SUPPLEMENT

Supplementary Materials and Methods

Participants

One hundred thirty-six consecutive patients with cognitive impairment (70 patients with mild cognitive impairment [MCI] and 66 patients with Alzheimer's disease [AD]) who visited a memory clinic and underwent brain 3T MRI between April 2020 and June 2021 were included in this study. The clinical diagnosis was confirmed by a neurologist with 15 years of experience or a psychiatrist with 21 years of experience. Diagnoses were based on the National Institute of Neurological and Communicative Disorders and Stroke and the Alzheimer's Disease and Related Disorders Association (NINCDS-ADRDA) Alzheimer's criteria [1,2] and the Diagnostic and Statistical Manual of Mental Disorders (DSM) 4th edition criteria. Of these, we excluded patients according to the following criteria: 1) aged younger than 55 years, 2) other confirmed types of dementia, 3) brain volume changes due to intracranial lesions, and 4) poor quality images. Finally, 50 patients with MCI (21 males and 29 females; mean age, 71.0 years) and 47 patients with AD (8 male and 39 female; mean age, 77.9 years) were included in this study as patients with cognitive impairment. A control group was also included from the image databases of 130 healthy individuals who underwent brain MRI for medical check-ups at a health-screening center during the same period. Among them, those who met the following criteria were excluded from the control group: 1) age < 55 years, 2) previous medical history of neurological or psychiatric symptoms, and 3) poor image quality. Accordingly, 48 healthy elderly individuals (26 male and 22 female; mean age, 60.8 years) were included. As a result, 145 participants from a single medical center (SMC) were included in this study. Additionally, to better ensure the generalizability of this study, we included 130 participants from the Alzheimer's Disease Neuroimaging Initiative (ADNI) dataset [3], which consists of different MRI scanners (different MRI vendors), sequences (inversion recovery spoiled gradient-echo [IR-SPGR]), and magnetic field strengths (1.5T Siemens, 3T GE, and 3T Phillips). The ADNI dataset *used in the preparation of this article were obtained from the Alzheimer's Disease Neuroimaging Initiative (ADNI) database (adni.loni.usc.edu). The ADNI was launched in 2003 as a public-private partnership, led by Principal Investigator Michael W. Weiner, MD. The primary goal of ADNI has been to test whether serial magnetic resonance imaging (MRI), positron emission tomography (PET), other biological markers, and clinical and neuropsychological assessment can be combined to measure the progression of mild cognitive impairment (MCI) and early Alzheimer's disease (AD)*. The ADNI data also consisted of normal cognition, MCI, and AD groups. The flow diagram in Figure 1, Table 1, and Supplementary Table 1 provides the inclusion and exclusion criteria and demographic information of the study population.

Magnetic Resonance Volumetry

The NeuroQuant (NQ) algorithm includes the following: 1) a quality check step to determine whether the MR image sequence complies with the specifications required to perform automatic parcellation, 2) rectification for gradient nonlinearity [4] and B1 field inhomogeneity [5], 3) stripping of the scalp, skull, and meninges, and 4) data conversion using discrete cosine nonlinear registration to a probabilistic atlas tailored for labeling the anatomy [6]. The NQ algorithm assigns a neuroanatomical tag to each voxel based on its position in the atlas during the parcellation process, and repeatedly checks each voxel to maximize the probability that it belongs to a labeled structure [6,7].

The deep convolutional neural network (CNN) of the DeepBrain (DB) is a 2.5-channel high-ResNet architecture without a stride or pooling layer. Of the 22 residual blocks used in the segmentation network, the first four blocks use a standard convolutional layer with a 3 x 3 kernel without a stride. The remaining 18 residual blocks use atrous convolution layers, which can expand the field of view (FOV). The FOV size can be obtained even with the same number of weight parameters [8]. DB developers trained a deep CNN using FreeSurfer (FS) segmentation mask corrected by anatomy experts as an output corresponding to preprocessed (resampling, resizing, intensity normalization) 3D-T1 weighted image (T1WI) (input). Therefore, when 3D-T1WI is uploaded to the DB, the image preprocessing mentioned above is performed and the estimated segmentation mask of 82 brain regions [8] is calculated within 1 min through the analysis of the already trained CNN.

Following parcellation, the analyzed results obtained from the two commercial software programs (NQ and DB) were

displayed as volume data of each brain region, which were expressed in numbers and various color-coded overlaid images, with each color indicating a specific brain structure (Fig. 2). Each software program generates numeric reports with the volumes of multiple brain regions as a percentage of intracranial volume, which are modified according to head size, thereby allowing comparisons between individuals. The volume results analyzed in both software programs are compared with age- and sex-matched data controls stored in the database of each software; thus, the result is also provided as a normative percentile. The total processing time of the NQ and DB software was approximately 10 minutes and approximately 1–2 minutes per one sagittal T1-MPRAGE image, respectively.

FS is also used for brain segmentation as the silver standard ground truth of two commercial software programs. Volumetric segmentation was performed with structural images using a fully automated pipeline in FreeSurfer 7.2 (https://surfer.nmr.mgh.harvard.edu) [9,10]. The structural images were resampled to 1 mm isovoxels using Advanced Normalization Tools (ANTs: https://github.com/ANTsX/ANTs) [11]. The processing step with FS includes N4 bias correction, intensity normalization, skull stripping, removal of non-brain tissue, automated Talairach transformation, cortical and subcortical segmentation of white matter (WM) and gray matter (GM), and tessellation of the GM WM boundary and pial surface using continuity information and image intensities from the structural volume. The Desikan–Killiany atlas was applied to the parcellate and a neuroanatomical label was assigned to each location on a cortical volume [12]. Manual editing was performed by experts to correct for any poor GM or WM segmentation.

Supplementary Results

Volume of Segmented Brain Regions

The mean volumes of the cortical gray matter and cerebellum were larger in NQ than in DB. Among these two areas, the cortical GM was the area where the difference between the mean volume of FS and the mean volume of DB was smaller than that of FS and NQ. Conversely, the cerebellum had the smallest difference in mean volume between FS and NQ in the two datasets. The mean volumes of the caudate, putamen, pallidum, hippocampus, and cerebral WM in the DB were larger than those in the NQ. Among these, the regions where the mean volume difference between FS and DB was smaller in the two datasets than that between FS and NQ were the caudate, pallidum, and cerebral WM volume. Conversely, the putamen was the region where the mean volume difference between FS and NQ was smaller in the SMC and ADNI data than in FS and DB. There was no significant difference in the mean volume between NQ and DB in the left thalamus in the SMC dataset and the left amygdala, right putamen, and cerebral WM in the ADNI dataset. There was no significant difference in the mean volume of the TICV between NQ and FS in either the SMC or ADNI dataset.

In terms of comparing the measured volumes of the two datasets (SMC and ADNI), the mean volume of TICV from DB was slightly larger than those from NQ and FS in the SMC dataset, but the mean volume of TICV from DB was slightly smaller than that of other software measurements in the ADNI dataset. However, the mean volume difference in the TICV between FS and NQ was smaller than that between FS and DB in the two datasets. Except for TICV estimated by the three software programs, all other regional brain volumes maintained a constant size relationship between the two datasets (Fig. 3). Nevertheless, compared to our SMC data, the cortical GM difference between each software was smaller in the ADNI dataset (Supplementary Table 3).

The measurements of the three software programs, except for some measurements of the putamen, amygdala, thalamus, total cerebral WM, and TICV, showed medium to large effect sizes ($0.73 < d < 5.51$) in most brain regions (Supplementary Table 10). In DB and NQ, the pallidum and cortical GM revealed the largest effect sizes among several analyzed brain region volumes in the two datasets: the effect sizes of the pallidum were 3.70–4.92 in the SMC data and 3.66–3.86 in the ADNI data, and those of the cortical GM were 4.52–4.76 in the SMC and 2.85–2.93 in the ADNI data, respectively. In the two datasets, the brain regions with smaller effect sizes between DB and FS than those between NQ and FS were the cortical GM, caudate, pallidum, and amygdala. Conversely, brain regions with larger effect sizes between DB and FS than between NQ and FS were the putamen, cerebellum, and TICV in the SMC and ADNI datasets.

Normative Percentiles of Segmented Brain Regions

Regarding the comparison of the N% of the two datasets (SMC and ADNI), almost all regional brain N% values derived from the two software programs maintained a constant size relationship (Fig. 5). However, there was a marked decrease in the mean N% at the cerebral cortical GM in the ADNI data compared with that in the SMC data. This may be explained by the smaller mean volume difference in the cortical GM between each software program in the ADNI data than in the SMC data, as described above.

To analyze the correlation between the visual rating scale and N% of the hippocampus and cortical GM, two neuroradiologists (with 12 and 13 years of experience in neuroradiology) who were blinded to the clinical diagnosis of the two datasets measured the medial temporal atrophy (MTA) [13] and global cortical atrophy (GCA) scales [14]. Interobser ver agreement for the visual rating scale was substantial for MTA (weighted kappa coefficient: 0.75 [SMC data], 0.73 [ADNI data]) and GCA (weighted kappa coefficient: 0.69 [SMC data], 0.65 [ADNI data]). Spearman's rank correlation analysis was also performed for the mean of the visual rating scale measured by the two reviewers (mean MTA, mean GCA) and N% of the hippocampus and cortical GM.

Even though there were marked differences in N% between the two software programs, the visual rating scale (mean MTA scale, mean GCA scale) and N% (total hippocampus, total cerebral cortical GM) of each software were highly correlated ($p < 0.001$) (Supplementary Table 23). There was a tendency toward a higher correlation between the N% of cortical GM from DB and GCA compared to those of NQ and GCA in the two datasets (Supplementary Table 23). Supplementary Figure 7 (scatter plots with regression lines) shows the correlation between the visual rating scale and N%.

Regarding the diagnostic performance of N% for discriminatory power of the clinical diagnosis, the N% of the cortical GM of both software programs showed significantly higher areas under the receiver operating characteristic curve (AUCs) than visual ratings (GCA) in the ADNI data (Supplementary Table 24). The AUC of hippocampal N% derived from both software programs showed a tendency to be higher than that of MTA, but the difference did not reach statistical significance ($p > 0.05$) according to Delong's test. In general, the discriminatory power of N% for the hippocampus and cortical GM derived from the two software programs was almost the same as the AUC value.

Subgroup Analysis of the Single Medical Center and ADNI Data

The Volume of Segmented Brain Regions in the Three Subgroups

A similar overall pattern was observed when the three subgroups of 1.5T Siemens, 3T GE, and 3T Phillips (only in ADNI data) and normal participants and patients with MCI and AD in both datasets were analyzed individually (Supplementary Tables 4-16 and Supplementary Figs. 1-3).

In the Bland–Altman analysis, the overall trends of all subgroups were almost identical to the total dataset trend (Supplementary Figs. 1-3). There were also overall similar relationships among the three software volume results in all subgroups, according to the reproducibility coefficient (RC) (Supplementary Tables 7-9) and effect size (Supplementary Tables 11-13), compared with their total data (either SMC or ADNI data). However, even though there was a general tendency for RC, effect size, and mean volume difference in TICV, which demonstrated closer values to FS in NQ compared with DB, only the 3T GE subgroups showed the opposite trend in TICV. In addition, contrary to the overall tendency of effect size in total cerebral WM in the other two vendor subgroups, which demonstrated closer values to those of FS in DB than in NQ, the 1.5T Siemens subgroup showed a reversed trend for total cerebral WM.

Repeated measures ANOVA showed significant differences in the three software programs in most brain regions ($p < 0.05$) in the SMC and ADNI datasets, even in the normal participant group. Nevertheless, there were newly detected brain regions that revealed no statistically significant differences in the subgroup analysis of the two datasets. In the SMC dataset, there were subgroups in which the measured volumes of the amygdala and cerebral WM did not differ significantly. In the ADNI dataset, there were subgroups with no significant differences in the measured volumes of the cerebellum, thalamus, amygdala, putamen, cerebral WMs, and TICV (Supplementary Tables 4-6).

Notably, although there was an overall tendency toward a mean TICV size order in other vendor subgroups (FS > NQ > DB) in the ADNI data, the largest TICV volume was derived from NQ and the smallest TICV volume was derived from FS in the 3T GE subgroup (NQ > DB > FS) (Supplementary Table 5). Other exceptions that seemed to correlate with previous effective size analyses were found in the mean cerebral WM volume of the ADNI subgroup (1.5T Siemens). Although there was a size order tendency of measured cerebral WM volume between the three software in a total of two datasets (FS > DB > NQ), the largest cerebral WM volume was derived from NQ in the 1.5T Siemens subgroup (NQ > FS > DB) (Supplementary Tables 4-6).

Similar to the results for the total study population, the ICC revealed a broad range of agreement (-0.0002 < ICC < 0.99; poor to excellent agreement) in all subgroups of the two different datasets (Supplementary Tables 14-16). Similar exceptions were found in the ICC analysis of the ADNI subgroup (3T GE) to those in the RC analysis; specifically, the ICC of FS and DB was higher than that of FS and NQ in the 3T GE subgroup of TICV.

Normative Percentiles of Segmented Brain Regions in Three Subgroups

In the subgroup analysis of two different datasets, the pattern revealed in the total study population was substantially maintained to be the same (Supplementary Tables 17-19). Additionally, in the Bland–Altman analysis, the general trends of all subgroups were almost identical to their two total dataset trends (Supplementary Figs. 4-6). In particular, the hippocampus and cortical GM, which were significantly correlated with cognitive function and disease progression, showed significantly greater NQ than DB in all subgroups (including clinical diagnosis subgroups of two datasets and vendor subgroups from the ADNI data).

Regarding the ICC of the normal percentile (Supplementary Tables 20-22), the trends shown in the total study population were almost identical in all subgroups of both datasets.

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Supplementary Table 1. Demographic Data of Study Population in ADNI Dataset (Vendor Subgroup)*

Characteristics	1.5T Siemens	3T GE	3T Phillips
Number	43	47	40
Age, year	77.77 ± 4.98	76.38 ± 8.46	74.80 ± 7.32
Sex			
Female	21 (48.84)	22 (46.81)	22 (55.00)
Male	22 (51.16)	25 (53.19)	18 (45.00)
MMSE score	26.60 ± 2.63	25.49 ± 5.34	26.75 ± 3.81
CDR (MCI and, AD only)	0.40 ± 0.32	0.50 ± 0.50	0.43 ± 0.36
Diagnosis			
NL	14 (32.56)	15 (31.91)	14 (35.00)
MCI	19 (44.19)	15 (31.91)	15 (37.50)
AD	10 (23.26)	17 (36.17)	11 (27.50)

*The data are reported as the mean ± standard deviation or the number of patients with % in parentheses. AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, CDR = clinical dementia rating, MCI = mild cognitive impairment, MMSE = Mini-Mental State Examination, NL = normal elderly participants

Supplementary Table 2. MR Imaging Parameters for Sagittal T1–Weighted Volume Images of the Study Population

Parameter	3T Siemens (Single Medical Center)	1.5T Siemens (ADNI)	3T GE (ADNI)	3T Phillips (ADNI)
Sequence	MPRAGE	MPRAGE	IR-SPGR	MPRAGE (SENS2)
Repetition time, ms	2300	2400	6.96	6.76
Echo time, ms	2.98	3.54	2.83	3.11
Flip angle, degree	9	8	11	9
Section thickness, mm	1.2	1.2	1.2	1.2
Field of view, mm^2	250 x 250	240 x 240	256 x 256	256 x 256
Matrix	256 x 256	192 x 192	256 x 256	256 x 256

ADNI = Alzheimer's Disease Neuroimaging Initiative, IR-FSPGR = inversion recovery spoiled gradient-echo, MPRAGE = magnetization-prepared rapid gradient-echo

Supplementary Table 3. Volume Measurements Analyzed by the Three Software Programs and Results of Repeated Measures ANOVA of SMC and ADNI Data

	Lt. Hemisphere						Rt. Hemisphere					
	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)
Cortical GM												
SMC	229.24 ± 2.46	182.11 ± 1.75	189.76 ± 1.87	< 0.001	< 0.001	< 0.001	232.93 ± 2.54	184.02 ± 1.75	191.47 ± 1.85	< 0.001	< 0.001	< 0.001
ADNI	218.82 ± 2.36	192.00 ± 1.83	198.80 ± 2.03	< 0.001	< 0.001	< 0.001	220.72 ± 2.34	191.96 ± 1.76	200.21 ± 1.98	< 0.001	< 0.001	< 0.001
Caudate												
SM	2.50 ± 0.04	3.28 ± 0.04	3.14 ± 0.04	< 0.001	< 0.001	< 0.001	2.65 ± 0.04	3.44 ± 0.04	3.14 ± 0.04	< 0.001	< 0.001	< 0.001
ADNI	2.70 ± 0.05	3.37 ± 0.04	3.16 ± 0.05	< 0.001	< 0.001	< 0.001	2.80 ± 0.05	3.51 ± 0.05	3.30 ± 0.05	< 0.001	< 0.001	< 0.001
Putamen												
SMC	4.67 ± 0.06	5.07 ± 0.06	4.21 ± 0.06	< 0.001	< 0.001	< 0.001	4.60 ± 0.05	4.92 ± 0.05	4.33 ± 0.06	< 0.001	< 0.001	< 0.001
ADNI	4.83 ± 0.06	4.99 ± 0.06	3.88 ± 0.06	0.002	< 0.001	< 0.001	4.67 ± 0.06	4.76 ± 0.05	3.97 ± 0.05	0.235*	< 0.001	< 0.001
Pallidum												
SMC	0.57 ± 0.01	1.32 ± 0.02	1.86 ± 0.02	< 0.001	< 0.001	< 0.001	0.54 ± 0.01	1.36 ± 0.01	1.84 ± 0.02	< 0.001	< 0.001	< 0.001
ADNI	0.51 ± 0.01	1.37 ± 0.02	1.84 ± 0.02	< 0.001	< 0.001	< 0.001	0.49 ± 0.01	1.32 ± 0.02	1.75 ± 0.02	< 0.001	< 0.001	< 0.001
Thalamus												
SMC	6.58 ± 0.07	6.50 ± 0.06	5.96 ± 0.06	0.066*	< 0.001	< 0.001	6.69 ± 0.07	6.14 ± 0.05	6.08 ± 0.06	< 0.001	0.018	< 0.001
ADNI	6.99 ± 0.08	6.60 ± 0.06	6.14 ± 0.06	< 0.001	< 0.001	< 0.001	6.76 ± 0.08	6.11 ± 0.05	5.93 ± 0.05	< 0.001	0.018	< 0.001
Amygdala												
SMC	1.52 ± 0.03	1.45 ± 0.02	1.39 ± 0.03	< 0.001	< 0.001	< 0.001	1.46 ± 0.02	1.60 ± 0.02	1.55 ± 0.03	< 0.001	< 0.001	< 0.001
ADNI	1.33 ± 0.03	1.30 ± 0.02	1.16 ± 0.02	0.097*	< 0.001	< 0.001	1.30 ± 0.02	1.43 ± 0.02	1.37 ± 0.03	< 0.001	< 0.001	< 0.001
Hippocampus												
SMC	3.36 ± 0.07	3.96 ± 0.06	3.63 ± 0.05	< 0.001	< 0.001	< 0.001	3.51 ± 0.07	4.22 ± 0.05	3.82 ± 0.06	< 0.001	< 0.001	< 0.001
ADNI	2.90 ± 0.05	3.51 ± 0.06	3.26 ± 0.05	< 0.001	< 0.001	< 0.001	2.97 ± 0.06	3.67 ± 0.06	3.40 ± 0.05	< 0.001	< 0.001	< 0.001
Cerebellum												
SMC	60.72 ± 0.55	55.15 ± 0.50	59.03 ± 0.54	< 0.001	< 0.001	< 0.001	60.36 ± 0.57	55.79 ± 0.56	59.05 ± 0.62	< 0.001	< 0.001	< 0.001
ADNI	61.60 ± 0.60	58.43 ± 0.57	63.62 ± 0.60	< 0.001	< 0.001	< 0.001	60.88 ± 0.59	59.10 ± 0.58	63.16 ± 0.62	< 0.001	< 0.001	< 0.001
Cerebral WM												
SMC	201.52 ± 2.51	209.33 ± 2.43	215.76 ± 2.47	< 0.001	< 0.001	< 0.001	205.88 ± 2.54	211.91 ± 2.48	215.91 ± 2.47	< 0.001	< 0.001	< 0.001
ADNI	209.78 ± 2.26	211.70 ± 2.18	217.85 ± 2.19	0.379*	< 0.001	< 0.001	212.51 ± 2.67	213.55 ± 2.17	217.90 ± 2.16	1.000*	< 0.001	0.005
Total cortical GM												
SMC	462.17 ± 4.96	366.14 ± 3.47	381.23 ± 3.68	< 0.001	< 0.001	< 0.001						
ADNI	439.55 ± 4.65	383.96 ± 3.54	399.00 ± 3.96	< 0.001	< 0.001	< 0.001						
Total cerebral WM												
SMC	407.40 ± 5.03	421.24 ± 4.90	431.67 ± 4.92	< 0.001	< 0.001	< 0.001						
ADNI	422.02 ± 4.89	425.24 ± 4.33	435.75 ± 4.33	0.775*	< 0.001	< 0.001						
TICV												
SMC	1371.68 ± 11.69	1404.40 ± 11.58	1366.75 ± 12.31	< 0.001	< 0.001	0.78*						
ADNI	1513.31 ± 13.82	1470.93 ± 11.40	1504.96 ± 13.26	< 0.001	< 0.001	0.653*						

Data are mean ± SE. The overall *p* value of the repeated measures ANOVA among the three groups was less than 0.01 for all analysis values; they are not listed in the table so as not to impair readability. Bonferroni correction for multiple comparisons was applied for all *P* values of pairwise comparison (between two software programs). *Not statistically significant. ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, NQ = NeuroQuant, SE = standard error, SMC = single medical center, TICV = total intracranial volume, WM = white matter

Supplementary Table 4. Volume Measurements Analyzed by the Three Software Programs and Results of Repeated measures ANOVA of SMC and Subgroups

	Lt. Hemisphere						Rt. Hemisphere					
	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)
Cortical GM												
SMC	229.24 ± 2.46	182.11 ± 1.75	189.76 ± 1.87	< 0.001	< 0.001	< 0.001	232.93 ± 2.54	184.02 ± 1.75	191.47 ± 1.85	< 0.001	< 0.001	< 0.001
NL	255.40 ± 3.36	199.30 ± 2.62	208.67 ± 2.67	< 0.001	< 0.001	< 0.001	260.41 ± 3.62	201.39 ± 2.65	210.26 ± 2.72	< 0.001	< 0.001	< 0.001
MCI	222.70 ± 3.34	178.29 ± 2.44	185.59 ± 2.62	< 0.001	< 0.001	< 0.001	227.25 ± 3.20	180.45 ± 2.32	187.95 ± 2.41	< 0.001	< 0.001	< 0.001
AD	209.47 ± 3.05	168.63 ± 2.20	174.89 ± 2.35	< 0.001	< 0.001	< 0.001	210.93 ± 3.00	170.10 ± 2.21	176.03 ± 2.23	< 0.001	< 0.001	< 0.001
Caudate												
SMC	2.50 ± 0.04	3.28 ± 0.04	3.14 ± 0.04	< 0.001	< 0.001	< 0.001	2.65 ± 0.04	3.44 ± 0.04	3.14 ± 0.04	< 0.001	< 0.001	< 0.001
NL	2.57 ± 0.07	3.43 ± 0.07	3.35 ± 0.07	< 0.001	< 0.001	< 0.001	2.76 ± 0.08	3.55 ± 0.07	3.41 ± 0.06	< 0.001	< 0.001	< 0.001
MCI	2.40 ± 0.07	3.19 ± 0.07	3.04 ± 0.07	< 0.001	< 0.001	< 0.001	2.54 ± 0.07	3.34 ± 0.07	3.03 ± 0.07	< 0.001	< 0.001	< 0.001
AD	2.54 ± 0.08	3.21 ± 0.07	3.02 ± 0.07	< 0.001	< 0.001	< 0.001	2.65 ± 0.08	3.42 ± 0.07	2.99 ± 0.07	< 0.001	< 0.001	< 0.001
Putamen												
SMC	4.67 ± 0.06	5.07 ± 0.06	4.21 ± 0.06	< 0.001	< 0.001	< 0.001	4.60 ± 0.05	4.92 ± 0.05	4.33 ± 0.06	< 0.001	< 0.001	< 0.001
NL	5.20 ± 0.08	5.59 ± 0.86	4.75 ± 0.08	< 0.001	< 0.001	< 0.001	5.06 ± 0.08	5.45 ± 0.08	4.87 ± 0.08	< 0.001	< 0.001	< 0.001
MCI	4.54 ± 0.08	4.91 ± 0.08	4.11 ± 0.07	< 0.001	< 0.001	< 0.001	4.51 ± 0.07	4.76 ± 0.07	4.24 ± 0.07	< 0.001	< 0.001	< 0.001
AD	4.27 ± 0.09	4.69 ± 0.08	3.76 ± 0.09	< 0.001	< 0.001	< 0.001	4.22 ± 0.08	4.56 ± 0.08	3.86 ± 0.09	< 0.001	< 0.001	< 0.001
Pallidum												
SMC	0.57 ± 0.01	1.32 ± 0.02	1.86 ± 0.02	< 0.001	< 0.001	< 0.001	0.54 ± 0.01	1.36 ± 0.01	1.84 ± 0.02	< 0.001	< 0.001	< 0.001
NL	0.71 ± 0.02	1.40 ± 0.02	1.97 ± 0.03	< 0.001	< 0.001	< 0.001	0.67 ± 0.02	1.47 ± 0.02	1.92 ± 0.03	< 0.001	< 0.001	< 0.001
MCI	0.54 ± 0.02	1.26 ± 0.02	1.79 ± 0.03	< 0.001	< 0.001	< 0.001	0.54 ± 0.02	1.30 ± 0.02	1.78 ± 0.03	< 0.001	< 0.001	< 0.001
AD	0.44 ± 0.02	1.30 ± 0.03	1.83 ± 0.03	< 0.001	< 0.001	< 0.001	0.41 ± 0.02	1.31 ± 0.03	1.83 ± 0.04	< 0.001	< 0.001	< 0.001
Thalamus												
SMC	6.58 ± 0.07	6.50 ± 0.06	5.96 ± 0.06	0.066*	< 0.001	< 0.001	6.69 ± 0.07	6.14 ± 0.05	6.08 ± 0.06	< 0.001	0.018	< 0.001
NL	7.07 ± 0.11	7.10 ± 0.09	6.55 ± 0.09	1.000*	< 0.001	< 0.001	7.17 ± 0.11	6.61 ± 0.08	6.67 ± 0.09	< 0.001	0.438*	< 0.001
MCI	6.49 ± 0.10	6.35 ± 0.09	5.82 ± 0.09	0.187*	< 0.001	< 0.001	6.59 ± 0.10	6.01 ± 0.07	5.91 ± 0.08	< 0.001	0.010	< 0.001
AD	6.18 ± 0.11	6.04 ± 0.09	5.51 ± 0.09	0.082*	< 0.001	< 0.001	6.32 ± 0.11	5.79 ± 0.08	5.65 ± 0.09	< 0.001	0.002	< 0.001
Amygdala												
SMC	1.52 ± 0.03	1.45 ± 0.02	1.39 ± 0.03	< 0.001	< 0.001	< 0.001	1.46 ± 0.02	1.60 ± 0.02	1.55 ± 0.03	< 0.001	< 0.001	< 0.001
NL	1.78 ± 0.04	1.65 ± 0.03	1.72 ± 0.04	< 0.001	0.005	0.076*	1.68 ± 0.03	1.81 ± 0.03	1.87 ± 0.04	< 0.001	< 0.001	< 0.001
MCI	1.47 ± 0.04	1.44 ± 0.03	1.34 ± 0.04	0.233*	< 0.001	< 0.001	1.43 ± 0.04	1.59 ± 0.04	1.54 ± 0.05	< 0.001	0.026	< 0.001
AD	1.30 ± 0.04	1.28 ± 0.03	1.11 ± 0.04	0.772*	< 0.001	< 0.001	1.27 ± 0.03	1.41 ± 0.03	1.24 ± 0.04	< 0.001	< 0.001	0.973*
Hippocampus												
SMC	3.36 ± 0.07	3.96 ± 0.06	3.63 ± 0.05	< 0.001	< 0.001	< 0.001	3.51 ± 0.07	4.22 ± 0.05	3.82 ± 0.06	< 0.001	< 0.001	< 0.001
NL	4.08 ± 0.06	4.61 ± 0.06	4.21 ± 0.06	< 0.001	< 0.001	0.014	4.26 ± 0.06	4.81 ± 0.06	4.40 ± 0.06	< 0.001	< 0.001	0.006
MCI	3.29 ± 0.09	3.90 ± 0.08	3.50 ± 0.08	< 0.001	< 0.001	< 0.001	3.43 ± 0.09	4.15 ± 0.07	3.73 ± 0.07	< 0.001	< 0.001	< 0.001
AD	2.71 ± 0.08	3.37 ± 0.07	3.18 ± 0.06	< 0.001	< 0.001	< 0.001	2.83 ± 0.08	3.69 ± 0.07	3.32 ± 0.08	< 0.001	< 0.001	< 0.001
Cerebellum												
SMC	60.72 ± 0.55	55.15 ± 0.50	59.03 ± 0.54	< 0.001	< 0.001	< 0.001	60.36 ± 0.57	55.79 ± 0.56	59.05 ± 0.62	< 0.001	< 0.001	< 0.001
NL	65.21 ± 0.89	59.38 ± 0.77	63.49 ± 0.87	< 0.001	< 0.001	< 0.001	64.43 ± 0.84	60.14 ± 0.79	63.78 ± 0.89	< 0.001	< 0.001	0.049
MCI	59.48 ± 0.93	53.89 ± 0.83	57.46 ± 0.91	< 0.001	< 0.001	< 0.001	59.34 ± 0.90	54.96 ± 0.88	57.61 ± 1.01	< 0.001	< 0.001	< 0.001
AD	57.44 ± 0.65	52.16 ± 0.63	56.16 ± 0.65	< 0.001	< 0.001	< 0.001	57.28 ± 0.93	52.24 ± 0.90	55.74 ± 0.96	< 0.001	< 0.001	< 0.001
Cerebral WM												
SMC	201.52 ± 2.51	209.33 ± 2.43	215.76 ± 2.47	< 0.001	< 0.001	< 0.001	205.88 ± 2.54	211.91 ± 2.48	215.91 ± 2.47	< 0.001	< 0.001	< 0.001
NL	223.25 ± 3.90	229.92 ± 3.95	234.90 ± 4.03	< 0.001	< 0.001	< 0.001	227.90 ± 3.95	233.40 ± 4.03	234.87 ± 4.08	< 0.001	0.015	< 0.001
MCI	197.76 ± 3.62	204.62 ± 3.40	210.92 ± 3.62	< 0.001	< 0.001	< 0.001	201.81 ± 3.68	206.94 ± 3.47	211.31 ± 3.59	< 0.001	< 0.001	< 0.001
AD	183.32 ± 3.49	193.31 ± 3.48	201.36 ± 3.73	0.104*	< 0.001	0.001	187.71 ± 3.49	195.25 ± 3.49	201.43 ± 3.74	0.319*	< 0.001	0.018
Total cortical GM												
SMC	462.17 ± 4.96	366.14 ± 3.47	381.23 ± 3.68	< 0.001	< 0.001	< 0.001						
NL	515.81 ± 6.91	400.69 ± 5.21	418.93 ± 5.35	< 0.001	< 0.001	< 0.001						
MCI	449.94 ± 6.50	358.74 ± 4.73	373.53 ± 4.98	< 0.001	< 0.001	< 0.001						
AD	209.47 ± 3.05	168.63 ± 2.20	174.89 ± 2.35	< 0.001	< 0.001	< 0.001						
Total cerebral WM												
SMC	407.40 ± 5.03	421.24 ± 4.90	431.67 ± 4.92	< 0.001	< 0.001	< 0.001						
NL	451.16 ± 7.80	463.32 ± 7.94	469.77 ± 8.10	< 0.001	< 0.001	< 0.001						
MCI	399.58 ± 7.27	411.56 ± 6.85	422.23 ± 7.15	< 0.001	< 0.001	< 0.001						
AD	371.03 ± 6.93	388.56 ± 6.92	402.78 ± 7.43	< 0.001	< 0.001	< 0.001						
TICV												
SMC	1371.68 ± 11.69	1404.40 ± 11.58	1366.75 ± 12.31	< 0.001	< 0.001	0.780*						
NL	1439.10 ± 20.75	1458.94 ± 21.28	1423.54 ± 22.00	< 0.001	< 0.001	0.033*						
MCI	1349.07 ± 19.15	1387.23 ± 18.85	1350.65 ± 20.24	< 0.001	< 0.001	1.000*						
AD	1326.88 ± 17.29	1366.96 ± 17.80	1325.87 ± 19.49	< 0.001	< 0.001	1.000*						

Data are mean ± SE. The overall *p* value of the repeated measures ANOVA among the three groups was less than 0.02 for all analysis values; they are not listed in the table so as not to impair readability. Bonferroni correction for multiple comparisons was applied for all *P* values of pairwise comparison (between two software programs). *Statistically not significant. AD = Alzheimer's disease, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, SE = standard error, SMC = single medical center, TICV = total intracranial volume, WM = white matter

Supplementary Table 5. Volume Measurements Analyzed by the Three Software Programs and Results of Repeated Measures ANOVA of ADNI (Vendor Subgroup)

	Lt. Hemisphere						Rt. Hemisphere					
	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)
Cortical GM												
ADNI	218.82 ± 2.36	192.00 ± 1.83	198.80 ± 2.03	< 0.001	< 0.001	< 0.001	220.72 ± 2.34	191.96 ± 1.76	200.21 ± 1.98	< 0.001	< 0.001	< 0.001
3T GE	223.76 ± 4.12	198.15 ± 3.01	207.41 ± 3.31	< 0.001	< 0.001	< 0.001	224.19 ± 4.02	195.60 ± 2.92	207.22 ± 3.20	< 0.001	< 0.001	< 0.001
3T Phillips	225.91 ± 4.07	196.32 ± 3.09	203.21 ± 3.28	< 0.001	< 0.001	< 0.001	228.64 ± 4.11	197.40 ± 3.07	204.73 ± 3.41	< 0.001	< 0.001	< 0.001
1.5T Siemens	206.72 ± 3.43	181.12 ± 2.78	185.07 ± 3.03	< 0.001	< 0.001	< 0.001	209.48 ± 3.48	182.82 ± 2.73	188.19 ± 2.97	< 0.001	< 0.001	< 0.001
Caudate												
ADNI	2.70 ± 0.05	3.37 ± 0.04	3.16 ± 0.05	< 0.001	< 0.001	< 0.001	2.80 ± 0.05	3.51 ± 0.05	3.30 ± 0.05	< 0.001	< 0.001	< 0.001
3T GE	2.71 ± 0.10	3.31 ± 0.07	3.14 ± 0.09	< 0.001	0.003	< 0.001	2.77 ± 0.09	3.46 ± 0.08	3.30 ± 0.08	< 0.001	< 0.001	< 0.001
3T Phillips	2.69 ± 0.08	3.55 ± 0.09	3.24 ± 0.09	< 0.001	< 0.001	< 0.001	2.84 ± 0.10	3.66 ± 0.09	3.39 ± 0.11	< 0.001	< 0.001	< 0.001
1.5T Siemens	2.70 ± 0.08	3.28 ± 0.06	3.10 ± 0.06	< 0.001	< 0.001	< 0.001	2.80 ± 0.08	3.43 ± 0.07	3.22 ± 0.07	< 0.001	< 0.001	< 0.001
Putamen												
ADNI	4.83 ± 0.06	4.99 ± 0.06	3.88 ± 0.06	0.002	< 0.001	< 0.001	4.67 ± 0.06	4.76 ± 0.05	3.97 ± 0.05	0.235*	< 0.001	< 0.001
3T GE	4.80 ± 0.09	5.11 ± 0.09	3.85 ± 0.10	< 0.001	< 0.001	< 0.001	4.53 ± 0.12	4.83 ± 0.09	3.98 ± 0.08	0.006	< 0.001	< 0.001
3T Phillips	5.25 ± 0.10	5.06 ± 0.11	4.08 ± 0.10	0.004	< 0.001	< 0.001	5.12 ± 0.09	4.86 ± 0.11	4.19 ± 0.10	0.001	< 0.001	< 0.001
1.5T Siemens	4.48 ± 0.09	4.78 ± 0.09	3.71 ± 0.08	< 0.001	< 0.001	< 0.001	4.42 ± 0.08	4.58 ± 0.08	3.74 ± 0.08	0.003	< 0.001	< 0.001
Pallidum												
ADNI	0.51 ± 0.01	1.37 ± 0.02	1.84 ± 0.02	< 0.001	< 0.001	< 0.001	0.49 ± 0.01	1.32 ± 0.02	1.75 ± 0.02	< 0.001	< 0.001	< 0.001
3T GE	0.50 ± 0.02	1.47 ± 0.03	1.98 ± 0.04	< 0.001	< 0.001	< 0.001	0.48 ± 0.02	1.40 ± 0.03	1.89 ± 0.04	< 0.001	< 0.001	< 0.001
3T Phillips	0.57 ± 0.02	1.28 ± 0.03	1.85 ± 0.04	< 0.001	< 0.001	< 0.001	0.54 ± 0.02	1.30 ± 0.03	1.76 ± 0.03	< 0.001	< 0.001	< 0.001
1.5T Siemens	0.47 ± 0.02	1.35 ± 0.03	1.68 ± 0.03	< 0.001	< 0.001	< 0.001	0.45 ± 0.02	1.26 ± 0.02	1.59 ± 0.03	< 0.001	< 0.001	< 0.001
Thalamus												
ADNI	6.99 ± 0.08	6.60 ± 0.06	6.14 ± 0.06	< 0.001	< 0.001	< 0.001	6.76 ± 0.08	6.11 ± 0.05	5.93 ± 0.05	< 0.001	0.018	< 0.001
3T GE	7.12 ± 0.14	6.54 ± 0.10	6.08 ± 0.11	< 0.001	< 0.001	< 0.001	6.71 ± 0.17	6.06 ± 0.09	5.75 ± 0.10	< 0.001	< 0.001	< 0.001
3T Phillips	7.06 ± 0.14	7.06 ± 0.11	6.38 ± 0.10	< 0.001	< 0.001	< 0.001	6.82 ± 0.13	6.27 ± 0.10	6.13 ± 0.09	< 0.001	0.010	< 0.001
1.5T Siemens	6.78 ± 0.12	6.26 ±0.09	5.99 ± 0.09	< 0.001	< 0.001	< 0.001	6.75 ± 0.11	6.03 ± 0.08	5.93 ± 0.09	< 0.001	0.111*	< 0.001
Amygdala												
ADNI	1.33 ± 0.03	1.30 ± 0.02	1.16 ± 0.02	0.097*	< 0.001	< 0.001	1.30 ± 0.02	1.43 ± 0.02	1.37 ± 0.03	< 0.001	< 0.001	< 0.001
3T GE	1.33 ± 0.04	1.31 ± 0.03	1.19 ± 0.04	0.768*	< 0.001	< 0.001	1.30 ± 0.03	1.43 ± 0.03	1.42 ± 0.04	< 0.001	1.000*	< 0.001
3T Phillips	1.44 ± 0.05	1.45 ± 0.04	1.26 ± 0.04	1.000*	< 0.001	< 0.001	1.39 ± 0.04	1.59 ± 0.04	1.47 ± 0.05	< 0.001	< 0.001	< 0.001
1.5T Siemens	1.23 ± 0.04	1.17 ± 0.04	1.02 ± 0.04	0.010	< 0.001	< 0.001	1.22 ± 0.04	1.28 ± 0.04	1.22 ± 0.04	< 0.001	0.014	1.000*
Hippocampus												
ADNI	2.90 ± 0.05	3.51 ± 0.06	3.26 ± 0.05	< 0.001	< 0.001	< 0.001	2.97 ± 0.06	3.67 ± 0.06	3.40 ± 0.05	< 0.001	< 0.001	< 0.001
3T GE	3.10 ± 0.07	3.68 ± 0.08	3.46 ± 0.07	< 0.001	< 0.001	< 0.001	3.12 ± 0.09	3.81 ± 0.07	3.62 ± 0.07	< 0.001	< 0.001	< 0.001
3T Phillips	3.02 ± 0.09	3.76 ± 0.10	3.39 ± 0.09	< 0.001	< 0.001	< 0.001	3.16 ± 0.10	3.97 ± 0.10	3.57 ± 0.10	< 0.001	< 0.001	< 0.001
1.5T Siemens	2.58 ± 0.07	3.09 ± 0.09	2.92 ± 0.08	< 0.001	< 0.001	< 0.001	2.63 ± 0.08	3.22 ± 0.09	2.30 ± 0.08	< 0.001	< 0.001	< 0.001
Cerebellum												
ADNI	61.60 ± 0.60	58.43 ± 0.57	63.62 ± 0.60	< 0.001	< 0.001	< 0.001	60.88 ± 0.59	59.10 ± 0.58	63.16 ± 0.62	< 0.001	< 0.001	< 0.001
3T GE	61.95 ± 1.13	59.58 ± 1.05	64.95 ± 1.07	< 0.001	< 0.001	< 0.001	61.73 ± 1.13	60.47 ± 1.08	64.86 ± 1.12	0.008	< 0.001	< 0.001
3T Phillips	61.22 ± 1.06	58.42 ± 0.99	64.23 ± 1.05	< 0.001	< 0.001	< 0.001	60.02 ± 0.97	59.13 ± 0.96	63.66 ± 1.08	0.008	< 0.001	< 0.001
1.5T Siemens	61.56 ± 0.90	57.15 ± 0.89	61.57 ± 0.95	< 0.001	< 0.001	1.000*	60.74 ± 0.90	57.53 ± 0.88	60.79 ± 0.91	< 0.001	< 0.001	1.000*
Cerebral WM												
ADNI	209.78 ± 2.26	211.70 ± 2.18	217.85 ± 2.19	0.379*	< 0.001	< 0.001	212.51 ± 2.67	213.55 ± 2.17	217.90 ± 2.16	1.000*	< 0.001	0.005
3T GE	204.53 ± 3.49	213.65 ± 3.84	215.23 ± 3.87	< 0.001	0.253*	< 0.001	204.78 ± 5.20	214.35 ± 3.74	215.87 ± 3.78	0.021	0.249*	0.007
3T Phillips	206.70 ± 4.28	215.89 ± 4.17	222.93 ± 4.20	< 0.001	< 0.001	< 0.001	211.29 ± 4.15	218.58 ± 4.19	221.95 ± 4.17	< 0.001	0.022	< 0.001
1.5T Siemens	218.48 ± 3.81	205.61 ± 3.18	216.03 ± 3.22	< 0.001	< 0.001	0.909*	222.27 ± 3.80	207.97 ± 3.20	216.40 ± 3.25	< 0.001	< 0.001	0.064*
Total cortical GM												
ADNI	439.55 ± 4.65	383.96 ± 3.54	399.00 ± 3.96	< 0.001	< 0.001	< 0.001						
3T GE	447.96 ± 8.05	393.75 ± 5.82	414.63 ± 6.41	< 0.001	< 0.001	< 0.001						
3T Phillips	454.55 ± 8.11	393.72 ± 6.11	407.94 ± 6.63	< 0.001	< 0.001	< 0.001						
1.5T Siemens	416.21 ± 6.80	363.94 ± 5.41	373.26 ± 5.89	< 0.001	< 0.001	< 0.001						
Total cerebral WM												
ADNI	422.02 ± 4.89	425.24 ± 4.33	435.75 ± 4.33	0.775*	< 0.001	< 0.001						
3T GE	408.59 ± 8.62	428.00 ± 7.53	431.11 ± 7.60	< 0.001	0.190*	< 0.001						
3T Phillips	418.00 ± 8.41	434.48 ± 8.35	444.88 ± 8.36	< 0.001	< 0.001	< 0.001						
1.5T Siemens	440.75 ± 7.58	413.58 ± 6.35	432.43 ± 6.43	< 0.001	< 0.001	0.259*						
TICV												
ADNI	1513.31 ± 13.82	1470.93 ± 11.40	1504.96 ± 13.26	< 0.001	< 0.001	0.653*						
3T GE	1502.06 ± 27.31	1474.59 ± 19.34	1458.05 ± 21.98	0.345*	0.152*	0.019						
3T Phillips	1555.15 ± 21.79	1495.29 ± 21.41	1558.53 ± 24.11	< 0.001	< 0.001	1.000*						
1.5T Siemens	1486.96 ± 20.03	1444.19 ± 18.22	1507.49 ± 20.75	< 0.001	< 0.001	0.002						

Data are mean ± SE. The overall *p* value of the repeated measures ANOVA among the three groups was less than 0.02 for all analysis values; therefore, they are not listed in the table so as not to impair readability. Bonferroni correction for multiple comparisons was applied for all *P* values of pairwise comparison (between two software programs). *Statistically not significant. ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, NQ = NeuroQuant, SE = standard error, TICV = total intracranial volume, WM = white matter

Supplementary Table 6. Volume Measurements Analyzed by the Three Software Programs and Results of Repeated Measures ANOVA of ADNI (Diagnosis Subgroup)

	Lt. Hemisphere							Rt. Hemisphere						
	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P**	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)	NQ (Mean ± SE)	DB (Mean ± SE)	FS (Mean ± SE)	*P**	*P* (NQ vs. DB)	*P* (DB vs. FS)	*P* (NQ vs. FS)
Cortical GM														
ADNI	218.82 ± 2.36	192.00 ± 1.83	198.80 ± 2.03	< 0.001	< 0.001	< 0.001	< 0.001	220.72 ± 2.34	191.96 ± 1.76	200.21 ± 1.98	< 0.001	< 0.001	< 0.001	< 0.001
NL	225.76 ± 3.25	197.49 ± 2.43	205.45 ± 2.68	< 0.001	< 0.001	< 0.001	< 0.001	227.04 ± 3.26	196.95 ± 2.40	205.45 ± 2.68	< 0.001	< 0.001	< 0.001	< 0.001
MCI	222.48 ± 3.94	193.95 ± 3.07	200.53 ± 3.48	< 0.001	< 0.001	< 0.001	< 0.001	225.04 ± 3.85	194.59 ± 2.90	202.27 ± 3.35	< 0.001	< 0.001	< 0.001	< 0.001
AD	206.18 ± 4.54	183.22 ± 3.66	188.97 ± 3.97	< 0.001	< 0.001	< 0.001	< 0.001	207.89 ± 4.52	182.85 ± 3.51	190.52 ± 3.87	< 0.001	< 0.001	< 0.001	< 0.001
Caudate														
ADNI	2.70 ± 0.05	3.37 ± 0.04	3.16 ± 0.05	< 0.001	< 0.001	< 0.001	< 0.001	2.80 ± 0.05	3.51 ± 0.05	3.30 ± 0.05	< 0.001	< 0.001	< 0.001	< 0.001
NL	2.57 ± 0.06	3.30 ± 0.05	3.11 ± 0.07	< 0.001	< 0.001	< 0.001	< 0.001	2.71 ± 0.07	3.44 ± 0.06	3.26 ± 0.06	< 0.001	< 0.001	< 0.001	< 0.001
MCI	2.64 ± 0.08	3.34 ± 0.08	3.12 ± 0.08	< 0.001	< 0.001	< 0.001	< 0.001	2.80 ± 0.09	3.49 ± 0.09	3.29 ± 0.09	< 0.001	< 0.001	< 0.001	< 0.001
AD	2.93 ± 0.12	3.50 ± 0.08	3.24 ± 0.10	< 0.001	< 0.001	< 0.001	< 0.001	2.90 ± 0.11	3.61 ± 0.09	3.36 ± 0.10	< 0.001	< 0.001	< 0.001	< 0.001
Putamen														
ADNI	4.83 ± 0.06	4.99 ± 0.06	3.88 ± 0.06	< 0.001	0.002	< 0.001	< 0.001	4.67 ± 0.06	4.76 ± 0.05	3.97 ± 0.05	< 0.001	0.235†	< 0.001	< 0.001
NL	5.03 ± 0.08	5.05 ± 0.08	3.96 ± 0.08	< 0.001	1.000†	< 0.001	< 0.001	4.87 ± 0.07	4.80 ± 0.07	4.03 ± 0.06	< 0.001	0.912†	< 0.001	< 0.001
MCI	4.88 ± 0.10	4.98 ± 0.09	3.88 ± 0.09	< 0.001	0.403†	< 0.001	< 0.001	4.70 ± 0.12	4.79 ± 0.09	4.00 ± 0.09	< 0.001	0.994†	< 0.001	< 0.001
AD	4.55 ± 0.12	4.92 ± 0.12	3.78 ± 0.12	< 0.001	< 0.001	< 0.001	< 0.001	4.42 ± 0.11	4.67 ± 0.12	3.85 ± 0.11	< 0.001	0.010	< 0.001	< 0.001
Pallidum														
ADNI	0.51 ± 0.01	1.37 ± 0.02	1.84 ± 0.02	< 0.001	< 0.001	< 0.001	< 0.001	0.49 ± 0.01	1.32 ± 0.02	1.75 ± 0.02	< 0.001	< 0.001	< 0.001	< 0.001
NL	0.51 ± 0.02	1.34 ± 0.03	1.82 ± 0.04	< 0.001	< 0.001	< 0.001	< 0.001	0.51 ± 0.02	1.29 ± 0.02	1.70 ± 0.03	< 0.001	< 0.001	< 0.001	< 0.001
MCI	0.51 ± 0.02	1.37 ± 0.03	1.81 ± 0.03	< 0.001	< 0.001	< 0.001	< 0.001	0.49 ± 0.02	1.34 ± 0.02	1.77 ± 0.03	< 0.001	< 0.001	< 0.001	< 0.001
AD	0.50 ± 0.02	1.40 ± 0.04	1.91 ± 0.05	< 0.001	< 0.001	< 0.001	< 0.001	0.46 ± 0.02	1.32 ± 0.03	1.78 ± 0.05	< 0.001	< 0.001	< 0.001	< 0.001
Thalamus														
ADNI	6.99 ± 0.08	6.60 ± 0.06	6.14 ± 0.06	< 0.001	< 0.001	< 0.001	< 0.001	6.76 ± 0.08	6.11 ± 0.05	5.93 ± 0.05	< 0.001	< 0.001	0.018	< 0.001
NL	7.06 ± 0.13	6.68 ± 0.10	6.22 ± 0.10	< 0.001	< 0.001	< 0.001	< 0.001	6.87 ± 0.12	6.14 ± 0.09	5.95 ± 0.10	< 0.001	< 0.001	< 0.001	< 0.001
MCI	6.99 ± 0.11	6.67 ± 0.10	6.17 ± 0.09	< 0.001	< 0.001	< 0.001	< 0.001	6.74 ± 0.15	6.17 ± 0.08	5.93 ± 0.08	< 0.001	< 0.001	< 0.001	< 0.001
AD	6.91 ± 0.17	6.44 ± 0.13	6.01 ± 0.12	< 0.001	< 0.001	< 0.001	< 0.001	6.66 ± 0.14	6.01 ± 0.10	5.89 ± 0.12	< 0.001	< 0.001	0.116†	< 0.001
Amygdala														
ADNI	1.33 ± 0.03	1.30 ± 0.02	1.16 ± 0.02	< 0.001	0.097†	< 0.001	< 0.001	1.30 ± 0.02	1.43 ± 0.02	1.37 ± 0.03	< 0.001	< 0.001	< 0.001	< 0.001
NL	1.50 ± 0.03	1.45 ± 0.03	1.33 ± 0.03	< 0.001	0.018	< 0.001	< 0.001	1.43 ± 0.03	1.57 ± 0.04	1.50 ± 0.04	< 0.001	< 0.001	0.002	0.001
MCI	1.29 ± 0.04	1.27 ± 0.04	1.12 ± 0.04	< 0.001	1.000†	< 0.001	< 0.001	1.29 ± 0.03	1.42 ± 0.04	1.35 ± 0.04	< 0.001	< 0.001	0.004	0.006
AD	1.18 ± 0.04	1.19 ± 0.04	1.02 ± 0.04	< 0.001	1.000†	< 0.001	< 0.001	1.163 ± 0.04	1.29 ± 0.04	1.24 ± 0.05	< 0.001	< 0.001	0.155†	0.005
Hippocampus														
ADNI	2.90 ± 0.05	3.51 ± 0.06	3.26 ± 0.05	< 0.001	< 0.001	< 0.001	< 0.001	2.97 ± 0.06	3.67 ± 0.06	3.40 ± 0.05	< 0.001	< 0.001	< 0.001	< 0.001
NL	3.21 ± 0.06	3.95 ± 0.07	3.58 ± 0.07	< 0.001	< 0.001	< 0.001	< 0.001	3.31 ± 0.06	4.04 ± 0.07	3.69 ± 0.07	< 0.001	< 0.001	< 0.001	< 0.001
MCI	2.81 ± 0.08	3.40 ± 0.09	3.18 ± 0.08	< 0.001	< 0.001	< 0.001	< 0.001	2.87 ± 0.10	3.57 ± 0.09	3.33 ± 0.09	< 0.001	< 0.001	< 0.001	< 0.001
AD	2.68 ± 0.09	3.17 ± 0.09	3.01 ± 0.08	< 0.001	< 0.001	< 0.001	< 0.001	2.73 ± 0.10	3.37 ± 0.10	3.16 ± 0.09	< 0.001	< 0.001	< 0.001	< 0.001
Cerebellum														
ADNI	61.60 ± 0.60	58.43 ± 0.57	63.62 ± 0.60	< 0.001	< 0.001	< 0.001	< 0.001	60.88 ± 0.59	59.10 ± 0.58	63.16 ± 0.62	< 0.001	< 0.001	< 0.001	< 0.001
NL	64.41 ± 1.11	58.62 ± 1.02	63.48 ± 0.97	< 0.001	< 0.001	< 0.001	< 0.001	60.53 ± 1.04	59.11 ± 0.10	63.04 ± 0.95	< 0.001	< 0.001	< 0.001	< 0.001
MCI	61.59 ± 0.94	58.01 ± 0.93	63.24 ± 1.00	< 0.001	< 0.001	< 0.001	< 0.001	60.92 ± 0.97	58.93 ± 0.94	62.80 ± 1.05	< 0.001	< 0.001	< 0.001	< 0.001
AD	61.83 ± 1.11	58.77 ± 1.06	64.29 ± 1.20	< 0.001	< 0.001	< 0.001	< 0.001	61.21 ± 1.08	59.31 ± 1.10	63.78 ± 1.24	< 0.001	< 0.001	< 0.001	< 0.001
Cerebral WM														
ADNI	209.78 ± 2.26	211.70 ± 2.18	217.85 ± 2.19	< 0.001	0.379†	< 0.001	< 0.001	212.51 ± 2.67	213.55 ± 2.17	217.90 ± 2.16	0.003	1.000	< 0.001	0.005
NL	211.61 ± 3.87	214.01 ± 3.35	217.57 ± 3.40	0.032	0.971†	< 0.001	0.041	215.31 ± 3.88	215.13 ± 3.35	217.84 ± 3.39	0.288†	1.000†	0.006	0.825†
MCI	210.57 ± 3.65	212.07 ± 3.63	219.41 ± 3.60	< 0.001	1.000†	< 0.001	< 0.001	211.62 ± 5.21	214.63 ± 3.61	219.46 ± 3.65	0.07†	1.000†	0.002	0.042
AD	206.64 ± 4.37	208.59 ± 4.47	216.11 ± 4.52	< 0.001	1.000†	< 0.001	< 0.001	210.52 ± 4.36	210.33 ± 4.38	215.91 ± 4.28	0.012	1.000†	< 0.001	0.046
Total cortical GM														
ADNI	439.55 ± 4.65	383.96 ± 3.54	399.00 ± 3.96	< 0.001	< 0.001	< 0.001	< 0.001							
NL	452.80 ± 6.49	394.44 ± 4.80	411.83 ± 5.29	< 0.001	< 0.001	< 0.001	< 0.001							
MCI	447.52 ± 7.72	388.54 ± 5.89	402.80 ± 6.76	< 0.001	< 0.001	< 0.001	< 0.001							
AD	414.06 ± 8.87	366.07 ± 6.98	379.49 ± 7.67	< 0.001	< 0.001	< 0.001	< 0.001							
Total cerebral WM														
ADNI	422.02 ± 4.89	425.24 ± 4.33	435.75 ± 4.33	< 0.001	0.775†	< 0.001	< 0.001							
NL	426.92 ± 7.72	429.14 ± 6.68	435.41 ± 6.76	0.110†	1.000†	< 0.001	0.207†							
MCI	421.50 ± 8.83	426.70 ± 7.22	438.87 ± 7.22	0.003	0.968†	< 0.001	0.005							
AD	417.16 ± 8.66	418.92 ± 8.78	432.02 ± 8.75	0.002	1.000†	< 0.001	0.005							
TICV														
ADNI	1513.31 ± 13.82	1470.93 ± 11.40	1504.96 ± 13.26	< 0.001	< 0.001	< 0.001	0.653†							
NL	1524.68 ± 18.56	1471.05 ± 18.25	1505.89 ± 21.16	< 0.001	< 0.001	0.004	0.078†							
MCI	1527.37 ± 20.05	1481.40 ± 17.59	1513.24 ± 21.22	< 0.001	< 0.001	0.002	0.171†							
AD	1504.16 ± 26.39	1459.01 ± 24.86	1498.73 ± 27.70	< 0.001	< 0.001	0.006	1.000†							

Data are mean ± SE. Bonferroni correction for multiple comparisons was applied for all *P* values of pairwise comparison (between two software programs). *The overall *p* value calculated using the Repeated measures ANOVA, †Statistically not significant. AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, SE = standard error, TICV = total intracranial volume, WM = white matter

Supplementary Table 7. RC of the Measured Regional Brain Volume Obtained From Each Software using SMC Dataset (Diagnosis)

	DB vs. Free		NQ vs. Free		DB vs. NQ	
	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere
Cortical GM	16.63	16.08	79.13	83.40	94.30	98.10
NL	19.65	18.99	92.44	99.33	110.63	116.64
MCI	16.11	15.90	74.06	78.32	88.40	92.98
AD	13.51	12.67	68.97	69.69	81.37	81.22
Caudate	0.48	0.76	1.39	1.17	1.59	1.63
NL	0.27	0.42	1.61	1.39	1.74	1.61
MCI	0.45	0.73	1.33	1.03	1.58	1.62
AD	0.64	1.01	1.19	1.05	1.93	1.66
Putamen	1.77	1.29	1.12	0.89	0.97	0.91
NL	1.71	1.18	1.04	0.63	0.92	1.03
MCI	1.64	1.15	1.00	0.87	0.91	0.76
AD	1.95	1.53	1.31	1.10	1.07	0.93
Pallidum	1.12	0.99	2.59	2.59	1.53	1.63
NL	1.15	0.90	2.49	2.46	1.39	1.58
MCI	1.08	0.99	2.49	2.48	1.47	1.53
AD	1.12	1.08	2.77	2.83	1.71	1.79
Thalamus	1.20	0.51	1.47	1.42	0.85	1.36
NL	1.16	0.50	1.23	1.19	0.61	1.28
MCI	1.19	0.46	1.59	1.51	1.03	1.43
AD	1.24	0.57	1.55	1.53	0.85	1.36
Amygdala	0.37	0.31	0.42	0.39	0.30	0.36
NL	0.34	0.24	0.38	0.49	0.39	0.36
MCI	0.32	0.26	0.36	0.37	0.23	0.39
AD	0.43	0.41	0.51	0.29	0.25	0.33
Hippocampus	0.79	0.88	0.86	0.88	1.26	1.49
NL	0.87	0.87	0.60	0.62	1.09	1.17
MCI	0.90	0.90	0.81	0.79	1.29	1.51
AD	0.59	0.86	1.10	1.15	1.37	1.74
Cerebellum	8.38	8.19	4.91	5.11	11.41	9.75
NL	8.74	7.95	4.54	3.72	12.01	8.98
MCI	8.15	7.96	5.85	6.13	11.46	9.28
AD	8.24	8.67	4.11	5.15	10.70	10.93
Total cortical GM	32.20		162.35		192.30	
NL	38.25		191.59		227.18	
MCI	31.11		152.12		181.29	
AD	25.97		138.59		162.51	
Total cerebral WM	28.29		55.48		35.49	
NL	17.79		40.97		28.74	
MCI	27.99		51.83		31.99	
AD	36.23		70.17		44.20	
TICV	124.40		102.74		94.78	
NL	121.19		84.73		71.52	
MCI	112.13		106.56		113.27	
AD	139.17		114.68		94.02	

Each row with a specific brain region name represents the results of the total study population. AD = Alzheimer's disease, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, RC = reproducibility coefficiency, SMC = single medical center, TICV = total intracranial volume, WM = white matter

Supplementary Table 8. RC of the Measured Regional Brain Volume Obtained From Each Software using ADNI Dataset (Vendor)

	DB vs. Free		NQ vs. Free		DB vs. NQ	
	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.
Cortical GM	16.38	19.46	42.91	43.76	55.75	59.63
1.5T Siemens	11.56	13.82	45.41	45.50	53.90	56.33
3T GE	20.29	25.04	35.94	36.78	53.64	59.54
3T Phillips	15.65	17.01	47.43	49.09	59.96	63.08
Caudate	0.66	0.59	1.12	1.21	1.50	1.52
1.5T Siemens	0.51	0.55	1.02	1.02	1.27	1.36
3T GE	0.73	0.53	1.14	1.22	1.43	1.47
3T Phillips	0.70	0.69	1.21	1.36	1.79	1.72
Putamen	2.25	1.63	2.08	1.64	1.00	0.92
1.5T Siemens	2.16	0.66	1.67	1.48	0.87	1.69
3T GE	2.54	1.78	2.13	1.48	1.25	1.06
3T Phillips	1.95	1.35	2.40	1.97	0.79	0.98
Pallidum	1.01	0.90	2.67	2.52	1.76	1.67
1.5T Siemens	0.69	1.62	2.41	2.27	1.77	0.68
3T GE	1.09	1.02	2.97	2.81	1.97	1.85
3T Phillips	1.18	0.95	2.56	2.41	1.45	1.50
Thalamus	1.17	0.70	1.99	1.90	1.41	1.58
1.5T Siemens	0.72	0.60	1.76	1.78	1.40	1.62
3T GE	1.23	0.85	2.43	2.25	1.76	1.76
3T Phillips	1.47	0.61	1.63	1.57	0.84	1.30
Amygdala	0.38	0.29	0.40	0.29	0.26	0.35
1.5T Siemens	0.39	0.29	0.46	0.23	0.27	0.25
3T GE	0.33	0.27	0.33	0.34	0.25	0.34
3T Phillips	0.43	0.32	0.43	0.28	0.26	0.45
Hippocampus	0.67	0.71	0.84	0.89	1.29	1.38
1.5T Siemens	0.55	0.64	0.83	0.84	1.11	1.21
3T GE	0.62	0.53	1.41	0.92	1.77	1.29
3T Phillips	0.94	0.82	0.91	0.89	1.64	1.54
Cerebellum	11.05	8.95	6.48	6.72	7.48	5.58
1.5T Siemens	9.27	7.04	3.68	3.30	9.26	6.95
3T GE	11.83	9.97	7.71	7.55	6.64	5.86
3T Phillips	11.82	9.51	7.21	8.25	6.15	3.01
Total cortical GM	35.45		86.39		115.17	
1.5T Siemens	25.07		90.54		109.98	
3T GE	44.86		72.48		113.01	
3T Phillips	32.32		96.30		122.88	
Total cerebral WM	37.40		59.22		54.67	
1.5T Siemens	48.61		62.32		70.90	
3T GE	22.98		53.46		46.17	
3T Phillips	37.23		62.17		42.51	
TICV	145.54		109.92		125.48	
1.5T Siemens	155.91		82.42		110.49	
3T GE	112.25		143.60		119.04	
3T Phillips	167.05		87.96		146.30	

Each row with a specific brain region name represents the results of the total study population. AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, RC = reproducibility coefficiency, TICV = total intracranial volume, WM = white matter

Supplementary Table 9. RC of the Measured Regional Brain Volume Obtained From Each Software using ADNI Dataset (Diagnosis)

	DB vs. Free		NQ vs. Free		DB vs. NQ	
	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.
Cortical GM	16.38	19.46	42.91	43.76	55.75	59.63
NL	17.57	20.77	42.42	43.30	57.82	61.51
MCI	16.26	18.08	47.34	48.32	59.50	62.91
AD	15.10	19.65	37.04	37.68	47.79	52.72
Caudate	0.66	0.59	1.12	1.21	1.50	1.52
NL	0.64	0.56	1.22	1.24	1.54	1.54
MCI	0.57	0.55	1.14	1.13	1.53	1.46
AD	0.77	0.67	0.98	1.26	1.42	1.57
Putamen	2.25	1.63	2.08	1.64	1.00	0.92
NL	2.23	1.59	2.31	1.81	0.84	0.84
MCI	2.22	1.61	2.10	1.67	0.95	0.87
AD	2.31	1.69	1.76	1.40	1.22	1.06
Pallidum	1.01	0.90	2.67	2.52	1.76	1.67
NL	1.04	0.84	2.61	2.38	1.69	1.58
MCI	0.92	0.90	2.58	2.53	1.75	1.69
AD	1.07	0.97	2.84	2.66	1.84	1.75
Thalamus	1.17	0.70	1.99	1.90	1.41	1.58
NL	1.21	0.62	2.06	1.94	1.40	1.66
MCI	1.20	0.76	1.80	1.97	1.21	1.52
AD	1.10	0.72	2.14	1.77	1.64	1.58
Amygdala	0.38	0.29	0.40	0.29	0.26	0.35
NL	0.33	0.25	0.41	0.27	0.27	0.34
MCI	0.40	0.30	0.42	0.29	0.25	0.36
AD	0.42	0.32	0.39	0.31	0.25	0.35
Hippocampus	0.67	0.71	0.84	0.89	1.29	1.38
NL	0.84	0.77	0.86	0.84	1.52	1.48
MCI	0.59	0.70	0.88	0.88	1.27	1.36
AD	0.52	0.66	0.78	0.97	1.02	1.31
Cerebellum	11.05	8.95	6.48	6.72	7.48	5.58
NL	10.40	8.57	7.51	6.82	6.65	5.31
MCI	11.32	8.83	5.46	6.38	8.49	5.67
AD	11.40	9.53	6.42	7.02	6.95	5.77
Total cortical GM	35.45		86.39		115.17	
NL	38.02		85.43		119.18	
MCI	33.98		95.44		122.21	
AD	34.28		74.36		100.23	
Total cerebral WM	37.40		59.22		54.67	
NL	21.18		60.07		60.25	
MCI	42.81		58.11		48.75	
AD	43.77		59.66		55.26	
TICV	145.54		109.92		125.48	
NL	145.29		109.65		135.92	
MCI	132.48		102.21		121.91	
AD	161.07		119.40		117.47	

Each row with a specific brain region name represents the results of the total study population. AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, RC = reproducibility coefficiency, TICV = total intracranial volume, WM = white matter

Supplementary Table 10. Effect Size of Measured Regional Brain Volume Obtained From Each Software Based on the Total Study Population

	DB vs. Free		NQ vs. Free		DB vs. NQ	
	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.
Cortical GM						
SMC	2.07	2.15	4.57	4.26	4.76	4.52
ADNI	1.37	1.49	2.30	2.35	2.85	2.93
Caudate						
SMC	0.73	1.16	2.03	1.50	3.33	2.97
ADNI	0.86	0.97	1.29	1.37	1.83	2.26
Putamen						
SMC	2.98	2.14	1.37	0.98	1.31	0.98
ADNI	3.56	3.18	1.99	1.79	0.32	0.13
Pallidum						
SMC	3.26	3.10	5.51	5.45	3.70	4.92
ADNI	2.19	2.63	4.70	4.63	3.66	3.86
Thalamus						
SMC	1.80	0.23	1.45	1.63	0.19	1.35
ADNI	1.19	0.60	1.48	2.02	0.63	1.60
Amygdala						
SMC	0.36	0.32	0.73	0.52	0.45	1.19
ADNI	1.13	0.46	1.50	0.53	0.20	1.06
Hippocampus						
SMC	1.42	2.01	0.77	0.93	2.60	2.49
ADNI	1.08	1.07	1.46	1.93	2.31	3.03
Cerebellum						
SMC	2.16	1.23	0.90	0.58	3.25	2.28
ADNI	2.31	1.95	0.76	0.90	1.48	0.79
Total cortical GM						
SMC	2.31		4.51		4.69	
ADNI	1.48		2.37		2.94	
Total cerebral WM						
SMC	1.04		1.65		1.18	
ADNI	0.66		0.44		0.06	
TICV						
SMC	0.73		0.09		0.91	
ADNI	0.53		0.24		1.14	

ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, NQ = NeuroQuant, SMC = single medical center, TICV = total intracranial volume, WM = white matter

Supplementary Table 11. Effect Size of Measured Regional Brain Volume Obtained From Each Software using Single Medical Center Dataset

	DB vs. Free		NQ vs. Free		DB vs. NQ	
	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere
Cortical GM	2.07	2.15	4.57	4.26	4.76	4.52
NL	2.59	2.25	6.99	6.56	8.50	7.36
MCI	1.91	2.39	5.07	5.27	5.46	5.81
AD	2.15	2.29	5.13	4.97	5.32	5.60
Caudate	0.73	1.16	2.03	1.50	3.33	2.97
NL	0.75	0.87	2.99	2.25	3.89	3.38
MCI	0.82	1.57	2.96	2.50	4.30	4.09
AD	0.78	1.45	1.28	0.84	2.62	2.20
Putamen	2.98	2.14	1.37	0.98	1.31	0.98
NL	3.70	3.32	1.59	0.72	1.48	1.11
MCI	3.34	1.97	1.63	0.77	1.27	0.84
AD	2.52	2.01	1.13	0.83	1.22	1.01
Pallidum	3.26	3.10	5.51	5.45	3.70	4.92
NL	4.03	4.04	7.84	8.71	4.37	7.52
MCI	3.33	3.21	5.09	5.38	3.29	4.70
AD	2.70	2.72	5.24	4.99	4.38	4.65
Thalamus (SMC)	1.80	0.23	1.45	1.63	0.19	1.35
NL	2.29	0.21	1.40	1.48	0.10	1.64
MCI	1.78	0.44	1.44	1.81	0.27	1.29
AD	1.50	0.53	1.54	1.66	0.33	1.18
Amygdala (SMC)	0.36	0.32	0.73	0.52	0.45	1.19
NL	0.48	0.60	0.33	1.16	0.93	0.92
MCI	0.72	0.39	0.95	0.65	0.25	1.20
AD	1.21	1.26	1.10	0.15	0.17	1.69
Hippocampus	1.42	2.01	0.77	0.93	2.60	2.49
NL	2.11	2.51	0.43	0.47	2.68	2.33
MCI	1.68	2.38	0.60	1.05	2.40	2.43
AD	0.90	0.45	1.59	1.56	3.04	1.22
Cerebellum	2.16	1.23	0.90	0.58	3.25	2.28
NL	2.36	2.01	1.10	0.36	3.06	2.61
MCI	1.64	0.85	0.91	0.66	3.16	2.40
AD	3.01	1.28	0.76	0.71	3.73	2.08
Total cortical GM	2.31		4.51		4.69	
NL	2.59		7.09		8.05	
MCI	2.54		5.44		5.73	
AD	2.33		5.12		5.54	
Total cerebral WM	1.04		1.65		1.18	
NL	1.00		1.93		1.47	
MCI	1.11		1.64		1.07	
AD	1.19		1.89		1.22	
TICV	0.73		0.09		0.91	
NL	0.69		0.38		0.64	
MCI	0.82		0.03		0.87	
AD	0.70		0.02		1.50	

Each row with a specific brain region name represents the results of the total study population. AD = Alzheimer's disease, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, SMC = single medical center, TICV = total intracranial volume, WM = white matter

Supplementary Table 12. Effect Size of Measured Regional Brain Volume Obtained From Each Software using ADNI Dataset (Vendor)

	DB vs. Free		NQ vs. Free		DB vs. NQ	
	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.
Cortical GM	1.37	1.49	2.30	2.35	2.85	2.93
1.5T Siemens	0.89	1.16	2.58	2.27	2.51	2.45
3T GE	1.96	2.22	2.01	2.14	2.69	2.86
3T Phillips	1.68	1.55	2.66	3.15	3.72	3.95
Caudate	0.86	0.97	1.29	1.37	1.83	2.26
1.5T Siemens	0.94	1.13	1.19	1.36	2.01	2.23
3T GE	0.52	1.04	1.40	0.77	1.54	2.32
3T Phillips	1.82	1.09	1.94	1.27	2.88	2.39
Putamen	3.56	3.18	1.99	1.79	0.32	0.13
1.5T Siemens	3.70	4.12	2.10	2.06	0.89	0.54
3T GE	3.69	2.90	1.61	1.40	0.59	0.49
3T Phillips	4.55	3.67	3.23	2.36	0.55	0.61
Pallidum	2.19	2.63	4.70	4.63	3.66	3.86
1.5T Siemens	2.64	3.10	5.64	5.52	4.16	4.23
3T GE	2.13	2.75	4.71	4.67	4.39	3.95
3T Phillips	3.11	3.08	5.61	5.60	3.64	4.12
Thalamus	1.19	0.60	1.48	2.02	0.63	1.60
1.5T Siemens	1.06	0.33	1.84	2.13	1.06	1.82
3T GE	1.01	0.98	1.52	2.61	0.86	1.62
3T Phillips	2.17	0.50	1.35	1.67	0.02	1.45
Amygdala	1.13	0.46	1.50	0.53	0.20	1.06
1.5T Siemens	1.08	0.46	1.91	0.06	0.47	0.67
3T GE	0.88	0.07	1.32	0.87	0.19	1.04
3T Phillips	1.59	1.17	1.42	0.69	0.07	1.19
Hippocampus	1.08	1.07	1.46	1.93	2.31	3.03
1.5T Siemens	0.73	0.93	1.39	1.63	2.08	3.15
3T GE	0.99	1.03	1.52	2.36	2.35	3.29
3T Phillips	1.97	1.45	1.43	1.87	3.01	3.51
Cerebellum	2.31	1.95	0.76	0.90	1.48	0.79
1.5T Siemens	2.59	2.12	0.01	0.03	2.58	2.09
3T GE	1.86	1.73	1.15	1.47	0.95	0.44
3T Phillips	3.50	2.57	1.41	1.70	1.93	0.70
Total cortical GM	1.48		2.37		2.94	
1.5T Siemens	1.05		2.48		2.52	
3T GE	2.23		2.11		2.82	
3T Phillips	1.68		2.94		3.91	
Total cerebral WM	0.66		0.44		0.06	
1.5T Siemens	1.15		0.27		1.12	
3T GE	0.27		0.94		0.88	
3T Phillips	0.65		1.57		1.15	
TICV	0.53		0.24		1.14	
1.5T Siemens	1.30		0.55		1.15	
3T GE	0.26		1.28		1.01	
3T Phillips	1.09		0.07		1.32	

Each row with a specific brain region name represents the results of the total study population. ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 13. Effect Size of Measured Regional Brain Volume Obtained From Each Software using ADNI Dataset (Diagnosis)

	DB vs. Free		NQ vs. Free		DB vs. NQ	
	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.
Cortical GM	1.37	1.49	2.30	2.35	2.85	2.93
NL	1.90	1.93	2.66	2.60	3.28	3.32
MCI	1.25	1.47	2.27	2.52	2.83	3.14
AD	1.11	1.17	2.16	2.07	2.74	2.50
Caudate	0.86	0.97	1.29	1.37	1.83	2.26
NL	0.67	0.83	1.78	1.72	2.48	2.52
MCI	1.20	1.01	1.46	1.57	2.05	2.50
AD	0.82	1.08	0.81	0.97	1.26	1.84
Putamen	3.56	3.18	1.99	1.79	0.32	0.13
NL	3.22	3.11	2.12	2.16	0.05	0.16
MCI	3.69	3.33	2.27	2.03	0.24	0.06
AD	3.79	3.04	1.68	1.31	0.71	0.51
Pallidum	2.19	2.63	4.70	4.63	3.66	3.86
NL	1.99	2.89	4.73	5.05	3.51	4.08
MCI	2.16	2.55	5.00	5.13	3.74	4.34
AD	2.55	2.54	4.54	4.07	3.71	3.33
Thalamus	1.19	0.60	1.48	2.02	0.63	1.60
NL	1.09	0.72	1.33	2.40	0.64	1.67
MCI	1.27	0.75	1.77	2.13	0.60	1.83
AD	1.21	0.35	1.41	1.60	0.65	1.31
Amygdala	1.13	0.46	1.50	0.53	0.20	1.06
NL	0.99	0.55	1.63	0.60	0.44	1.15
MCI	1.12	0.50	1.33	0.44	0.15	1.01
AD	1.29	0.33	1.60	0.55	0.02	1.02
Hippocampus	1.08	1.07	1.46	1.93	2.31	3.03
NL	1.80	1.90	1.54	2.13	3.41	4.11
MCI	0.98	0.92	1.39	1.97	1.96	2.51
AD	0.73	0.74	1.44	1.74	2.55	3.08
Cerebellum	2.31	1.95	0.76	0.90	1.48	0.79
NL	2.24	2.02	0.64	1.02	1.41	0.61
MCI	2.03	1.68	0.69	0.72	1.47	0.92
AD	2.95	2.30	1.12	1.00	1.69	0.84
Total cortical GM	1.48		2.37		2.94	
NL	2.00		2.70		3.35	
MCI	1.40		2.43		3.02	
AD	1.18		2.17		2.67	
Total cerebral WM	0.66		0.44		0.06	
NL	0.70		0.28		0.07	
MCI	0.67		0.51		0.05	
AD	0.71		0.55		0.06	
TICV	0.53		0.24		1.14	
NL	0.53		0.35		1.20	
MCI	0.53		0.28		1.08	
AD	1.13		0.09		1.13	

Each row with a specific brain region name represents the results of the total study population. AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 14. Intermethod Reliability of Regional Brain Volume Measured by the Three Software Programs of Single Medical Center (Diagnosis Subgroup)

	DB vs. Free		NQ vs. Free		DB vs NQ	
	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere
Cortical GM	0.93 (0.03–0.98)	0.93 (0.03–0.98)	0.45 (-0.02–0.80)	0.42 (-0.02–0.78)	0.35 (-0.02–0.72)	0.33 (-0.02–0.71)
NL	0.87 (-0.03–0.97)	0.88 (-0.03–0.97)	0.27 (-0.01–0.66)	0.26 (-0.01–0.65)	0.21 (-0.01–0.58)	0.02 (-0.01–0.57)
MCI	0.90 (0.01–0.98)	0.89 (-0.02–0.98)	0.37 (-0.02–0.75)	0.32 (-0.02–0.71)	0.28 (-0.02–0.67)	0.08 (-0.98–0.31)
AD	0.91 (-0.002–0.98)	0.92 (-0.0005–0.98)	0.34 (-0.02–0.73)	0.33 (-0.02–0.72)	0.26 (-0.02–0.65)	0.26 (-0.01–0.65)
Caudate	0.88 (0.66–0.94)	0.74 (0.07–0.90)	0.44 (-0.08–0.77)	0.55 (-0.09–0.82)	0.40 (-0.04–0.76)	0.38 (-0.05–0.74)
NL	0.96 (0.84–0.98)	0.89 (0.56–0.96)	0.34 (-0.05–0.74)	0.44 (-0.07–0.78)	0.36 (-0.03–0.74)	0.39 (-0.04–0.76)
MCI	0.89 (0.60–0.96)	0.77 (-0.04–0.93)	0.47 (-0.05–0.81)	0.61 (-0.06–0.88)	0.39 (-0.02–0.77)	0.38 (-0.03–0.76)
AD	0.78 (0.39–0.90)	0.57 (-0.09–0.84)	0.49 (-0.08–0.78)	0.59 (0.12–0.80)	0.45 (-0.06–0.80)	0.37 (-0.08–0.73)
Putamen	0.52 (-0.05–0.83)	0.65 (-0.07–0.89)	0.72 (-0.02–0.90)	0.78 (0.45–0.89)	0.78 (0.04–0.92)	0.77 (0.23–0.90)
NL	0.46 (-0.03–0.81)	0.61 (-0.04–0.89)	0.65 (-0.08–0.88)	0.83 (0.53–0.93)	0.72 (-0.05–0.91)	0.63 (0.01–0.85)
MCI	0.43 (-0.04–0.79)	0.56 (-0.08–0.85)	0.67 (-0.08–0.89)	0.65 (0.23–0.83)	0.72 (-0.001–0.90)	0.71 (0.25–0.87)
AD	0.37 (-0.06–0.73)	0.49 (-0.08–0.81)	0.57 (-0.03–0.82)	0.62 (0.16–0.82)	0.68 (-0.01–0.88)	0.71 (0.12–0.88)
Pallidum	0.15 (-0.04–0.46)	0.18 (-0.04–0.50)	0.01 (-0.01–0.07)	0.01 (-0.01–0.05)	0.04 (-0.03–0.17)	0.04 (-0.02–0.17)
NL	0.11 (-0.03–0.39)	0.16 (-0.03–0.49)	0.02 (-0.01–0.09)	0.02 (-0.01–0.10)	0.04 (-0.02–0.16)	0.03 (-0.01–0.15)
MCI	0.14 (-0.04–0.44)	0.14 (-0.04–0.45)	0.005 (-0.01–0.03)	0.005 (-0.01–0.03)	0.01 (-0.02–0.07)	0.02 (-0.02–0.11)
AD	0.16 (-0.05–0.47)	0.17 (-0.05–0.50)	0.0003 (-0.01–0.01)	0.001 (-0.01–0.02)	0.03 (-0.02–0.13)	0.02 (-0.01–0.07)
Thalamus	0.74 (-0.06–0.92)	0.93 (0.90–0.95)	0.65 (-0.06–0.87)	0.67 (-0.07–0.89)	0.85 (0.80–0.89)	0.65 (-0.05–0.86)
NL	0.67 (-0.06–0.91)	0.91 (0.84–0.95)	0.66 (-0.01–0.88)	0.69 (-0.06–0.90)	0.88 (0.82–0.94)	0.63 (-0.08–0.87)
MCI	0.65 (-0.08–0.89)	0.90 (0.81–0.95)	0.50 (-0.09–0.79)	0.55 (-0.09–0.84)	0.69 (0.51–0.81)	0.52 (-0.08–0.80)
AD	0.62 (-0.08–0.87)	0.87 (0.73–0.94)	0.56 (-0.09–0.84)	0.57 (-0.09–0.84)	0.82 (0.69–0.90)	0.57 (-0.04–0.82)
Amygdala	0.83 (0.74–0.89)	0.88 (0.83–0.92)	0.82 (0.53–0.91)	0.83 (0.68–0.90)	0.87 (0.77–0.92)	0.81 (0.12–0.93)
NL	0.71 (0.48–0.84)	0.85 (0.65–0.93)	0.71 (0.52–0.83)	0.56 (-0.04–0.81)	0.64 (0.11–0.84)	0.64 (0.11–0.84)
MCI	0.81 (0.49–0.91)	0.90 (0.81–0.94)	0.81 (0.30–0.93)	0.80 (0.53–0.90)	0.90 (0.82–0.94)	0.74 (0.04–0.91)
AD	0.64 (-0.03–0.86)	0.66 (-0.03–0.87)	0.59 (-0.01–0.83)	0.80 (0.68–0.89)	0.84 (0.73–0.91)	0.74 (-0.06–0.92)
Hippocampus	0.84 (0.05–0.95)	0.81 (-0.05–0.95)	0.82 (0.50–0.92)	0.83 (0.37–0.93)	0.72 (-0.05–0.92)	0.63 (-0.06–0.88)
NL	0.63 (-0.07–0.89)	0.61 (-0.06–0.88)	0.76 (0.57–0.86)	0.74 (0.54–0.86)	0.54 (-0.06–0.85)	0.45 (-0.07–0.79)
MCI	0.73 (-0.06–0.92)	0.68 (-0.06–0.91)	0.77 (0.51–0.88)	0.77 (0.16–0.91)	0.61 (-0.06–0.88)	0.48 (-0.07–0.81)
AD	0.83 (0.39–0.94)	0.73 (-0.04–0.91)	0.56 (-0.09–0.84)	0.62 (-0.08–0.87)	0.51 (-0.05–0.84)	0.40 (-0.03–0.77)
Cerebellum	0.81 (-0.05–0.95)	0.84 (0.16–0.95)	0.93 (0.67–0.97)	0.93 (0.85–0.97)	0.70 (-0.04–0.92)	0.78 (-0.05–0.94)
NL	0.76 (-0.06–0.94)	0.80 (-0.05–0.95)	0.93 (0.49–0.98)	0.95 (0.91–0.97)	0.63 (-0.04–0.89)	0.74 (-0.05–0.96)
MCI	0.80 (-0.03–0.94)	0.83 (0.43–0.93)	0.90 (0.54–0.96)	0.90 (0.71–0.95)	0.69 (-0.04–0.92)	0.78 (-0.05–0.94)
AD	0.68 (-0.04–0.91)	0.79 (0.05–0.93)	0.89 (0.64–0.96)	0.92 (0.74–0.97)	0.55 (-0.03–0.86)	0.70 (-0.07–0.91)
Total cortical GM	0.93 (0.02–0.98)		0.43 (-0.02–0.79)		0.34 (-0.02–0.71)	
NL	0.87 (-0.03–0.97)		0.27 (-0.01–0.66)		0.20 (-0.01–0.57)	
MCI	0.90 (-0.02–0.98)		0.34 (-0.02–0.73)		0.26 (-0.01–0.64)	
AD	0.91 (-0.01–0.98)		0.32 (-0.02–0.71)		0.25 (-0.02–0.63)	
Total cerebral WM	0.97 (0.77–0.99)		0.90 (0.06–0.97)		0.96 (0.57–0.99)	
NL	0.99 (0.89–1.00)		0.93 (0.05–0.98)		0.96 (0.41–0.99)	
MCI	0.96 (0.64–0.99)		0.88 (0.03–0.97)		0.95 (0.60–0.98)	
AD	0.93 (0.42–0.98)		0.78 (-0.06–0.94)		0.89 (0.26–0.97)	
TICV	0.51 (-0.04–0.83)		0.93 (0.91–0.95)		0.50 (-0.02–0.83)	
NL	0.53 (-0.04–0.85)		0.95 (0.92–0.98)		0.49 (-0.02–0.83)	
MCI	0.48 (-0.04–0.82)		0.92 (0.87–0.96)		0.48 (-0.03–0.83)	
AD	0.44 (-0.05–0.79)		0.89 (0.81–0.94)		0.43 (-0.02–0.88)	

Data are intraclass correlation coefficient (95% confidence interval). Each row with a specific brain region name represents the results of the total study population.
AD = Alzheimer's disease, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 15. Intermethod Reliability of Regional Brain Volume Measured by the Three Software Programs of ADNI Data (Vendor Subgroup)

	DB vs. Free		NQ vs. Free		DB vs NQ	
	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere
Cortical gray matter	0.93 (0.28–0.98)	0.90 (0.12–0.97)	0.71 (-0.06–0.92)	0.70 (-0.06–0.91)	0.57 (-0.05–0.86)	0.53 (-0.05–0.84)
1.5T Siemens	0.95 (0.75–0.98)	0.93 (0.44–0.98)	0.61 (-0.06–0.88)	0.60 (-0.07–0.87)	0.49 (-0.06–0.82)	0.47 (-0.07–0.80)
3T GE	0.90 (-0.002–0.97)	0.84 (-0.04–0.96)	0.79 (-0.05–0.94)	0.78 (-0.06–0.94)	0.61 (-0.05–0.88)	0.54 (-0.05–0.85)
3T Phillips	0.93 (0.10–0.98)	0.92 (0.12–0.98)	0.63 (-0.05–0.89)	0.63 (-0.04–0.90)	0.51 (-0.03–0.84)	0.49 (-0.03–0.83)
Caudate	0.81 (0.41–0.92)	0.86 (0.40–0.95)	0.62 (-0.05–0.85)	0.59 (-0.07–0.83)	0.45 (-0.09–0.77)	0.48 (-0.07–0.80)
1.5T Siemens	0.81 (0.31–0.93)	0.83 (0.18–0.94)	0.55 (-0.05–0.81)	0.60 (-0.07–0.85)	0.47 (-0.09–0.80)	0.47 (-0.07–0.80)
3T GE	0.80 (0.61–0.90)	0.89 (0.62–0.95)	0.69 (0.07–0.88)	0.61 (-0.09–0.86)	0.54 (-0.09–0.82)	0.52 (-0.07–0.84)
3T Phillips	0.82 (-0.04–0.95)	0.86 (0.26–0.94)	0.58 (-0.08–0.86)	0.57 (-0.07–0.83)	0.38 (-0.05–0.75)	0.44 (-0.07–0.79)
Putamen	0.35 (-0.04–0.72)	0.50 (-0.04–0.82)	0.36 (-0.09–0.70)	0.46 (-0.09–0.76)	0.72 (0.61–0.80)	0.68 (0.57–0.76)
1.5T Siemens	0.30 (-0.03–0.68)	0.40 (-0.03–0.78)	0.42 (-0.08–0.76)	0.44 (-0.08–0.78)	0.74 (0.24–0.89)	0.82 (0.62–0.91)
3T GE	0.31 (-0.03–0.69)	0.42 (-0.05–0.78)	0.29 (-0.10–0.63)	0.46 (0.01–0.72)	0.56 (0.26–0.75)	0.55 (0.29–0.73)
3T Phillips	0.45 (-0.02–0.81)	0.65 (-0.03–0.90)	0.31 (-0.04–0.70)	0.38 (-0.07–0.74)	0.83 (0.62–0.92)	0.71 (0.41–0.86)
Pallidum	0.21 (-0.07–0.52)	0.23 (-0.06–0.58)	0.01 (-0.01–0.03)	0.004 (-0.007–0.02)	0.01 (-0.01–0.04)	0.01 (-0.01–0.04)
1.5T Siemens	0.31 (-0.06–0.68)	0.24 (-0.05–0.61)	0.002 (-0.007–0.02)	0.001 (-0.01–0.01)	0.009 (-0.01–0.05)	0.004 (-0.01–0.03)
3T GE	0.16 (-0.07–0.46)	0.20 (-0.05–0.55)	0.002 (-0.009–0.02)	-0.0002 (-0.01–0.02)	0.007 (-0.01–0.04)	0.01 (-0.01–0.04)
3T Phillips	0.15 (-0.04–0.46)	0.15 (-0.04–0.47)	0.01 (-0.01–0.06)	0.008 (-0.01–0.04)	0.04 (-0.03–0.16)	0.02 (-0.02–0.09)
Thalamus	0.70 (0.02–0.88)	0.83 (0.64–0.91)	0.47 (-0.10–0.76)	0.44 (-0.08–0.72)	0.65 (0.37–0.80)	0.48 (0.01–0.72)
1.5T Siemens	0.82 (0.22–0.94)	0.85 (0.73–0.91)	0.49 (-0.09–0.80)	0.47 (-0.08–0.80)	0.58 (0.005–0.82)	0.48 (-0.09–0.80)
3T GE	0.67 (0.08–0.87)	0.80 (0.24–0.93)	0.39 (-0.10–0.72)	0.36 (-0.06–0.65)	0.53 (0.07–0.77)	0.39 (0.06–0.62)
3T Phillips	0.58 (-0.07–0.86)	0.86 (0.71–0.93)	0.58 (-0.08–0.84)	0.56 (-0.09–0.84)	0.86 (0.75–0.92)	0.67 (-0.06–0.89)
Amygdala	0.77 (0.12–0.91)	0.87 (0.77–0.92)	0.77 (-0.02–0.93)	0.86 (0.72–0.92)	0.89 (0.84–0.92)	0.79 (0.19–0.92)
1.5T Siemens	0.72 (0.08–0.89)	0.80 (0.63–0.90)	0.70 (-0.07–0.91)	0.87 (0.78–0.93)	0.85 (0.70–0.92)	0.86 (0.62–0.94)
3T GE	0.78 (0.29–0.91)	0.85 (0.75–0.92)	0.81 (0.05–0.94)	0.79 (0.32–0.92)	0.88 (0.80–0.93)	0.76 (0.14–0.91)
3T Phillips	0.72 (-0.06–0.91)	0.86 (0.86–0.96)	0.76 (-0.02–0.93)	0.88 (0.65–0.95)	0.89 (0.79–0.93)	0.72 (-0.07–0.92)
Hippocampus	0.86 (0.29–0.95)	0.84 (0.28–0.94)	0.75 (-0.03–0.91)	0.69 (-0.02–0.88)	0.60 (-0.07–0.87)	0.55 (-0.08–0.84)
1.5T Siemens	0.87 (0.61–0.95)	0.83 (0.35–0.94)	0.70 (-0.05–0.90)	0.71 (-0.07–0.91)	0.62 (-0.08–0.88)	0.60 (-0.04–0.88)
3T GE	0.83 (0.31–0.94)	0.86 (0.33–0.95)	0.68 (-0.07–0.90)	0.49 (-0.04–0.76)	0.54 (-0.07–0.84)	0.41 (-0.10–0.73)
3T Phillips	0.80 (-0.06–0.94)	0.75 (-0.03–0.92)	0.73 (-0.04–0.91)	0.76 (-0.06–0.93)	0.50 (-0.05–0.83)	0.50 (-0.03–0.84)
Cerebellum	0.73 (-0.06–0.92)	0.81 (-0.05–0.95)	0.89 (0.65–0.95)	0.88 (0.53–0.95)	0.85 (0.05–0.96)	0.91 (0.68–0.96)
1.5T Siemens	0.76 (-0.05–0.94)	0.84 (-0.04–0.96)	0.95 (0.91–0.97)	0.96 (0.93–0.98)	0.75 (-0.05–0.93)	0.84 (-0.04–0.96)
3T GE	0.73 (-0.07–0.92)	0.81 (-0.04–0.95)	0.88 (0.26–0.96)	0.89 (0.12–0.97)	0.90 (0.51–0.97)	0.92 (0.85–0.96)
3T Phillips	0.69 (-0.03–0.92)	0.77 (-0.05–0.94)	0.86 (0.08–0.96)	0.82 (-0.03–0.95)	0.89 (-0.003–0.97)	0.97 (0.89–0.99)
Total cortical GM	0.92 (0.16–0.98)		0.70 (-0.06–0.91)		0.54 (-0.05–0.85)	
1.5T Siemens	0.94 (0.59–0.98)		0.60 (-0.06–0.88)		0.47 (-0.06–0.81)	
3T GE	0.87 (-0.03–0.97)		0.78 (-0.06–0.94)		0.57 (-0.05–0.87)	
3T Phillips	0.92 (0.09–0.98)		0.63 (-0.05–0.89)		0.50 (-0.03–0.84)	
Total cerebral WM	0.93 (0.80–0.96)		0.79 (0.67–0.86)		0.81 (0.74–0.86)	
1.5T Siemens	0.84 (0.19–0.95)		0.76 (0.60–0.87)		0.73 (0.07–0.90)	
3T GE	0.98 (0.96–0.99)		0.77 (0.45–0.89)		0.80 (0.54–0.90)	
3T Phillips	0.94 (0.81–0.97)		0.84 (0.002–0.96)		0.92 (0.40–0.98)	
TICV	0.86 (0.75–0.92)		0.88 (0.83–0.91)		0.82 (0.66–0.89)	
1.5T Siemens	0.83 (0.08–0.95)		0.95 (0.88–0.98)		0.90 (0.35–0.97)	
3T GE	0.92 (0.85–0.95)		0.78 (0.62–0.88)		0.73 (0.57–0.84)	
3T Phillips	0.84 (0.23–0.95)		0.95 (0.91–0.97)		0.86 (0.12–0.96)	

Data are intraclass correlation coefficient (95% confidence interval). Each row with a specific brain region name represents the results of the total study population.
ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 16. Intermethod Reliability of Regional Brain Volume Measured by the Three Software Programs of ADNI Data (Diagnosis Subgroup)

	DB vs. Free		NQ vs. Free		DB vs NQ	
	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere	Lt. Hemisphere	Rt. Hemisphere
Cortical GM	0.93 (0.28–0.98)	0.90 (0.12–0.97)	0.71 (-0.06–0.92)	0.70 (-0.06–0.91)	0.57 (-0.05–0.86)	0.53 (-0.05–0.84)
NL	0.87 (-0.02–0.97)	0.82 (-0.04–0.95)	0.60 (-0.05–0.88)	0.59 (-0.06–0.87)	0.42 (-0.04–0.78)	0.39 (-0.04–0.76)
MCI	0.94 (0.38–0.98)	0.92 (0.16–0.98)	0.69 (-0.06–0.91)	0.67 (-0.06–0.91)	0.56 (-0.05–0.86)	0.51 (-0.04–0.84)
AD	0.95 (0.57–0.98)	0.91 (0.34–0.97)	0.79 (-0.06–0.94)	0.77 (-0.06–0.94)	0.67 (-0.05–0.91)	0.61 (-0.06–0.88)
Caudate	0.81 (0.41–0.92)	0.86 (0.40–0.95)	0.62 (-0.05–0.85)	0.59 (-0.07–0.83)	0.45 (-0.09–0.77)	0.48 (-0.07–0.80)
NL	0.68 (0.32–0.84)	0.77 (0.33–0.91)	0.40 (-0.10–0.74)	0.42 (-0.10–0.75)	0.25 (-0.06–0.61)	0.77 (0.33–0.91)
MCI	0.89 (0.28–0.96)	0.91 (0.49–0.97)	0.62 (-0.08–0.86)	0.69 (-0.07–0.90)	0.49 (-0.08–0.81)	0.57 (-0.06–0.86)
AD	0.79 (0.36–0.91)	0.84 (0.23–0.95)	0.77 (0.34–0.90)	0.58 (0.04–0.81)	0.55 (-0.07–0.82)	0.49 (-0.10–0.81)
Putamen	0.35 (-0.04–0.72)	0.50 (-0.04–0.82)	0.36 (-0.09–0.70)	0.46 (-0.09–0.76)	0.72 (0.61–0.80)	0.68 (0.57–0.76)
NL	0.23 (-0.04–0.60)	0.34 (-0.05–0.72)	0.15 (-0.07–0.45)	0.21 (-0.08–0.55)	0.65 (0.43–0.79)	0.57 (0.33–0.74)
MCI	0.37 (-0.03–0.74)	0.55 (-0.04–0.86)	0.38 (-0.08–0.74)	0.51 (-0.06–0.79)	0.77 (0.63–0.86)	0.67 (0.49–0.80)
AD	0.43 (-0.03–0.79)	0.55 (-0.04–0.86)	0.53 (-0.10–0.83)	0.60 (-0.07–0.85)	0.69 (0.31–0.86)	0.72 (0.47–0.86)
Pallidum	0.21 (-0.07–0.52)	0.23 (-0.06–0.58)	0.01 (-0.01–0.03)	0.004 (-0.007–0.02)	0.01 (-0.01–0.04)	0.01 (-0.01–0.04)
NL	0.16 (-0.08–0.46)	0.18 (-0.05–0.52)	0.01 (-0.01–0.04)	-0.0001 (-0.009–0.02)	0.01 (-0.02–0.03)	0.01 (-0.01–0.04)
MCI	0.18 (-0.08–0.48)	0.20 (-0.06–0.55)	0.005 (-0.009–0.03)	0.008 (-0.01–0.04)	0.01 (-0.02–0.05)	0.02 (-0.02–0.07)
AD	0.27 (-0.06–0.65)	0.30(-0.06–0.67)	0.01 (-0.01–0.05)	0.004 (-0.01–0.03)	0.02 (-0.02–0.08)	0.004 (-0.02–0.05)
Thalamus	0.70 (0.02–0.88)	0.83 (0.64–0.91)	0.47 (-0.10–0.76)	0.44 (-0.08–0.72)	0.65 (0.37–0.80)	0.48 (0.01–0.72)
NL	0.65 (0.03–0.86)	0.87 (0.62–0.95)	0.39 (-0.10–0.71)	0.46 (-0.07–0.80)	0.60 (0.25–0.79)	0.52 (-0.10–0.82)
MCI	0.67 (-0.03–0.88)	0.78 (0.40–0.90)	0.49 (-0.09–0.80)	0.34 (-0.03–0.61)	0.71 (0.41–0.85)	0.40 (0.09–0.63)
AD	0.76 (0.05–0.92)	0.85 (0.73–0.92)	0.51 (-0.09–0.81)	0.56 (-0.09–0.84)	0.64 (0.29–0.82)	0.58 (-0.07–0.84)
Amygdala	0.77 (0.12–0.91)	0.87 (0.77–0.92)	0.77 (-0.02–0.93)	0.86 (0.72–0.92)	0.89 (0.84–0.92)	0.79 (0.19–0.92)
NL	0.67 (0.09–0.87)	0.86 (0.68–0.93)	0.65 (-0.08–0.88)	0.83 (0.60–0.92)	0.76 (0.57–0.87)	0.73 (0.06–0.91)
MCI	0.76 (0.09–0.92)	0.85 (0.70–0.92)	0.76 (0.001–0.92)	0.84 (0.70–0.91)	0.90 (0.82–0.94)	0.77 (0.18–0.91)
AD	0.72 (-0.02–0.90)	0.84 (0.70–0.91)	0.76 (-0.05–0.93)	0.83 (0.63–0.92)	0.88 (0.79–0.94)	0.77 (0.17–0.92)
Hippocampus	0.86 (0.29–0.95)	0.84 (0.28–0.94)	0.75 (-0.03–0.91)	0.69 (-0.02–0.88)	0.60 (-0.07–0.87)	0.55 (-0.08–0.84)
NL	0.66 (-0.08–0.89)	0.72 (-0.07–0.92)	0.58 (-0.09–0.85)	0.65 (-0.07–0.90)	0.32 (-0.04–0.71)	0.40 (-0.03–0.78)
MCI	0.89 (0.45–0.96)	0.85 (0.41–0.94)	0.73 (-0.03–0.91)	0.61 (0.05–0.83)	0.61 (-0.08–0.87)	0.48 (-0.10–0.78)
AD	0.88 (0.62–0.95)	0.85 (0.55–0.94)	0.76 (-0.03–0.93)	0.72 (-0.07–0.92)	0.68 (-0.06–0.91)	0.63 (-0.04–0.89)
Cerebellum	0.73 (-0.06–0.92)	0.81 (-0.05–0.95)	0.89 (0.65–0.95)	0.88 (0.53–0.95)	0.85 (0.05–0.96)	0.91 (0.68–0.96)
NL	0.74 (-0.06–0.93)	0.80 (-0.05–0.95)	0.85 (0.62–0.93)	0.87 (0.35–0.95)	0.89 (0.13–0.97)	0.92 (0.79–0.96)
MCI	0.72 (-0.07–0.92)	0.82 (-0.03–0.95)	0.92 (0.74–0.97)	0.90 (0.70–0.96)	0.81 (0.002–0.94)	0.91 (0.56–0.97)
AD	0.74 (-0.04–0.93)	0.81 (-0.05–0.95)	0.90 (0.36–0.97)	0.88 (0.40–0.96)	0.87 (0.01–0.97)	0.91 (0.61–0.97)
Total cortical GM	0.92 (0.16–0.98)		0.70 (-0.06–0.91)		0.54 (-0.05–0.85)	
NL	0.85 (-0.04–0.96)		0.59 (-0.05–0.88)		0.40 (-0.04–0.77)	
MCI	0.93 (0.23–0.98)		0.68 (-0.06–0.91)		0.53 (-0.05–0.85)	
AD	0.93 (0.41–0.98)		0.78 (-0.06–0.94)		0.63 (-0.05–0.89)	
Total cerebral WM	0.93 (0.80–0.96)		0.79 (0.67–0.86)		0.81 (0.74–0.86)	
NL	0.97 (0.89–0.99)		0.79 (0.65–0.88)		0.79 (0.64–0.88)	
MCI	0.91 (0.74–0.96)		0.91 (0.75–0.96)		0.79 (0.66–0.88)	
AD	0.92 (0.73–0.97)		0.84 (0.65–0.93)		0.86 (0.75–0.93)	
TICV	0.86 (0.75–0.92)		0.88 (0.83–0.91)		0.82 (0.66–0.89)	
NL	0.84 (0.66–0.92)		0.91 (0.83–0.95)		0.85 (0.17–0.95)	
MCI	0.88 (0.76–0.93)		0.82 (0.70–0.89)		0.71 (0.54–0.82)	
AD	0.87 (0.71–0.94)		0.93 (0.88–0.96)		0.93 (0.46–0.98)	

Data are intraclass correlation coefficient (95% confidence interval). Each row with a specific brain region name represents the results of he total study population. AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, FS = FreeSurfer, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 17. Comparison of Normative Percentiles of Regional Brain Volume Derived from NQ and DB of SMC (Diagnosis Subgroup)

	Lt. Hemisphere		Rt. Hemisphere	
	NQ	DB	NQ	DB
Cortical GM	74.04 ± 26.54	23.40 ± 28.40	76.99 ± 24.62	27.85 ± 30.84
NL	81.27 ± 20.59	41.47 ± 30.86	84.71 ± 18.16	48.01 ± 31.01
MCI	73.54 ± 26.19	21.65 ± 26.83	78.58 ± 22.68	26.55 ± 29.86
AD	67.19 ± 30.62	6.83 ± 12.66	67.40 ± 29.21	8.63 ± 15.54
Caudate	49.32 ± 31.89	37.84 ± 39.73	50.85 ± 30.88	57.62 ± 34.11
NL	53.00 ± 32.98	46.49 ± 34.29	54.63 ± 32.13	63.07 ± 33.21
MCI	45.34 ± 29.68	34.31 ± 30.56	46.58 ± 28.02	52.43 ± 32.67
AD	49.79 ± 33.20	38.60 ± 36.49	51.53 ± 32.55	57.57 ± 36.32
Putamen	50.43 ± 31.21	65.98 ± 33.43	55.77 ± 30.47	68.16 ± 31.59
NL	70.54 ± 21.91	81.39 ± 23.85	73.33 ± 23.45	86.29 ± 19.65
MCI	48.06 ± 29.44	62.28 ± 33.82	55.52 ± 28.41	64.31 ± 29.58
AD	32.43 ± 29.62	54.18 ±35.98	38.11 ± 29.06	53.73 ± 35.02
Pallidum	46.59 ± 29.53	65.44 ± 32.04	45.57 ± 28.47	74.47 ± 27.41
NL	54.31 ± 26.74	77.33 ± 21.46	50.10 ± 26.14	85.44 ± 14.69
MCI	47.04 ± 28.36	57.45 ± 33.60	50.42 ± 26.58	66.30 ± 30.89
AD	38.23 ± 31.76	61.79 ± 36.21	35.79 ± 30.68	71.96 ± 30.19
Thalamus	53.90 ± 28.17	24.81 ± 31.21	63.19 ± 26.32	43.50 ± 33.39
NL	63.10 ± 24.01	27.10 ± 31.31	71.71 ± 21.86	51.54 ± 31.15
MCI	55.06 ± 29.34	25.17 ± 32.97	63.42 ± 27.15	42.68 ± 35.21
AD	43.26 ± 27.80	22.10 ± 29.61	54.23 ± 27.14	36.17 ± 32.49
Amygdala	64.32 ± 32.31	50.03 ± 36.92	68.01 ± 31.14	54.91 ± 35.40
NL	83.67 ± 20.18	65.48 ± 32.08	86.96 ± 16.91	69.51 ± 27.20
MCI	63.32 ± 33.35	51.37 ± 39.26	67.54 ± 29.83	56.44 ± 37.20
AD	45.64 ± 30.32	30.97 ± 25.66	49.17 ± 32.51	34.80 ± 27.26
Hippocampus	65.30 ± 34.43	50.43 ± 38.96	69.19 ± 33.00	56.25 ± 37.57
NL	87.98 ± 20.27	74.91 ± 30.73	91.77 ± 13.27	76.79 ± 26.56
MCI	66.94 ± 32.26	47.71 ± 40.32	72.02 ± 28.22	55.41 ± 38.40
AD	40.40 ± 31.77	26.20 ± 28.79	43.13 ± 33.84	36.18 ± 35.71
Cerebellar GM	57.01 ± 27.52	40.07 ± 32.94	57.93 ± 27.01	35.64 ± 32.87
NL	58.40 ± 27.10	40.19 ± 32.89	57.50 ± 24.98	35.29 ± 32.53
MCI	58.80 ± 28.99	39.23 ± 34.47	60.94 ± 28.00	38.26 ± 34.46
AD	53.68 ± 26.63	40.83 ± 31.99	55.17 ± 28.17	33.23 ± 31.99
Cerebellar WM	73.56 ± 23.27	30.23 ± 31.29	76.37 ± 22.61	29.18 ± 30.32
NL	79.92 ± 18.51	34.46 ± 30.76	79.90 ± 18.90	31.25 ± 29.06
MCI	73.18 ± 23.16	28.56 ± 32.30	76.16 ± 23.06	30.54 ± 31.82
AD	67.47 ± 26.35	27.68 ± 30.96	73.00 ± 25.38	25.60 ± 30.27
Cerebral WM	48.03 ± 26.49	40.07 ± 32.94	51.45 ± 26.64	52.11 ± 32.82
NL	62.98 ± 22.23	60.74 ± 30.40	67.75 ± 20.49	64.74 ± 28.29
MCI	48.00 ± 23.53	39.23 ± 34.47	50.72 ± 23.87	49.39 ± 32.70
AD	32.81 ± 25.15	43.91 ± 36.29	35.57 ± 25.49	42.10 ± 33.74
Total cerebral cortical GM	75.64 ± 25.34	25.18 ± 29.74		
NL	83.33 ± 18.71	44.25 ± 31.26		
MCI	76.14 ± 24.44	23.90 ± 28.60		
AD	67.26 ± 29.70	7.07 ± 13.51		
Total cerebral WM	49.77 ± 26.22	51.08 ± 33.44		
NL	65.67 ± 20.02	61.93 ± 30.04		
MCI	49.30 ± 23.72	48.52 ± 32.87		
AD	34.04 ± 25.02	42.74 ± 35.00		
TICV	26.60 ± 23.84	36.41 ± 34.91		
NL	31.15 ± 25.68	37.59 ± 36.09		
MCI	20.34 ± 20.48	30.00 ± 32.46		
AD	28.62 ± 24.29	42.02 ± 35.81		

Data are mean ± standard deviation. Each row with a specific brain region name represents the results of the total study population.
AD = Alzheimer's disease, DB = DeepBrain, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, SMC = single medical center, TICV = total intracranial volume, WM = white matter

Supplementary Table 18. Comparison of Normative Percentiles of Regional Brain Volume Derived from NQ and DB of ADNI (Vendor Subgroup)

	Lt. Hemisphere		Rt. Hemisphere	
	NQ	DB	NQ	DB
Cortical GM	40.86 ± 30.00	27.74 ± 34.81	40.04 ± 30.47	27.18 ± 34.87
1.5T Siemens	30.58 ± 25.48	12.81 ± 23.90	29.95 ± 28.03	14.09 ± 27.63
3T GE	50.77 ± 29.70	40.29 ± 38.28	48.50 ± 30.14	37.66 ± 37.92
3T Phillips	40.00 ± 31.61	28.73 ± 34.88	40.73 ± 30.86	28.69 ± 34.23
Caudate	47.71 ± 31.16	31.00 ± 33.42	47.76 ± 32.60	42.22 ± 36.58
1.5T Siemens	53.77 ± 29.48	27.44 ± 28.41	54.05 ± 31.31	42.34 ± 34.17
3T GE	45.50 ± 34.11	27.41 ± 34.93	44.96 ± 33.42	37.85 ± 37.90
3T Phillips	43.85 ± 28.92	39.13 ± 35.84	44.35 ± 32.80	47.33 ± 37.71
Putamen	39.32 ± 29.93	45.02 ± 34.09	43.80 ± 30.43	39.67 ± 32.69
1.5T Siemens	27.56 ± 24.17	38.87 ± 31.01	33.42 ± 26.22	33.49 ± 29.50
3T GE	38.94 ± 31.39	51.91 ± 32.91	39.27 ± 30.79	43.68 ± 32.58
3T Phillips	52.43 ± 28.99	43.37 ± 37.80	60.40 ± 27.90	41.49 ± 35.79
Pallidum	29.53 ± 24.12	57.78 ± 35.25	31.83 ± 24.57	49.68 ± 32.81
1.5T Siemens	28.07 ± 26.80	59.28 ± 34.56	30.70 ± 24.97	44.37 ± 29.84
3T GE	26.94 ± 21.90	73.65 ± 27.02	29.29 ± 24.59	65.01 ± 30.96
3T Phillips	34.23 ± 23.53	37.14 ± 35.02	36.10 ± 24.19	36.99 ± 31.44
Thalamus	63.76 ± 24.11	20.15 ± 28.60	57.62 ± 26.72	23.85 ± 28.32
1.5T Siemens	60.65 ± 25.49	12.06 ± 22.92	61.98 ± 27.72	25.55 ± 27.96
3T GE	70.31 ± 21.75	16.10 ± 26.14	60.13 ± 24.44	22.16 ± 28.77
3T Phillips	59.25 ± 24.15	33.70 ± 32.51	49.93 ± 27.27	24.04 ± 28.76
Amygdala	34.96 ± 32.86	24.82 ± 35.11	35.76 ± 31.20	24.74 ± 33.39
1.5T Siemens	27.26 ± 31.46	10.05 ± 25.62	27.86 ± 28.10	7.85 ± 18.30
3T GE	34.94 ± 30.66	25.85 ± 34.36	35.48 ± 32.04	22.69 ± 29.96
3T Phillips	43.28 ± 35.55	39.45 ± 38.96	44.58 ± 31.77	45.36 ± 38.98
Hippocampus	34.19 ± 30.18	20.61 ± 30.74	35.51 ± 30.31	17.38 ± 26.64
1.5T Siemens	19.51 ± 24.30	7.41 ± 18.07	19.28 ± 22.10	4.32 ± 10.59
3T GE	47.71 ± 30.76	27.74 ± 33.44	47.15 ± 30.40	22.02 ± 29.10
3T Phillips	33.75 ± 28.23	26.25 ± 34.12	39.00 ± 30.87	25.83 ± 30.59
Cerebellar GM	47.90 ± 30.35	54.00 ± 36.84	46.00 ± 30.45	48.75 ± 36.30
1.5T Siemens	57.16 ± 27.24	62.41 ± 35.51	53.84 ± 28.67	56.64 ± 35.80
3T GE	50.48 ± 30.30	62.59 ± 35.31	51.58 ± 30.41	57.48 ± 36.29
3T Phillips	34.85 ± 29.78	34.64 ± 33.33	30.88 ± 27.38	29.81 ± 29.93
Cerebellar WM	59.93 ± 27.43	31.32 ± 32.21	61.44 ± 28.27	32.12 ± 32.36
1.5T Siemens	64.56 ± 22.22	19.67 ± 27.12	67.33 ± 23.74	14.91 ± 20.36
3T GE	57.98 ± 28.94	35.19 ± 32.96	59.88 ± 30.62	39.39 ± 35.65
3T Phillips	57.30 ± 30.53	39.19 ± 33.56	56.98 ± 29.41	42.03 ± 31.87
Cerebral WM	38.54 ± 27.53	49.93 ± 34.47	39.94 ± 27.27	48.76 ± 34.82
1.5T Siemens	62.33 ± 25.57	45.75 ± 33.07	64.05 ± 24.26	46.83 ± 32.46
3T GE	28.52 ± 20.29	54.92 ± 34.59	29.27 ± 20.25	49.84 ± 37.01
3T Phillips	25.00 ± 19.76	48.44 ± 35.90	26.83 ± 19.82	49.54 ± 35.38
Total cortical GM	40.12 ± 30.22	27.07 ± 34.72		
1.5T Siemens	29.79 ± 26.30	13.22 ± 25.68		
3T GE	49.42 ± 30.07	38.27 ± 37.91		
3T Phillips	40.08 ± 31.39	28.51 ± 34.77		
Total cerebral WM	39.18 ± 27.33	49.25 ± 34.18		
1.5T Siemens	63.42 ± 24.78	46.32 ± 32.01		
3T GE	28.63 ± 19.77	52.18 ± 35.39		
3T Phillips	25.78 ± 19.68	48.90 ± 35.51		
TICV	45.92 ± 27.73	74.62 ± 34.52		
1.5T Siemens	37.28 ± 24.64	70.05 ± 36.40		
3T GE	44.46 ± 28.75	75.12 ± 34.57		
3T Phillips	56.98 ± 26.52	78.92 ± 32.60		

Data are mean ± standard deviation. Each row with a specific brain region name represents the results of the total study population.
ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, GM = gray matter, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 19. Comparison of Normative Percentiles of Regional Brain Volume Derived from NQ and DB of ADNI (Diagnosis)

	Lt. Hemisphere		Rt. Hemisphere	
	NQ	DB	NQ	DB
Cortical GM	40.86 ± 30.00	27.74 ± 34.81	40.04 ± 30.47	27.18 ± 34.87
NL	48.98 ± 27.93	37.05 ± 38.30	47.48 ± 28.27	33.67 ± 36.38
MCI	47.29 ± 30.10	34.14 ± 35.38	46.71 ± 31.31	33.26 ± 36.67
AD	23.16 ± 24.99	8.71 ± 19.95	22.82 ± 25.13	11.84 ± 25.48
Caudate	47.71 ± 31.16	31.00 ± 33.42	47.76 ± 32.60	42.22 ± 36.58
NL	42.55 ± 28.29	27.24 ± 30.03	43.32 ± 31.67	41.43 ± 33.63
MCI	42.61 ± 32.36	26.51 ± 33.40	45.51 ± 34.47	38.05 ± 37.71
AD	60.26 ± 29.90	41.12 ± 35.76	55.79 ± 30.51	48.51 ± 38.45
Putamen	39.32 ± 29.93	45.02 ± 34.09	43.80 ± 30.43	39.67 ± 32.69
NL	43.86 ± 26.49	49.01 ± 33.36	48.66 ± 28.12	43.16 ± 32.48
MCI	40.53 ± 30.95	44.14 ± 33.64	47.22 ± 30.75	39.48 ± 31.89
AD	32.50 ± 31.86	41.53 ± 35.89	33.76 ± 31.00	35.86 ± 34.35
Pallidum	29.53 ± 24.12	57.78 ± 35.25	31.83 ± 24.57	49.68 ± 32.81
NL	28.14 ± 22.08	56.23 ± 36.39	33.95 ± 25.10	45.67 ± 31.58
MCI	32.00 ± 26.49	55.31 ± 34.30	32.22 ± 23.39	53.12 ± 33.22
AD	27.97 ± 23.52	62.78 ± 35.55	28.87 ± 25.79	49.88 ± 34.00
Thalamus	63.76 ± 24.11	20.15 ± 28.60	57.62 ± 26.72	23.85 ± 28.32
NL	67.02 ± 22.39	22.03 ± 29.92	59.16 ± 27.52	23.95 ± 28.13
MCI	63.94 ± 25.26	22.08 ± 30.94	60.27 ± 26.36	24.83 ± 30.67
AD	59.76 ± 24.56	15.48 ± 23.66	52.42 ± 26.23	22.46 ± 25.99
Amygdala	34.96 ± 32.86	24.82 ± 35.11	35.76 ± 31.20	24.74 ± 33.39
NL	56.52 ± 31.67	41.29 ± 39.13	53.57 ± 30.47	40.15 ± 38.08
MCI	29.45 ± 30.76	20.80 ± 32.62	33.27 ± 29.43	21.52 ± 29.95
AD	17.11 ± 21.93	10.91 ± 25.07	18.34 ± 22.84	11.05 ± 24.09
Hippocampus	34.19 ± 30.18	20.61 ± 30.74	35.51 ± 30.31	17.38 ± 26.64
NL	54.25 ± 26.56	41.27 ± 34.09	52.89 ± 27.96	29.55 ± 30.69
MCI	26.78 ± 28.69	14.31 ± 26.86	30.31 ± 28.62	12.62 ± 22.01
AD	20.53 ± 23.86	4.81 ± 14.75	22.11 ± 26.03	9.41 ± 22.31
Cerebellar GM	47.90 ± 30.35	54.00 ± 36.84	46.00 ± 30.45	48.75 ± 36.30
NL	47.52 ± 29.90	55.45 ± 37.57	44.27 ± 30.00	49.75 ± 35.82
MCI	45.06 ± 32.79	48.57 ± 37.95	44.08 ± 32.34	44.61 ± 36.61
AD	52.00 ± 27.81	59.32 ± 34.48	50.47 ± 28.72	52.94 ± 36.88
Cerebellar WM	59.93 ± 27.43	31.32 ± 32.21	61.44 ± 28.27	32.12 ± 32.36
NL	53.57 ± 28.12	27.18 ± 30.61	54.43 ± 27.58	27.13 ± 29.09
MCI	61.27 ± 28.90	30.94 ± 32.57	62.86 ± 30.50	32.42 ± 34.09
AD	65.58 ± 23.62	36.59 ± 33.63	67.71 ± 24.81	37.50 ± 33.59
Cerebral WM	38.54 ± 27.53	49.93 ± 34.47	39.94 ± 27.27	48.76 ± 34.82
NL	42.43 ± 29.27	53.33 ± 34.41	42.61 ± 29.22	50.02 ± 33.33
MCI	38.53 ± 25.07	50.39 ± 34.25	40.63 ± 25.50	51.22 ± 35.34
AD	34.05 ± 28.51	45.42 ± 35.24	35.95 ± 27.40	44.14 ± 36.29
Total cortical GM	40.12 ± 30.22	27.07 ± 34.72		
NL	48.16 ± 28.15	35.18 ± 37.33		
MCI	46.76 ± 30.61	33.35 ± 36.09		
AD	22.26 ± 24.69	9.57 ± 21.95		
Total cerebral WM	39.18 ± 27.33	49.25 ± 34.18		
NL	42.52 ± 29.29	51.84 ± 33.53		
MCI	39.61 ± 25.11	50.85 ± 34.53		
AD	34.74 ± 27.85	44.20 ± 34.83		
TICV	45.92 ± 27.73	74.62 ± 34.52		
NL	50.14 ± 24.34	77.47 ± 31.23		
MCI	47.43 ± 28.52	77.25 ± 33.81		
AD	39.11 ± 29.78	67.92 ± 38.79		

Data are mean ± standard deviation. Each row with a specific brain region name represents the results of the total study population.
AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 20. Intermethod Reliability of Normative Percentiles Presented by NQ and DB of Single Medical Center (Diagnosis Subgroup)

	NQ vs. DB	
	L. Hemisphere	R. Hemisphere
Cortical GM	0.202 (-0.083–0.504)	0.217 (-0.086–0.523)
NL	0.300 (-0.095–0.644)	0.304 (-0.100–0.642)
MCI	0.177 (-0.080–0.482)	0.164 (-0.080–0.458)
AD	0.083 (-0.057–0.293)	0.101 (-0.059–0.338)
Caudate	0.804 (0.542–0.881)	0.784 (0.692–0.847)
NL	0.898 (0.770–0.934)	0.820 (0.658–0.903)
MCI	0.778 (0.509–0.890)	0.735 (0.575–0.841)
AD	0.755 (0.542–0.868)	0.788 (0.647–0.877)
Putamen	0.711 (0.352–0.850)	0.749 (0.486–0.861)
NL	0.702 (0.335–0.856)	0.560 (0.174–0.767)
MCI	0.676 (0.365–0.830)	0.753 (0.557–0.862)
AD	0.632 (0.081–0.841)	0.716 (0.312–0.869)
Pallidum	0.245 (0.070–0.403)	0.183 (-0.028–0.373)
NL	0.098 (-0.103–0.320)	0.087 (-0.075–0.284)
MCI	0.222 (-0.044–0.463)	0.317 (0.054–0.541)
AD	0.293 (0.014–0.533)	0.152 (-0.077–0.391)
Thalamus	0.431 (-0.058–0.703)	0.536 (0.152–0.734)
NL	0.351 (-0.103–0.681)	0.459 (0.049–0.705)
MCI	0.438 (-0.061–0.723)	0.565 (0.115–0.783)
AD	0.520 (0.050–0.760)	0.520 (0.159–0.734)
Amygdala	0.648 (0.432–0.774)	0.670 (0.463–0.790)
NL	0.383 (0.067–0.619)	0.299 (0.004–0.544)
MCI	0.714 (0.500–0.837)	0.589 (0.363–0.747)
AD	0.579 (0.317–0.751)	0.810 (0.582–0.906)
Hippocampus	0.780 (0.470–0.889)	0.716 (0.517–0.824)
NL	0.648 (0.291–0.819)	0.436 (0.068–0.676)
MCI	0.724 (0.336–0.871)	0.587 (0.278–0.767)
AD	0.720 (0.340–0.868)	0.761 (0.604–0.860)
Cerebellar GM	0.649 (0.246–0.816)	0.602 (0.018–0.821)
NL	0.718 (0.077–0.894)	0.668 (-0.065–0.887)
MCI	0.592 (0.159–0.796)	0.560 (0.051–0.792)
AD	0.658 (0.363–0.815)	0.593 (0.026–0.822)
Cerebellar WM	0.155 (-0.077–0.384)	0.125 (-0.074–0.337)
NL	0.116 (-0.079–0.347)	0.098 (-0.073–0.315)
MCI	0.155 (-0.086–0.414)	0.161 (-0.088–0.429)
AD	0.178 (-0.086–0.443)	0.110 (-0.079–0.333)
Total cortical GM	0.207 (-0.083–0.512)	
NL	0.295 (-0.096–0.637)	
MCI	0.173 (-0.080–0.475)	
AD	0.086 (-0.056–0.300)	
Total cerebral WM	0.694 (0.599–0.769)	
NL	0.717 (0.547–0.830)	
MCI	0.677 (0.492–0.803)	
AD	0.600 (0.378–0.757)	
TICV	0.817 (0.608–0.901)	
NL	0.855 (0.734–0.920)	
MCI	0.766 (0.518–0.880)	
AD	0.815 (0.315–0.930)	

Data are intraclass correlation coefficient (95% confidence interval). Each row with a specific brain region name represents the results of the total study population. AD = Alzheimer's disease, DB = DeepBrain, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 21. Intermethod Reliability of Normative Percentiles Presented by NQ and DB using ADNI (Vendor Subgroup)

	NQ vs. DB	
	L. Hemisphere	R. Hemisphere
Cortical GM	0.601 (0.403–0.730)	0.599 (0.410–0.726)
1.5T Siemens	0.367 (0.038–0.615)	0.457 (0.141–0.678)
3T GE	0.642 (0.427–0.786)	0.593 (0.366–0.752)
3T Phillips	0.614 (0.365–0.779)	0.650 (0.392–0.806)
Caudate	0.534 (0.277–0.696)	0.692 (0.589–0.773)
1.5T Siemens	0.459 (-0.049–0.739)	0.648 (0.403–0.800)
3T GE	0.603 (0.255–0.788)	0.762 (0.608–0.860)
3T Phillips	0.553 (0.297–0.735)	0.659 (0.440–0.804)
Putamen	0.695 (0.591–0.776)	0.619 (0.501–0.714)
1.5T Siemens	0.687 (0.403–0.835)	0.755 (0.589–0.859)
3T GE	0.616 (0.358–0.778)	0.583 (0.363–0.742)
3T Phillips	0.787 (0.602–0.887)	0.545 (0.168–0.760)
Pallidum	-0.032 (-0.148–0.098)	-0.142 (-0.291–0.019)
1.5T Siemens	0.032 (-0.153–0.254)	-0.100 (-0.356–0.185)
3T GE	0.016 (-0.073–0.143)	-0.151 (-0.352–0.113)
3T Phillips	-0.076 (-0.385–0.243)	-0.037 (-0.352–0.280)
Thalamus	0.163 (-0.082–0.409)	0.325 (-0.091–0.620)
1.5T Siemens	0.145 (-0.079–0.424)	0.297 (-0.101–0.618)
3T GE	0.083 (-0.064–0.285)	0.248 (-0.098–0.558)
3T Phillips	0.423 (-0.033–0.703)	0.493 (-0.068–0.776)
Amygdala	0.713 (0.569–0.806)	0.672 (0.504–0.779)
1.5T Siemens	0.550 (0.165–0.763)	0.414 (-0.006–0.682)
3T GE	0.656 (0.451–0.794)	0.693 (0.409–0.837)
3T Phillips	0.846 (0.729–0.915)	0.741 (0.559–0.854)
Hippocampus	0.712 (0.409–0.843)	0.629 (0.137–0.820)
1.5T Siemens	0.624 (0.207–0.817)	0.396 (-0.014–0.667)
3T GE	0.638 (0.132–0.837)	0.551 (-0.048–0.809)
3T Phillips	0.786 (0.614–0.884)	0.730 (0.394–0.871)
Cerebellar GM	0.824 (0.746–0.878)	0.844 (0.786–0.887)
1.5T Siemens	0.834 (0.711–0.907)	0.853 (0.746–0.918)
3T GE	0.749 (0.491–0.870)	0.785 (0.644–0.874)
3T Phillips	0.861 (0.751–0.924)	0.858 (0.748–0.922)
Cerebellar WM	0.224 (-0.014–0.427)	0.191 (-0.019–0.379)
1.5T Siemens	0.083 (-0.074–0.284)	0.042 (-0.053–0.181)
3T GE	0.412 (0.053–0.656)	0.410 (0.104–0.636)
3T Phillips	0.269 (-0.014–0.521)	0.292 (0.007–0.541)
Total cortical GM	0.597 (0.402–0.726)	
1.5T Siemens	0.407 (0.085–0.642)	
3T GE	0.612 (0.386–0.766)	
3T Phillips	0.631 (0.381–0.791)	
Total cerebral WM	0.269 (0.107–0.418)	
1.5T Siemens	0.046 (-0.059–0.196)	
3T GE	0.236 (-0.031–0.479)	
3T Phillips	0.437 (0.009–0.701)	
TICV	0.450 (-0.035–0.712)	
1.5T Siemens	0.378 (-0.079–0.679)	
3T GE	0.458 (-0.071–0.746)	
3T Phillips	0.513 (0.044–0.760)	

Data are intraclass correlation coefficient (95% confidence interval). Each row with a specific brain region name represents the results of the total study population. ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, GM = gray matter, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 22. Intermethod Reliability of Normative Percentiles Presented by NQ and DB using ADNI (Diagnosis Subgroup)

	NQ vs. DB	
	L. Hemisphere	R. Hemisphere
Cortical GM	0.601 (0.403–0.730)	0.599 (0.410–0.726)
NL	0.504 (0.246–0.695)	0.434 (0.163–0.645)
MCI	0.625 (0.369–0.783)	0.659 (0.402–0.808)
AD	0.462 (0.102–0.700)	0.577 (0.284–0.764)
Caudate	0.534 (0.277–0.696)	0.692 (0.589–0.773)
NL	0.431 (0.140–0.649)	0.673 (0.472–0.807)
MCI	0.596 (0.284–0.775)	0.802 (0.664–0.886)
AD	0.493 (0.147–0.717)	0.551 (0.289–0.737)
Putamen	0.695 (0.591–0.776)	0.619 (0.501–0.714)
NL	0.629 (0.414–0.778)	0.607 (0.385–0.764)
MCI	0.712 (0.542–0.826)	0.546 (0.319–0.715)
AD	0.734 (0.530–0.855)	0.709 (0.506–0.837)
Pallidum	-0.032 (-0.148–0.098)	-0.142 (-0.291–0.019)
NL	-0.122 (-0.331–0.129)	-0.226 (-0.477–0.065)
MCI	-0.053 (-0.260–0.185)	-0.062 (-0.274–0.181)
AD	0.088 (-0.108–0.320)	-0.161 (-0.407–0.133)
Thalamus	0.163 (-0.082–0.409)	0.325 (-0.091–0.620)
NL	0.127 (-0.083–0.371)	0.304 (-0.098–0.621)
MCI	0.199 (-0.092–0.484)	0.311 (-0.096–0.622)
AD	0.152 (-0.086–0.435)	0.385 (-0.100–0.706)
Amygdala	0.713 (0.569–0.806)	0.672 (0.504–0.779)
NL	0.598 (0.320–0.771)	0.597 (0.339–0.766)
MCI	0.698 (0.507–0.821)	0.563 (0.312–0.735)
AD	0.740 (0.539–0.858)	0.784 (0.563–0.891)
Hippocampus	0.712 (0.409–0.843)	0.629 (0.137–0.820)
NL	0.645 (0.360–0.806)	0.563 (-0.020–0.812)
MCI	0.722 (0.374–0.866)	0.594 (0.066–0.815)
AD	0.429 (0.014–0.694)	0.612 (0.243–0.803)
Cerebellar GM	0.824 (0.746–0.878)	0.844 (0.786–0.887)
NL	0.805 (0.650–0.893)	0.878 (0.778–0.933)
MCI	0.860 (0.765–0.918)	0.821 (0.704–0.895)
AD	0.794 (0.624–0.890)	0.839 (0.713–0.913)
Cerebellar WM	0.224 (-0.014–0.427)	0.191 (-0.019–0.379)
NL	0.101 (-0.113–0.335)	0.083 (-0.119–0.310)
MCI	0.248 (-0.049–0.505)	0.222 (-0.047–0.469)
AD	0.299 (-0.059–0.585)	0.217 (-0.070–0.487)
Total cortical GM	0.597 (0.402–0.726)	
NL	0.470 (0.205–0.671)	
MCI	0.640 (0.382–0.794)	
AD	0.492 (0.165–0.711)	
Total cerebral WM	0.268 (0.105–0.417)	
NL	0.277 (-0.004–0.522)	
MCI	0.205(-0.060–0.448)	
AD	0.315 (0.016–0.568)	
TICV	0.450 (-0.035–0.712)	
NL	0.415 (-0.064–0.706)	
MCI	0.450 (-0.063–0.735)	
AD	0.469 (-0.014–0.740)	

Data are intraclass correlation coefficient (95% confidence interval). Each row with a specific brain region name represents the results of the total study population AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, GM = gray matter, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, TICV = total intracranial volume, WM = white matter

Supplementary Table 23. Correlation between the Visual Rating Scales and N% of the Total Hippocampus, and Total Cortical GM Derived from NQ and DB

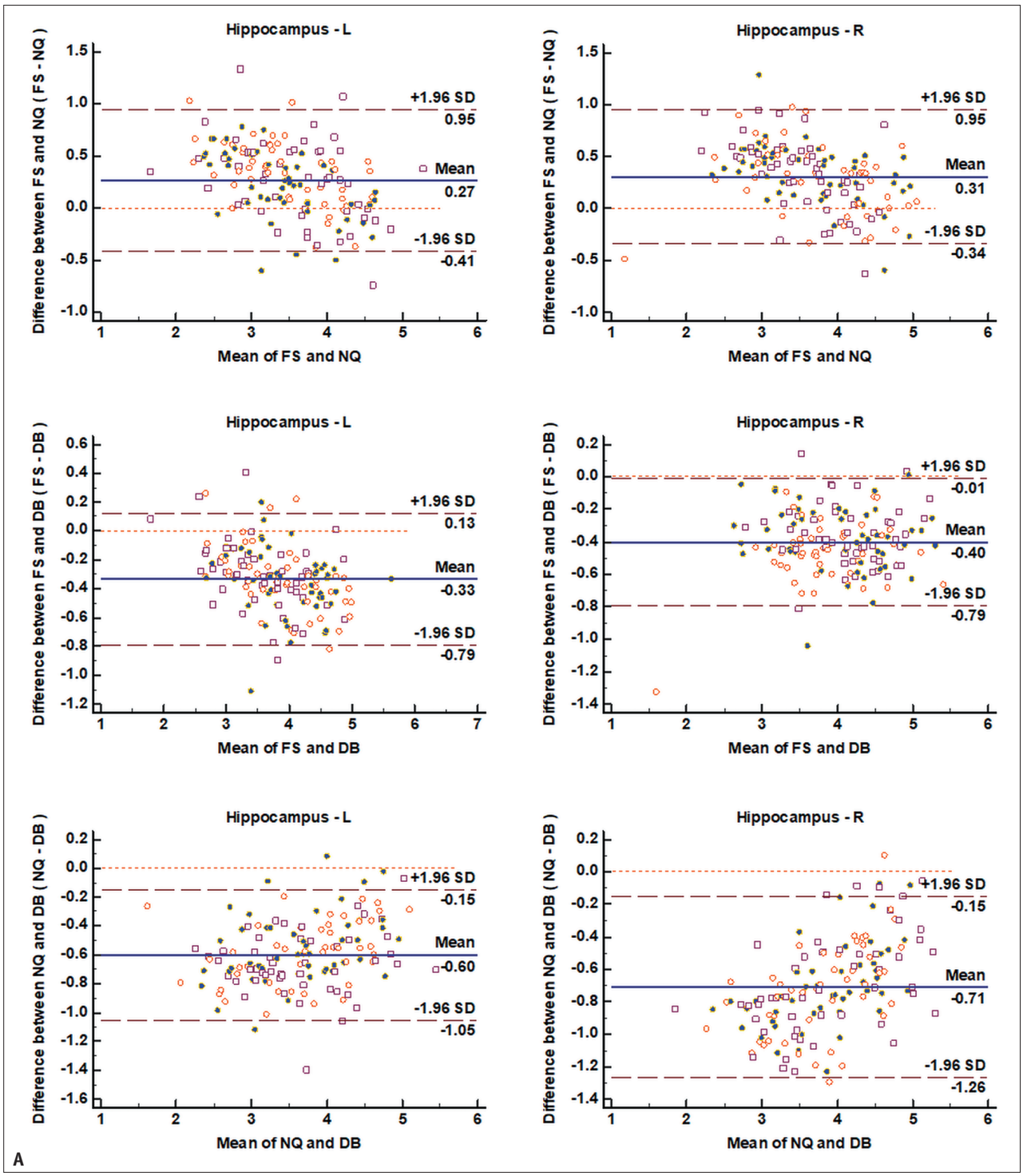
Visual Rating	Data Set	N% of Software (Brain Region)	Correlation*
Mean MTA	ADNI	DB (total hippocampus)	-0.551 (< 0.001)
		NQ (total hippocampus)	-0.556 (< 0.001)
	SMC	DB (total hippocampus)	-0.582 (< 0.001)
		NQ (total hippocampus)	-0.690 (< 0.001)
Mean GCA	ADNI	DB (total cortical GM)	-0.649 (< 0.001)
		NQ (total cortical GM)	-0.364 (< 0.001)
	SMC	DB (total cortical GM)	-0.657 (< 0.001)
		NQ (total cortical GM)	-0.347 (< 0.001)

*Data are Spearman correlation coefficients with the corresponding *p* values in parentheses. ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, GCA = global cortical atrophy, GM = gray matter, MTA = medial temporal atrophy, NQ = NeuroQuant, N% = normative percentiles, SMC = single medical center

Supplementary Table 24. Diagnostic Performance of the Visual Rating Scales, and N% of the Total Hippocampus, and Total Cortical GM Derived from NQ and DB using ADNI Dataset*

	Mean MTA	N% of Hippocampus (NQ)	N% of Hippocampus (DB)	*P*†	*P*‡	Mean GCA	N% of Cortical GM (NQ)	N% of Cortical GM (DB)	*P*†	*P*‡
AD vs. MCI	0.636	0.585	0.593	0.464	0.553	0.569	0.739	0.709	0.009	0.010
MCI vs. NL	0.663	0.767	0.766	0.066	0.049	0.557	0.509	0.555	0.499	0.970
AD vs. NL	0.766	0.842	0.849	0.168	0.152	0.635	0.765	0.792	0.058	0.002
AD vs. MCI and NL	0.698	0.708	0.715	0.860	0.774	0.600	0.751	0.749	0.009	0.001

There was no significant difference ($p > 0.05$) between the AUC of N% of two software programs. *Data are AUC, †p values between visual ratings (MTA or GCA) and N% of NQ (Delong's test), ‡p values between visual ratings (MTA or GCA) and N% of DB (Delong's test). ADNI = Alzheimer's Disease Neuroimaging Initiative, AUC = area under the curve, DB = DeepBrain, GCA = global cortical atrophy, GM = gray matter, MTA = medial temporal atrophy, NQ = NeuroQuant, N% = normative percentiles



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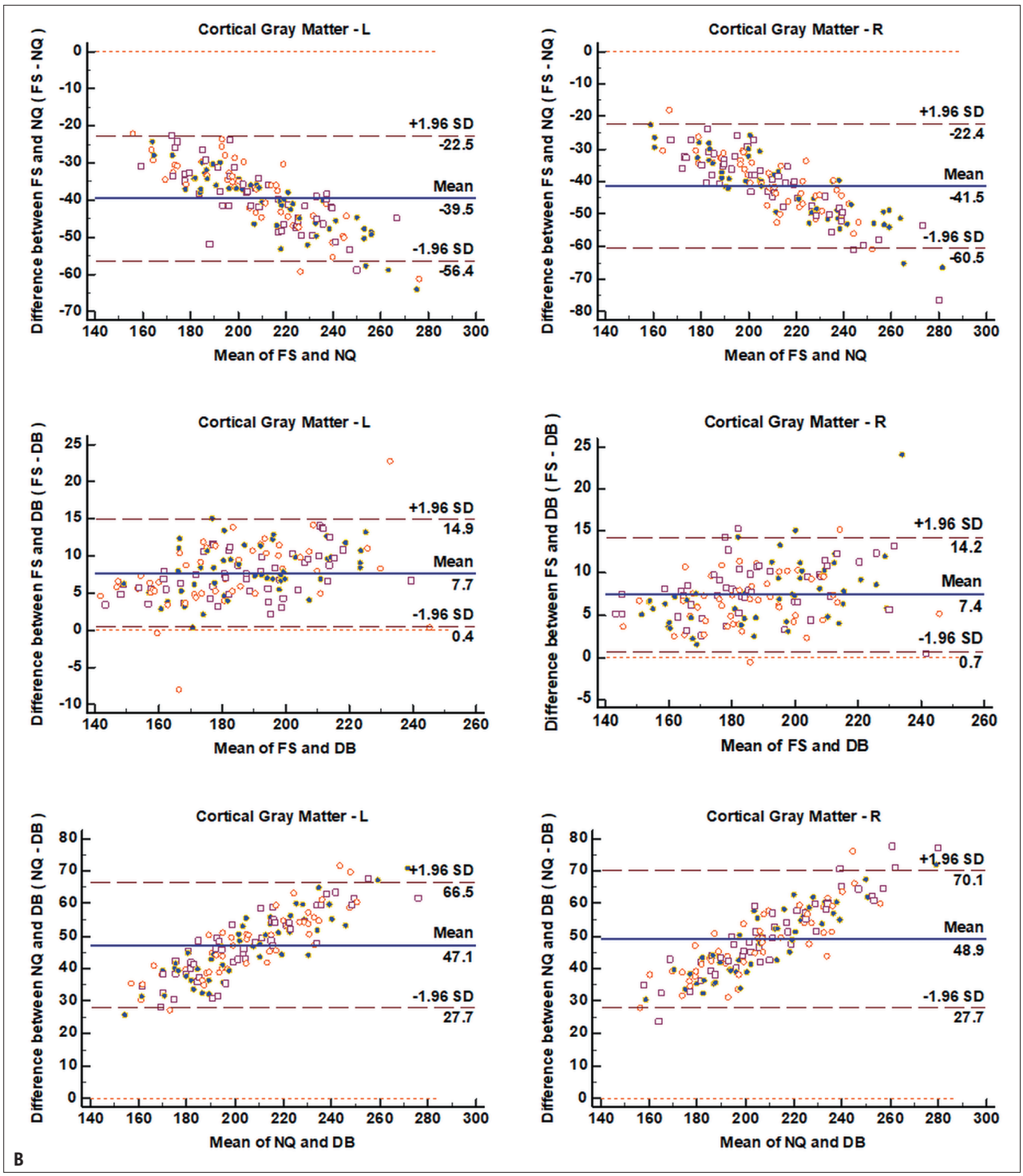

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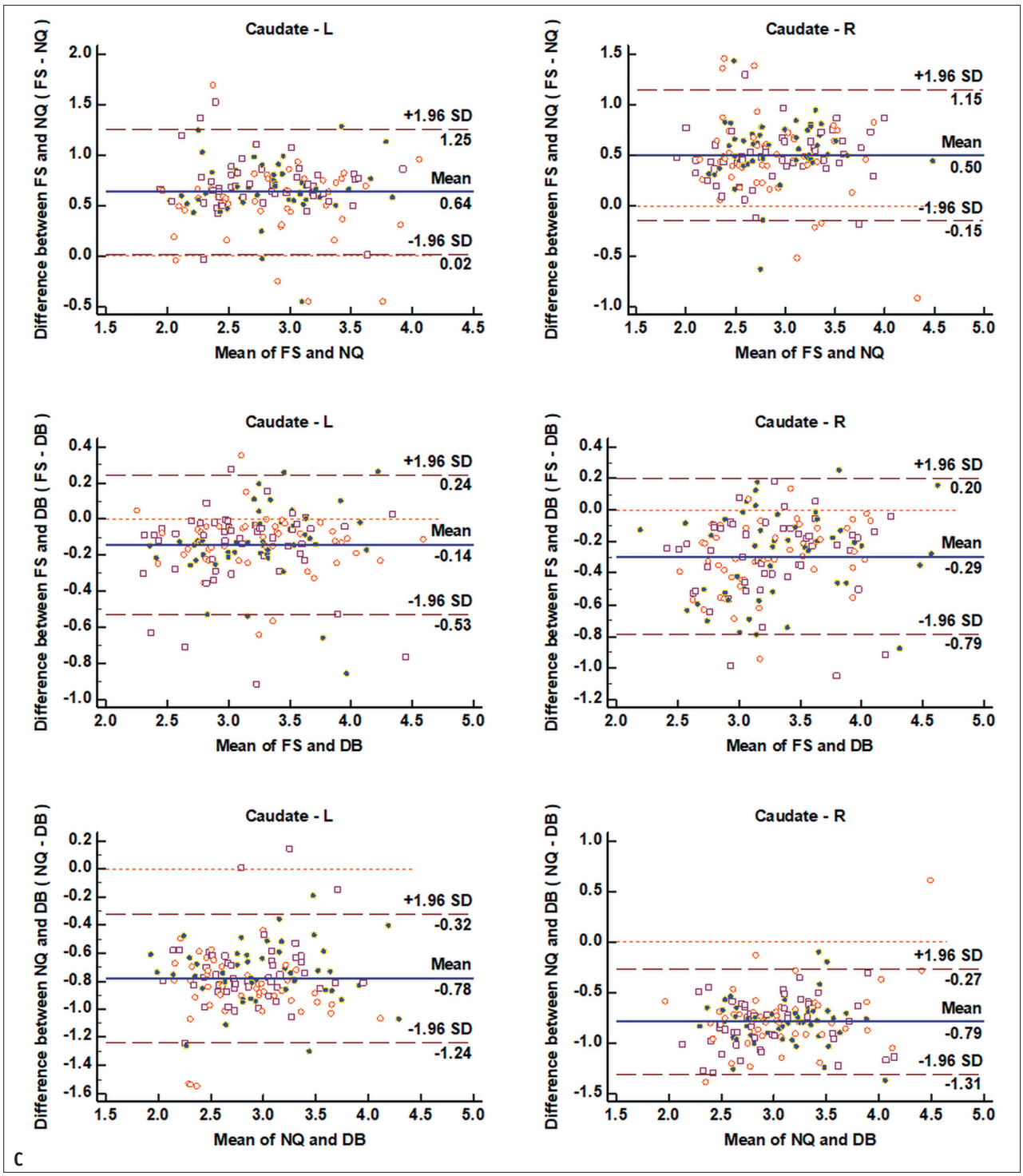

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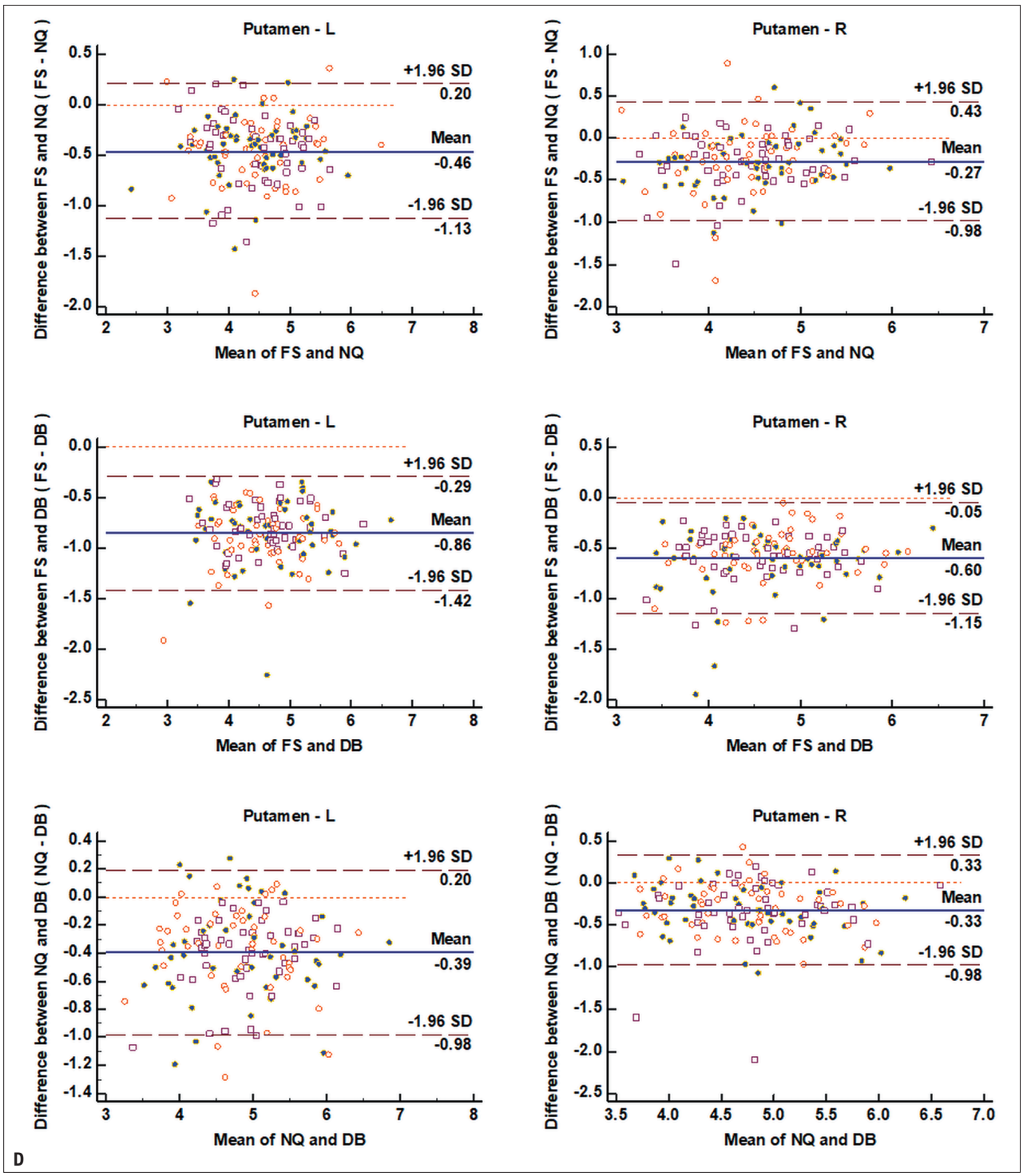

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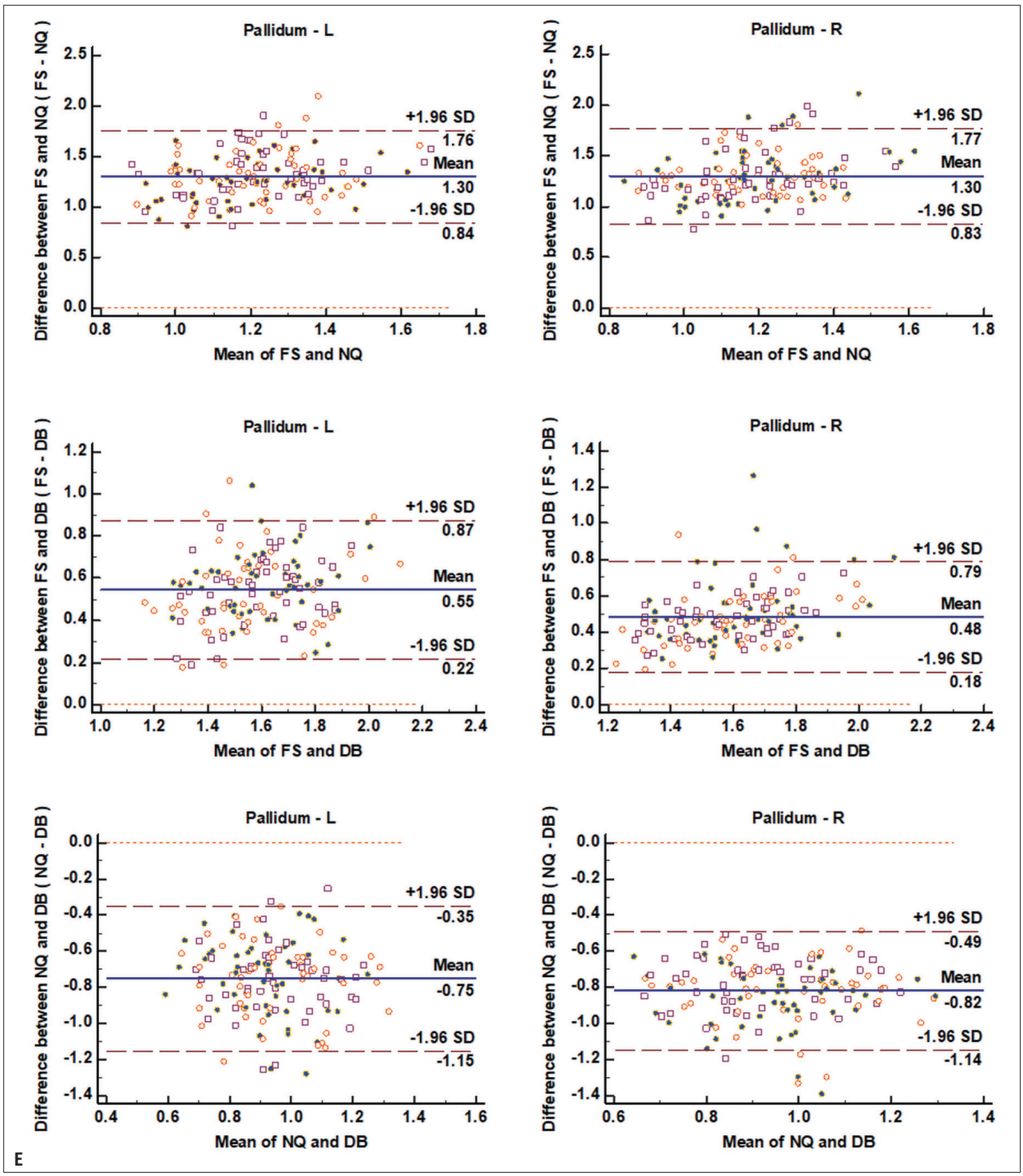

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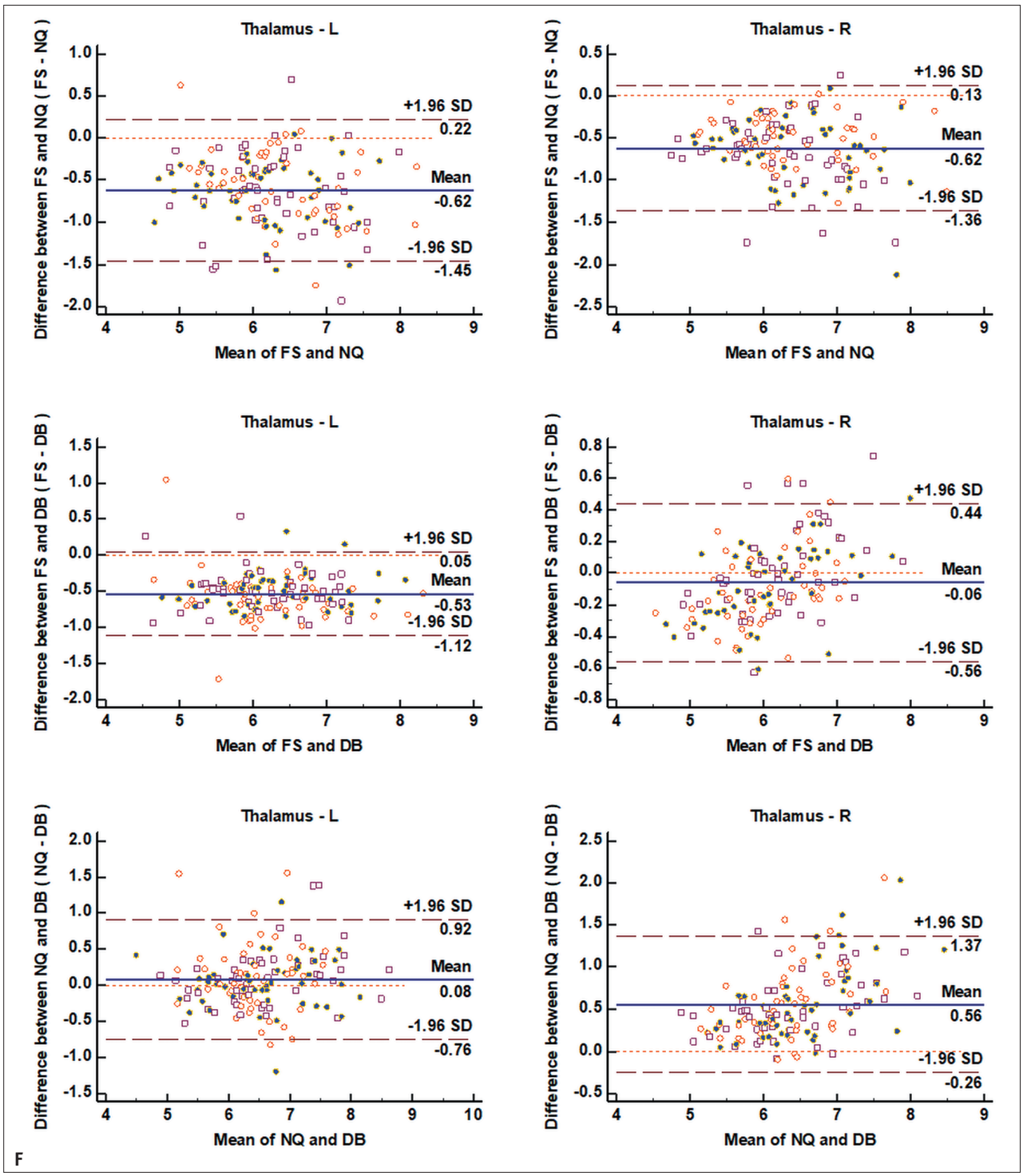

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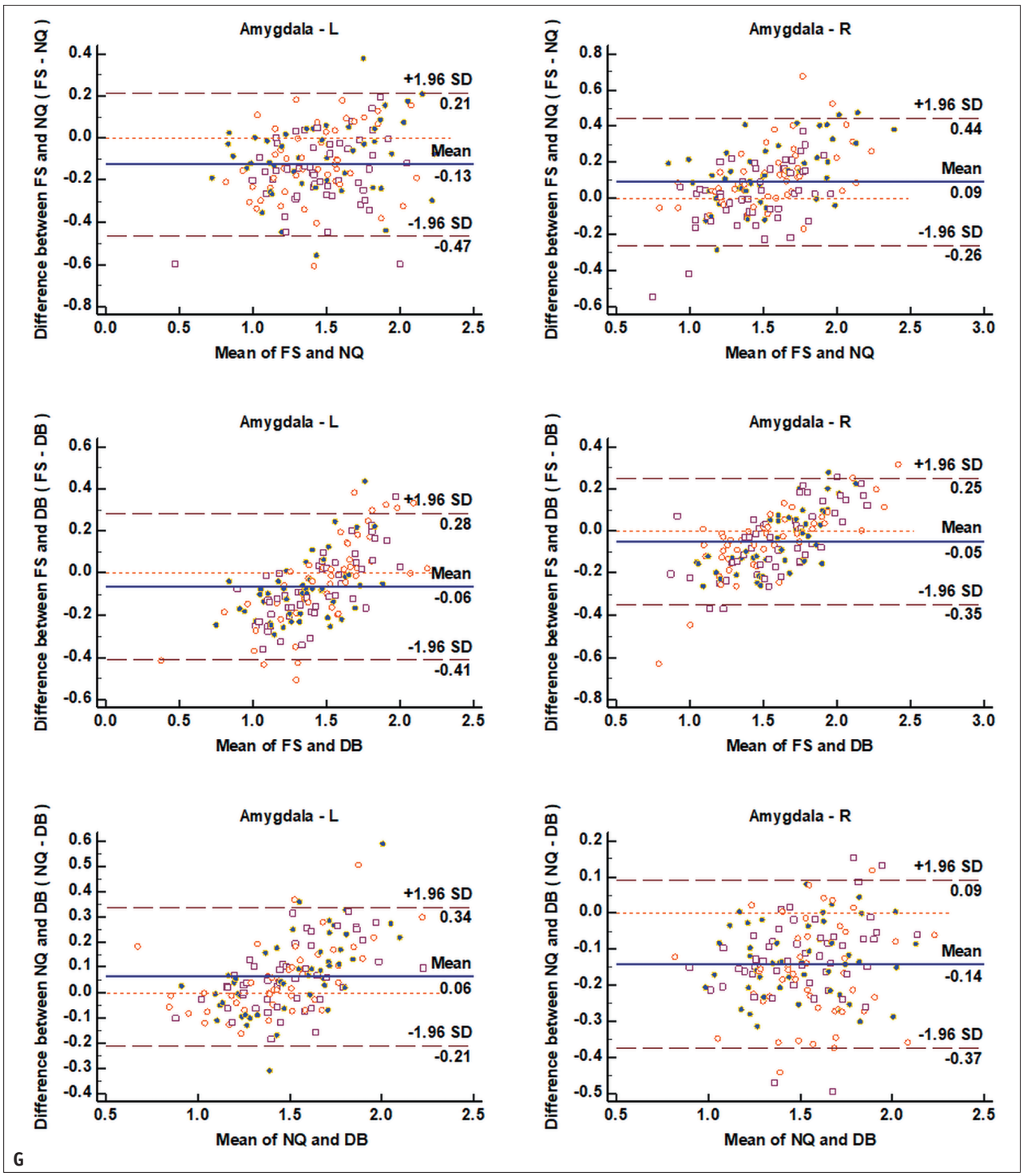

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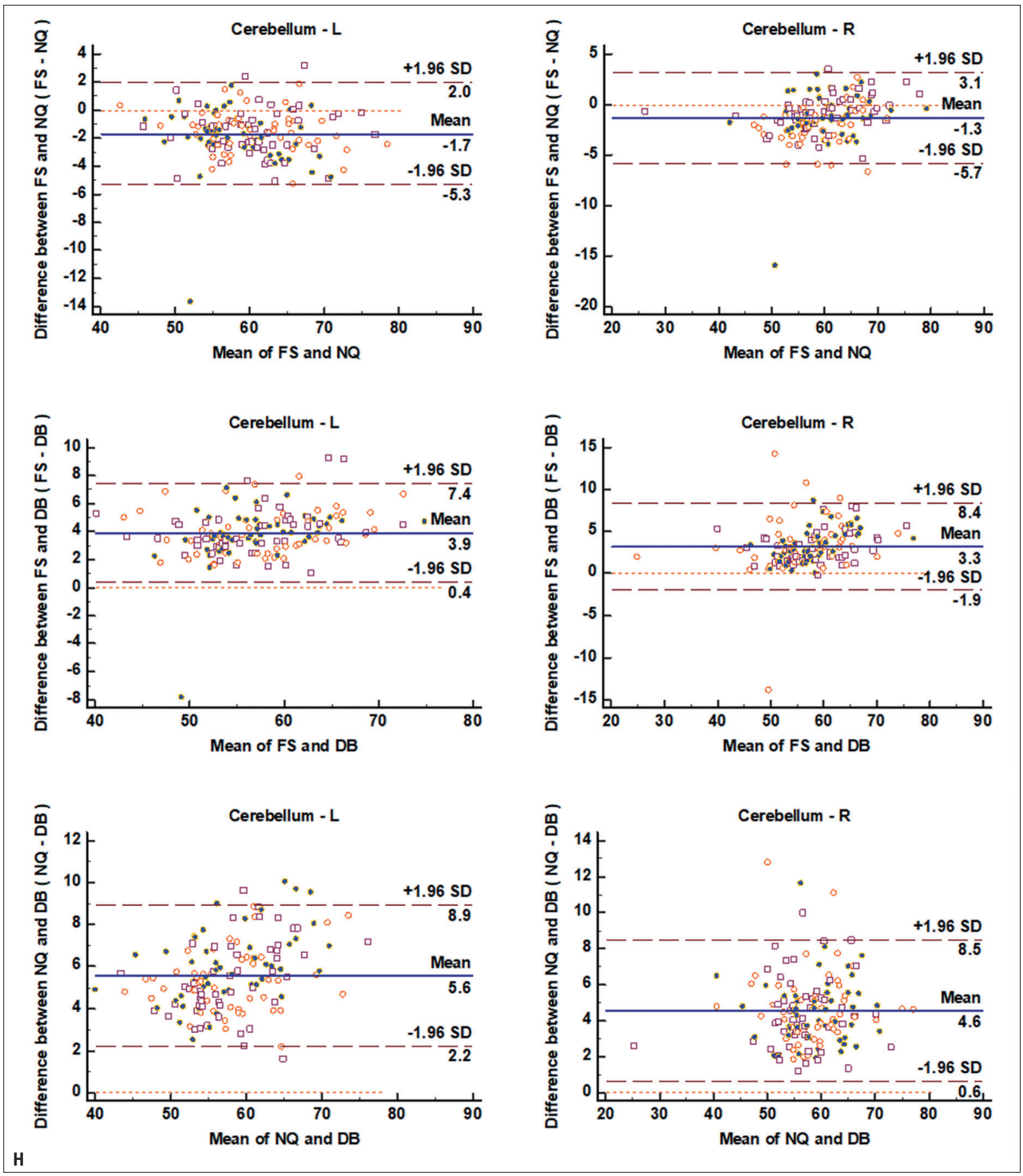

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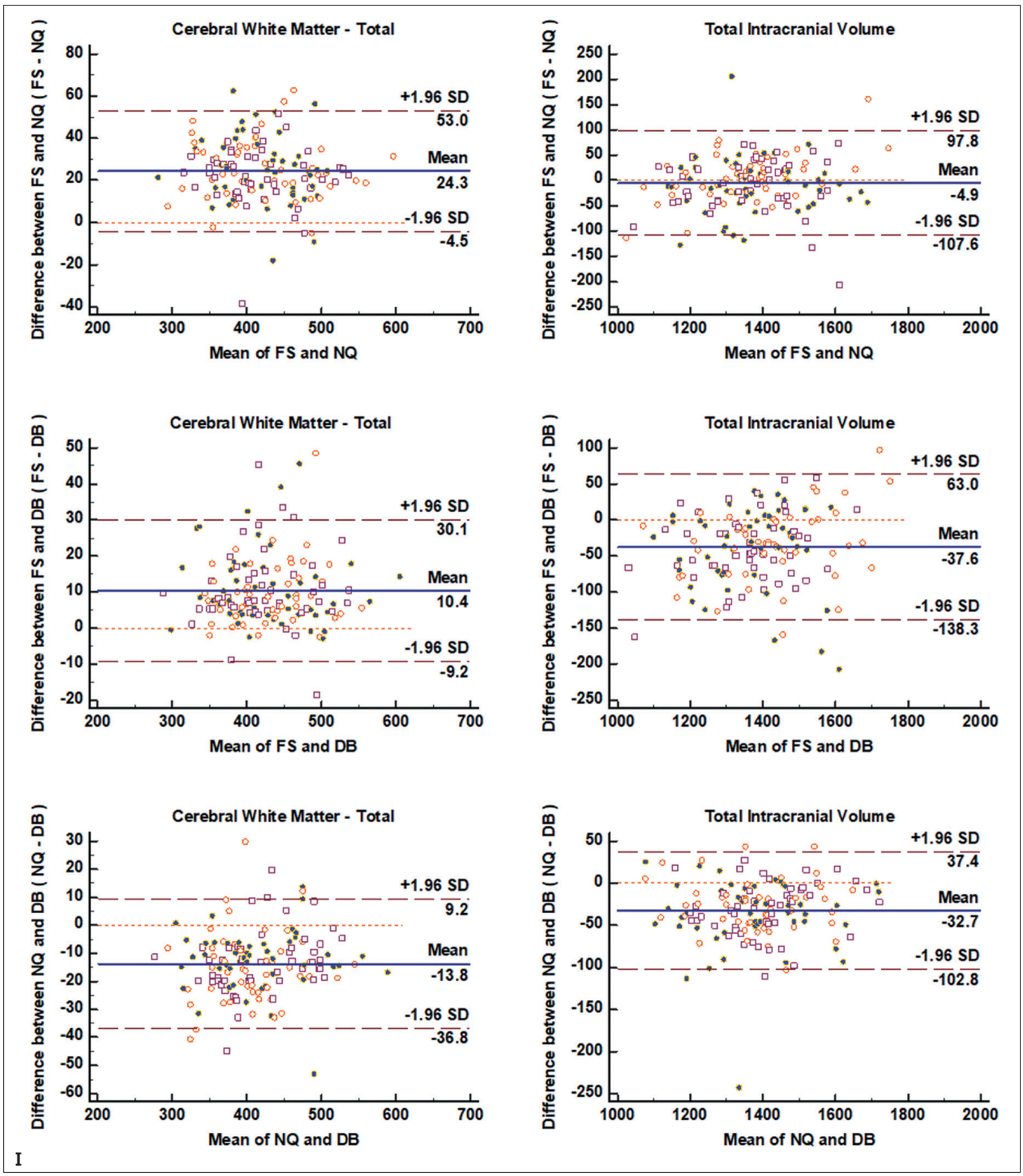

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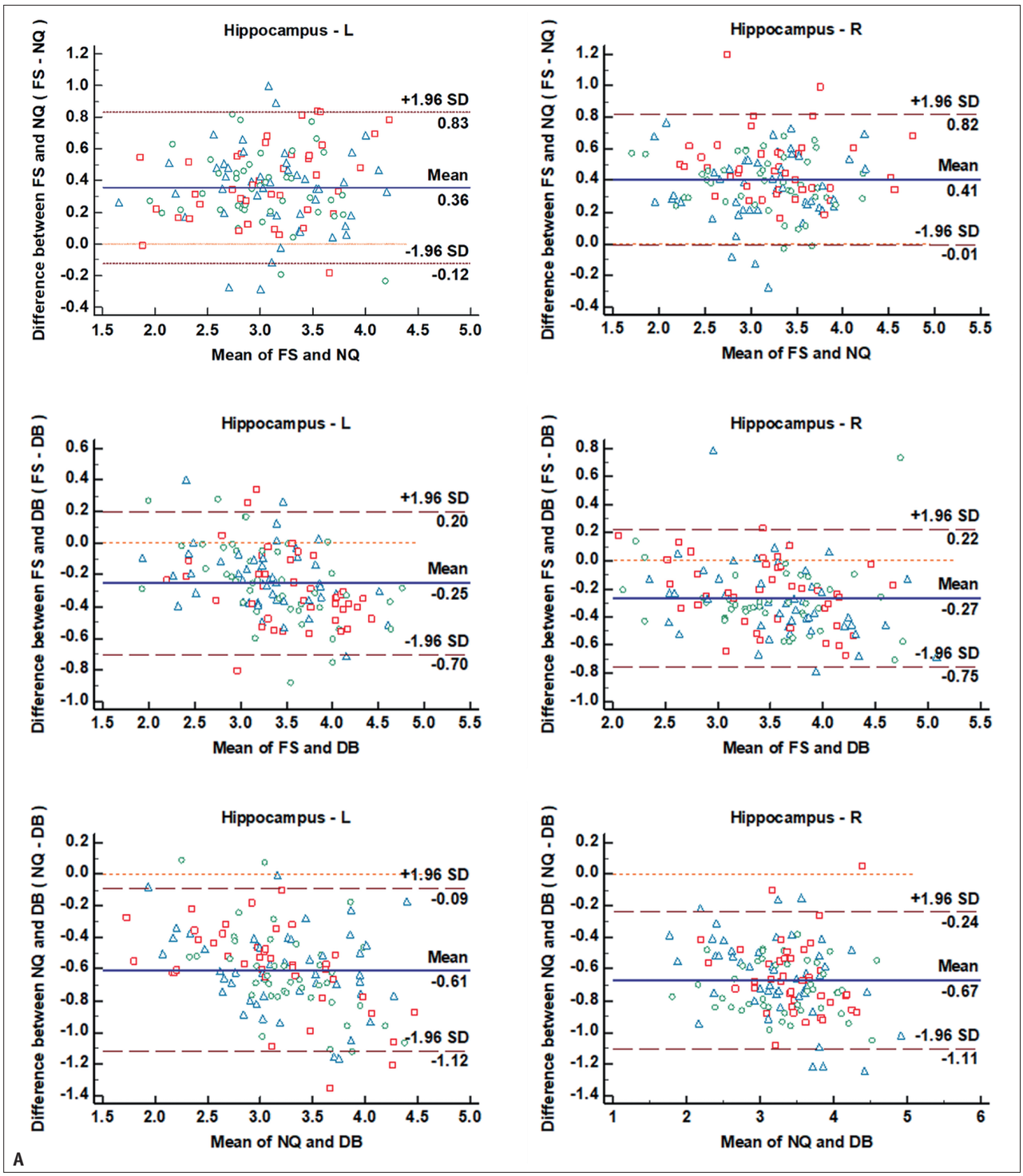

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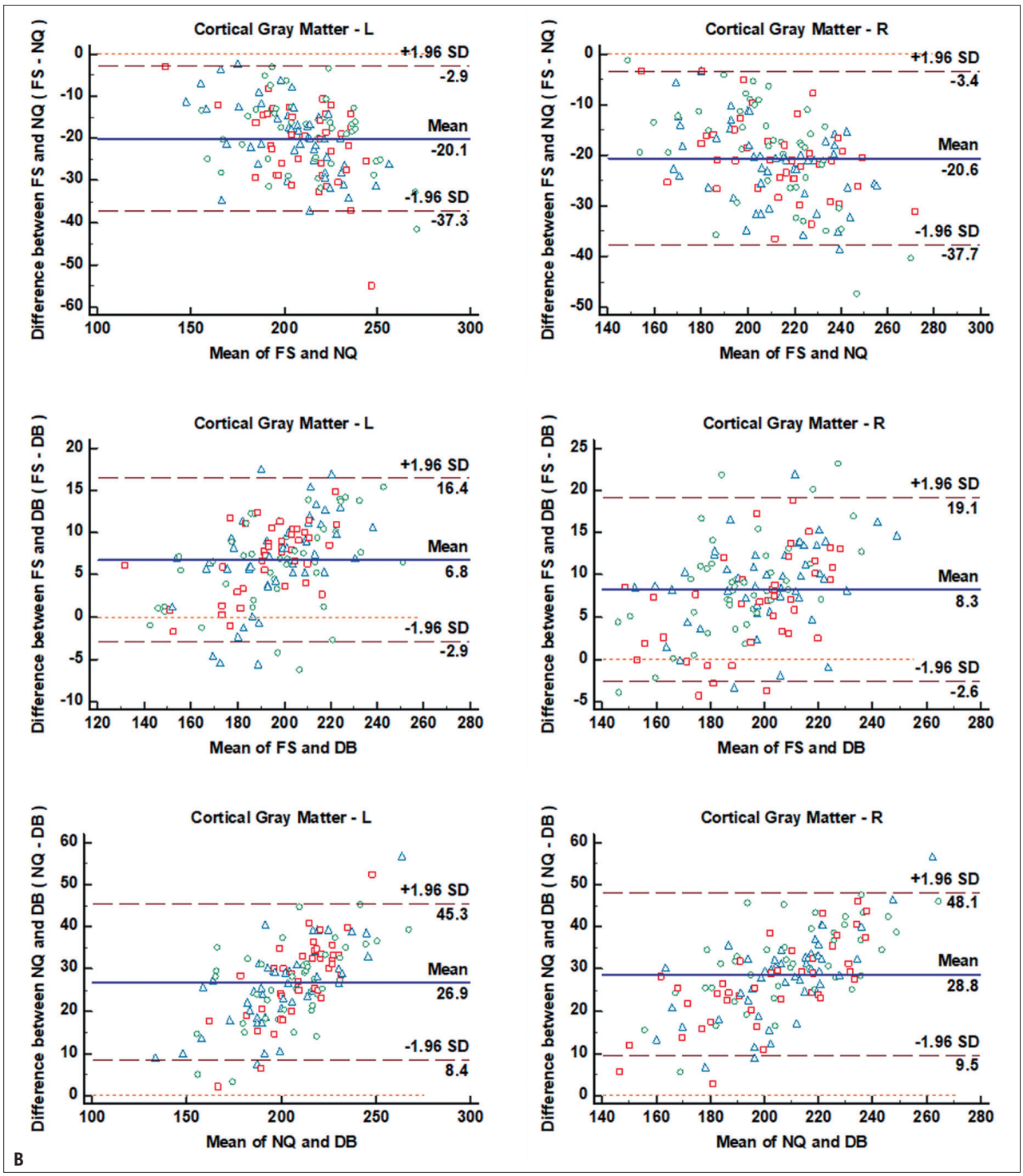

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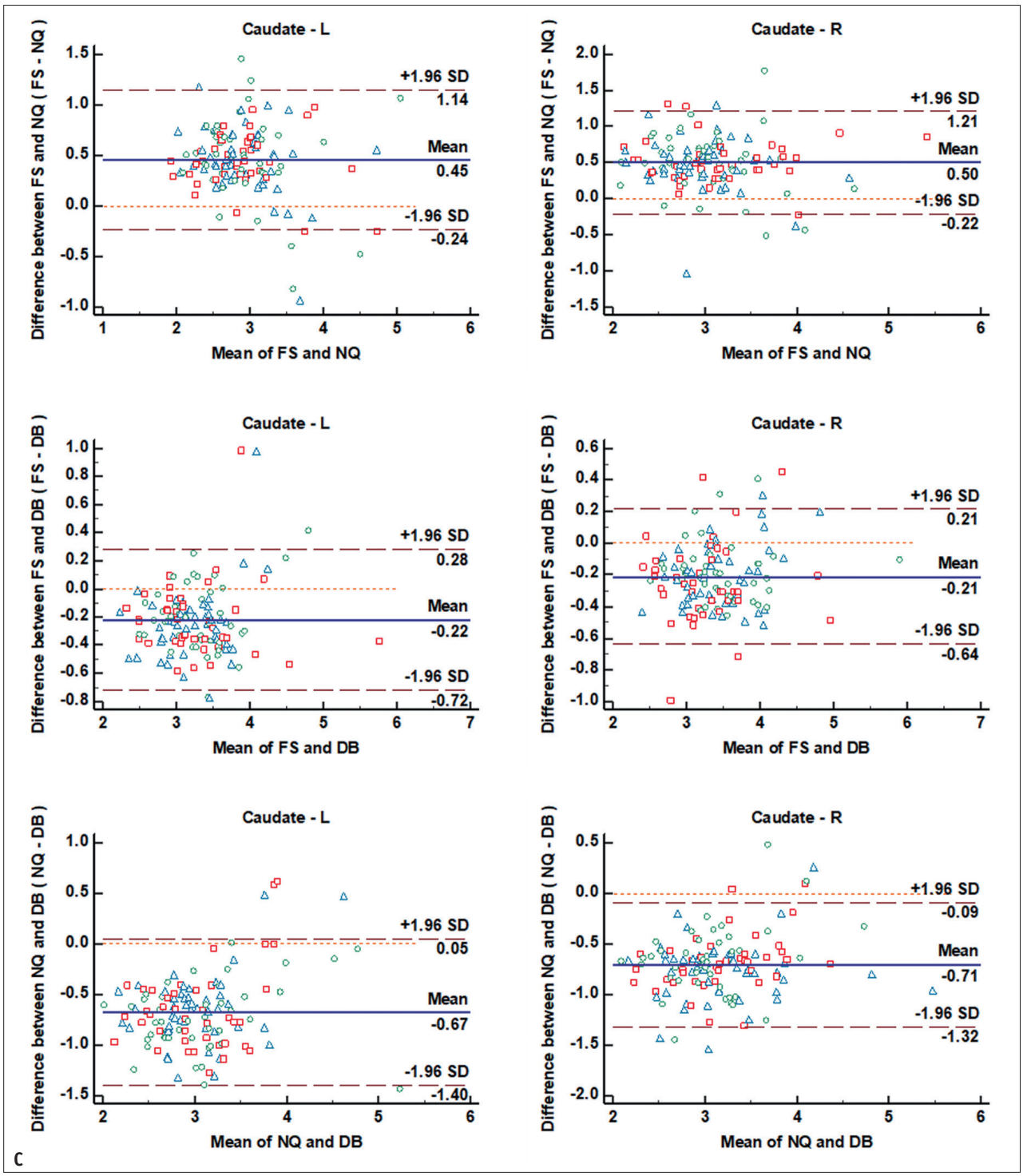

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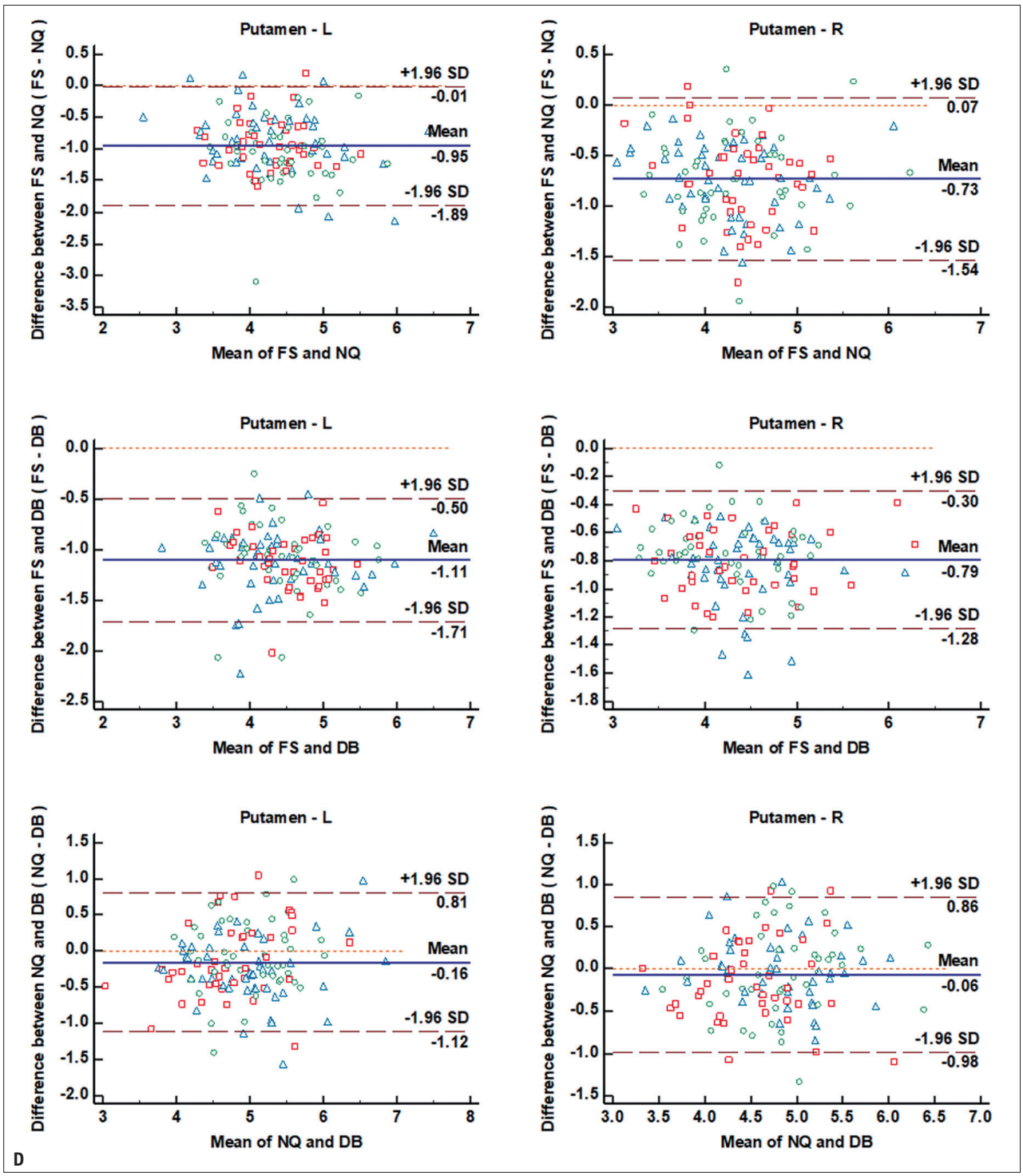

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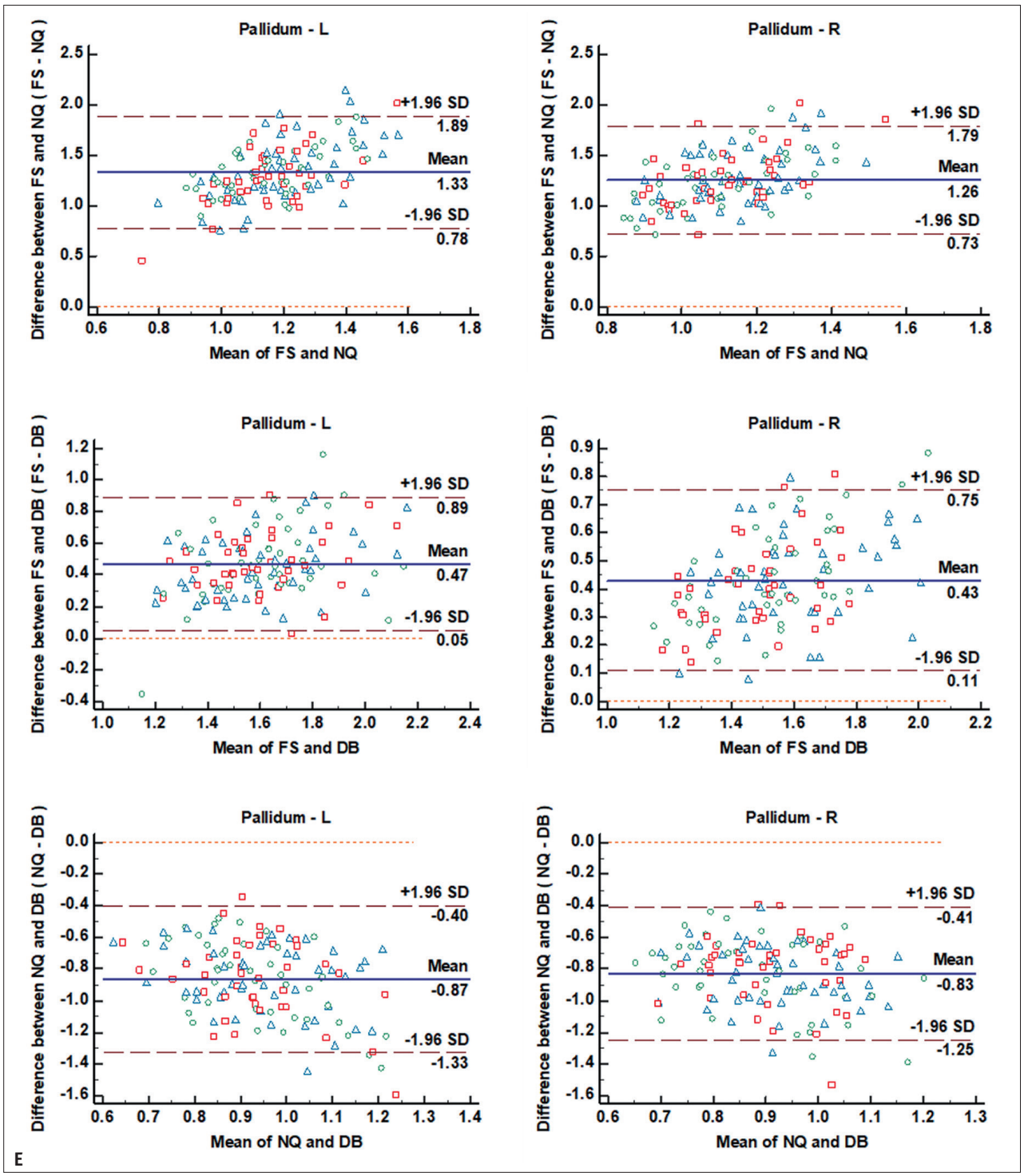

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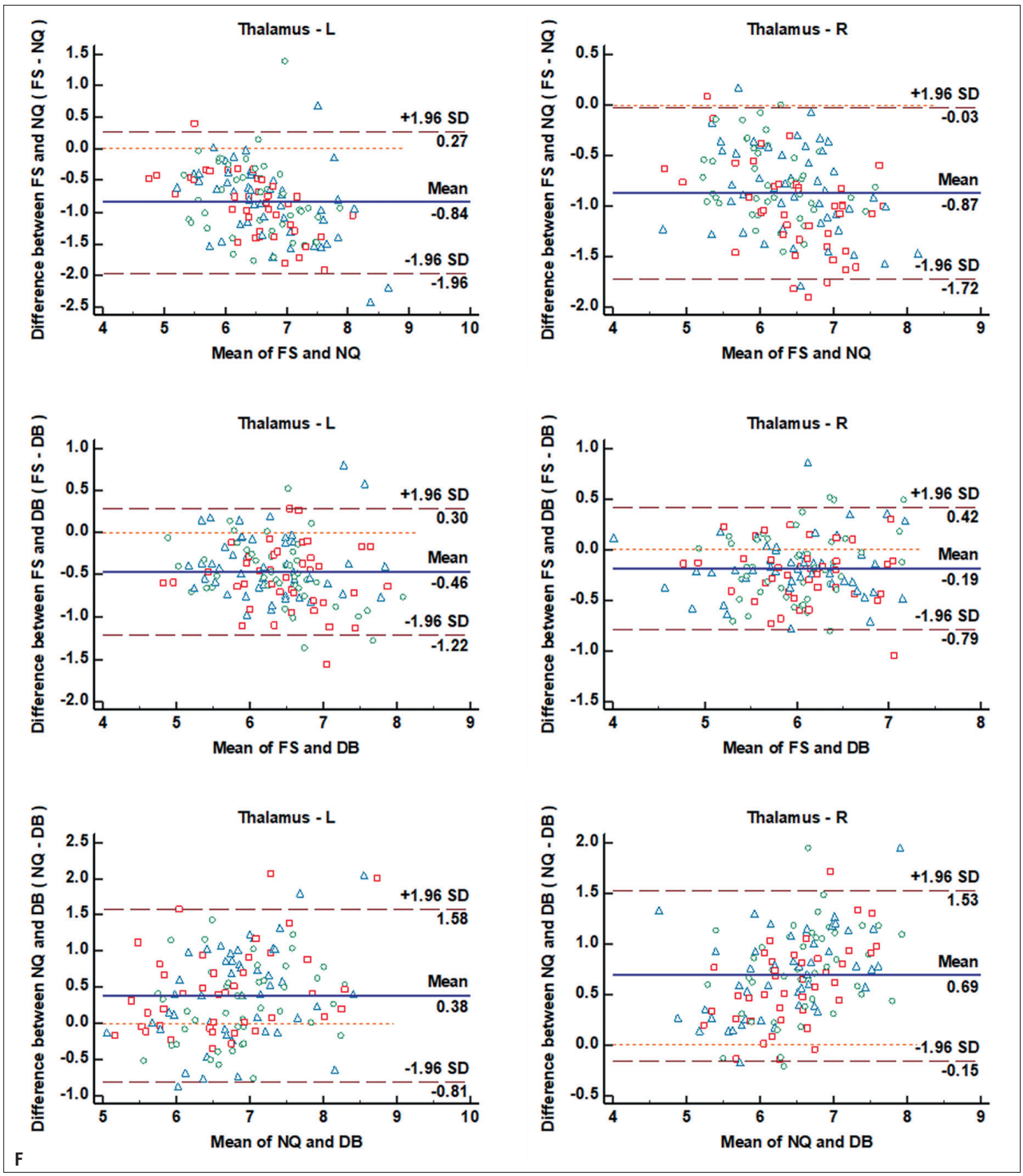

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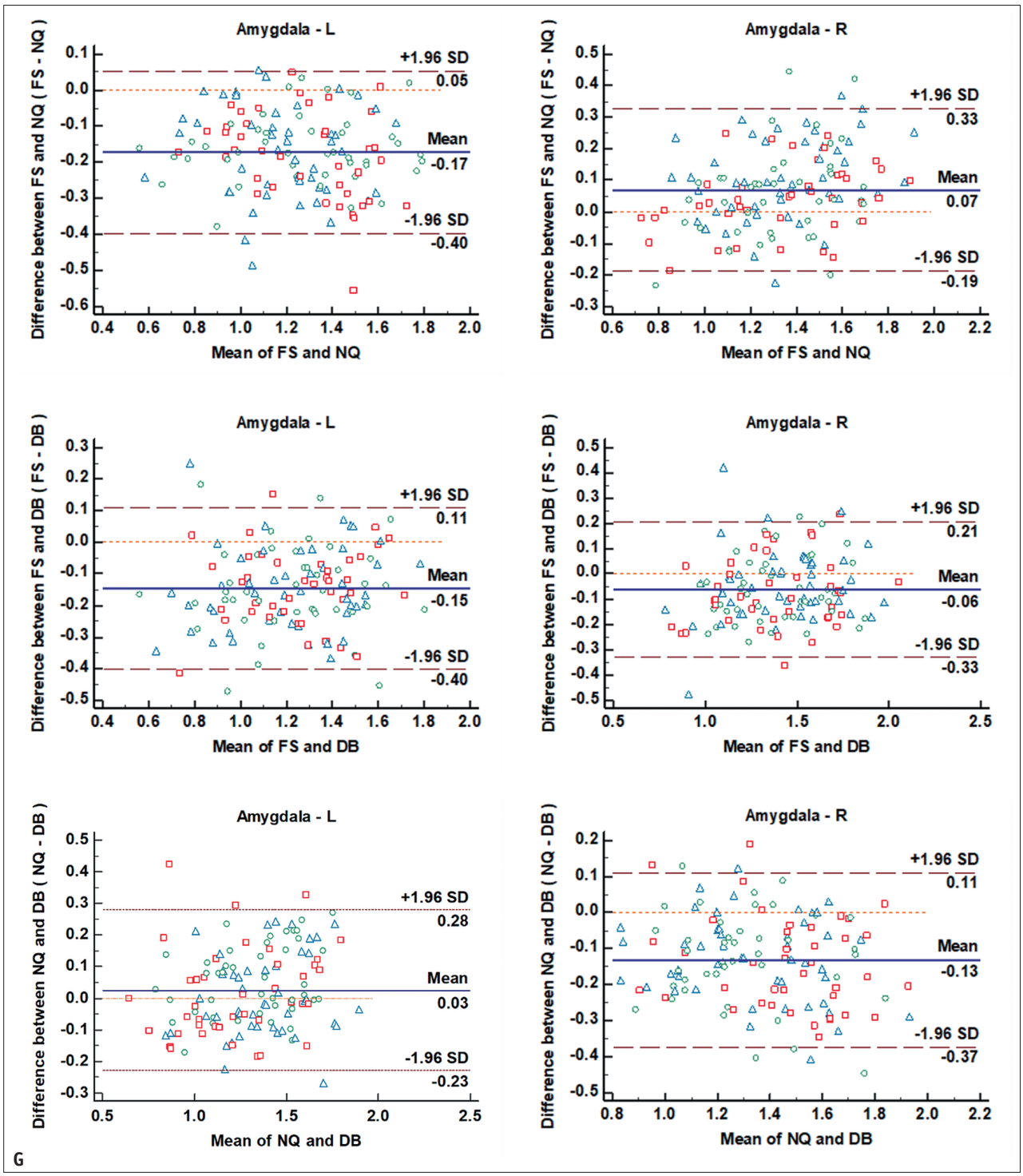

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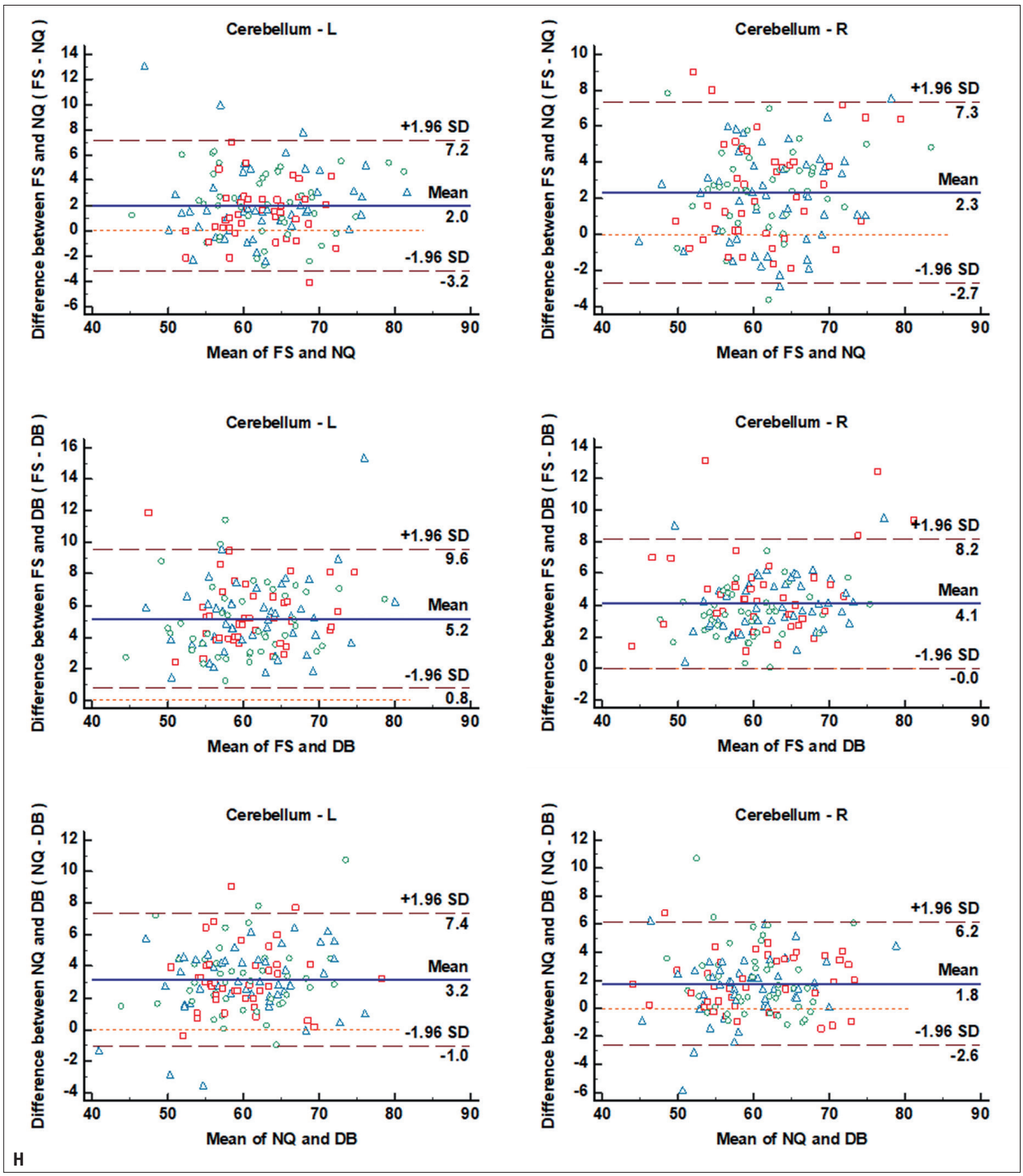

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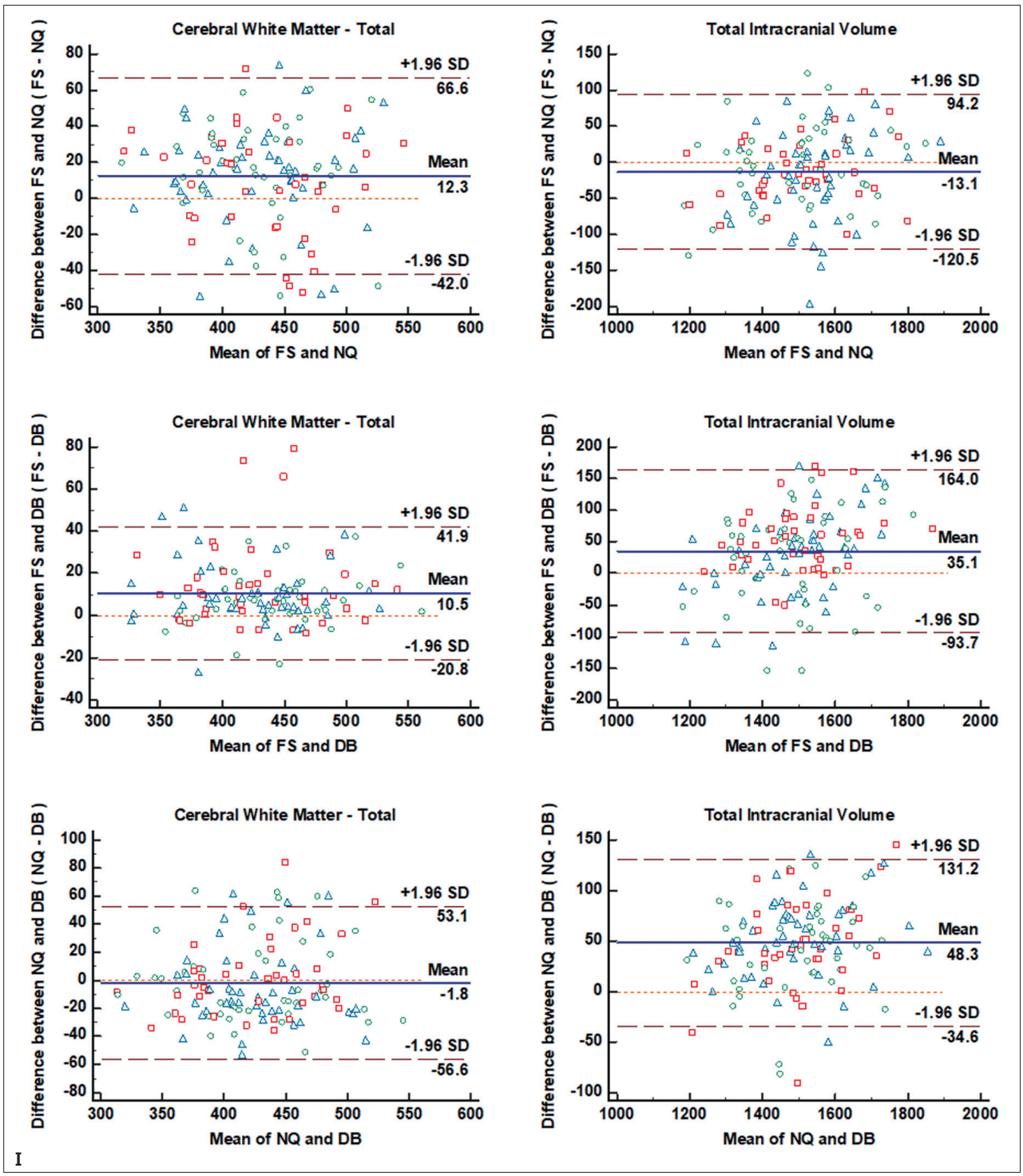

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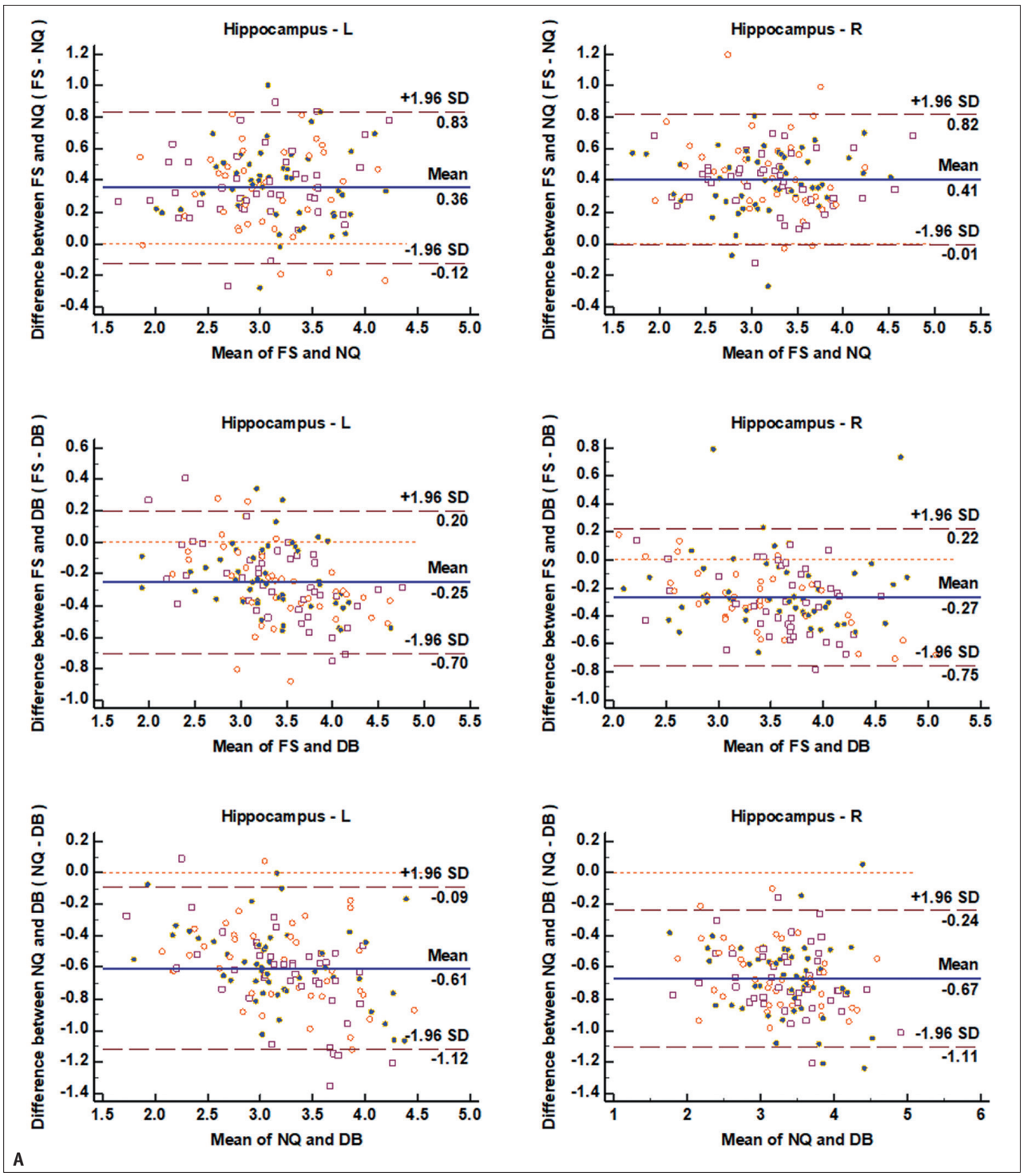

Supplementary Fig. 3. Bland–Altman plots for agreement between each software for all regional brain volumes in the ADNI data (diagnosis subgroup).

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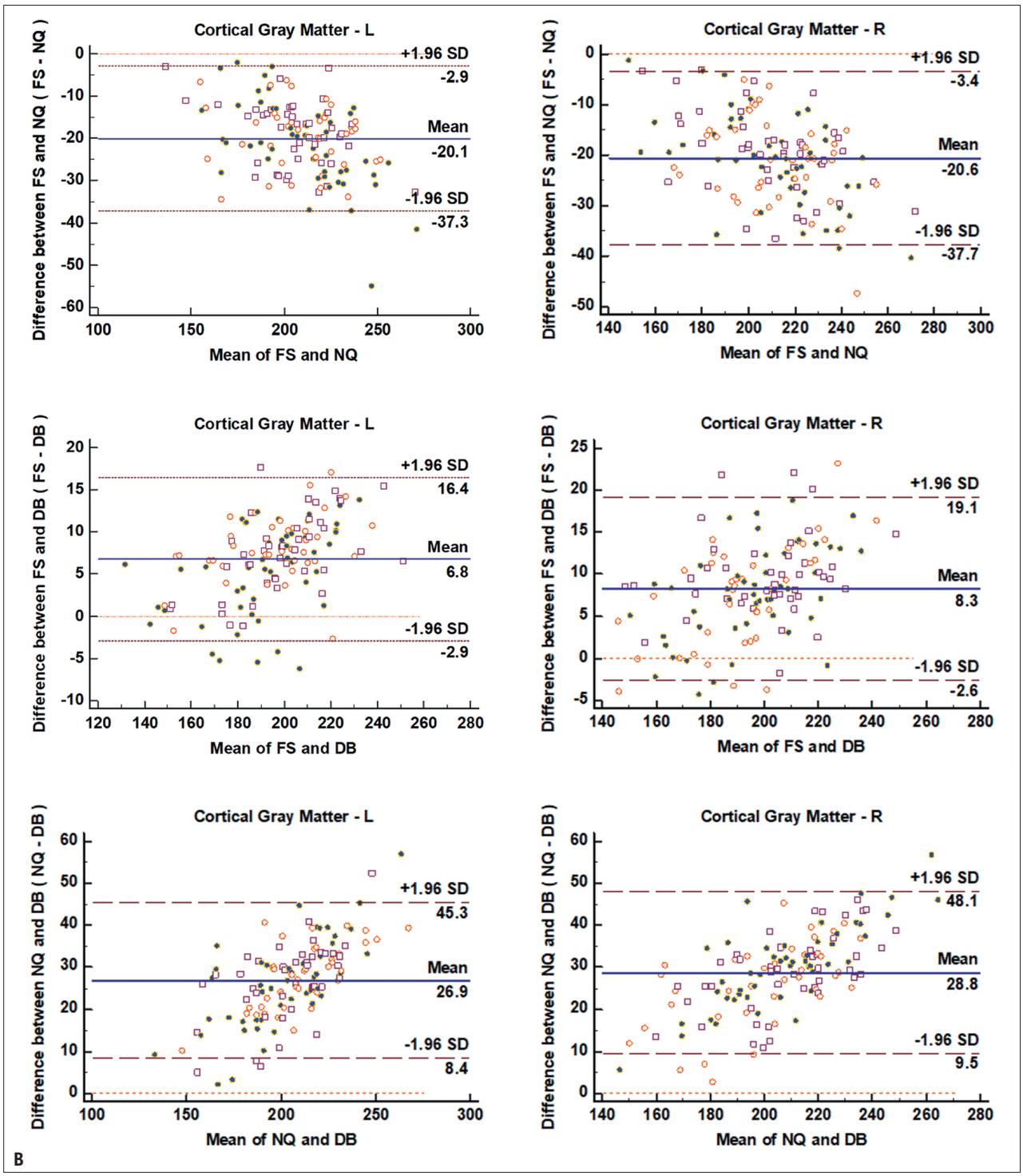

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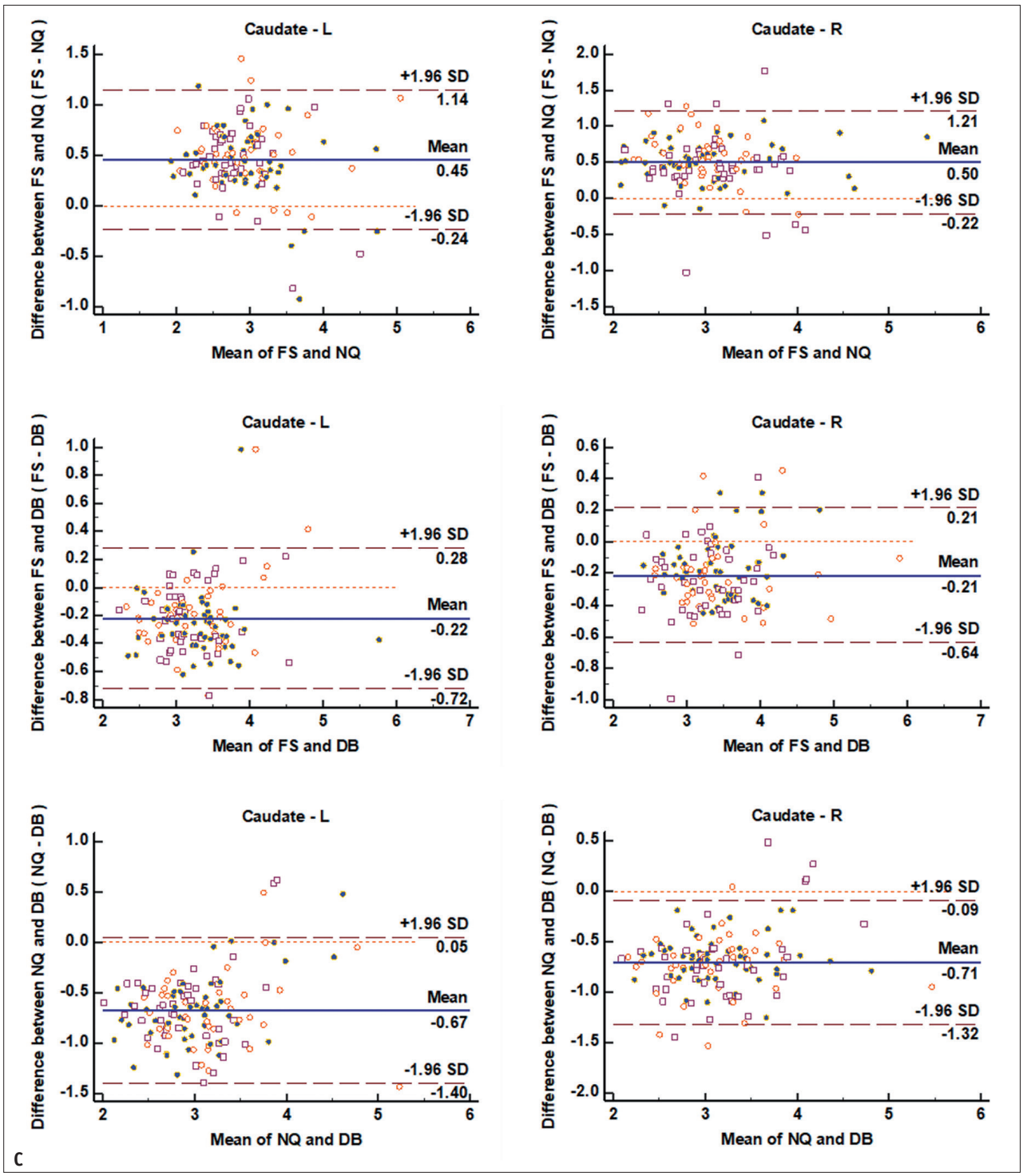

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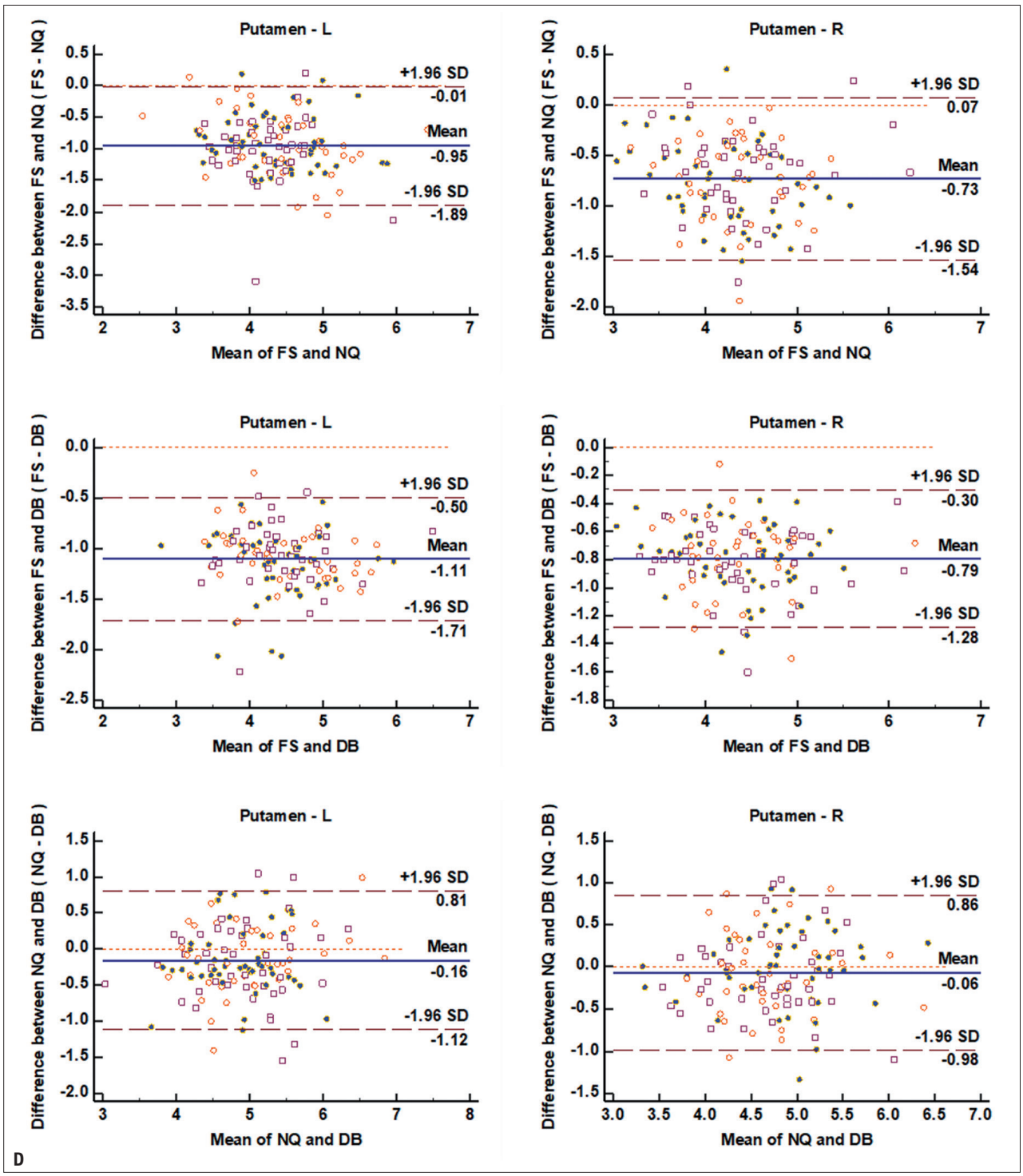

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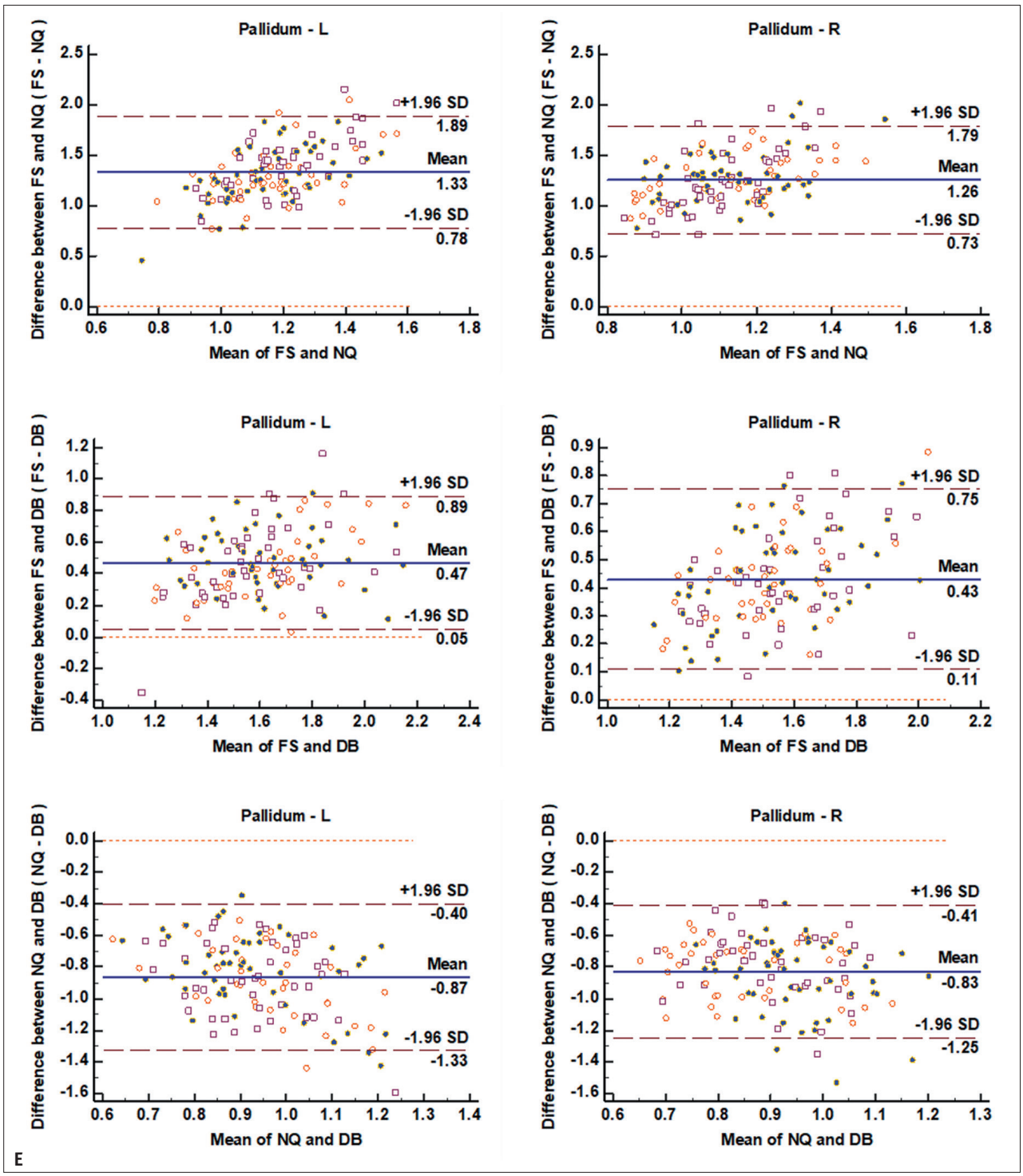

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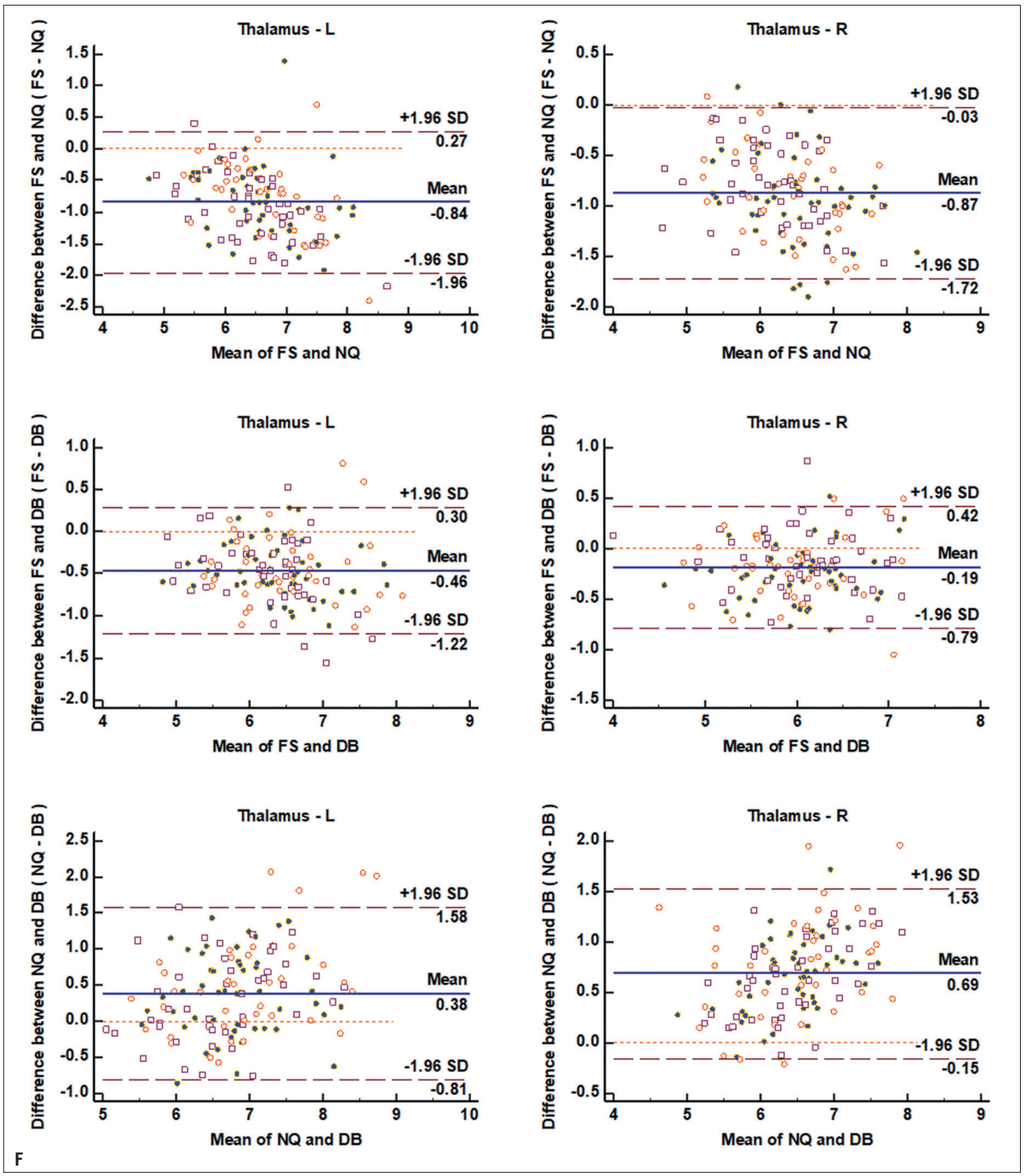

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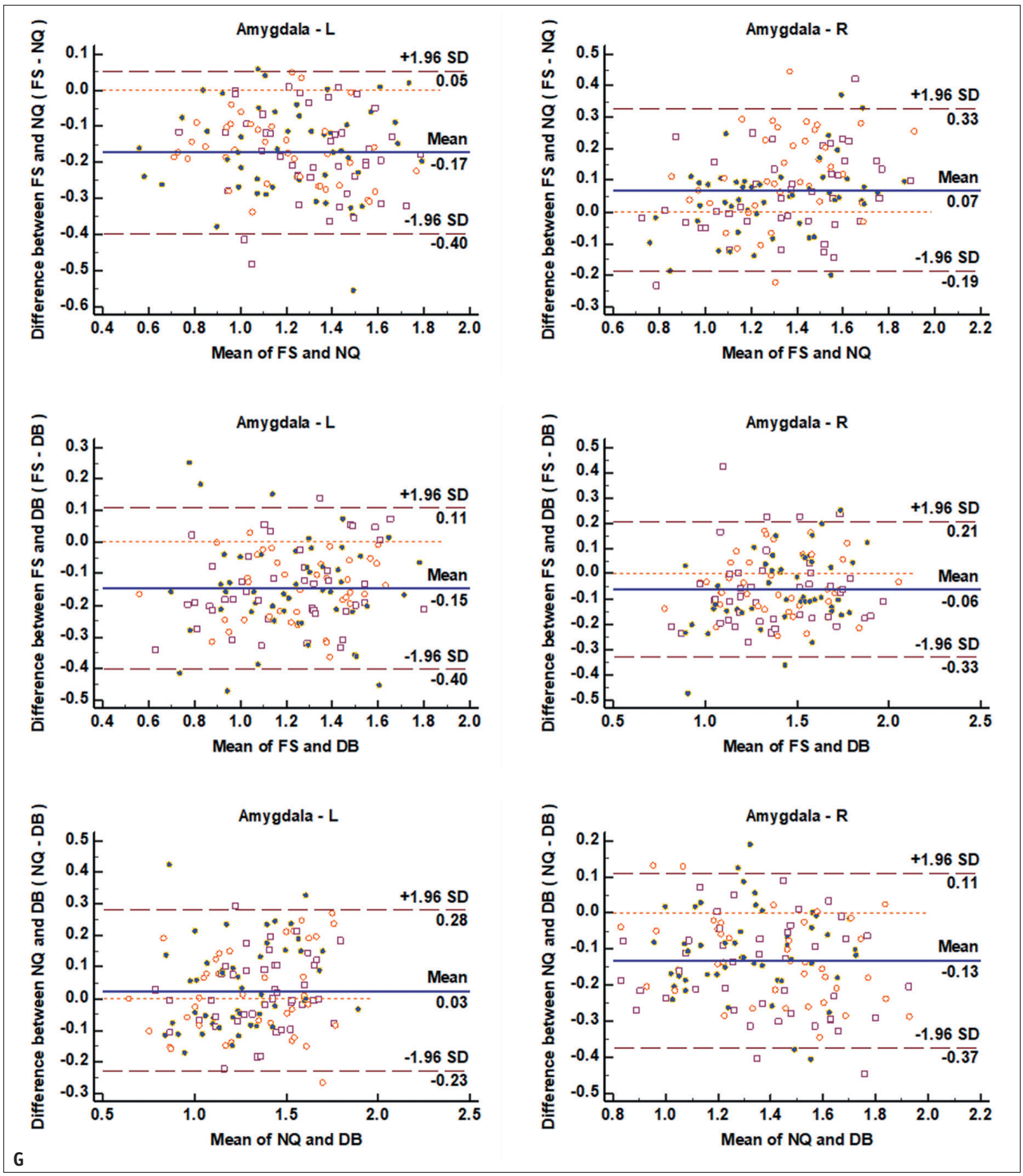

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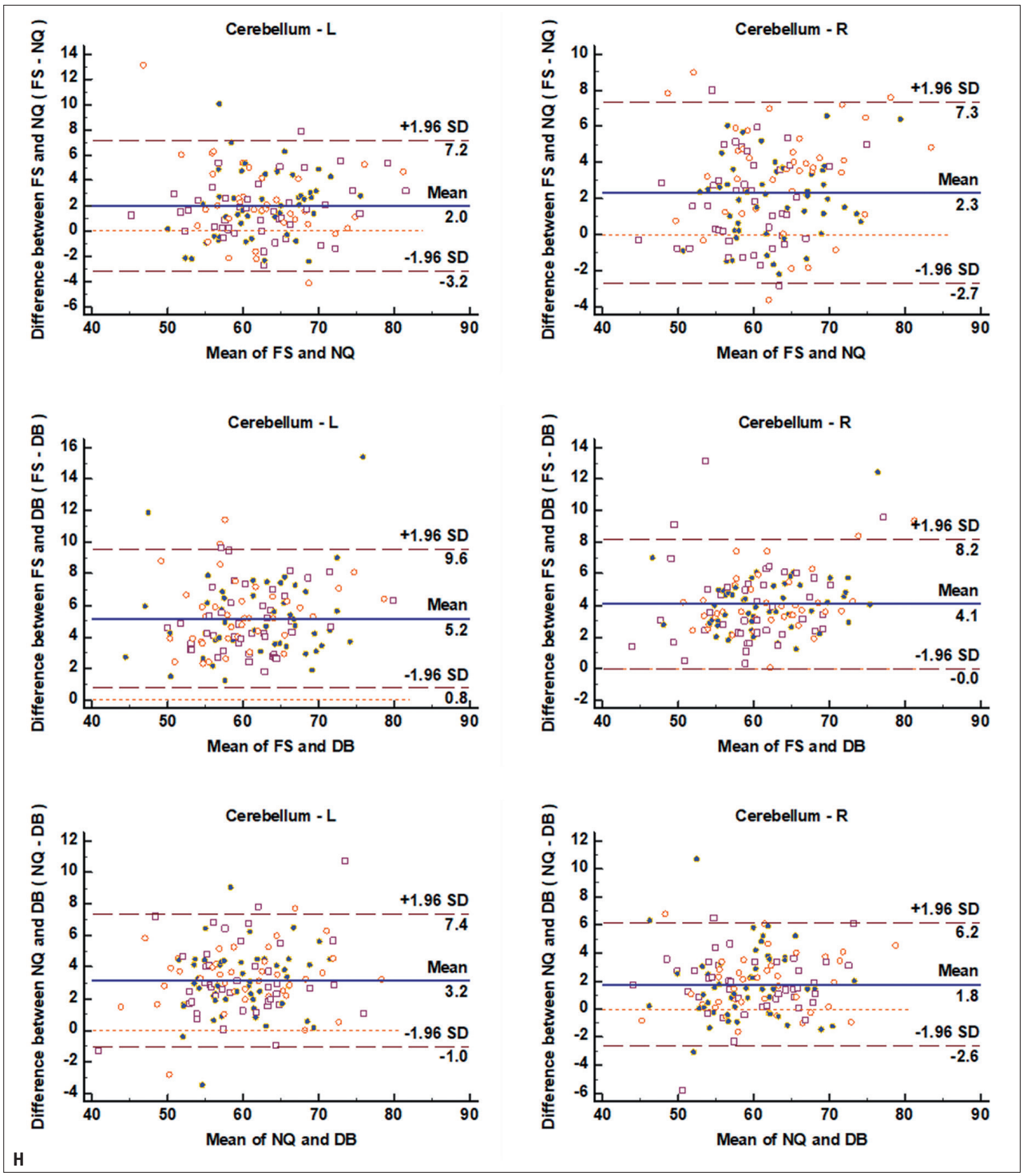

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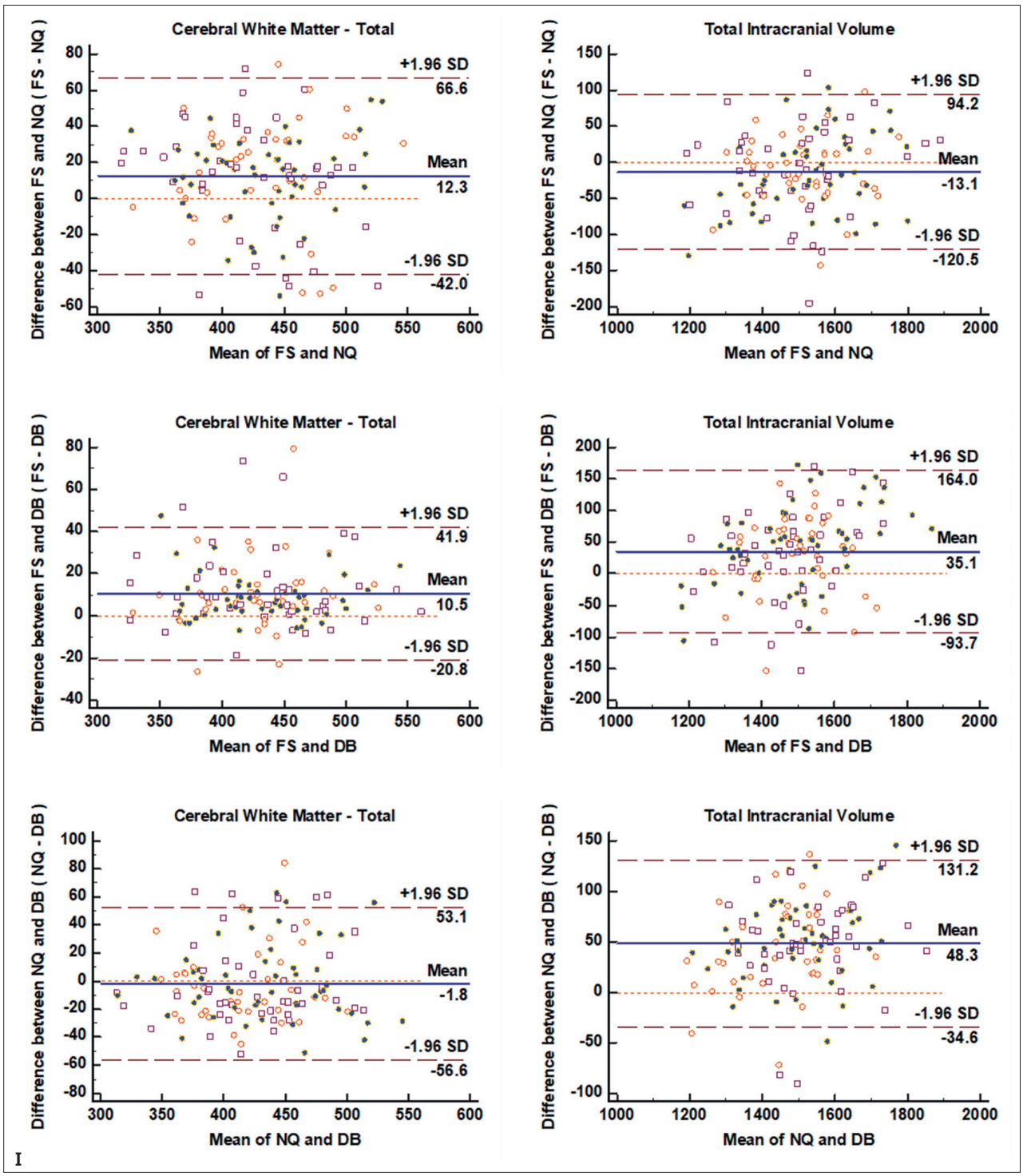

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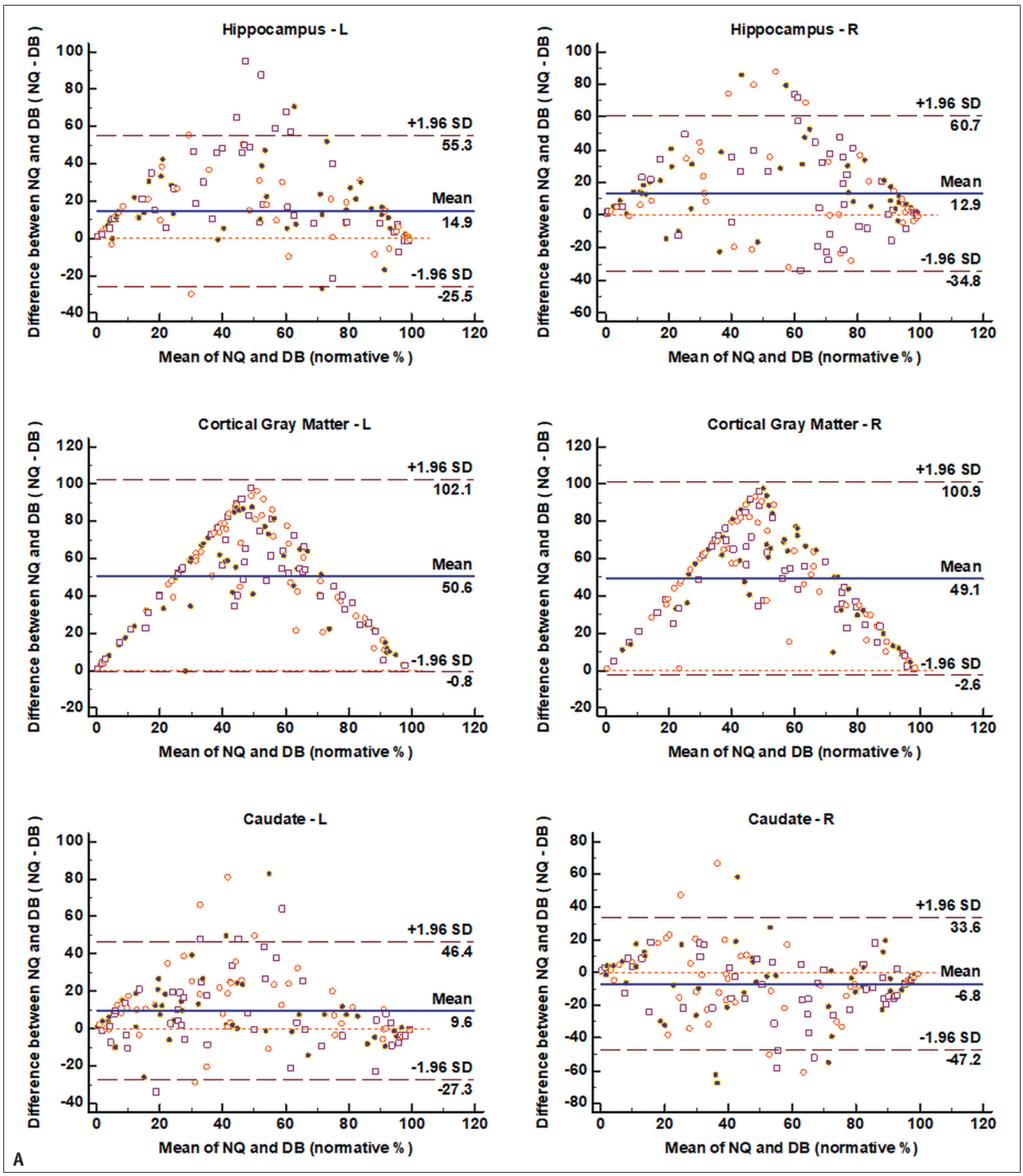
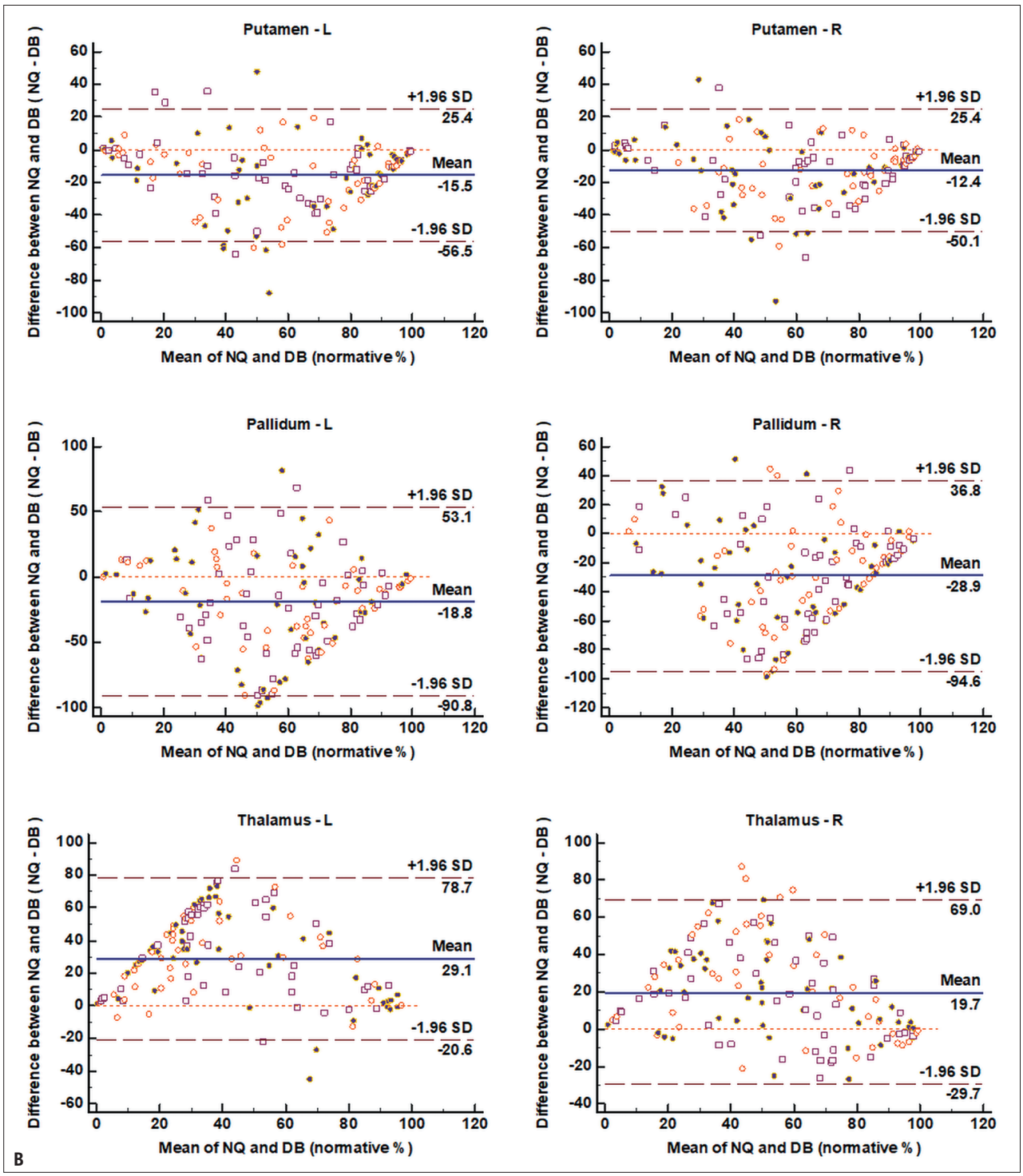


Supplementary Fig. 4. Bland-Altman plots for agreement of the normative percentile of all regional brain volumes between NQ and DB in the SMC data.

A-D. There is a tendency of triangular or rhomboid shapes on Bland–Altman plots with unacceptably broad limits of agreement for all datasets (Supplementary Fig. 4). The orange circle, brown square, and purple circle indicate the AD, MCI, and NL control subgroups in the SMC dataset, respectively. The brown horizontal dashed lines delineate the 95% confidence intervals (the likelihood of individual measures being within ± 1.96 SDs). The orange horizontal dashed line represents an equal (the difference between two software measurements is zero). The blue horizontal line indicates the difference between two software measurements. AD = Alzheimer's disease, DB = DeepBrain, MCI = mild cognitive impairment, NL = normal elderly participants, NQ = NeuroQuant, SD = standard deviation, SMC = single medical center



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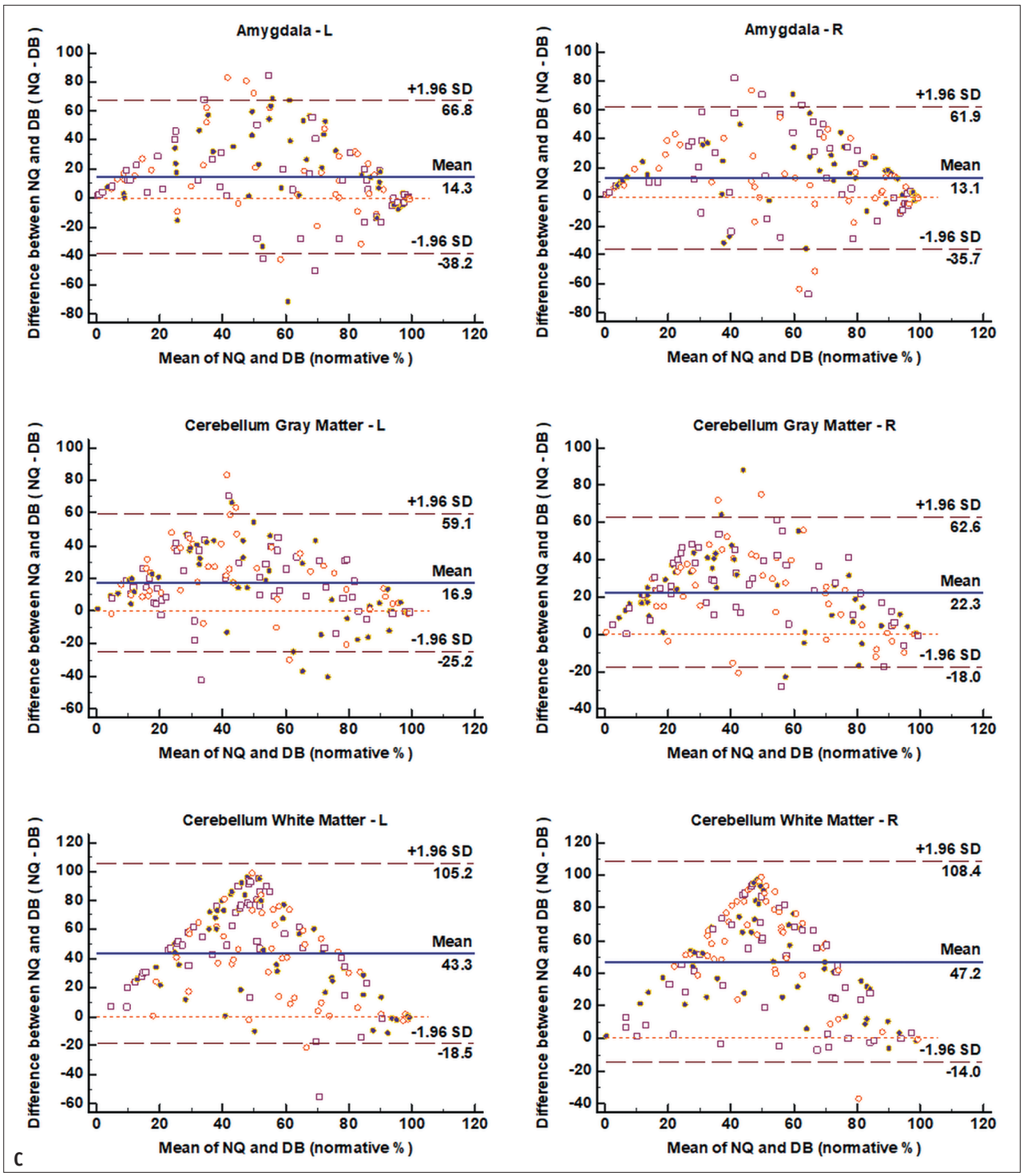

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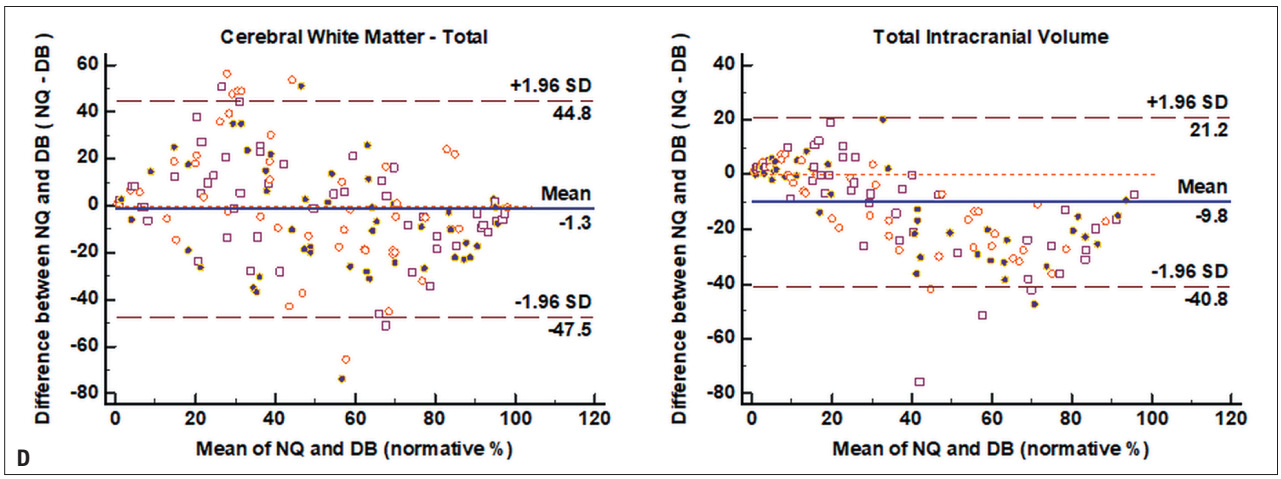

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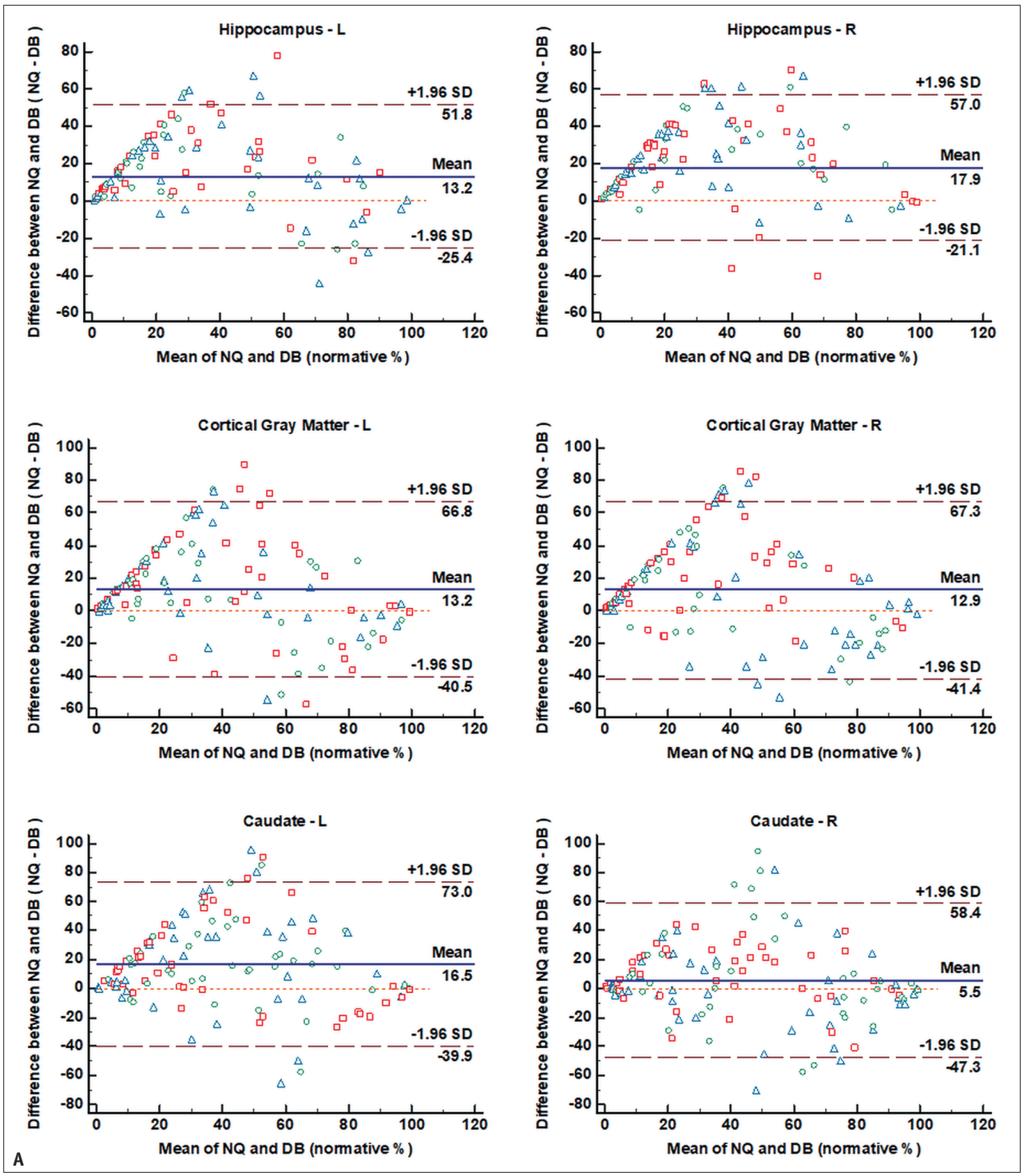

Supplementary Fig. 5. Bland–Altman plots for agreement of the normative percentile of all regional brain volumes between NQ and DB in the ADNI data (Vendor subgroup).

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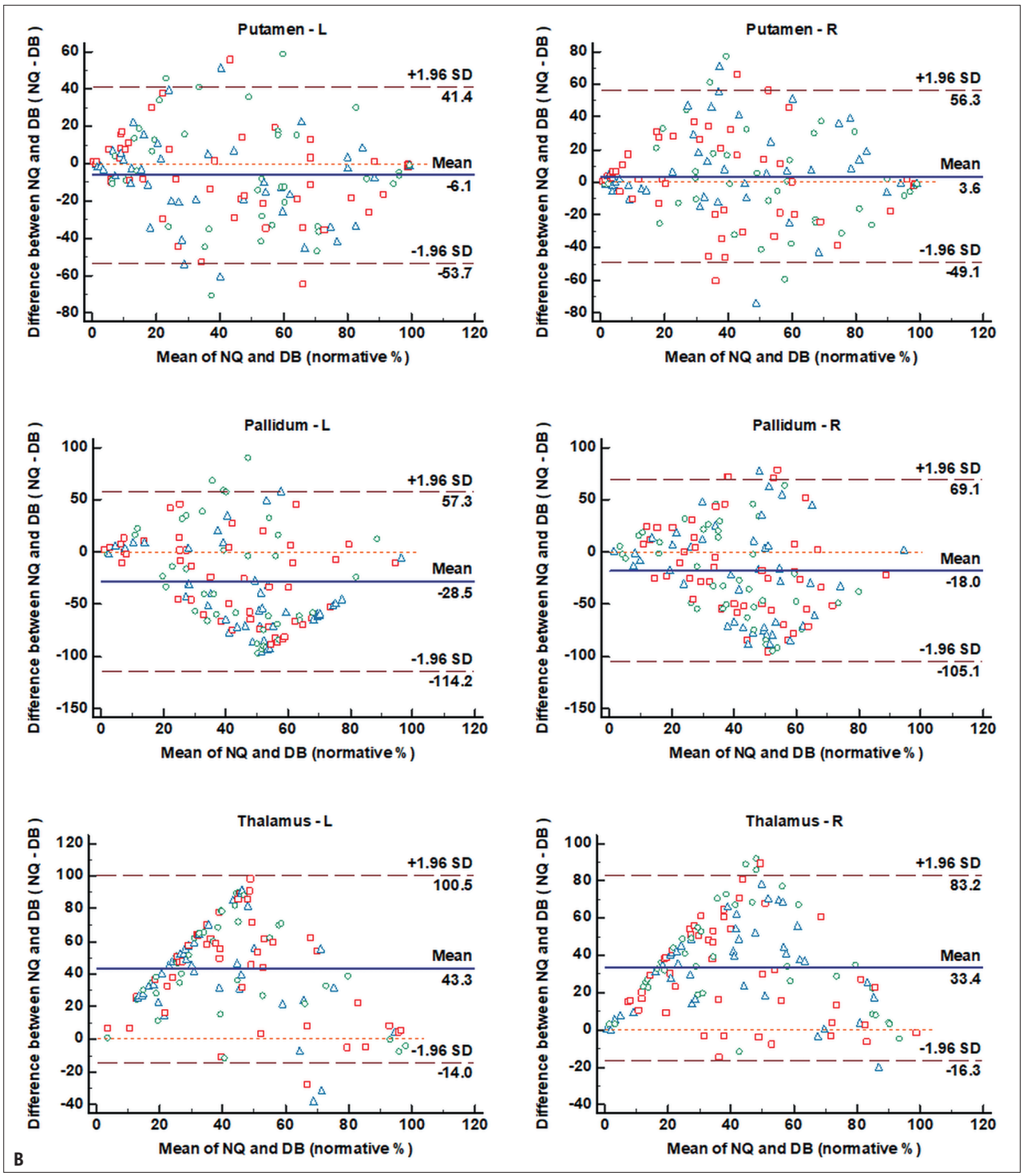

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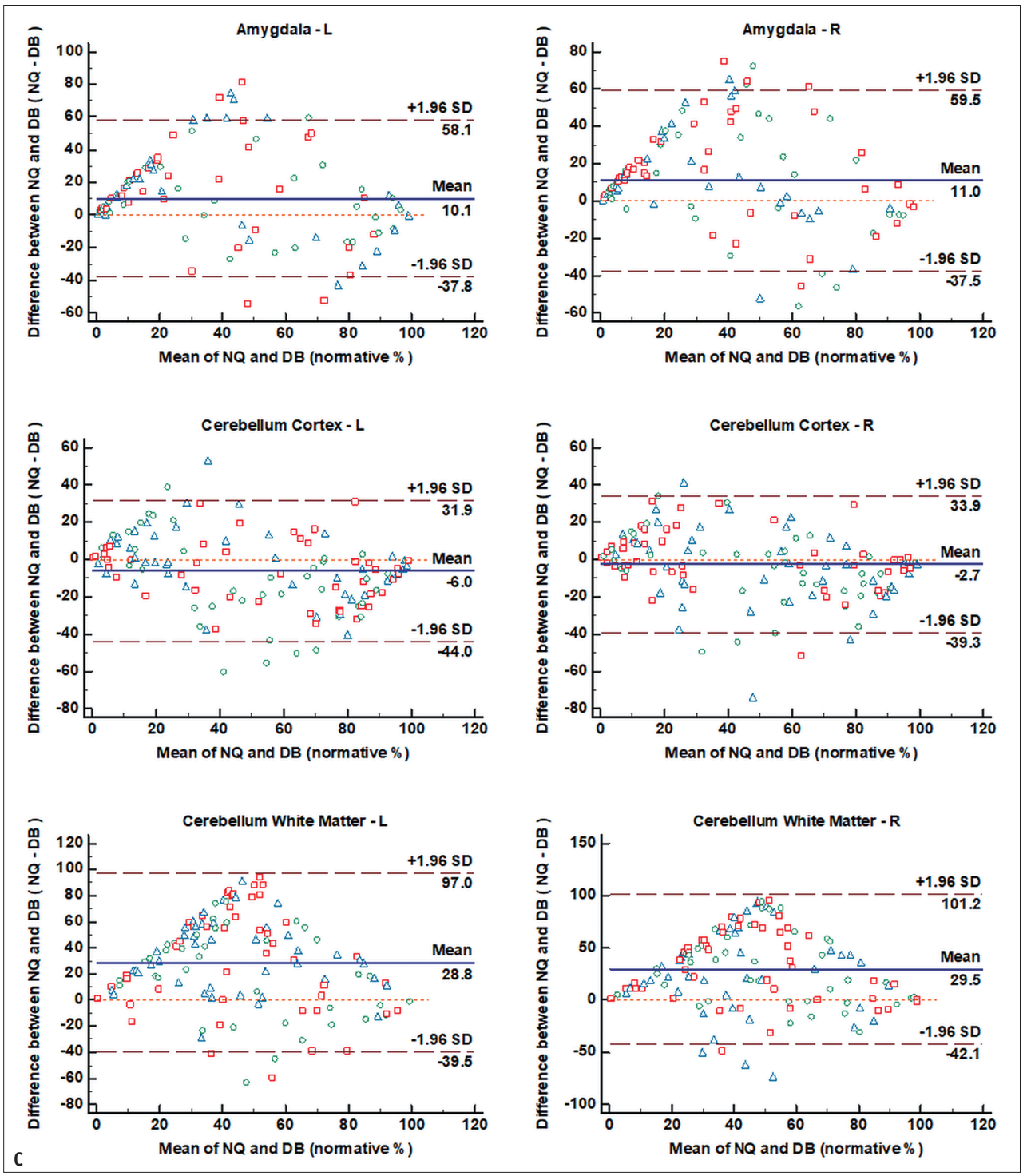

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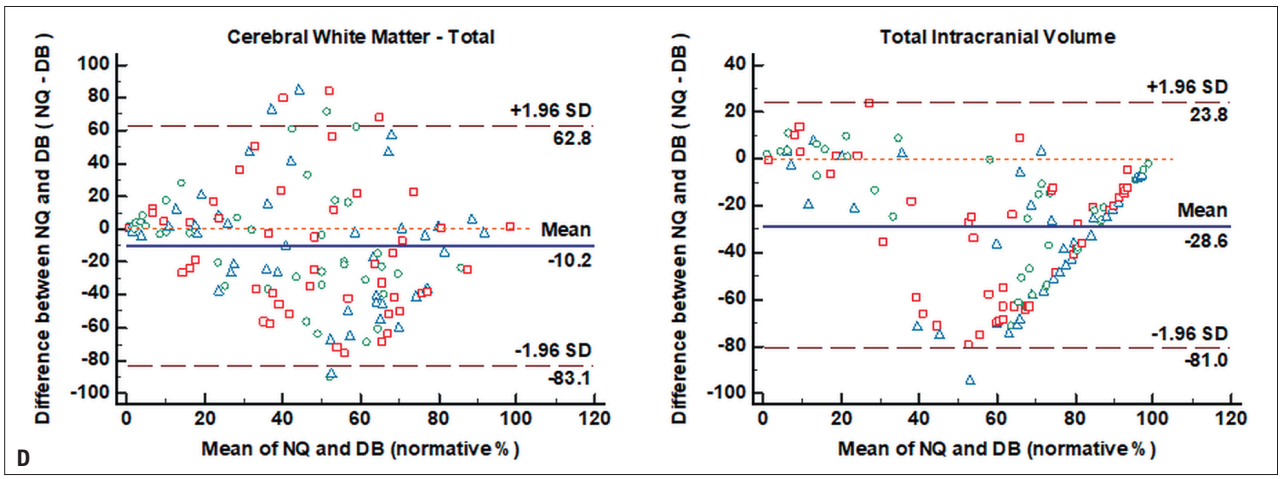

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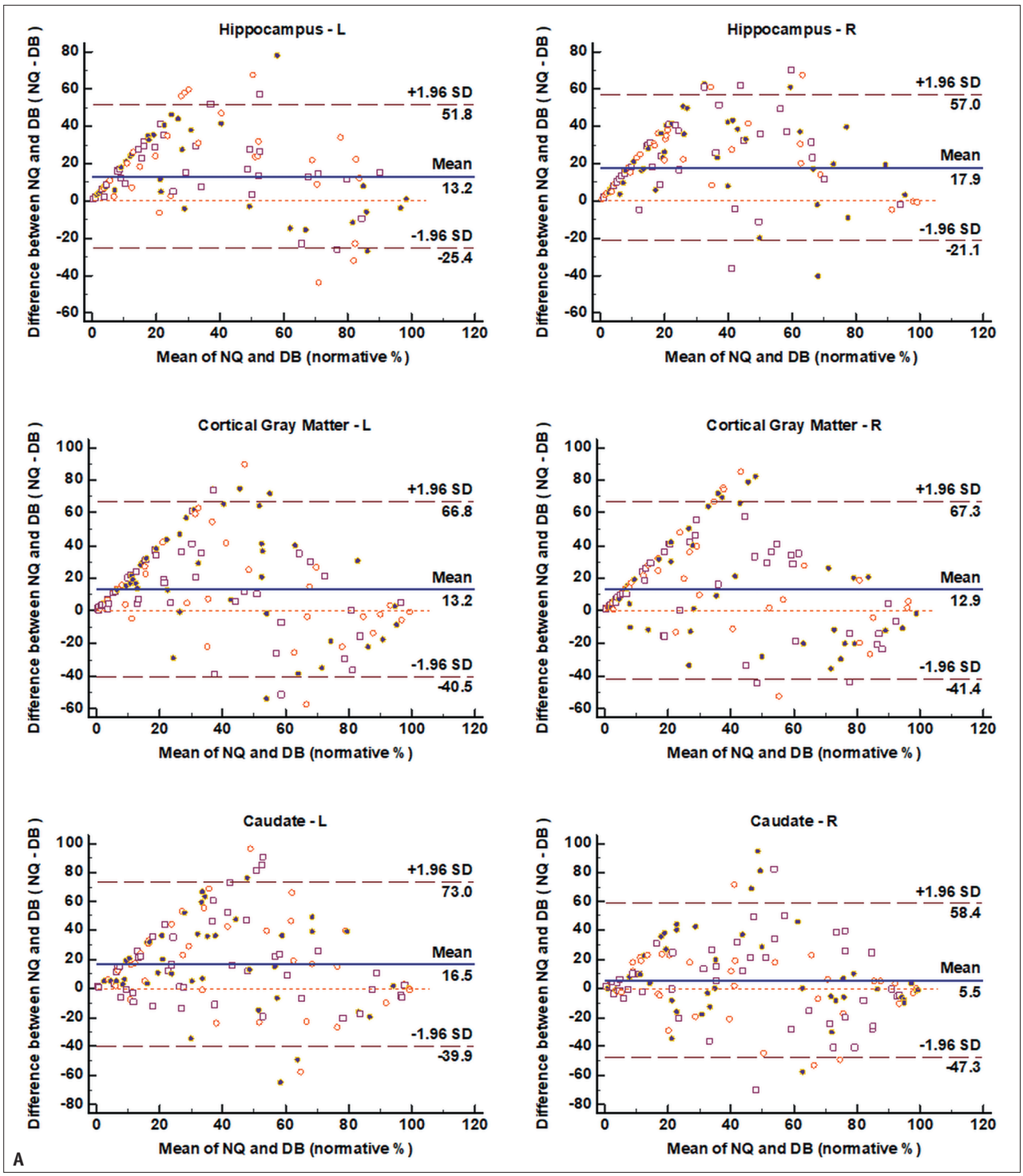

Supplementary Fig. 6. Bland–Altman plots for agreement of the normative percentile of all regional brain volumes between NQ and DB in the ADNI data (diagnosis subgroup).

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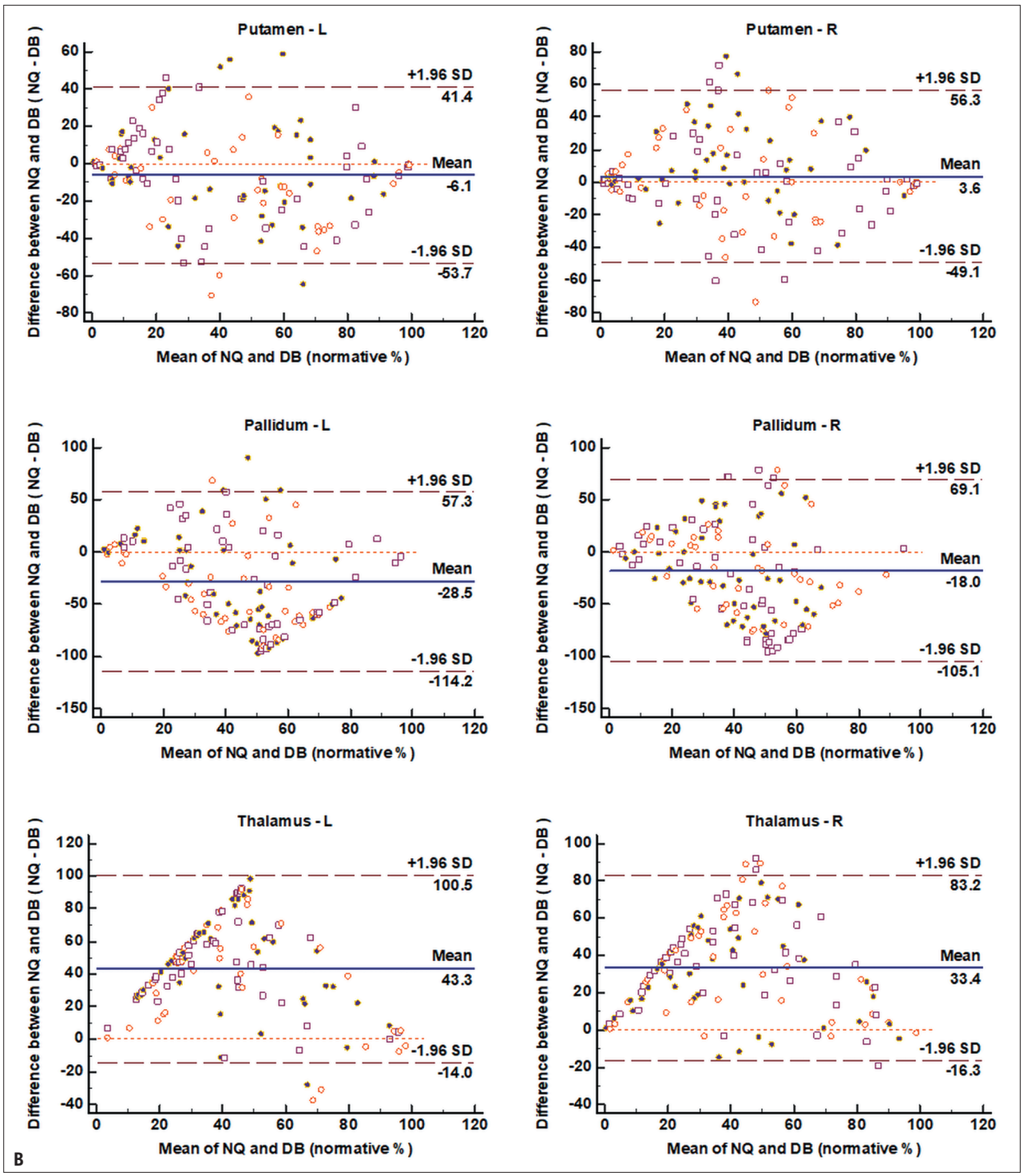

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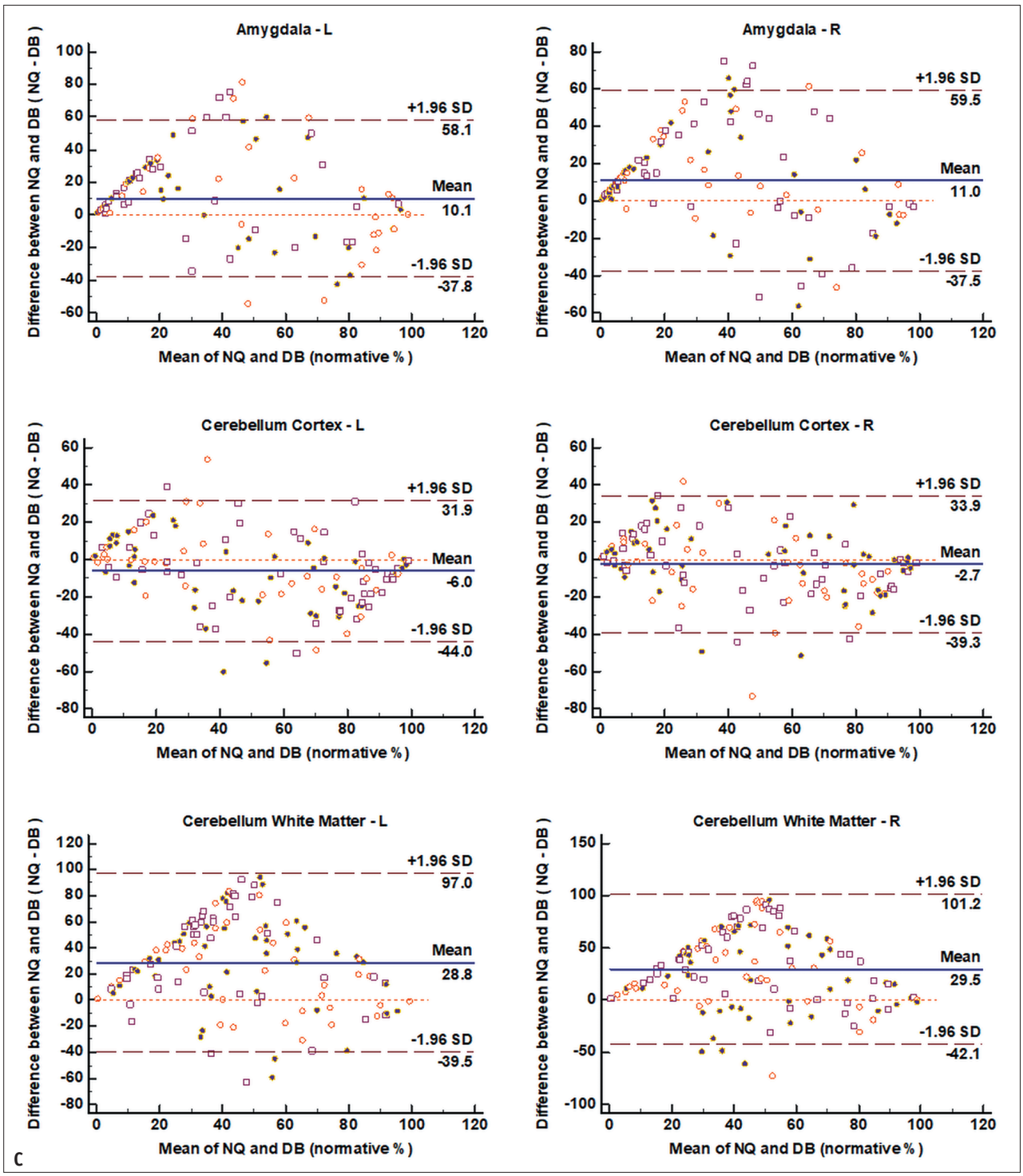

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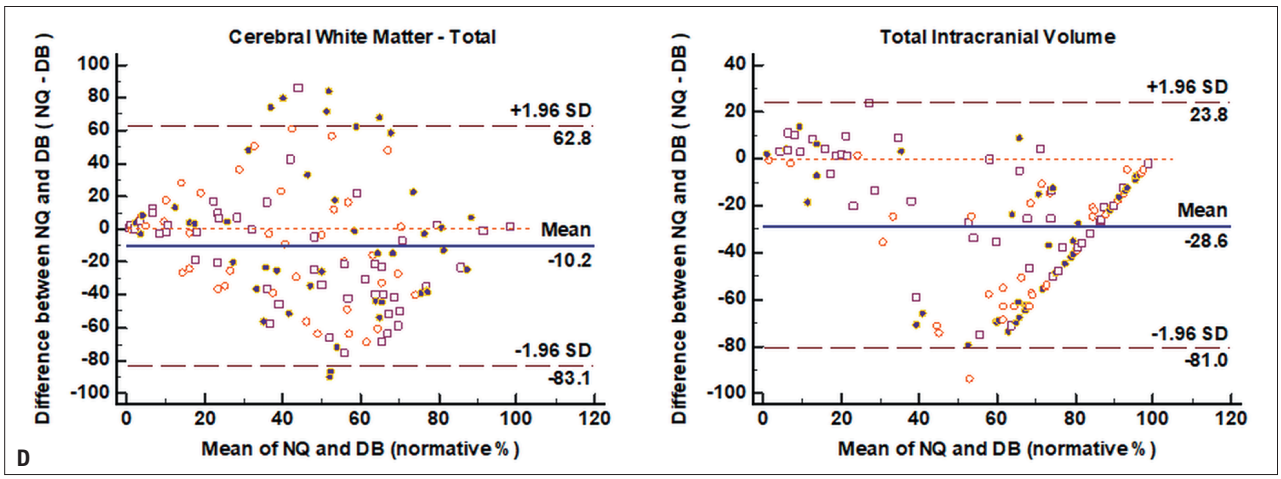

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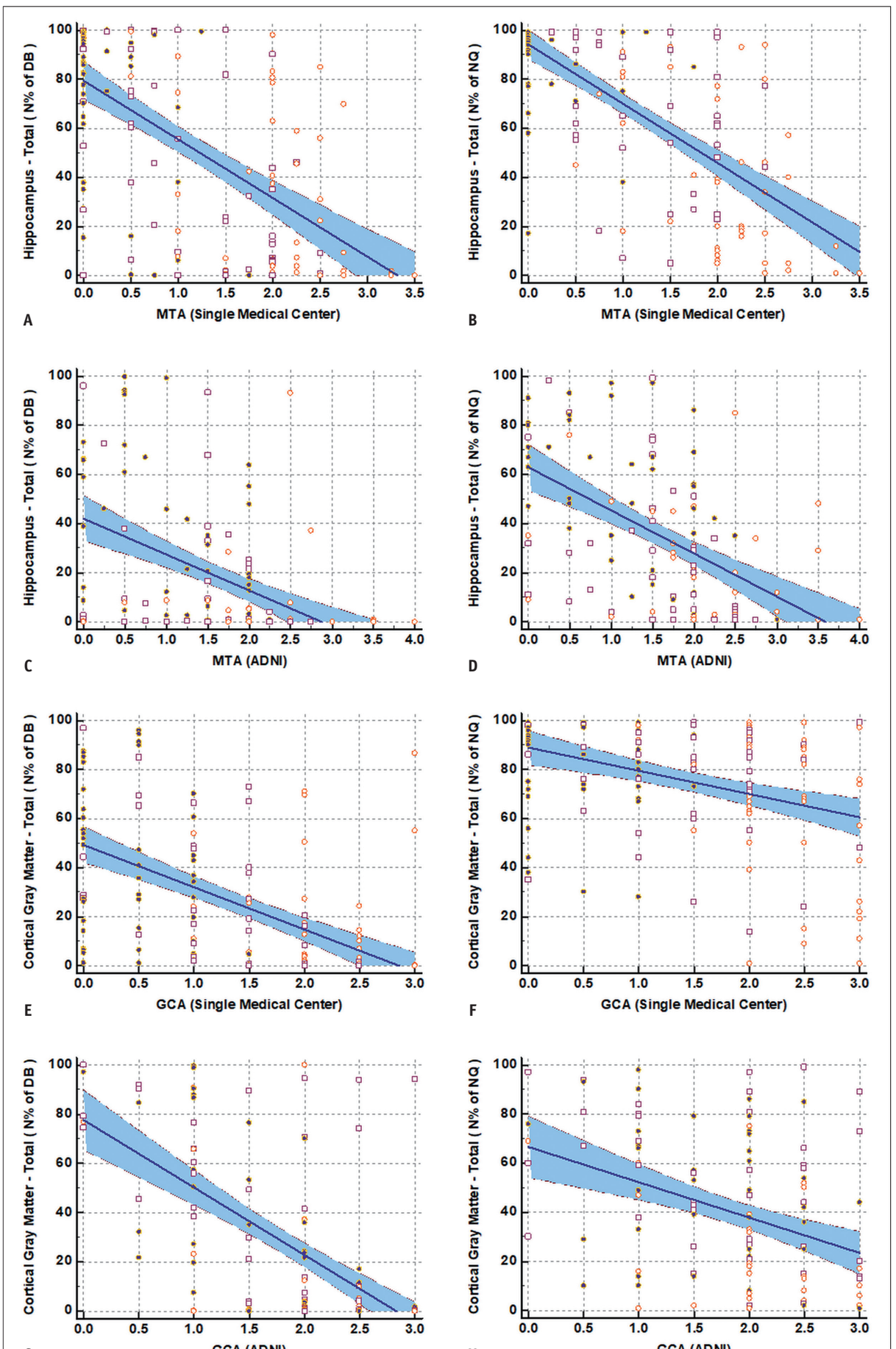

Supplementary Fig. 7. Scatterplot of N% of the total hippocampus and total cerebral cortical gray matter of each software versus visual rating scales.

A-H. Scatterplot of normative percentile (N%) of the total hippocampus and total cerebral cortical gray matter of each software versus visual rating scales (mean MTA and mean GCA) in the SMC and ADNI datasets demonstrate significant correlation (-0.347 < rho < -0.690; $p < 0.001$). The orange circle, brown square, and purple circle indicate the AD, MCI, and NL control subgroups in both the SMC and ADNI datasets, respectively. The thick solid blue line represents the fitted linear trend for the presented data. Curved brown dotted lines represent 95% confidence intervals. AD = Alzheimer's disease, ADNI = Alzheimer's Disease Neuroimaging Initiative, DB = DeepBrain, GCA = global cortical atrophy, MCI = mild cognitive impairment, MTA = medial temporal atrophy, NL = normal elderly participants, NQ = NeuroQuant, SMC = single medical center