Brain arousal regulation in carriers of bipolar disorder risk alleles

Philippe Jawinski[1,2,3], Christian Sander[1,2,3], Nicole Mauche[1,2], Janek Spada[2,3], Jue Huang[2], Anna Schmidt[1,2], Madlen Häntzsch[1,4], Ralph Burkhardt[1,4], Markus Scholz[1,5], Ulrich Hegerl[1,2,3], Tilman Hensch[1,2]

[1] LIFE – Leipzig Research Center for Civilization Diseases, University of Leipzig, Germany

[2] Department of Psychiatry and Psychotherapy, University of Leipzig, Germany

[3] Depression Research Centre of the German Depression Foundation, Leipzig, Germany

[4] Institute of Laboratory Medicine, Clinical Chemistry and Molecular Diagnostics, University Hospital Leipzig, Germany

[5] Institute for Medical Informatics, Statistics and Epidemiology, University of Leipzig, Germany

Supplementary S1

Procedure

In advance, subjects were informed about the general aims of the study and gave written informed consent. EEG measures were performed at approximately 8:00 am, 10:30 am and 1:00 pm. First, participants were seated into a chair within a sound-attenuated booth and EEG electrodes were attached. Participants were then brought into reclined position, light was dimmed and standardized auditory instructions were given via speakers using Presentation software (Neurobehavioral Systems Inc., Albany, USA). After conducting a Berger Manoeuver for reasons of participant suitability verification, participants were required to count backwards by six starting at one hundred. Following this final cognitive activation, participants were asked to close their eyes, to relax and not to struggle against any upcoming feeling of drowsiness. Subsequently, the twenty-minute resting EEG recording was started. Afterwards, participants were given the ability to ask questions and received an expense allowance.

Physiological data collection

Electroencephalic activity was recorded by 31 electrodes according to the extended international 10-20 system, amplified using a QuickAmp amplifier (Brain Products GmbH, Gilching, Germany), referenced against common average, and sampled at 1000 Hz with a low-pass filter at 280 Hz. Impedances were kept below 10 kΩ. In addition, electrooculogram (EOG) was recorded by 2 electrodes above and beneath the right eye for vertical eye movements, and 2 electrodes lateral to the right and left eye for horizontal eye movements. Further, electrocardiogram (ECG) was recorded by 2 electrodes attached to the right and left forearm. EEG data processing was performed using Brain Vision Analyzer 2.0 (Brain Products GmbH, Gilching, Germany) and included filtering (70 Hz low-pass, 0.5 Hz high-pass, 50 Hz notch with 5 Hz range), manually identifying and removing cardiac and eye movement artefacts by extracting the respective independent components, and segmenting the twenty-minute EEG recordings into 1200 consecutive one-second intervals. Intervals with remaining muscle, eye and sweating artefacts were excluded. Occurring graph elements (K-complexes and sleep spindles) were manually marked.