**Functional connectivity of Default Mode Network in ischemic stroke: a prospective study**

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**Introduction:** Brain reorganization is a fundamental mechanism during patient recovery after a stroke, since it involves the capacity of brain to restore itself or compensate for damage caused by the lesion. Resting-state functional connectivity is defined as a temporal correlation between spatially remote regions of brain [1]. The Default Mode Network (DMN) is one of most prominent resting-state functional network of the brain and it has been associated to self-referential processing, as cognitive and emotional skills [2]. We aimed to explore the mechanism of DMN functional connectivity recovery in ischemic stroke through a longitudinal study.

**Materials and Methods:** This study was approved by the Ethics Committee and all individuals provided written consent to participate. Twenty stroke patients aged between 45-80 years old who had experienced their first-ever ischemia, without previous neurological history, were submitted to functional Magnetic Resonance Imaging (fMRI) acquisition using a 3T scanner (Philips Achieva®) on their first and sixth month after stroke. Image processing based on realignment, segmentation, normalization (MNI-152) and smoothing used UF2C (User Friendly Functional Connectivity) toolbox. Paired t-test performed in SPM12 for MATLAB followed the parameters of *p*<0.001 uncorrected and cluster size with at least 50 voxels.

**Results:** We found an increased connectivity of DMN functional connectivity in posterior cingulate cortex (PCC) (table 1 and figure 1) in first month post stroke, when compared to six months after ictus.

**Table 1** Coordinates and cluster size of increased DMN functional connectivity on the first month after stroke in comparison with the sixth month (*p*<0.001, uncorrected)

|  |  |  |
| --- | --- | --- |
|  |  | **Stereotaxic coordinates (mm)** |
| **Cluster size** | **Region** | **X** | **Y** | **Z** | **T value** |  |
| 212 | Posterior Cingulate Cortex | -2 | -48 | 24 | 4.35 |  |

**Figure 1** Paired t-test results showed increased DMN functional connectivity in the sub acute stage, which was restored after six months (*p*<0.001, uncorrected)



**Discussion:** Increased DMN functional connectivity on the first month after ictus suggests failure to suppress activity in some of the core region of DMN, which is associated with self-referential processing [3]. However, six months after stroke, there is a functional improvement in this network, suggesting that the first six months are a critical period for neural reorganization[4].

**Conclusion:** Abnormal DMN was found following stroke in sub acute stage. There was a natural recovery of this network six months post stroke. Our findings are exploratory, and further research may facilitate the understanding of potential mechanisms underlying self-referential processing in stroke recovery.

**References:** [1] Raichle ME et al., PNAS 98: 676-682, 2001; [2] Greicius et al., PNAS 101: 4637-4642, 2004 [3] Grady CL et al., Cogn Neurosci 18: 227-241, 2006 [4] Park et al., Eur J Neurosci 40: 2715-2722.