Prostate Phantom

Guidelines for ***Planning and Treating*** the IMRT Prostate Phantom.
Revised March 2014

GENERAL INFORMATION:

Each institution may 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. Thank you for your cooperation.

The phantom contains two inserts. The water fillable imaging insert contains the CTV (prostate) and critical normal structures (bladder and rectum). The dosimetric insert contains TLD at 2 locations and perpendicular sheets of film in order to evaluate the dose to the center of the prostate. There are 2 more TLD to evaluate the dose to each femoral head.

If you have any questions, please contact the appropriate person.

Billing:	MDADL Staff	(713) 792-3233	mdadl@mdanderson.org
Technical questions:	Trang Nguyen	(713) 745-8989	trangnguyen@mdanderson.org
Technical questions:	Paola Alvarez	(713) 745-8989	palvarez@mdanderson.org

DOSIMETRY INFORMATION TO BE SUBMITTED:

The following information is to be submitted to the IROC Houston (include in the shipping box):

- Original hard-copy isodose distributions in the coronal and sagittal planes through the target center. Please ensure that each plane fills an entire page and that a scale is printed on the page.
- A completed **IROC IMRT Prostate Phantom Institution Information** form.
- A copy of results of all film and ion chamber QA measurements.

The following information is to be submitted to the IROC Houston:
Please follow the login URL: https://mdandersonorg.sharefile.com
and the log in information below to submit the digital treatment planning data in DICOM format which include all CT slices, 3D dose composite file, structure and plan file.

Username: trangnguyen@mdanderson.org
Password: Phantom8989

- To create a new folder, select the **Add Folder** tab on the top right hand site of the screen. In the **folder name** box, enter your institution name, city and state then click **Create Folder.**
- Select the folder that you have created, then select **Upload Files** tab on the right hand site. Follow the instruction and upload your file.
- Please log out once you finish and inform the IROC Houston by email **trangnguyen@mdanderson.org.**

DOSE PRESCRIPTION:

Margins for the PTV should be defined using your institution's protocol for prostate CTV.
The total dose to the phantom is 6 Gy, with the following constraints:

- Prostate PTV.
  - Total dose of 6 Gy to at least 98% of the PTV and
  - A maximum dose of 6.4 Gy may be given to < 2% of the PTV. This maximum dose volume must not be shared by critical normal structures.
- Critical Normal Structures (bladder, rectum and femoral head):
  - Constraints over the normal structure are specified in the following table

Normal Organs	No more than 15% volume receives dose that exceeds	No more than 25% volume receives dose that exceeds	No more than 35% volume receives dose that exceeds	No more than 50% volume receives dose that exceeds
Bladder	6.7 Gy	6.3 Gy	6.0 Gy	5.7 Gy
Rectum	6.3 Gy	6.0 Gy	5.7 Gy	5.0 Gy

The phantom should be imaged, planned and irradiated as if it were an actual patient, incorporating all of your customary quality assurance checks.

IRRADIATING THE PHANTOM

- Material included in box:
  Prostate Phantom
  Dosimetric insert
  Imaging insert
  Two plastic screws
  Rubber hose
  Two acrylic cylinders labeled "imaging cylinders"
  Two acrylic cylinders containing TLD in one of the ends, labeled "dosimetric cylinders"
  Envelope with background film (hidden from your view; please don't try to find it)
  Mailing label to return case.
  Traditional TLD block and irradiation table.
  (Please irradiate this at the time you irradiate the phantom.)

Procedures:

1. Fill the phantom with water:
   - **1.1.** Thread the rubber hose into one of the filler holes placed on the base of the phantom.
   - **1.2.** Fill slowly with water (the rubber hose stretches over most faucets). You may need to jiggle the phantom to release air trapped inside the cavity.
   - **1.3.** Remove hose and replace acrylic screws.
2. Allow the phantom to sit with water in it for 20 min. to check for leaks**.** Look in the insert space and check for water leakage. If you find any water call Carrie Amador at 713-745-8989. If not, proceed to the next step
3. Fill the imaging insert with water:
   - **3.1.** Remove both PVC plugs from the top of the insert.
   - **3.2.** Thread the rubber hose into one of the filler holes.
   - **3.3.** Fill slowly with water (the rubber hose stretches over most faucets). You may need to jiggle the insert to release air trapped between the different structures.
   - **3.4.** Remove hose and replace PVC plugs.
5. Look in the insert space and check for water leakage. If you find any water contact us. If not, proceed to the next step.
6. Position the imaging insert. Make sure that the insert is in its correct position by making small rotations of the insert around its central axis. When it is in the correct position it will **locked** in place by an indentation at the base of the insert.
7. Position one of the "imaging cylinders" in each one of the holes in the femoral head.
8. Position and CT the phantom as you would a patient. You may wish to scan with 1.5 mm slices especially near the center to better identify the edges of each organ. Remove the imaging insert. Drain the water from the insert. Place the insert in the box.
9. Segment the phantom images contouring the skin, prostate, bladder and rectum.
10. Look in the insert space and check for water leakage. If you find any water call Carrie Amador at 713-745 8989. If not, proceed to the next step.
11. Position the dosimetric insert. Make sure that the insert is in its correct position by making small rotations of the insert around its central axis. When it is in the correct position it will **locked** in place by an indentation at the base of the insert.
12. Position the "dosimetric cylinders" in each one of the holes in the femoral head following the color code. Insert the side with the screw. You will see a TLD capsule in each one of the cavities closed with the screw**.**
13. Perform your customary QA of the IMRT plan prior to irradiating the phantom. Include in the form values and all the information you consider are relevant for it analysis**.**
4. Irradiate the TLD block according to the instructions provided.
14. Treat the phantom with the developed plan as you would a protocol patient.
15. Remove the dosimetric insert and place it in the box.
16. Remove the acrylic legs from holes in the femoral head and place them in the box.
17. Please verify that there is no water in the insert space. If you find any water call the IROC Houston.
18. Remove the screw on the base of the phantom and drain the water in the phantom.
19. Put the empty phantom in the box.
20. Make sure that the rubber hose and the plastic screws are in the box.
21. Include the dosimetry data discussed above. Complete the attached forms. Be sure to include the scale used on the images coming from your TPS.
22. Return the complete package to IROC Houston.

Prostate Phantom Institution Information

Institution:_____

Address: _____

_____

Person performing irradiation: _____

Physicist to receive report: _____

Oncologist to receive report:_____

Person to call in case of questions: _____

Phone Number: _____ Fax Number:_____

Email address: _____

Treatment Unit:

Manufacturer: _____Model:_____

In-house specification:_____ Serial Number:_____

Photon Energy Nom _____(MV) IR (TMR 20/TMR 10): _____ %dd(10)$_x$ _____

Intensity Modulation Device:

□ MIMIC □ Multileaf Collimator □ Solid Attenuator Modulation

If Cyberknife please check: □ IRIS □ Cone

IMRT Technique:

□ Segmental (step and shoot) MLC □ Dynamic MLC □ Intensity Modulated Arc Therapy (IMAT)

□ Rapid Arc □ TomoTherapy □ VMAT Other: _____

Please enclose original copies of your treatment plans. Include the coronal and saggital planes through the target center. Include scaling factors for each plane. FTP the digital treatment plan.

Treatment Planning System:

Manufacturer: _____ Model: _____

Software:_____ Algorithm:_____ Version Number: _____

Total number of MU's:_____ Total number of segments: _____

Treatment of Phantom:

Date of Irradiation: _____

Dose specified is to: □ Muscle □ Water

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

Point	Dose (Gy)
Center of the prostate	
TLD position on femoral head (Left)*	
TLD position on femoral head (Right)*	

* Dose to the center of the TLD position on the femoral head, on the axial plane through the center of the prostate.

Results of IMRT QA:_____

_____

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

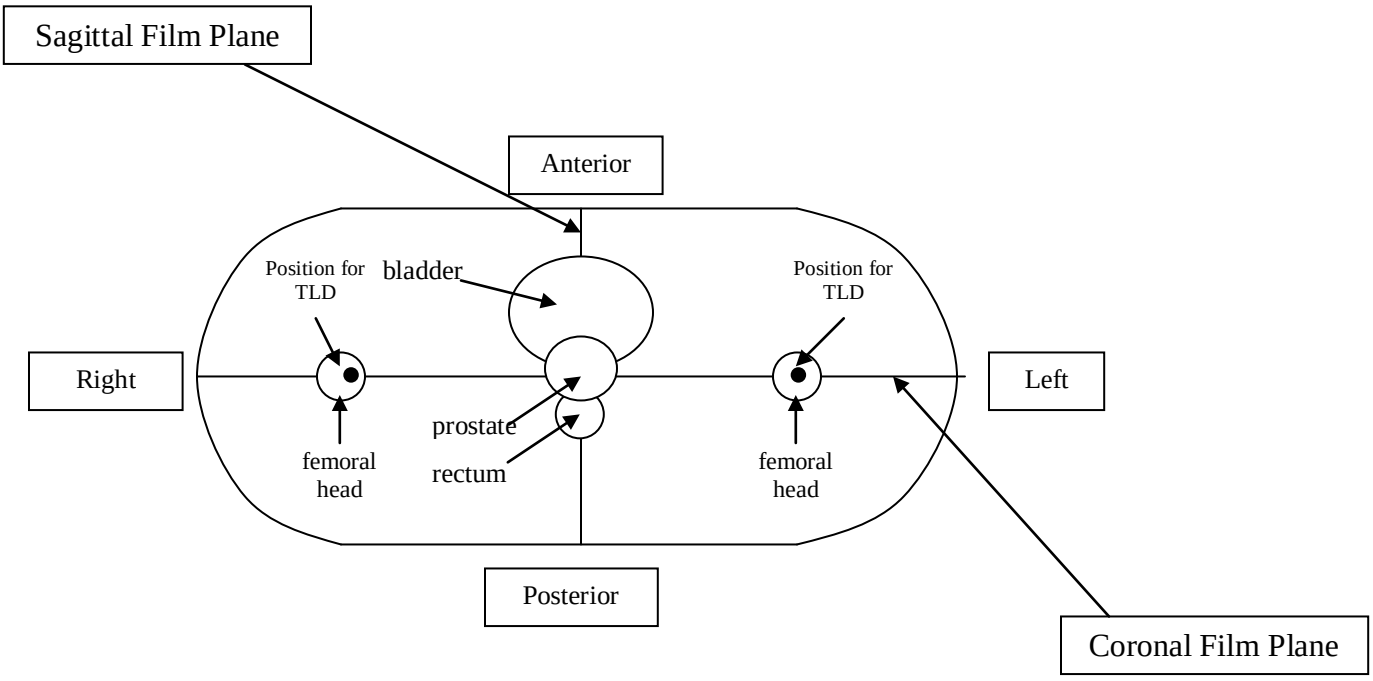
Attach copies of the treatment plan including slices in the sagittal and coronal film planes.

Comments: _____

_____

For Office Use Only	TLD Batch	Film Batch	Phantom ID #	Code	Date Sent		Date Rec'd	
	B11	EBT2 07301301	**P-**					

This is a cross sectional view of the phantom with the imaging insert in place.



Notes:

- **You need to deliver 6 Gy to the PTV (in 1 or more fraction).**
- **Please ignore all markings on the external shell of the phantom, use your own system to position the phantom.**