

ITC Update

ATC Mini-meeting
RTOG Semi-annual Meeting
Tampa, Florida
January 14, 2010

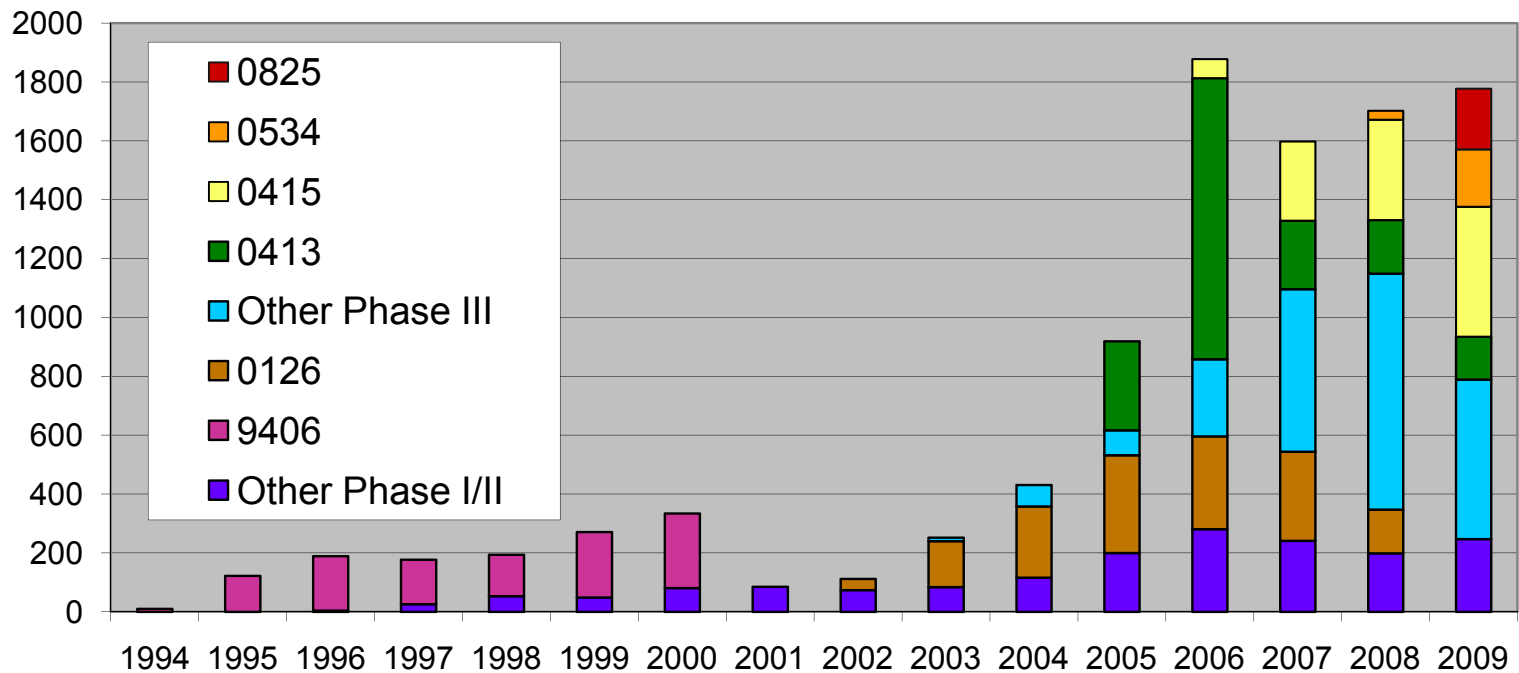
ATC Credentialing and QA Reports

- PDF copies of ATC Credentialing and QA Report have been posted to the ATC web site
 - IMRT Credentialing
 - IGRT Credentialing
 - Facility Questionnaires
 - External Reference Dosimetry Audits
 - Use of Protons (in preparation)

Protocol Case Submissions

- As of Sept. 21, 2009: 10,051 complete, protocol-case, volumetric digital datasets have been submitted using QuASA²R

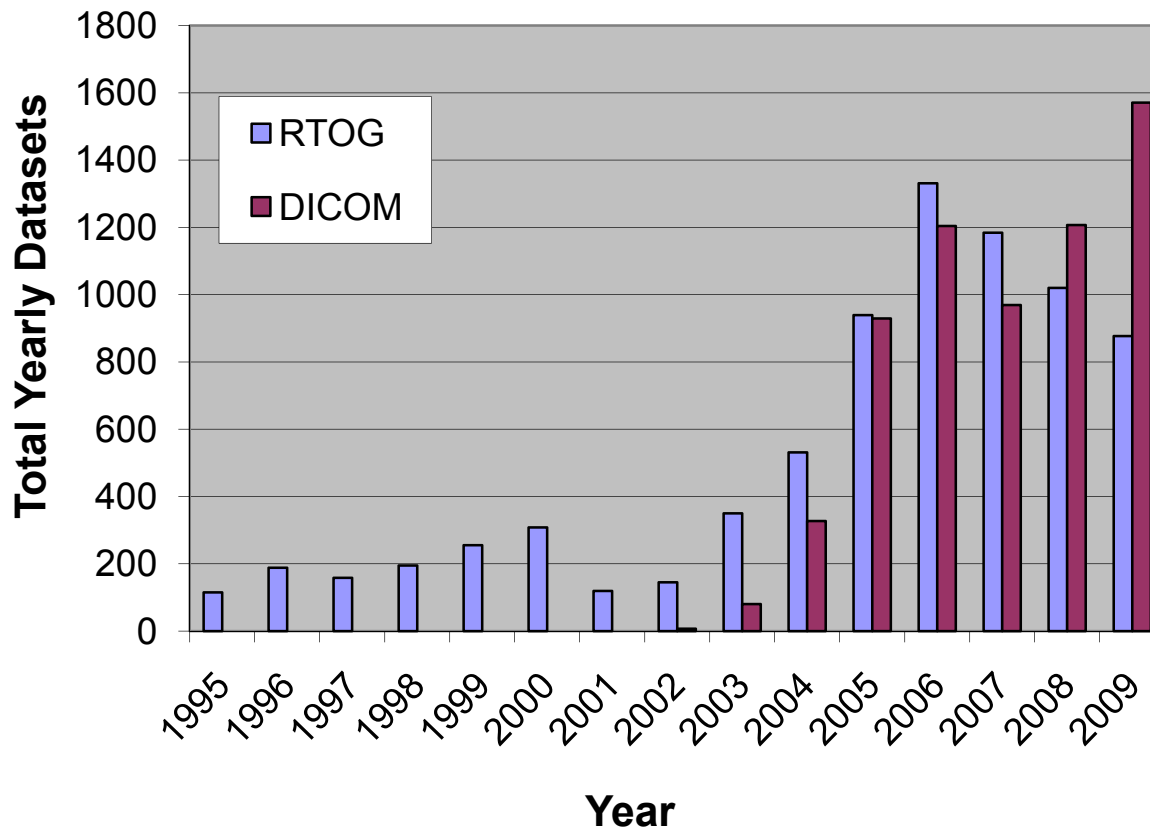
Annual Advanced-Technology Protocol Case Accruals



- 11 commercial TPS vendors (22 TPSs) have implemented ATC compliant export capability.
- 664 institutions able to submit digital RT data

Treatment Planning Data Formats

Format of Data Submitted to ITC



Approx 64% of data submissions are now in DICOM format.

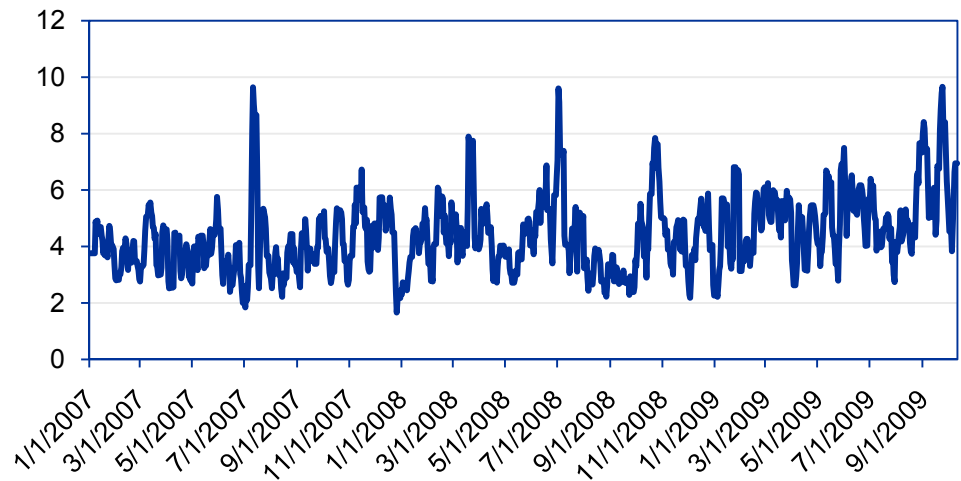
The proportion of DICOM datasets is expected to grow as updated TP systems with DICOM export are installed and older versions are no longer supported.

Datasets processed as of Dec. 31, 2009

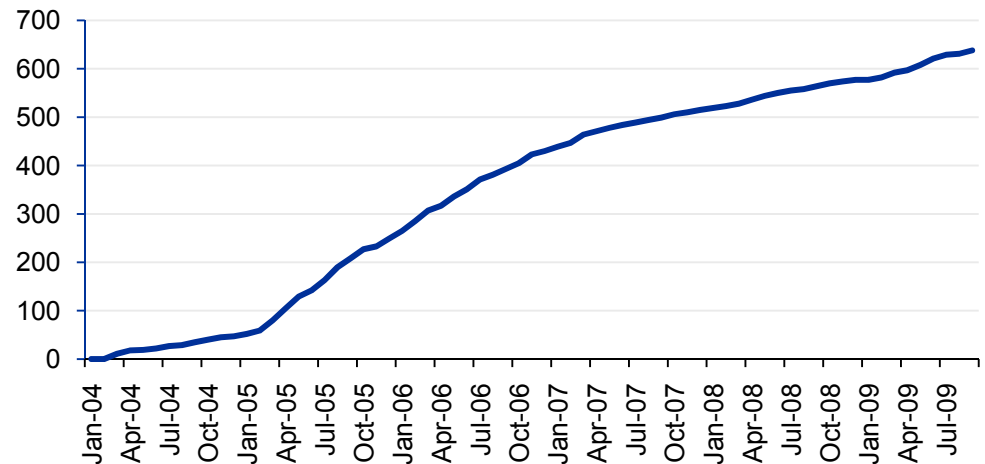
Data Submissions to ITC

- Approximately 6Gb of treatment planning and image data for advanced technology RT trials are uploaded to the ITC Secure FTP server each week.
- The ITC continues to create 60-70 new SFTP accounts per year.

SFTP Weekly Uploads to ITC (Gbytes)



SFTP Accts Created Since Jan 2004



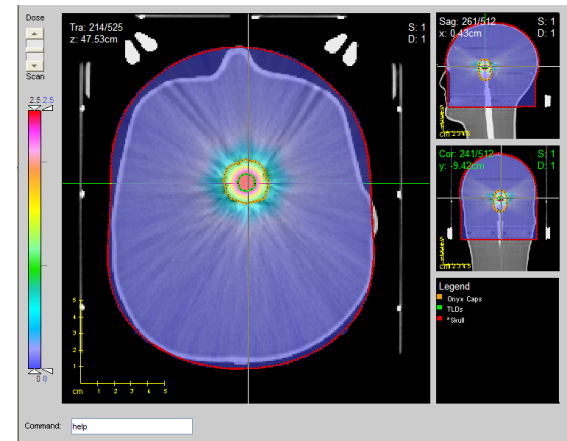
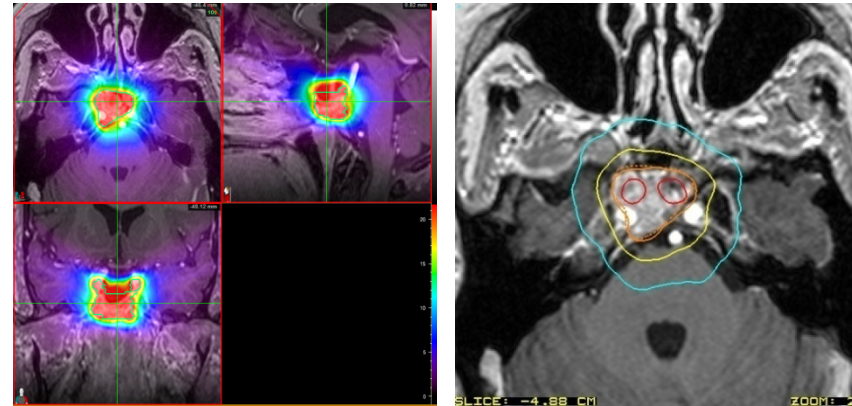
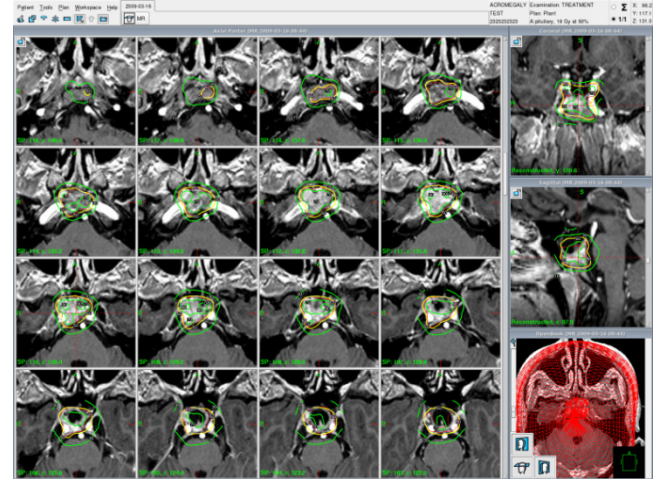
ITC Support of TP Vendor Data Export Development and Testing – 2009

- ATC Compliant TPS
 - Nucletron Oncentra HDR – 6/24/09
 - BrainLAB iPLAN – 7/23/09
- Vendor Complete TPS
 - Elekta GammaPlan 9.0 (pre-release) – 9/17/09
 - PlanUNC V6.8.11 – 5/27/09
- Work in progress
 - Nucletron Ultrasound for realtime prostate plans
 - Tomotherapy RT Dose corrected for FF scans

Vendor	System	Version ¹	Exchange Format	Treatment Modality				
				3DCRT	IMRT	Seed Brachy	HDR Brachy	Protons
Accuray	MultiPlan	1.5.2	D		✓			
BrainLAB	iPlan	4.1 ²	D	✓	✓			
Elekta	CMS Focus/XiO	3.1	R	✓	✓	✓		✓
	CMS XiO	4.3.1	D	✓	✓			
	RenderPlan 3D		R	✓				
	PrecisePlan	2.01	D	✓	✓			
Nomos	Corvus		R		✓ ³			
Nucletron	Helax TMS		R	✓	✓			
	TheraPlan Plus		R	✓				
	Oncentra MasterPlan	1.5	D	✓	✓			
		3.1	D	✓	✓		✓	
	PLATO RTS	2.62	D	✓				
	PLATO BPS	14.2.6	D				✓	
	SPOT-PRO	3.1-00	D			✓		
Philips	Pinnacle ³		R	✓	✓			
	Pinnacle ³	8.0h	D	✓	✓			
	AcqPlan	4.9	R	✓				
Prowess	Panther	4.41	D	✓	✓	✓		
Rosses Medical	Strata Suite CTPlan	4.0	R			✓		
RTek	PIPER	2.1.2	R			✓		
TomoTherapy	Hi-ART	3.0 ³	D		✓			
Varian	BrachyVision	6.5 (Build 7.1.67)	D				✓	
	Eclipse	7.1	D	✓	✓			✓
	VariSeed	7.1	D			✓		

Data Collection for SRS Protocols

- Collection of GammaPlan data for RTOG SRS protocol 0930
- Elekta is implementing DICOM export (CT, RTSS, RTDO) in GP 9.0, but the timetable for widespread clinical implementation is uncertain.
- In the interim, Elekta has made available to ITC software to enable conversion of GP datasets to DICOM:
 - GP 9.0 pre-release for GP 8.3.1 (.lgp) plans
 - Legacy Data Conversion Tool (LDCT 1.1) for GP 4.x and 5.x datasets
- GP 8.3.1 datasets have been converted successfully to DICOM
- R. Drzymala at WU has confirmed import of GP 4.x and 5.x legacy data
- Work is in progress to develop procedures for export and import of plan data from clinical sites.



ATC Efforts in Support of RT Data Exchange Standards

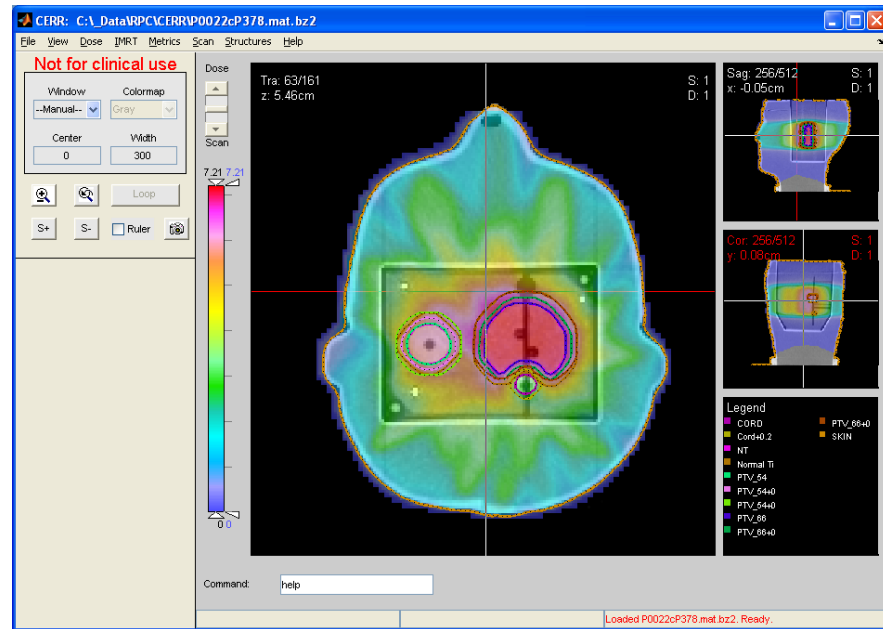
- DICOM – Working Group 7
 - Maintenance of current DICOM RT information object definitions
 - Development of second-generation RT objects
- IHE-RO
 - Define profiles for interoperable use of existing standards (e.g., DICOM)
 - Advanced RT Integration Profile – 2009 Connectathon
 - Dose Compositing Profile
 - Anonymization for Clinical Trials
 - Structure Template Creation, Import, and Export

ITC Support for RPC Phantom Dosimetry

- Since April 2008, 675 RPC phantom datasets have been processed by ITC for RPC Phantom Dosimetry Tests using the CERR and FilmQA tools.

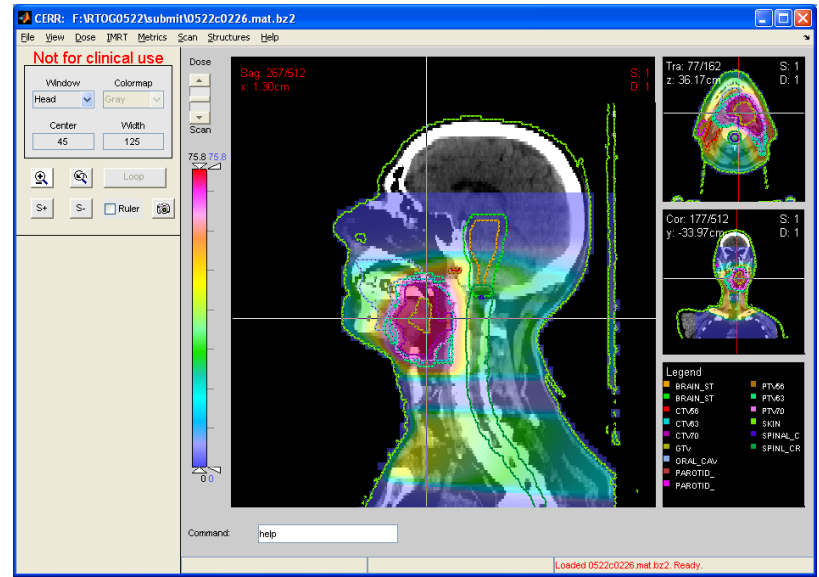
RPC Phantom	# Datasets
Head/Neck	384
Lung	182
Prostate	70
Spine	25
Liver	14

Datasets as of 1/6/2010



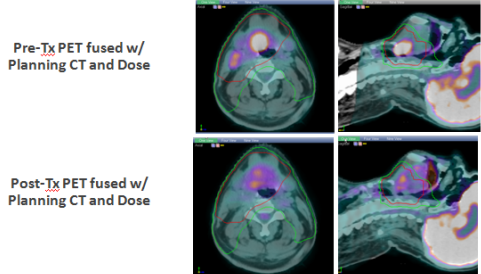
RTOG 0522/ACRIN 4500 NBIA Collection

- RTOG 0522 cases*
 - DICOM CT images, RT Structure Sets, RT Dose are uploaded to NBIA using MIRC/CTP
 - 83 cases uploaded, additional 13 are ready to upload
- ACRIN 4500 cases*
 - 103 cases with pre-RT PET
 - 93 cases with post-RT PET
 - 90 cases with pre- and post-RT PET



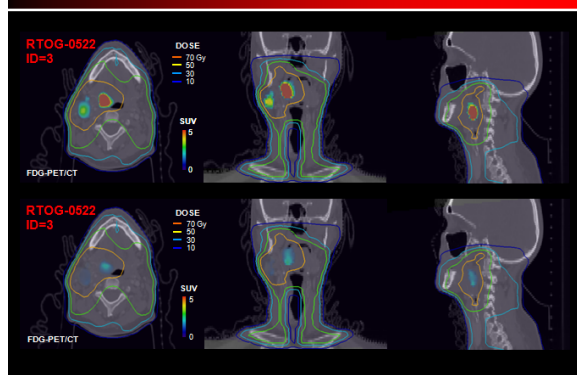
Therapy Response Assessment

Therapy response assessment using RT specific data with PET-CT pre-treatment and post-treatment images



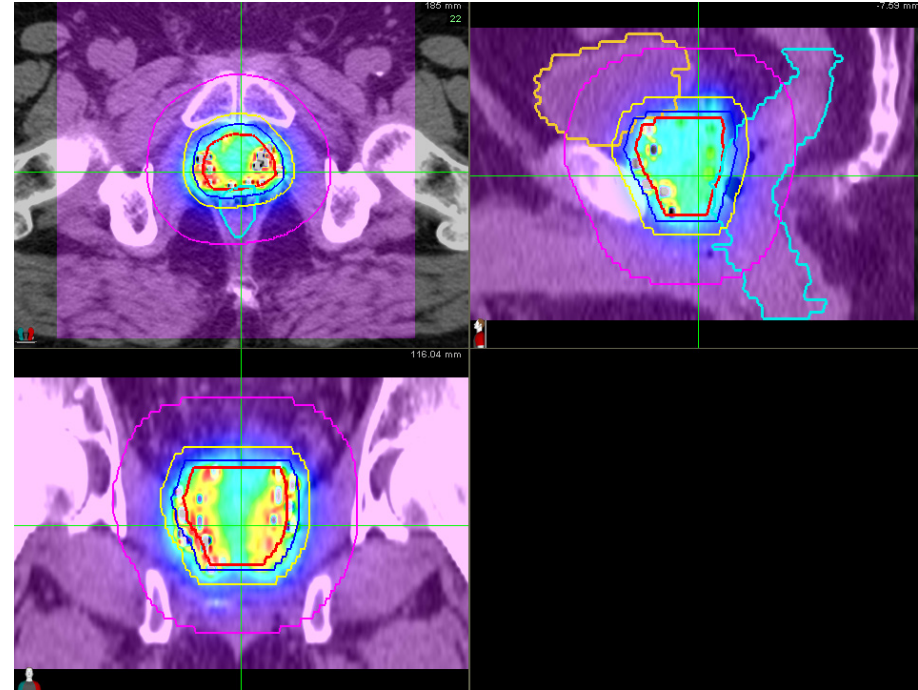
* Cases as of 1/12/2010

Pre and post-treatment FDG PET



VA Prostate Brachytherapy Dose Metrics Project

- RTOG statisticians selected representative cases from protocol 0232 with acceptable case QA scores.
- Contours for ETV, Bladder, and Rectum were reviewed at ITC
- Margins of 5, 10, 15, 20, 25, 30, 35, and 40mm were created around ETV.
- Dose-volume statistics were computed for Bladder, Rectum and Unspecified Tissue (i.e., ETV+40mm – Bladder – Rectum) at 0, 5, 10, 15, 20, 25, 30, and 35 mm outside ETV.
- RPC to confirm institutions were credentialed to participate



Uniform Structure Names

- Joint effort with RTOG Advanced Technology Integration Committee
- Base names for OAR derived from structure list used for RTOG advanced technology trials
- Indicate laterality for paired organs
- TV names include prescription dose
- PRV names include margin
- Current version (8/19/09) in use for RTOG protocols 0617, 0631, 0724, 0815, 0825, 0915, 0920

Uniform Structure Names for RT Clinical Trials

RTOG-ATIC / ATC

Uniform Tissue Names for Use in RTOG Advanced Technology Clinical Trials

Walter R. Bosch, D.Sc.

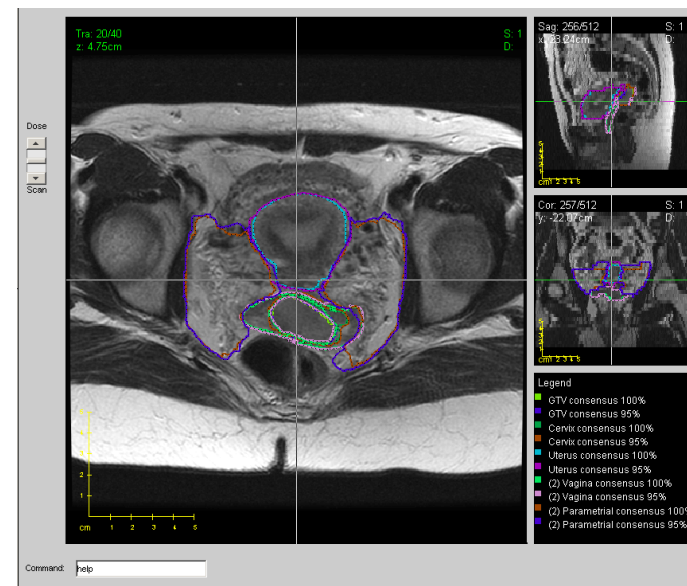
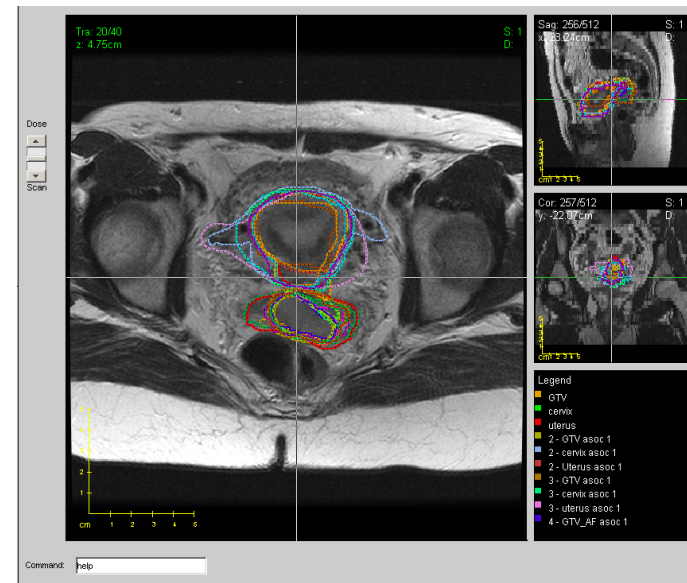
This document describes work in progress within the RTOG Advanced Technology Integration Committee (ATIC) and the Advanced Technology QA Consortium (ATC) to develop consistent nomenclature for structures used in radiation oncology treatment planning and plan review in ATC-supported clinical trials. Interest in and use of this information outside this scope is encouraged, but should acknowledge NCI U10 Grant CA021661 (RTOG) and U24 Grant CA081647 (ATC), which have supported this work.

Background

Consistent naming of contoured structures used in radiotherapy treatment planning is essential to facilitate the comparison of dose-volume statistics across patients for quality assurance and outcomes analysis. Maintaining consistency in structure names is particularly important (and challenging) in multi-institutional clinical trials, in which treatment planning data are collected from many participating institutions. Differences in treatment planning techniques and local languages are among the factors that contribute to variations in the names used to identify structures.

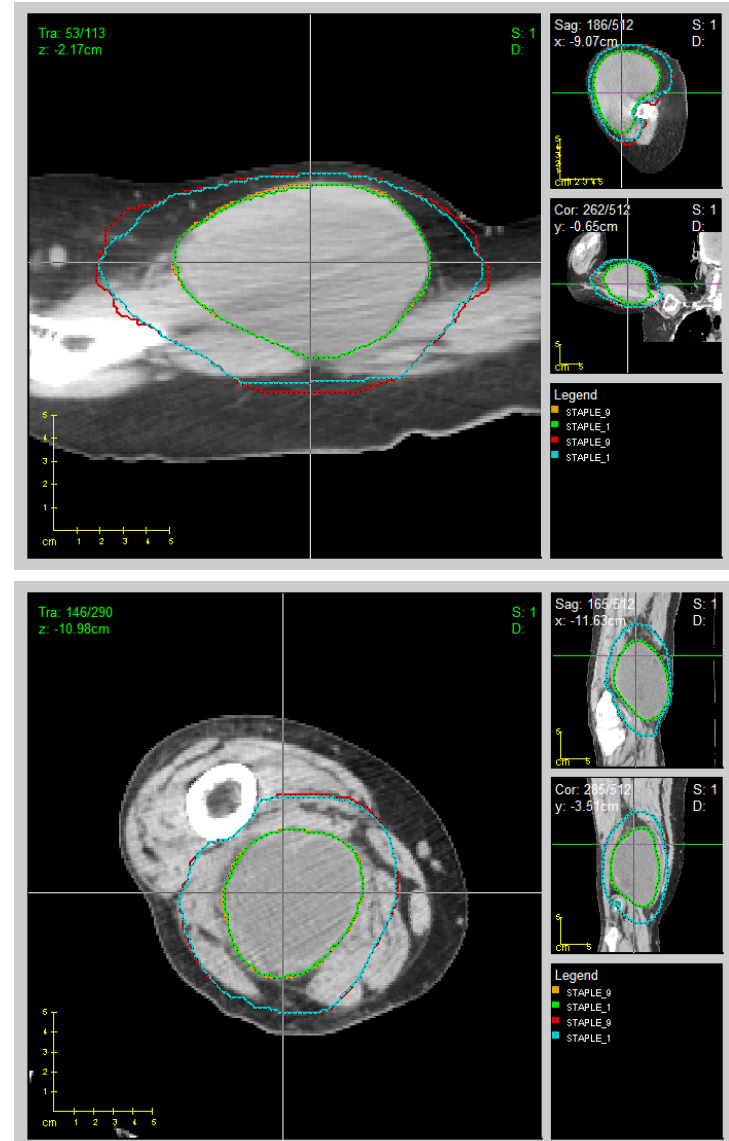
ATC Support for RTOG Consensus Contouring/ Image Segmentation Atlases

- Pelvic Lymph Node Volumes for Prostate Cancer
- Post-op Prostate Contours Atlas
- Anorectal Atlas
- GYN Atlas for CTV Delineation in Post-op Cervical and Endometrial Cancer (19 participants)
- **Normal Tissue Pelvic Atlas (male, female datasets, 16 participants)**
- **Sarcoma Atlas (upper, lower extremity datasets, 10 participants)**
- **Pancreas Consensus / Atlas (RTOG 0848)**



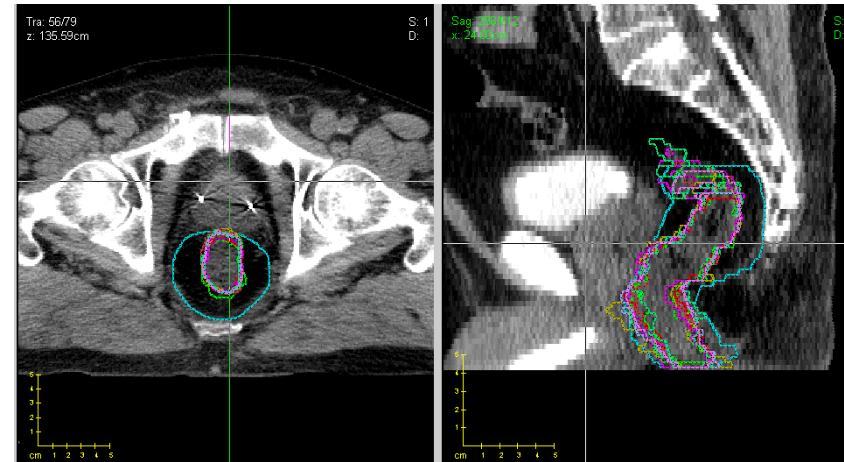
Sarcoma Atlas (RTOG 0630)

- Sets of simulation CT images and MRI images of the extremity sarcoma from two anonymous cases were prepared for download from the ATC web server.
- The GTV and CTV were contoured by 10 radiation oncologists from 8 participating institutions
- The contours and the image series used for contouring were then sent back to the ITC for analysis
- Consensus contours for the two CT image sets were computed using the STAPLE algorithm (El Naqa, Al-Lozi at WU) for review by the radiation oncologists participating in this project

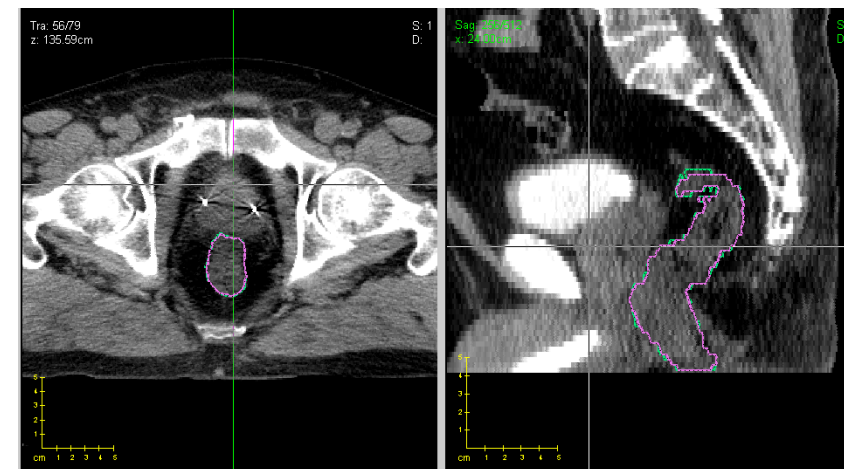


Normal Tissue Atlas (Male, Female Pelvis)

- Sets of simulation CT images for anonymous male and female pelvis cases were prepared for download from the ATC web server.
- The normal tissue structure were contoured by 16 radiation oncologists from 11 participating institutions
- The contours and the image series used for contouring were then sent back to the ITC for analysis
- Consensus contours for the two CT image sets were computed using the STAPLE algorithm (El Naqa, Al-Lozi at WU) for review by the radiation oncologists participating in this project



Anorectum (MP): merged contours

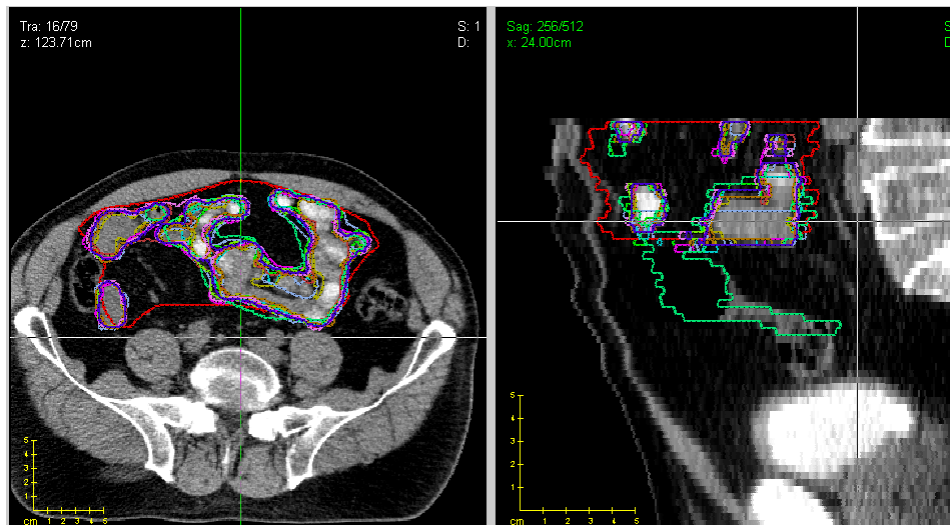


Anorectum (MP): STAPLE contours

Normal Tissue Atlas (Male, Female Pelvis) (2)

- Male Pelvis

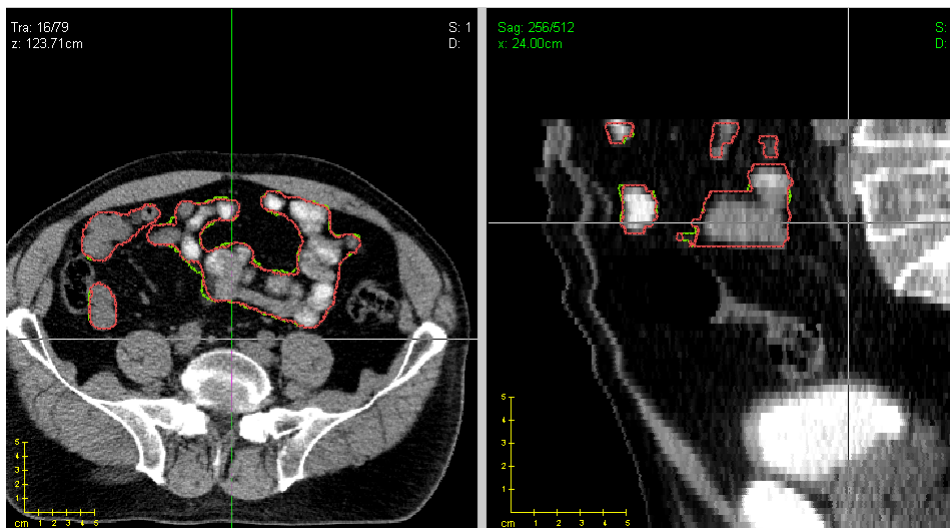
- Anorectum
- Anus
- Bladder
- Large Bowel
- Small Bowel
- Femurs
- Prostate
- Penile Bulb
- Seminal Vesicles
- Rectum



Small Bowel (MP): merged contours

- Female Pelvis

- Anorectum
- Anus
- Bladder
- Large Bowel
- Small Bowel
- Femurs
- Cervix
- Ovaries
- Uterus
- Rectum



Small Bowel (MP): STAPLE contours

QRRO Prostate Seed Implant Project Update

- 50 seed plan datasets from 11 centers uploaded to ITC as of 1/1/2010.
- 37 cases have been prepared for referee re-contouring, seed localization, and dose re-calculation.
- Spreadsheet on QRRO sharepoint tracks status of submitted datasets.

