

## QIBA Dynamic Contrast-Enhanced (DCE) MRI Biomarker Committee (BC) Call

Monday, December 7, 2020 at 11 am (CST)

### Call Summary

#### In attendance

Caroline Chung, MD (Co-Chair)

Hendrik Laue, PhD (Co-Chair)

Bihong (Beth) T. Chen, MD, PhD

Thomas Chenevert, PhD

Todd Jensen, PhD

Cristina Lavini, PhD

Krishna Nayak, PhD

Nancy Obuchowski, PhD

Russell Rockne, PhD

Prativa Sahoo, PhD

Mark Shiroishi, MD

Divya Yadav, MD

#### RSNA staff

Joe Koudelik

Susan Stanfa

**Moderator:** Dr. Laue

#### Update on DCE-MRI Profile

- The DCE-MRI BC and MR CC votes-to-release the Profile for public comment passed successfully on Nov. 10 and Nov. 20
  - The Profile will be released for public comment pending correction to discrepancies in the Claim values
- In response to Dr. Obuchowski's suggestions, Dr. Laue adjusted Ktrans true change values for brain and prostate in the Clinical Interpretation section
- Once the final Stage 1: Public Comment version is sent to staff, it will be published on the [Profiles page](#) of the QIBA Wiki and distributed for public comment

#### December 10, 2020 QIBA Working Meeting Preparation of Presentation Slides

- An update will be provided on the status of the DCE-MRI Profile
- Dr. Laue to follow up with Dr. Russek (NIST) regarding the [NIST Phantom-lending library](#)
- Dr. Nayak provided the following DCE-MRI BC member publication citation for reference during the MR Coordinating Cmte report: Bliesener Y, Zhong X, Guo Y, Boss M, Bosca R, Laue H, Chung C, Sung K, Nayak KS. [Radiofrequency transmit calibration: A multi-center evaluation of vendor-provided radiofrequency transmit mapping methods](#) (March 2019)

#### New DCE-MRI BC Members

- Divya Yadav, MD, is currently a Resident in the Nuclear Medicine Program at All India Institute of Medical Sciences and will be joining Dr. Chung's lab at the University of Texas, MD Anderson Cancer Center in Jan 2021
- City of Hope National Medical Center: Division of Mathematical Oncology
  - Russell C. Rockne, PhD is an Assistant Professor in the Department of Computational and Quantitative Medicine within the Beckman Research Institute; specializes in conducting patient-specific mathematic modeling for predicting responses to radiation therapy
  - New Radiologist, Bihong (Beth) T. Chen, MD, PhD
  - Postdoctoral Fellow, Prativa Sahoo, PhD

#### GBM Test/retest Analysis Presentation (Dr. Rockne)

- During the November 23 DCE-MRI BC meeting, there was a discussion regarding the difficulty of acquiring DCE-MRI test-retest data and Dr. Rockne had offered to share his research
- Due to the dearth of literature and lack of access to vendor-specific B1-mapping sequences, B1 correction was omitted as a DCE-MRI Profile requirement, however:

- Vendors may eventually make it possible for all to perform B1 correction, and the Profile would be updated with related information
- If test-retest data are published in the future, Profile requirements will be revisited
- This project was a collaborative effort with Russell Rockne, PhD; Beth (Bihong) Chen, MD, PhD; Prativa Sahoo, PhD; Ryan Woodall, PhD and Mark Shiroishi, MD (Division of Mathematical Oncology at City of Hope National Medical Center, Duarte, CA)
- Study Goals included:
  - Comparison of two models: Extended Tofts (eTM) vs. Leaky Tracer Kinetic Model (LTKM)
  - Determine test/retest repeatability and reproducibility of DCE-MRI parameters in primarily brain tumors to evaluate response to cell-based therapies
  - Currently working on CAR-T therapies, where DCE-MRI is used to measure permeability, leakage, and plasma volume fraction, *response to treatment*
  - Determine the change required between scans to confidently say two parameters are measurably different due to *physiological changes*, not system or process variability
  - 30 patients studied, each with two scans done 1-5 days apart
- Mamanov AB, Kalpathy-Cramer J. (2016) Data from QIN GBM Treatment Response. [Cancer Imaging Archive](#). DOI: [10.7937/k9/tcia.2016.nqf4gpn2](#)
- Results:
  - If the model, AIF, and fit criteria are fixed:
    - Among all parameters,  $V_p$  is the lowest source of variability
    - The LTKM is slightly more stable across all parameters
    - Conservative rule of thumb of +/-20%
  - Of 30 patients studied: B1 field (6 patients), Motion (2 patients), Small lesion (7 patient, less than 1000 voxels shows a good fit)
  - Similar number of fit voxels ("size") for both of the models
  - Greater variability with manual AIF as compared to automatic AIF
  - Will benchmark models/implementations with synthetic DCE
- QIBA DCE-MRI BC feedback and input were requested on the following
  - Whether models should be directly compared, and whether multiple should be reported in a study
  - What to do about B1 field inhomogeneity
  - Other considerations proposed by DCE-MRI BC members were patient weight, RF pulse shape, motion correction, synthetic data with  $v_p$
- Discussion regarding a scanner option to disable behind-the-scenes changing of imaging parameters; this may be difficult for vendors to implement due to software complexities
- The DCE-MRI BC is eager to receive public comments from vendors
- Dr. Rockne to follow up with Dr. Lavini offline; Dr. Laue will also follow up with Drs. Lavini and Rockne

**Next call:** Monday, December 21, 2020 at 11 am (CT)

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