

# Standardization of Imaging in the ADC Program

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# **Imaging in the ADC Program: Why Standardize?**

**ADCs should be a major resource to Alzheimer's Research and imaging is a crucial component**

**Standardization will allow detection of smaller effects in smaller subgroups**

**Standardization will facilitate collaboration between centers**

**Standardization will improve imaging capabilities across the ADC network**

# **What is the Role of Imaging in the ADCs?**

**Imaging has moved from an ancillary measurement to a core participant characteristic**

**Proposed new research framework stresses biomarker/imaging characterization**

**Unique opportunity for ADCs to validate research and clinical criteria**

**Imaging is central to describing the aging and dementia phenotype**

**Imaging is crucial for modern clinical trials**

# **What Do ADCs Contribute?**

**ADCs reflect the “state of the art” in clinical evaluation**

**ADCs recruit a clinically diverse sample of participants**

**Vascular and other comorbidities, non-AD dementias, range of severity**

**ADCs have rich affiliated data on participants**

**Postmortem (autopsy) data, cognitive measures, -omics, sleep, novel biomarkers, mobile technologies etc**

**Multiple affiliated databases (genetics/UDS)**

# **Current Status**

## **Imaging of ADC Participants**

**26 Centers (93%) collect MRI**

**24 Centers (86%) collect amyloid PET**

**21 Centers (75%) collect tau PET**

**7 Centers (25%) collect FDG PET**

**In most cases, funding for these studies is at least partly non-ADC and only part of the clinical cohort is examined**

**Standardization of acquisitions between and even *within* centers is not the rule**

**Extensive (mostly MR) data are available on the NACC website and have been analyzed by multiple laboratories**

# **Important Considerations**

**Standardization should not stifle innovation**

**Centers should pursue their scientific interests, including novel approaches to imaging**

**Many Centers have legacy data collected under R01 or other non-ADC funding**

**Centers differ in technical capacity**

**Standardization needs to include support for training/advice and technical resources**

**Some approaches to standardization are resource intensive, others require relatively little**

## **The Process So Far**

**Overall goal: Define what is needed to do the best possible science across all the ADCs using imaging modalities (MRI, amyloid PET, tau PET)**

**Steering Committee has met in person and via phone conference on multiple occasions**

**We soon recognized that there were things we could do in the short term to begin the process, and long term goals that will take more time and resources**

## **Short Term Goals**

**Review current protocols for images acquired by ADCs and propose standards for all uploaded data that will also guide ADCs as they develop their imaging programs**

**Work with interested centers to assist in protocol review, implementation of acquisition, and assistance with uploads**

**Improve annotation/labeling of NACC imaging data as image uploads become more complex**

# MRI Recommendations (29 ADCs)

Sequence	“Combinability” (1 low, 10 high)	Comments	Recommendation
3D T1	9	All sites acquire, most ~1mm <sup>3</sup>	Accept 3D ~1mm <sup>3</sup> , MPRAGE or IR-SPGR
FLAIR	5	Almost all acquire, about half 2D vs 3D, variable resolution and orientation	Accept all, analyze 2D and 3D separately
GRE/SWI	5	Most acquire, 2/3 2D GRE, variable resolution	Accept all, analyze 2D and 3D separately
DTI	3	Most acquire but highly variable direction #, mix of single and multi shell	Accept but limit analyses to simple measures (no TBSS etc)
3D T2	9	Only 8 sites acquire	Do Not Accept
fMRI	3	Highly variable TR, duration	Do Not Accept
ASL	2	Most 2D, variable spatial resolution	Do Not Accept

All recommendations are for 3T, GE/Siemens/Philips instruments

# PET Recommendations (31 ADCs)

Tracer	# of Centers	Comments	Recommendation
PIB	12	Most centers collect similar data	Accept 40-60 or 50-70 min averaged frames
Florbetapir	14	Most centers collect similar data	Accept 50-70 or 50-60 min averaged frames
Florbetaben	5	Most centers collect similar data	Accept 90-100 min averaged frames
Flortaucipir	15	Most centers collect similar data	Accept 80-100 min averaged frames
MK6240	5	No consensus on timing	Do not accept or accept all as development?
Others	2	GTP1/PI2620	Do not accept

Survey did not examine instrument (PET vs PET/CT vs PET/MR), resolution

# Long Term Goals

**Establish an infrastructure for decision making**

**Define scientific objectives to guide the allocation of new (but limited) resources**

**Implement more “hands on” QC of images**

**Develop more ambitious goals for data standardization – new sequences, new PET tracers**

**Explore centralized analyses of all images with standard readouts and feedback of results to ADCs**

**Provide advice to ADCs on use of images and reduced data**

**Develop approaches to harmonize legacy data**

**Advanced informatics for database queries**