
THE INTERACTION OF FUNCTIONAL MRI CONNECTIVITY AND RESTING STATE EEG IN THE COURSE OF THE DAY

D. Keeser¹, V. Kirsch², J. Blautzik³, S. Karch⁴, M. Kupka³, B. Rauchmann³, M. Paolini³, B. Ertl-Wagner³, O. Pogarell⁴

¹Department of Psychiatry and Psychotherapy & Institute for Clinical Radiology, Ludwig-Maximilians-University, Munich, Germany ; ²Department of Neurology, Ludwig-Maximilians-University, Munich, Germany ; ³Institute for Clinical Radiology, Ludwig-Maximilians-University, Munich, Germany ; ⁴Department of Psychiatry and Psychotherapy, Ludwig-Maximilians-University, Munich, Germany

Background

Over the last decade, the study of functional connectivity networks has dramatically expanded across diverse research fields as functional MRI connectivity (fcMRI) or EEG connectivity. The aim of this study was to evaluate functional connectivity in the course of the day using two different imaging methods.

Methods

27 healthy subjects (male and female students in the age-range between 18-30 years) underwent 6 repeated fcMRI measurements over 12 hours in a 3T Philips Achieva MR scanner. The subjects were instructed to close their eyes and not to think on anything in particular. Resting State EEG was recorded outside the MR scanner with eyes closed and eyes open using a Brain MR Amplifier with 32 channels. Sleep deprivation was kept constant across subjects and the subjects were restricted to low-calorie food. EEG was analysed for coherence and EEG-phase between all EEG channels in sensor and source space.

Results

The time course of 20 functional MRI networks were extracted and previous described functional networks were found. Eyes closed and eyes open EEG showed similar and distinct spatial correspondence. We found a good overlap for the Default Mode Network and the Frontal-parietal network. Day of time influenced the EEG measurements partly.

Conclusion

The findings of fcMRI and EEG connectivity are unique with high spatial resolution for fcMRI and high temporal resolution for EEG. Both measurements methods contribute further to our understanding of complex functional connectivity networks.