Current Topics in Microbiology and Immunology

250

Springer-Verlag Berlin Heidelberg GmbH

Clostridium difficile

Edited by K. Aktories and T.D. Wilkins

With 20 Figures and 11 Tables

Springer

Professor Dr.Dr. KLAUS AKTORIES
Albert-Ludwigs-Universität Freiburg
Institut für Pharmakologie und Toxikologie
Hermann-Herder-Str. 5
79104 Freiburg i.Br.
Germany
E-mail: aktories(a)uni-freiburg.de

Dr. TRACY D. WILKINS
Director of Biotechnology
Virginia Tech
Fralin Biotechnology Center
West Campus Drive, MC 0346
Blacksburg, VA 24061
USA
E-mail: tracyw(a)vt.edu

Cover Illustration: Biopsy specimen from a patient with pseudomembranous colitis induced by Clostridium difficile. *Focal superficial necrosis of the colonic mucosa with a typical mushroom-like desposition of fibrin with a few granulocytes. [Courtesy of Prof. Dr. E.-H. Schaefer, Pathologisches Institut (Ludwig-Aschoff-Haus) der Universität Freiburg, Germany]*

ISSN 0070-217X
ISBN 978-3-642-08668-7 ISBN 978-3-662-06272-2 (eBook)
DOI 10.1007/978-3-662-06272-2

Originally published by Springer-Verlag Berlin Heidelberg New York in 2000
Softcover reprint of the hardcover 1st edition 2000

Library of Congress Catalog Card Number 15-12910

Cover Design: *design & production GmbH*, Heidelberg
Typesetting: Scientific Publishing Services (P) Ltd. Madras
Production Editor: Angélique Gcouta
Printed on acid-free paper SPIN: 10664872 27 3020GiC 5 4 3 2 1 0

Preface

Since *Clostridium difficile* was recognized as a major pathogen for a wide range of enteric diseases including antibiotic-associated diarrhea and pseudomembranous colitis, it has become a major focus of intensive research. Scientific contributions on *Clostridium difficile* come from remarkably diverse fields including clinical and epidemiological research, microbiology, molecular biology, pharmacology, and cell biology. These concerted efforts have resulted in significant progress in the understanding of the role and action of *Clostridium difficile* as a pathogen. Progress in the molecular biology and toxinology of *Clostridium difficile* has been especially fruitful. Characterization of the mode of action of *Clostridium difficile* toxins A and B, which are the crucial virulence factors of the pathogens, has opened up a scientific treasure trove. The toxins have become the prototypes of a new family of clostridial cytotoxins that modify eukaryotic targets by glucosylation. The specific targets for the toxins are Rho GTPases, which regulate the actin cytoskeleton and act as molecular switches to control a large array of signaling processes. The unique activity and specificity of these toxins make them useful pharmacological and cell biological tools for studying signaling pathways in which Rho GTPases are involved.

This volume gives a review and update of recent developments and progress in this exciting field of research. We hope that the various contributions from different scientific fields will inspire further studies on *Clostridium difficile* and clostridial toxins.

KLAUS AKTORIES and TRACY D. WILKINS

List of Contents

J.S. Brazier and S.P. Borriello
Microbiology, Epidemiology and Diagnosis of *Clostridium difficile* Infection 1

J.S. Moncrief and T.D. Wilkins
Genetics of *Clostridium difficile* Toxins 35

I. Just, F. Hofmann, and K. Aktories
Molecular Mode of Action of the Large Clostridial Cytotoxins 55

M. Thelestam and E. Chaves-Olarte
Cytotoxic Effects of the *Clostridium difficile* Toxins 85

I. Just and P. Boquet
Large Clostridial Cytotoxins as Tools in Cell Biology . . . 97

R.J. Farrell and J.T. LaMont
Pathogenesis and Clinical Manifestations of *Clostridium difficile* Diarrhea and Colitis 109

D.N. Gerding
Treatment of *Clostridium difficile*-Associated Diarrhea and Colitis 127

Subject Index 141

List of Contributors

(Their addresses can be found at the beginning of their respective chapters.)

Aktories, K. 55

Boquet, P. 97

Borriello, S.P. 1

Brazier, J.S. 1

Chaves-Olarte, E. 85

Farrell, R.J. 109

Gerding, D.N. 127

Hofmann, F. 55

Just, I. 55, 97

LaMont, J.T. 109

Moncrief, J.S. 35

Thelestam, M. 85

Wilkins, T.D. 35