Reduced Regional Integration in the Default Network of Patients with Very Mild Alzheimer’s Disease Detected by Bootstrapping Rest-fMRI Data

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1. Subjects and Data Acquisition
- resting state fMRI of 24 patients with amnestic MCI (aMCI) and 16 healthy controls
- subjects were instructed to keep their eyes closed, not to think of anything in particular, and not to fall asleep;

2. Evaluation of Regional BOLD Variation
- bootstrapping the BOLD activity allows detecting minor variations in regional integration;
- for each time point the mean BOLD activity is computed for a large number of samples with replacement;
- width of the 95% confidence interval of all bootstrapping samples is the base of our marker;
- to obtain single robust measure of homogeneity, we average this quantity among all time points;

3. Results

#### Significant group differences

\( \alpha = 95\% \), Mann-Whitney-U, Westfall-Young Correction

- which cannot be explained by grey matter loss;
- only slight correlation to grey matter loss in hippocampi;
- differences of functional type

Most pronounced difference in BOLD Variation in right posterior cingulate cortex is a good test to identify aMCI;

(area under ROC curve 0.81)

4. Conclusion
- regional integration in rest-fMRI captured by bootstrapping plays an important role for aMCI identification;
- significant regions within the DN correspond well to previous findings (Grecius et al., 2004, Sorg et al. 2007);
- on the data of our study, our novel marker performs superior than previously proposed measures for regional integration (Li et al., 2002, Zang et al., 2004, Xu et al., 2008);
- comparison with VBM demonstrates that the differences are functional in nature;

### References