EMERGING INFECTIOUS DISEASES

A Guide to Diseases, Causative Agents, and Surveillance

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This book is dedicated to the health care professionals
at the front line in the battle against infectious diseases
and to the researchers who provide them with information
about the enemies and weapons to defeat them.

PREFACE

HEADLINES AND NEWS REPORTS warn of "Flesh-Eating Bacteria," "Mad Cow Disease," the AIDS pandemic, and flu pandemics. Drug-resistant bacteria are in our hospitals and our locker-rooms, malaria incidence is on the rise, and TB is reemerging. Every year, new infectious threats appear or old diseases spread to new areas or attack with greater viciousness. Some of the new diseases rear their heads and then suddenly vanish, like SARS, while others may be with humanity for the foreseeable future. The media warn and inform of the newly emerging diseases yet also may capitalize on public fears by overstating the real danger or describing the diseases in the most gruesome terms possible before moving on to the next "killer virus" predicted to kill tens of millions of people. Meanwhile, other, less spectacular diseases spread unnoticed through certain segments of the world's population (as babesiosis or cryptosporidiosis in immunosuppressed persons or dengue hemorrhagic fever in many parts of the world). This book attempts to provide a balanced overview of some of the emerging and reemerging diseases of current times. No single text could cover all of these diseases, but a number of illnesses have been selected which are found in different regions of the world. Many of these strike tropical regions or developing countries with particular virulence, others are found in temperate or developed areas, and still other microbes and infections are more indiscriminate. In five or ten years, other diseases may have emerged as major killers of humanity while some of the current threats may have been neutralized by the development of new drugs, vaccines, or other preventive measures. Poverty, civil unrest and war, and lack of access to modern health care supplies and facilities have fueled epidemics of some of the diseases covered in this book. If these underlying causes could be nullified or eliminated, many diseases would be controllable and large numbers of people freed from their crippling effects upon health and prosperity.

Since many of the infectious diseases presented in this book are relatively new or little information is known about the causative agent, much of the material has been derived from recent infectious disease journals or other related articles. Other timely information is derived from the Centers for Disease Control and Prevention, the World Health Organization, or MedLine Plus. The excellent

Emerging Infections series from the American Society for Microbiology have also provided much of the background material for this book.

This text has been written to accommodate several different groups of students, including but not limited to, upper-level undergraduate or graduate students in biology or medically-related professions, public health students, and persons already working in the healthcare arena. Not all of the information may be useful to every audience but the material (especially some of the immunology and microbiology) is presented for use by those who wish to have a greater understanding of how the microbes function and cause disease and how the human body attempts to remove or minimize the damage. This information may be skipped without losing understanding of the disease itself or its prevention and treatment.

The diseases are divided by type of causative agent: bacteria, viruses, protozoa, or infectious protein. Those chapters which deal with diseases induced by infection with a single organism or group of organisms are organized in a similar fashion: introduction, history, the disease(s), the causative agent(s), the immune response, diagnosis, treatment, prevention, and surveillance. The Major Concepts section presents a brief overview of the most important concepts found in the chapter. The Summary is a thumbnail sketch of the basic information about the microbe and the associated disease. Review Questions help students to test their knowledge of the material, while Topics for Further Discussion allow for a wider conversation of the implications of the disease and challenge students to "think outside of the box" to develop new solutions. There are no right answers or solutions to the material found within this section; rather, it is hoped that any students entering into the medical or research fields, as well as those destined to serve in public health, may learn to search for innovative ways of dealing with health-related problems.

The two introductory chapters provide basic information that will be useful for the other chapters, including an introduction to emerging and reemerging infectious diseases, proposed causes for disease emergence, very basic microbiology, and very basic immunology. The latter is included since a discussion of disease needs to include how the host attempts to defend itself as well as what can go wrong with this "protective" response. The last two chapters cover topics of particular interest. Chapter Twenty-Nine discusses emerging diseases in immunocompromised individuals since the numbers of people in this group are increasing rapidly, posing unique challenges to public health. Chapter Thirty describes several of the agents that may be used in acts of bioterrorism. Many of these agents have already been used for this purpose. Hopefully, the spread of knowledge about the threat of bioterrorism will discourage its usage in the future.

New Philadelphia, Ohio
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Lisa A. Beltz

THE AUTHOR

DR. LISA A. BELTZ is an assistant professor in the Department of Biology at Kent State University at Tuscarawas, in New Philadelphia, Ohio. She has taught a number of medically-related biology courses during her 14 years of teaching at Kent State University and the University of Northern Iowa. Prior to teaching, she studied two of the diseases described in this book. While a graduate student at Michigan State University, she examined the mechanisms by which *Trypanosoma cruzi* inhibits human immune responses, allowing the parasite to kill large numbers of people in Central and South America. Later, at Johns Hopkins University and the University of Pittsburgh, she studied interactions between the simian and human immunodeficiency viruses and bone marrow cells as well as exploring the mechanisms by which HIV kills white blood cells. Dr. Beltz was the co-originator of the course Cancer and Emerging Infectious Diseases during her time in Iowa. The need for a college-level textbook in this field became apparent over her seven years of teaching the course. Dr. Beltz's more recent research has involved studying the impact of nitrate and other environmental contaminants on the human immune system and studying the effects of green tea components upon normal and cancerous white blood cells.

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—L.A.B.

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