



IROC Rhode Island QA Center
Quality Assurance Review Center
Building B, Suite 201
640 George Washington Highway
Lincoln, RI 02865-4207
Phone (401) 753-7600
Fax: (401) 753-7601
www.irocqi.qarc.org

IROC Houston QA Center
M.D. Anderson Cancer Center
8060 EL Rio Street
Houston, TX 77054
Phone (713) 745-8989
Fax: (713) 794-1364
irochouston.mdanderson.org

3D Conformal Treatment Planning Benchmark

This benchmark is a sample case used to evaluate the treatment planning process at your institution, i.e., data acquisition, PTV and OAR delineation, conformal treatment planning (not IMRT), dose calculation and monitor unit calculations. The aim is to demonstrate your capability to participate fully in 3D protocol studies. Your benchmark will be evaluated by IROC to assess your 3D Conformal planning process. This benchmark need only be completed once and will not have to be repeated for additional protocols that may require it.

A CT image set will be provided with the target volume embedded in the scans. The image set may be downloaded from the IROC website (www.IROCRI.QARC.org)

Institutions are required to submit this 3D Conformal Benchmark in digital format as DICOM RT. The digital submission shall include planning CT, along with the structure, dose and plan files. The data may be submitted on a CD or sent electronically via sftp to IROC RI (QARC).

Instructions for digital submissions may be found on the IROC RI website - www.IROCRI.QARC.org, under Digital Data, RT Treatment Planning.

Section 1: Description of 3D Conformal Benchmark

1. Method:

The CT image set to be used for this benchmark may be downloaded from the IROC website (www.IROCRI.QARC.org).

The image set, which is provided in DICOM format as well as Pinnacle format for Pinnacle users, is to be imported into the treatment planning system that is used to plan treatments for protocol patients.

A treatment plan is to be developed following the instructions below and submitted as DICOM RT, along with any required supporting data.

2. Volumes:

The Clinical Target Volume (CTV), which appears as a black outline located in the lower right temporal lobe region on the CT scan, shall be contoured on your system. The Planning Target Volume (PTV) shall be 5 mm larger than the CTV in all directions. The following organs at risk (OARs) and other structures shall be contoured on the CT scans:

skin (or surface)

brain stem/ spinal cord

right globe

right optic nerve

left globe

left optic nerve

conformity volume: The conformity volume is a structure that is 5 cm greater than the PTV in all directions, excluding all that is external to the skin. (This will be used in the assessment of the conformity of the dose distribution).

3. Treatment Prescription:

A 3D conformal treatment plan (not IMRT) shall be developed to deliver a total dose of 54 Gy in 27 fractions of 2 Gy each to the isodose surface that encompasses the PTV. The prescription shall be no less than 95% relative to isocenter (or center of the target volume). The plan should be designed to deliver less than 48 Gy to all but 0.5cc of the brainstem or spinal cord, and minimal dose to the optic structures. No part of either globe shall receive more than 5 Gy. The entire PTV must receive at least 95% of the prescribed dose and no more than 1cc shall receive greater than 107%. No more than 15 % of the conformity volume shall receive more than 45 Gy.

4. Dose Calculation

The dose calculation shall take into account the effect of tissue heterogeneities. The dose calculation grid in the axial plane shall be no greater than 3 mm; the dose calculation grid in the cephalad/caudal direction shall include each axial plane on which target volume and/or normal tissue has been delineated. The monitor unit calculations for a daily fraction dose of 2 Gy shall be submitted, following the practice used clinically in your department.

5. Dose-Volume Histograms (DVHs)

Calculate the DVH for the CTV, PTV, brainstem/spinal cord, right optic nerve, right globe, left optic nerve, left globe and the conformity volume to ensure compliance with guidelines listed above in section 3. Dose volume histograms can be calculated from the DICOM RT submission for all defined structures and do not need to be submitted separately.

Section 2: Data to be Submitted

Institutions are required to submit this 3D Conformal Benchmark in digital format. The institution's treatment planning system must have the capability of exporting data as DICOM RT.

Submissions shall include:

1. The digital RT plan in DICOM RT format consisting of the CT data set along with structure, dose and plan files.
2. Digitally reconstructed radiographs (DRR) from the beam's eye view (BEV) of each portal showing the beam aperture and CTV and PTV.
3. A printout of planning system report that includes beam specifications, the beam energy, gantry, couch, and collimator positions, field sizes, aperture names, wedge specifications, and depth of isocenter (or SSD).
4. Completion of the Questionnaire in Section 3.

Note: Items that are not part of the digital submission should be submitted as screen captures or other electronic format whenever possible.

Section 3: 3d Conformal Benchmark Questionnaire

Institution: _____

City: _____ **State/Province:** _____ **Country:** _____

Treatment Planner: _____

Telephone: _____ **FAX:** _____ **e-mail:** _____

1. Treatment machine _____ & photon energy (MV _____) used.
 - a. For this accelerator, 1 MU = _____ cGy, for a _____ cm x _____ cm field, at _____ cm depth and _____ cm SSD.

Calibration protocol used: _____

Dose defined in water muscle other.

2. Treatment Planning System (*manufacturer, version*): _____

3. What 3D planning techniques are routinely used with this planning system?

field in field conformal arcs IMRT

4. Indicate which of these are used routinely in your department:

Multi-leaf collimators Dynamic wedge Portal imaging

MV or KV accelerator based CT imaging

5. For this benchmark case what grid size is used on the axial slices for the

dose calculation? _____ mm

6.

<u>ROI volumes</u>	<u>Volume (cc)</u>	<u>Volume (cc)</u>
Clinical Target Volume (CTV)	_____	Right Globe _____
Planning Target Volume (PTV)	_____	Right Optic Nerve _____
Brainstem/Spinal Cord	_____	Left Globe _____
Conformity Volume	_____	Left Optic Nerve _____

Please save and submit with supporting documents to IROC QA Center via sFTP.

Or