Superantigens and Superallergens
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Superantigens and Superallergens

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To my late mother, Francesca Rita Marsella,
as a token of my gratitude for her love and support.
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Preface

Superantigens constitute a growing family of bacterial and viral proteins that share the capacity of inducing massive activation of the immune system. This concept was first introduced in the late 1980s by the group of Philippa Marrack to describe the ability of staphylococcal enterotoxin B to induce a remarkable expansion of T cells expressing T cell receptors with a specific subset of the T cell receptor β-chain variable region. The classical superantigens are the T cell superantigens. However, some naturally occurring proteins possess the properties of superantigens for B lymphocytes. B cell superantigens are proteins endowed with immunoglobulin-binding capacity. Protein A of Staphylococcus aureus is the prototype B cell superantigen. Other B cell superantigens are gp120 of HIV-1, protein L and the human gut-associated sialoprotein known as ‘protein Fv’. B cell superantigens, by interacting with membrane-bound IgE, activate human basophils and mast cells that express the high-affinity receptor for IgE. In this context, the definition of immunoglobulin superantigens has been transferred to superallergens.

In this volume, we have tried to cover novel aspects of T cell and B cell superantigens and some recent molecular and clinical findings generated by the superallergen concept. In particular, the recent completion of several genome projects and database mining led to the identification of a myriad of novel superantigens. We also focused on the possibility that certain superantigens can modulate regulatory T cells and that superantigens may stimulate or inhibit IgE synthesis depending on the conditions.

An important part of this volume is devoted to the significance of superantigens in a wide spectrum of clinical settings going well beyond the classical
superantigen-associated diseases. For instance, there is some evidence that superantigens/superallergens might play a role in certain aspects of HIV-1 infection and autoimmune diseases. In addition, there is growing evidence that staphylococcal superantigens and superallergens might be involved in certain diseases of the upper and lower respiratory tract. For instance, endogenous, viral and bacterial superallergens can activate primary effector cells of allergic reactions to release proinflammatory mediators and cytokines.

The rapid advances in this field make it difficult to produce a timely reference text. Despite this difficulty, I accepted the invitation of the Editors of the Chemical Immunology and Allergy series to produce a volume entitled Superantigens and Superallergens. This project was designed to highlight results obtained with the recent characterization of molecular and clinical aspects of T and B cell superantigens and of superallergens. Several issues remain to be solved. The evolution of pathogens and their hosts is inextricably intertwined and studies of superantigens/superallergens have revealed interesting dimensions in the complex ongoing battle between pathogens and their hosts. We should also remember that we are constantly exposed to superantigens and superallergens. This leads to the question: ‘why do bacteria and viruses produce superantigens?’ All these fascinating aspects are awaiting answers.

There are several important aspects still remaining to be fully addressed. First, novel bacterial and viral superantigens and superallergens should be identified. Secondly, we need to know more about the molecular events governing the immunological synapse induced by superantigens and certain superallergens. Similarly, there is still much to learn about the activation of different subsets of T and B cells, and of effector cells caused by superantigens and superallergens. The information that might arise from such studies may lead to the prevention and better management of superantigen/superallergen-associated diseases.

It has been a rewarding experience for me to interact with many friends and colleagues and I am pleased to acknowledge the excellence of their work. I would like to thank Karger publishers and their staff, as well as Jean Gilder for their assistance throughout the production of this volume.

This volume owes much to the stimulating intellectual environment provided by my colleagues at the Center for Research in Basic and Clinical Immunology (CISI) of the University of Naples Federico II.

Gianni Marone