

Cambridge University Press
978-1-107-04749-5 - Textbook of Stroke Medicine: Second Edition
Edited by Michael Brainin, Wolf-Dieter Heiss and Susanne Tabernig
Frontmatter
[More information](#)

Textbook of Stroke Medicine

Second Edition

Cambridge University Press
978-1-107-04749-5 - Textbook of Stroke Medicine: Second Edition
Edited by Michael Brainin, Wolf-Dieter Heiss and Susanne Tabernig
Frontmatter
[More information](#)

Cambridge University Press
978-1-107-04749-5 - Textbook of Stroke Medicine: Second Edition
Edited by Michael Brainin, Wolf-Dieter Heiss and Susanne Tabernig
Frontmatter
[More information](#)

Textbook of Stroke Medicine

Second Edition

Edited by

Michael Brainin MD PhD

Professor and Chair, Department of Clinical Neuroscience and Preventive Medicine,
Danube University Krems, Krems, Austria

Wolf-Dieter Heiss MD PhD

Professor of Neurology, Emeritus Director, Max Planck Institute for Neurological Research and
Department of Neurology, University of Cologne, Cologne, Germany

Editorial Assistant

Susanne Tabernig MD

Vienna, Austria



CAMBRIDGE
UNIVERSITY PRESS

Cambridge University Press
978-1-107-04749-5 - Textbook of Stroke Medicine: Second Edition
Edited by Michael Brainin, Wolf-Dieter Heiss and Susanne Tabernig
Frontmatter
[More information](#)

CAMBRIDGE
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.

It furthers the University’s mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org
Information on this title: www.cambridge.org/9781107047495
Second Edition © Michael Brainin and Wolf-Dieter Heiss 2014

First Edition © Cambridge University Press 2010

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

Second Edition first published 2014
First Edition first published 2010

Printed in Spain by Grafos SA, Arte sobre papel

A catalog record for this publication is available from the British Library

Library of Congress Cataloging in Publication data
Textbook of stroke medicine / edited by Michael Brainin,
Wolf-Dieter Heiss ; editorial assistant, Suzanne Tabernig. –
Second edition.
p. ; cm.

Includes bibliographical references and index.
ISBN 978-1-107-04749-5 (Hardback)
I. Brainin, M. (Michael), editor of compilation. II. Heiss, W.-D. (Wolf-Dieter), 1939 December 31- editor of compilation.
III. Tabernig, Suzanne, editor of compilation.
[DNLM: 1. Stroke. WL 355]
RC388.5
616.8'1–dc23 2013048020

ISBN 978-1-107-04749-5 Hardback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.

.....

Every effort has been made in preparing this book to provide accurate and up-to-date information which is in accord with accepted standards and practice at the time of publication. Although case histories are drawn from actual cases, every effort has been made to disguise the identities of the individuals involved. Nevertheless, the authors, editors, and publishers can make no warranties that the information contained herein is totally free from error, not least because clinical standards are constantly changing through research and regulation. The authors, editors, and publishers therefore disclaim all liability for direct or consequential damages resulting from the use of material contained in this book. Readers are strongly advised to pay careful attention to information provided by the manufacturer of any drugs or equipment that they plan to use.

List of contributors vii
Preface ix

1. **Neuropathology and pathophysiology of stroke** 1
Konstantin-A. Hossmann and Wolf-Dieter Heiss
2. **Common causes of ischemic stroke** 33
Bo Norrving
3. **Neuroradiology** 45
 - (A) **Imaging of acute ischemic and hemorrhagic stroke: CT, perfusion CT, CT angiography** 45
Patrik Michel
 - (B) **Imaging of acute ischemic and hemorrhagic stroke: MRI and MR angiography** 49
Jochen B. Fiebach, Patrik Michel, and Jens Fiehler
 - (C) **Multimodal imaging-guided acute stroke treatment based on CT and MR imaging** 54
Patrik Michel
4. **Imaging for prediction of functional outcome and for assessment of recovery** 64
Wolf-Dieter Heiss
5. **Ultrasound in acute ischemic stroke** 82
László Csiba

6. **Basic epidemiology of stroke and risk assessment** 102
Jaakko Tuomilehto
7. **Common risk factors and prevention** 119
Michael Brainin, Yvonne Teuschl, and Karl Matz

9. **Common stroke syndromes** 155
Céline Odier and Patrik Michel
10. **Less common stroke syndromes** 169
Wilfried Lang
11. **Intracerebral hemorrhage** 188
Corina Epple, Michael Brainin, and Thorsten Steiner
12. **Subarachnoid hemorrhage** 206
Philipp Lichti and Thorsten Steiner
13. **Cerebral venous thrombosis** 222
Jobst Rudolf
14. **Behavioral neurology of stroke** 236
José M. Ferro, Isabel P. Martins, and Lara Caeiro
15. **Stroke and dementia** 255
Barbara Casolla and Didier Leys
16. **Ischemic stroke in the young and in children** 266
Valeria Caso and Didier Leys

17. **Stroke units and clinical assessment** 285
Danilo Toni and Ángel Chamorro
18. **Acute therapies for stroke** 294
Richard E. O'Brien and Kennedy R. Lees

Cambridge University Press
978-1-107-04749-5 - Textbook of Stroke Medicine: Second Edition
Edited by Michael Brainin, Wolf-Dieter Heiss and Susanne Tabernig
Frontmatter
[More information](#)

Contents

19. Interventional intravascular therapies for stroke 311	22. Secondary prevention 356
Pasquale Mordasini, Jan Gralla, and Gerhard Schroth	Hans-Christoph Diener, Sharan K. Mann, and Gregory W. Albers
20. Management of acute ischemic stroke and its late complications 326	23. Neurorehabilitation practice for stroke patients 371
Natan M. Bornstein and Eitan Auriel	Sylvan J. Albert and Jürg Kesselring
21. Infections in stroke 342	
Achim J. Kaasch and Harald Seifert	
	<hr/> <i>Index</i> 399

Contributors

- Gregory W. Albers, MD**
Department of Neurology, Stanford University
Medical Center, Stanford, CA, USA

Sylvan J. Albert, MD, MSc
Department of Neurology and Neurorehabilitation,
Rehabilitation Centre, Valens, Switzerland

Eitan Auriel, MD
Department of Neurology, Elias Sourasky Medical
Centre, Tel-Aviv, Israel

Natan M. Bornstein, MD
Department of Neurology, Elias Sourasky Medical
Centre, Sackler Faculty of Medicine, Tel-Aviv
University, Tel-Aviv, Israel

Michael Brainin, MD, PhD
Department of Clinical Neuroscience and
Preventive Medicine, Danube University Krems,
Krems, Austria

Lara Caeiro, PhD, MSc
Department of Neurosciences, Hospital de Santa
Maria and Instituto de Medicina Molecular,
University of Lisboa, Portugal

Valeria Caso, MD, PhD
Department of Internal Medicine, Stroke Unit,
University of Perugia, Perugia, Italy

Barbara Casolla, MD
Department of Neurology, Sapienza University,
Rome, Italy

Ángel Chamorro, MD, PhD
Neurology Service, Jefe de la Unidad de Ictus Hospital
Clínico, Barcelona, Spain

László Csiba, MD, PhD, DSc
Department of Neurology, University of Debrecen,
Health Science Center, Debrecen, Hungary
- Hans-Christoph Diener, MD, PhD**
Department of Neurology, University Hospital Essen,
University Duisberg Essen, Germany

Corina Eppele, MD
Department of Neurology, Klinikum Frankfurt
Höchst, Frankfurt, Germany

José M. Ferro, MD, PhD
Department of Neurosciences, Hospital de Santa
Maria and Instituto de Medicina Molecular,
University of Lisboa, Portugal

Jochen B. Fiebach, MD
Department of Neurology, Center for Stroke
Research Berlin, Charité-Universitätsmedizin Berlin,
Berlin, Germany

Jens Fiehler, MD
Department of Diagnostic and Interventional
Neuroradiology, University Medical Center
Hamburg-Eppendorf, Hamburg, Germany

Josef Finsterer, MD, PhD
Department of Internal Medicine, Krankenhaus
Rudolfstiftung, Vienna, Austria

Jan Gralla, MD, MSc
University Institute of Diagnostic and Interventional
Neuroradiology, Inselspital, University of Bern, Bern,
Switzerland

Wolf-Dieter Heiss, MD, PhD
Max Planck Institute for Neurological Research and
Department of Neurology, University of Cologne,
Cologne, Germany

Konstantin-A. Hossmann, MD, PhD
Max Planck Institute for Neurological Research,
Cologne, Germany

List of contributors

- Achim J. Kaasch, MD**
Institute for Medical Microbiology, Immunology and Hygiene, Medical Center, University of Cologne, Cologne, Germany

Jürg Kesselring, MD
Department of Neurology and Neurorehabilitation, Rehabilitation Centre, Valens, Switzerland

Wilfried Lang, MD
Neurologische Abteilung, KH der Barmherzigen Brüder Wien, Vienna, Austria

Kennedy R. Lees, MD
Division of Cardiovascular and Medical Sciences, University of Glasgow and Western Infirmary, Glasgow, UK

Didier Leys, MD, PhD
Department of Neurology, Stroke Department, University of Lille, Lille, France

Philipp Lichti, MD
Department of Neurology, Klinikum Frankfurt Höchst, Frankfurt, Germany

Sharan K. Mann, MD
Department of Neurology, Stanford University Medical Center, Stanford, CA, USA

Isabel P. Martins, MD, PhD
Department of Neurosciences, Hospital de Santa Maria and Instituto de Medicina Molecular, University of Lisboa, Portugal

Karl Matz, MD
Department of Neurology, Landeskrankenhaus Tulln, Tulln, Austria

Patrik Michel, MD
Neurology Service, Centre Hospitalier Universitaire Vaudois, University of Lausanne, Lausanne, Switzerland

Pasquale Mordasini, MD, MSc
University Institute of Diagnostic and Interventional Neuroradiology, Inselspital, University of Bern, Bern, Switzerland

Bo Norrving, MD, PhD
Department of Clinical Sciences, Division of Neurology, Lund University, Sweden
- Richard E. O’Brien, MD, FRCPEdin, MBChB**
City Hospitals Sunderland NHS Foundation Trust, Sunderland Royal Hospital, Sunderland, UK

Céline Odier, MD
Neurology Service, Centre Hospitalier Universitaire Vaudois, University of Lausanne, Lausanne, Switzerland

Jobst Rudolf, MD, PhD
Department of Neurology, General Hospital “Papageorgiou,” Thessaloniki, Greece

Gerhard Schroth, MD
University Institute of Diagnostic and Interventional Neuroradiology, Inselspital, University of Bern, Bern, Switzerland

Harald Seifert, MD
Institute for Medical Microbiology, Immunology and Hygiene, University of Cologne, Cologne, Germany

Thorsten Steiner, MD, PhD, MME
Department of Neurology, Klinikum Frankfurt Höchst, Frankfurt, Germany and Department of Neurology, University of Heidelberg, Heidelberg, Germany

Claudia Stöllberger, MD
Department of Internal Medicine, Krankenhaus Rudolfstiftung, Vienna, Austria

Yvonne Teuschl, PhD
Department for Clinical Neurosciences and Preventive Medicine, Danube University Krems, Krems, Austria

Danilo Toni, MD
Emergency Department Stroke Unit, Department of Neurological Sciences, University “La Sapienza,” Rome, Italy

Jaakko Tuomilehto, MD, PhD
Centre for Vascular Prevention, Danube University Krems, Krems, Austria;
Diabetes Prevention Unit, National Institute for Health and Welfare, Helsinki, Finland;
King Abdulaziz University, Jeddah, Saudi Arabia; and
Instituto de Investigacion Sanitaria del Hospital Universitario LaPaz (IdiPAZ), Madrid, Spain

Preface

This book is designed to improve the teaching and learning of stroke medicine in postgraduate educational programs. It is targeted at “beginning specialists,” either medical students with a deeper interest or medical doctors entering the field of specialized stroke care. Therefore, the text contains what is considered essential for this readership but, in addition, goes into much greater depth, e.g. the coverage of less frequent causes of stroke, and describing the more technical facets and settings of modern stroke care.

The textbook leads the reader through the many causes of stroke, its typical manifestations, and the practical management of the stroke patient. We have tried to keep the clinical aspects to the fore, giving relative weight to those chapters that cover clinically important issues; however, the pathological, pathophysiological and anatomical background is included where necessary. The book benefits from the experience of many specialized authors, thereby providing expert coverage of the various topics by international authorities in the field. In places this leads to some differences of opinion in the approach to particular patients or conditions; as editors we have tried not to interfere with the individual character of each

chapter, leaving only duplicate presentations when they were handled from different topological or didactic aspects, e.g. on genetic or rarer forms of diseases.

The development of this textbook has been triggered by the “European Master in Stroke Medicine Programme” held at Danube University in Austria. This program has been fostered by the European Stroke Organisation and has been endorsed by the World Stroke Organization. This book has been shaped by the experiences of the lecturers – most of them also leading authors for our chapters – and the feedback of our students during several runs of this course. Thus, we hope to satisfy the needs of students and young doctors from many different countries, both within and outside Europe.

Finally, we would like to thank Dr. Susanne Tabernig for her expert editorial assistance and her diligent and expert help in summarizing the chapters’ contents. Thanks also to Nick Dunton and his team at Cambridge University Press for their help and patience.

Michael Brainin
Wolf-Dieter Heiss