To investigate whether a temporal delay introduced on a paired stimuli applied in the medial and lateral side of the sole of the foot, modulate the size of the NWR.

Spatial summation has previously been observed in the NWR, although when stimulating the medial and lateral side of the sole of the foot, the magnitude of the NWR was inhibited [2]. A spinal inhibitory mechanism seems to play a major functional role in the defensive strategy of the NWR [2].

Temporal features of this spinal mechanism remain unclear and are important to elucidate nociceptive processing at spinal level.

**Aim**

To investigate whether a temporal delay introduced on a paired stimuli applied in the medial and lateral side of the sole of the foot, modulate the size of the NWR.

**METHODS**

**Subjects:** Fifteen healthy participants were included in the study.

**Stimulation:**
- Two stimulating sites: Arch (A) and Lateral (L) side of the sole of the foot.
- Stimulus delivered as single (in either site), simultaneous (both sites), and sequentially (in either site and as a combination of both).
- Sequential stimulation with different inter-stimulus intervals (ISI: 50, 100, 150, 200 and 500 ms) (Fig 1).

**NWR quantification:** EMG in Tibialis Anterior (TA) and Biceps Femoris (BF). NWR quantified by the root mean square (rms) value in the reflex window (80-150ms post NWR window).

**Data and statistical analyses**
- Quantified NWR due to sequential stimulation compared to simultaneous stimulation in both TA and BF muscle (Wilcoxon signed rank test).
- NWR due to different ISIs was compared (RM-ANOVA) Planned comparison between two extreme conditions with Bonferroni correction.
- Pain intensity ratings due to varying ISIs was compared (RM-ANOVA).

**RESULTS**

- Simultaneous stimulation elicited larger NWR than single stimulus in both A or L.
- With sequential stimulation, a main effect of the ISD was found regardless of stimulus site and recorded muscle (RM-ANOVA, p<0.05).
- For TA muscle, larger NWR with larger ISI (Fig 2. *p<0.05).
- For BF muscle, larger NWR with shorter ISI (Fig 2. **p<0.05).
- Perceived intensities were not affected by different ISI.

**CONCLUSIONS**

- The inhibition observed in a previous study when the same two sites (A and L) were simultaneously stimulated (NWR recorded in TA), is reduced when a larger ISI is introduced, suggesting a functional principle underlying the tempo-spatial integration.
- Larger ISI produced significantly larger motor responses in TA, while the opposite occurred in BF. This differential modulation between proximal vs distal muscle suggests the presence of spinal circuits controlling the optimal behavioral response to the specific tempo-spatial characteristics of a dangerous stimulus.
- No effect of ISI on NRS.
- Larger NWR with simultaneous stimulation (vs single) indicate spinal summation at spatio-temporal level.

**REFERENCES**