Temporal habituation of heat pain? Parameters used for measuring temporal summation primarily lead to decreases in pain ratings


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Introduction

Temporal summation of pain is believed to be the psychophysical correlate of wind-up (clonal from becomes hyperexcitable in response to repetitive, constant-intensity painful stimulus) in animals. This phenomenon has been demonstrated with different stimulus modalities (e.g., electric stimuli, heat stimuli) in humans. This present study examined temporal summation of heat pain in 124 healthy, pain-free individuals.

Participants

- 124 healthy, pain-free participants
  - 50% female
  - 58% Native American, 36% White
  - 72% single
  - 62% employed
  - Average age = 29.7 years (SD = 13.2)

- Exclusion criteria:
  - Cardiovascular, neurological, circulatory problems
  - Chronic pain condition (e.g., back pain)
  - Current use of anxiolytic, antidepressant, and/or antihypertensive medication
  - < 18 years of age

Procedure: Order of Tests

- Participants completed temporal summation of heat test (TS-heat) as part of a larger experimental paradigm
- TS-heat was always completed after an individualized single pulse heat procedure (SP-heat) assessing the temperature which participants rated 45 on a 100-point rating scale (see NRS below)
- SP-heat/TS-heat were randomized with three other pain tests:
  - Heat pain threshold/tolerance
  - Electric pain tolerance
  - Pressure pain threshold

Delivery/Ratings of Heat Pulses

- 5 trains of 10 heat pulses each delivered to volar surface of left forearm (probe moved in between trials)
- Participants provided verbal ratings to each pulse after delivery using NRS
- Pulses delivered from Contact Heat Evoked Potential Stimulator (CHEPS)

Calculation of TS-Heat

- TS-heat was calculated using 2 methods
  - Method 1 (TS-heat):
    - Pain rating of pulse 10 minus pain rating of pulse 1
  - Method 2 (TS-max):
    - Highest pain rating from pulses 2-10 minus pain rating of pulse 1

Presentation of Results

- Results will be displayed by test order such that TS-heat was at the beginning vs. end of test order
- Results will be displayed by parameters such that TS-heat and TS-max results will be compared by Old vs. New parameters

Temporal Summation of Heat Pain? Parameters

- Parameters were altered after collection of 30 participants' data
  - Initial TS-heat parameters = Old
  - Altered TS-heat parameters = New

Results: TS-heat by Test Order

- TS-heat by Test Order
  - TS-heat by Old Parameters
  - TS-heat by New Parameters

Results: TS-max by Test Order

- TS-max by Test Order
  - TS-max by Old Parameters
  - TS-max by New Parameters

Tables provide evidence for habituation as over half of participants rated the 1st heat pulse as the most painful regardless of test order or parameters.

Conclusion

These findings were not affected by the order TS-heat was completed in the experiment, the parameters used for measuring TS-heat, or the method used for calculating TS-heat.

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