tissue repair and wound healing. Hence, *acute* inflammation is beneficial to the host and must be tightly regulated. Too little inflammation may lead to progressive tissue destruction, for example, by the invading pathogen and compromise the survival of the host. In contrast, exaggerated and *chronic* inflammation is associated with many diseases ranging from contact allergy and asthma, psoriasis and rheumatoid arthritis, to inflammatory bowel disease, liver fibrosis, and inflammation of the central nervous system. Thus, a better understanding of the intricate interactions of the diverse cellular players and their molecular mediators holds the key to discover novel targets for designing improved immunotherapeutic strategies for the treatment of immune-mediated inflammatory diseases (IMID).

Considering the broad spectrum of IMID and the multidisciplinary scope of inflammation research, any protocol collection such as *Inflammation Protocols* will represent a limited selection of methods and tools to investigate inflammation that is largely biased by the personal choices of the editors. Owing to our strong conviction that the complex nature of an inflammatory reaction can best be studied *in vivo*, we have focused this volume on relevant animal models of human IMID. While naturally the emphasis lies on mice, we have also included innovative protocols studying zebrafish and nonhuman primates. Another personal flavor we introduced to the book is the combination of state-of-the-art descriptions of standard well-established IMID protocols, with bringing some highly specialized niche protocols such as the isolation and characterization of leukocytes from the aorta or oral mucosa to broader attention. Finally, we sought to incorporate some emerging technologies such as CyTOF and RNA sequencing that are currently being developed to study inflammation. These cutting-edge methods have the high potential to reveal novel targets, which can then be tested in different IMID models for the benefit of treating human diseases.

This volume of *Inflammation Protocols* is divided into four parts: The first three parts describe methods investigating IMID models affecting epithelial barriers to the environment, i.e., the skin (Part I), the lung (Part II), and the intestinal and oral mucosa (Part III). The last part illustrates inflammatory disease models of the brain, joints, and vasculature (Part IV). Despite the established relevance and high significance of *in vivo* protocols to study inflammation, there is an increasing awareness of issues concerning their reproducibility. Therefore, prior to the detailed descriptions of the various experimental protocols, we provide a viewpoint on how to avoid potential pitfalls in animal inflammation research.

Finally, we are particularly grateful to our friends and colleagues who contributed their favorite inflammation protocol to this collection. All contributing authors are leading experts in their respective fields, and we hope that their unique and comprehensive protocols will inspire the experienced investigator and the young experimenter alike to disentangle the fascinating process of inflammation.

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