Modulation of Electrical Brain Responses by Nociceptive Stimulus Properties

Gepubliceerd: 21-11-2017 Laatst bijgewerkt: 18-08-2022

N.A.

Ethische beoordeling	Positief advies
Status	Anders
Type aandoening	-
Onderzoekstype	Observationeel onderzoek, zonder invasieve metingen

Samenvatting

ID

NL-OMON27560

Bron
NTR

Aandoening

chronic pain
electrocutaneous stimulation
evoked potential
nociception

Ondersteuning

Primaire sponsor: University of Twente, Biomedical Signals and Systems Group
Overige ondersteuning: NWO: TTW

Onderzoeksproduct en/of interventie

Uitkomstmaten

Primaire uitkomstmaten

The primary objective of this study is to describe the quality and content of electrical brain responses of pain free subjects to electrocutaneous stimuli during multiple threshold tracking, by determining the signal-to-noise ratio of averaged responses and by exploration of the use of generalized linear mixed models to explain the variability in these responses.

The data will be used for computation of a linear mixed-model describing the influence of stimulus parameters on the nociceptive evoked potential.

Toelichting onderzoek

Achtergrond van het onderzoek

The development of treatments for chronic pain requires a more profound understanding of the physiological and psychological aspects of chronic pain. Several types of chronic pain are linked to increased sensitivity of the central nervous system. Therefore, it is important to study the underlying mechanisms of this increased sensitivity. However, one major obstacle is the lack of an objective measure of peripheral and central sensitivity. Tracking psychophysical thresholds of nociceptive specific electrocutaneous stimuli can facilitate the investigation of the underlying mechanisms of sensitization. Recently, a subjective method was developed for tracking multiple psychophysical thresholds over time, referred to as multiple threshold tracking (MTT), which has been shown sensitive to central changes in nociception. An objective measure of nociception related activity in the central nervous system is the electroencephalographic (EEG) signal. Multiple-trial averages of this signal, referred to as evoked potentials (EPs), have been shown to reflect nociceptive sensitivity to changes in stimulus parameters such as the number of pulses or number of trials. Since MTT has been shown to be effective in measuring the effect of stimulus parameters on stimulus detection, while the EP has been shown to reflect neurophysiological activity related to stimulus processing, a combination of both techniques might provide insight into the relation between neurophysiological activity and nociceptive stimuli. Both measures are subject to a large amount of noise as well as variation between measurements, leading to a poor signal-to-noise ratio (SNR). Doll et al. have shown that a generalized linear mixed model (GLMM) can be used to account for this variation in MTT measurements, while computing an estimate of the within-subject psychophysical function that is robust to noise. A similar mixed-regression analysis of the EPs during MTT is expected to successfully account for between-subject variations, and provide objective measures of peripheral and central sensitization.

Doel van het onderzoek

N.A.

Onderzoeksopzet

Each subject will participate one single time in the experiment. The duration of the main experiment is approximately 50 minutes.

Onderzoeksproduct en/of interventie

The participants will be asked to come to the Human Physiology Lab of the BSS Group at the University of Twente for one session. First, the participant is familiarized with the stimuli by

stepwise application of increasing stimuli until stimulus detection. During the experiment, the participant will receive randomized stimuli around the detection threshold according to the multiple threshold tracking paradigm. Several types of nociceptive stimuli will be applied, while the subject's response (detected or not detected) and the stimulus related EEG epochs will be measured.

Contactpersonen

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Deelname eisen

Belangrijkste voorwaarden om deel te mogen nemen (Inclusiecriteria)

Age between 18 and 40 years old.

Belangrijkste redenen om niet deel te kunnen nemen (Exclusiecriteria)

Participant refusal during the study. • Language problems. • Skin problems at site of stimulation or EEG recording. • Diabetes. • Implanted stimulation device. • Pregnancy. • Usage of analgesics within 24 hours before the experiment. • Consumption of alcohol or drugs within 24 hours before the experiment. • Pain complaints at the time of the experiment. • A medical history of chronic pain.

Onderzoeksopzet

Opzet

Type:	Observationeel onderzoek, zonder invasieve metingen
Onderzoeksmodel:	Factorieel
Toewijzing:	N.v.t. / één studie arm
Blindering:	Open / niet geblindeerd
Controle:	N.v.t. / onbekend

Deelname

Nederland

Status:	Anders
(Verwachte) startdatum:	21-11-2017
Aantal proefpersonen:	30
Type:	Onbekend

Ethische beoordeling

Positief advies

Datum:	21-11-2017
Soort:	Eerste indiening

Registraties

Opgevolgd door onderstaande (mogelijk meer actuele) registratie

Geen registraties gevonden.

Andere (mogelijk minder actuele) registraties in dit register

Geen registraties gevonden.

In overige registers

Register	ID
NTR-new	NL6699
NTR-old	NTR6869
Ander register	METC Twente, Enschede : P17-19

Resultaten