QARC Questionnaire for Stereotactic Radiosurgery (SRS)  
with a Linear Accelerator

Return the completed form to:  QARC  
Suite 201  
640 George Washington Highway  
Lincoln, RI 02865-4207

This questionnaire, with the requested information, must be submitted to QARC before patients can be placed on a stereotactic protocol. The data will be used by QARC in the review and verification of protocol treatments.

Check the applicable boxes and write in the requested information. Wherever it says "Describe", you may submit a published paper, an internal report, the vendor's descriptive literature, or provide a short description. Use additional pages, if necessary.

Please complete a sample RS-1 patient dosimetry summary form for a non-protocol patient treated in your institution.

If you have questions, please call the QARC Protocol Dosimetrist at 401-753-7600 or fax 401-753-7601 or email Physics@QARC.org.

I. General

Institution ________________________________________________________________

Physicist who can answer questions about dosimetry, quality assurance, and dose calculations for stereotactic irradiation:

Name ______________________________ Telephone __________________________

Address ___________________________ Fax ________________________________

Email ________________________________

Will you treat pediatric patients? Yes ☐ No ☐

If yes, will you routinely anesthetize pediatric patients during the radiosurgery procedure?  
Yes ☐ No ☐

If yes, please include a letter documenting the method of anesthesia that will be employed during the procedure.

How long has your institution been performing SRS? ____________________________

Number of SRS cases treated at your institution in the past six months ______________________
II. Equipment

A. Treatment unit used for stereotactic irradiation:

Manufacturer, model: ____________________________________________________________

Nominal beam energy _____ MV. Source-isocenter distance ________ cm.

Variation of isocenter over the range of gantry angles and couch rotations employed is ______ mm. Describe how this is determined (e.g. “beam spots”). How frequently is this determined?

The calibration of this unit is routinely verified by the RPC (mailed TLD’s) Yes ☐ No ☐

Most recent date: ______________________________

B. Head-frame

☐ Commercial system, manufacturer, model: _______________________________________

☐ System not commercially available. Describe: _____________________________________

C. Fixation system (i.e., head-frame to isocenter or treatment couch, if applicable)

☐ Commercial system, manufacturer: _____________________________________________

☐ System not commercially available. Describe: _____________________________________

D. Treatment planning system

☐ Commercial system, manufacturer, model: _______________________________________

☐ System not commercially available. Who developed it? ___________________________

Describe the procedure used to define the target volume in three dimensions (using CT, MRI, or other).

Can your system accommodate more than one isocenter? Yes ☐ No ☐

If yes, how many? ________________________________

Can the system provide isodoses in three orthogonal planes? Yes ☐ No ☐
Can the system generate dose-volume histograms for target volume?  Yes □  No □ for volumes of interest?  Yes □  No □

Can the system perform image fusion?  Yes □  No □
Is image fusion routinely used for your SRS treatments?  Yes □  No □

What image set is routinely used for definition of target volumes and normal tissues?
CT □  MR □  Fused (i.e. both) □

What image set is routinely used for dose calculation?  CT □  MR □

III. Data for dose calculations

A. Beam monitor units (MU)

For this accelerator, 1 MU = _______ cGy...

... to □ water or □ muscle, at _____ cm distance from the nominal source (s)
(distance = SSD + depth), at _____ cm depth in water with _____ cm X _____ cm field size.

Calibration protocol used is:  TG 51 □  TG 21 □  SCRAD □  NORDIC □  Other ____________________________

If this does not completely describe your calibration, add information separately.

B. Beam data

1. Collimator field size is defined at:  □ 100 cm  □ other _____ cm

2. Collimator sizes available:  Circular _________ cm  _________ cm

  _________ cm  _________ cm

  _________ cm  _________ cm

Describe any non-circular collimators:  __________________________________________
_____________________________________________________________________________
_____________________________________________________________________________

3. The standard field for relative output factors is  __________________________

  at ______________ cm distance

  at ______________ cm depth

4. Relative output factors for the different collimators were measured:

  with a __________________ detector at ______________ depth

  in □ water  □ other __________________

5. Depth dose dependences of dose for the different collimators were measured with a

   __________________ detector.

6. Depth dose dependence of dose was measured for

   □ each collimator or
7. Profiles of the beams were measured with a detector in water for each collimator or list:

8. Submit an isodose distribution (in color) for a single stationary beam for a typical collimator used for stereotactic irradiation. Normalize to 100% at 5 cm depth. Please state SSD and field size on the submission.

IV. Dose Calculations

A. Calculation of dose when the prescription point is at isocenter, for a stationary beam

If we were to use a single stationary beam, we would calculate the dose \( D(d,s) \) at isocenter (depth \( d \), field size \( s \), determined by the collimator) for a monitor setting.

- using the relation \( D(d,s) = TPR(d,s) \cdot OF(s) \) where the \( TPR = 1 \) at depth \( d_{ref} = \text{[cm]} \) for all collimators, and \( OF = D(d_{ref},s) \) is the output factor;

- using the relation \( D(d,s) = TMR(d,s) \cdot OF(s) \) with \( TMR = 1 \) at the depth of maximum dose \( d_m = \text{[cm]} \), which varies with the collimator, and \( OF = D(d_m,s) \);

- using another calculation technique. In this case describe your method.

- relying on our commercially available treatment planning system to calculate the monitor units; Name of program \( \text{[program]} \), version \( \text{[version]} \).

B. Calculation of doses off-axis

For stereotactic irradiation, we calculate the dose at a distance \( r \) from the central axis by

- multiplying the central-axis value with \( OAR(d,s,r) \), which is measured in water for each collimator, at one depth
  - measured in water for each collimator, at multiple depths
  - measured in water for some, but not all, collimators, at one depth
  - measured in water for some, but not all, collimators, at multiple depths

- other method (describe separately).

C. Arc Techniques

When calculating the monitor units to be delivered in an arc,
we use the same approach as in IV.A but with

- the average depth
  - averaged every _______ degrees of arc

- the average TPR, TMR etc.;
  - averaged every _______ degrees of arc

we use another method (describe separately).

V. Quality Assurance

A. Techniques to verify mechanical accuracy (couch, gantry, collimator, head frame, etc.)

Before every treatment
Describe: ____________________________
______________________________
______________________________
______________________________

Periodically (indicate frequency)
Describe: ______________________
______________________________

B. Techniques to verify the treatment dose
Describe: ____________________________
______________________________

C. Techniques to verify the dose distribution
Describe: ____________________________
______________________________

______________________________