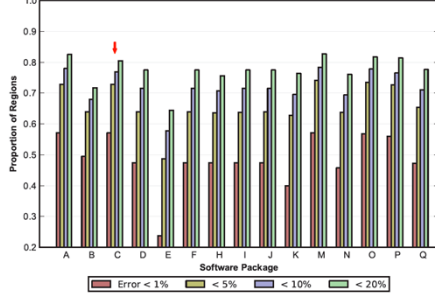


PDF Technical Committee Update

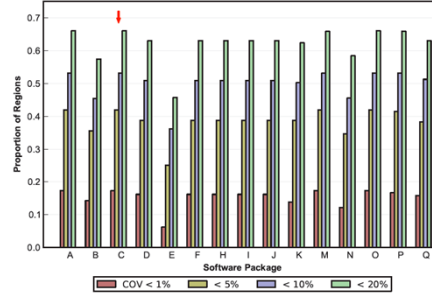
- Phase I Project Updates
- **DCE-MRI Phantom Project (Jackson)**
 - NCE through 12/2013 allowed purchase of four additional copies of the phantom. (Total of 8 QIBA DCE-MRI phantoms)
 - **Status:** All eight copies have been received. One copy provided to UPenn/ACRIN for site qualification for Phase II project.
- **Digital Reference Object Project (Barboriak)**
 - DCE-MRI signal intensity curves corresponding to varying k^{trans} , v_e , v_p , and k_{ep} values (with varying S_0 values, sampling interval, jitter, noise)
 - T1 mapping data with varying T1 and equilibrium magnetization values (with and without added noise)
 - **Status:** DROs completed. Data from results of T1 calculations from 15 different packages received and analyzed. Draft results report developed and reviewed/approved by PDF TC in Jan 2013

QIBA T1 Digital Reference Object

Proportion of Regions with Percent Error in R1 < 1%, 5%, 10%, and 20%, Noisy Data (Fig. 2)



Proportion of Regions with COV in R1 < 1%, 5%, 10%, and 20%, Noisy Data (Fig. 13)



From 15 software packages computing T1 from VFA data

Source: Barboriak Lab QIBA_T1_v03_beta1C

Sample Report Figure 2 (also evaluated: bias-median %, % low & high outliers, etc.)

January 2013

3



PDF Technical Committee Update

- Phase I Project Updates
- DCE-MRI Phantom Data Analysis Project (Ashton)
 - **Status:**
 - Version 3 of software release expected soon (to address Siemens and Philips data scaling / format issues)
 - Excel workbook created to import data analysis output from program and generate automated reports

January 2013

4



PDF Technical Committee Update

- DCE-MRI Profile 1.0

- Completed through “Publicly Reviewed Version” phase and posted

- Claim:

Quantitative microvascular properties, specifically transfer constant (K^{trans}) and blood normalized initial area under the gadolinium concentration curve ($IAUGC_{\text{BN}}$), can be measured from DCE-MRI data obtained at 1.5T using low molecular weight extracellular gadolinium-based contrast agents within a 20% test-retest coefficient of variation for solid tumors at least 2 cm in diameter.

PDF Technical Committee Update

- DCE-MRI Profile 1.0: Test phase (Phase II Project)

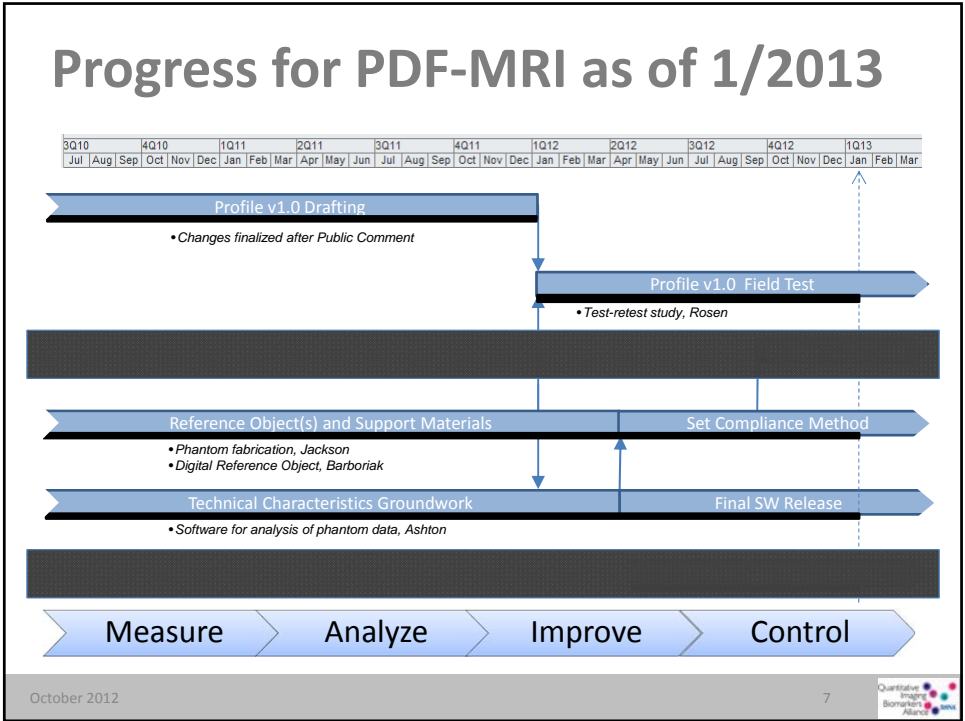
- Goals:

3-yr deliverable #1

- Determine the test-retest performance, as assessed by the coefficient of variation, of the median pixel values of K^{trans} and $IAUGC_{\text{bn}}$ using the whole prostate as the target “tumor”.
- Determine the test-retest performance, as assessed by the coefficient of variation, of the median pixel value of ADC using the whole prostate as the target “tumor”. (Includes “coffee break” DWI acquisition.)

- Status:

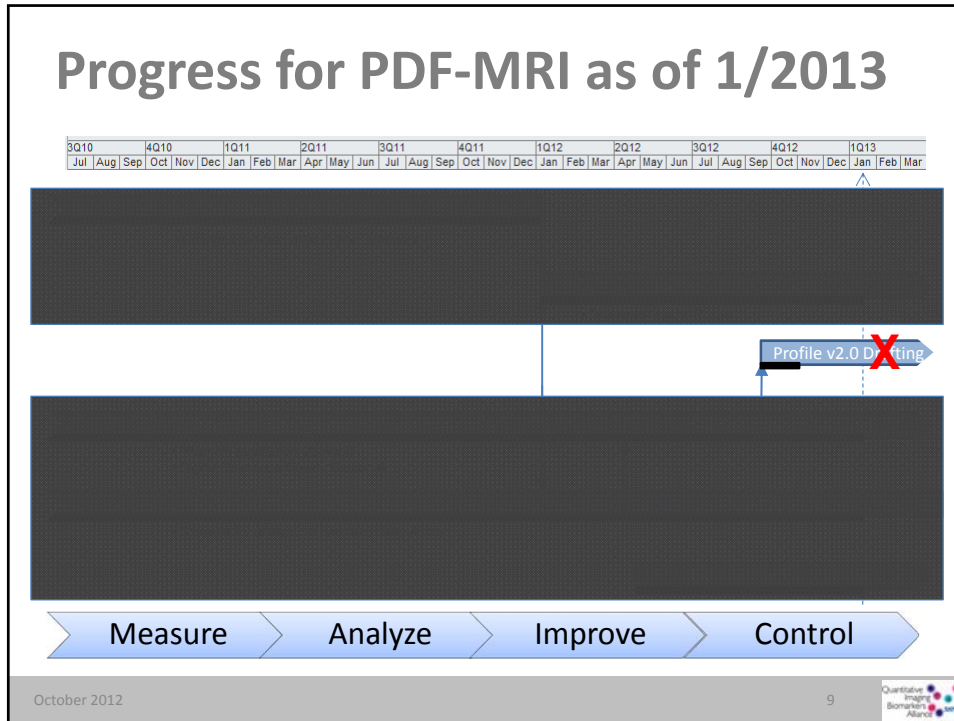
- ACRIN 6701 protocol approved and activated (PI: Mark Rosen, UPenn)
- UPenn approved as first site (DCE and DWI phantom scans)
- Additional accrual sites now being identified and phantoms distributed for site qualification process



3.0T DCE-MRI Profile

- Original Goal 3-yr deliverable #2
 - Profile draft beginning 3Q12
 - Contingent upon funding for groundwork projects
- Status
 - On hold

January 2013 8



PDF Technical Committee Update

- DW-MRI Profile 1.0: Development phase
- Status: 3-yr deliverable #3
 - No funding available for proposed groundwork projects
 - Literature review and reporting (by anatomic region) nearing completion
 - Draft claim statements established (next slide)
 - Interactions with EORTC Innovative Medicines Initiative QuIC-ConCePT (Quantitative Imaging in Cancer: Connecting Cellular Processes with Therapy) group to harmonize efforts
- Next Steps:
 - Complete literature review and finalize claim statements
 - Profile draft completion based on literature
 - Groundwork projects (if funding available), otherwise proceed with more limited scope of work

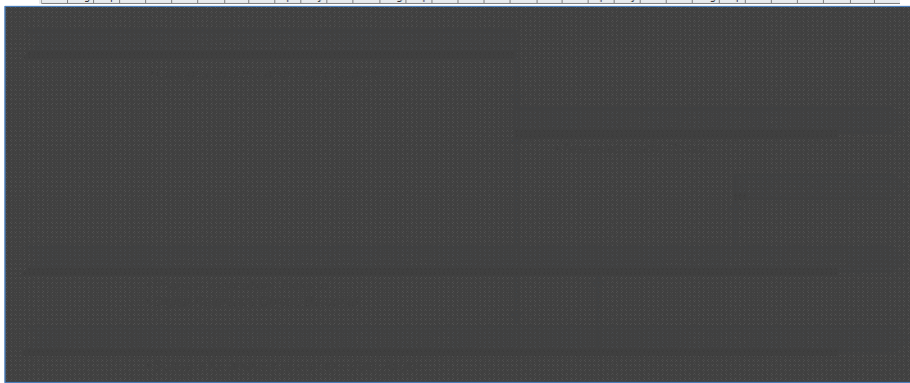
January 2013 10

PDF Technical Committee Update

- DW-MRI Profile 1.0: Development phase
- Draft claims:
 - At isocenter, ADC measurements of an ice water phantom should exhibit bias of $\leq 5\%$ of the gold standard value of $1.1 \times 10^{-9} \text{ m}^2/\text{s}$, regardless of coil type and field strength.
 - When acquiring ADC values in solid tumors greater than 1 cm in diameter or twice the slice thickness (whichever is greater), one can characterize *in vivo* diffusion with $\leq 15\%$ test/retest coefficient of variation.

Progress for PDF-MRI as of 1/2013

3Q10			4Q10			1Q11			2Q11			3Q11			4Q11			1Q12			2Q12			3Q12			4Q12			1Q13		
Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar



DWI Profile V1.0 Drafting



PDF Technical Committee Update

- Quantitative Imaging Data Warehouse Project
- Originally Proposed Timelines 3-yr deliverable #4
 - Provide DCE-MRI phantom data as first use case by Q3/2012
 - **Status:** Complete
 - Performance test of data warehouse based on phantom data by Q4/2012
 - **Status:** Complete (single user: second upload / download of phantom data completed 12/2012; metadata upload & test of preliminary database features)
 - Provide DCE digital reference objects as second use case by Q4/2012
 - **Status:** Ongoing (Agreement from owners of DCE-DRO and FDG-PET DRO for data use. Approvals obtained for test loads. Awaiting database modifications before uploads and testing.)

January 2013

13



PDF TC – Gaps

- **DCE-MRI Profile 1.0**
 - Final compliance criteria for phantom data
 - Final compliance criteria for digital reference object data results (T1 and DCE)
 - Each of the above would be facilitated by a more complete understanding of overall QIBA compliance strategy / policy
- **DCE-MR Profile 2.0 (3.0T)**
 - Ground work projects (require funding)
- **Full scope of DW-MR Profile 1.0**
 - Ground work projects (require funding)

January 2013

14



Projects on Hold Pending Receipt and Award of Funding

January 2013

15



3.0T DCE-MRI Profile

- 3.0T DCE-MRI Profile (2) Groundwork Projects
 - a) Project 1: Acquisition of T1 maps with various flip angles utilizing the QIBA DCE-MRI Phantom and 1.0T, 1.5T, and 3.0T scanners in order to provide basic information of the impact of parallel imaging and B1 field inhomogeneity correction at different field strengths and for different vendors.
 - b) Project 2: Development of analysis software with the following functionality:
 - a) Import 2D/3D-DICOM, binary, and image format data from DCE-MRI analysis tools
 - b) Create difference and ratio maps of results
 - c) Create scatter diagrams and correlation analysis of parameters
 - d) Apply a linear and a logarithmic model to compare the results
 - e) Create PDF and Excel export to document the comparisons

January 2013

16



DW-MRI Profile Project

- **DW-MRI Profile Groundwork Projects**
 - a) Project 1: a) Design and construct a minimum of four copies of an ADC phantom that incorporates a spread of ADC values and temperature control via ice water, b) standardization of the imaging protocol for use in the DW Profile, c) acquisition of data from multiple sites, and d) public distribution of these designs and data.
 - b) Project 2: Software development for analysis of the QIBA DW-MRI phantom data.

PDF TC – 2-year plan

- **DCE-MRI Phase I Projects**
 - Final compliance criteria for phantom data
 - Final compliance criteria for digital reference object data results (T1 & DCE)
- **DCE-MRI Profile 1.0 Test Phase (Phase II Project)**
 - First patient accrual / scan: Q1/2013
 - Completion of data acquisition: Q4/2014
 - Completion of data analyses: Q2/2015
- **DW-MR Profile**
 - Profile draft completed: Q3/2013
 - Public review completed: Q1/2014
 - Test phase completed: Q1/2015
- **QI Data Warehouse**
 - Pilot data upload / testing complete: Q3/2013