

PREFACE

Immunology is the quintessential medical science. Indeed, no branch of the medical sciences has improved the health of people more than the application of immunologic principles to prevention of disease. Smallpox has been eliminated from the planet as a natural infection, as has poliomyelitis from the western hemisphere. Hepatitis B vaccine has prevented more cancers than any intervention other than smoking cessation. The human papilloma virus vaccine promises to cut strikingly the toll of cervical cancer.

The continued need for progress in immunology is clear. The epidemic of human immunodeficiency virus roars on. Glimmers of hope from vaccine trials have led to a redoubling of effort, and the struggle to design effective vaccines for the great infectious scourges goes on, with encouraging results but no breakthroughs yet. Highly effective therapeutic vaccines for cancers still elude us, but some immunologic therapies for cancer have met with encouraging results. We hope for much more as we marshal the tools coming from the study of the innate immune system, regulatory T cells, and lymphocyte differentiation and effector function.

Understanding the basis of inflammation and the cytokine world has given us effective drugs to treat rheumatoid arthritis and a growing number of other autoinflammatory/autoimmune diseases. The value of the interventions based on this knowledge, such as the use of tumor necrosis factor, interleukin-6, and interleukin-1 blockers, is now established. The application of anti-CD20 in the treatment of autoimmune disorders shows great promise. Even more promising strategies are on the horizon.

Fundamental Immunology has the goal of aiding in the education of a new generation of immunologists who can both probe more deeply into the organizing principles of the immune system and can translate this new information into effective treatments and preventatives that will extend and enlarge on the record of immunologic science in bettering the lot of human kind.

Were I beginning the task of preparing a comprehensive text of immunology today, I might have titled it *Immunology, Endless Fascination*. Certainly that describes my own view of this science over the 30 years that I have been working on the seven editions of *Fundamental Immunology*. I had believed that scientific progress was marked by periods of intense creativity, during which new concepts were established, followed by longer periods of consolidation, when work that made important but anticipated advances would dominate.

Perhaps that will prove to be true of modern immunology as well when it is looked at by a disinterested observer, but for one in the midst, the pace of discovery seems to speed up with each passing year. *Endless fascination* certainly describes my experience of immunology.

I hope that this seventh edition will convey the dynamism and creativity of modern immunology and provide the reader with a solid introduction to our field and a picture of much of the very latest that has been achieved. As with each of the previous editions, most of the chapters are entirely new and not simple reworkings of the chapter in the previous edition. In order to contain the seventh edition within one volume, a decision was made to cite references in the printed text but only to provide the detailed citations in the online version. However, the references will be linked to PubMed so cited information can be easily obtained. The electronic version can be accessed at www.fundamentalimmunology.com.

As before, this edition begins with an introductory section consisting of the chapters "The Immune System" and "History of Immunology." These give an overview of modern immunology and of its origins, and provide those new to the field with the basis to go on to the subsequent chapters. This is followed by an "expanded introduction" provided by the sections "Organization and Evolution of the Immune System," "Immunoglobulins and B-Lymphocytes," and "T-Lymphocytes." These are followed by the two core "basic" immunology sections: "The Intersection of Innate and Adaptive Immunity" and "Induction, Regulation, and Effector Functions of the Immune Response." The book concludes with sections devoted to the immune system's role in protection against pathogenic microorganisms, "Immunity to Infectious Agents," and to how the immune system is involved in a variety of human disorders, "Immunologic Mechanisms in Disease."

I repeat a word of caution that has been in the Preface to each edition. Immunology is moving very fast. Each of the chapters is written by an expert in the field, but in some areas there may be differences of opinion expressed by equally accomplished authors. I ask the reader to take note of the differences and to follow developments in the field.

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