Title of the abstract *(max 300 characters)**

Corticospinal excitability as a function of time in touch and pain: preliminary data

Introduction *(max 800 characters)**

The attenuation of motor functioning by sensory afferent signalling is well documented. For example, TMS-induced motor-evoked potential can be inhibited by the delivery of a preceding single cutaneous stimulus (Chen et al., 1999; Tamburin et al., 2011). Characteristics of inhibition vary as a function of the temporal delay between the cutaneous afferent delivery and cortical excitation (i.e. short- and long-latency afferent inhibition, respectively). In our studies, we investigated the effect of afferent inhibition (AI) as a function of tactile stimulus duration (0.2 ms vs 0.4 ms). Furthermore, we wish to investigate the nature of AI during painful sensory processing, given the suggested disruption of sensorimotor functioning in acute and chronic pain states (e.g. Svensson et al., 2003).

Methods - *Please describe the population, the methodologies and the statistical approach- (max 800 characters)*

Ten healthy participants (6 females; $Mean_{Age} \pm SD_{Age} = 21.7 \pm 7.9$) participated in two experimental sessions. In session 1, a 0.4 ms (pulse frequency = 2500 Hz) electrotactile stimulus (Mean ± SD = 2.37 ± 0.62 mA) at 2.5 times the tactile detection threshold was delivered to the left index finger followed by delivery of spTMS over the right M1-FDI motor hotspot (110% of the resting motor threshold). Temporal delay between the tactile stimulation and TMS pulse (ISI) varied across trials (15, 25, 35, 45, 60 and 160 ms). In session 2, the same paradigm was repeated with a 0.2 ms (5000 Hz) electrotactile stimulus (1.49 ± 0.36 mA). AI was measured as the ratio between MEP amplitude recorded in the left fist dorsal interosseus (FDI) muscle between afferent stimulation and no afferent stimulation (TMS only).

Results - *A formal concise description of the results (max 800 characters)**

Corticospinal excitability varied as a function of temporal delay (TD) between tactile stimulation and TMS pulse. In both tactile conditions (0.4 and 0.2 ms), a significant reduction in MEP amplitude was found at both 25 and 35 ms TD ($p<.05$). No attenuation of corticospinal excitability was found at 45 or 60 ms TD ($p>0.5$), however, we found long-latency reduction of corticospinal excitability at 160 ms TD ($P<.001$). Furthermore, we note a significant interaction effect on MEP ratios between tactile conditions and TD ($p=.03$).

Discussion *(max 800 characters)*

Our findings confirm and extend the current literature on sensorimotor integration, demonstrating short and long-latency afferent inhibition on corticospinal excitability by afferent cutaneous stimulation. Moreover, the inhibitory effect differs as a function of tactile afferent properties such as duration. We propose a follow-up investigation to understand the influence of varying somatosensory conditions on corticospinal excitability. Notably, we plan to investigate these effects in the context of induced pain to understand the influence of pain on sensorimotor interactions.

References ***(max 3 references)***

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Keywords ***(max 3)****

Sensorimotor-interaction, touch, pain