QIBA PET Amyloid Biomarker Committee

22 May 2015 at 9:00 AM CT (GMT-6)

In attendance:			**RSNA**
Satoshi Minoshima, MD, PhD (Co-Chair)	Adriaan Lammertsma, PhD	Rathan Subramaniam, MD, PhD	Joe Koudelik
Anne Smith, PhD (Co-Chair)	Martin Lodge, PhD	Daniel Sullivan, MD	Susan Weinmann
John Hoffman, MD	Dawn Matthews, MS, MBA	Jean-Luc Vanderheyden, PhD	
Paul Kinahan, PhD, FIEEE	Nancy Obuchowski, PhD	Brian Zimmerman, PhD	

Moderator: Dr. Anne Smith

General Discussion Points:

Discuss the Open Issues section of the Profile (see below for more details)

- Criteria regarding minimal spatial resolution requirements following image reconstruction discussed
- Specifying a common target resolution for multi-center trials to maintain was deemed more appropriate than setting a difficult-to-achieve minimal resolution
- Drs. Klein and Boellaard have extensive experience with PET reconstruction procedures and their feedback is welcome

Update from Ms. Matthews, Dr. Lodge, and Dr. Subramaniam re: their project proposals from the perspective of the PET Amyloid Profile

Ms. Matthews provided a brief description of her Round-5 proposal

- Project aim is to determine how SUVRs are affected by subject motion in Amyloid imaging. Motion between CT and PET scan will be analyzed as well as intra-PET acquisition motion.
- Effects of reference region selection and various ways to define target regions will be investigated

Dr. Lodge reviewed his imaging Phantom project

- Although many brain imaging sites are doing good work, a harmonized image resolution process is needed
- Aim is to develop a practical tool (QA phantom) for use in standardization
- These tools will be useful for both the FDG Tumor and PET Amyloid Profiles

Dr. Subramaniam discussed his meta-analysis project

Aim of meta-analysis is to better support the Profile claim language by the end of 2015

Upcoming Proposed Nuclear Medicine Calls (Fridays, 9 am CT):

- **June 5:** FDG-PET Biomarker Ctte
- **June 19:** Amyloid Biomarker Ctte
- **June 26:** Combined NM Biomarker Ctte Call

Open Issues:

Comment [ep1]: Open/Closed Issues Section is taken from Profile Template. . . to be written for Amyloid. (Possibly consider PET/MR issue; Centiloid; new Brain Phantom – physical & virtual DRO; others?). . for group discussion.

The following open issues have been raised. They are provided here to capture the associated discussion, to focus the attention of reviewers on topics needing feedback, and to track them so they are ultimately resolved. In particular, comments on these issues are highly encouraged during the Public Comment stage.

[List any issues known to still be open regarding the profile. The idea is to allow forward progress even though some issues may still be under consideration.]

Q. Should the Profile attempt to define a pathway by which a 'new' amyloid tracer might be validated? (paraphrase from AAL) A. [tentative resolution (or blank)] For any new amyloid tracer it cannot be assumed that SUVR reflects amyloid load without validation, i.e. first full kinetic analysis needs to be performed to check that SUVR has a linear relationship with BP_{ND}.
Q. Current version of profile has excluded PET/MR scanners and only allows PET/CT and dedicated PET scanners with transmission sources, is this OK? A. Yes, to both per the PET Physics sub-group.
Q. In section 3.2.1.4 Scanner Acquisition Mode Parameters, should we add a sub-section for 68-Ge based transmission image? We do have a sub-section for CT acquisition. A. Yes, we should have a section for 68-Ge Transmission Imaging, plus other transmission sources. Ask experts in this area such as Bob Koeppe and Christian Michel. May need a phantom test to check for noise, recommend a given source strength. Some are done simultaneously. Reduce noise via segmentation such as MAP reconstruction. Use neuroshield if available – report that it was used. Ask John Sunderland as well.
Q. Currently, PET scanners that use analytical algorithms (i.e. don't measure directly the attenuation of the brain) to estimate attenuation and scatter corrections are excluded from this profile. Is this OK? A. Yes, do not use this.
Q. Currently, the normative text for qualification tests done using the Hoffman brain phantom lists two: gray/white matter ratio (should be > 0.55) and the COV of a uniform ROI (should be < 15%). Are there others that should be captured? A. Discuss at face-to-face with larger group. Do we want minimal threshold only, or do we need to shoot for harmonization of quantification? -> will depend on the Claims we want to support. Consider filling with solid 68-Ge for shipping to sites?
Q. CT contrast agent is not recommended nor supported in this profile. OK? A. Yes, per PET physics group. Currently no data on how CT contrast agent in the brain will affect the quantification of the PET image.
Q. Currently, profile states that no partial volume correction should be performed during reconstruction. OK? A. Yes, per PET physics-subgroup. Image analysis section will add some language as to why not. Should be discussed in Version 2.0, esp. w.r.t. MR/PET data. Need to specify a protocol to standardize PVC.
Q. Currently, profile states that reconstructed PET voxel size should be < 2.5 mm in all dimensions, but not necessarily isotropic. OK? A. Put 2.5 mm for x and y, and 3 mm for z, but needs discussion with full group.
Q. Currently, profile states that no PSF should be used during PET recon. OK? A. Yes, per PET physics subgroup.
Q. Currently, profile states that if TOF is available for PET recon, it can be used. OK? A. Change to can use, rather than should use. But be consistent, use it all the time or don't. Discuss with group. For multi-center study, same phantom should be scanned on all PET scanners, to get common denominator for performance. Therefore, TOF could be used on some scanners but not others.
Q. To the PET physics sub-group: what does the final minimal reconstructed PET image FWHM resolution need to be? 4.5 mm?

A. NEMA resolution may not be very helpful. Use a measure from the Hoffman brain phantom? Discuss with Greg and others. Do not specify a FWHM resolution per se, though. Do not use NEMA FWHM resolution as a spec.
Q. Spatial resolution - require a minimum of 7.5 mm FWHM "Hoffman equivalent" axially and trans-axially? A. If you do a multi-center study, the sites should agree on the minimum resolution (i.e. 7.5 or 8.0 FWHM using Hoffman). But for a single site, no need to have a requirement or specification for resolution. Need more discussion with Greg Klein.
Q. Only allow full ring PET scanners that have a >= 15 cm axial FOV for a single bed position? A**. At 15 cm, may need to position head correctly to cover the full brain. Compile the axial FOV of scanners in install base, to cover it. HR+. Specify how the brain is positioned in the scanner (add this to Acquisition of Data Section).**
Q. How much can patient move before we exclude data or do a correction for movement? A. Need to do a literature search. Ron Boellard's site excludes data if patient has moved 10 mm for qualitative studies, but likely needs to be tighter for quantitative analysis. Image Analysis sub-group also has had discussions on this topic. Ask test-retest group if the literature they reviewed gave any thresholds for excluding patient data. Dawn's proposal may have covered this.

Comment [AMS2]: Note this number is up for discussion. That number would exclude, for example the GE DLS, the Siemens Biograph Duo an the Philips Gemini GLX. If we relax this to 8.0 mm, then this would pass