

QIBA fMRI Biomarker Committee (BC) Call

Wednesday, March 18, 2020 at 11 a.m. CT

Call Summary

In attendance

Feroze Mohamed, PhD (Co-chair)

David Soltysik, PhD (Co-chair)

Jay Pillai, MD (Co-chair)

Cathy Elsinger, PhD

Ichiro Ikuta, MD, MMSc

Nancy Obuchowski, PhD

Jim Voyvodic, PhD

Yuxiang Zhou, PhD, DABR

RSNA staff

Joe Koudelik

Susan Stanfa

Review of Previous Call Summary

- The 03.04.2020 call summary was approved as presented

Profile

- Brief overview re: resources discussed during March 4 call
 - [Neurosynth](#), a platform for large-scale, automated synthesis of functional magnetic resonance imaging (fMRI) data, can be used for a literature search on language studies
 - Benjamin, CF, et al. [Presurgical Language fMRI: Mapping of Six Critical Regions](#). *Human Brain Mapping*. 2017; 38:4239–4255.
 - Hsu AL, et al. [Presurgical resting-state functional MRI language mapping with seed selection guided by regional homogeneity](#). *Magn Reson Med*. 2019 Dec 2. doi: 10.1002/mrm.28107. [Epub ahead of print]

Dashboard

- During the March 5 MR Coordinating Cmte call, BC leaders were encouraged to update milestones and accomplishments in the QIBA Dashboard
 - Advice was sought for updating the Dashboard re: the redirected efforts from fMRI Motor-Mapping Profile v1.0 to Language-Mapping Profile v2.0, which has increased engagement and renewed momentum
 - Consensus was “one column per Profile version” to help track past progress and maintain a history of effort
 - How advanced a Profile develops (final stage) remains the prerogative of each BC, e.g., Consensus or Technically Confirmed deemed “successful”
 - Once a BC deems a Profile successful, it is free to shift focus to another Profile or Profile version; consideration of staff resources is necessary if multiple Profiles are active within a BC

fMRI Tasks Discussed

- Dr. Ikuta discussed his experience re: presurgical mapping from a language standpoint
- Discussion re: whether certain language tasks were recommended, such as word generation, verb generation, sentence completion, and object-naming
 - Consensus was that object-naming was only recommended for impaired patients Dr. Voyvodic conducts a passive language-listening task for those who have trouble following instructions; good results are obtained with this when subjects cannot handle other tasks
 - Discussion re: audio equipment (headphones) used during these tasks
 - Dr. Pillai noted difficulty for older patients with decreasing auditory ability to hear during auditory tasks due to scanner noise
 - Object-naming is used fairly frequently, but not as a first-line task
 - Siemens headphones were recommended as a remedy

- Broca's area (BA) and Wernicke's area (WA) were activated when subjects watched videos; when content is familiar (not being heard for the first time) it is easier for the subject to hear despite background scanner noise

Next Steps

- To increase the productivity and efficiency of these BC calls, it was recommended that BC Co-chairs prepare agendas in advance
- To help guide BC call discussions, Dr. Soltysik developed a checklist of decisions that have been made and ones that have yet to be made
 - Expressive and receptive language systems to be studied have been determined
 - ROIs to be included for localization are BA (Neurosynth to be referenced to estimate) and WA
 - ROIs to include for laterality are currently undecided; areas in addition to BA and WA to be considered
 - Recommendation to omit areas in ROIs that are not believed to be language-related
 - Assess the probability of co-lateralization of the six areas
 - Large regions will be included if they co-lateralize
 - Other decisions to be made:
 - Task timing
 - Image quality assurance (QA)
 - Image processing methodology
 - Method for calculating the laterality index (LI)
 - Claim 1: If X, Y, Z is the measured location of the weighted center-of-mass of a single focus of fMRI language activation (wCMA), then the 95% confidence interval for the X, Y, Z of the true wCMA is +/- X mm in any direction
 - Claim 2: Laterality Index Claim
 - Past discussion revisited re: normalizing before identifying areas
 - Dr. Liu's experience will be valuable re: choosing which atlas to define ROIs
 - In the process of mapping to an atlas, average areas where sentence and word generation tasks map to be determined
 - Additional discussion needed re: how to map a subject to a standard atlas when a brain lesion distorts anatomy
 - Differences re: epilepsy and tumor resection
 - With tumor, localization is key and preoperative mapping needed, frequently along with complementary intraoperative mapping
 - With epilepsy, lateralization rather than localization is frequently the issue and intraoperative mapping is frequently not done, but rather either Wada testing or extraoperative mapping may be performed in addition to fMRI.

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

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