

## Alterations in functional connectivity in default network in adolescent internet gaming addiction

yan zhou<sup>1</sup>, Yawen Sun<sup>1</sup>, Weina Ding<sup>1</sup>, Yong Zhang<sup>2</sup>, and Jianrong Xu<sup>1</sup>

<sup>1</sup>Radiology, Ren Ji Hospital, Jiao Tong University School of Medicine, shanghai, shanghai, China, <sup>2</sup>GE healthcare, shanghai, shanghai, China

### Target audience:

Researchers and psychiatrists interested in Internet addiction disorder and behavioral addiction.

### Purpose:

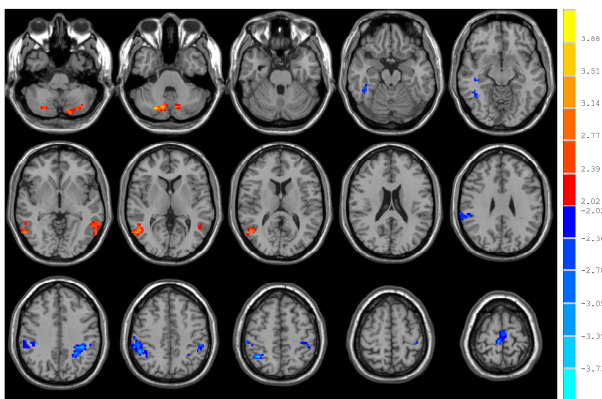
The excessive use of the Internet has been linked to a variety of negative psychosocial consequences including mental disorders such as somatization, obsessive-compulsive and other anxiety disorders [1]. This study used resting-state functional magnetic resonance imaging (fMRI) to investigate whether functional connectivity (FC) is altered in adolescents with Internet gaming addiction (IGD).

### Methods:

Seventeen IGD adolescents and 24 control adolescents underwent a 7.3 minute resting fMRI scan. Posterior cingulate cortex (PCC) connectivity was determined from all the subjects by investigating synchronic low-frequency fMRI signal fluctuations using a temporal correlation method. To assess the relationship between IGD symptom severity and PCC connectivity, the contrast image representing areas correlated with the PCC was correlated with the 17 IGD subjects' Chen Internet Addiction Scale (CIAS) scores [2].

### Results:

There were no significant differences in the distributions of age, gender and years of education between the two groups. Compared with the control group, IGD patients exhibited increased FC in bilateral cerebellum posterior lobe and bilateral middle temporal gyrus. And decreased FC in right inferior temporal gyrus, right inferior parietal lobule, left inferior parietal lobule and right medial frontal gyrus. Connectivity with the PCC was positive correlated with CIAS scores in right middle temporal lobe and negative correlated with CIAS in left inferior parietal lobule. As for time for internet use per week, positive correlation was found in bilateral left middle temporal gyrus, negative correlation was found in bilateral inferior parietal lobule.



Significant between-group differences in functional connectivity of PCC. ( $p < 0.05$ , AlphaSim-corrected).

### Reference

- [1] Adalier, A. (2012) The relationship between Internet addiction and psychological symptoms. *Int. J. Glob. Educ.*, 1, 42–49.
- [2] Baillieux H, De Smet HJ, Dobbeleir A, Paquier PF, De Deyn PP, et al. (2010) Cognitive and affective disturbances following focal cerebellar damage in adults: a neuropsychological and SPECT study. *Cortex* 46: 869-879.
- [3] Grasby PM, Frith CD, Friston KJ, Bench C, Frackowiak RS, et al. (1993) Functional mapping of brain areas implicated in auditory-verbal memory function. *Brain* 116 ( Pt 1): 1-20.

**Discussion:** Posterior cerebellum is predominantly involved in cognitive regulation[2], signal processing, and storage relevant to auditory-verbal memory function[3]. The inferior parietal lobule of the left hemisphere lies at the junction of the auditory, visual, and somatosensory cortexes, with which it is massively connected. Middle temporal gyrus is thought responsible for auditory functions.

### Conclusion:

Our results suggested online game playing decreased the brain synchronization in sensory-motor coordination related brain regions. And increased the excitability in auditory related brain regions.