Antiseptic Prophylaxis and Therapy in Ocular Infections

Bibliographic Indices. This publication is listed in bibliographic services, including Current Contents® and Index Medicus.

Drug Dosage. The authors and the publisher have exerted every effort to ensure that drug selection and dosage set forth in this text are in accord with current recommendations and practice at the time of publication. However, in view of ongoing research, changes in government regulations, and the constant flow of information relating to drug therapy and drug reactions, the reader is urged to check the package insert for each drug for any change in indications and dosage and for added warnings and precautions. This is particularly important when the recommended agent is a new and/or infrequently employed drug.

All rights reserved. No part of this publication may be translated into other languages, reproduced or utilized in any form or by any means electronic or mechanical, including photocopying, recording, microcopying, or by any information storage and retrieval system, without permission in writing from the publisher.

© Copyright 2002 by S. Karger AG, P.O. Box, CH–4009 Basel (Switzerland) www.karger.com Printed in Switzerland on acid-free paper by Reinhardt Druck, Basel ISBN 3–8055–7316–2
Contents

List of Contributors .................................................. VIII

Foreword ................................................................. XIII
S.J. Isenberg

Preface ................................................................. XV
A. Kramer, W. Behrens-Baumann

Fundamentals and Aims

1 Microbial Colonization of the Eye as Target for Antiseptics ...... 2
A. Kramer, W. Behrens-Baumann

2 The Eye and Conjunctiva as Target of Entry for Infectious Agents:
Prevention by Protection and by Antiseptic Prophylaxis. ........... 9
L. Gürtler

3 Antisepsis versus Antimicrobial Chemotherapy and
Indications for Eye Antisepsis. ...................................... 14
A. Kramer, W. Behrens-Baumann

4 Requirements Concerning Antiseptics for Periorbital, Orbital and
Intraorbital Application ............................................... 28
4.1 Antimicrobial Efficiency ........................................... 28
A. Kramer, H.-P. Werner

4.2 Local Tolerance .................................................. 32
G. Geerling, J. Baatz, D. Harder, G. Müller, K. Reimer, P. Rudolph, A. Kramer

4.3 Systemic Tolerance of Antiseptics Used in Ophthalmology .......... 57
W. Siegmund, T. Giessmann
Supporting Measures for Infection Control

12  Preventive Measurements to Avoid the Transmission of Relevant Pathogens after Occurrence of Infection  ........... 306  
F.-A. Pitten, L. Jatzwauck, A. Kramer

13  Hand Hygiene  .......................................... 316  
A. Kramer, M. Exner, M. Rotter

14  Contact Lens Hygiene  .................................. 328  
A. Berke, W. Cagnolati

15  Antimicrobial Efficacy of Contact Lens Care Products and Critical Comment on ISO/FDIS 14729  ................. 343  
A. Kramer, P. Rudolph, H.-P. Werner

16  Sampling and Transport of Specimens for Microbial Diagnosis of Ocular Infections  ....................... 362  
H.-G. Sonntag

Subject Index  ............................................ 368
List of Contributors

Christoph Aspöck, Dr. med.
Klinische Abteilung für
Krankenhaushygiene
am Allgemeinen Krankenhaus Wien
Währinger Gürtel 18–20
A–1090 Wien, Austria
Phone +43-1-40400-1904
Fax +43-1-40400-1907
E-mail Christoph.Aspeck@akh-wien.ac.at

Wolfgang Behrens-Baumann, Dr. med.
Universitätsprofessor and Chairman
Department of Ophthalmology
Medical Faculty, Otto von Guericke University
Leipziger Strasse 44
D–39120 Magdeburg, Germany
Phone +49-391-6713571
Fax +49-391-6713570
E-mail augenklinik@Uni-Magdeburg.de

Ojan Assadian, Dr. med.
Institute of Hygiene
University of Vienna Medical School
Division of Hospital Hygiene
A–1090 Wien, Austria
Phone +43-1-40400-1904
Fax +43-1-40400-1907
E-mail Ojan.Assadian@akh-wien.ac.at

Harald Below, Dr. rer. nat.
Institute of Hygiene and Environmental Medicine
Medical Faculty
Ernst Moritz Arndt University
Hainstrasse 26
D–17487 Greifswald, Germany
Phone +49-3834-834622
Fax +49-3834-834600
E-mail below@uni-greifswald.de

Jutta Baatz, Dipl. oec. troph.
Medical Scientific Department
Dr. Mann Pharma
Brunsbütteler Damm 165–173
D–13581 Berlin, Germany
Phone +49-30-33-093345
Fax +49-30-33-093357
E-mail Jutta_Baatz@bausch.com

Andreas Berke, Dr. rer. nat.
Höhere Fachschule für Augenoptik
Bayenthalgürtel 6–8
D–50968 Köln, Germany
Phone +49-2205-85115
Fax +49-2205-919453
E-mail Aberke.Hfak@t-online.de

VIII
List of Contributors

Alexander A. Bialasiewicz, Dr. med.
Professor and Chairman
Department of Ophthalmology
SQUH University of Oman
123 Al Khod
Muscat, Oman
E-mail bialasiew@aol.com

Timm Bredehorn, Dr. med.
Johann-Andreas-Segner-Strasse 8
D–06108 Halle-Saale, Germany
Phone +49-345-290007
Fax +49-345-290007
E-mail timm.bredehorn@medizin.uni-halle.de

Burkhard Dick, Dr. med.
Privatdozent
Department of Ophthalmology
Johannes Gutenberg University
Langenbeckstrasse 1
D–55131 Mainz, Germany
Phone +49-6131-175445
Fax +49-6131-175566
E-mail bdick@mail.uni-mainz.de

Wolfgang Cagnolati, MS (USA)
Adjunct Faculty
Pennsylvania College of Optometry
Institute for Ophthalmic Optics and Optometry
Am Buchenbaum 21
D–47051 Duisburg, Germany
Phone +49-203-25365
Fax +49-203-299203
E-mail cagno@t-online.de

Gregor Caspari, PD Dr. med.
Institute of Immunology
Medical Faculty
Ernst Moritz Arndt University
Sauerbruchstrasse, Diagnostic Center
D–17489 Greifswald, Germany
Phone +49-3834-865458
Fax +49-3834-865489
E-mail caspari@uni-greifswald.de

Armin Duis
Department of Pharmacy
Johannes Gutenberg University Hospital
Langenbeckstrasse 1
D–55101 Mainz, Germany
Phone +49-6131-172477
Fax +49-6131-173442
E-mail duis@apotheke.klinik.uni-mainz.de

Martin Exner, Dr. med.
Universitätsprofessor and Chairman
Institute of Hygiene
Rheinische Friedrich Wilhelms University
Sigmund-Freud-Strasse 25
D–53127 Bonn, Germany
Phone +49-228-2875520
Fax +49-228-2875645
E-mail rappold@mail.meb.uni-bonn.de

Lars Frisch, Dr. med.
Department of Ophthalmology
Johannes Gutenberg University
Langenbeckstrasse 1
D–55131 Mainz, Germany
Phone +49-6131-1725533
Fax +49-6131-175566
E-mail frisch@mail.uni-mainz.de

Christoph Fusch, Dr. med.
Universitätsprofessor and Chairman
Division of Neonatology and Pediatric Intensive Care Clinic of Pediatrics
Medical Faculty
Ernst Moritz Arndt University
Soldtmannstrasse 15
D–17487 Greifswald, Germany
Phone +49-3834-866420
Fax +49-3834-866422
E-mail fusch@mail.uni-greifswald.de

Gerd Geerling, Dr. med.
Department of Ophthalmology
University Hospital of Lübeck
Ratzeburger Allee 160
D–23538 Lübeck, Germany
Phone +49-451-5003098
Fax +49-451-5002226
E-mail ggeerling@ophtha.mu.luebeck.de
Thomas Giessmann, Dr. med.
Institute of Pharmacology
Department of Clinical Pharmacology
Medical Faculty
Ernst Moritz Arndt University Greifswald
Friedrich-Loeffler-Strasse 23d
D–17487 Greifswald, Germany
Phone +49-3834-865643
Fax +49-3834-865631
E-mail giesmann@uni-greifswald.de

Lutz Gürtler, Dr. med.
Universitätsprofessor and Chairman
Loeffler Institute of Medical Microbiology
Medical Faculty, Ernst Moritz Arndt
University Greifswald
Lutherstrasse 6
D–17487 Greifswald, Germany
Phone +49-3834-865560
Fax +49-3834-865561
E-mail guertler@uni-greifswald.de

Manfred Haber, Dr. rer. nat.
Chairman
Department of Hospital Pharmacy
Saarland University Hospital
Kirbergerstrasse
D–66421 Homburg/Saar, Germany
Phone +49-6841-162216
Fax +49-6841-162010
E-mail apinhab@med-rz.uni-saarland.de

Dirk Harder, Dr. med.
Masvingo Eye-Care Programme
Morgenster Hospital
Masvingo
PO Morgenster
Zimbabwe
Phone +263-39-64103
Fax +263-39-64247
E-mail dirkharder35@hotmail.com
or:
Dirk Harder, Dr. med.
Waldstrasse 21
D–18356 Barth, Germany
Phone +49-38231-2086
E-mail dirkharder@hotmail.com

Lutz Jatzwauk, Dr. rer. nat.
Krankenhaushygieniker
Universitätsklinikum Dresden
Fetscherstrasse 74
D–01307 Dresden, Germany
Phone +49-351-4582948
Fax +49-351-4585729
E-mail jatzwauk@t-online.de

Volker Klauss, Dr. med.
Universitätsprofessor
Department of Ophthalmology
Mathildenstrasse 8
D–80336 Munich, Germany
Phone +49-89-51603824
Fax +49-89-51604942
E-mail vklauss@ak-i.med.uni-muenchen.de

Axel Kramer, Dr. med.
Universitätsprofessor and Chairman
Institute of Hygiene and Environmental Medicine, Medical Faculty
Ernst Moritz Arndt University
Hainstrasse 26
D–17487 Greifswald, Germany
Phone +49-3834-834611
Fax +49-3834-834600
E-mail kramer@uni-greifswald.de

Irene Krämer, Dr. rer. nat.
Privatdozentin, Department of Pharmacy
Johannes Gutenberg University Hospital
Langenbeckstrasse 1
D–55101 Mainz, Germany
Phone +49-6131-177209
Fax +49-6131-175525
E-mail kraemer@apotheke.klinik.uni-mainz.de

Gerald Müller, Dr. rer. nat.
Institute of Hygiene and Environmental Medicine, Medical Faculty
Ernst Moritz Arndt University
Hainstrasse 26
D–17487 Greifswald, Germany
Phone +49-3834-834618
Fax +49-3834-834600
E-mail muellerg@uni-greifswald.de

List of Contributors
List of Contributors

Frank-Albert Pitten, Dr. med.
Institute of Hygiene and Environmental Medicine, Medical Faculty
Ernst Moritz Arndt University
Hainstrasse 26
D–17487 Greifswald, Germany
Phone +49-3834-834617
Fax +49-3834-834600
E-mail pitten@uni-greifswald.de

Uwe Pleyer, Dr. med.
Universitätsprofessor
University Eye Clinic, Charité
 Humboldt University Berlin
Augustenburger Platz 1
D–13353 Berlin, Germany
Phone +49-30-4505 54032
Fax +49-30-45054901
E-mail uwe.pleyer@charite.de

Karen Reimer, Dr. med.
Mundipharma GmbH
Mundipharmastrasse 2
D–65549 Limburg, Germany
Phone +49-6431-701402
Fax +49-6431-701444
E-mail Karen.Reimer@mundipharma.de

Manfred Rotter, Dr. med.; Dip. bact.
(London)
Universitätsprofessor and Chairman
Institute of Hygiene, University of Vienna
Kinderspitalgasse 15
A–1095 Wien, Austria
Phone +43-1-40490-79401
Fax +43-1-40490-9794
E-mail hygiene@univie.ac.at

Peter Rudolph, Dr. med.
Institute of Hygiene and Environmental Medicine, Medical Faculty
Ernst Moritz Arndt University
Hainstrasse 26
D–17487 Greifswald, Germany
Phone +49-3834-834616
Fax +49-3834-834602
E-mail rudolph@uni-greifswald.de

Ulrich C. Schaller, Dr. med.
Department of Ophthalmology
Mathildenstrasse 8
D–80336 Munich, Germany
Phone +49-89-51603811
Fax +49-89-51605160
E-mail ulrich.schaller@ak-i.med.uni-muenchen.de

Werner Siegmund, Dr. med.
Universitätsprofessor
Institute of Pharmacology
Department of Clinical Pharmacology
Medical Faculty
Ernst Moritz Arndt University
Friedrich-Loeffler-Strasse 23d
D–17487 Greifswald, Germany
Phone +49-3834-865632
Fax +49-3834-865631
E-mail siegmuw@mail.uni-greifswald.de

Hans-Günther Sonntag, Dr. med.
Professor and Chairman
Institute of Hygiene, Department of Hygiene and Medical Microbiology
University of Heidelberg
Im Neuenheimer Feld 323
D–69120 Heidelberg, Germany
Phone +49-6221-568310
Fax +49-6221-565857
E-mail hans-guenthersonntag@med.uni-heidelberg.de

Hoda Tawfik-Schlieper, Dr. Professor
TS Pharma Consulting, Wiesenweg 7a
D–86938 Schondorf, Germany
Phone +49-8192-7948
Johan Hendrik Theodorus Wagenvoort, MD PhD
Department of Medical Microbiology
Atrium Medical Centre
PO Box 4446
NL–6401 CX Heerlen, Netherlands
Phone +31-45576-7803
Fax +31-45576-7098
E-mail J.Wagenvoort@gozl.nl
Heiko Wassil, Dr. med.
Center for Ophthalmology
Friedrichstrasse 18
D–35385 Giessen
Phone +49-641-9943940
Fax +49-641-9943919
E-mail 1 dr@wassill.de

Heinz-Peter Werner, Prof. Dr. med.
Centrum für Hygiene und medizinische Produkt sicherheit
Bornhöved Strasse 78
D–19055 Schwerin, Germany
Phone +49-385-568265
Fax +49-385-568267
E-mail HygCen@t-online.de

Frank Wilhelm, Dr. med.
Privatdozent
Department of Ophthalmology
Medical Faculty, Martin Luther University
Halle/Wittenberg
Magdeburger Strasse 8
D–06097 Halle, Germany
Phone +49-345-5571559
Fax +49-345-5571848
E-mail frank.wilhelm@medizin.uni-halle.de

Peter Wutzler, Dr. med.
Professor and Chairman
Institute for Antiviral Chemotherapy
Medical Faculty, Friedrich Schiller University
Nordhäuser Strasse 78
D–99089 Erfurt, Germany
Phone +49-361-7411214
Fax +49-361-7411114
E-mail wutzler@zmkh.ef.uni-jena.de

Klaus-Dieter Zastrow, Dr. med.
Humboldt Hospital
Am Nordgraben 2
D–13509 Berlin, Germany
Phone +49-30-41941602
Fax +49-30-41941604
E-mail KDZastrow@Krankenhaus-Reinickendorf.de
It has been said that it is always better to prevent a disease than to treat it. This is particularly important to the eye where the potential negative outcome is blindness.

The literature on the use of antiseptic agents to prevent and treat eye infections has increased markedly in the last 30 years. In 1982, when Leonard Apt and I scoured the literature to seek scientifically sound publications (utilizing controls, randomization and masking) to justify a particular regimen to prepare eyes before surgery, we found almost none. This was approximately 100 years after Credé proved the principle that prophylaxis can prevent ocular infections in the context of ophthalmic neonatorum. We then conducted a worldwide survey to see if there was any consistency in the methods of preoperative preparation by well-known ophthalmologists [1]. We found very little uniformity.

Since then, the literature has exploded with well-done studies to prevent eye diseases. Can these studies make a difference? Consider the impact of one example – that of the application of a drop of 5% povidone-iodine solution to an eye just before surgery [2]. It is estimated that in the United States, approximately 2.5 million intraocular operations are performed annually. Assume that about 25% of cases of postoperative endophthalmitis result in functional blindness and that, according to Speaker and Menikoff [3, 4], the use of povidone-iodine preoperatively reduces the incidence of endophthalmitis from 0.24 to 0.06%. Thus, by virtue of this one intervention, more than 1,100 people annually will not suffer from blindness in one eye. This calculation is for the United States alone. Imagine the magnitude of vision preserved if all the measures promoted in this book were employed!
Obviously, this is a work that is long overdue. Professors Kramer and Behrens-Baumann are to be congratulated for bringing the collective knowledge and experience of themselves and their expert contributors, largely from Europe, to expand on this important topic. May the readers apply the lessons from this excellent text to their patients as we together continue to fight against one of the scourges of humanity – blindness.

Sherwin J. Isenberg, MD

References

Preface

In the course of the past two decades, antisepsis has witnessed more or fewer developments, depending on the respective medical discipline. Most developments were seen in skin antisepsis, which is the only area permitting standardized efficacy testing in vitro and on persons (phase 2, step 2). In addition, several indications can already be distinguished for antisepsis of the oral cavity.

Antisepsis in ophthalmology is still at an incipient stage. This is surprising since Credé’s prophylaxis has a tradition spanning more than 100 years. However, antisepsis of the eye has been well focused during the past few years. This is due to measures aimed at prevention of endophthalmitis and to increasing bacterial resistance to antibiotics.

This publication, which is the first of its kind to deal with antisepsis in ophthalmology, aims to systematically collate the available clinical and experimental findings and evaluate them in respect of their relevance to the practical setting. Since antisepsis can only be successful as part of a general infection-prevention concept, some techniques for pathogen isolation, hand hygiene and contact lens hygiene are discussed. In addition, sampling and dispatch of samples to the laboratory are presented.

All authors deserve recognition for their commitment to presenting the latest findings in their field. Furthermore, we thank the personal secretaries of the editors, Mrs. Brigitte Sümnicht and Mrs. Stefanie Scheid, for their technical assistance.

A. Kramer
W. Behrens-Baumann
Greifswald/Magdeburg, July 2001