Journal of the Neurological Sciences xxx (2015) xxx–xxx

Contents lists available at SciVerse ScienceDirect

Journal of the Neurological Sciences

journal homepage: www.elsevier.com/locate/jns

Pain 1

226
WFN15-0376
Pain 1
Somatosensory evoked potentials to painful and painless electrical stimulation (SSEPEES). A tool for the clinical assessment of neuropathic pain pathways?

R.J. Guiloff[a], G. Barraza[b], M. Campero[b], R.D. Treede[c], J.M. Matamala[d], R. Verdugo[d], J.L. Castillo[d], f. Grupo Dolor Neuropatico[e]. [a]*Neuromuscular Unit, Faculty of Medicine University of Chile, Santiago, Chile;* [b]*Neuromuscular Unit, Hospital Clinico Universidad de Chile, Santiago, Chile;* [c]*Faculty of Medicine, University of Heidelberg, Mannheim, Germany;* [d]*Depto de Ciencias Neurologicas Area Oriente, Faculty of Medicine University of Chile, Santiago, Chile;* [e]*University of Chile, Faculty of Medicine, Santiago, Chile*

Background: SSPEs with N1 latency of ~140 ms and Ad range velocity are recorded with painful and painless electrical stimulation (ring electrodes). Intradermal electrodes have been used for specific stimulation of the thermoalgesic pathways. Similar potentials are obtained with other sensory modalities, described as reflecting the saliency rather than the nature of the stimuli.
Objective: To reassess whether recorded SSPEs can reliably index their afferent pathway function.
Methods: 26 controls, mean age 41 years ± SD13.1 (range27-71). VAS graded stimulation (ring electrodes) to 3rd finger and 2nd toe with 2 stimuli of 0.5 ms and ISI = 5 ms at frequencies between 0.1-1Hz. Recordings at Cz-A1A2 (ten 2 s epochs averaged twice). The effect of compression block, and of magnetic and heat stimulation (CHEPS, Medoc) were also investigated. Subject consent and institutional approval obtained.
Results: N1-P1 amplitude increased with increasing VAS graded stimulus intensity. N1 latency across VAS grades did not change. No potentials recorded with threshold stimuli (VAS = 0). Mean N1-P1 amplitude decreased with increasing stimulation frequency. No change in amplitude was seen for each of 4 levels of VAS graded stimuli when their order of presentation was changed. Magnetic and heat stimulation elicited similar potentials. Arm compression block resulted in diminishing N1 amplitude and paraesthesiae at 5 min, unrecordable at 15 min (cold perceived as hot and light touch and pinprick absent then), and unrecordable potential at 20 min.
Conclusion: N1-P1 amplitude and latency at 0.1 Hz seem robust parameters. Further testing in patients with thermoalgesic pathways pathology is advisable.

*Fondecyt 1120339: LAcevedo, GBarraza, MCampero, JLCastillo, GCavada, RJGuiloff, JHoneyman, JMMatamala, EMullins, POrellana, CRamirez, HRojas, ISazunic, RVerdugo, YWang.

doi:10.1016/j.jns.2015.08.302

227
WFN15-0452
Pain 1
Contact heat evoked potentials (CHEPS) in patients with painful and non-painful polyneuropathies

G. Barraza[a], M. Campero[a], J.M. Matamala[b], J.L. Castillo[b], R.J. Guiloff[a]. [a]*Neurologia, Hospital Clínico Universidad de Chile, Santiago, Chile;* [b]*Ciencias Neurologicas, Facultad de Medicina-Universidad de Chile, Santiago, Chile*

Background: CHEPS evaluate central and peripheral thermo-algesic pathways. There are few studies comparing CHEPS in polyneuropathies and central nervous system disorders with and without neuropathic pain.
Objective: To compare CHEPS in controls and patients with polyneuropathies and central nervous system disorders(CNS) with and without neuropathic pain.
Patients and methods: 58 M, 70 F. Mean age 52.5 years (range 21–83). 27 normal controls. 53 polyneuropathies with sensory involvement (16 small fibre), 39 painful. 25 had CNS disease, 17 painful. 21 had other peripheral conditions. CHEPS (Medoc, Israel) thermode was placed on the distal forearm and leg, baseline T° 37 °C, target T° 54 °C. Random interstimulus interval 10–15 seconds. 2 trains of 10 stimuli averaged and superimposed recorded from CZ-A1/A2. Filters 3–100 Hz. N2 latency and N2-P2 amplitude measured. Parametric and non-parametric statistics as appropriate.
Results: The morphology of CHEPS was similar in central and peripheral lesions. CHEPS were absent in the legs significantly more in all groups than in controls. The mean amplitudes in lower limbs in painful and non-painful polyneuropathies and in CNS disease were smaller than in controls. Mean N2 latency was prolonged (compared to controls only) in the arm of CNS diseases and in the leg of painful polyneuropathies and non painful CNS diseases.
Conclusions: CHEPS seems to be a reliable technique to assess the thermoalgesic pathway in sensory polyneuropathies and CNS disorders. The technique did not differentiate between painful and non-painful polyneuropathies nor between sensory polyneuropathies and CNS lesions.

*Fondecyt 1120339: LAcevedo, GBarraza, MCampero, JLCastillo, GCavada, RGuiloff, JHoneyman, RHughes, JMMatamala EMullins, POrellana, CRamirez, HRojas, ISazunic, RVerdugo, YWang.

doi:10.1016/j.jns.2015.08.303

228
WFN15-0612
Pain 1
Bedside neuromodulation of persistent pain and allodynia using caloric vestibular stimulation: an effectiveness trial

T.T. Ngo[a], W.N. Barsdell[a], C.A. Arnold[b], M.J. Chou[c], P.W. New[d], S.T. Hill[e], A.K. Nunn[e], D.J. Brown[e], S.J. Gibson[b], S.M. Miller[a]. *[a]Monash Alfred Psychiatry Research Centre, Monash University, Melbourne, Australia; [b]Caulfield Pain Management & Research Centre, Caulfield Hospital, Melbourne, Australia; [c]Amputee Rehabilitation Unit, Caulfield Hospital, Melbourne, Australia; [d]Spinal Rehabilitation Unit, Caulfield Hospital, Melbourne, Australia; [e]Victorian Spinal Cord Service, Austin Health, Melbourne, Australia*

Background: Caloric vestibular stimulation (CVS) is widely applied for neurological diagnosis but is also a safe, inexpensive, non-invasive neuromodulation technique. Case studies report short and sustained therapeutic effects of CVS in persistent pain (PP).
Objective: Conduct an effectiveness trial of CVS in phantom limb pain (n = 8), spinal cord injury pain (n = 12), complex regional pain syndrome (CRPS; n = 14) and non-specific PP (n = 4).
Patients and methods: Thirty-eight participants (19 males; mean age = 45.6 years) underwent 1–3 sessions of iced-water CVS. All but four also underwent a cold-arousal control (ice-pack to forehead). Subjective pain and light touch allodynia numerical rating scores (NRS) were collected pre- and post-CVS. The study was IRB-approved.
Results: MANOVA showed significant interaction of time by intervention ($F[2,32] = 3 \cdot 99$, $p < 0.05$). Univariate tests revealed pain scores differed significantly between CVS and control ($F[1,33] = 17.30$, $p < 0.01$). Pain was significantly lower 30 minutes post-CVS ($M = 3.44$, $SD = 2.62$) than post-control ($M = 4.25$, $SD = 2.79$; $t(33) = -3.77$, $p < 0.01$). Average reductions were 24.8% for CVS (1.13 NRS points, $SD = 1.67$) and 6.4% for control (0.29 points, $SD = 1.21$). The strongest CVS PP responses lasted up to one week. Importantly, CVS induced clinically significant allodynia reductions in three of nine CRPS patients with allodynia (10/10 to 2/10; 6/10 to 3/10; 2/10 to 0/10), lasting 24 hours to one month. CVS was well-tolerated (one patient had vomiting).
Conclusion: Examination is required of repeated CVS (several times/week for several weeks) to increase PP reductions from statistically to clinically significant, increase the proportion of clinically significant allodynia responders, and assess other allodynia conditions (e.g. post-herpetic, trigeminal and occipital neuralgia).

doi:10.1016/j.jns.2015.08.304

229
WFN15-0801
Pain 1
Investigating a novel mechanism of hypersensitivity induced by exclusive damage to intraepidermal nerve fibres: neuropathic pain in epidermolysis bullosa

S. von Bischhoffshausen[a], P. Álvarez[b], P. Morandé[c], M. Calvo[d]. *[a]Facultad de Medicina, Universidad de los Andes, Santiago, Chile; [b]Departamento de Neurología, Universidad Católica de Chile, Santiago, Chile; [c]Debra Chile, Debra Chile, Santiago, Chile; [d]Departamento de Fisiología, Universidad Católica de Chile, Santiago, Chile*

Introduction: Small fibres that innervate the skin are especially susceptible to damage, however, their role in the development of neuropathic pain (NP) is still unclear. We are investigating pain in Epidermolysis-Bullosa-Dystrophic, (EBD) a rare disorder in which mutations of proteins of the dermo-epidermal junction lead to blistering. The somatosensory system in these patients is intact, except from the probable damage that occurs in their skin fibres.
Aims: To investigate if EBD-patients present NP and if this is due to intraepidermal fibre damage.
Methods: EBD patients were recruited within Debra Chile. The study complies with requirements of the Faculty of Medicine Ethics Committee. To detect NP we used the painDetect, DN4, NPSI questionnaires. A structured neurological examination, nerve conduction studies, autonomic tests, and Quantitative Sensory Testing (QST) was done and a skin biopsy was obtained.
Results: The prevalence of NP in EBD patients was 76.9%. Mean VAS score was 4.48 ± 0.54. QST revealed that EBD patients presented with a unique somatosensory profile with exclusive loss in thermal detection thresholds. This dysfunction presented a length dependant distribution. Nerve conduction studies (sural and motor peroneal) were normal. Testing of the autonomic system revealed no dysfunction. Quantification of IENFD of 17 EBD patients showed a significant decrease in fibre density (1.79 ± 0.8) compared with healthy volunteers (10.27 ± 0.7, $p < 0.01$).
Conclusion: These data show for the first time that EBD patients present with NP and have a small fibre neuropathy.

doi:10.1016/j.jns.2015.08.305

230
WFN15-1228
Pain 1
Somatosensory evoked potentials after painful electrical stimulation in patients with central and peripheral somatosensory pathology with and without neuropathic pain

J.M. Matamala[a], J.L. Castillo[a], G. Barraza[b], M. Campero[b], R. Verdugo[a], R.J. Guiloff[b]. *[a]Department of Neurological Science, University of Chile, Santiago, Chile; [b]Department of Neurology, University of Chile, Santiago, Chile*

Background: The potential clinical use of somatosensory evoked potentials after painful electrical stimulation (SSEPs) has not been systematically explored.
Objective: To compare SSEPs in controls and patients with central nervous system (CNS) lesions and Polyneuropathies (PNP) affecting the somatosensory pathway with and without neuropathic pain (NP).
Methods: Healthy adults n = 24. Patients (n = 77), mean age 55.8 ± 14.9 (20 to 83 years), grouped as with(+) and without(−) NP. CNS(+), n = 14/26, CNS(−), n = 12/26; PNP(+), n = 35/51, PNP(−), n = 16/51. 10 double pulse stimuli, 1 ms duration ISI 5 ms at 0.1Hz were applied twice (ring electrodes) in the middle finger and second toe. The electrical intensity was such to evoke pain (VAS 4 or more). Two superimposed averages were recorded at Cz-A1/A2. N1, P1 latencies and N1-P1 amplitude were measured. Patient consent were obtained.
Results: SSEPs were recorded in all controls subjects. Absent SSEPs in arms or legs(n): CNS(+) 8/14, CNS(−) 4/12, PNP(+)17/35 PNP(−) 8/16. There were no significant differences in the proportions of absent SSEPs between CNS and PNP, or their subgroups, nor between all with and without NP (Fisher's exact test). P1 latency was prolonged only in arms in both groups of CNS and PNP patients. N1-P1 amplitudes in legs were significantly smaller only compared to controls in both subgroups of CNS and PNP patients ($P < 0.0001$).
Conclusions: SSEPs may be useful in the assessment of patients with central or peripheral somatosensory pathways pathology but did not appear to distinguish between CNS and PNS pathology or between presence or absence of NP.

*Fondecyt 1120339: LAcevedo, GBarraza, MCampero, JLCastillo, GCavada, RGuiloff, JHoneyman, RHughes, JMMatamala, EMullins, POrellana, CRamirez, HRojas, ISazuni, RVerdugo, YWang.

doi:10.1016/j.jns.2015.08.306

231
WFN15-1419
Pain 1
Unexpected meningeal reaction to pain in trigeminal region: association with calcitonin gene related polipeptide

Z. Lackovic[a], B. Filipovic[a], I. Matak[a], S. Helyes[b]. [a]*Pharmacology Lab Molecular Neuropharmacology, University of Zagreb School of Medicine, Zagreb, Croatia;* [b]*Pharmacology and Pharmacotherapy, University of Pecs Faculty of Medicine, Pecs, Hungary*

Background: Recently we observed that two different types of pain: infraorbital nerve constriction injury (IONC) and facial formalin injection in rats (Filipović et al. Plos One 2012) are accompanied by dural neurogenic inflammation (DNI) characterized by extravasation of plasma proteins and inflammatory cells. This previously unknown phenomenon is specific only for trigeminal region, since peripheral types of pain like partial transection of the sciatic nerve (ScNT) and sciatic nerve constriction injury (SCI) are avoid of extravasation of lumbar or cranial dura (Filipović et al., J Neural Transmission 2004).
Objective: To investigate possible association of pain induced DNI with calcitonin gene-related peptide (CGRP).
Material and methods: We investigated third type of pain in trigeminal region: Freund adjuvant induced inflammation and pain in temporomandibular joint (TMJ) of rat. DNI was investigated by Evans blue-plasma protein extravasation, and cell histology. CGRP was investigated by immunohistochemistry and radioimmunoassay. Effect of several analgesics drugs (aspirin, morphine, sumatriptan) was tested as well
Results: TMJ induced pain was accompanied by dural plasma proteins and inflammatory cells and increase in CGRP level in dura.
Conclusion: In addition to IONC and facial formalin injection, TMJ induced pain is accompanied by neurogenic dural extravasation, as well. Pain induced DNI is associated with CGRP expression in meninges.

doi:10.1016/j.jns.2015.08.307

232
WFN15-0372
Pain 1
Thermal-specific, thermal-pain thresholds and pain estimation in patients with peripheral (PNP) and central (CNS) somatosensory pathology with and without pain

M. Campero[a], J.M. Matamala[b], R.J. Guiloff for Neuropathic pain group[a]. [a]*Neurology & Neurosurgery, Hospital Clinico Universidad de Chile, Santiago, Chile;* [b]*Ciencias Neurologicas Oriente, Universidad de Chile, Santiago, Chile*

Background: Quantitative thermotests evaluate small diameter afferents but thermal thresholds may not be significantly different in PNP patients with and without pain.
Objective: To determine thermal and thermal pain thresholds, and pain estimation after suprathreshold stimuli, in upper and lower limbs in patients with PNP, or CNS lesions, with and without pain.
Methods: Patients with PNP ($N = 60$), and CNS lesions ($N = 26$) with sensory symptoms, with and without pain, were recruited and compared to controls ($N = 13$). Thermal thresholds (average x3) were obtained from the thenar eminence, lateral leg 10 cm above the ankle and tarsal area with a 3x3cm thermode (TSA-Medoc). Pain estimations (0–10) to nociceptive thermal stimuli (5 sec 20 °C, 5 °C, 40 °C and 45 °C) were recorded.
Results: Cold and warm thresholds were lower in controls compared to all patient groups ($p < 0.001$). Cold and heat pain thresholds were lower in healthy controls compared to all groups ($p = 0.001$) except for patients with CNS pathology without pain. Only cold threshold was significantly higher in patients with painful PNP.

($p = 0.05$) compared to painless PNP. Thermal and thermal pain thresholds were otherwise similar in the other patient groups. Pain estimation for cold was higher in patients compared to controls but not statistically significant.
Conclusions: Patients with PNP or CNS pathology display significantly thermal and thermal pain hypoesthesia with a tendency to thermal hyperalgesia with suprathreshold stimuli. Cold hypoesthesia was the only parameter distinguishing painful from painless PNP.

*Fondecyt 1120339: LAcevedo, GBarraza, MCampero, JLCastillo, GCavada, RGuiloff, J Honeyman, RHughes, JMMatamala, EMullins, POrellana, CRamírez, HRojas, ISazunic, RVerdugo.

doi:10.1016/j.jns.2015.08.308