EIGHTH EDITION

MANUAL OF
MOLECULAR
AND CLINICAL
LABORATORY
IMMUNOLOGY

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Contents

Editorial Board / xi
Contributors / xiii
Foreword: How It Began / xxiii
Preface / xxv
Author and Editor Conflicts of Interest / xxvii

section A

GENERAL METHODS / 1
VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITOR: THOMAS A. FLEISHER

1 Introduction / 3
   THOMAS A. FLEISHER

2 Molecular Methods for Diagnosis of Genetic Diseases Involving the Immune System / 5
   AMY P. HSU

3 The Human Microbiome and Clinical Immunology / 19
   FREDERIC D. BUSHMAN

4 Protein Analysis in the Clinical Immunology Laboratory / 26
   ROSHINI SARAH ABRAHAM AND DAVID R. BARNIDGE

section B

IMMUNOGLOBULIN METHODS / 47
VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITOR: DAVID F. KEREN

5 Introduction / 49
   DAVID F. KEREN

6 Immunoglobulin Genes / 51
   THOMAS J. KIPPS, EMANUELA M. GHIA, AND LAURA Z. RASSENTI

7 Immunoglobulin Quantification and Viscosity Measurement / 65
   JEFFREY S. WARREN

8 Clinical Indications and Applications of Serum and Urine Protein Electrophoresis / 74
   DAVID F. KEREN AND RICHARD L. HUMPHREY

9 Immunochemical Characterization of Immunoglobulins in Serum, Urine, and Cerebrospinal Fluid / 89
   ELIZABETH SYKES AND YVONNE POSEY

10 Cryoglobulins, Cryofibrinogenemia, and Pyroglobulins / 101
    PETER D. GOREVIC AND DENNIS GALANAKIS

11 Strategy for Detecting and Following Monoclonal Gammapathies / 112
    JERRY A. KATZMANN AND DAVID F. KEREN

section C

COMPLEMENT / 125
VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITOR: PATRICIA C. GICLAS

12 Introduction / 127
   PATRICIA C. GICLAS

13 The Classical Pathway of Complement / 129
   PATRICIA C. GICLAS

14 Analysis of Activity of Mannan-Binding Lectin, an Initiator of the Lectin Pathway of the Complement System / 133
   STEFFEN THIEL

15 The Nature of the Diseases That Arise from Improper Regulation of the Alternative Pathway of Complement / 138
   RICHARD J. H. SMITH
ANDREW D. LUSTER

38 Cytokines: Diagnostic and Clinical Applications / 357
PRIYANKA VASHISHT AND TIMOTHY B. NIEWOLD

39 Detection of Anticytokine Autoantibodies and Clinical Applications / 365
SARAH K. BROWNE

section G
IMMUNOHISTOLOGY AND IMMUNOPATHOLOGY / 373
VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITOR: R. NEAL SMITH

40 Introduction / 375
ROBERT G. HAMILTON

41 Immunofluorescence Methods in the Diagnosis of Renal and Cardiac Diseases / 376
A. BERNARD COLLINS, JAMES R. STONE, AND R. NEAL SMITH

42 Western Blot Analysis for the Detection of Anti-Glomerular Basement Membrane Antibodies and Anti-Phospholipase A2 Receptor Antibodies / 385
A. BERNARD COLLINS AND R. NEAL SMITH

section H
INFECTIONIOUS DISEASES CAUSED BY BACTERIA, MYCOPLASMAS, CHLAMYDIAE, AND RICKETTSIAE / 391
VOLUME EDITOR: JOHN L. SCHMITZ
SECTION EDITOR: CHRISTINE M. LITWIN

43 Introduction / 393
CHRISTINE M. LITWIN

44 Diagnostic Methods for Group A Streptococcal Infections / 394
CHRISTINE M. LITWIN, SHELDON E. LITWIN, AND HARRY R. HILL

45 Diagnosis of Helicobacter pylori Infection and Assessment of Eradication / 404
BRUCE E. DUNN AND SUHAS H. PHADNIS

46 Laboratory Diagnosis of Syphilis / 412
JOHN L. SCHMITZ

47 Lyme Disease, Relapsing Fever, and Leptospirosis / 419
GUIQING WANG AND MARIA E. AGUERO-ROSENFELD

48 Immunological Tests in Tuberculosis / 433
CHRISTINE M. LITWIN

49 Mycoplasma: Immunologic and Molecular Diagnostic Methods / 444
KEN B. WAITES, MARY B. BROWN, AND JERRY W. SIMECKA

50 Chlamydia and Chlamydophila Infections / 453
ROSEMARY SHE

51 The Rickettsiaceae, Anaplasmataceae, and Coxiellaceae / 461
LUCAS S. BLANTON AND DAVID H. WALKER

52 The Bartonellaceae, Brucellaceae, and Francisellaceae / 473
CHRISTINE M. LITWIN, BURT ANDERSON, RENEE TSOLIS, AND AMY RASLEY

section I
MYCOTIC AND PARASITIC DISEASES / 483
VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITOR: THOMAS B. NUTMAN

53 Introduction / 485
THOMAS B. NUTMAN

54 Immunological and Molecular Approaches for the Diagnosis of Parasitic Infections / 486
PATRICIA P. WILKINS AND THOMAS B. NUTMAN

55 Serological and Molecular Diagnosis of Fungal Infections / 503
MARK D. LINDSLEY

section J
VIRAL DISEASES / 535
VOLUME EDITOR: JOHN L. SCHMITZ
SECTION EDITORS: RICHARD L. HODINKA AND JOHN L. SCHMITZ

56 Introduction / 537
JOHN L. SCHMITZ

57 Immunologic and Molecular Methods for Viral Diagnosis / 538
MARIE LOUISE LANDRY AND YI-WEI TANG

58 Herpes Simplex Virus / 550
D. SCOTT SCHMID

59 Varicella-Zoster Virus / 556
D. SCOTT SCHMID

60 Epstein-Barr Virus and Cytomegalovirus / 563
HENRY H. BALKOFER, JR., KRISTIN A. HOGQUIST, AND PRIYA S. VERGESE
Contents

61 Human Herpesviruses 6, 7, and 8 / 578
   RICHARD L. HODINKA

62 Parvovirus B19 / 591
   STANLEY J. NAIDES

63 Respiratory Viruses / 598
   DAVID J. SPEICHER, MOHSIN ALI, AND MAREK SMEJJA

64 Measles, Mumps, and Rubella Viruses / 610
   DIANE S. LELAND AND RYAN F. RELICH

65 Viral Hepatitis / 620
   HUBERT G. M. NIESTERS, ANNELIES RIEZEBOS-BRILMAN, AND
   CORETTA C. VAN LEER-BUTER

66 Viral Agents of Gastroenteritis / 639
   GABRIEL I. PARRA AND KIM Y. GREEN

67 Arboviruses / 648
   ROBERT S. LANCIOTTI AND JOHN T. ROEHRIG

68 Diagnosis of Hantavirus Infections / 658
   WILLIAM MARCIEL DE SOUZA AND LUIZ TADEU MORAES FIGUEREIDO

69 Rabies Virus / 665
   D. CRAIG HOOPER

70 Human T-Cell Lymphotropic Virus
   Types 1 and 2 / 674
   BREANNA CARUSO, RAYA MASSOUD, AND STEVEN JACOBSON

71 Diagnosis of Prion Diseases / 682
   RICHARD RUBENSTEIN, ROBERT B. PETERSEN, AND THOMAS WISNIEWSKI

72 Principles and Procedures of Human
   Immunodeficiency Virus Diagnosis / 696
   KELLY A. CURTIS, JEFFREY A. JOHNSON, AND S. MICHELE OWEN

section L

ALLERGIC DISEASES / 781

VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITOR: PAMELA A. GUERRERIO

80 Introduction / 783
   PAMELA A. GUERRERIO

81 Quantitation and Standardization of
   Allergens / 784
   RONALD L. RABIN, LYNNSEY RENN, AND JAY E. SLATER

82 Immunological Methods in the Diagnostic
   Allergy Clinical and Research Laboratory / 795
   ROBERT G. HAMILTON

83 Assay Methods for Measurement of Mediators
   and Markers of Allergic Inflammation / 801
   JOHN T. SCHROEDER, R. STOKES PEEBLES, JR., AND PAMELA A. GUERRERIO

84 Tests for Immunological Reactions to
   Foods / 815
   CARAH B. SANTOS, DAVID M. FLEISCHER, AND ROBERT A. WOOD

85 Diagnosis of Rare Eosinophilic and Mast Cell
   Disorders / 825
   CEM AKIN, CALMAN PRUSSIN, AND AMY D. KLION

section M

SYSTEMIC AUTOIMMUNE
   DISEASES / 839

VOLUME EDITOR: BARBARA DETRICK
SECTION EDITOR: WESTLEY H. REEVES

86 Introduction / 841
   WESTLEY H. REEVES

87 Antinuclear Antibody Tests / 843
   ALESSANDRA DELAVANCE, WILSON DE MELO CRUVINEL, PAULO LUIZ CARVALHO FRANCESCATONIO, AND LUIS EDUARDO COELHO ANDRADE

88 Detection of Autoantibodies by Enzyme-Linked
   Immunosorbent Assay and Bead Assays / 859
   EDWARD K. L. CHAN, RUFUS W. BURLINGAME, AND MARVIN J. FRITZLER

89 Immunodiagnosis and Laboratory Assessment of

section K

IMMUNODEFICIENCY
   DISEASES / 711

VOLUME EDITOR: BARBARA DETRICK
SECTION EDITORS: KATHLEEN E. SULLIVAN AND HOWARD M. LEDERMAN

73 The Primary Immunodeficiency Diseases / 713
   HOWARD M. LEDERMAN

74 Severe Combined Immune Deficiency: Newborn
   Screening / 715
   JAMES W. VERBSKY AND JOHN M. ROUTES

75 Combined Immunodeficiencies / 721
   CHRISTINE SEROOGY AND MELISSA ELDER

76 Antibody Deficiencies / 737
   KIMBERLY C. GILMOUR, ANITA CHANDRA, AND D. S. KUMARARATNE

77 Hereditary and Acquired Complement
   Deficiencies / 749
   PATRICIA C. GICLAS

78 Neutropenia and Neutrophil Defects / 765
   STEVEN M. HOLLAND

79 Evaluation of Natural Killer (NK) Cell
   Defects / 774
   KIMBERLY RISMA AND REBECCA MARSH

80 Introduction / 783
   PAMELA A. GUERRERIO

81 Quantitation and Standardization of
   Allergens / 784
   RONALD L. RABIN, LYNNSEY RENN, AND JAY E. SLATER

82 Immunological Methods in the Diagnostic
   Allergy Clinical and Research Laboratory / 795
   ROBERT G. HAMILTON

83 Assay Methods for Measurement of Mediators
   and Markers of Allergic Inflammation / 801
   JOHN T. SCHROEDER, R. STOKES PEEBLES, JR., AND PAMELA A. GUERRERIO

84 Tests for Immunological Reactions to
   Foods / 815
   CARAH B. SANTOS, DAVID M. FLEISCHER, AND ROBERT A. WOOD

85 Diagnosis of Rare Eosinophilic and Mast Cell
   Disorders / 825
   CEM AKIN, CALMAN PRUSSIN, AND AMY D. KLION

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   DISEASES / 839

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87 Antinuclear Antibody Tests / 843
   ALESSANDRA DELAVANCE, WILSON DE MELO CRUVINEL, PAULO LUIZ CARVALHO FRANCESCATONIO, AND LUIS EDUARDO COELHO ANDRADE

88 Detection of Autoantibodies by Enzyme-Linked
   Immunosorbent Assay and Bead Assays / 859
   EDWARD K. L. CHAN, RUFUS W. BURLINGAME, AND MARVIN J. FRITZLER

89 Immunodiagnosis and Laboratory Assessment of
90 Immunodiagnosis of Autoimmune Myopathies / 878
MINORU SATOH, ANGELA CERIBELLI, MICHITO HIRAKATA, AND EDWARD K. L. CHAN
91 Immunodiagnosis of Scleroderma / 888
MASATAKA KUWANA
92 Antibody and Biomarker Testing in Rheumatoid Arthritis / 897
ANN DUSKIN CHAUFFE AND MICHAEL RAYMOND BUBB
93 Antiphospholipid Antibody Syndrome: Clinical Manifestations and Laboratory Diagnosis / 905
MARTINA MURPHY AND NEIL HARRIS
94 Antineutrophil Cytoplasmic Antibodies (ANCA) and Strategies for Diagnosing ANCA-Associated Vasculitides / 909
R. W. BURLINGAME, C. E. BUCHNER, J. G. HANLY, AND N. M. WALSH
95 IgG4-Related Disease: Diagnostic Testing by Serology, Flow Cytometry, and Immunohistopathology / 917
JOHN H. STONE
96 Future Perspectives for Rheumatoid Arthritis and Other Autoimmune Diseases / 922
JEREMY SOKOLOVE

section N
ORGAN-LOCALIZED AUTOIMMUNE DISEASES / 927
VOLUME EDITOR: JOHN L. SCHMITZ
SECTION EDITORS: C. LYNNE BUREK AND PATRIZIO CATUREGLI
97 Introduction / 929
C. LYNNE BUREK
98 Endocrinopathies: Chronic Thyroiditis, Addison Disease, Pernicious Anemia, Graves’ Disease, Diabetes, and Hypophysitis / 930
C. LYNNE BUREK, N. R. ROSE, GIUSEPPE BARBESINO, JIAN WANG, ANDREA K. STECK, GEORGE S. EISENBARTH, LIPING YU, LUDOVICA DE VINCENITIS, ADRIANA RICCIUTI, ALESSANDRA DE REMIGIS, AND PATRIZIO CATUREGLI
99 Myasthenia Gravis / 954
ARNOLD I. LEVINSON AND ROBERT P. LISAK
100 Autoantibodies to Glycolipids in Peripheral Neuropathy / 961
HUGH J. WILLISON
101 Detection of Antimitochondrial Autoantibodies in Primary Biliary Cholangitis and Liver Kidney Microsomal Antibodies in Autoimmune Hepatitis / 966
PATRICK S. C. LEUNG, MICHAEL P. MANNS, ROSS L. COPPEL, AND M. ERIC GERSHWIN
102 Cardiovascular Diseases / 975
CHERYL L. MAIER, C. LYNNE BUREK, NOEL R. ROSE, AND AFTAB A. ANSARI
103 Celiac Disease and Inflammatory Bowel Disease / 983
MELISSA R. SNYDER
104 Autoantibodies Directed against Erythrocytes in Autoimmune Hemolytic Anemia / 990
R. SUE SHIREY AND KAREN E. KING
105 Immune Thrombocytopenia / 995
THOMAS S. KICKLER
106 Monitoring Autoimmune Reactivity within the Retina / 998
JOHN J. HOOKS, CHI-CHAO CHAN, H. NIDA SEN, ROBERT NUSSENBLATT, AND BARBARA DETRICK

section O
CANCER / 1005
VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITORS: DANIEL CHAN AND LORI J. SOKOLL
107 Introduction / 1007
ROBERT G. HAMILTON
108 Immunoassay-Based Tumor Marker Measurement: Assays, Applications, and Algorithms / 1008
ELIZABETH A. GODBEY, LORI J. SOKOLL, AND ALEX J. RAI
109 Malignancies of the Immune System: Use of Immunologic and Molecular Tumor Markers in Classification and Diagnostics / 1015
ELAINE S. JAFFE AND MARK RAFFELD
110 Monitoring of Immunologic Therapies / 1036
THERESA L. WHITESIDE
111 Circulating Tumor Cells as an Analytical Tool in the Management of Patients with Cancer / 1051
DANIEL C. DANILA, HOWARD I. SCHER, AND MARTIN FLEISHER

section P
TRANSPLANTATION IMMUNOLOGY / 1063
VOLUME EDITOR: BARBARA DETRICK
SECTION EDITORS: ELAINE F. REED AND QIUHENG JENNIFER ZHANG

112 Histocompatibility and Immunogenetics
Testing in the 21st Century / 1065
QIUHENG JENNIFER ZHANG AND ELAINE F. REED

113 Molecular Methods for Human Leukocyte
Antigen Typing: Current Practices and Future
Directions / 1069
MARK KUNKEL, JAMIE DUKE,
DEBORAH FERRIOLO, CURT LIND, AND
DIMITRI MONOS

114 Evaluation of the Humoral Response in
Transplantation / 1091
PAUL SIKORSKI, RENATO VEGA,
DONNA P. LUCAS, AND ANDREA A. ZACHARY

115 Non-Human Leukocyte Antigen Antibodies in
Organ Transplantation / 1103
ANNETTE M. JACKSON AND BETHANY L. DALE

116 Evaluation of the Cellular Immune Response in
Transplantation / 1108
DIANA METES, NANCY L. REINSMOEN, AND
ADRIANA ZEEVI

117 Complement in Transplant Rejection / 1123
CARMELA D. TAN, E. RENE RODRIGUEZ, AND
WILLIAM M. BALDWIN III

118 Molecular Characterization of Rejection in
Solid Organ Transplantation / 1132
DARSHANA DADHANIA, TARA K. SIGDEL,
THANGAMANI MUTHUKUMAR,
CHOLI HARTONO, MINNIE M. SARWAL, AND
MANIKKAM SUTHANTHIRAN

119 Killer Cell Immunoglobulin-Like Receptors in
Clinical Transplantation / 1150
RAJA RAJALINGAM, SARAH COOLEY, AND
JEROEN VAN BERGEN

120 Chimerism Testing / 1161
LEE ANN BAXTER-LOWE

section Q

LABORATORY
MANAGEMENT / 1169

VOLUME EDITOR: ROBERT G. HAMILTON
SECTION EDITOR: RONALD J. HARBECK

121 Clinical Immunology Laboratory
Accreditation, Licensure, and
Credentials / 1171
LINDA COOK AND RONALD J. HARBECK

122 Validation and Quality Control: General
Principles and Application to the Clinical
Immunology Laboratory / 1180
VIJAYA KNIGHT AND TERRI LEBO

Author Index / 1193

Subject Index / 1195
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The Manual of Molecular and Clinical Laboratory Immunology is by its nature a continuously revised work which refines and extends the contributions of previous editions. Since its first edition in 1976, many eminent scientists have contributed to this important reference work. The American Society for Microbiology and its Publications Board gratefully acknowledge the contributions of all of these generous authors over the life of this Manual.
In 1971, I was working at the University of Oxford’s Sir William Dunn School of Pathology in the laboratory of James Gowans, the investigator who first definitively showed that the lymphocyte was the source of specific adaptive immunity. I was busily cannulating the thoracic ducts of rats in order to harvest T lymphocytes when I was informed that a transatlantic telephone call was coming in. My first reaction was fear of bad news. Rather, it was a phone call from Earle Spaulding. I knew Earle as the chairman of microbiology at Temple and active in the Eastern Pennsylvania branch of the American Society for Microbiology (ASM). He explained that he was calling as a member of the editorial group of the Manual of Clinical Microbiology (MCM), at that time in its first edition. His particular concern was the chapter on immunology, which devoted 100 pages to various serologic tests for infectious organisms with no mention of noninfectious diseases. Earle felt strongly that the field of immunologic diagnosis was growing exponentially and deserved a separate, companion manual. The MCM editorial board agreed, providing I was willing to accept the position of Editor-in-Chief.

I was delighted to receive the invitation. I had recently chaired a “blue ribbon” committee of the American Association of Immunologists (AAI) on the future of clinical immunology. We concluded that there was no space for a new patient-centered clinical specialty, but great need for improved, expanded laboratory support. A comprehensive manual would serve as a great stimulus to the whole field of laboratory-based clinical immunology. I accepted the offer with two qualifications. First, I needed a co-editor, particularly someone well versed at a practical level in immunology related to infectious diseases. Second, I asked that such a manual be cosponsored by the AAI. Both qualifications were agreed to by the ASM Publications Board.

The person I had in mind as co-Editor-in-Chief was Herman Friedman. I knew Herman from contacts arising from our joint interest in allergy research. I knew he understood the practice of laboratory immunology and was one of the few immunologists who actually researched the immunology of infection. Herman readily agreed to partner with me on the Manual, and so began a close collaboration that continued for three subsequent editions of the Manual, ended only by his untimely death. The AAI also accepted an offer of collaboration and appointed a liaison committee to work with us.

We were off and running, but we had no idea of how to proceed. There had never been a manual describing the entire laboratory practice of immunology. Part of our mission was to include the many applications of immunology devoted to detection and analysis of a wide variety of diseases, not only those induced by microorganisms. Should we approach the subjects disease by disease or method by method? We finally decided to compromise by beginning the book with invited chapters on the common methods used in the immunology laboratory, then continuing with sections covering their application to the main categories of disease. We included a final section on laboratory administration and quality control.

Having developed particular sections, we then sought the most experienced and highly qualified individuals to serve as section editors. Because of the cross-cutting matrix arrangement, there was major concern that some topics would be dealt with twice or even three times. We therefore decided to organize a “stakeholders meeting,” at which all of the section editors met at ASM in Washington, DC, with proposed outlines of their sections. Going through each one systematically, we identified topics where overlap occurred and ensured that everything important was included once, but not more. We also made a fundamental decision that the book would be complete and free-standing. The methods would be described in sufficient detail that the laboratory worker could actually prepare the materials, perform the tests, and interpret the results without consulting other references. It should be understood that, at that time, most laboratory reagents...
were prepared within the laboratory and were generally not available as commercial kits. This format required that we keep descriptions terse and the reference lists short.

When the first edition of the Manual of Clinical Immunology was published in 1976, we felt it warranted some type of celebration. Herman suggested that we should organize a meeting to mark the birth of the book and to bring together the leaders in clinical laboratory immunology, including our authors and section editors. Eventually, this led to the formation of the Association of Medical Laboratory Immunologists and the American Board of Medical Laboratory Immunology.

The Manual continues to be published at regular intervals to the present, as the editorial lineup has evolved. Barbara Detrick and Robert G. Hamilton joined me as Editors for the Sixth Edition, and Dr. Detrick has continued to lead the Manual for the Seventh and the present Eighth Edition. I hope the series will go on for many years. Although the Manual’s name has changed and the format is altered, the overall aim is still to improve the care of patients with infectious malignant inflammatory and immune-mediated disorders. With the ready availability of validated kits, the job of the clinical laboratory immunologist has shifted toward working with clinical colleagues on the significance and interpretation of laboratory tests.

I’m proud to have been involved in the genesis of this Manual. It would not have been possible without the continued support of ASM, the cooperation of AAI, the persistence of succeeding volume and section editors, the contributions of hundreds of practicing clinical laboratory immunologists, and the foresight of a few visionary microbiologists of the 1970 era who realized that immunology had become a discipline and specialty of its own. It never would have happened if Herman Friedman had not joined with me in accepting the challenge. I hope that he will long be remembered for his numerous contributions to immunology.

NOEL R. ROSE, MD, Ph.D.
Preface

For over 40 years, the Manual of Clinical Laboratory Immunology has been the leading reference source, both in the United States and abroad, to advance the field of laboratory immunology, to foster the best contemporary and most cutting-edge methodologies, and to translate basic immunologic principles into appropriate laboratory tests.

Since the publication of the 7th edition of this Manual, remarkable progress has been made in the field of immunology, and these notable advancements have been reflected in the clinical immunology arena as well. The scope of clinical immunology is exceptionally broad and encompasses nearly every medical specialty, including such areas as transplantation, rheumatology, oncology, infectious disease, allergy, hematology, and neurology, to name a few. Because of its strategic position in the hospital setting, it is critical that the clinical immunology laboratory should have a guide to follow with regard to accurate and appropriate laboratory procedures. As the field of clinical immunology continues to expand, we look to the laboratory director as a key person to gather the new basic information and integrate it into useful clinical procedures as well as to serve as a pivotal contact for communication with the various disciplines. In addition to keeping abreast with the most updated testing systems, the goal for this Manual is that it must not only serve the needs of today’s clinical immunology laboratory but also look to the future, where even more dramatic progress in diagnosis and treatment can be anticipated.

In an effort to capture the new dimensions in this field and to reflect the continuous evolution of clinical immunology, significant changes have been introduced into the 8th edition of the Manual of Molecular and Clinical Laboratory Immunology. Several sections of the Manual have been notably updated to reflect the latest laboratory approaches in molecular assays as well as the shift to automated testing, kit-based diagnostics, and new technical tools: themes that are carried throughout the book. New chapters have been introduced to highlight these changes. For example, section D, Flow Cytometry, describes the latest applications of these techniques, such as polychromatic flow cytometry and mass cytometry; section F reviews fresh information on the clinical applications of cytokines and chemokines; the infectious disease sections H, I, and J include the newest strategies used in infectious disease diagnosis and treatment, including the HIV and syphilis algorithms; section K, Immunodeficiency Diseases, presents the recent newborn screening programs for severe combined immune deficiency; and section P, Transplantation Immunology, outlines the usefulness of next-generation sequencing in the human leukocyte antigen (HLA) laboratory.

Once again, this Manual is offered not just in print but also electronically as either an EPUB file or a PDF. This special feature will allow a larger audience to review and use the Manual.

As we produce the 8th edition of this Manual, it is appropriate to celebrate its success. Noel Rose, the Manual’s first Editor-in-Chief, has provided a foreword reflecting on how the field has changed over the past 5 decades.

Since the publication of this Manual is a joint effort of many dedicated individuals, I wish to acknowledge the outstanding commitment and invaluable support of our volume editors, section editors, and chapter authors, all of whom, as internationally renowned experts in their areas, have contributed their extraordinary experience, energy, and time to the success of this edition. Also, I would like to extend my appreciation to the ASM editorial staff, in particular Ellie Tupper, Senior Production Editor, and Christine Charlip, Director, ASM Press, who have provided their valuable experience and support to complete this edition.

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<table>
<thead>
<tr>
<th>Author Index</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abraham, Roshini Sarah, 26, 269</td>
</tr>
<tr>
<td>Aguero-Rosenfeld, Maria E., 419</td>
</tr>
<tr>
<td>Akin, Cem, 825</td>
</tr>
<tr>
<td>Ali, Mohsin, 598</td>
</tr>
<tr>
<td>Anderson, Burt, 473</td>
</tr>
<tr>
<td>Andrade, Luis Eduardo Coelho, 843</td>
</tr>
<tr>
<td>Ansari, Aftab A., 975</td>
</tr>
<tr>
<td>Baldwin III, William M., 1123</td>
</tr>
<tr>
<td>Balfour, Jr., Henry H., 563</td>
</tr>
<tr>
<td>Barbesino, Giuseppe, 930</td>
</tr>
<tr>
<td>Barnidge, David R., 26</td>
</tr>
<tr>
<td>Baxter-Lowe, Lee Ann, 1161</td>
</tr>
<tr>
<td>Biancotto, Angélique, 149</td>
</tr>
<tr>
<td>Blanton, Lucas S., 461</td>
</tr>
<tr>
<td>Brown, Mary B., 444</td>
</tr>
<tr>
<td>Browne, Sarah K., 365</td>
</tr>
<tr>
<td>Bryceson, Yenan T., 300</td>
</tr>
<tr>
<td>Bubb, Michael Raymond, 897</td>
</tr>
<tr>
<td>Buchner, C. E., 909</td>
</tr>
<tr>
<td>Burd, C. Lynne, 929, 930, 975</td>
</tr>
<tr>
<td>Burlingame, Rufus W., 859, 909</td>
</tr>
<tr>
<td>Burton, Robert L., 280</td>
</tr>
<tr>
<td>Bushman, Frederic D., 19</td>
</tr>
<tr>
<td>Caruso, Breanna, 674</td>
</tr>
<tr>
<td>Caturegli, Patrizio, 930</td>
</tr>
<tr>
<td>Ceribelli, Angela, 878</td>
</tr>
<tr>
<td>Chan, Chi-Chao, 998</td>
</tr>
<tr>
<td>Chan, Edward K. L., 859, 878</td>
</tr>
<tr>
<td>Chandra, Anita, 737</td>
</tr>
<tr>
<td>Chaffee, Ann Duskin, 897</td>
</tr>
<tr>
<td>Chiang, Samuel C. C., 300</td>
</tr>
<tr>
<td>Collins, A. Bernard, 376, 385</td>
</tr>
<tr>
<td>Cook, Linda, 1169</td>
</tr>
<tr>
<td>Cooley, Sarah, 1150</td>
</tr>
<tr>
<td>Copel, Ross L., 966</td>
</tr>
<tr>
<td>Crivinelo, Wilson de Melo, 843</td>
</tr>
<tr>
<td>Curtis, Kelly A., 696</td>
</tr>
<tr>
<td>Dalhania, Darshana, 1132</td>
</tr>
<tr>
<td>Dale, Bethany L., 1103</td>
</tr>
<tr>
<td>Davila, Daniel C., 1051</td>
</tr>
<tr>
<td>De Remigis, Alessandra, 930</td>
</tr>
<tr>
<td>de Souza, William Marcuel, 658</td>
</tr>
<tr>
<td>De Vincentis, Ludovica, 930</td>
</tr>
<tr>
<td>Degheidy, Heba, 226</td>
</tr>
<tr>
<td>Dellavance, Alessandra, 843</td>
</tr>
<tr>
<td>Dentrick, Barbara, 998</td>
</tr>
<tr>
<td>DiGiuseppe, Joseph A., 207</td>
</tr>
<tr>
<td>Douglas, Steven D., 261</td>
</tr>
<tr>
<td>Duffy, Elizabeth R., 324</td>
</tr>
<tr>
<td>Duke, James, 1069</td>
</tr>
<tr>
<td>Dunn, Bruce E., 404</td>
</tr>
<tr>
<td>Eisenbarth, George S., 930</td>
</tr>
<tr>
<td>Elder, Melissa, 721</td>
</tr>
<tr>
<td>Ferriola, Deborah, 1069</td>
</tr>
<tr>
<td>Figuereido, Lúcio Tadeu Moraes, 658</td>
</tr>
<tr>
<td>Fleischer, David M., 815</td>
</tr>
<tr>
<td>Fleisher, Martin, 1051</td>
</tr>
<tr>
<td>Fleisher, Thomas A., 3</td>
</tr>
<tr>
<td>Flores-Montero, Juan, 235</td>
</tr>
<tr>
<td>Francescantonio, Paulo Luiz Carvalho, 843</td>
</tr>
<tr>
<td>Fritzler, Marvin J., 859</td>
</tr>
<tr>
<td>Galanakis, Dennis, 101</td>
</tr>
<tr>
<td>Gershwin, M. Eric, 966</td>
</tr>
<tr>
<td>Ghia, Emanuela M., 51</td>
</tr>
<tr>
<td>Gleich, Patricia C., 127, 129, 749</td>
</tr>
<tr>
<td>Gilmour, Kimberly C., 737</td>
</tr>
<tr>
<td>Godbey, Elizabeth A., 1008</td>
</tr>
<tr>
<td>Gorevic, Peter D., 101</td>
</tr>
<tr>
<td>Green, Kim Y., 639</td>
</tr>
<tr>
<td>Guerrerio, Pamela A., 783, 801</td>
</tr>
<tr>
<td>Hamilton, Robert G., 375, 795, 1007</td>
</tr>
<tr>
<td>Han, Shuhong, 868</td>
</tr>
<tr>
<td>Hanly, J. G., 909</td>
</tr>
<tr>
<td>Harbeck, Ronald J., 1169</td>
</tr>
<tr>
<td>Harris, Neil, 903</td>
</tr>
<tr>
<td>Hartono, Choli, 1132</td>
</tr>
<tr>
<td>Hill, Harry R., 394</td>
</tr>
<tr>
<td>Hirakata, Michio, 878</td>
</tr>
<tr>
<td>Hodinika, Richard L., 578</td>
</tr>
<tr>
<td>Hogueist, Kristin A., 563</td>
</tr>
<tr>
<td>Holland, Steven M., 766</td>
</tr>
<tr>
<td>Hooks, John J., 323, 998</td>
</tr>
<tr>
<td>Hooper, D. Craig, 665</td>
</tr>
<tr>
<td>Hsu, Amy P., 5</td>
</tr>
<tr>
<td>Humphrey, Richard L., 74</td>
</tr>
<tr>
<td>Illingworth, Andrea, 168</td>
</tr>
<tr>
<td>Islam, Sabina A., 343</td>
</tr>
<tr>
<td>Jackson, Annette M., 1103</td>
</tr>
<tr>
<td>Jacobson, Steven, 674</td>
</tr>
<tr>
<td>Jaffe, Elaine S., 1015</td>
</tr>
<tr>
<td>Johnson, Jeffrey A., 696</td>
</tr>
<tr>
<td>Kattmann, Jerry A., 112</td>
</tr>
<tr>
<td>Keeney, Michael, 168, 182</td>
</tr>
<tr>
<td>Keren, David E., 49, 74, 112</td>
</tr>
<tr>
<td>Kickler, Thomas S., 995</td>
</tr>
<tr>
<td>King, Karen E., 990</td>
</tr>
<tr>
<td>Kipps, Thomas J., 51</td>
</tr>
<tr>
<td>Klion, Amy D., 825</td>
</tr>
<tr>
<td>Knight, Vijaya, 1180</td>
</tr>
<tr>
<td>Kuhns, Douglas B., 310</td>
</tr>
<tr>
<td>Kumararatne, D. S., 737</td>
</tr>
<tr>
<td>Kunke, Mark, 1069</td>
</tr>
<tr>
<td>Kuwana, Masatake, 888</td>
</tr>
<tr>
<td>Lanciotti, Robert S., 648</td>
</tr>
<tr>
<td>Landry, Marie Louise, 538</td>
</tr>
<tr>
<td>Lebo, Terri, 1180</td>
</tr>
<tr>
<td>Lederman, Howard M., 713</td>
</tr>
<tr>
<td>Leland, Diane S., 610</td>
</tr>
<tr>
<td>Leung, Patrick S. C., 966</td>
</tr>
<tr>
<td>Levinson, Arnold L., 954</td>
</tr>
<tr>
<td>Li, Yi, 868</td>
</tr>
<tr>
<td>Lind, Curt, 1069</td>
</tr>
<tr>
<td>Lindsay, Mark D., 503</td>
</tr>
<tr>
<td>Lisak, Robert P., 954</td>
</tr>
<tr>
<td>Litwin, Christine M., 393, 394, 433, 473</td>
</tr>
<tr>
<td>Litwin, Sheldon E., 394</td>
</tr>
<tr>
<td>Lucas, Donna P., 1091</td>
</tr>
<tr>
<td>Luster, Andrew D., 343</td>
</tr>
<tr>
<td>Maeccker, Holdon T., 251, 338</td>
</tr>
<tr>
<td>Maier, Cheryl L., 975</td>
</tr>
<tr>
<td>Manns, Michael P., 966</td>
</tr>
<tr>
<td>Marsh, Rebecca, 775</td>
</tr>
<tr>
<td>Massini, John, 688</td>
</tr>
<tr>
<td>Massoud, Raya, 674</td>
</tr>
<tr>
<td>McCoy, Jr., J. Philip, 149</td>
</tr>
<tr>
<td>Medoff, Benjamin D., 343</td>
</tr>
<tr>
<td>Metes, Diana, 1108</td>
</tr>
<tr>
<td>Monos, Dimitri, 1069</td>
</tr>
<tr>
<td>Murphy, Martina, 905</td>
</tr>
<tr>
<td>Muthukumar, Thangamani, 1132</td>
</tr>
</tbody>
</table>
1194 ■ AUTHOR INDEX

Nahm, Moon H., 280
Naides, Stanley J., 591
Nieters, Hubert G. M., 620
Niewold, Timothy B., 357
Nixon, Douglas F., 290
Nussenblatt, Robert, 998
Nutman, Thomas B., 485, 486
O’Gorman, Maurice R. G., 147, 199
Orfao, Alberto, 235
Owen, S. Michele, 696
Parra, Gabriel I., 639
Peebles, Jr., R. Stokes, 801
Pérez, José Juan, 235
Petersen, Robert B., 682
Phadnis, Suhas H., 404
Pojero, Fanny, 235
Posey, Yvonne, 89
Priel, Debra Long, 310
Prussin, Calman, 825
Puig, Noemí, 235
Rabin, Ronald L., 784
Raffeld, Mark, 1015
Rai, Alex J., 1008
Rajalingam, Raja, 1150
Rasley, Amy, 473
Rassenti, Laura Z., 51
Reed, Elaine F., 1065
Reeves, Westley H., 841, 868
Reinsmoen, Nancy L., 1108
Relich, Ryan F., 610
Remick, Daniel G., 324
Renn, Lynne, 784
Ricciuti, Adriana, 930
Riezebos-Brilman, Annelies, 620
Risma, Kimberly, 775
Rodriguez, E. Rene, 1123
Roehrig, John T., 648
Rose, Noel R., 930, 975
Routes, John M., 715
Rubenstein, Richard, 682
Salem, Dalia A. A., 226
Sanaja, Luzalba, 235
Santos, Carah B., 815
Sarwal, Minnie M., 1132
Sato, Minoru, 878
Scher, Howard L., 1051
Schmid, D. Scott, 550, 556
Schmitz, John L., 412, 537
Schroeder, John T., 801
Sen, H. Nida, 998
Seropy, Christine, 721
Shacklett, Barbara L., 290
She, Rosemary, 453
Shirey, B. Sue, 902
Sigdel, Tara K., 1132
Sikorski, Paul, 1091
Simecka, Jerry W., 444
Slater, Jay E., 784
Smieja, Marek, 598
Smith, Richard J. H., 138
Smith, R. Neal, 376, 385
Snyder, Melissa R., 983
Sokoll, Lari J., 1008
Sokolove, Jeremy, 922
Soma, Lori, 217
Speicher, David J., 598
Steck, Andrea K., 930
Stetler-Stevenson, Maryalice, 226
Stone, James R., 376
Stone, John H., 917
Suthanthiran, Muniakkam, 1132
Sutherland, D. Robert, 168, 182
Sykes, Elizabeth, 89
Tan, Carmela D., 1123
Tang, Yi-Wei, 538
Thiel, Steffen, 133
Tsolis, Renee, 473
Van Bergen, Jeroen, 1150
Van Leer-Buter, Coretta C., 620
Vashisht, Priyanka, 357
Vega, Renato, 1091
Verbisky, James W., 715
Verghese, Priya S., 563
Vidriales, María Belén, 235
Waites, Ken B., 444
Walker, David H., 461
Walsh, Noreen M., 909
Wang, Guiqing, 419
Wang, Jian, 930
Warren, Jeffrey S., 54
Weinberg, Adriana, 263
Whiteside, Theresa L., 296, 1036
Wilkins, Patricia P., 486
Willison, Hugh J., 961
Wisniewski, Thomas, 682
Wood, Brent, 217
Wood, Robert A., 815
Yu, Liping, 930
Yuan, Constance M., 226
Zachary, Andrea A., 1091
Zeevi, Adriana, 1108
Zhang, Qiheng Jennifer, 1065
AABB (American Association of Blood Banks), 1172
AAE (acquired angioedema), 756–757
ABB (American Board of Bioanalysis), 1174
ABCC (American Board of Clinical Chemistry), 1174
ABFT (American Board of Forensic Toxicology), 1174
ABHI (American Board of Histocompatibility and Immunogenetics), 1172
ABI SOLiD system, 20
ABMG (American Board of Medical Genetics), 1172
ABMLI (American Board of Medical Laboratory Immunology), 1172
ABMM (American Board of Medical Microbiology), 1172
Absolute cell counting, in polychromatic flow cytometry, 155
ACA (anticentromere antibody), 888–889
Acanthamoeba, 489
Accreditation of clinical immunology laboratory, 1176–1177
Accuracy, 1183–1184
Acetylcholine, 954–956
Acetylcholine receptor, 954–958
Acetylcholine receptor antibodies, 954–958
Acetylcholinesterase, 957
aCGH (array comparative genomic hybridization), 745
ACIF (anticomplement immunofluorescence assay), for human herpesvirus-6, 582–583
Acoustic radiation, 151
ACPA. See Anti-cyclic citrullinated peptide antibody
Acquired angioedema (AAE), 756–757
Acrocyanosis, cryoglobulins and, 101–102
Acrodermatitis chronica atrophicans, Lyme, 421
Activated partial thromboplastin time (APTT), 906–907
Activation-induced deaminase (AID), 59, 740
Active cell movement, signal transduction and, 351
Acute erythroid leukemia, 220
Acute glomerulonephritis, poststreptococcal, 394–395, 397, 399–401
Acute lymphoblastic leukemia (ALL), 207–214, 1150
diagnosis, 207–212
flow cytometry immunophenotyping, 207–214
immunophenotypic-genotypic and prognostic correlations, 212
minimal residual disease (MRD), 207–209, 212–214
Acute megakaryoblastic leukemia, 220
Acute monocytic leukemia (AMoL), 220, 1028–1029
Acute motor axonal neuropathy (AMAN), 961–962, 964
Acute myeloid leukemia (AML), 147–148, 207, 209–214, 1066, 1150
antigens associated with diagnosis of, 218
biology of, 218
classification, 218–220
diagnostic sample preparation and evaluation, 220–222
data acquisition, 221
data analysis, 221
reagent panels, 221
reporting, 221–222
specimen requirements and processing, 220–221
epidemiology, 218
minimal residual disease, 222–223
data acquisition and evaluation, 222–223
reporting, 223
specimen requirements, processing, and reagent panels, 222
normal myeloid maturation and antigen expression, 217–218
overview, 217–220
Acute myocardial injury, 975–976
Acute-phase reaction, electrophoresis, 81–82
Acute promyelocytic leukemia (APL), 220
Acute respiratory tract infections, 598. See also Respiratory viruses
Acute rheumatic fever, 394–395, 397–401
ADA, 301, 306
Adalimumab, 361
AdCC (antibody-dependent cellular cytotoxicity), NK cell-mediated, 1156
ADGs (analog-to-digital converters), 153
Addison disease
antibodies to adrenal antigens, 931–932
clinical manifestations, 931
indirect IF test for adrenal autoantibodies, 931–932
prevalence, 931
Addressable laser bead immunoassay (ALBIA), 862–863
Adenosine, extracellular, 298
Adenoviridae, 640
Adenoviruses, 598, 644–645
clinical significance, 600–602, 644
description of agents, 599
detection and characterization, 645
direct fluorescent antibody (DFA), 603
epidemiology, 600
gastroenteritis, 644
genome, 644
proteins, 644–645
rapid diagnosis, 539
species, 645
specimen collection, transport, and storage, 662–663
taxonomy, 599
transmission, 600
Adhesion assays, 350
Adhesion disorders, 767–771
Adhesion molecules, allograft rejection and, 1132
Adult T-cell leukemia/lymphoma, 1026
human T-cell lymphotropic virus, 674–675
immunophenotype of, 228
Affinity maturation, 59, 67
African sleeping sickness, 489
African tick bite fever, 463–464
African trypanosomiasis, 489
Agora gel electrophoresis
CSF samples, 98–99
monoclonal gammopathies, 115
protein identification, 77
reference ranges, 77
serum proteins, 83
urine proteins, 85–86, 97
Age-related macular degeneration (AMD), 100, 127, 749
Agglutination, rheumatoid arthritis testing, 900
Agreement, 1184
Agrin, antibodies against, 958–959
AH50 assay, 749–751
analytical concerns, 753
controls, 752–753
interpretation, 754
materials and reagents, 752
pitfalls and troubleshooting, 753
Anti-perinuclear factor, 898–899
Anti-phospholipase A2 receptor antibodies, 819
Western blot analysis of, 387–388
Antiphospholipid antibody syndrome (APS), 905–907
Anticardiolipin assay, 907
clinical manifestations, 905
considerations when testing, 907
diagnostic criteria, 905–906
laboratory testing, 906–907
lupus anticoagulant testing, 906–907
whom to test, 907
Anti-PM-Scl antibody, 891
Anti-proliferating cell nuclear antigen (PCNA) antibodies, 870
Anti-RA33 antibody, 899
Antiretroviral therapy (ART), 545–546
Anti-RA33 antibody, 899
Antigen-presenting cells
Antigen-antibody binding
Antigen-presenting cells
Antihemophilic factor, 908
Antihuman hormone antibodies, 930–931
Anti-Th/To antibodies, 890
Antinuclear antibody (ANA)
Antinuclear factor
Antinuclear factor, 859
Antinuclear antibodies, 843–857
Antinuclear antibodies, 843–857
biomarker of joint disease, 923
detection, 859–865
in diabetes mellitus, 935–946
to erythrocytes, 990–993
to glycolipids, 961–964
interference in transplantation, 1099
to liver microsomal, 969–972
in myasthenia gravis, 954–958
myositis-specific, 878–887
parietal cell antibodies, 932–933
in peripheral neuropathy, 961–964
platelet, 995–997
in scleroderma/systemic sclerosis, 888–895
in systemic lupus erythematosus (SLE), 868–874
thrombocytopenia, 930–931
thromboplastin, 860–861
production of recombinant proteins, 860–861
purification of autoantigens, 860
purification of recombinant proteins, 861
Rosetta bacteria for production of large recombinant proteins, 861
use of natural autoantigens, 860
use of peptide antigens, 860
bead-based immunoassays, 862–865
addressable laser bead immunoassay (ALBIA), 862–863
advantages of, 864
challenges of multiplexed immunoassays of, 865
chimeras/mice, 863–864
overview, 859
Autoantibodies
putative antibodies, 946–949
purification, 860
use in autoantibody detection, 860
Autoimmune diseases. See also specific disorders
antineutrophil cytoplasmic antibodies (ANCA) associated vasculitis, 909–914
Astroviridae, 640
Astroviruses, 642–644
detection and characterization, 643–644
genome, 643
overview, 642–643
Ataxia telangiectasia, 713, 722, 725
ATG16L1 gene, 986
Atherosclerosis, chemokines in, 346
Athletes software, 1087
ATLR (angiotensin II type I receptor), 1103–1104
ATLL. See Adult T-cell leukemia/lymphoma
Atopic dermatitis, food allergy and, 815–819
Atopic disorders, 795–797
Atoy patch tests, 817–818
Atorvastatin, 1138
ATP synthesis assay, intracellular, 1110–1119
Austalian bat lyssavirus, 666
Autoantibodies
to adrenal antigens, 931–932
anti-acetylcholine receptor antibodies, 947–958
antimicrothodial, 966–969
antinuclear antibody, 843–857
biodemarker of rheumatic diseases, 923
detection, 859–865
in diabetes mellitus, 935–946
to erythrocytes, 990–993
to glycolipids, 961–964
interference in transplantation, 1099
liver microsomal, 969–972
in myasthenia gravis, 954–958
myositis-specific, 878–887
parietal cell antibodies, 932–933
in peripheral neuropathy, 961–964
platelet, 995–997
in scleroderma/systemic sclerosis, 888–895
in systemic lupus erythematosus (SLE), 868–874
thrombocytopenia, 930–931
thromboplastin, 860–861
production of recombinant proteins, 860–861
purification of autoantigens, 860
purification of recombinant proteins, 861
Rosetta bacteria for production of large recombinant proteins, 861
use of natural autoantigens, 860
use of peptide antigens, 860
bead-based immunoassays, 862–865
addressable laser bead immunoassay (ALBIA), 862–863
advantages of, 864
challenges of multiplexed immunoassays of, 865
chimeras/mice, 863–864
overview, 859
Autoantigens
putative antibodies, 946–949
purification, 860
use in autoantibody detection, 860
Autoimmune diseases. See also specific disorders
antineutrophil cytoplasmic antibodies (ANCA) associated vasculitis, 909–914
CD15s deficiency
CD16
acutelymphoblastic leukaemia, 212
acute myeloid leukaemia, 217–220
NK cell defects, 776, 779
NK cells, 300–301, 305–306
T-cell chronic lymphoproliferative disorders, 228
CD18, 150, 749
deficiency, 201
leukocyte adhesion deficiency (LAD), 770–771
CD19
acutelymphoblastic leukaemia, 207–208, 210, 212–213
acute myeloid leukaemia, 217–219
B-cell chronic lymphoproliferative disorders, 227
B cells, 280–281
chronic lymphocytic leukaemia (CLL), 226–229, 232
deficiency, 740
human herpesvirus-8, 586–587
plasma cells, 239–246
T cell lymphoblastic lymphoma, 1021
CD20
acute lymphoblastic leukaemia, 207–208, 210, 212–213
B-cell chronic lymphoproliferative disorders, 227
B cells, 280–281
chronic lymphocytic leukaemia (CLL), 226–227, 229
Hodgkin’s lymphoma, 1028
plasma cells, 239–240, 243
removal by pronase treatment of cells, 1099
T cell lymphoblastic lymphoma, 1021
tissue rejection and, 1137
CD21, 563, 1028
CD22
acute lymphoblastic leukaemia, 208–210, 212
B-cell chronic lymphoproliferative disorders, 227
chronic lymphocytic leukaemia (CLL), 226, 229
CD23
B-cell chronic lymphoproliferative disorders, 227
B-cell lymphomas, 1023
B cells, 281
chronic lymphocytic leukaemia (CLL), 226, 229
dendritic cells, 1028
CD24, in assays for PNH, 172–173, 175, 177
CD25
acute lymphoblastic leukaemia, 212
B-cell chronic lymphoproliferative disorders, 227
chronic lymphocytic leukaemia (CLL), 226
daclizumab (anti-CD25 antibody), 299
deficiency, 723, 727–728
mast cells, 831–833
T-cell chronic lymphoproliferative disorders, 228
T-cell lymphomas, 1026
Treg cells, 296–298
CD25high, 275, 298
B cells, 281
lymphocytic variant hypereosinophilic syndrome, 828
plasma cells, 239–242, 245–246
CD28, plasma cells, 239–240, 242, 244
CD30
Hodgkin’s lymphoma, 1028
T-cell lymphomas, 1027
CD33
acute myeloid leukaemia, 217–220, 223
in assays for PNH, 171–172
chronic lymphocytic leukaemia (CLL), 226
plasma cells, 239–240
CD34/CD34+ cells, 197
acute myeloid leukaemia, 207–211
acute myeloid leukaemia, 217–222, 223–225
flow cytometry quantification, 150
hematopoietic stem cells enumeration, 182–196
benefits, 190–191
CD34+ cell subsets in backup marrow, 196
clinical issues, 183
clinical utility, 195–196
commercial kits based on ISHAGE guidelines, 187–190
controls for rare-event detection, 184
early methods, 183
graft assessment, 183
immunological characterization of CD34+ stem cells, 193–195
ISHAGE protocol, basic, 185
ISHAGE single platform with viability assessment, 185–187
lysing agents, 191
negative antibody controls, 191
quality assurance, 191
sequential Boolean gating, 184–185
simultaneous CD34+ and CD34+ cells, 192–193
single-platform absolute CD34+ count, 185
statistical issues in rare-event detection, 183–184
technical issues, 184
CD34 Count KIt (Dako), 188–189
CD35, 130–131, 138, 749
dendritic cells, 1028
CD36, acute myeloid leukaemia, 218, 220
acute lymphoblastic leukaemia, 207, 209
acute myeloid leukaemia, 217, 219–220, 222–223
B-cell lymphomas, 1024
chronic lymphocytic leukaemia (CLL), 226, 232
plasma cells, 236, 238–240, 242, 246–247
CD39, Treg cells, 296–298
CD40. X-linked hyper IgM syndrome (XHIM) and, 726
CD40L
expression for diagnosis of X-linked hyper IgM syndrome (HIGM), 742–744
as marker of T cell activation, 269–270, 275
CD40 ligand deficiency screens, 201–203
CD43, chronic lymphocytic leukaemia (CLL), 226, 229
CD45, 161
acute lymphoblastic leukaemia, 207–214
acute myeloid leukaemia, 217–222
in assays for PNH, 175, 178
B-cell lymphomas, 1024
chronic lymphocytic leukaemia (CLL), 226, 229
in flow cytometry of hematopoietic stem cells, 183–195
plasma cells, 239–242, 245–246
CD46, 130–131, 138–139, 141, 580, 749, 1124
CD54, 155, 238–240, 239
CD55, 131, 138–139, 141, 749
absence in PNH, 168–169
in assays for PNH, 170
flow cytometry quantification, 150
CD56
acute myeloid leukaemia, 218–219, 223
NK cell defects, 777
NK cells, 300–301, 305
plasma cells, 239, 242
T-cell chronic lymphoproliferative disorders, 228
T-cell lymphomas, 1027
CD56high, 300
CD56dim, 300, 303–305
CD57, T-cell chronic lymphoproliferative disorders, 228
CD57high, 305
CD59, 131, 138, 1126
absence in PNH, 168–169
in assays for PNH, 169–172, 174, 180
deficiency, 761
flow cytometry quantification, 150
CD61, acute myeloid leukaemia, 220
CD62L, 155
in cryoprotected peripheral blood mononuclear cells, 266
NK cells, 300
CD63, as basophil surface activation marker in allergy, 791, 806, 821
CD64, 32–33
acute lymphoblastic leukaemia, 212
in assays for PNH, 171–172, 175, 177–178
CD65, in acute lymphoblastic leukaemia, 211
CD66b, in assays for PNH, 172–173
CD68, 1127
CD69
as basophil surface activation marker in allergy, 796
as marker of T cell activation, 269, 275
NK cells, 301, 305
X-HIGM screening, 731–732
CD71, acute myeloid leukaemia, 217–218, 220
CD73, 298
CD79a, 52, 209, 212
B-cell lymphomas, 1024
T-cell lymphomas, 1021
CD79b, 52
B-cell chronic lymphoproliferative disorders, 227
chronic lymphocytic leukaemia (CLL), 226, 229
Downloaded from www.asmscience.org by
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On: Sun, 14 Jul 2019 20:38:19
quality assurance for clinical testing, 988
testing recommendations, 986
Cell culture. See Culture
Cell death, measuring, 1042
Cell-mediated immunity
food allergy, 815–816
human herpesvirus-6, 580
Cell Quest software, 1044
CellSearch immunomagnetic isolation,
1052–1053, 1056
Cell surface markers, on T cells after
activation with mitogenic stimuli,
274, 277
Cellular immune response in transplantation,
evaluation of, 1108–1121
cell division and precursor frequency
analysis using multiparameter CFSE-
MLC, 1111–1112
data analysis and interpretation, 1112
pitfalls and troubleshooting, 1112
procedure, 1111–1112
clinical applications, 1120–1121
cytokine measurements, 1113–1116
ELISPOT assay, 1113–1114
clinical significance, 1114
pitfalls and troubleshooting, 1114
procedure, 1113–1114
flow cytometry, 1111–1112, 1114–1116
immune cell function assay, 1116–1119
intracellular ATP synthesis assay,
1116–1119
expected values, 1119
interpretation of results, 1118–1119
overview, 1116–1117
procedure, 1117–1118
intracellular cytokine staining (ICS),
1114–1116
data acquisition, 1116
data analysis, 1116
procedure, 1114–1116
troubleshooting, 1116
mixed lymphocyte culture (MLC) assay,
1108–1110
concept, 1108
equipment and instrumentation, 1109
interpretation, 1109
materials and reagents, 1109
mechanics and controls, 1109
MTT method, 1109–1110
pitfalls and troubleshooting, 1109
procedure, 1108–1109
sample requirements, 1108–1109
propagation of lymphocyte cultures from
allograft biopsy specimens, 1112–1113
concept, 1112–1113
pitfalls and troubleshooting, 1113
procedure, 1113
T-cell precursor frequency determination by
limiting dilution assays, 1110–1111
validation of assays, 1119–1120
analysis of patient and healthy control
subject data, 1119–1120
proficiency testing, 1120
quality assurance, 1120
quality control, 1120
statistical evaluation of data, 1119–1120
Cellular infiltrate, chemokine assays, 348
Center for Clinical Standards and Quality
(CCSQ), 1172
Centers for Disease Control and Prevention
(CDC)
CDC-EITB (CDC-enzyme-linked
immunoelectrotransfer blot) assay for
cysticercosis, 492–493
guidelines for flow cytometry, 1180
Model Performance Evaluation Program
(MPEP), 1177
Centers for Medicare & Medicaid Services
(CMS), 1171–1175
Centropoietin (cP) unit, 71
Cerebrospinal fluid (CSF)
arboviruses, 648, 650, 652, 655
cryptococcosis, 522–523
cysticercosis, 492–493
herpes simplex virus, 550
immunochemical characterization of
immunoglobulins, 98–99
malaria viruses, 612
transferin in, 79
Treponema pallidum, 413–416
Trypanosoma cruzi, 491
Ceruloplasmin, 361
CFB (complement factor B), 140, 142
CFH receptors, 138, 140, 142
CFSE (carboxyfluorescein diacetate
succinimidyl ester), 270, 298,
1111–1112
CGD. See Chronic granulomatous disease
CH50 (complement 50% hemolysis),
131–132
CH50 assay, 749–754
analytical concerns, 753
buffer preparation, 751
controls, 752–753
equipment and instruments, 751
interpretation, 753–754
materials, 751
pitfalls and troubleshooting, 753
postanalytical concerns, 753
preanalytical concerns, 753
procedure, 751–752
quality control/quality assurance, 753
reagents, 750–751
sample requirements, 750
sensitized sheep cells, 751
Chagas’ disease, 491
Charg-e-coupled device (CCD), 150, 165
Chédiak-Higashi syndrome, 765–767, 771
Chemiluminescence immunosassay (CIA)
autotaxin detection, 863–864
human immunodeficiency virus (HIV),
698–705
oxidative metabolism disorders, 773–774
systemic sclerosis-related antinuclear
antibodies, 892
Treponema pallidum, 414–417
viral infections, 542
Chemokines and chemokine receptors, 323,
343–354
allograft rejection, 1132
assays, 348–353
adhesion assays, 350
animal models, 353
Boyden chamber, 349
cellular infiltrate, 348
for chemokine expression in disease,
347–348
chemotactic response: in vitro assays,
348–351
chemotactic response: in vivo assays,
351–353
imaging, in vivo, 351–353
integrin conformation change, 350–351
overview, 348
recruitment assays, 351
signal transduction and active cell
movement, 351
Chemokines and chemokine receptors
(continued)
transmigration assays, 349
nomenclature, 343
overview, 343
principles, 343, 345
role in disease, 346–348
assays for chemokine expression in
disease, 347–348
asthma, 346–347
atherosclerosis, 346
rheumatoid arthritis, 346–347
transplant rejection, 346–348
table of chemokines and their functions, 344
Chemokinesis, 349
Chernobyl
assays
signal transduction and active cell
movement, 351
in vitro assays, 348–351
neutrophil defects, 771–772
Chemotherapy, cytotoxic, 767
Chicken pox, 556
Chicken pox virus, 649, 652, 654–655
Children
assay reference interval, 1186
tuberculosis in, 441
Chlamydia
clinical disease, 457
serology, 456–457
molecular testing, 457
laboratory diagnosis, 455–457
description of organism, 455
culture, 456
serology, 454–455
specimen collection, 454
Chlamydophila, 453–458
Chlamydiaceae, 453
Chlamydia trachomatis, 453–455
disease, 453
culture, 456
description of organism, 453
direct antigen detection, 454
laboratory diagnosis, 453–455
molecular testing, 455
recommended laboratory tests, 453–454
erosology, 454–455
serovars, 453
specimen collection, 454
Chlamydia pneumoniae, 455–457, 600
case series, 456
culture, 456
description of organism, 455
disease, 455–457
molecular testing, 457
serology, 456–457
specimen collection, 456
C. psittaci, 457–458
case series, 457
description of organism, 457
disease, 457
Cholangitis, biliary, See Biliary cholangitis
Chorea, streptococcal, 395
Chromatogram, 1080
Chromatography, 1080
Chromobacterium violaceum, chronic
granulomatous disease (CGD) and,
767
Chromosome in situ hybridization (CISH), for
lymphoma, 1019–1020
Chronic ataxic neuropathy, 961–964
Chronic ataxia, 961–964
Chronic granulomatous disease (CGD), 14
diagnosis, 772–774
chimerism testing, 453–454
clinical disease, 455
serology, 454–455
recommended laboratory tests, 453–454
strategies, 453–454
immunoblot analysis of phox subunits of
NOX2, 317–319
isolation and characterization of PMN, 312–313
quantitative analysis of O2
 generation using SOD- inhibitable
ferricytochrome c reduction, 314–315
interferon-γ (IFN-γ) for, 323
neutrophil dysfunction, 767, 772–774
oxidative burst assay screen for, 204
Chronic lymphocytic leukemia (CLL), 148,
226–232, 1020, 1023–1024
CLL-Z index, 230
chronic wasting disease (CWD), 682,
684–685, 687, 691–692
CHSI, 771, 767
Churg-Strauss syndrome, 699, 913
CIA. See Chlamydiae
CID. See Combined immunodeficiency
CIE/CRE (crossed immunocephoresis/
crossed radioimmuonocephoresis), 790
Circulating tumor cells, 1051–1057
analytical validation, 1056
biomarkers predictive of tumor
sensitivity, 1057
clinical qualification, 1056
diagnostics, 1056–1057
future in the clinic, 1057
molecular characteristics of CTGs,
1056–1057
prognostic and response bioindicator,
1056
detection methods, 1052–1055
agnostic methods, 1054–1055
CellSearch immunomagnetic isolation,
1052–1053, 1056
filtration assays, 1054
flow cytometry, 1054
functional assays, 1054
genome-, transcription-, and translation-
based assays, 1054
molecular capture, 1054
metastatic process, 1051–1052
morphology and characteristics, 1051–1052
shedding of, 1051
Cirrhosis, electrophoresis pattern in, 80–82
CISH (chromogen in situ hybridization), for
lymphoma, 1019–1020
Citrullinemia, survey, 898–899
Citronella, 898
CJD. See Creutzfeldt-Jakob disease
Cladribine, for mastocytosis, 834
Classical NK cell deficiency, 300, 305
Classical pathway, complement, 129–132
Class switching, heavy-chain, 58–59
Class switch recombination (CSR), 58–59
CLEP (Clinical Laboratory Evaluation
Program), New York State, 1176
CLIA (Clinical Laboratory Improvement
Amendment), 1092, 1171–1172,
1174–1175
Clinical and Laboratory Standards Institute
(CLSI), 1174, 1178, 1180, 1186
Clinical immunology laboratory
accreditation and licensure, 1176–1177
American Society for Histocompatibility
and Immunogenetics (ASHI), 1177
College of American Pathologists,
1176–1177
The Joint Commission, 1177
proficiency testing, 1177
crediting agencies and programs,
1178–1179
federal government agencies and regulatory
issues, 1171–1175
analyte specific reagents regulation, 1175
Clinical Laboratory Improvement
Amendment (CLIA), 1171–1172,
1174–1175
GIl Laboratory Practices (GLP)
Regulations, 1175
laboratory-developed tests regulation,
1175
website addresses of governmental
agencies, 1173
international issues and agencies,
1177–1179
quality control, 1187–1189
state certifying programs, 1175–1176
California, 1176
New York State, 1176
Washington State, 1176
validation, 1180–1187, 1190
Complement activation (continued)
  polyclonal and monoclonal antibodies to
  C5b-C9, 1124–1126, 1126
  quality control of complement assays,
  1126
  soluble complement products in body
  fluids, 1127–1128
  specific organ transplants, 1126–1127
  types of injury, 1128–1129
Complement activation-related pseudoallergy
  (CARPA), 127
Complement control protein (CCP), 757
Complement activation
  mumps virus, 615
  measles viruses, 611–613
  IgM and, 66
  IgG and, 66
  histoplasmosis, 524–525
  C5b-9, 521
  blastomycosis, 517
  aspergillosis, 515
  arboviruses, 651
  advantages, 509
  equipment, 510
  fungal infections, 509–512
  histoplasmosis, 524–525
  IgG and, 66
  IgM and, 66
  materials, 510
  measles virus, 611–613
  mumps virus, 615
  Mycoplasma pneumoniae, 445
  paracoccidioidomycosis, 526
  procedure, 510–512
  reagent preparation and standardization,
  510
  titration of guinea pig complement,
  510–511
  reading and interpretation of reactions,
  511–512
  rubella virus, 616–617
  sample requirements, 510
  theory, 509–510
  Trypanosoma cruzi, 491
Complement receptor 1 (CR1), 130–131,
  138–139, 749, 759, 761, 1124–1125
Complement receptor 3 (CR3), 749
Comprehensive leukocyte
  immunophenotyping panel (CLIP),
  160–162
Conentalen rubella syndrome, 616
Congestive heart failure, 976–977
Constant (C) region, immunoglobulin, 53,
  66–67
Combs test, for Brucella, 478
COPD (chronic obstructive pulmonary
disease), 601
CORIA mutation, 725
Coronavirus (genus), 599
Coronavirus (species), 599
Coronaviruses. See Human coronaviruses
Coxiella burnetti, 461–468
epidemiology, 462, 464
laboratory diagnosis, 465–468
immunodiagnosis, 466–467
molecular diagnosis, 468
pathobiology, 464–465
taxonomy, 461–462
Coxiellaceae, 461–462
CPE. See Cytopathic effect
C-reactive protein
  simple, 101–102
  testing, 102–106
  antibody assays, 105
  antigen assays, 105
  complement measurement, 105–106
  concentration determination, 103
  isolation, quantitation, and
  characterization, 102–105
  nucleic acid detection, 105
  Cyprus, 1062–1066
  Cryoglobulinemia, 95, 101–106
  Cryoglobulinemia, 101–106
  description, 101
  diseases associated with, 101–102
  laboratory abnormalities in, 101, 103
  monoclonal gammopathy, 113
  testing for, 102–106
  types, 101
  Cryopreservation of peripheral blood
  mononuclear cells, 261, 263–267
  clinical uses, 263
  functional assays using cryopreserved
  PBMC, 264–265
  cytokine-based assays, 264–265
  cytotoxic assays, 264
  proliferative assays, 264–265
  surface markers on cryopreserved PBMC,
  265–267
  B-cell functional assays, 266–267
  immunophenotyping by flow cytometry,
  265–266
  mRNA quantification assays, 267
  TCR Vβ repertoire, 266
  technical aspects, 263–264
  thawing of frozen PBMC, 263–264
  transportation of frozen PBMC, 263
Cryptococcus, 506, 522–523
  clinical indications and diagnostic
  rationale, 522
  enzyme immunoassay (EIA), 523
  lateral flow assay, 523
  latex agglutination, 522
  Cryptosporidiosis, 519–520
  CSF. See Cerebrospinal fluid
  CSR (class switch recombination), 58–59

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Delta heavy chain, 66–67
DeltaZ virus (genus), 674
Dendritic cells, 1023
in allergic conditions, 801, 807
follicular, 1028
interdigitating, 1028
interferon alpha production, 807
Langerhans cells, 1028
proliferative histiocytic lesions, 1028
Dengue virus, 648–653
Denileukin diftitox, 299
Dense deposit disease, 140, 142–143
Density gradients, in polychromatic flow
erythrocytometry, 153
Dermatitis herpetiformis, 984
Desensitization protocols, monitoring,
Dermatitis herpetiformis, 984
Direct fluorescent antibody
DFA. See Direct fluorescent antibody
diagnosis, of cutaneous LE
Diabetic glomerulosclerosis, 984
Diabetes mellitus
assays
clinical application, 946
electrochemiluminescence (ECL), 942–945
ELISA, 945
epitope assays, 945
table 1
interpretation, 945–946
radioassay, 939–942
autoantibodies, 935–946
carboxypeptidase H autoantibodies, 936–937
glutamic acid decarboxylase autoantibodies, 936–946
insulin autoantibodies (IAA), 935–938, 941–945
insulinaemia antigen-2 (IA-2) autoantibodies, 936–941
insulinaemia antigen-2B (IA-2B) autoantibodies, 936–947
islet cell autoantibodies (ICA), 935–939
subclass and isotope determination, 945
table 2
zinc transporter-8 (ZnT8) autoantibodies, 936–938, 941–942
categories, 935–936
Diagnostic accuracy, 1183–1184
Diagnostically (clinical) sensitivity, 1186–1187
Diagnostic (clinical) specificity, 1187
Dichlorofluorescein diacetate, 204
Dideoxynucleotides (ddNTPs), 5
Dielectrophoretic array, 1054
Difference gel electrophoresis (DIGE), in proteome studies in transplant
rejection, 1140, 1142–1143
Diffuse large B-cell lymphoma (DLBCL), 226, 227, 1020, 1024–1025
DiGeorge syndrome, 713
Dihydothradamine (DHR), 1054
analysis of FMN H2O2 production by flow
cytometry of dihydothradamine 123
staining, 310–312
interpretation and limitations, 312
principle, 310
procedure, 311–312
reagents, 310–311
range and normal range, 312
oxidation in oxidative metabolism
disorders, 772–773
Dilated cardiomyopathy, 975–978
Dilute Russell Viper Venom time assay, 906
Dimethyl sulfoxide (DMSO), as
cryoprotectant, 263
Direct antiglobulin test, for autoimmune
hemolytic anemia, 991
Direct detection
herpes simplex virus, 551–552
viral infections, 538–543
Direct fluorescent antibody (DFA)
adeno viruses, 603
Chlamydia trachomatis, 454
cryptosporidiosis, 491–492
enterovirus, 603
Francisella, 479
giardiasis, 495
herpes simplex virus, 552
human metapneumovirus, 603
influenza virus, 603
parainfluenza viruses, 603
Pneumocystis jirovecii, 527
rabies virus, 666, 671
respiratory syncytial virus, 603
respiratory viruses, 603
trichomoniasis, 498
varicella-zoster virus, 558
viral infections, 542
Disease, animal models of chemokines and
chemokine receptors in
DFA. See Direct fluorescent antibody
DHR. See Dihydrorhodamine
Diabetes mellitus
assays
clinical application, 946
electrochemiluminescence (ECL), 942–945
ELISA, 945
epitope assays, 945
table 1
interpretation, 945–946
radioassay, 939–942
autoantibodies, 935–946
carboxypeptidase H autoantibodies, 936–937
glutamic acid decarboxylase autoantibodies, 936–946
insulin autoantibodies (IAA), 935–938, 941–945
insulinaemia antigen-2 (IA-2) autoantibodies, 936–941
insulinaemia antigen-2B (IA-2B) autoantibodies, 936–947
islet cell autoantibodies (ICA), 935–939
subclass and isotope determination, 945
table 2
zinc transporter-8 (ZnT8) autoantibodies, 936–938, 941–942
categories, 935–936
Diagnostic accuracy, 1183–1184
Diagnostically (clinical) sensitivity, 1186–1187
Diagnostic (clinical) specificity, 1187
Dichlorofluorescein diacetate, 204
Dideoxynucleotides (ddNTPs), 5
Dielectrophoretic array, 1054
Difference gel electrophoresis (DIGE), in proteome studies in transplant
rejection, 1140, 1142–1143
Diffuse large B-cell lymphoma (DLBCL), 226, 227, 1020, 1024–1025
DiGeorge syndrome, 713
Dihydothradamine (DHR), 1054
analysis of FMN H2O2 production by flow
cytometry of dihydothradamine 123
staining, 310–312
interpretation and limitations, 312
principle, 310
procedure, 311–312
reagents, 310–311
range and normal range, 312
oxidation in oxidative metabolism
disorders, 772–773
Dilated cardiomyopathy, 975–978
Dilute Russell Viper Venom time assay, 906
Dimethyl sulfoxide (DMSO), as
cryoprotectant, 263
Direct antiglobulin test, for autoimmune
hemolytic anemia, 991
Direct detection
herpes simplex virus, 551–552
viral infections, 538–543
Direct fluorescent antibody (DFA)
adeno viruses, 603
Chlamydia trachomatis, 454
cryptosporidiosis, 491–492
enterovirus, 603
Francisella, 479
giardiasis, 495
herpes simplex virus, 552
human metapneumovirus, 603
influenza virus, 603
parainfluenza viruses, 603
Pneumocystis jirovecii, 527
rabies virus, 666, 671
respiratory syncytial virus, 603
respiratory viruses, 603
trichomoniasis, 498
varicella-zoster virus, 558
viral infections, 542
Disease, animal models of chemokines and
chemokine receptors in development
of, 353
Disseminated tumor cells, 1051–1052
DNA
cccDNA (covalently closed circular DNA), 624
cDNA, 8, 335. See also cDNA microarray
concentration measurement, 1074
detection
Epstein-Barr virus, 569
parovirus B19, 595
double stranded (dsDNA), antibodies to,
873–874
isolation, 5
DNA barcoding. See Barcoding
DNA-dependent protein kinase (DNA-PK), 58
dNA microarray
cDNA microarray in transplant rejection,
1134, 1137
lymphoma, 1020, 1024–1025
DNA polymerase, 1132–1133
DNA repair and recombination, T-cell defects
in, 725
ataxia telangiectasia, 722, 725
Omenn syndrome, 722, 725
DNase(s), 264
DNase B
anti-DNase B test, 399–400
DNA sequencing. See Sequencing
Dobovra-Belgrade virus, 660–661, 663
DOCK8 deficiency, 10, 724, 729
Donor-specific antibodies, 1091, 1097,
1100–1101, 1126–1127
Dot ELISA, for arboviruses, 651
EC (endothelial cell) crossmatch, 1105
E. coli, in cryofibrinogenemia testing,
108–109
Edu (5-ethynyl-2′-deoxyuridine), 270, 271, 277
EEE (eastern equine encephalitis), 648–656
EFLM (European Federation of
Immunogenetics), 1075
EIA. See Enzyme immunoassay
EITB (enzyme-linked immunoelectrotransfer
blot), for cisticercosis, 492–493
Electrochemiluminescence (ECL) assay, 942–945
glutamic acid decarboxylase autoantibodies, 944–945
insulin autoantibodies (IAA), 943–944
protein biomarker validation, 1145
Electron microscopy
amebiasis, 489
astroviruses, 642
herpes simplex virus, 551
parovirus B19, 593–594
rotaviruses, 639
varicella-zoster virus, 558
Electropherogram, 75–76, 90–93, 115–117,
119–120
Electrophoresis, 74–87
acutephase reaction, 81–82
agarose gel. See Agarose gel electrophoresis

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On: Sun, 14 Jul 2019 20:38:19
artifacts, 95–96
capillary. See Capillary electrophoresis
chimerism testing, 1162–1163
clinical applications, 85–87
cost of testing, 87
difference gel electrophoresis (DICE), 1140, 1142–1143
false-positive results, 86–87
fuzzy bands, 83–84
immunochemical characterization of immunoglobulins, 89–99
immunofixation. See Immunofixation electrophoresis
immunosubtraction. See Immunosubtraction electrophoresis
liver disease pattern, 80–82
monoclonal gammopathies, 112, 115–121
M-spine measurement/quantification, 119–121
nephrotic pattern, 82
oligoclonal banding, 94–95
PAGE. See Polyacrylamide gel electrophoresis
principles, 74–76
protein analysis, 27–28, 89
protein structure and, 74
proteome studies in transplant rejection protein analysis, 27–28, 89
protein analysis, 28
principles, 74–76
PAGE.
oligoclonal banding, 94–95
false-positive results, 86–87
difference gel electrophoresis (DIGE), 1140, 1142–1143
clinical applications, 85–87
chimerism testing, 1162–1163
specimen requirements, 77
M protein detection, 84–85
pattern interpretation, 80–84
proteins identified, 77–80
specimen requirements, 76–77
two-dimensional gel electrophoresis (2DE), 1140, 1142–1143
specimen requirements, 76–77
quality control/assurance, 76–77
specimen requirements, 76–77
specimen collection, transport, and storage, 539
rapid diagnosis of, 539
RNA integrity, analysis of, 1133
specimen requirements, 77
M protein detection, 82–83
M protein quantification, 83–84
M protein detection, 84–85
specimen requirements, 77
zone, 75–76
Elimination diets, 818
ELISA. See Enzyme-linked immunosorbent assay
ELISA inhibition assay, 791
ELISPOT. See Enzyme-linked immunosorbent spot (ELISPOT) assay
Emerin, 978
enm typing, 396
EMT (epithelial-mesenchymal transition), 1051–1052
Endocanophilases, 930–949
Endomysial antibodies, 984–985
Endoplasmic reticulum aminopeptidase (ERAP) 2 gene, 998
Endosmosis, 75
Endothelial cell (EC) crossmatch, 1105
Endothelial cells, 1103–1105
Enhancers, immunoglobulin, 59
α-Enolase, 1000
Entamoeba dispar, 489
Entamoeba histolytica, 489
Entanercept, for vasculitis, 913
Enteropathy type T-cell lymphoma, immunophenotype of, 228
Enterovirus
clinical significance, 600–602
description of agents, 599
direct fluorescent antibody (DFA), 603
epidemiology, 600
EV-D68, 601–602
rapid diagnosis of, 539
specimen collection, transport, and storage, 602–603
taxonomy, 599
transmission, 600
Enterovirus (genus), 599
Enzyme immunosorbent assay (EIA)
adenviruses, 645
antifungal antibody detection, 513–514
antiretinal antibodies, 1000
aspergillosis, 515–516
astrovirus, 644
blastomyocosis, 517
Borrelia burgdorferi, 422–423
candidiasis, 518–519
Chlamydia trachomatis, 455
Chlamydiophila pneumoniae, 456–457
coccidioidomycosis, 521–522
cryptococcosis, 523
cryptosporidiosis, 491–492
echinococcosis, 493
Entamoeba histolytica, 489
Epstein-Barr virus, 564, 567–568
fascioliasis, 494
fungal antigen detection, 514
fungal infections, 513–514
giardiasis, 495
hantaviruses, 661
hepatitis C virus, 628–629
hepatitis E virus, 627–628
hepatitis B virus, 565, 572–573
histamine, 801–802
human herpesvirus-6, 581, 583
human herpesvirus-7, 586
human herpesvirus-8, 587
human immunodeficiency virus (HIV), 698–701
leishmaniasis, 495
measles virus, 611–612
mumps virus, 615
Mycoplasma genitalium, 457
Myco-Plasmas pneumoniae, 445–446
paragonimiasis, 496
rubella virus, 616–617
strongyloidiasis, 497
systemic sclerosis-related antinuclear antibodies, 891–893
theory, 513
toxocariasis, 497
toxoplasmosis, 497
Treponema pallidum, 414–417
trichinelliasis, 498
Trypanosoma cruzi, 491
varicella-zoster virus, 559
viral infections, 541–542
Enzyme-linked immunoelectrotransfer blot (ETEB), for cytostercoris, 492–493
Enzyme-linked immunofluorescent assay (ELISA)
allergy testing, 791
allergen testing, 789–790
anticytokine autoantibody detection, 365, 367–368
anti-dsDNA antibodies, 874
antiganglioside antibodies, 963–964
anti-MCV (mutated citrullinated vimentin), 899
antimitochondrial autoantibodies, 967–968
antineutrophil cytoplasmic antibodies (ANCA), 911
antiphospholipid antibody testing, 907
arboviruses, 648, 650–653
automated liquid-handling systems, 1189–1190
Bartonella, 476
blocking reagent selection, 325–326
Borreliaburgdorferi, 422–423
Brucella, 478
chemokine/chemokine receptor assays, 348
Chlamydiophila pneumoniae, 457
Costella, 466
cytokine assays
plate-based micro-ELISAs, 330–331
sequential ELISA, 326–327
traditional ELISA, 324–326
direct, 325
Franciella, 479
glutamic acid decarboxylase autoantibodies, 945
group A streptococci, 401
hantaviruses, 661
Helicobacter pylori, 407–408, 409
herpes simplex virus, 552
histamine, 801–802
human T-cell lymphotropic virus, 676
humoral response in transplantation, evaluation of, 1093
IgE, 799
IgG4-related disease, 920
immunologic monitoring, 1040, 1045
indirect (sandwich), 325
insulin autoantibodies (IAA), 945
interferon alpha, 807
Leptospira, 429–430
leukotriene C4, 804
liver kidney microsomal antibodies, 970–972
myastenia gravis, 958–959
non-HLA antibody testing, 1104–1105
parvovirus B19, 594–595
pituitary antibodies, 947
pneumococcal, 283
prion diseases, 686
protein analysis, 28
protein biomarker validation, 1145
rabies virus, 666–667, 670–671
recombinant myositis autoantigens, 885–887
rheumatoid arthritis testing, 900–901
rheumatoid factor measurement by, 898
Rocky Mountain spotted fever, 465
sensitivity and specificity, 325
systemic sclerosis-related antinuclear antibodies, 892
thyroglobulin antibodies, 930–931
thyroxine-thyroidperoxidase antibodies, 930–931
tryptase, 806–807
tuberculosis, 441
validation, 1185
varicella-zoster virus, 558–560
Wuchereria bancrofti, 494
zinc transporter-8 (ZnT8) autoantibodies, 945
Enzyme-linked immunosorbent assay (ELISPOT) assay
applications of, 292
automated liquid-handling systems, 1189–1190
B-cell functional assays, 266–267
Fixation, for immunofluorescence, 377
FLAER (fluorescent derivative of bacterial pro-ailosyn), in PNH detection assays, 169, 172–178, 180
Flagellin, Borella burgdorferi, 421–422
Flaviviruses, 626–627
Flavivirus (genus), 627
FlowCAP, 164
Flow cytometry. See also Polychromatic flow cytometry
acute lymphoblastic leukemia/lymphoma immunophenotyping, 207–214
acute myeloid leukemia (AML), 217–223
allergen extract potency testing, 791
antibody deficiencies, laboratory investigation of, 741
automated liquid-handling systems, 1189–1190
basophil activation testing, 821
bead array assays, 332–334
cell processing, 339–340
cellular conjugate verification, 175, 177
flow cytometry, 25–27
future technologies and applications, 251–257
hematopoietic stem cells enumeration, 182–196
benefits, 190–191
CD34+ cell subsets in backup marrow, 196
clinical issues, 183
clinical utility, 195–196
commercial kits based on ISHAGE guidelines, 187–190
controls for rare-event detection, 184
early methods, 183
graft assessment, 183
immunological characterization of CD34+ stem cells, 193–195
ISHAGE protocol, basic, 185
ISHAGE single platform with viability assessment, 185–187
lysing agents, 191
negative antibody controls, 191
quality assurance, 191
sequential Boolean gating, 184–185
simultaneous CD34++CD3+ cells, 192–193
single-platform absolute CD34++count, 185
statistical issues in rare-event detection, 183–184
technical issues, 184
chemoassay, 348
chimerism testing, 1165
chronic lymphocytic leukemia (CLL), 226–232
cardiac issues, 232
role in diagnosis, 226
role in prognostication, 226–227
sample preparation, 227–228
ZAP-70 analysis, 229–232
circulating tumor cells, 1054
combined immunodeficiency (CID), 729–732
Ca++ flux assay, 733
cell populations, 729–730
Foxp3 analysis, 731
intracellular cytokine staining, 730
intracellular protein expression and T-cell differentiation, 730
T-cell activation, 731–732
tyrosine phosphorylation (phosphoepitope analysis), 732
WASp, SAP, or XIAP expression, 731
compensation, 150
hardware, 149
software, 149
complement control proteins, 749
cytokine measurement, 323, 338–340
bead array assays, 332–334
cell processing, 339–340
costimulation, 338
data analysis, 340
resting prior to stimulation, 338
secretion inhibitors, 339
stimulation kinetics, 339
stimulation vessels, 338
workflow of intracellular cytokine staining (ICS) assay, 340
future technologies and applications, 251–257
hematoviruses, 663
history of, 149
humoral response in transplantation, 1094–1095
assay characteristics, 1093
general principles, 1094
IgG4-related disease, 920
immunologic monitoring cytokine, 1042
intracellular staining for flow cytometry, 1042
multi-parameter flow cytometry, 1042–1043
immunophenotyping cryopreserved peripheral blood mononuclear cells (PBMC), 265–266
interferon assessment, 876
laboratory investigation of antibody deficiencies, 741–742
leukocyte adhesion deficiency (LAD), 771
lymphoma, 1024
mass cytometry, 251–253
acquisition speed, 252–253
assay sensitivity, 179–180
assay validation, 178–180
evolution of methods, 168–169
fluorescence-minus two controls, 177–178
general guidelines, 169
high-sensitivity five-color WBC assay, 175, 177
high-sensitivity four-color WBC assay, 171–174
high-sensitivity RBC assay, 170–171
high-sensitivity six-color WBC assay, 175, 178
issues with early flow methods, 169
presence of type II populations in neutrophils and monocytes, 174–176
quality control and assurance, 175, 177–178
routine versus high-sensitivity, 169
strategies for outgoing antibody-conjugate verification, 175, 177
verification of instrument set-up and antibody performance, 178–179
phospho-flow, 253–256
antibodies, 255
data analysis, 255
fixation and permeabilization, 255
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
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mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
mass cytometry combined with, 256
Fluorescent antibody virus neutralization (FAVN), for rabies virus, 669–670
Fluorescent in situ hybridization (FISH) chimerism testing, 1164–1165
lymphoma, 1019–1020, 1024–1025, 1027
myeloproliferative hypereosinophilic syndromes, 827
Fluorescent treponemal antibody absorption (FTA-ABS) test, 414–417
Fluorochromes
Food allergy, 783, 815–822
Follicular lymphoma, 227, 1017, 1023–1024
Focus reduction neutralization test (FRNT), FNKD (functional NK cell deficiency), 300, 1185–1187
FNKD (functional NK cell deficiency), 300, 306
Focus reduction neutralization test (FRNT), for bartonellosis, 660
Follicular lymphoma, 227, 1017, 1023–1024
Food allergy, 783, 815–822
atopic dermatitis and, 815–819, 821
cell-mediated disorders, 815–816
disorders, 816
foods commonly associated with, 815
IgE-mediated, 815–816
RAST (radioallergosorbent test), 817, 819
signs and symptoms, 816
skin testing, 808
in vitro tests, 819–822
basophil responses, 821
component resolved diagnostics, 820–821
quantification of food-specific IgE antibodies, 819–820
quantification of food-specific IgG antibodies, 821
specific epitope analysis, 821–822
total IgE, 821
tryptase, serum, 821
in vitro tests, 816–819
atopy patch tests, 817–818
elimination diets, 818
fresh food skin prick tests, 817
intraepidermal skin tests, 817
oral food challenges, 818–819
skin prick tests, 816–817
Food and Drug Administration (FDA) analyte specific reagents regulation, 1175
Good Laboratory Practices (GLP) Regulations, 1175
laboratory-developed tests regulation, 1175
test system premarket approval process, 1172
Food challenges
double-blind, placebo-controlled, 815–822
oral, 818–819
Forced expiratory volume in 1 second (FEV1), 810–811
Fourier transform ion cyclotron resonance (FTICR) MS, 1143
FOX3, 13, 275, 296, 1046
CD25 deficiency and, 727
detection in intracellular cytokine staining (ICS) assay, 339
flow cytometry, 731
Franciscella
clinical manifestations, 475
epidemiology, 474
F. novicida, 473
F. philomiragia, 473–474, 479
F. tularensis, 473–475, 479
F. tularensis subsp. holarctica, 473–475
F. tularensis subsp. mediasiatica, 473–474
F. tularensis subsp. novicida, 473–474, 479
F. tularensis subsp. tularensis, 473–475
immunological methods, 479
laboratory diagnosis, 478–479
culture, 478
immunological methods, 479
molecular methods, 479
serology, 478–479
serology, 478–479
ELISA, 479
microagglutination, 478–479
tube agglutination, 478–479
taxonomy, 473–474
Franciscella, 473–474
Free light chain(s)
clearance/metabolism of, 89
diseases, 94
electrophoresis, 94
kappa-to-lambda ratio, 113, 116, 119–120
monoclonal, 94
monoclonal gammopathies, 112–116, 118–121
multiple myeloma, 113
Free light chain assay, 68–69, 71, 98
quantitative, 115–116
screening for M protein detection, 116, 118
Fresh food skin prick tests, 817
Frozen-tissue sectioning, 377
FTA-ABS (fluorescent treponemal antibody absorption) test, 414–417
FTICR (Fourier transform ion cyclotron resonance) MS, 1143
Functional cellular assays
for B cells and antibodies, 261, 280–288
chronic granulomatous disease diagnosis, 262, 310–320
cryopreservation of peripheral blood mononuclear cells, 261, 263–267
enzyme-linked immunosorbent assay (ELISPOT) assay, 261, 290–293
lymphocyte activation, 261, 269–278
NK cell assays, 262, 300–307
overview, 261–262
regulatory T cell (Treg) assays, 261–262
Functional NK cell deficiency (FNKD), 300, 306
Fungal infections, 485, 503–528
Fungal infections, 485, 503–528
Fungal infections, 485, 503–528
Fungal infections, 485, 503–528
Fungal infections, 485, 503–528
Fungal infections, 485, 503–528
Fungal infections, 485, 503–528
Fungal infections, 485, 503–528
Gene expression profiles in allografts, 1132–1135
absolute quantification of mRNA levels by PCR, 1133
competitive quantitative PCR, 1133
microarray assays, 1134
next-generation sequencing, 1134–1135
PCR, 1132–1133
preamplification-enhanced real-time PCR assay, 1133–1134
real-time quantitative PCR, 1133
Gene therapy, for severe combined immunodeficiency (SCID), 715
Genetic diseases, molecular methods of diagnosis, 5–17
analysis of variations, 9–11
arrays, 8–9
diagnosis process, 12–17
framework for diagnosis in immunocompromised patients, 16–17
next-generation sequencing, 7–8
PCR, 5–6
quantitative RT-PCR (qPCR), 8–9
RT-PCR, 8
samples, 5
Sanger sequence analysis, 6–7
TagMan, 8
T-cell excision circles (TRECs), 8
Genetic prion diseases, 690–691
Genome Analysis Toolkit (GATK), 7–8, 1087
Genome size, 19
Genomics, 3
See also Metagenomics
immunologic monitoring, 1046
Genotyping
HLA typing, 1074
human immunodeficiency virus (HIV), 706
killer cell immunoglobulin-like receptors (KIRs), 1154, 1157–1158
mumps virus, 614
viral infections, 544, 546
German measles, 615
Gerstmann-Sträussler-Scheinker (GSS) syndrome, 682, 687, 690
Giant cell arteritis, 911
Hematopoietic stem cell transplantation (HSCT), 182–183
chimerism testing after, 1161–1165
Epstein-Barr virus and, 563–564
graft assessment by CD34+ cell enumeration, 183
killer cell immunoglobulin-like receptors (KIRs) in, 1154–1156
augmenting NK cell-mediated benefits after transplant, 1156
control of viral infections after transplant, 1155–1156
determination of donor NK cell alloreactivity, 1154–1155
donor selection based on KIR genotype, 1155
mismatching, 1155
measuring graft adequacy, 182
mismatching, 1066, 1155
for severe combined immunodeficiency (SCID), 715
Hemoglobinuria
Hereditary senile systemic amyloidosis, 77
Hereditary hemorrhagic telangiectasia, 140–141
Histamine
Histocompatibility testing standards, 1177
Histopathology, of cytomegalovirus, 572
Histograms, 153
Highlands J virus, 650
HIV.
HIVassociated lymphomatosis, 1091–1101
evaluation of, 1091–1101
rationale, 524–525
commercial indications and diagnostic rationale, 524
complement fixation, 524–525
enzyme immunoassay (EIA), 525–526
immunodiffusion, 524
latex agglutination, 525
HIV. See Human immunodeficiency virus
HLA (human leukocyte antigen)
gene polymorphism, 1065
humoral response in transplantation, 1091–1101
mismatching, 1066
...
natural killer cell receptor ligands, 1150–1158
omenclature, 1072
relevance in transplantation, 1091–1092
HLA Caller software, 1087
HLA-DR, 208, 211, 217–220, 1125
HLA typing
in celiac disease, 984, 986
contamination prevention, 1075–1076
future of, 1087–1088
HLA-DR, 208, 211, 217–220, 1125
HLA Caller software, 1087
sequence-specific oligonucleotide probes
Sanger sequence-based typing (SBT)
interpretation of results, 69–70
HLH (hemophagocytic lymphohistiocytosis), 204
HME (human monocytic tropic leukemia), 462–464, 466, 468
HMG (high-mobility group) proteins, 58
Hodgkin’s lymphoma
classical, 1027–1028
nodular lymphocyte-predominant, 1025, 1028
Hook effect, 68–69
Horizon stains, 149
Horseshoe crab, 127, 129, 514
HSC. See Hematopoietic stem cell transplantation
hsSLAM (human signaling lymphocyte activation molecule), 611
HTLV. See Human T-cell lymphotropic virus
HTLV-1-associated myelopathy/tropical spastic paraparesis (HAM/TSP), 675
Human bocavirus
description of agents, 599–600
new species, 598
specimen collection, transport, and storage, 602–603
taxonomy, 599
Human Cell Differentiation Molecules (HCDM), 158
Human coronaviruses
clinical significance, 600–602
description of agents, 599
epidemiology, 600
Middle East respiratory syndrome (MERS) coronaviruses, 538, 598–599, 602–603
new species, 598
rapid diagnosis of, 539
severe acute respiratory syndrome (SARS) coronaviruses, 538, 599, 602
specimen collection, transport, and storage, 602–603
taxonomy, 599
transmission, 600
Human Genome Variation Society
omenclature, 6
Human granulocytic anaplasmosis (HGA), 462–463, 466, 468
Human herpesvirus-6, 578–585
antibody avidity assay, 583
antibody detection, 581–582
anticomplement immunofluorescence assay (ACIF), 582–583
antigen detection, 580–582
antiviral susceptibility testing, 584–585
biological characteristics, 579
clinical manifestations, 579
collection and storage of specimens, 582
culture, 581
diagnostic methods, 581
genome, 581
immunohistochemistry (IHC), 580–581
immunologic diagnosis, 580–583
immunology of infection, 580
indirect fluorescent antibody (IFA), 582
molecular diagnosis, 583–584
morphology, 578
neutralization test, 583
nucleic acid detection, 581, 583–584
PRC, 583–584
radioimmunoprecipitation assay (RIA), 583
rapid diagnosis, 539
reactivation, 579–580
respiratory symptoms, 600
serology, 583
spike amplification shell vial assay, 581–582
transmission, 579–580
Western blot, 583
Human herpesvirus-7, 585–586
antigenemia assay, 586
biological characteristics, 579
clinical disease, 581
culture, 581
diagnostic methods, 581
enzyme immunoassay (EIA), 586
epidemiology and clinical characteristics, 580
genome, 585
immunologic and molecular diagnosis, 585–586
indirect fluorescence antibody (IFA), 586
nucleic acid detection, 581
reactivation, 585
serology, 586
Western blot, 586
Human herpesvirus-8, 586–588
biological characteristics, 579
culture, 581, 587
diagnostic methods, 581, 587–588
disease associations, 586
enzyme immunoassay (EIA), 587
epidemiology and clinical characteristics, 580
genetic diversity, 586
genome, 586
HIV coinfection, 586–588
immunoblot, 587–588
indirect fluorescence antibody (IFA), 587–588
nucleic acid detection, 581
PCR, 587
respiratory symptoms, 600
serology, 587–588
transmission, 587
Human herpesvirus 8, lymphomas and, 1020, 1025
Human Immune Monitoring Center, 148
Human immunodeficiency virus (HIV)
antiviral susceptibilities, 726–727
genotyping assays, 706
phenotyping assays, 706–707
tropism assays, 707
assay result trending, 542
chemiluminescence immunoassay (CIA), 698–700
circulating recombinant forms, 699
coinfections/codisorders
Baronella, 474
Epstein-Barr virus, 567
human herpesvirus-6, 578–579
human herpesvirus-8, 586–588
lymphoma, 1025
strongyloidiasis, 497
syphilis, 412
toxoplasmalnosis, 498
method, 435–436
reproducibility, conversions, and reversions, 437
role in active TB diagnosis, 440
sensitivity and specificity, 439–440
variability and quality control issues, 437
role in active TB diagnosis, 440
sensitivity and specificity, 439–440
T-SPOT.TB assay, 435, 437–441
advantages and disadvantages, 439
in children, 441
costs, 439
in immunocompromised people and HIV-infected patients, 440–441
interpretation criteria, 439
method, 435, 437–439
role in active TB diagnosis, 440
sensitivity and specificity, 439–440
IgA antimitochondrial autoantibodies, 966
characteristics, 66–67
class switching, 58–59
cryoglobulins, 101–102, 105
deficiency, 70, 740–741, 984
electrophoresis, 80
Epstein-Barr virus, 568
function, 280
heavy-chain disease, 94
hyperviscosity and, 71
immunofixation electrophoresis, 90–91
immunosubtraction, 91–92
measurement of, 67–68
in monclonal gammopathies, 114
monoclonal, 93
M protein electrophoresis, 82
polyclonal, 93
pyroglobulins, 110
structure, 52, 66–67
subclasses, 67
IgA vasculitis, 911
IgD characteristics, 66–67
class switching, 58–59
electrophoresis, 80
in monclonal gammopathies, 114
monoclonal, 93
M protein electrophoresis, 82
polyclonal, 93
pyroglobulins, 110
structure, 52, 66–67
surface, 280–281
IgD myeloma, 85
IgE allergen potency testing, 790–791
in allergic diseases
allergen-specific IgE, 795–798
total serum IgE, 796–797, 798–800
basophil histamine release assay for demonstration of activity, 802
characteristics, 66–67
class switching, 58–59
electrophoresis, 80
in monclonal gammopathies, 114
monoclonal, 93–94
in multiple myeloma, 113–114
pyroglobulins, 110
structure, 52, 66–67
surface, 280–281
IgD myeloma, 85
monoclonal, 93–94
omalizumab (anti-IgE), 795
pyroglobulins, 110
structure, 52, 66–67
total serum IgE assay, 796–797, 798–800
IgE myeloma, 80, 85
IgG allergen-specific, 796–797, 799
anti-acetylcholine receptor antibodies, 955
anticytokine autoantibodies, 369
antimitochondrial autoantibodies, 966
Bartonella, 476
Brugia, 494
class switching, 58–59
complement activation, 129
Coxiella, 466–467
cryoglobulins, 101–102
class switching, 58–59
immunofixation electrophoresis, 79
IgG4 molecule, 918
IgG4-related disease, 917–920
measles viruses, 611–614
measurement of, 67–68
in monclonal gammopathies, 114
monoclonal, 93
M protein electrophoresis, 82
mumps virus, 614–615
onchocerciasis, 494
polyclonal, 93
pyroglobulins, 110
structure, 52, 66–67
serum IgG4 concentrations, 919–920
treatment, 919
IgG avidity
cytomegalovirus, 572–573
herpes simplex virus, 553
human herpesvirus-6, 583
measles viruses, 611
rubella virus, 616
toxoplasmosis, 498
IgG ELISA, for arboviruses, 651
IgG index, 99
IgG myeloma, 89
IGH gene, 1024, 1028
IgM Bartonella, 476
characteristics, 66–67
Chlamydia pneumoniae and, 457
class switching, 58–59
complement activation, 129
Coxiella, 466
cryoglobulins, 101–103, 105
cytomegalovirus, 543–544, 572
electrophoresis, 80
Entamoeba histolytica, 489
Epstein-Barr virus, 565–569
function, 280
hantaviruses, 658, 660–662
heavy-chain disease, 94
hepatitis A virus, 624
hepatitis B virus, 624
hepatitis C virus, 633
human herpesvirus-6, 580, 584
hyper-IgM syndrome type 1, 58
hyper-IgM syndrome type II, 59
hyperviscosity and, 71
immunofixation electrophoresis, 79, 90–91
immunosubtraction, 91–92
Loa loa, 495
measles viruses, 611–614
measurement of, 67–68
in monclonal gammopathies, 114
monoclonal, 93
M protein electrophoresis, 82
mumps virus, 614–615
onchocerciasis, 494
polyclonal, 93
pyroglobulins, 110
Rocky Mountain spotted fever, 465
rubella virus, 616–617
structure, 51–52, 66–67
subclass deficiency, 741
toxoplasmosis, 497–498
trichinellosis, 498
varicella-zoster virus, 557, 559–560
IgG4 allergen-specific, 797, 799
characteristics of molecule, 918
food-specific antibodies, 821
serum concentrations in IgG4-related disease, 919–920
IgG4-related disease, 917–920
clinical features, 917–918
abdomen, 917
chest, 917
head and neck, 917
retroperitoneum, 917–918
flow cytometry, 920
immunodiagnosis, 919
pathology, 918
pathophysiology, 918–919
B-cell lineage, 918
CD4 killer cell, 919
IgG4 molecule, 918
immunoglobulin class switch, 918–919
T-cell pathways, 919
leptospirosis, 429–430
IgM paraproteinemic neuropathy, 961, 964
IHA. See Indirect hemagglutination assay
ISUB. See Immunosubtraction (ISUB)
electrophoresis
iTRAQ, 1145
ILU1S (International Union of Immunological Societies), 1178
Ivemark syndrome, 713
IVG (intravenous immunoglobulin), 1066
IVM (intravital microscopy), 350, 352–354
Ixes, 463
J. pacificus, 421
J. persulcatus, 421, 462
J. ricinus, 421, 462
J. scapularis, 421, 462, 490
Lyme disease, 419, 421
relapsing fever, 427
JAK3 deficiency, 723, 727
jak3 gene, 301, 306
Japanese encephalitis, 648–653
Kappa receptor- excision circle (KREC) assay, 91–92
Kappa light chain, 40, 51, 66–67
Kaposi’s sarcoma, 586–588, 1020
Kappa light chain, 40, 51, 66–67
electrophoresis, 80
gene complex, 53–56
immunofixation electrophoresis, 80
immunofluorescence, 80
immunologic biomarker for chemotherapy response, 1043
immunosubtraction, 91–92
monoclonal proteins, 93–94
Kappa receptor-excision circle (KREC) assay, 718–719
Kawasaki disease, 913
Kenya tick typhus, 461
Keratin, antibody against, 898–899
Keratoconjunctivitis, cryoglobulinemia and, 102
Ki-67 assay, 270, 272
Kidney disease
acute glomerulonephritis, poststreptococcal, 394–395, 397, 399–401
electrophoresis patterns, 82, 84
Kidney transplantation
allocation process using calculated panel-reactive antibody (cPRA), 1065
complement activation products in, 1126
kidney paired-exchange (KPD) programs, 1066
killer cell immunoglobulin-like receptors (KIRs) and, 1156–1157
Killers cell immunoglobulin-like receptors (KIRs), 300, 1066, 150–158
clonal expression, 1153–1154
genotyping, 1154, 1157–1158
in hematopoietic stem cell transplantation, 1154–1156
augmenting NK cell-mediated benefits after transplant, 1156
control of viral infections after transplant, 1155–1156
determination of donor NK cell alloreactivity, 1154–1155
donor selection based on KIR genotype, 1155
overview, 1150–1151
population differences in, 1152–1153
sequence polymorphism, nature of, 1152
in solid organ transplantation, 1156–1157
kidney, 1156–1157
liver, 1157
variation between individuals, 1151–1152
K1 poliovirus, 598, 600
Kit, 832–834
Koplik spots, 610
Kostmann syndrome, 767
KRAS mutations, 1054, 1057
KREC (kappa receptor-excision circle) assay, 718–719
Ku, antibody to, 891
Ku protein, 57
La antigen, antibodies to, 869
Laboratory Accreditation Program, CAP, 1176–1179
Laboratory-developed tests, 1175, 1181
Laboratory management, 1169–1179
accreditation, licensure, and credentials, 1171–1179
validation and quality control, 1180–1191
LaCrosse encephalitis, 648–649, 651–653
LAD (leukocyte adhesion deficiency), 765, 776
LAD-1 (leukocyte adhesion deficiency type-1), 1 cell surface adhesion marker upregulation in, 201–202
Lambda-5 protein, 57
Lambda light chain
electrophoresis, 80
gene complex, 53–56
immunofixation electrophoresis, 90–91
immunofluorescence, 80
immunologic biomarker for chemotherapy response, 1043
immunosubtraction, 91–92
monoclonal proteins, 93–94
Kappa receptor-excision circle (KREC) assay, 718–719
Kawasaki disease, 913
Kenya tick typhus, 461
Keratin, antibody against, 898–899
Keratoconjunctivitis, cryoglobulinemia and, 102
Ki-67 assay, 270, 272
Kidney disease
acute glomerulonephritis, poststreptococcal, 394–395, 397, 399–401
electrophoresis patterns, 82, 84
Kidney transplantation
allocation process using calculated panel-reactive antibody (cPRA), 1065
complement activation products in, 1126
kidney paired-exchange (KPD) programs, 1066
killer cell immunoglobulin-like receptors (KIRs) and, 1156–1157
Killers cell immunoglobulin-like receptors (KIRs), 300, 1066, 150–158
clonal expression, 1153–1154
genotyping, 1154, 1157–1158
in hematopoietic stem cell transplantation, 1154–1156
augmenting NK cell-mediated benefits after transplant, 1156
control of viral infections after transplant, 1155–1156
determination of donor NK cell alloreactivity, 1154–1155
donor selection based on KIR genotype, 1155
overview, 1150–1151
Leukemia (continued)
myelogenous leukemia, BCR-ABL
translocation in, 922
plasma cell, 235–237, 240
IMWG diagnostic criteria, 237
monoclonal gammopathy, 113
pyroglycobiologin and, 110
Leukotriene C4, assay for, 803–804
Levey-Jennings chart, 77–78, 153–154,
1188–1189
L-ficolin, 133
Liat HIV Quant VL assay, 702
Licensure of clinical immunology laboratory,
1176–1177
Light-chain deposition disease, in monoclonal
Luminex assay
Limiting dilution assay (LDA)
LightCycler HA V quantitation assay, 623
Light chains, immunoglobulin
Light-chain multiple myeloma, 94
Light chain, 53–56
kappa, 53–56
immunofixation electrophoresis, 90–91
immunomutation, 91–92
monoclonal proteins, 93–94
production excess, 89
structure, 40, 51, 66–67
LightCycler HAV quantitation assay, 623
Limiting dilution assay (LDA)
of cytotoxic T lymphocytes, 1110–1111
of helper T lymphocytes, 1110
Limit of blank (LoB), 1185
Limit of detection (LoD), 1185–1187
Limit of quantitation (LoQ), 1185–1186
Linearity, 1185–1186
Line-blotted immunoassay, for systemic sclerosis-
related antineutrophil antibodies, 892–894
Line immunoassay, for human T-cell
lymphotropic virus, 676–677
Liprotein-related protein 4 (LRP4),
antibodies against, 958
LIPS. See Luciferase immunoprecipitation
systems
Liquid chromatography coupled with mass
spectrometry (LC-MS), 38
IgG4-related disease, 920
protein studies in transplant rejection,
1142–1143
Liquid-handling systems, automated,
1189–1190
Live-Dead stains, 149
Live-gating techniques, 163
Liver disease
autoimmune hepatitis, 969–972
electrophoresis pattern, 80–82
primary biliary cholangitis, 966–969
Liver kinase B1 (LKB1), 1143
Liver transplant
complement activation products in, 1127
microbiome of recipient, 23
Lupus. See Systemic lupus erythematosus
(SLE)
Lupus anticoagulant, 905–907
Lutzomyia verrucarum, 474
Lyme disease, 419–420
taxonomy of Lyme
Borrelia
erythema migrans, 421–426
epidemiology, 419, 421
assay for, 803–804
molecular diagnostic tests, 1127
Western blot, 422–423, 425
measurement of T cell proliferation by
Ki-67 assay, 270, 272
measurement of T cell proliferation by
using [H]-thymidine, 270
Lymphocyte cultures from allograft biopsy
specimens, 1112–1113
concepts, 1112–1113
pitfalls and troubleshooting, 1113
procedure, 1113
Lymphocyte proliferation assay (LPA), 732
for B-cell analysis, 281–282
cryopreserved peripheral blood
mononuclear cells (PBMC), 264–265
secretion of soluble mediators, 282
stimulation index, 282
using Euh-based flow cytometry, 271,
277
in vitro whole-blood, 283–284
Lymphocyte separation medium, 1109
Lymphocyte-specific protein kinase (LCK),
1138
Lymphogranuloma venereum, 453–455
Lymphoma, 1015–1029.
See also specific types of lymphoma
adult T-cell leukemia/lymphoma, 1026
anaplastic large-cell lymphoma (ALCL),
228, 1017, 1020, 1027
Burkitt's, 227, 563, 1017, 1020, 1025
classification, 1015–1017
diagnostic tests, 1017–1020
cytology, 1018–1020
flow cytometry, 1017
in situ hybridization, 1019
molecular cytophenetics, 1019–1020
PCR, 1018–1020
diffuse large B-cell lymphoma (DLBCL),
226–227, 1020, 1024–1025
Epstein-Barr-associated, 1020
folicular, 227, 1017, 1023–1024
human herpesvirus 8-associated, 1020
human T-cell leukemia virus-associated,
1020
immunophenotypes of T-cell chronic
lymphoproliferative disorders, 228
lymphoblastic, 1020–1022
lymphoplasmacytic, 226, 1023–1024
MALT (mucosa-associated lymphoid
tissue), 404, 1017, 1020
mantle cell lymphoma (MCL), 226–227,
229, 1017, 1023
marginal zone, 1023
markers, 1020–1028
multiple myeloma, 1024
NK/T-cell, 1020, 1026–1027
nodular lymphocyte-predominant
Hodgkin's lymphoma, 1025, 1028
peripheral T-cell lymphoma, 1020
small lymphocytic, 226, 1023–1024
small mature B cell lymphoma, 1023–1025
splenic marginal zone, 227, 1023
T-cell-rich large B-cell lymphoma, 1025
translocations in, 1019–1020, 1022–1024
Lymphoplasmacytic lymphoma, 226,
1023–1024
Lymphoproliferative disease
Epstein-Barr virus-associated, 567
monoclonal gammopathy, 113
percentage of plasma cell proliferative
disorders, 90
lympholization, 159
lyoplates, 159
lysozyme, 1028
lyssavirus, 665
LYST, 301, 307, 771, 776, 778

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On: Sun, 14 Jul 2019 20:38:19
Monoclonal gammopathy, 89–90, 112–121.
See also specific disorders
classification, 112–115
malignant plasma cell proliferative disorders, 112–114
premalignant plasma cell proliferative disorders, 114
prostate (or low-tumor-burden) diseases, 114–115
diagnostic testing strategy, 115–116
electropherograms, 116–117, 119–120
free light chains, 112–116, 118–121
monitoring M proteins, 119–121
M-spike measurement/quantification, 119–121
ordering patterns, 121
response to therapy, criteria for, 121
screening panels for M protein detection, 116, 118
stratification of risk, 118–119
Monoclonal gammopathy of undetermined significance (MGUS), 71, 84, 87, 89–90, 94, 97, 235–237, 239–240, 242–244, 247
diagnosis, 114, 118
immunofixation electrophoresis, 118–119
immunoglobulin types, 114
IMWG diagnostic criteria, 237
incidence, 114
percentage of plasma cell proliferative disorders, 90
progression, 114, 118
progression to multiple myeloma, 236
Monoclonal proteins disorders associated with, 89–90, 93–94
diversity of, 112
electrophoresis biconal pattern, 93–94
clinical applications, 85–87
detection in serum, 82–85
detection in urine, 84–85
immunofixation and immunounsubraction, 93–94
immunoglobulin G, 75–76
principles, 75–76
quantification in serum, 83–84
quantification in urine, 97
sample requirements, 75–76
immunochromatographic characterization, 89–99
monitoring, 119–121
screening panels for M protein detection, 116, 118
Monocytes
flow cytometry for detection/monitoring of
INH, 171–179
malignancies of, 1028–1029
MonoMAC syndrome, 10, 15–16
Mononegavirales, 654
Monoplex assays, for viral infections, 544–545, 665
MonoMAC syndrome, 10, 15–16
M protein. See also Monoclonal proteins
anti-M-protein test, 401
detection, 82–83
quantification, 83–84
M protein serotyping, streptococci, 396
MRD. See Minimal residual disease
mRNA
absolute quantification of mRNA levels by
PCR, 1133
cancer-specific, 1054
cytokine, detection with in situ hybridization, 335
gene expression profiles in allografts, techniques for characterization, 1132–1135
profiles in tissue rejection, 1135–1138
mRNA quantification assays, in cryopreserved peripheral blood mononuclear cells (PBMC), 267
MS. See Multiple sclerosis
MS2 phage, 606–607
MS/MS analysis of
of intact proteins, 39–40
of proteolytic peptides to quantify proteins by SRM, 38–39
of tryptic peptides to identify proteins, 38
M-spike, 1009.
See also Monoclonal proteins
capillary electrophoresis, 79–80
cryoglobulins and, 101–103
measurement/quantification, 119–121
multiple myeloma and, 70
pyroglobulins and, 110
MST1 mutation, 725
MMT reduction assay, 1109–1110
Mucocutaneous gd T-cell lymphomas, 1054
Mucin 1, 1054
MTT reduction assay, 1109–1110
Mu heavy chain, 66–67
Mucocutaneous gd T-cell lymphomas, 1054
Mucin 1, 1054
Mutant lymphocyte assay, 228
Multimodal imaging, 228
Multifocal motor neuropathy (MMN), 228
Multidimensional protein identification technology (MudPIT), 1143
Multifocal motor neuropathy (MMN), 961–962, 964
Multiprofile assay (MPA), 228
Mutational analysis of the M protein, 1009.
See also Monoclonal proteins
capillary electrophoresis, 79–80
cryoglobulins and, 101–103
measurement/quantification, 119–121
multiple myeloma and, 70
pyroglobulins and, 110
multiple myeloma, 235–237, 242–244, 247
Multiple myeloma, 89, 235–247, 1024
Multiphoton intravital microscopy, 352–354
Multiphoton intravital microscopy, 352–354
Multiphoton intravital microscopy, 352–354
Multiple myeloma, 112–114, 116
M protein serotyping, streptococci, 396
MRD. See Minimal residual disease
mRNA
absolute quantification of mRNA levels by
PCR, 1133
cancer-specific, 1054
cytokine, detection with in situ hybridization, 335
gene expression profiles in allografts, techniques for characterization, 1132–1135
profiles in tissue rejection, 1135–1138
mRNA quantification assays, in cryopreserved peripheral blood mononuclear cells (PBMC), 267
MS. See Multiple sclerosis
MS2 phage, 606–607
MS/MS analysis of
of intact proteins, 39–40
of proteolytic peptides to quantify proteins by SRM, 38–39
of tryptic peptides to identify proteins, 38
M-spike, 1009.
See also Monoclonal proteins
capillary electrophoresis, 79–80
cryoglobulins and, 101–103
measurement/quantification, 119–121
multiple myeloma and, 70
pyroglobulins and, 110
MST1 mutation, 725
MMT reduction assay, 1109–1110
Mucocutaneous gd T-cell lymphomas, 1054
Mucin 1, 1054
Mutant lymphocyte assay, 228
Multimodal imaging, 228
Multifocal motor neuropathy (MMN), 961–962, 964
Multiprofile assay (MPA), 228
Mutational analysis of the M protein, 1009.
See also Monoclonal proteins
capillary electrophoresis, 79–80
cryoglobulins and, 101–103
measurement/quantification, 119–121
multiple myeloma and, 70
pyroglobulins and, 110
multiple myeloma, 235–237, 242–244, 247
Multiple sclerosis (MS)
diagnosis, 98–99
interferon-β (IFN-β) treatment for, 323, 357, 362
Multiplex assays
chemokine/chemokine receptor assays, 348
rheumatoid arthritis testing, 901
viral infections, 544–545, 605–606
Multiplex bead fluorescence immunoassays
meso viruses, 611–613
mumps virus, 615
rubella virus, 616–617
Multiplex cytokine assays, 324–336
bead array assays, 324–334
capillary electrophoresis, 331–332
cost comparison, 334–335
membrane-bound antibody arrays, 331
microarrays, 327–330
molecular methods for measuring cytokines, 335
overview, 324
PCR, 335
plate-based micro-ELISAs, 330–331
sequential ELISA, 326–327
in situ hybridization, 335
traditional ELISA, 324–326
Multiplexed opsonophagocytic killing assay (MOPA4) for functional antibodies against Streptococcus pneumoniae, 285–288
materials and reagents, 285
prepared solutions, 285–286
procedures, 286–288
HL-60 cell differentiation, 286
initiation of HL-60 cultures, 286
preparation of target bacteria working stocks, 286
routine HL-60 propagation, 286
Multiplex ligation-dependent probe amplification (MLPA), 745
Multiplex reverse transcription-PCR (RT-PCR)
human immunodeficiency virus (HIV), 702
rotaviruses, 640
Mumps virus, 285–286
Mumps virus, 614–615
clinical manifestations, 614
complement fixation, 615
diagnostic strategies, 614–615
enzyme immunoassay (EIA), 615
epidemiology, 614
genotyping, 614
hemagglutination inhibition, 615
incidence, 614
indirect fluorescence antibody (IFA), 615
interpretation of testing, 615
molecular methods, 615
multiplex bead fluorescence immunoassays (FIA), 615
neutralization test, 615
rapid diagnosis, 540
resurgence of disease, 610
reverse-transcriptase (RT)-PCR, 614–615
serology, 615
technology for testing, 615
transplacental transfer of antibodies, 614
vaccination, 614
viral infections, 610
virus isolation, 610
Murray Valley encephalitis virus, 648, 650, 654
Myasthenia gravis, 954–959
clinical manifestations, 954
classification, 954
immunoprecipitation analysis of small RNAs, 883–886
cell lysis, 885
interpretation, 885
quality assurance, quality control, and test validation, 885
RNA extraction, 884
RNA sample preparation for urea-PAGE, 884
silver staining of nucleic acids, 885
total RNA sample standard preparation, 883–884
urea-PAGE gel preparation, 884–885
urea-PAGE procedure, 884–885
washing beads, 884
prevalence and clinical association of myositis autoantibodies, 884
Myosin-specific autoantibodies, 878–887
PAS bead preparation with purified antibodies, 879
quality assurance, quality control, and test validation, 882
radiolabeled cell extract preparation, 879–880
radiolabeling, 879
SDS-PAGE fluorography reagents, 880
SDS-PAGE gel preparation, 880–881
SDS-PAGE procedure, 881–882
technology and instrumentation, 878
washing beads, 880
immunoprecipitation analysis of small RNAs, 883–886
cell lysis, 885
interpretation, 885
quality assurance, quality control, and test validation, 885
RNA extraction, 884
RNA sample preparation for urea-PAGE, 884
silver staining of nucleic acids, 885
total RNA sample standard preparation, 883–884
urea-PAGE gel preparation, 884–885
urea-PAGE procedure, 884–885
washing beads, 884
prevalence and clinical association of myositis autoantibodies, 884
Myosin-specific autoantibodies, 878–887
NAA Ts. See Nucleic acid amplification tests
NADase, anti-NADase test, 401
NAK, 1156
natural killer (NK) cells
assay procedure, 301–307
antibody panels, suggested, 302
assessment of lytic granule content, 302–303
assessment of NK-cell function, 303–304
controls, 304
equipment and instrumentation, 302–304
experimental procedure, 302–304
interpretation, 305–306
materials and reagents, 302
pitfalls and troubleshooting, 304–305
quality control and assurance, 304
sample requirements, 301–302
CD107a as surrogate of degranulation process in NK cell cytotoxicity, 204–205
cell recognition, 1151
clinical indications for evaluating function of, 775
CTLs compared, 300
cytomegalovirus and, 570
cytotoxic assays, 275
defects, 301, 306–307, 775–779
assessed by Cr51 release assay, 776–779
assessed by degranulation assay, 779
assessed by enumeration, 715–716
assessed by perforin staining, 776–777
cytotoxic T lymphocytes (CTLs) and, 775–779
degranulation, 301
education, 1154
functional cellular assays, 262, 300–307
genes associated with NK cell defects, 306–307
in hematopoietic stem cell transplantation, 1155–1156
augmenting NK cell-mediated benefits after transplant, 1156
control of viral infections after transplant, 1155–1156
determination of donor NK cell alloreactivity, 1154–1155
donor selection based on KIR genotype, 1155
human herpesvirus-6, 578, 580
human herpesvirus-7, 585
innate immunity and, 1150
killer cell immunoglobulin-like receptors (KIRs), 1150–1158
lymphoproliferative diseases, Epstein-Barr virus-associated, 567
receptors types, 1150
in solid organ transplantation, 1156–1157
NBST. See Nephelometry
N. (N. meningitidis, complement C5 deficiency and, 760
N. gonorrhoeae, complement C5 deficiency and, 760
N. meningitidis, complement C5 deficiency and, 760
N. gonorrhoeae, complement C5 deficiency and, 760
Neisseria gonorrhoeae, complement C5 deficiency and, 760
NEMO (NFκB essential modulator), 725, 740
NEMO deficiency, 12–13, 723, 728
Neoehrlichia
N. microangiitis, 462–463
taxonomy, 461–462
Neorickettsia
N. sennetsu, 462–463
taxonomy, 461–462
Neostigmint, 957
Nephelometry
ASO test, 399
cryoglobulins, 105
free light chain measurement, 69
immunoglobulin measurement, 67–68
immunologic monitoring, 1040
protein analysis, 27
rheumatoid arthritis testing, 900
rheumatoid factor measurement by, 898
Nephritis
cryoglobulins and, 101–102
pyroglobulins and, 110
tubulointerstitial, 917–918
Nephropathy
BKV virus, 347, 1135, 1143
Nephrotic syndrome
anti-microglobulin in, 79
electrophoresis pattern, 82
Nested RT-PCR, 662
human T-cell lymphotropic virus, 677–678
myeloproliferative hyper eosinophilic syndromes, 827
Neuroborreliosis, 421
Peripheral blood mononuclear cells (PMBC)

Periodic sharp wave complexes, 688–689

Perforin, 301, 303, 305, 1133

Peptidyl-arginine deiminase (PAD), 898

Peptidomics, 1144

Peptide bond, 74–75

Pediculus humanus, 427

PDGFRA (platelet-derived growth factor receptor alpha), 825–829, 832–833

Pediculus humanus, 427

var. capitis, 474

var. corporis, 461, 474

Penicilliosis marneffei, 526–527

Peptide bond, 74–75

Peptide fingerprinting, 1142

Peptidomics, 1144

Peptidyl-arginine deiminase (PAD), 898

Peranivirus, 602

Perforin, 301, 303, 305, 1133

Perforin staining, NK cell defects assessed by, 776–777

Periodic sharp wave complexes, 688–689

Peripheral blood mononuclear cells (PMBC) assessment of cell surface markers on T cells after activation with mitogenic stimuli, 274, 277

intraacellular cytokine staining (ICS) assay, 338–339

lymphocyte proliferation assay

B cell function assessment, 281

using Edu-based flow cytometry, 271, 277

measurement of T cell proliferation by using H-thymidine, 270

NK cell assays, 301–302, 304–305

systemic-onset juvenile idiopathic arthritis (SoJIA), 359

Peripheral blood mononuclear cells (PMBC), cryopreservation of, 261, 263–267

functional assays using cryopreserved PMBC, 264–265

cytokine-based assays, 264–265

cytotoxic assays, 264–265

proliferative assays, 264–265

surface markers on cryopreserved PMBC, 265–267

B-cell functional assays, 266–267

immunophenotyping by flow cytometry, 265–266

mRNA quantification assays, 267

TCR VB repertoire, 266

technical aspects, 263–264

Thawing of frozen PBMC, 263–264

Transportation of frozen PBMC, 263

Peripheral neuropathy, 961–964

overview, 961–962

testing for autoantibodies to glycolipids, 961–964

cost assessment, 964

interpretation, 964

materials and reagents, 962

procedure, 963–964

sample requirements, 962

Perlecan, 1103

Pernicious anemia, 932–933

Perforin (gene), 627

PFGE (pulsed-field gel electrophoresis), 396

pH, electrophoresis and, 74

Phagocyte oxidase (phox), 310

Phagocytic cells, 1028–1029

Phagocytosis

Chlamydia trachomatis, 453

streptococcus, 394–395

viral, 600

PhenoSense assay, 706–707

Phenotypic assays, for human immunodeficiency virus (HIV), 706–707

Phenotyping proteins with mass spectrometry, 40–41

Ph (Prostate Health Index), 1013

Phlebotomus fever, 649

Phenotypic analysis

chronic granulomatous disease assays, 311–316

in intracellular cytokine staining (ICS) assay, 340

lymphocyte activation and, 269, 272, 275, 277

Phosphatidylglycerol-soluble complementation class A (PIG-A) gene, 168

Phosphatase and tensin homolog (PTEN), 351

Phospholipase A2 receptor (PLA2R), 378

Plaque reduction neutralization, for measles virus, 611–613

Plasma, complement activation soluble products in, 1128

Plasmatocytes, 920

Plasma cell(s)

flow cytometry quantitation of plasma cells in bone marrow aspirated samples, 242–243

immunophenotypic characteristics of normal, 238, 240

markers, 239

PC-grating strategy, 238

Plasma cell disorders, 90, 235–247. See also specific disorders

aberrant phenotypes, 240–242

clinical utility of MFC immunophenotyping, 243–247

diagnosis and classification, 243

MRD monitoring in multiple myeloma, 244–247

prognostic stratification of patients, 243–244

diagnostic subgroups, 235, 237

flow cytometry quantitation of plasma cells in bone marrow aspirated samples, 242–243

IMWG criteria for treatment response categories, 246

IMWG diagnostic criteria, 237

multicolor panels of antibody reagents, 242

overview, 235, 247

proliferative disorders

malignant, 112–114

monoclonal immunoglobulins, 112–121

premalignant, 114

stratification of risk, 118–119

Plasma cell dyscrasia, 1009

cryoglobulins and, 101

cytoglobin and, 110

Plasma cell leukemia, 235–237, 240

IMWG diagnostic criteria, 237

monoclonal gammapathy, 113

plasminogens and, 110

Plasmacytoma, 89–90, 235, 237, 243

IMWG diagnostic criteria, 237

monoclonal gammapathy, 113

plasminogens and, 110

Plasmacytosis, 89–90, 235, 237, 243

IMWG diagnostic criteria, 237

monoclonal gammapathy, 113

Plasmacaemia, 89–90, 235, 237

IMWG diagnostic criteria, 237

monoclonal gammapathy, 113

Plasmacytoid (Plasmo) dendritic cell, 243

IMWG diagnostic criteria, 237

monoclonal gammapathy, 113

Plasmodium, 496

Platelet-derived growth factor receptor alpha (PDGFRα), 825–829, 832–833

Platelets, in immune thrombocytopenia, 995–997

PLC (phospholipase C), 351

Plexiform, 196

PLG gene, 141

PMA. See Phorbol myristate acetate

PMBC. See Peripheral blood mononuclear cells; Peripheral blood mononuclear cells (PMBC), cryopreservation of

Pituitary antibodies, 946–949

clinical significance and utility, 949

ELISA, 947

immunoprecipitation, 947

indirect immunofluorescence, 947–949

Western blotting, 947

Pityriasis rosea, 385

PIZZ deficiency, 78

PKC (protein kinase C), 351

PKR, 358

PLAZR (phospholipase A2 receptor), 378

Placenta, antibodies to, 932

Placentation, lymphocytes to, 932

Placental transfer, IgG, 66

Platelet, alpha-granules in, 923

Platelet- derived growth factor (PDGF) receptor alpha, 825–829

Platelet derived growth factor receptor alpha (PDGFRα), 825–829, 832–833

Platelet-derived growth factor receptor alpha (PDGFRα), 825–829, 832–833

Platelets in immune thrombocytopenia, 995–997

PLC (phospholipase C), 351

Plexiform, 196

PLG gene, 141

PMA. See Phorbol myristate acetate

PMBC. See Peripheral blood mononuclear cells; Peripheral blood mononuclear cells (PMBC), cryopreservation of

Plasmodium, 496

Platelet-derived growth factor receptor alpha (PDGFRα), 825–829, 832–833

Platelets, in immune thrombocytopenia, 995–997

PLC (phospholipase C), 351

Plexiform, 196

PLG gene, 141

PMA. See Phorbol myristate acetate

PMBC. See Peripheral blood mononuclear cells; Peripheral blood mononuclear cells (PMBC), cryopreservation of

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Streptococcus pneumoniae (continued) pneumococcal ELISA, 283 pneumococcal vaccine, 281, 283 Streptococcus pyogenes. See Streptococci.

STXBP2, 301, 306–307, 776, 778–779

STX11, 301, 306–307, 776, 778–779

STXBP2

STX11

Strychnine

Systemic lupus erythematosus (SLE), 868–876

Sympathetic ophthalmia, 998

Systolic hypertension, 412, 413

T cell activation, 269

T cell activation, 269–275
cytokine production, 270–275
T cell excision circles (TRECs), 713, 715–719, 725

T cell lymphoma, 1020

T cell lymphoproliferative diseases, Epstein-Barr virus-associated, 567

T cell lymphoma, 716, 718

T cell lymphoproliferative diseases, Epstein-Barr virus-associated, 567

T cell lymphomas.

T cell receptor (TCR) defects, 726
rearrangement, 828–829, 1026

T cell receptor-excision circle (TREC), 8, 713, 715–719, 725

T cell–rich large B-cell lymphoma, 1025

T cell–rich large B-cell lymphoma, 716, 718

T cell–rich large B-cell lymphoma, 1025

T cell receptor (TCR). See T cell receptor.

T cell receptor (TCR) defects, 726

T cell receptor-excision circle (TREC), 8, 713, 715–719, 725

T cell receptor-excision circle (TREC), 8, 713, 715–719, 725

T cell–rich large B-cell lymphoma, 1025

T cell–rich large B-cell lymphoma, 1025

T cell receptor (TCR). See T cell receptor.

T cell receptor (TCR) defects, 726

T cell receptor-excision circle (TREC), 8, 713, 715–719, 725

T cell receptor (TCR). See T cell receptor.

Terminal deoxynucleotidyl transferase (TdT), 207, 209–210

Tertis codon, 10

Th17 cells, 207

Th17 cells, 1026

Th17 cells, 207

Th17 cells, 713, 715–719, 725

Th17 cells, 207

Thin-layer chromatography, in ganglioside studies, 962, 964

Thrombocytopenia. See Immune thrombocytopenia.

Thrombocytopenia. See Immune thrombocytopenia.

Thrombotic microangiopathy (TMA), 140

Th/Ti, antibody against, 890

β2HM, measurement of T cell proliferation by using, 270

Thymoma, 957, 959

Thymomas, 207

Thymoepitope abnormalities, 721–725

Thymus, role in myasthenia gravis, 957

Thymus and activation-regulated chemokine (TARC), 828–829

Thyroglobulin, antibodies to, 930–931

Thyroid antibodies, 930–931

Thyroid gland
chronic thyroiditis, 930–931
hypothyroidism, 933–935
Thyroiditis, 79, 930–931

Thyroid-stimulating hormone receptor, 933–935

Ki-67 assay, 270, 272

measurement of T cell proliferation by using 1H-thymidine, 270

T-cell defects
development defects, 721–722, 725
cartilage hair hypoplasia, 722, 725

CORA mutation, 725

MHC class I and II deficiencies, 721–722

MST1 mutation, 725

in DNA repair and recombination, 725

ataxia telangiectasia, 722, 725

Ommen syndrome, 722, 725

in proximal T-cell activation, 722, 726

in signal transduction pathways, 722, 726–727

Lck deficiency, 722, 726–727

Unc119 deficiency, 722, 727

ZAP-70 deficiency, 722, 727

in survival, 723, 728

PNF deficiency, 723, 728

T cell lymphoma, 716, 718

T cell lymphoproliferative diseases, Epstein-Barr virus-associated, 567

T-cell precursor frequency determination by limiting dilution assays, 1110–1111

T-cell proliferation assays, 732

T cell receptor (TCR). See T cell receptor.

T cell receptor-excision circle (TREC), 8, 713, 715–719, 725

T helper cells limiting dilution assay (LDA), 1110

T follicular helper (Tfh) cells, 1026

T follicular helper (Tfh) cells, 1026

T follicular helper (Tfh) cells, 1026

T follicular helper (Tfh) cells, 1026

T follicular helper (Tfh) cells, 1026

T follicular helper (Tfh) cells, 1026

Thin-layer chromatography, in ganglioside studies, 962, 964

Thrombocytopenia. See Immune thrombocytopenia.

Thrombotic microangiopathy (TMA), 140

Th/Ti, antibody against, 890

1H-thymidine, measurement of T cell proliferation by using, 270

Thymoma, 957, 959

Thymoepitope abnormalities, 721–725

Thymus, role in myasthenia gravis, 957

Thymus and activation-regulated chemokine (TARC), 828–829

Thyroglobulin, antibodies to, 930–931

Thyroid antibodies, 930–931

Thyroid gland
chronic thyroiditis, 930–931
hypothyroidism, 933–935
Thyroiditis, 79, 930–931

Thyroid-stimulating hormone receptor, 933–935
definition, 1182
non-HLA antibody testing procedures, 1106
validation parameters, 1183–1187
accuracy, 1183–1184
analytical sensitivity and specificity, 1185
clinical (diagnostic) sensitivity, 1186–1187
clinical (diagnostic) specificity, 1187
limit of blank (LoB), 1185
limit of detection (LoD), 1185–1186
limit of quantitation (LoQ), 1185–1186
linearity, 1185–1186
precision, 1184–1185
reference range/interval, 1186
Variable-number tandem repeat (VNTR), 1161–1164
Variable (V) region, immunoglobulin, 53, 66–67
Variant Creutzfeldt-Jakob disease (vCJD), 682, 684, 687, 691
Variation databases, 11
Varicella, 556
Varicella-zoster virus, 556–560
antibody avidity, 559–560
cytopathic effect (CPE), 557
direct examination from skin lesions, 558
direct fluorescent antibody (DFA), 558
electron microscopy, 558
ELISA, 558–560
genotype, 54–544
enzyme immunoassay (EIA), 559
fluorescent antibody to membrane antigen (FAMA assay), 558–559
genealogy, 56–58
generation, 559
lateral flow assay, 558–559
latex agglutination, 558–559
neutralization assays, 559
overview, 556–557
PCR, 556–558
rapid diagnosis, 540
respiratory symptoms, 600
serologic testing, 558–560
specimen collection, 557
time-resolved fluorescence immunoassay (TRFIA), 559
virus isolation, 557–558
Vascular cellular adhesion molecule 1, 556–560
Vascular cellular adhesion molecule 1, as
Varicella-zoster virus, 556–560
antibody avidity, 559–560
cytopathic effect (CPE), 557
direct examination from skin lesions, 558
direct fluorescent antibody (DFA), 558
electron microscopy, 558
ELISA, 558–560
genotype, 54–544
enzyme immunoassay (EIA), 559
fluorescent antibody to membrane antigen (FAMA assay), 558–559
genealogy, 56–58
generation, 559
lateral flow assay, 558–559
latex agglutination, 558–559
neutralization assays, 559
overview, 556–557
PCR, 556–558
rapid diagnosis, 540
respiratory symptoms, 600
serologic testing, 558–560
specimen collection, 557
time-resolved fluorescence immunoassay (TRFIA), 559
virus isolation, 557–558
Vascular cellular adhesion molecule 1, as biomarker of chronic myocardial injury, 977
Vasculitis
antineutrophil cytoplasmic antibodies
(ANCA)-associated, 909–914
disease diagnosis, 909
neutrophil extracellular traps and, 914
tests for ANCA, 909–911
treatment, 913–914
types, 911–913
cryoglobulinemia and, 107
cryoglobulins and, 101–102, 104, 106, 911
nomenclature, 911
types
anti-glomerular basement disease, 911
drug-induced vasculitis, 913
eosplenic glomerulitis with polyclanigitis (EGPA), 913
giant cell arteritis, 911
granulomatosis with polyangiitis, 912–913
IgA vasculitis, 911
Kawasaki disease, 911
large vessel vasculitis, 911
medium vessel vasculitis, 911
microscopic polyangiitis, 913
polyarteritis nodosa, 911
small vessel vasculitis, 911
Takayasu’s arteritis, 911
VCF file, 8
Venereal Disease Research Laboratory
(VDRL) assay, 413–416
Venezuelan equine encephalitis virus (VEE), 650, 652, 656
Verification, 1181
Verruga peruana, 475
Viability dyes, in polychromatic flow cytometry, 149–150, 158–160
Vimentin, 899, 1051, 1103
Viral infections, 537.
See also
Vimentin, 899, 1051, 1103
Virus
infections, 537.
See also
Vimentin, 899, 1051, 1103
Virus isolation
time, 600
PCR, 556–558
latex agglutination, 558–559
lateral flow immunoassay, 558–559
immunofluorescence, 538, 541–542
genotyping assays, 544, 546
molecular methods, 544–546
monoplex assays, 544–545
multiplex assays, 544–545
nucleic acid amplification techniques (NAATs), 539–540, 544–546
PCR, 544–545
quantitative assays, 544–546
rapid, table of, 539–540
test monitoring, 547
test selection, 546
test validation, 546–547
natural killer (NK) cell control of infections
in hematopoietic stem cell transplantation, 1155–1156
in solid organ transplantation, 1156–1157
ViroSeq HIV-1 genotyping system, 706–707
Virtual crossmatching, 1065, 1097–1099
Virus
antibody neutralization of, 282
infections, and myelokathexis
WHO. See World Health Organization
WHO. See World Health Organization
Whole exome sequencing, 1155–1156
Whole-genome sequencing, 1156
Whole-lung antigen challenge, 811
Whooping cough, 600
Whole equine encephalitis (WEE), 649–652, 654, 656
Westgard, James O., 1188
West Nile virus, 648–649, 652–656
WHIM (warts, hypogammaglobulinemia, infections, and myelokathexis) syndrome, 765–767
White blood cells, paroxysmal nocturnal hemoglobinuria (PNH), 168–180
WHO. See World Health Organization
WHO. See World Health Organization
Whole exome sequencing, 1088
Whole-genome sequencing, 1088
Whole-lung antigen challenge, 811
Whooping cough, 600
Winter vomiting disease, 640
WISH cells, 358
Wiskott-Aldrich syndrome, 281, 713, 723, 729, 795–796
Wolbachia, 461–462
Woodchuck hepatitis virus, 624
World Association of Societies of Pathology and Laboratory Medicine, 1178
World Health Organization (WHO)
classification of lymphoid neoplasms, 1015–1017
laboratory quality assurance, 1178
Nomenclature Committee for Factors of the HLA System, 1072
Wuchereria bancrofti, 494
WU polyomavirus, 598, 600
X(C) chemokines, 343
Xenopsylla cheopis, 494
Xenopus laevis, 494
X-linked chromosomal inactivation, 1018–1019

X-linked disorders
- agammaglobulinemia, 32–33
- anhidrotic ectodermal dysplasia with immunodeficiency, 723, 728
- antibody deficiency, 743–745
- hyper IgM syndrome, 201, 281, 726, 742–744
- lymphoproliferative disease, 724, 729, 775–776
- lymphoproliferative syndrome 1, 743–745
- lymphoproliferative syndrome 2, 743–745

X-linked inhibitor of apoptosis (XIAP), 724, 729, 731
- Xpert Flu assay, 605
- Xpert HIV-1 Qual, 702
- Xpert HIV-1 viral load assay, 702
- Xpert MTB/RIF assay, 433
- xTAG Respiratory Virus Panel, 605–606

Yellow fever virus, 648–656

Zanamivir, 602
- Zap-70 (zeta chain-associated protein kinase), 226–227, 229–232, 1024
- ZAP-70 deficiency, 722, 727
- Zinc transporter-8 (ZnT8) autoantibodies, 936–938, 941–942
- Zombie stains, 149
- Zone electrophoresis, 75–76
- Zoonoses, hantaviruses as, 658
- Zoster, 556. See also Varicella-zoster virus