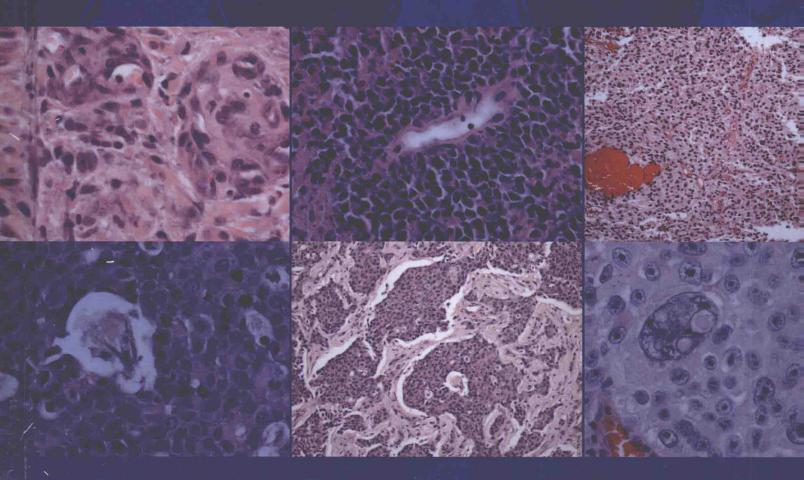
Epilepsy Brain Tumors

EDITED BY
HERBERT B. NEWTON AND MARTA MASCHIO





EPILEPSY AND BRAIN TUMORS

Edited by

HERBERT B. NEWTON

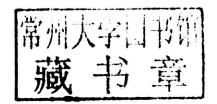
Departments of Neurology and Neurosurgery
Dardinger Neuro-Oncology Center
Division of Neuro-Oncology
Wexner Medical Center at The Ohio State University and
James Cancer Hospital and Solove Research Institute
Columbus, Ohio, USA

Marta Maschio

Center for Tumor-Related Epilepsy Area of Supporting Care Regina Elena National Cancer Institute Rome, Italy

Assistant Editor

LESLEY MICHELLE PRITIKIN







Academic Press is an imprint of Elsevier 32 Jamestown Road, London NW1 7BY, UK 525 B Street, Suite 1800, San Diego, CA 92101-4495, USA 225 Wyman Street, Waltham, MA 02451, USA The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK

Copyright © 2015 Elsevier Inc. All rights reserved.

No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying, recording, or any information storage and retrieval system, without permission in writing from the publisher. Details on how to seek permission, further information about the Publisher's permissions policies and our arrangements with organizations such as the Copyright Clearance Center and the Copyright Licensing Agency, can be found at our website: www.elsevier.com/permissions.

This book and the individual contributions contained in it are protected under copyright by the Publisher (other than as may be noted herein).

Notices

Knowledge and best practice in this field are constantly changing. As new research and experience broaden our understanding, changes in research methods, professional practices, or medical treatment may become necessary.

Practitioners and researchers must always rely on their own experience and knowledge in evaluating and using any information, methods, compounds, or experiments described herein. In using such information or methods they should be mindful of their own safety and the safety of others, including parties for whom they have a professional responsibility.

To the fullest extent of the law, neither the Publisher nor the authors, contributors, or editors, assume any liability for any injury and/or damage to persons or property as a matter of products liability, negligence or otherwise, or from any use or operation of any methods, products, instructions, or ideas contained in the material herein.

British Library Cataloguing-in-Publication Data

A catalogue record for this book is available from the British Library

Library of Congress Cataloging-in-Publication Data

A catalog record for this book is available from the Library of Congress

ISBN: 978-0-12-417043-8

For information on all Academic Press publications visit our website at elsevierdirect.com

Typeset by SPi Global, India



EPILEPSY AND BRAIN TUMORS

Dedication

I would like to thank my wife, Cindy, and my children, Alex and Ashley, for their love and support. I would also like
to thank my Neuro-Oncology patients and their families for their constant inspiration, as we continue the fight
against brain tumors.

Herbert B. Newton

Knowledge and understanding allow our dreams to take flight. Though at times arduous, especially against the wind, flying is always beautiful..

Don't ever stop.

To my daughter

Italian version:

La conoscenza e il sapere sono le ali dei nostri sogni. A volte è faticoso volare, specie controvento. Eppure è sempre bellissimo.

Non smettere mai.

A mia figlia

Marta Maschio

Foreword

Epilepsy caused by brain tumors is a growing problem for both patients and the doctors who treat them, but it has not yet received the attention that it deserves from the research community. The numbers alone are impressive. The annual incidence of primary brain tumors is estimated to be 5 to 15 per 100,000 people, and the incidence of metastatic brain tumors is within the same range. Between 30 and 70% of people with brain tumors develop epilepsy, and in approximately 20-40% of cases, seizures are the initial presenting symptom. The diagnosis and management of epilepsy secondary to brain tumors require the clinician to confront unique challenges, including the complications associated with each of the two conditions, each with its given treatment approach and possible interactions. In light of these challenges, Marta Maschio and Herbert Newton should be commended for assembling a panel of top international experts to create a book that comprehensively addresses the relationship between brain tumors and epilepsy, as viewed by both the neuro-oncologist and the epileptologist. Epilepsy and Brain Tumors provides up-todate information on several key aspects of the disorders and their treatment, including epidemiology, diagnostic approaches, pathology, and pathophysiology, as well as mechanisms of focal epileptogenesis, surgical, radiation and pharmacological treatments, neuropsychology, and rehabilitation programs. The book correctly emphasizes that managing people with epilepsy and brain tumors requires more than managing two separate conditions; it must involve a holistic approach with contributions from many disciplines. Epilepsy and Brain Tumors fills an important gap in the medical literature, and I am confident that it will be well received by neurologists, neuropediatricians, oncologists, palliative care specialists, and all scientists with an interest in epileptogenesis, epileptic seizures, and the specificities of brain tumors.

> Emilio Perucca, MD, PhD President, International League Against Epilepsy National Institute of Neurology C. Mondino and Department of Internal Medicine and Therapeutics, University of Pavia, Pavia, Italy

Preface

It is not by chance that we, the editors of this book, come from two different areas of expertise, epileptology and neuro-oncology, and from two different continents. After many stimulating discussions about our different approaches to taking care of patients with brain tumor-related epilepsy, we concluded that our different visions could be the key to creating a unique and more complete approach to this complex disease.

Hence, we decided to embark on this endeavor, bringing with us many friends and colleagues whose work has contributed greatly to this field. Our intention was to strike the proper balance between advances in basic science and clinical practice, with patient quality of life as an integral part of each chapter. Reading this special volume will provide a more comprehensive understanding of brain tumor-related epilepsy mechanisms and care, with a special focus on the next steps toward individualized targeted therapies, which will be the primary research and clinical objective for all medical practitioners in the next decade.

We hope that we have successfully communicated to you, the readers, our firm belief that brain tumor-related epilepsy is the disease that best represents the need for specialists from different disciplines to work together, always and above all, with the patient and his/her caregivers in mind.

Marta Maschio Herbert B. Newton

Contributors

- **Giuliano Avanzini** Unit of Epileptology and Experimental Neurophysiology, Fondazione Istituto Neurologico Carlo Besta, Milano, Italy
- Sheri Cotterman-Hart The Ohio State University, Columbus, OH, USA
- Marco de Curtis Unit of Epileptology and Experimental Neurophysiology, Fondazione Istituto Neurologico Carlo Besta, Milano, Italy
- Milind Deogaonkar Department of Neurological Surgery, Wexner Medical Center, Center for Neuromodulation at the Ohio State University, Columbus, OH, USA
- Loredana Dinapoli Center for Tumor-Related Epilepsy, Area of Supporting Care, Regina Elena National Cancer Institute, Rome, Italy
- Tiziana Granata Fondazione IRCCS Istituto Neurologico C. Besta, Milano, Italy
- J. Layne Moore Department of Neurology, Wright State University Medical Center, Dayton, OH, USA
- Laura Librizzi Unit of Epileptology and Experimental Neurophysiology, Fondazione Istituto Neurologico Carlo Besta, Milano, Italy
- Jonathan Lopez University of Washington School of Medicine, Seattle Children's Hospital; Seattle, WA, USA
- Marta Maschio Center for Tumor-Related Epilepsy, Area of Supporting Care; Center for Tumor-Related Epilepsy, Regina Elena National Cancer Institute, Rome, Italy
- Jesse W. Mindel Department of Neurology, Wexner Medical Center at The Ohio State University, James Cancer Hospital and Solove Research Institute, Columbus, OH, USA

- Herbert B. Newton Department of Neurology; Department of Neurosurgery; Dardinger Neuro-Oncology Center, Division of Neuro-Oncology, Wexner Medical Center at The Ohio State University and James Cancer Hospital and Solove Research Institute, Columbus, OH, USA
- Jose J. Otero Department of Pathology, Dardinger Neuro-Oncology Center, Division of Neuro-Oncology, Wexner Medical Center at The Ohio State University and James Cancer Hospital and Solove Research Institute, Columbus, OH, USA
- Francesco Paladin Department of Neurology, Epilepsy Center, SS Giovanni and Paolo Hospital, Campo SS Giovanni e Paolo, Venice, Italy
- Leslie Ray Department of Pharmacy, Dardinger Neuro-Oncology Center, Division of Neuro-Oncology, Wexner Medical Center at The Ohio State University and James Cancer Hospital and Solove Research Institute, Columbus, OH, USA
- Ali Rezai Department of Neurological Surgery, Wexner Medical Center, Center for Neuromodulation at the Ohio State University, Columbus, OH, USA
- Andrea Rigamonti Ospedale A. Manzoni, Lecco, Italy
- Andrea Salmaggi Fondazione IRCCS Istituto NeurologicoC. Besta, Milano; Ospedale A. Manzoni, Lecco, Italy
- Ammar Shaikhouni Department of Neurological Surgery, Wexner Medical Center, Center for Neuromodulation at the Ohio State University, Columbus, OH, USA

Contents

Foreword Preface Contributors	xi xiii xv	Ethical Issues Conclusion References	59 61 61
Brain Tumor-Related Epilepsy: Introduction and Overview MARTA MASCHIO, MD, HERBERT B. NEWTON, MD, FAAN	1.	5. Brain-Tumor-Related Epilepsy in Children JONATHAN LOPEZ, MD	65
Introduction Epilepsy: Definition, Incidence, Social Context and Treatment Options References	1 2 8	The Pediatric Perspective Epilepsy-Associated Brain Tumors Pathophysiology Epidemiology Presentation	65 65 67 69 70
2. Overview of Epidemiology, Pathology, and Treatment of Primary Brain Tumors HERBERT B. NEWTON, MD, FAAN, JOSE J. OTERO, MD, PhD	11	General Principles of Management History and Physical Exam Diagnostic Evaluation Medical Management	74 74 75 80
Epidemiology of PBT Pathology of Selected PBT Surgical Therapy of PBT Radiation Therapy of PBT	11 14 20 21	Surgical Management Outcome Future Directions Acknowledgment	85 88 89 90
Chemotherapy of PBT Molecular or "Targeted" Treatment Acknowledgments References	21 24 25 25	6. Mechanisms of Focal Epileptogenesis MARCO DE CURTIS, MD, LAURA LIBRIZZI, PhD,	90
3. Overview of Epidemiology, Pathology, and Treatment of Metastatic Brain Tumors HERBERT B. NEWTON, MD, FAAN, JOSE J. OTERO, MD, PhD	29	GIULIANO AVANZINI, MD Time Course and Specificity of Acquired Epileptogenesis References	102 106
Epidemiology of MBTs Pathology of MBTs Surgical Therapy of MBTs Radiation Therapy of MBTs	29 31 32 35	7. Pathophysiology of Brain Tumor-Related Epilepsy Andrea Salmaggi, MD, Tiziana Granata, MD, Andrea Rigamonti, MD	111
Chemotherapy of MBTs Acknowledgments References	37 39 39	Introduction Epidemiology of BTRE Pathophysiology of BTRE	111 111 112
4. Supportive Care of Brain Tumor Patients HERBERT B. NEWTON, MD, FAAN, LESLIE RAY, PharmD, BCOP	45	Treatment of BTRE References	114 117
Introduction Seizures and Anticonvulsant Therapy Corticosteroids Gastric Acid Inhibitors Thromboembolic Complications and Anticoagulation	45 46 48 50 50	8. The Neurophysiology of Central Nervous System Tumors Jesse W. Mindel, Md, Herbert B. Newton, Md, J. Layne Moore, Md	119
Dysphagia and Swallowing Disorders Psychiatric Issues Pain Control Issues Palliative Care	51 52 56 57	Introduction EEG Modalities and Applications EEG Background Changes	119 120 121

viii	CONT	ENTS	
	122		100
Epileptiform Activity		Vigabatrin	188
Meningiomas	124	Zonisamide	189
Generation of Abnormal Cerebral Activity	131 131	References	190
References	151	13 Antionilantic Drugs and Brain Tumor	
9. Surgical Treatment for Epilepsy	133	13. Antiepileptic Drugs and Brain Tumor	105
	133	Patients	195
AMMAR SHAIKHOUNI, MD, PhD, MILIND DEOGAONKAR, MD, ALI REZAI, MD		LESLIE RAY, PharmD, BCOP, MARTA MASCHIO, MD, HERBERT B. NEWTON, MD, FAAN	
Introduction	133	Introduction	195
Evaluation and Selection of the Surgical Candidate	133	Pathophysiology	195
Resection Procedures	134	Type of Seizure	196
Nonresective Techniques	135	Treatment of Seizures	196
Disconnection Surgeries	136	Levetiracetam	198
References	139	Oxcarbazepine	200
		Lacosamide	201
10 01: 1		Pregabalin	202
10. Clinical Evaluation of Epilepsy in		Topiramate	203
the Brain-Tumor Patient	143	Zonisamide	203
HERBERT B. NEWTON, MD, FAAN, MARTA MASCHIO, MD		Lamotrigine	204
		Conclusion	204
Differential Diagnosis	145		204
Clinical History and Physical Examination	149	References	204
Neuroimaging Evaluation	150	14 Ol: 1-1 A 1 to Desire	
Clinical and Electrophysiological Work-Up	153	14. Clinical Approach to Brain	
Effects of Oncological Therapy on Brain Tumor-Related		Tumor-Related Epilepsy	207
Epilepsy	155	MARTA MASCHIO, MD, HERBERT B. NEWTON, MD, FAAN	
Acknowledgments	157		
References	157	Seizure Prophylaxis in Patients with BTRE	207
		Is There a Best Practice for Seizure Treatment?	211
	150	Clinical Approach to BTRE	217
11. Antiepileptic Drugs: First Generation	159	Driving and BTRE	217
SHERI COTTERMAN-HART, MD, PhD		References	218
Carbamazepine	159	15. Neuropsychology of BTRE	225
Ethosuximide	161	MARTA MASCHIO, MD, LOREDANA DINAPOLI, PhD	
Phenobarbital	163	MAKTA MASCITIO, MD, LOKEDAWA DIWAI OLI, TILD	
Phenytoin	165	Introduction	225
Primidone	166	Overview of Neurocognitive Impairment in BT,	
Valproate	167	Epilepsy, and BTRE	226
References	168	Neurocognitive Impairment in BTRE	229
		Specific Cognitive Deficits in BT, Epilepsy, and BTRE	229
12. Antiepileptic Drugs: Second and		Overview of Neuropsychological Assessment	
	171	Techniques for BT, Epilepsy, and BTRE	230
Third Generation	171	Psychological Issues in BT, Epilepsy, and BTRE	232
SHERI COTTERMAN-HART, MD, PhD		Sexual Disturbances in Patients with BT, Epilepsy and BTRE	234
	224.7	QoL Assessment and Monitoring in BT, Epilepsy and BTRE	235
Introduction	171	Conclusions	237
Clobazam	171	References	237
Eslicarbazepine Acetate	173	references	25 (
Ezogabine/Retigabine	177	16. Cognitive Rehabilitation in Patients	
Felbamate	177		212
Gabapentin	178	with BTRE	243
Lacosamide	179	MARTA MASCHIO, MD, LOREDANA DINAPOLI, PhD	
Lamotrigine	180		242
Levetiracetam	181	Introduction	243
Oxcarbazepine	183	Goals of Cognitive Rehabilitation	244
Perampanel	184	Treatment Modalities in BT	245
Pregabalin	184	Treatment Modalities in Epilepsy	246
Rufinamide	185	Treatment Modalities in BTRE	247
Tiagabine Hydrochloride	186	Pharmacological Approaches for Treatment of	
Topiramate	187	Cognitive Deficits	247

		TENTS	ix	
Caregivers Issues	248	Health Economics: Funding Priorities	260	
Implications for Future Research in BTRE	249	Epilepsy	262	
References	255	Brain Tumor	265	
		Conclusion	266	
17. Social Cost of Brain Tumor-Related Epilepsy	257	References	267	
MARTA MASCHIO, MD, FRANCESCO PALADIN, MD				
Introduction	257	Appendix	269	
Health Economic Reporting: Terminology and Aims	258	Index	271	

此为试读,需要完整PDF请访问: www.ertongbook.com