Quantitative Imaging Biomarker Alliance

Quantitative Imaging Biomarkers Alliance RSNA

QIBA MR Committee

Gudrun Zahlmann

MR-TC co-chair

PRINCIPAL LOGISTICAL AND FINANCIAL SUPPORT PROVIDED BY RSNA

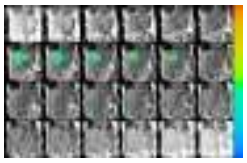
Where it all started - 2008

- DCE-MRI is not routine standard of care, but increasingly used clinically
- Current radiological practice is not quantitative
- Manufacturers have different implementations of pulse sequences that result in wide range of contrast response characteristics
- Manufacturers have nothing with which to compare
- Economic challenge to manufacturers in supporting clinical trial applications vs clinical routine
- Economic challenge to manufacturers in clinical trials vs clinical routine

- DCE-MRI is used in early phase clinical studies
- There is increasing interest in clinical use as well
- The diversity in technical solutions will remain due to the lack of economic benefits to the vendors. The task is to come up with solutions to harmonize image biomarker results across vendors.
- Image quality is a major issue for all quantitative imaging
- Manufacturers are focusing on technology not biological validation. We have to deal with it for almost all exploratory types of activities.

Definition of work items on DCE-MR

- If we want to use K^{trans} as a quantitative measure in a multicenter trial,how can we assure quality and comparable quantitative results? => profile
- Phantom study
  - Understand phantom landscape and practical issues
  - Understand DCE-MRI imaging protocol across different manufacturers' scanners for comparable results
  - Understand the problem space with regard to (protocol)



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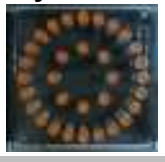
DCE-MR work streams

- Literature review
- Main result: Profile
  - Based on literature evidence define a claim on ktrans and IAUGC
  - Describe in detail how the claim can be fulfilled in a clinical trial setting
- Identified gaps → 'groundwork' projects on:
  - Phantom design and testing
  - Phantom analysis software



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DCE-MR Workstream continued

- Profile writing process was refined while going forward and getting more experienced
  - Writing is done by a smaller group of committee members
  - Committee enlarge excellent for first committee reviews
  - After reaching committee consensus 'public comment' period started with pre-identified international experts
  - Groundwork projects ongoing in parallel

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DCE-MR Workstream continued

- Publicly reviewed profile published 13 December 2011
- New groundwork project needs were identified:
  - Phantom and adjustment of analysis software with final outcome of a report
  - Introduction of concept of 'Digital Reference Objects' to simulate parameter ranges and resulting images to test DCE analysis software
  - Clinical test - retest
  - Need identified to have a central data repository for pahntom data, DROs

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DCE-MR Workstream continued

- What do we have now for DCE-MR?
  - Publicly reviewed profile
  - Tested phantom (technical validation, clinical validation)
  - Phantom analysis software
  - DROs
  - Data repository
- How can this be used practically – compliance to DCE-MR profile

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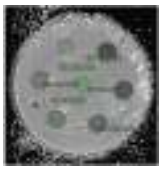
From DCE-MR to PDF-MR

- Anti-angiogenic drugs and other targeted therapies led to questions regarding MoA that go beyond perfusion
- Committee decision to investigate DWI – MR due to clinical care as well as clinical trial needs
- Renaming DCE-MR into PDF MR committee
- DWI work based on DCE-MR experience
  - Literature search
  - Profile drafting
  - Ground work projects (same concepts)



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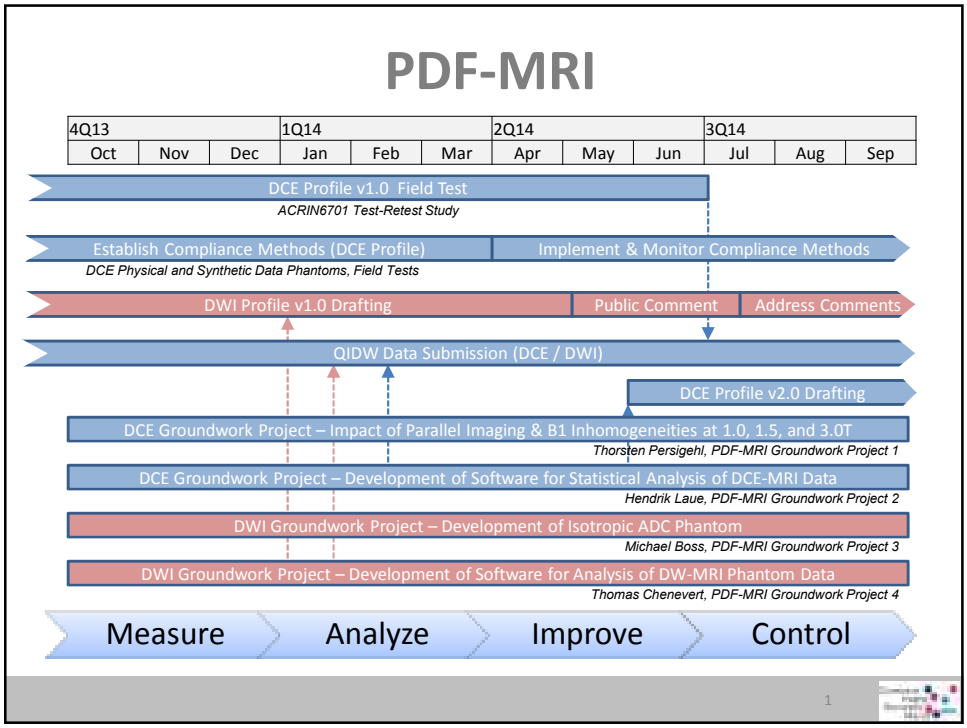
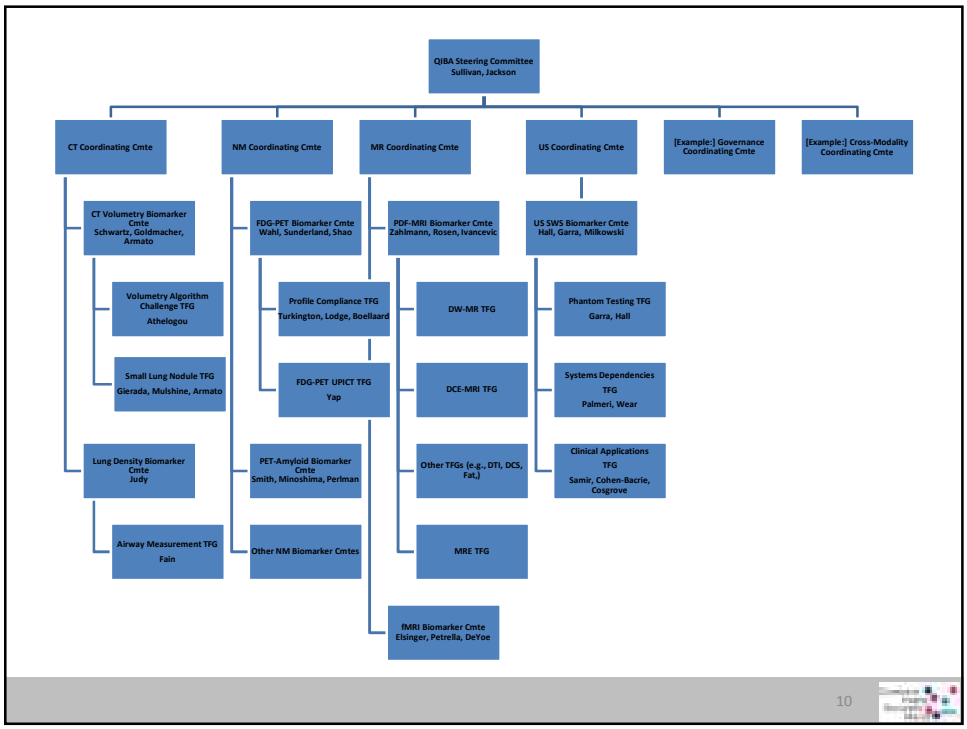

PDF-MRI
4Q13
Oct
Nov
Dec
1Q14
Jan
Feb
Mar
2Q14
Apr
May
Jun
3Q14
Jul
Aug
Sep
DCE Profile v1.0 Field Test
ACRIN6701 Test-Retest Study
Establish Compliance Methods (DCE Profile)
Implement & Monitor Compliance Methods
DCE Physical and Synthetic Data Phantoms, Field Tests
DWI Profile v1.0 Drafting
Public Comment
Address Comments
QIDW Data Submission (DCE / DWI)
DCE Profile v2.0 Drafting
DCE Groundwork Project – Impact of Parallel Imaging & B1 Inhomogeneities at 1.0, 1.5, and 3.0T
Thorsten Persigehl, PDF-MRI Groundwork Project 1
DCE Groundwork Project – Development of Software for Statistical Analysis of DCE-MRI Data
Hendrik Laue, PDF-MRI Groundwork Project 2
DWI Groundwork Project – Development of Isotropic ADC Phantom
Michael Boss, PDF-MRI Groundwork Project 3
DWI Groundwork Project – Development of Software for Analysis of DW-MRI Phantom Data
Thomas Chenevert, PDF-MRI Groundwork Project 4
Measure
Analyze
Improve
Control
1


QIBA Steering Committee
Sullivan, Jackson
CT Coordinating Cmte
NM Coordinating Cmte
MR Coordinating Cmte
US Coordinating Cmte
[Example:] Governance Coordinating Cmte
[Example:] Cross-Modality Coordinating Cmte
CT Volumetry Biomarker Cmte
Schwartz, Goldmacher, Armato
FDG-PET Biomarker Cmte
Wahl, Sunderland, Shao
PDF-MRI Biomarker Cmte
Zahlmann, Rosen, Ivancevic
US SWS Biomarker Cmte
Hall, Garra, Milkowski
Volumetry Algorithm Challenge TFG
Athelogou
Profile Compliance TFG
Turkington, Lodge, Boellaard
DW-MR TFG
Phantom Testing TFG
Garra, Hall
Small Lung Nodule TFG
Gierada, Mulshine, Armato
FDG-PET UPICT TFG
Yap
DCE-MRI TFG
Systems Dependencies TFG
Palmeri, Wear
Lung Density Biomarker Cmte
Judy
PET-Amyloid Biomarker Cmte
Smith, Minoshima, Perlman
Other TFGs (e.g., DTI, DCS, Fat,)
Clinical Applications TFG
Samir, Cohen-Bacrie, Cosgrove
Airway Measurement TFG
Fain
Other NM Biomarker Cmtes
MRE TFG
fMRI Biomarker Cmte
Elsinger, Petrella, DeYoe
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