

QIBA fMRI Reproducibility Subcommittee Update
December 21, 2010
11 am CST

Call Summary

In attendance:

James T. Voyvodic, PhD (Chair)
Jeffrey Petrella, MD
Jay Pillai, MD

Daniel C. Sullivan, MD
Domenico Zaca, PhD

RSNA:

Joe Koudelik
Julie Lisiecki

Project proposal follow up

- Challenges in getting started and coordinating submission
- Suggest not to wait for funding as group wishes to continue with projects
 - Dr. Voyvodic to follow up on coordination with Dr. DeYoe
 - Learn more about sub-proposals to see whether there are any shared aspects
 - Determine how the different subprojects are connected
- Dr. Pillai to continue with his project: neurovascular uncoupling and breath-hold data study
 - Continue collecting data to incorporate into protocol
 - Will also use normal volunteer data
 - Using current/new approach for BOLD processing to compare the two for reproducibility
 - Percentage signal change/ measurement of data – tailor threshold to individual patient
 - Perform basic GLM analysis (general linear modeling): various breath hold blocks used alternate with normal breathing

MAP

- Increased CVR in cortex compared to white matter
- Regional decrease in tumor or proximity to tumor margins
 - Look at positive and/or negative signal changes
 - Focus on relative quantitative measurement to track changes
 - Consider looking at perfusion imaging as compared to breath-hold
 - Would be interesting to review data for the same patients

Resting state analysis (Petrella project)

- For patients with cognitive disorders, find a metric using connectivity imaging which is the most reproducible
 1. Interest-based correlation between the two regions (node to node)
 2. “Goodness-of-fit” – metric where individuals’ pattern matches network pattern (network)
 3. Global measures – level of entire brain (whole brain)

Graph Theory Metrics

- Graph patterns, etc. , can be used to characterize any network
 - Characterize the efficiency with which information travels within these networks
 - In normal subjects, which of these best represents reproducibility?
 - Compare task-related vs. resting- state paradigms
- Map resting state without a task for comparison
 - Look at data driven sets for comparison and analysis – motor tasks with resting state vs. motor localization
 - Look for the reproducibility in all studies – not just the best case scenario

BOLD Mapping

- Dr. Voyvodic believes that BOLD mapping can be quantitative; challenge is in how to calibrate
- Focus on percent change of the signal
- Need more work on this particular issue

Next steps:

- Study perfusion and breath hold data for reproducibility and sensitivity

- Get feedback on various methodologies and multiple ways of using measurements
- Consider: “variability in hemodynamic responsiveness” for next discussion
- Dr. Voyvodic to share data with the group for next call
- Dr. Voyvodic to look at patterns within the maps and be prepared to discuss.
- Dr. Voyvodic and Dr. Zaca to pull together literature on “variability of the brain’s responsiveness to vascular uncoupling” with regard to patient application
- Dr. Pillai to review data on ASL and breath hold, as well as fBIRN

Next Call for fMRI Reproducibility: Tuesday, January 11, 2011, 11 am CST.