SAPIENZA
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Looking at old waves with new eyes:

The N13 spinal component of somatosensory evoked potentials is modulated by heterotopic noxious conditioning stimulation suggesting an involvement of spinal wide dynamic range neurons

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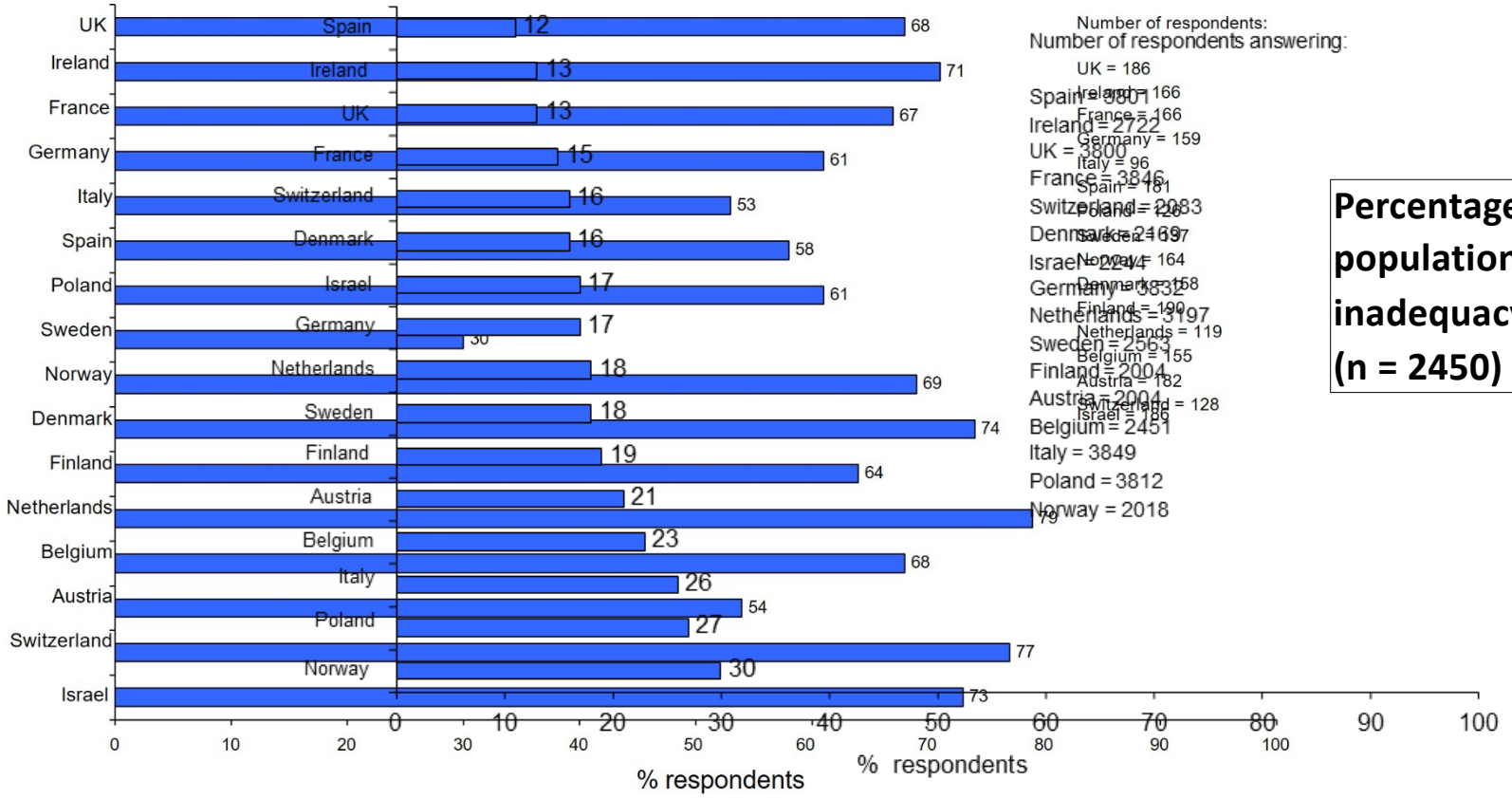
Background

- Chronic pain is one of the leading causes of human suffering and a major social burden (Rice 2016)
- Currently available pharmacological therapies provide inadequate relief for many patients with chronic pain
- Low clinical success of drugs for chronic pain



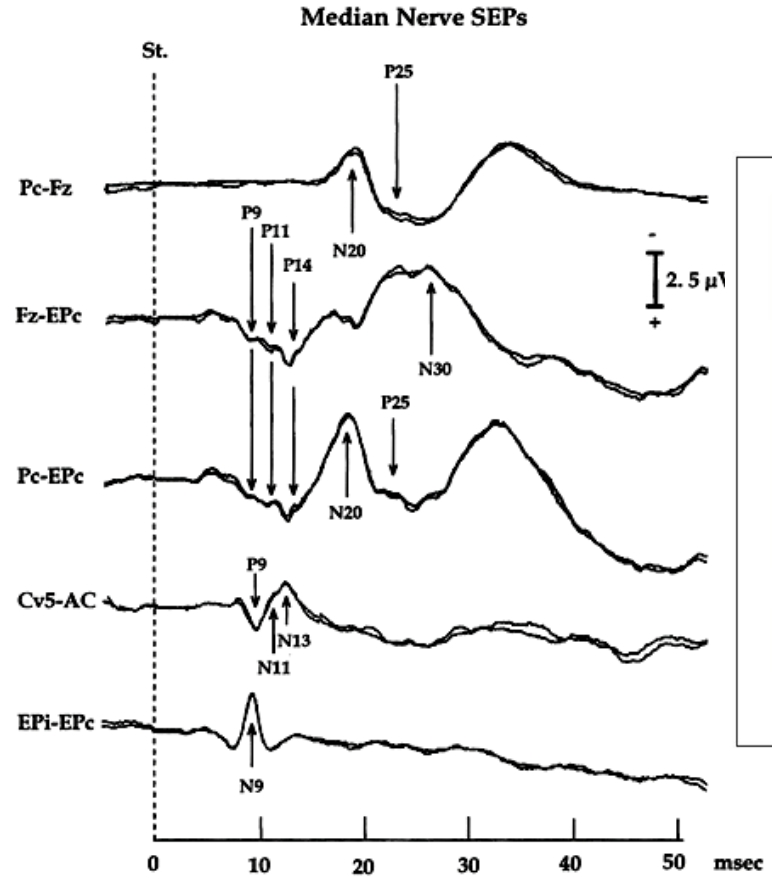
Percentage of total population reporting inadequacy (n = 2450) = 64%

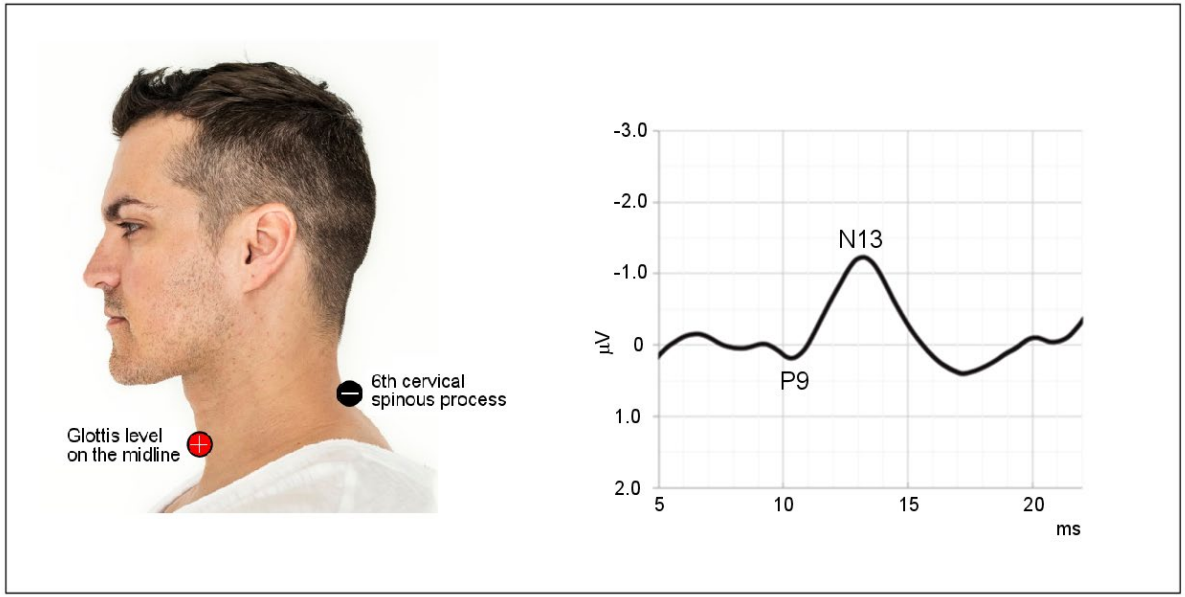
Breivik et al. EJP 2006

Background

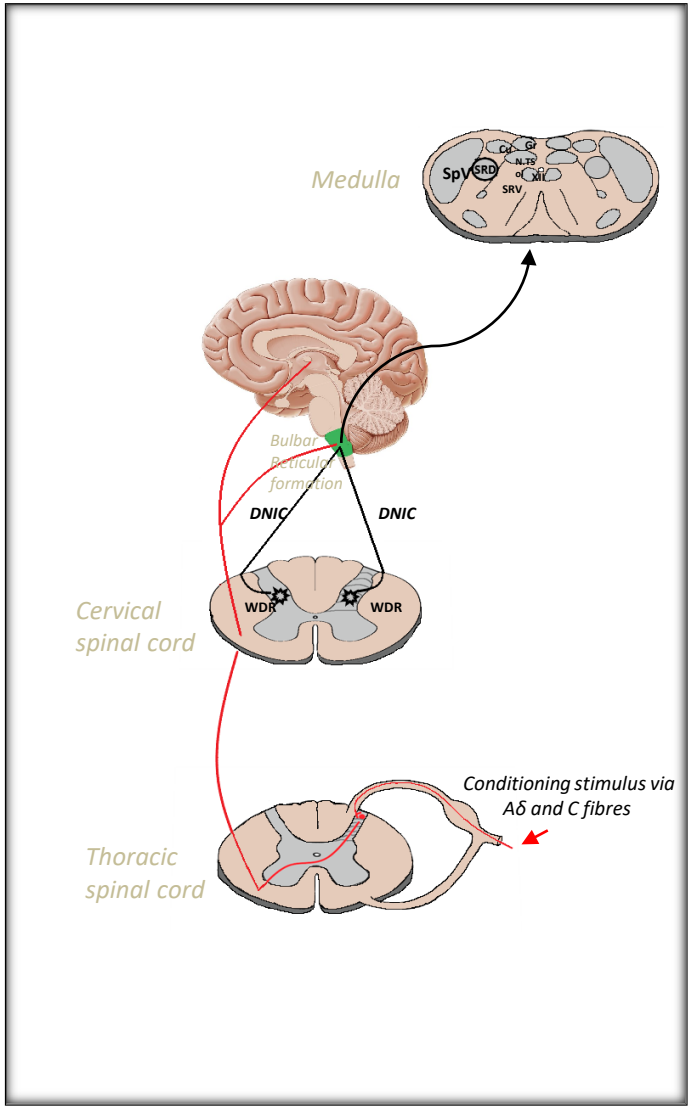
- The neuronal generator of the N13 spinal component of Somatosensory Evoked Potentials is not clearly understood

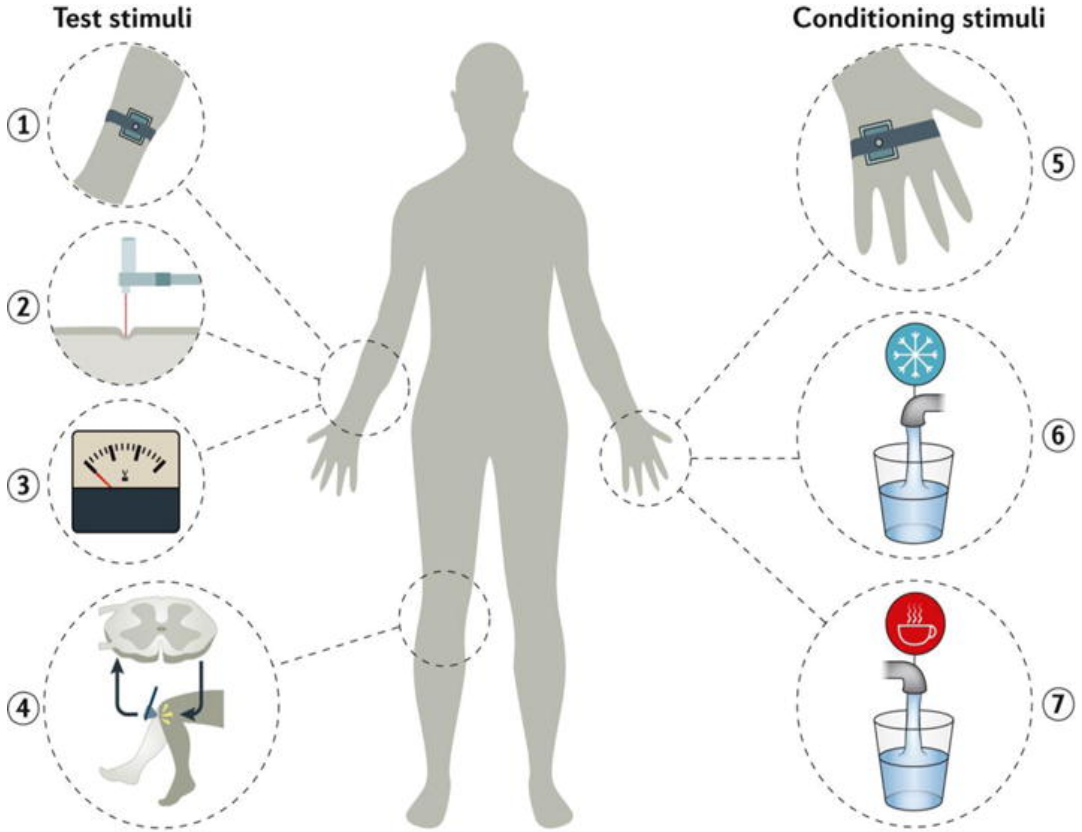
- N13 SEP may reflect the segmental postsynaptic response of wide dynamic range (WDR) neurons in laminae IV-V of the dorsal horn





Conditioned Pain Modulation





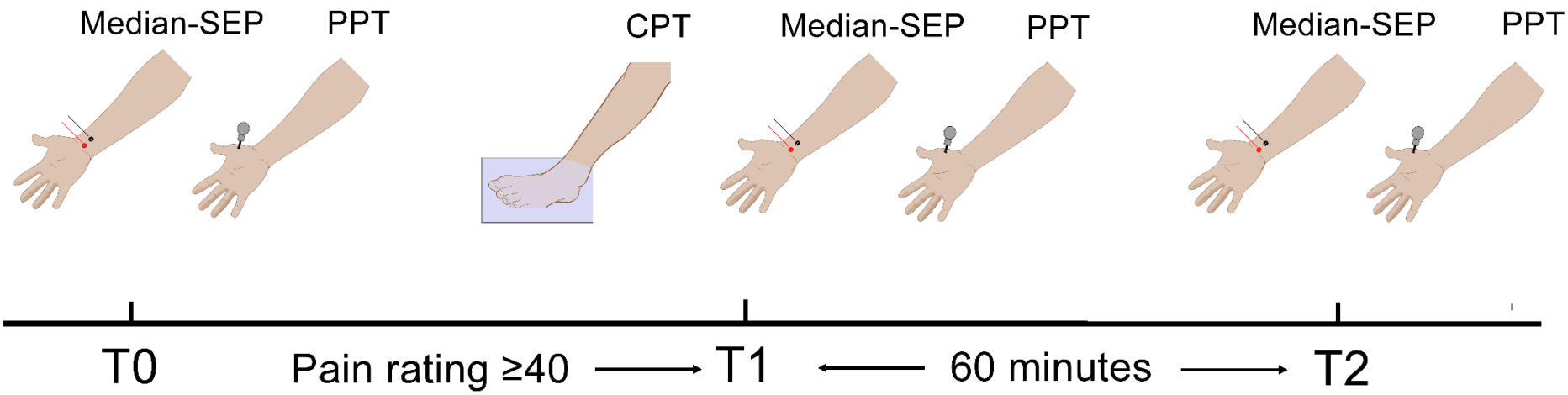
Leone and Truini, JCNP 2019

Colloca et al. Nat Rew 2017

Conditioned Pain Modulation

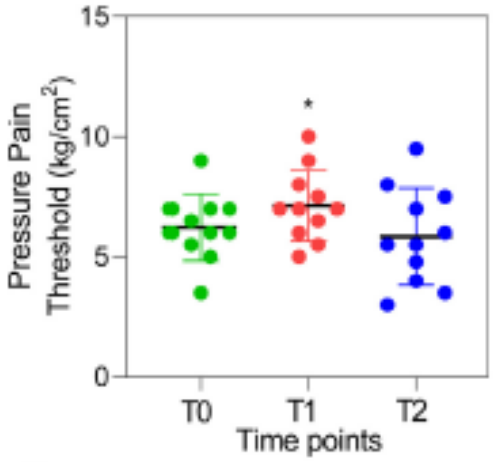
- Heterotopic noxious conditioning stimulation activates the diffuse noxious inhibitory control that inhibits WDR neurons
- N13 SEP sensitivity to heterotopic noxious conditioning stimulation may support the hypothesis that this spinal SEP component is mediated by WDR neurons

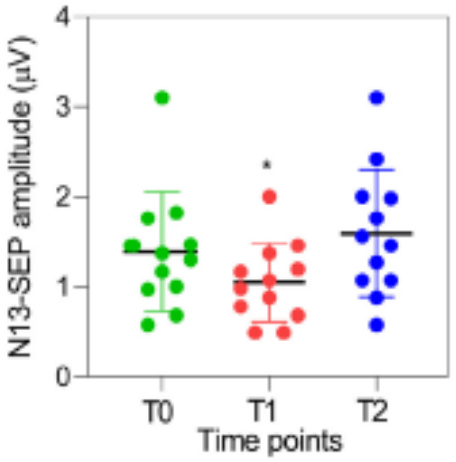
Methods

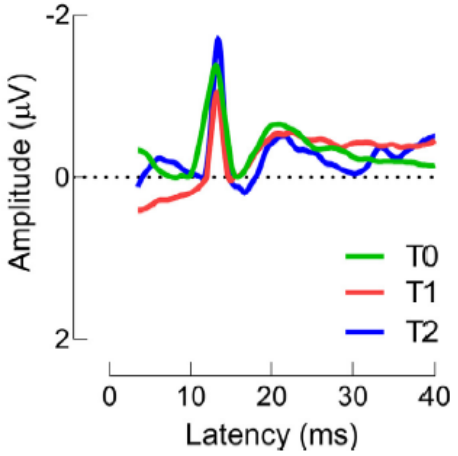


- 12 healthy subjects (mean age 26.7 yea
- Median nerve SEP and psychophysical r
  before (T0), during (T1), and 60 min aft
- Cold pressor test consisted of immersin
  (around 6-7 °C)

Results







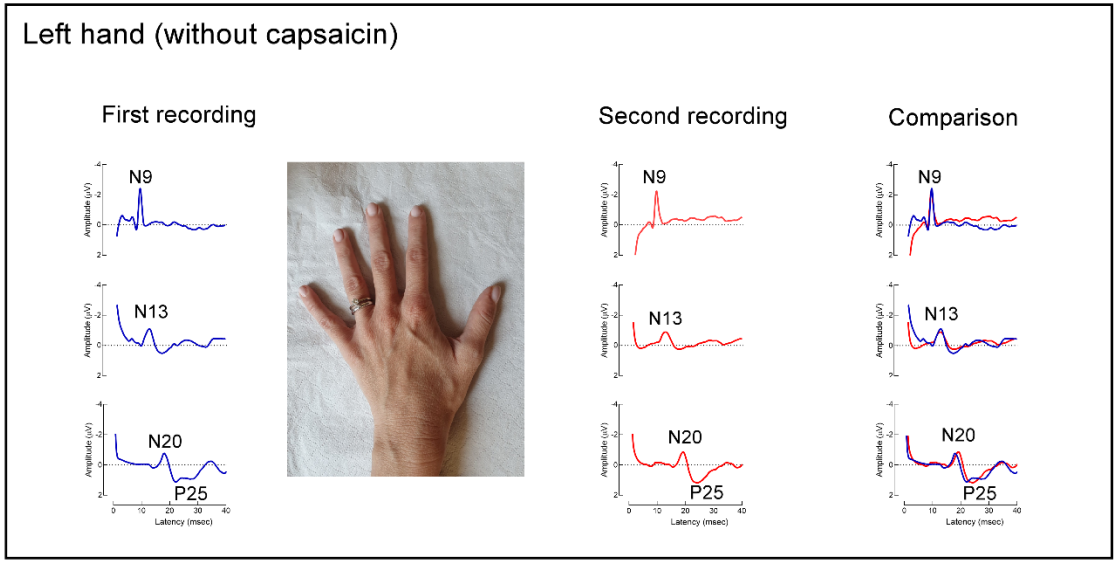
- At T1, pressure pain threshold was significantly higher (by 15%) and N13 SEP amplitude lower (by 25%) than at T0 ($p = 0.04$)
- At T2, pressure pain threshold and N13 SEP amplitude did not significantly differ to those at T0
- N13 latency and the other SEPs variables (N9, N20, P25) did not change across the three time points

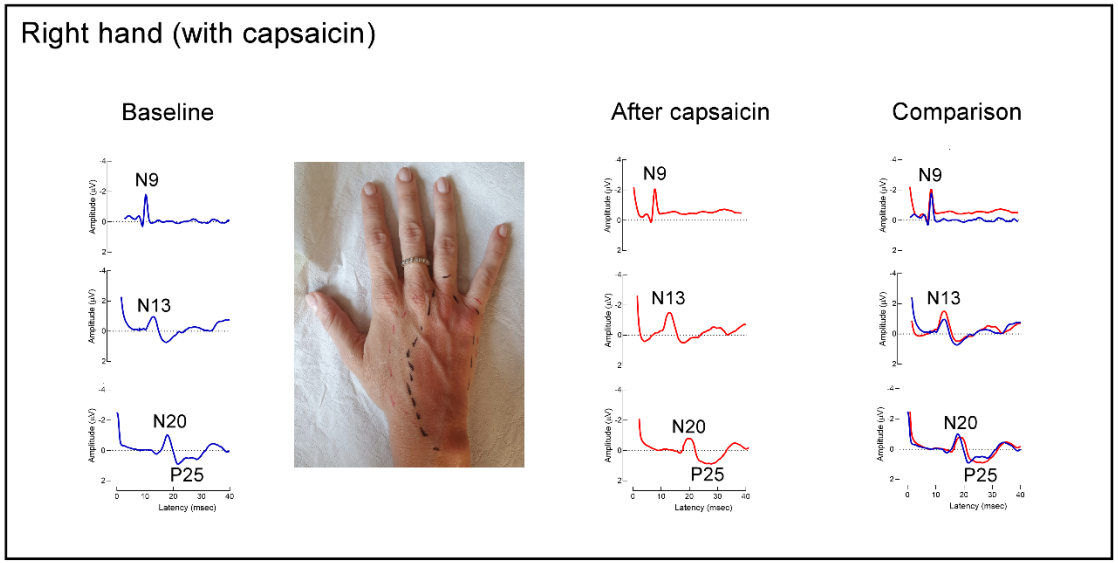
Discussion

- Heterotopic conditioning noxious stimulation, inhibiting the WDR neurons, reduced the N13 SEP amplitude

- Our data showing that N13 SEP reflects the excitability of WDR neurons in the dorsal horn may indirectly support the use of N13 SEP in the assessment of dorsal horn excitability during central sensitization

N13 modulation in an experimental model of central sensitization





Di Lionardo A. et al 2021

Discussion

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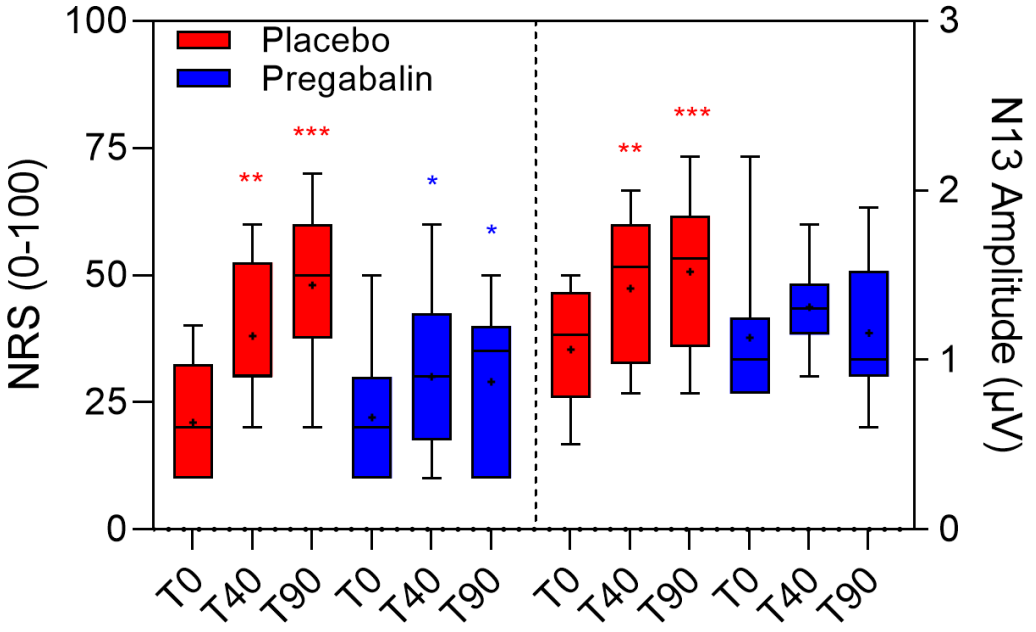
- Our data showing that N13 SEP reflects the excitability of WDR neurons in the dorsal horn may indirectly support the use of N13 SEP in the assessment of dorsal horn excitability during central sensitization

- The use of N13 SEP in preliminary pharmacological trials might facilitate the selection of the most promising drug candidates for chronic pain

N13 modulation in an experimental model of central sensitization



- Capsaicin application specifically modulates N13 SEP
- This modulation is prevented by Pregabalin
- N13 SEP may reflect changes in dorsal horn excitability and represent a biomarker of central sensitization

Di Lionardo A. et al 2021

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ORIGINAL ARTICLE

The N13 spinal component of somatosensory evoked potentials is modulated by heterotopic noxious conditioning stimulation suggesting an involvement of spinal wide dynamic range neurons

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Thank you