QIBA fMRI Reproducibility Subcommittee Update
February 1, 2011
11 am CST

Draft Call Summary

In attendance:		**RSNA:**
James T. Voyvodic, PhD (Chair)	Laura Rigolo, MS	Joe Koudelik
Andrew Buckler, MS	Daniel C. Sullivan, MD	Julie Lisiecki
Ted DeYoe, PhD	Domenico Zaca, PhD	
Cathy Elsinger, PhD		

Discussion of Quantitation as it relates to fMRI and reproducibility

- Dr. Voyvodic discussed the quantitation in fMRI; can fMRI be quantitated as a biomarker?
- What can be measured? What type of unit of measurement can be used?
- How can quantitation be used in fMRI as it relates to neuro-vascular uncoupling (NVU)?
- Based on the same person/ same task/ different sessions, how does one quantify these results?
- Focus on examples with language - easier to document (visual tasks more challenging).

fMRI Workflows

- Dr. Voyvodic would like a sample workflow from each participating site:
    - How is it ordered? What are the specific tasks? What is in the workflow? etc.

DICOM matrix

- Dr. Tucker is working on a matrix of various workflows for different sites
- Some of the variables included in this document may or may not apply to all sites
- Dr. DeYoe would like to expand the matrix with even more detail; possibly have separate meeting for DICOM group
    - Is a rating scale is being used? If so, how often? And, is it essential?
    - Would like to formalize the scale somewhat to gain a better understanding of the steps for profile development.

fMRI exam is supposed to show (via quantitative measurements):

- Where are the eloquent cortical areas?
- Receptive and expressive speech centers? Edge? Center? Spatial extent?
- Brain coordinates; distance from the center or edge in mm
- Which side is the dominant hemisphere?

Laterality Index:

- Expressed as a number between 1 and – 1, (1: dominant left brain; – 1: dominant right brain).
- Difficult to determine what gets converted to numbers, as well as what specifically to measure

NVU:

- Want to quantitate (for any part of the brain) – what is the probability that the area is coupled?
- Ability to generate signal from 0 to 1 – based on NVU measurements?
- Are these measurements what we're aiming for? How are these obtained?

Reproducibility:

- Do we measure by using one patient with same region, using multiple versions of exact same exam area on different days? (Day 1, Day 2, Day 3, etc.)
- Are voxels to be measured (how many overlap?) Day 1 vs. Day 2?
- Do we conclude that we need to do fMRI multiple times and take the average? Would it be preferred to quantitate once and measure the % overlap?
- Do we focus on comparing signals in repeat scans of the same person?

BOLD amplitude:

- What information are we getting from the amplitude signal and relative signal strength?
- What (if any) elements of the BOLD signal are quantifiable?
- Need to make a statement about what BOLD amplitude does and does not mean for the Profile.
    - Investigation may require new subcommittee.
- Compare signals in repeat scans of the same person: relative vs. absolute amplitude

- Calibrations to be make more consistent; relative signal is essential
- NVU model –trying to look at relative signals with quantifiable measures, moving toward absolute measurements.
- Focus on plotting raw % signal change to quantify how reproducible in both relative and absolute measurements for BOLD.

Funding deadlines
- End of February / early March for funding applications
- Call for new applications (especially if they support the group's strategic plan and have existing data available).

Next steps:
- Group to review Rick Buxton article on oxygenation and hemoglobin, and de-oxygenation and what drives it.
- Drs. DeYoe and Tucker to add additional data to the workflow table/checklist.
- Consider what aspects of the BOLD signal are quantifiable and whether or not formation of another subcommittee is warranted to investigate.
- Pull together supporting literature for the Profile.
- Focus on next phase fMRI funding proposals.
- Focus on different ways of looking at NVU (next fMRI Reproducibility call topic).

Next Call for fMRI: Wednesday, **February 9, 2011; 11 AM CST**

Next Call for fMRI Reproducibility: Tuesday, **February 15, 2011; 11 AM CST**