

QIBA fMRI Biomarker Committee (BC) Call

Wednesday, June 17, 2020 at 11 a.m. (CT)

Call Summary

In attendance

Feroze Mohamed, PhD (Co-chair)

Jay Pillai, MD (Co-chair)

David Soltysik, PhD (Co-chair)

Shruti Agarwal, PhD

Cathy Elsinger, PhD

Ping Hou, PhD

Ichiro Ikuta, MD, MMSc

Andrew Kalnin, MD

Ho-Ling (Anthony) Liu, PhD

Nancy Obuchowski, PhD

David Scott, PhD

Judd Storrs, PhD

James Voyvodic, PhD

Francisco Zamorano, PhD

RSNA staff

Susan Stanfa

Review of Previous Call Summary

- The 06.03.2020 call summary was approved as presented

Discussion on Duke University Reproducibility Study (Dr. Voyvodic)

- Dr. Sullivan had recently brought the group's attention to, Elliott ML, et al., [What Is the Test-Retest Reliability of Common Task-Functional MRI Measures? New Empirical Evidence and a Meta-Analysis](#)
- The article claimed that all fMRI results are suspect because the technique is fundamentally non-reproducible
 - Due to significant variability, measures were deemed unsuitable for brain biomarkers discovery
 - It was suggested that the authors made a broad, sweeping statement from a perspective that is very different than that of fMRI BC members; and, in that context, fMRI is not reproducible or reliable
 - Datasets from the Human Connectome Project (HCP) and Dunedin Multidisciplinary Health and Development Study were analyzed
 - The paper provides an ROI definition, and indicates a reliability analysis was conducted
 - AMPLE normalization or other approaches were not considered
- The fMRI BC is considering drafting a response paper that would argue:
 - If done properly, fMRI is a reliable way of looking at brain activity and can be reproducible
 - The proper procedure (i.e., the fMRI Profile) to be defined
 - It may be worth pointing out that there is a lot of criticism of fMRI because it is nonreproducible as *typically* performed, which is a large obstacle to clinical applications
 - The article is flawed because it did not consider variability in task designs and inherent problems of reproducibility related to such task designs rather than fMRI itself
 - It also did not take into consideration subject task performance and variability in cognitive paradigms (i.e., event-related vs. block designs)
 - The fMRI BC has data to support their forthcoming response
 - The paper would be good publicity for the fMRI Profile, the committee, and QIBA in general
 - Planning to be continued, including identifying the focus and strategizing
- There was discussion re: fMRI BC focus, with concern that it is a little siloed from general psychology and neuropsychology and has a clinical radiologist perspective

DRO Study Results (Dr. Voyvodic)

- Dr. Voyvodic to revise his motion DRO manuscript to include modeling spin-history artifacts, and resubmit it to *Neuroimage* for publication
- Physics-Oriented Simulated Scanner for Understanding MRI (Possum) software allows the image acquisition process to be synthesized
 - Using it to model DROs was determined unfeasible due to the time required and difficulty getting it to work properly
- Spin history calculations were added into Dr. Voyvodic's own software, and he has generated additional DROs
 - The software did not synthesize the image acquisition process, rather, it synthesized the spin history process
- A step-by-step overview of the methodology was provided
- Results of the DRO project will not change very much; Dr. Voyvodic anticipates confirming his original assertion that when there is a lot of active motion, the images would not meet criteria for a "good" scan, so they could not be used when defining a ROI
- Dr. Voyvodic requested the group's feedback on his approach so that he can address other possible issues before resubmitting

Next call: Wednesday, July 1, 2020 at 11 a.m. CT (1st & 3rd weeks of each month)

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