Contact Heat Evoked Potentials and Heat Pain Perception in Native Americans: Preliminary finding from the Oklahoma Study of Native American Pain Risk

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Introduction

• Prevalence rates indicate that Native Americans are at increased risk for chronic pain; yet, little is known about mechanisms that contribute to this higher risk  
• Contact heat evoked potentials (CHEPs) are an objective method to assess the integrity of the pain transmission system (specifically Aβ fiber function)  
• To do so, 51°C heat pulses are delivered to the skin and electroencephalogram (EEG) is used to record the amplitude of the N2P2 compound evoked potential  
• The present study assessed N2P2 amplitudes and heat pain thresholds/tolerances in order to investigate heat sensitivity in Native Americans

Participant Characteristics

• Healthy Participants: N = 184  
• 52 Women (50%)  
• 92 Men (50%)  
• 50 Native American (48.91%)  
• Native American heritage was corroborated by a Certificate of Degree of Indian Blood (CDIB) or Tribal ID card  
• Average age = 28.3 yrs (SD = 12.08)  
• Average amount of education = partial college (50%)

• Exclusion criteria:  
  - ≥$50,000  
  - $35,000  
  - $15,000  
  - <$9,999  
  - Employment system (specifically Aβ fiber function)  
  - To do so, 51°C heat pulses are delivered to the skin and electroencephalogram (EEG) is used to record the amplitude of the N2P2 compound evoked potential  
  - The present study assessed N2P2 amplitudes and heat pain thresholds/tolerances in order to investigate heat sensitivity in Native Americans

Methods: Heat Pain Threshold/Tolerance

Heat Pain Threshold  
Thermal probe is attached to volar surface of participant’s left forearm  
Probe temperature starts at 32°C and increases at a rate of 0.5°C per second until participant indicates heat is painful (average of 4 trials)

Heat Pain Tolerance  
Thermal probe is attached to volar surface of participant’s left forearm  
Probe temperature starts at 32°C and increases at a rate of 0.5°C per second until participant indicates heat is intolerable (average of 4 trials)

Methods: Contact Heat Evoked Potentials

5 blocks of 5 heat pulses (51°C) to the volar forearm of the non-dominant hand  
Participants provided informed consent after the procedures were explained  
Event-related potentials recorded at Cz sensor location

Results

There is a relationship between the pain transmission system integrity (as assessed by N2P2 amplitude) and heat pain sensitivity (assessed by threshold and tolerance) higher amplitudes ———> higher sensitivity

The relationship between N2P2 and heat pain Tolerance was moderated by race meaning that NAs showed a weaker relationship between N2P2 & heat tolerance than non-Native Whites

There is an additive effect such that NAs showed a non-significant N2P2 interaction was not significant (p = .06)  
This suggests affective factors may have weakened the N2P2-tolerance relationship in the NA sample

The regression analysis predicting heat pain tolerance was significant (R² = .04, p = .009)

Conclusions

• There is a relationship between the pain transmission system integrity (as assessed by N2P2 amplitude) and heat pain sensitivity (assessed by threshold and tolerance) higher amplitudes ———> higher sensitivity

• The relationship between N2P2 and heat pain Tolerance was moderated by race meaning that NAs showed a weaker relationship between N2P2 & heat tolerance than non-Native Whites

• There is an additive effect such that NAs showed a non-significant N2P2 interaction was not significant (p = .06)  
This suggests affective factors may have weakened the N2P2-tolerance relationship in the NA sample

• This might constitute a risk factor for chronic pain in NA.

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