RTOG Radiation Therapy Quality Assurance Program

RTQA Team

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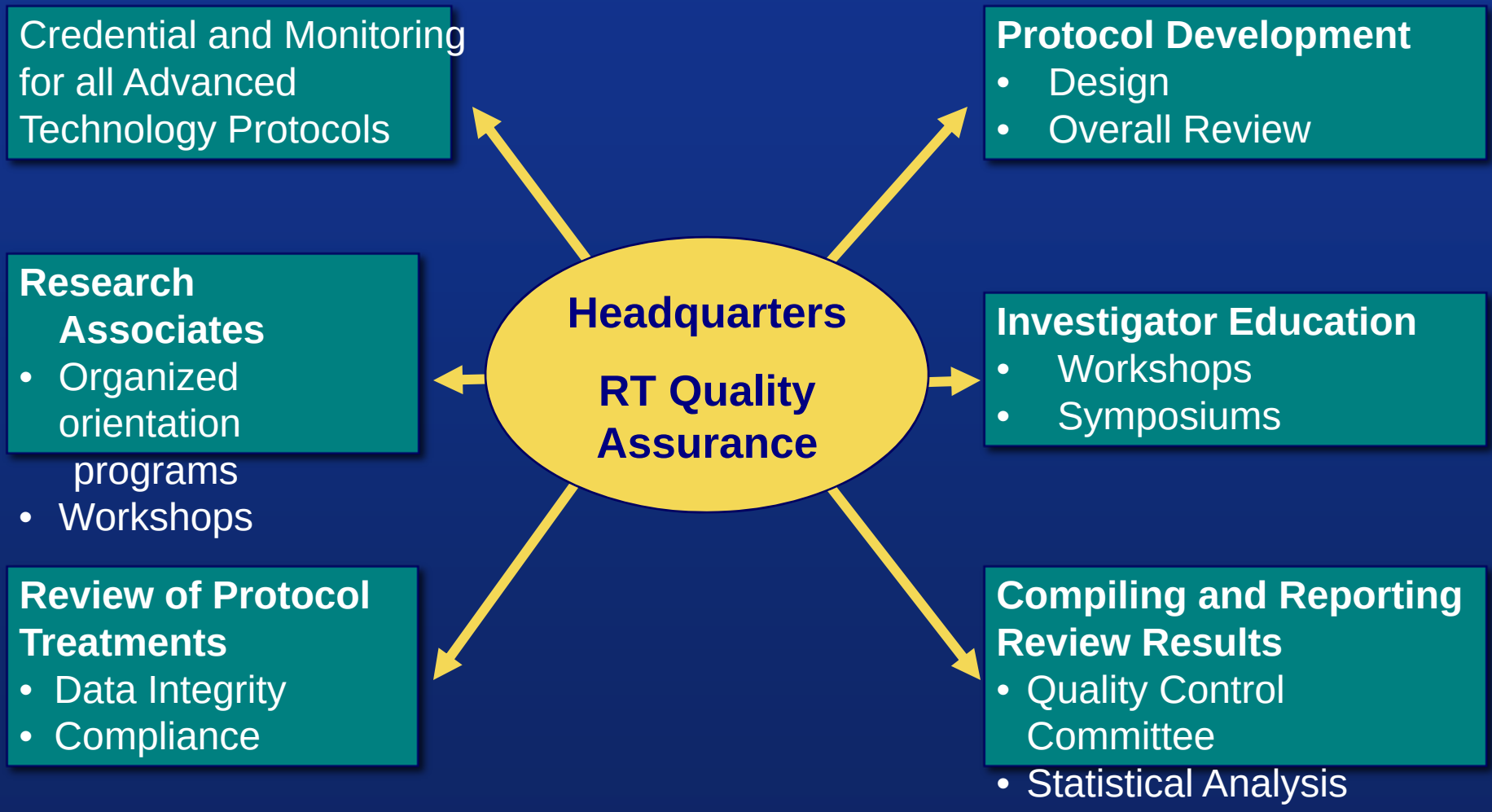
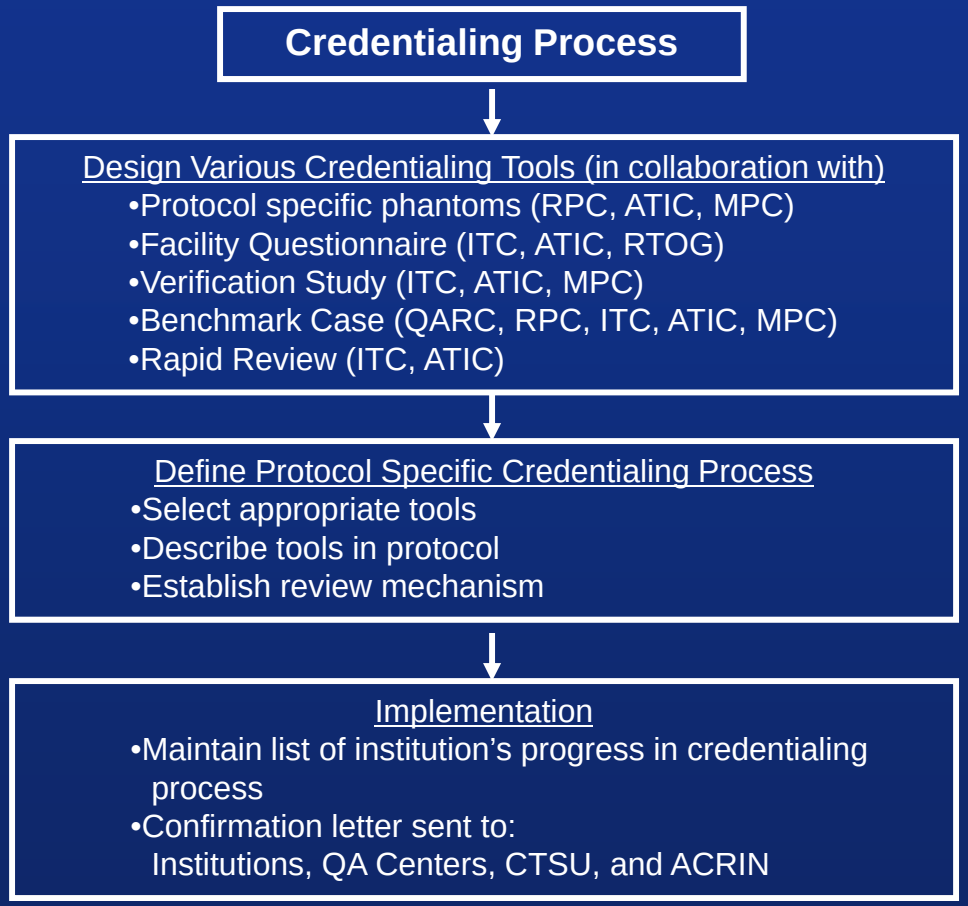
RTQA Responsibilities

- Radiation Therapy Quality Assurance (RTQA) is a major strength of the RTOG.
- The RTQA process includes the following components:
  - protocol development
  - pre-accrual credentialing for advanced technology protocols
  - data reviews
  - education
  - review of submission results to determine protocol compliance
- The QA process requires collaboration with various RTOG committees (e. g. the Medical Physics and the Advanced Technology Integration Committees) and with a number of outside organizations (e.g. the Image-Guided Therapy Center (ITC) and the Radiological Physics Center (RPC)). These collaborations are aimed at ensuring the highest possible quality for both conventional and advanced technology protocols.

RT Quality Assurance



RTOG Credentialing for Advanced Technology Protocols



ACRIN – American College of Radiology Imaging Network
ATIC – Advanced Technology Integration Committee
CTSU – Clinical Trials Support Unit
ITC – Image Guided Therapy Center
MPC – Medical Physics Committee
RPC – Radiological Physics Center
QARC – Quality Assurance Review Center

Advanced Technology Protocols

- The RTOG has launched a large number of Advanced Technology Protocols
- These protocols cover a range of technologies and disease sites

Protocols with Advanced Technology Requiring Credentialing: Total =31

RTOG 0529 – Anal Canal:IMRT
RTOG 0236 – Lung:Stereo Radioab IGRT
RTOG 0319 – Breast:3DCRT
RTOG 0413 – WBI vs PBI for Women

RTOG 0417 – Cervix:Bevacizumab HDR/LDR
RTOG 0418 – Cervix IMRT

RTOG 0436 – Esophagus:Chemo 3DCRT

RTOG 0621 – GU:RT/AS ± Docet/Pred IMRT
RTOG 0622 – GU:Radioactive Samarium

RTOG 0022 – H&N:IMRT
RTOG 0225 – Nasophr:IMRT
RTOG 0234 – H&N:IMRT
RTOG 0421 – H&N:Re-Irradiation IMRT
RTOG 0435 – H&N:Palifermin IMRT
RTOG 0522 – H&N:Adv Unres 3DCRT/IMRT
RTOG 0615 – Nasophrynx:IMRT

RTOG 0117 – Lung:3D + Chemo

RTOG 0515 – NSCLC:Vol. def. PET
RTOG 0617 – Lung:3DCRT/IMRT IGRT
RTOG 0618 – SBRT Operable NSCLC IGRT
RTOG 0623 – Lung:CT/3DCRT+/- Grow Factor

RTOG 0126 – Prostate:3D/IMRT
RTOG 0232 – Prostate:Brachy +/- RT/IMRT
RTOG 0321 – Prostate:HDR/RT
RTOG 0415 – Prostate:3DCRT/IMRT
RTOG 0521 – Prostate:3DCRT/IMRT
RTOG 0526 – Prostate:SLVG Brach
RTOG 0534 – Prostate:RT with Deprivat IMRT

RTOG 0822 – Rectum:Locally Adv IMRT

RTOG 0630 – Sarcoma IGRT

RTOG 0438 – GI:3DCRT Liver Mets IGRT

RTOG Credentialing Standards - Are they necessary?

- RTOG complies with the NCI's directives for IMRT and protons
- RT dosimetry data QA scores are high, including the SRS, SBRT, 3D CRT, and IMRT protocols
- RTOG 0126, a phase III prostate protocol with IMRT, will close soon after enrolling > 1500 patients
- The importance of good QA was emphasized in the review of RTOG 9704 (pancreas) which showed increased survival for a subgroup of patients whose treatment was per protocol
- RTOG credentialed institutions for:
  - Breast (RTOG 0413): 364 for 3DCRT, 38 for multi-catheter
  - Head and Neck (RTOG 0522): 217
  - Lung (RTOG 0617) with modern algorithm: 80
  - Lung SBRT (RTOG 0618): 10
  - Prostate (RTOG 0126) 3D and IMRT: 264
  - Prostate Brachytherapy (RTOG 0232): 79

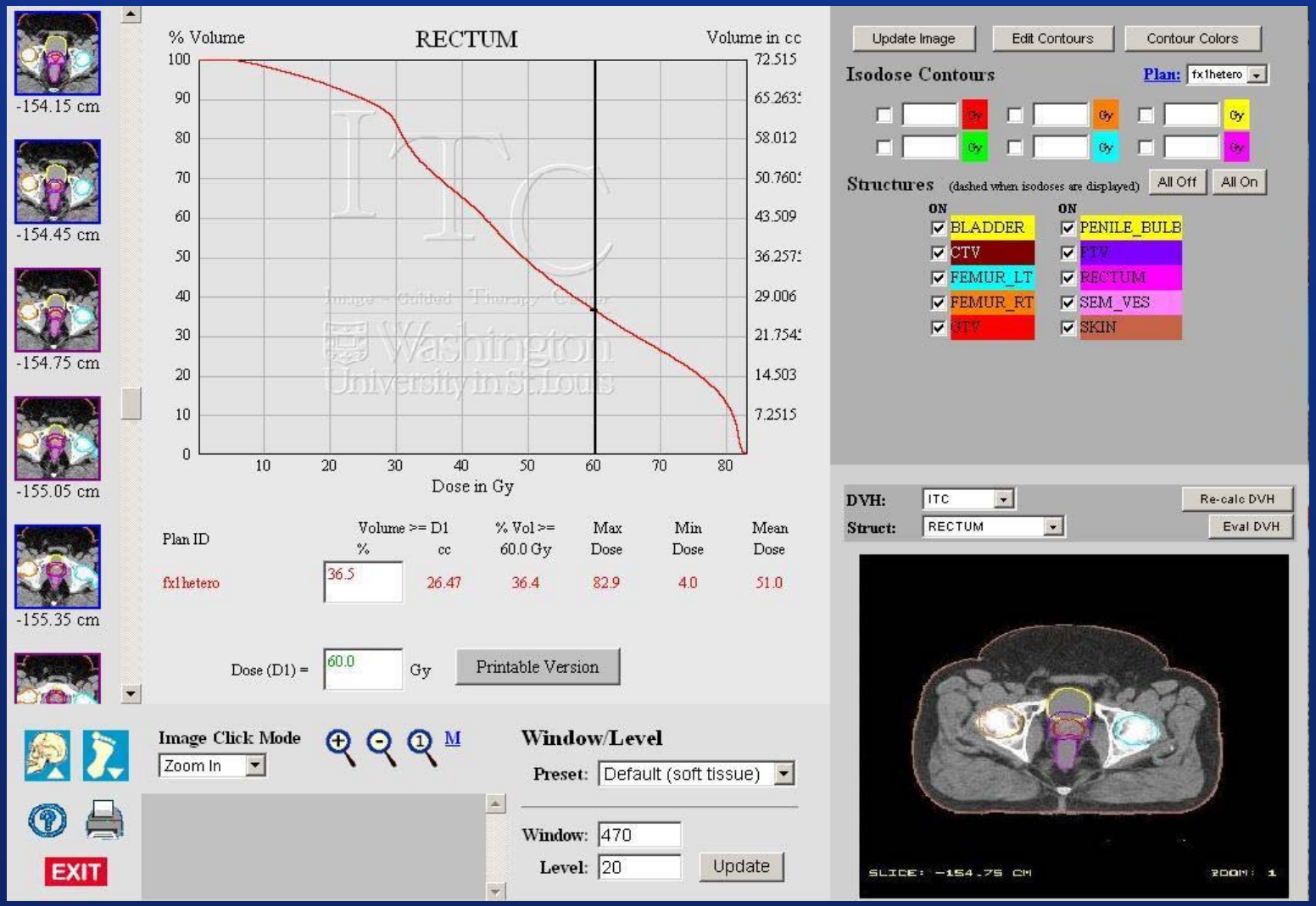
Current Review Methodology

- Dose Volume Analysis
- Target Volume/Organ at Risk Reviews

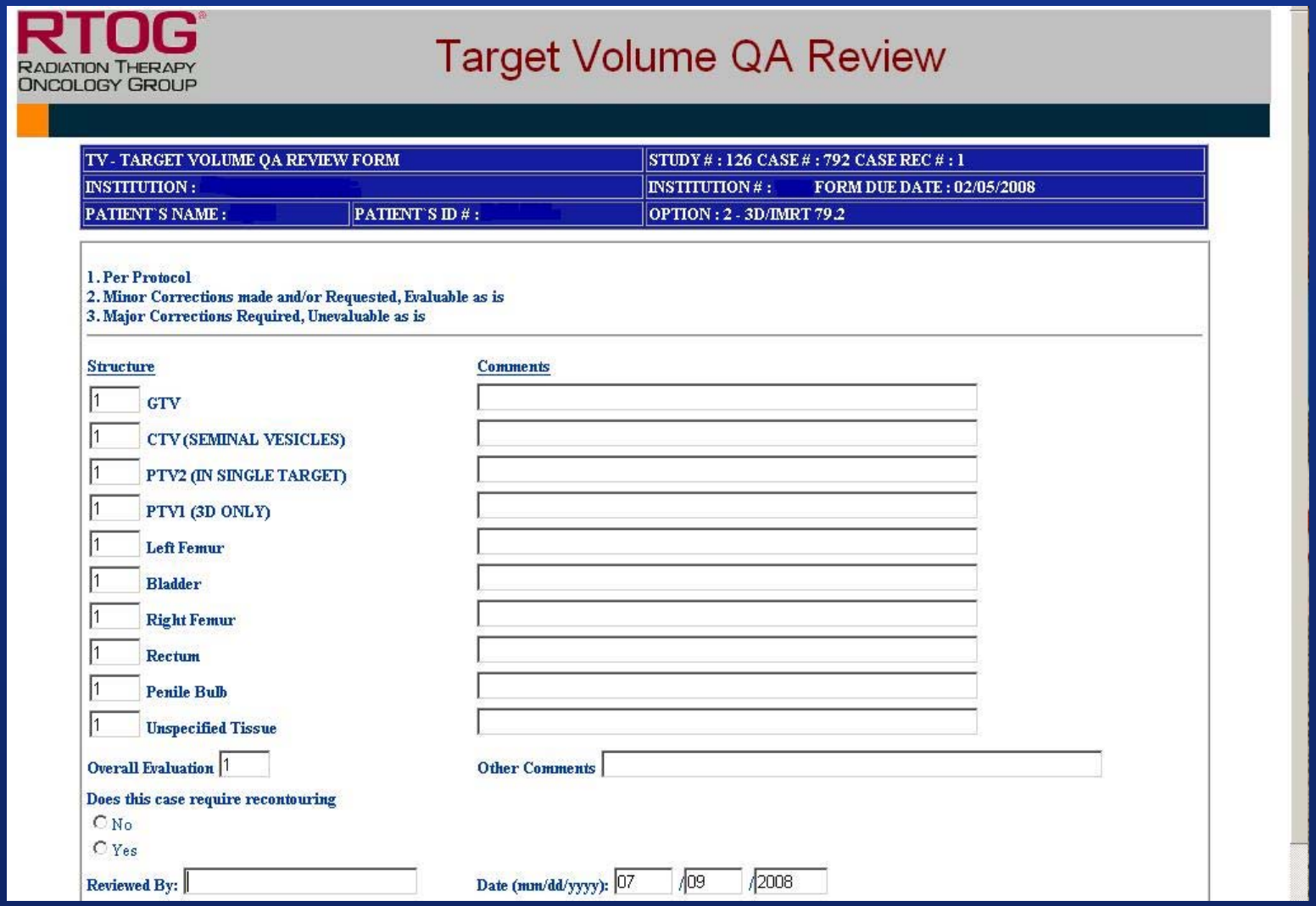
ITC Remote Review Tool

- The RTOG has used the ITC QuASA^{2}R tool to review a large number of advanced technology cases

Dose Volume Analysis Review



Target Volumes/Organs at Risk QA Review



RTOG
RADIATION THERAPY ONCOLOGY GROUP

Target Volume QA Review

TV - TARGET VOLUME QA REVIEW FORM		STUDY # : 126 CASE # : 792 CASE REC # : 1
INSTITUTION :		INSTITUTION # : FORM DUE DATE : 02/05/2008
PATIENT`S NAME :	PATIENT`S ID # :	OPTION : 2 - 3D/IMRT 79.2

1. Per Protocol
2. Minor Corrections made and/or Requested, Evaluable as is
3. Major Corrections Required, Unevaluable as is

Structure		Comments
1	GTV	
1	CTV (SEMINAL VESICLES)	
1	PTV2 (IN SINGLE TARGET)	
1	PTV1 (3D ONLY)	
1	Left Femur	
1	Bladder	
1	Right Femur	
1	Rectum	
1	Penile Bulb	
1	Unspecified Tissue	

Overall Evaluation 1

Other Comments

Does this case require recontouring

○ No
○ Yes

Reviewed By:

Date (mm/dd/yyyy): 07 /09 /2008

Implementing the IGRT Guidelines

- The RTOG has incorporated the IGRT Guidelines in new and developing protocols

IGRT Guidelines - Definition

- Process extending from CT-simulation imaging through the step of imaging the patient on the treatment unit
  - Process includes the following steps:
    - Manual or automatic registration of the two datasets
    - Determination of a series of mechanical movements of the patient support system to correct for detected positioning errors

IGRT Guidelines - Techniques

- **In-room diagnostic quality CT scanner**
- **MV and kV cone-beam CT attachments**
- **MV helical CT capabilities**
- **Stereoscopic 2D images obtained with kV or MV x-rays**

IGRT Guidelines - Methodologies Not Currently Included

- **The guidelines presented here do not include IGRT techniques that use ultrasound or infrared systems that place fiducial markers on the patient's skin**
- **Deformable fusion techniques are not included at this time**

IGRT Guidelines - Procedure

- **Protocol must include:**
  - **IGRT Specifications**
  - **IGRT Questionnaire**
  - **Phantom Irradiation**
    - Treatment units that do not include a robotic couch
    - Test to evaluate the performance of robotic couches with pitch and roll capabilities
  - **Image Registration Software Tests**
    - Tests that use patient datasets

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RTOG Protocols Studying IGRT

- Sarcoma Protocol #0630
  - Currently Active
- Spine SBRT Protocol #0631
  - Currently Under Development
- Head & Neck Protocol #0811
  - Currently Under Development

The Facility Questionnaire

- The RTOG has helped the ATC develop a Facility Questionnaire that can be used by all cooperative groups for all protocols

Facility Questionnaire

Facility Questionnaire
PART I (General Information for 3DCRT and IMRT)

The following items are required before you can enter cases on any RTOG protocol that requires data submission to the Image-Guided Therapy QA Center (ITC). This includes 3DCRT, IMRT or IGRT protocols supported by the ITC. Some of these protocols could require additional information relating to motion management or heterogeneous dose calculations when treating targets in or around the thorax. Additionally, some protocols might require you to complete two or more additional forms. For example, you must complete multiple forms for a protocol that requires or allows IMRT, IGRT and motion management. The additional forms are available through the ITC. If you have completed this or any of the other forms for previous credentialing and now wish to enter patients on another protocol requiring digital data submission, please request a copy of your previous application forms from the ITC. You should update any information on these forms that has changed since your earlier credentialing.

1. Submit this completed Facility Questionnaire to:

   Radiation Therapy Oncology Group (RTOG Headquarters)
   RT Quality Assurance Department
   1818 Market Street; Suite 1600
   Philadelphia, PA 19103

   Email: rtog-facquest@phila.acr.org
   Phone: 215-574-3219
   FAX: 215-940-8817

2. Contact the ITC (itc@castor.wustl.edu) and request an FTP account for digital data submission
3. Submit and successfully complete any required protocol specific Dry-Run test
4. A successful phantom experiment may also be required depending on the specific protocol requirements

Institution Name:_____ **RTOG Institution #:**_____
If Affiliate, Name of Member Institution:_____
Date Questionnaire Submitted:_____/_____/_____ **RTF#** _____
List the best contact individuals for general question regarding RTOG protocols
Physicist:_____ e-mail:_____
Address:_____
_____
_____
_____
Telephone:_____ Fax:_____
Research Associate:_____ e-mail:_____
Telephone:_____ Fax:_____
Dosimetrist:_____ e-mail:_____
Telephone:_____ Fax:_____
Responsible Radiation Oncologist _____
Telephone:_____ e-mail:_____

Existing RT Core Laboratory

Many components of the RT Core Lab are currently in place.

- The RTOG has gathered a large array of tools for image and dose review
- The RTOG has the image storage capacity to meet future needs
- The RTOG can gather protocol PI's at Headquarters, or individual investigators can use remote viewing capabilities for image and dose reviews
- The equipment currently at RTOG Headquarters includes: Mosaiq, Eclipse, MiMvista, QuASA^{2}R, and VelocityAI

Future Plans

- The existing RT Core Laboratory capabilities will be expanded to allow remote review of both images and dose distributions, and to provide a mechanism for post-processing of IGRT data for QA purposes
- Additional Core Laboratory systems will be added and validated for use
- Interactions with ACRIN will be strengthened through a physical move of the RT Core Laboratory to a location adjacent to the ACRIN Imaging Core Laboratory
- Credentialing and QA processes will be modified to accommodate new technological advanced (possible examples are carbon ion and scan beam proton therapies)
- Mechanisms will be put in place to facilitate, in terms of QA and credentialing for particular protocols, combined studies with protocol groups outside North America