

Contents

Section 1

Respiratory Motion and Tumor Tracking Techniques..... 1

1	Tumor Motion Ranges Due to Respiration and Respiratory Motion Characteristics SONJA DIETERICH and YELIN SUH	3
2	Respiratory Motion Tracking for Robotic Radiosurgery SOHAIL SAYEH, JAMES WANG, WILLIAM T. MAIN, WARREN KILBY, and CALVIN R. MAURER, Jr.....	15
3	Patient Alignment and Target Tracking in Radiosurgery of Soft-Tissue Tumors Using Combined Fiducial and Skeletal Structures Tracking Techniques XIAODONG WU, DONGSHAN FU, ALBERTO DE LA ZERDA, ELIZABETH BOSSART, HUA SHAO, JOSEPH BOTH, WALTER NIKE SCH, ZHICONG HUANG, ARNOLD M. MARKOE, and JAMES G. SCHWADE.....	31

Section 2

Thoraco-Abdominal Dosimetry, Radiobiology, and Imaging..... 37

4	The Radiobiological Rationale for Hypofractionation of Lung and Liver Tumors ALAN ALFIERI, JILL ROSSINOW, MADHUR GARG, SHALOM KALNICKI, and CHANDAN GUHA	39
5	¹⁸ FDG-PET/CT for Treatment Planning and Follow-Up MEDHAT M. OSMAN, ALLISON WALL, MATTHEW D. MILLER, NGHI NGUYEN, DANA A. OLIVER, RICHARD D. BUCHOLZ, and BRUCE J. WALZ	55
6	Treatment Planning of Abdominal Lesions CHARLES L. LEE	63
7	Use of a Target Complexity Index in Radiosurgical Plan Evaluation GREGORY J. GAGNON, WALTER JEAN, SONJA DIETERICH, HUAYING JI, and DONALD A. MCRAE	75
8	Dose Escalation with the Frameless Respiratory Tumor Tracking System of the CyberKnife for Early Stage Non-Small-Cell Lung Cancer JOOST JAN NYTTENS, JEAN-BRIAC PRÉVOST, MISCHA S. HOOGEMAN, and PETER C. LEVENDAG	81

Section 3**Thoraco-Abdominal Fiducial Placement Strategies 89**

- 9 Percutaneous Placement of Fiducial Markers for Thoracic Malignancies
FILIP BANOVAC, DONALD A. MCRAE, SONJA DIETERICH, KENNETH WONG,
LISA DIAS, and THOMAS CHANG 91
- 10 Use of a Blood Patch Technique to Prevent Pneumothorax
During Insertion of Lung Fiducials
JAMES W. BLALOCK, CLINTON A. MEDBERY, ASTRID E. MORRISON,
MARIANNE M. YOUNG, JULIE HENSLEY, and VIKKI HARRIET 101
- 11 Thoracic Fiducial Placement via Flexible Bronchoscopy
ERIC D. ANDERSON, BRIAN T. COLLINS, GREGORY J. GAGNON, SEAN P. COLLINS,
TIMOTHY MAHONEY, FILIP BANOVAC, CARLOS JAMIS-DOW, SHAKUN MALIK, and
CRISTINA A. REICHNER 105
- 12 Endoscopic Ultrasound–Guided Fiducial Placement for CyberKnife Radiosurgery
ALINE CHARABATY-PISHVAIAN, RICHARD DESI, and NADIM HADDAD 111

Section 4**Lung Tumor Treatment - Techniques and Experience 115**

- 13 Stereotactic Body Radiation Therapy in the Treatment of Early Stage
Non-Small Cell Lung Cancer
RONALD C. MCGARRY 117
- 14 Dosimetric Considerations for Stereotactic Body Radiotherapy Delivery in the Lung
LECH PAPIEZ 125
- 15 Selection of Treatment for Patients with Early Stage Non-Small Cell
Lung Cancer in a Multidisciplinary Thoracic Oncology Program
STUART M. BERMAN, MARK HUBERMAN, ARMIN ERNST, DAVID FELLER-KOPMAN,
DAVID H. ROBERTS, PHILLIP BOISELLE, J. ANTHONY PARKER, DANIELLE McDONALD,
NANCY RUMPLIK, ELENA A. NEDEA, SIMON ASHIKU, SIDHU P. GANGADHARAN,
MICHAEL GOLDSTEIN, SUSAN SCHUMER, SANJAY R. JAIN, DARREN BRENNAN,
MICHAEL S. BUFF, ROBERT L. THURER, and MALCOLM DeCAMP 133
- 16 CyberKnife Frameless Image-Guided High-Dose Fractionated Stereotactic
Radiosurgery with the Synchrony Motion Tracking Module in the Treatment of
Single Small Peripheral Lung Tumors
BRIAN T. COLLINS, KELLY ERICKSON, SEAN P. COLLINS, GREGORY J. GAGNON,
SONJA DIETERICH, DONALD A. MCRAE, CRISTINA REICHNER, THOMAS CHANG,
CARLOS JAMIS-DOW, FILIP BANOVAC, SHAKUN MALIK, and ERIC D. ANDERSON 145
- 17 Initial Experience Treating Lung Tumors with the CyberKnife
WILLIAM T. BROWN, XIAODONG WU, BEATRIZ E. AMENDOLA, MARK PERMAN,
FAHED FAYAD, SILVIO GARCÍA, HOKE T. HAN, MARKO AMENDOLA,
ALBERTO DE LA ZERDA, and JAMES G. SCHWADE 155
-

- 18 Stereotactic Radiosurgery for Early Stage Non-Small Cell Lung Cancer:
Rationale, Patient Selection, Results and Complications
NEIL A. CHRISTIE, STEVEN BURTON, ARJUN PENNATHUR, and JAMES D. LUKETICH.. 165

- 19 Toxicity and Efficacy of Treating Mediastinal and Hilar Lesions
ANDREW S. FINK, JUNE A. KIM, D. ROSS MCBRIDE, MICHEAL J. HERVEY II,
PENNY J. SINNEN, JODI L. MAMMENGA, GUY R. SHERWOOD, and LORI COPSEY 177

Section 5

Liver and Pancreas Treatment – Techniques and Experiment 193

- 20 A Review of Stereotactic Body Radiotherapy for Liver and Pancreas
KLAUS K. HERFARTH and MARC W. MÜNTER 195

- 21 Multidisciplinary Overview of Local-Regional Therapies for Liver Malignancies
ROBERT M. GOLDSTEIN, BRIAN D. BERGER, and JOHN K. O'CONNOR 205

- 22 Stereotactic Radiosurgery for Liver Malignancies Using the CyberKnife
KARYN A. GOODMAN..... 217

- 23 CyberKnife Radiosurgery for Pancreatic Cancer
SCOTT G. SOLTYS, KARYN A. GOODMAN, and ALBERT C. KOONG 227

- 24 Stereotactic Radiosurgery for Unresectable Adenocarcinoma of the Pancreas:
Initial Experience at Sinai Hospital of Baltimore
CHRISTOPHER HOFFELT and MUKUND DIDOLKAR 241

Section 6

Emerging Thoraco-Abdominal Radiosurgery Concepts 247

- 25 4D Treatment Optimization and Planning for Radiosurgery with
Respiratory Motion Tracking
JAY B. WEST, JONG PARK, JOHN ROBINSON DOOLEY, and CALVIN R. MAURER, Jr..... 249

- 26 Xsight Lung Tracking System: A Fiducial-Less Method for Respiratory
Motion Tracking
DONGSHAN FU, ROBERT KAHN, BAI WANG, HONGWU WANG, ZHIPING MU,
JONG PARK, GOPINATH KUDUVALLI, and CALVIN R. MAURER, Jr..... 265

- 27 CyberKnife Radiosurgery: Quality of Life and Cost Considerations
DONALD B. FULLER 283

- Abbreviations 295

- Subject Index 297

- List of Contributors 309