MRI Head Scan Ex: 29942 Se: 8 Im: 4

Radiation Oncology in Palliative Cancer Care

Edited by Stephen Lutz, Edward Chow and Peter Hoskin





AS

PI

Table of Contents

<u>Title page</u>

Copyright page

Contributor list

Foreword

PART 1: General principles of radiation oncology

<u>CHAPTER 1 A brief history of palliative</u> <u>radiation oncology</u>

Introduction The early years Fractionation Advances in radiotherapy technique: the 1950s and 1960s Fractionation revisited: explicit palliation Stereotactic radiotherapy Prognostication and tailoring palliative radiotherapy to anticipated survival Conclusion

<u>CHAPTER 2 The radiobiology of palliative</u> <u>radiation oncology</u> Introduction Radiation effect on cells Cell cycle characteristics Interaction of cell cycle and radiotherapy fractionation Radiotherapy fractionation characteristics Conclusion

<u>CHAPTER 3 The physics of radiation</u> <u>oncology</u>

Introduction

The development of radiation therapy technology Process of radiation therapy

<u>Special considerations in developing countries</u> <u>Conclusion</u>

<u>CHAPTER 4 Curative intent versus</u> <u>palliative intent radiation oncology</u>

Introduction The determination of cure plus palliation intent versus pure palliative intent Clinical diagnoses Special considerations in developing countries

Conclusion

<u>CHAPTER 5 Side effects of palliative</u> <u>radiotherapy</u>

Introduction

Issues with interpreting palliative radiotherapy toxicity data Acute side effects Late side effects Additive toxicity Clinical advice New technologies Challenges in developing countries Conclusion

PART 2: General principles of palliation and symptom control

<u>CHAPTER 6 A history of hospice and palliative medicine</u>

Introduction Before the modern movement St. Christopher's and the modern hospice Palliative care in the United States Global development of hospice and palliative care Continuing challenges

<u>CHAPTER 7 Radiation therapy and hospice</u> <u>care</u>

Introduction Hospice care around the world Hospice care in the United States Palliative radiation and hospice **Conclusion**

<u>CHAPTER 8 The current status of palliative</u> <u>care and radiotherapy</u>

<u>What is palliative care?</u> <u>Who can benefit from palliative care?</u> <u>What are the goals of palliative care and what</u> <u>features of a palliative care program help to</u> <u>accomplish these goals?</u> <u>What is the evidence regarding the benefits and</u> <u>risks of palliative care? When should palliative</u> <u>care be introduced to a patient?</u> <u>Are there standards for palliative care? If so, what</u> <u>are the defining measures?</u> <u>How does palliative care fit in with radiation</u> <u>oncology?</u>

<u>CHAPTER 9 Palliative care in low and</u> <u>middle income countries: A focus on sub-</u> <u>Saharan Africa</u>

Introduction The need for palliative care Radiotherapy Specific clinical indications for palliative radiotherapy in Africa Challenges of palliative care delivery Addressing challenges to adequate palliative care Palliative care research Delivery of palliative care **Conclusion**

CHAPTER 10 Pain management

Introduction Pain assessment Analgesia ladder Primary pharmacologic interventions Adjuvant medications End-of-life considerations Conclusion

PART 3: Locally advanced or locally recurrent diseases

<u>CHAPTER 11 Primary tumors of the central</u> <u>nervous system</u>

Introduction Radiotherapy Side-effect risks Radiotherapy limitations Adjuvant treatment modalities Promise of newer technologies Special considerations in developing countries Conclusion

CHAPTER 12 The role of palliative care in head and neck cancer

Introduction

Current management of head and neck squamous cell carcinomas Patient selection for palliative treatment Use of palliative radiotherapy in head and neck squamous cell carcinomas Recurrent disease The promise of emerging technologies Chemotherapy in palliative head and neck squamous cell carcinomas Non-squamous cell carcinomas histologies Specific issues in palliation of head and neck squamous cell carcinomas Specific issues in palliation of head and neck squamous cell carcinomas Special considerations in developing countries Conclusion

<u>CHAPTER 13 The role of palliative</u> radiotherapy in breast cancer

Introduction Rates of palliative loco-regional radiotherapy Biologic considerations Definitions, clinical features, and multidisciplinary approach Clinical scenarios Symptom control Palliative loco-regional radiotherapy for oligometastatic disease Radiotherapy dosing schedules Radiotherapy technique and the promise of newer technology Special considerations in developing countries Follow up Conclusion

CHAPTER 14 Palliative radiotherapy in advanced lung cancer

Introduction Radiotherapy treatment The impact of emerging technologies Important circumstances Special considerations in developing countries Conclusion

<u>CHAPTER 15 Palliative radiotherapy for</u> <u>gastrointestinal and colorectal cancer</u>

Introduction Treatment of dysphagia Gastric cancer Palliation of biliary obstruction Nodes at origin of the superior mesenteric artery High dose rate brachytherapy Locally advanced/recurrent rectal cancer Re-irradiation Anal cancer The promise of highly conformal therapy Special considerations in developing countries Conclusion

CHAPTER 16 Genitourinary malignancies

Introduction

Incidence and etiology Clinical behavior Bladder cancer Prostate cancer Renal cancer Palliative radiotherapy and other approaches for management of primary disease Specific management of metastatic disease in urologic malignancies The promise of highly conformal therapy Special considerations in developing countries Conclusion

<u>CHAPTER 17 Palliative radiotherapy in</u> <u>locally advanced and locally recurrent</u> <u>gynecologic cancer</u>

Introduction Patterns of loco-regional failures for gynecologic cancers Management Treatment of recurrent carcinoma of the cervix Recurrence after definitive radiation Recurrence after definitive surgery The promise of newer technologies Special considerations in developing countries Conclusion

CHAPTER 18 Hematologic malignancies and associated conditions Introduction Diagnoses Specific clinical circumstances Locally advanced and recurrent disease Future directions Special considerations in developing countries Conclusion

CHAPTER 19 Pediatric palliative radiation oncology

Introduction Delivery of radiation treatment Differences between pediatric and adult populations Background Clinical indications for palliative radiotherapy Caring for the pediatric patient Barriers to the use of palliative radiotherapy Special considerations in developing countries Conclusion

PART 4: Metastatic disease

CHAPTER 20 Bone metastases

Introduction Clinical implications and treatment modalities Clinical symptoms Technical considerations Prognosis and choice for treatment Proactive approach Special considerations in developing countries Conclusion

CHAPTER 21 Spinal cord compression

Introduction <u>Treatment</u> <u>Promise of newer technologies</u> <u>Re-irradiation</u> <u>Special considerations in developing countries</u> <u>Conclusion</u>

CHAPTER 22 Brain metastases

Introduction Radiotherapy treatment Radiotherapy limitations Promise of newer technologies and areas of ongoing research International patterns of care and special considerations in developing countries Conclusion

CHAPTER 23 Liver metastases

Introduction Radiotherapy treatment Whole-liver radiation therapy Conformal radiation therapy Brachytherapy Selective internal radiation therapy Surgery for liver metastases Radiofrequency ablation Promising new radiotherapy techniques Practice variation among different countries Conclusion Acknowledgments

<u>CHAPTER 24 Palliative radiotherapy for</u> <u>malignant neuropathic pain, adrenal,</u> <u>choroidal, and skin metastases</u>

<u>Malignant neuropathic pain</u> <u>Adrenal metastases</u> <u>Choroidal metastases</u> <u>Skin metastases (A.H. Wolfson)</u> <u>Conclusion</u>

PART 5: Integration of radiation oncology and palliative care

<u>CHAPTER 25 Design challenges in</u> palliative radiation oncology clinical trials

Introduction Challenges with the validation of palliative metrics Evolution of palliative care clinical trials: the Radiation Therapy Oncology Group experience International research efforts Conclusion

<u>CHAPTER 26 Radiation oncology cost-</u> <u>effectiveness</u>

Introduction Cost-effectiveness Newer technologies Conclusion

<u>CHAPTER 27 Quality measures and</u> <u>palliative radiotherapy</u>

Introduction Quality measures: characteristics Developing quality measures Desirable attributes of quality measures Uses of quality measures Current uses of quality measures in radiation oncology International quality measures in radiation oncology Conclusion

<u>CHAPTER 28 Use of technologically</u> advanced radiation oncology techniques for palliative patients

Introduction Overview of technologically advanced radiotherapy techniques Clinical applications reported in the literature Brain metastasis Stereotactic radiosurgery Scalp-sparing whole brain radiation therapy Hippocampus-sparing whole brain radiation therapy Stereotactic radiation therapy Spinal metastasis Spinal cord compression Bone metastasis Adrenal metastasis Toxicities associated with palliative radiotherapy using advanced technologies Conclusion

Index

Radiation Oncology in Palliative Cancer Care

Edited by

Stephen Lutz, MD MS

Radiation Oncologist Department of Radiation Oncology Blanchard Valley Regional Cancer Center Findlay, OH, USA

Edward Chow, MBBS MSc PhD FRCPC

Professor, Department of Radiation Oncology University of Toronto; Senior Scientist, Sunnybrook Research Institute Chair, Rapid Response Radiotherapy Program and Bone Metastases Site Group Sunnybrook Health Sciences Centre Toronto, ON, Canada

Peter Hoskin, MD FRCP FRCR

Professor in Clinical Oncology, University College London; Clinical Oncologist Mount Vernon Hospital Northwood, London, UK



A John Wiley & Sons, Ltd., Publication

This edition first published 2013 © 2013 by John Wiley & Sons, Ltd.

Registered office: John Wiley & Sons, Ltd., The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

Editorial offices: 9600 Garsington Road, Oxford, OX4 2DQ, UK

The Atrium, Southern Gate, Chichester, West Sussex, PO19 8SQ, UK

350 Main Street, Malden, MA 02148-5020, USA

111 River Street, Hoboken, NJ 07030-5774, USA

For details of our global editorial offices, for customer services and for information about how to apply for permission to reuse the copyright material in this book please see our website at <u>www.wiley.com/wiley-blackwell</u>

The right of the author to be identified as the author of this work has been asserted in accordance with the UK Copyright, Designs and Patents Act 1988.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, except as permitted by the UK Copyright, Designs and Patents Act 1988, without the prior permission of the publisher.

Designations used by companies to distinguish their products are often claimed as trademarks. All brand names and product names used in this book are trade names, service marks, trademarks or registered trademarks of their respective owners. The publisher is not associated with any product or vendor mentioned in this book. It is sold on the understanding that the publisher is not engaged in rendering professional services. If professional advice or other expert assistance is required, the services of a competent professional should be sought.

The contents of this work are intended to further general scientific research, understanding, and discussion only and are not intended and should not be relied upon as recommending or promoting a specific method, diagnosis, or treatment by health science practitioners for any particular patient. The publisher and the author make no representations or warranties with respect to the accuracy or completeness of the contents of this work and specifically disclaim all warranties, including without limitation any implied warranties of fitness for a particular purpose. In view of ongoing research, equipment modifications, changes in governmental regulations, and the constant flow of information relating to the use of medicines, equipment, and devices, the reader is urged to review and evaluate the information provided in the package insert or instructions for each medicine, equipment, or device for, among other things, any changes in the instructions or indication of usage and for added warnings and precautions. Readers should consult with a specialist where appropriate. The fact that an organization or Website is referred to in this work as a citation and/or a potential source of further information does not mean that the author or the publisher endorses the information the organization or Website may provide or recommendations it may make. Further, readers should be aware that Internet Websites listed in this work may have changed or disappeared between when this work was written and when it is read. No warranty may be created or extended by any promotional statements for this work. Neither the publisher nor the author shall be liable for any damages arising herefrom.

Library of Congress Cataloging-in-Publication Data Radiation oncology in palliative cancer care / edited by Stephen Lutz, Edward Chow, Peter Hoskin. p.; cm.

Includes bibliographical references and index.

ISBN 978-1-118-48415-9 (hardback : alk. paper)

I. Lutz, Stephen. II. Chow, Edward. III. Hoskin, Peter J.

[DNLM: 1. Neoplasms-radiotherapy. 2. Palliative Caremethods. 3. Radiation Oncology-methods. 4. Radiotherapymethods. QZ 269]

616.99'407572-dc23

2012044508

ISBN: 9781118484159

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

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books.

Cover image: (Top) iStockphoto.com Courtesy of Simon Lo

Cover design by Modern Alchemy LLC

Contributor List

Shaun Baggarley, MSc

Chief Radiation Physicist Department of Radiation Oncology National University Cancer Institute National University Health System Republic of Singapore

Elizabeth A. Barnes, MD FRCP(C)

Assistant Professor Department of Radiation Oncology University of Toronto Odette Cancer Centre Toronto, ON, Canada

Susannah Batko-Yovino, MD

Assistant Professor Department of Radiation Oncology, and Program of Palliative Medicine John Hopkins University Baltimore, MD, USA

Lawrence B. Berk, MD PhD

Chair, Radiation Oncology Director, Radiation Oncology at Tampa General Hospital University of South Florida Tampa, FL, USA

Sean Bydder, BHB MBChB MBA FRANZCR

Consultant Radiation Oncologist Department of Radiation Oncology Sir Charles Gairdner Hospital; Professor School of Surgery The University of Western Australia Perth, Australia

Eric L. Chang, MD

Professor and Chair Department of Radiation Oncology Keck School of Medicine at University of Southern California Los Angeles, CA, USA

Samuel T. Chao, MD

Assistant Professor Cleveland Clinic Lerner College of Medicine Cleveland, OH, USA

Haris Charalambous, BM MRCP FRCR

Consultant in Clinical Oncology Department of Radiation Oncology Bank of Cyprus Oncology Centre Nicosia, Cyprus

Caroline Chung, MD MSc FRCPC CIP

Radiation Oncologist and Clinician-Scientist University Health Network-Princess Margaret Assistant Professor Department of Radiation Oncology University of Toronto Toronto, ON, Canada

June Corry, FRANZCR FRACP MD

Consultant Radiation Oncologist Chair Head and Neck Service Peter MacCallum Cancer Centre Melbourne, Victoria, Australia

Henry Ddungu, MD

UCI Hutchinson Center Cancer Alliance Upper Mulago Hill Road P O Box 3935 Kampala Kampala, Uganda

Gillian M. Duchesne, MB MD FRCR FRANZCR Gr Ct Health Econ

Professor of Radiation Oncology Peter MacCallum Cancer Centre University of Melbourne and Monash University Melbourne, Victoria, Australia

Alysa Fairchild, BSc MD FRCPC

Associate Professor Department of Radiation Oncology Cross Cancer Institute University of Alberta Edmonton, AB, Canada

Frank D. Ferris, MD FAAHPM

Executive Director Palliative Medicine Research and Education OhioHealth Columbus, OH, USA

Robert Glynne-Jones, MB BS FRCP FRCR

Macmillan Lead Clinician in Gastrointestinal Cancer Mount Vernon Cancer Centre Northwood, London, UK

Charles F. von Gunten, MD PhD FAAHPM

Vice President Medical Affairs Hospice and Palliative Medicine OhioHealth Columbus, OH, USA

Mark Harrison, MB.BC PhD

Consultant Oncologist Mount Vernon Cancer Centre Northwood, London, UK

James A. Hayman, MD MBA

Professor Department of Radiation Oncology University of Michigan Ann Arbor, MI, USA

David D. Howell, MD FACR FAAHPM

Assistant Professor Department of Radiation Oncology University of Toledo College of Medicine Toledo, OH, USA

Candice A. Johnstone, MD MPH

Assistant Professor Medical Director of the Froedtert and Medical College of Wisconsin Cancer Network Department of Radiation Oncology Medical College of Wisconsin Milwaukee, WI, USA

Joshua Jones, MD MA

Fellow Palliative Care Service Massachusetts General Hospital Boston, MA, USA

Andre Konski, MD MBA MA FACR

Professor and Chair Department of Radiation Oncology Wayne State University School of Medicine Barbara Ann Karmanos Cancer Center Detroit, MI, USA

Ian H. Kunkler, MA MB BCHIR FRCPE CRCR

Honorary Professor of Clinical Oncology University of Edinburgh Edinburgh Cancer Centre Edinburgh, Scotland, UK

Yvette van der Linden, MD PhD

Radiation oncologist Department of Clinical Oncology University Medical Centre Leiden, The Netherlands

Simon S. Lo, MD

Director Radiosurgery Services and Neurologic Radiation Oncology; Associate Professor University Hospitals Seidman Cancer Center Case Comprehensive Cancer Center Case Western Reserve University Cleveland, OH, USA

Jiade J. Lu, MD MBA

Head and Associate Professor Department of Radiation Oncology National University Cancer Institute National University Health System Republic of Singapore

Ernesto Maranzano, MD

Director Radiation Oncology Centre Santa Maria Hospital Terni, Italy

Nina A. Mayr, MD

Professor Radiation Oncology Arthur G. James Cancer Hospital The Ohio State University Columbus, OH, USA

Erin McMenamin, MSN CRNP AOCN ACHPN

Oncology Nurse Practitioner Department of Radiation Oncology Hospital of the University of Pennsylvania Philadelphia, PA, USA

Marcia Meldrum, PhD

Associate Researcher Center for Health Services and Society Semel Institute for Neuroscience and Human Behavior University of California, Los Angeles Los Angeles, CA, USA

Benjamin Movsas, MD

Chairman Department of Radiation Oncology Henry Ford Health System Detroit, MI, USA

Arno J. Mundt, MD

Professor and Chair Center for Advanced Radiotherapy Technologies (CART) Department of Radiation Medicine and Applied Sciences University of California, San Diego San Diego, CA, USA

Firuza Patel, MD

Professor Department of Radiotherapy and Oncology Post Graduate Institute of Medical Education and Research Chandigarh, India

Rinaa S. Punglia, MD MPH

Assistant Professor Department of Radiation Oncology Dana-Farber Cancer Institute and the Brigham and Women's Hospital Harvard Medical School Boston, MA, USA

Dirk Rades, MD PhD

Professor Head of Department Department of Radiotherapy University Hospital Lübeck Lübeck, Germany

George Rodrigues, MD MSc FRCPC

Clinician Scientist and Radiation Oncologist Departments of Radiation Oncology and Epidemiology/Biostatistics London Health Sciences Centre and University of Western Ontario London, ON, Canada

Daniel E. Roos, BSc(Hons) DipEd MBBS MD FRANZCR

Senior Radiation Oncologist Department of Radiation Oncology Royal Adelaide Hospital; Professor University of Adelaide School of Medicine Adelaide, South Australia, Australia

Arjun Sahgal, MD

Associate Professor Radiation Oncology Princess Margaret Hospital and the Sunnybrook Health Sciences Center University of Toronto, Toronto, ON, Canada

Thomas Smith, MD FACP

Harry J. Duffey Family Professor of Palliative Medicine; Professor of Oncology Department of Oncology and Program of Palliative Medicine John Hopkins University Baltimore, MD, USA

Bin S. Teh, MD

Professor, Vice Chair and Senior Member The Methodist Hospital, Cancer Center and Research Institute Weill Cornell Medical College Houston, TX, USA

Albert Tiong, MB BS M.App.Epi. FRANZCR

Consultant Radiation Oncologist Peter MacCallum Cancer Centre Melbourne, Victoria, Australia

Fabio Trippa, MD

Vice Chair Radiation Oncology Centre Santa Maria Hospital Terni, Italy

May Tsao, MD FRCPC

Assistant Professor Department of Radiation Oncology, University of Toronto; Sunnybrook Odette Cancer Centre Toronto, ON, Canada

Vassilios Vassiliou, MD PhD

Consultant in Radiation Oncology Department of Radiation Oncology Bank of Cyprus Oncology Centre Nicosia, Cyprus

Tamara Vern-Gross, DO FAAP

Department of Radiation Oncology Wake Forest Baptist Health Comprehensive Cancer Center Winston-Salem, NC, USA

Anushree M. Vichare, MBBS MPH

Measures Development Manager American Society for Radiation Oncology Fairfax, VA, USA

Deborah Watkins Bruner, RN PhD FAAN

Robert W. Woodruff Professor of Nursing Nell Hodgson Woodruff School of Nursing Professor of Radiation Oncology Associate Director for Outcomes Research Winship Cancer Institute Emory University Atlanta, GA, USA

Michelle Winslow, BA PhD

Research Fellow Academic Unit of Supportive Care University of Sheffield Sheffield, South Yorkshire, UK

Aaron H. Wolfson, MD

Professor and Vice Chair Department of Radiation Oncology University of Miami Miller School of Medicine Miami, FL, USA

Foreword

"The final causes, then, of compassion are to prevent and to relieve misery."

Joseph Butler [1692–1752] This textbook, Radiation Oncology in Palliative Cancer Care, represents the full evolution of radiation therapy, and of oncology in general. This evolution in radiation oncology is in response to the changing priorities of cancer care.

More than a century ago, radiotherapy was the only treatment available for cancer, palliating the suffering from large masses and open wounds from the disease. The priority was to relieve the suffering from the disease, as the cure of cancer was rare. As medical science evolved, especially in anesthesia and surgery, the principles of cancer resection were developed. Cure of cancer became the priority, often at the accepted price of disfigurement. In the latter half of the 20th century, the development of agents dominated. Cure of chemotherapeutic cancer remained the priority, but now at the price of toxicity. Acute toxicity often limited the patient's ability to receive chemotherapy on schedule or complete the prescribed number of courses of chemotherapy. Late chemotherapeutic toxicity risked significant end-organ damage. Despite the "War on Cancer," the sacrifice of cure at any human cost was beginning to be questioned.

Quality of life, during and after cancer therapy, became a priority commensurate with cancer cure. Although often not fully recognized as such, palliative care principles were applied to improve the cancer patient's quality of life. In its broadest definition, palliative care relieves the symptoms of cancer and its treatment at any stage of disease, and maintains or restores the dignity of function. For every