Application for QIBA Project Funding

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| Title of Proposal: Amyloid Profile Continued Support with Brain Phantom Development | | |
| QIBA Committee/Subgroup: Nuclear Medicine | | |
| NIBIB SOW Objective which this project addresses: | | |
| **Project Coordinator or Lead Investigator Information:** | | |
| Last Name: Sunderland | First Name: John J. | Degree(s): PhD |
| e-mail: | Tel #: | |
| Institution/Company: University of Iowa | | |
| Amount Requested: | | |

**Project Description:**

**Digital and Physical Brain Phantom development in support of Amyloid Profile**: It has become clear during the course of Amyloid discussions that currently available brain phantoms are inadequate and ill-designed for quantitative assessment of amyloid tracer uptake, and that amyloid imaging, in particular, and the field of neuro-PET imaging in general, would significantly benefit from parallel development of both a digital and physical brain phantom designed to test quantitative approaches to PET amyloid imaging.

The proposed project is therefore requesting funding to support an academic/industry cooperative effort to design, develop, and manufacture these prototype brain phantoms that will be specifically designed to meaningfully test promising quantitative amyloid imaging and analysis approaches (including but not exclusively SUVr). We propose a two-phase project

1) The development of a PET Brain Digital Reference Object (DRO) with separate gray and white matter anatomies, with well-defined reference regions for SUVr (the amyloid metric currently identified for the profile) calculations. This work would leverage off of the significant foundational PET DRO work already performed. Paul Kinahan will spearhead the DRO effort.
2) The development of an amyloid specific physical brain phantom whose design would be modeled directly from the final version of the Brain DRO. The current plan would be to use porous High-Density Polyethylene manufactured by Porex as the primary phantom material. Scott Wollenweber from GE has machined complex experimental phantoms from this material simulating multiple concentrations from single phantom concentration fill (with the porosity defining the relative concentration). The porous HDPE is easily machinable, and with a straight forward CNC programming job, brain phantom slabs can be easily constructed. John Sunderland will lead this effort.

**Primary goals and objectives:**

- To design and construct a prototype brain DRO phantom with properties appropriate for testing and amyloid uptake patterns in a quantitative fashion. The result to be used to help develop methods to be used in the Amyloid profile and to test current commercial and academic amyloid analysis software in a consistent fashion.

- To design and construct a prototype physical brain phantom with properties appropriate for testing PET amyloid uptake in a quantitative fashion. The result to be used to help develop methods to be used and validate quantitative aspects of the Amyloid profile.