QIBA NM Coordinating Committee Update

Annual QIBA Meeting
Wednesday, May 17, 2017

Modality Committee Structure

- **NM Coordinating Committee**, Richard Wahl, MD; Eric Perlman, MD; David Mozley, MD

- **FDG-PET/CT Biomarker Committee**, Rathan Subramaniam, MD, PhD, MPH; John Sunderland, PhD; Scott Wollenweber, PhD
  - **Profile Conformance Task Force**, Timothy Turkington, PhD; Ronald Boellaard, PhD; Martin Lodge, PhD

- **PET-Amyloid Biomarker Committee**, Eric Perlman, MD; Satoshi Minoshima, MD, PhD; Anne Smith, PhD

- **SPECT Biomarker Committee**, Yuni Dewaraja, PhD; David Mozley, MD; John Seibyl, MD
  - **Ioflupane/I-123 Brain/Neuropsych Task Force**, John Dickson, PhD; John Seibyl, MD
  - **99mTc Body Oncology & Immunology Task**, Yuni Dewaraja, PhD; David Mozley, MD
Current Status: Profiles

- FDG-PET/CT Profile
  - Technically Confirmed
  - Updates needed for TOF, PSF, LBM
  - Clinically confirmed stage requires multi-center study with 50 to 100 subjects. Study protocol in drafting stage
  - No timeline yet for Clinically confirmed stage

- PET-Amyloid Profile
  - BC approved release for Public Comment. Next is review by NM CC (June 1)

- SPECT-123I-DAT Profile
  - Public comment phase closed, now reviewing comments

Round 6 NIBIB Funded Projects

<table>
<thead>
<tr>
<th>YR</th>
<th>Code</th>
<th>Committee</th>
<th>NM Projects</th>
<th>Lead</th>
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<tbody>
<tr>
<td>6</td>
<td>2016-R1</td>
<td>FDG-PET/CT</td>
<td>SUV Quantification with Point Spread Function PET Reconstruction</td>
<td>Lodge</td>
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<td>2016-R2</td>
<td>FDG-PET/CT</td>
<td>SUV Quantification with Point Spread Function PET Reconstruction</td>
<td>Boellaard</td>
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<td>2016-V1</td>
<td>SPECT</td>
<td>Multi-center Phantom Study to Characterize Bias and Precision of Quantitative I-123 SPECT</td>
<td>Dewaraja</td>
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<td>2016-V2</td>
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<td>Multi-center Phantom Study to Characterize Bias and Precision of Quantitative I-123 SPECT</td>
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<td>2016-X</td>
<td>SPECT</td>
<td>I-123 DAT Scan Digital Reference Object Development</td>
<td>Miyaoka</td>
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<td>2016-CC</td>
<td>FDG-PET/CT</td>
<td>Simple Variable Estimates in PET</td>
<td>Turkington</td>
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<tr>
<td></td>
<td>2016-DD</td>
<td>PET Amyloid</td>
<td>Quantification of Reconstruction Method Impact on Measured Amyloid Load</td>
<td>Matthews</td>
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</table>
Example Results of Funded Projects

PET Amyloid DRO in development

Segmented MRI

Positive patient image
CSF $\neq 0$

Initial DRO with full modeling
CSF $\equiv 0$

DRO with full modeling + scatter factors
CSF $\neq 0$

Example Results of Funded Projects

PET Amyloid DRO in development
Initial results using vendor software
Example Results of Funded Projects

SPECT 123I-DAT DRO in development

Diseased

Normal

Reduced uptake similar to physical phantom

Ratio of Putamen and Caudate to background is 4.5:1

Example Results of Funded Projects

SPECT 123I-DAT DRO in development

Initial results using vendor DAT software: diseased left putamen

<table>
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<tr>
<th>Striatum Right SBR</th>
<th>Striatum Left SBR</th>
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<tr>
<td>+2.01</td>
<td>+1.25</td>
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</table>
**Example Results of Funded Projects**

Multi-center phantom study to characterize bias and precision of quantitative 123I-DAT SPECT

CT and Fused SPECT/CT images showing the change in contrast using ACSCRR reconstruction (left), and FBP reconstruction (right). Left side striatal components were filled to simulate an abnormal uptake pattern similar to DRO.

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**Example Results of Funded Projects**

Impact of reconstruction on PET amyloid quantitation

Left: OSEM+TOF w 50 cm FOV. Right: Difference w 25 cm FOV. Differences are likely due to truncation of head holder in CT image.
Example Results of Funded Projects

Impact of reconstruction on PET amyloid quantitation

Pink subject areas are more than 4% different from reference recon

<table>
<thead>
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<th>$MK_{4}^{C}N$</th>
<th>$MK_{2}^{C}F$</th>
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<td>Whole brain</td>
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<tr>
<td>Cerebellum area 1</td>
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<tr>
<td>Cerebellum area 2</td>
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FDG-PET/CT Profile

- Profile is Technically Confirmed.
  - Current discussions are centered on how to move to ‘claim confirmed’ stage
  - Initial trial design is drafted. Need minimum of 50 repeat scans of patients at 5 sites. 100 scans would be better. Focus of F2F will be on funding methods
  - No timeframe yet for Claim Confirmed stage
- Concerns
  - Funding for next phase as described above
  - Profile needs updating to take into account TOF systems, PSF reconstructions, and new LBM formulation. PSF groundwork project underway (by Martin Lodge)
- Are there any anticipated new biomarkers for consideration in the coming year?
  - PET/MR systems: No specific proposal or biomarker yet
  - FLT or Ga68-PSMA prostate agents: No quantitative goal or specific proposal yet
- Opportunities for cross-organizational or international engagement?
  - potentially FNIH, ECOG-ACRIN, QIN?
PET-Amyloid Profile

- Profile status: BC approved release for Public Comment. Next is NM CC (June 1)
  - Will need to solicit and collect comments, and respond to comments
  - Several ‘Open Items’ to be addressed during Public Review
  - Completion 3Q17?
  - No new groundwork projects needed for current version
- Concerns: Is Claim of 2.9% within subject coefficient of variation of SUVR ‘tight enough’ to address clinical need?
  - Could be addressed with access to more data to improve estimate
  - After Publically-reviewed version, not clear how to conduct field tests etc. to reach Technically Confirmed stage. Potential partners: Alzheimer’s Association (funding?); ADNI (instantiate Profile?); GAIN (assistance with Profile stage progression?); FNIH or NIA (funding?)
- New Biomarkers under consideration: Tau agents (fluid field), PET/MR, FDG for AD and dementia. No specific proposals yet.

SPECT-123I-DAT Profile

- Profile Status: Post public comment phase, with many comments received. Now addressing comments on group calls every 2 weeks.
  - Expected completion 2Q17?
  - No new groundwork projects needed
- Concerns: After Publically-reviewed version, not clear how to conduct field tests etc. to reach Technically Confirmed stage.
  - Potentially partner with MJF foundation
- New Biomarkers under consideration: The SPECT BC has started a “99mTc Body Oncology & Immunology” Task Force (co-chairs Dewaraja & Mozley) with a goal of starting a new Profile
  - BC structure modified accordingly with 2 Task Forces
  - The 99mTc Body Oncology & Immunology is targeted for 4Q2017