**O.15.4: Movement specific beta-band modulation during movement cancellation in EMG**

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Cancellation of volitional movement has been shown to synchronise neuronal firing in the sensorimotor cortex, manifesting as an increase in spectral power within the beta band (15—30 Hz) of local field potentials [1]. Despite having no bearing on motor generation, this synchronisation is also reflected in the spectral content of EMG [2]. Whether this phenomenon is functionally relevant for motor control is not yet understood. To further characterise the projection of cortical dynamics to peripheral muscles we aimed to determine whether movement cancellation elicited spectral modulation in all active muscles or whether modulation was movement specific. In nine able-bodied participants, muscle activity was recorded from bilateral wrist extensors using EMG. Participants performed bimanual isometric wrist extensions at 10% maximum voluntary contraction. At the beginning of each trial participants were instructed to anticipate performing either a left or right ballistic wrist extension contingent on the appearance of an imperative go cue halfway through the trial. In 50% of trials the go cue did not appear at the expected moment. Participants maintained a steady contraction until the end of the trial in the absence of a go cue. There were 100 repetitions for each type of ballistic extension. EMG data from trials where no go cue was delivered were isolated for analysis. Trials that showed excessive deviation from the target force were excluded. EMG was high pass filtered at 10 Hz, rectified and decomposed into a time-frequency representation with Morlet wavelets (–2 to 2 s, relative to pre-stimulus interval; 10 to 60 Hz). The spectral power from the beta band range (15—30 Hz) was taken from 0 – 1 s relative to stimulus onset and normalised with respect to the mean of the pre-stimulus interval (–1 to 0 s). Laterality of beta band modulation was considered during movement cancellation for the two cancellation conditions. A two-way ANOVA was performed to compare the effect movement anticipation and muscle location had on beta-band power. Time-frequency decomposition showed that beta-band power was elevated during the no-go condition with respect to the pre-stimulus interval. Although an elevation in beta-band power was noted bilaterally, there was a lateralisation in power towards the side relevant to the movement task. During left wrist motor cancellation, the left wrist showed a 42% increase in beta-band power and the right wrist showed a 20% increase, with respect to the pre-stimulus interval. Further, right wrist movement cancellation resulted in the inverse: A 28% increase in the left side and a 43% on the right side. The results of a two-way ANOVA demonstrated a significant interaction effect between movement cancellation type and recording location ($p=0.028$), revealing a lateralisation of the effect. This study demonstrates that beta-band modulation following movement cancellation does not extend to peripheral muscles in a non-guided way but is specific in its projection to muscles. Future work will explore whether this specificity is directed from the cortical or spinal level. References[1] Wessel (2017)[2] Zicher et al. (2022)