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Books

Capturing rapidly evolving molecular medical microbiology

In 2016, the American Society for Microbiology Press decided it was time to publish an update on molecular microbiology. The third edition of Molecular Microbiology: Diagnostic Principles and Practice reflects the changes that have been made in the field since the last edition was published in 2011.

In 5 years, molecular techniques have evolved rapidly and their use in diagnosing infectious disease has become widespread. For example, point-of-care tests have increasingly been used to detect resistance genes in routine laboratory tests, and the first next-generation sequencer has been approved by the US Food and Drug Administration (FDA). This change is reflected by the first section's title Novel and Emerging Technologies, and the absence of many of the previous edition's chapters such as Real-Time PCR and Melting Analysis and Pulsed-Field Gel Electrophoresis: Laboratory and Epidemiologic Considerations for Interpretation of Data.

Describing the principles and illustrating the practical use of molecular microbiology in infectious diseases in a single volume is a monumental undertaking. The editors invited more than 100 authors to achieve this feat in 12 sections. The book begins by looking at the use of molecular microbiology in health-care-associated infections and in public health, with more technical topics, such as information technology, quality assurance, and the business of diagnostics, discussed later. Information Technology and The Business of Diagnostics are new sections in this edition. In Information Technology, authors discuss point-of-care device connectivity and surveillance software, broadening readers' understanding about molecular testing in medical microbiology and infection control fields. Somewhat confusingly, research-oriented sections, such as metagenomics (ie, studies of the microbiome), and the host and host response are separated. Perhaps, the editors wanted to emphasize that the microbiome is a hot topic by placing this section towards the front.

The chapters of the book are generally concise, while providing enough in-depth discussion for readers to understand the topic. Commandably, despite a large number of authors from Europe, the USA, and China, the style of the chapters is homogenous. We especially like that many of the chapters conclude by giving future perspectives, given that at this moment, it is difficult to predict whether molecular diagnostics will overtake current microbiology in the laboratory, or rather have a supportive role. Furthermore, it is interesting to read the authors’ predictions on which particular platform or methods will have a dominant role in next-generation sequencing. A nice surprise in the book is a chapter on the effect of molecular diagnostics on public health in China. With pathogens such as hepatitis B virus and SARS coronavirus endemic in China, this is an important addition.

The book is likely to be of interest to all people involved in the diagnosis and research of infectious diseases. For clinical microbiologists and infectious disease specialists, it provides an overview of the molecular techniques used to diagnose infectious disease, from PCR to mass spectrometry. For readers who are new to the field, clear explanations are provided for methods such as 16S ribosomal RNA sequencing (ie, why and how this method is used in bacteria identification). For national reference centers, up-to-date information about specific pathogens is provided, such as for methicillin-resistant Staphylococcus aureus and vancomycin-resistant enterococci. The book also offers laboratory managers advice on how to design a clinical microbiology laboratory taking into consideration recent advances (eg, point-of-care tests). Especially interesting for researchers are the chapters discussing the pros and cons of different next-generation sequencing platforms. Although the editors-in-chief David Persing and Fred Tenover work at a molecular diagnostics company, the book provides balanced reviews of commercial assays from various manufacturers. These comparisons are presented in table format, offering readers an accessible overview of which assay is most suitable to use.

However, this third edition could have been improved in a few ways. For readers not familiar with molecular technique terms, a glossary of terms would have been beneficial. Furthermore, information could have been provided more succinctly, with less overlap between chapters on the principles of next-generation sequencing platforms. We also believe that a separate chapter on carbapenemase-producing microorganisms, which are a major public health problem worldwide, should have been included. Finally, it should be noted that although techniques and microorganisms are discussed comprehensively, the book is not intended to be exhaustive; for more in-depth information, specific books should be consulted.

Despite these limitations, this book is likely to be a valuable reference for people involved in the diagnosis, treatment, and surveillance of infectious diseases, and who are interested in molecular techniques.

Erlangga Yusuf, Herman Goossens

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