

ADNI PET Component

Follow cohorts of normal, MCI and AD subjects

Evaluate change over time

Biomarkers and surrogate outcomes

Predict decline and conversion

Compare data analytic approaches

Compare PET and MRI

Goals

Collect FDG-PET imaging data on a 50% subsample of all subjects at all time points

Develop PET acquisition protocol that minimizes radiation dose, maximizes longitudinal participation, ensures quality, and can be applied across multiple imaging instruments

Apply methods for correction of PET data for differences in resolution and uniformity

Acquire quantitative data in a subset of sites

**Weiner, UCSF
Principal Investigator**

**Jack, Mayo
MRI PI**

**Jagust, UC Berkeley
PET PI**

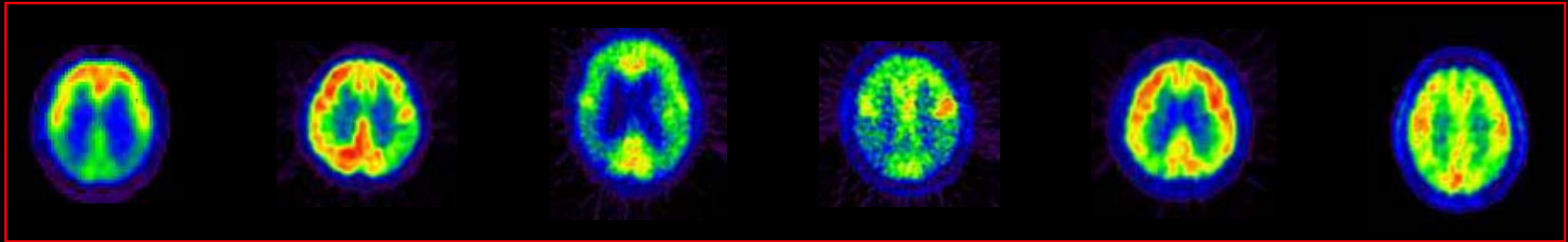
**Administration
Site Selection
Site Qualification
Image Correction
Quality Control
Data Analysis**

**Mony DeLeon
Karl Friston
Satoshi Minoshima
Steve Potkin
Gary Small**

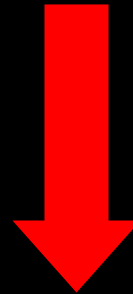
**Foster and Koeppe
University of Michigan**

**Reiman, Bandy - Banner Good
Samaritan Medical Center**

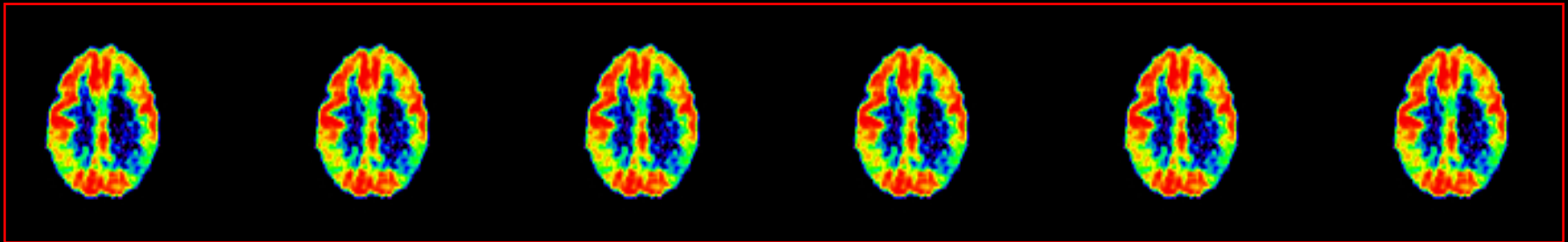
Multiple Sites: Differences in resolution, sensitivity, reconstruction, scatter, attenuation



Standardization/QC
Acquisition
Sensitivity/count rate



Correction
Uniformity (scatter)
Resolution



Analysis

Data Analysis

Three approaches to be contrasted

Statistical Parametric Mapping (SPM)

Stereotactic Surface Projection (SSP)

Region-of-Interest (ROI)

Standard space

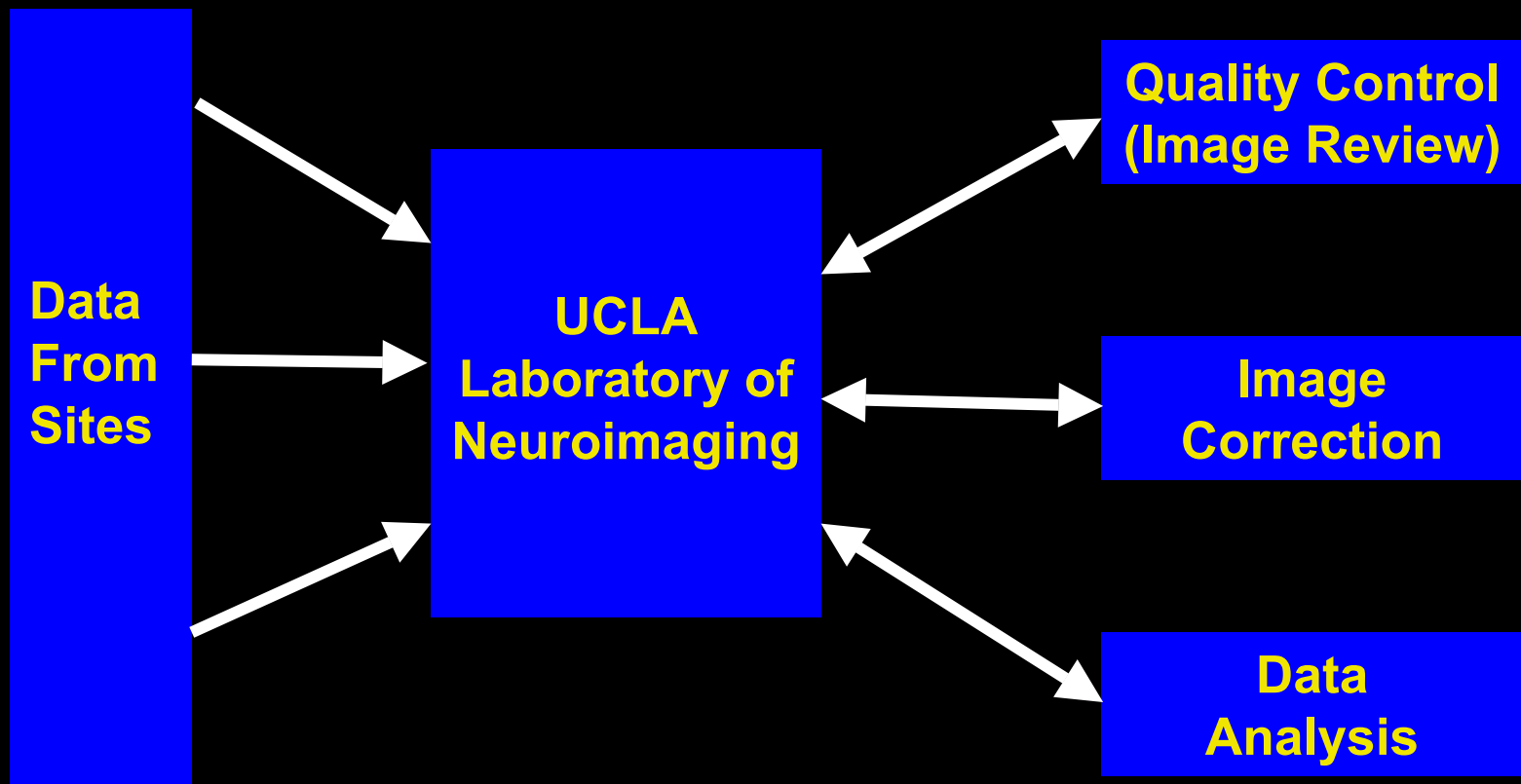
PET-MRI coregistration

Data analysis is part of QC operations

Preparatory Phase: October 2004 - April 2005



Execution Phase: Start April 2005

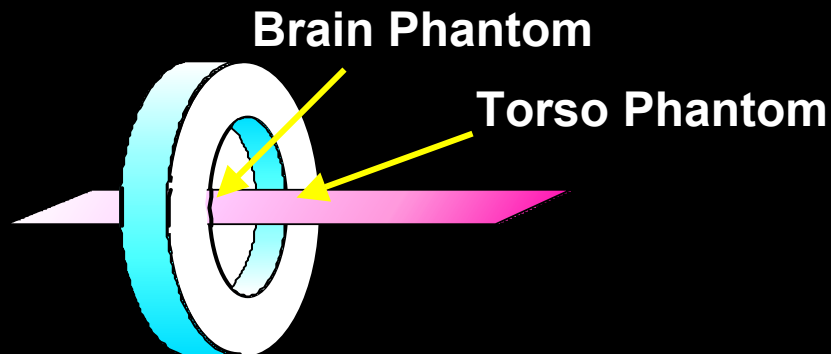


Phantom Imaging

Hoffman brain phantom shipped to sites

Sites will need to image this phantom with a “torso phantom” - a cylinder, ≥ 20 cm, provided by each site, radioactivity as a dilute F-18 solution

Depending on results, may require an additional phantom



PET Protocol

Tracer Injection

4 Hour fast

Blood glucose measurement, must be ≤ 180

Injection of 5 ± 0.5 mCi of FDG

Incorporation period of 30 minutes during which subject is in a quiet darkened room with eyes and ears unoccluded

PET Protocol

Data Acquisition

30 minute acquisition - 6 X 5 min frames

5 minute transmission scan

3D protocol with standard attenuation and scatter corrections

Iterative reconstructions with Fourier rebinning

No requirement for local reading of scan

PET Protocol

Quantitative Substudy

Dynamic data collection begins at injection:

**1x12, 8x2, 2x10, 1x12, 1x30, 2x60, 2x90, 1x210,
2x300, 1x600, 6x300**

5 Venous blood samples (8, 12, 20, 25, 45 min)

Blood glucose measured

Samples spun, plasma counted in well counter

**Calibration standard between well counter and
PET**

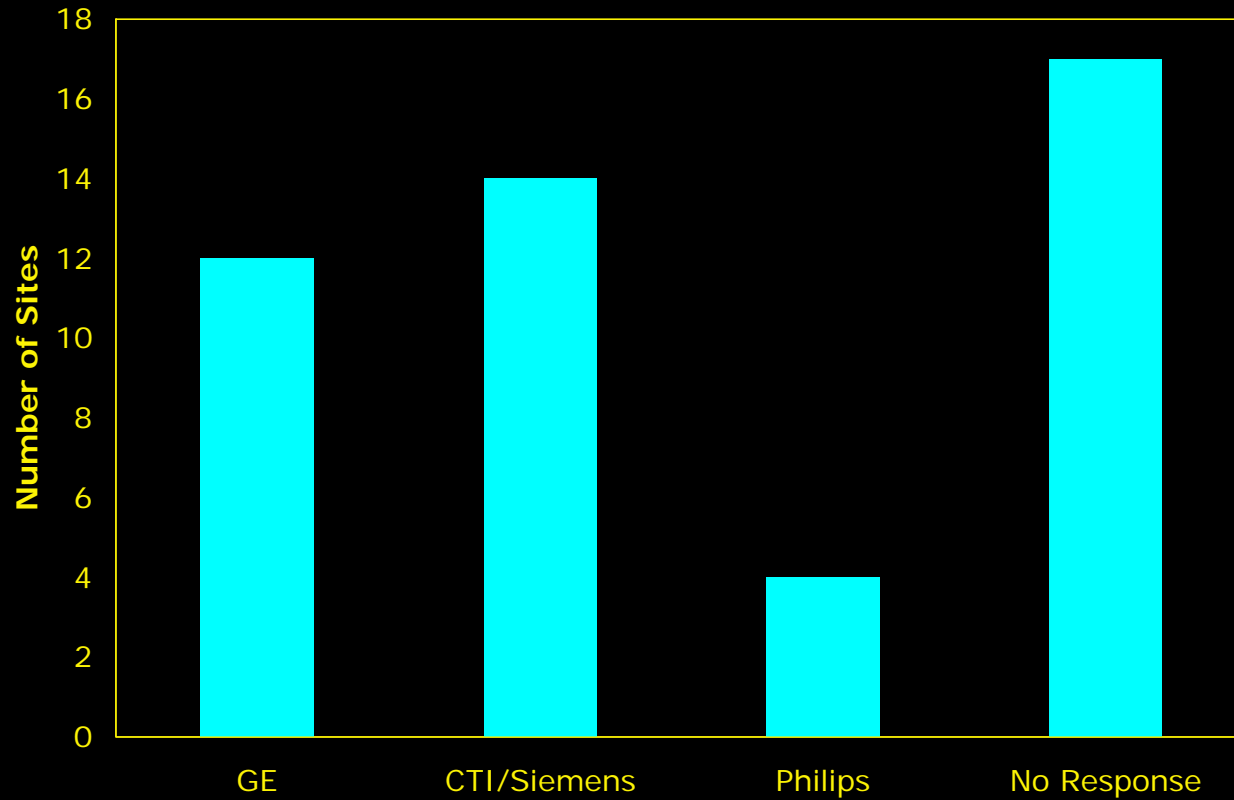
Radiation Dosimetry

Target Organ = Bladder wall (0.32 rad/mCi)
5 mCi injection/study - 1.6 rad/study

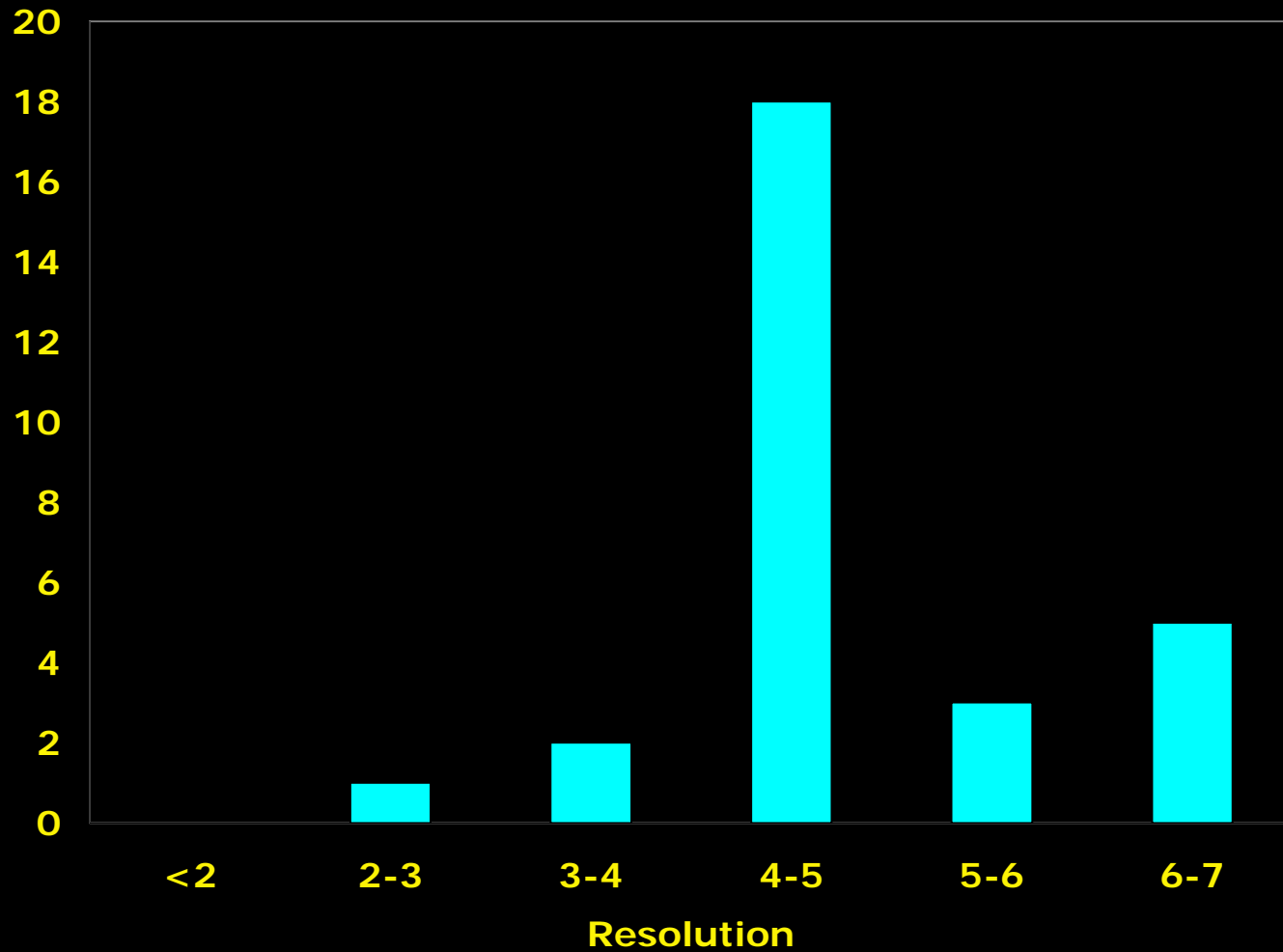
	Number of Studies	Total Bladder Dose
Controls	5	8 rad
MCI	6	9.6 rad
Alzheimer's	4	6.4 rad

FDA Guidelines: 15 rad total dose commitment

Vendors by Site



Instrument Resolution (x-y) By Site



Next Steps

Finalize PET sites

IRB submission by each site

Radiation Use

Radiopharmaceutical committees

Begin Phantom Imaging

Develop site-specific corrections

Pilot and troubleshoot acquisition and data transfer