INSTRUCTIONS FOR SRS QUALITY AUDIT SYSTEM

September 2024

Enclosed is a head phantom with an insert containing the "tumor," as well as film and TLD. Three ficudials markers are also embedded in the phantom in the vicinity of the target. The purpose of the phantom is to verify dose and dose distribution, as well as localization of the dose relative to the simulated “tumor."

The tumor/target volume is a solid water sphere (1.9 cm in diameter) embedded in high impact polystyrene. It includes two orthogonal sheets of GAFchromic film passing through the center of the target and two TLD within 0.5 cm of the center of the target (see the figure).

In order to ensure optimum precision of our evaluation, the following constraints should be observed in planning the treatment:

- The maximum dose to the film should be approximately 30 Gy.
- The dose to the TLD (at the center of the target) should be approximately 30 Gy.

Our report to you will include the following:

- The dose at the center of the target (solid water ball) measured by TLD.
- Dose profiles measured by film.
- Gamma analysis of the planar dose distributions

Image, plan, and treat this phantom as if it were a <u>real patient.</u> As an ideal end-to-end test of a clinical process, this includes (as relevant to your clinical practice) frame mounting by a physician, planning by a dosimetrist, review by a radiation oncologist, and treatment by a therapist.

Please send us enough documentation so we can tell what you have done. Please follow the enclosed instructions and return the phantom and paperwork as soon as possible.

The phantom has been shipped to you with the following:

1. Anthropomorphic Phantom
2. Ear TLD, two TLD on each ear.
3. TLD block for machine output verification.

RETURN SHIPPING INSTRUCTIONS

Please return the phantom using the enclosed prepaid mailing label.
For technical questions and questions regarding to the shipment contact

Phone: (713)-745-8989
Email: RQALAB@mdanderson.org

DOSIMETRY INFORMATION TO BE SUBMITTED

The following information is required to submit when return the phantom (to be include in the shipping case):

- Original hard copy isodose distribution in coronal and sagittal planes through target center.
- Treatment plan report or summary.
- Screen shots showing the contour of the TLD (similar to the figure below).

Data to be upload to OneDrive - A folder has been created with your institution name on OneDrive. It will be shared with you via email. Please upload digital treatment planning data in the DICOM format which include CT images along with 3D composite RTDose, RTStructure and RTPlan. **Please compress the file before upload to avoid the file corrupt during the process.**

- **Please note, if unable to do the above please send a CD with all the requested data with the phantom.**
- **DICOM data submit for analysis must be with CT images. We cannot process the data with MR images.**

PROCEDURES

Imaging:

1. If you use immobilization, apply it on the phantom. For headframes, the target is located roughly between the upper parts of the ears. When positioning the phantom, please attempt to keep the head level and straight so that the mid-coronal and mid-sagittal film planes are not rotated (if applicable to your setup, two leveling screws are present on the base-plate of the phantom). This is optimal to compare these measured planes with the corresponding dose plane produced by your treatment planning system.

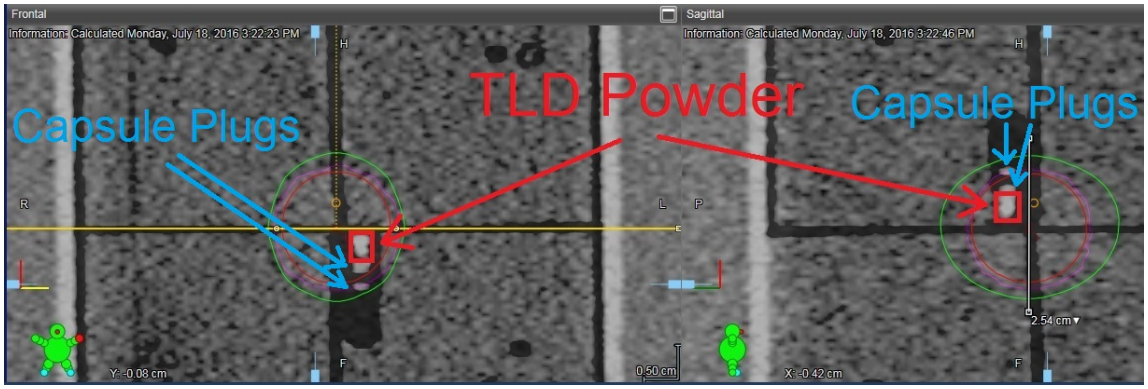
2. Locate the target with CT. This phantom is not compatible with MRI imaging and if MRI imaging is desired a different (water-filled) SRS phantom is necessary. Please provide axial, coronal and sagittal images through the target volume.

3. Create a treatment plan according to the guidelines provided below.

Planning:

1. The target is the solid water ball that should be evident on the CT scan. The center of the ball defines the center of the target volume. Please treat the solid water ball as the PTV.

2. Contour the TLD powder inside both of the capsules. The powder is illustrated in the figure below. Please note that the powder is just the high contrast volume near the mid-plane of the insert – please do not include the capsule plugs in this contour (the TLD powder size is approximately 3 mm in diameter and 4 mm in length). Submit the TLD contour dose as determined by your treatment planning computer. Please also submit the point dose to the center of the TLD.



3. Plan a treatment that covers the target volume while sparing all other tissues. To achieve maximum precision, we would like the dose to the center of the target to be approximately **30Gy (100% isodose line)**. This should be achievable with the following dose guidelines guidelines (with prescription dose is where you think it will cover your target)

    a. GammaKnife: Cover the target with 15 Gy (prescription isodose line 40% - 60%)

    b. CyberKnife: Cover the target with 20 Gy (prescription isodose line 60% - 80%)

    c. C-arm linear accelerator: Cover the target with 25 Gy (prescription isodose line >85%)

4. If you cannot meet this guideline (e.g., isodose line is >20% different from the suggested value), please contact our office at 713-745-8989.

Treatment:

1. Align the phantom according to your clinical workflow.
2. Remove the ear TLD after imaging and alignment (KV, CBCT…) are complete and before treatment begins.
3. Irradiate the phantom according to your plan.
4. Fill out the data sheet.
5. Upload the DICOM data on the folder we shared with you in OneDrive.
6. Pack and return all items. Please include copies of treatment plans and diagnostic images used to plan the treatment.

Stereotactic Radiosurgery Quality Audit Data Form

Institution: _____

Address: _____

_____

Person performing irradiation: _____

Person to receive report: _____

Email address: _____

Phone number: _____

Person to call in case of questions: _____

Email address: _____ Phone number: _____

Treatment Unit:

Manufacturer:_____ Model (Head model if Elekta): _____

Serial Number: _____

Treatment Details:

Photon Energy: _____ Type of Beam: Regular_____ SRS beam _____ FFF_____

Collimator type:

☐MLC. Model (e.g., Millennium 120 or HD120) _____

☐ Cone. Diameter (used for treatment):_____ (or variable diameter (e.g., IRIS) ☐)

Immobilization system: ☐ Head frame, ☐ Mask, ☐ Other_____

How many isocenters (shots) are you using? ☐ 1 ☐ More than1 (Number:_____)

What target volume (diameter) are you intending to treat: ☐ 1.9 cm, ☐ smaller (e.g., 17.5mm)

Treatment Planning System:

Treatment Planning System: _____ Manufacturer:_____

Algorithm:_____ Treatment Planning Version: _____

Treatment of Phantom:

Date of Irradiation: _____

Indicate the dose delivered to the TLD as determined by your treatment planning computer. This includes both the average dose over the TLD-powder contour, and the point dose to the center of the TLD volume (which should be very nearly 3.0 mm in the S/R/P and L/A/I directions from the center of the target).

TLD	TLD Contour Dose (Gy) (average dose to TLD)	TLD Point Dose (Gy) (point dose to center of TLD)
TLD superior		
TLD inferior		

Dose specified is to: _____ Muscle or _____ Water

Maximum plan dose: _____ Gy.

Prescription dose: _____ Gy.

NOTE: if you are unable to submit digital plan data (RT plan, RT dose, etc.), please complete the following section. This information is not needed if you submit digital plan data:

Diameter of treatment volume (identified by prescription isodose line) along: (Required). Determined from your treatment planning system.

Right/Left Profile: _____

Anterior/Posterior Profile: _____

Superior/Inferior Profile: _____

Comments:

_____

_____

For Office Use Only	TLD Batch	Phantom ID #	Code	Date Sent	Date Rec'd