• Claim update and discussion
  – Specifically need feedback from **PET Amyloid tracer vendors**
    • Please make this call if possible!
• Image Analysis Workstation Conformance update
• Round 5 Project Updates (if time and PI’s present and willing)
Amyloid-PET Profile Claims

• Claim 1: A measured change in SUVR of $\Delta$ % indicates that a true change has occurred if $\Delta > 5-8\%$, with 95% confidence, where the percent change in SUVR ($\Delta$) is defined as $[(\text{SUVR at Time Point 2 minus SUVR at Time Point 1}) / \text{SUVR at Time Point 1}] \times 100$.

  Note: we need to have a group consensus of which number to pick between 5-8%, unless we want to leave this as a range? I believe we wanted to go with the low end, so 5%.

• Claim 2: If Y1 and Y2 are the SUVR measurements at the two time point, then the 95% confidence interval for the true change is $$(Y_2 - Y_1) \pm 1.96 \times \sqrt{([Y_1 \times 0.043]^2 + [Y_2 \times 0.043]^2)}.$$
Claim Discussion

• **Latest version of Claim**
  – Radiopharmaceutical vendors in accordance with this version, specifically 5-8% RC?
  – Note, due to normal and abnormal groups having similar RCs per Rathan’s analysis, we will NOT have separate claims for these groups

• Rathan: any update re test-retest studies, re discussions with Lilly?

• ADNI: any follow-up for using these data for test-retest analysis?
Dawn, Nancy, Eric, Rachid and Anne met this week

- Metrology’s (Nancy’s) **Framework**
- **Problem statement** from Dawn
- Regarding the actors to show conformance:
  - “Conformance” is defined by the Profile
    - Image Analysis vendors must show conformance for their software
    - Readers/users must show conformance for their roles/protocols

- For Image Analysis Software, two types of conformance
  - **Reproducibility**
    - Most relevant for Longitudinal claims (what our first version of Profile Claim is)
    - Can take a single patient dataset and transform in various ways
      » Would test the registration to standard atlas space part of the analysis
    - Can take a single high statistic subject dataset and add various levels of noise
      » Could choose standard patient datasets of HCs and varying levels of amyloid positivity
      » SUVRs should be reproducible in each case until noise level is too high
    - *Dawn took action item to investigate using ADNI and Centiloid datasets (Centiloid paper)*
  - **Linearity**
    - Most relevant for Longitudinal claims (what our first version of Profile Claim is)
    - Usually best to use a DRO or Phantom where true activity and amyloid positivity are known
    - Is Hoffman Brain phantom a reasonable choice for this?
    - *Anne took action item to see if Paul’s DRO could possibly be ready in the time frame we have for version 1 of Profile*
      » Assume that John’s mechanical phantom WILL NOT be ready
  - **Fixed bias**
    - Most relevant for Cross-sectional claims (will not address in Version 1.0 of Profile)

- Will schedule another meeting next week with this group, to keep progress happening
  - Anyone with good ideas is welcome to join!
Profile – Next Steps

- Needs to finalize Profile for Public Review
  - CT BC: had a single day multi-hour review via WebEx
    - Agenda would be clear such that members could join at specific times
    - Thoughts on this?
  - Multiple separate sessions
  - DEFINITELY need a “Physics” session
    - Believe Eric has a list of open physics issues
Round 5 Project Update

- **Head motion project**
  - Anne
    - 56 simulated head transformations between CT and PET scan completed for the 3 subjects: HC, aMCI, eAD
    - Maximum transformers were 10 mm translations in all directions, and 10 deg rotations about all axes
    - 171 DICOM image volumes transferred to Dawn for image analysis
  - Dawn
    - All images aligned to the originally positioned scan for all subjects
      - Comparing two SPM methods for registration
    - Alignment parameters calculated by SPM compared to original applied translational and rotational misalignment
    - A set of ROIs and Reference Regions have been transformed to the native space of each subject for measurement
    - ROI measurements are in progress
Round 5 Project Update

- Tilted cylinder resolution measurement – Martin

- Amyloid Phantom (will do on a later call)
  - DRO - Paul
  - Mechanical – John
Edge spread function can be described by the integral of a Gaussian point spread function.

\[ ESF(x) = \int_{-\infty}^{\infty} PSF(x') dx' = \frac{1}{\sigma \sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{(x'-\mu)^2}{2\sigma^2}} dx' \]

\[ = \frac{1}{2} \left[ 1 + \text{erf} \left( \frac{x - \mu}{\sigma \sqrt{2}} \right) \right] \]

**ESF(x)** optimized to give best fit to the measured edge data.

Finely sampled edge spread function formed by combining profiles from multiple slices.

**Siemens**
Biograph mCT
OSEM + TOF, 2i, 21s,
5 mm Gaussian (3D)
→ Radial FWHM = 7.1 ± 0.1 mm

**GE**
Discovery VCT (RX)
OSEM, 2i, 21s, 3 mm Gaussian (2D),
z-filter standard
→ Radial FWHM = 6.2 ± 0.1 mm

**Philips**
Gemini TF
BLOB-OS-TF
→ Radial FWHM = 7.3 ± 2 mm