

DESCRIPTION OF THE BRAIN FUNCTIONAL CONNECTIVITY ACROSS SLEEP STAGES USING A COHERENCE ANALYSIS

F. Jurysta¹, L. Van Wettere¹, J.-P. Lanquart¹, P. Linkowski¹, D. Marinazzo²

¹Department of Psychiatry, ULB-Erasme Academic Hospital, Brussels, ²Department of Data Analysis, Faculty of Psychology and Pedagogical Sciences, University of Gent, Gent, Belgium

Objectives: The statistical dependencies among even remote brain regions are reflected by the functional connectivity. We studied the functional brain network across sleep stages for each relevant sleep EEG frequency band.

Methods: Nine healthy young subjects without somatic, psychiatric and sleep disorders were recruited. Sleep stages were defined in accordance with the Rechtschaffen and Kales criteria. The first 20 epochs of each sleep stage (Wake, stages 1 to 4 and REM sleep) were used for analysis in regard of specific sleep EEG frequencies as delta, theta, alpha, sigma and beta. Coherence analysis was applied between each electrode and each other of the 19 EEG electrodes.

Results: Coherence analysis showed high values within the same hemisphere at wake and sleep stage 1. During stages 2, 3 and 4 and REM sleep, high correlations were extended to more regions, particularly for slow oscillations. In delta band, coherence values differed between right and left cerebral hemispheres during all sleep stages. In other frequency bands, no differences were observed between both sides. In the right hemisphere, coherence values changed across sleep stages in delta frequency but remained unchanged for other sleep EEG frequencies. In the left hemisphere, no changes in coherence were observed across sleep stages and each frequency except for sigma and beta.

Conclusions: Changes in coherence measurements showed different mapping in the three sleep main states (Wake, NREM and REM sleep) and for sleep EEG frequencies. Further analyses will investigate connectivity across sleep stages transitions and also, in psychiatric conditions.