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Presentation Abstract

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Presentation Title: [Reproducibility of corticomuscular coherence: A comparison between static and perturbed tasks.](#)

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**Abstract:** Corticomuscular coherence (CMC) is used to quantify functional corticomuscular coupling during a static motor task. Although the reproducibility of CMC characteristics such as peak strength and frequency within one session is good, reproducibility of CMC between sessions is limited (Pohja et al. 2005, NeuroImage). Reproducible CMC characteristics are required in order to assess changes in corticomuscular coupling in a longitudinal study design, for example during rehabilitation. We recently demonstrated that the presence of CMC in the population in substantially increased when position perturbations are applied during an isotonic force task. Here, we assessed the reproducibility of perturbed CMC compared to unperturbed CMC. Subjects (n=10) performed isotonic wrist flexion contractions against the handle of a wrist manipulator (WM) while EEG (64 channels) and EMG of the m.flexor carpi radialis were recorded in two experimental sessions separated by at least one week. The handle of the WM either kept a neutral angle (baseline task) or imposed a small angle perturbation (perturbed task). In the baseline task, 3 subjects had significant CMC in both the first and the second sessions. In the other 7 subjects no significant CMC was found in both sessions. Between sessions, significant CMC was always found in overlapping frequency bands and generally on overlapping electrodes. In the subjects with CMC a significant cross correlation coefficient between the spectra in the two sessions was present (mean 0.57; 0.3 - 0.79). In the perturbed task CMC was present in 8 subjects in both sessions and absent in 1 subject in the two sessions. One subject had CMC only in the second session. For the subjects with CMC, the correlation coefficient between the spectra of the two sessions was significantly larger than zero with a mean of 0.68 (range 0.38 - 0.88). The presence and absence of CMC within subjects could be reproduced very well between the sessions. This was also demonstrated by the significant correlation between the spectra in the two sessions ; the

degree of correlation was variable over subjects both in the baseline and the perturbed task. The reproducibility characteristics of CMC in a perturbed task are comparable or slightly better with respect to an unperturbed task. However, comparison is limited by the small number of subjects with CMC in the baseline task. Perturbed CMC is present in more subjects, which is crucial when developing methods to track corticomuscular coupling over multiple sessions, for example during rehabilitation.

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Keyword(s): COHERENCE

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MOTOR CONTROL

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