

Preface

Fungi are eukaryotic microorganisms that are closely related to humans at cellular level. Human fungal pathogens belong to various classes of fungi, mainly zygomycetes, ascomycetes, basidiomycetes, and deuteromycetes. In recent years, fungal infections have dramatically increased as a result of improved diagnosis, high frequency of catheterization, instrumentation, etc. However, the main cause remains the increasing number of immunosuppressed patients, mostly because of HIV infection and indiscriminate usage of antineoplastic and immunosuppressive agents, broad-spectrum antibiotics and prosthetic devices, and grafts in clinical settings. Presently available means of combating fungal infections are still weak and clumsy compared to control of bacterial infection. The present scenario of antifungal therapy is still based on two classes of antifungal drugs (polyenes and azoles). These drugs are effective in many cases, but display toxicity and limited spectrum of efficacy. The recent trend towards emergence of drug-resistant isolates in the clinic is an additional problem. In recent years, a few new antifungal drugs have entered the clinics, but they are expected to undergo same fate as the older antifungal drugs.

The application of fungal genomics offers an unparalleled opportunity to develop novel antifungal drugs. However, it is too early to expect any novel drugs, as the antifungal drug discovery program is in the stage of infancy. Interestingly, several novel antifungal drug targets have been identified and validated. In contrast to the classical and genomic approaches to drug discovery, other traditional knowledge derived from natural products and phytomedicine has ample opportunity to provide an alternative mode of action for combating fungal infections which include superficial, cutaneous, and invasive and life-threatening systemic mycoses. Since a lot of scientific literature and data have been generated in recent decades on various aspects of fungi such as biology, taxonomy, drug resistance, and mode of action of antifungal drugs, on the molecular basis of virulence and pathogenicity, and on therapeutic approaches. However, little effort has been made to discuss various issues in a holistic way and to present them in the form of a book to provide more interrelated, interdisciplinary work on combating fungal infections with different strategies.

We have discussed these issues, and decided to edit a book in the larger interest of students and researchers, to fill the gap in book publication. Here we have worked to bring together experts in the field to contribute a series of chapters spanning a cross-section of the field. It is our hope and intent that the outcome of these efforts in the form of *Combating Fungal Infections: Problems and Remedy* will serve as a valued resource to the entire scientific/academic community. We hope that this text not only encapsulates the recent literature in the field, but will also illuminate related issues for the benefits of teaching, research and drug discovery.

This book consist of 20 chapters which address various aspects pertaining to the pathogenesis of fungi, their management, and recent advancement in their treatment. Chapter 1 provides a glimpse of various types of fungal infections, with special reference to immunocompromised hosts. Chapter 2 discusses virulence and pathogenicity of fungal pathogens. Chapters 3 and 4 deal with the reservoirs of animal and ocular fungal pathogens. Recent developments in antifungal drugs and their mode of action are the subject of review in Chap. 5. As presently available, antifungals, in particular polyene-based anti-fungals, manifest various side-effects, especially nephrotoxicity. Chapter 6 discusses these issues, especially in children under the age of 12. The development of resistance in fungal pathogens, including multidrug resistance and its mechanism, is dealt with in Chaps. 7 and 8. Diverse diagnostic approaches for fungal infections are reviewed in Chap. 9. Chapters 10 and 11 discuss antifungal therapy, and combination strategies used in combating invasive fungal infections. Chapter 12 deals with the management of pulmonary mycoses in stem-cell transplantation. Novel antifungal drugs (synthetic and herbal), fungal vaccines, and metabolic pathways as drug targets are discussed in detail in Chaps. 13, 14, 18, and 19. The role of innate immunity in management of dermatomycosis is elaborated in Chap. 15. Cytokine therapy and its application in the management of fungal infections are the topic of discussion in Chap. 16. Chapter 17 reviews the potential role of immunomodulators in the treatment of systemic fungal infections. As novel drug delivery systems have a great potential for modifying the pharmacokinetics of medicaments, Chap. 20, taking this fact into consideration, covers state-of-the-art delivery systems for controlling fungal infections.

We have made our sincere efforts to provide good scientific content in this book. It is our hope that this book will be useful to students, teachers, researchers and clinicians. However, there may also be some shortcomings. We invite you to communicate your experiences with the book to us.

We thank all the contributors/experts for timely submission of their excellent contributions and for their overall cooperation. We also thank many leading scientists in this field who may not contributed directly, but have encouraged or guided us towards successful completion of this project.

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Iqbal Ahmad
Mohammad Owais
Mohammed Shahid
Farrukh Aqil

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Ahmad, I.; Owais, M.; Shahid, M.; Aqil, F. (Eds.)

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