

**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.