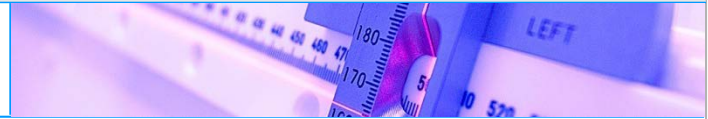


Stereotactic Body Radiation Therapy (SBRT)



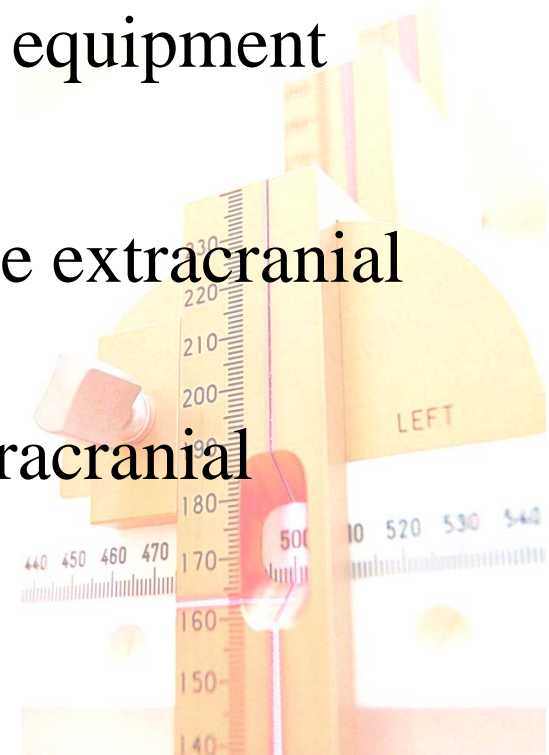
Stereotactic Body Radiation Therapy (SBRT)



Stereotactic Body Radiation Therapy (SBRT)

Considerations

- Stereotactic immobilization equipment
- Organ motion
- Dose and fractionation to the extracranial targets
- High dose irradiation of extracranial structures



Stereotactic Body Radiation Therapy (SBRT)

immobilization

- Body fix
- Body Frame
- Q-fix



[http://ecatalog.elekt.com/oncology/bodyfix\(r\)/products/0/2325/22341/20231/bodyfix\(R\).aspx](http://ecatalog.elekt.com/oncology/bodyfix(r)/products/0/2325/22341/20231/bodyfix(R).aspx)



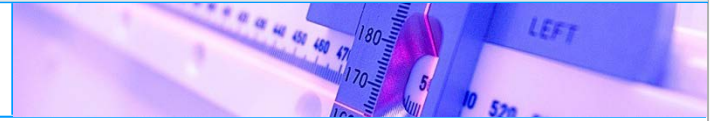
<http://www.elekt.hk/fileadmin/groups/1/images/Stereotactic-Body-Frame.jpg>



Product Guide and User Manual
RT-4558KV & RT-4558-1C
Stradivarius™ SBRT Device
and Accessories

WFR-Aquaplast/Qfix Systems

Stereotactic Body Radiation Therapy (SBRT)

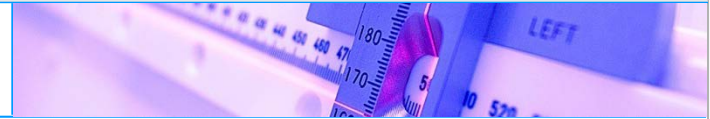


Organ Motion

- Compression technique to reduce the abdominal motion associated with respiration
- 4D CT simulator, ITV
- IGRT



Stereotactic Body Radiation Therapy (SBRT)



Organ Motion

- Large dose (6-30 Gy) given in 1-5 fractions
- GTV, CTV, ITV, PTV;
well defined tumor $GTV=CTV$
- High conformality and fast dose falloff
- Margin: millimeters
- Required setup accuracy: TG 40 ; TG 142
- Nonuniform dose distribution and hot spot are clinically acceptable
- CT, MRT, PET/CT
- High spatial targeting accuracy



Benedict et al.: Stereotactic body radiation therapy: The report of TG101

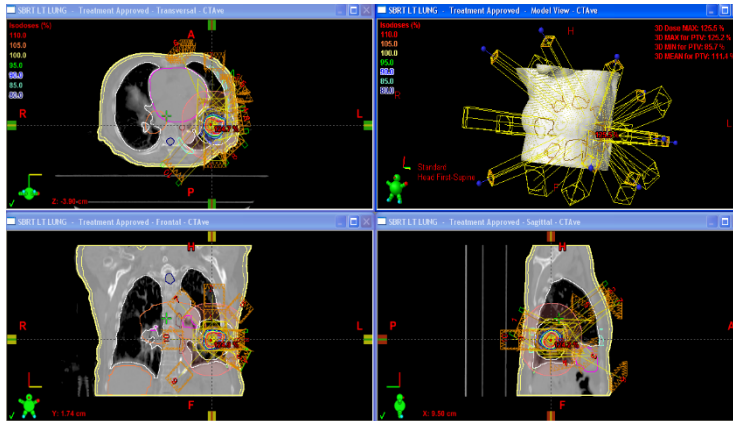
TABLE I. Comparison of typical characteristics of 3D/IMRT radiotherapy and SBRT.

Characteristic	3D/IMRT	SBRT
Dose/fraction	1.8–3 Gy	6–30 Gy
No. of fractions	10–30	1–5
Target definition	CTV/PTV (gross disease+clinical extension): Tumor may not have a sharp boundary.	GTV/CTV/ITV/PTV (well-defined tumors: GTV=CTV)
Margin	Centimeters	Millimeters
Physics/dosimetry monitoring	Indirect	Direct
Required setup accuracy	TG40, TG142	TG40, TG142
Primary imaging modalities used for treatment planning	CT	Multimodality: CT/MR/PET-CT
Redundancy in geometric verification	No	Yes
Maintenance of high spatial targeting accuracy for the entire treatment	Moderately enforced (moderate patient position control and monitoring)	Strictly enforced (sufficient immobilization and high frequency position monitoring through integrated image guidance)
Need for respiratory motion management	Moderate—Must be at least considered	Highest
Staff training	Highest	Highest+special SBRT training
Technology implementation	Highest	Highest
Radiobiological understanding	Moderately well understood	Poorly understood
Interaction with systemic therapies	Yes	Yes

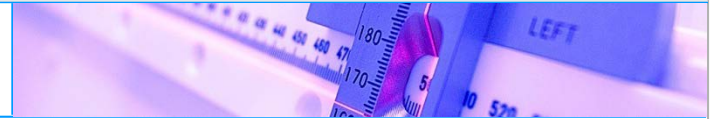
Stereotactic Body Radiation Therapy (SBRT)

SBRT Delivery Techniques

- Non-coplanar 3DCRT (12-18 fields) with small margin (mm)
- IMRT (less fields, 8-10?)
- VMAT, Rapid Arc, Tomotherapy



Stereotactic Body Radiation Therapy (SBRT)



References

- Cheng-Shie Wu, Ph.D., FACR, FAAPM, Columbia University, New York, NY
- Khan, Faiz M. The physics of radiation therapy / Faiz M. Khan. - 4th ed.
 1. Stereotactic Body Frame Operator's Manual, Publication no. 4513 370 19013
 2. Brendan J. Vahey, Elekta Stereotactic Body Frame. (19 Feb 2000)
 3. 陳逸偉，Stereotactic Body Frame. (30 NOV 2007)
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