Preface

Our Pathogens Are Not Standing Still and Neither Can We

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Editor

In 1 or 2 generations, we have gone from a world in which there were no cures for most infections to a declaration that the war against infectious disease was won. That period of ephemeral confidence was followed by the inexorable march toward increasingly resistant pathogens that quickly learned to evade each new advance and our own race, sometimes successful, sometimes faltering, to produce new antimicrobials and vaccines.

As a society, in turn, we have disincentivized investment in new antimicrobials and have seen decades of relative stagnation in development. At the same time, advances in molecular, cellular, computational, and structural biology; medicinal chemistry, microbial epidemiology; and diagnostics have led to spectacular progress in prevention and treatment of viral, bacterial, and parasitic diseases. I consider clinical microbiology a lynchpin in these successes, and despite the challenges ahead, the current and future contributions of clinical microbiology as a discipline, highlighted in articles in this issue, leave me optimistic.

It is well to remember that advances in treating cancer and autoimmune disease are associated with prolonged, often profound periods of immunosuppression. Infections are almost inevitable. Therefore, at their foundation, modern medicine is predicated on being able to rapidly identify and successfully treat infectious diseases. These infections will occur in the context of a world where empiric treatment efficacy is far less predictable. Therefore, the clinical microbiology advances described in this issue will help sustain medical advances that depend on containing infectious diseases.

In the next 20 years, I see an increasingly more crowded, more mobile world where infectious diseases can spread quickly. Emergence and spread of multidrug-resistant, carbapenemase-producing Enterobacteriaceae and Ebola virus outbreaks are examples. I am also mindful of the unpredictability of pathogen evolution and their occasional lack of concern for the well-being of their hosts, for example, introduction of a

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myxovirus, which killed 99% of Australia's rabbit population.[1] Would there be a similar fate for humans without tools in hand to diagnose, treat, and preempt?

The articles in this issue describe a series of tools, applications, insights, and approaches to address the challenges ahead. I thank all the authors for their very insightful contributions, roughly divided into 3 categories. The first is technological: what new techniques are available to provide the fastest, most accurate, and impactful infectious disease diagnostics to our patients? From microfluids to next-generation sequencing to clever multiplex syndromic-based nucleic acid amplification panels. The second considers how we apply these advances (point of care, automation). The third considers larger issues of how to bring advances or even more basic clinical microbiology capabilities to all areas of the world, including the role of public health infrastructure to coordinate and leverage these efforts, and how to educate clinical microbiologists of the future. Regarding the last, I especially welcome the contributions from several authors who are clinical fellows, and who will soon assume leadership positions in clinical microbiology and related fields. I am also grateful for the pictorial representation of some of the dilemmas in clinical microbiology from the perspective of two of our major pathogens, who do not always see cocci to cocci with one another.

Reading the articles, I am struck by and thrilled with the level of innovation in our field. I look forward to the next 20 years of clinical microbiology.

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