

CLINICAL  
Allergy &  
Immunology

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Leonard C. Altman

CLINICAL

# Allergy & Immunology

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To my parents, my wife, and my children

## PREFACE

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This book was written for three major reasons. First, our knowledge of host defenses and immunology has expanded at such a rapid pace over the last decade that many physicians, even those trained quite recently, find this area confusing and, as such, consider the diagnosis and treatment of patients with immunologic disorders to be complex and difficult. Second, this explosion of new information has greatly improved our ability to treat patients with immunologic disorders and has thereby lessened the associated morbidity and mortality of these diseases. As such, physicians should welcome the ever-expanding field of immunology since it is rapidly enhancing our ability to diagnose and treat more accurately allergic and other immunologic diseases. Third, because of the commonness of allergic diseases and our increased knowledge in the fields of immunology and allergy, there has developed a great interest by the lay public in these diseases and an associated proliferation of overutilized diagnostic and therapeutic techniques as well as other techniques of uncertain validity or known lack of value. Nonetheless, these techniques are often discussed in lay magazines, newspaper articles, and on television programs without critical appraisal. Accordingly, this volume has been written for members of the health profession who care for patients with allergic diseases to address the above three matters.

Chapters 1 to 5 present a current and complete review of basic immunology and host defense mechanisms as well as a discussion of the application of this basic information to the diagnosis and treatment of allergic diseases. Chapters 6 to 11 discuss the common respiratory and cutaneous diseases seen in allergy practice, their differential diagnoses, and treatments. Chapters 12 and 13 address drug and food allergy, respectively, while chapter 14 discusses allergic and other adverse reactions to stinging and biting insects. In chapter 15 there is a detailed discussion of the treatment of snake and arthropod bites, diseases caused by bacterial toxins, and the use of serum therapy in the treatment of these diseases. This chapter is not one commonly found in allergy textbooks but one that I believe provides invaluable information that is generally quite difficult to locate, especially under emergency situations when it is most often needed. Chapter 16 provides a careful review of immunodeficiency diseases including the newly described and most worrisome acquired immune deficiency syndrome. Chapter 17 presents a comprehensive overview of immunization therapy for the prevention of infectious diseases, including those seen in this country and the more exotic diseases associated with foreign travel. Finally, chapter 18 provides a most valuable

## PREFACE

discussion and comparison of the proved efficacy of standard immunotherapy with the frequently utilized but unproved techniques of allergy, such as Rinkel injection therapy, cytotoxic food testing, skin provocation testing, and neutralization and sublingual provocation testing. This again is a subject generally omitted from most allergy and immunology textbooks, but it is of major interest to the lay public and hence an area that is likely to find its way into the offices of most physicians who see patients with suspected allergic complaints.

In summary, this book was written to provide physicians with state-of-the-art information about basic immune and host defense mechanisms and to relate this information to the diagnosis and treatment of virtually all diseases that confront allergists and other physicians caring for patients with allergic or pseudoallergic complaints. The chapters have been written so that each is self-contained, but whenever necessary cross-referencing has been provided. The book has been carefully designed to make extensive use of tables and figures with the intention of giving the reader very practical diagnostic and therapeutic information. In a sense, we have attempted to provide the "tricks of the trade" often known only by specialists in allergy. I believe this volume should be most useful to allergists, internists, pediatricians, and family and emergency care physicians, although all health care professionals seeing patients with suspected allergic diseases may also find it beneficial.

# ACKNOWLEDGMENTS

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I am indebted to a number of people in many different ways for helping me prepare this text: first to my wife, Gaylene Bouska Altman, and parents, Ida and Martin Altman, for their love, understanding, and encouragement throughout my academic career; to Drs. Paul P. VanArsdel, Jr., Seymour Klebanoff, Robert G. Petersdorf, and Ralph Snyderman, for their advice, support, and teaching; and to Joan Garnett Blackburn, my secretary, without whose help the timely production of this book would not have been possible.

Lastly, I wish to thank Julius Erving, better known as Dr. J., whose skill in leading his team to the 1982–83 National Basketball Association Championship and general excellence in his profession have provided me with enjoyment and relaxation during the many long and tedious months of editing and perfecting this book.

PART I

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*Fundamental Principles of  
Allergy and Immunology*

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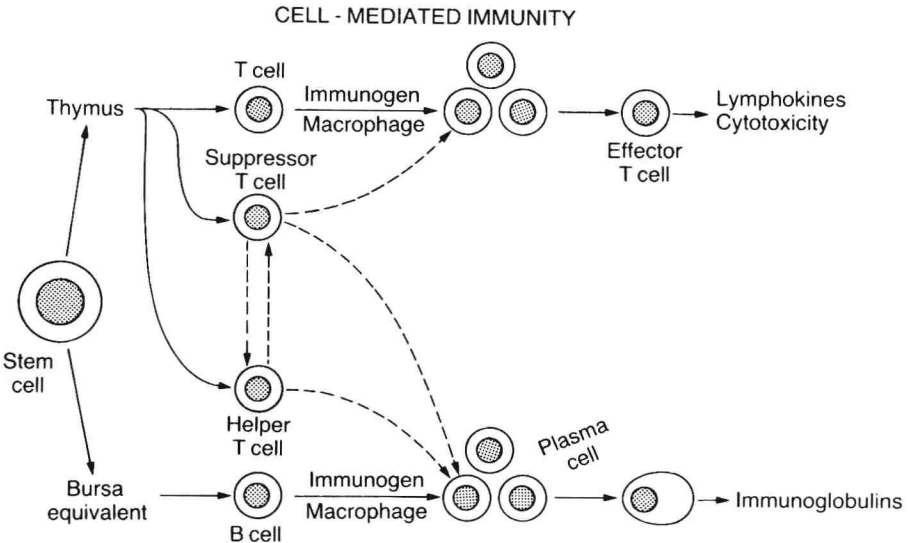
## *Humoral Immunity and Complement*

The immune system is comprised of many elements, including T and B lymphocytes, cells of the monocyte-macrophage series, and many soluble factors, most notably the complement proteins. B cells and their products, antibodies, are the basic components of humoral immunity; T cells and their products, along with macrophages, are the main components in cell-mediated immunity. The response to foreign substances requires cooperation among these cell types. The immune system is controlled and regulated through a complex communication network involving these cell types and their products. A normally functioning immune system is essential for defense against infection and for tumor surveillance. Alterations in the immune system lead to a variety of disorders including infectious diseases, neoplasms, and autoimmune disorders. This chapter will describe the cellular components of the immune system, the humoral immune response and its regulation, the structure and function of immunoglobulins, and the complement system.

### Cells of the Immune System

The principal cellular components of the immune system are T and B lymphocytes and macrophages (fig. 1.1). Lymphocytes are collectively organized into lymphoid tissue, which includes the thymus, bone marrow, lymph nodes, and spleen. In addition, lymphoid tissue is found along the gastrointestinal tract (tonsils, Peyer's patches, and appendix), respiratory tree, and genitourinary tract, and also may accumulate at sites of inflammation.

Evidence for two distinct populations of lymphocytes comes from a large body of experimental work in animals, and from studies of congenital and acquired immunologic deficiency disorders in humans.<sup>1,2</sup> In chickens, removal of the bursa of Fabricius, which is a lymphoepithelial organ near the cloaca, results in a deficiency of antibody, a lack of germinal centers in lymph nodes, and an absence of plasma cells.<sup>3</sup> The ability to reject grafts, a function of



**Figure 1.1.** Schematic representation of the development of the immune system and the immune response. The development of T cells from stem cells requires the microenvironment of the thymus. Upon exposure to a foreign substance, T cells proliferate and become effector cells capable of elaborating lymphokines and mediating cytotoxicity. The development of B cells depends on the presence of the bursa equivalent. Upon stimulation by a foreign substance, B cells proliferate and evolve into antibody-producing plasma cells. The immune response depends on cooperation among B cells, T cells, and macrophages. Distinct subsets of T cells function as helper cells or as suppressor cells which respectively are able to stimulate or suppress humoral or cell-mediated immune responses. Macrophages process and present antigens to T cells and B cells, and also elaborate helper and suppressor factors. (From Gilliland, B. C. Introduction to clinical immunology. In *Harrison's principles of internal medicine*, 10th edition. New York: McGraw-Hill, 1983. Reprinted by permission.)

cell-mediated immunity, remains intact. The human equivalent of the bursa is unknown but may be the bone marrow, fetal liver, or spleen. Alternatively, the bursa equivalent may exist in several diffuse sites. Because the development of antibody-producing lymphocytes depends on the presence of the bursa or its human equivalent, these cells are designated B cells.

Other animal models have been used to study the role of the thymus in the development and control of the immune response.<sup>4,5</sup> For example, remov-