
Preface

A series of discoveries in the late 1980s and early 1990s described how the receptor-associated JAK protein kinases and their substrates, the STAT transcriptional activators, transmitted signals following cytokine and growth factor binding to receptors expressed on the cell surface, to result in specific transcriptional and cellular responses. In the intervening two decades, the JAK/STAT cascade of tyrosine phosphorylation, protein–protein interactions, and transcriptional activation has been studied extensively. The field has progressed from identification of the individual components through to an understanding of the activation and deactivation mechanisms and the complex structural detail of the proteins involved. We now know that these pathways are important in many biological processes, including growth and development, hematopoiesis, and the innate and adaptive immune response. We have gained a greater understanding of the role these proteins may have in human diseases such as cancer, with the exciting prospect of pathway inhibitors being available for clinical use in the near future.

Protocols in JAK/STAT Signaling provide detailed methodology for examining many aspects of the pathway, which we anticipate will be of use not only to those working in the area but also to new investigators who are led to delve into the complexities of JAK and STAT responses. For that reason, we have included methods for the simple analysis of activation status, as well as more complex protocols. It is divided into four sections: two sections distinguish JAK- and STAT-specific approaches, a third section is dedicated to the negative regulators of the pathway, the Suppressor of Cytokine Signaling (SOCS) proteins, while the final section deals with the production and crystallization of JAK and STAT proteins. This last, apart from underpinning our mechanistic understanding, has been critical to the development of specific inhibitors for therapeutic use. The field continues to evolve and there is still much to be learnt. We hope that this volume can in some way serve those involved in such endeavors.

We would like to sincerely thank our many contributors who have generously shared their time and expertise to provide such comprehensive protocols.

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