

Antifungals

From Genomics to Resistance and the Development of Novel Agents

Edited by

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Cover design adapted from images courtesy of Jean-Philippe Bouchara (*Aspergillus fumigatus*, *Scedosporium apiospermum*, *Trychophyton rubrum*, *Microsporium canis* and *Cryptococcus neoformans*), Patrick Vandeputte (*Candida albicans* and disk diffusion) and Amandine Gastebois (E-test) of Groupe d'Etude des Interactions Hôte-Pathogène, L'UNAM Université d'Angers, Angers, France

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Preface

Over the last 30 years, the incidence of fungal infections in immuno-compromised patients has increased considerably. Systemic infections still have mortality rates of up to 50%, revealing the limitations of available antifungal therapies. These limitations are due partly to acquisition of antifungal resistance by pathogenic fungi and partly to the increasing incidence of intrinsically poorly susceptible pathogenic fungal species.

This book focuses on the most recent advances made to decipher the molecular mechanisms responsible for antifungal resistance to classic molecules that are azoles, polyenes, and echinocandins in the major fungal genera involved in human pathology. A large part is also dedicated to the contributions made to deepen the knowledge on fungal biology, always with the aim of defining new antifungal strategies. Thus, a special emphasis is given to the recent findings on a particular lifestyle that is biofilms, on fungal-specific biological pathways that constitute potential new targets, as well as on the research undertaken to enhance the efficacy of existing treatments. Likewise, high-throughput capabilities allowed the exponential increase in the number of screenings of chemical

compound collections for antifungal activity, with the underlying decryption of the mode of action of the candidate molecules. Furthermore, the most recent technologies allowed a tremendous increase in the comprehension of the mechanisms settled by the host in response to fungi, resulting in major advances in the field of antifungal vaccine development as well as in moderating the infection effects by modulation of the human immune response. Finally, a chapter is dedicated to the description of animal models most recently developed to specifically study fungal infections, without which all the data from *in vitro* research would not be transposable to humans, which is the basis for improving antifungal treatments and consequently patients' quality of life.

Science has never been so deeply renewed since the recent advent of high-throughput technologies, which allow researchers to consider the whole organism's response to any particular condition. In the field of antifungal therapy, this unprecedented level of analyses has not only clarified prior knowledge but also opened the door to entirely new disciplines.

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