resolution, FOV of 24 cm, 62.5 kHz acquisition bandwidth, 4mm slice thickness, 17 sagittal slices). Two different memory tasks were employed: A) Identification of in-/outdoor scenes, B) Comparison of left/right picture sizes. A stimulus-block paradigm with 30 seconds on (task A) and 30 seconds off (task B) were repeated for 4 cycles and followed by a 6 min resting paradigm in a 10-minute-total scan. A high resolution anatomical scan was conducted for image registration. Data Analysis: fMRI voxel time courses were cross-correlated with the stimulus function and a student t-test was performed to localize significantly activated voxels (p < 0.001). These functionally and spatially localized voxels in the entorhinal cortex region were used to guide the calculation of functional synchrony based on the voxel time courses during the 6-min resting paradigm (1). Results and Discussion: The designed stimulus paradigms significantly activated the regions of the entorhinal cortex, angular cortex, and dorsolateral prefrontal cortex. An average of 46 voxels in the entorhinal cortex regions of these subjects were activated by the tasks A and B. The voxel time courses at resting state of these localized voxels were cross-correlated. It was found that the functional synchrony in the entorhinal cortex region in the healthy volunteers was similar with those in the hippocampal region [1]. It is suggested that these methods and results could be applied to mild cognitive impairment subjects to determine their possible AD progression.

Reference

P2-219 AN IMAGE ANALYSIS AND CLASSIFICATION PROTOCOL FOR CHARACTERIZATION OF NORMAL AND ABNORMAL AGING VIA STRUCTURAL MRI

Christos Davatzikos1, Dinggang Sheng1, Xiaoying Wu1, Susan M. Resnick2, 1Section of Biomedical Image Analysis, Department of Radiology, University of Pennsylvania, Philadelphia, PA, USA; 2Laboratory of Personality and Cognition, National Institute of Aging, National Institutes of Health, Baltimore, MD, USA. Contact e-mail: christos@ru4.upenn.edu

Background: Early detection of structural brain changes that might be precursors to mild cognitive impairment (MCI) and Alzheimer’s Disease must be distinguished from background normal aging affects. Objective(s): In order for structural analysis to be useful as an early diagnostic tool.

Methods: We present a methodology for the quantitative analysis and classification of structural MR images, and its application to the Baltimore Longitudinal Study of Aging (BLSA), aiming at establishing extensive normative data of structural changes in the aging brain, and at determining quantitative imaging profiles of abnormal aging. This methodology is based on mass-preserving shape transformations applied in conjunction with a high-dimensional deformable registration method of very high accuracy. The methodology results in tissue density maps (primarily white and gray matter, as well as CSF), which quantify potentially complex patterns of brain atrophy. These tissue density maps are examined in conjunction with powerful nonlinear pattern recognition techniques, in a framework for multi-variate nonlinear classification.

Conclusions: Application of this method to 158 images from the BLSA resulted in spatial maps of normal aging, which quantify the % rate of change of various brain regions, as well the variability across individuals. Moreover, our analysis demonstrates associations between patterns of atrophy and MCI clinical status in a small set of 12 MCI patients.

P2-220 EMOTIONAL MEMORY, AMYGDALA VOLUME AND ALZHEIMER’S DISEASE

Rodrigo R. Schultz2, Edgar P. Henze M, Haberkorn U, Schroder J Purpose: Recent work has focused on the differentiation of Alzheimer’s disease (AD) from other forms of dementia, with the eventual aim of developing rational and specific therapies. The current holy grail of AD research is to improve aid early diagnosis. PET scanning is sensitive in AD: typical changes include reduced rCMRglu in posterior cingulate and temporoparietal association cortices with later hypofrontality. We investigated the pattern of rCMRglu in AD and compared rCMRglu in AD with rCMRglu in non-cognitively-impaired depressed controls. We also examined whether elevated tau in the cerebrospinal fluid (CSF) is associated with a differential pattern of rCMRglu in AD. Methods: 18FDG-PET was performed on 40 patients with AD (9m, 31f) and 10 non-cognitively-impaired depressed controls (2m, 8f) to measure resting brain glucose metabolism (rCMRglu). Lumbar puncture was performed in 28 AD patients (7m,2f) and tau was assayed using the htau antigen kit (Innogenetics). Using spm96 we correlated rCMRglu with MMSE as a measure of illness severity, and compared rCMRglu in AD with rCMRglu in depressed controls. We also correlated rCMRglu with CSF tau levels. Results: Increased disease severity was associated with reduced rCMRglu in left parietal lobe, frontal lobes, left cingulate lobe, and left temporal lobe (p < 0.05). Compared to controls, probands with AD had reduced rCMRglu in left and right parietal lobe, left and right temporal lobes and right frontal lobe. Increased tau was associated with reduced rCMRglu in right frontal lobe, right temporal lobe and left cingulate lobe (p < 0.05). Reduced right temporal lobe rCMRglu was most significantly associated with increased tau (p < 0.01). Discussion: We confirmed a typical pattern of reduced rCMRglu in predominantly left-sided fronto-temporo-parietal and cingulate cortices in AD. AD probands showed reduced activity compared to controls in bilateral temporoparietal and to a lesser extent in frontal areas. The association of increased tau with reduced activity in frontotemporal and cingulate areas further supports tau as a sensitive marker in dementia. Further work should focus on improving specificity, perhaps by combining PET with tau and neuropsychological markers.