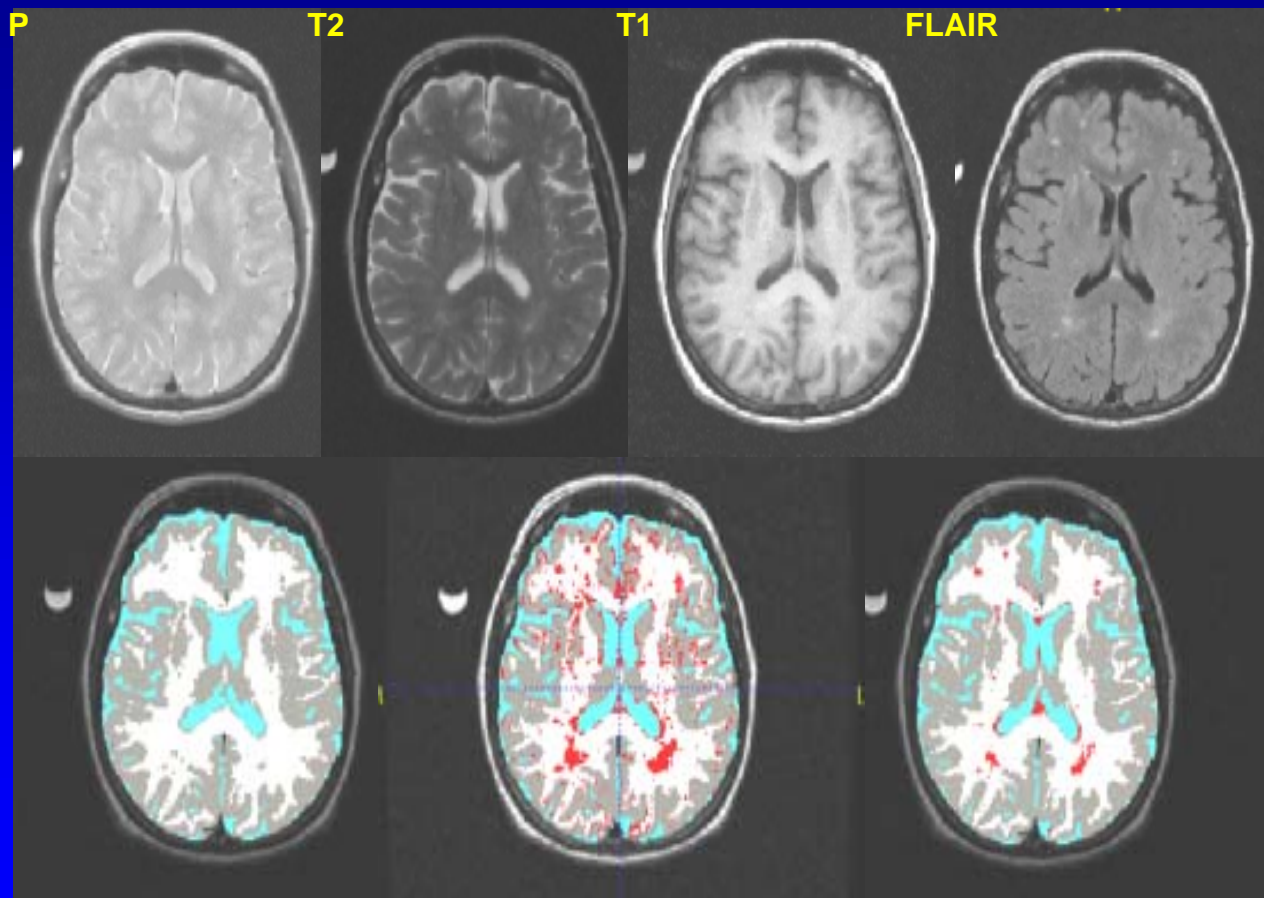


# Aim 1: Multi-contrast Morphometry

- Provide tools and protocols for studies using combinations of proton density, T2, FLAIR as well as T1 weighted scans
- As an example: vascular brain lesions (UBOs) are thought to be associated with aging and psychiatric disorders. Duke (Krishnan) has been using multiple contrasts to study brain morphometry, lesions and depression in elderly populations.
- UNC (Gerig) has been developing tools for automated tissue classification.
- Plan to recruit subjects with lesions from Duke population, image them using present BIRN T1-W plus PD, T2, FLAIR.
- Image twice (within six months) at each field strength (1.5, 3.0, 4.0 T)

# Aim 1: Multi-contrast Morphometry



- top row: PD, T2, T1 and FLAIR contrast images of a subject that shows vascular lesions in the white matter.
- bottom row: results of automated atlas driven image segmentation program that implements rule-based outlier analysis to allow identification of lesions.
- The left image classifies all pixels as gray, white or CSF. The middle image adds in a set of loose rules that allow many false positive lesions. The right image has a stricter set of rules that correctly identifies the lesions.

# Aim 1: Multi-contrast Morphometry

- Plan to evaluate correct tuning of lesion separation, cross machine and field variability of lesion, gray, white, csf
- IRB has been approved (January 25, 2005)
- Have coordinator assigned to project
- 1<sup>st</sup> subject identified, not yet recruited
- Dr Gerig has developed a first version of the multicontrast program that does not have the lesion segmentation implemented.
- Program is based on ITK/VTK, runs very quickly compared to former Matlab implementation.

# Aim 1: MIRIAD Project

- Multisite Imaging Research In (the) Analysis (of) Depression
- 50 depressed, 50 controls imaged at baseline and 2 years
- LONI and Brigham processing: gray, white, csf by lobe and by 13 subregions such as hippocampus, thalamus, superior temporal gyrus, etc
- Initial results encouraging but the data does not follow expected trends in all cases—analysis is on going
- Hybrid results obtained by applying the LONI derived lobar atlas (D. Rex) to Duke's semi-automated lesion analysis

# Aim 1: MIRIAD Project

- Paper title: LOBAR DISTRIBUTION OF LESION VOLUMES IN LATE-LIFE DEPRESSION: THE BIOMEDICAL INFORMATICS RESEARCH NETWORK (BIRN)
- After controlling for age and hypertension, depressed subjects exhibited significantly greater total white matter lesion volume (mean  $6.11 \pm 0.89$  ml) in both hemispheres and in both frontal lobes than did control subjects (mean  $3.38 \pm 0.90$  ml). Although a similar trend was observed in the parietal lobes, it did not reach a level of statistical significance; models of the temporal and occipital lobes were not statistically significant.

