

Institution 1

Human subjects: Patients with mild cognitive impairment without a diagnosis of Alzheimer's disease (4 males, 1 female; average age of 73.4 ± 10.7 years) were enrolled for PET/CT followed by same-day PET/MRI studies.

CT data acquisition: Non-contrast studies were performed using the following acquisition parameters: voltage: 120 kVp, tube current: 20 mA, slice thickness: 3.75 mm.

MRI data acquisition:

- 1) Three-dimensional gradient echo T1 (BRAVO): TR/TE = 7.9/3.0 msec, TI = 450 msec, flip angle = 12° , matrix size = 256 x 256, FOV = 25 x 25 cm, and slice thickness = 1 mm, which results in a voxel size of 1.0x1.0x1.0 mm.
- 2) Axial MR attenuation correction acquisition: TE1/TE2/TR = 1.2/2.3/5.2 msec, flip angle = 5° , matrix size = 256 x 128, slice thickness = 5.2 mm, NEX = 0.7.
- 3) Zero echo time (ZTE): TR/TE = 404/0, flip angle = 1° , matrix size = 110 x 110, FOV = 25 x 25 cm, slice thickness = 2.4 mm, NEX = 4, acquisition time = 21 seconds.

PET data acquisition: ^{18}F -florbetapir (Amyvid, AV-45, Eli Lilly) was administered with an average dose of 344.84 ± 51.8 MBq (9.32 ± 1.4 mCi). The average delay between injection and imaging was 108.4 ± 12.5 minutes. Emission data were acquired for 15 minutes. The images were reconstructed with the vendor-provided time-of-flight, OSEM algorithm with 2 iterations and 28 subsets. A matrix size of 256×256 was used.

Institution 2

Human subjects: Patients with mild cognitive impairment without a diagnosis of Alzheimer's disease (2 males, 3 females; average age of 75.8 ± 5.7 years) were enrolled for PET/CT (Siemens Biograph mCT) and PET/MRI. PET/MR scans were acquired 7.6 ± 31.2 days (range -17 to 62 days) after PET/CT scans.

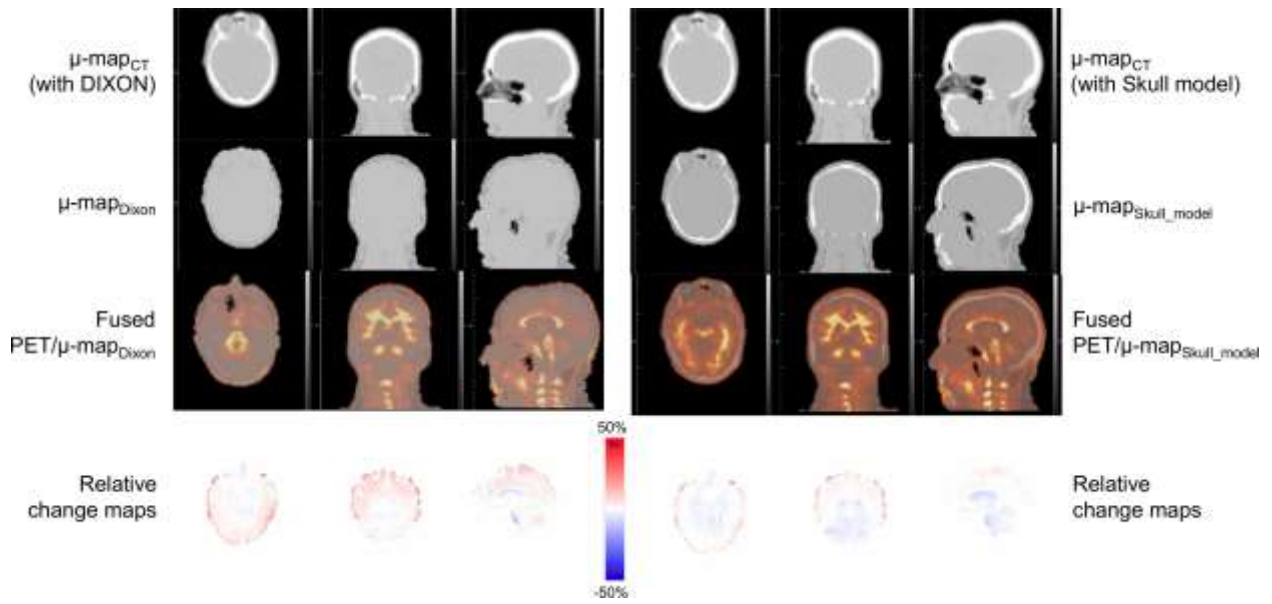
CT data acquisition: Non-contrast studies were performed using the following acquisition parameters: voltage: 120 kVp, tube current: 25 mA, 19.2 mm collimation, slice thickness: 3.0 mm.

MRI data acquisition:

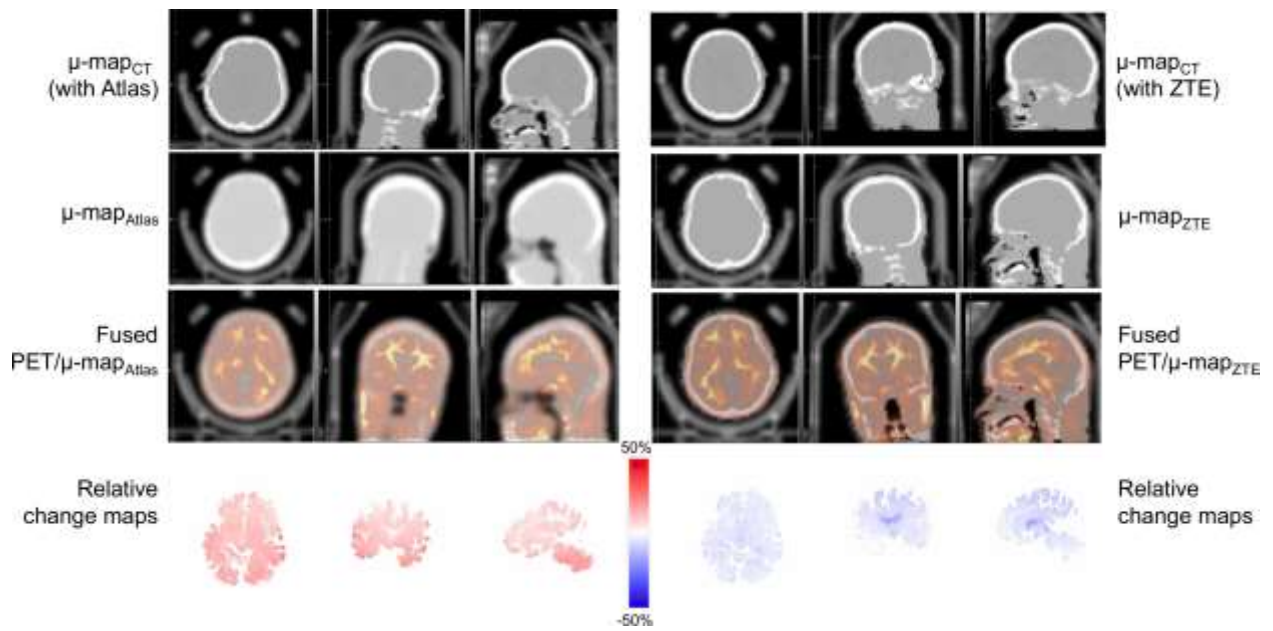
- 1) Sagittal three-dimensional Magnetization Prepared Rapid Gradient Echo (MPRAGE): TR/TE = 2300/2.95 msec, TI = 900 msec, flip angle = 9°, matrix size = 240 x 256, FOV = 25.3 x 27 cm, and slice thickness = 1.2 mm, which results in a voxel size of 1.0547×1.0547×1.2 mm.
- 2) Coronal MR attenuation correction acquisition (DIXON): TE1/TE2/TR = 1.23/2.46/3.56 msec, flip angle = 10°, matrix size = 192 x 126, slice thickness = 3.12 mm.
- 3) Coronal MR attenuation correction acquisition (CAIPIRINHA): TE1/TE2/TR = 1.28/2.51/4.14 msec, flip angle = 10°, matrix size = 384 x 204, slice thickness = 2.02 mm.

PET data acquisition: ¹⁸F-florbetapir (Amyvid, AV-45, Eli Lilly) was administered with an average dose of 361 ± 27.6 MBq (9.76 ± 0.75 mCi). The average delay between injection and imaging was 50 minutes. Emission data were acquired for 15 minutes. Images were reconstructed with the vendor-provided, 3D-OSEM algorithm with 3 iterations and 24 subsets, 4mm post-reconstruction Gaussian filter size on 256 × 256 matrix size and 2.03 mm slice thickness.

Supplemental Figure 1: Attenuation maps, corresponding PET images, fused images and voxel-wise percent difference maps for a representative subject scanned on the Siemens Biograph mMR.



Supplemental Figure 2: Attenuation maps, corresponding PET images, fused images and voxel-wise percent difference maps for a representative subject scanned on the GE Signa PET/MRI.



Supplemental Table 1: Percentage of voxels with an absolute relative difference smaller than 10% between the PET images obtained using the four attenuation map generation methods and those generated using the reference CT-based approach for all 10 subjects included in the analysis. Values greater than 90% are needed to satisfy QC#2.

Siemens Biograph mMR		GE SIGNA PET/MRI	
DIXON	Skull Model	ATLAS	ZTE
88.5	94.7	93.8	96.5
82.5	92.9	67.4	97.5
79.5	97.5	39.3	96.6
87.8	96.1	89.3	98.9
87.7	96.7	97.1	98.1