
Adult CNS Radiation Oncology

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Editors

Adult CNS Radiation Oncology

Principles and Practice

 Springer

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Adult Central Nervous System Radiation Oncology is dedicated to our parents, our families, and mentors who have greatly supported our careers.

We also dedicate this new textbook to countless patients who continue to motivate and inspire us. It is hoped that by disseminating and advancing knowledge through this new textbook, we will improve our collective capability to control disease, palliate patient suffering, and alleviate caregiver burden related to CNS disease.

—Eric L. Chang, Paul D. Brown, Simon S. Lo,
Arjun Sahgal, John H. Suh, the editors

Foreword

Thirty-one years ago, I became interested in adults patients with both benign and malignant brain tumors. I had to travel from the medical mecca of America (Boston) to do a mini-fellowship in San Francisco to work with Drs. Sheline, Liebel, Gutin, Larson, and Wilson—some of the most distinguished neuro-oncologists in the world—all in one institution (UCSF). In the first week of my time there, I saw more patients with benign and malignant brain tumors than I had in my entire residency in Boston. In San Francisco, I was exposed to research and clinical investigators, neuropathologists, and neuroradiologists who had dedicated their lives to improving the outcome for patients with these diseases. While the first comprehensive textbook on cancer had just been printed (*Cancer: Principles and Practice on Oncology*, Editors DeVita, Hellman, and Rosenberg), only a few chapters were dedicated to brain tumors. Fast-forward 31 years later and I am so excited to review this textbook completely dedicated to the role of radiation oncology in the treatment of these tumors.

Twenty years of studying the impact of treatment volume, fractionation schemes, dose, concurrent chemotherapy, and radiation sensitizers yielded little in the overall outcome for patients with malignant primary and metastatic disease. However, in the mid-1980s the introduction of MRI and internal and external stereotactic technologies allowed for better imaging definition of disease and the ability to deliver the most conformal treatments ever available. Intensity-modulated photons and protons soon followed to expand our armamentarium to increase dose and reduce late effects of radiation on normal brain tissue.

The editors and authors should be congratulated in putting together this fabulous new pedagogical addition to document where we are currently and where our dreams will take us in the future for the role of radiation in the treatment of our patients with brain tumors. I am particularly proud and humbled that I had a role in the training of two of the editors.

Boston, MA, USA

Jay S. Loeffler, MD, FACR, FASTRO

Preface

As active clinicians, educators, and researchers in the field of neuro-radiation oncology, the co-editors of this book identified a strong need to fill a gap in the medical textbook literature which until now lacked a modern comprehensive book dedicated to addressing the intersection of two important fields: radiation oncology and adult central nervous system (CNS) diseases.

The past two decades have witnessed remarkable developments and rapid advances in the field of neuro-radiation oncology, aided by image guidance, increasing sophistication of computers, software, radiation technology delivery, and ongoing development of molecular prognostic and predictive factors leading to improvements and refinement in the patient selection, and care of patients with CNS diseases.

Most recently, the World Health Organization classification of CNS tumors was updated in 2016 and now includes molecular subtypes in diagnoses as an important component. Therefore, indication for neuro-radiation oncology now requires an understanding of molecular diagnosis that will lead to appropriate utilization. Effective complication avoidance strategies employed when prescribing various forms of radiation therapy are more important than ever since patients with primary and secondary tumors of the CNS are now living longer than ever before.

This book is first organized into diseases afflicting the brain, skull base, and spine including benign tumors, vascular disorders and conditions, and malignant tumors. A chapter dealing with palliative radiation therapy of CNS tumors is also included. Then, radiation-related complications involving the brain, spinal cord, optic apparatus, neuroendocrine system, and neuro-cognition performance are covered. Finally, radiation treatment modalities including 3-D conformal therapy, intensity-modulated radiation therapy, LINAC-based radiosurgery, gamma knife, spine SBRT, proton beam therapy, and brachytherapy are addressed. Strategies to avoid CNS complications are covered across multiple chapters when appropriate, and radiation therapy is interwoven as a common theme in all chapters. Chapters include key learning objectives, and will frequently conclude with a highlighted case illustration, and self-assessment questions to help the reader consolidate their learning of the subject matter. It is hoped that this comprehensively organized book will help the reader achieve focused learning according to his/her own educational agenda and gain a thorough and nuanced understanding of specialty discipline of adult CNS radiation oncology.

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