
Preface

Immunology is a dynamic discipline with rapid research developments unparalleled by those of any other field except, perhaps, the neurosciences. This research has provided valuable new data for medicine and biology. Immunology, including its fundamental principles and clinical applications, is a very exciting field in which to specialize.

Nowadays, we still live to a ripe old age despite hostile attacks by myriads of pathogenic organisms. Immunological mechanisms have become highly sensitive and specific in the process. This color atlas graphically depicts these mechanisms. Its main goal is to explain the diverse interactions between the fundamental principles and the laboratory and clinical applications of immunology so as to create a vivid mental picture. The book's main target group includes medical students, biology students, and students in other branches of the biosciences. However, it also targets physicians and biologists who are active in their respective fields.

By definition, an atlas must focus on the graphic presentation of subject matter, the explanation of which is limited to brief text segments. Especially in immunology, a graphic presentation of the subject matter must depict certain processes and their progression through time and different phases as well as the interactions between a number of different substances and elements. In order to present an unmistakable picture of these "protagonists," the graphic designers must create archetypal models and skillfully use colors to ensure a clear understanding of the subject matter. We have mainly concentrated on harmonization of the color plates for different topics. The goal was to ensure that the visual elements were not overloaded with internal structures and to have the individual pieces combine to form a mosaic whole. This was sometimes achieved at the expense of aesthetics, and there is inevitably a certain loss of anatomical detail.

Due to space limitations and the emphasis on human medicine, the book mainly focuses on human immunology; space does not permit us to present all areas of the immense field of immunology in their entirety. A number of excellent textbooks of immunology are already on the market. Some of our colleagues may prefer a more comprehensive presentation of the subject matter. We must also remember the enormous developments in immunological research, the constant discovery of new information and processes that are still unclear today, but will soon be well understood. A constant exchange of paradigms is taking place, especially on the subject of tolerance and autoimmunity. The current edition cannot provide full coverage of this new information. We naturally hope that there will be many future editions that will allow us to revise the contents of the book to keep abreast of the latest advances. We would greatly appreciate any suggestions, additions, and corrections proposed by the readers of this color atlas.

Spring 2003

*Gerd-Rüdiger Burmester, Berlin
Antonio Pezzutto, Berlin
Jürgen Wirth, Darmstadt*

Introduction

This book targets students of medicine and biosciences as well as physicians and bioscientists. As was mentioned in the preface, the book mainly focuses on human immunology. This information will be conveyed in 131 color plates accompanied by explanatory texts on the facing pages.

The atlas is broken down into three main segments. The fundamental principles of human immunology are presented in the opening segment, the essential laboratory tests used in immunology are described in the second section, and the clinical aspects of immunological diseases are presented in the final section. The appendix contains a glossary of important immunological terms and tables including CD nomenclature for immunologically relevant molecules, criteria for classification of rheumatic diseases, an overview of the most important cytokines and growth factors, and important reference values for immunology. Besides providing an introduction to all relevant aspects of modern immunology, this color atlas also serves as an important source of reference for important questions in clinical medicine and laboratory practice.

The **fundamental principles** section begins with the organs of the immune system, followed by a description of the relevant cells of the immune system and the mechanisms by which T and B lymphocytes acquire high levels of specificity. Surface molecules are described in detail in deference to the enormous emphasis placed on them in most immunological publications. A description of accessory cells and natural killer cells follows. Next, the human lymphocyte antigen system is analyzed, followed by the principles of antigen processing and hypersensitivity reactions. Autoimmunity and tolerance are described in the last part of the section.

The **laboratory applications** section describes the most important test systems in immunology. “Conventional” methods such as precipitation, agglutination, and complement-binding reactions are presented along with newer methods such as immunoblotting, molecular biology tests, and a number of test systems for the detection of expressed genes.

The **clinical immunology** section describes immunodeficiencies and the essential immunological features of a number of immune diseases. The main focus is on rheumatology and hematology.

Uniform symbols are used to represent the various cell systems as well as their receptors and products. The symbols are explained on the inside front and inside back covers.