

Principal Investigator's Report Advanced Technology QA Consortium ATC Steering Committee Meeting Washington D.C. - March 31, 2004

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Department of Radiation Oncology
Washington University Medical Center
St. Louis, Missouri, USA**

**Supported by NIH U24 grant CA81647,
“Advanced Technology QA Center”**

Agenda

- **9:00 AM:** Welcome by Project Officer (Dr. Deye)
- **9:15 AM:** ATC P.I. Report (Dr. Purdy)
 - Overview of ATC activities
 - Review of ATC Steering Committee March 2003 input/response
- **10:15 AM:** Advanced Technology Credentialing: IMRT Phantoms & prostate brachy (RPC: Francisco Aguirre & Andrea Nelson Molineu)
- **10:30 AM:** IMRT Benchmark and ATC Method 2 use by COG (Drs. FitzGerald and Urie)
- **10:45 AM:** RTOG dosimetry QA review and protocol development (Ms. Martin)
- **11:00 AM:** Demonstration of ATC web-based tools (Drs. Bosch and Frouhar)
- **11:20:** Discussion of meeting presentations (All participants)
- **12:00 PM:** Lunch (ATC Steering Committee Executive Session)
(ATC Members separate room)
- **1:00 PM:** Questions/Discussion (All participants)
- **3:00 PM:** Adjourn

Review of ATC Steering Committee March 2003 Input/Response

- **High priority should be placed on integrating the three database systems now within the purview of the ATC (the ITC, RCET and QARC systems).**
- **Procedure should be put into place whereby ATC collectively can consider what needs to be done with each AT protocol irrespective of coop. group.**
- **Rapid review must be facilitated in whatever future system is decided upon.**
- **ATC should develop a plan that considers the degree to which they will spend time organizing incoming data vs. training CRA's/physics staff to organize data prior to submission.**
- **There still appears to be some concern over "turf" including funding.**

Review of ATC Steering Committee March 2003 Input/Response

- **ATC Steer.Comm. should request ATC to submit a priority list of goals and time frame for implementation. ATC Steer. Comm. needs to monitor progress in achieving goals.**
- **To some extent, there is overlap in the function and capabilities of various ATC members. Very little effort has been devoted to central planning and the various members are largely independent.**
- **There is no formal mechanism for gathering user input to define requirements, map them into defined tasks linked to available resources, and tracking the developments against a timeline. Since the ATC is, in many respects, akin to a small software company, it needs to clearly define its customers, the product (especially future versions), and manage the resources needed to develop and support its many functions.**

Review of ATC Steering Committee March 2003 Input/Response

- **Since there are multiple entities within ATC that can produce software, they should agree on a set of development standards and enforce them. By defining an API, it would be possible for others to work in concert with ATC on problems of more general applicability than radiotherapy.**
- **There are a multitude of constituencies that depend on ATC services, and there is a need to better manage communications among these various groups. The ATC has a website, and addition of one or more e-mail listservers integrated with the website may be very helpful.**

Review of ATC Steering Committee March 2003 Input/Response

- **The ATC should examine its information technology environment (including the definition of ontologies, controlled vocabulary, common data elements, and metadata), and apply state-of-the-art standards to their work.**
- **ATC should operate at the state-of-the-art in computer science and information science, using best available technology for heterogeneous distributed database integration. They should engage in a deliberate process to examine all potentially applicable technologies for their purposes - including portals, grids, data warehousing, metadata mediation, ... and set a long term direction to achieve ATC's goals. One of the most important of these would be to provide each client cooperative group with a private portal to ATC services.**

Review of ATC Steering Committee March 2003 Input/Response

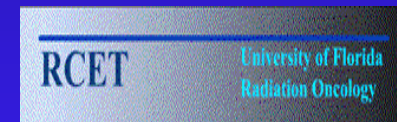
- **ATC should be encouraged to present its accomplishments, plans and needs to a broader community, especially at computer science, bioinformatics, imaging sciences, information technology and related meetings, and to publish their work in appropriate journals.**
- **ATC should define an "open" software development environment that would allow outside groups to build on the base they've created, and to make independent contributions of tools. A publicly accessible archive with defined policies for dataset contributions, access, long-term storage, security could be considered. ATC may wish to provide an API for skilled developers who are not members of the consortium.**

Review of ATC Steering Committee March 2003 Input/Response

- Highest priorities would be:
 - Requirements analysis to define user needs and priorities.
 - Communications infrastructure (to track and manage interactions among ATC members and with their various constituencies).
 - Define ATC information technology using state-of-the-art software engineering technologies (API,...) and use this to achieve the goal of integrating their various heterogeneous databases and software tools into a set of well-defined and supported products that meet the needs of cancer coop clinical trial groups.
 - Dissemination of ATC information technology resources, goals and plans to a broader audience.

Advanced Technology QA Consortium (ATC)

- In July 2002, NCI funded an Advanced Technology QA Consortium capitalizing on existing infrastructure and strengths of national QA programs
 - Image-Guided Therapy Center (ITC – Washington University in St. Louis)
 - Resource Center for Emerging Technologies (RCET – University of Florida in Gainesville)
 - Radiological Physics Center (RPC – M.D. Anderson Cancer Center)
 - Radiation Therapy Oncology Group (RTOG)
 - Quality Assurance Resource Center (QARC)



ATC's Mission

- **Developmental efforts:**

- electronic data exchange of digital planning data between ATC QA Centers and protocol participating institutions;
- web-based software tools to facilitate protocol digital data submissions and QA reviews by RTOG, QARC, and RPC;
- archival treatment planning & QA databases that can be linked with the cooperative group's clinical outcomes database.

- **Service efforts:**

- assist in protocol development, manage/facilitate protocol digital data submissions, credentialing, QA review, and data analysis.

What have we accomplished?

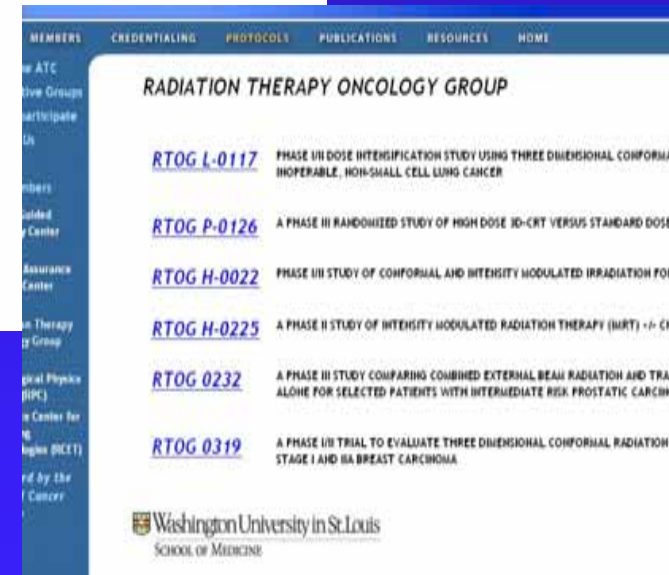
- **Improved Communications among subcontractors:**
 - **Meetings (with minutes)**
 - ATC Meeting - QARC, Providence, Nov. 19-20, 2002
 - ATC Steering Comm. - Chicago, April 15-16, 2003
 - ATC Meeting - RTOG, Montreal, June 26, 2003
 - ATC Meeting - COG, Dallas, Nov. 7, 2003
 - ATC Meeting - RTOG, New Orleans, Jan. 15, 2004
 - **Teleconferences (with minutes)**
 - (1) Feb. 5, 2003
 - (2) Mar. 5, 2003
 - (3) Apr. 2, 2003
 - (4) May 7, 2003
 - (5) Jun. 4, 2003
 - (6) Aug. 6, 2003
 - (7) Sep. 3, 2003
 - (8) Oct. 1, 2003
 - (9) Dec. 3, 2003
 - (10) Feb. 4, 2004
 - (11) Mar. 4, 2004

What have we accomplished?

- **ATC Mission Statement (Objective 1)**
 - Serve as an **educational** and developmental resource to the nation's clinical trial cooperative groups and participating institutions for support of advanced technology radiation therapy clinical trials:

What have we accomplished? (Educational Resource)

- ATC Website (<http://atc.wustl.edu>) activated on Oct. 15, 2003



- Links to ATC member websites
- Links to RTOG protocol information
- Facility Questionnaires, T2 forms (digital data submission), Dry Run/QA Guidelines

What have we accomplished? (Educational Plans for 2004)

- ICCR 2004 Meeting (June 10-14)
- AAMD 2004 Annual Meeting (June 20-24)
- AAPM 2004 Annual Meeting (July 25-29)
 - ATC Booth
 - Educational Symposium
 - NEMA/AAPM/ATC DICOM Connectathon
 - Refresher Course on use of DICOM for trials
- ASTRO 2004 Annual Meeting (Oct. 3-6)
 - ATC Refresher Course
 - Presence in NCI Booth

What have we accomplished? (Electronic Data Exchange)

- **ATC Mission Statement (Objective 2)**
 - Develop electronic data exchange mechanisms for treatment planning and verification (TPV) data between the ATC QA Centers and the protocol participating institutions, and between the ATC members and cooperative group Operations, Statistics, and Data Management Section(s).

What have we accomplished? (Electronic Data Exchange)

- RTOG Digital Data Exchange Format
- ATC involvement in DICOM WG 7 and WG18
- ATC DICOM Conformance Statement
- Digital Data Exchange Implementer's Workshops
- On-going ATC interactions with RTP manufacturers using Remote Review Tool
- NEMA/AAPM/ATC DICOM Conectathon to be held at 2004 AAPM Annual Meeting

DATA EXCHANGE TECHNICAL WORKSHOPS FOR RTP VENDORS

- **Mar 10, 1995, St. Louis: implementation of RTOG Data Exchange standard for participation in clinical trials..**
- **Sep 10-11, 1999, St. Louis: implementation of RTOG Data Exchange standard (emphasis on prostate brachy).**
- **March 16-17, 2001, St. Louis: implementation of DICOM 3.0 standard for participation in clinical trials.**
- **March 16, 2002, St. Louis: implementation of DICOM 3.0 standard for participation in clinical trials.**
- **May 3, 2003, St. Louis: implementation of DICOM 3.0 standard for participation in clinical trials.**
- **April 14, 2004, St. Louis: (will be followed by a WG7 meeting April 15-16)**

Agenda: April 14 DICOM Workshop

- 9:00 AM: Welcome (Bosch)
- 9:15 AM: Advanced-Technology Clinical Trials (Purdy)
- 9:30 AM: Radiation Therapy Trials Data and QA Process (Straube)
- 10:30 AM: Overview-ATC DICOM 3.0 Conformance Statement (Bosch, Straube, Matthews)
- 1:00 PM: Digital Data Submission ATC-Sponsored Trials (Bosch, Frouhar)
- 1:30 PM : 2004 DICOM Demonstration at AAPM (Bosch, B. Curran)
- 2:30 PM : Special topics: DICOM RT objects in clinical trials applications:
 - IHE Profiles for DICOM RT objects (B. Curran)
 - Requirements for Quantitative PET imaging (LaForest)
 - Multi-modality imaging and image registration (Sims)
 - Adaptive radiotherapy (Murray)
 - HDR Brachytherapy (Bencomo)
- 4:30 PM: ATC Vendor Assistance (Matthews)
- 4:45 PM: Wrap up and discussion
- 5:00 PM: Adjourn

Working Group 7 to meet at ITC

Working Group 07
(Radiation Therapy
objects)

DICOM

Digital Imaging and
Communications in Medicine

Chairman: David Murray Ph.D.,
TomoTherapy, Inc.

Email: dmurray@tomotherapy.com

Vice Chairman: Dr. Michael Neumann
Nucletron, B.V.

Email: michael.neumann@de.nucletron.com

Secretariat:

National Electrical Manufacturers Association

1300 North 17th Street, Suite 1847

Rosslyn, VA 22209 <http://medical.nema.org>

Secretary: Stephen Vastagh, NEMA

ste_vastagh@nema.org

AGENDA

MEETING: DICOM – Working Group 7
RT Objects

TIME: Thursday, April 15 – 9:00 am to 5:00 pm
Friday, April 16 8:00 am to 12 noon

PLACE: Washington University
Image-guided Therapy Center
Conference Room 202
4511 Forest Park Avenue
St. Louis, MO 63108

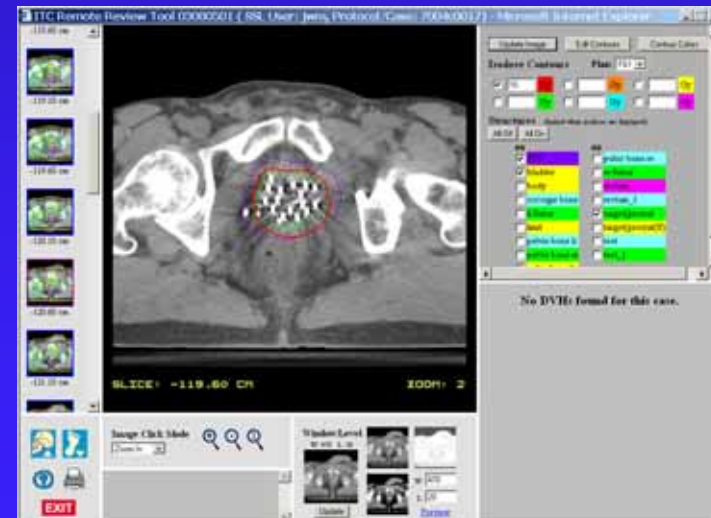
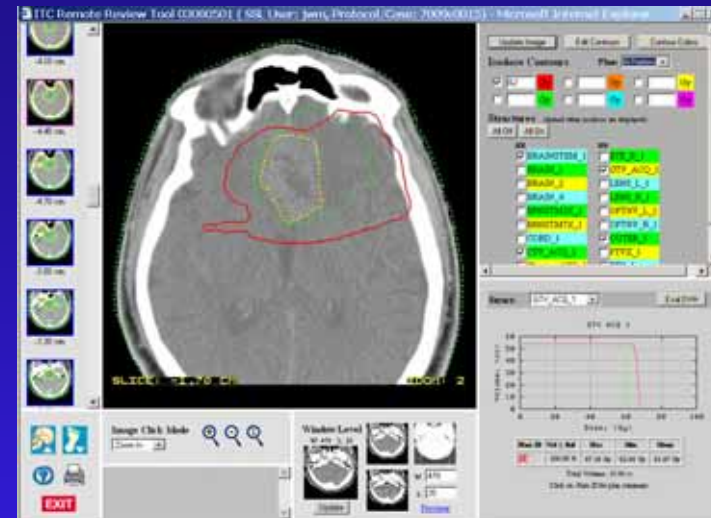
DOCUMENT POSTING:

All members that have "homework" or wish to submit a document for discussion at the next meeting should upload the document in the upcoming meeting's folder and send an e-mail to the Listserve,

- Will make it easier for vendors to attend the April 14 ATC DICOM Implementer's Workshop; we expect the best vendor turnout ever.
- Members of WG7 will have a better idea of "who ATC is" and "what ATC does"

ATC DICOM Assistance for Vendors

- Vendors submit DICOM datasets to ITC via FTP or media
- ITC imports the datasets into pseudo-protocols per vendor
- Vendors evaluate correctness of data transfer using ITC's Remote Review Tool (RRT)
 - CT, Structures, and Dose (Dose Array and DVH)
- For RT Plan validation, screensnaps are sent to vendor



Digital Data Exchange Status

ATC Compliant Treatment Planning Systems Per Modality

Treatment planning systems deemed to be *ATC Compliant* and listed in the table below are those with which ATC protocol participants have submitted *complete, protocol compliant* data sets.

Treatment Planning Systems			Exchange Format	Supported Treatment Modality			
Vendor	System	Version *		3DCRT	IMRT	Seed Brachy	HDR Brachy
CMS	Focus/XiO	3.1	RTOG	yes	yes	yes	no
Varian	Eclipse	7.1	DICOM	yes	yes	no	no
	VariSeed	7.1	DICOM	no	no	yes	no
Philips	Pinnacle ³		RTOG	yes	yes	no	no
	AcqPlan	4.9	RTOG	yes	no	no	no
Elekta	RenderPlan 3D		RTOG	yes	no	no	no
	PrecisePlan	2.01	DICOM	yes	no	no	no
Nucletron	Helax TMS		RTOG	yes	yes	no	no
	TheraPlan Plus		RTOG	yes	no	no	no
	PLATO RTS	2.62	DICOM	yes	no	no	no
Nomos	Corvus		RTOG	no	++	no	no

* Earliest compliant version of treatment planning system.

++ Nomos Corvus is temporarily suspended (effective 11/7/02) pending resolution of digital data submission problems. **Corvus users should consult special [submission guidelines](#) for workaround instructions regarding the use of Corvus for IMRT protocols.**

Compliant 8/8/2003
 Compliant 8/11/2003

Compliant 10/6/2003

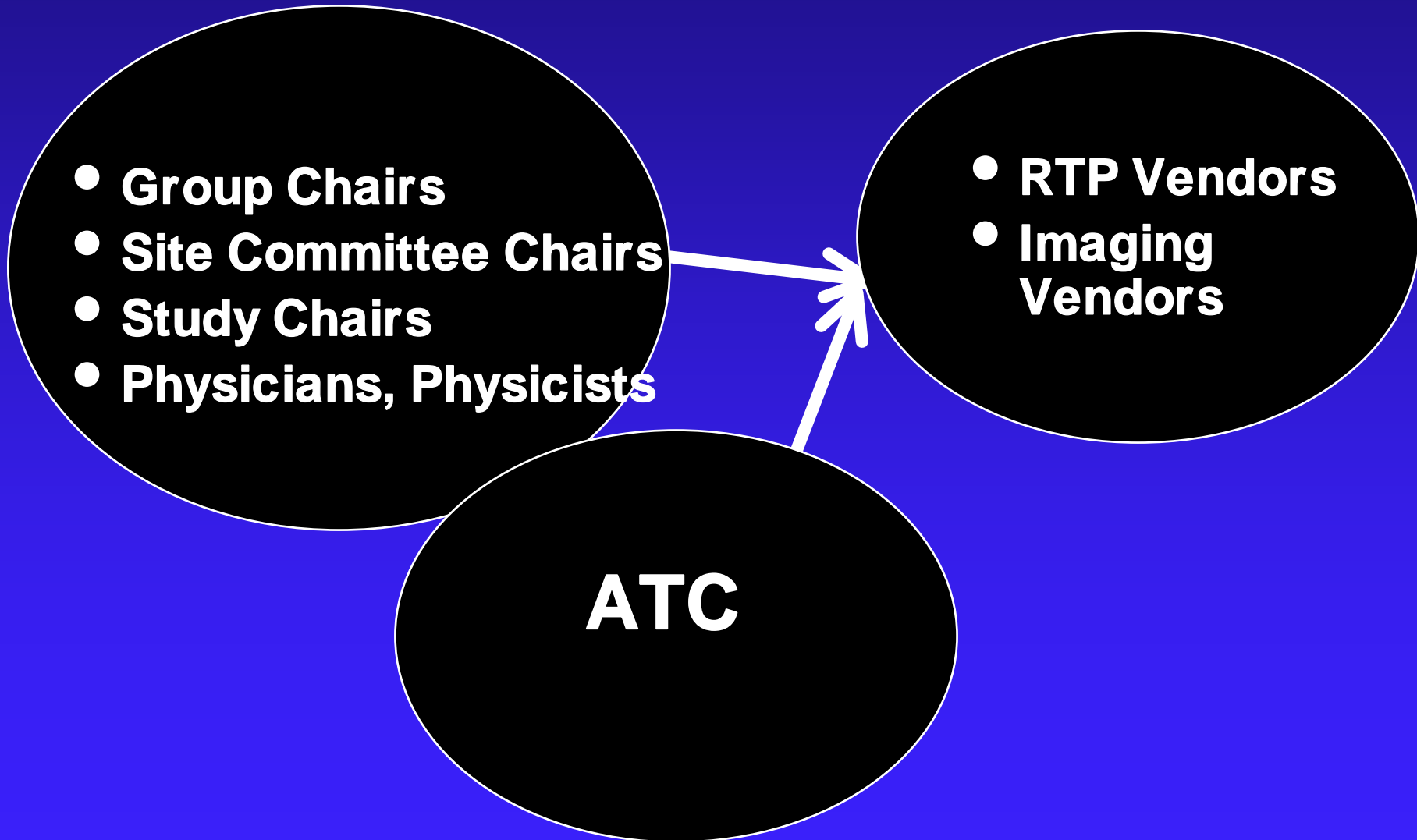
Compliant 3/15/2004

DICOM Status

- **DICOM implementations working with ATC, but not yet ATC approved:**
 - **Nucletron Plato HDR**
 - **Varian BrachyVision**
 - **Nomos Corvus**
 - **Siemens Dosimetrists Workspace (CT simulator)**
 - **Siemens KonRad RTP system**
 - **Others**

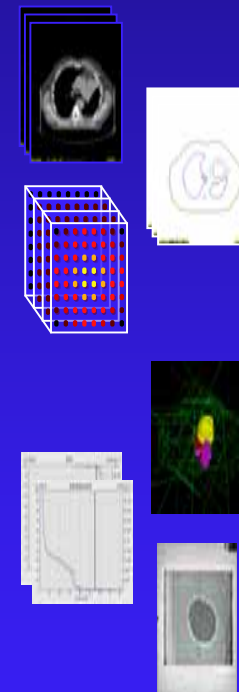
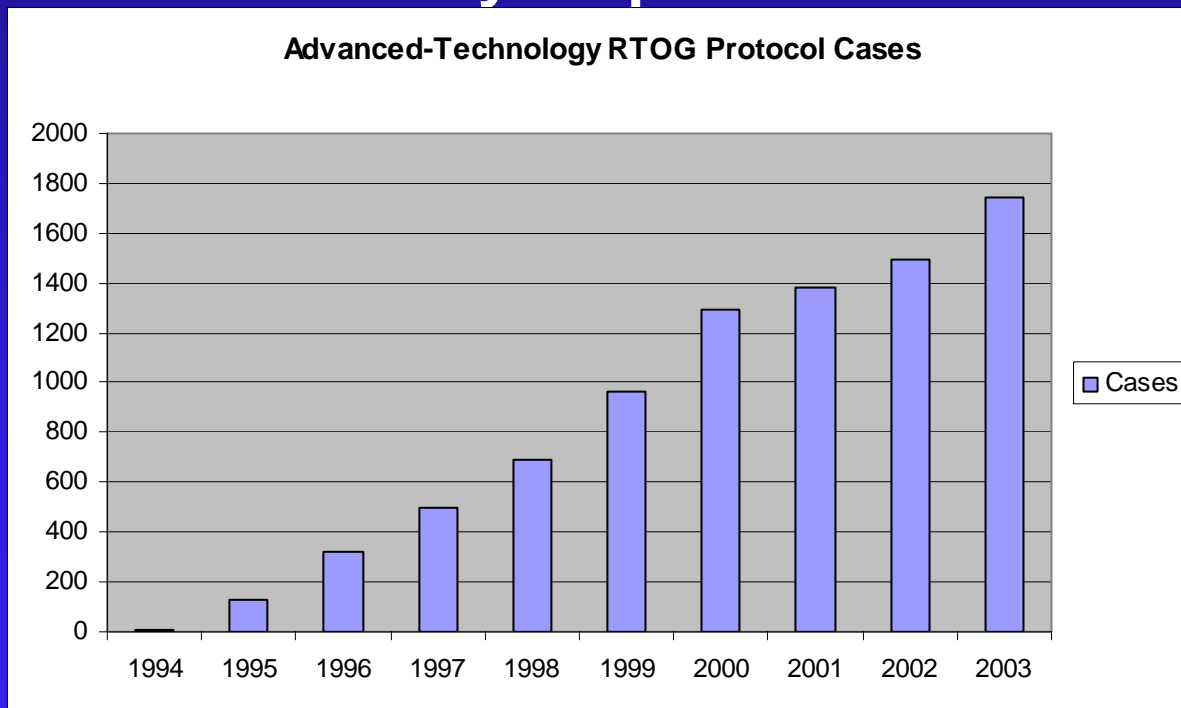
Continuing Challenges

Data Exchange - RTP Vendors



What have we accomplished? (Electronic Data Exchange)

- Over 1700 complete digital data sets (RTOG Protocols) submitted over 10 year period



- 11 commercial RTP systems have now implemented ATC export capability
- 121+ institutions are able to submit complete data sets

ATC Method 1

(currently in use for 6 RTOG protocols)

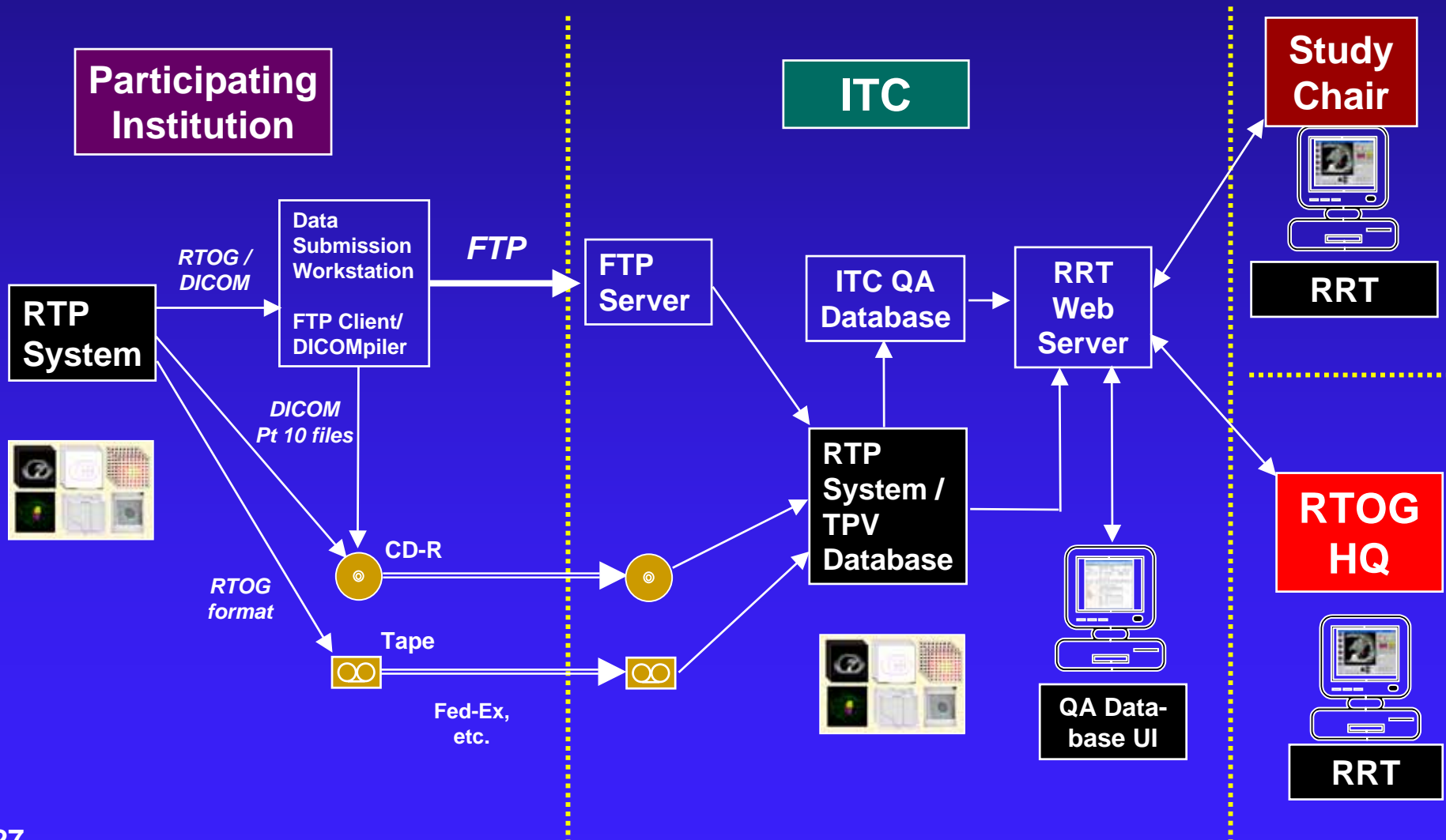
Data supported: CT planning images, OAR/TV contours, beam geometry/seed locations, 3D dose distributions, DVHs, DRRs, scanned films as either DICOM (images and RT objects) or RTOG data exchange format.

Submission method: (1) FTP of DICOM or RTOG files to ITC server, or (2) shipment of DICOM or RTOG files on CD-R or tape cartridge media to ITC.

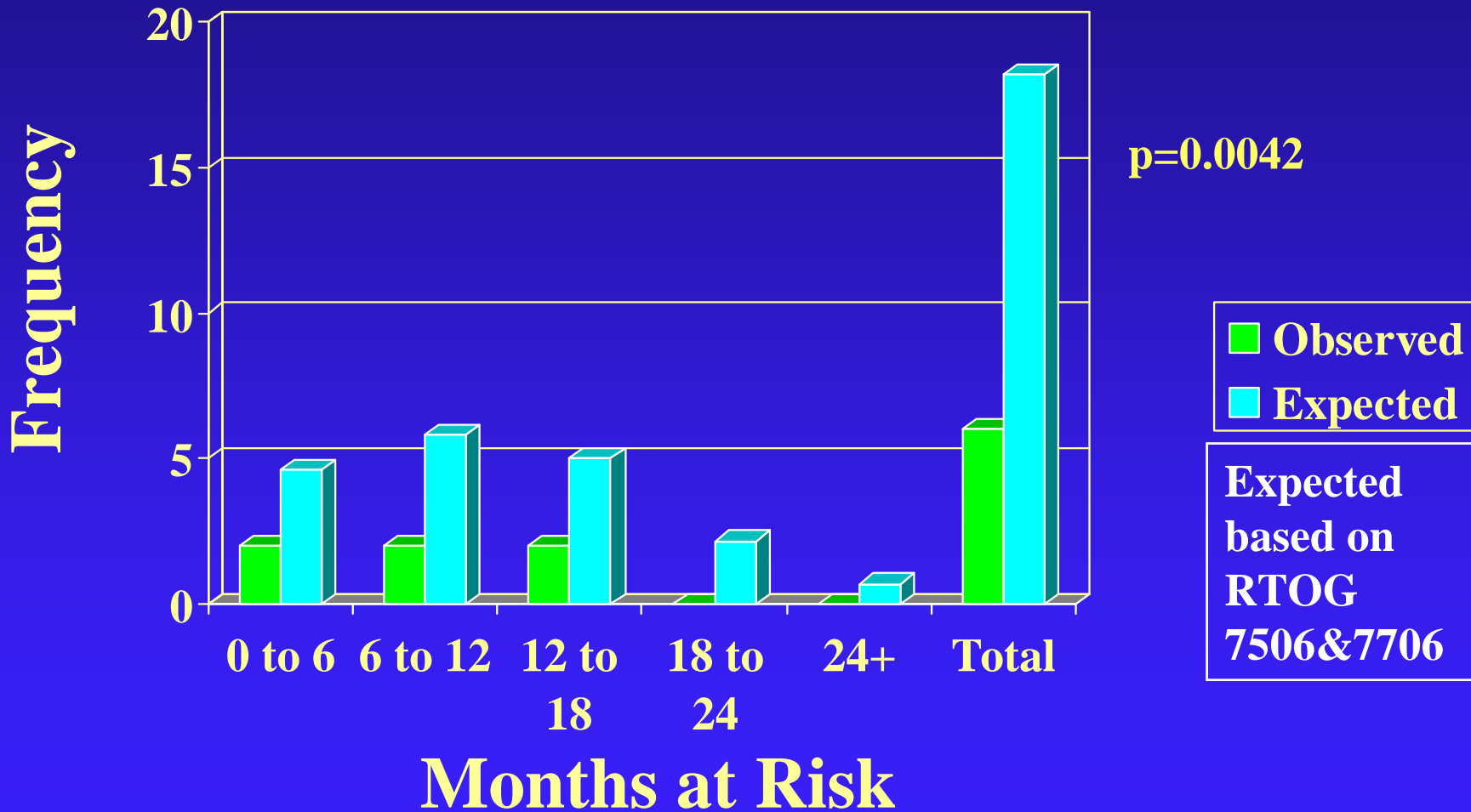
Processing: files from FTP server or media are imported into ITC treatment plan review system and become available for review using the Remote Review Tool (RRT).

Review facilities: RRT permits review of OAR/TV contours and iso-dose curves on axial CT slices, interactive DVH display, point-dose interrogation, contour editing, and DVH re-calculation.

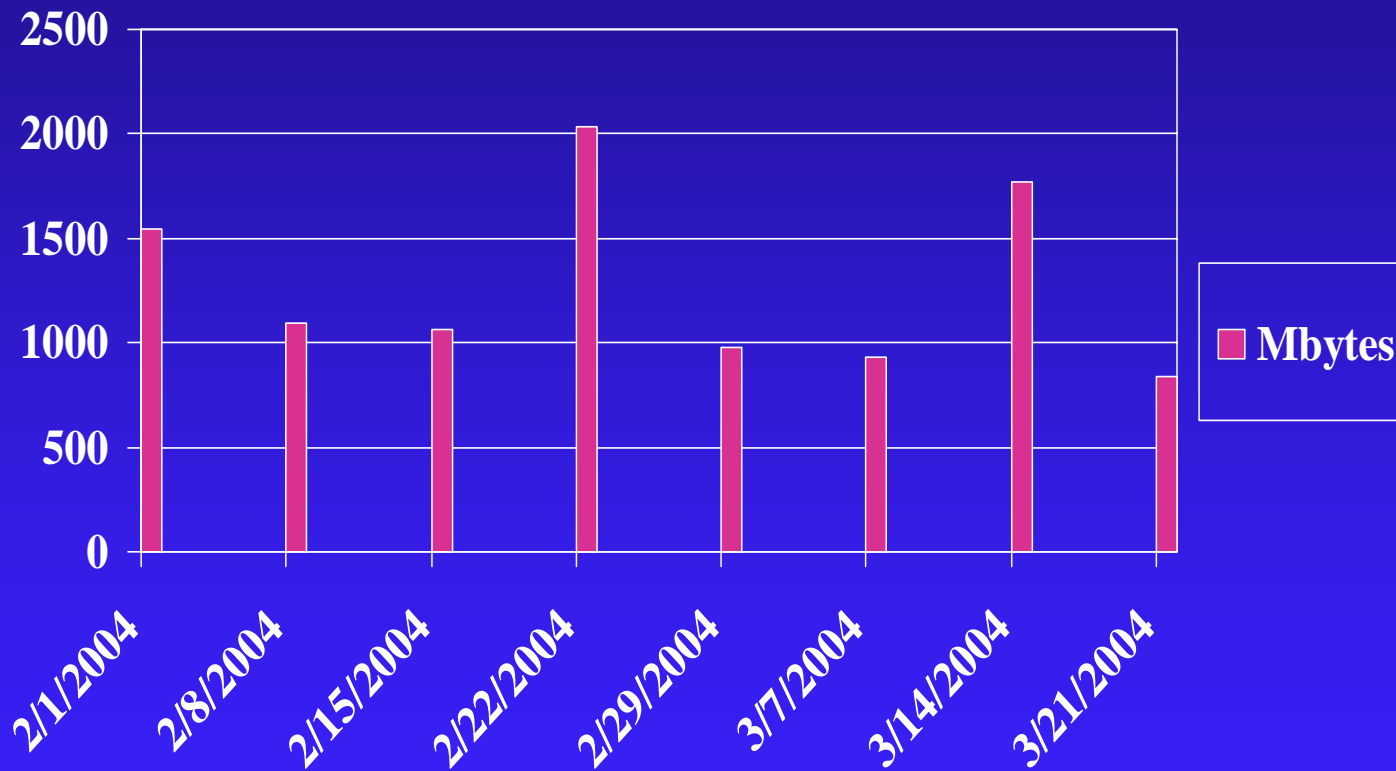
ATC Method 1: Digital Data Submissions to ATC (current ITC Method)



RTOG 9406 Dose Level V (78 Gy, 2Gy/fx), Disease Group 1, Late Grade 3+ Toxicity



ATC Method 1 FTP Server Data Upload Volume



ATC Method 2 : Digital Data Submissions to ATC (in development)

RCET NetSys/WebSys (IJROBP 57, 1427-1436, 2003)



Int. J. Radiation Oncology Biol. Phys., Vol. 57, No. 5, pp. 1427-1436, 2003
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 0360-3016/03/\$ - see front matter

doi:10.1016/S0360-3016(03)01624-9

PHYSICS CONTRIBUTION

WEB-BASED SUBMISSION, ARCHIVE, AND REVIEW OF RADIOTHERAPY DATA FOR CLINICAL QUALITY ASSURANCE: A NEW PARADIGM

JATINDER R. PALTA, PH.D., VINCENT A. FROUHAR, PH.D., AND JAMES F. DEMPSEY, PH.D.

Department of Radiation Oncology, University of Florida College of Medicine, Gainesville, Florida

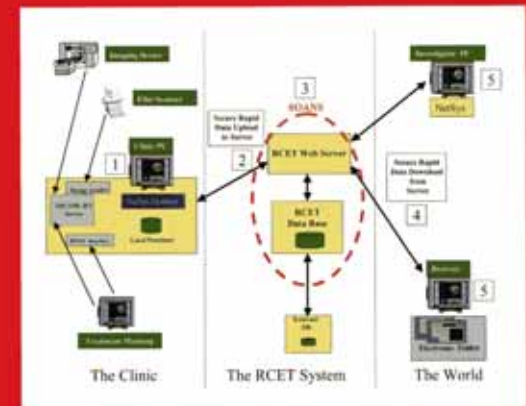
Purpose: To report on the implementation of a web-based system (the Resource Center for Emerging Technologies [RCET] System) that provides immediate access to the patient radiotherapy planning and delivery data for clinical quality assurance (QA) by the experts.

Methods and Materials: An infrastructure of comprehensive tools required for preparation, submission, auto-archiving, web-based review, and retrieval of diagnostic images, treatment planning images, and radiation therapy objects has been developed. These tools represent approximately 1.1 million lines of computer code development in seven languages (V, C++, Visual Basic, Java, ASP, HTML, and SQL) and consist of a secure auto-anonymizing upload and auto-archiving patient database, a web-based secure object archiving network system, a web-based rapid review tool, a web-based upload/download tool, and a personal computer client data application for data object preparation, visualization, and submission, named NetSys. The RCET system enables users to share radiotherapy data in a secure environment. This paradigm of electronic data exchange makes remote peer review very efficient and convenient.

Results: The RCET system can help the radiation therapy community ensure consistent evaluation of its therapies. It will encourage proactive QA. An example of proactive clinical QA would be to provide atlases of target and critical structure definitions, to serve as class solutions, as well as dose prescription, specification, and reporting examples for guidance to the radiation oncologists in the community. The web-based clinical quality assurance is ideally suited for emerging technologies in radiation therapy that generate complex and voluminous multimodality imaging and planning data.

Conclusions: The RCET system enables users to share multimodality imaging data, radiation therapy planning, and delivery data on demand. Our design paradigm will allow rapid peer review of radiotherapy data through a simple personal computer-based web browser. © 2003 Elsevier Inc.

Radiotherapy data exchange, Clinical QA, Electronic review.



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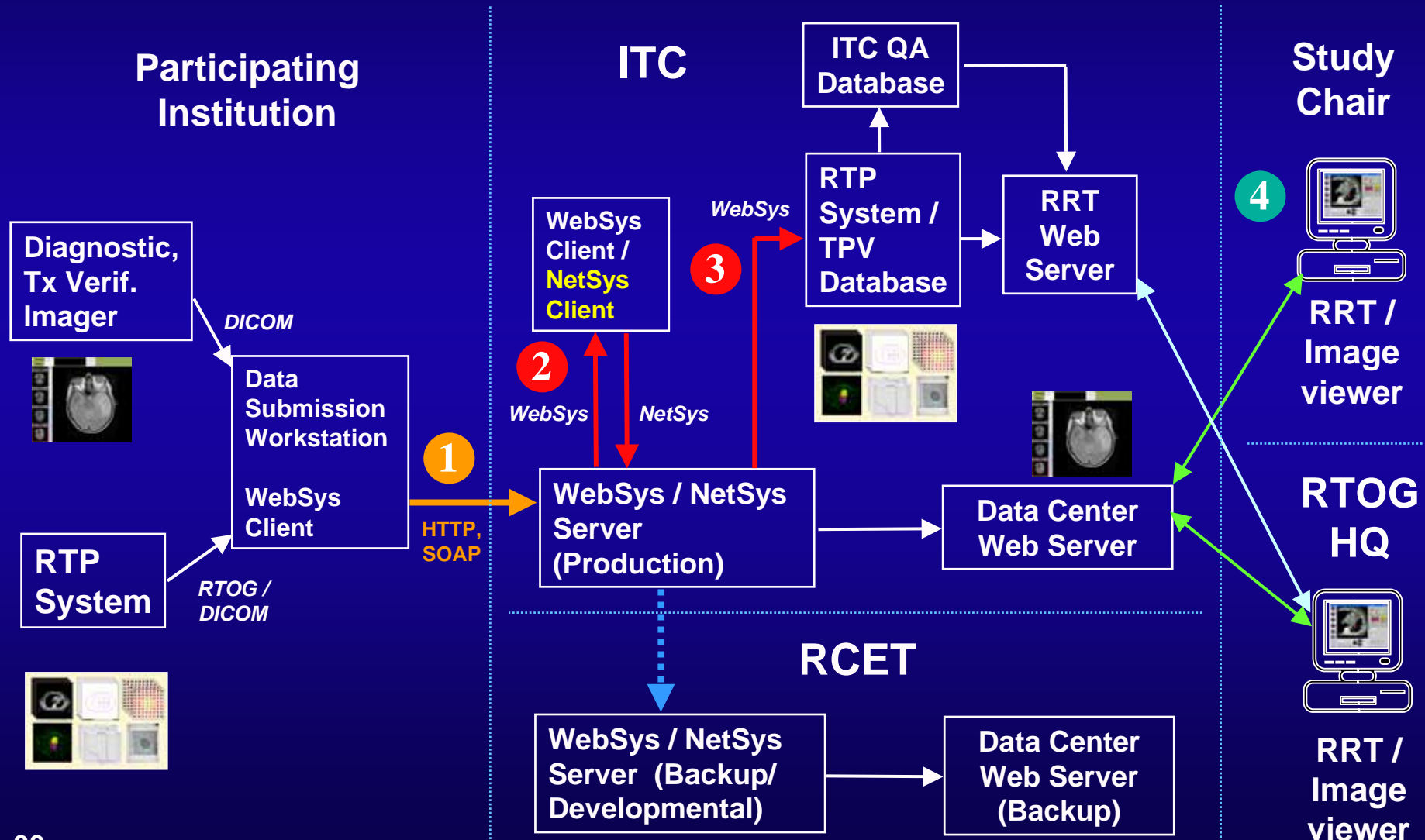
Visit IJROBP Online at www.mdjonline.org

What have we accomplished?

(Software Tools for QA Review, Databases)

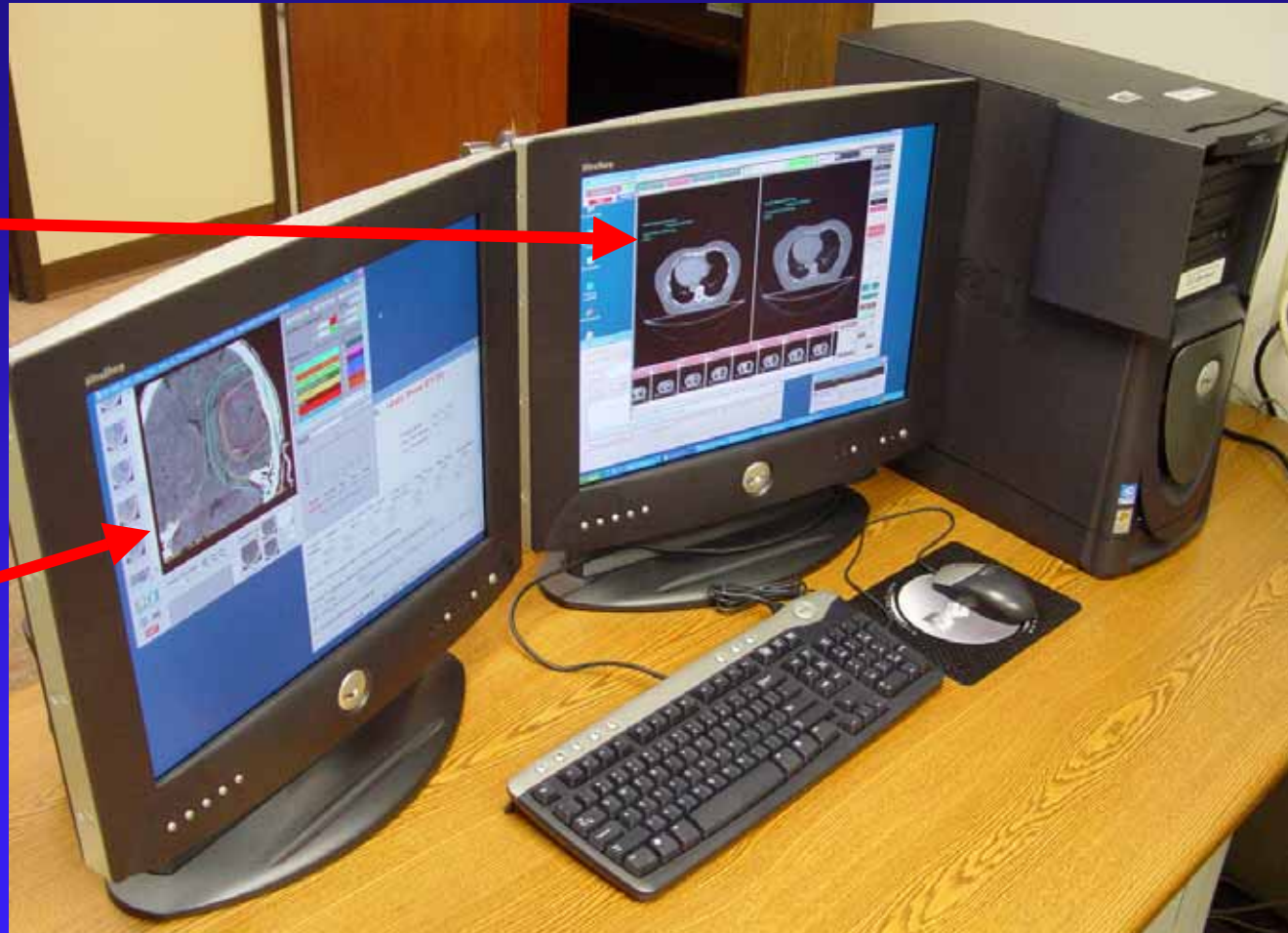
- **ATC Mission Statement (Objectives 3 & 4)**
 - Develop software tools to facilitate QA reviews by RTOG, QARC, and RPC of TPV data submitted by institutions participating in cooperative group clinical trials (both pediatric and adult) that utilize advanced technologies, including 3DCRT, IMRT, and brachytherapy. Emphasis is on the development and improvement of web-based remote-review tools that allow for the efficient review of centrally located image-based data by reviewers not co-located with these data.
 - Develop an archival TPV database for the advanced treatment modalities that can be linked with the cooperative group's clinical outcomes database.

Method 2 (in development): Digital Data Submissions to ATC



Method 2 (in development): Remote QA Review

- Use NetSys Data Center to review diagnostic CT, MR, PET images and verification images
- Use RRT to review TV/OAR contours, dosimetry



ATC Method 2 Data Import

- 2** Import of diagnostic and treatment verification images to Image Viewer database
 - Required to build thumbnail images and database entries for Image Viewer
 - Currently accomplished by WebSys download, NetSys upload
 - RCET to develop automated import mechanism
- 3** Import of treatment planning images and data to Remote Review Tool database
 - Convert submitted CTs, Structures, Doses, DVHs in DICOM or RTOG to local treatment planning system format
 - Data QA / consistency check is important for immature DICOM implementations
 - ITC to integrate RRT with WebSys database

ATC Method 2 Testing / Server Development

- **Method 2 data submission testing has been carried out in conjunction with the deployment of a production ATC Data Submission Server located at ITC. Attempts to upload and download COG test data sets from the ATC server constitute the first full-scale test of the NetSys server software.**
 - **These test have been helpful in identifying implementation errors in the NetSys database and DICOM import/export mechanism.**
 - **By providing realistic data sets and a meaningful test protocol, the COG test process has greatly accelerated the correction of these errors.**
 - **The first apparently successful submission and retrieval of both DICOM RT objects and RTOG data sets between ITC and the RCET server occurred on December 2, 2003. Since that time, additional bugs have been identified and corrected.**

ATC Server Bug/Feature List

- **Bugs**
 - Value of Group Length (0002,0000) attribute in DICOM Part 10 Header is four less than correct group length. (fixed VAF 1/10/04)
 - Inconsistent links on production server (polaris.wustl.edu) after NetSys update (fixed WRB 3/22/04)
- **Feature requests**
 - WebSys database limits user accounts to 6 protocols as “user” and 6 as “study director” (12/1/03).
 - Improved case selector in WebSys: select (or sort by) protocol, institution, case (1/7/04).
 - Add review status flag to indicate state of QA process flow (M. Urie to provide a list of categories for COG protocols.) (1/7/04)
 - WebSys/NetSys client revision interlock to disallow use of incompatible (obsolete) clients. (1/7/04)

ATC Digital Data Submission Server Action Plan

- **ITC to assume first-line support for data submissions**
 - ITC personnel to be trained in the use of basic user-account management & case-data management tools.
 - RCET to complete user & programmer documentation for WebSys and NetSys servers and databases.
- **Method 2 Test Group to continue to evaluate data submission and review tools**
 - Method 2 Test Group to continue testing with the original participants (Cross Cancer Center, LDS Hospital), as well as Washington University, Emory University, JCOG, EORTC, and others recruits.
 - Method 2 Test Protocol procedures to be modified as appropriate to govern these submissions.
- **ATC Data Submission Server bug/feature list to be maintained to prioritize server system development effort.**

Second Generation ATC Remote Review Tool

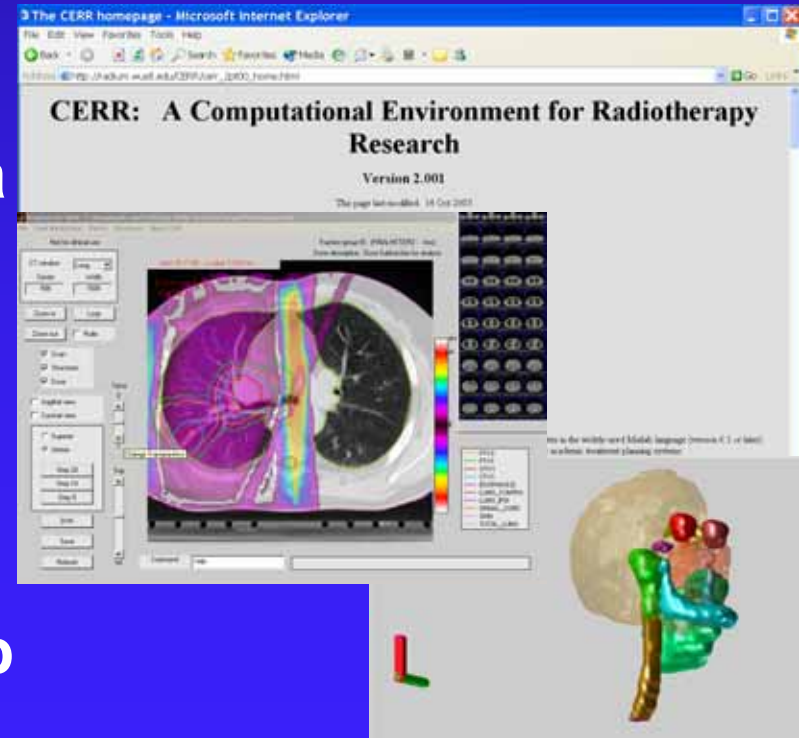
- Access ATC Digital Data Submission Server database and file system
- Re-implement low-level utilities used for
 - Image and structure/iso-dose contour rendering
 - Point-dose extraction
 - DVH calculation
 - DVH plotting
 - Structure contour extraction
 - RT Plan summary

ITC QA Database

- Existing Database
 - Data QA (timeliness, completeness, evaluability)
 - Organ-at-risk/target-volume QA
 - Dose-volume analysis
 - ◆ Protocol-dependent
 - ◆ Automatic import from treatment planning data
 - Treatment delivery record
 - Problem/correspondence log
- Need to scale for many new protocols!

Mechanisms for Data Sharing

- Export of RTOG Data Exchange format data for secondary analysis at M.D. Anderson (Tucker, *et al.*)
- Dose-volume analysis data from ITC QA database exported to RTOG statisticians for various outcomes studies.
- WebSys client provides for controlled, secure download of case data (DICOM or RTOG Data Exchange format).
- Computational Environment for Radiotherapy Research (**CERR**, Deasy) can be used to import DICOM or RTOG data, visualize interactively, and save as Matlab data sets



What have we accomplished?

(Protocol design, credentialing, QA,...)

- **ATC Mission Statement (Objectives 5 & 6)**
 - Provide expertise and support in the areas of protocol design, credentialing, digital data submissions, QA reviews, and outcome analysis with the intent to ensure uniformity of guidelines.
 - Facilitate protocol credentialing, digital data submissions, QA reviews, and outcome analysis

What have we accomplished?

(Protocol design, credentialing, QA,...)

RTOG Protocol	Site	Status	Approved Institutions	Accrued Cases*
9406	Prostate Ph I/II	Closed	53	1084
9311	Lung Ph I/II	Closed	26	180
9803	Brain (GBM) Ph I/II	Closed	46	210
H-0022	Oropharynx IMRT Ph I/II	Open	16	38
H-0225	Nasopharynx IMRT Ph II	Open	16	15
L-0117	Lung Ph I/II	Open	36	17
P-0126	Prostate Ph III	Open	86	233
P-0232	Prostate Brachytherapy Ph III	Open	20	25
BR-0319	Breast Ph I/II	Open 8/15	22	30

What have we accomplished?

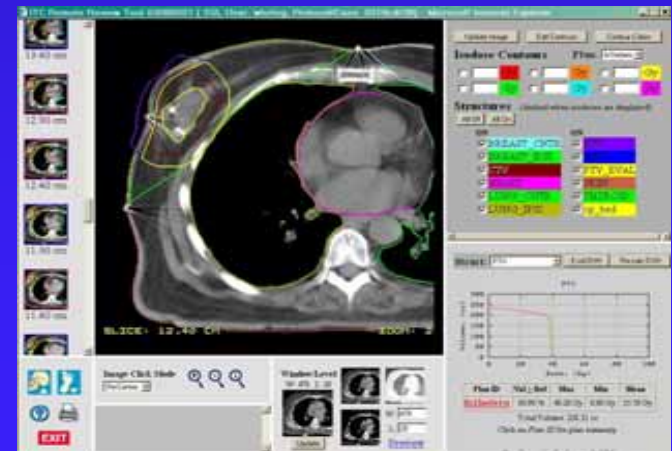
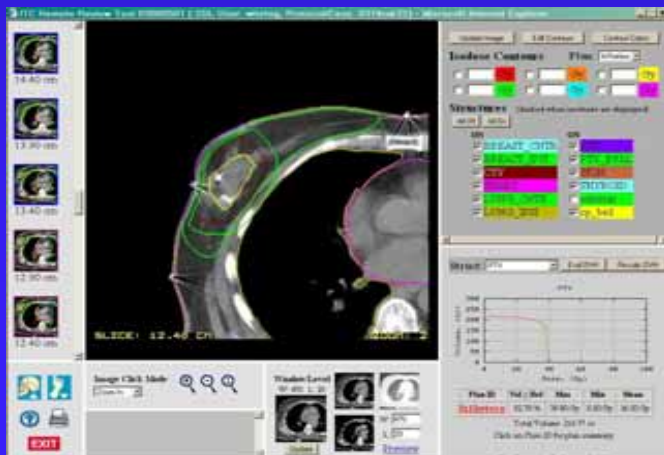
(Protocol design, credentialing, QA,...)

- Established RTOG credentialing requirements for 3DCRT and IMRT protocols requiring digital data submissions:
 - Completed Facility Questionnaire (only available from ATC website) to the ITC.
 - Pass protocol specific Dry Run test through ITC
 - IMRT protocols only: in addition to above two items, successfully pass RPC IMRT phantom test.
 - ◆ Dosimetry data to RPC
 - ◆ Digital phantom plan data to ITC
 - ◆ Evaluated by RPC

What have we accomplished?

(Protocol design, credentialing, QA,...)

- Dry Run test serving as an **educational** resource to the nation's clinical trial cooperative groups and participating institutions
- **Incorrect Contouring for 0319**
 - Breast incorrect
 - PTV incorrect
- **Corrected contouring** after feedback from ITC



What have we accomplished?

(Protocol design, credentialing, QA,...)

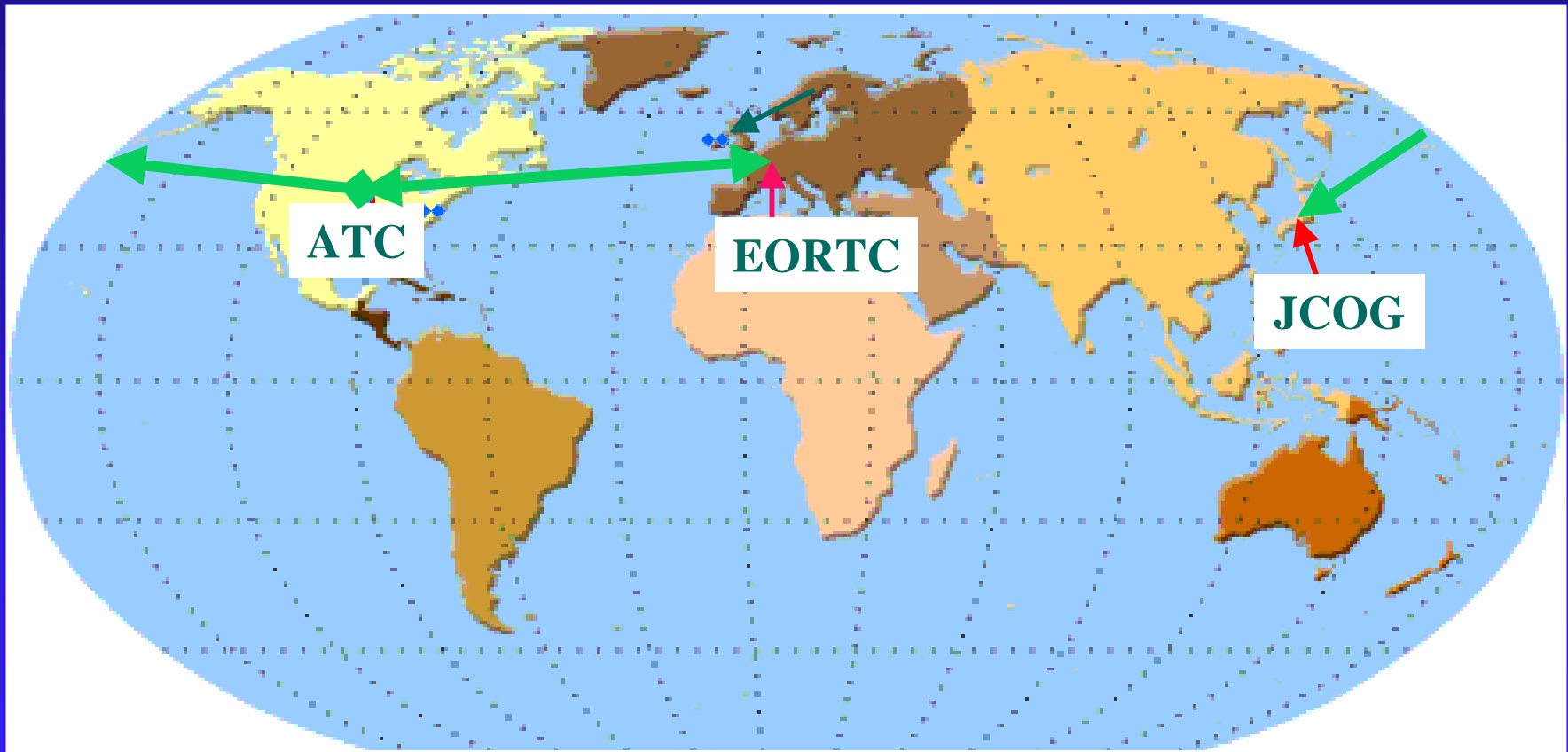
- Demonstrating a growing collaboration between members of the ATC:
 - RTOG/RPC/ITC collaboration in credentialing RTOG 0022, 0225, 0126 (IMRT phantom and IMRT Dry-Run)
 - RTOG/RPC/ITC collaboration in credentialing RTOG 0232
 - RCET/ITC collaboration in development of ATC Digital Data Submission/Review Server
 - COG/QARC/ITC/RCET testing of Method 2 Digital Data Submission and QA Review system
 - NCI/QARC/ATC IMRT Benchmark

What have we accomplished?

(Protocol design, credentialing, QA,...)

- **ATC Interactions with Cooperative Groups other than RTOG**
 - **COG**
 - **PBTC**
 - **NCIC**
 - **NSABP**

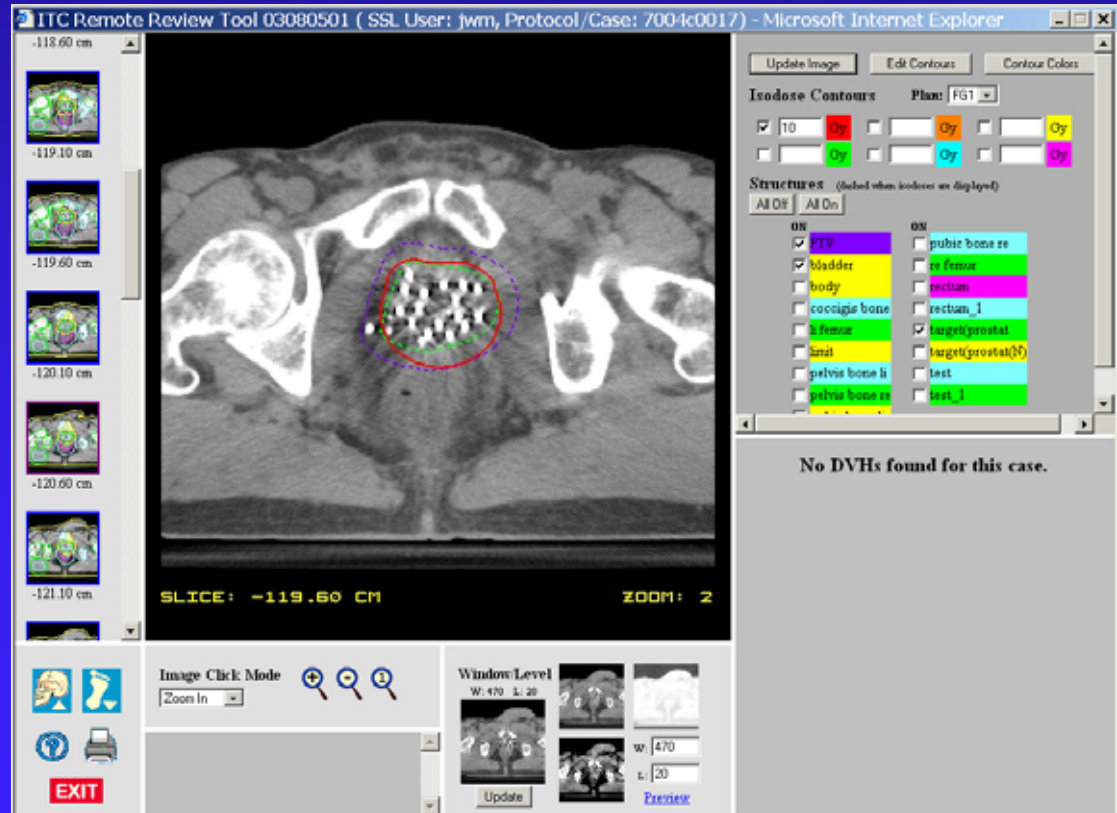
ATC INTERACTIONS - WORLD-WIDE



- EORTC (Dr. Bernard Davis, UniversitätsSpital Zürich at ASTRO)
- JCOG (Dr. Satoshi Ishikura, National Cancer Center Hospital East, Kashiwa, Japan)

Challenges for ATC Supported Clinical Trials

- HDR Brachytherapy
 - No ATC compliant RTP systems
 - RTOG 0321 in development
 - NSABP/RTOG partial breast irradiation protocol in development



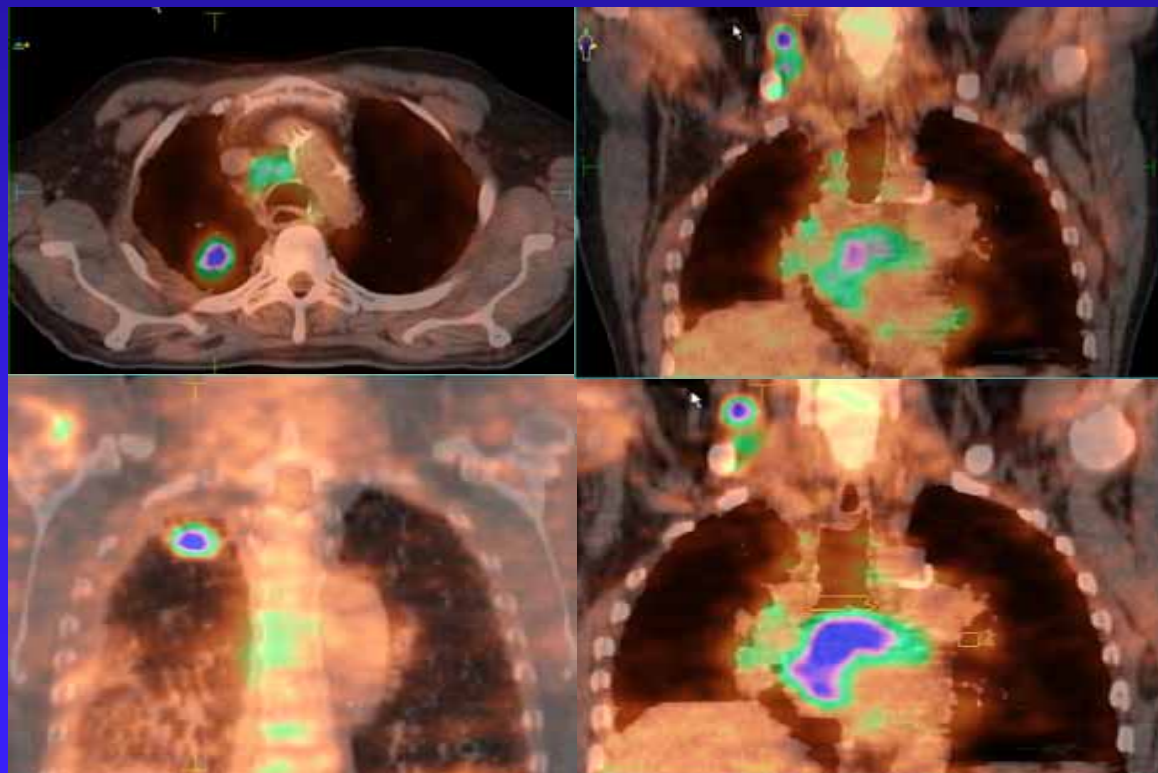
Challenges for ATC Supported Clinical Trials

- **Stereotactic Radiosurgery and Radiotherapy**
 - No ATC compliant stereotactic RTP systems
 - RTOG Lung 0236 in development
 - RTOG Liver 0245 in development



New Challenges for ATC Supported Clinical Trials

- PET (Quantitative)
- Image fusion QA
 - RTOG Lung 0238 in development



New Challenges for ATC Supported Clinical Trials

- **Adaptive Radiotherapy, Image-Guided Therapy
(Cone beam CT, Helical Tomotherapy)**
- **Daily Confirmation
and Adjustment**
 - On-Board Imaging
(EPID, Cone Beam
CT)

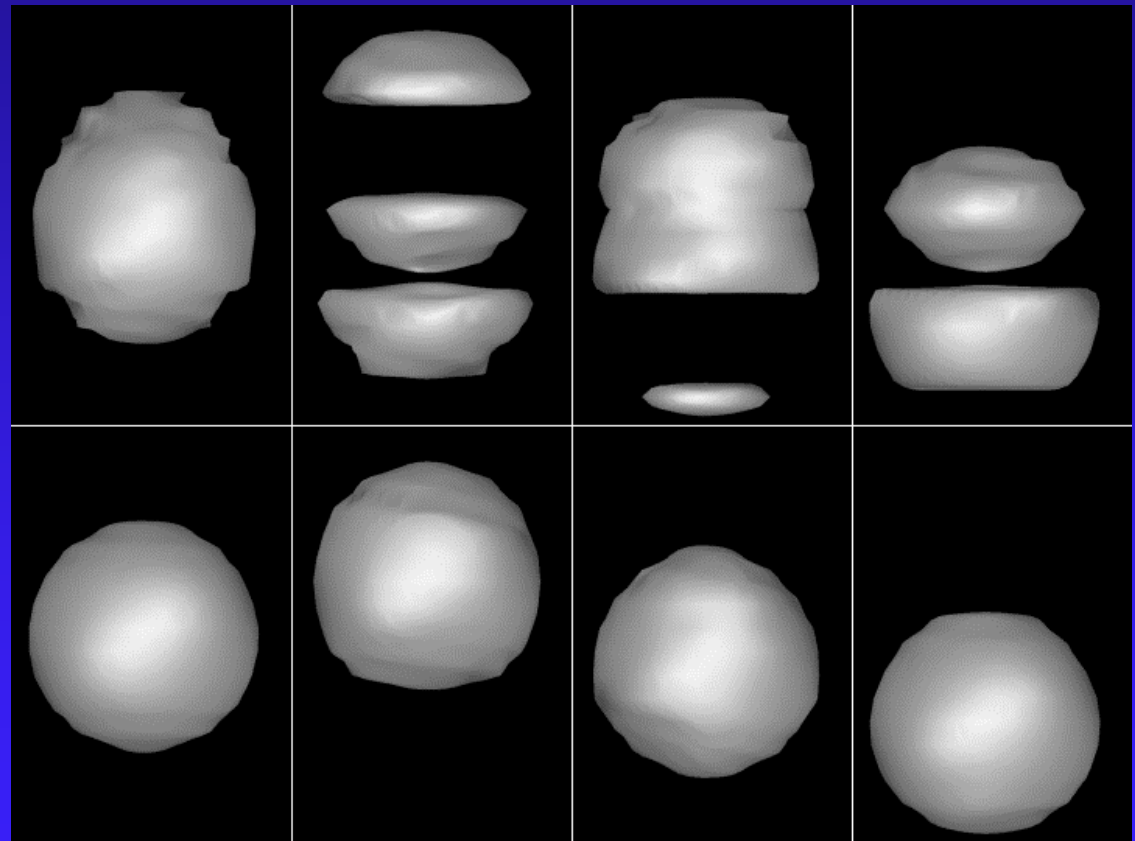


Elekta Synergy System

New Challenges for ATC Supported Clinical Trials

- 4-D CT (several 100 MB)

Moving Ball
“Light
Breathing”



New Challenges for ATC Supported Clinical Trials

- 4-D CT (several 100 MB)



ATC PRIORITIES

- **Developing Protocols (RTOG 236, RTOG 321, NSABP/RTOG 0414)**
 - Phantoms
 - Credentialing criteria
 - QA documents
 - ATC webpage
- **Development, testing, implementation ATC Method 2**
- **Use of ATC Method 1 by QARC/PBTC and QARC/COG**
- **Interface with other cooperative groups**

SUMMARY AND CONCLUSIONS

- **The ATC continues to pioneer the submission of digital data for clinical trials by fine-tuning the established Method 1 (FTP upload), while completing the development, testing, and deployment of Method 2 (WebSys secure upload to ATC Production Server).**
- **The ATC is working with RTP manufacturers and urging them to give the highest priority to implementing digital data submission capability on their systems.**

SUMMARY AND CONCLUSIONS

- ATC has provided RTOG the unique ability to conduct 3DCRT, IMRT, and prostate brachytherapy clinical trials in which volumetric 3D treatment planning digital data is collected, reviewed, analyzed, and linked to clinical outcomes
 - over 1700 data sets have been successfully submitted.
- ATC is now in a strong position to extend these capabilities to other cooperative-groups planning to conduct advanced-technology clinical trials.