University of Michigan
Department of Radiation Oncology
Division of Radiation Physics

Special Procedures Rotation I/II
SBRT, SRS, TBI, and TSET

Resident: _____

Rotation staff mentor/ advisor: _Scott Hadley, Kwok Lam, and Dale Litzenberg_____

Rotation Durations: 4 months (2 months + 2 months)
Rotation Dates: _____

A medical physics resident in radiation oncology at the University of Michigan will be expected to demonstrate the following competencies associated with special procedures. These are considered the minimum standards. Resident should complete the list of assignment during his/her rotations.

Contents Outline

Knowledge Factors
- List of reading assignments
- Read and understand relevant AAPM Task Group reports.

Practical Factors
- Observe SRS and SBRT simulation
- SRS and SBRT treatment planning
- Stereotactic pre-treatment QA
- Perform TBI simulation and calculation
- Perform TSET output check

Knowledge Factors – List of reference

Short list of useful references (this is by far not a comprehensive list):

- AAPM Task Group #29, "The physical aspects of total and half body photon irradiation."
- AAPM Task Group #30, "Total skin electron therapy: Technique and dosimetry."
- AAPM Task Group #42, "Stereotactic radiosurgery."
- AAPM Task Group #101, "Stereotactic body radiation therapy"
- AAPM Task Group #155, "Small Fields and Non-Equilibrium Condition Photon Beam Dosimetry"
- The Modern Technology of Radiation Oncology, Editor J. Van Dyk, Medical Physics Publishing, Copyright 1999.
- B.E. Pollack, "Stereotactic radiosurgery for Arteriovenous Malformations", Neurosurgery Clinics of North America, Vol. 10 (2) 281-290 (1999).
- L. Ma *et al.*, "Comparative analyses of linac and Gamma Knife radiosurgery for trigenminal neuralgia treatments, Phys. Med. Biol. 50, 5217-5227 (2005).
- M. Fuss *et al.*, "Stereotactic body radiation therapy: An ablative treatment option for primary and secondary liver tumors", Annals of Surgical Oncology, 11 (2) 130-138 (2004).
- K.K. Herfarth *et al.*, "Stereotactic single-dose radiation therapy of liver tumors: Results of a phase I/II trial", Journal of Clinical Oncology, 19 (1) 164-170 (2001).
- Ten Haken RK, Diaz RF, McShan DL, Fraass BA, Taren JA, Hood TW: From manual to computerized planning for 125-I stereotactic brain implants. Int J Rad Onc Biol Phys, 15:467-480, 1988.
- Title 10 of the Code of Federal Regulations Part 35 Subpart 600 – 35.600, .610, .615, .635, .645, .655

Knowledge Factors - SBRT

Demonstrate an understanding of TG-101.

Signature / Date	

Discuss the rationale for SBRT treatments, common treatment sites, and typical dose and fractionation schemes

Signature / Date	

Discuss and demonstrate an understanding of the immobilization and localization systems for SBRT treatments;

Signature / Date	

Discuss the use of simulation imaging for SBRT target definition, including multi-modality imaging and 4D imaging for cases requiring motion management.

Signature / Date	

Discuss treatment planning objectives for SBRT treatments, including dose limits, dose heterogeneity, dose gradient and fall-off, and beam geometry.

Signature / Date	

Demonstrate an understanding of the in-house procedures and documentation. This should include a discussion of treatment verification and delivery of SBRT, as well as use of in-room imaging.

Signature / Date	

Demonstrate an understanding of the equipment required to acquire SBRT related measurements (i.e. small field dosimetry).

Signature / Date	

Demonstrate an understanding of how to commission and implement a new SBRT program.

Signature / Date	

Knowledge Factors – SRS

Demonstrate an understanding of TG-42, including a comparison between linac-based and Co-60 gamma SRS.

Signature / Date	

Discuss the rationale for SRS treatments for the treatment of malignant and benign conditions, as well as common prescriptions.

Signature / Date	

Discuss commissioning and issues related to the clinical commissioning and maintenance of an SRS program (e.g., accurate localization, mechanical precision, accurate and optimal dose distribution, and patient safety);

Signature / Date	

Discuss the stereotactic localization of a target (e.g., on the basis of angiography as opposed to CT and MRI) and how the accuracy of this localization is measured.

Signature / Date	

Demonstrate an understanding of the alignment of coordinate systems (e.g., target frame of reference with linac frame of reference) and how the mechanical precision of this alignment is measured.

Signature / Date	

Demonstrate an understanding of the in-house procedures and documentation.

Signature / Date	

Demonstrate an understanding of pre-treatment QA for SRS systems, including linac-based and Co-60 SRS techniques.

Signature / Date	

Demonstrate an understanding of the equipment required to acquire SRS related measurements (e.g., small field dosimetry).

Signature / Date	

Knowledge Factors – TBI

Demonstrate an understanding of TG-29.

Signature / Date	

Discuss the rationale for TBI treatments for the treatment of malignant and benign conditions.

Signature / Date	

Demonstrate an understanding of TBI prescription and delivery techniques.

Signature / Date	

Discuss commissioning and issues related to clinical commissioning and maintenance of a TBI program.

Signature / Date	

Demonstrate an understanding of the significance of beam modifiers commonly used during TBI treatments and how they are clinically commissioned (e.g., lung/kidney blocks, beam spoilers).

Signature / Date	

Knowledge Factors - TSET

Demonstrate an understanding of TG-30

Signature / Date	

Discuss the rationale for TSET treatments for the treatment of malignant and benign conditions.

Signature / Date	

Demonstrate an understanding of TSET prescription and delivery techniques.

Signature / Date	

Discuss commissioning and issues related to clinical commissioning and maintenance of a TSET program.

Signature / Date	

Discuss and demonstrate an understanding of the significance of the TSET MU calculation, including the B-factor and how it is measured.

Signature / Date	

Demonstrate an understanding of the significance of beam modifiers commonly used during TSET treatments (e.g., shields, beam scatter).

Signature / Date	

Practical Factors – SBRT

Observe and discuss simulation of SBRT patients

Brain	*Signature / Date*	
Brain	*Signature / Date*	
Liver	*Signature / Date*	
Liver	*Signature / Date*	
Lung	*Signature / Date*	
Lung	*Signature / Date*	
Prostate	*Signature / Date*	
Prostate	*Signature / Date*	
Spine	*Signature / Date*	
Spine	*Signature / Date*	

Discuss and participate in planning of SBRT patients.

Brain	*Signature / Date*	
Brain	*Signature / Date*	
Liver	*Signature / Date*	
Liver	*Signature / Date*	
Lung	*Signature / Date*	
Lung	*Signature / Date*	
Prostate	*Signature / Date*	
Prostate	*Signature / Date*	
Spine	*Signature / Date*	
Spine	*Signature / Date*	

Perform pre-SBRT QA

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Observe and participate with day one SBRT treatments, including CBCT alignment

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Practical Factors – SRS

Observe and discuss simulation of frame-based SRS patients.

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Observe and discuss simulation of frameless SRS patients.

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Discuss and participate in planning of SRS patients.

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Perform SRS plan and MU secondary checks.

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Perform SRS pre-treatment QA.

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Practical Factors – TBI

Participate in TBI simulation – with or w/o lung blocks, but must include one of each.

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Perform TBI calculation, including where necessary, lung block calculations and QA.

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Setup TBI electronic chart and enter data into ARIA.

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Observe and participate in TBI treatment, treatment verification, and in vivo measurements, where applicable.

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Practical Factors – TSET

Participate in TSET beam calibration and output check.

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Participate in TSET planning and plan verification.

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Setup TSET electronic chart and enter data into ARIA.

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Observe and participate in TSET treatment and in vivo measurements.

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