BASIC IMMUNOLOGY

		_

BASIC IMMUNOLOGY

Piero Musiani, MD Guido Forni, MD

ALL RIGHTS RESERVED

This work is protected by copyright.

No part of this publication may be reproduced, distributed or used in any form or by any means, including photocopying, recording, or other electronic or mechanical methods, or stored in a database or retrieval system, including, but not limited to, in any network or other electronic storage or transmission, or broadcast for distance learning, without the prior written consent of the Publisher.

Any unauthorized distribution or use of this work, as well as any alteration of its electronic information, constitutes a violation of the rights of the Publisher and the Author(s) and will be sanctioned according to civil and criminal law, as provided by Law 633/1941 and ss.

As new scientific information becomes available through basic and clinical research, recommended treatments and drug therapies undergo changes. The author(s) and publisher have done everything possible to make this book accurate, up to date, and in accord with accepted standards at the time of publication. The author(s), editors, and publisher are not responsible for errors or omissions or for consequences from application of the book, and make no warranty, expressed or implied, in regard to the contents of the book. Any practice described in this book should be applied by the reader in accordance with professional standards of care used in regard to the unique circumstances that may apply in each situation. The reader is advised always to check product information (package inserts) for changes and new information regarding dose and contraindications before administering any drug. Caution is especially urged when using new or infrequently ordered drugs.

ISBN: 978-88-299-2882-8

FOREWORD



This book intends providing an introduction to immunology for undergraduate and graduate students. As we were engaged for a few years in teaching in a Master's Degree at the University of Huè, Viet Nam, the Authors debated at length what should be emphasized and, on the contrary, what could be left to an eventual personal investigation in a basic course of Immunology. Our first agreement was that the main emphasis should be on immunological strategies, while most of the molecular mechanisms could be left to student exploration. Molecular biology is now so pervasive that everyone easily swims in the sea of molecular mechanisms. Updated information on molecular pathways of the immune system can be obtained on internet without difficulty. By contrast, the peculiar logic of immunological reactions is sometimes not obvious and not easy to grasp.

A second shared view was that a schematic drawing could be more informative than a long text. Therefore this book is mainly based on text illustrations, while only an explanatory comment is reported in legends.

We wish to thank exquisite Mrs. Jehanne Marchesi for the numerous corrections and suggestions.

		_

ABOUT THE AUTHORS



PIERO MUSIANI, MD was a semi-professional basketball player, but then he became a Surgical Pathologist working first at the Catholic University, Rome and later at the University of Chieti, Italy. Initially his main experimental interest was on the thymus gland and secretory immunoglobulins. At the University of Chieti he played a pivotal role in the foundation of the Excellence Center on Aging (CeSI). In 2014 Piero died in a motorbike accident while he was drawing the illustrations of this book.

GUIDO FORNI, MD (ifrngdu@gmail.com) is a National Member of the Accademia dei Lincei, Rome. From 1970 to 2011 he was Professor of Immunology at the University of Torino Italy. Currently he teaches in a Medical Biotechnology Master in Viet Nam organized by the University of Sassari, Italy and Huè University of Medicine and Pharmacy. He has experience in basic and translational cancer immunotherapy, and has considerable expertise in transgenic mouse models of cancer and DNA vaccination. His work at the University of Torino, Italy on the role of cytokines in the immune recognition and vaccines to prevent tumors is recognized world-wide.

		_

CONTENTS

Chapter 1	IMMUNITY AT THE SURFACE	1
Chapter 2	SENTINEL CELLS	13
Chapter 3	CELLS OF THE INNATE IMMUNITY	21
Chapter 4	CYTOKINES	45
Chapter 5	THE MAJOR HISTOCOMPATIBILITY COMPLEX	61
Chapter 6	PEPTIDE PRESENTATION BY HLA GLYCOPROTEINS	73
Chapter 7	T CELLS	83
Chapter 8	THE THYMIC EDUCATION OF T CELLS	95
Chapter 9	ACTIVATION OF VIRGIN T CELLS	107
Chapter 10	T KILLER CELLS	127
Chapter 11	T HELPER CELLS	133
Chapter 12	B CELLS	145
Chapter 13	B CELL RECEPTOR AND ANTIBODIES	155
Chapter 14	GENERATION OF BCR (AND TCR) REPERTOIRE	163
Chapter 15	BINDING SITE-ANTIGEN INTERACTION	173
Chapter 16	THE ANTIBODIES	179
Chapter 17	ACTIVATION OF B CELLS	197
Chapter 18	SECONDARY LYMPHOID ORGANS	217
Chapter 19	DIRECT AND INDIRECT ANTIBODY ACTIVITIES	225
Chapter 20	THE COMPLEMENT SYSTEM	235
Chapter 21	MONOCLONAL ANTIBODY (mAb)	
Chapter 22	IMMUNE MEMORY	251
Chapter 23	IMMUNE TOLERANCE AND CONTROLS OF THE IMMUNE RESPONSE	257
Chapter 24	VACCINES	271
Chapter 25	IMMUNODEFICIENCIES	277
Chapter 26	AUTOIMMUNITY	283
_	INDEX	289