Proton Therapy Questionnaire

This questionnaire requests data specific to the beam lines and conditions you will use for patients on NCI sponsored clinical trials. Do not try to be comprehensive for your entire facility; replies should be pertinent to patients on pediatric and adult clinical trial group protocols sponsored by the NCI. Recognizing the rapid development of proton techniques, this questionnaire shall be completed each year concurrent with the TLD irradiations from IROC Houston.

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RTF Type
Record Type

Record No:22

		Date:	
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Date Completed/Updated:	1/24/2018		

A. Experience

Click to Expand/Collapse Section: ☐

A1. For the following sites approximately how many adult patients have you treated in the last 12 months?

Brain: 100 Head & Neck: 100 Pelvis: 100

Thorax: 50 Abdomen: 50 Other:

A2. Do you treat pediatric cases with protons? ☑ Yes ☐ No

If yes, how many have you treated in the last 12 months? 100

What is the age limit for "pediatric" cases? 18

A3. If you treat pediatric cases, are you capable of providing anesthesia? ☑ Yes ☐ No

If yes, what percentage of the pediatric caseload is treated under anesthesia? 25 %

B. Dose Calibration and Verification:

Click to Expand/Collapse Section: ☑

B1. What calibration protocol is followed for proton beam calibrations?

☑ TRS-398 Nw ☐ other (describe)

B2. Dose is specified in: ☑ Water ☐ other(describe)

B3. What devices are used for the absolute dose calibrations? (specify make, model and serial number)

Device	Manufacturer	Model	Serial Number
Ion Chamber	PTW	TN30013	1831
Electrometer			

B4. What are the methods of determining the dose per monitor unit for patient proton treatment fields?

(examples: TPS, stand-alone program, hand calculation, physical measurement)

a) primary used for treatment Hand calc & TPS

b) first check Measurement

c) second check Independent check

B5. For what percentage of patient proton treatment fields is the dose per monitor unit checked by physically measuring dose in the beam? 50

B6. For what percentage of patient proton treatment fields are the depth dose and/or lateral profile distributions physically measured in the beam? 50

B7. When the dose per monitor unit is checked with a physical measurement is:

	always	sometimes	never	N/A
a) the patient aperture used?	☐	☑	☐	☐
b) a standard aperture used?	☐	☐	☑	☐
c) no aperture used?	☐	☑	☐	
d) the patient range compensator/bolus used?	☐	☑	☐	☑
e) a substitute flat range compensator/bolus used?	☐	☑	☐	☐
f) no range compensator/bolus used?	☐	☑	☐	

g) additional explanations Energy absorber is also used

B8. When the depth dose and/or lateral dose profiles are checked with a physical measurement is:

	always	sometimes	never	N/A
a) the patient aperture used?	☐	☑	☐	☑
b) a standard aperture used?	☐	☐	☑	☐
c) no aperture used?	☐	☑	☐	
d) the patient range compensator/bolus used?	☐	☑	☐	☐
e) a substitute flat range compensator/bolus used?	☐	☐	☑	☐
f) no range compensator/bolus used?	☐	☐	☐	

g) additional explanations 0

B9. What dose parameter is used for patient treatments?

☐ Dose to water(Gy) ☐ Dose multiplied by RBE (Gy*RBE)

B10. If dose*RBE is used, what value for RBE is applied?

☐ 1.1 ☐ other (specify) 0

B11. What nomenclature is used to record the dose in the chart?

☑ Gy ☐ Co-Gy-Eq ☐ CGE ☐ GyRBE ☑ other (specify) -1

C1. Proton Beam Production and Delivery System(1): Click to Expand/Collapse Section: ☑

C1. Proton accelerator is: ○ cyclotron, ◉ synchrotron, ☐ synchrocyclotron, ☐ other

Manufacturer: Hitachi

Model: Probeat

C2. Proton nominal maximum energy (entering radiation head): 250 MeV.

C3. How many beam lines in clinical operation could be used for treating patients entered on NCI clinical trials? 4 For each please complete below:

Item	example	Beamline I	Beamline 2	Beamline 3	Beamline 4	Beamline 5
What is your facility's name for this beam line	A3 Green Room	G1	G2	G3	F2	Eyeline
When did/will the beam line begin treating patients?	Oct. 2011 Proj. May 2017	2006	2007	2008	2006	
From what orientations can the beam be directed?	360° gantry horizontal only	Gantry	Gantry	Gantry	90 degrees	
What is the primary method of laterally spreading the beam? (If scanning beam, please describe available spot sizes.) List all methods commissioned.	single scattering double scattering uniform scanning modulated scanning	scattered	scattered	modulated scanning	scattered	single scatter
What is the SAD in cm?	217 cm (x) 214 cm (y)	270	270	270	270	
What is the maximum field size	25 cm x 25 cm					

for each delivery system at the nominal isocenter for the maximum range?	(PBS) 18 cm x 18 cm (US)	25 cm x 25 cm	25 cm x 25 cm	30 cm x 30 cm	25 c,m x 25 cm	
What is the maximum depth in water that can be treated with a 10 cm x 10 cm field with 10 cm range modulation?	27.5 cm (Doub Scat) 30.1 cm (PBS)	32.4 cm	32.4 cm	30.6 cm	32.4 cm	
For the maximum nominal energy, what are the maximum and minimum dose rates for a 10 cm x 10 cm field with 10 cm modulation?	Max: 1.2 cGy/min Min: 0.8 cGy/min	Max: 250 cGy/m Min: 100cGy/m	Max: 250 cGy/m Min: 100cGy/m	100 cGy/min	Max: 250 cGy/m Min: 100cGy/m	
Where in the SOBP is dose/MU specified?	average dose in SOBP, dose at center of SOBP	center of SOBP	center of SOBP	cemter of SOBP	center of SOBP	
What method of range modulation is used?	Enter one or more codes from *note below	RMW	RMW	Spot scanning	RMW	

*Note: Use these codes to describe methods of range modulation that might be used for protocol patients (may combine codes for accurate description, for example 1 & 2, or 3 & 4):

1. rotating stepped rangeshifter (modulator wheel or propeller)
2. beam current modulation
3. ridge filter
4. energy stacking
5. spot scanning
6. upstream rangeshifter
7. Other (describe) 1 and 5

D. Treatment Planning: Click to Expand/Collapse Section

D1. What planning system/software and version is used for proton treatment planning?

Manufacturer: Varian Model: E Version: 13.7

D2. If patients receive both proton and photon beams as part of their treatment, is the photon planning done on the same system as the proton planning? ☑ Yes ☐ No

If yes, are the proton and photon portals part of the same plan? ☑ Yes ☐ No

If no, how are the dose distributions summed and how is RBE accounted?

D3. Can the planning system export a composite plan of photons and protons?

☑ yes , in DICOM RT format ☐ no

D4. What CT scanner(s) is used for proton therapy patients? For each, complete the table:

Scanner name	Siemens	
Helical? (y or n)	Yes	
Slice thickness	It depends	
kVp	120	

D5. How are CT numbers used for penetration calculations?

☑ Direct from CT# to RLSP (user input)

☐ CT# to mass density (user input), then mass density to RLSP (pre-programmed)

☐ CT# to tissue group and mass density (user input), then to RLSP (e.g. Monte Carlo)

other (describe)

D6. How was the conversion of CT data to proton range verified? (e.g. stoichiometric method, physical measurements)

Measurements

D7. Does the planning system allow different conversion functions or curves for CT data to relative stopping power for different CT scanners or scanning techniques? ☐ yes ☑ no

If yes, for which sites is 4D CT used? Thorax and upper abdoment

Describe how it is used (e.g. respiratory gating using RPM):

Breath hold

D9. Describe the method(s) used to account for lateral alignment uncertainties, motion, and lateral penumbra of the proton beam; i.e. how are lateral treatment margins created around the CTV?

Expansion

D10. Please give the lateral alignment uncertainties, or PTV margins if used, for the following sites:

Brain 3 mm Head & Neck 3 mm Pelvis 5 mm

Thorax 5 mm Abdomen 7 mm

D11. Describe the method(s) used to account for uncertainties in penetration of the proton beam, i.e. how are proximal and distal treatment margins created around the CTV in the direction of the beam?

3.5% of range plus 3 mm

D12. What are the typical smearing margins used for the following disease sites? (if applicable)

Brain 5 mm Head & neck 5 mm Pelvis 10 mm

Thorax 10 mm Abdomen 10 mm

D10. What are the typical border smoothing margins used for the following disease sites? (if applicable)

Brain 10 mm Head & neck 10 mm Pelvis 14 mm

Thorax 14 mm Abdomen 14 mm

D14. What are typical air gaps (or range of air gaps) used for the following disease sites?

Brain <100 mm Head & Neck <100 mm Pelvis <150 mm

Thorax <200 mm Abdomen <150 mm

D15. How is the treatment tabletop accounted for in treatment planning?

Rx couch is added to CT image data set

D16. Are patients with metal implants treated with proton therapy? Sometimes

D16a. If yes to D16, are proton beams allowed to pass through metal implants? If possible, never

D16b. If yes to D16a, describe how beam range is calculated when beam penetrates metal implant materials:

D16c. If yes to D16, describe how imaging artifacts are handled near metal implant materials.

D17. How are plans prescribed?

☐ ICRU or equivalent Point ☑ Isodose Surface

D13. If prescribing to isodose surface, what % isodose surfaces are usually prescribed for the following sites?

Brain 98 % Head & neck 98 % Pelvis 98 %

Thorax 98 % Abdomen 98 % Extremities 98 %

E. Immobilization: Click to Expand/Collapse Section: ☑

Please provide a clear description of immobilization techniques for treatments in the:

E1. Heard & neck: Mask

Is a rigidly attached bite block routinely used for H&N patients? ☑ Yes ☐ No

E2. Thorax Vacuum lock

E3. Pelvis: knee block, rectal balloon

E4. How are immobilization devices accounted for in treatment planning? Yes

F. Patient Alignment: Click to Expand/Collapse Section: ☑

How is the patient's anatomy localized with respect to the treatment field?

F1. ☑ orthogonal kV x-ray images compared to DRRs

☐ kV x-ray BEV portals compared to DRRs

☐ kV cone-beam CT images compared to planning CT

☐ kV CT images compared to planning CT

☐ other (please be specific)

F2. After initial daily localization and repositioning of the patient, is alignment verified with repeat imaging?

Adults: ☑ Yes ☐ No Pediatrics: ☑ Yes ☐ No

If yes, how frequently:

☑ before every trea ☐ before every treatment field

☐ first treatment and then weekly ☐ if repositioning shift exceeds mm

☐ never ☐ other

F3. What are setup tolerances? That is, what are the acceptable disagreements between the verification imaging and the planning imaging before treating?

Brain 2 mm Head & neck 2 mm Pelvis 2

Thorax 2 mm Abdomen 2 mm

F4. Are patch fields alternated? ☐ Yes ☐ No ☑ N/A

F5. For matched fields, is the patient's anatomy relocalized with respect to the second treatment field after making the specified move between fields? ☑ Yes ☐ No

If yes, what is the tolerance for changing the alignment? 2 mm

F6. Are implanted fiducial markers used for patient alignment? ☑ Yes ☐ No

If yes, for which sites? Prostate

What are the composition and size of the markers? Carbon fiducals - com[illegible]

F7. Is the correlation of agreement between the verification imaging and image informat[illegible] from the planning CT handled as a computerized process that generates shifts of the patie[illegible] support system? ☑ Yes ☐ No If yes, what software? PIAS from [illegible]achi

G. QA Procedures: Click to Expand/Collap[illegible] Se[illegible]n: ☑

G1. Describe the equipment used for daily dose/monitor uni[illegible](dose/M[illegible] dose/Gp) checks.

Equipment: Ion chamber, single or array

What is the acceptable variation?± 3 %

G2. Describe QA used to verify the transvers[illegible] be[illegible] prof[illegible] uniformity.

Equipment: Matrixx

Frequency: ☐ daily ☐ week[illegible] ☑ m[illegible]thly ☐ annually ☐ other

What is the acceptab[illegible] variati[illegible] within [illegible]e uniform dose region? ± %

G3. What is the acc[illegible]table deviation from the standard penumbra width? mm

G4. Describe QA used[illegible] verify be[illegible] depth dose profiles.

Equipment: Zebra[illegible] 3D scanning system

Frequency: ☐ daily ☐ weekly ☐ monthly ☑ annually ☐ other

G5. For modulation width, what is the acceptable variation in

the depth of the specified dose proximal to the center of modulation? 2 mm

In the depth of the specified dose distal to the center of modulation? 290 mm

G6. For modulated scanning, describe QA used to check spot size.

Equipment: Matrixx

Frequency: ☐ daily ☐ weekly ☐ monthly ☑ annually ☐ other

What is the maximum variation in spot size away from CAX? Unknown mm

At various gantry angles? 1 mm

G7. Describe the method of verifying coincidence between the therapy beam and imaging isocenter.

Image cube each treatment day

To return completed questionnaire, click "Submit New Data" or "Save Data". For any questions, please contact:

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