Antibodies

STRUCTURE, SYNTHESIS,
FUNCTION, AND IMMUNOLOGIC
INTERVENTION IN DISEASE

University of South Florida International Biomedical Symposia Series

ANTIBODIES: Structure, Synthesis, Function, and
Immunologic Intervention in Disease

Edited by Andor Szentivanyi, Paul H. Maurer, and Bernard W. Janicki

IMMUNOBIOLOGY AND IMMUNOPHARMACOLOGY OF
BACTERIAL ENDOTOXINS

Edited by Andor Szentivanyi, Herman Friedman, and Alois Nowotny

VIRUSES, IMMUNITY, AND IMMUNODEFICIENCY

Edited by Andor Szentivanyi and Herman Friedman

A Continuation Order Plan is available for this series. A continuation order will bring delivery of each new volume immediately upon publication. Volumes are billed only upon actual shipment. For further information please contact the publisher.

Antibodies

STRUCTURE, SYNTHESIS,
FUNCTION, AND IMMUNOLOGIC
INTERVENTION IN DISEASE

Edited by

Andor Szentivanyi

*University of South Florida College of Medicine
Tampa, Florida*

Paul H. Maurer

*Jefferson Medical College
Thomas Jefferson University
Philadelphia, Pennsylvania*

and

Bernard W. Janicki

*National Institute of Allergy and Infectious Disease
National Institutes of Health
Bethesda, Maryland*

PLENUM PRESS • NEW YORK AND LONDON

Library of Congress Cataloging in Publication Data

University of South Florida College of Medicine International Symposium on Antibodies:
Structure, Synthesis, Function, and Immunologic Intervention in Disease (1986: Clear-
water, Fla.)

Antibodies: structure, synthesis, function, and immunologic intervention in disease.

(University of South Florida international biomedical symposia series)

"Proceedings of the University of South Florida College of Medicine International Sym-
posium on Antibodies: Structure, Synthesis, Function, and Immunologic Intervention in
Disease, held February 19–21, 1986, in Clearwater, Florida" —T.p. verso.

Includes bibliographies and index.

1. Immunoglobulins—Congresses. 2. Immunoglobulins—Therapeutic use—Congresses.

I. Szentivanyi, Andor. II. Maurer, Paul H. III. Janicki, Bernard W. IV. Title. V. Series.
[DNLM: 1. Antibodies—congresses. QW 575 U58a 1986]

QR186.7.U55 1986

616.07'93

87-2457

ISBN-13: 978-1-4612-9044-5

e-ISBN-13: 978-1-4613-1873-6

DOI: 10.1007/978-1-4613-1873-6

Proceedings of the University of South Florida College of Medicine
International Symposium on Antibodies: Structure, Synthesis, Function,
and Immunologic Intervention in Disease, held February 19–21, 1986,
in Clearwater, Florida

© 1987 Plenum Press, New York

Softcover reprint of the hardcover 1st edition 1987

A Division of Plenum Publishing Corporation

233 Spring Street, New York, N.Y. 10013

Softcover reprint of the hardcover 1st edition 1987

All rights reserved

No part of this book may be reproduced, stored in a retrieval system, or transmitted
in any form or by any means, electronic, mechanical, photocopying, microfilming,
recording, or otherwise, without written permission from the Publisher

PREFACE

This publication is based on a Symposium that has been held in Clearwater, Florida on February 19-21, 1986, on antibodies, their structure, synthesis, function, and clinical applicability in disease.

Organization of this symposium by the University of South Florida College of Medicine was prompted by the unparalleled current expansion of information on these topics in general, and in the field of antibody diversity, in particular. The issues that surround the last named dimension of this field, began to surface in the late 1950's with the first conclusive genetic studies having been answered, and a new set of concepts has been defined. As we see it from the material presented in this volume, now new and different questions are being raised and answered by studies in progress, and it may be expected that there will be other questions that will be with us for a considerably longer time.

We believe that the symposium brought together many prominent investigators with different backgrounds and training experiences such as immunologists, microbiologists, biochemists, molecular biologists, and clinical scientists, thus providing an excellent example of the interdisciplinary value of modern immunology and modern biomedical science in general. We believe, therefore, that bringing these complex topics to a wide audience of biomedical scientists through this symposium as well as this volume is of value to the scientific and to the medical community.

We also take this opportunity to express our gratitude to Mrs. Christine Abarca for her outstanding editorial assistance and contributions, as well as to Dr. Pierre Bouis, Associate Dean for Continuing Medical Education, and his office for their support and organization of this symposium.

Paul H. Maurer, Ph.D.
Chairman and Professor
Department of Biochemistry
Jefferson Medical College of
Thomas Jefferson University
Philadelphia, Pennsylvania

Andor Szentivanyi, M.D.
Dean of the College of Medicine
Deputy Vice President for Medical Affairs
Chairman and Professor, Department of
Pharmacology and Therapeutics
University of South Florida
Tampa, Florida

Bernard W. Janicki, Ph.D.
Deputy Director
Immunology, Allergic and Immunologic
Diseases Program
National Institute of Allergy and
Infectious Disease
National Institutes of Health
Bethesda, Maryland

CONTENTS

Preface	1
-------------------	---

SECTION I. STRUCTURES OF ANTIBODIES AND THE COMBINING SITE

The Three Dimensional Structure of Immunoglobulin G and Its Relationship to the Expression of Biological Functions	3
Keith J. Dorrington and Michel H. Klein	
New Concepts in Antibody Structure	11
Heinz Kohler and Thomas Kieber-Emmons	
Nature of the Antibody Combining Site	19
Elvin A. Kabat	

SECTION II. B CELL DEVELOPMENT, FUNCTION, REPERTOIRE AND ACTIVATION

B Cell Development in Mammals	43
Max D. Cooper	
Control of μ and δ Gene Expression in B Lymphocyte Development	49
Nicolas Fasel, Michael Briskin, Carla Carter, Herman Govan, Gary Hermanson, Ronald Law, and Randolph Wall	
Functional Maturation of B Cell Repertoire Expression	61
Barbara G. Froscher and Norman G. Klinman	
Receptor Cross-Linkage Stimulates B Cell Activation	71
Junichiro Mizuguchi, Michael Beaven, Peter Hornbeck, Wayne Tsang, and William E. Paul	

SECTION III. ANTIBODY IDIOTYPES, ANTI-IDIOTYPES, AND NETWORK REGULATION

Induction of Antibodies to Pseudorabies Virus by Immunization with Anti-Idiotypic Antibodies	81
Michael F. Gurish, Tamar Ben-Porat, and Alfred Nisonoff	
Network and Regulation of the Idiotypic Repertoire	91
Carol Victor-Kobrin, Zahava Barak, F. A. Bonilla, and Constantin Bona	

Anti-Hapten Idiotypic Models in Studies of Aging and Idiotypic Networks	107
Gregory W. Siskind, Edmond A. Goidl, Young Tai Kim, Marc E. Weksler, and G. Jeanette Thorbecke	

SECTION IV.

IMMUNOLOGIC INTERVENTION WITH ANTI-IDIOTYPE ANTIBODIES

Antibodies to Acetylcholine, Adenosine and Glucocorticoid Receptors by an Auto-Anti-Idiotypic Route	119
B. F. Erlanger, W. L. Cleveland, N. H. Wasserman, H. H. Ku, B. L. Hill, R. Sarangarajan, R. Rajagopalan, E. Cayanis, I. S. Edelman, A. S. Penn, and K. K. Wan	
Idiotypic Interactions in the Treatment of Human Diseases	135
Raif S. Geha	
Regulation of Autoimmune Diseases	155
Norman Talal	

SECTION V.

IMMUNOLOGIC INTERVENTION WITH MONOCLONAL ANTIBODIES

Transfectomas Provide Antibodies with Novel Structures and Functions . .	167
Sherie L. Morrison, Letitia A. Wims, Polly D. Gregor, Barry J. Kobrin, and Vernon T. Oi	
The Use of Ricin A Chain-Containing Immunotoxins to Kill Neoplastic B Cells	179
Jonathan W. Uhr, R. Jerrold Fulton, and Ellen S. Vitetta	
Monoclonal Antibodies and Immunoconjugates as Anti-Cancer Agents	189
Robert K. Oldham	

SECTION VI.

OVERVIEW AND COMMENTS

Overview and Comments	203
Gregory W. Siskind	
Contributors	207
Index	211