Klin Neurophysiol 2013; 44 - P142
DOI: 10.1055/s-0033-1337283

Changes of resting-state EEG and functional connectivity in the sensor and source space of patients with major depression

D Keeser [1, 2], S Karch [1], JR Davis [3], T Surmeli [4], H Engelbregt [1, 5], A Länger [1], A Chrobok [1], F Loy [1], B Minton [6], RW Thatcher [7], O Pogarell [1]

- [1]Ludwig-Maximilian University, Department of Psychiatry and Psychotherapy, Munich, Germany, Deutschland
- [2]Ludwig-Maximilian University Munich, Institute for Clinical Radiology, Munich, Germany, Deutschland
- [3]McMaster University, Department of Psychiatry and Behavioral Neurosciences, Ontario, Canada, Kanada
- [4]Living Mental Health Center for Research and Education, Istanbul, Turkey, Tuerkei
- [5]Hersencentrum, Amsterdam, The Netherlands, Niederlande
- [6]301 Deinhard Lane, McCall, United States of America, Vereinigte Staaten Von Amerika
- [7]NeuroImaging Laboratory, St. Petersburg, Florida, Vereinigte Staaten Von Amerika

- Congress Abstract

Background:

Dyfunctions of prefrontal neuronal circuits contribute to the pathophysiology of depression. Previous studies showed increased functional MRI (Greicius et al. 2007) and EEG connectivity in patients with depression (Fingelkurts et al. 2007; Leuchter et al. 2012). In this study we investigated a large sample of patients with major depression (n = 228) and gender- and age-matched healthy subjects (n = 215) using resting state EEG and eLORETA in terms of spectrotemporal dynamics and brain connectivity.

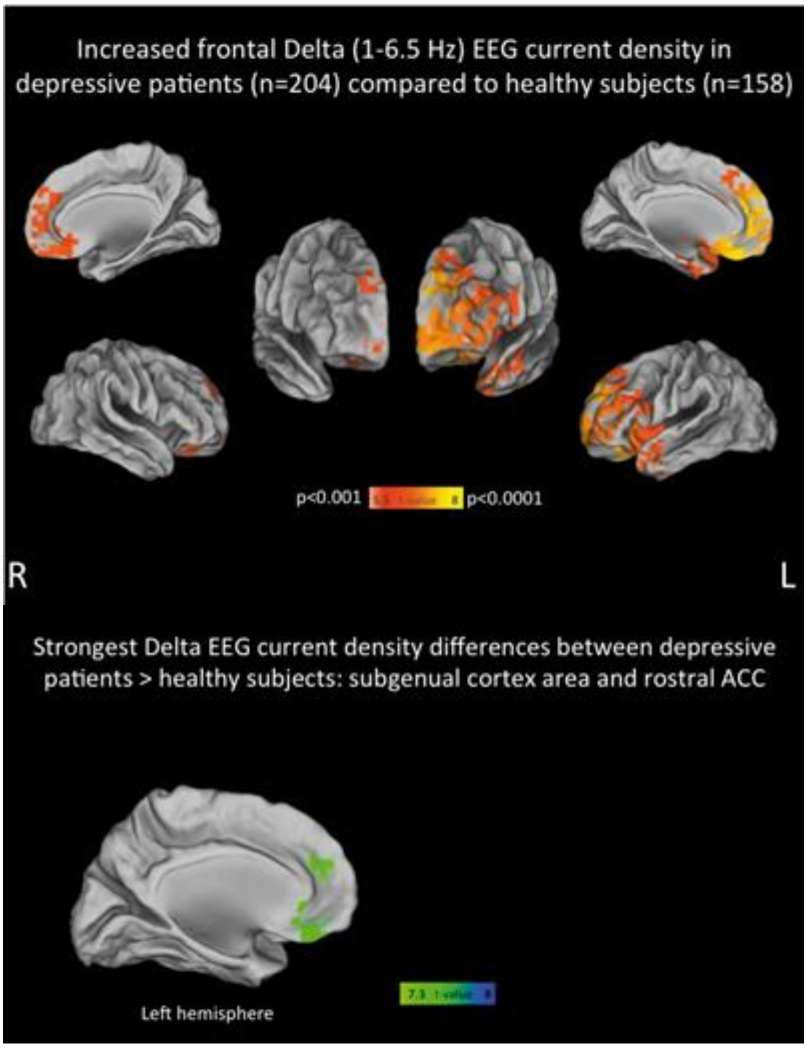
Methods:

Spectrotemporal dynamics during resting state with closed eyes were analyzed in sensor and source space to examine functional EEG connectivity alterations between groups. Quantitative measures of delta (δ), theta (θ), alpha (α), beta (β) and gamma (γ) power (μV^2), hemispheric asymmetry, coherence, phase and eLORETA (current density, connectivity) analyses were calculated from artifact-free EEG recordings.

Results:

EEG δ power was increased in all brain regions in the group of patients with a focus in frontal regions. We also found increased frontal θ and α power. Further analyses revealed significant

hemispheric differences between the groups. There were increased δ, θ, α, and β asymmetries in the left hemisphere between fronto-frontal, -central, -parietal and -occipital regions. We also found increased coherence differences in the δ, θ and α bands for fronto-frontal, -central, -temporal, -occipital, parieto-temporal, and occipto-temporal electrodes for both hemispheres. Decreased coherence was found between fronto-temporal, left fronto-frontal, and centro-parietal electrodes. In addition there were changes in phase differences in the δ, θ, α-bands between patients and healthy subjects. Differences in source current density (eLORETA) were found for the δ, θ, α-band in the subgenual and the rostral anterior cingulate cortex with increased current density in the patients.



Conclusion:

The main finding of the present study was an increase in cortical slow-wave activity in sensor and source space in patients with depression revealing marked differences in prefrontal cortical networks. Functional δ, θ and α-connectivity (coherence and phase) were altered with a predominance in the left hemisphere. Dysfunctions of the anterior cingulate cortex, together with alterations in functional connectivity may contribute to the pathophysiology of major depression.