Functional brain imaging of the influence of interoceptive awareness and autonomic nervous system function in pain processing in fibromyalgia

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This study will investigate the relationship between autonomic nervous system function and pain in fibromyalgia, with a specific emphasis on awareness of bodily sensations, also refered to as interoceptive awareness, as a potential modulator of pain...

Ethical review	Approved WMO
Status	Recruitment stopped
Health condition type	Musculoskeletal and connective tissue disorders NEC
Study type	Observational invasive

Summary

ID

NL-OMON33998

Source
ToetsingOnline

Brief title
Imaging of autonomic nervous system function in fibromyalgia

Condition

- Musculoskeletal and connective tissue disorders NEC

Synonym
fibromyalgia; muscle, joint or bone pain

Research involving
Human

Sponsors and support

Primary sponsor: Universitair Medisch Centrum Utrecht

Source(s) of monetary or material Support: Ministerie van OC&W,EGG grant; zie sectie J voor aanvullende opmerkingen over de ontvangen subsidie.

Intervention

Keyword: autonomic nervous system, fibromyalgia, fMRI, interoceptive awareness

Outcome measures

Primary outcome

Primary outcomes are brain activation patterns and the relationship between physiological measures, pain and interoceptive awareness.

Secondary outcome

Secondary outcomes are physiological data measures during brain imaging and verbal pain scores upon painful stimulation. These outcomes will be correlated to brain imaging patterns. Other outcomes are the physiological data assessments obtained at the screening session, detailed QST pain testing, physical fitness assessments, and questionnaire scores.

Study description

Background summary

Fibromyalgia is a common chronic pain disorder which mechanisms remain largely unknown. Fibromyalgia predominantly affects women and is characterized by symptoms of widespread musculoskeletal pain and discomfort on palpation of specific sites known as tender points. Fibromyalgia results in long-term sickness, inability to work, and repeated visits to medical practice. An important feature of fibromyalgia is the heightened report of bodily sensations compared to other disorders such as rheumatoid arthritis. Studies show that fibromyalgia patients have elevated basal sympathetic nervous system activity levels. Further, imaging studies show that brain regions implicated in pain processing largely overlap those involved in autonomic control, e.g., prefrontal, anterior cingulate and insular regions. Importantly, fibromyalgia patients show altered brain activity within these particular cortical areas.

Study objective

This study will investigate the relationship between autonomic nervous system function and pain in fibromyalgia, with a specific emphasis on awareness of bodily sensations, also refered to as interoceptive awareness, as a potential modulator of pain augmentation. The first objective of this study will be to examine the resting state of the brain in relation to autonomic nervous system function. Connectivity of the ventromedial prefrontal cortex will be examined in fibromyalgia patients compared to healthy subjects. The second objective will be to identify autonomic nervous system mechanisms underlying augmented cortical processing of pain. Sympathetic activation levels will be measured and correlated with brain activation patterns during rest and during painful stimulation. In addition, the healthy volunteers will be split into two groups based on their interoceptive awareness score as assessed by a heartbeat perception task to determine if increased interoceptive awareness induces brain activation changes. The third objective will be to assess the effect of increased attentional focus to bodily sensations, also referred to as hypervigilance. The fourth objective will be to assess whether physical fitness levels are predictive of altered pain sensitivity levels in patients with fibromyalgia.

Study design

This study requires one or two visits of 2.5-3 hours per visit. On the first visit, subjects will be screened for study participation. Inclusion- and exclusion criteria will be verified and informed consent will be signed. At this visit, autonomic nervous system functioning will be assessed with measures of heart beat, cardiac output, blood pressure, skin temperature, oxygenation of blood, and skin conductance. Also, pain intensity scores will be determined on a 0-100 visual analog scale using a conventional pressure algometer. In a selected sample, the effects of attentional focus on internal or external applied stimuli on pain threshold and pain tolerance measures will be tested by using a cold pressor test (CPT). On the second visit, a select group of subjects will undergo MRI scanning while autonomic nervous system measures are continuously monitored. During MRI scanning, non-painful and painful pressure stimuli will be applied to the thumbnail with the pressure stimulation device. Also, attentional focus to interoceptive (heart beat) or exteroceptive signals (weak electrical stimuli) will be manipulated. Another select group of patients will be asked to participate in a more detailed examination on the relationship between pain, as assessed by quantitative sensory testing (QST), and physical fitness which will be assessed by two fitness tests (VO2max cycle test and a 6-minute walking test). Subjects will be asked to fill out some questionnaires. Travel expenses will be reimbursed and in addition participants will be paid 7 euros for each hour participating in this study.

Study burden and risks

Risks associated with participation in this study are minimal. The equipment used to test pain and acquire physiological data is commonly used in clinical practices. Risks associated with scanning procedures are minimal. An unforeseeable risk releated to participation in this study is the possible discovery of claustrophobia when entering the small MRI scanning space which may be unknown to the subject. Sport physicians will supervise the physical fitness tests, and necessary cardiovascular screening will take place before the maximal physical effort tests. Subjects will be able to terminate study participation at any time in case this happens or for any other reason.

Contacts

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Trial sites

Listed location countries

Netherlands

Eligibility criteria

Age
Adults (18-64 years)
Elderly (65 years and older)

Inclusion criteria

Only female subjects will be recruited since most patients with fibromyalgia are female

(~85%). Fibromyalgia patients will have a diagnosis of primary fibromyalgia according to the American College of Rheumatology classification criteria. Control subjects will be healthy. Eligible participants will be: between 20-50 years of age, in their pre-menopausal state with a recurrent menstrual cycle, right-handed, and speak Dutch fluently. Further, participants should adequately perceive stimuli as painful and non-painful. This last criterion will be determined in the pre-fMRI screening session and will serve as an inclusion criterion for the next visit. Healthy participants will be matched to fibromyalgia patients on age and educational level. All participants will sign informed consent.

Exclusion criteria

Exclusion criteria are: cognitive impairment as tested by the Mini-Mental State Exam, if the painful stimulation fails to reach appropriate scores on a 0-100 visual analog scale of pain intensity, if not able to undergo MRI scanning, for example due to metal parts in or on the body or claustrophobia, if pregnant, current use of sedative psychotropic medications, when there is any serious injury to the body regions to be tested, serious health problems other than fibromyalgia as assessed with a health questionnaire.

Study design

Design

Study type:	Observational invasive
Intervention model:	Other
Allocation:	Non-randomized controlled trial
Masking:	Open (masking not used)
Control:	Active
Primary purpose:	Basic science

Recruitment

NL

Recruitment status:	Recruitment stopped
Start date (anticipated):	31-10-2008
Enrollment:	154
Type:	Actual

Ethics review

Approved WMO Date:	15-04-2008
Application type:	First submission
Review commission:	METC NedMec
Approved WMO Date:	12-08-2008
Application type:	Amendment
Review commission:	METC NedMec
Approved WMO Date:	04-11-2008
Application type:	Amendment
Review commission:	METC NedMec
Approved WMO Date:	11-11-2008
Application type:	Amendment
Review commission:	METC NedMec
Approved WMO Date:	17-03-2009
Application type:	Amendment
Review commission:	METC NedMec

Study registrations

Followed up by the following (possibly more current) registration

No registrations found.

Other (possibly less up-to-date) registrations in this register

No registrations found.

In other registers

Register	ID
CCMO	NL21150.041.08