Antibodies for Infectious Diseases
Antibodies for Infectious Diseases

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Contents

Contributors ix
Preface xvii

INTRODUCTION
1 History and Practice: Antibodies in Infectious Diseases 3
  Adam Hey

GENERAL FEATURES OF IMMUNOGLOBULINS
2 Functions of Antibodies 25
  Donald N. Forthal
3 Antibody Structure 49
  Robyn L. Stanfield and Ian A. Wilson
4 The Role of Complement in Antibody Therapy for Infectious Diseases 63
  Peter P. Wibroe, Shen Y. Helvig, and S. Moein Moghimi
5 Immunoglobulin E and Allergy: Antibodies in Immune Inflammation and Treatment 75
  Sophia N. Karagiannis, Panagiotis Karagiannis, Debra H. Josephs, Louise Saul, Amy E. Gilbert,
  Nadine Upton, and Hannah J. Gould

ANTIBODY DISCOVERY APPROACHES
6 Phage and Yeast Display 105
  Jared Sheehan and Wayne A. Marasco
7 Efficient Methods To Isolate Human Monoclonal Antibodies from Memory B Cells and Plasma Cells 129
  Davide Corti and Antonio Lanzavecchia
8 Use of Human Hybridoma Technology To Isolate Human Monoclonal Antibodies 141
  Scott A. Smith and James E. Crowe, Jr.
9 Humanized Mice for Studying Human Immune Responses and Generating Human Monoclonal Antibodies 157
  Ramesh Akkina
10 Antibodies: Computer-Aided Prediction of Structure and Design of Function 173
  Alexander M. Sevy and Jens Meiler
PATHOGEN-SPECIFIC ANTIBODIES

11 Antibodies Targeting the Envelope of HIV-1 193
   Luzia M. Mayr and Susan Zolla-Pazner

12 Committing the Oldest Sins in the Newest Kind of Ways—Antibodies Targeting the Influenza Virus Type A Hemagglutinin Globular Head 209
   Jens C. Krause and James E. Crowe, Jr.

13 Prevention of Respiratory Syncytial Virus Infection: From Vaccine to Antibody 221
   Kelly Huang and Herren Wu

14 Human Metapneumovirus 237
   Jennifer E. Schuster and John V. Williams

15 Dengue Antibody-Dependent Enhancement: Knowns and Unknowns 249
   Scott B. Halstead

16 Immunotherapeutic Approaches To Prevent Cytomegalovirus-Mediated Disease 273
   Edith Acquaye-Seedah, Zachary P. Frye, and Jennifer A. Maynard

17 Rotavirus 289
   Manuel A. Franco and Harry B. Greenberg

18 Bacterial Toxins—Staphylococcal Enterotoxin B 303
   Bettina C. Fries and Avanish K. Varshney

TECHNICAL ADVANCES

19 Antibody Engineering 321
   Kin-Ming Lo, Olivier Leger, and Björn Hock

20 High-Throughput DNA Sequencing Analysis of Antibody Repertoires 345
   Scott D. Boyd and Shilpa A. Joshi

21 Antibody Informatics: IMGT, the International ImMunoGeneTics Information System 363
   Marie-Paule Lefranc

22 Probing Antibody-Antigen Interactions 381
   Guocheng Yang, Stefanie N. Velgos, Shanta P. Boddapatli, and Michael R. Sierks

23 Radiolabeled Antibodies for Therapy of Infectious Diseases 399
   Ekaterina Dadachova and Arturo Casadevall
ALTERNATE SYSTEMS FOR EXPRESSION

24  Plant-Derived Monoclonal Antibodies for Prevention and Treatment of Infectious Disease   413
   Andrew Hiatt, Kevin J. Whaley, and Larry Zeitlin

25  Vector-Mediated In Vivo Antibody Expression   427
   Bruce C. Schnepp and Philip R. Johnson

Index   441
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Preface

Antibodies form the principal foundation for modern intervention against infectious diseases. Emil Adolf von Behring was awarded the first Nobel Prize in Physiology or Medicine in 1901 “for his work on serum therapy, especially its application against diphtheria, by which he has opened a new road in the domain of medical science and thereby placed in the hands of the physician a victorious weapon against illness and deaths.” Antibodies now provide the focus for understanding mechanisms of immunity to most infectious diseases, and they play a central role in passive immunotherapy and active vaccination as mechanisms or correlates of immunity. For most of the 20th century, immunotherapy was based on passive transfer of polyclonal hyperimmune animal serum, immune human serum, or even hyperimmune human serum. Georges J.F. Köhler and César Milstein reported the generation of monoclonal antibodies in 1979, for which they shared the 1984 Nobel Prize in Physiology or Medicine “for . . . the discovery of the principle for production of monoclonal antibodies.” Since that time, entire fields related to antibodies for infectious diseases, including antibody gene cloning, engineering, and expression; antibody libraries; and high-throughput antibody gene repertoire sequence analysis have extended our capabilities to explore the diversity of antibody specificity and function with unprecedented depth and breadth.

This book provides a broad survey of many of the most important aspects of the field of antibodies for infectious diseases. The book begins with a general introduction, followed by chapters 2 through 5 on general features pertaining to structure, function, isotype, and the role of complement in antibody function. Chapters 6 through 10 review contemporary approaches for antibody discovery using phage and yeast display, plasma cell and memory B cell cloning, human hybridomas, humanized mice, and computational methods. Chapters 11 through 18 review in depth the biology of antibodies specific for particular pathogens, including viruses and bacterial toxins, to illustrate the role of antibodies in antimicrobial immunity with specific targets. These chapters reveal that attempts to raise effective antibody responses to each of these pathogens faces unique and pathogen-specific challenges. Chapters 19 to 23 cover major technical advances pertaining to antibody engineering, repertoire sequencing and analysis, and new methods for study or therapeutic use of antibodies, including radiotherapy. Finally, chapters 24 and 25 cover new methods for expression of monoclonal antibodies, in plants or by transfer of antibody genes for in vivo expression in treated subjects.

Recent literature is exploding with new antibody-related techniques and reports of antimicrobial antibodies with unprecedented potency, breadth of activ-
ity, and therapeutic potential. We hope that this timely compilation of state-of-the-art reviews of major aspects of this field will be of interest to both antibody cognoscenti and those new to this exciting field. We thank the authors for their dedication in producing definitive reviews of the topics at hand.

James E. Crowe, Jr.
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Index

AAV (adeno-associated virus), 428–436
Abiotic surfaces, inhibition of bacterial attachment to, 28
Activation-induced cytidine deaminase (AID), 331, 332
Active systemic anaphylaxis (ASA), 79–80
Adalimumab, 11, 89, 330, 333–334
ADC (antibody drug complex/conjugate), 9, 15, 334–335
ADCC (antibody-dependent cellular cytotoxicity), 32–34, 65, 69–70, 322–326
Adcetris (brentuximab vedotin), 15, 334, 335
ADCP (antibody-dependent cellular phagocytosis), 322–323, 325
ADCVI (antibody-dependent cell-mediated virus inhibition), 33–34
ADE. See Antibody-dependent enhancement
Adeno-associated virus (AAV), 428–436
Adhesins, 16, 27
Adhesion of bacteria, interference with, 27–28
AD-HIES (autosomal dominant hyper-IgE syndrome), 81
Affinity matrix, artificial, 151–152
Affinity maturation, 174, 175, 330–334
broad neutralization versus, 184
by mammalian display, 332–333
in silico, 184–185
by somatic hypermutation, 332
by somatic mutations and computational design, 333
in vitro, 331–333
without display, 333–334
in vivo, 331
AFM (atomic force microscopy), 382, 386–389, 391–395
Agglutination, 26
Agglutinins, yeast, 115
Aggregation, 26
Agrobacterium tumefaciens, 414–415
AID (activation-induced cytidine deaminase), 331, 332
Alemtuzumab, 323, 324
Algorithm, antibody docking, 180
Allergen sensitization, 76
Allergens

IgE activation of immune response in presence of, 76
interactions with IgE and Fcε triggering hypersensitivity responses, 79
neutralizing antibody response induced by active allergen immunotherapy, 89–90
Allergic inflammation, 75–95
allergen-specific IgG antibody triggering hypersensitivity responses, 79–80
antibodies in treatment of allergies, 82–92
cancer, 92–94
clinical perspective, 75–76
future roles of antibodies in therapy, 94–95
IgE activation of immune response, 76
IgE antibodies in infectious diseases, 80–82
IgE effector cells, 77–79
APCs, 78
B cells, 78
mast cells, 77–78
monocytes and eosinophils, 78–79
IgE receptors, 76–77
interactions between allergens, IgE, and Fcε triggering hypersensitivity responses, 79
AllergoOncology, 94
Allergy treatment, antibodies in, 82–92
antibodies targeting cytokines, chemokines, and their receptors, 88–89
clinical studies in 2012, 86–87
future roles, 94–95
IgG4, allergen specific, 90–92
neutralizing antibody response induced by active allergen immunotherapy, 89–90
recombinant antibodies targeting IgE interactions with Fcε receptors, 82–88
specific immunotherapy (SIT), 90–92
Alternative pathway of complement activation, 66
AMA (Antibody Modeling Assessment), 179–180
Aminopterin, 148
AMPV. See Avian pneumovirus/metapneumovirus
Analytic vaccinology, 136, 137
Anaphylatoxins, 68–69
Anaplasma phagocytophilum, 29
Animal models
humanized mice, 158–160
staphylococcal enterotoxin B, 307–309
Animal models (continued)
vector-mediated in vivo antibody expression, 432–433
Antibiotics
introduction of, 5
pros and cons of antibody-based therapy relative to, 14
resistance to, 5, 13
Antibody classes, 10
computer-aided prediction of structure and design of function, 173–187
effector functions, 10–11
generating, methods and platforms for, 10–12
informatics, 363–377
structure, 8–10, 49–59, 346–347
3D, informatics and, 373–376
Antibody design, 183–187
broad neutralization versus affinity maturation, 184
overview, 183–184
in silico affinity maturation, 184–185
Antibody docking
algorithms, 180–181
epitope mapping and, 180–183
experimental data, 181–183
modeling, 174, 175–176
Antibody drug complex/conjugate (ADC), 9, 15, 334–335
Antibody engineering, 13–15, 321–337
affinity maturation, 330–334
antibody drug conjugates, 334–335
antibody informatics and, 370
bispecific antibodies, 335–337
choice of Ig isotypes and subclasses, 322–324
IgA, 322–323
IgG1, 323
IgG2, 323–324
IgG3, 324
IgG4, 324
Fc portion, 322–327
glycosylation, Fc, 324–327
humanization, 327–330
next-generation antibodies, 334–337
Antibody gene rearrangements, 346–348
Antibody gene transfer
for cancer, 435–436
drawbacks of rAAV, 436
for drug addiction, 435
expression systems for, 429–432
for HIV-positive individuals, 433
proof-of-concept studies in animal models, 432–433
for respiratory tract infections, 433–435
Antibody modeling
canonical structure of CDRs, 176–178
challenges in, 174, 175–176
comparative, 176–180
motivations for, 175
predicting conformation of HCDR3, 177–178
programs, platforms, and servers dedicated to, 179–180
Antibody Modeling Assessment (AMA), 179–180
Antibody selection
AFM, 391–393
FACS, 390–391
SPR, 389–390
Antibody-based therapy. See also Immunotherapy;
specific applications
allergic diseases, 82–92
approved/pending therapies, 6–8, 65
complement role in, 63–72
cost of therapy/production, 12, 16
drug addiction, 16–18
antibacterials, 16–17
antifungals, 18
antivirals, 17–18
future perspectives, 18–19
history of, 3–19
pros and cons, 14
strategic considerations in developing, 12–16
antibody engineering, 13–15
antibody formats, 15–16
avoiding escape mutants, 13
“magic bullet” creation, 15
Antibody-dependent cell-mediated virus inhibition (ADCVI), 33–34
Antibody-dependent cellular cytotoxicity (ADCC), 32–34, 65, 69–70, 322–326
Antibody-dependent cellular phagocytosis (ADCP), 322–323, 325
Antibody-dependent enhancement (ADE), 249–265
intrinsic ADE (iADE), 251, 254–258, 263–264
Leishmania, 255, 258
overview, 249–252
Antibody-dependent enhancement (ADE), dengue virus, 249–265
afferent phenomena, 252–261, 263–264
enhancing antibodies, 252–258, 263–264
genetic host factors contributing to DVPS susceptibility, 252, 263
role of dengue viruses in ADE, 258–261, 264
DENV-2
enhanced growth in primary human monocyes, 258, 264
genetic differences after infection with DENV-1, 259–261, 264
genetic differences after infection with DENV-3, 260–261, 264
strain differences in neutralization by DENV-1 antibodies, 258–259, 264
efferent phenomena, 252, 253, 261, 264–265
enhancing antibodies, 252–258
attributes of iADE, 254–257, 263
role of Fc, Rs, 257–258, 264
role of infection sequence, 257, 263–264
role of myeloid cells, 257, 264
sensitizing infection, 252–254, 263
Antifungals, 18
Antigen
studies in humanized mice, 166
target-agonist approach for antigen discovery in vaccine design, 136–137
Antigen design
epitope grafting, 185–187
neutralizing antibody elicited through, 185
Antigen presenting cells (APCs), 72, 76–78
Antigen-antibody docking
algorithms, 180–181
epitope mapping and, 180–183
experimental data, 181–183
modeling, 174, 175–176
Antigen-antibody interactions, probing, 381–395
antibody selection
AFM, 391–393
FACS, 390–391
SPR, 389–390
atomic force microscopy (AFM), 382, 386–389, 391–395
fluorescence-activated cell sorting (FACS), 382, 384–386, 390–391, 394–395
overview, 381–382
surface plasmon resonance (SPR), 382–384, 389–390, 394
Antilysosomal antibody, 184
Antiretroviral therapy (ART), 433
Antivirals, 17–18
APCs (antigen presenting cells), 72, 76–78
APV. See Avian pneumovirus/metapneumovirus
APV/AMPV. See Avian pneumovirus/metapneumovirus
AR-HIES (autosomal recessive hyper-IgE syndrome), 81
ART (antiretroviral therapy), 433
ASA (active systemic anaphylaxis), 79–80
Aspergillus fumigatus, 403
Asthma
IgE and, 82–85
omalizumab (Xolair), 83–85
respiratory syncytial virus (RSV) and, 82
Atomic force microscopy (AFM), 382, 386–389, 391–395
Atopic dermatitis, staphylococcal enterotoxin B, 309–310
Attachment, interference with, 27–28
Aurexis (tefibazumab), 16
Aurograb, 16
Autosomal dominant hyper-IgE syndrome (AD-HIES), 81
Autosomal recessive hyper-IgE syndrome (AR-HIES), 81
Avastin, 436
Avian pneumovirus/metapneumovirus (APV/AMPV), 238, 240
Avidin-biotin bridging, 146
B cell receptor (BCR), 132, 357
B cells
allergic inflammation and, 76, 78
antibodies blocking CD23 functions, 83–84, 88
antibody gene rearrangements, 346–348
high-throughput DNA sequencing and, 346–348, 355–357
human hybridoma technology, 141–152
immortalized, 12, 130, 131–133, 143, 283
mRNA for phage library, 106
rotavirus and, 289–295, 298–299
Bacillus anthracis, 17
antiantibody monoclonal antibodies discovered by phage display, 114
antiantibody monoclonal antibodies discovered by yeast display, 120–121
radioimmunotherapy (RIT), 404–405
Bacteria. See also specific bacteria
antibacterial monoclonal antibodies discovered by phage display, 113–115
discovered by yeast display, 119–121
antibody-based therapy examples, 16–17
antibody-dependent cellular cytotoxicity (ADCC), 33
complement activation, 30–31, 64
history passive antibody therapy, 4–5
hyper-IgE syndrome (HIES), 82
neutralization of infectivity, 26–27
phagocytosis, 34–35
plant-derived monoclonal antibody for bacterial toxins, 420–421
anthrax, 420
Clostridium perfringens epsilon toxin, 420–421
staphylococcal enterotoxin B, 421
radioimmunotherapy (RIT), 404–405
sensitivity to infection, 82
Bacterial opsonophagocytosis killing assay, 132
Bacteriophage. See Phage; Phage display
Binding affinity, 180
Binding constant, antibody, 382, 385–386, 389–390
Binding interactions, antigen-antibody, 381. See also
Antigen-antibody interactions, probing
Biological cloning methods, in human hybridoma
technology, 149–152
Biological weapon, as staphylococcal enterotoxin B, 304
Biopanning
AFM-based, 391–393
magnetic bead-based, 392
Bispecific antibodies, 335–337
Bite (bi-specific T cell engager), 9, 336
Blinatumomab, 336
BLT mice, 159, 160–164, 166–167
Borrelia, 27
Botulism toxin, 113–114, 120
Candida, 27
Candida albicans, 18, 28, 31, 403–404
Cancer
allergic response against, 92–94
AllergoOncology, 94
antibody gene transfer for, 435–436
“magic bullet” creation for, 15
Candida, 27
Candida albicans, 18, 28, 31, 403–404
Capillary morphogenesis protein 2, 420
Carbohydrates, recognition of self, 55–57
CaroRx, 417
Catumaxomab, 336
CCR5 receptor, 17, 53, 111, 161, 194, 198, 428, 433
CCR9 (chemokines receptor 9), 294, 295
CD2, 306
CD4/CD4+ cells, 17, 53, 76, 112, 130
enterotoxins and, 303
human immunodeficiency virus (HIV) and,
194–195, 199–200, 428, 433
humanized mice and, 163
CD5+ cells, 163
CD8/CD8+ cells, 70
dengue virus infection and, 262
humanized mice and, 163–164
in respiratory syncytial virus (RSV) disease, 224
response to CMV, 276, 278
phagocytic activity, 15
staphylococcal enterotoxin B, 310
CD10+ cells, 163
CD20, 15
CD21, 144
CD22, 332
CD23, 77–80, 83–84, 88
CD28, 306
CD30, 334
CD33, 334
CD34+ cells, 159–162
CD40, 77, 132
CD40L (CD40 ligand), 130, 132, 144, 164
CD45+ cells, 160
CD46, 71
CD47, 167
CD59, 71
CD154
CDC (complement-dependent cytotoxicity), 65,
68–71, 322–324
CDCD (complement-dependent cell cytotoxicity),
65, 68, 70
CDR. See Complementarity-determining region
Certolizumab pegol, 89, 334
Cetuximab, 12, 184
Chemical shift mapping, 181–183
Chemokines, 77–78, 88–89
Chemokines receptor 9 (CCR9), 294, 295
Chimeric antibodies, 11, 16, 314
Chronic lymphocytic leukemia (CLL), 70
Classes of immunoglobulins, 10
Classical pathway of complement activation,
65–66
Clonality score, 356
ClonePix, 152
Clostridium botulinum
antibotulinum monoclonal antibodies discovered
by phage display, 113–114
antibotulinum monoclonal antibodies discovered
by yeast display, 120
Clostridium difficile, 17, 114–115
Clostridium perfringens epsilon toxin, 420–421
Clostridium tetani
antibacterial monoclonal antibodies discovered
by phage display, 115
passive antibody therapy, 4
CMV. See Cytomegalovirus
Coagulation, complement and, 63–64
Cocaine, 435
Cocktails of antibodies, 13, 17, 18–19
Coincidence index, 356
Collières de Perles, 365, 366, 369–370
Colorectal cancer, Erbitux (cetuximab) therapy for,
310
Combinatorial library approaches, for humanization,
12
Complement
activation, 30, 64
alternative pathway, 66
antibody-mediated, 66–68
classical pathway, 65–66
lectin pathway, 66
antibody functions dependent on, 30–31
antibody therapy and, 63–72
antibody-mediated activation, 66–68
IgA, 67–68
IgG, 65–67
IgM, 65–67
coagulation and, 63–64
dengue vascular permeability syndrome (DVPS) and, 261–262, 264
homeostasis, role in, 63, 64–65
inflammatory responses, 69
manipulating Ab-mediated responses, 69–70
increasing complement response, 69–70
reducing negative effects of complement, 70
membrane attack complex (MAC), 68
opsonization, 68–69
overview of system, 63–65
roles of, 63–65
Complementarity-determining region (CDR), 173
affinity maturation, 184–185
antibody docking, 180–181
antibody gene rearrangements, 346–347
CDR-IMGT lengths for antibody humanization by grafting, 366
cytotoxic drug delivery and, 15
high-throughput DNA sequencing and, 346–347, 355–356
humanization and CDR grafting, 327–330
abbreviated CDRs containing SDRs (specificity-determining residues), 328–329
framework adaptation, 330
framework shuffling, 329–330
human string content optimization, 329
main decision-making points, 328
standard technology, 327–328
superhumanization, 329
veneering/resurfacing, 328
lengths and posttranslational modifications, 55
modeling, 174, 176–181, 184
recombination and, 175
structure, 9–10, 50–55, 57–59
canonical structure of, 176–178
disulfides in, 54–55
H3 structure, 51–53
predicting conformation of HCDR3, 177–178
synthetic phage antibody libraries, 107–108
Complement-coated Ab transfer, 68
Complement-dependent cell cytotoxicity (CDC), 65, 68, 70
Complement-dependent cytotoxicity (CDC), 65, 68–71, 322–324
Computational design of antibodies, 183–187
Computer-aided prediction of structure and design of function, 173–187. See also Antibody design; Antibody modeling
Constant domains, 8–10, 174
Contact-mode AFM, 387
Convertases, 68
Coronaviruses
antiviral monoclonal antibodies discovered by phage display, 112–113
Middle East respiratory syndrome coronavirus (MERS-CoV), 111, 112–113
severe acute respiratory syndrome coronavirus (SARS-CoV), 111, 112
Cryptococcus neoformans, labeled antibodies against, 15, 400–404
monoclonal antibody therapy, 18
Cryptosporidium parva, labeled antibodies against, 15, 400–404
Cytomegalovirus (CMV), 273–284
anti-CMV antibody structure, 55
future challenges, 283–284
immune response, 276–279
latency, 276–278
overview, 273–275
structure and life cycle, 275–276
studies in humanized mice, 166
target-agonist approach for antigen discovery in vaccine design, 136–137
testing therapies for, 6
therapeutic antibodies, 280–283
monoclonal antibodies, 282–283
table of antibody-based therapeutics, 281
townes's strains, 279, 280
vaccine development, 279–280
Cytotoxic drugs, antibody-delivered, 15
Cytotoxic T lymphocytes (CTLs), 224
DAclizumab, 330
DC-SIGN, 326
Dendritic cells, 76–78, 166, 256, 326
Dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS), 251–253, 261–262, 264
Dengue vascular permeability syndrome (DVPS), 251–253, 261–263, 265
clinical features of, 251, 261
genetic factors contributing to susceptibility, 252, 263
sensitizing infection, 252–254, 263

Dengue virus
afferent phenomena, 252–261, 263–264
enhancing antibodies, 252–258, 263–264
genetic host factors contributing to DVPS susceptibility, 252, 263
role of dengue viruses in ADE, 258–261, 264
antibody-dependent enhancement (ADE), 249–265
antiviral monoclonal antibodies
discovered by phage display, 111
discovered by yeast display, 118, 119
dengue hemorrhagic fever/dengue shock syndrome (DHF/DSS), 251–253, 261–262, 264
dengue vascular permeability syndrome (DVPS), 251–253, 261, 263–265
DENV-2
enhanced growth in primary human monocytes, 258, 264
genetic differences after infection with DENV-1, 259–261, 264
genetic differences after infection with DENV-3, 260–261, 264
strain differences in neutralization by DENV-1 antibodies, 258–259, 264
efferent phenomena, 252, 253, 261, 264–265
enhancing antibodies, 252–258
attributes of iADE, 254–257, 263
role of Fc.Rs, 257–258, 264
role of infection sequence, 257, 263–264
role of myloid cells, 257, 264
sensitizing infection, 252–254, 263
heterohybridomas, 149
studies in humanized mice, 162
Dental caries monoclonal antibodies, 416–417

Design, 429

Dentifrice, 324

DHF/DSS.

Dielectrophoresis, 146–147

Echinococcus multilocularis, 150

EBV.

EBV. See Epstein-Barr virus

Effector functions of antibody, 10–11

Effector silent antibodies, 325–326

Efungumab, 18

Ehrlichia risticii, 33

ELAM, 306

Electrofusion, in hybridoma production, 146–148

Electrotransfection, 146

Enbrel (etanercept), 324

Enzyme-linked immunosorbent assay (ELISA), 382, 388

Enterotoxins, staphylococcal, 303–304. See also Staphylococcal enterotoxin B

Entrez Gene, 364

Epitope

Discontinuous, 186

IMGT (International ImMunoGeneTics information system), 374–376

Epitope drift, 330

Epitope grafting, 185–187

Epitope mapping
antibody docking and, 180–183
HIV neutralizing antibodies, 429

Epsilon toxin, Clostridium perfringens, 420–421

Epstein–Barr virus (EBV)
B cells immortalization using, 130, 131–133, 143–145, 148, 283
high-throughput DNA sequencing applications for study of, 356
studies in humanized mice, 161–164

Erbilux (cetuximab), 12

ERK, 255

Error correction strategies, for high-throughput DNA sequencing, 355

Escherichia coli, 17, 90, 327
adhesion, interference with, 27
bacteriophages, 105
teratogenic, 27
urogenital, 27

Esterification, in atomic force microscopy (AFM), 388

Etanercept, 89

European Bioinformatics Institute (EBI), 364
Evolution directed, 184
viral, 110

Fab
Fab-pIII phage display format, 109
structure, 9, 50, 180
yeast display and, 115–117

Factor VII, 64

Fc
agalysosylated, 327
antibody engineering, 14–15, 322–327
fusion proteins, 9, 16
glycosylation and effector functions, 324–327
sialylation, 326–327
structure, 9–10, 50, 174

Fc, 76–77, 79, 82–88
Fc-Fc receptor interactions, antibody functions dependent on, 32–35

FeyRs
allergic responses and, 79–80
antibody engineering, 322–327
role in antibody-dependent enhancement (ADE), 249, 250, 254–255, 257–258, 264

FcRn (neonatal Fc receptor), 10, 15, 326

Feline infectious peritonitis virus, 10

Filamentous phage, 105–106

Fimbriae, 27

5' RACE, 350–351

Flaviviruses, 251
antiviral monoclonal antibodies discovered by phage display, 111
antiviral monoclonal antibodies discovered by yeast display, 118, 119

Flow cytometry
hybridoma cell sorting and, 151


FMDV (foot-and-mouth disease virus), 26, 430–431, 435

Food poisoning, staphylococcal enterotoxin B, 309

Foot-and-mouth disease virus (FMDV), 26, 430–431, 435

Foravirumab, 18

Framework adaptation, 330
Framework shuffling, 329–330
Fucosylation, 324–325

Functions of antibodies, 25–36
agglutination, 26
aggregation, 26
antibody-dependent cellular cytotoxicity (ADCC), 32–34
complement dependent, 30–31
dependent on Fc-Fc receptor interactions, 32–35
incentive for measuring, 25
independent of effector cells/molecules, 26–29
inflammation modulation, 35–36
neutralization, 26–29
overview of, 25–26
phagocytosis, 34–35

Fungi
antibody-based therapy examples, 18
radioimmunotherapy (RIT) for fungal infections, 400–404

yeast display, 115–121

Fusion, inhibition of, 28
Fusion efficiency, 142
Fusion methods for hybridoma production, 145–148
electrical cytofusion, 146–148
PEG, 145–146

viral, 145

Fusion partners for hybridoma production, 148–149

Fusion proteins, 9, 16
Fab-pIII phage display format, 109
scFv-pIII phage display format, 108–109

Fv structure, 50

Galactose, yeast display and, 115
Galectin-3, 77, 79
Ganciclovir, 277

goat microdroplet encapsulation, 152

Gell-Coombs immunopathology, 249

Gemtuzumab, 324

Gemtuzumab ozogamicin, 334

Gene rearrangements, antibody, 346–348

Genome Database, 364

Giardia, 28

Glycan shield, 56, 194

GlycoFi, 325

Glycosylation
Fc, 324–327

of plant-derived monoclonal antibodies, 415–416

Glycotope, 325

Golimumab, 89, 334

Graft versus host disease (GVHD), 159

Guided selection, 330

Guy's 13, 416–417

HAART (highly active antiretroviral therapy), 405–406

Haemophilus influenzae, 31

history of serum therapy for, 4

hyper-IgE syndrome, 81

vaccine, 357

Half-life, immunoglobulin, 10

Hamming distance, 354

HCDR3, modeling, 177–180

Heat shock proteins, 18, 27
Heavy chains
antibody gene rearrangements and, 346–348
domination of antibody-antigen interaction,
53–54
paired heavy and light chain sequencing, 354
in scFv-pIII phage display format, 108
structure, 8–10, 50, 53–54, 174–175
Helper phage, 108–109
Hemagglutinin
antibodies against, 28, 58, 111, 119, 132–135,
210–216
antibodies targeting residues mediating receptor
specificity, 213–214
antibodies that mimic sialic acid, 214–215
antibody response in humanized mice, 162
characteristics of globular head versus stem HA
antibodies, 210
cross-reactivity of globular head HA antibodies,
212–213
future areas for study, 215–216
antigenic mapping, 211–212
structure, 110–111, 209–211
Hematopoietic stem cells
Hu-HSC mice, 159, 161–164, 166–167
Hu-Liver-HSC mice, 160
Hemolytic uremic syndrome, 17
Hepatitis B virus
combinations of antibodies against, 13
studies in humanized mice, 162, 166
Hepatitis C virus, 17
monoclonal antibodies against, 149
studies in humanized mice, 166
Herceptin (trastuzumab), 325, 330, 335, 336, 436
Herd immunity, respiratory syncytial virus (RSV)
and, 222
Herpes simplex virus (HSV)
antibody-dependent cellular cytotoxicity
(ADCC), 32–33
antiviral monoclonal antibodies discovered by
phage display, 111
plant-derived monoclonal antibody, 418
studies in humanized mice, 166
Heterohybridomas, 148–149
HGNC (Human Genome Organization Nomenclature
Committee), 364
Highly active antiretroviral therapy (HAART),
405–406
High-throughput DNA sequencing, 345–357
antibody gene rearrangements, 346–348
data analysis, 354–357
alignment and parsing programs, 354–355
applications in infectious disease research,
355–357
primer trimming, 354
quality scores, 354
sequence barcode analysis, 354
future directions, 357
instruments, 348–350
overview, 345–346
strategies for Ig repertoires, 350–354
5’ RACE, 350–351
cell populations, 350
error correction strategies, 353
multiplexing and chimeric sequences, 352–353
paired heavy and light chain sequencing, 354
replicate library preparation, 353
targeted PCR, 350–351
template choice, 351–352
HighV-QUEST, 355
Histoplasma capsulatum, 15, 403–404
History of antibody-based therapy
monoclonal antibodies, 11–12
passive antibody therapy, 4–5
HIV. See Human immunodeficiency virus
HLA
CMV and, 278, 283
humanized mice and, 164, 166, 167
HMPV. See Human metapneumovirus; Human
metapneumovirus (HMPV)
Homeostasis, complement and, 63, 64–65
Hooke’s law, 388
HRIG (human antirabies immunoglobulin), 419
HSV. See Herpes simplex virus
HTLV-1, 166
Hu-HSC mice, 159, 161–164, 166–167
Hu-Liver-HSC mice, 160
Human antirabies immunoglobulin (HRIG), 419
Human Genome Organization (HUGO), 364
Human Genome Organization Nomenclature
Committee (HGNC), 364
Human immunodeficiency virus (HIV)
antibody response to, 193–196
combinations of antibodies against, 13
neutralizing antibodies, exceptional broadly,
195–196
pregnancy and, 196
virus escape mechanisms, 194–195
antibody-dependent cellular cytotoxicity
(ADCC), 33
anti-HIV antibody structure, 49, 53, 54, 57, 183,
186
attachment, interference with, 27
complement and, 30
conformational masking, 194–195
glycan shield, 56, 194
HAART (highly active antiretroviral therapy),
405–406
high-throughput DNA sequencing applications
for study of, 356
IgG3 and, 324
incidence and prevalence, 193
monoclonal antibody against, 17, 130–131
discovered by phage display, 112
discovered by yeast display, 118–119
mutation rate, 194
neutralization of infectivity, 26–29, 58, 185–186
neutralizing antibodies
exceptional broadly, 195–196
importance of, 428–429
as vaccine, 429
plant-derived monoclonal antibody, 418–419
radioimmunotherapy (RIT), 405–407
self-carbohydrate recognition by HIV antibodies,
56–57
somatic hypermutation in immune systems chronically exposed to, 348
studies in humanized mice, 158–159, 161–164, 166

target-agonist approach for antigen discovery in vaccine design, 136
vaccine development and immunogen design, 196–200, 427–429

Abs targeting CD4 binding sites, 199–200
Abs targeting membrane-proximal external region (MPER), 200
Abs targeting variable loops 1 and 2, 197–198
Abs targeting variable loops 3, 198–199

Human metapneumovirus (HMPV), 132–133, 237–244
age-related antibody development, 239
antibody cross-protection, 238–239
antibody response to infection, 239
antibody specificity, 238
antigenic proteins, 242–243
F protein, 239, 241–244
immunoglobulin classes after infection, 239
induction of antibodies by immunization, 241–242
monoclonal antibodies, 243–244
phylogeny, 240
seroprevalence of infection, 237–238

Human papillomavirus, 29
Humanization
antibody engineering, 327–330
antibody informatics and, 370
CDR grafting, 327–330
abbreviated CDRs containing SDRs (specificity-determining residues), 328–329
framework adaptation, 330
framework shuffling, 329–330
human string content optimization, 329
main decision-making points, 328
standard technology, 327–328
superhumanization, 329
veneering/resurfacing, 328
CDR-IMGT lengths for antibody humanization by grafting, 366
combinatorial library approaches, 330
guided selection, 330
overview, 327

Humanized mice, 157–168
antigens studied in, 166
future prospects, 167–168
HLA restriction, 163–164, 164, 166, 167
human cell reconstitution and antibody response, 162–163
human immunodeficiency virus (HIV) studies, 158–159, 161–164, 166
immunodeficient mouse strains, 158, 160
monoclonal antibody generation in, 164–166
mouse models, 158–160
advantages and disadvantages, 166–167
BLT mice, 159, 160–164, 166–167
Hu-HSC mice, 159, 161–164, 166–167
Hu-Liver–HSC mice, 160
Hu-PBL mice, 158–159
SCID–Hu mice, 159, 163
pathogens studied in, 166
preparation, infection, and immunization, 160–162
T-cell response in, 163–164
Humira (adalimumab), 11
Hu-PBL mice, 158–159

Hybridoma, 12
fusion methods, 145–148
electrical cytofusion, 146–148
PEG, 145–146
viral, 145
heterohybridomas, 148–149
history, 141–142
human hybridoma technology, 141–152
advantages of, 141–142
B cell source, 143–145
biological cloning methods, 149–152
disadvantages of, 142
first human hybridomas, 142–143
fusion methods, 145–148
fusion partners, 148–149
trioma, 149
Hydrogen-deuterium exchange, 181–183
Hyper-IgE syndrome (HIES), 82
Hypersensitivity
allergic inflammation, 75–95
serum therapy and, 4, 10–11
Hypoxanthine, 148
iADE (intrinsic antibody-dependent enhancement), 251, 254–258, 263–264
Ibalizumab, 17
Ibritumomab (Zevalin), 15, 334, 399
Ichthyophthirius multifilis, 26
ICK (immunocytokine), 335
IFN. See Interferon
IgA
agglutination and, 26
antibody engineering, 322–323
complement activation, 67–68
IgA (continued)

- half-life, 10
- human metapneumovirus infection, 239–240
- plant-derived monoclonal antibody, 414, 416
- respiratory syncytial virus (RSV) monoclonal antibody, 227
- rotavirus and, 291–299
- IgBlast, 355
- IgD, rotavirus and, 291
- IgE, 75–95
  - allergic inflammation, 75–95
  - antibodies in treatment of allergies, 82–92
  - clinical perspective, 75–76
  - IgE activation of immune response, 96
  - IgE antibodies in infectious diseases, 80–82
  - IgE effector cells, 77–79
    - APCs, 78
    - B cells, 78
    - mast cells, 77–78
    - monocytes and eosinophils, 78–79
  - IgE receptors, 76–77
  - interactions between allergens, IgE, and Fcε trigger hypersensitivity responses, 79
  - allergic response against cancer, 92–94
  - allergy treatment, antibodies in, 82–92
  - antibodies targeting cytokines, chemokines, and their receptors, 88–89
  - clinical studies in 2012, 86–87
  - future roles of antibodies in therapy, 94–95
  - IgG4 triggered protective immunity with immunotherapy, 90–95
  - neutralizing antibody response induced by active allergen immunotherapy, 89–90
  - recombinant antibodies targeting IgE interactions with Fcε receptors, 82–88
  - enterotoxin induction of, 310
  - half-life, 10
  - IgE antibodies in infectious diseases, 80–82
  - bacterial infections, 81
  - parasitic infections, 80–81
  - viral infections, 82
  - IgE receptors, 76–77
  - IgG
  - allergen-specific IgG antibody triggering hypersensitivity responses, 79–80
  - antibody engineering
    - Fc glycosylation and effector functions, 324–327
    - IgG1, 323
    - IgG2, 323–324
    - IgG3, 324
    - IgG4, 324
  - antibody response humanized mice, 162–163, 166
  - antibody-dependent cellular cytotoxicity (ADCC) and, 322–326
  - complement activation, 65–67
  - complement-dependent cytotoxicity (CDC) and, 322–326
  - Fc sialylation, 326–327
  - half-life, 10
  - human metapneumovirus infection, 239–240
  - IgG4, allergen specific, 90–92
  - plant-derived monoclonal antibody, 414, 416
  - respiratory syncytial virus (RSV) monoclonal antibody, 227–228
  - rotavirus, 290–295
  - structure, 9–10, 173–175
  - subtypes, 67
- IgM
  - antibody response humanized mice, 162–163, 166
  - complement activation, 65–67
  - half-life, 10
  - rotavirus and, 291–293, 299
- iHMMunealign, 355
- IL-1, 306
- IL-2, 158, 164, 306–307, 312, 314
- IL-4, 255
- IL-4, antibodies targeting, 88
- IL-5, antibodies targeting, 88–89
- IL-6, 134, 257, 307
- IL-9, antibodies targeting, 89
- IL-10, 90–92, 255–257, 263
- IL-12, 255, 307
- IL-13, antibodies targeting, 88
- IL-21, 130, 144
- Illumina high-throughput DNA sequencing instruments, 349–350
- IMGT (International ImMunoGeneTics information system), 348, 363–377
  - antibody 3D structures, 373–376
  - IMGT/2Dstructure-DB, 376
  - IMGT/3Dstructure-DB, 373
  - IMGT/3Dstructure-DB card, 373
  - IMGT/3Dstructure-DB contact analysis, 374
  - IMGT/Domainsuperimpose, 376
  - IMGT/mAb-DB, 376
  - IMGT/StructureQuery, 376
  - paratope and epitope, 374–376
  - antibody engineering, importance of, 370
  - availability and citation, 377
  - Colliers de Perles, 365, 366, 369–370
  - humanization, importance of, 370
  - IMGT/Domainsalign, 370–373
  - IMGT/LIGM-DB, 376
  - nomenclature, 364
  - overview, 363–374
  - paratope and epitope, 374–376
  - standardized and integrated system, 366–367
  - targeted and customized therapeutic antibodies, 376–377
  - unique numbering, 364–366
  - anchors for V and C domains, 365–366
  - CDR-IMGT lengths for antibody humanization by grafting, 366
  - highly conserved amino acids, 366

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INDEX

JAK/STAT signaling, 256
Japanese encephalitis virus, 254, 263–264
Jawless vertebrates, 53–54
Junctional diversity, 175, 184
Kadcyla (ado-trastuzumab emtansine), 15
Kaposi’s sarcoma-associated herpesvirus, 166
Knobs-into-holes technology, 336
Lebrikizumab, 88
Lectin pathway of complement activation, 66
Legionella pneumophilia, 31
Leishmania, 30
intrinsic antibody-dependent enhancement (iADE), 255, 258
studies in humanized mice, 166
Lentiviruses, antibody-dependent cellular cytotoxicity (ADCC) and, 93
Light chains antibody gene rearrangements and, 346–348
paired heavy and light chain sequencing, 354
in scFv-pIII phage display format, 108
structure, 8, 50, 174–175
Limiting dilution cloning, 150
Lineweaver-Burke plot, 385
Listeria monocytogenes, 29
LocusLink, 364
Lovastatin, 314
Lymphoblastoid cells, 144
Lysozyme-antilysozyme binding, 389

“Magic bullet” creation, 15
Magnetic assisted cell sorting (MACS), 115–116
Magnetic bead-based biopanning, 392
Major histocompatibility complex (MHC)
CMV and, 278
humanized mice and, 162–163, 167
staphylococcal enterotoxin B and, 304–308, 311, 313
Mammalian display, affinity maturation of antibody by, 332–333
Mannose-activating serine proteases (MASPs), 66
Mannose-binding lectin (MBL), 66
MARMs (monoclonal antibody resistant mutants), 243–244
Mass spectrometry, staphylococcal enterotoxin B and, 310
Mast cells, 77–78
Mating type, yeast, 115
Maytansinoids, 335
MCP-1 (monocyte chemoattractant protein 1), 307–308
Mean fluorescence intensity (MFI), 385–386
Measles virus
IgE antibodies induced by, 82
inhibition of, 29
Membrane attack complex (MAC), 68
Membrane-proximal external region (MPER), HIV, 200
Memory B cells
efficient methods to isolate monoclonal antibodies from, 129–137
frequency in circulation, 142
immortalization, 130, 131–133
Meningitis, history of serum therapy for, 5
Mepolizumab, 88
Metapneumovirus. See also Human metapneumovirus (HMPV)
avian, 238, 240
phylogeny, 240
MHC. See Major histocompatibility complex
Mice
heterohybridomas, 148–149
humanized, 157, 168. See also Humanized mice
immunodeficient strains, 158, 160
monoclonal antibody production in, 130
staphylococcal enterotoxin B monoclonal antibodies for treatment of, 313–314
mouse model, 307–308
Microscopy
atomic force microscopy (AFM), 382, 386–389, 391–395
electron microscopy, antibody docking and, 181–183
Middle East respiratory syndrome coronavirus (MERS-CoV), 111, 112–113
Modeling. See Antibody modeling
MOE modeling server, 179
Monoclonal antibody
anti-infectious, 65
approved/pending therapies, 6–8, 65
complement and, 67, 68–71
cost of therapy, 12
defined, 11
history, 11–12, 141–142
hybridoma and, 12
immunotherapy
cytomegalovirus (CMV), 282–283
human metapneumovirus (HMPV), 243–244
respiratory syncytial virus (RSV), 226–231
neutralization of infectivity and, 26–27
phage display, 106, 109–115
antibacterial mAbs discovered, 113–115
antiviral mAbs discovered, 110–113
plant-derived, 413–421
production, 12
efficient methods to isolate from memory B cells and plasma cells, 129–137
high-throughput cellular screens, 130–135
human hybridoma technology, 141–152
in mice, 130, 157–168
in plants, 413–416
single-cell reverse transcription (RT)-PCR, 130, 133, 135

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specificity of, 12, 13
staphylococcal enterotoxin B, 313–315
  chicken, 314
  chimeric, 314
  human, 314–315
  murine, 313–314
yeast display, 118–121
  antiviral mAbs discovered, 118–119
  bacterial mAbs discovered, 119–121
Monoclonal antibody resistant mutants (MARMs), 243–244
Monocyte chemotactant protein 1 (MCP-1), 307–308
Monocytes, 78–79
Motavizumab/motavizumab-YTE, 228–229, 231
MPER (membrane-proximal external region), HIV, 200
Murray Valley encephalitis virus (MVEV), 250
Mutagenesis, affinity maturation and, 331–333
Mutations, escape in antibody therapy, 13
Mycobacterium tuberculosis, 27
Myeloma, hybridoma production and, 148–149
Myoltarg (gemtuzumab ozogamicin), 15
NALP3 inflammasome complex, 72
Nanobody, 231
Nanoparticles, 71
Natalizumab, 326
National Center for Biotechnology Information (NCBI), 364
  Neisseria gonorrhoeae, 31
  Neisseria meningitidis, 4, 31, 33, 35
Neonatal Fc receptor (FcRn), 10, 15, 326
Neuraminidase, antibodies against, 29, 58
Neutralization, 26–29
  antibody design, 184
  complement and, 65
  defined, 26
  inhibition of fusion/entry, 28
  interference with attachment, 27–28
  intracellular, 29
  mechanisms of, 57–58
  by monoclonal antibodies discovered by phage display, 110
  “multiple hit” phenomenon, 27
  neutralizing antibody elicited through antigen design, 185
  epitope grafting, 185–187
  neutralizing antibody response induced by active allergen immunotherapy, 89–90
  postattachment, 28–29
  preattachment, 26–27
  screening by, 132–133
Nicotiana, 415–421
NK cells
  antibody-dependent cellular cytotoxicity (ADCC) and, 322, 323, 325, 326
  in immunodeficient mice strains, 158
  NMR spectroscopy, 181–183
  NOG mice, 158–160
  Nonobese diabetic (NOD)-SCID mice, 158, 160, 161
  NS1, dengue virus, 260–262, 264–265
  NSG mice, 158–161
  Nude mice, 158
  Numax (motavizumab), 17
OKT3, 11–12, 283
Omalizumab (Xolair), 83–88
Opsonization, 68–69
OraVax, 227
Ouabain, 148
Pagibaximab, 16
Palivizumab, 6, 17, 18, 65, 137, 227–231, 321, 434
Panobacumab, 16
Parainfluenza virus, 30
Paramyxoviruses, 30, 222
Parasites
  antibody-dependent cellular cytotoxicity (ADCC), 33
  complement and, 31
  IgE mechanisms of protection in parasitic infections, 80–81
  interference with attachment, 28
  phagocytosis, 35
  replication inhibition by IgA, 29
Passive antibody therapy. See also Monoclonal antibody
table gene transfer, 429–436
  for cytomegalovirus, 280–283
  future roles in allergic disease treatment, 94
  history of, 4–5
  for HIV, 428–429
  intravenous immunoglobulin (IVIG), 5, 225–226, 280–282
  for respiratory syncitial virus, 225–226
  for rotavirus, 296–297
  side effects, 4, 10–11
  staphylococcal enterotoxin B, 313–315
Pathogenicity islands, 304
PCR, 350–354
Pearl chain formation, 147
Penicillin, discovery of, 5
Pentoxifylline, 311
Peptide antagonists, for staphylococcal enterotoxin B treatment, 311
Permeabilization, 146
Phage. See also Phage display
described, 105–106
  helper, 108–109
  recovery using AFM, 394
Phage display, 105–115, 129–130, 184
  antibody display formats, 108–109
  Fab-pIII display, 109
Phage display (continued)
scFv-pIII display, 108–109
discovery of antibodies for infectious diseases by, 109–115
antibacterial antibodies, 113–115
antiviral antibodies, 110–113
library selection procedure, 106–107
overview, 105–106
purpose of, 106
sources of antibody genes for display libraries, 106–108
immune phage antibody libraries, 106–107
naïve phage antibody libraries, 106
synthetic phage antibody libraries, 107–108
yeast display compared, 116–117
Phagemid vectors, 108
Phagocytosis
antibody function and, 34–35
antibody-dependent cellular phagocytosis (ADCP), 322–323, 325
Pichia pastoris, 90
PIGS server, 179
PIII phage antibody display
Fab-pIII, 109
scFv-pIII, 108–109
Pili, 27
Plant-derived monoclonal antibody, 413–421
bacterial toxins, 420–421
anthrax, 420
Clostridium perfringens epsilon toxin, 420–421
staphylococcal enterotoxin B, 421
infectious disease targets, 416–421
dental caries, 416–417
Ebola virus, 417–418
herpes simplex virus, 418
human immunodeficiency virus (HIV), 418–419
rabies, 419
respiratory syncytial virus (RSV), 419
in vivo studies, 417
West Nile virus, 419–420
production, 413–416
controlling Mab N glycosylation, 415–416
rational, 413–414
transgenic technologies for, 414
transient technologies for, 415
for purification of infectious disease antigens, 421
Plasma cells
efficient methods to isolate monoclonal antibodies from, 129–137
long-term culture, 133–134
Plasmodium, 28
Plasmodium falciparum, 28, 31
ADCC, 33
phagocytosis, 35
studies in humanized mice, 166
Platforms, antibody modeling, 179–180
Pneumococcal pneumonia, serum therapy for, 4
Pneumococcal vaccine, 357
Pneumovirinae (subfamily), 222
Poliomyelitis
aggregation of, 26
inhibition of vesicle escape, 28
Polyethylene glycol (PEG)-mediated cell fusion, 142, 145–146
Polymerase chain reaction (PCR), 350–354
Posttranslational modification, 50–53
PREVENT study, 226
PRO140, 17
Programs, antibody modeling, 179–180
Protein Data Bank, 49, 175–176, 178–180
Pseudomonas aeruginosa, 16–17, 26
Quadroma technology, 336
Quality scores, DNA sequencing, 354
Rabies, 17–18, 419
RACE (rapid amplification of cDNA ends), 350–351
Radioimmunoassay (RIA), 382
Radioimmunotherapy (RIT), 399–408
bacterial infections, 404–405
fungal infections, 400–404
HIV, 405–407
overview, 399–400
Radioisotopes
antibody drug conjugates, 334
labeled antibodies, 15, 399–408
Rapamycin, 311
Rapid amplification of cDNA ends (RACE), 350–351
Raxibacumab, 17, 114
Recombinant adeno-associated virus (rAAV), 428–436
Recombination, 50, 174, 184
Resilizumab, 89
RespiGam, 226
Respiratory diseases. See also specific etiologic agents
antibody gene transfer for, 433–435
staphylococcal enterotoxin B and, 310
Respiratory syncytial virus (RSV), 221–232
antibody gene transfer, 433–434
antiviral monoclonal antibodies discovered by phage display, 111
clinical features of infection/disease, 221–222
combinations of antibodies against, 13
epitope grafting, 186–187
F protein, 222–223, 225, 227, 239, 242–244
future opportunities for treatment and prevention, 231–232
herd immunity, 222
IgE antibodies induced by, 82
immunoprophylaxis, 225–231
intravenous immunoglobulin (IVIG), 225–226
monoclonal antibody, 226–231
motavizumab/motavizumab-YTE, 228–229, 231
INDEX

overview, 221–224
palivizumab for, 6, 17, 18, 65, 137, 227–231, 321
pathogenesis, 223
plant-derived monoclonal antibody, 419
ribavirin for, 224
screening monoclonal antibodies by neutralization,
structure and life cycle, 222–223
target-agonist approach for antigen discovery in
vaccine design, 137
vaccine, 224–225
Resurfacing, 328
Reverse vaccinology, 198
RG mice, 158–160, 162, 164
Rhinitis, staphylococcal enterotoxin B and, 310
Rhinovirus
IgE antibodies induced by, 82
interference with attachment, 27
RIA (radioimmunoassay), 382
Ribavirin, 224
RIT. See Radioimmunotherapy
Rituximab (Rituxan), 11, 70, 325
RNA interference (RNAi), 231
Roche/454 platform, 349
Root mean square deviation (RMSD), 180–181
Rosetta Design, 186
Rosetta Antibody, 179
Rosetta Dock algorithm, 180–181
Ross River virus (RRV), 250, 257
Rotarix vaccine, 297
Rotavirus, 289–299
antibody response against, 290–296
compartmentalization of rotavirus-B cells, 293–295
Ig gene usage of rotavirus-B cells, 292–293
mechanism of protection and specificity of
rotavirus-Ig, 295–296
ontology of rotavirus-B cells and rotavirus-Ig,
290–292
future challenges, 298–299
overview, 289–290
therapeutic/prophylactic applications of rotavirus
antibodies, 296–298
RSV. See Respiratory syncytial virus
Saccharomyces cerevisiae, 115
Salmonella, 33
Salmonella enterica serovar Typhimurium, 26, 166
Scaffold, epitope grafting and, 186–187
scFv. See Single-chain variable fragments
scFv-pIII display, 108–109
Schistosoma haematobium, 80
Schistosoma mansoni, 33, 80
SCID-Hu mice, 159, 163
SEBILS (SEB-induced lethal shock), 307–308,
311–312, 314
Secretory IgA, plant-derived monoclonal, 414
SEED (strand-exchange engineered domain), 336
Self-carbohydrate recognition, 55–57
Semliki Forest virus, 30
Sendai virus
for fusion in hybridoma production, 145
inhibition of, 29
Sensitizing infection, in dengue vascular
permeability syndrome (DVPS), 252–254, 263
Serum sickness, 4
Serum therapy
history of, 4–5
pros and cons of antibody-based therapy relative
to, 14
for toxin-mediated diseases, 311
Servers, antibody modeling, 179–180
Severe acute respiratory syndrome coronavirus
(SARS-CoV), 111, 112
Severe combined immunodeficiency (SCID) mice,
158–161, 163, 406–407
Sharks, 54
Shiga toxin, 17
Shigella flexneri, 33
Sialic acid, antibodies that mimic, 214–215
Sialylation, Fc, 326–327
Silanization, in atomic force microscopy (AFM), 388
Simian immunodeficiency virus (SIV), 428
Sindbis virus, 26
Single-cell reverse transcription (RT)-PCR, 130, 133,
135
Single-chain variable fragments (scFv)
sFv-pIII phage display format, 108–109
yeast display and, 115–117
SIT (specific immunotherapy), 90–92
Site-directed mutagenesis, 181–183, 312–313
SnugDock algorithm, 181
SoDA2, 355
Somatic hypermutation, 175, 184
antibody gene rearrangements, 348
in vitro affinity maturation by, 332
Somatic recombination, 175
Specific immunotherapy (SIT), 90–92
SPR (surface plasmon resonance), 382–384,
389–390, 394
Spring constant, 388
Staphylococcal enterotoxin B, 303–315
animal models, 307–309
mouse, 307–308
nonhuman primate, 308–309
piglet, 308
rabbit, 308
rat, 308
biological and pathological activities, major, 307
as biological weapon, 304
clinical manifestation and epidemiology, 309–310
atopic dermatitis, 309–310
food poisoning, 309
respiratory diseases, 310

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Staphylococcal enterotoxin B (continued)
toxic shock syndrome, 309
ulcerative colitis, 310
description of agent, 304–306
diagnosis, 310
future challenges, 315
immune cell interaction with, 306–307
infection, 304–307
overview, 304
plant-derived monoclonal antibody, 421
SEBILS (SEB-induced lethal shock), 307–308,
311–312, 314
treatment, 310–315
cytokine inhibitors, 311
immunotherapy, 311–315
peptide antagonists, 311
Vβ domains, 311
Staphylococcus aureus. See also Staphylococcal
toxic shock syndrome, 309
enterotoxin B
antibacterial monoclonal antibodies discovered
by phage display, 115
complement evasion, 71
enterotoxins, 303–315
hyper-IgE syndrome, 81
methylcellulose-resistant (MRSA), 5, 16, 65, 115
single-chain variable fragments (ScFv) targeting, 16
vancomycin-resistant, 5
STAT3, 81
STAT5, 164
Strand-exchange engineered domain (SEED), 336
Streptavidin-biotin interaction, 388–389
Streptococcus, history of serum therapy for, 4
Streptococcus mutans, 16, 416–417
Streptococcus pneumoniae, 33, 34–35, 67
history of serum therapy for, 4
hyper-IgE syndrome, 81
labeled antibodies against, 15
monoclonal antibodies against, 149
radioimmunotherapy (RIT), 404–405
Structure of antibodies, 8–10, 49–59
antibody gene rearrangements and, 346–348
basics of, 8–10, 50–51
CDR H3, 51–53
computer-aided prediction of structure and
design of function, 173–187
disulfides in CDRs, 54–55
glycan shield, 55–57
heavy chain domains, 53–54
mechanisms of antibody neutralization and, 57–58
posttranslational modification, 50–53
recombination and, 50
relation of sequence, structure, and function, 173–175
self-carbohydrate recognition, 55–57
unusual indels, 57
Substance P, 309
Superantigens, enterotoxins as, 303–305, 315
Superhumanization, 329
Surface biomembrane force probe, 389
Surface plasmon resonance (SPR), 382–384,
389–390, 394
Sym003, 231
Synagis, 6, 12, 17, 18, 321, 419, 434. See also
Palivizumab
Synthetic phage antibody libraries, 107–108
T cell receptor (TCR)
CMV and, 278–279, 283
diversity estimates, 357
informatics and, 363–364, 370
Staphylococcal enterotoxin B and, 304–307, 313, 314
T cells
antibody-dependent enhancement (ADE) and,
255–256
cytotoxic T lymphocytes (CTLs) in respiratory
syncytial virus (RSV) disease, 224
response in humanized mice, 159, 163–164
Staphylococcal enterotoxin B and, 306–307
T helper (Th) cells, 76, 78, 224, 255–256, 310
Talizumab (TNX-901), 83
Tapping mode AFM, 388
T-DM1, 335
Tefibazumab, 16
Terminal deoxynucleotidyltransferase (TdT), 363
TERT, 149
Tetanus toxoid, 162, 166
Th17 cells, 81
Thraxiva, 17
Thymidine, 148
Tissue remodeling, 78–79
TNF-α. See Tumor necrosis factor alpha
Toll-like receptors
complement and, 63
monoclonal antibody production and, 132–133,
143, 166
Tositumumab, 15, 334, 399
Total internal reflection (TIR), 382–383
Toxic shock syndrome (TSS), 306, 309
Toxic shock syndrome toxin 1 (TSST-1), 166, 303,
308, 309, 312, 313
Toxins
antibacterial monoclonal antibodies discovered
by phage display, 113–115
passive antibody therapy, 4
plant-derived monoclonal antibody for bacterial
toxins, 420–421
Staphylococcal enterotoxin B, 303–315
Toxoplasma gondii, 29
Tralokinumab, 88
Trastuzumab (Herceptin), 325, 330, 335, 336, 436
Trichinella spiralis
ADCC, 33
IgE and, 80–81
interference with attachment, 28
Trioma, 149
Trypanosoma brucei, 31
TSS (toxic shock syndrome), 306, 309
TSST-1 (toxic shock syndrome toxin 1), 166, 303, 308, 309, 312, 313
Tumor necrosis factor alpha (TNF-α), 77
antibodies targeting, 89, 333–334
staphylococcal enterotoxin B and, 306–307, 312, 313, 315
Ulcerative colitis, staphylococcal enterotoxin B and, 310
Ultrasound, electroacoustic fusion and, 146
Vaccine
against adhesins, 27
cytomegalovirus (CMV), 279–280
high-throughput DNA sequencing applications for study, 356–357
human immunodeficiency virus (HIV), 196–200, 427–429
respiratory syncytial virus (RSV), 224–225
reverse vaccinology, 198
rotavirus, 297–298
staphylococcal enterotoxin B, 312–313
Vaccine design
analytic vaccinology, 136, 137
target-agonist approach for antigen discovery, 136–137
Valortim, 17
Variable domains, 8–10, 174–175
antibody gene rearrangements and, 346–348
rotavirus-B cells and, 292–293
in scFv-pIII phage display format, 108
Vascular endothelial cell growth factor receptor-2 (VEGFR2), 435
Vβ domains, for staphylococcal enterotoxin B treatment, 311
VD recombination, 50
Vector-mediated in vivo antibody expression, 427–436
antibody gene transfer
for cancer, 435–436
drawbacks of rAAV, 436
for drug addiction, 435
expression systems for, 429–432
for HIV-positive individuals, 433
proof-of-concept studies in animal models, 432–433
for respiratory tract infections, 433–435
expression systems for antibody gene transfer, 429–432
proof-of-concept studies in animal models, 432–433
Veneering, 328
Vertebrate Genome Annotation (Vega) Browser, 364
Vesicular stomatitis virus, for fusion in hybridoma production, 145
Vibrio cholerae, 26
Viral attachment, interference with, 27–28
Virus. See also specific viruses
antibody-based therapy examples, 17–18
antiviral monoclonal antibodies discovered by phage display, 110–113
antiviral monoclonal antibodies discovered by yeast display, 118–119
evolution, 110
for fusion in hybridoma production, 145
IgE antibodies induced by, 82
neutralization, 26–29, 110
phagocytosis, 34
plant-derived monoclonal antibody
Ebola virus, 417–418
herpes simplex virus, 418
human immunodeficiency virus (HIV), 418–419
rabies, 419
respiratory syncytial virus (RSV), 419
West Nile virus, 419–420
Viruslike particles
human metapneumovirus immunization with, 239, 241, 243
rotavirus and, 290–291, 293
V(D)J recombination, 50, 174, 184. See also Antibody gene rearrangements
V-QUEST, 355
WAM modeling server, 179
Wellcome Trust Sanger Institute, 364
West Nile virus, 28
antibody-dependent enhancement (ADE), 250
antiviral monoclonal antibodies discovered by phage display, 111, 113
antiviral monoclonal antibodies discovered by yeast display, 118, 119
complement and, 30
dengue virus cocirculation with, 254
plant-derived monoclonal antibody, 419–420
studies in humanized mice, 162, 163
WHO-International Nonproprietary Names (WHO-INN), 364
World Health Organization-International Union of Immunological Societies (WHO-IUIS), 364
Xolair (omalizumab), 83–88
X-ray crystallography, 179
Yeast, 115
Yeast display, 115–121
discovery of antibodies for infectious diseases by, 117–121
antibacterial antibodies, 119–121
antiviral antibodies, 118–119
overview, 115–116
phage display compared, 116–117
Zanamir, 58
Zevalin (ibritumomab), 15, 334, 399