

# Testing order does not influence assessment of electrocutaneous pain threshold or nociceptive flexion reflex (NFR) threshold

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#### Introduction

Electrocutaneous pain threshold and nociceptive flexion reflex (NFR) threshold (a physiological measure of spinal nociception) are often measured together to assess pain sensitivity and spinal nociceptive sensitivity, respectively. One concern associated with measuring reactions to multiple noxious procedures in a single testing session is whether testing order influences their measurement. Given that the assessment of NFR does not depend on subjective responses to the stimulus, testing NFR first could help minimize subjective reactivity to future noxious stimuli and thus influence assessment of pain threshold. By contrast, testing pain threshold first could influence NFR threshold if the reflex habituates during pain threshold testing. While counterbalancing is typically employed to deal with order effects, this may not overcome confounding, especially when within-subject changes are being studied.

## Objective

To determine whether testing order influences the assessment of electrocutaneous pain threshold or nociceptive flexion reflex (NFR) threshold.

#### **Participants**

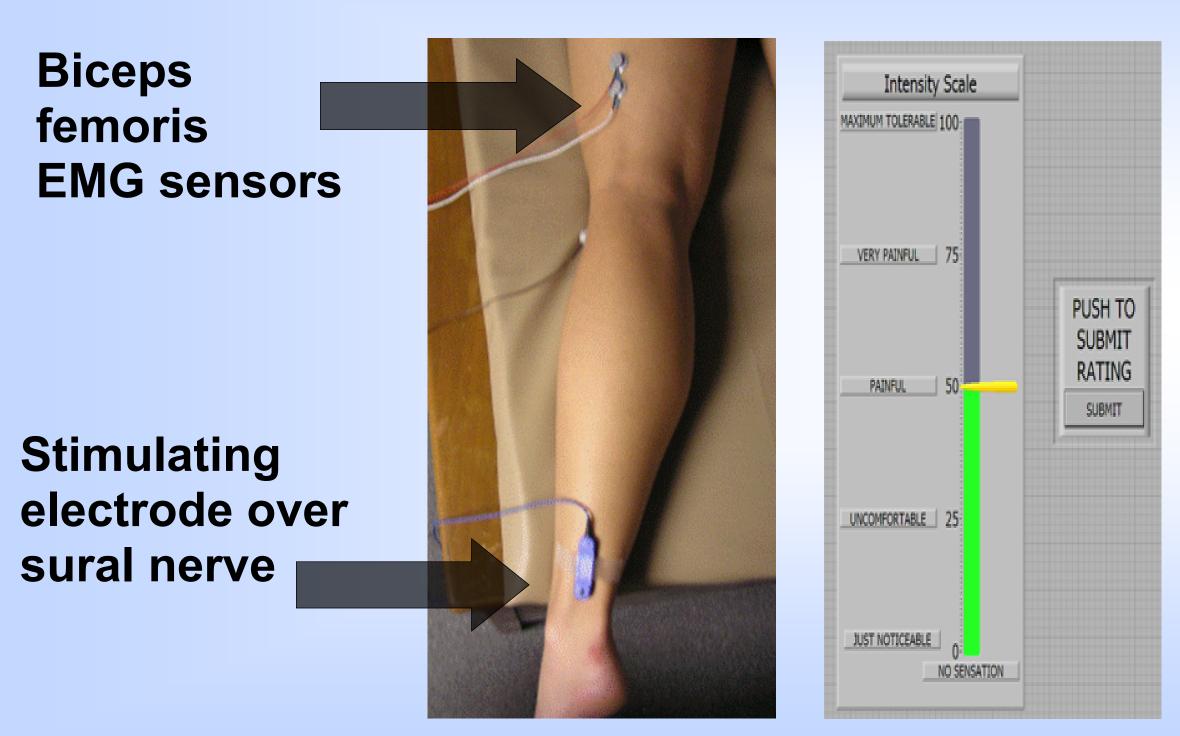
#### •Healthy Participants: *N* = 53

- Characteristics: Female (62%, N = 33), White non-Hispanic (93%, N = 49), and average age (21 years, SD = 2.9)
- Exclusion Criteria:
  - <18 years of age
  - Current acute illness
  - Cardiovascular, neurological, and/or circulatory problems
  - Chronic pain condition (e.g., back pain)
  - Recent use of analgesic medication
  - Current use of anxiolytic and/or hypertensive medication
  - Recent psychological trauma
  - •BMI >35

## **Experimental Procedure**

- Overview, informed consent, & eligibility determination (health status screening)
- Electrode application
- Counterbalanced procedure: participants were randomly assigned to a testing order: some participants underwent nociceptive flexion reflex (NFR) threshold testing first, while others underwent pain threshold testing first
- Using an ascending-descending staircase procedure, noxious electrocutaneous stimuli were
  delivered to the sural nerve to determine the level of stimulation that reliably elicited pain and NFR

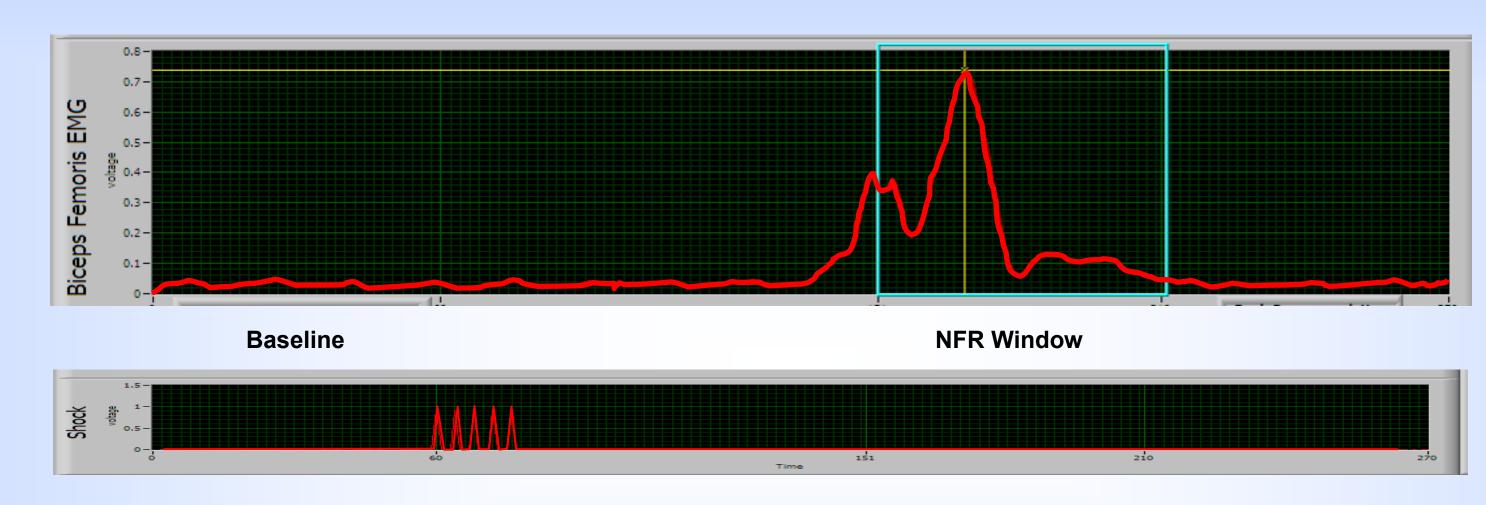
## Pain Sensitivity: Electrocutaneous Pain Threshold



Numerical Rating Scale (NRS): Pain ratings made following each stimulation

Electrocutaneous Pain Threshold: Three ascending-descending staircases of electric stimuli were delivered, starting at 0 mA and increasing in 4 mA steps until pain threshold was reached. Pain Threshold = average intensity (mA) of the 4 stimuli immediately above and immediately below a rating of 50 on the last 2 ascending and descending staircases

## Nociceptive Flexion Reflex (NFR) Threshold Assessment

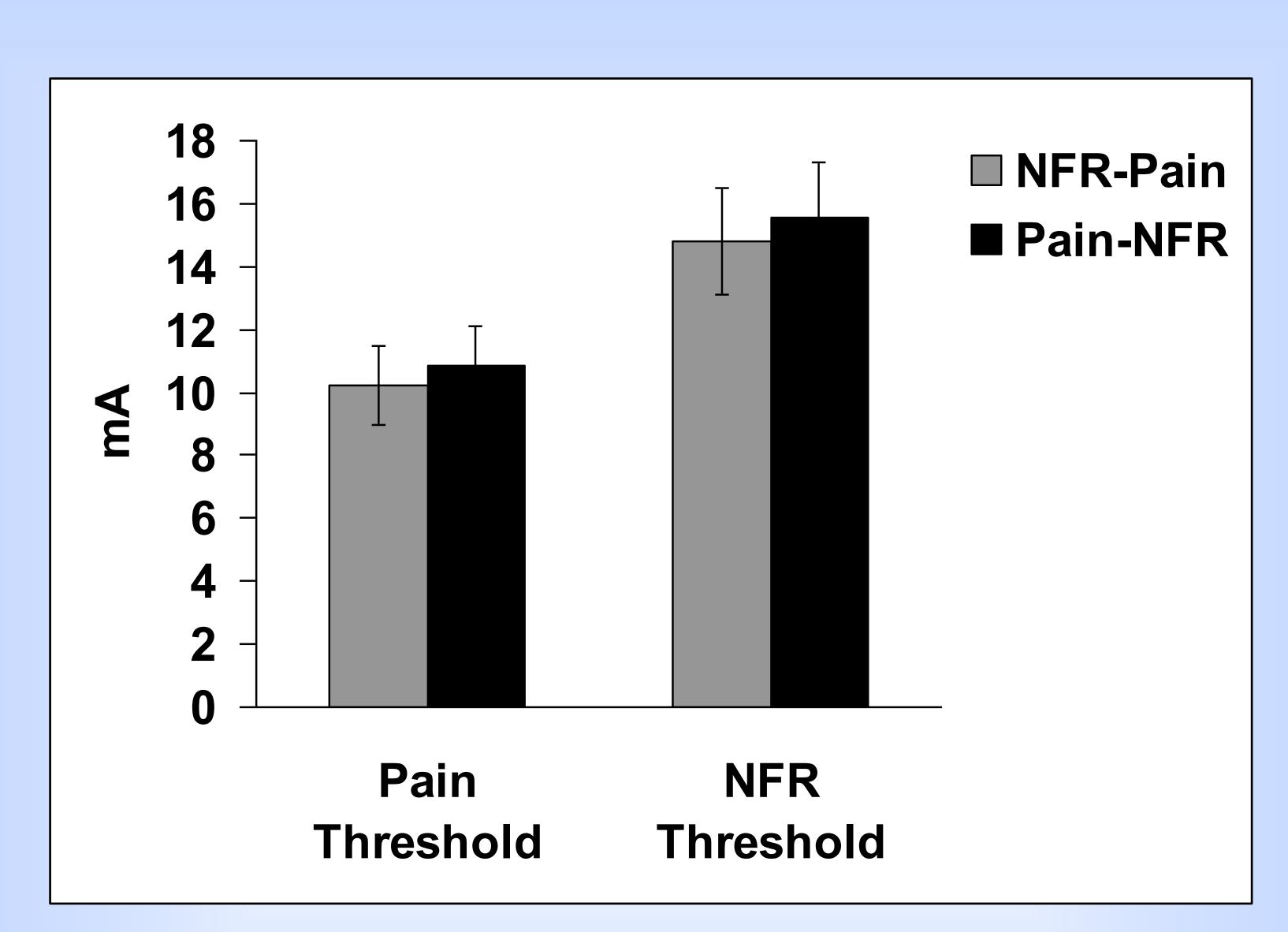


- Nociceptive Flexion Reflex (NFR) Threshold: biceps femoris EMG activity in the 90-150 ms post-stimulus window
- •NFR is a spinally-mediated protective withdrawal reflex elicited by Aδ fiber activation used to assess spinal nociception
- NFR threshold correlates highly with pain threshold

## Data Analysis

Analyses were conducted using a 2 (Testing Order) X 2 (Pain Outcome) x 2 (Participant Sex) ANOVA

# Effect of Testing Order on NFR and Pain Thresholds



- •Results indicated that there was no significant effect of testing order on pain or NFR threshold (p=.98), an effect that was true for men and women (Test Order x Sex interaction: p=.11)
- •Only the main effect of pain outcome was significant (*p*<.001), indicating that pain thresholds were significantly lower than NFR thresholds

#### Conclusions

- •Findings suggest prior exposure to noxious electrocutaneous stimuli does not significantly impact assessment of pain threshold or NFR threshold
- Therefore, counterbalancing these nociceptive outcomes may not be necessary in future studies