

# IGRT Credentialing for Clinical Trials

## Introduction

Image guided radiation therapy (IGRT) for credentialing purposes is defined as external beam radiation therapy with positional verification using imaging prior to each treatment fraction. It is a complete process that extends from the imaging at the time of CT-simulation through imaging the patient on the treatment unit to delivery of the dose. Requirements for IGRT include:

- The treatment planning must be image-based (CT) with the capability of transferring the treatment data to a verify/record system.
- The treatment unit must have “on-board” (or “in-room”) imaging (including the placement of a diagnostic CT unit in the treatment room) that has a fixed frame-of-reference with an origin that is precisely related to the frame-of-reference origin for the treatment device (isocenter).
- The treatment unit must have software that allows registration of the images and calculates required shifts.

The standard use of MV EPID images for a visual comparison with DRR's does not meet the requirements for IGRT.

For IGRT credentialing several sequential IGRT datasets shall be submitted for a patient treated in a manner similar to patients who will be treated on protocol. The adequacy of the institution's IGRT process will be assessed using these datasets in conjunction with the shift information to be provided on the spreadsheet in Appendix I. In most cases five datasets will be required. However, credentialing for SBRT protocols that use fewer than five fractions will require submission of fewer IGRT datasets.

The required data shall be submitted as DICOM whenever possible. Data to be submitted include the treatment plan (CT, RT Structure Set, RT Plan, and RT Dose) and the daily IGRT datasets, as well as the shift information recorded in the table.

In the case of 2D imaging, the institution shall submit “screen-captured” images to demonstrate the results of the registration process. Software features such as "split screen" or "spyglass" are helpful for this purpose. The most appropriate images may be somewhat dependent on the part of the body being treated, and the institution is encouraged to discuss the details of this process with the appropriate QA Center or physicist named on the protocol.

## **The following items should be submitted:**

For 3D IGRT cases:

- a) CT scan, in DICOM format, for a single patient treated in a manner similar to protocol requirements
- b) DICOM RT Structure Set
- c) DICOM RT Plan file
- d) DICOM RT Dose file
- e) Cone beam CT (MV or kV) in DICOM format for the required number of fractions
- f) DICOM spatial registration file, if available, for each CBCT study
- g) Completed IGRT spreadsheet documenting patient positioning shifts

For 2D IGRT cases:

Submit screen captures showing the registration of the IGRT images for the required number of fractions (see fourth paragraph above).

The screen captures submitted should be for a single patient treated in a manner similar to protocol requirements.

For questions about what to submit, please contact the QA center for instructions.

## Data Submission

All IGRT credentialing materials should be sent to IROC-Rhode Island (formerly QARC). Instructions for submission of digital data to IROC-Rhode Island can be found on the IROC-Rhode Island website ([www.QARC.org](http://www.QARC.org)). Screen captures may be submitted in the same manner as digital data or as email attachments.

Questions may be addressed to:

Physics Division  
**IROC-Rhode Island**  
640 George Washington Highway,  
Building B, Suite 201  
Lincoln, RI 02865  
Phone: (401) 753-7600  
FAX: (401) 753-7601  
Email: [Physics@QARC.org](mailto:Physics@QARC.org)

## Appendix I 3D IGRT Data Sheet

Institution Name: \_\_\_\_\_ RTF No: \_\_\_\_\_

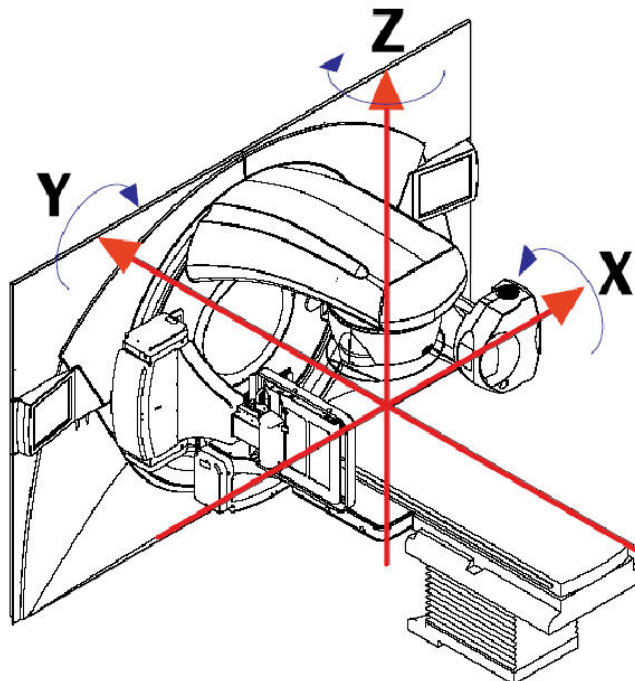
Physicist: \_\_\_\_\_ Telephone: \_\_\_\_\_ Email: \_\_\_\_\_

Model of Linear Accelerator: \_\_\_\_\_ Software used for image fusion: \_\_\_\_\_

Protocol: \_\_\_\_\_ (if applicable) Case Number: \_\_\_\_\_

Date	Tr #	IGRT technique <sup>2</sup>	Isocenter shift X (mm) <sup>1</sup>	Isocenter shift Y (mm) <sup>1</sup>	Isocenter shift Z (mm) <sup>1</sup>	Couch rotation around X (°) <sup>1</sup>	Couch rotation around Y (°) <sup>1</sup>	Couch rotation around Z (°) <sup>1</sup>	IGRT time pt <sup>3</sup>	Was a repositioning made pre-tx?

<sup>1</sup> Record shift and rotation numbers according to the following definition of the dimensions: (Please make sure to use correct positive or negative sign. Note that the shifts are defined as the difference between planned isocenter and imaging center, i.e. shift = planned isocenter – imaging center. For example, if the imaging center is 1.0 cm in the positive X direction from the isocenter, this should be reported as an X shift of -1.0cm or -10mm)



Definition of XYZ dimension (arrowheads indicate positive directions for shifts & rotations)

Notes:

<sup>2</sup> An institution should have a primary means of IGRT.

KVCB = KV Cone Beam CT scan

MVCB = MV Cone Beam CT scan

KVCT = KV Fan Beam CT scan (e.g., in-room diagnostic CT)

MVCT = MV Fan Beam CT scan (e.g., Tomotherapy)

However, an institution may use a backup system for IGRT if necessary – for example if an institution’s KVCB is not working one day, they may use MVorth. Portal imaging with radiographic film (MVForth) can be used for backup only.

Provide some additional information for your imaging technique that will help to estimate imaging dose:

kV, mAs, MU# used: \_\_\_\_\_

CT scanning angles: \_\_\_\_\_

Rotational Isocenter: \_\_\_\_\_

Other: \_\_\_\_\_

<sup>3</sup> When the Images were obtained relative to treatment.

A = Prior to treatment -- Immediately after immobilizing patient using marks on mask – no prior imaging;

B = Re-imaging -- Prior to treatment but after a previous positioning and/or imaging procedure.

C = Post-treatment imaging.

\* Please provide any information of the registration process that can help to assess the registration results (e.g., if the registration is a fully automatic result from the software; if any specific structure is used for alignment; if any specific ROI is used during registration; if any manual adjustment is involved; etc. Please provide another sheet if the space in this form is not enough.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Please save and submit with supporting documents to QARC via sFTP**

**Or**