

QIBA fMRI Biomarker Committee (BC) Call

Wednesday, April 21, 2021 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
Ho-Ling (Anthony) Liu, PhD

Nancy Obuchowski, PhD
James Voyvodic, PhD
Divya Yadav, MD

RSNA staff

Joe Koudelik
Susan Stanfa

Review of Previous Call Summary

- The 04.07.2021 call summary was approved as presented

fMRI Language-Mapping Profile v2.0: Decisions to be Made

- Once consensus is reached on fMRI data to inform Claims, image quality assurance and image processing methodology, the fMRI BC can proceed with Claim development
- Broca's area (BA) and Wernicke's area (WA) to be the focus for localization, but ROIs for laterality are undecided
- Dr. Agarwal reviewed methodology and results of Agarwal S, Hua J, Sair HI, Gujar S, Bettegowda C, Lu H, and Pillai JJ. [Repeatability of language fMRI lateralization and localization metrics in brain tumor patients](#). *Hum Brain Mapp*. 2018
- The approach for assessment of LI variability and center of mass variability and approach to ROI determination based on different atlas-based parcellation were discussed
- There were two language paradigms based on ASFNR recommendations; tasks included sentence completion (SC) and silent word generation (SWG) task
- Selected expressive ROIs and receptive language ROIs were defined
- The BA ROI contained only the inferior frontal gyrus (pars opercularis and pars triangularis) and the WA ROI contained only temporal lobe gyri (specifically, superior, and middle temporal gyri)
- Findings indicated that SWG and SC tasks were effective in activating critical language areas
- Both changes in LI and center of mass (COM) from the first to the second runs of each task (SWG & SC) were evaluated
- Median values of COM_{VAR} (i.e., distance between COM1 and COM2 in mm) across all subjects in each ROI for SC and SWG were <5 mm for both BA and WA
- When LI variability was greater than one, dominance switched from one hemisphere to another; when variability was less than one, dominance remained in the same hemisphere
- Discussion re: study results within the context of Profile Claim development
 - It was noted that one potential flaw is that true confidence interval analysis was not performed as part of this study; it was estimated that there was a 75% confidence that the true COM is within 5 mm
 - A standard in QIBA is to set Claims at 95% confidence, however, different confidence rates for different measurements could be considered
 - Less Claims rigor with a 90% WcV and possibly 80% may be included, with values adjusted accordingly
 - Dr. Voyvodic's data were deemed sufficient for Claim development
- Threshold-independent ROI and weighted ROI were calculated in the HBM paper
- Dr. Voyvodic had used an AMPLE-based approach for thresholding and his own methods for ROI selection (Broca's and Wernicke's areas), but did not include all areas involved in the language network
- Dr. Voyvodic calculated laterality indices using 50% AMPLE thresholding, AMPLE-weighted values, and did not resort to thresholding-independent approaches
- LI/reproducibility data was discussed and Dr. Voyvodic reviewed his language-mapping study results

- Dr. Voyvodic plotted the LI value against the LI match probability; for $LI > 0.4$ or $LI < -0.4$, you have a 90% confidence that the other scan will give you the same laterality

Next Steps

- The goal is to make decisions on ROIs, Claim development, and image quality assurance and processing methodology
- Profile-related action items to be determined

Next call: Wednesday, May 5, 2021 at 11 a.m. CT (1st & 3rd weeks of each month)

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