Increased default mode activity in patients with progressive supranuclear palsy

Y-C. Lin[1], T-M. Liu[2], C-S. Lu[3], Y-Y. Wai[1], and J-J. Wang[2]

[1]Department of Diagnostic Radiology, ChangGung Memorial Hospital, KweiShan, Taoyuan, Taiwan, [2]Department of Medical Imaging and Radiological Science, ChangGung University, Taoyuan, Taiwan, [3]Department of Neurology, ChangGung Memorial Hospital, Taoyuan, Taiwan

Introduction:

Progressive supranuclear palsy (PSP) is an atypical parkinsonian syndrome, characterized by supranuclear vertical gaze palsy, postural instability and falls, parkinsonian features. Studies with routine and volumetric MR imaging is useful [2], though controversial, in distinguishing PD from PSP and other parkinsonisms. A baseline or control state is fundamental to the understanding of most complex systems. The brain regions exhibit such increased level of activity during resting-state when they are engaged in spontaneous, self referential mental activity and there are no external demands on our attention [3]. Because it was assumed the thalamo-cortical circuit was involved in both disease states, the neuro-connectivity can be affected. The present work proposed to examine the changes in the default mode network activity measured during the resting state in patients with PSP.

Materials and Methods:

6 patients with PSP [1 male, 5 female, aged between 53 and 71 year old] and 6 healthy old controls [2 male, 4 female, aged between 60 and 70 year old] were included in the study. All studies were performed on a 3.0 Tesla MR scanner (Trio a TIM system, Siemens, Erlangen, Germany). Images were acquired using a single shot T2*-weighted EPI sequence with the following parameters: 40 slices of thickness of 3 mm to cover the whole brain down to the cerebellum; TR/TE/flip angle = 3000ms/45ms/90°, matrix size = 64×64, FOV= 192mm, which leads to an in-plane resolution of 3mm×3mm. Subjects were prompted to remain restingly awake without performing any specific task. The resting state data were analyzed through independent component analysis.

Results and Discussion:

Figure 1 shows the default mode network activities in the patients (left) and in controls (right). Patients showed increased activations in anterior cingulate and parahipocampus. The result might suggest that the neural network in patients of PSP was affected such that increased amount of resources was required to maintain a similar level of performance.

Conclusions:

The change in default mode activity in patients with PSP, as measured during the resting state, might suggest a change in the neuroconnectivity in the diseased state.
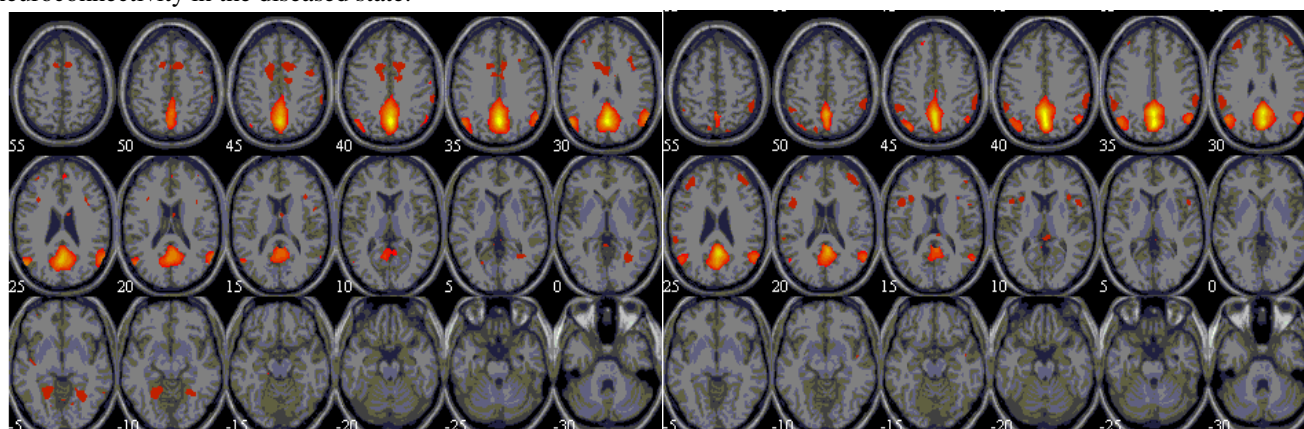
References:

[1]Rehman HU, et al, 2000
[2]Schulz JB, Skalej M, Wedekind D, et al., 1999
[3]Jafri MJ et al 2008