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Cross Frequency Modulation and Cognitive Performance

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BACKGROUND: Cross-frequency modulation (**CfM**) supports the synchronization and the coordination of the high-frequency activity of large brain areas and it may represent a generalized mode of systems communication and integration (*Canolty and Knight, 2010*). CfM, therefore, it is likely to be a key element of the brain integration (*He et al, 2010*), featuring the learning process (*Tort et al, 2009*), the higher cognitive functions and the healthy thought process (*Allen et al, 2011*) as well as the emergence of consciousness (*Melloni et al, 2007, Tononi, 2010*).

AIM OF THE STUDY: The present study was focused on the relationship between CfM and cognitive performance compared withother classical neurophysiologic parameters.

METHODS: A cognitive task, similar to the WCST, was developed. 71 Channels EEG was recorded by means of EGI Geodesic equipment set to a sample ratio of 250 Hz.. Data are processed using the EEGLAB Matlab Package (*Delorme and Makeig, 2004*). Independent Component Analysis, Cluster Analysis with dipole projection were performed. Cross Frequency Modulation (CfM) indexes between EEG low frequency phase and high frequency amplitude have been computed also.

RESULTS: Present preliminary data are performed on a sample of healthy subjects, aged between 20 and 45 years old. Avarage response time was about 2 sec, and an anticipation of the P_3 pick was observed the case of a persistent correct answers. A greater CfM was associated to best performances, in some clusters only.

CONCLUSIONS: This preliminary results support the hypothesis that CfM may have a role in brain network integration.

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