QIBA sub-award (8A) -- Duke University Medical Center

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Project title: Digital Reference Object for DCE-MRI Analysis Software Verification

Progress on 3 month milestones:

- We have successfully produced a draft version of a simple paths model DRO. This data set was released on September 29, 2011. K^{trans} parameters ranging from 0.01 -- 0.2/min and v_e values ranging from 0.01 -- 0.5 are represented in the test data set. The DRO can be downloaded here: https://dblab.duhs.duke.edu/modules/QIBAcontent/index.php?id=1
- A draft version of the T1 mapping DRO has been created in the lab, with release date estimated before the end of October, 2011. In order to make the synthetic data relevant for validation of software used in the DCE-MRI phantom project, Ed Jackson, PhD was consulted to obtain a reasonable range of parameter values to simulate. In its current iteration, the DRO simulates R1 (1/T1) from 0.3536 -- 45.25483 sec^{-1} and a range of equilibrium magnetization from 500 to 50,000.

Progress on 6 month milestones:

- Early in our evaluation of the dcemriS4package (http://dcemri.sourceforge.net/), we found that the software did not properly handle image time point intervals that were not whole numbers. We consulted with Brandon Whitcher and Volker Schmid of the dcemriS4 project, and they provided updated software which solves this problem. We have begun the process of further evaluation of the dcemriS4package using the synthetic data set.

Progress on 12 month milestones:

- The outline of extension of DCE MRI simulations was discussed during a teleconference on September 29, 2011. The general outline of verification protocols was also discussed.
- The possibility of including data from our simulations in the TCIA (The Cancer Imaging Archive, http://cancerimagingarchive.net/) was discussed with John Freymann from NIH/NCI.

Other progress:

- In keeping with the open science design of the project, we have released not only draft DROs but also the software instructions used to derive the objects. The website that hosts this data (https://dblab.duhs.duke.edu/modules/QIBAcontent/index.php?id=1) is no longer password protected and available to the public.

- With the help of RSNA staff, we engaged in a successful teleconference regarding the project on September 29, 2011 which included not only members of QIBA but also members of the image analysis software industry, ACRIN, FDA, and the Quantitative Imaging Network (QIN) of the NCI and solicited recommendations for various issues. Slides presented during this teleconference are available here:
  http://qibawiki.rsna.org/images/2/2d/Synthetic_data_presentation_20110929_redact.pdf
- We created a Google Groups site at http://groups.google.com/group/qiba_dcemri_dro?hl=en to facilitate discussion of the DRO project.
- We are in discussions with Mehdi Adineh, Ph.D. from the Imaging Core Lab of ACRIN about the possibility of using the simple Tofts model DRO to test software which is currently resident on-site at the core lab.