Sexually Transmitted Diseases
22. Neurodegeneration Methods and Protocols, edited by Jean Harry and Hugh A. Tilson, 1999
17. HIV Protocols, edited by Nelson Michael and Jerome H. Kim, 1999
13. Molecular Diagnosis of Infectious Diseases, edited by Udo Reischl, 1998
5. Molecular Diagnosis of Genetic Diseases, edited by Rob Elles, 1996
1. Antisense Therapeutics, edited by Sudhir Agrawal, 1996
Preface

In recent years, molecular techniques have enhanced our ability to detect sexually transmitted infections and to conduct research to further our understanding of sexually transmitted diseases. Molecular methods to quantitate pathogen load have also been shown to be useful for the management of HIV and other viral STDs. Existing laboratory manuals for the clinical microbiology laboratory often do not include molecular methods for STDs. Sexually Transmitted Diseases: Methods and Protocols is intended to fill the need for a dedicated manual that covers all the fundamental aspects of molecular protocols for laboratory diagnosis, as well as research methodology for STDs, including HIV.

There are more than 12 types of molecular techniques described in this book covering nine major sexually transmitted pathogens. Although molecular methods for the detection of such pathogens as Trichomonas vaginalis are available in the published literature, they have not been included since they are not yet widely used for laboratory diagnosis or research.

Sexually Transmitted Diseases: Methods and Protocols is one of a series of books treating Methods in Molecular Medicine, published by Humana Press. It is intended as a stand-alone laboratory manual that will not require reference to any other sources. When a reagent or product for any protocol requires a unique source, the manufacturer is cited in the text. Unique features of books in this series are such regular elements as a "Notes" section at the end of each chapter that provides hands-on information on pitfalls to avoid, tips for problem solving, alternative strategies, along with other practical information that has accumulated during the authors' years of experience with molecular techniques. Such valuable information and insight are seldom found in journal articles or other publications.

Sexually Transmitted Diseases: Methods and Protocols should be of interest not only to clinical microbiologists who are new to molecular techniques, but also useful for laboratory scientists with an interest in STD/HIV research. Given the enormous psychological implications of a positive diagnosis for a sexually transmitted infection, laboratories currently employing commercial kits for routine detection of sexually transmitted pathogens can use methods described in this book to independently confirm positive results, and for qual-
ity assurance in general. Methods suitable for field studies described in this book may be of use for studies in developing countries. Duplex and multiplex PCR methods designed as panels for STD syndromes can be a cost-effective means of monitoring disease prevalence and validating algorithms for syndromic management, an important STD control strategy in developing countries.

Rosanna W. Peeling, PHD
P. Frederick Sparling, MD
Contents

Preface ........................................................................................................................................... v
Contributors .................................................................................................................................. ix

PART I. OVERVIEW
1 The Impact of Molecular Technology on STD Control: A Historical Perspective
   P. Frederick Sparling ..................................................................................................................... 3

PART II. MOLECULAR TECHNIQUES FOR THE DETECTION OF SEXUALLY TRANSMITTED PATHOGENS
2 Neisseria gonorrhoeae: Detection and Typing by Probe Hybridization, LCR, and PCR
   Charlotte A. Gaydos and Thomas C. Quinn .............................................................................. 15
3 Molecular Diagnosis for Chlamydia trachomatis Infections by Probe Hybridization, PCR, LCR, TMA, and Q-β Replicase
   Max A. Chernesky and James B. Mahony .................................................................................. 33
4 Haemophilus ducreyi Detection by PCR
   Patricia A. Totten, Jane Kuypers, and Stephen A. Morse ..................................................... 47
5 Detection of Treponema pallidum, Haemophilus ducreyi, and Herpes Simplex Virus by Multiplex PCR
   Karina A. Orle and Judith B. Weiss .......................................................................................... 67
6 Detection of Genital Mycoplasmas by PCR
   Claire B. Gilroy and David Taylor-Robinson .......................................................................... 81
7 Hepatitis B Virus: Detection and Quantitation by Membrane and Liquid Hybridization, Branched DNA Signal Amplification, Hybrid Capture, and PCR Methods
   Mel Krajden ............................................................................................................................ 103
8 Molecular Diagnosis of HIV-1 by PCR
   Susan A. Fiscus ......................................................................................................................... 129
PART III. RESEARCH TECHNIQUES FOR EPIDEMIOLOGY AND THE MANAGEMENT OF STDs

9 Genotyping of Neisseria gonorrhoeae by Pulse Field Gel Electrophoresis and PCR
   Ian W. Maclean .......................................................................................................... 143

10 Genotyping Chlamydia trachomatis by PCR
   Deborah Dean .............................................................................................................. 151

11 Human Papillomavirus Detection by PCR and Typing by Dot-Blot
   Agnetha Josefsson, Patrik Magnusson, and Ulf Gyllensten ...... 171

12 Quantitation of HIV-1 RNA in Dried Plasma Spots (DPS): A Field Approach to Therapeutic Monitoring
   Sharon A. Cassol, Francisco Diaz-Mitoma, and D. William Cameron ......................... 195

13 Collection and Processing of Seminal Plasma for the Quantitation of HIV-1 RNA by NASBA and RT-PCR
   Susan A. Fiscus and Myron S. Cohen ........................................................................ 209

PART IV. MOLECULAR TECHNOLOGY FOR STD DIAGNOSIS AND RESEARCH: THE NEW CHALLENGES

14 Molecular Techniques for HIV and STDs: Implications for Research and Disease Control in the New Millennium
   Rosanna W. Peeling, David C. W. Mabey, and King K. Holmes .................................. 219

Index ................................................................................................................................. 233
Contributors

D. William Cameron • Division of Infectious Diseases, Ottawa General Hospital, Ottawa, Ontario Canada
Sharon A. Cassol • Ottawa General Hospital Research Institute, Ottawa, Ontario, Canada
Max A. Chernesky • Regional Virology and Chlamydia Laboratory, St. Joseph's Hospital, Hamilton, Ontario, Canada
Myron S. Cohen • Department of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC
Deborah Dean • University of California at San Francisco School of Medicine, San Francisco, CA
Francisco Diaz-Mitoma • Ottawa General Hospital Research Institute, Ottawa, Ontario, Canada
Susan A. Fiscus • Department of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC
Charlotte A. Graydos • Infectious Disease Division, Johns Hopkins University, Baltimore, Maryland
Claire B. Gilroy • The Jefferiss Trust Research Laboratories, Imperial College School of Medicine at St. Mary's, London, UK
Ulf Gyllensten • Department of Medical Genetics, Biomedical Center, Uppsala, Sweden
King K. Holmes • Center for AIDS and Sexually Transmitted Diseases, University of Washington, Seattle, WA
Agnetha Josefsson • Department of Medical Genetics, Biomedical Center, Uppsala, Sweden
Mel Krajden • The Toronto Hospital, Toronto, Ontario, Canada
Jane Kuypers • Department of Pathology, University of Washington, Seattle, WA
David C. W. Mabey • Department of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, UK
Ian Maclean • Department of Medical Microbiology, University of Manitoba, Winnipeg, Manitoba, Canada
Patrik Magnusson • Department of Medical Genetics, Biomedical Center, Uppsala, Sweden
Contributors

JAMES B. MAHONEY • Regional Virology and Chlamydia Laboratory, St. Joseph’s Hospital, McMaster University, Hamilton, Ontario, Canada

STEPHEN A. MORSE • Centers for Disease Control and Prevention, Atlanta, GA

KARINA A. ORLE • Roche Molecular Systems, Alameda, CA

ROSANNA W. PEELING • National Laboratory for Sexually Transmitted Diseases, Laboratory Centre for Disease Control, Health Canada, Winnipeg, Manitoba, Canada

THOMAS C. QUINN • Infectious Disease Division, Johns Hopkins University, Baltimore, MD

P. FREDERICK SPARLING • Department of Medicine, University of North Carolina at Chapel Hill, Chapel Hill, NC

D. TAYLOR-ROBINSON • The Jefferiss Trust Research Laboratories, Imperial College School of Medicine at St. Mary’s, London, UK

PATRICIA A. TOTTEN • Division of Infectious Diseases, University of Washington, Harborview Medical Center, Seattle, WA

JUDITH B. WEISS • Roche Molecular Systems, Alameda, CA