A - HEADACHE TRAINEE’S EXCELLENCE TOURNAMENTS

A1

EHMTI-0117. CGRP infusion in awake rats does not increase expression of immediate early genes, c-fos and zif268, in the trigeminal nucleus caudalis

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Background and aims: Calcitonin gene-related peptide (CGRP) and glyceryl trinitrate (GTN) infusion in migraineurs provokes headache resembling spontaneous migraine. GTN infusion model was transformed to rats causing expression of protein markers as a surrogate for headache. We hypothesized that CGRP infusion in awake rats would increase molecular markers of neuronal activation in migraine relevant tissues.

Methods: CGRP was infused intravenously in freely moving rats. c-fos mRNA in trigeminal nucleus caudalis (TNC) was analyzed by qPCR at different time points after CGRP and saline infusion. c-Fos and Zif268 stained nuclei were counted in the TNC. c-Fos-positive nuclei were also counted in the nucleus tractus solitaries (NTS) and caudal ventrolateral medulla (CVLM), integrative sites in the brain stem for processing cardiovascular signals. Protein expression of phosphorylated-extracellular signal-regulated kinase (p-ERK), p-CREB and c-Fos was analysed in the dura mater, trigeminal ganglion and TNC samples using western blot.

Results: CGRP infusion caused a fall in blood pressure, and activated -nociceptive stimulation pd06

p-ERK, p-CREB and c-Fos was analysed in the

Aims: To better understand the vascular pathology of migraine, we measured dural vessel diameter changes during normal behavior and under pharmacologically-induced migraine attack in awake behaving mice.

Methods: We use two-photon laser scanning microscopy (2PLSM) to concurrently measure dural and pial surface vessel diameters down to micrometer resolution. Measurements were made in the somatosensory cortex of awake, head-fixed mice on a spherical treadmill, which allowed the mice to voluntarily run.

Results: A majority of the dural vessels constricted during locomotion (n=29 vessels in 11 mice, peak constriction=−11.2%±5.7%), some of them did not respond (8 vessels in 4 mice), while there were a few that dilated (3 vessels in 2 mice, peak dilation=12.2%±3.3%). In the contrast, all the pial vessels dilated during locomotion, with arteries showing rapid and large dilation (19.7%±8.2%) and veins showing a slower and smaller dilation (6.6%±3.2%). Preliminary experiment shows that injecting CGRP, which is believed to provoke migraine, drives the dilation of dural vessels.

Conclusions: Dural vessels exhibit diverse dynamics during locomotion, but the dominant effect was constriction. The differences between dural and pial vessels have never been reported before, but may indicate a unique function of dural vessels during exercise. This work provides novel insights into the normal dynamics of dural vessels during behavior and their disfunction during migraine.

No conflict of interest.

A2

EHMTI-0174. Dural vessel hemodynamics during normal behavior and migraine attack

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Introduction: Migraine is hypothesized to be caused by the pathological dilation of blood vessels in the dura.

Aims: To better understand the vascular pathology of migraine, we measured dural vessel diameter changes during normal behavior and under pharmacologically-induced migraine attack in awake behaving mice.

Methods: We use two-photon laser scanning microscopy (2PLSM) to concurrently measure dural and pial surface vessel diameters down to micrometer resolution. Measurements were made in the somatosensory cortex of awake, head-fixed mice on a spherical treadmill, which allowed the mice to voluntarily run.

Results: A majority of the dural vessels constricted during locomotion (n=29 vessels in 11 mice, peak constriction=−11.2%±5.7%), some of them did not respond (8 vessels in 4 mice), while there were a few that dilated (3 vessels in 2 mice, peak dilation=12.2%±3.3%). In the contrast, all the pial vessels dilated during locomotion, with arteries showing rapid and large dilation (19.7%±8.2%) and veins showing a slower and smaller dilation (6.6%±3.2%). Preliminary experiment shows that injecting CGRP, which is believed to provoke migraine, drives the dilation of dural vessels.

Conclusions: Dural vessels exhibit diverse dynamics during locomotion, but the dominant effect was constriction. The differences between dural and pial vessels have never been reported before, but may indicate a unique function of dural vessels during exercise. This work provides novel insights into the normal dynamics of dural vessels during behavior and their disfunction during migraine.

No conflict of interest.

A3

EHMTI-0034. Pharmacological modulation of trigemino-nociceptive stimulation

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Introduction/aims: Using functional resonance imaging (fMRI) with a standardized paradigm for trigemino-nociceptive stimulation [1], we explored the effect of sumatriptan on central pain processing structures compared to saline and acetylsalicylic acid (ASA). Given the mode of action of triptans [2-4], we hypothesized, that differences in BOLD activation between sumatriptan and saline/ASA would be revealed in the trigeminal nuclei.

Methods: We scanned 21 healthy volunteers for each group (sumatriptan, ASA) at two different time points (within-subject design). Differences in behavioural and imaging data between medication and saline conditions as well as between the medications were investigated. Using a general psychophysiological interaction analysis (gPPI), neuronal coupling between brain structures under saline compared to sumatriptan condition were explored.
This double-blind fMRI study was approved by the local Ethics Committee and all volunteers gave written informed consent prior to fMRI data acquisition.

**Results:** Mean pain intensity ratings did not differ between saline and sumatriptan/ASA conditions or between medications. Imaging data revealed increased activation of the trigeminal nuclei (T (18) = 3.59, p < 0.05 FWE corrected) after sumatriptan compared to saline. The same was also true for sumatriptan vs. ASA (T (31) = 2.8, p < 0.05, FWE corrected). The gpPPI showed an increased coupling between the trigeminal nuclei and several cortical and subcortical pain related brain areas for the saline condition during painful stimulation.

**Conclusion:** The study reveals an increased activation within the trigeminal nuclei under sumatriptan treatment compared to saline. Furthermore, this effect is specific for triptans. As the coupling between the trigeminal nuclei and other pain related brain structures during sumatriptan treatment compared to saline is attenuated, we suggest a weakening effect of sumatriptan on functional brain connectivity during pain.

**No conflict of interest.**

**References**


**Conclusion:** These results confirm abnormalities in specific cortical regions in a large cohort of migraineurs. The areas where we observed reductions of cortical thickness belong to somatosensory, pain and visual networks, all previously implicated in migraine pathophysiology.

**A5**

**EHTMT-0033. The phosphodiesterase 3 inhibitor cilostazol induces migraine-like attacks via cAMP increase**

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**Introduction:** The initiating mechanisms of migraine attacks are very complex but may involve the cyclic adenosine 3’5’-monophosphate (cAMP) signaling pathway. It is unknown whether intracellular cAMP accumulation induces migraine attacks.

**Aims:** To investigate whether administration of cilostazol, which causes cAMP accumulation, may induce migraine attacks.

**Methods:** We included 14 migraine patients without aura in a double-blinded, placebo-controlled crossover study. All participants received oral cilostazol or placebo on two separate days. We recorded migraine headache characteristics and associated symptoms using a questionnaire.

**Results:** Cilostazol induced delayed migraine-like attacks in 12 patients (out of 14) compared to 2 (out of 14) patients after placebo (P=0.002). The median time to onset for migraine-like attacks was 6 h (range 3-11 h). Patients reported that the attacks mimicked their usual migraine attacks and that cilostazol induced attacks responded to their usual migraine treatment. The median time of medication intake was 6 h (range 4-11).

**Conclusions:** The present study suggests that intracellular cAMP accumulation plays a crucial role in migraine induction. This knowledge is a further step in our understanding of the intracellular pathway of migraine initiation.

**No conflict of interest.**
DNA methylation. Further analyses are required to determine the potential of the identified targets in determining susceptibility to human migraine.

No conflict of interest.

B - GENES AND ENVIRONMENT: GENETICS, EPIDEMIOLOGY AND PEDIATRIC HEADACHES

B1

EHMTI-0323. Pediatric aspects of venous headache. The indicators of cerebral venous outflow for diagnostics and treatment of children

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Disturbances of cerebral venous hemodynamics define development of child headache. However, directed by the diagnosis and subsequent treatment, these disturbances are not considered. The absence of diagnostics algorithm and norms of cerebral venous blood flow limits the possibility of timely therapy at children.

Aims: The studies of headache caused by venous hemodynamics disturbance.

Materials and methods: 600 patients (3-17 years old) who complained of headache have been examined. The data of a blood flow velocity in deep cerebral veins of a brain: in straight venous sinus, vein of Galen, sinuses cavernous defined by Transcranial Color-Coded Duplex.

Results: Headache caused by cerebral venous dysfunction noted in 47% of children. The surveyed children had typical headache (100%) of holding apart character in occipital and parietal areas after a dream (69%), after physical activity (14%) and a long static pose have been revealed (17%). "Venous" headache at children often can be similar to dizziness. The attacks of headache which are coming to an end with vomiting are revealed at 25% of children. Children also complained of nasal bleeding as a fountain (60%) during a night or day dream (40%), noise in ears (53%), ocular pathology refraction (43%) and expressed vegetative symptoms (80%).

We have found clinical signs of the connective tissue dysplasia syndromes at 67% of children. Structural cerebral abnormalities (hypoplasia of cerebral venous sinuses) were revealed at 9% patients of them by MRI.

"Markers" of disturbances in cerebral venous hemodynamics was venous outflow in deep brain veins. The research of parameters of a cerebral hemodynamics was carried out in the conditions of functional rest and after dynamic tests. We suggest modified Valsalva, orthostasis and head-down tilting tests in children.

Conclusion: Definition of cerebral venous hemodynamic normal indicators in children of different age groups is very important for identification and treatment of headache with cerebral venous disturbances.

No conflict of interest.

B2

EHMTI-0291. Chronic headache is associated with mental vulnerability, depression, and neuroticism and poor mental health-related quality of life: a cross-sectional population study

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Introduction: Psychiatric comorbidity in migraine and tension-type headache (TTH) is well established.

Aim: To study differences in mental health variables in relation to headache subtype and frequency.

Methods: A sample of 547 subjects completed a questionnaire based on ICHD-1 and provided data on mental vulnerability (12-item scale), depression (MDI), neuroticism (Eysenck Personality Questionnaire) and mental health-related quality of life (SF-12). Results were adjusted for age, gender and education in a multiple regression model. Chronic headache indicated headache on ≥15 days per month.

Results: Mental vulnerability scores (mean ± SD) were highest for chronic headache (migraine +/- TTH) headache (6.1 ± 1.9), followed by chronic TTH (5.7 ± 2.1), episodic migraine +/- TTH (4.2 ± 1.9), episodic TTH (4.2 ± 1.6), no headache (3.1 ± 1.4), (p < 0.001). Neuroticism scores were highest for chronic TTH (11.7 ± 8.2), followed by chronic headache (9.5 ± 4.9), episodic TTH (8.9 ± 4.9), episodic migraine +/- TTH (8.8 ± 4.5), no headache (6.2 ± 4.3), (p < 0.001). Depression scores were highest for chronic headache (13.8 ± 10.4), followed by chronic TTH (12.6 ± 14.0), episodic migraine +/- TTH (7.4 ± 6.3), episodic TTH (7.2 ± 7.3), and no headache (4.4 ± 4.9), (p<0.001). SF-12 scores were lowest in chronic TTH (43.0 ± 11.6), followed by chronic headache (48.1 ± 10.1), episodic TTH (51.2 ± 8.8), episodic migraine +/- TTH (50.4 ± 8.0), no headache (53.9 ± 6.8), (p<0.001).

Conclusions: Chronic migraine and TTH are associated with low mental health-related quality of life, high mental vulnerability, depression and neuroticism scores.

B3

EHMTI-0015. Impact of headache-attributed burden on productivity and quality of life in Russia: structured healthcare is urgently needed

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Introduction: Tension-type headache (TTH) and migraine are common, respectively the second and third most prevalent disorders globally. Their direct burdens of recurrent pain and associated symptoms are damaging to quality of life (QoL) and disabling – migraine being the seventh-highest specific cause of disability worldwide.

Aims: The study evaluated headache-attributed burden and its impact on productivity and quality of life in Russia. Its purpose was to support recommendations for change.

Methods: A nationwide population-based random sample of 2725 biologically unrelated adults in 35 cities and nine rural areas of Russia were interviewed in a door-to-door survey. The structured questionnaire enquired into symptom burden, functional disability, lost productive time and QoL and willingness to pay (WTP) for adequate headache treatment.

Results: Mean lost paid-work days in the previous 3 months were 1.9±4.2, and mean lost household work days 3.4±5.7. The estimated annual indirect cost of primary headache disorders was USD 22.8 billion, accounting for 1.75% of gross domestic product. QoL was reduced by all types of primary headaches. According to WHOQoL-B, it was significantly lower in those with headache on ≥15 days/month than in those with episodic headache (24.7±4.6 vs. 28.1±5.0; P<0.05) and lower in those with migraine than in those with TTH (27.1±4.9 vs. 28.8±5.0; P<0.05). Average WTP was sufficient for adequate headache treatment and correlated with illness severity.

Conclusions: Headache is common, burdensome and costly in Russia and, manifestly, poorly mitigated by existing healthcare. Structured healthcare services for headache need to be urgently put in place.

No conflict of interest.

B4

EHMTI-0241. Association between migraine and sod1 and sod2 genes polymorphisms: the biobim study

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Background: Familial Hemiplegic Migraine type 1 (FHM1) is a rare monogenic subtype of migraine with aura caused by mutations in the CACNA1A gene. In FHM1, knock-in mouse models show mutations increase the susceptibility for cortical spreading depression (CSD): the underlying mechanism of the migraine aura.

Aim: To study the consequences of CSD in a migraine-relevant context, we measured cortical gene expression profiles in FHM1 and wild-type mice 24 hours after CSD induction.

Method: Expression profiles were generated using deep-Serial Analysis of Gene Expression (SAGE) sequencing, a tag-based next-generation sequencing method for gene expression profiling. Relevant expression changes were validated by qPCR experiments.

Results: Our data show that CSD induces differential expression of genes involved in inflammatory pathways in both the FHM1 and wild-type mice. However, we identified a gene set that is up-regulated upon CSD specifically in the FHM1 migraine mouse model. Genes from this gene set are involved in inflammatory and interferon-related signaling, and were often found up-regulated in immune-stimulated conditions.

Conclusion: Differential expression of genes involved in inflammatory pathways in the brain of FHM1 migraine mice compared to wild-type mice upon CSD, indicates that CSD affects the brain differently in a genetically predisposed animal which may help increase our understanding of migraine pathophysiology.

No conflict of interest.
Introduction: Psychosocial stress is one of the most important factors causing migraine and T-TH. Stressors of school environment are expected to be a probable cause of headaches. The aim of the study is to investigate the susceptibility to stress among adolescents with T-TH and migraine.

Methods: A total of 135 students with T-TH including 94 girls and 41 boys, 96 students with migraine including 70 girls and 26 boys, 52 students with migraine and coexisting T-TH including 38 girls and 14 boys, and 240 headache free students including 121 girls and 119 boys, aged 12-17 years, participated in the study. Stress influence was established according to the Rahe Stress Scale of perceived stress.

Results: The average perceived stress index in the group with T-TH was 27.9%; 30.6% for boys and 25.1% for boys, in the group with migraine - 19.1%; 20.6% for girls and 17.6% for boys, with migraine and coexisting T-TH 29.5%; 33.5% for girls and 25.5% for boys. In headache free patients it was 17.9%; 18.4% for girls and 17.5% for boys. The perceived stress index revealed an increase with age of patients, frequency of T-TH and number of migraine days.

Conclusions: Increased vulnerability to stress is present among adolescents with T-TH and migraine. The correlation between increased stress level and age, gender and frequency of headache was found. No conflict of interest.

B9

EHMTI-0054. Monthly variation of Tashkent pediatric headache emergency department visits

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Headache is the most frequent neurological symptom and the most common manifestation of pain in childhood.

The objective of this article is to determine the monthly variation of emergency department (ED) visits for pediatric headache.

We hypothesized youth have increased headache-related ED visits in the months associated with school attendance.

Methods: Using a Tashkent representative sample of ED visits in the National Hospital Ambulatory Medical Care Survey from September 2009 to April 2014, we estimated number of visits associated with ICD-9 codes related to headache, migraine, status migrainosus, or tension-type headache in 5- to 18-year-olds. Age-stratified multivariate models are presented for month of visit.

Results: There was a national estimate 3300 ED visits annually related to headache (2.1% of total visits) in 5- to 18-year-olds. In 5- to 11-year-olds, the adjusted rate of headache-related visits was lower in March (OR 0.42, 95% CI 0.20, 0.88). In 12- to 18-year-olds, there were higher rates in January (OR 1.92, 95% CI 1.16, 3.14) and September (OR 1.64, 95% CI 1.06, 2.55).

Conclusions: In adolescents we found higher ED utilization in January and September, the same months associated with school return from vacation for a majority of children nationally. No significant reduction in the summer suggests that school itself is not the issue, but rather changes in daily lifestyle and transitions. No conflict of interest.

B10

EHMTI-0013. The relations between attention deficit and hyperactivity disorder and different types of headaches in a non-clinical sample of adolescents

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Introduction: Stress is considered to be a major trigger for aggravation of headaches. In a previous study we demonstrated a high prevalence of ADHD among patients who were referred to a pediatric clinic due to headaches. In the present study we examined whether this is true for the general population of adolescents.

Aims: To assess the prevalence of primary headaches among school students and the relation to learning disorders and ADHD.

Methods: A computerized questionnaire that was filled out anonymously by tenth grade students attending a high school in Haifa, after receiving informed consent from parents and informed ascent from the students participating in the study.

Results: Out of 310 valid questionnaires, 230 students (81%) complained about headaches (88% of the girls and 76% of the boys, p=0.08). 98 of them (43%) elaborated on the characteristics of their headaches: 50% matched migraine, 28% Tension Type Headache, and in 22% there was not enough data to make a definitive diagnosis. Out of the students who had headaches, 27% were diagnosed with ADHD and or learning disabilities with 32% learning with disabilities. Students who felt as if they had ADHD and or learning disabilities but were not diagnosed formally with these diagnoses had significantly more headaches than their diagnosed peers (p=0.002).

Conclusions: Our work indicates that students who feel that they have learning disabilities and or ADHD but were not diagnosed, complain more about headaches compared to their peers who were either diagnosed or did not feel they had one of the two diagnoses. No conflict of interest.

B11

EHMTI-0047. Genetic association and gene expression studies suggest that genetic variants in the SYNE1 and TNF genes are related to menstrual migraine

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Background: This study investigated genetic variants potentially related to menstrual migraine (MM), specifically undertaking genotyping and mRNA expression analysis of the ESRI, PGR, SYNE1 and TNF genes in MM cases and non-migraine controls.

Methods: Migraine diagnosis was in accordance with ICHD-II. Diagnosis of pure menstrual migraine and menstrually-related migraine was confirmed by diary evidence from at least three menstrual cycles.

Controls were women with no personal or family history of migraine, age and ethnicity matched to cases, where possible. A total of 37 variants distributed across 14 genes were typed in 437 DNA samples (282 cases and 155 controls [median age 45.0 vs. 39.5 years]). In addition levels of gene expression were determined in 74 cDNA samples (41 cases and 33 controls [median age 42.0 vs. 35.5 years]). Association and correlation analysis were performed using Plik and RStudio.

Results: SNPs rs3093664 and rs3971601 in ESRI1 and TNF genes respectively, were significantly associated with migraine in the MM population (p = 0.008; p = 0.009 respectively). Analysis of qPCR results found no significant difference in levels of gene expression between cases and controls. However, we found a significant correlation between the expression of ESRI and SYNE1, ESRI and PGR and TNF and SYNE1 in samples taken during the follicular phase of the menstrual cycle.

Conclusions: Our results show that SNPs rs3971601 and rs3093664 in the SYNE1 and TNF genes respectively, are associated with MM. The present study also provides strong evidence to support the correlation of ESRI, PGR, SYNE1 and TNF gene expression in MM.

B12

EHMTI-0187. A novel ATP1A2 mutation in a case of familial hemiplegic migraine with especially severe attacks

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Introduction: Familial hemiplegic migraine (FHM) is a rare disorder characterized by migraine attacks with motor weakness during aura phase. Mutations in CACNA1A, ATP1A2, SCN1A and PRRT2 genes have been described.

Aim: To describe a novel mutation in ATP1A2 gene in a FHM case with especially severe and prolonged symptoms.

Patient: 22-year-old woman admitted due to migrainous headache and sudden onset right-side weakness and aphasia. Previous episodes during childhood. Her mother was diagnosed as hemiplegic migraine without genetic confirmation. Ten days before admission mild head trauma. On clinical exam, body temperature of 38°C, diminished consciousness, left gaze preference, mixed aphasia, right facial palsy, right hemiplegia and left cranial paresis. Urgent perfusion computed tomography showed hyperperfusion throughout all left cerebral hemisphere. No abnormalities in brain Magnetic Resonance and cerebrospinal fluid. In electroencephalogram diffuse slowing. Impaired consciousness and dysphasia began to improve three days after admission and mild dysphasia and right hemiparesis remained during 10 days. No recurrence during a six months follow-up.

Results: Genomic DNA was extracted from peripheral blood and exons were amplified using PCR primers. Capture and massive sequencing of exons of candidate genes obtained using SureSelect Human All Exon 51 Mb kit (Agilent) and Hiseq2000 (Illumina) 30x tests. We identified an undescibed missense variant in heterozygous state in ATP1A2 gene (p.Thr364Met), pathogenic according to different prediction algorithms (SIFT, PolyPhen2, MutationTaster and Condell).

Conclusion: Genotype-phenotype correlation in FHM caused by ATP1A2 mutations is not well defined. This new mutation might be linked to especially severe and long lasting attacks. No conflict of interest.

B13
EHMTI-0212. Possible dependence of primary headache intensity on environmental factor as nuclear plant
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Introduction: Recently the incidence of primary headaches has been increased not only in the capital city of Yerevan, Armenia but in the rural distant towns too. There is consideration that in Armaqir it could be associated with locally situated Nuclear Plant.

Aims: The aim of this study was comparison of primary headaches in Yerevan and Armaqir, and possible differences of disease distribution, headache pain intensity and impact of headache.

Methods: 100 patients with primary headaches were examined (50 in Yerevan and 50 in Armaqir). Patients were also screened by visual analog scale of headache perception and impact (VAS) and headache impact test (HIT-6) screening tools.

Results: Distribution of patients with tension-type, migraine and cluster headaches in Yerevan and Armaqir was 82%, 11%, 7% vs 67%, 18%, 15%, respectively. Headache pain intensity by VAS was 5–7 in Yerevan compared with 7–8 in Armaqir and HIT-6 score was 52 vs 58 in Armaqir.

Conclusions: Headache distribution in Yerevan was within the international data, whether in Armaqir the prevalence of paroxysmal types (migraine and cluster) is higher, with worse scores in both pain intensity and impact of headache. No conflict of interest.

B14
EHMTI-0110. Epidemiology of primary headaches in the population of Baku
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Introduction: Headache is one of the most common reasons people see physicians. It has been estimated that 47% of the adult population have headache at least once within last year in general.

That is why the aim of the study was to investigate the prevalence of primary headaches in the population of Baku the capital of Azerbaijan.

Methods: Baku consists of eleven districts. During 2010-2012 years every 30th of 45,000 Nasimi district inhabitants were invited to the clinic for an interview and screening of headaches. Only one district inhabitants were involved to the study. Currently, the total population of district is 202,073 people. The study included 1,300 people. With the help of a standardized questionnaire, have studied the presence of headache, their specificity, the type, risk factors, neurological and somatic status of the respondents, their social and economic status. Diagnosis of headache conducted according to the criteria of the International Classification of Headache Disorders (second edition).

Results: In 40.5% of the respondents in the last 6 months there has been a headache.13.7% of them were men, 26.3% were women. At 18.2% had migraine, 42.2% have tension type headaches. Distribution headaches by sex showed predominance of primary headaches among women (2:1). Primary headaches are other character (cluster, paroxysmal hemihemicrnia, etc.) revealed only a few people that had no practical meaning. The remaining 183 people (34.7%) were diagnosed secondary headaches. In conclusion our findings may be helpful in organizing the treatment and prevention measures of headaches in Baku. No conflict of interest.

B15
EHMTI-0012. Comorbidity disorders and the quality of life in children and adolescents with primary headache
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Aims and methods: In order to assess comorbid disorders, their impact on the course of headaches, and quality of life (QL) were examined using questionnaires and neuropsychological methods 279 children and adolescents with tension-type headache, 164 with migraine and 60 healthy controls. Parents signed informed consent for their children’s survey.

Results: The spectrum and severity of comorbid psychosomatic disorders (anxiety, depression, autonomic dysfunction, fatigue, insomnia, cognitive dysfunction) depend on the frequency of headache. In patients with chronic headache, especially teenagers, have expressed anxiety, autonomic disorders, mild depression, insomnia, asthenia, and cognitive disorders, often associated with each other. Dissatisfaction with current life situation noted 95,5% of the patients with chronic headache, increased anxiety and depression - 90,9%, reduction in daily activity - 63,3%, reduction of self-control - 54,5%, a reduction of social contacts – 36,4%, worsening of the relation with parents - 31,8%. Quality of life due to the mutual influence of many medical and social factors: the frequency and intensity of headache, severity of emotional disturbances, personality characteristics, family microclimate, level of social adaptation.

Conclusions: Established reliable relationship of comorbid disorders among themselves and with quantitative indicators of pain, a significant impact on QL of children and adolescents: in the same form of headache the patients with comorbidity had worse indicators of QL, especially physical activity, emotional well-being, social functioning. With the development of integrated rehabilitation programs for children and adolescents with primary headache the need to pay special attention to the identification and correction of comorbid psychosomatic disorders. No conflict of interest.

B16
EHMTI-0298. Relationship between migraine and abnormal EEG findings in children
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Introduction: Migraine is a disabling illness that causes absence from school and affects the quality of life. It has been stated that headache may represent an epileptic event. EEG abnormality is a prominent finding in children with migraine.
The aim of this study was to evaluate EEG abnormalities in children with migraine.

Materials and methods: Two-hundred twenty-eight children were enrolled into the study. Evaluation and following of cases was performed by one physician, paraclinical tests were used to increase the accuracy. The study was conducted under the supervision of pediatric neurology masters and the selected cases were from different parts of the country.

Results: Comparing EEG abnormalities in different types of migraine revealed that there is an association between them. There was also a significant difference between EEG abnormalities in different types of aura. Migraine type was associated with the patient’s age. Sleep disorders were more common in patients with a positive family history of seizure.

Conclusions: Our study disclosed migraine as a common problem in children with abnormalities present in approximately 20% of the patients. Migraine and abnormal EEG findings are significantly associated. 

No conflict of interest.
according to Lipton criteria for migraine and ICHD-2 criteria for both migraine and tension headache. Prevalence of migraine was 12.8% (17% in women and 8.1% in men) and prevalence of tension headache was 38.3% (40.6% in women and 35.7% in men). Prevalence of migraine with TTH was 2.9% (3.1% in women and 2.7% in men). There was significant difference in prevalence of migraine (OR=2.3) and tension headache (OR=1.23) between female and male students. We have found that migraineurs were more prone to self-medication (OR=3.29), as to health care utilization (OR=8.12). Also we have identified smoking as a precipitating factor for migraine.

The prevalence of primary headaches in Croatia is similar to that in other countries of the world, tension headache is the common primary headache, occurring later than migraine, and both types are more common in females. Smoking is a risk factor for developing migraine. Although migraineurs visit the doctor and take medications more frequently, both headaches are underdiagnosed and undertreated. No conflict of interest.

B21
EHMTI-0296. Estimating prevalence and burden of major disorders of the brain in Nepal: methodology of a nationwide population-based study
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Introduction: The major disorders of the brain are public health problems globally also prevalent in the low and middle income countries where they are poorly described.

Aim: The aim this paper was to report how standard method developed by Lifting The Burden for population-based study was carried out in Nepal, a country with rather unusual physiographic challenges. The final goal of the research was to find the prevalence and burden of the major disorders of the brain -- migraine, anxiety and depression in the adult population.

Methods: Expert group collaboration was initially the method used to arrive at the instruments to be employed. Subsequently, pre-pilot and pilot studies were made to test and modify the final version. The study was an unannounced door-to-door survey to cover all parts of the country. Fifteen representative districts out of 75 in the country were investigated. Furthermore, households in the cluster were selected by using a “spin the bottle” method. Face-to-face interviews were carried out and involved one randomly selected adult family member. The structured questionnaire, originally developed by Lifting The Burden, with the addition of the Hospital Anxiety Depression Scale and the Eysenck’s neuroticism scale was used. These additional scales were translated into Nepali and psychometric validation was also done.

Results: Among 2,210 contacted households, 2,109 were eligible for the study, and 2,100 (99.6%) adults from eligible households finally participated in the study.

Conclusion: The reported method and the extended and translated HARDSHIP questionnaire were found adequate for the Nepali context. No conflict of interest.

B22
EHMTI-0084. Resting state functional connectivity abnormalities in pediatric patients with migraine
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Introduction: Previous resting state (RS) functional magnetic resonance imaging (fMRI) studies in adult patients with migraine have demonstrated abnormal functional connectivity (FC) of brain networks involved in pain processing, including the default mode (DMN), the salience (SN) and the executive control (ECN) network.

Aims: To explore abnormalities of brain RS FC in pediatric patients with migraine and their correlation with patients’ clinical characteristics.

Methods: Using a 3.0 Tesla scanner, RS fMRI scans were acquired from 13 pediatric migraine patients and 15 age-matched controls. Independent component analysis and a template-matching procedure were used to identify the DMN, ECN, working memory networks (WMN), SN, sensorimotor (SM), auditory and visual (VN) networks. Within-group and between-group RS FC comparisons and analysis of correlation were performed using SPM8.

Results: Compared to controls, pediatric migraine patients had an increased RS FC of the orbito-frontal, middle and posterior cingulate gyrus of the DMN and WMNs; the inferior temporal gyrus of the ECN, the Rolandic operculum and lingual gyrus of the WMNs and the postcentral gyrus of the VN. They also experienced a decreased RS FC of the anterior cingulum of the SN, the middle temporal gyrus and cerebellar vermis of the WMNs and the superior temporal gyrus of the SM. Altered RS FC of the temporal lobes of the ECN and WMN was correlated with disease duration and attack frequency.

Conclusions: In pediatric migraine patients, distributed abnormalities of brain RS FC occur and engage not only pain-facilitating and pain-inhibiting regions, but also areas involved in executive processes. No conflict of interest.

B23
EHMTI-0114. Vestibular migraine, prevalence in vestibular and headache centre and aids for diagnosis
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Introduction: In population-based studies, lifetime prevalence of migraine and vertigo in the general population of Western industrial nations is approximately 16% and 7%, respectively. A lot terms are used to describe combination of migraine and vestibular symptoms (migranous vertigo, migraine-associated-vertigo, vertiginous migraine), recently the International Headache Society and the Barany Society (International Society for NeuroOtology) created a consensus document with diagnostic criteria for Vestibular Migraine (VM) to clearly diagnose and compare patient populations in a standardized manner.

Evaluative the prevalence of VM is particularly complex for its overlap between otolaryngology and headache experts. Our experience teaches us that, if main symptom of VM is headache, probably patient will be more easily diagnosed migraine but not VM, and if the main symptom is dizziness may not be interviewed on association with headache, failing the diagnosis. Aim of the study is to start a collaboration with the otolaryngology to evaluate the utility of self-administered tests to facilitate diagnosis of VM in patients who access to vestibular or headache clinics.

Methods: Patients who access from 15 April to 30 May in our clinics will fill out self-administered tests for the diagnosis of VM as ID-Migraine, disability scales for headache and dizziness as the Headache Impact Test 6 (HIT-6) and the Italian Dizziness Handicap Inventory (DHI-It).

Results: Preliminary data show that administration of tests has sensibly improved (more than 70%) diagnosis of VM in vestibular and headache clinic improving sensibility of clinicians to both symptoms, optimizing diagnosis and treatment of vertigo undefined.

No conflict of interest.

B24
EHMTI-0197. Whole blood transcriptome analysis in migraine with aura patients: a case control study
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Antecedents: There has been only one report analyzing whole blood transcriptome (WBT) in menstrual migraine.
Objective: To investigate interictal WBT in patients suffering from migraine with aura (MWA).

Methods: We performed 52 RNA-seq experiments with 26 controls (20 females) and 26 interictally-drawn samples (20 females) from sex- and age-adjusted patients suffering from MWA using Illumina Hi-seq high-throughput sequencing machine. To detect differentially expressed (DE) genes between affected and unaffected samples we used the edgeR (robust dispersion estimation) software correcting by sex.

Results: We obtained more than 10 million short reads per sample. We identified 93 up-regulated genes in unaffected, and 7 up-regulated genes in affecteds (FDR< 5%). Interestingly, among those DE genes we found some related to endothelial function (HBG1, HBG2, and ADIPOR1), and other related to solute carriers, energetic mechanisms, and apoptosis were also found up-regulated in controls; overexpression of genes involved in inflammation were found in affecteds. We also performed a gene ontology enrichment for the differentially expressed genes (DAVID database) and found eutroctic and myeloid differentiation processes to be activated. (Bonferroni <0.01). Other gene ontologies, like apoptosis or positive regulation of synaptic transmission, showed uncorrected significant P values (<0.05).

Conclusion: Our preliminary results after analyzing WBT found 100 differentially expressed genes in MWA. The most significantly DE genes are involved in endothelial homeostasis. These results open new targets for understanding migraine pathophysiology.

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No conflict of interest.

B25

EHMTI-0115. Migraine under 7 years: a clinical study

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Introduction: Migraine in children under 7 years has received limited attention and the few studies rarely report a careful description of clinical and therapeutic features.

Aims: The aim of this study was to describe some characteristics of migraine phenotype in children under 7 years and to compare it with a population of migraineous children over 7 years.

Methods: We reviewed all standard clinical files of children seen in a four years period and diagnosed with primary headache. In the study we included all children under 7 years age diagnosed with migraine. Twenty clinical variables were reported.

Results: 456 children with primary headaches (216 males, 240 females, mean age10.9 ± 3.1), have been seen during the study period. 374 children (188 males, 186 females) were affected by migraine with/without aura. The children under 7 years affected by migraine were 40 (8.9%) (20 males, 20 females, 5.7±1.2 mean age), two children had migraine with aura. These children showed generally a prevalence of main migrainous features similar to the group over 7 years. However the parameters found to be statistically significant different were duration of attacks and frequency of attacks (longer and more frequent with increasing age).

Conclusion: Our study shows that prevalence of migrainous characteristics is similar in younger to that of older migraineous, but duration of attacks and frequency of attacks are statistically different between two groups. These differences may reflect greater exhaustion of the mechanisms activating attacks with following refractoriness to a new attack.

No conflict of interest.

B26

EHMTI-0329. Cluster headaches - experience from a tertiary children's headache clinic

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Introduction: Tension Type Headache (TH) 39%) and Migraine (with and without aura 33%) are the most common primary headache seen in paediatric headache clinics. Rare headaches including Cluster Headaches (CH ) account for 8% (Abu Arafeh 2013).

Aims: To study the prevalence and clinical characteristics of children with CH.

Methods: A retrospective case-note study from January 2006 – December 2013 was undertaken.

Results: Of the 472 new referrals 9 had CH (1.9 %). Mean age at presentation was 10 years 11 months (6y5m to 16y10m). Two had chronic CH and seven episodic CH. 3/9 had multiple headache types (cluster + migraine). One had a family history of CH.

All headaches were described as severe or very severe and descriptive terms ranged from sharp to stabbing to throbbing to pounding. Location was always unilateral with neither side dominating. 7 experienced autonomic symptoms with no particular one standing out. All were agitated. 7 had some degree of photo or phonophobia. None were affected by movement.

All had normal neuroimaging (usually MRI) except one (cerebellar- pontine angle dermoid). Three had normal pituitary tests. Examination elicited occipital nerve tenderness in 7 but was otherwise normal. Mean time to diagnosis was 25 months (range 4-91). No treatment was consistently effective. Intranasal sumatriptan and occipital nerve injection were effective in three cases each.

Conclusions: Cluster headaches can evolve over time in children. Agitation is a key feature of the condition. No conflict of interest.

B27

EHMTI-0295. Estimating prevalence and burden of major disorders of the brain in nepal: cultural, geographic, logistic and philosophical issues of methodology

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Introduction: Headache, anxiety and depression are major disorders of the brain in terms of prevalence, burden and costs to society. Nationwide population-based studies of these disorders are warranted but, in research-naive and resource-poor countries such as Nepal, a host of underlying methodological problems are encountered including cultural, geographic, logistic and philosophical issues. Existing literature, however, is not able to guide the planning of major epidemiological studies in such resource-deficient countries.

Aim: To identify the potential difficulties and come up with the solution for making epidemiological research possible in Nepal.

Methods: Expert consensus was sought among researchers from different professional and cultural backgrounds in planning and conceptualizing an epidemiological study that would be adapted to the special situation and circumstances of Nepal, but applicable in several other similar countries as well.

Results: The methodological concerns were sorted out into different themes; related to the research procedure, logistics and practical matters. Each of them was dealt with separately and their inter-relationships were explored. Geographic, climatic, and socio-cultural issues were the areas that contained the biggest challenges.

Conclusion: Anticipating potential problems in a large epidemiological study in advance and establishing an expert consensus about their resolution was done to avoid logical and methodological complications that would influence the outcome. No conflict of interest.

B29

EHMTI-0167. Prevalence of migraine in schoolchildren in the republic of Moldova. Pilot study

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Background: Migraine is a disabling primary headache that often has its onset in childhood and adolescence and may be present in 7–10% of children by age 15. Aims: To study the prevalence of migraine in adolescents in the Republic of Moldova (RM). Methods: The 6-month period study included 500 schoolchildren aged between 14–19 years from randomly chosen schools in Chisinau, capital city of the RM. We developed a special questionnaire including 10 chapters (101 questions). The headache diagnosis was established based on the ICHD-II (2004) and ICHD-III (2006) criteria. The data were analysed using SPSS software. Results: Of 500 schoolchildren interviewed 336 (67.6%) were suffering from headache, and 162 (32.4%) were headache free. The average age of respondents was 16.4±0.17 years. The average age of headache onset was 12.1±0.23 years. Migraine distribution by gender was as follows: girls – 73.4% and boys – 26.6%. The prevalence of migraine was 19.4%, with episodic migraine in 11.6% and chronic migraine – in 7.8% cases. Regarding age criterion the questionnaires were distributed as follows: 14 years – 16 (3.2%) persons, 15 years – 101 (20.2%) persons, 16 years – 151 (30.2%) persons, 17 years – 117 (23.4%) persons, 18 years – 108 (21.6%) persons, 19 years – 7 (1.4%) persons. According to gender, there were 314 (62.8%) girls and 186 (37.2%) boys. Conclusion: The preliminary data show a quite high prevalence of episodic (11.6%) and chronic (7.8%) migraine among schoolchildren of the Republic of Moldova. Further analysis with bigger sample size will offer more accuracy.

No conflict of interest.

B30
EHMTI-0040. Headaches after traumatic spinal cord injury
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Background: Patients with traumatic spinal cord injury (TSCI) often suffer from different types of pain. However, headaches (HA) after TSCI have not been studied specifically.

Aim: To examine the HAs among patients with TSCI.

Methods: The cross-sectional study included individuals with TSCI from 1997 to 2011 who were interviewed via telephone. The interview based on a specifically designed questionnaire.

Results: There were 9 women and 64 men (mean age 37.1±10.6 years). The most frequently mentioned pain was HA (71%), followed by back pain (60%) and pain in neck (44%). HAs were more frequent after the trauma compared with the HAs before TSCI (p=0.01). The HAs that arose after TSCI were not related to the concomitant brain injury (p=0.80). The occurrence of HA did not depend on the severity nor the level of the TSCI.

The most frequently reported HA located in the occipital, was pulsating and lasted from 1 to 3 hours. The maximal intensity of the pain was 6.9±2.0 according to the Numeric Rating Scale. Due to the HA 85% of the patients were not seen by any physician and their HA was not diagnosed.

Conclusions: This is the first study that shows HA is the most prevalent pain after TSCI. Despite this, the majority of patients are never consulted, diagnosed or appropriately managed due to their HA. This indicates that further studies are needed to provide evidence regarding the causes of HA and their impact on quality of life.

No conflict of interest.

B31
EHMTI-0247. Headache-attributed lost productivity, and the influence of headache frequency, in two different female workforces in Turkey
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Background: In our previous workforce study at Ford Otomotiv Sanayi (FO), the association between high headache frequency and presenteeism in the relatively small female workforce attracted our attention.

Aim: We compared this workforce with another female hospital-based workforce to explore similarities and dissimilarities.

Methods: The HALT-30 questionnaire had been employed as the survey instrument at FO. We administered the same to nurses and female residents of Kocaeli University Medical Faculty Hospital (KUMFH). We categorised headache frequency into four groups: low (<1/month), moderate (2–4/month), high (5–14/month) and headache on ≥15 days/month.

Results: At FO (n=431; mean age 29.2±4.5 years), 1-month headache prevalence was 62.6%, and at KUMFH (n=466; mean age 29.9±4.9 years) it was 76.8% (p<0.05). Distributions between the frequency groups were similar: 16.6%, 46.3%, 31.5%, 5% (low to high) at FO and 16.4%, 52.7%, 15.1%, 6.8% at KUMFH (although p<0.05). Of those with headache, 135 (50%) at FO and 145 (42.9%) at KUMFH reported lost productivity, mostly from presenteeism. The key finding was a clear gradient associating headache frequency and presenteeism at individual level in both workplaces (FO: I: 0, 2.0, 3.9, 10.3; KUMFH: 1.0, 1.9, 3.5, 6.0 days/month), but not absenteeism (FO: 0.2, 0.02, 0.05, 0; KUMFH: 0.02, 0, 0.07 days/month).

Discussion: Headache frequency and lost productivity were rated as presenteeism are high among working women. The association between them is expected. Turkish employment situation might be a factor in determining absenteeism rates. People with infrequent attacks, facing one unexpectedly, might be unprepared for avoiding absenteeism.

No conflict of interest.

B32
EHMTI-0246. Lost productive time attributed to headache in a heavy-manufacturing workforce in Turkey
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Background: Headache disorders cause productivity losses through absenteeism and presenteeism. Productivity losses may be influenced as much by culture, social factors (employment levels) and the nature of the work as by frequency and severity of headache.

Aim: To investigate productivity loss and its characteristics due to headache.

Methods: We studied headache-attributed time losses in the workforce (n=7,200) of Ford Otomotiv Sanayi AS, a vehicle manufacturing company. Over one year, the HALT-30 questionnaire was administered to every employee during their routine annual health-check.

Results: We obtained usable data from 5,916 employees (92.7% male, 7.3% female; mean age 32.5±5.4 years) among whom 1-month headache prevalence was 45.4%, with 896 (16.4% of the workforce) reporting headache-attributed productivity loss. Presenteeism greatly outweighed absenteeism (3,036 [94.2%] vs 190 mean lost days/month). The nature of an employee’s work, from office and managerial through paint-house to heavy manufacturing (welder, assembler, press-metal worker), had insignificant impact on the probability of reporting productivity losses (range 15.2–18.8%) or on the mean loss per individual (range 2.8–3.6 days/month).

Discussion: The lost productive time recorded was about 2.3% of all available time – a substantial penalty. It was surprising that the nature of work had so little influence, but it may be that the country’s economic state and unemployment rate, and the related social issues, were dominant factors. Supporting this was the finding that 94% of lost productivity was accounted for by presenteeism – largely hidden from the employer.

No conflict of interest.

B33
EHMTI-0208. Positive association between -1021C/T polymorphism of dopamine-b-hydroxylase gene and level substance dependence in medication-overuse headache
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Introduction: Medication overuse headache (MOH) is a chronic headache associated with an overused of NSAIDs, combined analgesics or triptans. The pathophysiology and the risk factors of MOH are still unknown. MOH can be considered as an interaction between the chronic pain disorders and individual predisposition for the dependent behavior.

Aims: The current study was conducted to determine the association between the dopamine β-hydroxylase (DBH) -1021C/T polymorphism and MOH.

Methods: -1021C/T polymorphism in promoter region of DBH gene was analyzed in 44 patients with MOH with a control sample of 30 individuals without headache and without drug overuse, and with 24 patients chronic migraine without MOH and 41 episodic migraineurs. The DBH genotypes were identified by a PCR-RFLP method and clinical profile were assessed by Headache Diary and Leeds Dependence Questionnaire (LDQ)

Results: The genotype frequencies of -1021C/T polymorphism DBH gene did not differ between the MOH and other groups. In contrast, we found that the presence of the -1021T allele was significantly associated with the monthly drug consumption and LDQ total score in the MOH group. We also found an interaction between the presence of DBH -1021T genotype and efficiency serotonin-norepinephrine reuptake inhibitors in patient with MOH.

Conclusions: These results showed the influence of the -1021T>C polymorphism DBH gene on the number of symptomatic drug doses taken and level substance dependence (LDQ total score) in MOH, supporting a relationship between MOH and dependence-related behavior.

No conflict of interest.

B34

EHM01-0248. Evaluation of headache prevalence and characteristics in orphans aged 12-17
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Introduction: The epidemiological studies show that presence of divorced parents or loss of a parent is a risk factor for headache during childhood.

Aims: We aimed to investigate the frequency, clinical features, trigger factors, comorbidities, effects on daily life and accompanying emotional and behavioral problems of the migraine and tension-type headache (TTH) in the orphan children.

Methods: We performed our study in a school where the orphan children study. 415 students of 12-17 age group are counted in the study. PedMIDAS scale of 5 questions and strength and difficulties questionnaires are asked to fill. The results are compared by dividing the children into 2 groups of 12-14 and 15-17 age groups.

Results: In the 12-14 age group, the frequency of primary headache is found as 59.8% with the frequency of migraine is 24.4% and the frequency of TTH is 35.4%. In the 15-17 age group the frequency of headache is 59.7% and 23.6% of them were composed of migraine where as the 36.1% of them fulfill the criteria of TTH.

Conclusions: Stressful life events during childhood such as parent loss is found to be relevant with becoming chronic and higher frequency of headache.

No conflict of interest.

B35

EHM01-0233. Clinical characteristics of migraine patients with dopaminergic gene polymorphisms RS1611115
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Introduction: The dopaminergic system plays a major role in migraine. Dopamine beta hydroxylase (DBH) is responsible for maintaining dopamine-to-norepinephrine ratio implicated in migraine pathophysiology. We aimed to look for association of polymorphisms in dopaminergic genes in genetic susceptibility to migraine in Russian population. In the present study DBH polymorphisms rs1611115 was selected.

The aim of this study was to determine whether the polymorphisms rs1611115 in DBH gene influenced any particular symptoms of the disease.

Methods: We have analyzed clinical characteristics of 128 patients with migraine (22 patients with migraine with aura and 106 patients with migraine without aura), according to the ICHD-II (2003) taking into account their genotypes of TT variant of DBH. Genotyping was done using polymerase chain reaction (PCR).

Results: We have shown that the T-allele carriers (46.9%) as compared to the CC genotype patients (53.1%), have more severe coarse of migraine. A significant association was shown (number of acute medication per month (p=0.04), more severe grade of medication overuse (p=0.001), presence of allodinia (p=0.03) and prodromal period (p=0.001).

Conclusions: Thus, according to our data, the T-allele in rs1611115 is significantly associated with certain clinical characteristics of migraine. No conflict of interest.

B36

EHM01-0205. Methodology guidelines for population surveys of headache prevalence, burden and cost
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The Neurological Institute, Taïpe Veterans General Hospital, Taipei, Taiwan


Background: The global burden of headache is very large, but knowledge of it is far from complete. Published population-based studies have used variable methodology, which has influenced findings and made comparisons difficult.

Aim: To produce consensus-based methodological guidelines [1] with the main focus on migraine, tension-type headache and medication-overuse headache, but not intended to be exclusive to these.

Method: An expert consensus group including experience and competence in headache epidemiology and epidemiology in general was drawn from all six WHO world regions. Drafts were discussed and revised by email before and after a three-day consensus conference in September 2011, and eventually revised after a public consultation posting on the International Headache Society website.

Results: The recommendations cover most methodological issues: study design; definition of population of interest; control of bias, sample selection and participation rate; how to access and engage participants, and methods of enquiry; case definition and diagnosis, and algorithm for making headache diagnoses; use of pilot studies; measurement of headache burden. There are also discussions of how to report studies and evaluate other studies, as well as of ethical issues.

Conclusion: The principles should be useful to researchers whose main interests are in the field of headache, but they also seek to encourage collaborations between specialists in headache disorders and epidemiologists.

No conflict of interest.

Reference

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The response rate was 53.1%. The prevalences of CH (3.3%) and MOH were 1.4% and 0.9%, respectively. CH was more prevalent among those with low SEP (OR 2.5, 95% CI 1.7–3.7) than among those with high SEP. MOH was more prevalent among those with low SEP (OR 5.5, 95% CI 3.3–9.1) than among those with high SEP. MOH was associated with low SEP regardless of education and income. CH was not associated with any SEP indicators.

Aim: To characterize the headache types experienced by patients with ASD who presented in the neurology clinic from January 2011 to April 2013 was performed.

Methods: A retrospective chart review of patients with ASD who presented in the neurology clinic from January 2011 to April 2013 was performed.

Results: Eighteen patients were identified, 12 males and 6 females. Migraine was the most frequent headache type occurring in up to 61% (11/18) of patients. Eight of these 11 patients have migraine without aura; one with migraine with aura and two patients have both migraine with and without aura. Combined migraine and tension type headache was seen in 3 patients. Three had chronic daily headache and one had probable migraine. Age at presentation ranged from 5-16 years. All patients were verbal and all have co-morbid behavioral and mental health conditions.

Conclusion: Our data show that ASD patients, despite being known to have indifference to pain, can experience headaches with migraine being the most common headache type in these patients referred in our neurology clinic. No conflict of interest.

B38

EHMTI-0145. Health risk behaviours in medication-overuse headache: results of a population-based study

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Introduction: Medication-overuse headache (MOH) has been called a biobehavioural disorder.

Aim: This cross-sectional study, we investigated associations between MOH and health-related behaviours as indicated by daily physical activity, and body mass index.

Methods: 129,150 randomly selected individuals aged >16 years were invited to the 2010 Danish National Health Survey. Data on SEP indicators were retrieved from national registers. Respondents with headache >15 days/month over three months were classified as having chronic headache (CH). Those with CH and concurrent over-the-counter analgesic intake of >15 days/month were classified as having medication-overuse headache (MOH). Physical and mental health composite scores (SF-12) were summarized per headache group, stratified by SEP, and compared to the sample mean. All analyses were adjusted for stratified sampling and non-response.

Results: The response rate was 53.1%. The prevalences of CH (3.3%) and MOH (1.7%) were inversely related to SEP. Compared to the general population, health status scores were significantly lower among people with CH, particularly those with MOH, regardless of education and income. Scores were markedly lower among those with MOH who were unemployed, early pensioners, or were receiving social/sickness benefits.

Conclusion: CH and MOH are more prevalent among those with low SEP than those with high SEP. Preventing and treating MOH would substantially reduce the individual and societal burden of CH. No conflict of interest.

B40

EHMTI-0066. Effect of intrauterine growth restriction on the development of migraine and tension-type headache: the Nord-Trøndelag Health Study (HUNT-3)

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Introduction: Little is known about the importance of intrauterine factors on the later development of headache.

Aims: We aimed to study whether intrauterine growth restriction is associated with development of migraine and tension-type headache in young adulthood.

Methods: We analysed data from 6,321 Norwegian adults age 19-41 years who participated in the Nord-Trøndelag Health Study (HUNT-3), using linked data on birth weight and gestational age from the Medical Birth Registry of Norway. Based on national reference values, participants were categorized as being born appropriate for gestational age (10th-90th percentile), small for gestational age (3rd-10th percentile), or very small for gestational age (<3rd percentile). The effect of intrauterine growth restriction on the presence of migraine or tension-type headache in young adulthood was analysed using logistic regression, adjusted for age and sex.

Results: Compared with those born with a birth weight appropriate for gestational age, children born small or very small for gestational age had an increased risk for developing migraine (OR=1.23, 95% CI=1.08-1.55, and OR=1.69, 95% CI=1.18-2.41 respectively, p for trend=0.001), but not tension-type headache (OR=1.09, 95% CI=0.86-1.38 and OR=1.43, 95% CI=1.00-2.09 respectively, p for trend=0.053). When stratified by sex, there was a significant association between intrauterine growth...
Intrauterine growth restriction is associated with an increased risk for developing migraine in young adulthood. This suggests that migraine is caused partly by influences in early development. No conflict of interest.

**B41**

**EHMTI-0058. Association between Ala379Val polymorphism of lipoprotein-associated phospholipase A2 and migraine without aura in an Iranian population**

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**Introduction:** Migraine is a common neurovascular disorder with multifactorial and polygenic inheritance.

**Aims:** The aim of this study was to investigate the association of migraine without aura and Ala379Val polymorphism of lipoprotein-associated phospholipase A2 (Lp-PLA2) gene in an Iranian population.

**Methods:** In this study 103 migraine patients and 100 healthy controls were enrolled. DNA samples were extracted and the Ala379Val polymorphism of Lp-PLA2 gene was investigated. To assess severity of headache, patients filled out the HIT-6 and MIGSEV questionnaires.

**Results:** Allele V had significantly lower frequency in case group than control subjects (P=0.00, OR=0.25, CI:0.15 - 0.40). The frequency of migraine patients that were carrier of V allele (V/V and A/V) was significantly lower than control group (P=0.003, OR=2.39, CI: 1.35 - 4.23). There was no significant difference of alleles frequency between three grades of MIGSEV (P=0.316). Also total HIT-6 score was not significantly different between different genotypes (0.466).

**Conclusion:** In conclusion our results showed that Ala379Val gene polymorphism of Lp-PLA2 is associated with lower risk of migraine but not with severity of headaches. No conflict of interest.

**C - NON-MIGRAINE HEADACHES: TENSION-TYPE HEADACHE, TACS, OTHER PRIMARY AND SECONDARY HEADACHES**

**C1**

**EHMTI-0232. Non-surgical management of rhinogenic contact point headache**

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**Introduction:** Rhinogenic contact point headache (RCPH) is a pain that arises from two opposing mucosal surfaces in the nose. The diagnosis is made by history and physical examination along with nasal endoscopy and imaging. The mainstay of treatment is surgical removal of contact area. The mainstay of treatment is surgical removal of contact area. The mainstay of treatment is surgical removal of contact area.

**Aims:** To evaluate retrospectively the differences in demographics, headache characteristics, concomitant diseases and treatment response of 198 CH patients diagnosed and followed at the Pavia Headache Centre.

**Results:** Data from 134 males and 64 females were collected. The mean age at CH onset was lower in women than in men (24.8±10.8y vs 28.03±10.2y, p<0.43). Episodic form of the disease was diagnosed in 91% of subjects, without gender difference. No differences were detected as regards the annual mean number of CH periods, their mean duration and the average daily frequency of attacks during the active phase. Untreated attacks were shorter in men (90 minutes vs 107 minutes, p<0.02). A family history of migraine was present in 71.4% of women and 59.1% of men (p=0.06). Nausea, vomiting, photo and osmophobia were reported more frequently by women than men, while local autonomic symptoms were almost equally distributed between sexes. No difference was found in treatment response between genders. Female CH sufferers presented more frequently thyroid disorders and psychiatric illness than men. On the contrary, snoring in sleep occurred statistically more frequently in men.

**Conclusions:** This retrospective survey shows some specific features for CH in women: earlier onset of disease, more frequent association with ‘migrainous’ symptoms during the attacks and a longer duration of untreated attacks.

**C2**

**EHMTI-0011. Spinal manipulation for a child with chronic cervicogenic headaches: a case report**

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**Introduction:** Cervicogenic headache (CH) mostly affects men but a substantial percentage of women also suffer this headache disorder. Little is known about possible gender-related differences in the characteristics of attacks from studies where CH diagnosis was validated.

**Aim:** To evaluate retrospectively the differences in demographics, headache characteristics, concomitant diseases and treatment response of 198 CH patients diagnosed and followed at the Pavia Headache Centre.

**Results:** Data from 134 males and 64 females were collected. The mean age at CH onset was lower in women than in men (24.8±10.8y vs 28.03±10.2y, p<0.43). Episodic form of the disease was diagnosed in 91% of subjects, without gender difference. No differences were detected as regards the annual mean number of CH periods, their mean duration and the average daily frequency of attacks during the active phase. Untreated attacks were shorter in men (90 minutes vs 107 minutes, p<0.02). A family history of migraine was present in 71.4% of women and 59.1% of men (p=0.06). Nausea, vomiting, photo and osmophobia were reported more frequently by women than men, while local autonomic symptoms were almost equally distributed between sexes. No difference was found in treatment response between genders. Female CH sufferers presented more frequently thyroid disorders and psychiatric illness than men. On the contrary, snoring in sleep occurred statistically more frequently in men.

**Conclusions:** This retrospective survey shows some specific features for CH in women: earlier onset of disease, more frequent association with ‘migrainous’ symptoms during the attacks and a longer duration of untreated attacks.
Introduction: Headache is a symptom very often present in patients with epilepsy. Aims: The aim of our study was to find the characteristics of headache in adults patients with symptomatic epilepsy. Methods: We studied patients with symptomatic epilepsy and headache using standard protocol: neurological examinations, Color duplex ultrasound, Transcranial ultrasound, Electroencephalography (EEG), Computerized tomography (CT) and MR/MRA (angiography). Results: 82 patients were observed, 52 female and 30 male, age range 39 to 82. All of them were suffering by acute or chronic headache and symptomatic epilepsy. Preictal headache was present in 8 (9,75%) patients, postictal in 27 (32,92%) and interictal in 47 (57,1%) patients. Among the patients with postictal headache 13 (48,14%) had migraine, 9 (33,33%) tension-type of headache and 7 (27,52%) other headaches. Among the patients with interictal headache 28 (59,57%) was migraine, 15 (31,91%) combined migraine and tension-type and 7 (14,89 %) other headaches. The majority of seizures were simple focal seizures. Conclusions: 1) Among the patients with symptomatic epilepsy interictal migraine was commonly than other headaches. 2) The majority of seizures in patients with headache and symptomatic epilepsy were simple focal seizures. 3) The comorbidity may be important in the choice of treatment of headache.

Introduction: Temporomandibular joint (TMJ)-related pain also includes the craniomandibular and cervicocranial areas due to the topographic-functional closeness. Aims: To determine the relationship between types of headaches and cervical spine (CS) disorders in a patients with osteoarthritis (OA) of TMJ with one-year-follow-up. Methods: 65 patients (mean age 47,95.4% women) were consecutively treated for signs and symptoms of OA of TMJ. A definitive diagnosis of OA was confirmed by magnetic resonance imaging. The patients were examined by a dentist, a neurologist, and a physiatrist-rheumatologist. Results: They were treated by an occlusal splint and physical therapy with one-year-follow-up. Results: The applied treatment modalities achieved a significant reduction of pain (p<0.001) in the TMJ at first examination and one-year-follow-up (mean values on VAS: 6,56 and 1,67). 46.2% of patients did not have interictal diagnosis and 53.9% of patients did not have headaches. 16.9% of them had migraines, 23.1% had CS-related headache and 61% of patients had tension-types headaches. Cervical syndrome was found in 10.8% of patients. 26.1% had cervicobrachial syndrome, 7.7% had cervicocephalic syndrome and 9.2% of patients had both. The SC syndrome was significant regarding the patients’ age (mean age 40.8 as opposed to 53,1 years, with p=0.0002), whereas there were no differences for headaches.

Introduction: Cranial neuralgias are distinct, treatable syndromes which comprise one of the possible causes of facial pain. Although some prophylactic medications and techniques have been proposed as treatments, there are still many refractory patients and other therapeutic options are warranted. Peripheral nerve stimulation (PNS) has been proposed as a promising therapy for these patients. Aim: The aim of this study is to evaluate the efficacy and tolerability of PNS for the treatment of refractory cranial neuralgias. Methods: Twelve patients (3 men, 9 women, average age 52.8±12.0) suffering from different drug-resistant cranial neuralgia were enrolled and implanted with a neurostimulation device. Five suffered from occipital neuralgia, 3 had postherpetic neuralgia and 4 had trigeminal neuralgia. The primary endpoint was the reduction in Analogical Visual Scale (AVS). Patient satisfaction, side effects and reasons for discontinuation were also studied. Significance level was set at P<0.05. Results: Pain severity according to the AVS was reduced from 9.0±0.9 before to 4.9±2.7 after treatment initiation. 58% of treated patients were satisfied or very satisfied with the procedure. The most common adverse event was persistent implant site pain and three patients required to be explanted due to inefficacy. There were not differences between different subgroups. Conclusions: PNS has been explored as a possible treatment option in selective drug-resistant cranial neuralgias and, according to our results, this technique may be effective, safe and well tolerated in treating them. More studies are warranted to confirm these results. No conflict of interest.

Introduction: Tension type headache is the most common type of headache. Although it is not a serious medical condition, in the general population it is the main cause of analgesics use. Aims: The aim of this study was to estimate intensity and other qualities of pain as well as the influence of pain on daily functions, the presence of depressive symptoms and their correlation with pain intensity in patients with tension type headache. Patients and methods: It was a prospective study performed at the University Department of Neurology, Sestre milosrdnice University Hospital Centre, Zagreb. Patients with tension type headache older than 18y and 30 healthy volunteers were included. Exclusion criteria were: patients younger than 18y, serious physical or mental illness and use of prophylactic therapy for headaches. The intensity and quality of pain were estimated by visual analog scale (VAS), McGill questionnaire, Brief Pain Inventory (BPI) and presence of depressive symptoms by Beck depression inventory (BDI-II). Descriptive statistical methods and regression analysis were used in statistical analysis. Results: The pain intensity in patients with tension type headache was according VAS 51,7±11,86/100mm, McGill questionnaire 15,13±5,06 points and according BPI 1,9±0,86 points. The disability level according BPI was 1,84±1,33 points. The presence of depressive symptoms was 8,76±4,57
The tension type headache is the chronic pain condition, probably the consequence and not the reason of depressive symptoms.

Conclusion: The tension type headache is the chronic pain condition, probably the consequence and not the reason of depressive symptoms. No conflict of interest.

C8
EHMTI-0129. 3D-cinema and headache: preliminary results of a prospective cross-sectional study
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Introduction: 3D-cinema is a growing audio-visual experience worldwide. There are anecdotal reports, that the exposure to 3D-movies can induce headache.

Aim: To establish the frequency of occurrence of headache after viewing 3D-movies in commercial cinemas, to describe the headache characteristics in response to the exposure and to assess possible contributing co-factors.

Methods: Specifically designed questionnaire, containing demographic data, name of a movie, prior history of headaches, exposure to possible contributing co-factors and headache descriptors, was distributed to 6000 visitors of three major cinemas in Estonia.

Results: By the date of the abstract submission 1131 persons (337 men and 794 women) have responded to the questionnaire. The mean age of responders was 33 years (6-74). Among them 26.6 % reported to have had a headache in response to work in front of a non-3D computer screen, 13.9% in relation to 3D movies, and only 1.5% after watching 2D-films earlier in life. In this study, however, 6.2% of men and 11.6% of women reported to have headache: women were at a higher risk of occurrence of headache after or during the 3D-cinema compared to men (OR=1.78; 95%CI=1.18-2.69). More specific and final results, including the subgroups analysis will be presented.

Conclusions: Watching 3D-movies at a cinema can cause a headache. Further studies are needed to confirm the possible risk factors of individual susceptibility to the 3D-cinema headache. There is a need of rising public awareness of possible discomfort people may suffer during and after the explosion to 3D-movies. No conflict of interest.

C9
EHMTI-0202. Study protocol of BoTN: a randomized, double-blind, placebo-controlled trial to evaluate the efficacy and safety of botulinum toxin injections in the treatment of trigeminal neuralgia
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Background: Trigeminal neuralgia (TN) is a chronic disorder characterized by paroxysmal facial pain. Adequate prophylactic drug therapy is often limited by the lack of efficacy and intolerance due to central nervous system side effects. Subcutaneous injections of botulinum toxin type A (BT-A) are a promising treatment option for patients with insatisfactory response to drug therapy or neurological intervention.

This is the study protocol of a prospective, placebo-controlled, double blind clinical trial investigating the add-on therapy of subcutaneous of BT-A injections to standard treatment.

Methods and design: BoTN is a prospective, randomized, double-blind, placebo-controlled trial with a randomized withdrawal design. Eligible patients with classic TN who are otherwise refractory to medical and neurological treatment will receive subcutaneous injections of BT-A into injection sites of the affected trigeminal branch.

In the first phase phase all patients will receive verum in a single blinded intervention and twelve weeks later therapy responders will be 1:1 allocated to the verum or placebo (saline) arm. This time the intervention is double blind and injections will be done at the same sites. This trial will be conducted in a tertiary outpatient clinic specialized in the treatment of headache and facial pain.

Discussion: BoTN is designed to assess the efficacy and safety of local BT-A injections in addition to standard prophylactic treatment.
No conflict of interest.

C10
EHMTI-0211. Post-dural puncture headache related to spinal anesthesia for elective knee surgery
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Introduction: Post-dural puncture headache (PDPH) has many risk factors for its development. However, it is not clear whether those factors are still significant in controlled procedural setting.

Aims: To ascertain 1) risk factors for developing PDPH, and 2) clinical profiles of PDPH in the patients received knee surgery under spinal anesthesia(SA).

Methods: We evaluated the presence of PDPH in all consecutive 400 patients (243 males, 157 females, age: 1-79 years) who received knee surgery under SA during 1 year at our hospital. SA was performed by one anesthesiologist with 25-G Quincke needle. Data regarding demographic profile, presumptive risk factors for PDPH, and clinical features of PDPH were analysed.

Results: The incidence of PDPH was 6.8%(27 out of 400), which was higher in female(10.8%, p=0.01). Lower BMI, previous recurrent headache, and smoking were also identified as risk factors for PDPH. Duration of anesthesia or operation, age, or perioperative blood pressure did not differ for the patients with or without PDPH. Most of PDPH(77.7%) developed at least 6 hours past the end of operation. PDPH was usually orthostatic (74.1%) and started within 15 minutes on upright position. Nausea(66.7%) was the most frequent associated symptom. Headache intensity was variable. All PDPH were relieved spontaneously without epidural blood patch.

Conclusions: PDPH related to elective knee surgery under SA was more frequent in patients of female, lower BMI, recurrent headache history, and smoker. PDPH patients showed benign clinical outcomes, which might be due to controlled procedural settings different from diagnostic lumbar puncture.
No conflict of interest.

C11
EHMTI-0082. Use of IV steroids in cluster headache
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Background: Steroids are very effective in aborting episodes of Cluster Headache (CH), both orally and intravenously (IV). Anyway, formal studies to assess this efficacy are lacking. A placebo-controlled study with oral steroid has received approval and is currently under development. To our knowledge no study focusing to IV steroid use for blocking acute episodes has been published yet.

Aim: To evaluate retrospectively a case series of patients with CH episodes treated with infusion of corticosteroid.

Methods: A series of 16 consecutive patients observed in our Headache Centre in the last 3 years for acute episodes of CH unresponsive to standard management (short tapering of oral steroids and Verapamil per os).

All of them were male, of age between 37 and 69 years old. They underwent rescue treatment with IV methylprednisolone 500 mg for 3 or for 5 days, followed by slow tapering per os. One half of the patients received Verapamil per os, too, in fast titration and to the maximum dose of 720 mg/day split in three doses.
Results: By the end of the IV steroid, 13 out of 16 patients were free from attacks (81.2%). Of the three unresponsive patients, one was diagnosed with a possible somatoform disturb. The two others received concomitantly maximum doses of Verapamil, to no avail.

Conclusion: IV steroids are effective in blocking episodes of CH. In the acute phase improvement does not seem correlated to addition of Verapamil, which is likely more useful in preventing reappearance of attacks shortly after steroid discontinuation. No conflict of interest.

C12

EHMTI-0081. Use of rotigotine in chronic cluster headache
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Background: Chronic Cluster Headache (CCH) is an infrequent form of Cluster Headache, defined by the absence of remission periods. Medical treatments are few, sometimes ineffective and poorly tolerated. Rotigotine was recently reported as useful in a single patient with CCH.

Aim: Reporting the results observed using rotigotine in four cases with CCH.

Cases report: All patients received a diagnosis of CCH according to ICHD-3 Beta. Brain imaging and neurological examination were normal. Patients were 61, 67, 49 and 45 respectively. Verapamil, carbamithium and steroids were used unsuccessfully.

Case 1: He had tried Gammaocore and pregabalin, too, ineffectively. Transdermal rotigotine was started at the dose of 2 mg/die. After a few days, only scarce, minor attacks persisted, and were stopped by titrating posology to 4 mg/die.

Case 2: Rotigotine was titrated up to 6 mg/die, without any beneficial effect, and after a month it was discontinued.

Case 3 and 4: Titration proceeded to 4 mg/die, for persistence of minor attacks with lower doses. Lasting remission has been observed since.

No adverse event has been reported by the patients.

Conclusions: Rotigotine is a non-ergoline D2-like receptor agonist. Its availability in the transdermal form and its safety profile make it well accepted by patients. The four subjects whose cases we reported did not show any adverse event. Three of them showed initial but definite benefit from this therapy and are currently free from pain and under follow-up. We think that rotigotine should be considered in the management of CCH unresponsive to common treatment.

No conflict of interest.

C13

EHMTI-0301. Effect of experimental tooth clenching on the release of beta-endorphin
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Introduction: Several etiologic factors have been suggested for tooth grinding and clenching, but the exact mechanism is not known. One biologic explanation might be that tooth clenching activates the reward system as observed in other types of muscle exercises.

Aims: To investigate the association between experimental tooth clenching and the release of β-endorphin in patients with myofascial temporomandibular disorders (M-TMD) and healthy subjects.

Methods: Fifteen M-TMD patients and 15 healthy subjects were included and assigned an experimental clenching-task. Venous blood was collected and pain intensity was noted on a visual analog scale. The masseter pressure pain threshold (PPT) was assessed 2-hours before the clenching-task and immediately after. A mixed-model analysis of variance was used for statistical analyses.

Results: Significant main effects for time and group were observed for pain intensity and PPT, with a significantly higher pain intensity (P < .001) and a significantly lower PPT (P < .01) after the clenching-task compared with baseline. M-TMD patients had significantly higher pain intensity (P < .001) and significantly lower PPT (P < .05) than healthy subjects. No significant time or group effects were observed for the level of β-endorphin.

Neither pain intensity nor PPT correlated significantly with β-endorphin levels.

Conclusions: This experimental clenching-task was not associated with significant alterations in β-endorphin levels over time, but with mechanical hyperalgesia and low to moderate levels of pain in healthy subjects and M-TMD patients, respectively. More research is required to understand the role of the β-endorphinergic system in the etiology of M-TMD. No conflict of interest.

C14

EHMTI-0274. Secondary headache due to orbital pseudotumor: a case report
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We present a case report in which a secondary headache caused by orbital pseudotumor (OP) that has been treated with high doses of steroids.

A female patient, 44 years old, who complained having 12 years of headache. Last five years it had been very acute and compulsive. This was especially on the left side of her head, and it severely effected her left eye. Her left eye and its eyelash were swollen. The severity of headache was increased with movements. There was no autonomic finding. Third and sixth cranial nerve palsy and optic atrophy (OA) developed in her left eye. The patient had diabetes insipidus and diabetes mellitus. The diagnosis of the patient considered the DIDMOAD syndrome without deafness. The severity of the headache was controlled and reduced by steroid medication. Analgesics and antiepileptics didn’t help.

In the clinical history of case; hypothyroidism and ankylosing spondylitis were present. The physical examination of case was revealed mydriasis, light responsiveness, proptosis, and movement restriction of in all direction in the left eye, and OA. Orbital MRI showed the OP on the left eye, but the etiology remains unexplained. The patient’s complaint was decreased seven times pulse form to 1000 mg per day by giving prednisolone. After this treatment the prednisolone dosage was reduced from 1000 mg to 250 mg per day. Rituximab 1000 mg per 15 day were given to the patient. Recently, the patient has complained with a pain started in the right eye. Left ocular muscle biopsy was performed.

No conflict of interest.
C16
EHMTI-0326. OnabotulinumtoxinA for the treatment of chronic paroxysmal hemicrania: a case report
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Introduction: Chronic paroxysmal hemicrania (CPH) is characterized by attacks of very severe, unilateral pain, fulfilling criteria of The International Classification of Headache Disorders, 3rd edition, beta version (ICHD-3 beta) for paroxysmal hemicrania and occurring without a remission period, or with remissions lasting <1 month, for at least 1 year.

Aims: OnabotulinumtoxinA is now used for the treatment of chronic migraine. We wanted to try the treatment of CPH with OnabotulinumtoxinA, because other treatments have not been effective.

Patient and methods: We present the case of a patient diagnosed with CPH that lasts for 32 years. Attacks of headache lasted about 15 years without remission. The patient described her headaches as attacks of hemicrania lasted from 15 to 25 minutes with a frequency usually 8 times per day. OnabotulinumtoxinA was infiltrated at eight ipsilateral points. Total dose was 45 units (each intramuscular injection site was 0.1 mL = 5 U onabotulinumtoxinA). Seven points were identical as in the treatment of chronic migraine in the frontal and temporal areas and one point was in infratemporal area. Method applications of onabotulinumtoxinA based on the methodology of application of onabotulinumtoxinA in patients with chronic migraine.

Results: The CPH showed a dramatic response to onabotulinumtoxinA infiltration. Effect of treatment was evident as early as three weeks after the first injection, gradually improved, it takes seven months from start of treatment with 3-monthly infiltrations.

Conclusions: The treatment of CPH with OnabotulinumtoxinA significantly improved the quality of life of the patient.

C17
EHMTI-0254. One-year follow up study of clinical characteristics of headache and its profile in a case series of cerebral venous sinus thrombosis
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Introduction: Headache is the most frequent presenting symptom of cerebral venous thrombosis (CVT), most commonly associated with other manifestations. We investigated the pattern and location of headache in consecutive sixty patients with confirmed diagnosis of CVT to elucidate clinical characteristics of headache and its profile.

Methods: Patients with diagnosis of CVT referring to Ghaem hospital neurology department a referral neurology center in north eastern Iran (Mashhad-Iran) were recruited consecutively during one year and followed for 12 months. Diagnosis of CVT was made by magnetic resonance imaging (MRI) combined with MR venography (MRV): both increased signal on MRI T1 and T2 weighted images and the absence of flow was required to confirm diagnosis.

Results: Age range was 18-83 years (mean: 38.11 years). On presentation, study of location of headache showed 34(56.7%) had diffuse headache, 10 (16.7%) frontal, 7(11.7%) hemi cranial, 5(8.3%) temporal and two (3.3%) patients had temporal and occipital headaches. Nine (15%) patients presented with thunder club headache. Only one patient had persistent headache after one year follow up. 51(85%) patients had papilledema. Duration of headache in 36(60%) patients was between three to seven days.

Conclusions: There is no special, consistent, identifiable pattern of headache in CVT patients. No conflict of interest.

C18
EHMTI-0249. Headache attributed to hypertension in chronic migraine patients
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Background: Hypertension is frequent in chronic migraine patients and could be a factor that promotes chronification (Bigal, 2008). In these patients could be a secondary headache named “headache attributed to hypertension”.

Aim: to detect the presence of “headache attributed to hypertension” in chronic migraine patients with high blood pressure (HBP).

Method: Study sample include 60 chronic migraine patients with associated arterial hypertension (MwHBP) and 30 patients with hypertension without migraine (HBPw/oM). All the patients underwent neurological examination, ambulatory blood pressure monitoring. Headache was established according to IHS criteria (2004,2013).

Results: In the MwHBP group 65% of patients presented a second type of headache corresponding to “headache attributed to hypertension” criteria compared to 33% in the HBPw/oM group. This type of headache in MwHBP group was unilateral (60% vs. 23.1%, p<0.05), pulsating (60% vs. 17.9%, p<0.05), in any part of the day (80% vs. 23.1%, p<0.05), with the combination of two or more associated symptoms (100% vs. 0%) compared with HBPw/oM group - predominantly on the morning, with isolated associated symptoms (30% - just photophobia vs. 0%, 40% - just phonophobia vs. 0%, 30% - just nausea vs. 0%, p<0.05).

Conclusion: In the chronic migraine patients with associated hypertension could be detected two types of headache. The first one is migraine and the second - “headache attributed to hypertension”, which is more frequent than in the hypertension without migraine group (65% vs. 33%) and preserved the migrainous features. No conflict of interest.

C19
EHMTI-0242. Treating chronic tension-type headache with and without pericranial tenderness in association with a feeling of deontological guilt
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Chronic tension type headache is a disorder evolving from frequent episodic tension-type headache, with daily or very frequent episodes of headache, typically bilateral, pressng or tightening in quality and of mild to moderate intensity, lasting hours to days, or unremitting. The pain does not worsen with routine physical activity, but may be associated with mild nausea, photophobia or phonophobia. The feeling of deontological guilt occurs in individuals who, violating moral standards of the society in which they live, wonder how they were capable of such an attitude.

In this guilt feeling brain areas that mediate disgust are stimulated as the insula.

The proposal was to evaluate the ineffectiveness of the treatments [antidepressants, anticonvulsants, beta-blockers, NSAIDs or acetaminophen, tramadol, acetalsalicylic acid, opioids, muscle relaxants, psychotherapy, acupuncture] to which that 21 patients (15 men and 6 women) aged 40 to 52 were submitted for 2 years after stealing money from their clients motivated by revenge. All patients were professionals, no previous psychiatric and neurologic disorders. The headache started in sequence to no evidence of the crime.

Counseling replaced treatments. The pain only remitted when each patient donated the stolen amount to charitable institutions to assuage guilt.

This study presents limitations: it is retrospective with a limited number of patients, showing a specific subpopulation of chronic tension-type headache. It is important to note that the criterion was limiter. This research supports a main conclusion that brain changes can be corrected, in this case, with the recognition of error and change of conduct. No conflict of interest.
**C20**

EHMTI-0051. Prevalence of venous sinus stenosis in pseudotumor cerebri (PTC) using digital subtraction angiography (DSA)

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**Objectives:** To study the prevalence of intracranial venous stenosis in Pseudotumor cerebri patients.

**Patients and methods:** Thirty patients diagnosed as PTC according to Dandy criteria. All underwent general and neurological assessment. Radiological assessment included CT scan brain +/- MRI brain without contrast, MRV. All underwent digital subtraction cerebral Angiography (DSA) (venous phase) to confirm the validity of filling gaps seen at the level of MRV.

**Results:** MRV brain showed that 24 patients (80%) showed filling gaps. Digital subtraction cerebral angiography (venous phase) showed 9 patients (30%) had stenosis in their dural sinuses. MRV showed to be a good screening tool since it had 100% sensitivity and negative predictive value. However, since it has a moderate specificity (62%) with a positive predictive value (PPV) of only 35%, then lesions detected should be confirmed with digital subtraction cerebral angiography (venous phase) particularly those involving the transverse and sigmoid sinus.

**Conclusion:** Studying the intracranial venous system in patients with PTC is an important step in understanding the pathophysiology of the disease. Detection of venous sinus stenosis opens the way to a novel therapeutic option for refractory patients like venous sinus stenting. No conflict of interest.

**C21**

EHMTI-0261. Idiopathic intracranial hypertension presenting as acute onset bilateral visual loss

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*The Journal of Headache and Pain 2014, 15(Suppl 1)*

**Introduction:** Idiopathic intracranial hypertension (IIH) is a disorder of elevated cerebrospinal fluid pressure of unknown cause. Visual acuity usually remains normal except when the condition is long standing and severe.

**Aims:** This case highlights occurrence of acute onset visual loss as a rare presentation of IIH.

**Case report:** A 27-years-old obese female, presented with 15 days history of acute onset holocranial throbbing headache and eight days history of acute onset rapidly progressive visual loss in both eyes. Neurological examination revealed bilateral papilloedema with visual acuity 6/60 in right eye and 1/60 in left eye with no other neurological deficit. Contrast enhanced MRI brain was suggestive of IIH and CT venography was normal. CSF manometry showed 520 mm of CSF pressure with normal protein and cellular response. Thus, a final diagnosis of definite IIH was made. Acetazolamide 250 mg thrice a day was started with which she made. Acetazolamide 250 mg thrice a day was started with which she

**Conclusion:** IIH should always be considered as a possible diagnosis in a patient with headache and papilloedema with no other signs of focal neurological deficits. Although uncommon, acute onset visual loss in IIH can be presenting feature in some patients.

No conflict of interest.

**C22**

EHMTI-0204. Efficacy of SPG stimulation in relieving acute cluster pain: results from >5000 attacks treated during long-term follow-up of the pathway CH-1 study


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**Introduction:** In the randomized, double-blind, multi-center study of an SPG neurostimulator (Pathway CH-1 study) 68% of patients experienced clinically significant improvements.

**Aim:** The aim of this interim analysis is to evaluate acute response of SPG stimulation therapy for the treatment of CCH during Long-Term Follow-Up (LTFU).

**Method:** 43 patients with refractory CCH (minimum 4 attacks/week) were enrolled in the Pathway CH-1 study; 33 continued into LTFU (from an average of 14 months through up to 3 years following neurostimulator insertion). Each attack treated with SPG stimulation therapy was evaluated for effective therapy (relief from moderate or greater pain, or freedom from mild pain). All evaluable attacks during the LTFU period through March 2014 were included in the analysis.

**Results:** Twenty-six patients provided data for treatment of at least one cluster attack during LTFU. Time in LTFU was an average of 365 days (range 117-575). Average number of attacks treated per patient was 197 (range 1-1489). A total of 5132 attacks were treated (22% mild initial pain, 47% moderate, 22% severe, 9% very severe). 65% (N=3354/5132) of these attacks achieved effective therapy (59% of mild attacks, 78% of moderate, 62% of severe, 21% of very severe). Average stimulation duration was 12.9 minutes.

**Conclusion:** Two-thirds of the more than 5000 cluster attacks evaluated during the LTFU period are effectively treated with SPG stimulation therapy. No conflict of interest.
C23
EHMTI-0121. The disturbances of reactivity of cerebral vessels in patients with posttraumatic headaches
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Microstructural disturbances develop in the wall of vessels in patients with mild traumatic brain injuries (TBI). The purpose of our research was to detect the regularities of changes of hemodynamics and reactivity of cerebral circulation in patients with consequences of mild traumatic brain injuries by using the method of Doppler ultrasonography with hyper-and hypocapnic tests.

Materials and methods: We examined 62 patients with consequences of mild TBI. The control group consisted of 20 healthy people. Doppler ultrasonography with hyper-and hypocapnic tests were carried out according to the standard method.

Results: Conducting Doppler ultrasonography with hyper-and hypocapnic tests in the patients with consequences of TBI we detected that coefficient of reactivity was 1.11±0.07. The insignificant asymmetry of bloodflow which increased after hyper- and hypocapnia was observed in the patients (82%). An early development of atherosclerotic lesion of cerebral vessels in the form of hemodynamic insignificant atherosclerotic plaques of the walls of cerebral vessels was observed (73%). We detected paradoxical reaction of cerebral vessels in 40 patients when hyper-and hypocapnic tests were being held.

Conclusions: The data obtained confirm the changes of reactivity of cerebral vessels towards the decrease of linear velocity of bloodflow in the patients with consequences of mild TBI. The detected paradoxical reaction of vessels which was observed when we used hyper-and hypocapnic tests, is the consequence of the decrease of elasticity of vessels walls as a result of microstructural disturbances of vessels, an early development of atherosclerotic changes in vessels and the manifestation of a long-term angiospasm.

No conflict of interest.

C24
EHMTI-0069. The low prevalence of “forehead and facial flushing” and “sensation of fullness in the ear” in Japanese cluster headache patients
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Background: New ICHD-3 beta criteria for cluster headache added two accompanying autonomic symptoms: “forehead and facial flushing” and “sensation of fullness in the ear”. Previous reports showed that several clinical features of cluster headache were different between Caucasian and East Asian.

Aim: We evaluated the presence of “forehead and facial flushing” and “sensation of fullness in the ear” in Japan.

Method: Subjects comprised 23 consecutive cluster headache patients who had been diagnosed with cluster headache according to ICHD-2 (14 males, 9 females; mean age, 41.4±13.8 years; range, 20-71 years). Information was collected by face to face interview.

Results: All patients were episodic cluster headache. Two patients (9%) had “forehead and facial flushing” and 4 patients (17%) had “sensation of fullness in the ear”. The patients with “forehead and facial flushing” had also “sensation of fullness in the ear”. The prevalence of “forehead and facial flushing” and “sensation of fullness in the ear” in our study were lower than that of previous Caucasian study (20.0% reported “forehead and facial flushing” and 33.3% “sensation of fullness in the ear”).

Conclusion: The low prevalence of “forehead and facial flushing” and “sensation of fullness in the ear” may be clinical characteristic in Japanese cluster headache patients. No conflict of interest.

C25
EHMTI-0127. Three faces of pain-herpes zoster ophthalmicus
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Objectives: 64 years old female patient’s medical history from beginning of the pain will be presented following the change and pain relief to recovery.

Background: Herpes zoster ophthalmicus (HZO) occurs only the people who have been previously infected with varicella zoster virus (VZV). Primary infection is a chickenpox (95% VZV seropositive in US adults). Reactivated forms its dormant status is the dorsal root, cranial nerve and other sensory ganglia may lay for years to decades. Reactivation of latens VZV localized cutaneous rash erupting a single dermatome. It may travel along a sensory axon of the skin from vesicular lesions. Perineuritis causes intensive pain in the nerve distribution.Lifetime reactivation of VZV as shingles 50% incidence, HZO is rare (10-20%) of
all VZV causes. HZO is a trigeminal manifestation of VZV. Reactivated VZV travels down V/1 and V/2 centripetal distribution. Contagious spread of the VZV may lead to the involvement of the other cranial nerves resulting optic neuropathy (II) isolated cranial nerve palsies (III, IV, especially IV) neurogenic motility disorders. Predisposing factors: immunocompromised condition (decreased T-cell activity), acute herpes simplex virus infection and other reacting factors. Complications 50% of HZO patient is a postherpetic neuralgia (20% of a cases) involves the orbit (10-25% of cases).

Acute management: antiviral agent immediately-best prognosis started early-within 72 hours and general measures, ophthalmology consultation.

Pain management: acute and postherpetic neuralgia.

Our patient evaluated for left sided facial pain, unilateral “burning eye” and malaise that began two days ago. The neurological examination has been proven partially n. oculomotorius palsy of the left side and hyperaesthesia in dermatome V/1 unilateral side.

Neuroimaging studies (cerebral and orbital CT and MRI) have shown normal status.

Two days later on the face in the V/1 and V/2 dermatome we detected special characteristic skin symptom.

Conclusion: The diagnosis was clear: herpes zoster ophthalmicus (HZO). We present evolution change in the nature of pain, following and demonstrating the eye movement disorders and skin signs from termination to recovery process.

No conflict of interest.

C26
EHMTI-0227. Therapeutic effectiveness of sphenopalatine ganglion (SPG) stimulation for cluster headache – pathway registry study interim results at 6 months
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Background: The Pathway Registry is an open label registry of SPG stimulation therapy for cluster headache treatment. In a previous randomized, double-blind, multi-center study (Pathway CH-1 study) 68% of patients experienced clinically significant improvements.

Aim: The aim of this interim analysis is to evaluate acute and/or preventive therapeutic effectiveness at 6 months following insertion of an SPG neurostimulator.

Method: Therapeutic effectiveness (acute pain response following SPG stimulation and/or attack frequency reduction) was analyzed during the first six months following SPG neurostimulator insertion. Acute pain responders achieved relief from moderate or greater pain, or freedom from mild pain in ≥50% of analyzable attacks (with completed diary questions). Frequency responders achieved ≥50% attack frequency reduction at the six month study visit (evaluated over the previous four weeks), versus the 4 week baseline period.

Results: 49 patients have been enrolled, 18 completed follow-up through six months[RJ1] (189 days post-insertion, range 149-238). Average baseline attack frequency was 28.4 attacks/week (range 0-70), and the average attack frequency at 6 months was 17.3 attacks/week (range 0-70), a 40% reduction. 67% (12/18) were responders. Of the 12 responders, 67% (N=8) were acute responders, treating 86% of their attacks effectively (N=546). 75% (N=9) were frequency responders; frequency reduced by 90% (from 22.3 at baseline to 2.1 (range 0-8) attacks/week). 5 patients were both acute and frequency responders.

Conclusion: Interim data from a registry of cluster headache patients continues to demonstrate the effectiveness of SPG stimulation therapy.

C27
EHMTI-0299. Serotonin as biomarker of ache intensity in chronic tension headache
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The Journal of Headache and Pain 2014, 15(Suppl 1)C27

Introduction: Tension headache (TH) belongs to most frequent type of the idiopathic cephalalgias. Depression and serotonin metabolism disorders play a leading role in the pathogenesis of TH.

Aims: Study the dependence of the intensity of the TH of degree of reduction. 67% (12/18) were responders. Of the 12 responders, 67% (N=8) were acute responders, treating 86% of their attacks effectively (N=546). 75% (N=9) were frequency responders; frequency reduced by 90% (from 22.3 at baseline to 2.1 (range 0-8) attacks/week). 5 patients were both acute and frequency responders.

Conclusion: Interim data from a registry of cluster headache patients continues to demonstrate the effectiveness of SPG stimulation therapy.
C29

EHMTI-0162. Cognitive behavioural treatment for the chronic post-traumatic headache patient: a randomised controlled trial
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Background: Chronic post-traumatic headache (CPTH) after mild head injury can be difficult to manage. Research is scarce and successful interventions are lacking.

Aim: To conduct a randomized controlled trial (RCT) exploring whether a group-based Cognitive Behavioural Therapy (CBT) intervention would lead to a relative decrease in headache, pain perception and psychological symptoms and an increase in quality of life in the study group compared to a waiting-list control group.

Methods: Ninety patients with CPTH according to ICHD-2 criteria were enrolled from the Danish Headache Center. Patients were randomly assigned to either a waiting-list group or to a nine-week CBT group intervention. At baseline and after 26 weeks all patients completed the Rivermead Post-concussion Questionnaire, SF-36, SCL-90-R (psychological distress) and a headache diary.

Results: The CBT had no effect on headache and only a minor impact on the CPTH patients’ quality of life, psychological distress, and the overall experience of symptoms. The waiting-list group had also unchanged headache but, opposed to the treatment group, a significant decrease in somatic and cognitive symptoms indicating a spontaneous remission over time.

Conclusions: Our primarily negative findings confirm that management of patients with CPTH still remains a considerable challenge. Psychological group therapy with CBT might be effective in an earlier stage of CPTH and in less severely affected patients. There is an urgent need for development of new treatment strategies and a need for randomized controlled studies to test the efficacy of psychological therapy for CPTH patients.

No conflict of interest.

C30

EHMTI-0161. Personality profiles of patients with chronic post-traumatic headache: a case-control study
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Background: The aetiology of chronic post-traumatic headache (CPTH) after mild head injury is unclear, but psychological stress and personality factors have been suggested as both causing and maintaining factors. Research is scarce and it is uncertain whether patients with CPTH share a specific personality profile and if the profile differ from other chronic headache patients.

Aim: To investigate whether CPTH is distinguished from other chronic headache patients in terms of mental distress, general personality characteristics and traits specifically as measured by the The Revised NEO Personality Inventory (NEO-PI-R).

Methods: Ninety patients with CPTH and 45 control patients with chronic primary headaches were enrolled from the Danish Headache Center. They completed NEO-PI-R personality assessment, The Symptom Checklist (SCL-90-R) and a headache diary for 4 weeks.

Results: The scale scores and the levels of psychological distress did not differ between the CPTH and the headache control group. CPTH patients with a headache duration over two years had a higher score on the domain Neuroticism (p=0.002), but lower Extraversion (p=0.001) and lower Openness (p=0.038) on the NEO-PI-R.

Conclusion: In contrast to prior hypothesis patients with CPTH were not characterised by a specific personality profile although long lasting CPTH was associated to higher neuroticism and a lower degree of extraversion and openness. No differences were found in the reported level of psychological distress in patients with CPTH compared to a headache control group.

No conflict of interest.

C31

EHMTI-0251. Brief intervention for medication-overuse headache in primary care - 1-year follow-up – the BIMOH study
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Introduction: MOH can be identified in the general population through simple screening for headache frequency followed by the Severity of Dependence Scale (SDS).

Aim: To evaluate the long-term effectiveness of brief intervention (BI) for medication-overuse headache (MOH) in primary care.

Methods: This was a double-blind pragmatic cluster randomised parallel controlled trial in primary care in Norway. Fifty GPs were randomised to receive BI training or to continue their business as usual (BAU). 25 486 patients aged 18-50 years from the GPs lists were screened for MOH by a questionnaire. Patients were cluster randomised and received treatment by their GP. GPs practising BI assessed their MOH patients using the SDS. Based on this, the patients received feedback about the risk of MOH, and recommendations for reducing intake of headache medication. Outcomes were interview based and assessed one year after inclusion in the study.

Results: Sixty MOH patients were included at baseline and 57 patients followed-up after one year. Analyses of the outcomes showed that BI was better than BAU with significant improvements only in the BI group at three months which persisted up to one year. Only two initially detoxified patients relapsed into medication overuse after one year. More results are currently being analysed and will be presented at the meeting.

Conclusion: BI intervention for MOH conducted in primary care has significant effects lasting over twelve months.

No conflict of interest.

C32

EHMTI-0250. General practitioners’ experiences with brief intervention for medication-overuse headache: a qualitative study
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Introduction: Medication-overuse headache (MOH) is common in the general population, and the majority of sufferers are managed in primary health care. Brief Intervention (BI) has been used as a motivational technique for patients with drug and alcohol overuse, and may have a role in the treatment of MOH.

Aim: To explore GPs’ experiences using BI in the management of patients with MOH.

Method: Qualitative study in Norwegian general practice. Data was collected through four focus group interviews with 22 GPs who participated in an intervention study on BI for MOH. We used systematic text condensation to analyse transcripts from the focus group interviews.

Results: The GPs experienced challenges when trying to convince patients that the medication they used to treat and prevent headache could cause headache, but labelling MOH as a diagnosis opened up space for action. GPs were able to use BI within the scope of a regular consultation, and they thought that the structured approach had a potential to change patients’ views about their condition and medication use. Being diagnosed with medication overuse could bring about feelings
of guilt in patients, and GPs emphasised that a good alliance with the patient was necessary for successful change using BI to manage MOH. **Conclusion:** GPs experience BI as a feasible strategy to treat MOH, and the technique relies on a good alliance between the doctor and patient. When using BI, GPs must be prepared to counter patients' misconceptions about medication used for headache. **No conflict of interest.**

C33
**EHMTI-0302. SUNCT syndrome, case report**
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**Introduction:** The short-lasting primary headache syndromes may be conveniently divided into those exhibiting marked autonomic activation and those without autonomic activation. The former group comprises chronic and episodic paroxysmal hemiscrania, short-lasting unilateral neuralgiform headache with conjunctival injection and tearing (SUNCT syndrome) and cluster headache. SUNCT is relatively rare, with a recent study showing a prevalence of 6.6/100,000 and an incidence of 1.2/100,000. The disorder had a male preponderance, with a sex ratio of 2:1. The typical age of onset is between 40 and 70 years, with a mean age of onset at 48 years.

**Methods:** We report the case of a 73 years old man, with a history of two months of right side retro-orbital severe stabbing headache attacks that last 70 seconds with a frequency of 5 to 7 attacks per hour. During the attacks he had ipsilateral conjunctival injection, periorbital and facial redness and sweating, eyelid edema, ptosis tearing and nasal congestion (video). The patient was treated first with Gabapentin 600 mg/d but it was shown ineffective. We start the treatment with sodium valproate up to 1500 mg/d and after one month the patient had a significant reduction of attacks and their severity.

**Conclusion:** The most of drugs used in treatment of primary headaches are ineffective in the treatment of SUNCT syndrome. Sodium valproate is B recommendation of AAN, and may be good choice in treatment of this syndrome. **No conflict of interest.**

C34
**EHMTI-0272. Microvascular decompression of the trigeminal nerve in the treatment of medically intractable SUNCT and SUNA**
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**Introduction:** Microvascular compression (MVD) of the trigeminal nerve has been so far reported to be effective in 12/19 SUNCT and SUNA patients (63 %) with neurovascular compression. **Aims:** We report the outcome of MVD, using Jannetta procedure, in nine cases of medically intractable chronic SUNCT and SUNA patients.

**Methods:** Nine patients with chronic SUNCT and SUNA with a vascular loop indenting or distorting the trigeminal nerve ipsilaterally to the side of the pain demonstrable on MRI scan were offered MVD of the trigeminal nerve. All the patients failed to respond or tolerate adequate dosages of: lamotriginne, topiramate, oxcarbazepine, carbamazepine, duloxetine, pregabalin or gabapentin and greater occipital nerve blocks. Intravenous lidocaine improved the pain only during infusion in some of them.

**Results:** Seven SUNCT and two SUNA patients underwent MVD of the trigeminal nerve. They all had multiple daily severe headache attacks at baseline. At a median follow-up of 15 months (range: 8-30 months) after the operation, four patients became and remained pain free, one patient each had 90%, 70% and 50% improvement, respectively. The patient who improved by 50% was rendered pain free on preventive treatments. Two patients became pain free for 12 months, before pain returned. One patient suffered a CSP leak after the procedure.

**Conclusions:** MVD of the trigeminal nerve was effective in 7/9 SUNCT/ SUNA patients (78%). Although longer follow-up is needed to establish the long term outcome of this procedure, these preliminary data support the role of MVD in the surgical management of SUNCT and SUNA. **No conflict of interest.**

C35
**EHMTI-0198. Importance of neurovascular conflict with the trigeminal nerve in SUNCT and SUNA**
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**Introduction:** Recently, a small case series showed the presence of neurovascular conflict with the trigeminal nerve in a significant proportion of SUNCT and SUNA patients, suggesting a possible pathophysiological overlap between SUNCT, SUNA and trigeminal neuralgia (TN).

**Aims:** To assess the presence of a neurovascular conflict with the trigeminal nerve in a large series of SUNCT and SUNA patients.

**Methods:** Consecutive MRI examinations performed over the period from 2005 to 2013 from consecutive patients with SUNCT and SUNA syndromes were retrospectively reviewed by a consultant neuroradiologist blinded to the diagnosis and localisation of symptoms.

**Results:** The analysis included 87 patients (SUNCT=45 patients; SUNA=44 patients). Thirty SUNCT (66.7%) and 29 SUNA patients (65.9%) had a vascular loop ipsilateral to the side of the pain. Seven SUNCT (15.6%) and three SUNA patients (6.8%) showed a vascular loop contralateral to the side of the pain, whereas eight SUNCT (17.7%) and 12 SUNA patients (27.3%) showed no vascular loops. Of the 178 trigeminal nerves considered, a vascular loop was present in 59/95 (62.1%) of the symptomatic trigeminal nerves, as opposed to 15/83 (18.1%) of the asymptomatic nerves. There was a remarkable correspondence between the site of the pain (V1, V2, V3) and the circumferential location of the site of vascular contact.

**Conclusion:** The presence of neurovascular conflict with the trigeminal nerve in two-thirds of SUNCT and SUNA patients highlights their aetiological overlap with TN. The correlation between site of pain and location of the vascular contact supports the pathophysiological role of the compression of the trigeminal sensory root in SUNCT and SUNA. **No conflict of interest.**

C36
**EHMTI-0064. The prevalence of cluster headache in the elderly is higher in women than in men**
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**Introduction:** Cluster headache (CH) is considered a disorder of young men, which predominantly begins at age 20-to-40 years.

**Aims:** We evaluated the gender distribution in patients with CH aged 65 years and older.

**Methods:** For the last 15 years we have observed 261 patients suffering from CH. Out of these cases, 43 patients (16.5% of the whole population) were over 65 years.

**Results:** In this group of elderly patients, 24 were females and 19 were males. We diagnosed 4 patients with CH (only one bout, according to the International Classification of Headache Disorders), 25 with episodic CH, and 14 with chronic CH. The onset occurred in ages 35-44 years for 21.4% of cases, in ages 45-54 for 16.7%, in ages 55-64 for 28.6% and after the age of 65 years for 33.3%. Notably, in the latter subgroup, the females significantly prevailed, accounting for 78.6% of cases. Out of the patients aged over 65 years the prevalence of chronic CH was remarkably higher (25.6%) than in previous ages (9.5%).

**Conclusions:** The increasing number of elderly patients with CH could be related to an inadequate recognition of this headache disorder, which has been believed for a long time to affect mainly young subjects. Appendix
peculiar to female distribution, an increased frequency of CH appears to occur in middle-age and elderly patients. To our knowledge, we report the patient with the oldest age at onset (a 93-year-old woman) and the largest case series of CH elderly patients published in the literature to date.

No conflict of interest.

C37

**EHMTI-0269. The idiopathic intracranial hypertension without papilloedema counterfeits the migrainous headache in clinical presentation**

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**Introduction:** Idiopathic intracranial hypertension (IIH) is a pathological state defined as an increase of intracranial pressure in the absence of a causative pathological process.

**Aim:** To evaluate the clinical features of the patients with IIH diagnosed in our Headache Ambulances according to the current knowledge of this disorder.

**Method:** In the retrospective and cross-sectional analysis of 3550 patients we present 18 newly diagnosed IIH patients, 15 women and 3 men, aged from 18 to 51, with obtained values of cerebrospinal fluid pressure between 220 and 680 mm of water. The symptoms of IIH clinical presentation have been headache, reported by 94 % of patients without optic nerve papilloedema (PE) noted in 30 % of them.

**Results:** The obtained results confirmed the presence of headache features that are included in criteria for headache attributed with IIH in patients with PE. On the other side, it is worth to note, that in patients without PE majority of them (80%), had “migrainous” features of headache and accompanying symptoms.

**Conclusion:** We assume that a misdiagnosis of “primary” chronic migraine might be possible in patients without PE who may in fact suffer from a headache attributed to IIH according to currently used ICHD criteria. It seems that the headache profile of IIH is not pathognomonic as it sometimes mimics the primary headaches. We could conclude that some chronic migraine patients refractory for treatment might be patients with IIH.

No conflict of interest.

C38

**EHMTI-0139. Field-testing of the ICHD-3 beta diagnostic criteria for classical trigeminal neuralgia**

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**Introduction:** In the summer of 2013 the International Headache Society (IHS) published the beta-version of the 3rd International Classification of Headache Disorders (ICHD-3 beta) with revised diagnostic criteria for classical trigeminal neuralgia (TN). The TN diagnostic criteria are based on expert opinion and IHS strongly encourages field-testing of the new diagnostic criteria.

**Aims:** To aim field-test ICHD-3 beta diagnostic criteria for TN by comparing sensitivity and specificity to ICHD-2 criteria, and evaluate needs for revision.

**Methods:** Clinical characteristics were systematically and prospectively collected from 206 consecutive TN patients and from 37 consecutive patients with persistent idiopathic facial pain in a cross-sectional study design. We used a modified version of the 2nd International Classification of Headache Disorders (ICHD-2) to allow for sensory abnormalities. Symptomatic trigeminal neuralgia and posttraumatic painful trigeminal neuropathy were excluded based on a thorough history and 3.0 Tesla MRI.

**Results:** The specificity of ICHD-3 beta was similar to ICHD-2 (97.3% vs. 89.2%, p = 0.248) and the sensitivity was unchanged (76.2% vs. 74.3%, p = 0.134). The majority of false negative diagnoses in TN patients were due to sensory abnormalities. With a proposed modified version of ICHD-3 beta it was possible to increase sensitivity to 96.1% (p < 0.001 compared to ICHD-3 beta) while maintaining a specificity at 83.8% (p = 0.074 compared to ICHD-3 beta).

**Conclusions:** ICHD-3 beta was not significantly different from ICHD-2 and both lacked sensitivity. A modification of the criteria improved the sensitivity greatly and is proposed for inclusion in the forthcoming ICHD-3. No conflict of interest.

C39

**EHMTI-0138. Significance of neurovascular contact in classical trigeminal neuralgia**

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**Introduction:** Neurovascular contact (NVC) is considered a frequent cause of classical trigeminal neuralgia (TN) and transposition of a blood vessel in the potentially dangerous procedure of microvascular decompression is considered over other surgical options in medically refractory TN. However, prevalence of NVC has not been investigated in a representative neurological TN patient cohort using high-quality imaging and blinded evaluator.

**Aim:** We aimed to investigate whether presence and degree of NVC are correlated to pain side in TN.

**Methods:** Consecutive TN patients were referred to 3.0 Tesla MRI and included in a cross-sectional study. MRI scans were evaluated blindly and graded according to presence and degree of NVC. Severe NVC was defined as displacement or atrophy of the trigeminal nerve.

**Results:** A total of 135 TN patients were included. NVC in general was prevalent on both symptomatic and asymptomatic side (89% vs. 78%, p = 0.014, OR = 2.4 (1.2-4.8), p = 0.017) while severe NVC was highly prevalent on asymptomatic compared to asymptomatic side (53% vs. 13%, p < 0.001, OR = 11.6 (4.7-28.9), p < 0.001). Severe NVC was caused by arteries in 98%.

**Conclusions:** Severe NVC is associated to pain side in TN, while any type of NVC is common on both symptomatic and asymptomatic side. Findings demonstrate importance of NVC grading and have important implications for understanding of TN etiology and most likely for patient selection for microvascular decompression. No conflict of interest.

C40

**EHMTI-0163. Reduced neck and shoulder strength in patients with tension-type headache. A case control study**

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**Background:** Tension-type headache (TTH) is associated with increased muscle tenderness, with an increasing headache frequency and intensity. The potential role of the peripheral muscles in TTH is unclear, and it is unknown if tenderness is related to strength.

**Aims:** To compare muscle strength in neck and shoulder in TTH patients and healthy controls, by examining the Maximal Voluntary Isometric Contraction (MVC) during shoulder abduction, neck flexion and extension as well as the extension-flexion strength ratio of the neck.

**Methods:** 60 TTH patients and, 30 sex and aged matched healthy controls were included. Inclusion criteria for patients TTH ≥8 days per month. The MVC in neck extensor and flexor muscles were tested with the subject seated upright. MVC in shoulder abduction was tested with the subject lying supine. The MVC tests were performed using a computerized dynamometer.

**Results:** Compared to controls TTH patients had a significantly weaker neck extension (21.49±10.31Nm) vs. (17.07±9.16 Nm) (p= 0.02) resulting in a significantly lower Extension/Flexion moment ratio (p=0.03). TTH-patients
also showed a tendency to significantly lower shoulder abduction strength (44.3±19.3 Nm) vs. (38.7, ±15.9 Nm.) (p = 0.05).

Conclusions: The reduced neck Extension/Flexion ratio due to decreased strength of the neck extensors and the borderline lower shoulder abduction strength, suggests an unbalanced muscle activity in TTH patients.

No conflict of interest.

C41
EHMTI-0303. Treatment of medication overuse headache
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Background: Medication overuse headache (MOH) has an estimated prevalence of 0.7-1.7 % on a global scale. It is highly invalidating compared with other chronic headaches and has great socioeconomic costs. Many different treatment initiatives are in use today, but few are based on scientific evidence.

Aim: To review and evaluate currently used treatment options of MOH.

Method: A simple search using MeSH term “medication overuse headache”, previously used terms “Rebound headache” and “drug-induced headache” and “headache” and drug misuse” was made. Only clinical trials (n=41) were included. Predictors of outcome were collected from different studies and compared.

Results: Treatment outcome was not different between patients treated with advice alone, outpatient, or inpatient treatment. Stratifying patients in groups with or without comorbidities revealed a difference in treatment outcome for patients with comorbidities in favor of inpatient treatment.

Different prophylactic medication given during medication overuse showed a significant reduction in headache frequency for topiramate, gabapentin and pregabalin, but not for prednisolone compared with placebo.

Conclusion: Delayed initiation of prophylactic medication to after detoxification reduced the number of patients who needed prophylactic medication. Predictors of treatment outcome were ambiguous.

Conclusion: The type of treatment (inpatient, outpatient or advice alone) should be selected according to comorbidities of the patient. Delayed initiation of prophylactic medication probably causes less need of prophylactic medication and better the effect of subsequent prophylactic medication. Topiramate, gabapentin and pregabalin are useful as prophylactics for MOH patients who are unable to undergo detoxification.

No conflict of interest.

C42
EHMTI-0116. Tension type primary headaches and fibromyalgia: strong correlations
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Introduction: Fibromyalgia (FM) is becoming more widespread and better diagnosed, which leads to understanding of its mechanisms, presence of possible comorbidities. Tension Type Headaches (TTH) remain most distributed among primary headaches, and we found strong correlations between FM and TTH.

Aim of study is unveiling the distribution of TTH in patients with FM, and measure the quality of life of patients with generalized pain syndromes.

Methods: 159 patients with FM, mean age 49±14, 101 women and 58 men, were evaluated for other pain syndromes and quality of life.

Results: 114 patients (71.6%) had simultaneously headaches, distributed as follows: TTH in 78 (49% from all included or 68% of randomized), migraine in 15 (9.4% and 13% respectively), cluster headaches in 6 (3.8% and 5.2%), S had Sluder syndrome (3% and 4.4%), 3 had trigeminal neuralgia (2% and 2.6%), and seven patients suffers of headaches or facial pain due to sinusitis, injury, inflammation.

Results: The number of patients with comorbid headaches was surprisingly high in FM population, making up 2/3, although the main distribution of the types of headaches was almost as in general population, with leading number of TTH patients (68% of randomized).

Patients with comorbid headaches had worse scores of quality of life comparing to those with isolated FM.

Conclusion: Despite of heterogeneity of FM in its clinical presentations, presence of TTH must be assessed. There are strong correlations between FM and TTH, and both could be considered as presentations of Generalized Pain Syndrome, with probable similar etiology and mechanisms.

No conflict of interest.

C43
EHMTI-0142. Features of the headache secondary to unruptured intracranial aneurysm with oculomotor nerve paresis
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Introduction: The symptoms of unruptured intracranial aneurysms (UIA) may be shown the oculomotor nerve paresis (ONP). Those cases should be treated immediately as an impending rupture.

Aims: We evaluated the headache secondary to UIA with ONP.

Methods: Seventeen cases of UIA with ONP were examined. All cases were treated surgically to prevent the rupture by 6 clipping, 9 IVR, 1 bypass-parent artery occlusion and 1 bypass+IVR. The localizations of aneurysms were as follows, 12 IC-Pcom, 2 IC-Acho, 2 BA-SCA and 1 BA bifurcation, including 2 large IC-PC and 1 giant BA-SCA.

Results: Except for one case, no one had an episodic headache history. Thirteen cases had a headache besides the all preceded ONP. Ten of whom experienced a pain around orbital region in 9 IC-Pcom and 1 IC-Acho, two of whom had dull headache in 1 giant BA-SCA and 1 BA bifurcation and one of whom had details unknown headache in 1 BA-SCA. Four cases had no episode of a headache in 1 IC-Pcom, 2 large IC-Pcom and 1 IC-Acho. Although it took 11.2 days from onset of a headache to ONP, it was only 6.1 days especially in the cases with an orbital pain. The typical characteristics of an orbital pain were sharp pain to disturb a sleep, no effect on analgesic and sudden onset. In 6 cases performed clipping, very thinner aneurysmal walls about to rupture were observed without exceptions.

Conclusions: In cases of IC-Pcom and IC-Acho with a diameter of 12 mm less, an orbital pain trended to precede ONP. Since no headache was observed in 2 large IC-Pcom seemed to grow gradually, the pain especially in orbital region may relate in the stimulus to just local tent edge due to the abrupt growth of aneurysm and in thevascular pain itself by aneurysmal wall dilation. There was a possibility that the pain-generating mechanism of an orbital pain in this series may be similar with it of cluster headache presenting a typical orbital pain, which is considered the origin of pain in internal carotid artery near the cavernous sinus.

No conflict of interest.

C44
EHMTI-0279. Deep brain stimulation for refractory chronic cluster headache
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Introduction: Chronic cluster headache (CCH) is an excruciating, unilateral headache with recurrent episodes of severe pain associated with ipsilateral autonomic features. 10-20% of patients are refractory to medical management. We present a prospective cohort of 19 patients with intractable CCH treated with posterior hypothalamic deep brain stimulation (DBS).

Methods: Patients with refractory CCH referred to multidisciplinary headache clinic at our centre underwent DBS. Clinical data was collected pre and post-treatment. Headache load (HAL) (defined as [severity
(on the visual analogue score) x [duration] x [frequency] of headaches over a 2 week period) was calculated before and after treatment. A treatment response was identified as a 30% or more reduction in HAL.

**Results:** 19 patients (M=15) with a median age of 48 years (33-67 years) underwent surgery. Median follow up time was 12 months (9-48 months). 17 patients had at least one year follow up. Five patients failed to respond to treatment but nine showed a reduction in HAL of more than 80%. Within three months of surgery, the median change in HAL was 62% (0-100%) and at twelve months was 69% (0-100%). Significant differences exist between HAL at baseline and at three (p=0.001) and twelve months (p=0.06). There were no serious adverse events. One patient reported persistent diplopia, which was due to decompensation of a long-standing third nerve palsy.

**Conclusions:** Posterior Hypothalamic DBS appears a safe and effective treatment for cluster-headache, with minimal adverse-events. No conflict of interest.

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**C45**

EHMTI-0278. Onabotulinum toxin a for hemicrania continua: a case series of 8 patients

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**Introduction:** Hemicrania Continua (HC) is a strictly unilateral continuous headache that is exquisitely responsive to Indometacin but some patients cannot tolerate this drug. Evidence for other therapies is limited, often limited to single case reports.

**Aim:** Onabotulinum Toxin A (BoNT-A) is licensed for use in chronic migraine. Previous case reports on its use in HC are limited to two patients. We present outcome data on eight patients with HC treated with BoNT-A.

**Methods:** Eight patients with HC received BoNT-A treatment as per the PRE-EMPT protocol for chronic migraine. Clinical data was collected pre and post-treatment. Headache load (defined as [severity (on the visual analogue score)] x [duration] x [frequency of headaches]) of each patient was calculated before and after treatment.

**Results:** The median number of treatments was 2 (range 1-8) and the median number of BoNT-A units injected were 165 (range 134-185). Six patients showed a headache load reduction of over 50%. Median improvement in headache load post-treatment was 88.5% (0-100%) with a significant difference in headache load post-treatment (p=0.018). The median duration of effect was 9.5 weeks (0-20 weeks). Five of six respondents were previously taking Indometacin on a daily basis. All were able to switch to intermittent use of the drug.

**Conclusions:** BoNT-A may be a useful treatment for HC where Indometacin is not tolerated and adds another potential option to the limited therapeutic arsenal currently available.

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**C46**

EHMTI-0136. Medical cannabis in the treatment of treatment-resistant, chronic cluster headache. A retrospective report

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**Background:** Treatment-resistant chronic cluster headache is a debilitating disease. Since 2011 we were able to offer cannabis and we hereby report our experience using cannabis in this condition.

**Methods:** Sixteen patients underwent medication surgery. Median follow up time was 12 months (9-48 months). 15 (83%) patients, in 90-100% severity decrease in 11 (61%) subjects. Nine (50%) patients reported 80-100% decrease in the headache frequency while the rest had no change in their attack frequency. Eleven patients (61%) reported high satisfaction from cannabis usage, with significant reduction of medications; sleep and quality of life improvement. Somnolence and dizziness limited cannabis usage in 2 subjects. Treatment success was unrelated to age, gender, duration of the headache or the chronic state.

**Conclusions:** Cannabis was found an effective treatment for resistant chronic cluster-headache, with minimal adverse-events. No conflict of interest.

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**C47**

EHMTI-0263. WHO step scheme in combination with a therapeutic local anesthesia (TLA), physiotherapy, TENs, phytophysical, acupuncture, acupuncture for chronically therapy resistant trigeminal neuralgia after Trang

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**Introduction:** The Trigeminal neuralgia is associated with immense pains besides the destruction pains at myocardial infarction whose intensity makes the life to many of the patients concerned the hell, frequently leads with patients to suicide.

**Objective:** The extremely therapy resistant pains got more tolerable, used for the preservation of the success and further recovery at continuation of the therapy in the four to paying attention-week treatment distance. With all patients the quality of life improved significantly because of the treatment and the pain diminution resulting from it.

**Methods:** The therapy after mentioned WHO step scheme after Trang with PDA C2 – C4, Ganglion pterygopalatine blockade, physiotherapy, psychotherapy, TENS, Phytotherapy, cupping, acupressure, acupuncture, could the chronically therapy resistant Trigeminal neuralgia remove the pat. at over 70% completely, obtain a recovery at the left to 70% of the original complaints, in which at first the started therapy was used accompanyingly furthermore until a longer pain reduction with Carbamazepin or Neurontin.

**Results:** This therapy has already helped Trigeminal neuralgia many patients therapy more resistantly with before. None of the patients given to therapy had to suffer from pains before unbearable for his furthermore so that the modified WHO step scheme after Trang means a new breakthrough in the treatment of the Trigeminal neuralgia.

**Conclusion:** The therapy techniques are demonstrated in support of everyone understandably here. No conflict of interest.

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**C48**

EHMTI-0098. Frontal executive functions in medication overuse headache

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**Introduction:** In the neuroimaging studies, prefrontal dysfunctions have been reported in the patients with medication overuse headache (MOH).

**Aims:** The study investigates the presence of cognitive deficits in patients with medication overuse headache (MOH) or migraine without aura as compared to healthy controls.
Methods: Neuropsychological test battery assessing frontal executive functions and attention was applied in 50 patients with MOH, 50 patients with migraine without aura and 50 control subjects. Depressive symptoms were measured with Hamilton depression rating scale.

Results: The results were compared between the three groups using analysis of covariance. Tukey test was used for post hoc multiple comparisons. The patients with MOH performed worse than patients with migraine on the digit span-forward, digit span-backward, verbal fluency KAS, animal numbers in attention and total categories completed on WCST, TMT A-B, total number of errors on CPT in executive functions whereas they were worsened than the control subjects on almost all tests. The patients with migraine were significantly poorer than control subjects on digit span-backward, and showed higher number of perseverating responses on WCST, total number of errors on CPT, and total number of errors on Go-NoGo.

Conclusions: The patients with MOH have frontal dysexecutive syndrome characterized by an inability in the inhibition of inappropriate responses and attention deficit. There are studies suggesting an association between drug addiction behavior and MOH via prefrontal cortex involvement. Our results further support the notion that MOH may be a part of the spectrum of drug addiction behavior.

No conflict of interest.

C49

EHMTI-0028. Occipital neuralgiform pain as multiple sclerosis relapse
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Occipital neuralgia(ON) is a rare presentation and might be due to multiple causes including occipital nerve pathologies and limit daily function of patients and have a severe impact on their quality of life (QoL). The clinical characteristics of ON include paroximal painful attacks of electric shock-like sensation, occurring spontaneously or evoked by stimuli in specific trigger areas. Cervical cord demyelination might rarely cause ON. In this case report we would like to discuss a rare case of occipital neuralgia presenting as an MS relapse. Although patients with multiple sclerosis have an increased incidence of headaches, new onset headaches might be related to a new active lesion and patient should be evaluated considering this possibility.

No conflict of interest.

C50

EHMTI-0103. Errors in recognition and management are still frequent in cluster headache
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Introduction: The prevalence of cluster headache (CH) is estimated to be around 0.1% of the general population; that is most likely physicians will be consulted by patients with CH during their clinical practice.

Aims: To analyse the trajectory to diagnosis and information provided in a series of CH patients from five headache clinics in Spain.

Methods: CH patients were asked to fulfill an ad hoc questionnaire.

Results: Seventy-five patients (mean age 41.5 years, 67 males) completed the questionnaire. Patients had visited during an average of 4.9 years a mean of 4.6 physicians who had obtained 2.5 neuroimaging procedures per patient before getting a diagnosis of CH. Sixty-three (84%) had received no diagnosis (21 cases; 28%), while 43 (57%) had been given an average of 2.1 alternative diagnoses. Migraine, trigeminal neuralgia and sinusitis were the most frequent mistakes. After diagnosis, 55% had subjectively received poor/very poor information on CH. Ninety-five percent had poor or incorrect information about the nature of the disease, or acute (70%) and preventive (61%) treatments. Aetiology (90%), management options (36%) and potential adverse events of medications (29%) were their main information demands.

Conclusions: Although CH is an invalidating and clinically clear-cut disorder suffered by around 1/1000 people, it is still frequently unrecognized and/or mistaken for other disorders, which calls for a better knowledge and education in the diagnosis of the main primary headaches.

No conflict of interest.

C51

EHMTI-0273. Onabotulinotoxin type A is a therapeutic option in chronic cluster headache
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To analyse the efficacy of Onabotulinumtoxin type A (OnabotA) in chronic cluster headache patients.

Six patients (5 men and 1 woman) diagnosed with refractory chronic cluster headache were included. Data regarding the characteristics of the headache, the frequency and the duration of the attacks, the presence of family history of migraine and the analgesic use were collected. The patients continued with their usual preventative treatment. In 4 of the 6 patients included (66.6%), we have observed a clear improvement in the frequency of the headache with a change in the pattern (from chronic to episodic). All of these had family history of migraine. In one of the patients no improvement was observed, and one patient was lost during follow-up.

The use of OnabotA could be considered as a therapeutic option in those patients with chronic cluster headache which are intolerant or refractory to the known and used preventative treatments, before using more invasive treatments. Larger series are needed to confirm these findings.

C52

EHMTI-0310. Headache in children with Sturge-Weber syndrome
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Introduction: Patients with Sturge-Weber syndrome can have varying degrees of neurological impairment – Epilepsy, hemiparesis, visual field defects, cognitive deficits, endocrine, psychiatric and ophthalmological involvement. Headaches affect 30-45% of patients with SWS (Thomas-Soehl et al., 2004). Over half patients feel that headaches have equal or greater impact on life than seizures.

Aims: To describe the frequency, associations and disability of headaches in children with Sturge Weber Syndrome from a tertiary specialist clinic.

Methods: A computer generated list of all patients seen at Great Ormond Street Hospital Sturge-Weber Clinic over a 10 year period was compiled. Clinical and Demographic information including epilepsy diagnosis, developmental delay, glaucoma, focal weakness, brain involvement, drugs prescribed, headache history were collected.

Results: 88 patients’ notes reviewed. 4 excluded due to incomplete information. n= 84, 31 patients (37%) have documented reports of ≥1 headache and screaming episodes. Mean age of onset = 7 years, 3 months (SD 4 years, 1 month; range 5 months – 15 years). Duration ranged from 3 minute-long episodes to 10 days. Precipitating factors: head trauma, Seizures, behavioural problems, viral infections, Pilocarpine, noisy environments and school lessons.

Conclusion: 35% headache patients have headaches more than once a month. 25% of patients describe headaches impacting on their activities. It is unclear whether they fit migraine headache criteria. Female sex, children with glaucoma, hemiplegia and recent seizures tend to be over represented in the headache group. The significance of this needs further analysis by a prospective study.

No conflict of interest.
Results: No significant differences were observed in the decrement of the severity and duration (p=0.114 and 0.149 respectively) of headache between two groups. Side effects were reported in 42 % and 18.9% of prednisolone and celecoxibe groups respectively (Relative Risk=2.2, p=0.011).

Conclusion: Celecoxib has similar efficacy and fewer side compared to prednisolone during withdrawal therapy. No conflict of interest.

C54
EHMTI-0293. Comparison between celecoxib and prednisolone in bridge stage therapy following medication overuse headache: double blind randomized clinical trial
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Introduction: Many patients with chronic or frequent headaches overuse the analgesic or anti-migraine drugs. Medication overuse headache (MOH) is a common severe headache. The basis of treatment of MOH is discontinuation of the offending drugs. However, cessation of drug consumption could lead to severe disabling headache. Corticosteroids are the most popular drugs for bridge phase of treatment. However corticosteroids might cause different side effects. Celecoxib is a Cox 2 inhibitor drug with analgesic and anti-inflammatory properties, assumed to be a good alternative for steroids.

Aims: We conducted this study to compare celecoxib with prednisolone for bridge stage therapy in MOH.

Methods: 103 patients (18-65 years) with at least 15 days of headache per month were enrolled. They assigned into two groups: celecoxib (53 cases) and prednisolone (51 cases). Prednisone was administered as daily doses of 75, 50, 30, 25, and 10 mg in 3 days interval. Celecoxib was administered for 15 days according to the following schedule: 100 mg three times per day (5 days), twice a day (5 days) and once a day (5 days). The severity and duration of headache, as well as side effects were assessed.

C55
EHMTI-0041. ARTe Cluster project. Cluster headache - from pain to inspiration
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Background and aim: Barriers of communication play a crucial role in underestimating the disability induced by the headache disorders. Art is at its essence "a tool for creating empathy among human beings". ARTe Cluster is a project of Alleanza Cefalalgici Cluster aimed to collect artistic material to be used for promoting the activities of the association and to raise awareness about CH patients suffering. In this study we analyzed the educational, artistic and therapeutic value of the paintings included in ARTe Cluster.

Methods: In 2011 we solicited CH patients’ associations and figurative artists, throughout the world, to join to the ARTe Cluster project. Here we present a narrative analysis of artwork collected in the last two years.

Results: ARTe Cluster Project includes now 210 paintings (95 made by Cluster Headache sufferers; http://alcecluster.cefalea.it/). The exhibition expresses the full range of physical and psychological aspects related to CH with a prevalence of themes dealing with exhaustion, torture, isolation and fear.

Conclusion: CH represents a powerful source of inspiration for artistic expression. Art has proven to be able to create powerful icons of the disease that communicate about CH much more than single words can do and that may be used as educational tools to sensitize people and physicians about the dramatic sufferings of CH patients. An impressive number of CH patients demonstrated an artistic talent (12 of them were professional artists) possibly for the therapeutic aspect of the creative process of art making or for a natural artistic talent. No conflict of interest.

C56
EHMTI-0043. Clinically-oriented stratified approach and patient-preference approach in the management of MOH – a comparison between two strategies
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Background and aim: The management of medication overuse headache (MOH) is often difficult and no specific guidelines are available as regards the most practical and effective approaches. The aim of this study is to compare the cost-effectiveness of two different stratified approaches of drug withdrawal in 100 MOH subjects.

Materials and methods: In the first approach, called clinically-oriented stratified strategy (COSS), patients were stratified based on the presence/absence of complicated MOH. Patients with complicated MOH received a standard inpatient withdrawal programme whereas patients with simple MOH received an advice to withdraw the offending drug. In the second approach, called patient-preference stratified strategy (PPSS), the patients received information about the effectiveness of the different withdrawal regimens (1) simple advice, 2) outpatient detoxification and 3) inpatient detoxification) and they were treated according to their preferences.

The primary outcome measures used for comparing COSS and PPSS were: 1) number of responders ; 2) number of dropouts 3) cost per detoxified patient, 4) number of relapsers at 6 months follow-up.
Results: The number of responders (80% vs 70%), dropouts (16% vs 18%), and relapers (12.5 vs 14.5%) did not differ between COSS and PPSS. The cost per detoxified patient was $1211 and $430 for PPSS.

Conclusions: A patient preference stratified strategy is as effective as a clinically-oriented stratified strategy, but less cost intense.

No conflict of interest.

C57
EHMTI-0304. Headache determines quality of life in idiopathic intracranial hypertension
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Introduction: No previous studies have assessed quality of life (QoL) in idiopathic intracranial hypertension (IIH) associated with a therapeutic weight loss. Our previously published prospective cohort study confirmed that weight loss significantly reduced intracranial pressure (ICP) and treated chronic active adult IIH.

AIMS: Evaluate if QoL improved following treatment of IIH achieved through weight loss. Additionally, evaluate the relationship between QoL and changes in clinical outcome measures (body mass index (BMI), ICP (lumbar puncture), papilloedema (retinal coherence tomography retinal nerve fibre layer thickness), automated perimeter (Humphrey visual field 24-2), LogMar visual acuity as well as headache severity (diastolic verbal rating scale 0-10) and disability (headache impact test-6).

Methods: QoL was assessed using the short form 36 questionnaire (SF-36) before and after a dietary intervention and compared to changes in clinical outcomes. Baseline QoL was also compared to a control cohort.

Results: At baseline, SF-36 scores were worse in IIH group compared to an age-matched population. Following therapeutic weight loss, with reduction of ICP (p<0.001), SF-36 significantly improved (8 out of 11 domains). Despite a significant improvement with therapeutic weight loss, the following were not associated with enhanced quality of life: ICP, papilloedema, automated perimeter, visual acuity and BMI. The only variables that significantly correlated with improved QoL were headache disability and weight loss, p<0.001.

Conclusion: QoL significantly improved in IIH following therapeutic weight loss with reduction in ICP. Improvement in headache was the only factor that correlated with enhanced QoL. Effective headache management is a vital determinant of QoL in IIH.

No conflict of interest.

C58
EHMTI-0235. Hemodialysis-related headache
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Background: Hemodialysis (HD) increases expected lifetime of the patients minimizing the effects of neurological complications. However, dialysis may in itself, also have prejudicial effects on the nervous system. Headache (HDH) is the most common reported complaint among HD patients.

Aim: In the presented prospective study we aimed to further understand the HDH frequency and clinical characteristics in a large group of patients undergoing HD under standard dialysis programme with bicarbonate dialysate.

Method: A total of 494 patients were included. Patients undergoing HD sessions with no complaints of headache or any other neurological disorders were selected as control group. For HDH and control subjects arterial systolic and diastolic blood pressure, body weight, serum levels of BUN and creatinine were measured before and after one HD session.

Results: 175 patients (35.42%) were diagnosed with HDH and 275 patients were selected as controls. Headache was started with a mean of 2.90±0.72 hours of the hemodialysis session. The pain was usually throbbing in bi-frontal region, the mean duration of headache was 6.1±7.7h, and VAS score was 5.63±2.02. The difference between pre- and post-dialysis values of BUN in patients with HDH was statistically significant. Patients with HDH showed significantly higher mean systolic and diastolic blood pressure pre-dialysis values compared with control group, whereas post-dialysis values did not differ between the two groups.

Conclusion: HDH may cause disability to the patient and changing dialysis parameters or methods can prevent the attacks and disability. No conflict of interest.

C59
EHMTI-0027. The neuropathic pain in vascular dementia
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Objectives: To demonstrate that an appropriate pain control in patients with vascular dementia (VD) depends on good pain evaluation and may express an improvement in behavior and daily activities.

Methods: 56 patients were diagnosed in the last two years with advanced vascular dementia according to clinical manifestations, vascular risk factors and neuroimaging which revealed brain atrophy and multiple focal lesions in the subcortical white matter. 21 of them suffered from neuropathic pain but were unable to reliably communicate their pain. So, we used Pain Assessment in Advanced Dementia Scale (PainAD) whose total score ranges from 0 to 10 points, including mild pain (1-3), moderate pain (4-6) and severe pain (7-10). The lesions were 34% compressive-disc prolapse in the spine, producing sciatica or cervico-brachial nevralgia, 15% were infiltrative as paraneoplastic polineuropathy and 51% due to damage to the nerve itself by an intrinsce process-diabetic, alcoholic neuropathy, postherpetic nevralgia. The pain responded well to antiseizures and antidepressant medication.

Results: From 21 patients treated with painkillers others than opioids, 15 revealed marked cognitive and behavior improvement concerning especially apathy, depression and incontinence of affect-involuntary laughing and crying.

Conclusion: The patients with white matter lesions, particularly those noncommunicative, but also demented patients who report less prevalent pain, must be considered at high risk for undertreatment of pain. That’s why, we have to use the screening instruments to check the existence of pain, first and then to check whether the pain is neuropathic.—Leeds Assessment for Neuropathic Symptoms and Signs (LANS) and Pain DETECT. No conflict of interest.

C60
EHMTI-0009. A particular case of cluster headache
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Introduction: Cluster headache represents a severe, strictly unilateral retroorbital short lasting headache, accompanied by permanent parasympathetic autonomic features; attacks occur regularly for one week to one year, separated by pain-free periods that last at least one month.

Aims: We present a case of cluster headache as the presenting symptom leading, in the end, to the diagnosis of Multiple Sclerosis (MS) with a demyelinating lesion in the left trigeminal nucleus and tract.

Methods: We reviewed the case retrospectively, including the clinical, laboratory and radiological data.

Results: Our patient, female, aged 31 years, was admitted to our hospital with attacks of headache of short duration 10-20 minutes, that occur 4-5 times a day, usually during sleeping, accompanied by rhinorrhea, eyelid edema, ptosis, miosis and conjunctival injection. The pain is so excruciating that the patient describes it as “suicide headache”, followed by an incomplete abolition of the pain after 50-100 mg Sumatriptane per day,
600 mg Magnesium daily and Capsaicin cream. Cerebrospinal fluid revealed mildly elevated protein. Magnetic resonance imaging showed a non-harming, non restricting lesion within the pontine portion of the left trigeminal nucleus and tract. There were also numerous periventricular and callosal white T2 hyperintensities consistent with demyelination. The diagnosis of MS was confirmed by additional lesions in the cervical spinal cord, presence of oligoclonal bands, intrathecal Ig G synthesis.

Conclusion: The case suggests that in patients with any primary headache, especially young population, neuroimaging is often useful in order to exclude structural lesions.

No conflict of interest.

C61 EHM11-0286. Hemicrania episctica: case report
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Headache occurring during partial seizure, ipsilateral to the epileptic discharge, and remitting immediately after the seizures has terminated, is mentioned in IHS Classification 3rd edition (7.6.1). We here report the case of a misunderstood partial epilepsy, headache being considered the main problem. A fifty years old woman presented with a ten days history of stabbing left lateralized headache. The attacks were short-lasting (<3 minutes), at least forty or more every day, neuralgiform without conjunctival injection or tearing, but always associated with elementary hallucination (a bright light) in the right hemifield. She had a history of very severe head trauma at age twenty-one, with left hemotoma evacuation, followed by hydrocephalus, installation of ventriculo-peritoneal shunt complicated by meningitis. She had the same headache attacks at age thirty for a period of three months. She took several analgesic preparation every day with benefit on headache but not on right sided hallucinations. EEG showed left spikes discharges on the left temporo-occipital regions o the brain. MRI and MR spectroscopy of the brain: non-specific granulomatous inflammation in the pons (15x12x14 mm). Cerebrospinal fluid: proteinorachia, hypoglycorrhachia, mild pleocytosis. She was treated with methylprednisolone 1000 mg/day for 5 days and then switched to 60 mg of prednisone daily. After two weeks she was free from severe headache, after two months hearing and balance were significantly improved, steroids were gradually reduced and after 6 months excluded.

MRI of the brain (check-up): after two months granulomatous changes in the pons is reduced (8x5x6 mm) and after six months finding is normal.

Conclusion: Hemicrania episctica is a rare cause of chronic headache which responds poorly to analgesics, the diagnosis is often easily overlooked, and treatment must be vigorous with pulse doses of steroids and oral steroids.

C62 EHM11-0221. Tension type headaches and chronic pain syndrome
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Introduction: Tension type headaches (TTH) are the most common forms of primary headaches. The prevalence of TTH is about 80 % among cephalic pain.

Aims: The aim of study was investigation of intercoupling of TTH and chronic pain syndrome (CPS).

Methods: Method Questionnaires on screening of headaches (according to recommendations of International Headache Society) were blindly distributed among 3000 people in the country. 603 (458 women/145men) patients were selected for the study with primary headaches (migraine, tension type and cluster headache). Age of participants was 42±16 years.

Results: Data analysis revealed that 387 patients (64.2 %) (107 males and 280 females) suffer of TTH, 204 migraine (33.8%) (36 males and 168 females), 12 (2%) (8 males and 4 females) cluster headache. The coincidence with CPS was revealed in 232 patients with TTH (60%) and in 40 patients with migraine (20%).

Conclusions: Our data reveal non significant difference of distribution of primary headaches in Armenia, but it shows that CPS is present in more cases of chronic TTH and/or combination of TTH with other primary headaches. Further investigation on simultan CPS and TTH must be continued, as both could have common mechanisms and development, as well treatment options. No conflict of interest.

C63 EHM11-0060. Neurosarcoioidosis and chronic headache - case report
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Introduction: Sarcoioidosis is a granulomatous disease of unknown etiology that in 5% of patients affects the central nervous system. Headache is one of the most common neurological symptoms.

Case report: A 40-years old female patient gradually developed diffuse headache over period of six months. As headache become more severe, analgesics were of little or no help. During the last two months she gained hearing loss, gait instability and mild weaknesses in lower extremities, that were detected during neurological assessment. Five years prior to hospitalization patient was treated for pulmonary and lymph node sarcoioidosis. The diagnosis was confirmed by cytological finding after parotid gland puncture and CT of the chest. She was treated with prednisone for ten months and she was fully recovered.

Conclusion: Neurosarcoidosis is a rare case of chronic headache which responds poorly to analgesics, the diagnosis is often easily overlooked, and treatment must be vigorous with pulse doses of steroids and oral steroids.

C64 EHM11-0155. The course of headache in idiopathic intracranial hypertension: a 12 month prospective follow-up study
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Background: Although many patients with Idiopathic intracranial hypertension (IIH) experience disabling headache, data on the long-term outcome are sparse. Thus very little is known about predictors and mechanisms of chronification.

Aims: To prospectively describe the course of headache during the first year of IIH.

Methods: Patients with newly diagnosed IIH were consecutively included from December 2010 to June 2013. Treatment according to international guidelines was initiated at diagnosis. Headache history was based on diaries and standardized interviews performed at baseline and after 1, 2, 3 and 12 months. Intracranial pressure (ICP) was recorded at base line and after 3 months. Papilledema was assessed by optical coherence tomography (OCT) and compared to healthy controls.

Results: We included 44 patients, 35 completed the one-year follow-up. Dramatic headache improvement occurred within the first weeks after diagnosis and treatment. After one year 13 patients reported no headache. Fifteen of the remaining 22 patients reported sustained chronic headache. Episodic headache was reported by 7 patients. Early age of onset (OR=1.13, p<0.03) and high ICP (and OR=0.86, p=0.03) were associated with positive headache outcome. Papilledema decreased rapidly within the first three months of diagnosis. After 12 months OCT measures had normalised.
Conclusions: Although headache responded very well in 43% of patients, sustained long-term headache was seen in the remaining patients, despite normalisation of ICP and papilledema. Headache in IIH may thus be attributed to more complex mechanisms than ICP elevation alone. High ICP at baseline and young age predicted positive headache outcome.

Conflict of interest.

C65

EHMTI-0156. Quantitative sensory testing in patients with headache attributed by idiopathic intracranial hypertension – a case-control study

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Background: In patients with idiopathic intracranial hypertension (IIH) headache often persist as a disabling symptom even after intracranial pressure (ICP) has normalized. Yet very little is known about the mechanisms of chronicization.

Aim: To explore pain perception in patients with IIH in a controlled design at time of diagnosis and after 3 months of treatment.

Materials and methods: We explored pain perception in patients with newly diagnosed IIH by Quantitative Sensory Testing (QST) measuring cephalic and extra-cephalic supra-threshold pain ratings and pain thresholds for pressure and electrical stimulation. QST was performed at diagnosis and after one and three months. ICP was measured at baseline and at the 3-month follow-up. QST measurements from sex-matched controls were used for comparisons. Headache was assessed by monthly standardized interviews and headache diaries.

Results: At baseline IIH patients (n=28) showed no consistent abnormalities in pain sensitivity or thresholds (p>0.09 for all comparisons to healthy controls (n=28). Although headache improved markedly and ICP normalized in 52%, there was no consistent change in pain sensitivity from baseline to follow-up (p>0.09 for all variables). Patients with (54%) and without persistent chronic headache (46%) 3 months after diagnosis showed no different pain perception either at baseline or at the 3-month follow-up.

Conclusions: Although headache persisted as a chronic symptom in half of the patients we found no evidence of increased central pain sensitivity suggesting that headache chronicization in IIH is caused by mechanisms other than central sensitization.

C66

EHMTI-0281. Frequency of headache in stroke

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Background: Headache is a relatively common symptom associated with various types of stroke. It belongs to symptomatic headaches and is classified in the 6th group IHS classification. The aim of this study was to compare the frequency of the headache in stroke patients depending on sex, age, type of stroke, duration of headache, location and size of the cerebral lesion.

Methods: From January 1 to December 31, 2013, 5,476 stroke patients were admitted in St. Sava hospital. Out of them, 843 patients were treated, female 402, male 441, mean age 67.9. The patients were studied using the standard protocol including CT and MR. The presence of headache was established by taking history from the patients or relatives.

Results: Among these patients, 48.9% had experienced headache, with higher frequency in female (64.3%), less than 70 years old. Frequency of headache in patients with ischemia was 41.6%, and with hemorrhage 50.3%. Headache was most common in patients with cortical lesions (56.7%) and with lesions located in the basilar artery (41.3%). Large lesions (>2 cm) were more frequently followed with headache (62.3% vs. 28%). The average duration of headache in ischaemic stroke was 25 hours compared to 65 hours in haemorrhagic stroke.

Conclusions: Headache was more frequent in females (P < 0.01), in patients with hemorrhage (P = 0.05), with large ischemic lesions (P < 0.01), located in the basilar distribution (P < 0.05) and in the cortical area (P < 0.05).

No conflict of interest.

C67

EHMTI-0284. Frequency and intensity of headache following vasospasm after SAH

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Background: Vasospasm after SAH can begin 3–14 days after the first bleed, most commonly between 7–10 days. Symptoms of SAH include a severe headache with a rapid onset, that belongs to symptomatic headaches and is classified in the 6th group IHS classification. The aim of our study was to determine frequency and intensity of the headache following vasospasm after SAH, using TCD for diagnosis of MCA spasm.

Method: The study included 69 patients (age 55±10 years) after SAH, admitted to the St Sava Hospital from January 1 to December 31, 2012. TCD ultrasound was performed every 24–48 hours to monitor possible development of vasospasm and its gravity. MCA/ICA index and MFV of the M1 branches were measured with TCD and compared with presence of headache, its frequency and intensity established by taking the history from the patients or relatives.

Results: MFV for M1-MCA were significantly higher in patients with spasm than in those without spasm(p>0.01) and MCA/ICA index was >3. The ROC curve identified the best cut-off point for M1(MFV125 cm/s). Those with mild to moderate spasm (MFV-M1 < 120 cm/s) described headache as a dull lingering pain. Those with severe vasospasm (MFV >200 cm/s) experienced sudden and strong pain that referred to a “thunderclap headache” which further increased to a headache described as “like being kicked in the head”, or the “worst ever” pulsed towards the occiput.

Conclusion: Our results confirm that frequency rate and intensity of headache is proportionate to vasospasm and that severe headache is most common in patients with vasospasm of high degree, occurring between 3-7 days after SAH.

No conflict of interest.

D - HEADACHE CARE: DIAGNOSTICS AND OTHER CLINICAL ASPECTS OF HEADACHES

D1

EHMTI-0276. A novel mobile health application for patients with chronic headache

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Background: Headache is the commonest presenting complaint to neurology clinics across Europe and the developed world. However, within publically funded healthcare systems such as the UK’s National Health Service (NHS), long term follow-up in specialist clinics is not currently possible for all patients with chronic headache disorders. One potential solution to this challenge is to develop mobile health (mHealth) applications to allow specialists to monitor larger numbers of patients than would be possible within existing service models. We therefore aimed to develop a novel mobile application based system to allow remote monitoring of patients with chronic headache.

System design: The system consists of separate interfaces for patients and clinicians. The patient interface, accessed through mobile devices, enables patients to keep headache diaries and assesses the impact of symptoms using quality of life scales. The web-based interface used by clinicians, charts patients responses in a user-friendly format. Longitudinal change in symptom severity is charted in relation to medication/lifestyle changes and other interventions. The treating clinician is also able to set alarm parameters for individual patients that would alert them that a patient needs review and if necessary expedite a clinic appointment.
Conclusions: With patient compliance in mind, we have designed a user-friendly mobile application for remote monitoring of patients with headache. Such applications could potentially improve access to finite specialist headache services. Future work will aim to validate the use of this application in patients with headache. No conflict of interest.

D2
EHMTI-0166. Chronic daily headache-impact of adverse childhood experiences
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Background: In “Kronohodestudien” (KS) published in 2007-2009 we followed a cohort of 80 patients with chronic daily headache one year after withdrawal therapy and found that headache improved by > 50% in a third, and a third did not improve [1].

Aim: To examine whether adverse childhood events is associated with chronic headache and prognosis after withdrawal therapy.

Methods: All 80 patients from the KS study were invited to a follow-up in 2013. Headache was registered, and a questionnaire concerning Adverse Childhood Events (ACE) was delivered to KS patients and controls without headache or other chronic pain. The study was performed anonymously and approved by the ethical committee.

Results: Sixty-six KS patients (73% women) and 69 controls (70% women) were included. Total ACE score was higher in patients [1.6 (1.1-2.1)] than in controls [0.9 (0.5-1.3)], p=0.02. Reporting sexual violence was more common in patients without improvement of headache [9/24 (38%)] than in controls [7/69 (10%)], p <0.01. An ACE score > 4 was more common in patients who did not improve [7/24 (29%)] than in patients who had improved more that 50% [1/21(5%), p =0.05], and more common than in controls [8/69(12%), p=0.04].

Conclusion: Adverse childhood experience seems to be more common in patients with chronic headache than in controls, and most common in patients with a poor response to withdrawal therapy. No conflict of interest.

Reference

D3
EHMTI-0259. Demonstrational project: to develop, implement and test an educational model for better headache-related primary health care
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Introduction: While headache disorders are under-recognized, under-diagnosed and undertreated everywhere in the world, a principal factor is lack of knowledge among health-care providers, especially those in primary care.

Aim: To develop, implement and test an educational model for improving headache-related primary health care.

Methods: The study was performed in the town of Põlva, Estonia, among 6 general practitioners (GPs) with a patient base of 12500. We made retrospective base-line and prospective outcome observations using the same measures, separated by the intervention. The primary outcome measure was the referral rate to specialist care, selected because it was objective and verifiable, and had economic impact. Secondary outcome measures included GP-made headache diagnoses, treatments recommended/initiated, investigations performed and several patient-related outcomes. The intervention was a 2-day educational course based on EHF recommendations.

Results: Baseline review included 490 case records; prospective analysis included 29%. Overall referral rate changed insignificantly (from 38% to 35% p=0.19). However, other measures showed marked improvements. There was a strong shift from using non-specific headache diagnoses towards specific (39% to 13%; p<0.0001); diagnosis of precise migraine subtypes increased from 8% to 38% (p=0.0005). Headache treatment initiation rate increased from 58% to 81% (p<0.0001). (Unnecessary) investigation rate in patients with primary headache disorders fell from 26% to 4% (p<0.0001).

Conclusions: This is the first direct demonstration that well-structured education of GPs in headache improves outcomes; with fewer unnecessary investigations, and is probably cost-saving. Clearly the study needs replicating, and there is work to do to develop the methodology of these studies.

No conflict of interest.

D4
EHMTI-0169. Trajectories of headache days over one year (5 waves) in chronic and episodic migraineurs participating in the chronic migraine epidemiology and outcomes (cameo) study
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Introduction: Within-person variation in headache (HA) frequency and the nature and predictors of this variation have rarely been studied.

Aims: To determine variation and predictors of HA days/month in persons with episodic (EM) or chronic migraine (CM).

Methods: CaMEO was a longitudinal US survey employing quota sampling for screening 80,783 respondents to identify persons with migraine. Baseline HA day frequency was classified as EM (modified ICHD-3b migraine diagnosis, <15 HA days/month for past 3 months) or CM (modified ICHD-3b diagnosis, ≥15 HA days/month for past 3 months). Migraineurs completed quarterly surveys over 5 waves (~1 year) assessing HA symptoms and frequency. Using repeated measures regression modeling, we describe variation in HA days within/between individuals, and evaluate potential variation predictors.

Results: From 58,418 useable returns, we identified 16,789 migraineurs at baseline (EM: 15,313 [91.2%]; CM: 1,476 [8.8%]). The reported number of HA days/month showed cyclic variation over time within and between respondents with both CM and EM. HA days increased more for CM (vs EM) persons over time (quarterly RR=1.26, 95% CI 1.20–1.33; P<0.0001). A comprehensive graphical decomposition of this interaction will be presented.

Conclusion: Substantial within- and between-person heterogeneity in quarterly estimates of HA days/month was observed, and resulting trajectories differed between groups. The number of HA days/month increased 26% more per quarter for persons with CM vs EM, possibly resulting from a lowered threshold for migraine initiation, creating positive feedback leading to more attacks.

Funding: Allergan

D5
EHMTI-0170. The pain is less severe but more disabling in chronic vs. Frequent migraine patients
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Background: Attenuation of some “migrainous” traits during migraine chronification has previously been reported, but the detailed analysis of a migrigenous attack structure on a big sample of chronic migraine (CM) in comparison with frequent migraine (FM) patients has not been performed.

The aim: To evaluate the phenomenology of migraine attack and related phenomena in CM vs. FM.
Methods: The study included 154 patients with CM and 70 with FM based with the initial structured questionnaire, 15(Suppl 1):tracranial hypotension can

Results: Paroxysmal headache in CM is less intense than in FM (6.7 vs. 7.9 on VAS), significantly rarer hemicranic(35.1% vs. 52.9%) and pulsating (68.2% vs. 85.7%) than FM. Headache in occipito-cervical location is more common in CM(27.2% vs.14.3% FM,p<0.05), correlating with cervical myofascial syndrome (47.4% vs. 11.4%, respectively, p<0.0001). Nausea (63.6% vs. 81.4%, p<0.01) and vomiting (20.8%vs. 30.0%) are less pronounced in CM vs. FM. Associated signs like photophobia (85.7% vs. 97.1%), phonophobia (81.3% vs 94.3%), osphomoria (71.4% vs. 87.1 %) are also significantly lower in CMs. FM. In contrast, in CMthe need for bed rest,dizziness, weakness, drowsiness, concentration difficulties and decreased work capacity were significantly more frequent during an attack.

Conclusions: On a big sample size, we have revealed “blurred” migrainous features in CM patients: the attacks “lose” some of pulsatility and hemicranic character, become almost daily, less intense, but more incapacitating and the patient’s suffering is more pronounced.

No conflict of interest.

Introduction and aims: To investigate the patterns and mechanisms of audiovestibular dysfunction in intracranial hypotension.

Methods: We had consecutively recruited 16 adult patients with intracranial hypotension at the Dizziness Center of Pusan National University Hospital between November 2011 to November 2013. Spontaneous, gaze-evoked, and positional nystagmus were recorded using 3D video-oculography. Most patients had pure tone audiometry, and bithermal caloric tests.

Results: Out of the 16 patients with intracranial hypotension, five (31%) had neuro-otological symptoms along with the orthostatic headache. One of them presented with recurrent spontaneous vertigo and tinnitus mimicking meniere's disease (MD). Oculographic analysis documented abnormal eye movements in 38%, which include spontaneous downbeat nystagmus with variable positional modulation (n=3, 19%) and positional upbeat nystagmus (n=3, 19%). During the attack of vertigo in the patient with MD-like symptoms, we observed unidirectional horizontal and torsional nystagmus with normal head impulse test. Bithermal caloric tests were normal in all patients who tested. Audiometry showed unilateral or bilateral sensorineural hearing loss in about half of the patients.

Conclusions: Our study demonstrates that intracranial hypotension can induce higher frequency of audiovestibular dysfunction, which may be attributed to both irritation or dysfunction of the peripheral labyrinth or vestibulocochlear nerve, and brainstem or cerebellar dysfunction due to brain sagging.

No conflict of interest.
**D11**

**EHTMI-0080. How migraine is affected by therapies for multiple sclerosis**

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**Conclusions:** There are a number of available disease-modifying therapies for Multiple Sclerosis (MS). Prevalence of migraine is higher in MS patients than in the general population, so possible effects of these preventive treatments on migraine should be monitored. A review of the literature on the subject is presented.

**Methods:** PubMed, Ovid and Google Scholar searches were conducted looking for Migraine combined with Beta-Interferon (bIFN), Glatiramer Acetate (GA), Natalizumab, Fingolimod, Laquinimod, Teriflunomide, Azathioprine, Methotrexate, Mitoxantrone and Ciclofosfamide.

**Results:** Use of bIFN-1a was related to worsening of previously diagnosed migraine (37.5-41%, p<0.05) and to high percentage of de novo headache presentation (41-44%, p=0.05, ¼ of which with migraine features). GA was associated with only 11% of worsening of migraine, and a direct comparison with bIFN showed the latter as much more migraine-inducing. Effects of Natalizumab on migraine were evaluated in a small sample, but a significant reduction in migraine frequency and MIDAS scores was detected. Only spurious cases of worsening of migraine were reported with use of Fingolimod.

**Conclusions:** Of all disease-modifying therapies used in MS, bIFN is the only one which showed a clear association with worsening of previous migraine. Interpretation of data is difficult on increased incidence of migraine after starting a disease-modifying treatment, due to uneasy distinction between facilitation of a true migraine and secondary headache, attributable to medications. Migraine should always be carefully assessed in patients affected by MS, in particular if treated with disease-modifying medications, to evaluate eventual modification of migraine itself.

No conflict of interest.

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**D10**

**EHTMI-0075. Is insomnia associated with migraineurs attributable to anxiety and depression?**

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**Introduction:** Excessive daytime sleepiness is a major clinical and health concern that can have harmful consequences and has shown an associated with anxiety and depression. A close relationship between EDS and migraineurs has been reported in case-control studies. Case-control study may be affected by confounding factors.

**Aims:** To examine whether excessive daytime sleepiness (EDS) in migraineurs is associated with anxiety and depression in a population-based sample.

**Methods:** We selected a stratified random population sample of Koreans aged 19-69 and evaluated them with a 60-item semi-structured interview designed to identify headache type, anxiety, depression and EDS. Subjects with EDS was identified if a subject’s Epworth Sleepiness Scale (ESS) was 10 or more. Anxiety and depression symptoms were evaluated using Goldberg Anxiety Scale questions and Patient Health Questionnaire-9, respectively.

**Results:** The 1-year prevalences of EDS and migraine were 16.8% and 5.4%, respectively. Migraineurs reported more commonly reported EDS compared to non-migraine subjects (25.2% vs. 16.3%, p=0.005). Migraineurs with EDS reported higher attack frequency per month (6.0±8.5 vs. 3.5±5.8, p=0.010), higher HIT-6 score (60.0±10.1 vs. 52.6±8.3, p<0.001) compared to migraineurs without EDS. Logistic regression analysis revealed that migraineurs showed an odds ratio (OR) for EDS compared to non-migraineurs (OR [CI] = 1.7 [1.2-2.6]). After adjusting anxiety and depression, migraine was not associated with EDS (OR [CI] = 1.3 [0.8-1.9]).

**Conclusions:** Approximately 1/4 of migraineurs experienced EDS. Excessive daytime sleepiness in migraineurs was associated with anxiety and depression.

No conflict of interest.

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**D12**

**EHTMI-0172. “Calabria cephalalgic network”: innovative services and systems for the integrated clinical management of headache patients**

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**Introduction:** The Calabria Cephalalgic Network represents a novel healthcare delivery context which, according to a patient-centered vision, allows to effectively integrate different care settings (mainly primary and secondary care) by developing and implementing evidence based clinical workflows. On this basis, the Network is able to effectively support continuity of care, outpatient-inpatient integration, efficient use of health care resources and reduction of economic costs.

**Aims:** We present the architectural organization of the network, the structure of the clinical workflows and the related technology platform providing a captivating and pro-active informative and decision making dashboard in order to effectively and efficiently support the Headache integrated care processes.

**Methods:** The proposed organization of the Cephalalgic Network is based on a new integrated care program characterized by: (i) the set of relevant health care “actors” with roles and responsibilities; (ii) the services for sustaining collaborative and cooperative interactions among the end-users; (iii) the services for supporting the planning and operative management of all involved health care resources; (iv) the decision-making services for supporting integrated clinical workflows among the several healthcare settings.

**Results:** The Calabria Cephalalgic Network is currently under validation by a piloting activity involving a set of healthcare actors (GPs, Hospitals, local healthcare authorities and service providers) and enrolled patients. Relevant cost-benefit indicators have been defined and collected during the validation activity.
Conclusions: The current results confirm the effectiveness of the proposed approach, since it allows more efficient clinical service planning and management by making the best use of available hospital resources. No conflict of interest.

D13
EHMTI-0078. Headache attributed to masticatory myofascial pain: clinical features and management outcomes
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Introduction: To define better the association between headache and temporomandibular disorders it is important to identify if there is evidence of a headache attributed to temporomandibular disorders.

Aims: To describe the characteristics of headache attributed to temporomandibular disorders pain and to assess the effect of two management strategies in headache intensity and frequency.

Methods: The sample (n=60) of this randomized controlled trial was comprised of masticatory myofascial pain patients, according to the Research Diagnostic Criteria for Temporomandibular Disorders (RDC/TMD) and headache complaints and divided into two groups. The group 1 received only counseling for behavioral changes and the group 2, besides counseling, received occlusal splint. Follow-up was 5 months with three assessments moments. Outcomes were the temporomandibular disorders-related headache characteristics measured by a questionnaire, headache intensity (visual analogue scale - VAS) and frequency (questionnaire).

Results: The clinical features of headache attributed to temporomandibular disorders were the long duration, fronto-temporal bilateral location and tightening/pressing quality. There was a general reduction in the headache intensity and frequency without differences between groups. The baseline headache intensity mean (SD) was 7.55 (2.24) for the group 1 and 6.52 (1.63) for group 2. Final values were, respectively, 3.13 (2.19) and 2.5 (2.33).

Conclusion: Long duration, fronto-temporal bilateral location and tightening/pressure quality are the most distinguished characteristics in headache secondary to masticatory myofascial pain. Besides, the management of masticatory myofascial pain could be effective in the improvement of headache attributed to temporomandibular disorders. No conflict of interest.

D14
EHMTI-0331. Q-No: a questionnaire to predict nocebo in outpatients seeking neurological consultation
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Background and aim: Nocebo affects significantly adherence and treatment outcome and varies considerably among neurological conditions. We aimed to evaluate a questionnaire to predict nocebo in outpatients seeking neurological consultation.

Methods: A four-item (rating range 0-20) self-filled questionnaire (Q-No) was given in outpatients seeking neurological consultation at the Athens Naval Hospital. A blind to Q-No scoring neurologist rated outpatients as nocebo or no-nocebo after follow-up of >6 months.

Results: 338 (71.6% females) patients with mean age 46.9 ±13.8 years fulfilled the Q-No and the mean total score was 13.2 ±3.7. The Crombach’s alpha coefficient was 0.627. Neurologist suggested 80 patients (23.7%) as nocebo and 258 as no-nocebo (mean Q-No score=12.4 ±9.5% CI: [12.0-12.9] and 15.8, 95%CI: [15.1-16.6], respectively). By using a cut-off at score 16 the Q-No predicts nocebo with 82.6% specificity and 61.3% sensitivity.

Conclusions: Q-No may serve as a useful tool to predict nocebo in outpatients seeking neurological consultation. No conflict of interest.

D15
EHMTI-0339. Pain 101: managing complex chronic headaches across the lifespan
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Introduction: Headache pain has been found to be a common pain complaint across cultures. Much remains to be learned regarding the etiology and biological treatments of complex headaches. Much is unknown regarding etiology and biological treatments of headache.

Aim: To examine the efficacy of a best practice psychological treatment program based on 3rd wave cognitive-behaviour therapy incorporating Mindfulness-Based Stress Reduction in adolescents and adults with complex headaches.

Method: Outpatients referred to Stollery Children’s Hospital’s Pediatric Chronic Pain Clinic and University of Alberta Hospital Multidisciplinary Pain Centre were enrolled in the Pain 101 pain management program. Of these individuals, 52 adolescents and 139 adults reported complex headache. Pain 101 uses 10 psychosocial educational sessions aiming at the key areas of pain education, reducing physiological arousal, goal setting and activity management, cognitive reappraisal and acceptance, and emotional regulation. Data collection is targeted for five years post-assessment.

Results: Headache sufferers across the lifespan showed significant reductions in pain, pain-related disability, anxiety, pain-related fear, and a significant improvement in sleep and quality of life. Adults but not pediatric patients showed depression reduction. In adults, some of these improvements were durable over time to five years post-treatment. Insufficient data is available in the pediatric population at present to reliably discern outcomes past 6-months post-treatment.

Conclusion: The Pain 101 program shows promise for managing complex headaches and its clinical sequelae. The program successfully reduced disability, improved mood, and increased quality of life in a cost-effective treatment setting. Treatment effects lasted for an extended period post-treatment. No conflict of interest.

D16
EHMTI-0340. Distance treatment programs for individuals with complex chronic headaches living far from the hospital: the Canadian experience
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Introduction: Individuals far from treatment centres are at increased risk of unmet needs. Given the high prevalence of headache, this is a great concern. With increased communication technology advancements including telehealth comes the opportunity to treat remote patients with limited or no access.

Aims: 1) To compare the efficacy of the Pain 101 program in headache patients who attend the program in person versus those who attend via telehealth.

2) To discuss qualitative aspects of telehealth use reported by patients and staff.

Method: Adolescent and adult outpatients with complex headaches referred to tertiary care hospitals were enrolled in Pain 101. This pain management program targets pain education, reducing physiological arousal, goal setting and activity management, cognitive reappraisal and acceptance, and emotional regulation.

Results: Adult and pediatric patients showed significant and lasting reductions in pain, pain-related disability, anxiety, pain-related fear, and a significant improvement in sleep and quality of life. Adults but not pediatric patients showed depression reduction. No significant differences
were found between patients who attended via telehealth compared to those attending in person. Cost saving estimates to individual patients ranged from 1650–6600 Euro. Qualitatively, several patients reported that they would not have been able to attend without telehealth. Common complaints regarding telehealth were occasional technical difficulties and not feeling as involved in the group process.

**Conclusion:** Strong support for telehealth technology was found for individuals with complex headaches who live far from treatment centres. Recommendations for effective use of this technology for providing headache treatment will be discussed.

No conflict of interest.

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**D17**

EHMTI-0099. Migraineur perception regarding family burden from chronic migraine: results of the CAMEO (chronic migraine epidemiology & outcomes) study

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**Introduction:** Chronic migraine (CM) is associated with personal disability and burden; however the effect on family life is less certain.

**Aims:** The Family Burden Module (FBM) from the CaMEO study evaluated the extent, nature, and perceptions of burden of headache on migraineurs and their families.

**Methods:** CAMEO recruited persons to participate in a series of web-based surveys over 1 year to characterize migraine. The panel surveyed was sociodemographically representative of the US. FBM-Protoband survey assessed 15 domains (134 items), including missed activities with family, partner, and children, and relationship impact. Data from respondents meeting CM study criteria (modified International Classification of Headache Disorders, 3rd edition, beta [ICHD-3b] migraine diagnosis + ≥15 headache days/month for past 3 months; ICHD-3b criterion C not assessed) were included in current analysis.

**Results:** 11,518 respondents had valid data from the FBM; 994 (8.6%) probands were classified with CM. Probands reported reduced participation in family activities (6.9 days) and enjoyment of quality time with partners (6.6 days) within the preceding month. 20% reported missed vacations and reduced enjoyment at important family events (9.4 weeks) within the previous year. Most probands felt their headaches made their partner’s (64.1%) and children’s (56.5%) lives hard, and thought they would be better partners (72.5%) and parents (59.1%) without headaches.

**Conclusions:** CM adversely affects family perception, relationships and activities. These findings suggest CM is a significant burden to migraineurs that extends to the family.

**Funding:** Allergan.

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**D18**

EHMTI-0171. Headache disorders - current care of physiotherapy?

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**Introduction:** Headache disorders are a major health problem in Europe and lead to widespread suffering and considerable economic consequences. For the treatment of these patients the World Health Organisation recommends the use of management guidelines. In some guidelines beside the treatment with medication other therapies like physiotherapy are also mentioned to be a potential treatment option.

**Aims:** So far, it remains unclear, to what extent physiotherapists are nowadays confronted with patients with headache disorders and which physiotherapy interventions are actually applied in this patient population.

**Methods:** A cross-sectional study by means of a digital questionnaire was send in January 2013 to 4892 members of Physio Austria (the professional organisation for physiotherapists in Austria). After two weeks a reminder was send.

**Results:** The questionnaire was returned by 627 physiotherapists, resulting in a response rate of 13%. 70.1% of this physiotherapists treats in their clinical setting headache patients, either as primary diagnose (70%) or as coexisting symptoms. Interventions like Manual therapy, Relaxation Training or Trigger Point therapy are applied according to clinical findings and anamneses.

**Conclusion:** The findings of this study show that physiotherapists are confronted with patients with headache disorders on a regular basis. Therefore it can be recommended that management of headache patients should be included in physiotherapy education and interdisciplinary teams could consider taking physiotherapists on board. Furthermore, scientific studies should focus in effectivity of physiotherapy interventions.

No conflict of interest.
carotidian examination with a linear 12 MHz transductor, GE Loqic 5 Expert high resolution ultrasound device. We assessed intima-media thickness (IMT) at 1cm before right and left common carotid artery (CCA) bifurcation at the posterior wall and presence and severity of atherosclerotic plaques.

**Results:** 12 patients (40%) exhibited no vasular issues, IMT normal (6: IBS-D and 6: IBS-C); 18 patients (60%) showed various aspects of endotelial dysfunction: abnormal IMT in 15 patients (8: IBS-D) and small nonstenotic, stable plaques in 3 patients (1:IBS-D, 2:IBS-C) with fibrolipidic features. There was no statistically significant difference between the two groups neither having vs. not having vascular issues (p=0.8974), nor between abnormal vs presence of atherosclerotic plaques (p=0.2549).

**Conclusions:** More than half of IBS female patients complaining of migraine without aura presented features of endotelial dysfunction: either increased IMT or patent signs of early atherosclerotic plaques. No statistically significant differences concerning vascular issues were set between the two groups: IBS-C vs IBS-D patients.

No conflict of interest.

**D21**

**EHMTI-0193. The impact of cognitive symptoms on migraine attack related disability**

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**Introduction:** The socio-economic impact of Migraine is related to work loss and increased related disability. Migraine associated cognitive dysfunction during an attack may be the cause of this difficulties.

**Aim:** To analyze the presence and relevance of cognitive symptoms during migraine attacks, relating their intensity and symptom related disability with other migraine defining symptoms.

**Methods:** Consecutive migraine patients of headache clinic fulfilled diaries scoring each migraine symptom (including cognitive symptoms) intensity and symptom related disability.

**Results:** One hundred consecutive patients were included in this study (eight males, age average 31.2 ± 7.5 years), 34 (all females, age average 31.8 ± 8.8 years) returned information on 229 attacks, on average 6.7 per participant. This population had a moderate to severe impact of migraine (HT-6 63.4 ± 4.4). Intensity of each symptom is always rated slightly higher than disability. Pain is the symptom scored with the highest intensity and disability, followed by cognitive symptoms (difficulty in thinking and worsening with mental effort) and photo and phonophobia.

**Conclusions:** Cognitive symptoms are frequent during migraine attacks, their intensity and perceived symptom-related disability is second only to pain, during the attack. New acute migraine drugs trial should include cognitive evaluation as a secondary end-point, in order to be able to diminish decreased work performance and Migraine burden.

No conflict of interest.

**D22**

**EHMTI-0049. Headache, migraine and epileptic seizures**

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There are different possible temporal associations between epileptic seizures and headache attacks which have given rise to unclear or controversial terminologies. Migraine endepilepsy have common pathophysiologic mechanisms and share essential and defining attributes which distinguish them from other common neurologicaildisorders. They are both characterized by paroxysmal symptoms and episodic disorders. Occipital lobe to be thebrain structures most responsible for development of migraine and occipitallobe epilepsy. Both are characterized by visual symptoms followd by headache and other autonomic symptoms. Recognition of headache as an epilepticmanifestation per se still represents a challenge.

The classification of the international league AgainstEpilepsy does not refer to this type of disorder, while the International Classification of headache Disorderdefines kinds of association _ migraine triggered seizures hemicrania epileptica and post ictal headache._

Epileptic headache or ictal epileptic headache is an epileptic manifestation per se, with onset and cessation if isolated, coinciding with EE pattern of an epileptic seizures EH maybe followed by other epileptic i manifestation /motor/ sensory/ autonomic/.

Hemicrania epileptica is very rare variant. Post ictal pre ictal headache _ when headache is followed during or short time after typical ictal seizures Migraine attack maybe with or without aura, and seizures triggering role is stole a subject debate.

No conflict of interest.

**D23**

**EHMTI-0088. Prediction of treatment response in chronic daily headache patients (a prospective study)**

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**Introduction:** The prevalence of chronic daily headache (CDH) is 4-5% in general population. In headache clinics about 40% patients have CDH and 50-82% of them overuse acute drugs. Combining pharmacological and behavioural therapies can increase effectiveness of treatment, but predictive factors of treatment response are still discussed.

**Aim:** To examine predictive factors of treatment response for patient with CDH

**Methods:** 35 patients with CDH in age from 23 to 78 years were included in the study. All patients were treated by pharmacological therapy and cognitive-behavioral therapy. Patients with medication-overuse headache (MOH) underwent withdrawal therapy. Prospective analysis of clinical-psychological characteristics was performed at the end of 1 and 3 months of treatment.

**Results:** 40% (N=14) of patients were classified as having chronic migraine (CM), 25.7% (N=9) had chronic tension-type headache (CTTH), 31.4% (N=11) had CTTH and episodic migraine, 2.9% (N=1) had hemicrania continua. 62.9% (N=22) patients suffered from comorbid psychiatric conditions. Of those, 15.6% (N=5) had mood disorder, 17.1% (N=6) - anxiety disorder, 14.3% (N=5) - personality disorder and 17.1% (N=6) suffered from somatization disorder. 60% (N=21) of participants experienced at least 50% reduction of headache frequency after 3 months of treatment. Predictive factors of poor treatment response were: 1) certain psychiatric disorders (mood disorder, somatization disorder, schizoid personality disorder); 2) duration of CDH is more than 5 years; 3) out of employment.

**Conclusion:** Predictive factors of poor treatment response are mood disorder, somatization disorder, schizoid personality disorder, more than 5-years duration of CDH and out of employment.

No conflict of interest.

**D24**

**EHMTI-0334. Chronic migraine in young age: clinical characteristics in a prospective chronic migraine registry**

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**Introduction:** Chronic migraine (CM) prevalence peaked in midlife, but it is also present among young age.

**Aim:** We aimed to analyze characteristics of young patients in a CM prospective registry.

**Methods:** Patients firstly attended in an outpatient headache office in a tertiary hospital (January 2013-May 2014). CM diagnosed according to ICHD-2R criteria. We gathered demographic and clinical data including comorbidities and risk factors. Patients were classified in two groups, from 14 to 25 years old (Group A), and older than 25 (Group B).

**Results:** 218 patients (34 males, 184 females), mean age of 40.2 ± 14.2 years (14-71) were diagnosed of CM. 36 cases (16.5%, 8 male, 28 female)
were included in Group A. Among young patients, considering risk factors, in 15 (41.7%) stressful life events, in 2 (5.6%) mood disorders, and in 3 (8.4%) obesity. Among comorbidities, in 17 cases (47.2 %) vascular risk factor, especially smoking, in 2 (5.6 %) respiratory disease and no case with other chronic pain. 5 of 28 female patients (17.8%) described menstrually-related migraine. When comparing both groups, age at onset of migraine (13.1 ± 4.8 vs 19.3 ± 9, p<0.001), time in months from onset of CM (12.1 ± 11.3 vs 48.2 ± 80.5, p<0.001), and percentage of patients with medication overuse (27.8% vs 78.6%, p<0.001) and previous preventive therapies (27.8% vs 51.1%, p=0.01) were significantly lower in Group A patients.

Conclusion: CM is not uncommon among young age in our registry. Medication overuse is less present in young patients with CM. No conflict of interest.
Aims: The aim of this study was assessment of cephalgic pain severity and quality of life (QoL) in patients with primary headaches in comparison with those who additionally suffers of PHN.

Methods: 12 patients with PHN and comorbid migraine and TTH (3 and 9, respectively) and 14 patients with migraine and TTH only (4 and 10) as controls were assessed for headache pain severity by visual analog scale (VAS) and QoL by short form (SF-36) screening tools.

Results: Patients with PHN had worse results of headache pain intensity and QoL vs patients of control group. Headache pain severity in PHN group was 7-8 vs 5-6 in control group, and QoL scoring was lower in PHN group result than control.

Conclusion: PHN as the reason of central sensitization leads to further increase of the other chronic pain syndromes, such as primary headaches, elevate the cephalgic pain and decrease the QoL.

No conflict of interest.

D29

EHMTI-0159. Assessment of functional health and well-being in headache patients: the effect of individual-based physical therapy

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Background: Patients with tension-type headache (TTH) and/or migraine are often referred to physical therapy. Only few studies have evaluated the efficacy of individual-based exercise program.

Aim: To evaluate the effect of individual-based exercise on functional health and well-being, headache frequency and pain intensity in patients suffering from TTH and/or migraine.

Methods: During an 18 months period 282 consecutive patients entered an open label uncontrolled study in a multidisciplinary headache centre. Diagnoses were according to ICHD-3 beta. Functional health and well-being were measured by using Headache Impact TestTM (HIT-6); scores ranged from 36 (no impact) to 78 (severe impact). Pain intensity was recorded on an 11-point numeric rating scale(0-10); 0 = no pain; 10 = worst pain imaginable.

Results: So far, 40 women and 14 men, mean age 39,4, completed the study. 28 were diagnosed with TTH, 4 with migraine and 22 with both TTH and migraine.

In TTH-patients HIT-6 decreased from 59.6 to 54.4(p<0.01); frequency decreased from 243 to 180 days/month(p<0.01); pain intensity decreased from 5.8 to 3.9(NRS:11)(p<0.01).

In patients with combined TTH and Migraine HIT-6 decreased from 61.3 to 58.8(p=0.06); the TTH-frequency decreased from 20.6 to 12.6 days/month (p<0.01), and their migraine frequency from 4.0 to 2.3 days/month(p<0.003); whereas pain intensity was unaffected (TTH p=0.99, Migraine p=0.15).

Conclusion: Individual-based exercise has shown a positive effect on functional health and well-being, headache frequency and pain intensity in severely affected patients especially in TTH and less for combined Migraine and TTH. Randomised controlled studies are needed to confirm these findings.

No conflict of interest.

D30

EHMTI-0071. Psychological aspects, comorbidity and drugs usage in medication overuse headache patients

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Introduction: Medication Overuse Headache (MOH) patients are often treated in multidisciplinary clinical settings.

Aims: purpose of this study is obtaining preliminary data about MOH prevalence in our headache centre, identifying MOH patients features in terms of medication usage, comorbidity, psychological aspects and level of disability.

Methods: Clinical records of 89 patients accessing from January 2014 to April 2014 to our headache centre were reviewed and 27 MOH patients (2 males; 25 females) from 23 to 66 years old aged (M=40.63; DS=10.21) records were selected; demographical, clinical and psycho-social information were retrieved. Frequencies and covariance analyses were performed.

Results: MOH prevalence is 30.33%; migraine monthly frequency is high (M=16.74; DS=6.09); familiarity rate is 55.56%; comorbidity rate is 77.78%; most prevalent comorbidities are psychopathological (51.85%); mood disorders 25.93%; anxiety disorders 18.52% and metabolic (22.22%);

MIDAS mean score is 42.37; Zung-A mean score is 47.41; Zung-D mean score is 46.00; Prevalent personality traits are: evitatin (25.93%) and obsessive-compulsive (18.52%); Self efficacy is predominantly low to middle (moderate: sometimes); Overused medication are prevalently NSAID (59.26%) and combination analgesics (29.63%) with a average medications usage of 5397.04 mg/month and a mean overuse duration of 63.63 months; migraine frequency negatively correlates with age (p<0.05) and positively correlates with anxiety (p<0.01), depression (p<0.05), overuse (p<0.05); and disability level (p<0.05). Medication overuse positively correlates with disability (p<0.05).

Conclusions: The study suggest a relationship between medication overuse, health problems comorbidity and psychological aspects such as personality traits, self efficacy cognitions, psychopathological syndromes and disability.

No conflict of interest.

D32

EHMTI-0089. Relationship of sleep bruxism and migraine

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Introduction: Previous studies have shown the C1 spinal nerve has sensory neurons. Direct stimulation of the C1 spinal nerve provokes peri-orbital pain in migraine patients. No data exist which can predict a positive outcome for C1 nerve root block. Tenderness over the greater occipital nerve has been shown to predict outcome of GON block. We propose that tenderness over the GON with periorbital referral on exam predicts periorbital referral on direct C1 stimulation and predicts a positive outcome of block.

Aims: Predict the outcome of C1 spinal nerve block based on exam findings.

Methods: Review of 23 patients, 21 of whom had chronic migraine and 2 of whom had chronic cluster headache. All 23 have undergone C1 spinal nerve block.

Results: Of the 23 patients, 17 (74%) had GON tenderness on exam with periorbital referred pain and 6 (26%) had only occipital tenderness. Both cluster patients did not have periorbital nor orbital pain on palpation of the GON. All 17 with periorbital referred pain on GON palpation had reproducible periorbital pain intraoperatively on direct stimulation of the C1 spinal nerve with fluoroscopic guidance. Of those, 15/17 (88%) had a positive block. Of the 6/23 (26%) with a negative block, only two had periorbital pain reproduced on exam by GON palpation. Both cluster headaches had negative blocks. Neither had intraoperative periorbital or orbital pain on C1 stimulation.

Conclusion: Tenderness over the GON with periorbital pain referral during exam predicts positive outcome of C1 spinal nerve block in patients with migraine.

No conflict of interest.
patients with a diagnosis of migraine, there are many cases with malocclusion. Therefore, we focused on the relationship of malocclusion and migraine.

Aims: The current situation is treatment with drug primarily. The purpose of this study was malocclusion and migraine to look into the relationship of bruxism in particular.

Methods: We identified four patients with evidence of demyelination and molars with migraine group. By analyzing detail on these patients, we will consider the relevance of malocclusion and migraine. No conflict of interest.

Results: We found significant differences in relationship between incisors and molars with migraine group (P value 0.05). The questionnaire also showed statistically significant differences about clenching and bruxism (P value 0.05).

Conclusions: This study, as one of the causes of migraine, I considered bruxism and clenching are involved. In particular, we observed that the molar is related to bruxism of migraine group. Analyzing detail on these results, we will consider the relevance of malocclusion and migraine. No conflict of interest.

D33
EHMTI-0123. New-onset headaches heralding demyelination
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Background: Headache is a rare presenting demyelinating feature in people who go on to develop multiple sclerosis (MS). It has been suggested that approximately 2% of MS patients present with headache. There has been a debate whether MS patient group are at higher risk of developing headaches. We are not aware of any case reports where an occipital headache heralds first or recurrent high cervical cord demyelinating lesion.

Aim: To report headache characteristics in patients whose headache was the main presenting symptom of MS

Method: We prospectively collected data from patients who were referred to the MS clinic with new onset headaches who were found to have first demyelinating episode or MS relapse over the last 12 months. Magnetic Resonance Imaging (MRI) scans were reviewed for relevant demyelinating lesions.

Results: We identified four patients with evidence of demyelination whose main symptom was new onset headache (three with stabbing occipital headache and one with thunderclap headache) and were found to have relevant abnormal physical examination. Of these four patients, three had demyelinating plaque at C1-C2 segments. In 2 out of 4 cases, headache represented the first demyelinating episode.

Conclusion: Cervical spinal cord is a highly myelinated structure, demyelinating plaques could induce nociceptive inflow by affecting the trigemino-cervical complex. It is the traditional thinking that headaches are an unlikely presentation of a demyelinating episode, however detailed headache history coupled with appropriate examination and investigations could potentially reveal conditions which requires totally different therapeutic approach from the common primary headache disorders. No conflict of interest.

D34
EHMTI-0210. Dolotest may reflect the effect of psychological treatment in patients suffering from severe headache
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Introduction: Patients with severe headache who undergo psychological treatment at the Danish Headache Center, a tertiary multidisciplinary treatment centre, often report positive effects on their perceived general well-being and ability to work. However there is no agreement on which quality of life (QoL) instruments are useful for monitoring outcome of psychological treatment.

Aim: To assess the effect of psychological treatment in headache patients using the DOLOtест, a newer validated Health-Related QoL instrument.

Method: All patients referred to psychological assessment at the Danish Headache Center in 2012 underwent an initial interview and 129 were offered psychological treatment. Treatment was either group treatment or individual therapy. All participants were given the DOLOtést at baseline, 1st, 5th and last therapy session and at six-month follow-up. DOLOtést scores were compared using t-test.

Results: Of the patients offered treatment, 100 accepted, 93 completed, and 71 were reached at six-month follow-up. There was a significant improvement on the following domains at six-month follow-up compared to baseline: pain (p=0.039), problems with more strenuous physical activities (p=0.037), reduced energy and strength (p<0.001), and low spirit (p=0.007). Headache frequency was also significantly reduced from 23 to 17 days/month (p<0.001).

Conclusion: The DOLOtést may be a valuable multidimensional instrument to assess QoL in patients with severe headache, and to monitor outcome of psychological treatment in future trials. No conflict of interest.

D35
EHMTI-0226. Prevalence of headache disorders in three different social settings
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Introduction: The aim of our study was to estimate the prevalence of headache disorders in three different social settings using the newly published International Classification of Headache Disorders (ICHD-3-beta).

Methods: The study population consisted of: I042 students (719 females, mean age 20.6, range 17-40), 1075 workers (146 females, mean age 40.4, range 21-67), 1007 blood donors (484 females, mean age 34.1, range 18-64). All patients were diagnosed according to ICHD-3-beta using a semi-structured validated interview conducted by a neurologist or by trained senior medical students.

Results: In the whole material, 1-year prevalence of headache was 67%, migraine 15% and tension type headache (TTH) 58%. In females the prevalence of migraine in students (35%) was significantly higher than in workers (16%) and blood donors (19%), p<0.0001. In males the prevalence of migraine in students (15%) was also significantly higher than in workers (4%) and donors (5%), p<0.0001. The prevalence of TTH in females was respectively 77%, 65% and 66%. In males the prevalence of TTH in students (79%) was significantly higher than in workers (32%) and blood donors (59%), p<0.0001, the prevalence of TTH in donors (59%) was significantly higher than in workers (32%), p<0.0001. Only few (18%) had consulted because of headache. Particularly the very high prevalence of migraine and TTH in students is important and calls for further studies of risk factors and possibilities for preventive measures.

Conclusions: We show for the first time convincingly that headache disorders have different prevalence according to social setting. They represent a huge health problem in Russia. No conflict of interest.

D36
EHMTI-0203. Increased prevalence of migraine without aura in patients with saccular intracranial aneurysms (SIA) and remission after clipping of the aneurysm
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Introduction: The aim of our study was to determine 1-year prevalence of headache before rupture of saccular intracranial aneurysms (SIA) and 1-year after clipping of SIA.

Methods: We prospectively studied 199 consecutive patients with SIA (103 females and 96 males, mean age: 43.2 years). As control served 194 blood donors (86 females, 108 males, mean age: 38.4 years). Both groups were interviewed about headaches in the year preceding clipping/interview using a validated semi-structured neurologist conducted interview. SIA patients with a past history of recurrent headaches (N=87) were follow-up 1 year after clipping. The remission rates of migraine and tension-type headache (TTH) in these patients was compared to 92 patients from a headache center interviewed twice one year apart. Diagnoses were made according to the ICHD-2.

Results: During the year before rupture, 124 (62.3%) had one or more types of headache: migraine without aura (MO) -78 (39.2%), migraine with aura -21% (2%), probable migraine: 42%; TTH: 39/169 (64), cluster headache: 2 (1%). Only the prevalence of MO was significantly higher in patients with SIA compared to controls (39.2% VS 8.8%, OR 6.7, 95% CI 3.8-11.9, p<0.0001). One year after clipping, the prevalence of MO was significantly more reduced in patients with SIA than in controls (74.5% VS 12.8%, p<0.0001). No factors except clipping of the aneurysm could explain the remission of migraine. The prevalence of TTH did not change significantly after clipping of SIA but decreased significantly after treatment in controls.

Conclusions: Unruptured SIA is associated with a marked increase in the prevalence of migraine without aura which decreases significantly after clipping. No conflict of interest.

Background: Headaches are a common condition with high socioeconomic impact. Guidelines recommend medication but rarely include physiotherapy. However, patients report pain relief from exercises, mobilisation and massage. A systematic review with a literature search up to 11/2002 concluded that physical treatments may be effective but that further research might change this result.

Aim: To evaluate the current level of evidence for physiotherapy on headache symptoms.

Methods: Search strategy with pre-defined key terms conducted in MEDLINE, CENTRAL, PEDRO, reference lists of retrieved articles, and journal contents. Controlled trials, employing physiotherapy interventions for the reduction of headaches published in any language between 11/2002 and 04/2014 were included. Studies using chiropractic, osteopathic or acupuncture techniques were excluded. Quality was evaluated using the Cochrane risk of bias tool.

Results: Twenty-two trials were eligible. 19 reported outcome measures allowing combination in a meta-analysis. Physiotherapy included mobilisation, exercises, relaxation, massage, and physiotherapy as part of a multidisciplinary intervention. Headache types included migraine, TTH, CGH and mixed/undefined headache populations. A meta-analysis for pain reduction found a pooled effect size of -9.97 on a 0-100 VAS (95% CI -18.55; -1.38). Frequency was reduced by -2.76 days/months (95% CI -6.69; -0.87). Duration by -7.52 hours/attack (95% CI -10.49; -4.55). Sub-analyses indicated effectiveness for the reduction of pain intensity, frequency, headache types and mixed/undefined headache populations.

Conclusions: There is a high level of evidence that physiotherapy is effective for headache reduction. Physiotherapy is low-cost with no side-effects and potentially reduces medication use and work absenteeism. No conflict of interest.
**D40**

**EHMTI-0179. Emotive and behavior problems in adolescents with chronic headache (CDH) and medication overuse (MOH) using child behaviour checklist (CBCL) e youth self-report (YSR)**

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**Introduction:** Many studies have examined the importance of psychological factors for the etiopathogenesis of headache in children and adolescents. However, it is not clearly understood whether different types of headache are related or comorbid with specific psychopathological traits.

**Aims:** To address this issue, the aim of our study was to investigate the presence of psychological characteristics or peculiar psychopathological traits in subjects with chronic headache and/or medication overuse.

**Methods:** Fifty six patients ages 11.0-18.0 (39.3% male and 60.7% female), seen for headache in a third-level centre in Italy, and their 56 mothers were enrolled in this study. They were assessed using Parent Child Behaviour Checklist and Youth Self-report. A detailed history was taken to assess the presence of headache, using criteria defined by ICHD-III beta; in this way we have found: 7 patients with MOH and 24 patients with CDH.

**Results:** Patients with CDH at the YSR obtained higher T scores in Thought Problems: this result remained significant both in a three group comparison between patients with probable CDH, patients with confirmed CDH and patients with a non-chronic headache (p=0.04) and in a 2-groups comparison of patients with CDH (both probable or confirmed) or with non-chronic headache (p=0.01). Moreover, we observed a significant reduction of Total Competence score in patients with medication overuse (p=0.02).

**Conclusions:** This study confirmed that CDH could be related with a more severe psychopathology, and especially with Thoughts Problems at YSR. Moreover, patients with MOH are described by their mothers as having a reduction of functioning.

**No conflict of interest.**

**D41**

**EHMTI-0044. Variability of clinical features in attacks of migraine with aura**

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*The Journal of Headache and Pain 2014, 15(Supp 1):D41*

**Background:** There is significant variability in the clinical presentation of migraine, among patients, and between attacks in an individual patient. We examined clinical features of migraine with aura in a large group of patients, and compared retrospective and prospective patient reports of migraine attack characteristics.

**Methods:** 267 patients with migraine with typical visual aura provided a detailed retrospective description of the clinical features of their attacks of migraine. During the study, clinical symptoms in migraine attacks starting with aura were recorded prospectively in 861 attacks.

**Results:** Retrospectively reported visual aura symptoms were variable and often overlapping; the most common symptoms were dots or flashing lights, wavy or jagged lines, blind spots, and tunnel vision. Non-visual aura symptoms were reported by approximately half of the patients, the most prevalent being numbness and tingling, followed by difficulty in recalling or speaking words. There were significant inconsistencies between the features of prospectively and retrospectively recorded attacks. Headache, nausea, photophobia, and phonophobia were all less common in prospectively recorded attacks as compared with retrospective reporting. Nausea was prospectively reported in only 51% of attacks and mostly with mild intensity. The occurrence and severity of nausea was reduced with advancing patient age. Phonophobia was not consistently reported in conjunction with photophobia.

**Conclusion:** These findings indicate variable involvement of different brain regions during migraine attacks. The variable occurrence of nausea, and of phonophobia in conjunction with photophobia may be an important factor in clinical studies where attacks are diagnosed based on these clinical features.

**No conflict of interest.**

**D42**

**EHMTI-0311. Effect of physical activity and hours of sleep on symptoms scores following migraine**

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**Introduction:** Physical activity and regular sleep are a common recommendation by all physicians to mitigate a myriad of disorders. Migraine treatment typically targets reduction of symptoms after onset of the migraine as their primary objective, yet little data exist comparing the symptom scores for medication choices.

**Aim:** The purpose of this research is to determine how physical activity status, type of medication and hours of sleep effect the number/intensity of symptoms a migraineur reports.

**Methods:** 44 migraineurs reported hours of sleep and symptoms scores 0-6 on a Likert scale (0=no symptoms, 6 =max) for 22 symptoms associated with migraine at baseline, 24 hours, 48 hours and 7 days post migraine. Physical activity (meeting CDC minimum criteria) and type of medication [over the counter (OTC), prescription (Rx) OTC + Rx, None] were reported.

**Results:** Repeated Measures ANOVA found there was no significant difference between migraineurs in hours of sleep (p=.698, F=.479) or physical activity status (p=.822, F=.304) at each measure, but a significant difference in total symptom scores by time (p<.001, F=18.507). Migraineurs with medication had significantly higher total symptom scores following migraine, compared to migraineurs without medication. A one way ANOVA revealed significant differences between type of medication groups at 24 hours (p=.001, F=7.210) by treatment.

**Conclusions:** The number of hours of sleep and physical activity status had no effect on the number or intensity of symptoms in migraineurs. It is important to determine outcomes of medications on symptom reduction for each patient to choose the best migraine management strategy.

**No conflict of interest.**

**D43**

**EHMTI-0086. Pure mestral vestibular migraine**

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We describe two cases of a young patients affected, by benign paroxysmal positional vertigo (BPPV) during menstruation. Patient 1, of 32, present BPPV every month with menstruation, associated with constrictive non pulsating mild headache. Patient 2, of 43, present BPPV 6/7 time/year always during menstruation associated with severe throbbing headache. Both patients present history of kinetosis, familiarity for migraine, absence of vertigo and headache out of menstruation or during pregnancy. For a lot of years they were followed by otolaryngology for BPPV and treated with canalith repositioning procedure, without results. A instrumental examination like brain MRI and audiometric tests were normal, only nystagmus was present every crisis. Occurrence of the vertigo/headache and neurovegetative symptoms only during menstruation, we conclude for the diagnosis of Vestibular Migraine (VM) and treated like a pure menstrual migraine. Patient 1 undergone to a short term prophylactic therapy with naproxene 550mg bid starting before the period until the fourth day and frovatriptan 2.5mg like rescue therapy,
We have identified three subgroups in a large sample of patients with tension-type headache (TTH). The International Classification of Headache Disorders defines TTH as headaches occurring on average 15 days per month, not qualifying for migraine. We have previously shown that medication overuse is a major problem among TTH patients; however, we still lack a comprehensive understanding of who is at risk for medication overuse and why. In a single-center observational study, we applied a hierarchical cluster analysis to group 1021 self-rated health, on average four days per week, on a self-reported 7-point scale, to capture how patients rated their health. The ventilatory threshold (VT) is a standardized, individual parameter of metabolic demand during exercise. No study on the negative influence on their quality of life.

Aim: To study the manifestations of JHS and MCHDs in children and adolescents with migraine compared with their peers suffering tension-type headache (TTH).

Method: 109 children and adolescents with migraine with/without aura established by the diagnostic criteria of ICHD-2 were included into the study. The control group included 50 patients with TTH. The JHS was confirmed according to P.H. Beighton's scored assessment (1999). MCHDs were diagnosed by the heart ultrasound examination.

Results: The signs of UCTD were revealed in 76 (69%) of patients with JHM suffer migraine (Bendik E.M., 2011). The Goal: high prevalence of UCTD manifestations in child and adolescent migraine patients can influence the frequency and severity of migraine attacks and worsen the patients' somatic status which may have the negative influence on their quality of life.

No conflict of interest.

Results: 25 patients (EXE, N = 13; CT, N = 12) completed the study. All participants' characteristics and baseline measurements matched between groups. CT changed no post-intervention variable. For EXE, there were reduction in DAYS (8.9 ± 3.6 vs 5.6 ± 3.4, p = 0.002), FREQ (6.3 ± 3.0 vs 3.8 ± 2.4, p = 0.002), POMS (27.3 ± 35.1 vs 6.7 ± 13.1, p = 0.038), GAD7 (7.2 ± 5.1 vs 4.2 ± 3.1, p = 0.034), and a trend to decrease in BESII (6.3 ± 3.0 vs 3.8 ± 2.4, p = 0.067), and increase in VO2max (30.8 ± 6.5 vs 32.1 ± 5.5, p = 0.049) after AE. Conclusions: Metabolic-matched AE using VT prevented M and improved mood.

No conflict of interest.

**D44**

EHTMI-0330. The prevalence of undifferentiated connective tissue dysplasia syndrome in children with migraine

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**Background:** The efficiency of migraine therapy depends on its co-morbidities. One of these co-morbidities is represented by undifferentiated connective tissue dysplasia (UCTD). In general population the joint hypermobility syndrome (JHS) may be present in 5-30% (Murray K.J., 2001) and minor congenital heart defects (MCHDs) in 5-35% (Freed L.A., 1999). In adults approximately 75% of patients with JHM suffer migraine (Bendik E.M., 2011).

**Aims:** To study the manifestations of JHS and MCHDs in children and adolescents with migraine compared with their peers suffering tension-type headache (TTH).

**Method:** 109 children and adolescents with migraine with/without aura established by the diagnostic criteria of ICHD-2 were included into the study. The control group included 50 patients with TTH. The JHS was confirmed according to P.H. Beighton’s scored assessment (1999). MCHDs were diagnosed by the heart ultrasound examination.

**Results:** The signs of UCTD were revealed in 76 (69%) of patients with migraine. JHS was confirmed in 68 (62%) MCHDs were found in 42 (38%). In TTH patients the manifestations of UCTD were noted in only 21 (42%) cases of the form of JHS and in 18% (MCHDs), which rates are similar to the literature data for general population.

**Conclusion:** High prevalence of UCTD manifestations in child and adolescent migraine patients can influence the frequency and severity of migraine attacks and worsen the patients’ somatic status which may have the negative influence on their quality of life.

No conflict of interest.

**D45**

EHTMI-0200. Aerobic exercise training at the ventilatory threshold prevents migraine and improves mood

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**Introduction:** The ventilatory threshold (VT) is a standardized, individual parameter of metabolic demand during exercise. No study on the preventive effect of aerobic exercise training (AE) for migraine (M) has been used in the VT.

**Aims:** To measure changes in M clinical outcomes and mood state after a standardized AE program.

**Methods:** The study recruited episodic M patients with and without aura (ICHID) taking no preventive medicine. Study protocol comprised 12-week of AE, performed 3 times/wk, 30 min/session at the VT. Participants were randomly allocated for AE (EXE) or waiting list (CT) groups. VT was determined by a computerized open-circuit gas analyser during maximal cardiopulmonary exercise test for assessment of aerobic fitness (VO2max).

The corresponding heart rate, workload, and perceived effort at VT were used to monitor AE intensity. Days with M (Days), M frequency (FREQ), disability (DIS), medication (MED), depression (BECKII), anxiety (GAD7) and mood (POMS) were measured at baseline and after AE.

**Results:** 25 patients (EXE, N = 13; CT, N = 12) completed the study. All participants’ characteristics and baseline measurements matched between groups. CT changed no post-intervention variable. For EXE, there were reduction in DAYS (8.9 ± 3.6 vs 5.6 ± 3.4, p = 0.002), FREQ (6.3 ± 3.0 vs 3.8 ± 2.4, p = 0.002), POMS (27.3 ± 35.1 vs 6.7 ± 13.1, p = 0.038), GAD7 (7.2 ± 5.1 vs 4.2 ± 3.1, p = 0.034), and a trend to decrease in BESII (6.3 ± 3.0 vs 3.8 ± 2.4, p = 0.067), and increase in VO2max (30.8 ± 6.5 vs 32.1 ± 5.5, p = 0.049) after AE. Conclusions: Metabolic-matched AE using VT prevented M and improved mood.

No conflict of interest.

**D44**

EHTMI-0056. Self-medication of headache: identification of subgroups of patients through cluster analysis

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**Introduction:** We have previously shown that medication overuse is prevalent among individuals self-medicating regular headache. **Aims:** In this study we evaluated self-medication headache patients from a broader perspective, exploring the interplay between headache and concomitant pain conditions, pain-related disability and pain medication use. Identification of subgroups of patients could be helpful to tailor intervention strategies.

**Methods:** A hierarchical cluster analysis was used to group 1021 self-medicating headache patients according to their (1) sociodemographics, (2) pain characteristics, (3) pain-related disability and (4) pain medication use. Patients were recruited in 202 Belgian community pharmacies and fulfilled the following inclusion criteria: aged ≥18 years, purchasing an over-the-counter systemic analgesic, experiencing pain ≥1 full day/month and suffering from headache.

**Results:** Three subgroups were identified. Group 1 comprised patients with low socioeconomic status, low self-rated health, on average four concomitant pain conditions, high pain frequency, high disability, and high rates of medication overuse. Group 2 included older patients with a mean of two other pain syndromes, and low disability but high pain intensity. Group 3 comprised young highly-educated patients diagnosed with migraine, having on average one concomitant pain condition, low pain frequency, low disability but high pain intensity, and low rates of medication overuse.

**Conclusions:** We have identified three subgroups in a large sample of individuals self-medicating headache. The marked differences across the three groups stress the importance of a holistic assessment of headache patients and the need for tailored strategies to reduce the risk of medication-overuse headache in primary care.

No conflict of interest.

**D47**

EHTMI-0265. Premonitory symptoms in episodic migraine: a multicenter questionnaire study of serbian headache society

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**Introduction:** The International Classification of Headache Disorders defines premonitory symptoms as symptoms preceding and forewarning of a migraine attack by 2-48 h, occurring before the aura in migraine with aura and before the onset of pain in migraine without aura. Prevalence rates of patients reporting one or more premonitory symptoms range between 33% and 79% in clinic-based studies.

**References:**
Aims: The aim of our study was to evaluate the occurrence and characteristics of premonitory symptoms, and compare them between two migraine subtypes-with and without aura.

Methods: A multicenter study under the auspices of Serbian Headache Society was conducted in four headache centers in Serbia. Using a structured questionnaire, we retrospectively studied the prevalence of 16 predefined premonitory symptoms in 321 patients with episodic migraine.

Results: The mean age of patients was 38.48±12.24 years, 87.9% were women, and 25.8% of them had migraine with aura. At least one premonitory symptom was reported by 263 patients (81.9%). The most frequently reported symptoms were bad mood (61.4%), fatigue (60.7%), irritability (55.7%), stiff neck (55.0%) and concentration problems (54.1%). The mean number of premonitory symptoms per subject was 3.3. Migraine subtype had no effect on the mean number of symptoms per individual, and did not influence the number of symptoms that were always or occasionally associated with migraine attack. Anxiety was significantly more often reported in migraine with aura patients (p = 0.008).

Conclusions: Premonitory symptoms are frequently reported by migraine patients. Anxiety preceding the attack seems to occur more frequent in migraine with aura.

No conflict of interest.

D48
EHMTI-0332. Health care utilisation for primary headache disorders: insights from Karnataka, India
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Background: Globally, primary headache disorders are neglected and inadequately treated. There is little information on management or health-care utilisation for headache disorders from the Indian sub-continent.

Aims: To fill this knowledge gap in Karnataka State, south India.

Methods: In a population-based survey, 2,329 randomly selected, biologically unrelated adults (18-65 years) (1,141 male, 1,188 female; 1,226 urban, 1,103 rural) were interviewed using a validated structured questionnaire. Ethics approval and informed consent from participants were obtained.

Results: Headache was reported by 1,488 persons (crude annual 1-year prevalence 63.9%) with a mean age of 37±12 years, 58% females and 53% rural-dwelling. Only 24.7% (32.4% rural, 16.2% urban) had sought medical help. Of these, 80.6% had seen a primary-care doctor and 15.8% a specialist. Greater proportions of urban dwellers (38.8%) and females (17.7%) had consulted specialists. Consultation rates were higher for migraine (41.9% overall) but, even among those with high disability assessed as lost productive time by HALT questionnaire, did not exceed 50% (HALT grade 1: 27.3%; grade 2: 39.0%; grade 3: 45.7%; grade 4: 45.5%). Consultation rates were much higher for any headache occurring on ≥15 days/month (72.5%) and medication-overuse headache (78.6%).

Conclusion: Despite the high prevalence of primary headache disorders, health-care utilisation is poor. The primary care physician is consulted most often, which is where headache services should be built. Structured headache services require primary-care physicians trained in managing headache disorders, facilitated links to secondary care when needed, but also improved awareness among people with headache so that they use them.

No conflict of interest.

D50
EHMTI-0042. 2003-2013. Trends in clinical characteristics and use of health care services of moh patients attending an headache centre in Italy
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Background and aim: Over the past 15 years clinical experience and scientific evidences about MOH has accumulated providing the basis for new simplified diagnostic criteria, treatment guidelines and possibly an increased awareness about this disorder. The aim of this study was to analyze the trends in prevalence, clinical severity and health care utilization in MOH patients attending a specialty headache centre.

Methods: Data regarding the prevalence of MOH, the socio-demographic status (SES), the clinical characteristics (headache frequency, severity and related-disability, type of medication overused, duration of MOH, frequency of drug intake, complicated vs. simple form) and the health care use measures were extracted from the Headache clinic database.

Results: The prevalence of MOH patients visited at the INI headache centre decreased over time (17.3%-5.7%, p<0.0001) due to a significant reduction in the proportion of MOH females (18%-6%, p<0.01). When compared with the 2013 MOH cohort, MOH patients visited in 2003 were significantly more disabled (MIDAS IV, 66 vs 32%, p<0.001), had an higher frequency of headache (28.2 vs 24.3 days/month, p=0.03), had a higher drug intake (42 vs 26 drugs/month, p<0.01) had a longer duration of chronification (48 vs. 24 months), had a higher rate of complicated forms (73 vs 48%) and had used more frequently a preventive treatment (54% vs 32%, p=0.03).

Conclusion: Over a ten-years period MOH has become less prevalent and the clinical profile has improved over time suggesting an earlier recognition of MOH and an improved access of these patients to specialists' service.

No conflict of interest.
**Background:** Alexithymia is a term used to describe a disorder where patients have difficulty in expressing their own feelings in words. The presence of Ax had been related to the occurrence of chronic pain, but poorly studied in headache. Noteworthy, the presence of Alexithymia has been linked to specific correlates at level of posterior cingulated cortex [1].

**Aim:** The aim of this study is analyzing the construct of Alexithymia in MOH patients.

**Methods:** A clinical sample of 105 MOH patients (27 M, 78 F, mean age 47.49±10.03) and 78 control subjects (28 M, 50 F, mean age 41.51±11.03) had been enrolled for the administration of the Toronto Alexithymia Scale.

**Results:** Compared to controls, MOH showed significant values in the total score (t (181) = -4.706, p<0.001), in Factor 1 (Difficulties-in-describing-feelings) (t(181)=−5.296, p<0.001), Factor 2 (Difficulties-in-identifying-feelings) of TAS-20 (t (181) = -1.999, p<0.05) and for Factor 3 (Outside-oriented-thought) (t(181)=−1.799, p=0.099), without differences for gender. In MOH group, a pathological level of Ax is shown by 47% of patients (vs 15.4% of controls), a borderline level by 28.1% (vs 23.6%), and no-Ax by 24.9% (vs 61%).

**Conclusion:** Alexithymia seems an important psychological factor involved in MOH, even if it is not clear which is the link with headache, but pathophysiological and therapeutic meanings should be considered in further studies. No conflict of interest.

**Reference**

**D53 EHMTI-0236. A qualitative study of the functional impact of symptoms on migraine patients**

**Aim:** Migraines have significant impacts on patients, resulting in functional and quality of life impairments. There is limited qualitative data that describe the functional limitations related to episodic (EM) and chronic migraines (CM).

**Aims:** A qualitative study was conducted to understand migraine patients’ experiences.

**Methods:** Five U.S. clinical sites recruited patients to complete interviews with trained researchers. Subjects provided IRB-approved informed consent and met the following eligibility criteria: 18-60 years of age, and migraine history meeting IHS criteria. Interviews were conducted to elicit concepts that describe impacts on daily functioning. Transcripts were analyzed using qualitative methods.

**Results:** 21 EM and 11 CM patients were interviewed. Patient reported concepts were grouped into the following areas: physical function, everyday activities, social/relationship/leisure activities, and emotional responses. Physical function impacts included difficulty with moving head and bending, needing to lie down, limited movement, avoiding bright lights and loud noises; everyday activities included household chores, running errands, activities requiring concentration, interacting with others, performing tasks related to work and/or school. Social/relationship/leisure activity and emotional impacts included inability to make plans, avoiding people, feeling frustrated, moody, and guilty. Physical function was described as the most immediate impact from symptoms, with emotional and social impacts occurring during and after symptoms.

**Conclusion:** Functional impacts from migraine symptoms described by EM and CM patients can be grouped into 3 domains: physical, emotional, and social. Physical function limitations play a role in the immediate migraine experience. Emotional and social impacts are experienced during and after migraine episodes.

**D54 EHMTI-0306. Contact heat-evoked potentials (CHEPs) in healthy subjects and patients with episodic or chronic migraine**

**Introduction:** Habituation and 1st block amplitude of sensory evoked potentials are commonly reduced in episodic migraine between attacks, whereas in chronic migraine 1st block amplitude is increased and habituation tends to normalize like during an attack. The aim of our study was to compare Contact Heat-Evoked Potentials (CHEPs) in healthy subjects (HS), episodic migraine without aura (EM) and chronic migraine (CM).

**Methods:** Ninety subjects participated in the study: 53 HS, 31 EM and 6 CM. CHEPs were obtained using 53°C stimuli on the forehead and the wrist. Twenty responses were averaged and partitioned in 5 blocks of 4 responses. We measured P1, N2 and P2 amplitudes and P1-N2 and N2-P2 amplitudes and habituation. Pain was rated using a visual analog scale (VAS). Data were analyzed with ANOVA and post-hoc Scheffe’s test.

**Results:** There was no significant difference in CHEPs latency, amplitude or habituation between HS and EM either in the forehead or at the wrist. By contrast, in CM patients P1-N2 amplitude after forehead stimulation was increased (p<0.04) and habituation more pronounced (p=0.04). Both at forehead and wrist VAS pain ratings were significantly higher in CM than in HS (p=0.02) or EM (p=0.01).

**Conclusion:** We found no difference between HS and interictal EM for thermonoceptive evoked potentials. Contrasting with these findings, CM patients display increased CHEPs amplitude, CHEPs habituation and pain perception. Such a pattern is similar to that found in these patients with
visual evoked responses and may be due to central sensitisation and increased thalamo-cortical drive.
No conflict of interest.

**D55**

**EHMTI-0025. Clinical manifestations of subarachnoid hemorrhage from gnathostoma spinergerum in srinagarind hospital**

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**Introduction:** Subarachnoid hemorrhage (SAH) is a serious neurological condition. Common cause of SAH is vascular origin. Gnathostomiasis is also a common disease in Thailand and may cause SAH.

**Aim:** This study aimed to find clinical differences between SAH caused by both causes.

**Methods:** This was a retrospective study and collected data from medical charts of patients diagnosed as SAH at Srinagarind Hospital during 2009 and 2011. SAH caused by vascular causes diagnosed by cerebral angiogram, while cerebral gnathostomiasis diagnosed by negative cerebral angiogram with positive gnathostoma antibody.

**Clinical features between both groups were compared by descriptive statistics.**

**Results:** There were 18 patients in vascular group and 10 patients in gnathostomiasis group. Most variables between both groups were comparable except cerebrospinal fluid glucose/plasma glucose. This ratio in gnathostomiasis group was significantly higher than vascular group (80% vs 16.67%, respectively).

**Conclusion:** Cerebrospinal fluid glucose/plasma glucose ratio was significantly higher in SAH patients caused by gnathostomiasis than vascular group.

No conflict of interest.

**D56**

**EHMTI-0063. The migraine disability assessment (MIDAS) questionnaire: translation, validation and reliability of Bahasa Melayu version**

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The Journal of Headache and Pain 2014, 15(Suppl 1)D56

**Introduction:** MIDAS has become a popular and useful tool for evaluating migraine-related disability worldwide.

**Aim:** The study was designed to determine the validity and reliability of the Bahasa Melayu version (MIDAS-M) of the Migraine Disability Assessment (MIDAS) Questionnaire.

**Methods:** The patients attending the Neurology Clinic, Hospital Universiti Sains Malaysia, Kubang Kerian, Kelantan, Malaysia, were screened against inclusion and exclusion criteria. Patients were eligible for the study if they had been diagnosed with migraine for more than six months. Standard forward and back translation procedures were used to translate and adapt the MIDAS Questionnaire to produce the Bahasa Melayu version. The translated Malay version was tested for face and content validity. Validity and reliability testing were further conducted with 100 migraine patients (1st administration) followed by a retesting session 21 days later (2nd administration).

**Results:** A total of 100 patients between 15-60 years of age were recruited. The majority of the patients were single (66%), students (46%) and had a severe disability (46% MIDAS grade IV). The sample was adequate according to the Kaiser-Meyer-Olkin value of 0.75. The Cronbach’s alpha values were 0.84 (1st administration) and 0.80 (2nd administration). The test-retest reliability for the total MIDAS score was 0.73, indicating that the MIDAS-M questionnaire is stable; for the five disability questions, the test-retest values ranged from 0.77 to 0.87.

**Conclusion:** The MIDAS-M questionnaire is comparable with the original English version in terms of validity and reliability and may be used for the assessment of migraine in clinical settings.

No conflict of interest.

**D57**

**EHMTI-0008. The international headache society classification of primary headaches is not supported by data and should be revised**

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The Journal of Headache and Pain 2014, 15(Suppl 1)D57

The International Headache Society classification of primary headaches in the International Classification of Headache Disorders (ICHD) is almost universally accepted by researchers and clinicians. It is highly unlikely that reputable journals will accept submissions for publication if the cohorts have not been selected strictly according the ICHD. Likewise, in the clinical setting the appropriate treatment is prescribed according to how the patient’s headache is classified. But how reliable is the ICHD? As it does not appear to be based on data, its scientific validity is questionable. If indeed it cannot be scientifically validated, then the results of research based on the ICHD would be inaccurate. The practical implications of this are that the research data on the efficacy of migraine drugs is inaccurate. As a result, patients diagnosed according to this classification often receive the incorrect treatment.

No conflict of interest.

**D58**

**EHMTI-0160. New questionnaire – impact of migraine, tension-type headache and neck pain: a validation study**

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The Journal of Headache and Pain 2014, 15(Suppl 1)D58

**Introduction:** Migraine often include co-existing tension-type headache (TTH) and neck pain (NP). Currently no questionnaires cover these comorbidities. A new questionnaire “Impact of Migraine, Tension-Type Headache and Neck Pain” (Impact M-TTH-NP) was therefore needed.

**Aim:** To determine face and content validity of the newly developed Impact M-TTH-NP.

**Methods:** Nine migraine patients with co-existing TTH and NP participated in group interviews. Content validity was assessed by 13 headache experts. The Content Validity Index (CVI) at item (i-CVI) and at scale level (S-CVI/Ave) was used together with the Average Deviation (AD) index to assess interrater agreement.

**Results:** Impact M-TTH-NP showed acceptable face validity. Of 78 items twelve were revised and one was added based on group interviews and experts review. Seventy two items (92%) obtained i-CVI ≥ 0.78 (range 0.78-1.00) indicating excellent content validity, 71 items (91%) obtained acceptable AD index. Nine items did not meet either the limit for excellent i-CVI and/or acceptable AD index. The overall S-CVI/Ave was 0.92 indicating an excellent content validity.

**Conclusions:** The Impact M-TTH-NP questionnaire showed acceptable face validity and excellent content validity and can be recommended for clinical studies of patients with migraine and co-existing TTH and NP.

No conflict of interest.

**D59**

**EHMTI-0137. Headache as an initial clinical symptom of carotid artery dissection**

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**Background:** Carotid artery dissection (CAD) is main cause of stroke among young and middle-aged patients. Clinical presentation of CAD includes one side headache, pain on neck, often accompanied by homer syndrome, and followed by cerebral ischaemia.

**Conclusion:** The MIDAS-M questionnaire is comparable with the original English version in terms of validity and reliability and may be used for the assessment of migraine in clinical settings.

No conflict of interest.
The aim of this study was to analyze the spectrum of clinical presentation in patients with CAD.

**Methods:** This was a case series of 31 patients with CAD which were hospitalized from 2001 to 2014 at our department. The CAD was diagnosed in all cases by MRI, MRA and duplex sonography.

**Results:** Average age of patients was 47.4 (28-59) years. From a total of 31 patients, there were 27 with unilateral and 4 with bilateral CAD. Facial and neck pain and Horner’s syndrome were the only presenting symptoms in 6 patients; headache and visual disturbances in 2; headache and tinnitus in 1; facial pain, Horner’s syndrome and contralateral sensorimotor deficit in 7; headache and contralateral sensorimotor deficit in 5; contralateral sensorimotor deficit in 10. CAD was spontaneous in 24 patients while in 7 was triggered by mild trauma. MRI revealed infarction in 22 patients. Between patients without brain infarction, 6 patients presenting with facial and neck pain and Horner’s syndrome, 2 with headache and visual disturbances and 1 with headache and tinnitus. Good outcome (defined as modified Rankin score of 0-2) was seen in 28 patients (90.3%).

**Conclusion:** CAD was associated with headache in 21 patients (67.7%). However, the clinical presentation of CAD is variable and can be similar to other etiology of stroke. No conflict of interest.

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**D60**

**EHMTI-0132. Premonitory symptoms and migraine disability assessment (MIDAS) questionnaire**

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**Introduction:** Premonitory symptoms are symptoms which precede the migraine attack by 2-48h. Little attention has been paid to the variety of PS and how severely PS are affecting a patient’s life.

**Aim:** Determine frequency of PS and investigation of a connection between PS and MIDAS scores.

**Methodology:** Unsupervised, prospective study lasted for 8 months. In order to be included in the study, subjects had to be above 18 years old, and meet IHS criteria for migraine (without or with aura). Patients have filled in a questionnaire, containing a total of 11 symptoms that have been described as possible migraine PS. Also they have done MIDAS test as a general measure of migraine severity.

**Results:** A total of 200 migraine patients (F:M = 169:31), mean age 40.6 years (range 19-71) participated in this survey. 145 were diagnosed as having migraine without aura and 55 migraine with aura. 69 had a MIDAS score ≤10, 54 between 11 and 20 and 77 scored >21. 73 patients took different antimigraine preventive treatments. Most frequent individual premonitory symptoms were fatigue (62.5%) and unhappiness (62.0%) followed by stiff neck (58.5%), photophobia (57.0%), phonophobia (54.5%), concentration difficulties (50.5%), nausea (48.5%) and asthmophobia (45.0%), food craving (35.5%), yawning (34.5%) and water craving (30.0%). Premonitory symptoms fatigue and stiff neck were related with higher MIDAS scores (r = -0.41, F(4,424), p < 0.001).

**Conclusion:** Gender and age did not influence the frequency or the profile of PS. Taking prophylactic therapy for migraine was protective only for nausea. Fatigue and stiff neck were related with MIDAS scores, as they were more frequent, higher were the scores on the test. No conflict of interest.

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**D61**

**EHMTI-0194. The impact of dizziness in tertiary care migraine patients**

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**Introduction:** The association between dizziness and migraine has been proven. There is no data available on the relationship between dizziness and impact or disability scores in tertiary clinic migraine patients.

**Aims:** 1. Outline the incidence of dizziness in patients with migraine.

2. Compare Headache Impact Test (HIT-6) scores in patients with migraine and dizziness to those with migraine without dizziness.

**Methods:** A questionnaire design study collected demographic data, headache characteristics and features, healthcare utilisation, and outcome measures in patients attending a tertiary headache clinic over a six week period. One aspect of questioning related to dizziness as an associated feature. Analysis was carried out only on those who fulfilled the International Headache Society (IHS) classification for episodic or chronic migraine. Post-hoc analysis examined the differences in HIT-6 scores in subgroups using a Kruskall-Wallis test.

**Results:** Of the 61 respondents, analysis was carried out on the 51 who fulfilled the IHS migraine criteria. Of these, 84% were female with a mean age of 42.1 years (SD 14.5). Mean headache days per month was 13.4 (SD 10.5), while 45% had chronic migraine. Dizziness was experienced by 93% of patients with migraine, and those with dizziness had significantly higher HIT-6 scores (p<0.04).

**Conclusion:** Patients with migraine and dizziness experience a more severe impact on their daily lives than those without dizziness. This preliminary work has implications for future research which should be directed to the assessment and management of dizziness in migraine. No conflict of interest.

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**D62**

**EHMTI-0257. Intractable refractory unilateral hemicrania with autonomic symptoms – a case study of an undiagnosed pontine cavernous malformation**

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Cerebral Cavernous malformations (CCM) occur in less than 1% of the general population, and one-third may have more than one lesion. Headaches alone may accompany CCM in up to 10% patients although micro-haemorrhage with accompanying headache is more common. A 67-year old male presented with a 15-year history of episodes of sudden onset left facial pain with dysesthesia in the fifth cranial nerve V1 distribution and left sided headache. The frequency of facial pain has increased with daily episodes of occurrence, exacerbated by movements. His headache impact score HIT-6 was 71. The patient’s family history is a sister died of a stroke, another from multiple sclerosis and a nephew died at 15-years-old of cerebral haemorrhage. On examination there were signs consistent with a brainstem lesion. Extensive scanning demonstrated no haemorrhage into any lesion and confirming multiple foci including a pontine lesion. Genetic testing confirmed a CCM2 mutation heterozygous deletion of two-nucleotides and 50% risk of inheritance of the c76.7del to family members.

Pontine CCM can precipitate in migraine-type headache and atypical facial nerve distribution symptoms due to disruption of the trigeminovascular system (TGVS). The Periaqueductal Grey area (PAG) is involved in modulating pain through both ascending and descending projections, the latter connections to the TGVS that inhibits nociceptive afferent information. CCM lesion is also disrupting the Nucleus Raphe Magnus (NRM), acting as a migraine generator.

The diagnosis for the cause of this intractable facial pain and headache is the large pontine CCM lesion disinhibiting fibres of the TGVS. No conflict of interest.

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**D63**

**EHMTI-0327. Information and communication technology for improving the management of medication overuse headache: results of the comoestas multicentric, multinational study**

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**Introduction:** The association between dizziness and migraine has been proven. There is no data available on the relationship between dizziness and impact or disability scores in tertiary clinic migraine patients.

**Aims:** 1. Outline the incidence of dizziness in patients with migraine.

2. Compare Headache Impact Test (HIT-6) scores in patients with migraine and dizziness to those with migraine without dizziness.

**Methods:** A questionnaire design study collected demographic data, headache characteristics and features, healthcare utilisation, and outcome measures in patients attending a tertiary headache clinic over a six week period. One aspect of questioning related to dizziness as an associated feature. Analysis was carried out only on those who fulfilled the International Headache Society (IHS) classification for episodic or chronic migraine. Post-hoc analysis examined the differences in HIT-6 scores in subgroups using a Kruskall-Wallis test.

**Results:** Of the 61 respondents, analysis was carried out on the 51 who fulfilled the IHS migraine criteria. Of these, 84% were female with a mean age of 42.1 years (SD 14.5). Mean headache days per month was 13.4 (SD 10.5), while 45% had chronic migraine. Dizziness was experienced by 93% of patients with migraine, and those with dizziness had significantly higher HIT-6 scores (p<0.04).

**Conclusion:** Patients with migraine and dizziness experience a more severe impact on their daily lives than those without dizziness. This preliminary work has implications for future research which should be directed to the assessment and management of dizziness in migraine. No conflict of interest.
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D64

EHMTI-0014. A case of ice-pick headache

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Introduction: Ice-pick pain or ophthalmodynia periodica consists of unilateral, ultra-short and localized stabs of pain in the distribution of the first branch of the trigeminal nerve and occurs in the absence of organic disease.

Aim: To draw attention to the possibility of coexistence of a chronic migraine with a stabbing pain in a pregnant patient.

Methods: This case involves a female, aged 39, pregnant -12 weeks, experiencing stabbing light to 15-20 times per day on average. Before pregnancy, her pains were completely relieved with Indomethacin 25 mg three times daily for seven days and 6 mg of melatonin per day at bedtime: while continuing to take melatonin, she remained pain-free at a two-month-follow-up. Because these drugs were contraindicated in her status, we used Capsaicin nasal spray which improved the recurrent ice-pick pains-4-5 attacks per day, but with extreme headache-related disability. We suggested a preventive treatment with Boswellia serrata 350-three times a day which stopped completely the recurrent ice-pick pains for the entire period of pregnancy.

Results: In this particular case, Melatonin and Indomethacin, being contraindicated, a herbal treatment was appropriate and useful. Boswellia acid inhibits prostaglandin synthesis by inhibiting the lipooxygenase pathway.

Conclusion: Physicians need to be knowledgeable about this syndrome because each has its own treatment and the patient can be burdened with excruciating headache-related disability. Boswellia might be an effective option for it.

No conflict of interest.

D65

EHMTI-0016. Examples of problematic use of references in the headache literature. A problem for readers, authors, referees, and editors?

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Background: The problem with references is incorrect use to support statements in the text. This will be illustrated by presenting two of many observed examples.

Methods: Uncontrolled personal observations of dubious references in the headache literature. Examples:

Statement: Nagata et al. (4) reported that spontaneous migraine was not associated with any dilation of the middle meningeal artery as measured by MRA.


Comment: Note that only one migraine attack was studied.

Statement (from a kinetic study on orally inhaled DHE): Other routes of administration such as nasal delivery (40% bioavailability) have erratic and somewhat unpredictable pharmacokinetic (PK) properties that pose therapeutic challenges (eg, unpredictable clinical response or adverse events).


Comment: The statement is from an industry-sponsored paper on kinetics of the new orally inhaled DHE and discredits to some extent nasal DHE. However, an extensive study of nasal DHE from 1996 demonstrated "the reliability and reproducibility" of nasal DHE's pharmacokinetics (Humbert H. et al, Human pharmacokinetics of dihydroergotamine administered by nasal spray, Clin Pharmacol Ther 1996; 60: 265–275).

Conclusion: Problematic references should not be used neither by scientists nor by the industry. Some initiatives to diminish the problem will be suggested.

No conflict of interest.

D66

EHMTI-0314. A window to the past: the association between inflated pain scores and a history of abuse in women with chronic migraine

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Introduction: Childhood abuse is a risk factor for depression and anxiety and is reported by 58% of patients with episodic migraine (EM) or chronic migraine (CM). Maximum headache severity >10/10 on a 10-point visual analog scale (VAS) is not uncommon among CM patients. The relationship between inflated pain scores and abuse has never been investigated.

Aims: To evaluate the relationship between pain severity >10/10 on a ten-point VAS and a history of abuse in women with CM.

Methods: A retrospective review was conducted on new headache consults in female patients with ICHD-III-defined CM over a 34-month period. Age, maximum headache severity on a 10-point VAS, and history of physical, sexual, and emotional abuse were collected.

Results: 80 patients were included. Average age was 43 years in the pain >10 group and 40 years in the pain ≤10 group (range 19-72 years; 95% CI -3 to 3, p=0.31). 28.8% (n=23) reported maximal pain >10/10 and 71.2% (n=57) reported maximum pain ≤10/10. Of those reporting pain >10/10, 87% (n=20) reported an abuse history compared to 35% (n=20) in the pain ≤10/10 group (OR 12, 95% CI 0.33 to 0.70, p=0.001).

Conclusions: Among female CM patients, pain >10/10 correlates with a markedly higher likelihood of abuse compared to those reporting pain ≤10/10. As history of abuse is a risk factor for depression and anxiety, and treatment of psychopathology can influence CM treatment outcomes, all CM patients should be screened for a history of abuse, with special attention to those reporting pain >10/10.

No conflict of interest.
D67
EHMTI-0230. Characteristics of menstrual and nonmenstrual migraine attacks in women with menstrual migraine
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Introduction: The International Classification of Headache Disorders 3β defines menstrual migraine (MM) as attacks of migraine without aura occurring on day 1±2 of the menstrual cycle in ≥2/3 menstruations. Previous studies show conflicting results regarding possible differences between menstrual and nonmenstrual migraine attacks.
Aim: To compare characteristics of menstrual and nonmenstrual migraine attacks in women prospectively diagnosed with MM.
Method: 237 women from the general population with self-reported migraine in ≥50% of their menstruations were interviewed and diagnosed by a neurologist. Subsequently they were asked to complete a three month prospective headache and menstruation diary. When a headache occurred, the women recorded information about pain intensity, quality and location, time of onset and end of headache, associated symptoms, aggravation by routine physical activity, medical treatment and sick leave. In addition, they were asked to record each day of uterine bleeding.
Results: Of the 123 (52%) returned diaries, 42 were excluded due to oligoamenorrhea (n=36), no migraine (n=4) or incompleteness (n=2). Among the remaining 81 women, 56 fulfilled the diagnostic criteria for MM. In these 56 women, menstrual migraine attacks were more painful on a 0-10 scale (coefficient 0.34, 95% CI 0.02-0.65), longer lasting (coefficient 10.91 hours, 95% CI 5.68-16.14), and required more doses of symptomatic treatment (coefficient 1.09 doses, 95% CI 0.50-1.68) compared to nonmenstrual attacks. Additionally, they were more often associated with nausea (OR 2.22, 95% CI 1.35-3.65).
Conclusion: In women with MM, menstrual migraine attacks are more severe than nonmenstrual attacks. No conflict of interest.

D68
EHMTI-0228. A clinical interview versus prospective headache diaries in the diagnosis of menstrual migraine without aura
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Introduction: The International Classification of Headache Disorders (ICHD) II and III beta defines menstrual migraine as attacks of migraine without aura occurring on day 1±2 of the menstrual cycle in ≥2/3 menstruations. According to the ICHD III beta, a three month prospective headache diary is required in order to establish the diagnosis of MM.
Aims: To compare the diagnosis of MM from a clinical interview based on the ICHD II-criteria for MM, with prospective headache diaries in a population-based study.
Methods: 237 women with self-reported migraine in at least half of menstruations were interviewed by a neurologist about headache and diagnosed according to ICHD II. Additionally, the MM-criteria were expanded to include other types of migraine related to menstruation. Subsequently, all women were asked to complete three month prospective headache diaries.
Results: A total of 123 (52%) women completed both clinical interview and diaries. Thirty-eight women were excluded from the analyses; two had incomplete diaries and 36 women recorded 1 menstruation, leaving 85 diaries eligible for analysis. Sensitivity, specificity, positive and negative predictive value and Kappa for the diagnosis of MM in clinical interview vs. headache diary were 82%, 83%, 90%, 71% and 0.62 (95% CI 0.46-0.80).
Conclusion: A thorough clinical interview is valid for the diagnosis of MM. When this is undertaken, prospective headache diaries should not be mandatory to diagnose MM but may be necessary to exclude a chance association. No conflict of interest.

D69
EHMTI-0033. "Cervical pain" study in an Italian tertiary referral headache center
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Introduction: The majority of migraine patients remain undiagnosed or misdiagnosed in Italy (Cevoli et al. 2009). In our experience, many patients affected by migraine self-diagnose it as ‘cervical pain syndrome’ (CP) assuming cervical spine pathology as the cause.
Aim: To phenotype and classify, in a tertiary referral headache center, the headache types of patients with self-diagnosed CP, and to describe this sample of patients.
Methods: All patients aged 18 to 75yo, referred to Mondino Headache Center for a first visit for headache, completed a questionnaire about CP. A detailed history was taken and a neurological exam was performed in each patient. Brain and cervical imaging were performed when deemed necessary. All patients finally received a diagnosis based on ICHD-IIIβ criteria.
Result: 85 patients completed the questionnaire: 47 were suffering from self-diagnosed CP; 3 had suffered from self-diagnosed CP, 35 never had self-diagnosed CP. In all of 50 CP descriptions, the pain involved the head. ICHD-IIIβ diagnoses included migraine without aura (n=30), migraine with aura (1), probable migraine without aura (n=4), chronic migraine (n=7), medication overuse headache/chronic migraine (n=5), tension type headache (n=2), hemicrania continua (n=1), no patient presented with a phenotype suggestive of cervicogenic headache. 24 out of 50 patients with CP answered the question `who did tell you that these attacks are CP?` with: general practitioner/medical specialist. The majority of these patients underwent exams without a clear indication and ineffective treatment.
Conclusion: To the best of our knowledge, this is the first study that systematically assessed the headache phenotype of patients with self-diagnosed CP. The results suggest that the phenomenon of self-diagnosing CP is very common in Italy, even in patients referred to a tertiary headache center. The majority of these patients suffer from typical migraine attacks, without any evidence of pathological conditions of the cervical spine. No conflict of interest.

D70
EHMTI-0111. Intra-variability of migraine attacks features
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Background: Migraine attacks may have different feature with respect to different patients but also within the same patient. At the best of our
knowledge in literature is not described the percentage of patients that report attacks as stereotyped and the percentage of patients reporting attacks with different phenotype.

Aim: To evaluate the percentage of migraine patients reporting attacks with same characteristics on three consecutive attacks.

Methods: Each patient recorded in a diary the features of three consecutive attacks. Characteristics recorded were: pain intensity on a 4 point scale, presence of nausea (N), vomiting (V), photophobia (PT), phonophobia (PN), osmophobia (O), allodynia (A), cranial autonomic symptoms (CAS) (at least one), premonitory symptoms (at least one).

Patients were allowed to take a medication (triptan).

Results: In 30 patients, nobody presented identical characteristic on the three studied attacks. Results remained the same if we do not consider the pain intensity and the presence of at least one premonitory symptoms (0 out of 30 patients). If we consider only the presence of associated symptoms (N, V, PT, PN, O, A, CAS), 3 out of 30 patients had the same phenotype on three different attacks, while if we consider only the presence/absence of N, V, PT, PN, 9 out of 30 patients (30%) had three identical attacks. Triptan intake occurred at a mean of 63 minutes after pain onset when the average pain intensity was 2.

Conclusion: Migraine attacks are very different not just among patients, but also in the same patient. Our data indicates that stereotypy of attacks is uncommon.

No conflict of interest.

D71
EHMTI-0024. The typical duration of migraine aura: a prospective diary-based study
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Introduction: In ICHD-IIIb, non-hemiplegic migraine aura (NHMA) duration is considered normal when each symptom is no longer than one hour. A recent systematic review of the topic (Viana et al., 2013) did not find any article exclusively focusing on the duration of the aura. The pooled analysis of data from the literature on aura duration showed that visual symptoms lasting for more than one hour occurred in 6%–10% of patients, sensory symptoms in 14%–27% and dysphasic symptoms in 17%–60%.

Aim: To evaluate the duration and variability of individual symptoms of NHMA in a prospective diary-aided study.

Methods: We recruited 136 consecutive patients affected by NHMA at the Headache Centers of Pavia and Trondheim. The study received the approval by the local Ethics Committees. All patients signed an informed consent form. All the patients prospectively recorded the characteristics of three consecutive attacks in an ad hoc aura diary that included the time of onset and the end of each aura symptoms and the headache.

Results: Of the 136 patients recruited so far, 44 completed the diaries during three consecutive auras for a cumulative number of 132 auras recorded. Of the remaining 92 patients, 21 dropped-out and 71 have not completed three aura attacks. Visual symptoms lasted for more than one hour in 21 out of 129 auras (16%), somatosensory symptoms in 9 out of 47 auras (19%), dysphasic symptoms in 3 out of 15 auras (20%). Six patients out of 44 experienced the same aura symptoms lasting for more than one hour in one attack and for less than one hour in another attack out the three.

Conclusions: Our preliminary data suggest the duration of single symptoms of NHMA may be longer than one hour in a significant proportion of migraineurs, and that the one-hour limit needs review.

No conflict of interest.

Figure 1 (abstract D71)
Introduction: Evaluation of clinical characteristic of non-hemiplegic migraine aura (NHMA), such as timing of different aura symptoms, is important as it might give us an insight in aura pathophysiology. Only one study assessed with a prospective diary the aura characteristics, reporting the different pattern of succession of visual and sensory symptoms in nine auras (Russell et al 1994).

Aim: To evaluate the succession of individual symptoms of NHMA with a prospective diary-aided study.

Methods: We recruited 136 consecutive patients affected by NHMA at the Headache Centers of Pavia and Trondheim. All the patients prospectively recorded the characteristics of three consecutive attacks in an ad hoc aura diary that included the time of onset and the end of each aura symptoms. We designated the first completing symptom as the first symptom (FS).

Results: Of the 136 patients recruited so far, 44 completed the diaries during three consecutive auras for a cumulative number of 132 auras recorded. In 47 out of 132 auras there were at least two symptoms: in 16 auras (34%) the second symptom (SS) started simultaneously with the FS; in 14 auras (34%) the SS started during the FS; in 1 aura (2%) the SS started when the FS stopped, in 14 auras (30%) the SS started after a free interval of time after the end of FS (see Figure). In 11 auras there were 3 symptoms: in 1 aura (9%) the third symptom (TS) started simultaneously with the SS; in 6 auras (54%) the TS started during the SS; in 1 aura (9%) the TS started when the SS stopped; in 3 auras (28%) the TS started after a free interval of time after the end of SS.

Conclusions: It seems that in aura with multiple symptoms, the subsequent aura symptoms may either start simultaneously, during or after, the previous aura symptoms. No conflict of interest.
Background: Headache is an extremely common neurological problem. Italy is the first European country for OTC consumption with related problems of self-medication and risk of medication overuse headache (MOH).

Aim: to monitor the consumption of symptomatic drugs for headache and to prevent drugs abuse/dependence.

Materials and methods: 274 patients using symptomatic drug for headache were recruited in 32 pharmacies in the Pavia Health District. A telephonic interview was carried out in 199 patients; 179 entered the study at baseline (T0) and 112 (22 M and 90 F, mean age 45.0±11.5 yrs.) were followed-up at 6 months (T6).

Results: Patients with chronic migraine or MOH at T0 were 39 and 7 at T6. Days/month with headache at T6 vs T0 were 4.3±0.6 vs 9.7±0.8 (p<0.001). Attacks/month at T6 vs T0 were slightly reduced (1.9±0.2 vs 7.6±0.8 p=0.09). A significant decrease of the doses of analgesics consumption/month was noted (T6=13.2±1.2 vsT0=17.0±2.2, p=0.013). An increase in quality of life was found on MIDAS scores at T6 vs T0 (13.4±1.8 vs 12.7±2.5; p=0.00) and in the quality of treatment received (HURT) 5.0±0.4 vs 9.9±0.5; p=0.00).

Conclusions: Our results highlight that the change from self medication to medical care may reduce the numbers of symptomatic treatment, the headache days/month and ameliorate the quality of life in patients with headache. A longer follow-up (i.e. 12 month) may provide further evidence on improvement of the clinical picture of headache patients and prevention of MOH.

No conflict of interest.

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D75
EHMTI-0128. Headache as an initial symptom with the patients treated at the intensive care unit of the Clinic of Neurology 1997 – 2013
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The Journal of Headache and Pain 2014, 15(Supp1) 1D75

Introduction: At the intensive care unit of the Clinic of Neurology of the Clinical centre Nis, within the period 1997 – 2013 6852 patients were treated, of which 4941 patient (72,1%) with cerebrovascular diseases. 2237 (45,2%) had headache as an initial symptom.

Material and methods: The database of the hospitalized patients who suffered from headache as an initial symptom (verified with imaging techniques CT and MRI) of the Clinic of neurology at the Intensive care unit was analyzed.

4941 patient (2750 men s.55,7% and 2191 women s.44,3%) average age 63,11 (SD 0,117) years, 62,52 +/- 11,884 years for men 63,84 +/- 13,068 years for women. With TIA diagnose 132 (4,8%) men and 104 (4,7%) women were treated with headache 29 (12,2%), with subarachnoid haemorrhage 163 (5,9%) men and 257 (11,7%) women, with headache 346 (82,3%), with the diagnose of intracerebral hemorrhage 758 (27,6%) men and 561 (25,6%) women, with headache 846 (64,2%), Diagnosed with ischaemic brain stroke 1360 (49,5%) men and 978 (44,6%) women, with headache 893 (38,2%), with the diagnose of undefined brain stroke 196 (7,1%) men and 160 (7,3%) women, with headache 123 (34,7%) and with the diagnose of sequel conditions after the brain stroke 141 (5,1%) men and 131 (6,0%) women, without headache.

Conclusion: There is no significant difference of the presence of headaches as initial symptom according to sex. There is a frequency of headaches with ischaemic brain stroke (893 patients, that is 39,9% of all headaches) contrary to the expectations.

D76
EHMTI-0057. Anxiety and depression in migraine patients and their relation with impact, severity and frequency of headaches
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The Journal of Headache and Pain 2014, 15(Supp1) 1D76

Introduction: Several evidences showed anxiety and depression were more prevalent in patients suffer from headache. HIT-6 is a valid and reliable questionnaire for evaluating a wide spectrum of headache burden. Hospital Anxiety and Depression Scale (HADS) is a valid and reliable scale for screening the psychological disorders.

Aims: The objectives of the present study were to determine the prevalence of anxiety and depression in migraine patients and to assess the relation of frequency, severity and impact of headaches with depression and anxiety.

Methods: In this cross-sectional study we included migraine patients based on ICHD-2 criteria from four clinics in Isfahan, Iran. HADS, HIT-6 and a symptom questionnaire were fulfilled by the patients. Each patient was asked to determine number of headache days per month (HDPM) and also headache severity by numeric rating scale (NRS). NRS is defined as a scale for severity of pain from zero to 10 that is described by the patient (zero stands for lack of pain and 10 describes the worst pain ever experienced by the patient). Regards to odd questions summation of HADS scores’ we determined depression score (patients with scores more than 7 were assumed as depressed) and we calculated anxiety score by summing the even questions of HADS scores (patients with scores more than 7 were assumed as anxious). The student T test was used to compare the mean scores between two groups.

Results: In this study 126 migraine patients with mean ±SD age of 32.44±9.94 and 65.1% female gender were included. Of the participants, 100 (79.4%) and 56 (44.4%) had anxiety and depression according to the HADS questionnaire respectively. Patients with depression got significantly higher NRS and HDPM scores (P=0.004 and 0.031 resp.) than those without depression. But HIT-6 total score was not different statistically between them (P=0.125). There were no significant differences between patients with and without anxiety for total HIT-6, NRS and HDPM scores (P=0.275, 0.635 and 0.057 resp.).

Conclusions: Result of this study showed high prevalence of anxiety (79.4%) and depression (44.4%) in migraine patients. Also we found depressed migraineur express high level of headache severity and frequency in comparison to non-depressed migraineur whereas impact of headache is not different between depressed and non-depressed patients. We found no significant relation between anxiety and frequency or severity. No conflict of interest.
Results: Their ages of onset were from 26 to 44 years old (mean 38 ± 7). For preemptive therapy, 8 patients had received indomethacin (25–50 mg, intake 30–60 min prior to sexual activity). 7 patients reported good results and one limited success of this treatment and 4 patients had received sumatriptan (50-100 mg, intake 30–60 min prior to sexual activity). 2 patients reported good results and remaining 2 had no response. They received ibuprofen for preemptive therapy complete success. Prophylactic treatment with propranolol was given in 8 patients. The dose was 60 mg for propranolol. Six patients reported good results, two no success of propranolol prophylaxis. Other drug applied for prophylaxis was nimodipine in 4 patients, two success and two without success.

Conclusions: The patient who is diagnosed with PHASA should firstly receive indomethacin, or other drugs, sumatriptan, ibuprofen, is used for preemptive therapy if she/he can not get relief and/or tolerate the adverse effects and should firstly receive propranolol, or other drug, nimodipine, is used for prophylaxis if she/he can not get relief and/or tolerate the adverse effects.

No conflict of interest.

D78

EHM10097. Long-term outcome in 201 patients with chronic headache with medication overuse
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From the cohort of 240 patients with chronic headache with medication overuse (MOH), treated with drug withdrawal and prophylactic medications and evaluated at 1-year follow-up, 57.1% were without chronic headache and without medication overuse, 3.3% did not improve after drug withdrawal and 39.6% relapsed developing recurrent overuse (Cephalalgia 2007; 27:1219-25).

The aim of the present study was to evaluate the long-term outcome of these patients.

During the next 1-12 years, follow-up examinations were performed in 201 (83.8%) patients. There were no significant differences between patients lost for further examination and other patients regarding age and gender, as well as the outcome on 1-year follow-up.

On the last follow-up, 66 (32.8%) patients had chronic headache with medication overuse. Without overuse were 130 (64.7%) patients with episodic and five (2.5%) patients with chronic headaches. During the follow-up period, 47 (23.4%) patients had relapsed developing recurrent overuse. The recurrent overuses occurred once in 33 (16.4%), twice in 13 (5.0%) and thrice in four (2.0%) patients. MOH recurrence occurred during the first three years after the first-year follow-up in three quarters of patients. The majority of patients, 33 (70.2%), overused the same medication. Treatment of MOH recurrence was efficacious in 93.6% patients, with strong advice to cease overused drug in 79.0% and prophylactics in 83.0% patients. During the examined period 20 (23.3%) of the patients with MOH on the first-year follow-up had remission of chronic headache with subsequent decrease of medication use.

No conflict of interest.

E2

EHM10165. Acetazolamide infusion induces immediate and delayed headache and intracranial artery dilatation in healthy volunteers
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Background: All headache provoking substances are vasoactive and induce an immediate headache in healthy volunteers. The carbonic anhydrase inhibitor acetazolamide causes dilatation of cerebral arteries and extracellular acidosis. Whether acetazolamide induces headache and dilatation of cranial arteries is unknown.

Aim: To test whether acetazolamide induces headache and dilatation of cranial arteries in healthy volunteers.

Methods: Twelve healthy women received injection of 1 g acetazolamide or placebo on two separate days in a randomized double-blind crossover study design. We recorded headache on a verbal rating scale from 0-10 during an immediate phase (0-90 min) and a delayed phase (2-12 h). The circumscriptions of cranial arteries were measured in a blinded fashion using 3T high-resolution magnetic resonance angiography 30 and 60 min after acetazolamide injection.

Results: Acetazolamide induced immediate (0-30 min) headache in 9 out of 12 participants compared to 3 out of 12 participants after placebo (P = 0.031). 11 out of 12 participants reported headache in the delayed phase (2-12 h) after acetazolamide compared to 4 out of 12 after placebo (P = 0.016). Arterial circumference of the intracranial arteries increased after acetazolamide compared to placebo (P ≤ 0.005).

Conclusion: In contrast to known headache provoking substances, acetazolamide induced not only immediate but also a delayed headache. In addition, acetazolamide induced dilatation of intracranial arteries. It is
possible that extracellular acidosis induced by acetazolamide causes sensitization of intracranial perivascular nociceptors, which, in combination with vasodilatation, leads to delayed headache in healthy volunteers.

No conflict of interest.

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**EHMTI-0217. Neurophysiological study of tDCS effects in healthy volunteers**

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**Introduction**: Transcranial direct current stimulation (tDCS) is a non-invasive neuromodulation technique able to activate (anode) or to inhibit (cathode) the underlying cortex. It could be of interest for the preventive treatment of migraine that is associated with interictal changes in cortical responsivity. To optimize neuromodulation protocols, however, studies of their physiological effects on the normal human brain are necessary.

**Aims**: To study short and long-term effects of tDCS with the novel tDCS Cefaly device on visual cortex and DLPFC in healthy volunteers (HV).

**Methods**: Nine HV received anodal tDCS over Oz, 9 others anodal tDCS with the cathode at Oz: intensity 2 mA, duration 20min. We recorded CHEPS, QST, nBR and VEP at baseline (T0), immediately after tDCS (T1) and after 5 daily stimulations (T5).

**Results**: Anodal tDCS over Oz increased VEP habituation at T1 and even more so at T5 (p=0.038). It also increased heat pain thresholds (p=0.02) and CHEPS habituation at T5 (p=0.035), while reducing its latency (p=0.04). The F3 anode–Oz cathode combination only reduced the nBR sensory threshold at T1 (p=0.039).

**Conclusions**: Activation the visual cortex with anodal tDCS increases habituation of cortical evoked potentials and heat pain thresholds. This stimulation protocol may thus be of interest in migraine prevention. It also confirms our previous finding of an inhibitory connection between visual cortex and pain processing pathways.

No conflict of interest.

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**EHMTI-0191. A novel approach for the treatment of cluster headache – Onabotulinumtoxina block of the sphenopalatine ganglion**

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**Background**: Blockade of the sphenopalatine ganglion with Onabotulinumtoxina injections (SphenoBlock) represents a novel approach for treating intractable chronic cluster headache (ICCH).

**Aim**: The aim of this pilot study was to explore the safety aspects and therapeutic potential of SphenoBlock.

**Method**: After signing written confirmed consent ten patients with ICCH were injected with 25 U (n=5) or 50 U (n=5) onabotulinumtoxina towards the sphenopalatine ganglion in an observational study, approved by the Institutional Review Board, with 6 months follow-up. The procedure was performed with a novel image-guided technique. The primary endpoint was to evaluate safety of the procedure, but change in attack frequency from baseline to week 4, 12 and 24 was also registered.

**Results**: Data for the first 5 patients are presented. One patient experienced intermittent ipsilateral visual deficits lasting 4 weeks. Patient number 5 was a failed injection. Four patients were defined as frequency responders (>50% reduction from baseline) in week 4, 3 patients responded in week 12, and 2 patients in week 24 (Figure 1). Complete study data will be presented at the meeting.

**Conclusion**: SphenoBlock in ICCH shows promising preliminary results and give reasons for cautious optimism for further studies on this low-cost alternative treatment of ICCH.

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**Figure 1 (abstract E4)**
**E5**

**EHMTI-0280. Cortical excitability changes in chronic migraine vs episodic migraine: evidence by sound-induced flash illusions**  
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*The Journal of Headache and Pain 2014, 15(Suppl 1):E5*

**Introduction:** Sound-induced flash illusions (SIFI) permit to evaluate cross-modal audio-visual perception. When one flash is accompanied by two beeps, it is perceived as two flashes (‘fission’ illusion); a ‘fusion’ illusion occurs when a single beep causes the fusion of a double flash stimulus. SIFI strictly depends on cortical excitability: healthy controls perceive less illusions by increasing visual cortex excitability through anodal tDCS [1].  
**Aim:** to evaluate if, due to cortical hyperexcitability, differences in SIFI occur in migraine and further changes can be found across migraine cycle, migraine chronification or an drug overuse.  
**Methods:** we enrolled 64 patients with episodic migraine, 32 with-(MWA) and 32 without-aura (MWO) (42 F, mean age 32.3±16yrs), 44 patients with chronic migraine with medication overuse headache (36 F, mean age 39.2±12.2), and 20 healthy controls (13 F, mean age 38±18). All underwent a paradigm for SIFI induction where had to report the number of flashes seen. 13 of MWO and 12 out of MWA were examined in both ictal and interictal phase.  
**Results:** all migraine groups showed significantly less SIFI than controls (p<0.001); illusions are more reduced in in chronic migraine and particularly in those overusing triptans(<0.05).  
**Conclusions:** results point to a condition of visual cortical hyperresponsivity in patients with chronic migraine in analogy to what observed in episodic patients especially during ictal phase. This is in agreement with the view of chronic migraine as a ‘never ending attack’. The greater effect showed in triptan overuser can follow to down-regulation of 5HT1 receptors.  
No conflict of interest.  
**Reference**  

**E6**

**EHMTI-0268. Long term efficacy of repetitive sphenopalatine blockade with bupivacaine vs. Saline with the tx360 device for treatment of chronic migraine**  
RR Cady1, HR Manley, RJ Cady, JG Tarrasch, AL Oh  
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**Introduction:** The sphenopalatine ganglion (SPG) resides within the pterygopalatine fossa in close proximity to the sphenopalatine foramen and has been implicated in orofacial pain conditions including migraine. Blocking the SPG using local anesthetics may relieve pain associated with chronic migraine.  
**Aim:** The purpose of this study was to evaluate safety and efficacy following treatment with repetitive SPG blocks using 0.5% bupivacaine vs. saline.  
**Methods:** This was an IRB approved, 2 center, randomized, double-blind, placebo controlled study with 41 consented adult subjects, meeting ICH-11 definition of chronic migraine. Subjects were randomized 2:1 following a 28 day baseline period and received either 0.3 mL of 0.5% bupivacaine (group A) or saline (group B) delivered to the mucosal surface of the SPG though each nares with the Tx360® device. The procedure was repeated twice weekly for 6 weeks with follow-up visits 1 and 6 months post treatment.  
**Results:** There was a 6-day reduction in headache days for group A (p=0.001) vs. a 2-day reduction for group B at 6 months (p=0.9). HIT-6 scores were lower at 6 months vs. baseline for group A (p=0.03) but not for group B (p=0.59). Furthermore, subjects receiving bupivacaine reported less work interference (p=0.04), mood interference (p=0.02), general activity (p=0.05) relative to baseline. There were no significant changes in these measures for the saline group.  
**Conclusion:** These data suggest long-term benefits using repetitive SPG blockade with bupivacaine delivered by the Tx360® device. Benefits include a reduction of headache days and improvement in several quality of life assessments.  
No conflict of interest.

**E7**

**EHMTI-0266. Validation of a sham manipulative procedure: a new protocol for conducting placebo-control clinical trials in manual therapy**  
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**Background:** Few manual therapy studies have attempted to conduct placebo-control clinical trials. Thus, quantification of alleged placebo effects consequently becomes difficult.  
**Aim:** To investigate and validate a new placebo intervention for spinal manipulative therapy clinical trials, i.e. sham manipulation, and investigate the feasibility of a short de-blinding questionnaire.  
**Method:** A single blinded, prospective randomized, placebo-controlled trial with 1 month baseline and 3 months treatment with 12 treatments. 104 participants diagnosed with migraine were equally randomized into 1 of 3 groups: (i) chiropractic spinal manipulative therapy (CSMT), (ii) placebo (sham manipulation), (iii) control group (continued usual management). The participants filled in questionnaire on de-blinding after each treatment session. Primary end-point was the rate of successful blinding through de-blinding questionnaires given after each treatment session.  
**Results:** 772 out of 840 individual cases were analyzed, only 81.7 % out of all cases missed their appointment. The unadjusted result shows that both the active and placebo group believed they received active treatment with odds ratio (OR) of greater than 1 respectively. Due to strong cluster effect in our data, logistic regression model was used to adjust for repeated measures which showed a significant OR of >10 in both the active and the placebo group.  
**Conclusion:** This is the first study to successfully demonstrate a manipulative sham procedure over a full length treatment period, assessing the placebo group with de-blinding questionnaire after each session which thus, could be incorporated in future clinical trials.  
No conflict of interest.

**E8**

**EHMTI-0182. Positive family history of migraine predisposes to a reduced migraineurs visual cortical reactivity**  
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**Background:** In migraine, the genetic load can be seen as determining, on the one hand, a critical threshold for the disease development, and on the other hand, it may be responsible for intertival nervous system electrophysiological abnormality.  
**Aim:** Here, we were aimed to verify whether having a positive family history of migraine might influence cortical abnormal information processing in migraine patients.  
**Method:** We retrospectively collected 109 migraine patients from those reviewed who had visual evoked potentials (VEPs) recordings (6 blocks of 100 sweeps, 15 min of arc cheques, 3.1 repetition rate) and information about parental history of migraine. Neurophysiological recording data were compared with those of 42 healthy volunteers (HV) without a personal or family history of migraine.
Results: We recruited 85 patients with and 24 without a positive family history of migraine. Patients who had one parent affected (mother or father) had significantly lower N75-P100 VEP amplitude blocks overall than those who had no parents affected, the latter resulting not different from HV. Lack of VEP N75-P100 amplitude habituation was found in overall migraineurs compared with HV, irrespectively of whether they had a parent affected or not.

Conclusion: These findings suggest that familial occurrence of migraine may predispose to a general reduced cortical reactivity to visual stimulation.

No conflict of interest.

E9
EHMTI-0181. Fast recovery of visual evoked potential amplitude after photostress in migraine patients between attacks
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Background: Subtle impaired macular vision was observed among different psychophysical experimental tasks in migraine patients.

Aim: Here we studied visual evoked potential (VEP) after photostress (PS) representing an objective index of the dynamic properties of macular performance after exposure to intense light stimulation.

Method: We recorded VEPs in basal condition and after PS in 43 migraine patients (19 with [MA] and 24 without [MO] aura) and 14 healthy volunteers (HV). PS is induced for a duration of 30 s by means of the bulb of a 200-W lamp. We compared P100 implicit time and N75-P100 amplitude of baseline VEP with those collected every 20 s up to 200 s after PS.

Results: VEP parameters did not differ between groups at the baseline. In all groups, the VEPs recorded after PS showed a significant increase in latency at 20 s. In HV, N75-P100 amplitude significantly decreased 20 s after PS, and recovered subsequently. There was no effect in the migraine groups. In fact, the percentage reduction in N75-P100 amplitude observed at 20 s after photostress in MA patients was lower than in HV (MA & MA vs. HV P<0.05). When data of migraine patients were combined, the percentage of amplitude change at 20 s was negatively correlated with number of days since the last migraine attack (r=−0.525, p=0.02).

Conclusion: We documented altered recovery after PS under the influence of imminent attack. Whether or not present VEP findings are related to the ictal/interictal migraineur susceptibility to abnormal sensory perception, such as visual discomfort, remains to be determined.

No conflict of interest.

E10
EHMTI-0177. Evidence for plastic brain morphometric changes during the migraine cycle
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Background: Neurophysiological investigations have demonstrated that there are distinctive fluctuations in the brain’s electric signals between the ictal and interictal periods of recurrent migraine. Whether structural plasticity of the brain is also an important feature of episodic migraine remains unresolved.

Aim: We therefore investigated the possibility that there are fluctuations over time in whole brain grey matter morphometry of patients affected by episodic migraine without aura (MO).

Method: Twenty-four patients with untreated MO underwent MRI scans (3-Tesla Siemens Verio) during (n = 10) or between attacks (n = 14) and were compared to a group of 15 healthy volunteers (HV). We then performed voxel-based-morphometry (VBM) analysis of structural T1-weighted MRI scans to determine if changes in brain structure were observed over the course of the migraine cycle.

Results: During the interictal phase, MO patients had a significantly lower grey matter (GM) density within the right inferior parietal lobule, right temporal inferior gyrus, right superior temporal gyrus, and left temporal pole than did HV. During attacks, GM density increased within the left temporal pole, bilateral insula, and right lenticular nuclei, but no areas exhibited decreased GM density.

Conclusion: The morphometric GM changes between ictal and interictal phases reported in the present study suggest that abnormal structural plasticity may be an important mechanism of migraine pathology. Given the functional neuroanatomy of these areas, our findings suggest that migraine is a condition associated with global dysfunction of multisensory integration and memory processing.

No conflict of interest.

E11
EHMTI-0220. Cortical excitability in episodic cluster headache
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Background: Cluster headache (CH) is a severe primary headache disorder, whose pathophysiological processes remain largely unknown. Along with central disinhibition of the trigeminal nociceptive system and hypothalamic impairment, a cortical involvement has been supposed.

Aim: To evaluate cortical excitability in episodic CH patients by using different paradigms of transcranial magnetic stimulation (TMS).

Methods: Twenty-five patients with episodic CH and thirteen healthy subjects underwent an experimental session where we evaluated, in both hemispheres, motor-cortical response to: 1) single-pulse TMS: i.e. motor threshold (MT); input-output (IO) curves and cortical silent period (CSP) and 2) paired-pulse TMS: i.e. intracortical facilitation (ICF) and short intracortical inhibition (SICI). Thirteen patients were evaluated outside bout, while the remaining twelve patients were inside bout at the time of recording.

Results: We showed increased ICF values in the hemisphere ipsilateral to the side of pain in patients evaluated both outside and inside bout. Differently, IO curves showed increased slope in both hemispheres in patients examined outside bout, but only in the hemisphere contralateral to the affected side in those evaluated during bout.

Conclusions: Our results show a condition of increased cortical excitability in episodic CH both outside and inside bout. Interestingly, cortical excitability was greater in the hemisphere ipsilateral to the side of pain in patients outside bout, but decreased in patients inside bout possibly due to activation of compensatory inhibitory mechanisms of cortical excitability. Along with subcortical and peripheral mechanisms, changes in cortical excitability could also play an important role in the pathophysiology of CH. No conflict of interest.

E12
EHMTI-0243. Pressure pain sensitivity maps of the head are similar in patients with unilateral or bilateral migraine
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Background: Pain sensitivity differences in the head among migraineurs have been reported, but the comparison of unilateral versus bilateral migraine remains unresolved.

Aim: Our study compared pressure pain sensitivity maps (PPSM) in headache-free patients with unilateral or bilateral migraine.

Methods: PPSM measurements were obtained in 27 patients (15 with unilateral [UM] and 12 with bilateral [BM] migraine) and 30 healthy volunteers (HV) using a handheld algometer (1,500 Newton). The median pain threshold was calculated for each pressure stimulus and for each of the 32 points of the head.

Results: The median pain threshold was higher in UM patients compared to HV (UM vs. HV: 93.0 [83.0–140.0] vs. 70.0 [60.0–104.0] N; p=0.023). There were no significant differences between UM and BM patients (UM vs. BM: 93.0 [83.0–140.0] vs. 86.0 [68.0–127.0] N; p=0.081).

Conclusions: Our results show that pain sensitivity maps in the head are similar in patients with unilateral or bilateral migraine.

No conflict of interest.

Page 55 of 100
Introduction: Migraine is considered a unilateral headache though several patients exhibit bilateral pain. Previous studies suggest the presence of bilateral pressure pain sensitivity in temporalis region in unilateral migraine patients. No data exists concerning pressure sensitivity maps of the head in this population.

Aim: To determine differences in pressure pain sensitivity maps of the head in patients with unilateral or bilateral migraine.

Methods: Ten patients with strictly unilateral migraine on left side, 10 on the right and 10 with bilateral migraine, all of them episodic. Pressure pain thresholds were measured in 21 points distributed over the scalp. Locations of those points were based on normalized positions for electroencephalogram recordings. Pressure pain sensitivity topographical maps were constructed. All patients were headache-free when evaluated.

Results: No differences existed among the 3 groups in age, time from onset of migraine and days with pain during previous month. Cartographic maps of the head did not reveal significant differences between patients with predominantly unilateral migraine (either left or right side dominant) and bilateral migraine (all, P<0.049). Pressure sensitivity maps of the head revealed that the temporal part of the head (points F8, F7, F4, F3) were more sensitive (all, P<0.001) than the remaining parts of the head.

Conclusion: Our results suggest that pressure pain sensitivity map of the head is independent of the presence of bilateral or unilateral pain in migraine. Further, it seems that the temporal scalp may be the most sensitized part of the head in these patients, accordingly to previous studies.

No conflict of interest.

E13
EHMTI-0150. A controlled study of sleep in cluster headache patients. apo04
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Background: Cluster headache (CH) is a primary headache disorder characterized by notoriously severe attacks of unilateral pain following a chronobiological pattern. There is a close connection with sleep as many attacks occur during the night and a complex hypothalamic involvement has been suggested.

Aim: To investigate sleep in a large, well-characterized population of CH-patients and compare our findings to those in healthy controls.

Methods: We performed polysomnography (PSG) for two nights in 40 CH patients during active bout and for one night in 25 age, sex and BMI-matched controls on an in-hospital basis. Clinical headache characterization was obtained through a semi-structured interview.

Results: A total of 99 nights of PSG were analyzed. Our main finding was a reduced percentage of REM-sleep (P<0.01), longer REM-latency (P<0.01) and fewer arousals (P<0.01) in CH patients. There was no difference in the prevalence of sleep apnea between patients (38%) and our matched controls (32%) although numerically patients had a higher mean apnea-hypopnea index (10.75 vs. 4.93). We observed 45 nocturnal CH attacks but no temporal association with particular sleep stages.

Conclusions: To date, this is the largest study of sleep in CH. REM-sleep is affected in CH which is in line with our current understanding of CH and newer studies indicating hypothalamic involvement in the regulation of this sleep stage. Further, we found fewer arousals in CH-patients as has been demonstrated in other headache disorders. Together, the findings support a central role of the hypothalamus and arousal systems in CH.

No conflict of interest.

E14
EHMTI-0149. Low CSF hypocretin-1 levels are associated with cluster headache
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Background: Cluster headache (CH) is a debilitating headache disorder with strong chronobiological features characterized by severe pain attacks often waking the patient from sleep. Hypocretin (HCRT) is involved in the regulation of arousal and pain and is produced in the hypothalamus. HCRT has been suggested to play a role in the pathology of CH.

Aim: To investigate HCRT-1 levels in CH during active bout.

Methods: CSF HCRT was measured in 12 chronic and 14 episodic CH patients during active bout, and in 27 healthy controls. Patients were characterized beyond the dichotomy of current diagnostic criteria (episodic/chronic) using a CH index reflecting total headache duration and their attack rhythmicity compared to HCRT concentrations.

Results: We found lower HCRT-1 levels in both chronic (388.67 pg/ml, p=0.0221) and episodic cluster headache (375.36 pg/ml, p=0.0005) compared with controls (430.96 pg/ml) and a tendency towards relatively higher values in chronic CH compared with episodic CH. A positive relationship between the CH index and HCRT concentrations was found in all patients (R2=0.1541, p=0.0473). We also identified a tendency towards relatively higher HCRT concentrations in patients without chronobiological rhythmicity.

Conclusion: This is the first report of lower HCRT-1 concentrations in CH suggesting that decreased levels may reflect an insufficient anti-nociceptive activity of the hypothalamus. The exact mechanism of the anti-nociceptive effect of HCRT is not known and requires further investigation. In conclusion, this study supports the hypothesis of a connection between arousal- and pain- regulation and the pathogenesis of CH.

No conflict of interest.
Background: Interictally, episodic migraine is associated with reduced habituation of visual evoked potentials (PR-VEP) due to decreased thalamic drive and cortical preactivation. EEG studies performed in migraineurs interictally demonstrated increased ‘photoc driving’ at high frequency visual stimulation, attributed to cortical hyperexcitability.

Aim: To compare for the first time in the same migraine patients EEG power spectra at rest and during photic stimulation with PR-VEP characteristics.

Method: Thirty-seven episodic migraineurs underwent EEG and PR-VEP recordings in random order. The power spectra of occipital EEG activity were measured during a 2-min recording at baseline and during two 15-s sec trains of 20Hz flash stimulation.

Results: Twenty-two patients were in interictal and 15 in(peri)ictal phase. As described before, PR-VEP habituation tended to be reduced between attacks and overall the habituation deficit was associated with lower initial PR-VEP amplitude.

Between attacks, power of the 20Hz frequency band during photic stimulation, i.e. photic driving, tended to be lower (p<0.08) and baseline alpha power higher (p=0.06). Photic driving was also positively correlated with PR-VEP amplitudes and negatively with PR-VEP habituation (p<0.05).

During attacks, alpha power was associated with increased PR-VEP habituation (p<0.05).

Conclusion: We show that the interictal PR-VEP habituation deficit is associated with low photic driving at 20 Hz. During the attack, both habituation and photic driving increase compared to interictal state. Both tests are thus consistent and confirm that visual cortex preactivation decreases between attacks. Moreover, our correlations corroborate that during migraine attack visual cortex habituation increases proportionally to cortical preactivation and enhanced thalamic drive.

No conflict of interest.

E18

EHM1-0085. White matter microstructure abnormalities in pediatric migraine patients: in vivo measures of brain hyperexcitability? R Messina 1, MA Rocca 1, B Colombo 2, E Pagani 1, A Fotiini 1, G Comi 1, M Filippi 1, E Siro 1, D Zardari 1, A Balog 1, Z Majlath 1, MA Rocca 1, B Colombo 2, E Pagani 1, A Fotiini 1, G Comi 1, M Filippi 1, E Siro 1, D Zardari 1, A Balog 1, Z Majlath 1, MA Rocca 1, B Colombo 2, E Pagani 1, A Fotiini 1, G Comi 1, M Filippi 1, E Siro 1, D Zardari 1, A Balog 1, Z Majlath 1, MA Rocca 1, B Colombo 2, E Pagani 1, A Fotiini 1, G Comi 1, M Filippi 1

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Introduction: By exploiting diffusion characteristics of water molecules in the central nervous system, diffusion tensor (DT) magnetic resonance imaging (MRI) provides several quantities with the potential to disclose WM microstructure abnormalities. Among these, fractional anisotropy (FA) reflects axonal integrity and fiber organization, mean diffusivity (MD) measures the overall magnitude of diffusion, axial diffusivity (AD) is associated with fiber density and axon intrinsic characteristics, whereas radial diffusivity (RD) reflects the degree of myelination.

Aims: To explore abnormalities of white matter (WM) microstructure in pediatric patients with migraine using DT MRI and two different methods of analysis.

Methods: Using a 3.0 Tesla scanner, dual-echo and DT MRI scans were acquired from 15 pediatric migraine patients and 15 age-matched controls. Track-based spatial statistics (TBSS) analysis was performed using FMRIB’s Diffusion Toolbox. In order to confirm TBSS results, we also performed a DT probabilistic tractography analysis.

Results: Both TBSS and DT tractography analysis showed that compared to controls, pediatric migraine patients had significantly lower MD, AD and RD of the brainstem, thalamus and fronto-temporo-occipital lobes. They also experienced increased FA of the left optic radiation. No correlation was found between WM abnormalities and disease duration and frequency of attacks.

Conclusions: Pediatric patients with migraine experience diffuse WM microstructural abnormalities. Higher FA and lower MD, AD and RD might be explained by repeated neuronal activation or by the presence of higher neuronal and synaptic densities in these patients compared to controls. Both these mechanisms would reflect a hyperexcitability of the brain in migraine patients.

No conflict of interest.

E19

EHM1-0282. Deep brain stimulation in chronic cluster headache: lead location, clinical response and neuromonitoring signatures

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Background: Chronic Cluster Headache (CCH) is refractory to medical therapy in a small minority of patients. Neuroimaging implicates the ipsilateral posterior hypothalamic region (PH) in its pathogenesis. PH deep brain stimulation (PH-DBS) has shown promise in the management of refractory CCH. Here we investigate the value of local field potentials (LFPs) in relation to the site of active DBS contact used for chronic stimulation.

Methods: Four patients with refractory CCH treated with PH-DBS were investigated. The target on stereotactic T2-weighted images lay in the anteromedial quadrant between the red nucleus and mammillary bodies. LFPs were recorded from externalised wires prior to implantation of the impulse generator a week after lead implantation.

Results: All leads were within 1.0mm of the intended target point. Mean (range) coordinates of the chronically active contact were 3.6(2.0-5.4) mm lateral, 3.1(1.2-5.0)mm posterior and 5.0(2.0-8.6)mm inferior to the midcommissural point. Mean follow-up was 23(15-26) months. Headache load was defined as the [severity (on the visual analogue scale)] x [duration] x [frequency] of cluster headache. Headache load reduced by 57, 58, 68 and 100% in each patient. LFP peaks were noted in 3 out of 4 cases (at 8, 11 and 15Hz). The contacts used for stimulation at last
follow-up coincided with one or both of the contacts affording the highest amplitude peak in bipolar recordings.

Conclusions: Our results support previous data that PH-DBS may be useful in patients with medically refractory cluster headache. LFP activity may potentially be useful in guiding contact selection during programming and deserves further investigation. No conflict of interest.

E20

EHMTI-0240. Modulation of central pain processing by anodal direct current stimulation – a fMRI study
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Introduction: Drugtherapy of pain and headache disorders was substantially improved during the last decades. However, in some patients headaches poorly respond to drug treatment, especially in chronic courses of disease. Transcranial direct current stimulation (tDCS) offers a new therapeutic approach in these patients. The underlying mechanisms of this neuromodulatory method are poorly understood.

Aims: To expand understanding of the underlying mechanism of the antinociceptive effect of anodal tDCS in healthy volunteers using functional magnetic resonance imaging.

Methods: Thirty subjects were investigated after left sided anodal-DC and sham stimulation. A fMRI block paradigm was used testing trigeminal nociceptive processing as well as visual (checkerboard) and motor-function (fingertapping) as control conditions. Painful trigeminal stimuli were applied using a specialized electrode highly specific for nociception.

Results: The pattern of cerebral activation observed in single-subject and group-analyses were consistent with those previously reported for pain-, motor- and visual-processing. The analyses comparing sham and anodal-DC stimulation were not able to detect differences in cerebral motor or visual processing after stimulation, but revealed a significantly increased nociceptive activation in the middle temporal lobe and the ipsilateral hippocampus after anodal DC-stimulation.

Conclusions: These preliminary results demonstrate a DC-dependend modulation of trigeminal pain processing resulting in an increased activation of the ipsilateral middle temporal lobe and the hippocampus after anodal stimulation. This altered activation pattern may represent the correlate of antinociceptive effects of this method, which may be based on increased antinociceptive activity of the middle temporal lobe and modified evaluation of pain in the hippocampus.

No conflict of interest.

E21

EHMTI-0072. Anodal transcranial direct current stimulation alleviates pain in trigeminal neuralgia
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Introduction: TN usually leads to paroxysms of short lasting but very severe pain. Between the attacks the patient is usually asymptomatic, but a constant dull background pain may persist. Carbamazepine is currently the drug of first choice in the treatment of TN. It is efficient in 70-80% of patients but often associated with severe adverse effects such as drowsiness, confusion, nausea and ataxia, which may require discontinuation of medication. Surgical interventions may not be suitable for all patients and waiting for the procedure can be agonizing. Therefore different treatment options are indispensable.

Aims: To investigate the efficacy of transcranial direct current stimulation (tDCS) of the primary motor cortex on pain and trigeminal nociceptive processing in subjects with classical trigeminal neuralgia (TN).

Methods: Seventeen subjects with TN were recruited in the study. Patients stimulated daily for 20 minutes over two weeks using anodal (1mA) or sham tDCS in a randomized cross-over design. Primary outcome variable was pain intensity on a verbal rating scale (VRS). VRS and attack frequency were assessed daily for one month before and after tDCS using an individual patient diary. The impact on trigeminal pain processing was assessed with pain-related evoked potentials (PREP) and the nociceptive blink reflex (nBR) following electrical stimulation on both sides of the forehead (V1) before and after tDCS. All patients gave written informed consent prior to study inclusion. The study was approved by the Ethics committee of University of Duisburg-Essen medical faculty.

Results: Anodal tDCS reduced pain intensity more effectively than sham stimulation after two weeks of treatment. The attack frequency reduction was not significant. PREP showed an increased N2 latency and decreased peak-to-peak amplitude after anodal tDCS. No severe adverse events were reported. Patients with concomitant chronic background pain do not seem to benefit from tDCS as described previously for medical therapy and surgical intervention.

Conclusions: Daily anodal tDCS over two weeks ameliorates trigeminal pain in TN. It may become a valuable treatment option for patients unresponsive to conventional medical treatment or on wait for surgical procedures. International, multicenter, randomized controlled trials are needed with higher patient numbers before a definite recommendation can be proposed. No conflict of interest.

E22

EHMTI-0267. Plasma anandamide concentration after aerobic exercise training in healthy individuals and episodic migraine patients
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Introduction: Anandamide (AEA) is an endocannabinoid operative in several biological functions. Nevertheless, it is not known the effect of aerobic exercise training (EXT) on plasma AEA.

Aims: Because a dysfunctional endocannabinoid system has been suggested to underlie migraine (M) pathophysiology, we intended to explore the plasma [AEA] after EXT in M patients and healthy individuals.

Methods: EXT protocol consisted of 12-week of supervised treadmill at standardized intensity, performed 3 times/week, 30 min./session. Four groups were separated for intervention or waiting list: Healthy subjects without AET (CC), healthy subjects undergoing EXT (CEXE), M patients without EXT (MC), and M patients undergoing EXT (MEXE). Patients had episodic migraine with and without aura (ICHDII). Blood collections were performed intercritically at least 24h after attacks or anti-inflammatory use. AEA was quantified by LC/MS/MS. All participants took no preventive medication.

Results: The study included 48 participants (12 for each group) and groups matched by age, sex, and BMI. Baseline [AEA] was not different between groups. AEA reduced in MEXE and CEXE, but was statistically significant only in CEXE (p = 0.007). There was a trend to a negative correlation between adherence and [AEA] (r=-0.565, p = 0.056).

Conclusions: Plasma AEA decreases after EXT in healthy subjects. In M patients, this response is prevented by lower adherence. Future studies should investigate the relationship between exercise-reward and AEA.

* p = 0.007, Friedman’s Test
No conflict of interest.

E23

EHMTI-0252. The frequency of acute medication intake relates to its perceived effectiveness in chronic headache patients
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Introduction: Although the benefit of acute pain medications for chronic headaches (≥ 15 days/month) often is limited, patients frequently continue to take them in an attempt to control their pain, which may then result in medication overuse.
The current study investigates whether the intake of acute medication creates an illusion of control (IoC) and whether an accepting attitude may prevent this IoC in chronic headache patients. Forty-one chronic headache patients (primarily migraine sufferers) filled out a questionnaire battery (e.g., CPAQ and MIDAS) followed by an adapted IoC Task. During this IoC task, patients were asked on each trial to indicate whether they would take a fictitious medication to cope with a fictitious headache day. Afterwards the patient received random information on the effectiveness of the pain medication. After the task participants filled out 6 questions on the perceived effectiveness of this painkiller. Results: Data show that the perceived effectiveness was positively related to the number of times patients have fictively taken the painkiller (p<.01) and not to its actual contingency (i.e., actual effectiveness). Secondly, acceptance was positively related to perceived effectiveness of the painkiller (p<.05), but did not moderate the relationship between perceived effectiveness and frequency of medication intake. Conclusions: Results of the present study suggest that a higher intake of acute medication by chronic headache patients is related to higher perceived effectiveness of the acute medication, independent of its actual effectiveness. This IoC-effect is however not influenced by acceptance. No conflict of interest.

E24

EHMTI-0105. CGRP and VIP levels as predictors of efficacy of onabotulinumtoxin type A (onabotA) in chronic migraine
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Introduction: The mechanism of action concerning CGRP and VIP levels and onabotA response. Aim: To analyse a potential relationship between CGRP and VIP levels and onabotA response.

Methods: CGRP and VIP levels were determined in antecubital vein samples by ELISA outside a migraine attack prior to treatment with onabotA. OnabotA was administered according to PREEMPT at least twice. A patient was considered as a moderate responder when both: 1) moderate-severe headaches were reduced by between 33-66%; and 2) benefit in a visual scale of 0-100 was recorded between 33-66%. Patients were considered as excellent responders when both items improved > 66%. Those without improvement of at least one-third in the two items were considered as nonresponders.

Results: We assessed samples from 81 CM patients and 33 controls. CGRP and VIP levels were significantly increased in CM population. CGRP and, to a lesser degree, VIP levels were significantly increased in responders vs nonresponders. For CGRP, a threshold of 72 pg/ml positively correlated with 95% of nonresponders. The probability of being a responder to onabotA was 28 times higher with a CGRP level above the threshold of 72 pg/ml. Even though the sensitivity for the calculated threshold for VIP was poor, the probability that CM patients with low VIP levels will respond to onabotA was significantly higher in those patients with high VIP levels.

Conclusions: Intercital CGRP and, to a lesser degree, VIP levels are of help on predicting onabotA response. Supported by PII1/00889 FISSS and Allergan-Eurasia MAF/SS/NS/C03 grants. Conflict of interest.

E25

EHMTI-0184. Ictal adiponectin levels are modulated by pain severity and treatment response in episodic migraineurs
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Introduction: Adiponectin (ADP) and leptin (LEP) are adipokines with roles in inflammation. Aim: To assess ADP and LEP levels before and after acute abortive treatment in episodic migraineurs (EM).

Methods: Peripheral blood specimens were collected from EM participants before and after acute abortive treatment with sumatriptan/naproxen sodium versus placebo.

Results: A total of 34 participants (17 responders, 17 non-responders) were included. In all participants, for every 1 point increase in the HMW-T-ADP ratio, pain severity increased by 4.11 (CI: 0.44, 7.77; p=0.028). In responders (n=17), crude T-ADP levels were reduced at 30 min (11.49 ± 3.7; p=0.001), 60 min (11.54 ± 3.2; p=0.001) and 120 min (11.39 ± 3.7; p=<0.001) after treatment as compared to onset (12.47 ± 3.6). In non-responders (n=17), crude T-ADP levels were unchanged after treatment. After adjustments, T-ADP levels remained decreased 30-120 min after treatment in responders; additionally, HMW-ADP, and the HMW-T-ADP ratio were decreased and LMW-ADP and the LMW-T-ADP ratio (coeff 0.04; CI: 0.01, 0.07; p=0.045) were increased 120 min after treatment in responders. In non-responders, the adjusted LMW-ADP (coeff -0.45; CI: -0.77, -0.14; p=0.005) and the LMW-T-ADP ratio (coeff -0.04; CI: -0.07, -0.01; p=0.018) were decreased at 60 min as well as at 120 min after treatment. Unadjusted and adjusted LEP levels were not modulated by changes in pain severity or treatment response.

Conclusion: Adiponectin, but not leptin, is associated with pain severity and is modulated by treatment response in episodic migraineurs. Conflict of interest.

E26

EHMTI-0264. Differences of some cytochemical parameters in persons with and without migraine
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Background: Diagnosis of migraine currently based only on clinical symptoms and exclusion of secondary headache. Useful screening method of migraine is still unmet medical need. Aim: Comparison of some cytochemical parameters in persons suffering from migraine and healthy volunteers, and evaluate sensitivity of each parameter in case of significant difference between both groups. Materials and methods: 49 persons suffering from migraine, only women (42.1 ± 9.3 y.o.) and 30 gender, age and body mass index matched healthy volunteers (38.2 ± 5.5 y.o.) were included in trial. Cytochemical parameters were evaluated: interferon gamma (IFN-g), interleukin-10 (IL-10), interleukin-8 (IL-8), interleukin-17 (IL-17), plasminogen activator inhibitor type 1 (TPAI-1), matrix metalloproteinase-9 (MMP-9), soluble cell adhesion molecules (SVCAM-1, SICAM-1), transforming growth factor alpha (TGF-alpha), monocyte chemotactic protein-1 (MCP-1), interleukin-1alpha (IL-1alpha), interleukin-1beta (IL-1beta), interleukin-9 (IL-9). Levels of every parameter compared between both groups. Statistical method of Mann-Whitney test used.

Results: It was revealed statistically significantly lower level of IFN-g (z=2.60, p=0.011), IL-17 (z=2.78, p<0.001), TPAI-1 (z=2.19, p=0.01), MMP-9 (z=2.60, p=0.002), SICAM-1 (z=2.76, p=0.001) and TGF-alpha (z=2.52, p=0.01) in migraine group. Evaluation of Area Under Curve (AUC) using Receiver Operating Characteristic (ROC) method showed no significant difference in migraine and control groups (AUC<=0.63-0.68 in mentioned above parameters).

Conclusion: It was statistically significant difference of cytokine levels in migraine patients and control group. However, it does not allow interpreting findings in terms of clinical screening. No conflict of interest.
There was no statistically significant difference in terms of lower FFM increased the risk of migraine in overweight and chronic migraine (CM). High prevalence and frequency is detected in migraine and chronic migraine. Surface-based morphometric analyses should complement vascular risk factors and smoking.

In medication-overuse headache (MOH) pain modulation is analyzed. Furthermore, patients with HCF disturbances were analyzed according to presence of MES. Results: There was no statistically significant difference in terms of gender, age at the time of examination and age at the time of the onset of disease between three groups. Aura was longer (34.71 ± 18.05 vs. 23.87 ± 13.64, p=0.002) and frequency of aura per year was higher (16.29 ± 14.21 vs. 10.10 ± 11.00, p=0.029) in the HCD group as compared to the Control group I. Also, sensory aura was significantly more present in HCD group (p<0.001). MES were detected in 10 (29.4%) patients from HCD group, which was significantly higher compared to 1 (3.2%) in Control group I and 2 (5.9%) in Control group II (z=2.7, p=0.005; z=x=6.476, p=0.011).

Conclusion: High prevalence and frequency is detected in migraine patients with HCF disturbances during aura. The exact pathophysiological mechanism of this finding is not clear and requires additional investigations.

No conflict of interest.

E29
EHMTI-0292. The effect of body fat mass and fat free mass on migraine headache
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Introduction: Obesity seems to be associated to migraine headache. Increase in body fat, especially inglueteofemoral region, elevates the tissue tension and leads to derecognition which in turn impair inflammatory processes that could be contributing to migraine risk.

Aims: This study was designed to assess the relationship between body composition and risk of migraine.

Methods: In this cross-sectional study, 1510 middle-aged women who were visited in a weight reduction clinic of university were recruited. Migraine was diagnosed with HIS criteria. Body composition parameters including total fat mass (TFATM), total fat free mass (TFFM), trunkal fat mass (TFATM), and truncal fat free mass (TFFM) was assessed using bioelectric impedance. We further assessed cardiovascular risk factors and smoking as confounding factors. To determine the real association between different variables and risk of migraine, the associations were adjusted by multivariate logistic regression analysis.

Results: Elevation in fasting blood sugar, total cholesterol, LDL cholesterol, FFMI, TFFM, and waist-to-hip ratio increased the risk of migraine. When the associations were adjusted for other factors, only the association between migraine and FFMI remained statistically significant.

Conclusion: Lower FFMI increased the risk of migraine in overweight and obese individuals. In the other words, higher fat free mass could be a protective factor for migraine.

No conflict of interest.
Results: In patients with MOH cortical thickness was decreased in the left middle frontal gyrus (rostral part) compared to controls, whereas local gyriﬁcation was increased in the right fusiform gyrus and adjacent temporal regions, as well as in the right occipital pole.

Conclusions: Decreased cortical thickness in frontal regions corresponds to decreased grey matter volume in similar regions. Increased local gyriﬁcation in the right fusiform gyrus corresponds to increased grey matter volume in the previous volumetric study. Increased gyriﬁcation in occipital regions might be related to increased susceptibility for cortical spreading depression.

References

E31
EHMTI-0253. Sycopal migraine: factors that inﬂuence the positive response to tilt table testing
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Background: Sycopal migraine is a condition when patient has migraine and syncope simultaneously (Curfman, 2012). Both conditions are known to present with autonomic imbalance that may determine a positive response to tilt table testing.

Aim: was to evaluate the factors that could inﬂuence the tilt table response in sycopal migraine.

Method: The study sample consisted of 65 patients with sycopal migraine. All the patients underwent detailed clinical examination and tilt table testing using Westeminer protocol. According to the response on tilt test, the patients were divided in two groups and compared: Gr. I (N=32) with positive response and Gr. II (N=33) with negative response. All the data collected were analyzed using SPSS software.

Results: In the sycopal migraine sample, 50.7% of the patients had positive response to the test (developing presyncopal or syncopal symptomatology during the test). The first group presented increased frequency of headache-days per month (9.18 vs. 3.13, p<0.001), more severe headaches (8.1 vs. 6.7, VAS, p<0.05), more expressed anxiety and depression, according to Spilberger test (36.5±1.7 vs. 29.26±1.7, p<0.05) and depression Beck score (8.03±0.09 vs. 5.01±0.6, p<0.05), respectively. The Nijmegen score was very high in the group I (31.56±1.4 vs. 15.29±1.0, p<0.001) indicating the presence of a respiratory dysfunctional syndrome.

Conclusion: Frequent and severe headaches, increased anxiety and depression, the presence of dysfunctional respiratory syndrome could be the factors that predispose sycopal migraine patients to positive response on tilt table testing, which is an orthostatic stress and indicate autonomic imbalance and increased cardiovascular reactivity.

No conﬂict of interest.

E32
EHMTI-0055. Abnormal thalamic function in patients with vestibular migraine
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Introduction: Vestibular migraine (VM) has been increasingly recognized as a possible cause of episodic vertigo, but its pathophysiology is still unclear.

Aims: We used advanced non-invasive neuroimaging to examine the functional response of neural pathways associated with vestibular stimulation in patients with VM.

Methods: Twelve patients with VM underwent whole-brain blood oxygen level-dependent (BOLD) fMRI during ear irrigation with cold water. The functional response of neural pathways to this stimulation in patients with VM was compared to age- and gender-matched patients with migraine without aura (MwoA) and healthy controls (HC). Secondary analyses explored associations between BOLD signal change and clinical features of migraine in patients.

Results: We observed a robust cortical and subcortical pattern of BOLD signal change in response to ear irrigation across all participants. Patients with VM showed signiﬁcantly increased thalamic activation in comparison with both patients with MwoA and HC. The magnitude of thalamic activation was positively correlated with the frequency of migraine attacks in patients with VM.

Conclusions: We provide novel evidence for abnormal thalamic functional response to vestibular stimulation in patients with VM. These functional abnormalities in central vestibular processing may contribute to VM pathophysiology.

No conflict of interest.

E33
EHMTI-0154. Brainstem mechanisms of trigeminal nociception: an fMRI study at 3T
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Introduction: The brainstem is the major site of trigeminal pain processing and modulation and plays a key role in the pathophysiology of various headache disorders. However, comprehensive human imaging studies on function and activity of brainstem areas following trigeminal nociceptive stimulation are scarce.

Aim: To develop a viable protocol for brainstem fMRI of standardized trigeminal nociceptive stimulation.

Methods: 21 healthy participants (16 female) were scanned on a 3T scanner with a standardized trigeminal nociceptive stimulation protocol for event-related fMRI using a specifically designed sequence for high resolution brainstem echo planar imaging as well as a brainstem specific noise correction technique and brainstem template.

Results: We observed signiﬁcant BOLD responses in areas typically involved in trigeminal nociceptive processing such as the spinal trigeminal nuclei (sTN), thalamus, SII, insular cortex and cerebellum as well as in a pain modulating network including the dorsal raphe nuclei (DRN), periaqueductual grey area (PAG), hypothalamus (HT) and nucleus cuneiformes (CN) (p < 0.0002, voxel extent = 10). Using PPI analyses, we found enhanced connectivity of the sTN with the HT and the CN.

Conclusions: Our results are in line with previous animal and human imaging studies on brainstem processing of nociceptive stimuli. However, using the proposed high resolution imaging technique, we achieved a more detailed insight into brainstem pain processing as compared to whole brain fMRI. High resolution brainstem fMRI of trigeminal nociceptive stimulation offers a unique opportunity to better understand headache pathophysiology.

No conﬂict of interest.

E34
EHMTI-0135. Migraine outcomes and cortical excitability: analysis of pattern-reversal visual evoked potentials (PR-VEP)
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Introduction: Outcomes of migraine (M) in the elderly as well as age-related neurophysiological changes are poorly studied.

Aim of study was to evaluate cortical excitability changes in M patients depending on patient’s age and M outcome.

Methods: Study groups comprised: 20 young (aged 20-49, YM) and 35 elderly pts (aged 50-70, EM) with ongoing typical M attacks; 11 elderly pts (aged 50-70) with complete M cessation by now and typical M course
in the past (No more M) and 7 pts of any age with partial M cessation (preservation of M aura without headache) - Late Life Migraine Equivalents (LLME). Diagnosis was based on ICHD-2, 2004. Control groups: healthy subjects without headache (n=15 aged 20-49, n=15 aged 50-70). The RP-VEP test was carried out in a period free from migraine attacks.

**Results:** Significant increase in total N75-P100 (p<0.05) and more marked

There was no difference in either the grant average N2/P3 latency –

The lack of habituation in response to significant verbal and

3

Subjects were recruited on-line (MTurk), consented, and

15(Suppl 1):

However, cognitive dysfunction in

15(Suppl 1):

We sought to measure stigma towards individuals with differing

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pattern typical for M reflecting cortical

3,617 total US subjects

latency and the amplitudes P300,

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10 % in 5/20 girls and

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Both training and counselling lead to headache reduction.

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For both groups headache frequency decreased significantly,

3

We studied cognitive event related potential P300 elected by

Our study has shown that patients with active M and those

keeping M aura but shedding headache phase (LLME) demonstrate

neurophysiological pattern typical for M reflecting cortical

hyperexcitability which could be the basis for M preservation in any age.

On the contrary, in patients of any age with complete M cessation we revealed complete normalization of both indices which appeared comparable to subjects who never suffered from M.

No conflict of interest.

**E35**

EHMTI-0207. Abnormal brain excitability and cognitive dysfunction in adolescents with chronic daily headache

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**Introduction:** People with daily chronic headache (CDH) commonly report impaired cognitive function. However, cognitive dysfunction in patients with CDH is poorly studied.

**Aims:** We studied cognitive event related potential P300 elected by specific visual verbal and non-verbal stimuli "Headache" at adolescents with daily chronic headache (CDH).

**Methods:** We recorded cognitive event related potential (ERP) P300 (significant stimuli - verbal (the word «headache») and non-verbal (the image «headache»)) in 14 healthy adolescents and in 14 age, gender and socio-economic matched CDH patients. To test the ERP habituation, three consecutive blocks were recorded for P300 potential. Habituation of the ERPs P300 was defined as the % change of the N2/P3 amplitude between the 1st and 3rd block.

**Results:** There was no difference in either the grant average N2/P3 latency or the grant average N2/P3 amplitudes as for verbal (323,8±70,8 ms; 19,6±5,5 mV and for the grant average latency and the amplitudes P300, respectively) as for non-verbal (342,4±64,2 ms; 21,2±6,1 mV for the grant average latency and the amplitudes P300 potential, respectively) stimuli at CDH group compared with controls.

During repeating stimulation (three blocks of stimuli) there was significant lack of habituation in CDH patients at specific verbal (+ 3,5%) and non-verbal stimuli (+0,8%) compared with controls (-15,6% and -13,4%, respectively).

**Conclusions:** The lack of habituation in response to significant verbal and non-verbal stimuli points to the increase of relevance to cognitive function at CDH group. The results point at the development of memory and cognitive dysfunction in adolescents with CDH

No conflict of interest.

**E36**

EHMTI-0313. Factors influencing stigma towards persons with migraine

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**Introduction:** Previously, we demonstrated that stigma towards persons with migraine was comparable in magnitude to stigma towards individuals with epilepsy or panic disorder.

**Aim:** We sought to measure stigma towards individuals with differing migraine phenotypes versus comparator conditions.

**Methods:** Subjects were recruited on-line (MTurk), consented, and randomized to assess one of six fictional vignettes:

1) a woman with migraine four days/month with zero lost workdays/year (W0)

2) a woman with migraine four days/month with two lost workdays/year (W2)

3) a man with migraine four days/month with two lost workdays/year (M2)

4) a woman with seizures four days/month with two lost workdays/year (E2)

5) a woman caring for her invalid husband four days/month with two lost workdays/year (H0)

6) a woman with migraine twenty days/month with ten lost workdays/year (W10)

Subjects used sliders from 0 to 100 to answer five questions measuring social distance attitudes (SDA) towards the individual described in the vignette; maximum stigmatizing attitude would be a total SDA score of 500. [Study approved by UBC Office of Research Services.]

**Results:** 3,617 total US subjects ≥19 years old completed the survey (mean age 32.2 years; 51% female).

W2/M2/E2 scores and W0/E2 scores did not differ significantly. Relative to W2/M2, W0 was significantly lower and H2 was significantly higher. W10 was significantly higher than all other scores.

**Conclusions:** Among M Turk subjects, stigma towards persons with migraine increased with their absenteeism, but did not vary by gender.

No conflict of interest.

**E37**

EHMTI-0157. Specific strength training compared with interdisciplinary counselling for girls with tension-type headache – a randomised controlled trial

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**Background:** Childhood tension-type headache (TTH) is a prevalent and debilitating condition for the child and family. Low-cost non-pharmacological treatments are usually the first choice of professionals and parents. The study examined the outcomes of specific strength training for girls with TTH.

**Methods:** Forty-nine girls 9-18 years with TTH were randomised to patient education programmes with 10 weeks of strength training compared with counselling by nurse and physiotherapist. Primary outcomes were headache frequency, intensity and duration; secondary were neck-shoulder muscle strength, aerobic power and pericranial tenderness, measured baseline, after intervention and at 12 weeks follow-up. HRQOL questionnaires were assessed at baseline.

**Results:** For both groups headache frequency decreased significantly, p=0.001 and likewise for duration p=0.022, with no significant between-group differences. The odds of having headache a random day decreased during 22 weeks by 0.65 (0.50-0.84) (OR 95%CI)). For both groups neck extension strength decreased significantly with a decrease in cervicothoracic ratio to 1.7, indicating a change in muscle balance. In the training group shoulder strength increased ≥10 % in 5/20 girls and estimated VO2 max increased ≥15% for 4/20 girls.

**Conclusions:** Both training and counselling lead to headache reduction. Adjusting muscle-balance seems to precede strength gains. Exercising might lead to important changes in the child’s physical capability and health. Restructuring patient education and examining dose-response of exercising is recommended.

No conflict of interest.
E38
EHMTI-0319. TMS-measured cortical excitability do not change by migraine phase: a blinded longitudinal study
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Introduction: Many migraineurs have increased sensitivity to light, sounds, odors or sensory stimuli, particularly in the premonitory phase and during the headache attack. These symptoms may be caused by alterations in cortical excitability. Transcranial magnetic stimulation (TMS) measurements of cortical excitability in migraineurs have yielded conflicting results, possibly due to large interindividual differences, different procedures and lack of blinding.

Aim: Do TMS-measurements of cortical excitability change in relation to a migraine attack?

Methods: Resting motor threshold (RMT), cortical silent period (CSP) and paired-pulse TMS (ppTMS) were measured on four different days in 16 migraineurs. All participants signed an informed consent form and the Regional Committee for Medical and Health Research Ethics approved the study. Measurements were classified as interictal, preictal or ictal by headache diaries with a one-day cut-off. Ten interictal-preictal and 7 interictal-ictal individual pairs were analysed with paired samples Student's t-test for RMT and CSP and repeated measures ANOVA with period and inter-stimulus-interval aswithin-subject factors for ppTMS.

Results: There were no statistically significant intraindividual changes neither in RMT, CSP nor ppTMS (p > .17).

Conclusion: Cortical excitability measured by TMS did not change from the period between a migraine attack to right before or during an attack. However, the results should be interpreted with some caution due to the rather small sample size.

No conflict of interest.

E39
EHMTI-0285. Frontal thermography in healthy individuals: reliability of the method
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Introduction: Infrared Thermography (TH) is useful in making diagnoses and doing evaluations in the field of pain medicine.

Methods: 26 volunteers (20 females and 6 males) with a mean age of 32±10 years were examined. Seven volunteers had a history of low frequency migraine. TH has been assessed with an infrared thermal camera (model LT3. Zhejiang Dali Technology Co. Ltdt) measuring the temporal distribution of the heat over the face. The image analysis evaluated the temperature in two target points (left (L) and right (R) side) in the frontal polar sites. The measurements were taken in one session (N=26), 19 subjects underwent a second session at least one day apart. The Asymmetry Index (AI) (100 x (L side/Lside+R side)) was also calculated. Concerning the first test session analysis of variance (ANOVA 1 way), intra-class correlation coefficient (ICC) and Pearson’s correlation coefficient were calculated. Measurements between two different days (T1 and T2 session) were evaluated with the ANOVA 2 way with replication.

Results: The analysis of variance showed no significant difference between three consecutive measurements during the first session both on the R side (p=0.30) and the L side (p=0.32). Both R and L ICC measurements showed good reliability (0.55 and 0.66). TH values in healthy subjects showed no large asymmetry (49.98±0.22). ANOVA 2 way did not reveal intra-individual variations between the first and second testing session on separate days.

Conclusion: TH measurements were rather symmetrical and reproducible on both sides. TH could be a reliable method for the evaluation of localized/lateralized pain syndrome. No conflict of interest.

E40
EHMTI-0019. Exploratory research of headache from psychiatric opd patients via biofeedback
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Introduction: It is common for psychiatric patients reporting somatic symptoms of headache. For these years, psychiatric treatment for headache in Taiwan is usually by medications. However, biofeedback treatment is also well addressed as a functional intervention for headache.

Aims: The aim of this study is to look for the relations of headache and physical signs. It is also the idea that clinical psychologists might help the patients to control or to prevent the headache by relaxation training.

Methods: This study invited the OPD psychiatric adult-patients without organic or other head injuries. The data of heartbeat rate, galvanic skin response (GSR) and respiratory were measured under three states of conditions. The first state was the baseline state which required patients to hold the quicker breathing rate than the non-headache group under the same conditions. The second state was the stress stage, after the 5 minutes of stress stage, the rehabilitation stage started with relaxation.

Results: There were 100 patients participated, 69% of participants reported headache. The significant differences (p< .05) between headache group and non-headache group in the respiratory rate of the baseline condition and the rehabilitation state were shown. The headache group tended to show the higher rate of breathing in these two states.

Conclusion: It is interesting to find out that the headache group tended to hold the quicker breathing rate than the non-headache group under the conditions of non-stress states. It was pointed that, for headache patients should take breathing slowly under the conditions of non-stress state.

No conflict of interest.

E41
EHMTI-0059. Reduced functional connectivity between salience and visual networks in migraine with aura
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Introduction: Migraine with visual aura (MA) is associated with distinct visual disturbances preceding migraine attacks, but shares other visual deficits in-between attacks with migraine without aura (MO). The dorsal extrastriate cortex in the occipital lobe (V3A) and middle temporal cortex were reported to be relevant neural substrate for MA and MO based on structural MRI studies.

Aims: To determine if abnormalities specific to inter-ictal MA exist in functional brain connectivity of intrinsic cognitive networks. In particular, these networks are involved in top-down modulation of the visual system.

Methods: Using resting-state functional magnetic resonance imaging, whole-brain functional connectivity maps were derived from seeds placed within the default mode (DMN), salience (SAL), and dorsal attention networks (DAN). Twenty-six inter-ictal MA patients were compared with 26 matched MO patients and 26 controls. Headache parameters were used for regression analyses.
The major findings were: (1) Connectivity between the SAL and occipital visual areas was reduced in MA but not MO and was negatively correlated with headache severity. (2) The V3A region exhibited decreased connectivity with the SAL and increased connectivity with the posterior DMN in MA. (3) Connectivity between the DAN and visual regions in the inferior and middle temporal cortices were increased in both MA and MO.

Conclusions: The unique pattern of connectivity changes found in interictal MA patients involved area V3A which has been implicated in aura generation. Hyperconnectivity to temporal visual regions may reflect interictal deficits in visual perceptions in both MA and MO. No conflict of interest.

E42
EHMTI-0124. Central vestibular system modulation in vestibular migraine - a VBM study
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Introduction: Vestibular migraine affects 1% of the general population and 30-50% of all migraine patients describe occasionally associated vertigo or dizziness.

Aims: We aimed to identify brain regions altered in vestibular migraine in order to evaluate the connection between migraine and the vestibular system.

Methods: Seventeen patients with definite vestibular migraine were compared to 17 controls using magnetic resonance imaging based voxel-based-morphometry.

Results: We found gray matter volume reduction in the superior, inferior and middle (MT/V5) temporal gyrus as well as in the middle cingulate, dorsolateral prefrontal, insula, parietal and occipital cortex. A negative correlation of disease duration and GM volume was observed in areas associated with pain and vestibular processing. Moreover, there was a negative correlation between headache severity and prefrontal cortex volume.

Conclusions: Alterations identified in vestibular migraine resemble those previously described for migraine, but also extent to areas involved in multisensory vestibular control and central vestibular compensation possibly representing the pathoanatomical connection between migraine and the vestibular system. No conflict of interest.

E43
EHMTI-0307. Chronification of migraine: a clinical and voxel-based morphometry study
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Introduction: Migraine is an episodic disease which may transform to a chronic form. However, the precise pathogenesis of migraine chronification is not well understood.

Aim: We aimed to detect the changes of brain gray matter volume (GMV) in chronification of migraine.

Methods: Voxel-based morphometry (VBM) of MRI was employed to analyze the volume of brain gray matter in 44 patients with chronic migraine with medication-overuse headache (CM-MOH), 16 patients with CM without MOH (CMwoMOH), 18 patients with episodic migraine (EM) and 32 healthy controls (HCS).

Results: The GMV did not differ significantly among groups but was positively related to body mass index (BMI) and male gender, negatively related to age, course of disease and anxiety. Compared with HCs, local GMV of middle temporal pole decreased in all the three patient groups. GMV of right superior and middle orbital frontal gyrus and right inferior temporal gyrus decreased in CM-MOH and CMwoMOH groups. Besides, GMV of left gyrus rectus, middle cingulate gyrus, bilateral insula, right Rolando Operum, occipital lobes decreased in CM-MOH group. GMV of right middle frontal gyrus, Rolando Operum, right precentral gyrus, left postcentral gyrus, left superior occipital lobe increased in patients with EM and CMwoMOH. Furthermore, CMwoMOH patients had significantly increased GMV in bilateral caudate nucleus.

Conclusion: Our findings indicate that a reduced volume of orbitofrontal gyrus may reflect chronicity of migraine. Decreased GMV of gyrus rectus may reflect disease-specific modifications of CM-MOH. Increased GMV of caudate nucleus may specifically reflect pathophysiological changes of chronicity of migraine without medication overuse. No conflict of interest.

F - BASIC SCIENCE: HEADACHE
BASIC EXPERIMENTAL SCIENCE AND PATHOPHYSIOLOGY

F1
EHMTI-0122. Serum micronas as potential biomarkers of migraine
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Background: Migraine is a highly prevalent neuro-vascular disorder. Protein-based serum biomarkers have been assessed in relation to diagnosis and patients’ stratification, but general lack of robustness and reproducibility impede widespread clinical utilization. MicroRNAs have emerged as promising biomarkers for multiple conditions such as cancer and recently also for painful conditions.

Aim: To assess the potential of applying serum microRNAs as biomarkers for migraine.

Methods: In an initial screening, 386 microRNAs, previously found in serum, were assessed in six migraineurs in pain-free periods and during migraine attacks. From this, four differentially expressed microRNAs (hsa-miR-34a-5p, miR-29c-5p, hsa-miR-382-5p and hsa-miR-26b-3p) were selected for further investigation. Validation was performed in a cohort of 8 migraineurs during attack, 8 in a pain-free period and 8 healthy sex-matched and age-matched controls and in a separate cohort of 12 migraineurs in pain-free period and 12 healthy age-matched controls. In total, serum microRNA expression was analyzed in 48 migraineurs and controls.

Results: A significant alteration in more than 30 microRNAs (~8% of the assays) was detected during the screening. Three of the four microRNA were confirmed to have significantly higher expression during migraine attacks compared to pain-free periods. Furthermore, microRNA expression were significantly altered between migraineurs and healthy controls in two independent validation cohorts (n = 16 and n = 24).

Conclusions: These preliminary data, proposes microRNAs as potential biomarkers for migraine with applications in patients’ stratification, diagnosis or perhaps therapeutic aspects of migraine. Further investigations are warranted. No conflict of interest.

F2
EHMTI-0237. The A11 hypothalamic nucleus is susceptible to nitric oxide signalling
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Introduction: The involvement of hypothalamic nuclei in the pathophysiology of migraine and trigeminal autonomic cephalalgias has been suggested for some time, with dopaminergic mechanisms proposed...
to play a prominent role. The hypothalamic A11 nucleus is, to date, the only nucleus found to provide a dopamine-mediated inhibitory effect on nociceptive transmission in the trigeminocervical complex.

Aims: We aimed to examine the effects of trigeminovascular stimulation and nitricergic mechanisms on the neuronal activity of A11 hypothalamic neurons.

Methods: In anesthetised male Sprague-Dawley rats, extracellular single neuron electrophysiological recordings were performed from the A11 hypothalamic area. Trigeminovascular activation was achieved by electrical stimulation of the superior sagittal sinus. The nitric oxide donor sodium nitroprusside (SNP), or saline were intravenously infused and their effects on spontaneous neuronal firing examined. In a different experimental group, animals were pre-treated with indomethacin 15 minutes prior SNP infusion.

Results: Infusion of SNP significantly attenuated spontaneous neuronal firing in the A11 nucleus for at least 90 minutes, whereas saline infusion had no significant effects. Pre-treatment with indomethacin, significantly blocked the SNP-induced attenuation of spontaneous neuronal activity. None of the recorded neurons, located in the rostrocaudal extent of the A11 nucleus, demonstrated increased evoked-activity in response to electrical activation of the superior sagittal sinus.

Conclusions: The A11 hypothalamic nucleus is susceptible to nitric oxide-mediated inhibition and at least, part of indomethacin’s mechanism of action involves interactions with nitric oxide signaling. Our data further suggest that the A11 nucleus may not be activated directly by trigeminovascular afferents.

No conflict of interest.

F3

EHMTI-0244. Optogenetic elicitation of cortical spreading depression in unanesthetized, head-restrained mice
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Introduction: We tested the hypothesis that cortical spreading depression (CSD) could be initiated by optogenetically activating astrocytes in unanesthetized mice. Previously, we demonstrated that depolarizing astrocytes expressing the light-responsive channelrhodopsin-2 receptor (ChR2) elicited CSD in brain slices and in anesthetized mice.

Aims: Our principal aim was to demonstrate that CSD elicited optogenetically was not due to slice conditions, nor dependent on anesthetic agents.

Methods: In mice, the ChR2 receptor was selectively expressed in astrocytes expressing gliarial fibrous acidic protein (GFAP+). Mice were anesthetized to expose the skull and burr holes were made for local field potential (LFP) recordings in homotypical cortical regions. A custom stereotaxic frame immobilized the head and following recovery the mice are free to move on a treadmill (i.e., floating foam sphere). A blue laser was used to activate Chr2-expressing astrocytes through the skull and while recording LFPs.

Results: Consistent with our previous work in slice and in anesthetized mice, blue light activation of ChR2-expressing astrocytes elicited CSDs. Multiple CSDs could be elicited within a single animal at the same location although stimulus duration varied. Green light of equal intensity failed to produce CSDs. Local LFPs from the stimulated hemisphere exhibited large DC changes that define CSD as well as high frequency discharges prior to the large DC deflection.

Conclusions: Optogenetic approaches to the study of CSD in awake, moving animals is possible. Depolarizing populations of astrocytes is sufficient to elicit CSD and suggest that astrocyte dysfunction can play an instigating role in CSD generation.

No conflict of interest.

F5

EHMTI-0038. Does hypophysial-gonadal system influence formation of tension-type headache in women of reproductive age?
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The obvious difference in pain prevalence related to gender is well known, but the underlying mechanisms are not clearly identified. Female sex steroids may play an important role in this difference. The obvious difference in pain prevalence related to gender is well known, but the underlying mechanisms are not clearly identified. Female sex steroids may play an important role in this difference. Female sex steroids may play an important role in this difference.

Objective: Estimation of hypophysial-gonadal hormones level and psychoemotional status in women of reproductive age with tension-type headache

Methods: We have evaluated the content of hypophysial-gonadal hormones in blood serum in luteal and follicular phases. Diagnosis has been made using ICHD-II. Psychoemotional status has been assessed by the scale of Beck, Hamilton and Spilberg.

Results: 1. At moderate personal and reactive anxiety and depression in women with chronic tension-type headache (CTTH) the increased cortisol in blood has been found.

2. In a follicular phase the women with CTTH had the increased luteinizing (52.2±7.5 IU/l) and FSH (18.2±1.4 IU/l), while in a luteal phase-progesterone was high (89.7 ±3.6 nmol/l). Estradiol (274.3±25.3 pg/ml), testosterone (2.4±0.3ng/ml) and cortisol (877.2±356.6 nmol/l) were increased as in the luteal and follicular phases of the ovary cycle. Quantitatively, the hypothesis-ovary and hypothesis-adrenal cortex hormones in patients with episodic tension headache were within the normal range in both phases of the ovary cycle.

3. In women CTHH was accompanied by moderate reactive and personal anxiety and evident depression during the ovary cycle becoming more intensive. The women with episodic tension-type headache demonstrated low anxiety and absence of depression in follicle and luteinizing phases.

Conclusion: The obtained data allow us to track the pathogenic correlation between CTHH and hormonal deviations

No conflict of interest.
F6
EHMTI-0018. CGRP receptor antagonists attenuate pain behavior induced by cortical spreading depression in freely moving rats
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Introduction: Cortical spreading depression (CSD) is implicated in migraine. Pain behavior is important for experimental migraine studies.
Aims: In this study, the effect of CSD on pain and anxiety behavior in freely moving rats was investigated. The effect of CGRP receptor antagonist (MK-8825) on CSD induced behavior, and c-fos activation pattern in certain brain structures were evaluated to understand pain mechanisms.
Methods: Study was approved the Institutional Animal Care and Use Committee and care and handling of animals were in accord with National Institute of Health guidelines. CSD was performed by topical KC1 in awake rat, basal pain thresholds to mechanical and cold allodynia were evaluated. Rats were given either saline or CGRP receptor antagonist 30 or 100 mg/kg. After CSD induction, spontaneous behavior, ultrasonic vocalization was recorded; anxiety tested by elevated plus maze and mechanical and cold allodynia were evaluated. C-fos immunohistochemistry was performed to brain sections.
Results: MK-8825 reversed CSD induced freezing, grooming, head shake and wet dog shake behavior; increased mechanical and cold allodynia thresholds. MK-8825 reduced c-fos positive cell number in ipsilateral trigeminal nucleus caudalis (TNC) and thalamic reticular nucleus. We found no co-localization with c-fos and CGRP, CLR or RAMP1.
Conclusions: CGRP receptor antagonists dose dependently attenuated CSD induced pain response. Besides blocking central transmission at TNC, CGRP receptor antagonists may also exert their effect on thalamic reticular nucleus.
No conflict of interest.

F7
EHMTI-0062. Expression of fractalkine (CX3CL1) and fractalkine receptor (CX3CR1) in the trigeminal ganglia: implications for craniofacial nociception
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Introduction: Evidence indicates that fractalkine (CX3CL1) and its receptor CX3CR1 are involved in the pathogenesis of pain. Within the central nervous system, CX3CL1 is expressed by neurons and CX3CR1 by microglia. This unique pattern of expression has supported the idea of neuron to gli communication, which is thought to be disregulated under pathological pain conditions. The presence of CX3CL1 and CX3CR1 in trigeminal ganglion (TG) neurons and satellite glial cells (SGCs) and their contribution to nociceptive signal transmission have not been well documented.
Aims: To investigate the expression of CX3CL1 and CX3CR1 in naive rat trigeminal ganglia.
Methods: Trigeminal ganglia were isolated from one adult male and one adult female Sprague-Dawley rat. Immunohistochromistry was performed on 5 ganglia sections per rat to determine the expression of CX3CL1 and CX3CR1 on trigeminal neurons and SGCs. ImageJ was used for data analysis.
Results: CX3CL expression was observed in only 3% of TG neurons (diameter: 9-46 μm) and was rarely observed in SGCs. In contrast, 39% of TG neurons (diameter: 5-58 μm) expressed CX3CR1. CX3CR1 was also expressed in trigeminal SGCs, many of which surrounded CX3CR1-positive TG neurons.
Conclusions: CX3CR1 is expressed by TG neurons of widely varying sizes and by many SGCs. CX3CL1 immunoreactivity was rarely identified in TG neurons or SGCs. Cross talk between neurons and SGCs through fractalkine signaling does not appear likely under normal conditions. Increased expression of CX3CL1 in the TG may occur following craniofacial inflammation or injury, which is currently under investigation in our laboratory.
No conflict of interest.
Effect was seen. Similarly, no sign of tolerance was seen with 10-day repeated administration of JNJ at 30 mg/kg p.o. dose, selected based on acute dose-response study. Potential side effects of both compounds were monitored by an automated behavioral observation system. In the above examined dose range and dosing regimens (acute and chronic) no considerable side effects were detected. No effect of CA on thermal or mechanical nociceptive threshold was seen up to 10 mg/kg dose. Our results suggest potential utility of mGLur2 PAMs against trigeminal neuralgia or migraine. CA proved to be similarly effective but much more potent in vivo than JNJ.

F10
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F10

**EHTM1-0234. Glyceryl trinitrate provoked mast cell degranulation as secondary to the release of nitric oxide in vivo**

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Introduction: *Infusion of the nitric oxide (NO) donor, glyceryl trinitrate (GTN), provokes a migraine-like attack in migraineurs and causes up-regulation in rat trigeminal nucleus caudalis. We studied the level of dura mast cell degranulation after infusion of GTN in awake, freely moving rats and hypothesized that the degranulation is secondary to NO.*

Aims: *We studied the effect on dura mast cell degranulation of NO from GTN in vivo and of GTN and sodium nitroprusside (SNP) ex vivo.*

Methods: *GTN was infused i.v. in rats and mast cell degranulation was evaluated at different time points (Approved by Animal Experiments Inspectorate). Dura mater was subjected to GTN and SNP ex vivo and mast cell degranulation was likewise evaluated. Release of NO was confirmed by cerebral artery relaxation in a wire myograph setup.*

Results: *GTN infusion in vivo induced a significant mast cell degranulation in a time-dependent manner. Degranulation increased from 30 min (20.3 ± 3.0%) to 2 hours (61.0 ± 15.3%) reaching a stable level for at least 6 hours (54.5 ± 9.3%). In an ex vivo setup, neither of the NO donors GTN (9.65 ±1.17%) or SNP (11.63 ± 3.46%) caused mast cell degranulation compared to vehicle (11.65 ± 2.89% and 9.97 ± 3.09%, respectively) after 10 min. Cerebral arteries diluted significantly in response to both GTN (68.0 ± 1.0%) and SNP (73.5 ± 2.5%).*

Conclusions: *In vivo infusion of GTN caused significant mast cell degranulation 30 min to at least 6 hrs after infusion, suggesting a secondary effect of NO. In support of this, direct application of NO did not degranulate dura mast cells ex vivo.*

No conflict of interest.

F11

**EHTM1-0092. Activation of the 5-HT2B receptor induces dural plaque protein extravasation in a mouse migraine model**

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Introduction: *Migraine attacks originate in the meninges which are densely innervated by trigeminal nerve fibers. Upon stimulation, endothelial cells of dural blood vessels secrete nitric oxide and as a consequence, neuropeptides are released from trigeminal nerve fibers. This, in turn, leads to meningeal plasmalemma extravesation (PPE) and vasodilation. Inflammatory components such as PPE and vasodilation serve as indicators for migraine attacks in animal models. A guinea pig migraine model was described in which the partial 5-HT2B receptor agonist meta-Chlorophenylpiperazine (mCPP) is applied to induce PPE in the dura mater. We have transferred this model to mice.*

Aim: *Characterize the role of the 5-HT2B in a mouse migraine model.*

Methods: *Tissue accumulation of the tracer Evans Blue is measured to quantify the extent of the PPE.*

Results: *Mice are only responsive to mCPP after several weeks of hypoxia. The induction of PPE in hypoxic mice is blocked by the specific 5-HT2B receptor antagonist BFT-1.*

Conclusion: *The 5-HT2B receptors play a crucial role in the induction of migraine symptoms in hypoxic mice.*

No conflict of interest.

F12

**EHTM1-0148. Perivascular spaces and headache: a population-based imaging study (MRI HUNT)**

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Background: *In three former studies headache sufferers (in particular migraineurs) had more perivascular spaces (PVS) on MRI than headache-free. Aim: To evaluate the association between headache and PVS in a relatively large and population-based imaging study with a blinded design.*

Method: *The study was part of a large longitudinal epidemiological study (Nord-Trendelag Health Survey (HUNT)). The 1006 participants were 50-65 years at inclusion, had participated in all previous HUNT studies (1, 2 and 3), and had been randomly selected to a population-based imaging study of the head (MRI-HUNT, 2007-2009). The number of diluted PVS in the basal ganglia (BG) and hemispheric white matter (HWM) was compared in headache sufferers (migraine with and without aura, non-migrainous headache) and headache-free. Both cross-sectional and longitudinal analyses were performed.*

Results: *The cross-sectional analysis showed that migraineurs without aura in HUNT 3 had fewer PVS than headache-free (OR=0.84, 95% CI=0.75-0.95, P-value=0.003) in BG. In the longitudinal analysis those with migraine in only HUNT 2 were found to have fewer PVS than headache-free (OR=0.98, 95% CI=0.96-1.00, P-value=0.049) in HWM. There was no relation between PVS and any other headache types.*

Conclusion: *In contrast to the findings of previous studies the present study showed no increase in number of diluted PVS among headache sufferers. Fewer PVS in migraineurs without aura may be an incidental finding.*

No conflict of interest.

F13

**EHTM1-0093. Investigation of 5-HT2B receptor pathways with relevance to a mouse migraine model**

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Introduction: *Recent research raises the question whether the serotonin 2B receptor (5-HT2B) plays a role in the pathogenesis of migraine. Clinical studies revealed that the 5-HT2B/2C agonist meta-Chlorophenylpiperazine (mCPP) induces migraine-like headache more likely in migraineurs than in subjects without a history of migraine. We therefore developed an animal model for chronic migraine, where we are able to induce a neurogenic inflammation in the dura mater of hypoxic mice with 5-HT2B agonists. This inflammation can be blocked by specific 5-HT2B inhibitors. Until now little is known about the 5-HT2B receptor: It is expressed on endothelial cells of blood vessels, but it may also be present on other cell types. Like most of the other serotonin receptors it is a G protein-coupled receptor, but the native signal transduction pathway after receptor activation is not clear yet.*

Aims: *Investigation of the 5-HT2B receptor in a primary cell culture system to determine native signal transduction pathways.*

Methods: *Cultivation of primary cells. Validation of the presence of the receptor. Signal transduction assays.*

Results: *Stimulation with the 5-HT2B/2C agonist mCPP induced concentration-dependent ERK phosphorylation in 5-HT2B positive primary cells.*

Conclusions: *Activation of the 5-HT2B receptors may stimulate cell proliferation and angiogenesis and therefore alter the vascular system of the dura mater, which may result in a higher susceptibility for migraine.*

No conflict of interest.
F14
EHMTI-0338. The enzymes phosphodiesterase 3 and 5 express activity in the trigeminal ganglion and co-localize with calcitonin gene-related peptide
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Introduction: The neuropathology leading to migraine pain has centered on an either a vascular or neuronal origin. Sildenafil, a specific inhibitor of phosphodiesterase 5 (PDE5), was the first compound to induce migraine-like headache in a human headache model without a concomitant artery dilatation.

Aim: In this study we investigated the presence and activity of PDE3 and PDE5 in a key component of the neuronal pathway, the trigeminal ganglion. We further addressed a possible cross-talk with a key molecule in migraine pain signaling, calcitonin gene related peptide (CGRP), by investigating cellular co-localization.

Methods: Analyzes were performed on isolated rat trigeminal ganglion. Localization was done by immunohistochemistry, in situ hybridization, and western blots. Enzymatic assays for CAMP and cGMP hydrolysis were done using scintillation proximity assay.

Results: We show that PDE3 and PDE5 are present and express activity in the trigeminal ganglia. PDE3 and PDE5 were observed in the majority of neurons in the ganglion. However, only a subset of these PDE3 and PDE5 positive cells contained CGRP.

Conclusions: Hydrolysis of cyclic AMP was in contrast to cGMP, influenced by both sildenafil and clobazol, suggesting sildenafil, clobazol and CGRP may work through a common CAMP pathway resulting in migraine pain. No conflict of interest.

F15
EHMTI-0095. Spreading depression enhances neurogenesis in hippocampus and dentate gyrus
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Introduction: Spreading depression (SD) known by transient loss of spontaneous and evoked neuronal activity and changes in ionic, metabolic and hemodynamic characteristics of the brain. Neuronal damage followed by SD, supposed to have a dramatic impression on SD-derived pathologic conditions. We aimed to determine whether SD is able to stimulate persistent neurogenesis.

Methods: Wistar rat (60-80g) randomly chosen and 3 mol/L KCi injected for induction of SD. Four weeks after the first injection, all rats were decapitated and the brains removed. The density of mitotic cells, divided cells, and new neurons in the pyramidal cell layer of hippocampal CA1 and CA3 and granular cell layer of dentate gyrus was assessed. We also detect the DNA during the 5 phase using Bromodeoxyuridine (BrdU).

Results: A remarkable increase occurred in the number of BrdU-labeled cells in hippocampal region, detected by immunohistochemistry method. The density of mitotic cells, divided cells, and new neurons in hippocampal CA1 and CA3 and granular cell layer of dentate gyrus also increased.

Conclusion: We conclude that Spreading depression potentiates to trigger persistent neurogenesis in rat hippocampus. No conflict of interest.

F16
EHMTI-0094. Effect of nifedipine on memory impairment induced by repetitive spreading depression
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Introduction: Spreading depression (SD) is known by transient loss of spontaneous and evoked neuronal activity and changes in ionic, metabolic and hemodynamic characteristics of the brain. It has been shown that repetitive SD produced memory deficits in juvenile rats. Furthermore, the role of Ca2+ channels on induction and propagation of SD was investigated by several scientists. The aim of the present study was to study the role of a Ca2+ channel-blocker, nifedipine, on memory deficits induced by repetitive SD.

Materials and methods: Wistar rats (60-80g) were divided into 4 groups and nifedipine (1 mg/kg) was administrated weekly for 4 weeks in SD group. SD was also induced weekly for four weeks by KCi (2 M). Retrieval of spatial memory was evaluated by T-maze memory test.

Results: The T-maze test demonstrated that memory was impaired in SD group. The memory retrieval significantly improved by application of nifedipine.

Conclusions: This study suggests the possible role of calcium channels in memory impairments following repetitive SD.

F17
EHMTI-0079. Reduced volume of anterior thalamic nuclei in migraineurs
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Introduction: Previous studies on small samples of migraineurs have suggested subtle abnormalities of thalamic anatomy and function.

Aims: To study changes of thalamic volume and shape in a large cohort of migraineurs using a novel label-fusion based segmentation approach.

Methods: High-resolution 3D T-weighted MRI data were acquired at 3T in 131 migraineurs (31±9 years old; 109 women; monthly attack frequency: 3.2±2.5; disease duration: 14±8.4 years) and 115 matched healthy subjects (29±7 years old; 81 women) at four international centers. The thalamus and thalamic subnuclei were segmented using a fully-automated multi-atlas approach. Deformation-based shape analysis was performed to localize thalamic surface abnormalities. To investigate group effects, ANCOVA was used (age, gender, site and brain volume as nuisance covariates; results were FDR corrected for multiple comparisons at threshold of 0.05).

Results: We found volume reductions of the anterior, central, lateral dorsal (all FDR p<0.05) and a trend in the lateral posterior nucleus (FDR p<0.1) in migraineurs compared to controls. Patients with MwoA had by trend smaller volumes of anterior, central and lateral dorsal (all FDR<0.1) nuclei compared to controls. No significant differences were observed in patients with MwA compared with controls. No thalamic surface changes (shape analysis) and no relationship between thalamic volumes and migraine disorder duration or headache frequency was observed.

Conclusions: The thalamic nuclei with abnormal volumes are densely connected to the limbic system. The data hence lend support to the view that higher-order integration systems are altered in migraine. No abnormalities were found in classical somatosensory nuclei.

No conflict of interest.

F18
EHMTI-0287. Peptides involved in sleep and appetite homeostatic regulation and its effects in the modulation of trigeminovascular nociceptive activation
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Introduction: Disturbances in appetite and sleep contribute to triggering in migraineurs. Neuropeptide Y (NPY), leptin and insulin are involved in...
F19
EJHMT-0219. Quantitative histological differences in the inter- and intraindividual differences in the dural vasculature of the mouse
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Introduction: To examine both migraine and pulmonary hypertension (PH) we developed a hypoxic mouse model. Under hypoxic conditions (four weeks at 10% O2) mice develop typical symptoms of PH, characterized by an increased muscularization of arterial blood vessels in the lung. The vessel remodeling can be prevented by the chronic application of S-HT2B receptor antagonists. We found that hypoxic mice also develop increased sensitivity towards the 5-HT2 receptor agonist meta-Chlorophenylpiperazine (mCPP). In contrast to the control group (normoxic mice kept at 20% O2) at low doses of 1 μg / kg body weight, mCPP triggers plasma protein extravasation (PPE) in the dura mater in hypoxic mice. Dural PPE is a quantifiable indicator of migraine-like events in animal models.

Aims: The sensitization towards mCPP may coincide with structural remodeling processes in arterial blood vessels of the dura mater, possibly exhibiting similarities to vascular alterations in the lung. A prerequisite in the investigation of vascular alterations in the dura mater is a thorough understanding of the normal organization of dural vasculature in mice and of the extent of its normal biological variance.

Methods: Histological examinations of the length of dural vessels were performed to quantify and statistically analyze inter- and intraindividual differences.

Results: Intereindividual differences: The arteriole total lengths are 15% far from the arithmetic mean. Intraindividual differences: The difference in the length of arterioles represents 12% of the total length of the arterioles.

Conclusion: On the basis of these results examinations of dural vessels of hypoxic mice can be investigated.

No conflict of interest.

F20
EJHMT-0101. Is inflammation atherogenic in neurological diseases? A case-control study with migraine and multiple sclerosis patients
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Introduction: There has been some debate concerning the endothelial damage and cerebrovascular risk in migraine. Aim: We will evaluate the endothelial damage in migraine comparing carotid intima-media thickness (IMT) and the endothelial-dependant flow-mediated vasodilatation (EDV) with healthy controls and an active group, such as multiple sclerosis (MS).

Methods: >Subjects were matched for sex and age (range 20-55). McDonald’s 2010 criteria were used for MS; IHS-2004 and 2006 criteria for episodic migraine (EM) and chronic migraine (CM). IMT, EDV, and other vascular parameters, were obtained by a certified blind examiner. NO, von Willebrand factor (vWF), ICAM-1 and VCAM-1 were determined. Statistics Student’s t test, general lineal models with post-hoc Bonferroni correction with adjusted means, and Pearson regression test.

Results: We recruited 22 controls, 59 migraine patients (25 CM), 33 MS patients. IMT was thicker in MS than in controls (p=5.4E-009), EM (p=8.9E-006), and CM patients (p<0.008). CM had thicker IMTs than EM (p=0.001). IMT correlated with EDSS (r=-0.464; p=0.011), and inversely with EDV (r=-0.414; p=0.00013) and BHI (r=-0.300; p=0.015). BHI inversely correlated with vWF (r=-0.317; p=0.011). EDV, was higher in controls than in MS (p=5.6E-006), and CM (p=0.001). MS and CM still predicted IMT and EDV under the model corrected for age and BMI (p<0.001).

Conclusion: Our findings suggest intrinsic endothelial vascular damage which was found more consistently for MS than in CM patients. We hypothesize that endothelial damage could be associated to the neuroinflammation status itself.


F21
EJHMT-0104. VIP levels in peripheral blood outside migraine attacks as a potential biomarker of cranial parasympathetic activation in chronic migraine
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Introduction: To determine vasoactive intestinal peptide (VIP) levels outside migraine attacks in peripheral blood as a potential biomarker for chronic migraine (CM).

Methods: Women older than 17 and diagnosed as CM were recruited. Matched women with no headache history and with episodic migraine (EM) served as controls, together with a series of patients with cluster headache in a pain-free period. VIP levels were determined in samples obtained from the antecubital vein by ELISA outside a migraine attack and having taken no symptomatic medication. Due to ethical reasons, preventative treatments were not stopped.

Results: We assessed plasma samples from 119 women with CM, 33 healthy women, 51 matched women with EM and 18 patients (16 males) with cluster headache matched for age. VIP levels were significantly increased in CM (101.1 pg/ml) as compared to controls and numerically lower that those of CM. Thresholds of 71.8 and 164.5 pg/ml optimize the sensitivity and specificity to differentiate CM from healthy controls and EM, respectively. Variables such as age, CM duration, the presence of aura, analgesic overuse, depression, fibromyalgia, vascular risk factors, history of triptan consumption or kind of preventative treatment did not influence VIP levels.

Conclusion: Increased interictal VIP level measured in peripheral blood could be a biomarker helping in CM diagnosis, though it does not clearly differentiate between CM and EM. Supported by PI11/00889 FISSS and Allergan-Eurasia MAT/ISS/NS/CM/003 grants.
F22
EHMTI-0125. Studying the permeability of the blood-brain barrier during migraine attacks using [11C]-dihydroergotamine
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Introduction: Due to unfavorable molecular size and lipophilicity, migraine-specific medications such as dihydroergotamine (DHE) are not expected to penetrate the blood-brain barrier (BBB). A breakdown of the BBB during migraine attacks has been postulated as the mechanism in which DHE accesses postulated central sites of action.

Aim: To demonstrate whether the permeability of the BBB increases for DHE during migraine attacks.

Methods: As a measure of parenchymal binding in the brain and thus BBB penetration, we calculated the influx rate constant Ki for the radioligand [11C]-dihydroergotamine ([11C]-DHE) using arterial blood input function over the course of dynamic positron emission tomography (PET). The influence of migraine on the Ki maps, i.e. the BBB was assessed in a second [11C]-DHE scan during glyceryl trinitrate (GTN)-induced migraine attacks.

Results: Independent from the presence of migraine headache, six migraineurs and six age- and gender-matched control subjects showed identical binding of [11C]-DHE at the choroid plexus, the pituitary gland, and the venous sinuses. There was no binding (Ki = 0/min) in the brain parenchyma, including the candidate brainstem sites of action during migraine (periaqueductal grey, raphe nuclei) and the area with the highest density of the highest-affinity DHE receptors (hippocampus).

Conclusions: The lack of icat binding of [11C]-DHE to the brain parenchyma suggests that the BBB remains intact for DHE during migraine attacks. The efficacy of DHE in treating an acute migraine attack may have a peripheral component although some implicated structures remain outside the BBB.

F23
EHMTI-0143. The association between stress and headache: a longitudinal population-based study
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Introduction: Stress as a trigger for headache is often reported by patients.

Aims: We studied the association between stress intensity and headache frequency for tension type headache (TTH), migraine and migraine with coexisting TTH (MigTTH).

Methods: The German Headache Consortium studied a population-based sample of 5,159 participants (21-71years) who were asked every three months between March 2010 and April 2012 about headache and stress. Log-linear regression in the framework of Generalized Estimating Equations was used to estimate regression coefficients presented as percent changes to describe the association between stress intensity (visual analogue scale [VAS] from 0-100) and headache frequency (days/month) stratified by headache subtypes and age groups. Percent changes were adjusted for sex, age, frequent intake of acute pain drugs, drinking, smoking, body mass index and education.

Results: TTH was reported in 31% participants (48.1±12.5years, 51.5% women, 2.2±3.9 mean headache days/month, 52.3±26.7 mean stress), migraine in 14% (44.8±11.3years, 73.3%, 4.5±5.2days/month, 62.4±23.3), MigTTH in 10.6% (43.5±11.5years, 61.0%, 3.6±4.8days/month, 58.6±24.1), 23.6% of respondents were unclassifiable, 20.8% had no headache. In participants with TTH an increase of 10 points on VAS was associated with an increase of headaches days/month of 6.0% (fully adjusted). Higher effects were observed in younger age-groups (21-30/31-40/41-50/51-60/61-71years: 9.8/10.2/7.0/6.5/6.3/5.3%).

Conclusions: Our study provides evidence for an association between stress intensity and headache frequency. Our findings are clinically important explaining that patients might benefit from psychological interventions for stress. The benefit might be higher in younger headache sufferers.

No conflict of interest.

F24
EHMTI-0199. CGRP modulates trigeminal ganglionic neuronal excitability in minimally low pH condition
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Introduction: It is well recognised that trigeminal ganglion neurons are responsive to acidic condition (pH<6.5). Their response to minimally low pH (7.0) and the interaction with calcitonin gene related peptide (CGRP) is not well demonstrated.

Aims: To investigate the effect of minimally low pH (7.0) on trigeminal neuronal excitability and the modulating effect of CGRP upon this process.

Methods: Whole cell patch clamp recording was performed in primary cultured rat trigeminal ganglion neurons. Cultured neurons are classified to small-to-medium sized (diameter < 40 μm) and large neurons (diameter > 40 μm). Depolarizing current pulses were applied to generate action potential. Electrical properties were measured at pH 7.4 and re-measured again after incubation fluid pH was adjusted to pH 7.0. In another set of experiment, cultured neurons were pre-incubated with 1 μM CGRP for one hour prior to electrical recording.

Results: In small-to-medium-sized neurons, lowering pH to 7.0 increased excitability of trigeminal neurons as evident from less negative resting potential, more negative threshold potential and decreased rheobase. Minimally low pH did not alter the excitability of large-sized neurons. After pre-incubation with CGRP, large-sized neurons became more sensitive to acidic condition. The rheobase was decreased from 60.8 ± 9.2 to 51.7±8.5 pA (pH 7.4 and 7.0 respectively).

Conclusions: These findings indicate that pH 7.0 can increase the excitability of small-to-medium-sized neurons. On the other hand, large-sized neurons will become more sensitive to acidic condition only after pre-exposure to CGRP. These results reflect the interaction between CGRP and low pH condition in modulating the excitability of trigeminal neurons.

No conflict of interest.

F25
EHMTI-0213. Does prior craniofacial noiception lead to an increase in cortical excitability?
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Introduction: Attacks of migraine following the intense craniofacial somatosensory activation is observed clinically. The mechanism underlying this phenomenon may involve the trigeminal influence on cortical excitability. Whether or not this evoked attack is specific to craniofacial noiception is still unclear.

Aims: To compare the effect of prior craniofacial and extra-craniofacial noiception on development of cortical spreading depression (CSD) and CSD-evoked cortical hyperemia.

No conflict of interest.
Methods: Formalin 10% (0.1 ml) was subcutaneously injected into the forehead and forepaw of adult male Wistar rats (7 each) in order to induce nociception. Saline of the same volume was given to the control animals. One hour after injection, CSD was induced by application of 3 mg of solid potassium chloride on rat’s parietal cortex. The depolarization shift (DC shift) and CSD-evoked changes in cortical blood flow were recorded for one hour.

Results: Nociceptive activation induced by formalin injection into forehead and forepaw significantly increased the development of CSD and CBF. The number of DC shifts was 12±2, and 15±1 in the control and facial nociception groups, respectively. Similar pattern was observed in the forepaw nociception group. The number of DC shifts was 12±2, and 17±2 in the control and forepaw nociception groups, respectively. Characteristics of CSD-evoked cortical hyperemia were not different comparing between facial and forepaw nociception groups.

Conclusion: Our findings indicate that acute nociceptive activation can facilitate the development of CSD regardless of site of nociception. These results imply that nociception-evoked cortical hyperexcitability may involve modification of central modulating system and does not specific to trigeminal nociception.

No conflict of interest.

Introduction and aims: HMG1 (high-mobility group box 1), which can serve as both a DNA-binding protein and a cytokine-like secretory molecule, has been implicated in the pathophysiological processes initiated by cortical spreading depression (CSD). Here, we examined the expression of HMG1 at the RNA and protein levels in the cerebral cortex subjected to CSD.

Methods: CSD was induced by applying 1 M KCl to the cerebral cortex in male C57BL/6 mice. The induction of CSD was monitored by recording DC potentials at an electrode close to the CSD induction site. To examine HMG1 expression, immunohistochemistry and in situ hybridization were performed for 10 micrometers-thick sections prepared from the cerebral cortices exposed to CSD. Non-treated control mice and sham-operated mice were also investigated.

Results: The basal expression of HMG1 transcript and protein was identified in neurons and astrocytes with HMG1 immunoreactivity being localized exclusively within the nucleus. At 3 hours after CSD induction, the HMG1 transcription level was more marked in the cerebral cortex subjected to multiple CSD (5 times) compared to single CSD. At 24 hours after CSD induction, the HMG1 transcriptional activity returned to the basal level. Meanwhile, HMG1 immunoreactivity was recognized in the cytoplasm as well as within the nucleus in a small proportion of neurons in the cerebral cortex subjected to CSD.

Conclusions: CSD causes the release of HMG1 from the nucleus in cortical neurons. Transient transcriptional upregulation of HMG1 is driven by CSD, apparently contributing to replenishment of the molecule after its release.

No conflict of interest.

Introduction: Systemic nitroglycerin (NTG) activates cerebral nuclei of rat involved in nociceptive transmission, as well as in neuroendocrine and autonomic functions. These changes are considered relevant for migraine pain, since NTG consistently provokes spontaneous-like migraine attacks in migraineurs. Several reports have suggested the existence of relations between the endocannabinoids and migraine. URB937, a peripheral fatty acid amide hydrolase (FAAH) inhibitor, induces analgesia in animal models of pain but there is no information on its effects in migraine.

Aim: In this study, we evaluated whether the URB937 administration modulates c-Fos expression following NTG administration in specific brain areas of rat.

Methods: The analgesic effect of URB937 was evaluated in male Sprague Dawley rats. Animals were treated with NTG (10mg/kg, i.p.) followed by URB937 (1mg/kg i.p.) or vehicle (DMSO, 1ml/kg i.p.) and their brain processed for the detection of c-Fos protein. The principles of the Helsinki declaration and IASP’s guidelines for pain research in animals were rigorously applied. The experimental research on animals was approved by ethics committee for research on animals of the University of Pavia.

Results: Brain mapping of nuclei activated by NTG administration demonstrated that peripheral FAAH inhibition with URB937, significantly reduces neuronal activation in the nucleus trigeminalis caudalis (NTC) and locus coeruleus (LC).

Conclusions: These findings show that URB937 may counteract the activation of nuclei involved in migraine attacks probably via the increase of anandamide levels at the meningeal level, within the trigeminovascular system, or on extracerebral vessels.

No conflict of interest.
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Background: Idiopathic intracranial hypertension (IIH) is a condition of increased intracranial pressure (ICP) without identifiable cause. The majority of IIH patients are obese, which suggests a connection between CSF regulation and obesity. However, the pathophysiological mechanisms remain widely unresolved.

Aim: To develop a long-term ICP monitoring method and investigate ICP in lean and obese rats. We also aimed to clarify if any ICP difference could be attributed to changes in some well-known ICP modulators; retinol and arterial partial pressure of CO2 (pCO2).

Methods: ICP was measured in six obese and six lean Zucker rats with a newly developed epidural ICP monitoring method over a period of 31 days. Furthermore, arterial pCO2 and serum retinol were measured in blood samples from each animal.

Results: Obese rats had significantly elevated ICP-levels compared to lean controls on all recording days (p < 0.0001). Serum retinol (lean: 10.54 ± 0.36, obese: 11.70 ± 0.91, p = 0.35) and arterial pCO2 (lean: 37.17 ± 1.58, obese: 41.25 ± 1.80, p = 0.16) did not differ between the two groups.

Conclusion: Obesity-related intracranial hypertension in rats is not related to altered pCO2 levels or retinol metabolism. This indicates that the increase in ICP might be related to molecular changes in the brain caused by the adipose state. Although further studies are warranted, obese Zucker rats could potentially constitute a model for IIH.

No conflict of interest.

F30
EHMTI-0140. The potential role of levetiracetam in migraine treatment: an animal study

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Introduction: Cortical spreading depression (CSD) is one of the most widely used animal models of migraine. Whether levetiracetam (LEV), like other antiepileptic drugs, has a role in the treatment of migraine remains uncertain.

Aim: To investigate the potential of LEV in the treatment of migraine using a rat model of CSD.

Method: Male Sprague-Dawley rats were used. The effects of acute (3 days) and chronic (28 days) treatment with vehicle, LEV 200mg/kg/d, and LEV 400mg/kg/d on CSD susceptibility were examined. Drugs were given as daily intraperitoneal injections. After completion of drug treatment, CSD was elicited by placing a cotton ball soaked with 1M KCl onto the occipital cortex, and was recorded for 2 hours by placing a glass microelectrode into the frontal cortex.

Results: In the acute treatment experiment, rats receiving LEV 400mg/kg/d (8.4±1.0) had fewer CSDs per hour than those receiving vehicle (12.9±1.7, p<0.001) and LEV 200mg/kg/d (12.5±2.1, p<0.001). In the chronic treatment experiment, rats receiving LEV 400mg/kg/d (11.4±2.6) had fewer hourly CSD events than those receiving vehicle (14.3±2.3, P<0.001) and LEV 200mg/kg/d (13.6±0.4, p<0.001), and rats treated LEV 200mg/kg/d had less CSDs than those in the vehicle group (p=0.049).

Conclusion: LEV had a modest effect on reducing CSD susceptibility at a dose of 400mg/kg/d, and the effects on CSD susceptibility were comparable when administered acutely or chronically.

Conflict of interest.

F31
EHMTI-0239. Effect of chronic paracetamol treatment on the csd-induced cgrp expression in the trigeminal ganglion

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Introduction: Calcitonin gene related peptide (CGRP) is a neuropeptide which play an important role in the trigeminal nociception. Previous studies have demonstrated that chronic paracetamol (APAP) treatment resulted in the enhancement of trigeminal nociception. However, the effect of chronic APAP treatment on the CGRP has never been explored.

Aim: To investigate the effects of chronic APAP treatment (30 days) on the CSD-induced CGRP expression in the trigeminal ganglion.

Methods: Rats were divided into control, CSD only, APAP treatment only and APAP treatment with CSD groups. Once-daily injection of APAP at a dose of 200 mg/kg body weight was intraperitoneally injected into the APAP-treated groups for 30 days. CSD was induced by topical application of potassium chloride on the parietal cortex. The expression of CGRP was monitored by immunohistochemistry and the CGRP mRNA level was investigated by RT-PCR.

Results: The induction of CSD caused an increase in the expression of CGRP in the trigeminal ganglion with a significantly higher in the number of CGRP-positive neuron than that observed in the control group. Interestingly, chronic APAP treatment in combination with or without CSD could significantly enhance the CGRP expression than that observed in CSD group. The results obtained from RT-PCR were in line with those obtained from immunohistochemical study. Chronic APAP treatment could significantly increase the CGRP mRNA level than that of control, especially in combination with CSD.

Conclusion: Based on these results, it can be concluded that chronic APAP treatment can increase the CSD-induced CGRP expression in trigeminal ganglion.

No conflict of interest.

F32
EHMTI-0050. Systemic and cerebral endothelial function in migraine

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Background: We showed different endothelial functions of the anterior and posterior cerebral circulation in healthy subjects, worse vasodilatory capacity of the posterior cerebral circulation and unimpaired systemic endothelial function in migraine patients without comorbidities. The relationship between cerebral and systemic endothelial function and the anterior and posterior cerebral endothelial function in migraine patients is still not clear.

Methods: We compared cerebral and systemic endothelial function through post-hoc linear regression analysis of cerebrovascular reactivity (CVR) to L-arginine between the middle cerebral artery (MCA) and flow mediated vasodilation (FMD) of the right brachial artery and posterior cerebral artery (PCA) and FMD in migraine patients without comorbidities and in healthy subjects.

Results: We did not find any significant correlation between CVR to L-arginine in the MCA and FMD and PCA and FMD in migraine patients with aura (p = 0.880 vs. 0.682), without aura (p = 0.153 vs. p = 0.179) and healthy subjects (p = 0.869 vs. p = 0.662). On the other hand we found a significant correlation in CVR to L-arginine between the MCA and PCA in migraine patients with aura (p = 0.004), without aura (p = 0.001) and in healthy subjects (p = 0.002).

Conclusions: Our study suggests that the endothelial function of cerebral and systemic circulation might be different in migraine patients without comorbidities, while that of the anterior and posterior cerebral circulation might be coupled with a worse vasodilatory capacity in the posterior cerebral circulation, which could indicate endothelial dysfunction in this territory.

No conflict of interest.
**G1**

**EHM1-0223.** Botox in the prevention of chronic migraine; 18-months follow up outcome in 67 patients

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**Background:** Chronic migraine (CM) affects 2% of the population and Botox is the only licensed treatment for prevention of adult patients with CM. In the UK, National Institute for Clinical Excellence (NICE) approved its use on the NHS in patients who failed three preventive medications. NICE recommends continuing treatment beyond cycle 2 in those with 30% reduction in headache days (negative stopping rule) and the treatment is stopped when migraine become episodic (positive stopping rule). However, the long-term outcome i.e. duration of required treatment remains uncertain.

**Objectives:** To ascertain the duration of treatment with Botox for the prevention of chronic migraine in responders as per NICE criteria.

**Method:** Adult patients with CM attending the Hull migraine clinic were offered Botox based on clinical needs and maintained a headache diary. Data were extracted for headache, migraine, and headache-free days.

**Results:** Patients (N=67) who commenced treatment between July 2010 and June 2012 were followed up for at least 18 months. 30 Patients stopped treatment at Cycle 2 as per negative stopping rule by NICE. Of 37 responders, only 12 were still on treatment at 18 months. Nearly half of the patients stopped treatment by the 4th Cycle (positive stopping rule).

**Discussion:** We continue to follow all patients who receive Botox for prevention of chronic migraine and aim to present 2 year follow up on a larger cohort at the EHMTIC September 2014.

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**G2**

**EHM1-0090.** Botox in the prevention of chronic migraine; comparing NICE criteria versus hull criteria for evaluating responder rate

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**Background:** Chronic migraine (CM) affects 2% of the population and Botox is the only licensed treatment for prevention of adult patients with CM. In the UK, National Institute for Clinical Excellence (NICE) approved its use on the National Health Service (NHS) provided patients had failed three preventive medications and appropriately addressed for medication overuse. NICE defines responder with 30% reduction in headache days without emphasis on severity of headache or number of migraine days. We developed Hull Criteria that defines responder as one with either: 50% reduction in either Headache days Or migraine days

An increment in crystal clear days twice that of baseline

**Objectives:** To compare the outcomes of patients receiving Botox treatment in CM according to NICE and Hull Criteria.

**Method:** Adult patients with CM attending the Hull migraine clinic were offered Botox based on clinical needs and maintained a headache diary. Data were extracted for headache, migraine, and headache-free days.

**Results:** Out of a cohort of 357 patients having received a total of 858 cycles, we analysed 151 patients who had received two treatment cycles as recommended by NICE.

A significant number of patients who responded with Hull Criteria did not satisfy NICE criteria and were denied treatment.

**Discussion:** We recommend that severity of headache and number of migraine days must be taken in to account in evaluating response rate to Botox.

NICE criteria should include reduction in migraine days in addition to headache days.

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**G3**

**EHM1-0052.** Efficacy of early vs. late use of frovatriptan combined with desketoprofen vs. frovatriptan alone in the acute treatment of migraine attacks with or without aura

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**Aims:** To compare frovatriptan 2.5 mg plus desketoprofen 25 or 37.5 mg (FroDex25 and FroDex37.5) vs. frovatriptan 2.5 mg (Frova) in the acute treatment of migraine attacks in a post-hoc analysis of a double-blind, randomized, parallel-group study. Patients who took the drug within 30 min from the onset of pain (early use, EU) or after (late use, LU) were analyzed.

**Methods:** 314 migraineurs with or without aura treated at least one attack with Frova, FroDex25 or FroDex37.5. Traditional migraine endpoints were compared across study drugs in the 279 patients of the full analysis set according to EU (n=172) or LU (n=107).

**Results:** Pain free (PF) at 2 hours in EU was 33% with Frova, 50% with FroDex25 and 51% with FroDex37.5 (p=NS), while in LU was 22%, 51% and 50% (p<0.05 combinations vs. monotherapy), respectively. PF at 4-hours was 54% for EU and 34% for LU of Frova, 71% and 57% with FroDex25 and 74% and 68% with FroDex37.5 (p<0.05 for EU and p<0.01 for LU vs. Frova). Sustained pain free at 24-hours was 26% under Frova, 43% under FroDex25 and 40% under FroDex37.5 (p<0.05) in EU, while it was 19% under Frova, 43% under FroDex25 and 45% under FroDex37.5 (p<0.05) in LU. Risk of relapse at 48-hours was similar (p=NS) among study groups (Frova: 22%, FroDex25: 21%, and FroDex37.5: 37%) for both EU and LU (14%, 42% and 32%).

**Conclusions:** FroDex was found to be more effective than Frova taken either early or late.

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**G4**

**EHM1-0317.** Transcranial direct current stimulation in chronic migraine: a pilot trial combining cathodal visual and anodal dlPFC stimulation

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**Background:** Contrary to episodic migraine, chronic migraine (CM) is associated with sensitisation of visual cortex and depression that is characterized by left DLPFC hypoactivity. Transcranial direct current stimulation (tDCS) is able to activate (anode) or inhibit (cathode) the underlying cortex, thus of potential therapeutic interest in CM.

**Aim:** To explore the effect in CM of simultaneous tDCS over the visual cortex and DLPFC with a novel tDCS Cefaly® device.

**Method:** We recruited 20 patients suffering from chronic migraine (n=15) or medication overuse headache (n=5) (ICHD-III beta 1.3 or 8.2). All had stable preventive treatment for at least 2 months. We applied anodal tDCS over F3 and cathodal over Oz; intensity 2 mA, duration 20min, daily for 8 weeks. Patients filled in headache diaries before (T0), during (T1)
and after treatment (T2). We recorded CHEPS, QST, n8R and VEP at baseline (T0) immediately after (T1) and after 8 weeks (T2).

Results: Total headache days decreased from 21.9/month at T0 to 15.7/month at T2 (-28.4%, p = 0.004). Severe migraine attacks were reduced by 43.7% (p = 0.05), headache hours by 30.2% (p = 0.02). The 50th percentile rate for migraine days was 33.3%. There was no significant therapeutic effect in MOH patients.

tDCS had no effect on VEP and QST. It increased n8R habituation at T1 (p = 0.05) but decreased habituation of frontal CHEPS at T2 (p = 0.04) in CM.

Conclusion: These results suggest that tDSC inhibiting the visual cortex while activating lDLPFC has an interesting therapeutic potential in chronic migraineurs. A sham-controlled trial seems worthwhile.

No conflict of interest.

G5

EHMTI-0224. Occipital nerve stimulation for drug-resistant chronic migraine: increasing experience
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Introduction: Although some prophylactic medications have been proposed to treat chronic migraine (CM) there are still many refractory patients and other treatments are warranted. Peripheral nerve stimulation (PNS) of the occipital nerves is a potentially promising therapy for CM patients.

Aim: The aim of this study is to evaluate the efficacy and tolerability of PNS of the occipital nerves for the treatment of refractory CM.

Methods: Twenty one patients (8 men, 13 women, average age 52.8±12.2) meeting the IHS criteria for refractory CM were enrolled in this study and implanted with a neurostimulation device near the occipital nerves. The primary endpoint was the reduction in Analogical Visual Scale (AVS). Patient satisfaction, migraine frequency, side effects and reasons for discontinuation were also studied. Significance level was set at P<0.05.

Results: Headache severity according to the AVS was reduced from 8.9±2.7 before PNS to 3.3±2.8 after treatment initiation. There was also a significant difference in reduction of number of headache days and 80% of the patients were satisfied or very satisfied with the procedure. The most common adverse event was persistent implant site pain and only one patient required to be explanted due to inefficacy.

Conclusions: PNS has been explored as a possible treatment option in selective drug-resistant primary headache disorders and, according to our results, this technique may be effective, safe and well tolerated in treating refractory CM. An increasing experience and a more routine use of these techniques can be forecasted in the near future.

No conflict of interest.

G6

EHMTI-0068. Facial plastic surgery for migraine therapy: personal procedures
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Background: During the last few years multiple studies have demonstrated the efficacy of surgical treatment in patients who suffer from migraine headache: by removing the hyperactive surrounding muscles, the trigger point is being eliminated.

Aim: The aim of this study was to demonstrate the efficacy of surgical decomposition by means of both endoscopic and open surgery, through an innovative and improved technique compared with beforehand evaluated surgical techniques.

Method: Fifty-one patients who complained of chronic migraine headaches underwent a frontal bilateral selective miotomy procedure of Procerus, Depressor Superficii et Corrugator Superficii Muscles by means of video-assisted endoscopic surgery, and/or an occipital selective miotomy procedure of Occipital, Trapezius, Sternocleidomastoid and Semispinalis Capitis Muscles by means of open surgery.

Results: Of the 51 patients included in the study (range, 18 to 73 years), 38 were women and 13 were men. Forty-four of 51 patients (86.3%) reported a positive response to the surgery: 21 of 51 patients (41.2%) observed complete elimination, 23 patients (45.1%) experienced significant improvement (at least 50% reduction in intensity or frequency), and 7 patients (13.7%) did not notice a change in their migraine headaches.

Conclusion: This study confirms previous data in literature, strengthening the role of a peripheral mechanism (trigger points) in migraine headaches. Moreover, the minimally invasive procedure we described, is easy, fast and cost-effective, relying on the use of a single instrument, also reducing the numbers of postoperative scars from five to one.

No conflict of interest.

G7

EHMTI-0328. Comparative evaluation of pregabalin, gabapentin, carbamazepine and topiramat in migraine
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Objective: To compare the efficacy and safety of pregabalin, gabapentin, carbamazepine and topiramate in migraine.

Research design and methods: In this observational study, 24 patients received pregabalin, gabapentin, carbamazepine and topiramate orally twice daily, each for 6 months with optional dose up titration (divided in four groups, each group has 6 patients). Pain diagnosis of migraine was made according to the second edition of the International Classification of Headache Disorders (ICHD-2) criteria and pain relief was measured by the Migraine Disability Assessment Questionnaire (MIDAS). Treatment goals include restoring function and improving pain control.

Results: There was a significant improvement in pain with all treatments compared with their baseline values. There were no significant differences in various other outcome measures between the groups.

Conclusions: Both carbamazepine and topiramate demonstrated similar efficacy in migraine but pregabalin, gabapentin were less effective on pain. No conflict of interest.

G8

EHMTI-0302. Persistence and switching characteristics among chronic migraine population: a retrospective claims analysis
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Objective: Migraine prevention guidelines recommend oral migraine preventive medications (OMPMs) for patients with frequent headache, such as chronic migraine (CM). We sought to understand OMPM treatment patterns by evaluating persistence, medication switching, and medication re-initiation among CM patients.

Methods: A retrospective claims analysis was undertaken using the MarketScan® Databases. The analysis included patients ≥18 years old, with a CM diagnosis, who initiated an OMPM between January 1, 2008 and September 30, 2012. Patient persistence was measured at 6 and 12 months. Time to discontinuation was assessed for each OMPM and compared using Cox regression models. Among those who discontinued, we also assessed the proportion of patients who switched to another OMPM within 60 days or re-initiated treatment with OMPMs between 61 to 365 days.

Results: A total of 8,707 patients met the inclusion/exclusion criteria. Persistence with the initial OMPM was 25% at 6 months and 14% at 12 months. Likelihood of discontinuation was highest for amitriptyline, nortriptyline, and gabapentin had significantly higher likelihood of discontinuation when compared to topiramate. Of patients who discontinued, approximately 23% switched to another prophylactic and another 41% reinitiated therapy within one year. Among patients who...
switched, 12-month persistence was 13% to the second prophylactic and 10% for the third. Among reinitiated patients this rate was 8% and 4%, respectively.

**Conclusion:** Persistence to OMPMs is poor among the US CM population at 6 months and declines further by 12 months. After initial discontinuation, switching or re-initiating is common; however, persistence declines as patients cycle through various OMPMs.

**G9**

**EHM1-T036. Metabolic diet therapy in the prophylactic treatment of migraine headache in adolescents by using ketogenic diet**

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**Introduction:** The high-fat, low-carbohydrate KD is a well-known add-on treatment option for children with medically intractable epilepsy. Anticonvulsants as topiramate can be helpful for migraine prophylaxis in children, however, there are severe cautions by using chronic drug treatment by the parents. Several mechanisms may exist for the effect of KD in CNS diseases: including disruption of glutamatergic synaptic transmission, inhibition of glycosylation, activation of ATP-sensitive potassium channels and alteration of the mTOR pathway by modifying the brain excitability.

**Aims:** The objective of our study was to evaluate the efficacy and tolerability of Ketogenic Diet (KD) in the prophylactic treatment of migraine in adolescents.

**Patient and methods:** We have selected adolescents patients between the age of 12-17 years over a 3 month period beginning January 2013. The subjects had a minimum of two attacks per month before applying the ketogenic diet, for at least 1 year. Migraine was diagnosed by IHS-R criteria. A total of 16 children were recruited including 10 females and 6 males. Migraine attack frequency prior to diet and 1, 2 and 3 months after the initiation of KD were compared and the clinical effect of the diet was evaluated. The efficacy was evaluated as completely headache free, markedly effective (attack reduction >75%), effective (reduction >50%) or invalid (reduction <50%). The ratio of fat to carbohydrate plus protein was 3:1. Urine ketones were checked randomly at least twice a week. The KD was started in outpatient care without using a fasting period. The diet was planned for a minimum period of 3 months with the assistance of dieticians.

**Results:** Of the total 16 patients 7 discontinued the restrictive diet because of poor compliance (5) and gastrointestinal side effects (2), 9 patients (100%) continued the study for more than 1 month. From those 3 patients were interpreted as invalid responder and discontinued the diet because of lack of efficacy prior to the 2 months visit. 6 subjects (77%) completed the 3 months study period. At the end of the study no subject became completely attack free. The diet was markedly effective for 3 patients (33%) and effective for 3 patients (33%). During the 3 months period an obvious upper trend in the efficacy was observed.

**Conclusions:** The compliance of adolescents migraineurs with a restrictive type of KD is problematic, however at the beginning all of the subjects were absolutely open for a non-pharmacological “natural” treatment. Furtheron, most of the patients were additionally motivated to use the KD by its potential weight loss effect, however, all of subjects had clinically normal weight at baseline. An obvious improvement in the headache frequency was observed in about 77% of the patients who were able to continue the restrictive diet for at least a 3 months period. The increase of the efficacy correlated with the duration of therapy.

No conflict of interest.

**G10**

**EHM1-T0178. CGRP monoclonal antibody LY2951742 for the prevention of migraine: a phase 2, randomized, double-blind, placebo-controlled study**

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**Introduction:** Migraine remains poorly treated with few effective preventive medications available.

**Aim:** We evaluated the efficacy and safety of LY2951742, a fully humanized monoclonal antibody to Calcitonin Gene-Related Peptide (CGRP) for migraine prevention.

**Methods:** Eligible subjects with 4-14 migraine headache days (MHD) per month were randomized in a double-blind manner to LY2951742 or placebo, administered subcutaneously, every other week over a 12-week period. The primary endpoint was the mean change from baseline in number of MHD in the last 28 day period (month three); secondary end points included the mean change in headache days, migraine attacks, and the 50% responder rate at month 3.

**Results:** Mean change in MHD (primary) was -4.2 vs. -3.0 for LY2951742 (n=107) and placebo (n=110), respectively (p = 0.003). LY2951742 was superior to placebo for all secondary endpoints including headache days (n=107) vs. -3.7 (p = 0.0117), migraine attacks -3.1 vs. -2.3 (p = 0.0051), and 50% responder rate, 70% vs. 45% (OR 2.88 [CI 1.78;4.69]). An exploratory endpoint of complete response (100% reduction in MHD in month 3) was 31.6% vs. 17.3% (OR 2.16 [CI 1.24;3.75]) for LY2951742 and placebo, respectively. Adverse events reported by approximately ≥5% of LY2951742-treated patients and more frequently with LY2951742 than placebo included upper respiratory tract infections, injection site pain, neck pain, abdominal pain, dizziness, injection site erythema, rash, hypertension and pain in extremity.

**Conclusions:** Treatment with LY2951742 demonstrated significant separation from placebo on the primary and secondary endpoints. LY2951742 appeared to be safe and well-tolerated.

**G11**

**EHM1-T0337. Botulinum A toxin for treatment of chronic migraine**

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**Introduction:** Chronic migraine is a common and debilitating headache syndrome.

Botulinum neurotoxin A (BoNT A), produced by the anaerobic bacterium Clostridium botulinum has been recently employed for patients suffering from chronic migraine.

**Aims:** BoNT A has been used in our clinical experience for treating patients referring to our headache centre and suffering from chronic migraine with medication overuse.

**Method:** Forty four patients, suffering from chronic migraine with medication overuse, mean age 51.1±7.9, have been submitted to a withdrawal from medications in a day hospital setting, successively they have been treated by BoNT A injection in multiple sites according to the protocol of the PREEMPT study at the dosage of 155 U for 31 sites. Every session of local injection was repeated every three months for a period of one year.

**Results:** Twenty three patients achieved the 6 months follow up. The results, recorded by the diary, evidenced a significant decrease in days of headache/month (pre 20.4±6.9 post 13.7±9.1 p<0.005) and in medication intake/month (pre 22.2±6.9 post 13.8±9.2 p<0.0005).

**Conclusion:** Although these results are preliminary they led to intense efforts to evaluate analgesic properties of BoNT A and to assess their clinical applicability.

The pharmacological profile of BoNT A makes it a good candidate for migraine prevention as proposed in the PREEMPT study. Its long duration of action (3 months) makes it particularly attractive for patients who are not compliant with the daily use of preventive medications, or if they cannot tolerate them or when they are refractory to preventive medication.

No conflict of interest.
G12
EHMTI-0036. Gammacore device for treatment of migraine attack: preliminary report
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Introduction: Despite the several options for treatment of migraine attack, sometimes pain episodes remain unresolved and often patients ask for non pharmacological methods for aborting attack which can be a valid alternative to the use of medications.

Aim: The application of a simple and non invasive VNS device (gammacore) for treatment of migraine attack.

Method: Thirty patients, aged 18-65, suffering from migraine without aura according to HIS criteria, (5-9 attacks per month), were included in this open-label, single arm, multiple attack study.

Patients, after a specific educational training, treated from 3 to 6 migraine episodes by the portable VNS device. Treatment consisted of one, 90 seconds doses delivered to the right cervical branch of the vagus nerve.

Results: Ninety six migraine attacks were treated globally by a single shot application.

Ninety six attack were treated : 43 attacks were resolved completely within 30 minutes (44.8%); for 42 (43.7%) attacks the application did not show any benefit in the first 2 hours so patients recurred to rescue medication; in 11 (11.4%) attacks the result was uncertain: no resolution of attack, only a moderate relief of pain.

No adverse events were recorded.

Conclusions: The results suggest that VNS may be an effective and well tolerated treatment for migraine attack in a good percentage of cases, with one shot modality. Randomized controlled studies are needed also to fix up the adequate dosage to apply the device for the resolution of pain.

No conflict of interest.

G13
EHMTI-0119. Increased prevalence of migraine in patients with unruptured saccular intracranial aneurysms (SIA)
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Introduction: Rupture of SIA causes thunderclap headache but it remains unclear whether headache in general and migraine in particular is more prevalent in patients with unruptured SIA.

Aims: In this case-control study we therefore estimate the prevalence of headaches in patients with SIA during 1 year before rupture.

Methods: Prospectively 155 consecutive patients with SIA (96 women and 59 man, mean age 45.4 years) and 184 healthy blood donors (98 men, 86 women mean age 39.6 years) received an purpose developed semistructured interview. Diagnosis were made according to the International Headache Society criteria. Aneurysms were diagnosed by conventional cerebral angiography.

Results: Headaches in patients with SIA before their diagnostics or rupture were revealed in 103 patients, therefore their 1-year prevalence was 61.6%. The mean duration of these headaches was 12.5 years, the mean age at the beginning of headaches was 30.2 years. These headache included: migraine without aura (MO)-58 (40.2%), migraine with aura (MA)-21 (15%), tension type headache (TTH)-19 (14.8%), cluster headache (CH)-2 (1.5%), post-traumatic headaches (PH)-2 (1.5%).

1-year prevalence of headaches in controls was 32.5% (58 patients out of 184), they included: TTH-41 (23.2%), MO-16 (8.8%), PH-1 (0.5%). Among these headaches in patients with SIA and controls only the prevalence of migraine was significantly (4 times) higher in patients with SIA (OR 4.5, 95% CI 2.5-7.8, p<0.0001).

Conclusions: This is the first study that convincingly shows a significant association between unruptured SIA and migraine.

No conflict of interest.

G14
EHMTI-0118. Risk factors of migraine - a co-twin control study
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Introduction: Migraine is a very frequent disease in Armenia.

Aims: To evaluate the effect of a variety of diseases and environmental risk factors on the risk of migraine.

Methods: In 2012, more than 1'000 twin individuals participated in a questionnaire survey. Only complete same-sexed twin pairs discordant for migraine were included in this co-twin control study, which comprised 554 female and 325 male pairs. This design allowed us to control for most shared genetic and environmental predisposition.

Results: Low back pain, neck pain and whiplash were significantly associated with migraine with an increased risk of 50-110%. Arterial hypertension, kidney stone, osteoarthritis and tinnitus were also significantly associated with migraine. Coronary thrombosis and other thrombosis as separate entities were not associated with migraine, however, when pooled together there was significantly increased risk (OR 1.86[1.14-3.08], p=0.01). Weekly alcohol consumption was the only environmental factor significantly associated with migraine. The risk was decreased with almost 20%. The effect of obesity on the risk of migraine was 1.5, however, this was not statistically significant(=0.07).

Conclusions: This is the first large co-twin study of co-morbidities and environmental risk factors in migraine. A number of co-morbidities were confirmed but no environmental risk factors besides alcohol consumption were significant. Alcohol is a potent inducer of migraine attack therefore the association between alcohol and migraine is likely due to an avoidance reaction towards alcohol. Conventional socio-economic and lifestyle factors therefore do not seem to be important. Further studies should focus on other factors, e.g. emotional factors such as stressful events.

No conflict of interest.

G15
EHMTI-0029. Medicated headache mask
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Introduction: A topical treatment for migraine and/or tension headaches.

Aims: This study was performed to determine the efficacy of an anticephalig photoprotective mask in conjunction with a topical medication containing bromyonia and rhus toxicodendron in the treatment of migraine and/or tension headache.

Methods: Thirty-three patients were given masks and tubes of topical medication containing the bromyonia and rhus toxicodendron. They were instructed to apply the medication to their frontal and/or temporal areas in the event they should suffer a headache and apply a photoprotective mask. Furthermore, they were instructed to take their usual oral or parenteral medications if required for the relief of the headache. They subsequently filled out forms rating the degree of relief which they attributed to the topical medication and the mask using a 0-10 scale. At the interview following the completion of their participation in the study, the patients were also simply asked if this form of treatment helped or not.

Results: Thirty out of 33 patients stated the medication and the mask were effective over and above the normal degree of relief they were receiving from their oral and/or parenteral medications. This study demonstrated a significant efficacy rate (91%) in the treatment of migraine and/or tension headache with the anticephalig mask in conjunction with a topical cream containing bromyonia and rhus toxicodendron.

Conclusions: This study demonstrated a significant efficacy rate in the treatment of migraine and/or tension headache with the anticephalig mask in conjunction with a topical cream containing bromyonia and rhus toxicodendron.

No conflict of interest.
**G16**

EHMTI-0096. Efficacy of sumatriptan: assessment of a possible biomarker

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**Introduction:** Sumatriptan is a frequently applied anti-migraine treatment, yet 20-30% migraineurs are non-responders. TRPV1 channels on trigeminal nerve endings release CGRP during migraine attacks, while, supposedly, stimulation of the presynaptic 5-HT(1B/1D) receptor by sumatriptan inhibits this release. Capsaicin (CAP) stimulates TRPV1 channels, causing CGRP-dependent vasodilatation, whereas electrical stimulation (ES) induces vasodilatation without direct TRPV1 activation.

**Aim:** To assess a possible biomarker for the efficacy of sumatriptan.

**Methods:** We investigated the effect of sumatriptan on the rise of dermal blood flow (DBF) of the forehead skin (innervated by the trigeminal nerve) by CAP application (0.6 mg/ml) and ES (0.2-1.0 mA) before and after subcutaneous placebo and sumatriptan in a randomized, double-blind, placebo controlled cross-over study, including healthy male (n=11, age±SD: 29±8 yrs) and female (n=11, 32±7 yrs) subjects.

**Results:** DBF responses to CAP (means±SEM: 313±16 A.U.) were significantly attenuated after sumatriptan (mean decrease DBF: 82±18 A. U., p < 0.001) but not after placebo (mean decrease DBF: 21±12 A.U., p = 0.0126), whereas DBF responses to ES were not affected by sumatriptan or placebo. Sumatriptan, but not placebo, increased blood pressure by 6±2/11±2 mmHg, p < 0.001. In 23% of the subjects, sumatriptan did not attenuate the DBF response.

**Conclusions:** Sumatriptan may inhibit the release of CGRP via the stimulation of the presynaptic 5-HT(1B/1D) receptor and/or by a non-specific effect on TRPV1 channels. ES appears to be a non-specific stimulus, most likely releasing other neuropeptides besides CGRP. Future studies should indicate whether nonresponse in our model correlates with clinical nonresponse to sumatriptan.

No conflict of interest.

**G17**

EHMTI-0245. Some clinical characteristics and prophylactic treatment in patients with moh in an out-patient clinical sample

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**Introduction:** Medication Overuse Headache (MOH) is a well-known condition and diagnostic entity, recognized as a relevant medical and socio-economic problem everywhere. Whether initial primary headache type, its frequency, co-morbid conditions or else, it is not truly clear. The therapeutic management of MOH is often difficult and still not properly step-by-step guided.

**Aims:** We wanted to point out and compare some clinical features of patients with MOH, migraine and tension type headache as well as their response to prophylactic treatment.

**Methods:** We considered a group of 100 out-patients, adults and both sexes, according to headache diagnosis (ICHD-III) - migraine (M), tension type headache (TTH), co-existence of M and TTH (M+TTH) and MOH, previous headache in MOH group and attack frequency. Therapeutic response to applied various prophylactic single or combined medications (from the Guideline of EFNS) was estimated as an initial response and/or in a followed-up period of 6 months.

**Results:** There were 74 females and 26 males, 38 with M, 23 TTH, 20 M+TTH and 19 with MOH (19%) - 7 previously had M, 5 TTH and 7 M+TTH. 40 patients had less and 60 more than 15 headache days per month. Of 94 patients treated by prophylactic medication 74 (78.7%) responded and 20 (21.3%) did not - 3 had M, 8 TTH, 3 M+TTH and 6 MOH.

**Conclusions:** Focused MOH group and specially those poor responders to prophylactic treatment did not show any significant differences compared to other, mostly chronic, primary headache. Although difficult to manage, MOH is a treatable condition.

No conflict of interest.

**G18**

EHMTI-0133. Does medication overuse matter? Response to botulinum toxin type A in chronic migraine in patients with or without medication overuse

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**Introduction:** Chronic migraine (CM) affects 2% of the general population with substantial impact on quality of life. Chronic headache with medication overuse prevalence is about 65% in specialised-headache-centres based studies. Medication overuse (MO), by the International Headache Study definition, is different to Medication overuse headache (MOH). There is no consensus as to whether pharmacological prophylaxis should be initiated once MO has been treated or both could be done simultaneously. Topiramate efficacy was found to be not affected by medication overuse, moreover the PREEMPT data also indicated a similar response between the two groups.

**Aim:** To compare the efficacy of Botox in adults with MO versus CM patients without MO in real-life setting.

**Method:** Adult patients with CM were offered Botox if they were not satisfactorily managed by oral preventive therapy. Botox was delivered as per the PREEMPT protocol. Headache diaries were maintained for 30 days prior to and continuously after receiving Botox (July 2010 and January 2014). Data were extracted for headache, migraine, and headache-free days. A responder was defined as one with either a 50% reduction in either headache days or migraine days or an increment in crystal clear days twice that of the baseline we compared the above mentioned variables response between CM with MO and CM without MO patients.

**Outcome:** No significant differences were found between CM with MO (133 patients) and CM without MO (140 patients) in all of the above mentioned headache variants apart from medication over use days.

**G19**

EHMTI-0102. Prospective analysis of the use of onabotulinumtoxin (botox®) in the treatment of chronic migraine: real-life data in 299 patients from hull, uk

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**Background:** Chronic migraine (CM) affects 2% of the general population with substantial impact on quality of life. The efficacy and safety of Botox in CM was confirmed in the phase III Research Evaluating Migraine Prophylaxis Therapy (PREEMPT) clinical programme. Despite this, few data exist in the real-life setting.

**Aim:** To evaluate the efficacy of Botox in adults with CM in real-life setting.

**Method:** Adult patients with CM attending the Hull migraine clinic were offered Botox based on clinical needs using the PREEMPT protocol. Headache diaries were maintained for at least 30 days prior to and continuously after Botox (July 2010 and January 2014). Data were extracted for headache, migraine, and headache-free days. A responder was defined as one with either a 50% reduction in either headache days or migraine days an increment in crystal clear days twice that of the baseline.

**Results:** Of a series of 331 patients, full data were available on 299 patients. There was significant decrement in headache and migraine days as well as similarly significant increment in headache-free days. Responder rate was calculated for the above mentioned 3 categories.

**Discussion:** Our analysis has shown that, in a real-life clinical setting, Botox can effectively reduce headache and migraine days, and increase crystal clear days from baseline. Our cohort represent a more severely affected population than seen in PREEMPT study; furthermore the treatment headache days’ number was higher in our patients. We are hoping to present the data on 500 patients as we continue to treat patients.
G20  
EHMTI-0297. Influences of psychiatric and behavioral factors on treatment effects in the school-age children with migraine  
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Purpose: School-aged children with severe migraine might need medication, and often accompanied by a psychiatric or behavioral problems. Thus, study for the effect of its problems on treatment of severe pediatric migraine is very important.  
Materials and methods: Among the 197 school-aged children who were diagnosed as migraine by ICHD-3b, seventy-two patients who need prophylactic therapy were enrolled from January 2012 to December 2013. Secondary headaches and headaches with ADHD or psychiatric treatments were excluded. Before treatment, all patients were checked by Childhood behavioral checklist (CBCL), Children’s Anxiety Scale (CAS) and Children’s Depression Inventory (CDI) for screening of behavioral and psychological problems, and administered with topiramate (25-50 mg hs) as a prophylactic medication. They were followed-up at intervals of 2-4 weeks and grouped as good responder (GR) and poor responder (PR).  
Results: A total of 72 patients was M:F; 28:44, mean-age; 11.2±2.7 years. GR and PR group were statistically different in total behavior problems, internalizing problems, depression/anxiety, social immaturity, attention problems of CBCL (p<0.01), but not different in factors of depression or anxiety in CAS and CDI.  
Conclusion: Because behavioral factors affect the treatment children with migraine, it is important to selection of drugs or management of behavioral problems.  
No conflict of interest.

G21  
EHMTI-0188. Contraceptive-induced amenorrhea leads to reduced migraine frequency in women with menstrual migraine  
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Introduction: Menstrual migraine without aura (MM) is defined as attacks of migraine without aura (MO) occurring on day 1±2 of the menstrual cycle in at least 2/3 menstruations. Population-based studies shows that MM affects approximately 20% of female migraineurs in their 30s. Many women in this age group need contraception.  
Aim: The aim of the present study was to investigate the influence of hormonal contraception on attacks of migraine without aura (MO) in women with a history of MM.  
Methods: A total of 237 women from the general population with self-reported migraine in at least half of their menstruations were interviewed about headache and course of headache during use of hormonal contraception by a neurologist. Among these, 141 women had a history of MM according to the International Classification of Headache Disorders II.  
Results: Among 141 women with a history of MM, 49 women were currently using hormonal contraception. Of these, 23 reported amenorrhea and the remaining reported withdrawal bleeds/amenorrhea. Significantly more women with amenorrhea reported no MO-attacks during the preceding month compared to women without amenorrhea (OR 16.1; 95% confidence interval (CI) 1.8-140.4; P = 0.003). A reduction of MO-frequency was more often reported in women with than without amenorrhea (OR 3.5; 95% CI 1.1-11.4; P = 0.04). Pain intensity and attack duration did not differ between the groups.  
Conclusion: Amenorrhea leads to a reduction of MO-frequency in women with MM using hormonal contraceptives. Future prospective studies on MM should focus on contraceptive methods that achieve amenorrhea.  
No conflict of interest.

G22  
EHMTI-0322. Effect of cervical epidural 10khz spinal cord stimulation on patients suffering from chronic, medically-refractory migraine  
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A significant minority of chronic migraine (CM) patients do not respond to conventional medical treatment. Occipital nerve stimulation is a therapeutic option for refractory CM (ICM). However, randomized studies have failed to demonstrate efficacy. Cervical 10kHz spinal cord stimulation (10kHz-SCS) may provide a superior alternative to occipital stimulation. We report the preliminary results of a prospective, open-label, feasibility study to assess safety and tolerability cervical 10kHz-SCS in ICM patients.  
The study had EC approval and the subjects gave informed consent. Included subjects were diagnosed with CM by an experienced headache specialist according to IHS guidelines, were refractory to medical treatments as defined by the Refractory Headache Special Interest Section of the AHS, and had failed Botox treatment. Medication Overuse headache was not excluded.  
Patients underwent a 10kHz SCS-trial followed by a permanent implant if a significant reduction in headache intensity/episodes was reported during the trial. One or two epidural leads were used to cover the C2-C4. At 6 months 7 out of 14 patients reported >30% reduction in headache days. The average headache days reduction from baseline was 6.9±7.3 days (p=0.04), while the reduction in the responder group was 12.9±5.3 days (p=0.001). Three patients developed IPG tenderness and one had a lead migration that required surgical revision. Paresthesia-free cervical 10kHz-SCS may be an effective therapeutic option for chronic migraineurs refractory to conventional medications and Botox treatment.  
No conflict of interest.
G24
EHMTI-0192. Onabotulinumtoxina prophylaxis in chronic migraine utilization and patient characteristics: observational study in the European Union
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Objective: Evaluate onabotulinumtoxina utilization for chronic migraine (CM) headache prophylaxis in clinical practice and describe practice, physician, and patient characteristics.

Methods: This is a prospective, observational, multinational European post-authorization study among adults treated with onabotulinumtoxina for CM headache prophylaxis. Participating physicians recruited patients receiving treatment during routine care (September 2011-February 2014). The study aims to describe usage patterns and safety profile of onabotulinumtoxina. Baseline characteristics and utilization at first injection on study are summarized using descriptive statistics.

Results: As of January 1, 2014, 1141 patients treated by 86 physicians (81% neurologists) at 59 practices across UK, Germany, Sweden, and Spain were evaluated. The CM patient profile was generally comparable between countries. The average age was 46.4 years (range=19-79), 84% were female, 86% had a CM diagnosis recorded, and average number of headache-free days per usual month was 7.8 (SD=6.9). The most common medical conditions were depression (30%) and neck pain (27%). Most patients (86%) were using acute headache medications at baseline and 51% other preventative medications; half had received onabotulinumtoxina for CM before the study. In the first treatment on study, the number of injections (median=31) above muscle areas was similar between countries. The majority of patients (78%, range=57%-95%) received a total dose between 150 and 200 units.

Conclusions: Data from this study indicates that onabotulinumtoxina is used in the appropriate patient population. Although further analysis is required, utilization of onabotulinumtoxina generally appears to be consistent with aspects of the published PREEMPT injection paradigm.

G25
EHMTI-0126. Superiority of algopirin® versus excerdin® in treating migraine. Individual pain values and pain curves comparisons
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Background: A synergic association between acetylsalicylic acid, acetaminophen, caffeine in doses 3-4 times lower than similar combinations and chlorpheniramine was patented and marketed as analgesic drug. A previous study proved the non-inferiority of a unique dose of treatment using Algopirin®, versus Excendrin® similar association. Aim of the research was to prove superiority of two tablets Algopirin® versus one tablet Excendrin® in treating migraine.

Method: Patients treated two independent migraine episodes of at least moderate intensity with Algopirin® in first period and with Excendrin® (Novartis) in second period. All patients recorded the pain severity on a Visual Analog Scale before and 30, 60, 120, 180 and 240 min after drug intake. Comparison of the mean pain intensities was performed using paired t test and Wilcoxon pair signed rank test. Interpretation of pain curves as “survival pain curves” allowed application of statistical methods usual in cancer research. Comparison of areas under curves was performed similar with comparison of plasma levels of drugs in pharmacokinetics.

Results: Effect of Algopirin® was greater than that of Excendrin®. Mean time to 50 % (T50) pain relief was 30 min for Algopirin® and 45 min for Excendrin. Time to pain relief to 20 % (T20) was 85 min for Algopirin® and 180 min for Excendrin®. Difference between effects measured by areas under curves was 11%. All differences were statistically significant (p<0.01).

Conclusions: In spite of the fact that Algopirin® contains lower doses of active components, its effect on pain curves in migraine is superior to Excendrin®. No conflict of interest.

G26
EHMTI-0039. Different efficacy of acute migraine therapies for migraine with aura versus without aura
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Objective: To determine if acute migraine treatment outcome is different in patients with migraine with aura compared those with migraine without aura.

Methods: We extracted treatment outcome for migraine with and without aura from large-scale randomized clinical trials of two different drugs with proven efficacy in migraine treatment; sumatriptan and inhaled dihydroergotamine (DHE).

Results: The pain free rates 2 h post-dose for sumatriptan 100 mg were significantly higher in patients treating attacks without aura (32%), compared to the group who treated attacks with aura (24%), (p < 0.001). For DHE the 2 h pain free rates did not differ between patients treating attacks without aura (29.4%) compared to those who treated attacks with aura (27.2%; p = 0.65), see figure. The NNT to achieve 2 h pain free for sumatriptan was 4.3 for attacks without aura and 6.2 for attacks with aura. For DHE, NNT for 2 h pain free was 5.8 for attacks without aura and 5.0 for attacks with aura.

Conclusion: These data indicate that sumatriptan is less effective as acute therapy for migraine attacks with aura compared to attacks without aura. Inhaled DHE, by contrast, had similar efficacy for migraine attacks with and without aura. Different responses of migraine with vs. without aura to acute therapies may provide insight into underlying mechanisms of the disorder. In addition, these different responses may have implications regarding design of clinical trials, and may influence the choice of acute therapies for different types of migraine attacks. No conflict of interest.

G27
EHMTI-0087. Use of oxycodone/naloxone extended release for menstrual migraine
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Introduction: Menstrual migraine is a big challenge for the migraine expert. Severity and duration of hormonal stimulation determines the gravity and duration of menstrual attack. Various prevention therapy try to alleviate these attacks, usually long half-life triptans and-or anti-inflammatory drugs, combined with caffeine, magnesium, but however is very difficult to find the right drug in particular in women with uterine fibroids or endometriosis.

Aims: To support this limited class of patients, we considered to use the Oxycodeone/Naloxone Extended Release (O/N-ER) for its favourable mechanism of action on neuropathic pain, long half life and well documented gastrointestinal safety. Although the drug has an indication for chronic pain, many reports in literature support its use in acute pain.

Methods: Recruitment is only for patients non-responders to classical preventive therapy. Will be collected informed consent, headache diary and a satisfaction questionnaire on therapy, those data will compared with the one recorded in the previous quarter, pharmacoeconomic analysis will provided.
Patients will use O/N-ER exclusively for menstrual attacks and for three consecutive periods, with the possibility of use a triptan at the start of attack followed by O/N-ER bid for 3-5 days. 

**Results:** Of the 8 patients that have completed the study (12 patients are ongoing in the trial), 70% of the patients showed a mean reduction in intensity of attacks from 8 to 4 on a NRS scale, grade of satisfaction was 8/10, without significant side effects. More data will come from the analysis of the entire group of the enrolled patients. 

No conflict of interest.

**Introduction:** Migraine is a chronic neurological disease that is disabling to most of the patients. Although migraine is very common, only a few studies have been reported from Nepal.

**Aims:** This study was conducted to understand the characteristics of migraine among Nepalese population.

**Methods:** We retrospectively studied migraine patients presented in Neurology outpatient department of Grande International Hospital and Bir Hospital, Kathmandu, Nepal between August 2013 and March 2014.

**Results:** A total of 187 migraine patients were included in the study (Grande International Hospital: 138 patients; Bir Hospital: 49 patients). Mean age of the patients was 35.93±13.22 years (range: 8-73 years) with female patients: 147 (78.6%) and male patients: 40 (21.4%). Migraine without aura (73.3%), Migraine with aura (16.0%) and vertebrobasilar migraine (7.5%) are the common migraine types. Thirty-three patients (17.6%) presented as chronic daily headache and 2 patients (1.1%) presented as status migrainosus. Divalproex was the most commonly used as prophylactic treatment (31.0%, followed by propranolol (17.1%) and amitriptyline (17.1%). No prophylactic treatment needed for 37 patients (19.8%), whereas 5 patients (26.7%) needed 2 drugs combination for better control of migraine attacks. Sumatriptan was most commonly used for abortive treatment (89.3%). Sunlight or hot environment was the most common triggering factor (30 patients; 16%).

**Conclusions:** Prophylactic medications have a good control over migraine attacks. Avoidance of trigger may further help in the proper management of migraine. Government should further focus on public awareness programs regarding diagnosis and management of migraine in rural areas of Nepal. No conflict of interest.

**G29**

**EHMTI-0083. Can patients manage without methysergide?**

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**Background:** Methysergide has been the prophylactic drug of last resort at the Princess Margaret Migraine Clinic for many years. In Boston I reviewed the records of 38 patients, 27 with migraine and 11 cluster headache, including 11 who had been taking it continuously, in some cases for as long as ten years. The distribution of methysergide ceased in May 2013, and supplies dwindled in Britain during the autumn of 2013.
I have reviewed the 2013-4 records of these 11 patients, as well as an additional 4 (3 migraine and 1 cluster headache) who had started methysergide under our supervision during the early months of 2013. Two of the 13 migraine patients had remitted spontaneously, and in a further one the drug seemed to have lost efficacy; the remaining 10 and both the cluster patients were worse.

The European Medicines Agency have acknowledged the value of methysergide1, recommending that all patients are registered so that screening tests for fibrotic complications are undertaken regularly. The British Association for the Study of Headache and Pain will be arranging this; no doubt comparable arrangements will be set up in other countries. The British company Amdipharm holds a distribution licence for methysergide covering most of Europe; they hope to restore it to the market soon.

Conclusions: These findings suggest that there will always be a significant number of patients who would benefit from the drug.

No conflict of interest.

Reference
1. [https://exchange.imperial.ac.uk/owa/redir.aspx?c=WKUqcyycz404K9qV- gg2vz8P_JaGrEESOYW1kAD7H7ah2ZadbceglZ8ehh7Ve5z178g &L=html%3a%2f%2fwww.ema.europa.eu%2femena%2finfoIndex.jsp%3fcfu% 3dpages%2f%news_and_events%2f%news%2f2014%2f02%2fnews_detail_002029.jsp%3f%mid%3d3dWcboIac505043d5]1

**G20**

**EHTMT-0270. Experience with onabotulinumtoxin type a in high-frequency episodic migraine**

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To analyse the efficacy of onabotulinumtoxin type A (OnabotA) in High Frequency Episodic Migraine (HFEM) after two treatment cycles. Twenty-three consecutive patients (22 women, 1 man) diagnosed with HFEM and with an inadequate response or intolerance to oral preventatives were included. Data regarding frequency and intensity of headache attacks, analgesic use and migraine disability assessment scale (MIDAS) before and after OnabotA was collected. The current oral preventive therapy was continued in all patients.

Good responders were those who after treatment improved from HFEM to low-frequency episodic migraine, presented with a reduction in 75% of headache intensity, had a reduction of the oral analgesic/triptans use to one or less per week, and improved from a severe to a mild disability measured using the MIDAS scale (improvement in four categories). This was achieved in 16 patients (69.6%). Six other patients (26%) presented with a partial response to OnabotA, this was measured by an improvement from severe to moderate or minimal disability measured using the MIDAS scale and a reduction in the analgesic use (improvement in two categories). One patient did not improve after treatment.

In our clinical practice, treatment of refractory HFEM with OnabotA reduces the frequency and the intensity of the migraine attacks, reduces the consumption of symptomatic treatments and, improves the disability related with migraine. This makes it a good preventive therapeutic option.

**G31**

**EHTMT-0283. Predictors of early response to onabotulinumtoxin type a in chronic migraine**

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To analyse predictors of early response after two treatment cycles with Onabotulinumtoxin type A (OnabotA) in patients with chronic migraine (CM). Thirty-one patients (24 women, 7 men) with IHS criteria for CM and an inadequate response or intolerance to other oral preventatives were included. Data regarding the frequency and intensity of headache attacks, analgesic use and migraine disability assessment scale (MIDAS) before and after OnabotA treatment was collected; as well as, headache location and the presence of allodynia or bruxism. The current oral preventive therapy was continued in all patients.

Good responders were patients who after treatment improved in all of these four categories: headache frequency (CM to low-frequency episodic migraine), headpain intensity (reduction of >75%), analgesic/triptan use (reduction to a use of two days or less per week), and disability (from severe to a mild disability measured using the MIDAS scale). Partial responders were those who only improved in two of the four categories.

Patients were classified into 3 categories: good responders (58.1%), partial responders (29%), and non-responders (12.9%). The age (younger subjects) and the presence of a shorter migraine history are the two indicators of a better response to the treatment (p=0.04; p=0.04 respectively). Unilateral headache, presence of allodynia and/or bruxism appears not to be predictors of response to OnabotA in our study.

Age and the years of migraine history are predictors of early response to OnabotA in our experience. The younger the patient and less years of migraine chronification are good predictors of early response.

**G32**

**EHTMT-0146. Topiramate in migraine prevention**

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Purpose: The present analysis of pooled data from those 3 trials was performed to characterize the efficacy and adverse events of topiramate for migraine prevention in subjects who had used other migraine preventive medications.

Methods: We were analyzed patients with migraine, who had used migraine preventive medications, within approximately 8 months period. Patients were admitted to the Department of Neurology in Nis, after observing their migraine attack, during the period from January-December 2013. All of the patients have been diagnostically examened by intertial EEG, head CT, MRI, MRA angiography. We analyzed monthly migraine frequency from baseline period to endpoint. We compared different dosage of topiramate, so as the presence of adverse events. We started with 25 mg/day od topiramate and this lasted for 7 days and we increased dosage of topiramate 25 mg/week. Maximum dosage was 200 mg/day.

Results: Of sum of 167 patients, 96 (57.48%) female, aged between 21-59 years (mean age 39.2) were recruited. Subjects were treated with topiramate (50, 100 or 200 mg/day). More subjects on topiramate 50 mg/day (41%), 100 mg/day (63%) and 200 mg/day (54%) exhibited ≥ 50% reductions in monthly migraine frequency. Most common adverse event was paresthesis, incidence was 11%, fatigue 3%, seusea 2%. Mean duration of paresthesia was 19 days. Cognitive symptoms was registered only in 2 patients.

Conclusion: In subjects who had previously taken other migraine preventives, treatment with topiramate100 mg/day and 200 mg/day significantly reduced mean monthly migraine frequency. In our study, the lower dose of topiramate exhibited similar efficacy. Adverse events is rarely and most frequent is paresthesia which disappears in 3 weeks. No conflict of interest.

**G33**

**EHTMT-0206. Nigerian plants that are used for treatment of headache and migraine**

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Introduction: Migraine and headache are life-threatening ill-conditions that affect the active, industrious class, which may likely reduce productivity.

Aim: Because plants serve as source of 1 in every 4 drugs on drug market, there is need for survey of literatures with a view to identifying Nigerian medicinal plants with potential activity against migraine and headache.

Method: Literature survey and photography of medicinal plants that are used in Nigeria was carried out with a view to identify medicinal plants with therapeutic potentials against headache and migraine.

Result: Out of 184 medicinal plants identified, 23 have activity against migraine 29 have activity against both headache and migraine and 132 have activity against headache respectively. Orchis mascula, Hollarhena...
floribunda, Malaleuca leucodeurond, Cinnamomum zeylanicum, Citrus aurantifolium, Luffa acutangula Brassaica juncea, Brassica nigra, Ocimum basilicum, Citrus aurantium Petasites hybridus, Rothmania whitfeildi, Palisota hirsuta, Crassocephalum crepidoideis, Pridelia micrantha, Parkia bicolor, Cyclocissus gabonensis, Abelmoschus maschattus, Adenia venenata, Culcasia scandens, Dioscorea dumentorum, Galinsoga parviflora, Kolobopetalum auriculatum, Matricaria recutita, Petveria alliance, Piper nigran, Spilanthes flicaulis, Tragia benthani and Nigella sativa have activity against migraine and headache. Decoctions, infusions, concoctions and vapour of roots, leaves, stembark, flowers, and oil of the plants are used for the relief of the conditions. Since hypertension can cause headache plants such as Nigella sativa, Ocimum basilicum, chlorandrum sativum may be used to treat both migraine and headache caused by hypertension.

Conclusion: Therefore medicinal plant resources from Africa should be harnessed with a view to discovering additional novel drugs with activity against headache and migraine.
No conflict of interest.

G24

EHMTI-0026. Neuroprolotherapy and acupuncture for clinical trial of acute and chronic migraine treatment
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Summary: Neuroprolotherapy and acupuncture for clinical trial of acute and chronic migraine.

Objectives: Formulation of protocol for clinical trial of neuroprolotherapy and acupuncture treatment of migraine, partially based upon treatment sites used in OnabotulinumtoxinA treatment of migraine.

Background: Studies thus far have demonstrated that acupuncture is both effective, and cost effective in the treatment and prevention of migraine. Neuroprolotherapy and acupuncture are less costly, and are associated with fewer risks, than OnabotulinumtoxinA. No studies have been published that examine the effects of neuroprolotherapy on migraine.

This protocol will serve as a template for use in a multi-center clinical trial to be conducted at a later date.

Methods: Key muscles in the treatment of migraine, using either OnabotulinumtoxinA or acupuncture, are the frontalis, the corrugator supercilii, procerus, temporalis, occipitalis, trapezius, and splenius capitis. These muscle locations correspond to classical acupuncture point locations as follows: Frontalis: GB14, corrugator supercilii: BL2, procerus: GB24.5, or Yin Tang, temporalis: GB 4, 5, 6, 7, occipitalis GB20, splenius capitus: BL10, trapezius GB21.

Neuroprolotherapy utilizes similar locations, with emphasis on "Chronic Constriction Injuries of the Peptidergic Sensory System". These locations are chosen for their location directly over sensory nerve exits, and often correspond to acupuncture points as well. These locations include the nerve exits and course of the infraorbital (ST1), subarobital(BL2), subtrochlear(BL1), infraorbital(ST2), zygomatico-facial (SI18), zygomatic-temporal (GB1), auriculo-temporal (SI17), mental(Jiachengjiang [M-HN-18]), buccal, lessor occipital (GB12), greater auricular(SI16), greater occipital(GB20,19), auriculotemporal nerve (GB4, 5, 6, 7), posterior cutaneous branches of dorsal rami of C4, 5, 6 (BL10).

Clinical experience indicates that Neuroprolotherapy is able to abort chronic cyclic migraine, theoretically by repair of the peptidergic sensory TRPV1 receptors via the antagonist effect of 5% dextrose. Acupuncture activates the default mode network, and regulates heart rate variability and autonomic tone.

A protocol will be formulated that utilizes these points, as well as the addition of secondary acupuncture points chosen to alleviate myofascial strain patterns disrupting structural tensityure. Acupuncture points helpful in the alleviation of nausea will also be chosen.

Results: To be determined.

Conclusion: The protocol will create a reproducible template of neuroprolotherapy and acupuncture points that can be used to conduct a multicenter clinical trial examining the efficacy of the use of these methods in the treatment of migraine prophylaxis and acute treatment. No conflict of interest.

G35

EHMTI-0070. Effect of occlusal sprint in migraine patients
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Introduction: In recent years, research has progressed about the relevance of the Temporomandibular joint (TMJ) and headache. We also feel malocclusion are involved in the background. However, induction factors of migraine are many. In this study, we carried out splint therapy for migraine patients. We summarize the features of malocclusion and its effectiveness.

Methods: The study population was composed of 14 migraine patients recruited at the Fujiitsu clinic. All subjects were diagnosed with migraine by the second edition of the International Classification of Headache Disorders (mean age=40.1). For all subjects, we took impressions of the upper and lower teeth, face bow transfer and questionnaires about TMJ. On the dental model, we made occlusal sprint for patients and they used them for three months. We evaluated their change of migraine by MIDAS and HIT-6. Based on these data, the entire sample was divided into the following two groups. Group1: improvement of migraine. Group2: no change or worsened migraine. About two groups, we compared their dental models by the 3D digitizer. The statistical processing was used SPSS (Version 16.0 for Windows), Mann-Whitney U test.

Results: There was a significant difference in Posterior occlusal Plane (POP) between group 1 and 2. POP of group 1 was significantly steeper than group 2 (p=0.017).

Conclusions: In migraine patients, there was a difference in the characteristics of the occlusion between the groups. It suggests the potential for improvement of migraine due to occlusion therapy. We want to continue further research from the point of view of dentist.

G36

EHMTI-0022. Pharmacokinetic variability of drugs used for prophylactic treatment in migraine
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Introduction: In order to evaluate pharmacokinetic variability of preventive migraine drugs we have in this study reviewed single dose studies.

Methods: PubMed was searched for each drug with the "drugs generic name", "pharmacokinetics", and "single dose". Variability was calculated as coefficient of variation (CV).

Results: A total of 105 single-dose kinetic studies were reviewed but only a few representative results are presented: Extended release propranolol 160 mg (n = 2): CV for Cmax = 45-55%, and CV for AUC: 43-48%. Propranolol 80 mg (n = 1): Ratio for Cmax = 14 and ratio for AUC = 24. Metoprolol 100 mg (n = 2): CV for Cmax = 23-64%, and CV for AUC: 26-75%. Metoprolol 100 mg (n = 1): Ratio for Cmax = 8 and ratio for AUC = 23. Extended release divalproex 500 and 1000 mg (n = 2): CV for Cmax = 12-21%, and CV for AUC: 19-30%. Topiramate 100 mg (n = 1): CV for Cmax = 16% and CV for AUC = 14%. Candesartan 16 mg (n = 2): CV for Cmax = 31-34% and CV for AUC 26-28%.

Conclusion: A coefficient of variation of a pharmacokinetic parameter above 40% is considered to be high. The results for the AUCs of propranolol and metoprolol show high variability; and it is not likely that the migraine patients can be treated with a fixed dose-schedule with these two drugs. Instead dosing should in each case be tailored to the individual migraine patients.
No conflict of interest.
G37
EHMTI-0120. Are the IHS’ recommendations for evaluation and registration of adverse events in drug trials in migraine being followed?
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Introduction: In 2008 the International Headache Society (IHS) published guidelines on evaluation and registration of adverse events in clinical drug trials in migraine (Cephalalgia 2008; 28: 683-688). In this study we evaluated whether these guidelines on adverse events (AEs) subsequently were adhered to by reviewing, randomized, controlled trials (RCTs) on migraine drug treatment published in the three leading headache journals for the last 4 years.


We noted for each RCT the presentations of 5 parameters: number of patients with any AEs, any serious AEs, patients withdrawn because of AEs, intensity of AEs, see results.

Results: At total of 23 RCTs, 17 acute treatment RCTs and 6 preventive RCTs, were reviewed. Patients with any AEs were reported in 16 of 23 RCTs; any serious AEs were reported in 8 of 23 RCTs; patients withdrawn because of AEs in 8 of 23 RCTs; and intensity of AEs was mentioned in 8 of 23 RCTs (in most cases e.g. most AEs were mild and moderate).

Discussion: It is noteworthy that even such an obvious major parameter for tolerability, patients with any AEs, was only reported in 70% (95% CI: 51 – 89%) of the reviewed RCTs. In addition, intensity of AEs is only very briefly reported.

No conflict of interest.

G38
EHMTI-0031. Efficacy and safety of venlafaxine for the treatment of chronic migraine: a randomized, double-blind, controlled trial
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Introduction: Chronic migraine (CM) is a disabling neurological disorder that is defined in different ways. Treatment of CM is difficult and needs multidisciplinary approach. To date, minimal study of chronic migraine treatment has been done and few medications are suggested to improve headache duration and intensity in chronic migraine. Different studies demonstrated that topiramate at a dose of 100 mg/day, can reduce migraine days in CM patients when compared with placebo.

Aims: The purpose of this double-blind, randomized trial was to evaluate and compare the effects of extended-release venlafaxine with topiramate in patients with chronic migraine and medication overuse headache (MOH) to investigate whether venlafaxine could be at least as effective as topiramate.

Methods: Chronic migraine was defined according to the criteria of the Headache Classification Committee of the International Headache Society (IHS). A prospective, 4-week run-in phase was followed by a 12-week treatment phase which consisted of a 4-week titration and 8-week maintenance period.

Results: There was no statistically significant difference in terms of primary or secondary efficacy measures between topiramate-group and venlafaxine-group during the double-blind period.

Conclusions: In this double-blind, randomized study extended-release venlafaxine 150 mg/day found to be effective in chronic migraine. Our study showed a clear effect that was in subgroup of subjects with medication overuse. In addition, in this study, the low number of adverse events showed venlafaxine to be well tolerated. Future controlled trials expended longer with larger sample size, should also support the effectiveness and safety of venlafaxine in patients suffering from chronic migraine.

No conflict of interest.

G39
EHMTI-0229. A case of migraine like headache with postprandial hypoglycemia treated with lifestyle changing
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Introduction: Postprandial hypoglycemia (PH), is describing recurrent episodes of symptomatic hypoglycemia occurring after high carbohydrate meal in people who don’t have diabetes. Hypoglycemia symptoms, blurry vision, fatigue, dizziness, sweating, headaches, numbness/coldness, confusion, coma.

The diagnosis was based upon reproduction of the patient’s hypoglycemia symptoms in association with a blood glucose value of <70 mg/dl after an oral glucose tolerance test (OGTT). Fasting plasma glucose was less than 100 mg/dl.

Case: The patient was healthy 32-year-old woman with repeated episodes of postprandial unilateral, throbbing headaches with nausea, vomiting, worsened by light for one year. She felt hungry before headache. She had to take more ten days NSAID per month.

Neurological examination, CT-MRI of the craniam were unremarkable.

Blood tests, HbA1c was normal. Fasting plasma glucose was 74 mg/dl. In OGTT, 2-hour glucose was detected 64 mg/dl. Based on her clinical features and blood test, the patient was diagnosed with migraine-like headache secondary to PH.

She refused preventive therapy and began to use domperidon, naproksen and frovatriptan. And she changed lifestyle-nutrition; eating small meals, avoiding sugar,eating regularly, eating a variety of foods, choosing high-fiber.

During follow-up first month she had six episode of headache and took 6 times domperidon-naproksen and 3 times frovatriptan. In second month she took 4 times domperidon-naproksen, didn’t take frovatriptan. In third month she took 1 time domperidon-naproksen, didn’t take frovatriptan.

Conclusion: We report this case to point to the physician to ask the patient with headache the relation of meal; also to show changing lifestyle and nutrition habit will resolve the headache instead of medications.

G40
EHMTI-0108. Efficacy of therapy in patients with migraine: comparison in group of < 9 migraines and > 10 migraines per month
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Aims: To investigate the efficacy of acute and prophylactic migraine therapy in groups of patients with < 9 migraines and > 10 migraines per month (p.m.).

Methods: All consecutive patients with migraine that attended one single tertiary outpatient care service during 2011. were analysed. Migraine was diagnosed according to the ICHD II criteria.

Results: A total of 390 patients were analysed: 262 (68.9%) patients with < 9 migraines p.m (222 women, 40 men) (group A), 39 (10.3%) patients with 10-14 migraines p.m. (30 women, 9 men) (group B) and 79 (20.8%) patients with > 15 migraines p.m. (66 women, 13 men) (group C). In group A 72.1% declared that triptans were efficient, 8.1% partly and 12.6 not efficient; in group B 82.8% declared that triptans were efficient and 18.2 partly efficient. In group C 44.4% declared that triptans were very efficient, 22.2% partly and 33.3% not efficient. Adverse events were present in 9%, 9.1% and 11.1% respectively. In group A 102 (38.9%) was on prophylaxis, 47.1% declared efficacy > 50%, 18.6% declared efficacy 25-50% and 21.6% declared efficacy less than 25%. In group B 14 (35.9%) was on prophylaxis, 14.3% declared efficacy > 50%, 7.1% declared efficacy 25-50% and 7.1% declared efficacy less than 25%. In group C 24 (30.4%) was on prophylaxis, 4.2% declared efficacy > 50%, and 79.2% declared efficacy less than 25%. Adverse events were present in 9%, 21.4% and 16.7% respectively.

Conclusions: Migraine patients with frequent attacks respond better to acute and prophylactic therapy. More attention should be given to patients with frequent attacks in order to provide them more efficient therapy. No conflict of interest.
**G41**

**EHMTI-0107. Treatment of migraine in Croatia, year 2013**

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**Aims:** To estimate the burden and current treatment patterns of migraine in Croatia.

**Methods:** This was a public health study conducted from April to June 2013. In Croatia, a questionnaire with 10 questions was sent to 2750 e-mail addresses, randomly chosen from various internet sites.

**Results:** Of 2750 sent e-mails, 246 declared having migraine; 209 (85%) were women (56.5% aged 18-45 years; 28.7% aged 46-65 years; 37 (15%) were men (8.1% aged 18-45 years and 6.5% aged 46-65 years). Up to 2 attacks per month had 59.4%, 2-10 attacks had 38.6% and > 10 attacks had 2% of respondents. In the last 3 months, 74.4% was never absent from work because of headache, 20.7% was absent < 2 days and 4.9% was absent > 3 days. Working with 50% reduced capacity declared 21.5% on < 2 days, 24% on 3-4 days and 21.6% on > 5 days. In acute migraine attacks 71.5% used NSAIDs and simple analgesics, 9.4% triptans, 11.4% combination of drugs (NSAIDs+triptan) and 3.3% ergotamins. Two drugs per attack takes 39.4%, one drug 26.4% and > 3 drugs 30.9%. Only 9.4% respondents was completely satisfied with acute drug treatment, 75% efficacy declared 33.7%, 50% efficacy 32.1% and less than 25% efficacy declared 23.6%. Prophylactic therapy (beta blockers, antidepressants or anticonvulsives) used 7.3%; 11% used magnesium, vitamins or herbal drugs.

**Conclusion:** This study provides the most current available estimates of the impact and treatment patterns of migraine in Croatia. Migraine is under-treated and represents a major public health problem.

No conflict of interest.

**G42**

**EHMTI-0318. The place of corticosteroids in migraine attack management: systematic review and critical appraisal**

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**Introduction:** Headaches recur in up to 87% of migraine patients visiting the emergency department (ED), making ED rectidivism a management challenge.

**Aims:** We aimed herein to determine the role of corticosteroids in the acute management of migraine in the ED and outpatient care.

**Methods:** A PubMed search was employed for Clinical Studies and Systematic Reviews on the PubMed Clinical Queries tool combining the terms ‘migraine’ and ‘corticosteroids’ from 1980 until May 1, 2014.

**Results:** Twenty-two studies (n=2203, 50% ED-based, 64% randomized-controlled) and four systematic reviews were included. International Classification of Headache Disorders criteria were applied in 68%. Twenty-one studies indicated observed outcome differences favoring benefits of corticosteroid administration. Median absolute risk reduction was 30% (range 6 - 48.2%) and 11% (6 - 48.6%) for 24- and 72-hour headache recurrence, respectively. Parenteral dexamethasone was the most commonly (65%) administered steroid, at an average single dose of 12.8 mg (range 4 - 24 mg). All meta-analyses revealed efficacy of adjuvant corticosteroids to various abortive medications – indicating generalizability. Adverse effects were tolerable. Higher disability, status migrainosus, incomplete pain relief, and previous history of headache recurrence predicted outcome favorability.

**Conclusions:** Our literature review suggests that with corticosteroid treatment, recurrent headaches become milder than pretreated headaches and later respond to nonsteroidal therapy. Single-dose intravenous dexamethasone provides reasonable option for managing resistant, severe, or prolonged migraine attacks; recommendations include 6-8 administrations per year with follow up of adverse effects.

No conflict of interest.

**G43**

**EHMTI-0315. AMG 334, the first potent and selective human monoclonal antibody antagonist against the CGRP receptor**

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**Background:** Clinical studies with multiple CGRP receptor antagonists reported that CGRP receptor antagonism is effective in acute migraine reversal. Using XenoMouse® Technology, we successfully generated a group of human monoclonal antibodies (mAb) that specifically target the human CGRP receptor.

**Aim:** To characterize the pharmacological properties of AMG 334, one of the mAbs currently in clinical development for migraine prevention.

**Methods:** We used [125I]-CGRP and [125I]-AMG 334 binding assays to measure AMG 334/CGRP-receptor interactions, cell-based cAMP assays to study functional activity and selectivity of AMG 334, and a laser Doppler model in cymolagus (cyon) macaque to assess the pharmacodynamic effects of blocking capsaicin-induced increases in dermal blood flow with AMG 334.

**Results:** AMG 334 is a potent inhibitor of [125I]-CGRP binding to the human CGRP receptor with a Ki of 0.02 nM. It exhibited full inhibition of CGRP-stimulated cAMP production with an IC50 of 2.3 nM in cell-based functional assays. Potency of AMG 334 at the cyno CGRP receptor is similar to that at the human receptor, but with significant reduced potency at dog, rabbit and rat receptors. AMG 334 also demonstrates > 5000-fold selectivity over other closely related receptors in the family. The receptor kinetics studies using [125I]-AMG 334 reveals a dissociation t1/2 off of 67 min.

In the cyno study, AMG 334 produces a significant and sustained inhibitory effect on capsaicin-induced increase in dermal blood flow.

**Conclusion:** AMG 334 is a potent and selective antibody against the human CGRP receptor with potential for migraine prevention.

**G44**

**EHMTI-0312. Long term efficiency and tolerability of greater occipital nerve infiltrations in primary headache disorders**

S Lim1, T Young2


**Introduction:** Greater Occipital Nerve (GON) infiltrations with local anesthetic and steroid have been utilized in primary headache disorders for decades. Despite this we are not aware of significant long-term data of tolerability and effectiveness beyond 26 months.

**Aims and methods:** From a 2012 department audit 8 patients under the Headache Service with ongoing GON infiltrations for 3 years or more were identified, with additional data for these patients added up to the present time. Of this cohort, 6 had a diagnosis of chronic migraine (3 with medication-overuse headache, 1 had basilar-type migraine and 1 had additional Familial hemiplegic migraine); 1 had New daily persistent headache (migrainous variant) and 1 had Chronic cluster headache.

**Results:** A total of 145 GON infiltrations were delivered to this group over a mean time period of 6 years 2 months (range 4 years to 10 years 11 months). All patients continued to experience some benefit over this period, of whom 4/8 had responses at the last injection comparable to that after the first injection. Mild adverse reactions included pain, numbness or dizziness following injections. One patient experienced worsening of pre-existing basilar migraine attacks (after their first GON infiltration) and one developed Valsalva headaches within a month of their last GON infiltration.

**Conclusions:** Whilst this may be a self-selecting group, we believe this is the longest duration data published on effectiveness and tolerability of GON infiltrations. In some patients at least, retained effectiveness and tolerability of GON infiltration seems possible for more than 6 years. No conflict of interest.
**LATE BREAKING ABSTRACTS**

**H1**

EHMTI-0380. The association of migraine susceptibility loci with severe migraine characteristics in a clinic-based migraine sample

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*The Journal of Headache and Pain 2014, 15(Suppl 1)*

**Introduction and aim:** Migraine with typical aura (MTA) and migraine without aura (MO) are common neurological disorders with complex inheritance. Recent efforts have identified 12 independent loci at which single nucleotide polymorphisms (SNPs) have shown to confer risk of migraine (Anttila V. Nat.Genet 2013). The objective of this study was to investigate whether these SNPs could be replicated in a Danish clinic based migraine sample and to test if the risk-alleles are associated with severe migraine traits.

**Methods:** Semi-structured migraine interviews based on a validated questionnaire, blood samples and genotyping were performed on 1806 unrelated migraineurs from the Danish Headache Center, Glostrup Hospital. The control group consisted of 6415 individuals with no history of migraine. Association analyses were carried out using logistic regression. The primary endpoints were regarded as a proxy for severe migraine traits: early onset of migraine; many lifetime attacks; prolonged migraine attacks and chronification of migraine) and tested against the 12 SNPs and a combined genetic risk score.

**Results:** Five out the 12 previously reported loci were replicated in our sample. The association was significant for those with migraine without aura. Following correction for statistical testing, five SNPs showed nominal association with the severe migraine traits: early onset of migraine, prolonged migraine attacks and many lifetime attacks.

**Conclusion:** Our study confirms previous findings on the association of several SNPs with migraine. The association results with severe features, albeit nominal, suggests that the previously reported migraine risk alleles may be implicated in the development of severe migraine characteristics.

No conflict of interest.

**H2**

EHMTI-0374. Gene-based pleiotropy across migraine with and migraine without aura

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**Introduction:** There has been extensive discussion in the migraine field concerning whether migraine with aura (MA) and migraine without aura (MO) are distinct subtypes or part of the same disease spectrum.

**Aims:** Utilizing a novel gene-based (statistical) approach, we aimed to identify specific genes and pathways associated with both MA and MO.

**Methods:** Gene-based tests were performed utilizing genome-wide association summary statistics results from the recent International Headache Genetics Consortium (IHGC) study comparing 5,118 MA cases to 74,239 controls, and 7,107 MO cases to 69,427 controls. After accounting for non-independence of gene-based test results, we examined the significance of the proportion of genes associated across MA and MO.

**Results:** We found a highly significant overlap in genes associated with MA and MO. For example, of the total 1,297 genes with a nominally significant gene-based p-value (Pgene-based ≤ 0.05) in the MA subgroup, 132 genes also produced Pgene-based ≤ 0.05 in the MO subgroup. The proportion of overlapping genes is almost double the empirically derived null expectation, producing highly significant evidence of gene-based overlap (Binomial-test= 8.36 x 10-10) between both migraine subtypes.

The genes overlapping MA and MO were enriched (p < 0.05 and Fold enrichment > 1.2) for molecular functions of ‘actin binding’, ‘phosphatase activity’, ‘growth factor activity’, ‘protein homodimerization activity’, and ‘protein dimerization activity’ and were overrepresented in networks related to ‘Auditory and Vestibular System Development and Function’, ‘Cellular Development’, and ‘Cellular Growth and Proliferation’.

**Conclusions:** Our results provide important insight into the likely genes and biological mechanisms underlying MA and MO. No conflict of interest.

**H3**

EHMTI-0361. Lack of differences in microrna expression profiles of blood cells in migraine

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**Introduction:** Migraine is a complex and very common neurological disorder. Several genome-wide significant loci have been described as key regulators in neurological diseases and have also been described as key regulators in nociception.

**Aim:** To detect microRNA expression differences involved in the susceptibility and chronification of migraine.

**Methods:** 20 migraineurs (5 episodic without aura, 5 chronic without aura, 5 episodic with aura, 5 chronic with aura) and 5 headache-free controls diagnosed by neurologists were included. In order to minimize differences, all 3 groups were homogenous regarding age (average 40.4 ±1.98), sex (3 women, 2 men), and a family history of migraine (first-degree relatives). Patients diagnosed with chronic migraine suffered from more than 15 days/month and patients diagnosed with episodic migraine had 1-2 days/month. Patients with aura suffered from more than 50% of attacks with aura.

RNA was extracted from peripheral blood mononuclear cells (PBMCs), microRNA expression profiles were determined and all possible comparisons were performed.

**Results:** There were no statistically significant differences in any of the comparisons performed.

**Conclusions:** This is the first microRNA analysis performed in migraine. The negative results indicate the lack of differences in microRNA expression in PBMCs in migraine. However, gene expression regulatory mechanisms such as microRNAs are tissue and cell specific, suggesting that differences in microRNA expression linked to migraine should be explored in brain tissue. No conflict of interest.
I - NON-MIGRAINE HEADACHES: TENSION-TYPE HEADACHE, TACS, OTHER PRIMARY AND SECONDARY HEADACHES

11

EHMTI-0381. Visual images can prove to be an important tool to aid in the diagnosis of cluster headaches
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Background: Cluster headache is one of the most distressing and painful clinical conditions seen in medical practice, and affect 1-2 % of the population. Although its clinical presentation does not vary widely in terms of the symptoms experienced by patients, it still presents a significant diagnostic challenge particularly to the primary and secondary care physicians. This results in patients having to bear with agonizing symptoms before they are given the correct diagnosis and appropriate therapy. The time taken to diagnose cluster headache has reduced from 22 years in the 1970’s to 3.4 years about 8 years ago1 and on average a patient sees 5 doctors before receiving the correct diagnosis, however, the severity of the condition merits early recognition.

Aims and objectives: To evaluate the use of visual images and verbal description of pain as an aid to diagnosis in primary and secondary care but not limited to them.

Method: 12 cluster headache patients were interviewed along with 10 migraine patients used as a control (as it is the most common misdiagnosis). The questions were aimed at identifying patients’ symptoms with a set of visual images which they were shown and their verbal description of pain. The diagnosis of cluster headache and migraine was based on the ICHD-III beta criteria from the International Headache Society.

Results: The description of pain remained consistent for cluster headache patients due to the excruciating nature of the pain whereas it varied in migraineurs depending on the individual pain threshold of patients. Patients with cluster headache chose visual images different to migraineurs. We conclude that visual images are an efficient way to describe symptoms in cluster headache patients and could be used as a vital tool to aid diagnosis.

No conflict of interest.

12

EHMTI-0355. Comparison of carbamazepine and oxcarbazepine tolerability in patients with trigeminal neuralgia
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Introduction: Little work has been done around the adverse events profile (AEP) of drugs used to treat trigeminal neuralgia (TN). TN patients are often unaware of significant side effects associated with pharmacotherapy.

Aims: To examine the AEP of carbamazepine and oxcarbazepine in TN patients.

Methods: 74 TN patients averaging 1.76 outpatient consultations over 2 years and undergoing treatment only with carbamazepine or oxcarbazepine were recruited to complete the AEP questionnaire (Baker et al, 1994) at each outpatient visit in relation to the current drugs being taken for pain control. The AEP contains 19 items assessing the frequency of a range of adverse effects using a scale of 1 to 6, with 4 indicating more frequent occurrences. Scores can range from 1 to 76 and >45 suggests toxicity. Drug dosages were converted to mg/kg. Efficacy of 200mg dose of carbamazepine is considered equivalent to 300mg oxcarbazepine (Beydoun 2002).

Results: Using a multilevel logistic regression model, 50% probability of significant toxicity for a 70kg person is estimated at 1300 mg carbamazepine and 2600mg oxcarbazepine. Women reported higher levels of toxicity. Most common side effects were tiredness, memory problems, sleepiness, difficulty in concentration, unsteadiness. Hyponatraemia occurred more frequently in patients on oxcarbazepine and is dose related.

Conclusions: At equivalent clinical doses oxcarbazepine results in fewer AEPs than carbamazepine and so should be considered as an alternative to carbamazepine in case of intolerance.

No conflict of interest.

13

EHMTI-0395. Hypnotic relaxation vs amitriptyline for tension-type headache: let the patient choose
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Introduction: Although both pharmacological and behavioral interventions may relieve tension-type headache, data are lacking regarding treatment preference, compliance, and feasibility of behavioral intervention in a neurological outpatient clinic setting.

Aims: To describe patient choice, compliance, and outcome in a neurological clinic where patients are given the choice of the approach they wish to pursue.

Methods: Patients presenting to the headache clinic with a diagnosis of tension-type headache, were given the choice of amitriptyline (AMT) treatment or hypnotic relaxation (HR), and were treated accordingly. Patients were given the option to cross-over to the other treatment group. HR was performed during standard length neurology clinic appointments by a neurologist. Follow-up interviews were performed between 6 and 12 months following treatment initiation to evaluate compliance, headache frequency or severity, and quality-of-life.

Results: 98 patients were enrolled. 92 agreed to receive prophylactic therapy. 53 (57.6%) patients chose HR of which 36 (67.9%) initiated this treatment, 39 (42.4%) chose AMT of which 25 (64.1%) initiated therapy. 74% of the patients in the HR group and 58% of patients in the AMT group had a 50% reduction in the frequency of headaches (P<.16). At the end of the study, 26 patients who tried HR compared with 10 who tried AMT continued receiving their initial treatment.

Conclusions: HR was a more popular choice among patients. Patients choosing HR reported greater amelioration than those choosing AMT and were found to have greater treatment compliance. HR practiced by a neurologist is feasible in a standard neurological outpatient clinic.

No conflict of interest.

14

EHMTI-0398. Long term safety of the ATI neurostimulation System for the treatment of cluster headache
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Introduction: At least two-thirds of cluster headache (CH) patients that received the ATI Neurostimulation System have achieved profound clinical improvements including acute headache pain relief and/or significant attack frequency reduction. The ATI Neurostimulator is inserted trans-orally using a minimally invasive technique.

Aim: This analysis aims to characterize the long term safety of the ATI Neurostimulation System in CH sufferers.

Method: Patients from the Pathway CH-1 and Pathway R-1 studies were included in the analysis. All adverse events (AEs) including transient
swelling and pain, were documented and assessed for relationship to procedure and/or the presence of the neurostimulator.

Results: Ninety-eight (98) patients received the ATI Neurostimulator as of May 2014. Fifteen patients (15%) reported no AEs and 83 patients (85%) reported at least one related AE. In total, 341 AEs were reported (average 4.1 AEs/patient). Currently, 216 (63%) of all AEs have resolved; average time to resolution was 69 days (range 0-611). The majority of reported AEs (77.4%) occurred within 30 days of the insertion procedure (peri-op AEs). Of these AEs, 82% of patients experienced sensory disturbances. The large majority (72%) of these events had a mild to moderate impact on the patient’s daily activities and were transient, with an average resolution of 110 days (range 20-313).

Conclusion: The majority of AEs were reported within 30 days of the Neurostimulator insertion procedure and the majority resolved within 3 months. These AEs are not different from standard sequela reported for other trans-oral procedures and display a similar time course for healing.

Conflict of interest.

16 EHMII-0363. Quality of life in subjects treated by non-invasive vagus nerve stimulation using gammacore® for the prevention and acute treatment of chronic cluster headache

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Introduction: The debilitating nature of chronic cluster headache (CH) can negatively impact a patient’s quality of life (QoL). In recent years, non-invasive neuromodulation devices have been of increasing interest for the treatment of CH.

Aim: To evaluate the clinical effects of prophylactically stimulated vagus nerve (nVNS) compared with sham stimulation (SoC) for the prevention and/or the rescue treatment of CH attacks.

Methods: PREVA was a multicenter study comprising of 3 phases: a 2-week run-in phase, a 4-week randomized (1:1; nVNS vs SoC) phase, and a 4-week extension phase. Subjects delivered stimulations prophylactically twice daily (mandatory) or optionally for the rescue treatment of CH attacks. Three validated scales (EQ-5D-3L™, Headache Impact Test™ [HIT-6], and Hospital Anxiety and Depression Scale [HADS]) were used to assess the QoL of subjects at the end of each study phase.

Results: A total of 97 subjects were randomized to treatment; data from 93 subjects (n=45 nVNS; n=48 SoC) were included in the efficacy analysis population. Compared with subjects treated with SoC alone, subjects also treated with nVNS reported greater overall improvements in EQ-5D-3L, HIT-6, and HADS scores from the end of run-in to the end of the randomized phase. As of June 2014, QoL data from the extension phase were not available; however, they will be available for presentation at EHMTIC.

Conclusion: Compared with SoC, use of nVNS for both preventive and acute treatment of CH was associated with greater improvement in QoL as assessed on 3 validated instruments.

Abstract submitted on behalf of the PREVA Study Investigators.

15 EHMII-0373. Adrenal suppression associated with greater occipital nerve and multiple cranial nerve blocks using triamcinolone

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Introduction: Greater Occipital Nerve (GON) and Multiple Cranial Nerve (MCN) blocks using local anesthetics and corticosteroids have been used to treat various headache syndromes including Trigeminal Autonomic Cephalgias (TAC). We report cases where low cortisol levels have been seen in patients with TAC treated with GON/MCN blocks that included triamcinolone.

Aims: We report four cases of adrenal suppression in TAC patients treated with GON/MCN blocks.

Methods: The cases were collected retrospectively from a specialist headache clinic. Pituitary function tests prior to GON/MCN blocks were undertaken as part of their routine work up for TAC. Cortisol levels were repeated in the patients reported here due to varied nonspecific medical complaints.

Results: Our cases include a 25 year old female with TAC who reported weight loss and leg pain following three MCN blocks in three weeks. Cortisol levels were found to be low on two separate occasions. Another case is a 33 year old female treated with MCN blocks for TAC who was found to have low cortisol; the patient’s cortisol also failed to respond adequately to synthetic ACTH. We aim to present another two patients, under ongoing investigation, who have had low cortisol levels associated with GON/MCN blocks for TAC.

Conclusions: Whilst adrenal suppression is a known side effect of steroid use, it has not been widely described in patients treated with GON/MCN blocks. These cases suggest that professionals using local nerve blocks containing steroids should be cautious of the potential for adrenal suppression, particularly when used on a repeated basis.

No conflict of interest.

17 EHMII-0364. Non-invasive vagus nerve stimulation using gammacore® for prevention and acute treatment of chronic cluster headache: report from the randomized phase of the preva study

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Introduction: Cluster headache (CH) is a painful and debilitating disorder for which non-invasive vagus nerve stimulation (nVNS) may be a treatment option.

Aim: Compare the efficacy of gammacore®, a handheld nVNS device, with the standard of care (SoC) in chronic CH subjects in the randomized phase of the Prevention and Acute (PREVA) Treatment of Chronic Cluster Headache study.

Methods: PREVA was a multicenter study comprised of 3 phases: 2-week run-in, 4-week randomized (1:1; nVNS vs SoC), and 4-week extension. Subjects randomized to nVNS delivered stimulations prophylactically twice daily (mandatory) or optionally for the rescue treatment of CH attack. The primary efficacy end point was the reduction in number of CH attacks/week during the last 2 weeks of the randomized phase versus the run-in phase. Additional end points included the proportion of subjects with >50% reduction in CH attacks/week (response rate) and rescue medication use; safety was assessed by monitoring the frequency of adverse events.

Results: Ninety-seven subjects were randomized; data from 93 subjects (n=45 nVNS; n=48 SoC) were included in the intention-to-treat population. Number of CH attacks/week was significantly reduced in subjects treated with nVNS compared with patients treated with SoC only (-7.6 vs -2.0; P<.002). Further, significantly more nVNS- than SoC-treated subjects were considered treatment responders (54.4% vs 7.1%; P=.003). nVNS was associated with less use of rescue medications and demonstrated a favorable safety/tolerability profile.

Conclusion: Prophylactic treatment of chronic CH with nVNS is safe and, compared with SoC, reduces frequency of CH attacks/week. Sham-controlled studies are warranted and underway to confirm these data.

Abstract submitted on behalf of the PREVA Study Investigators.
Results: Median CGRP concentration was 44.4 pmol/L in MOH patients before withdrawal and 43.8 pmol/L in healthy volunteers (p=0.72). After withdrawal, median CGRP-concentration reduction was 2.1% (p=0.76). Median headache-frequency reduction was 42.5%; from 25 days/month to 12 days/month. Female patients tended to have higher CGRP levels than male patients; 50.6 vs 39.6 pmol/L (p=0.38). We were not able to detect any differences in CGRP concentration according to type of drug overused, in relation to underlying headache type, or to reduction in headache frequency.

Conclusions: No change in CGRP was detected despite dramatic reduction in headache frequency after detoxification of MOH patients. Thus, our results do not support the notion that CGRP is involved in MOH. No conflict of interest.

J10
EHMTI-0353. MR tractography in short lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) patients: case reports
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Short-lasting unilateral neuralgiform headache attacks with conjunctival injection and tearing (SUNCT) is trigeminal autonomic cephalalgias which is characterized by repetitive short lasting, severe attacks. Headache attacks are distribution of the ophthalmic and maxillary trigeminal divisions and associated with ipsilateral autonomic phenomena. A growing body of literature has focused on brain magnetic resonance imaging (MRI) evidence of neurovascular compression in these syndromes. There is some evidence supporting microvascular decompression of the trigeminal nerve in selected patients who have medically refractory SUNCT and a demonstrable ipsilateral aberrant vessel on magnetic resonance imaging (MRI). Here, we describe two cases concerning a 52-year-old adult and a 69-year-old with short-lasting, recurrent headache combined with cranial autonomic features. Pain was described as excruciating, and was non-responsive to most traditional analgesic drugs. We report two patients of SUNCT syndrome with MRI cisternography and tractography findings of neurovascular compression. We performed MRI cisternography and tractography for delineates structural changes in the trigeminal nerve. Pain was completely relieved after surgery that microvascular decompression. We suggest that SUNCT patients with brain MRI should always be performed with a dedicated view to exclude neurovascular compression. In this case reports we performed MRI tractography delineates structural changes in the trigeminal nerve for SUNCT. MRI tractography is the first reports for SUNCT patients in the literature.

J - HEADACHE CARE: DIAGNOSTICS AND OTHER CLINICAL ASPECTS OF HEADACHES

J1
EHMTI-0357. Perceptions and experiences of cluster headache among patients, general practitioners and neurologists in the north of england: a qualitative study
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Background: Very few qualitative studies on cluster headache have been conducted. As a result we have little in-depth understanding of the perceptions and experiences of cluster headache patients and the health professionals who treat them. With this research we aim to rectify that gap. Aim: The overall objective of the project is to gain insight into the perceptions, experiences and understandings of cluster headache from the perspective of three key stakeholder groups: the cluster headache patients, GPs and neurologists. We present here the findings of our
literature study and identify the emergent themes which we will use during the interview studies for this project.

Method: A qualitative study using semi-structured interviews with the three participant groups. A systematic qualitative methodology is applied to the transcribed interviews.

Result: This study runs from August 2014 to June 2015 and data collection is currently in process. Therefore all results are tentative. Early findings show that this study sheds new light on the following aspects: early detection and diagnosis; health education and promotion; effective treatment and management of cluster headaches.

Conclusion: This study will identify the particular challenges for each stakeholder group—patients, general practitioners and neurologists—with respect to early detection of cluster headaches and ways in which treatment and management can be facilitated. We envisage this study will raise awareness about the importance of early diagnosis, health education and the need for effective treatment pathways for cluster headaches.

J2

EHMTI-0384. A double blind randomized placebo controlled trial for non-invasive dynamic trans-cutaneous electrical nerves stimulation in management of tension type headaches

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Tension-type headaches (TTH) are the most common type of headaches, and new non-invasive modalities might improve their better management. Dynamic transcutaneous electrical nerves stimulation (dTENS) is one of them. We designed a protocol for a randomized double blind placebo controlled clinical trial to assess the effects of dTENS for patients with chronic TTH. dTENS is added to the standard management with no changes in routine practice. We invite for this study adolescents, adults and elderly patients who consented to participate. Specially designed headache diaries, HALT, HART indices and clinical interview are included as the major outcomes measures. The zones, intensity and duration for dTENS application were recommended and modified by physical therapist (L.G.) and acupuncture specialist (M.N.). They included the zones (on the head and neck) and dosage recommended by the manufacturer. The course of dTENS study consists of 10 procedures performed by clinicians (D.V. and G.R.) who were trained for this. All participants of the study are randomized into two groups using a computer-based software. Placebo-devices were made for this trial by the manufacturer (DENAS Corporation, Ekaterinburg, Russia). The sham-devices look and sound exactly as the active ones, but electrodes are not connected to the electrical stimulator. These compact devices for dTENS are approved for using in medical settings and at home, and this trial might add evidence for physicians when prescribing them to patients.

Reference

J3

EHMTI-0370. The performance of the ID-Migraine questionnaire in a Hungarian sample

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Background: Migraine causes significant disability and severely affects patients’ quality of life. A significant proportion of patients is not diagnosed, and therefore not treated adequately. A short and reliable migraine screening tool could improve disease identification. ID-Migraine is a simple and reliable screening tool, originally developed in the United States, but also used in other countries and languages.

Objective: To assess the performance of the ID-Migraine questionnaire on a Hungarian sample.

Methods: Outpatients at the Headache Service, Department of Neurology, Semmelweis University completed the Hungarian version of ID-Migraine. The gold standard was the clinical diagnosis made by a headache specialist according to the ICHD criteria. We calculated the sensitivity, specificity, positive and negative predictive value and the misclassification rate.

Results: 350 patients (241 females, mean age 39.2 ± 13.3 years) were enrolled. The diagnosis was migraine in 244, tension type headache in 37, cluster headache in 16 and other headaches in 8. The questionnaire’s sensitivity was 0.95 and specificity was 0.56. The positive predictive value was 0.69 and the negative predictive value was 0.78. The misclassification rate was 0.13.

Discussion: The Hungarian version of ID-Migraine was easy to use and well accepted by patients. Its specificity was somewhat lower than that of the original questionnaire; its other measures of performance were similar to those of the original version and its existing Italian, Turkish and Portuguese translations. ID-Migraine seems to be a promising screening tool for migraine in the Hungarian population.

No conflict of interest.

J4


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Objective: Spontaneous intracranial hypotension (SIH) caused by cerebrospinal fluid leakage commonly presents with orthostatic headache. We hypothesize that positional changes, i.e. a decrease of the optic nerve sheath diameter (ONSD) occur from supine to upright position in symptomatic patients with orthostatic headaches. We performed an ultrasound study investigating whether there are positional changes in ONSD in symptomatic patients suffering orthostatic headaches.

Methods: Dynamic ultrasound was performed in 44 consecutive patients with suspected SIH. In 18 patients the leading symptom was orthostatic headaches (Group A:10 men, 8 women; mean age 51.9 years), while 26 patients did not suffer from acute orthostatic headache (Group B: 15 men, 11 women; mean age 61.9 years).

Results: In supine position ONSD were similar in both groups (A: mean 0.538 vs. B: 0.539cm; p=0.957). In the upright position mean ONSD was significantly smaller in patients with orthostatic headaches (mean 0.484 ± SD 0.095cm) as compared to patients without (0.549 ± SD 0.097cm, p=0.036). Patients with orthostatic headaches showed a larger change of ONSD from supine to upright position (mean -0.053 ± SD 0.034cm) compared to patients without orthostatic headaches (0.065 ± SD 0.038cm, p<0.001).

Conclusion: In this series significant changes of ONSD occurred during dynamic measurement from supine to upright patient position only in patients with acute orthostatic headaches. We call this method of comparing supine and subsequent upright ONSD “dynamic assessment of the optic nerve sheath diameter by ultrasound”. Transorbital dynamic ultrasound may become a useful, novel, non-invasive diagnostic tool for patients with orthostatic headaches.

No conflict of interest.

J5

EHMTI-0397. Significance of the economy productivity losses assessment in cause of migraine in whole population of Russia

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Objective: Migraine is very important disease because of middle age (25 -55 years) working people disability. Migraine patients cannot work, have temporal
disability that can be reason of the large social and economy losses. In social aspect migraine leads to disadaptation in patient’s life and decrease its quality. Methods: We used Russian State Standard and Statistical Committee materials for January 2013 and own questionnaires of migraine patients. Results: The production of gross revenue in 2012 was 10 863.4 billion rubles. There are 14 543 migraine patients (17%) in general working group. In calculation of general number of working population in Russia for 2012 (87.9 millions) and coefficient the value of production works 0.75, approximately evaluation of the part of internal gross revenue of each worker in calculation in US dollars is compose 2910 dollars per year. Taking account the numbers of working population in Russia and coefficient of taking part in the valuation of making production 0.75, the general quantity of migraine patients day lost is 6 working days per year increasing 0.7, that will be 395,55 millions patients-days or 1.58 millions in year. General gross revenue lost in US dollars will be 4604.2 millions. Mean cost of 1 day of disability is 90 rubles. Mean disability losses per year is constitute of 31 412 880 rubles. Conclusion: Migraine is high social-economical significance disease and its adequate therapy can decrease social and economical expenses of the population and increase the quality of life in migraine patients. No conflict of interest.

J6
EHMTI-0356. Hypnic headache in a patient with sunct: case report
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Case description: A 49 year-old healthy woman developed two rare primary headaches. At the age of 23 she experienced single painful stabs in the left orbital-temporal region lasting few seconds, every 6-7 months. In the subsequent 3 years the frequency and duration of those attacks increased, so in the following 3 years they occurred daily. In the following years, active periods reached the duration of 3 consecutive months, with remissions of 1 month. Six years ago, the patient was evaluated in our Headache Centre, a SUNCT (short-lasting unilateral headache with conjunctival injection and tearing) was diagnosed, and lamotrigine 100 mg/day was effectively administered. The pain recurred after therapy discontinuation, so she was forced to continue lamotrigine. She was pain-free for further 2 years, then she began suffering from a new occipital bilateral presssing pain, moderate, sometimes with nausea, presenting exclusively during sleep and causing awakening. Attacks occurred usually at 4:00-5:30 a.m., lasted about 60 minutes and gradually became near daily. A diagnosis of hypnic headache was made and the patient was treated with caffeine 30 minutes before sleeping, without headache recurrence.

Conclusions: At the best of our knowledge, this is the first description of SUNCT and hypnic headache occurring in the same patient. The pathogenetic mechanisms of this coexistence are interesting. In this patient the combined specific treatment of both SUNCT and hypnic headache was effective. No conflict of interest.

J7
EHMTI-0382. A distal epidural blood patch relieves low CSF pressure headache
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Introduction: Low CSF pressure headache is a clinical syndrome that identifies patients who were previously headache-free and who develop a persistent headache over 24 h, or just a few days. The diagnostic feature of low CSF pressure headache is that of worsening when upright and significant improvement on lying flat. Conservative treatment options include bed rest, abdominal binder, hydration, caffeine, and corticosteroids. If conservative treatment fails, epidural blood patching is often the next option.

Aim: Since the accumulation of CSF leakage spreads widely, the injection site for the epidural blood patch may be difficult to choose in the management of low CSF pressure headache. We prefer the distal approach for the epidural blood patch which will be demonstrated in the following case.

Case report: A 31-year-old man spontaneously developed orthostatic headaches for 2 weeks. The pachymeningeal enhancement of brain is noted with venous sinus engorgement in the images of brain MRI. Spinal MRI demonstrated CSF signals along bilateral C5-6, C6-7, C7-T1, T1-2, T8-9, T9-10, T10-11, and T11-T12 neural forams with epidural fluid accumulation from C7 to T12 compatible with CSF leakage. Conservative treatment with bed-rest, intravenous fluid infusion of 3000 ml QD, nonsteroidal anti-inflammatory drugs, and caffeine failed. An epidural blood patch of 6mL through T10-11 interspinous space resulted in immediate headache relief.

Conclusion: Some patients have spontaneous low CSF pressure headache, most often due to a cryptic CSF leak. Epidural blood patch at distal part relieves headache by immediately compressing the dural sac and raising intrathecal pressure. No conflict of interest.

J8
EHMTI-0359. Migraine pain location and measures of healthcare use and distress: an observational study
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Introduction: Previous research suggests that pain arising on the left side of the body may be associated with greater emotional distress and use of healthcare services than right-sided pain. Migraine is a highly prevalent condition in which lateralized pain is a core diagnostic feature. Aims: We sought to evaluate whether patients with exclusive or predominant left-sided migraine pain experienced higher levels of distress or healthcare use compared with those with right-sided pain. Methods: We extracted medical record information for a random sample of 477 patients with migraine seen in 2011 at the John R. Graham Headache Center. Information was collected on patient demographic characteristics, comorbid affective spectrum disorder and other selected psychiatric diagnoses, ED visits and healthcare contacts. Using a scoring system, we categorized patients as having exclusive, predominant, somewhat or no right or left lateralized pain.

Results: Of the 228 patients with some degree of lateralized head pain, almost twice as many experienced right vs left lateralized pain (47% vs 29%). With one exception (PTSD), there were no statistically significant differences between the groups in measures of affective spectrum disorder comorbidities or healthcare use.

Conclusions: Taken as a whole, our data do not support the view that left-sided head pain is more distressing than right-sided pain. Although lateralization of head pain is useful in making a diagnosis of migraine, it does not have additional clinical implications. Additionally, its absence does not rule out a diagnosis of migraine, since in our sample roughly half of patients with migraine had bilateral pain. No conflict of interest.

J9
EHMTI-0391. Use of telemedicine in the management of headache: a new tool between general practitioners and neurologists
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Introduction: Headache is the most common neurological disorder seen by general practitioners (GPs) and neurologists. We propose the use of telemedicine system to evaluate patients with headache. This system will provide direct contact among GPs, Neurologists and patients, avoiding referral to the specialty clinic.
Aims: Evaluation of telemedicine system in the assessment of patients suffering from headache, considering technical and assistance quality of care, delay in providing care, efficacy and patient’s satisfaction.

Methods: We evaluated 15 patients with headache (13 women and 2 men, average age 36 years) by telemedicine system. Patients first evaluation was done by GPs and afterwards the same patients were evaluated by Neurologists using this system.

Results: Migraine was diagnosed in 86.7% of patients, and tensional headache in 13.3%. In 53.3% of patients GPs and Neurologists made the same diagnosis. Neuroimaging studies were obtained in 3 patients, and the results were given to the patients using this system. The waiting time to be evaluated by Neurologists was 11 days. 80% of patients felt comfortable using this system, and 47% thought it was better than face-to-face consultation. 66.7% of patients thought they could save time using this system and 100% will highly recommend it.

Conclusions: Our preliminary results showed that telemedicine system could be an useful and effective tool in the management of patients with headache between GPs and Neurologists. It will reduce the waiting time and it will provide the chance of a shared evaluation by GPs and Neurologists.

No conflict of interest.

J10
EHMTI-0392. Migraine and risk of ischemic heart disease: a systematic review and meta-analysis of observational studies
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Background: Several studies have assessed the possible increased risk of ischemic heart diseases in migraineurs, drawing different conclusions.

Aim: To define and update the issue of the association between migraine and ischemic heart disease we performed a systematic review and meta-analysis of the available observational studies.

Methods: Electronic databases were systematically searched up to April 2014 for observational studies dealing with the risk of any form of ischemic heart disease in subjects with migraine.

Results: Out of 3,348 records, we identified 15 studies which were included in the meta-analysis. The pooled analysis indicated an increased risk of myocardial infarction (pooled adjusted effect estimate 1.33, 95% CI 1.08-1.64; P=0.007) and of angina (pooled adjusted effect estimate 1.29, 95% CI 1.17-1.43; P<0.0001) in subjects with any migraine compared to non-migraineurs (Figure 1); subjects with migraine with aura had an increased risk of myocardial infarction and of angina (Figure 2). At variance, the pooled analysis did not indicate an increased risk of ischemic heart disease or of coronary revascularization procedures in subjects with any migraine compared to non-migraineurs (Figure 1).

Conclusions: Based on our data indicating an association of migraine with myocardial infarction and angina and on previous data showing an association of migraine, and particularly migraine with aura, with an increased risk for stroke, migraine can be appropriately considered an overall risk factor for cardiovascular diseases.

No conflict of interest.

J11
EHMTI-0371. A new physical sign in migraine ‘pointing forehead’
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Objectives: This study was designed to compare the presence of seven clinical signs in a group of patients with migraine with that of patients with non-migraine headache.
Background: Migraine is sometimes misdiagnosed. Therefore additional features are useful to improve the diagnostic accuracy of migraine.

Methods: A cross sectional descriptive study was conducted in a group of 709 outpatients with headache. The physical signs were named as A-G. These were carefully observed certain gestures exhibited by patients themselves when they describe their headache.

Results: Sign A (pointing right side of the forehead) and sign B (pointing left side of the forehead) were significantly higher in patients with migraine (Sign A positive-123/339, Chi square-15.784, p<0.001; Sign B positive-146/339, Chi square-20.813, p<0.001). Sign F (keeping the head on a table) was significantly higher in patients with non-migraine headache (Sign F positive-132/370, Chi square-12.954, p<0.001). Sign A was more commonly associated with unilateral, severe headache which lasted for a longer period of time. However sign B was more commonly associated with unilateral, severe headache only. Sign C was significant in patients who had bilateral headache in both migraine and non-migraine groups than unilateral headache.

Conclusions: It is concluded that pointing right or left side of forehead when the patient describes his or her headache is a characteristic sign of migraine. Keeping the head on the table during an attack of headache is not a characteristic sign of migraine.

J12
EHMTI-0360. Chronic sympathetic activation in migraine headache: unique to migraine or common to sympathetic nervous system disorders?
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The mechanisms of autonomic nervous system dysfunction in migraine are not well understood. It has been proposed that chronic/excessive SNS activation contributes to migraine episodes by rapidly depleting norepinephrine stores while increasing the release of dopamine, adenosine triphosphate, adenosine and prostaglandins. Research showing significantly colder hands in female migraineurs than healthy controls between headaches suggests evidence of chronic/excessive SNS activation in female migraineurs.

A recent audit of standardized clinical assessment data collected over several years during a 26 minute psychophysiological mental stress assessment revealed interesting results which shed light on this dilemma. Data included hand skin temperature (HST), frontal sEMG, HR, SCR, respiration rate and the Anxiety Sensitivity Index. Ten female migraineurs (MH), 10 females with muscle contraction headache (MCH) and 10 females with panic disorder (PD) were compared.

MCH controlled for the effects of having a distressing non-migraine/non SNS headache disorder. PD controlled for the effects of having a distressing non-headache, SNS disorder. There were no significant between-group differences for age and most test scores.

A repeated measures ANOVA showed a significant between-groups difference for HST. The MCH group was in the normal range while the MH and PD groups were well below normal and significantly colder than the MCH group. The MH group results suggest chronic SNS arousal. However the PD group’s similar result and the MCH normal result suggests that chronic SNS arousal is a characteristic of SNS disorders and is not unique to migraine. Alone, it appears insufficient to explain migraine episodes. Additional factors are proposed. No conflict of interest.

J13
EHMTI-0366. Efficacy of cognitive behavior therapy and gestalttherapy on poor sleep quality among college female students with headache
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Introduction: The concomitance of sleep and headaches has been known for centuries, but the details of that concomitance were mysterious. Headache and sleep disorders are common in the general population and often coexist in the same patient.
Aims: The present study evaluated the effects of an 8-week cognitive behavior therapy and Gestalt therapy on poor sleep quality in 21 college female students with headache (TH). They were randomly placed in either a control or experimental group.

Methods: Experimental groups were randomly divided into Gestalt therapy and CBT groups. General design of this study was an experimental one with pre-test, post-test and control groups. First, The Pittsburgh Sleep Quality Index (PSQI) was administrated to 3 groups. Second, Cognitive behavior groups participated in CBT sessions and Gestalt therapy groups participated in Gestalt therapy sessions. Third, all participants (3 groups) completed the PSQI again after intervention and 4 weeks later. Analysis of the data involved both descriptive and inferential statistics including mean, standard deviation, Cronbach, t-test, ANOVA, and Analysis of co-variance.

Results: This study observed more significant differences such as phenomena like subjective sleep quality, sleep latency, sleep duration after intervention in experimental groups. Post treatment assessment at a month later revealed significant improvement of sleep quality in 14 subjects. Furthermore, there wasn’t significant difference between two experimental groups, in terms of the level of improvement of sleep quality.

Conclusion: With respect to the results obtained from one way ANOVA and covariant analysis, it is concluded that Gestalt therapy and cognitive behavior therapy has an effect on the improvement of sleep quality of the female university students with headache.

No conflict of interest.

J14

EHMTI-0365. The effectiveness of health training on improving sleep quality, and reduction of the symptoms of migraine headaches in individuals with multiple sclerosis

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Introduction: Migraine headaches and undesirable quality of sleep in patients with multiple sclerosis are very common.

Aims: The aim of the present study is the effectiveness of sleep health training on improving sleep quality, and reduction of the symptoms of migraine headaches in individuals with multiple sclerosis.

Methods: Therefore, to do this, 60 patients with MS peered selected and randomly put into two groups of experimental and control. They answered Pittsburgh quality of sleep of the Najarian symptoms of migraine headache. Experimental group took part for four sessions of Sleep health training session. After completing the sessions both answered to two tests again.

Results: The results showed that sleep health training on improving the quality of sleep and reduction the symptoms of migraine headache has been effective in experimental group.

Conclusions: Therefore, sleep health training to improve the quality of sleep and reduce the symptoms of migraine headache suffers of MS, can be conducted along with other pharmaceutical and medical treatments.

No conflict of interest.

J15

EHMTI-0367. Comparison of sleep quality and migraine headaches in people with proper and improper and poor sleep

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Introduction: Sleep disorder is prevalent in patients with migraine headaches. This research aims to compare sleep quality and migraine headaches in patients with proper and improper sleep.

Aims: The aim of this study was to Comparison of sleep quality and migraine headaches in people with proper and improper and poor sleep.

Methods: This study is both descriptive and comparative. The population included all male and female undergraduate students at the University Urmia of the 2011-2012 school year who were selected by simple random sampling. Thus, in the first step, 280 people completed Pittsburgh Sleep Quality Test and Najarian Migraine headache symptoms questionnaire. In the next step, 115 students who scored lower than the cut point on the tests of sleep quality and 115 of the students who scored above the cut point were selected and were stratified as people with proper and improper sleep. The test data were analyzed using multivariate variance statistical analysis.

Results: The results showed no significant difference between the two groups in terms of the variables being studied. The group with improper sleep obtained a higher average in the variable of migraine headache, sleep quality and its sub-scales i.e. subjective sleep quality, delay and difficulty falling asleep, sleep duration, good sleep, sleep disorders, use of narcotics and sleep medications and daily dysfunctions.

Conclusions: People who have poor sleep quality, sleep disorders, migraine headaches and difficulty falling asleep experience more problems in their life. No conflict of interest.

J16

EHMTI-0386. Chronic subdural hematoma and spinal cerebrospinal fluid leak and in non-geriatric patients

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Introduction: The etiology of chronic subdural hematoma (cSDH) in non-geriatric patients (<60 years) often remains unclear.

Aim: The primary objective of this study was to identify spinal cerebrospinal fluid (CSF) leaks in non-geriatric patients with the hypothesis that spinal CSF leaks are causally related to cSDH.

Methods: All consecutive patients ≤ 60 years who were operated upon for cSDH from Sept. 2009 to April 2011 were included in this prospective cohort study. The patient workup included in the variable search for a spinal CSF leak using a systematic algorithm: magnetic resonance (MR) imaging of the spinal axis with or without intrathecal contrast application, myelography/fluoroscopy, and postmyelography CT scanning. Spinal pathologies were classified according to direct proof of CSF outflow from intra- to extrathecal space, presence of extrathecal fluid accumulation, presence of spinal meningeal cysts, or no pathological findings.

Results: Twenty-seven patients (mean age±SD: 49.6±9.2 years) were operated upon for cSDH. The chief complaint was headache in 15 (56%) patients. Hematomas were unilateral in 20 and bilateral in seven. In seven of 27 patients (25.9%) spinal CSF leakage was proven, in nine (33.3%) patients spinal meningeal cysts in the cervico-thoracic region were found, and three (11.1%) had spinal cysts in the sacral region. The remaining eight (29.6%) patients showed no pathological findings.

Conclusions: Spinal imaging results are challenging the pathogenetic concept of cSDH in young patients. The direct proof of spinal CSF leakage in 25.9% of patients suggests that spinal CSF leaks may be a frequent cause of non-geriatric cSDH.

No conflict of interest.

J17

EHMTI-0383. Spontaneous intracranial hypotension due to calcified micro-sprouts perforating the dura – a case series

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Introduction: Spontaneous intracranial hypotension (SIH) is a rare but increasingly diagnosed condition. Low cerebrospinal fluid (CSF) pressure due to a dural leakage causes orthostatic headache. The nature, etiology, and location of the CSF leak itself are currently unknown and are thought to be spontaneous or idiopathic in most cases.

Aim: We present a case series with proven CSF leaks in which a systematic and meticulous search revealed dura-perforating micro-sprouts as a cause of SIH.

Methods: A consecutive series of patients with symptoms of intracranial hypotension were evaluated for a systematic diagnostic work-up from
February to August 2013. We performed a spine focused, stepwise escalating imaging set. If a CSF leak could be restricted, we performed microsurgical exploration under intraoperative electrophysiological monitoring of the presumed site of the CSF-leak.

Results: We identified 6 patients with SIH and imaging signs of spinal dural perforation. In 5 cases a calcified micro-spur extruding out of the disc space was identified perforated the dura and arachnoid and was the cause of CSF leak in all 5 cases. In one case a broad osteophyde had ripped the dura. All 5 micro spurs and one osteophyte were micro-surgically removed, the dura was sealed, and the CSF leak ceased immediately.

Conclusions: The etiology of the CSF leak in SIH remains obscure. Here we present 6 patients in which a systematic spinal work-up, including microsurgical exploration, revealed dura perforating micro spurs. The dura-perforating micro spurs were a frequent, definitive, and readily treatable cause of SIH.

No conflict of interest.

J18
EHMTI-0346. Do nurses improve migraine management in primary care?
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Background: There are indications that a primary health care nurse may improve the treatment of migraine patients.

Methods: We conducted a non-randomized controlled prospective cohort study in primary care practices. In total 235 patients, diagnosed with migraine with or without aura according to ICHD-2 criteria, between 18 and 65 years of age, were included. Patients with migraine treated only by their general practitioner (control group). Primary outcome was the difference in referral rate to a neurologist because of migraine.

Results: In the intervention group, fewer migraine patients were referred to the neurologist (3.5% vs. 29.8% in the control group, p=0.001). The reduction in mean monthly headache days compared to baseline was apparent in the intervention group at 6 months (6.8 vs. 5.3 in the control group, p=0.006) and 9 months (4.7 vs. 2.1 days in the control group, p=0.006). At 9 months there was no significant change in dichotomized HIT score, compared to baseline (p=0.068). Change in satisfaction of patients with treatment compared to baseline after 9 months did not differ significantly between the control and intervention group (p=0.070).

Interpretation: The care administered by a primary care nurse supervised by a general practitioner (intervention group), Primary outcome was the difference in referral rate to a neurologist because of migraine.

Aims: To investigate resting-state functional connectivity in salience (SN), somatosensori (SMN) and default mode networks (DMN) during the early phase of putitary adenylate cyclase-activating polypeptide-38 (PACAP38)- induced migraine attacks.

Method: In a double-blind randomized study, 24 female migraine patients without aura received intravenous PACAP38 or vasoactive intestinal polypeptide (VIP) for 20 min. Both peptides are closely related and cause vasodilatation, but only PACAP38 induces migraine attacks. VIP was therefore used as an active placebo. Functional MRI was recorded before and during PACAP38-induced attacks (n=16) and before and after VIP infusion (n=15). Data were analyzed by SPM8 and the REST toolbox for Matlab in a seed-based fashion.

Results: During PACAP38-induced attacks, we found increased connectivity of the bilateral opercular part of the inferior frontal gyrus (Brodmann area 44) in the SN. In SMN, there was increased connectivity in the right prefrontal cortex and decreased activity in the left visual cortex. Several areas showed increased (left primary auditory, secondary somatosensory, premotor and visual cortices, and left superior longitudinal fascicle) and decreased (right cerebellum and left frontal lobe) connectivity in DMN. We found no resting-state network changes after VIP.

Conclusion: The early phases of PACAP38-induced migraine attacks are associated with altered connectivity of several large-scale functional networks of the brain.

K2
EHMTI-0354. Abnormal expression of gene transcripts linked to inflammatory response in the perioestem of chronic migraine patients: implications to extracranial origin of headache
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Introduction: Progress in headache research suggests that migraine pathophysiology involves inherited abnormal brain functions and that the initiation of headache depends on flow of nociceptive signals that originate in pain-sensitive intra- and extra-cranial organs conveyed through peripheral nociceptors to central trigeminovascular neurons. Despite this progress, little is known about the identity of the pain fibers that mediate the initiation phase, or what activates them.

Aims: To assess the extent of presence of inflammatory molecules in perioestem tissues that were taken from calvarial areas where the head hurts.

Methods: We compared number of copies of gene transcripts (mRNA) that encode proteins that play known roles in inflammatory and immune responses and number of copies of molecules that regulate the expression of those genes (miRNA) in perioestem tissues of 27 chronic migraine (CM) patients and 17 control subjects.

Results: 36/524 mRNAs and 27/726 miRNAs were differentially expressed in the perioestem of CM patients compared to control subjects. Of these, 25 genes were up-regulated (all encode proteins that facilitate inflammation) whereas 11 were down-regulated (all encode proteins that suppress inflammation). Of the 27 post-transcripts, expression was low for 11 (all regulate expression of pro-inflammatory genes) and high for 16 (all regulate expression of anti-inflammatory genes) mRNA sequences.

Conclusion: The findings suggest that the molecular environment in which perioestal pain fibers exist contain abnormal expression of genes that promote inflammation; a condition that is likely to lower their activation threshold, when symptoms appear at the onset of an attack, or activate them chronically.

K - HUMAN EXPERIMENTAL SCIENCE: CLINICAL EXPERIMENTAL HEADACHE SCIENCE AND PATHOPHYSIOLOGY

K1
EHMTI-0393. Abnormal ictal large-scale network connectivity in migraine without aura: a resting-state functional connectivity study
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Introduction: Alterations in cerebral resting-state functional connectivity (RSFC) have been reported outside of migraine attacks. To date, no studies studied possible changes in RSFC during migraine attacks.

Aims: To investigate resting-state functional connectivity in salience (SN), somatosensori (SMN) and default mode networks (DMN) during the early phase of putitary adenylate cyclase-activating polypeptide-38 (PACAP38)- induced migraine attacks.

Method: In a double-blind randomized study, 24 female migraine patients without aura received intravenous PACAP38 or vasoactive intestinal polypeptide (VIP) for 20 min. Both peptides are closely related and cause vasodilatation, but only PACAP38 induces migraine attacks. VIP was therefore used as an active placebo. Functional MRI was recorded before and during PACAP38-induced attacks (n=16) and before and after VIP infusion (n=15). Data were analyzed by SPM8 and the REST toolbox for Matlab in a seed-based fashion.

Results: During PACAP38-induced attacks, we found increased connectivity of the bilateral opercular part of the inferior frontal gyrus (Brodmann area 44) in the SN. In SMN, there was increased connectivity in the right prefrontal cortex and decreased activity in the left visual cortex. Several areas showed increased (left primary auditory, secondary somatosensory, premotor and visual cortices, and left superior longitudinal fascicle) and decreased (right cerebellum and left frontal lobe) connectivity in DMN. We found no resting-state network changes after VIP.

Conclusion: The early phases of PACAP38-induced migraine attacks are associated with altered connectivity of several large-scale functional networks of the brain.

K3
EHMTI-0375. Central mechanisms of migraine improvement with ketogenic diet: an evoked potentials study
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Introduction: Ketogenic diet (KD) is a dietetic regimen that mimics fasting in producing ketone bodies, which seems to have a potential role in treating migraine. From animal and human models emerges that KD might affects CNS at multiple levels: it is able to normalize cortical dysexcitability and to reduce cortical spreading depression velocity of propagation, which mechanisms are potentially of interest in migraine pathophysiology.

Aim: We investigated visual evoked potentials (VEPs) before and during KD to find cortical electrofunctional correlates of responsiveness to short-lasting preventive intervention with KD in migraine.

Methods: To find out whether ketogenic diet alters VEP habituation, we recorded VEPs (3.1Hz reversal rate, 15 min of arc checkerboard visual pattern) before and during ketogenesis, as confirmed by urinary sticks, in 15 migraine patients. We measured VEP N75-P100 amplitudes in 6 sequential blocks of 100 sweeps and habituation as the slope of the linear regression line for the 6 blocks.

Results: After a mean of 1-month period of KD, a significant reduction of migraine frequency (from a mean of 4.0 to 1.5 attacks/month, paired t-test p<0.001) and duration (from 56.0 to 10.7 hours/month, p<0.001) was observed. KD tended to increase VEP amplitude in block 1 and induced normalization of the interictally reduced VEP habituation (from +0.07 to -0.16, p=0.01).

Conclusions: These findings suggest that ketogenic diet may exert its prophylactic effect in migraine by influencing the processing of information at the cortical level. KD may be a promising therapeutic option as migraine prevention. No conflict of interest.

K4

EHMTI-0378. Imaging sensory effects of occipital nerve stimulation: a new computer-based method in neuromodulation

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Background: Within the last years, occipital nerve stimulation has proven to be an important method in the treatment of severe therapy-resistant neurological pain disorders. The correspondence between electrode placement as well as possible stimulation parameters and the resulting stimulation effects remains unclear.

Objective: The method aims to directly relate the neuromodulatory mechanisms with the clinical treatment results, to achieve insight in the mode of action of neuromodulation, to identify the most effective stimulation sets and to optimise individual treatment effects.

Methods: We describe a new computer-based imaging method for mapping the spatial, cognitive and affective sensory effects of occipital nerve stimulation. The procedure allows a quantitative and qualitative analysis of the relationship between electrode positioning, the resulting stimulation effects as well as the sensory and clinical stimulation effects.

Results: The mapping can be carried out with different given stimulation parameters, to qualitatively and quantitatively capture the effects of the chosen parameters. The patient first documents the programme, for which he or she wishes to map the treatment effects. Using the JIP control device, the stimulation intensity for the respectively used programme are selected and then documented using the graphical user interface. Thereafter, patients are able to map the sensory experiences and their intensity.

Conclusion: The new computer based imaging procedure allows a continuous tracking of progress and success of neuromodulation. A regular documentation of stimulation and sensory parameters allows individually a close-mesh optimisation of occipital nerve stimulation treatment in future.

Through the internet-based application, the tool can be used internationally and multi-centrally.

No conflict of interest.

K5

EHMTI-0372. No abnormalities of intrinsic brain connectivity during the interictal phase of migraine with aura

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Introduction: Functional neuroimaging studies have shown hyperresponsiveness of cortical areas to visual stimuli in migraine patients with aura outside of attacks. This may be a key feature in the initiation of aura episodes and possibly also migraine headache attacks. It is unknown if cortical dysfunction is present at rest, i.e. in the absence of any external stimuli. Functional magnetic resonance imaging (fMRI) is a powerful technique for evaluating resting-state functional connectivity, i.e. coherence of brain activity across cerebral areas.

Aims: To investigate resting-state functional brain connectivity in migraineurs with aura outside of attacks using fMRI.

Methods: We investigated 40 patients suffering from migraine with visual aura and 40 individually age- and gender-matched healthy controls with no history or family history of migraine. Following advanced denoising, the data were analyzed both in a hypothesis-driven fashion, testing for abnormalities involving 27 different brain areas of potential relevance to migraine with aura, including the cortical visual areas, the amygdala and peri-ocipital grey matter, and in a data-driven, exploratory fashion (dual regression) in order to reveal any possible between-group differences of resting state networks. Age, gender, attack frequency, and disease duration were included as nuisance variables.

Results: We found no differences of functional connectivity between patients and controls.

Conclusions: The previously reported increased cortical hyperresponsivity in the interictal phase of migraine with aura is unlikely to be caused by abnormalities of intrinsic brain connectivity. The interictal migraine aura brain may be abnormally functioning only during exposure to external stimuli. No conflict of interest.

K6

EHMTI-0376. Trigeminovascular sensitisation by chronic subdural haemorrhage: four clinical paediatric cases

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Background: Sensitisation of the trigeminal nerve (TG) has been extensively studied as a potential mechanism of migraine. Meningeal nociceptors project onto second order neurones of the trigeminocervical complex (TCC) via glutamate neurotransmission. Sensitisation of trigeminal afferents causes massive release of glutamate and central sensitisation. The TCC connects with the VII, IX and Xth cranial nerve nuclei, and participates in the trigeminocardiac reflex which is particularly important in the young.

Aim: In the laboratory, application of ‘inflammatory soup’ causes increased trigeminal sensitisation and increased responsiveness so that dural afferents can be strongly activated by mechanical and other stimuli that initially had evoked little or no response. We wished to show that bleeding in the human dura, which produces an inflammatory response and increased mast cell numbers, may sensitise the trigeminal system.

Method: We examined our autopsy database for infants and children with chronic subdural haemorrhage who collapsed and died unexpectedly.

Project onto second order neurones of the trigeminocervical complex (TCC) via glutamate neurotransmission. Sensitisation of trigeminal afferents causes massive release of glutamate and central sensitisation. The TCC connects with the VII, IX and Xth cranial nerve nuclei, and participates in the trigeminocardiac reflex which is particularly important in the young.

Aim: In the laboratory, application of ‘inflammatory soup’ causes increased trigeminal sensitisation and increased responsiveness so that dural afferents can be strongly activated by mechanical and other stimuli that initially had evoked little or no response. We wished to show that bleeding in the human dura, which produces an inflammatory response and increased mast cell numbers, may sensitise the trigeminal system.

Method: We examined our autopsy database for infants and children with chronic subdural haemorrhage who collapsed and died unexpectedly.
Results: We identified four patients with chronic dural haemorrhage who died following following TG stimulation; one by hypertension and three by oronasal stimulation during choking. All had selective necrosis in the spinal nucleus of the TCC at autopsy.

Conclusion: We suggest these cases represent excitotoxic damage in the presence of sensitisation by chronic dural haemorrhage. Collapse may have been mediated by the trigeminocardiac reflex resulting in bradycardia, hypotension and apnoea. Exaggeration of this protective response has been implicated in Sudden Infant Death Syndrome.

No conflict of interest.

L - BASIC SCIENCE: HEADACHE BASIC EXPERIMENTAL SCIENCE AND PATHOPHYSIOLOGY

L1
EHMTI-0369. Migraine is a dysfunction of the mind – in networks creating reality
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The Journal of Headache and Pain 2014, 15(Suppl 1):l.1

Introduction: Thinking of migraine pathophysiology is today constrained by a post-Wolff intellectual fixation with pain as the main migraine hallmark, and constrained by the rigid syndrome classification which excludes the understanding of other sufferings from the same dysfunction contributes to the creation of concepts. That fixedness is a significant obstacle to understand migraine as a general dysfunction of the brain.

Method: Knowledge of how the brain works on the system level has developed within the field of cognitive neuroscience. This knowledge is built on what brains do: It register the world, creates an understanding of reality, and acts according to goals. This approach is somewhat different from the classical neuron-approach of neurology, looking at what single neurons does.

We apply knowledge from cognitive neuroscience to present an understanding of what migraine is.

Result: Migraine is a dysfunction in network creation of what Bernard Baars describes as ‘context’ or ‘frame’. Stanislas Dehaene is calling the same unconscious ongoing creation of a coherent workable reality ‘preconsciousness’. This function is reflected in the P300 potentials.

Conclusion: We suggest a form to build knowledge about migraine brain dysfunction. We believe Albert Einstein knew an absolute and basic truth of how the human brain creates knowledge: It seems that the human mind has first to construct form independently before we can find them in things...the truth [is] that knowledge cannot spring from experience alone, but only from a comparison of the inventions of the intellect with observed facts.

A. Einstein 1930
No conflict of interest.

L2
EHMTI-0347. Migraine prevalence in patients aged up to 50 with acute cerebrovascular insult (CVI) treated in St.Sava Hospital during 2012
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The Journal of Headache and Pain 2014, 15(Suppl 1):l.2

Objective: of this study was to determine percentage incidence of migraine in patients with acute CVI compared to the population of patients with acute CVI without pre-morbid migraine, all of whom were aged up to 50 and 50. Migraine prevalence up to the above said age is the largest in extent, whereas the incidence of other cerebrovascular disease risk factors is the smallest. This is why other factors minimally affected the result set forth as the objective of this study. The goal in this study was to determine migraine prevalence in patients aged up to 50 with acute CVI, as well as to prove migraine infraction within this population.

Methods: Statistical processing of the data obtained from the computerized database of St.Sava Hospital was applied. In the period from 1 January 2012 to 31 December 2012.

Result: Hetero-anamnestic and auto-anamnestic data revealed that, within this age group of patients 45 female patients used to have migraine headaches. Out of them, 3 patients suffered from migraine with aura, whilst another woman aged 38 suffered from migraine with aura and had neurological deficit in terms of hemiparesis on the right within the aura. The neurological deficit was retained even after the migraine attack. Neuro-imaging methods confirmed the left temporal-parietal position of an ischemic lesion. This case represents the only confirmed instance of migraine infraction.

Conclusion: This study showed that migraine prevalence in patients with acute CVI is not larger than prevalence in general population. In addition, a single instance of migraine infraction was confirmed in a female patient in her 30s who suffered from migraine with aura.

No conflict of interest.
M - MIGRAINE THERAPY: PHARMACOLOGICAL ACUTE AND PREVENTATIVE MIGRAINE THERAPY

M1
EHMTI-0394. Predictive parameters for the effect of botulinum toxin infiltrations in chronic migraine
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Introduction: Since the PREEMPT trials botulinum toxin infiltrations have become mainstay treatments for chronic migraine. Although not reimbursed in Belgium, botulinum toxin infiltrations can be a viable option for refractory chronic migraine patients in whom previous oral treatments have failed.

Aims: We report on the effectiveness and side effects of botulinum toxin infiltrations for chronic migraine.

We investigate which parameters influence the effect of the treatment.

Methods: Patients meeting criteria for chronic migraine who had failed conventional oral treatments for the condition were proposed botulinum toxin infiltrations. After informed consent, they were asked to keep detailed headache calendars, documenting the number of headache days, the number of migraine days, the intensity of the headaches/migraines and analgesic use. We compared these parameters before treatment and after two cycles of botulinum toxin infiltrations. Statistical significance was calculated by means of a Wilcoxon signed rank test.

Results: In our preliminary cohort of 7 patients treated with botulinum toxin no major adverse events were reported. One patient reported a mild transient unilateral paresthesia that did not hamper vision.

On average we observed a reduction in headache days from 26.6 days/month before treatment to 22.0 days/month after treatment (p=0.250). The number of migraine days after 2 cycles was reduced on average from 15.6 to 8.2 migraine days/month (p=0.016). The average reduction of the number of days that painkillers were used after 2 treatment cycles, was much less pronounced, from 9.1 to 7.6 days/month (p=0.406).

Conclusions: In our experience, even though high doses of botulinum toxin are used in chronic migraine, the treatment is safe. In selected patients with refractory chronic migraine botulinum toxin infiltrations can significantly improve the headache control. We observed that there is a subpopulation of patients with a distinct and significant effect of the infiltrations who will continue treatment beyond 2 treatment cycles. Another subgroup seems to have little or no benefit from the infiltrations and will discontinue treatment after 2 cycles.

We will investigate in a regression analysis in 20 patients which patient characteristics influence the success of the botulinum toxin treatments.

M2
EHMTI-0379. Update of the uk post market pilot programme with single pulse transcranial magnetic stimulation (STMS) for the acute treatment of migraine
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Introduction: Some patients suffer disabling, frequent migraine without effective treatment as current pharmacological options may be contra-indicated, poorly tolerated or overused. Single pulse transcranial magnetic stimulation (sTMS) is a novel, CE marked, non-drug treatment for migraine.

Aim: To evaluate the patient response to sTMS in open outpatient settings at UK headache clinics, and to assess the impact of sTMS over three months.

Methods: Clinicians selected patients and prescribed the device. Migraine patients with and without aura treating with sTMS had an initial review and training call (n = 304) with a headache nurse and then participated in telephone surveys at week six (n = 157) and week twelve during a 3-month treatment period (n= 122; episodic, n = 42; chronic, n = 80). Patient outcomes were documented, anonymised and analyzed and are presented here.

Results: In total 122 (35%) patients have been using the device for a minimum of three months and completed surveys. Of these, 89 (73%) reported a reduction or alleviation of pain. 101 (83%) were also using an acute medication at the time of prescription. Of these, 69 (68%) reported a reduction in the number of days of medications use. The treatment was well tolerated with no serious or unanticipated adverse events reported.

Conclusions: sTMS may be a valuable addition to options for the treatment of both episodic and chronic migraine. This device is safe to use in clinical practice and has reliable, reproducible effects on migraine over time.

The UK Pilot Programme was supported by eNeura Therapeutics.

M3
EHMTI-0377. The influence of genetic constitution on migraine drug responses
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Background: Specific acute treatments of migraine are 5HT1B/D receptor agonists, i.e. triptans and ergotamine. No migraine prophylactic drugs are specific to migraine. Prophylactic drugs are selected by time consuming “trial and error”. Personalized treatment is therefore much needed.

Aim: The objective of this study was to test the effect of 12 common SNPs significantly associated with migraine on migraine drug responses.

Methods: Semi-structured migraine interviews, blood samples and genotyping were performed on 1806 unrelated migraine cases recruited from the Danish Headache Center. Association analyses were carried out using logistic regression and ORs were calculated assuming an additive model for risk. The effect on drug responses was tested for a combined genetic score and for each of the 12 SNPs.

Results: A higher combined genetic score, and a single SNP, rs2651899 in PRDM16, were significantly associated with efficacy of triptans with an OR of success of 2.6 and 1.3, respectively. A number of SNPs showed nominal preferential association with the efficacy of triptans and others with prophylactic drugs.

Conclusion: We show for the first time an association between genetic constitution and migraine drug response. This is a first step towards future individualized medicine.

No conflict of interest.

M4
EHMTI-0390. The attitude of migraineurs to alternative therapies
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Introduction: The growing interest in alternative therapies (ALTs) is a worldwide phenomenon. Headache and migraine are among the top five conditions treated with such therapies, although scientific proof of efficacy is often lacking.

Objective: To explore the attitude of Hungarian migraineurs to alternative therapies.
Methods: Questionnaire survey conducted at two headache centres. A willingness to pay approach was used to assess the importance of alternative therapies for the patients.

Results: 75 patients (mean age: 35.4±12.4 years; 70 women) were enrolled. Thirty-four (44%) had already tried at least one ALT. Ninety percent of the patients were willing to pay for ALTs recommended for their migraines, on average 19% of the Hungarian monthly net minimum wage. If scientific evidence of efficacy was lacking, 57% of the patients would pay for the ALTs (on average 14% of the net minimum wage). If the ALTs were associated with side effects, only 33% of patients would try them. Actual use and willingness to use was higher among patients with higher levels of education. If two therapies were equally effective, 66% would choose an ALT and 11% would prefer the conventional therapy (24% having no preference). If the treatments' side effects were equal, 36% would choose the ALT and 22% the conventional treatment (p<0.001 for the differences between the two scenarios).

Discussion: The majority of migraineurs had positive attitudes towards ALTs. This is probably due to ALTs being considered safer than conventional therapies. Patients with higher levels of education have a higher preference for ALTs.

No conflict of interest.

M5

EHTMI-0389. Occipital nerve stimulation in the treatment of chronic migraine: experiences of two years

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Background: Occipital nerve stimulation (ONS) as a special form of neuromodulation has proven to be an important method in the treatment of therapy refractory chronic migraine.

Objective: Severely affected patients, not responding to other treatment options, present in our specialised headache centre and treatment network to put up the medical indication for ONS. The patient characteristics and satisfaction rates are analysed over the time span of two years.

Methods: Descriptive analysis of patient characteristics, therapy satisfaction rates and disability due to migraine of patients treated with ONS since November 2011.

Results: ONS was used in a total of 43 patients due to therapy-resistant migraine (age 44.98±10.6 years, range 22-69 years, 36 women, 7 men). Migraine had before existed an average of 28.47±11.5 years. When starting treatment, the average MIDAS score was 129.14±58.73, after one year it dropped to 87.44±45.69 (p<0.001). In the follow-up studies during the time of analysis, patients were asked whether they would choose to be treated with ONS again (answers: yes/ambivalent/no). In the follow up studies 1-6, the following answers were found: (1) 56.1/41.5/2.4, (2) 56.8/32.4/10.8, (3) 51.9/44.3/4.7, (4) 55.6/44.4/0, (5) 58.3/41.7/0, (6) 60.0/20.0/0.

Conclusion: ONS led to a positive evaluation in more than half of patients treated, despite therapy-resistance beforehand. The burden of chronic migraine can be significantly lifted through ONS. Only a very small fraction of patients would not choose this therapy again.

M6

EHTMI-0348. Refractive errors in patients with migraine headache

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The Journal of Headache and Pain 2014, 15(Suppl 1) M6

Introduction: Migraine is one of the most common debilitating diseases. Despite of intensive research in the pathogenesis and treatment of migraine, its relationship between refractive error have been controversial.

Aims: To evaluate refractive errors in patients with migraine headache and to compare with healthy subjects.

Methods: This prospective case-control study includes patients with migraine and age- and sex- matched healthy subjects. Clinical and demographic characteristics of the patients were noted. Then detailed ophthalmological examination were performed containing spherical refractive error, astigmatic refractive error, spherical equivalent (SE), anisometropia, best corrected visual acuity, intraocular pressure, slit lamp biomicroscopy, fundus examination, axial length, anterior chamber depth, and central corneal thickness. Spectacle use in migraine and control groups was compared. Also, the relationship between refractive components and migraine headache variables were investigated.

Results: Seventy-seven migraine patients with mean age of 33.27±8.84 years and 71 healthy subjects with mean age of 31.15±10.45 years were enrolled (p=0.18). The migraine patients had higher degrees of astigmatic refractive error, SE, and anisometropia when compared with the control subjects (p=0.01, p=0.03, p=0.02, respectively).

Conclusions: Migraine patients may have higher degrees of astigmatism, SE, and anisometropia. Therefore, they should have ophthalmological examination regularly to ensure that their refractive errors are appropriately corrected. Seventy-seven migraine patients with mean age of 33.27±8.84 years and 71 healthy subjects with mean age of 31.15±10.45 years were enrolled (p=0.18). The migraine patients had higher degrees of astigmatic refractive error, SE, and anisometropia when compared with the control subjects (p=0.01, p=0.03, p=0.02, respectively).

No conflict of interest.

M7

EHTMI-0396. Reappearance of high fever on migraine patients, after individualized homeopathic treatment, is a valuable prognostic factor

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Background: Nine years experience of introduction of Homeopathy at Headache Clinic of a major Public Hospital.

Aim: To reproduce the positive results of a previous study presented in EHTIC 2008.

Methods: One hundred and twenty migraine patients assigned to receive individualized homeopathic treatment. Additional evaluation by a neurologist was performed at baseline, 6 and 12 months. Primary and secondary measures of migraine severity and impact on quality of life were recorded and analyzed.

Results: Eighty two patients opted only for homeopathic treatment until the completion of the study, with a baseline HIT-6 score of 67.4. Significant improvement was recorded at 6 months (HIT-6 45±8, P<0.0009 vs baseline, Wilcoxon signed ranks test), further established at 12 months (HIT-6 40.2±7, P<0.0009 vs 6 months). Migraine severity (VAS) decreased by 72% and frequency by 81 % at 12 months (P<0.0001 vs baseline). Observed potential adverse effects were an initial 'aggravation' of migraine symptoms in 69%, recurrence of past medical diseases ,especially infections or upper respiratory with high fever in 62%.

Conclusion: More positive results and more reappearance of high fever infections appeared in this study after following G.Vithoulkas’ instructions. Original videos of many patients describing the unexpected reappearance of very high fever, after a long time, will be presented.

No conflict of interest.

M8

EHTMI-0387. Characterization of peripheral and central sensitization in patients undergoing occipital nerve stimulator implant for intractable pain

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The Journal of Headache and Pain 2014, 15(Suppl 1) M8
**Introduction:** Trigemino-spinal sensitization and impaired descending inhibitory control (DNIC) has been reported in chronic migraine. Further mechanism behind occipital nerve stimulation (ONS) remains speculative.

**Aims:** This observational study characterises peripheral and central sensitization in patients undergoing ONS for intractable chronic migraine.

**Methods:** Quantitative Sensory testing (QST) measurements were carried out in patients before and after ONS (n=6).

1. **Measurement of pressure pain thresholds (PPT):** Computer-controlled pressure algometer (SomedicAB, Sweden, diameter contact tip 10mm; standardised speed 0.3kg/s) measured PPTs at standardised three points (temporal, cheek bone and cervical). 2. **DNIC:** DNIC response was measured using PPT on cheekbone with an inflated cuff insitu on one arm.

**Results:** Patients with chronic migraine demonstrated loss of DNIC, (PPT ≥ 56.0 kPa vs 46.2kPa cuff inflated). A “normal” DNIC response was observed two weeks following ONS (PPT ≥ 100.4kPa cuff inflated) continuing positively over next three months. In contrast the PPTs remained same before and after the ONS.

**Conclusion:** This case series reports sustained reversal of the loss of DNIC response in patients undergoing ONS for intractable headache whilst having no effect on peripheral pain thresholds.

No conflict of interest.

Reference:

M9

EHMTI-0349. Levitiracetam in the treatment of pediatric headache

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**Introduction:** Migraine headache is common among the pediatric and adolescent population, with prevalence rates ranging from approximately 3% to 4% in early ages to as high as 8% to 23% during adolescence. Before puberty, boys have more headaches than girls, but after puberty, migraine headaches occur more frequently in girls. Recent studies have highlighted the potential use of levetiracetam in pediatric migraine prophylaxis, it resulted in significant decreases in mean headache frequency were observed at dosages similar to those used in epilepsy patients, with good tolerability.

**Aims:** The study was conducted to evaluate the efficacy and safety of levetiracetam in migraine prophylaxis in young patients.

**Methods:** Ten consecutive patients aged 12–21 years with typical or atypical migraine were reviewed prior to and following the administration of levetiracetam for 6 months (750–2250 mg/day).

**Results:** Headache score, duration, and frequency showed considerable improvement in all patients compared to baseline. Headaches were eliminated in 3 patients. Electroencephalogram showed dysrhythmia grade 2 or 3 at baseline, which improved to grade 1 in all patients following the treatment period.

**Conclusion:** In this pilot study, levetiracetam was effective and well tolerated. The improvements in headache outcomes in this group of patients may be due, in part, to the effect of levetiracetam on electroencephalogram dysrhythmias. These preliminary results of levetiracetam seem to be promising in relieving headaches in the pediatric age group. No conflict of interest.

Reference:

M10

EHMTI-0358. Improved chronic migraine after DTMS

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**Background:** The prevalence of chronic migraine (CM) in the general population is around 2%. CM occurs with impaired quality-of-life and frequent medication overuse. Deep transcranial magnetic stimulation (dTMS) of the dorsolateral prefrontal cortex (DLPFC) transiently suppresses central pain perception through reduced functional connectivity between mid-brain and medial thalamus.

**Aim:** To assess pain reduction in CM using high frequency rTMS over the left DLPFC.

**Method:** Fourteen patients with ICHD-3 CM were randomised to 12 dTMS sessions, delivered on alternate days over bilateral DLPFC with left prevalence (N=7; 6 women, 1 man; mean age 45 years) or to treatment as usual (TAU, with anti-migraine agents). All had severe headaches for ≥215 days/month in the last three months, and did not respond to ≥3 preventive medications and to drug overuse treatment. Outcome measures were attack frequency, headache index, and number of medications in the month before (baseline), during treatment, and one month later.

**Results:** Patients treated with dTMS, compared to TAU and baseline, had reduced pain intensity, frequency of attacks, and analgesic overuse, during treatment and one month later.

**Conclusion:** dTMS presumably improved DLPFC function, thus allowing better executive abilities. This may have enhanced salience-related brain activity, redirecting or diverting attention through the hippocampus, the cingulate cortex, or other pain matrix structures. Results are compatible with improved brain control over pain sensations. High-frequency dTMS over bilateral DLPFC improved CM, supporting a role for DLPFC in pain control.

No conflict of interest.

Reference:

M11

EHMTI-0368. Treatment of migraine attacks as suggested by Dr. John R. Graham in 1955. A historical analysis with current implications

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**Introduction:** In 1955 Dr. John R. Graham, an astute clinician, published 3 influential papers on migraine theories and mainly on treatment of migraine in the New England Journal of Medicine [1,2,3]. Many of Dr. Graham’s clinical observations remain relevant to current methods of treating migraine attacks and some of his examples of suggestions are shown below.

Examples of suggestions on ergot therapy:
1. The patient should be checked regarding to diagnosis of migraine and possible contraindications to ergot therapy.
2. The ergot dose should be carefully selected as the minimally effective dose.
3. The patient should be instructed to use ergot as early in the attack as he can make the diagnosis of “one of his migraine.”
4. He should be urged to use the selected amount of ergot at the start rather than to distribute it over several hours.
5. Ergot derivatives should not be considered a failure until ergotamine tartrate has been given, early in an attack, by the parenteral route.

**Conclusion:** If the word “ergot” is replaced with “triptans” Dr. Graham thus seemingly anticipated in 1955 optimal modern acute treatment of migraine.

No conflict of interest.

References:

M12

EHMTI-0351. PFO closure with migraine in East Tallinn Central Hospital (Estonia)

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**Introduction:** PFO closure may reduce the frequency and severity of migraine headaches in patients with significant right-to-left shunts.
Methods: Between January 2008 and March 2013 consecutive patients (mean age, 34.8 years; 83.4% women) with migraine symptoms were given a prior PFO closure with the Cardia PFO occluder for migraine attack prevention. All patients had right-to-left shunts; the shunts were associated with migraine symptoms in 8 patients and all eight had aura symptoms. Septal aneurysm was present in 4 (i.e. 50%) migraine patients. All patients had very frequent migraine attacks, more than 7 times per month. All 8 patients underwent transesophageal echocardiography after PFO closer with a clinical follow-up after 24 hr, then after 6, and 12 months, and then yearly.

Results: An acute migraine attack occurred after PFO closure in 2 (25%) of 8 patients. There was a significant reduction (>50%) in the number and intensity of attacks in 6 (75%) of the 8 patients after the 3-month follow-up period but in 1 (12.5%) similar attacks occurred before closure. After the 12-month follow-up period, migraine had ceased in 5 (62.5%) patients, and 3 (37.5%) had a reduction in the migraine recurrence rate and disabling symptoms. These results were maintained in the follow-up (about 72 months). Only one patient remained migraine attacks, but not more than one attack per month about three month follow up period after PFO closure. There was an overall improvement in 82.5% of the treated patients.

Conclusions: Percutaneous PFO closure in migraineurs may provide beneficial mid-term and long-term results, with significant reduction in the intensity and frequency of headache symptoms. No conflict of interest.

Cite abstracts in this supplement using the relevant abstract number, e.g.: Toomsoo et al. EHMTI-0331. PFO closure with migraine in East Tallinn Central Hospital (Estonia). The Journal of Headache and Pain 2014, 15(Suppl 1):M12