Proton Head & Neck Phantom

Guidelines for ***Planning and Treating*** the Proton H&N Phantom.
Revised August 28, 2023

The irradiation of this phantom is part of the credentialing process for proton therapy in clinical trials. The purpose of the phantom treatment experiment is to confirm that the dose distribution planned by each institution can be delivered by that institution, and correctly submitted to our office.

We request that each institution keep the phantom for a period of time *no more than 2 weeks.*

During this two-week period, the institution will image, plan, and treat the phantom and return it to our office. Thank you for your cooperation.

The phantom contains one insert. The insert contains the GTV (tumor target), TLD at 5 locations and perpendicular sheets of film in order to evaluate the dose to the target.

If you have any questions, please contact the Radiation Quality Assurance Laboratory at:

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

DOSIMETRY INFORMATION TO BE SUBMITTED:

The following information is to be submitted when returning the phantom (include it in the shipping box):

- A completed **Proton Head & Neck Phantom Institution Information** form.
- Original hard copy of the plans and isodose distributions in the axial and sagittal plane through the target center.
- Please upload the Proton Head and Neck phantom digital data. A folder had been created with your institution name on OneDrive and it will be shared with you. The files to upload are the digital data for your Proton Head and Neck phantom irradiation in DICOM format, and include all CT slices, 3D composite dose file, structure file and plan file.

DOSE PRESCRIPTION:

The doses to be delivered to the phantom are a factor of 10 less than the protocol dose specifications, namely:

- Primary PTV:
  - Total dose of 6.6 Gy(RBE) to at least 95% of the PTV, and
  - < 1% of the PTV receives < 93% of the prescribed dose.
- Cord organ at risk (posterior to the target):
  - < 4.5 Gy(RBE), maximum dose
- Normal tissue:
  - ≤ 110% of the prescribed dose (6.6 Gy(RBE))

IRRADIATING THE PHANTOM

Materials included in box:

- Head & Neck Phantom, with 2 TLD capsules taped to each ear.
- Phantom insert
- Envelope with background film (hidden from your view; please don't try to find it)
- Pillbox to hold TLD from phantom ears.
- Mailing label to return case.

Procedures:

1. This phantom has only one insert. The same insert is used for both simulation and for treatment.
2. Position the cylindrical insert inside the inferior opening of the phantom. Rotate the insert inside the phantom until it locks into place (anterior marking on insert matches the anterior orientation of the phantom).
3. Make sure there is 1 TLD capsule taped onto each ear of the phantom. If they have come off, please tape them back on. They will remain on for the **imaging** process, then be removed before the treatment irradiation so as to determine the background for the TLD inside the insert.
4. CT scan the phantom as you would a patient. You may wish to scan with the typical CT Head and Neck Protocol used at your institution. You may also use BBs or place tape with cross marks on the phantom to help with the alignment. A head rest or head mold is strongly advised in order to guarantee reproducibility in treatment setup.
5. REMOVE THE TLD CAPSULES FROM THE EARS. Place in the pillbox labeled "ear TLD".
6. Plan the treatment as specified in the dose prescription.
7. Proceed with the typical patient treatment procedure established at your institution (if it is the case, perform the regular imaging before each alignment).
8. Remove the insert and place it in the box.
9. Put the empty phantom in the box.
10. Make sure that the "ear TLD" pillbox is in the box.
11. Include the dosimetry data discussed above. Complete the attached forms. Be sure to include the scale used on the images coming from your TPS.
12. Return the complete package to our office.

Proton Head & Neck Phantom: Institution Information

Institution:_____

Address: _____

_____

Person performing irradiation: _____

Physicist to receive report: _____

Email address: _____

Phone Number: _____

Person to call in case of questions: _____

Phone Number: _____ Fax Number: _____

Email address: _____

Treatment Unit:

Manufacturer: _____ Model: _____

In-house specification:_____Serial # _____

Proton Energy: Nom _____ (MeV) Range: _____ cm

1. For the phantom irradiation, the technique used was (check one):

 Pencil Beam Scanning (PBS) / IMPT (variable intensity pencil beam scanning).

 Uniform Scanning.

 Passive Scattering.

2. Collimation technique: Multileaf Solid Aperture

3. Range modulation technique:

 Range modulator wheel Range shifters Both RMW and shifters

 Other, please describe _____

4. Compensator technique:

 Solid compensator / bolus Other, please describe _____

****Please enclose original copies of your treatment plans. Include the coronal and sagittal planes through the target center. Include scaling factors for each plane.**

Treatment Planning:

TPS Manufacturer: _____ Model: _____

Software: _____ Algorithm: _____ TPS Version: _____

Beam angles used: _____

For pencil beam scanning - was a range shifter or energy absorber used? □ No □ Yes _____

For pencil beam scanning - was repainting used? □ No □ Yes _____

If yes, #_____ layer repaintings #_____ _____volume repaintings _____

Treatment of Phantom:

Date of Irradiation: _____

Dose specified is to: □ Muscle □ Water

and is: □ Physical □ Biological - RBE used is _____

Indicate the dose delivered to these specific points as determined by your treatment planning computer:

TLD	Mean Dose (cGy(RBE))	Min Dose (cGy(RBE))	Max Dose (cGy(RBE))
PTV Superior TLD			
PTV Inferior TLD			
Parotid Left TLD			
Parotid Right TLD			
Cord TLD			

Results of QA:_____

_____

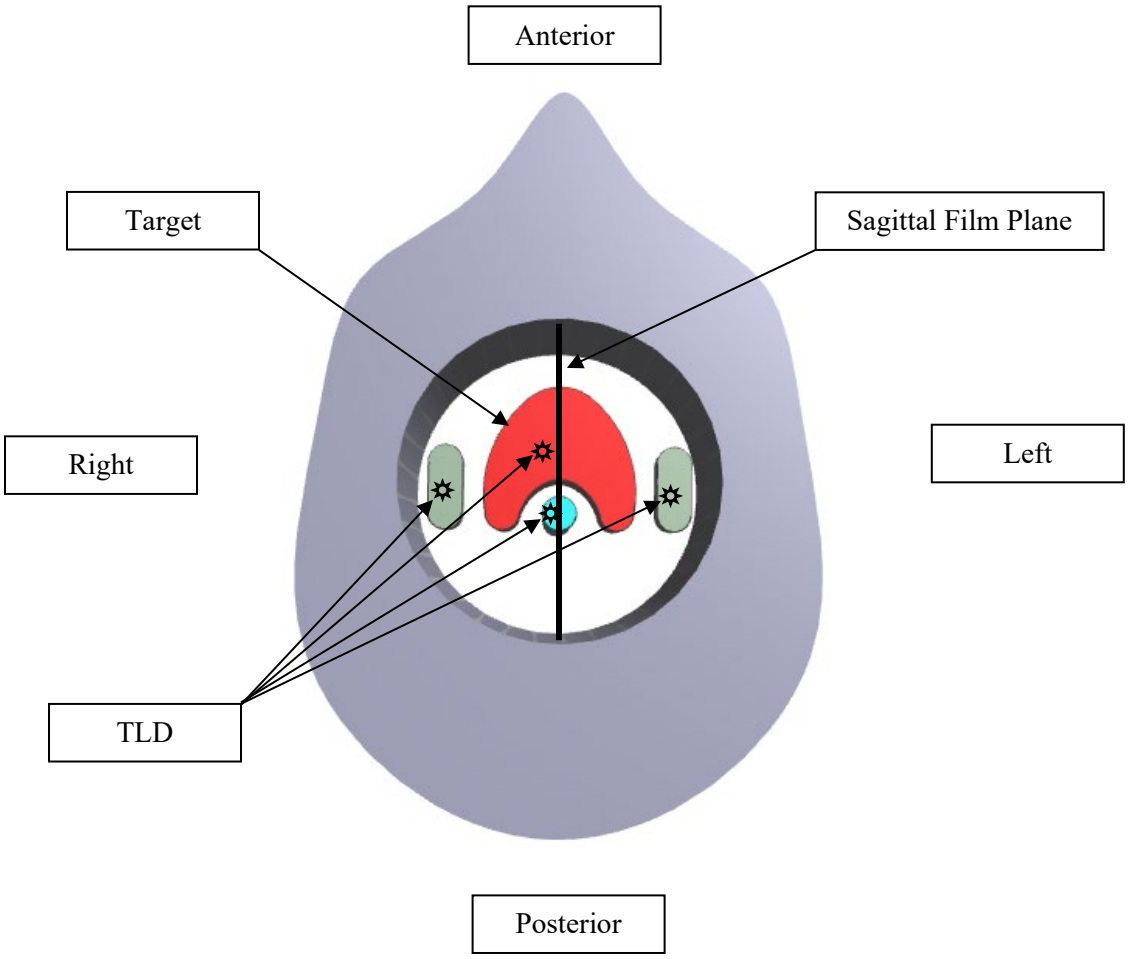
Did you change the M.U. based on your QA? □No □Yes _____

Comments: _____

_____

For Office Use Only	TLD Batch	Film Batch EBT3 LOT #	Phantom ID #	Code	Date Sent	Date Rec'd

This is a cross-sectional view of the phantom and insert.



Notes:

- **You need to deliver 6.6 Gy(RBE) to the PTV (in 1 or more fractions).**
- **Please ignore all markings on the external shell of the phantom, use your own system to position the phantom.**

Thanks!

-The Phantom Team