

Supplementary Information of “Inhibitory interneuron circuits at cortical and spinal levels are associated with individual differences in corticomuscular coherence during isometric voluntary contraction”

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Appendix A. coherence function

Correlations between two signals ($\overline{C_{xy}(f)}$) were determined by coherence using following equation:

$$|C_{xy}(f)| = \frac{|\overline{P_{xy}(f)}|^2}{\overline{P_{xx}(f)} \cdot \overline{P_{yy}(f)}} \quad (1)$$

Where $|\overline{P_{xy}(f)}|$ denotes the averaged cross-spectral density function for the signal x that is the EEG and y that is the rectified EMG throughout the segments at a given frequency f . $\overline{P_{xx}(f)}$ and $\overline{P_{yy}(f)}$ denote the averaged power-spectral density (PSD) functions for signal x and y throughout the segments at the same frequency. The coherence function evaluates a linear correlation on a scale of 0 to 1, where 1 represents a perfect linear correlation.

Appendix B. Significant level for CMC

To eliminate the false-positive, a Bonferroni correction across frequency bins between 3 and 50 Hz (including α , β , and γ -bands) was applied to the equation defining the significant level coherence (SL). Thus, when the confidence limit is $\alpha\%$, the SL is defined as follows:

$$SL(\alpha) = 1 - \left[\frac{1}{N} \cdot \left(1 - \frac{\alpha}{100} \right) \right]^{1/(L-1)} \quad (2)$$

Where N is the number of frequency bins, and L is the number of epochs. In EXP_{ICL} , as an N of 80, L of 245, and α of 95 were chosen, the SL was determined to be 0.030. In EXP_{RL} , as an N of 40, L of 70, and α of 95 were chosen, the SL was determined to be 0.091.