

ROI	Quarc	FreeSurfer Long.	p
Entorhinal	-2.08 [-2.56 -1.71]	-0.86 [-1.12 -0.63]	$\leq 1.0e-6$
Hippocampus	-1.82 [-2.24 -1.49]	-1.07 [-1.35 -0.83]	6.5e-4
Whole Brain	-1.50 [-1.88 -1.19]	-0.89 [-1.17 -0.66]	0.0039

Table 1: Cohen’s d effect size estimates for annual regional change in AD controlled for normal aging (Eq. 6), from a head-to-head comparison of Quarc with FreeSurfer Longitudinal (v4.4). Values in brackets are 95% confidence intervals. For FreeSurfer Longitudinal, ROI volumes at baseline and at 12-months reflect modifications made using the full set of scans available up to 3-years, while for Quarc, the baseline and 12-month data used were not adjusted based on subsequent visit data. Thus, the results here are biased toward FreeSurfer Longitudinal. Nevertheless, all effect sizes are significantly greater for Quarc. Number of subjects: 129 HC; 85 AD.

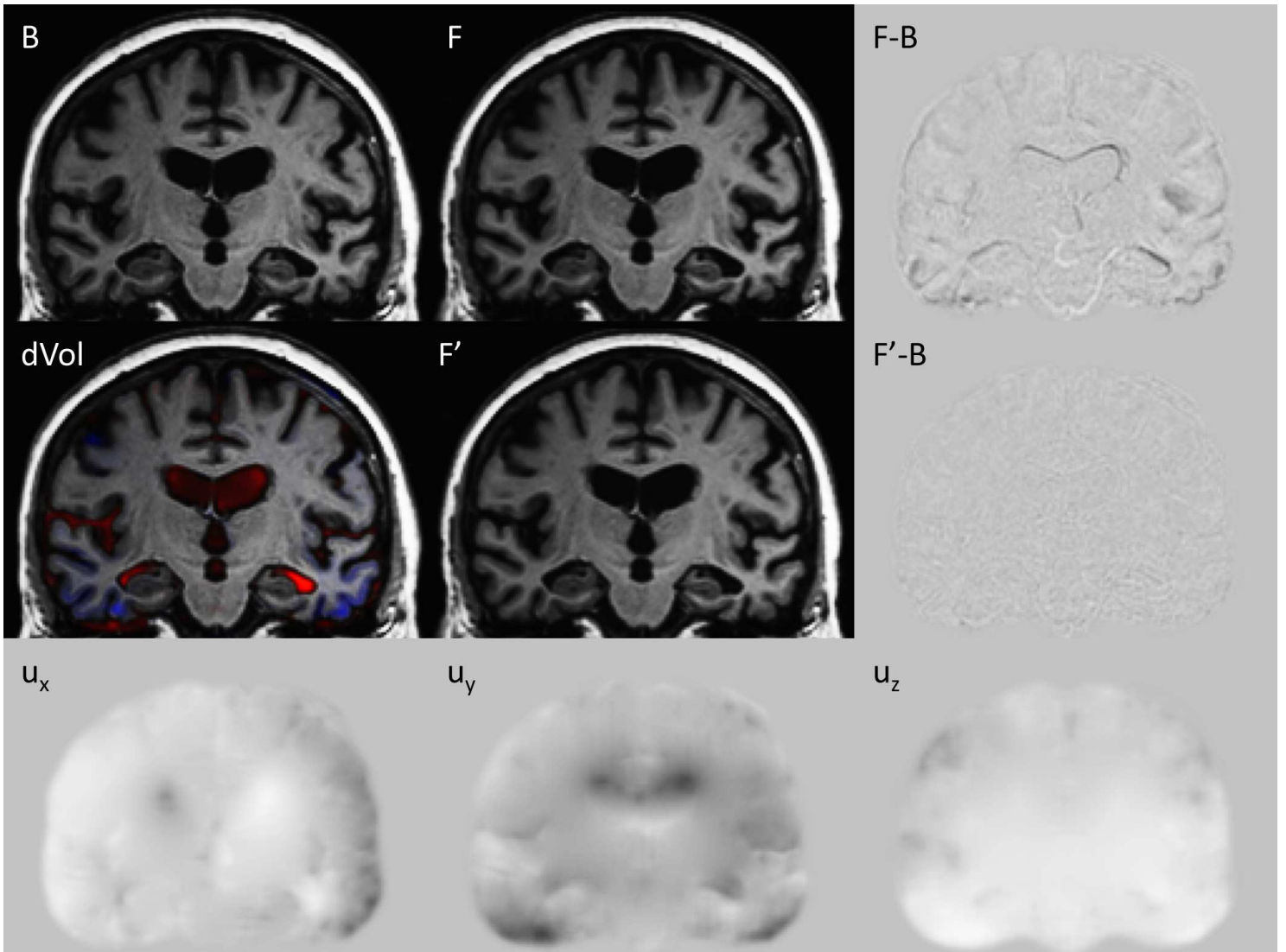


Figure 1: Nonlinear registration: same as Fig. 3, but for six-months followup.

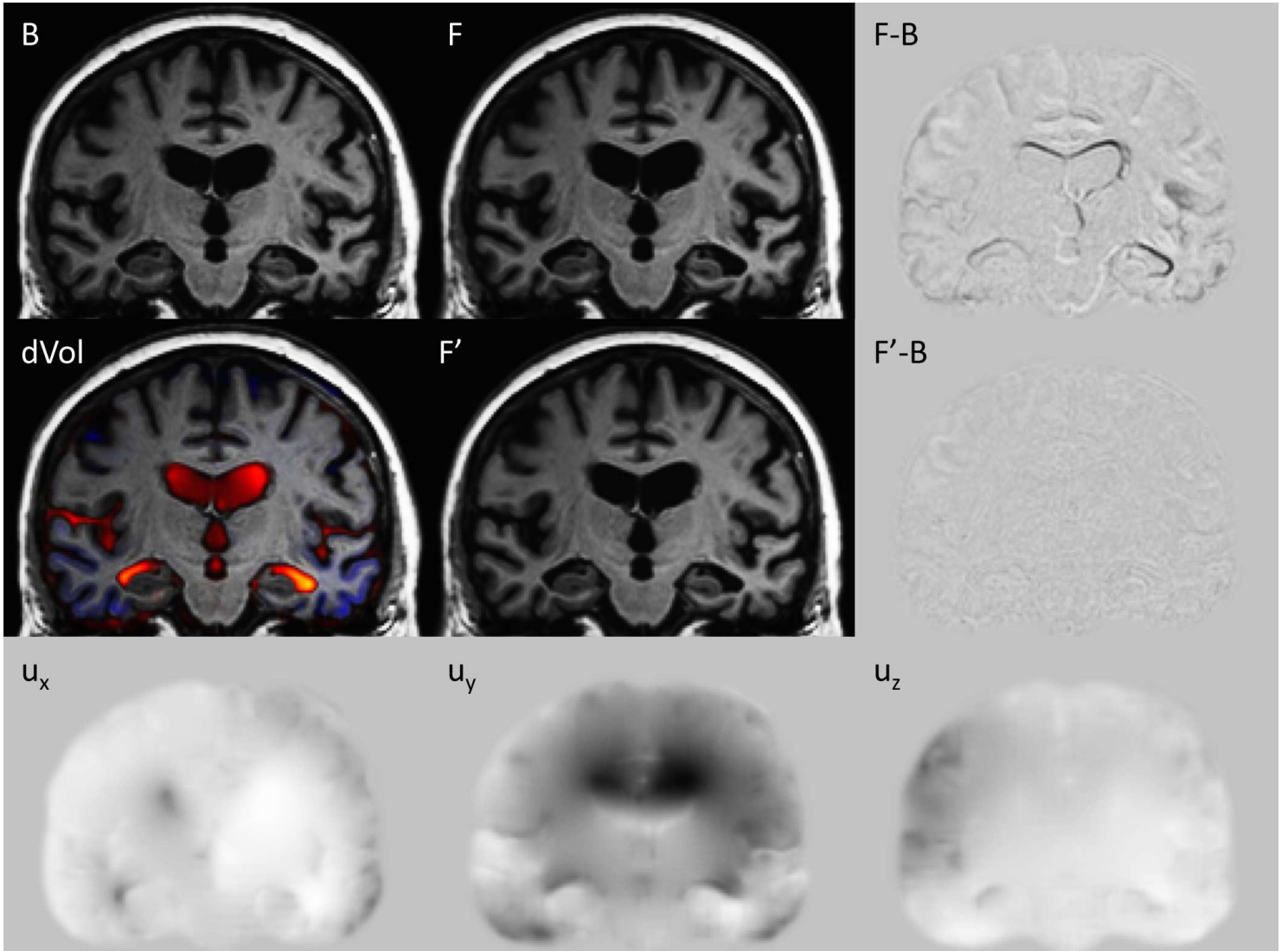


Figure 2: Nonlinear registration: same as Fig. 3, but for one-year followup.

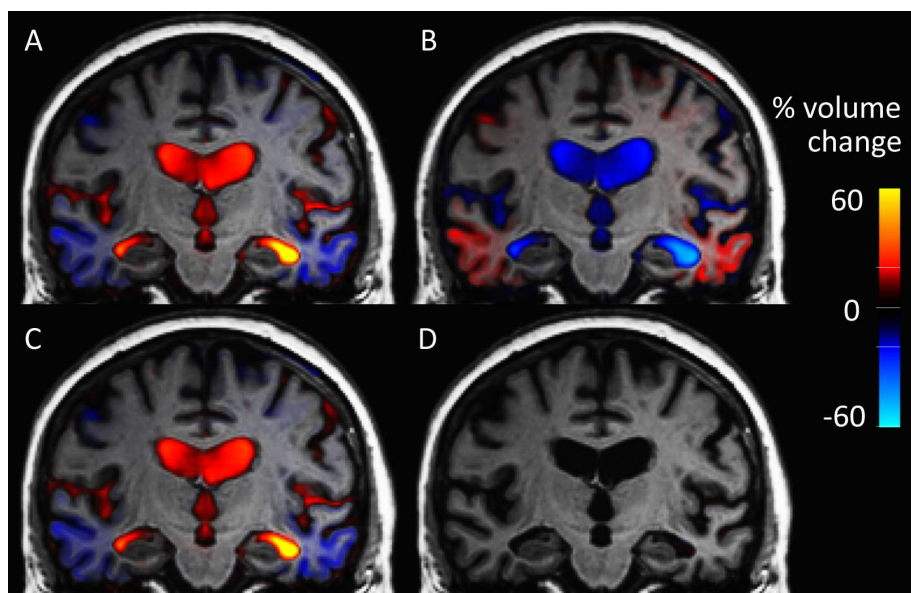


Figure 3: Inverse mapping: (A) Volume-change field for the two-year followup overlaid on the baseline scan, reproduced from Fig. 3(dVol); (B) Volume-change field for the inverse mapping (directly calculated from the forward mapping, i.e., not the result of an independent nonlinear registration calculation) overlaid on the two-year followup scan; (C) Volume-change field for the inverse of the inverse mapping, which as expected is essentially identical to the volume-change field in (A); (D) Subtraction of the volume-change field in (C) from that in (A)—essentially zero.

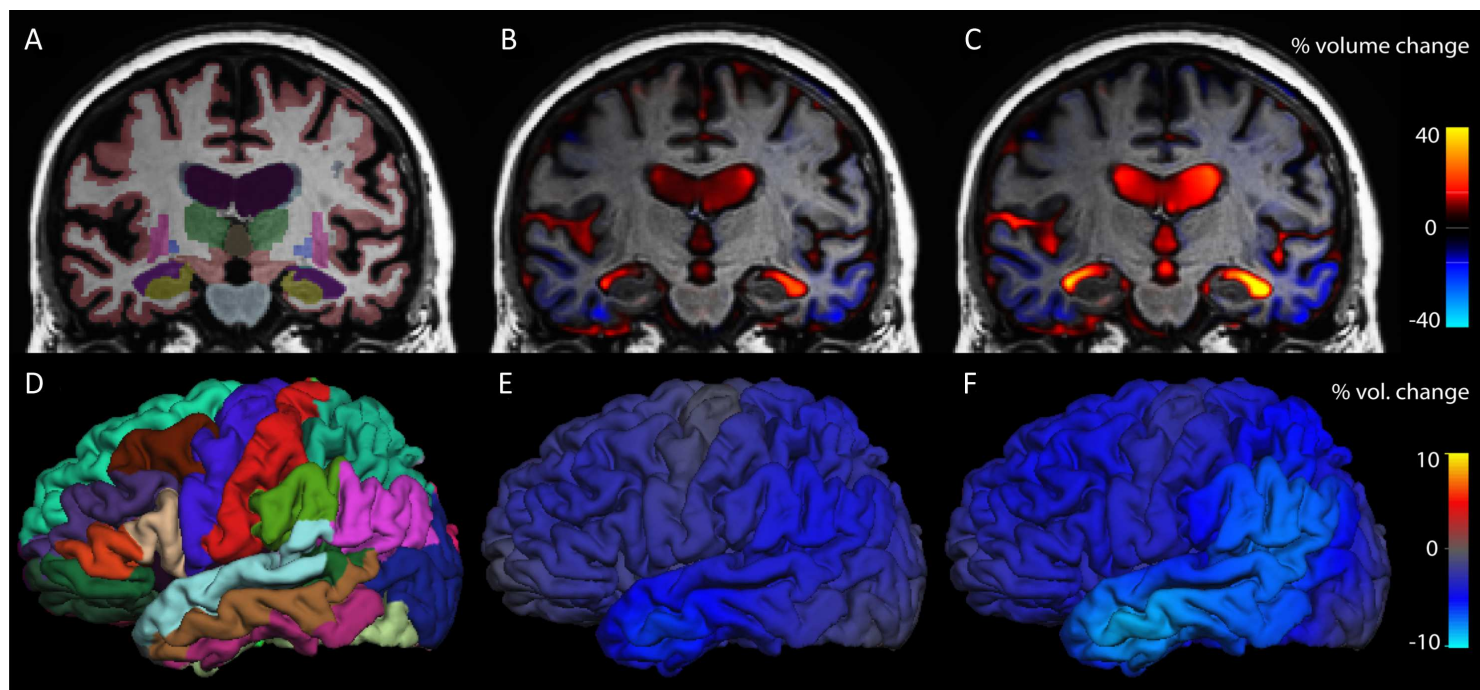


Figure 4: Tissue segmentation, with 6- and 12-month volume-change fields for the MCI subject shown in Fig. 3, (same coronal slice). (A) Segmentation of the baseline MRI scan, with different brain structures represented in different colors. (B) Corresponding coronal slice overlain with a heat map representation of the voxelwise estimates of volumetric change at 6 months and (C) 12 months. (D) Left hemisphere cortical parcellation of the baseline MRI scan. (E) Cortical surface overlain with a heat map representation of the estimates of cortical volumetric change at 6 months and (F) 12 months. Region-specific estimates were obtained by averaging the voxelwise change within each region of interest. In this subject, the left middle-temporal gyrus has decreased in volume by 4.7% at 6 months and by 8.2% at 12 months; the left temporal-horn lateral ventricle has increased by 17.4% at 6 months and by 35.3% at 12 months.