

ADVANCES IN  
**Immunology**

EDITED BY

FRANK J. DIXON

*Scripps Clinic and Research Foundation  
La Jolla, California*

ASSOCIATE EDITORS

K. FRANK AUSTEN  
JONATHAN W. UHR  
TADAMITSU KISHIMOTO  
FRITZ MELCHERS  
FREDERICK ALT

VOLUME 55



**ACADEMIC PRESS, INC.**

A Division of Harcourt Brace & Company

San Diego New York Boston  
London Sydney Tokyo Toronto

## CONTENTS

### The kit Ligand, Stem Cell Factor

STEPHEN J. GALLI, KRISZTINA M. ZSEBO, AND EDWIN N. GEISSLER

I. Introduction	1
II. The Stem Cell Factor Receptor, Encoded by the <i>c-kit</i> Gene	3
III. The kit Ligand, Stem Cell Factor	10
IV. Tissue Distribution of SCF and the SCF Receptor	15
V. Nature and Biological Consequences of Mutations Affecting SCF or the SCF Receptor	17
VI. Regulation of Expression of SCF and the SCF Receptor	24
VII. Signal Transduction through the SCF Receptor	33
VIII. Biological Consequences of Interactions between the SCF Receptor and Its Ligand	37
IX. Lymphohematopoiesis	43
X. Mast Cell Biology	52
XI. Melanocyte Biology	64
XII. Germ Cell Development	66
XIII. The Nervous System	69
XIV. Neoplasia	71
XV. SCF as a Therapeutic Agent	78
XVI. Concluding Remarks	81
References	84

### Interleukin-8 and Related Chemotactic Cytokines—CXC and CC Chemokines

MARCO BAGGIOLINI, BEATRICE DEWALD, AND BERNHARD MOSER

I. Introduction	97
II. Structures and Chemical Properties	97
III. Chemokine Genes	103
IV. Cellular Sources of CXC and CC Proteins	105
V. Biological Activities	112
VI. Receptors	122
VII. Signal Transduction	140
VIII. Role in Pathology	142
References	148

## Receptors for Transforming Growth Factor- $\beta$

KOHEI MIYAZONO, PETER TEN DIJKE, HIDENORI ICHIJO, AND  
CARL-HENRIK HELDIN

I. Introduction	181
II. Structure and Activity of Members of the TGF- $\beta$ Superfamily	183
III. Serine/Threonine Kinase Receptors	188
IV. Other TGF- $\beta$ Receptors	195
V. Signal Transduction by TGF- $\beta$	200
VI. Perspectives	205
References	206

## Biochemistry of B Lymphocyte Activation

MICHAEL R. GOLD AND ANTHONY L. DEFranco

I. Introduction	221
II. Different Models of B Cell Activation	222
III. Structure of the B Cell Antigen Receptor	226
IV. Initial Signaling Reactions Stimulated by the B Cell Antigen Receptor	231
V. Early Cellular Events Following Antigen Contact	262
VI. Mechanism of Contact-Dependent T Cell Help	269
VII. Signaling by Receptors for B Cell Growth and Differentiation Factors	273
VIII. B Cell Survival	280
IX. Summary	282
References	282

## CD5 B Cells, a Fetal B Cell Lineage

RICHARD R. HARDY AND KYOKO HAYAKAWA

I. Introduction	297
II. Background	298
III. Origins of CD5 B Cells	299
IV. Model for Generation of CD5 B Cells	304
V. Properties of Murine CD5 B Cells	306
VI. Biases in Specificity	312
VII. Biases in V Gene Usage	319
VIII. A Homologous Human Population?	326
IX. Final Considerations and Summary	330
References	333

## Human Natural Killer Cells: Origin, Clonality, Specificity, and Receptors

LORENZO MORETTA, ERMANNO CICCONE, MARIA CRISTINA MINGARI,  
ROBERTO BIASSONI, AND ALESSANDRO MORETTA

I. Introduction	341
II. Ontogeny of NK Cells	342
III. Expression of CD3 Genes during NK Cell Maturation	346
IV. Evidence for NK Cell Specificity	347
V. The Human NK Cell Repertoire	347
VI. Genetic Analysis of Human NK-Defined Allospecificities	348
VII. Involvement of Class I Molecules in NK-Specific Functions	349
VIII. Clonally Distributed Molecules (p58) Involved in Regulation of NK-Mediated Cytolysis	354
IX. p58 Molecules as Putative Receptors for MHC Class I Molecules in Human NK Cells	356
X. Human NK Receptors for Class I Molecules Are Composed of p58 Dimers	358
XI. Effect of p58 Modulation on Cytolytic Activity	362
XII. Opposite Effect of Specific MHC Recognition by T Lymphocytes or NK Cells	363
XIII. The Putative Murine NK Receptor for MHC	364
XIV. Other Possible Murine Receptors and the Hybrid Resistance Phenomenon	366
XV. "Receptors" Mediating NK Cell Activation	367
XVI. Concluding Remarks	370
References	373

## MHC Class I-Deficient Mice

DAVID H. RAULET

I. Introduction	381
II. Production of $\beta_2$ -Microglobulin-Deficient Mice	383
III. $\beta_2$ -Microglobulin-Deficient Mice Show No General Developmental Deficiencies	384
IV. Effects of $\beta_2$ -Microglobulin Deficiency on Cell Surface Expression of Class I Molecules	385
V. Transplantation Studies	387
VI. Effects of Class I Deficiency on Target Cell Susceptibility to NK Cells	392
VII. Deficiencies in Lymphocyte Development in $\beta_2$ -Microglobulin Mice	392
VIII. Impaired NK Cell Activity in Class I-Deficient Mice	404
IX. Responses of Class I-Deficient Mice to Pathogens	405
X. Autoimmune Disease	415
XI. Summary and Conclusions	415
References	417

**The Immune System of Mice Lacking Conventional MHC Class II Molecules**

SUSANNA CARDELL, MATTHIAS MERKENSCHLAGER, HELEN BODMER,  
SUSAN CHAN, DOMINIC COSGROVE, CHRISTOPHE BENOIST, AND  
DIANE MATHIS

I. Peripheral Immune Compartments	424
II. The Thymus	430
III. Beyond the 11 <sup>0</sup> Line	434
IV. The Future	436
References	437
INDEX	441
CONTENTS OF RECENT VOLUMES	451