QIBA Round 5 Funding
Analyses to Support Amyloid Imaging Profile Development:
Quantify the Effect of Misalignment and Subject Motion
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Discovered a Profile Gap

- **PET Amyloid Claim (Draft version)**
  - ... 95% probability that the measured change in SUVR +/- 12%
    encompasses the true change in brain amyloid burden

- **Confounding factors when measuring SUVR**
  - Patient head motion may be the largest factor
    - Listed as biggest clinical challenge by many sites
    - Current scientific literature does not address the quantitative impact on PET SUVR values ➔ How much motion is too much?

- **Group discussed the gap**
  - Found a champion to be the PI
  - Submitted project and was awarded Round 5 funding
Subject Motion: Impact on SUVR

In cases of severe motion, PET motion correction does not remove embedded artifact from mis-aligned CT.

Scan of subject with minimal movement

Target Region
Reference region
SUVR relatively constant throughout 50-70 minute time window

Scan of subject with severe motion

Target Region
Reference region
SUVR at 50-55 minutes = 1.5; SUVR at 60-65 minutes = 1.0, a 50% difference

In cases of severe motion, PET motion correction does not remove embedded artifact from mis-aligned CT.
Filling in the Gap

• **PET Amyloid Claim (Draft version)**
  • ... 95% probability that the measured change in SUVR +/- 12% encompasses the true change in brain amyloid burden

• **Based on magnitude of results and Profile Claim**
  • Add “acceptance criteria” and acceptable methods to Profile
    • **Examples**
      • If magnitude of translation vector > X mm
        • Data must be corrected or
        • Data are not compliant to the profile
      • If magnitude of rotation > Y deg
        • Data must be corrected or
        • Data are not compliant to the profile
      • Details for how the data need to be corrected
Using Actual Patient Data and Realistic Patient Motion

Simulate movement between CT and PET

Simulate movement during PET and between CT and PET