

Contents

Preface	vii
1. Definitions and Abbreviations	1
2. Resource Requirements for IMRT	3
2.1 Machine Characteristics.....	4
2.2 Treatment Planning System (TPS) Capabilities and Commissioning.....	5
2.3 Quality Assurance Procedures.....	6
2.4 Other Considerations.....	6
2.4.1 Shielding Considerations.....	7
2.4.2 Staff Requirements	7
2.4.3 Additional Staffing Considerations.....	9
3. Simulation	11
3.1 Simulation Imaging: CT.....	11
3.2 Scanner Requirements and Parameters	11
3.3 Quality Assurance and Additional Information	12
3.4 Immobilization and Localization.....	12
3.5 Verification Simulation.....	13
4. Planning.....	15
4.1 Contouring.....	15
4.1.1 Organs at Risk.....	15
4.1.2 Optimization Contours.....	15
4.2 Isocenter Placement	16
4.2.1 Isocenter from CT Simulation	16
4.2.2 Beam Isocenter	16
4.3 Beam Arrangement.....	17
4.3.1 IMRT Beam Arrangement	17
4.3.2 VMAT Beam Arrangement	17
4.4 Optimization.....	18
4.4.1 Pinnacle Optimization.....	20
4.4.2 Eclipse Optimization	22
4.4.3 RayStation Optimization	26
4.4.4 Basic Guidelines for Optimization	30
4.4.5 Introductory Case: A Lung Lesion IMRT	31
5. Quality Assurance of Intensity-Modulated Plans	35
5.1 Secondary Monitor Unit Verification.....	36
5.2 Delivery Verification (Pretreatment Measurements)	36
5.2.1 Point Dose Measurements	37
5.2.2 Radiochromic Film.....	37
5.2.3 Portal Imaging.....	37
5.2.4 Detector Arrays.....	38
5.3 Measurement Acquisition Methods	38
5.4 Measurement Analysis Methods	39

6.	Application of VMAT for Spatially Fractionated Radiation Therapy (Grid Therapy)	41
6.1	Early Applications of Grid Therapy	41
6.2	Grid Therapy Makes a Return	42
6.3	Conclusion.....	50
	Chapter References.....	50
7.	Pinnacle TPS Sample IMRT and VMAT Plans	51
	Case Number pTA01: Thorax and Abdomen—Gastroesophageal.....	52
	Case Number pTA02: Thorax and Abdomen—Left Upper Lung	61
	Case Number pTA03: Thorax and Abdomen—Mediastinum and Lung	70
	Case Number pTA04: Thorax and Abdomen—Gastroesophageal.....	78
	Case Number pTA05: Thorax and Abdomen—Spinal Cord.....	87
	Case Number pHN01: Head and Neck	96
	Case Number pHN02: Head and Neck	104
	Case Number pHN03: Head and Neck	112
	Case Number pHN04: Head and Neck	121
	Case Number pHN05: Head and Neck	131
	Case Number pP01: Prostate + Lymph Nodes	141
	Case Number pP02: Prostate	149
	Case Number pP03: Prostate	157
	Case Number pP04: Prostate + Lymph Nodes	165
	Case Number pP05: Prostate + Lymph Nodes	172
8.	Eclipse TPS Sample IMRT and VMAT Plans	179
	Case Number eTA01: Thorax and Abdomen—Left Lung SBRT	180
	Case Number eTA02: Thorax and Abdomen—Right Hilum and Mediastinum	186
	Case Number eTA03: Thorax and Abdomen—Left Chest Wall	193
	Case Number eHN01: Head and Neck—Neck Lymphoma.....	201
	Case Number eHN02: Head and Neck—Bilateral Neck—Larynx.....	207
	Case Number eHN03: Head and Neck—Left Temporal GBM.....	214
	Case Number eP01: Pelvis—Prostate Bed Treatment.....	221
	Case Number eP02: Pelvis—Right Hip Treatment.....	227
	Case Number eP03: Pelvis—Recurrent Rectal Treatment.....	233
9.	RayStation TPS Sample IMRT and VMAT Plans	241
	Case Number rTA01: Thorax and Abdomen—Right Lung	242
	Case Number rTA02: Thorax and Abdomen—Lower Esophagus.....	247
	Case Number rTA03: Thorax and Abdomen—T7 Vertebral Body.....	255
	Case Number rHN01: Head and Neck—Bilateral Neck	261
	Case Number rHN02: Head and Neck—Right Neck.....	269
	Case Number rHN03: Head and Neck—Left Parotid.....	276
	Case Number rP01: Pelvis—Prostate + Lymph Nodes	281
	Case Number rP02: Pelvis—Left Acetabulum	287
	Case Number rP03: Pelvis—Prostate Bed.....	293