Headache and pain 1

P 2149

Evidence for cortical functional changes in patients with migraine and white matter abnormalities on conventional and diffusion tensor MRI

M. Filippi, M. A. Rocca, B. Colombo, E. Pagani, A. Falini, G. Scotti, G. Comi
Ospedale San Raffaele, Milan, ITALY

Introduction We used functional magnetic resonance imaging (fMRI) to investigate the pattern of cortical activations following a simple motor task in patients with migraine and white matter (WM) abnormalities on conventional MRI scans of the brain. We also investigated whether the extent of brain activations was correlated with WM structural pathology measured using diffusion tensor (DT) MRI.
Method From 15 right-handed patients with migraine and 15 sex- and age-matched, right-handed healthy volunteers, we obtained: a) fMRI (repetitive flexion-extension of the last four fingers of the right hand); b) dual-echo turbo spin echo scans, and c) pulsed-gradient spin-echo echo-planar sequence to calculate DT-MRI maps. FMRI analysis was performed using statistical parametric mapping (SPM99) and cluster detection. Mean diffusivity (MD) histograms of the normal-appearing WM (NAWM) were also produced.
Results Compared to healthy volunteers, migraine patients had a larger relative activation of the contralateral primary sensorimotor cortex ($p=0.01$), and a rostral displacement of the supplementary motor area (SMA) ($p=0.03$). The shapes of the curves reflecting the time course for fMRI signal intensity changes were similar between migraine patients and controls for all the cortical areas we studied. Compared to healthy subjects, migraine patients had significantly lower MD histogram peak height of the NAWM histogram ($p=0.02$), which was found to be correlated with the extent of displacement of the SMA ($r=-0.80$, $p<0.001$).
Conclusion This study suggests that functional cortical changes occur in patients with migraine and brain MRI abnormalities and that they might be secondary to the extent of subcortical structural damage.

P 2150

Colour visual evoked potentials in migraine

M. De Marinis, M. Oratino, L. Natale, N. Accornero
Dept. of Neurological Sciences – "La Sapienza University", Rome, ITALY

Introduction The occipital cortex is thought to be involved in migraine. Increase in VEPs amplitude and decrease in habituation to repetitive visual stimulations have been considered sings of visual cortex hyperactivity in this disease. However, there is also evidence for hypoexcitability of visual cortex in headache-free migraine patients studied with transcranial magnetic stimulation.
Method We used a new colour VEP procedure in 30 headache-free patients suffering from migraine with and without aura and 30 control subjects. We assessed VEPs obtained with reversal achromatic (black-white and grey-black) and chromatic (blue-black and red-black) checkerboard patterns in these subjects.
Results A mild longer P1 latency was observed in migraine patients than in control subjects when high contrast achromatic stimulations were used (black-white). This delayed response was statistically significant in migraine with aura (MA) patients ($p<0.05$) when compared with migraine without aura (MWA) patients and control subjects. The responses obtained with red-black chromatic pattern reversal stimulations were delayed in migraine patients when compared with control subjects ($p<0.01$). This delay, however, was more marked in MWA than in MA ($p<0.05$). Interestingly, the P1 latencies obtained in migraine patients with blue coloured pattern reversal stimulations were significantly prolonged than those obtained in control subjects ($p<0.001$) in both MA and MWA patients.
Conclusion Our observations suggest that in MA there is a dysfunction of the visual cortex that seems to involve both the magnocellular and parvocellular systems, whereas the parvocellular system seems to be more affected in MWA.

P 2151

Headache associated with sexual activity: course of the disease and treatment options

A. Frese, K. Frese, S. Schwaag, A. Rahmann, I. W. Husstedt, S. Evers
Department of Neurology, University of Münster, Münster, GERMANY

Introduction The objective of out study was to characterize the course of idiopathic headache associated with sexual activity (HSA) and to determine treatment options.
Method Out of 37 patients diagnosed with HSA between 1996 and 2001, 28 were contacted by phone in 2002 (33.2±19.1 months later) and questioned by a structured interview.
Results 17 patients had never suffered from HSA again. Four patients had suffered from a second phase of the disease but were actually free from HSA. 7 patients reported continued attacks of HSA without longer remissions. Out of those 7, only one had frequent attacks occurring with approximately every second sexual activity, the others had rare attacks.
There were no significant differences between HSA type 1 (dull type, n=7) and type 2 (explosive type, n=21) regarding the course of the disease.
11 patients with HSA type 2 were treated with betablockers (Propranolol=10, Metoprolol=3, mean treatment duration 5.0±7.4 months). 10 reported good results, 1 patient stopped the treatment already after two weeks without success. 3 patients had received indomethacin as a short-term prophylaxis. All three reported good results.

Conclusion HSA has a favourable outcome and continued complaints are rare. For those with HSA type 2 and frequent attacks, betablockers for prophylaxis or indomethacin for short-term prophylaxis should be used. For prophylaxis, a short course (2 to 6 months) seems adequate because spontaneous remissions of HSA are frequent.

P 2152

Comparison of preference for rizatriptan 10 mg tablet vs ergotamine/caffeine in migraine

H. Göbel[1], V. Mateos[2], S. Christie[3], C. Allen[4], F. Vrijens[5], M. Shivaprakash[4]
[1]Kiel Pain Clinic, Kiel, GERMANY, [2]Central Hospital of Asturias, Oviedo, SPAIN, [3]Ottawa Headache Centre, Ottawa, ON, CANADA, [4]Merck & Co., Inc., Whitehouse Station, NJ, USA, [5]Merck Sharp and Dohme (Europe), Inc., Brussels, BELGIUM

Introduction Rizatriptan (MAXALT™) is a selective 5-$HT_{1B/1D}$-receptor agonist with rapid oral absorption and early onset of action in the acute treatment of migraine.
Method This randomised double blind crossover outpatient study assessed the preference for rizatriptan 10mg tablet to 2 ergotamine 1 mg/caffeine 100mg tablets in 439 patients treating a single migraine attack with each therapy.
Results More than twice as many patients preferred rizatriptan to ergotamine/caffeine (69.9% vs 30.1%, p≤0.001). Faster relief of headache pain was the most important reason for preference, cited by 67.3% of patients preferring rizatriptan and 54.2% of patients preferring ergotamine/caffeine. The co-primary endpoint of pain free at 2h was also in favour of rizatriptan. 49% of patients were pain free 2h after rizatriptan, compared with 24.3% treated with ergotamine/caffeine (p≤0.001), rizatriptan being superior within 1h of treatment. Headache relief at 2h was 75.9% for rizatriptan and 47.3% for ergotamine/caffeine (p≤0.001), rizatriptan being superior to ergotamine/caffeine within 30 minutes of dosing. Almost thirty-six percent of patients taking rizatriptan were pain free at 2h and had no recurrence or need for additional medication, compared to 20% of patients on ergotamine/caffeine (p≤0.001). Rizatriptan was also superior to ergotamine/caffeine in relieving nausea, phonophobia or photophobia, and returning patients to normal function 2h after dosing (p≤0.001). More patients were satisfied 2h after treatment with rizatriptan (69.7%) than with ergotamine/caffeine (38.6%, p≤0.001). Both treatments were well tolerated. The most common adverse events after rizatriptan and ergotamine/caffeine respectively, were dizziness (6.7% and 5.3%), nausea (4.2% and 8.5%) and somnolence (5.5% and 2.3%).

P 2153

Co-prescription of triptans with other medications: a cohort study involving 240,268 patients

S. Tepper[1], C. Allen[2], D. Sanders[2], A. Greene[3], S. Boccuzzi[3]
[1]The New England Center for Headache, Stamford, CT, USA, [2]Merck & Co., Inc., Whitehouse Station, NJ, USA, [3]The Institute for Effectiveness Research, Bridgewater, NJ, USA

Introduction This study examined the rate of co-prescription of triptans available in the US (sumatriptan, naratriptan, rizatriptan, and zolmitriptan) with specified agents with potential for drug interactions.
Method A cohort of 240,268 patients receiving pharmacy benefits from Merck-Medco (N=65+M) was followed over a one-year period. This analysis included patients who received at least two triptan prescriptions during the study (6/00–5/01). 91% of the cohort remained on the same triptan during the study period. "Co-prescription" was defined as any fill for a select medication obtained between the first and last triptan fills during the study period. Mean patient age was 43 (SD+/–11.6) and 82% were female.
Results 21% were co-prescribed selective serotonin reuptake inhibitors, reflecting the considerable co-morbidity of migraine and depression. Patients taking triptans were almost never co-prescribed monoamine oxidase inhibitors (0.02%), and co-prescription of ergots was also low (1.45%). Less than 1% (0.45%) received cimetidine while taking zolmitriptan, while 2.7% of patients taking rizatriptan 10mg also took propranolol. While agents unavailable in the U.S. were not evaluated in this cohort, 6% of patients were treated with potent CYP 3A4 inhibitors, which would not be expected to cause any problems with the triptans in the survey. However, such agents are specifically contraindicated for use with one triptan (eletriptan), recently launched in the EU, suggesting that continued vigilance will be necessary to avoid co-prescription of medicines with the potential for producing adverse drug events.

P 2154

Do drivers of patient preference for acute migraine therapies cross populations? Analysis from the rizatriptan – sumatriptan preference trials

F. Skobieranda[1], R. Von Seggern[2], C. Allen[3], F. Vrijens[4], N. Bohidar[1], F. Guerra[1], A. Kolodny[1]
[1]Merck & Co., Inc., West Point, PA, USA, [2]Headache Wellness Center, Greensboro, NC, USA, [3]Merck & Co., Inc., Whitehouse Station, NJ, USA, [4]Merck & Co., Inc., Brussels, BELGIUM

Introduction Migraine therapy endpoints now include broad patient-centered measures such as preference, satisfaction, and health-related quality of life. These measures reflect the unique impact of a given disease state (presumably independent of the patient population) and the value system of the patient population (presumably different between populations) and thus may not be generalizable across populations. Patient preference was studied in US and international populations. This descriptive analysis compares drivers of preference between these populations.
Method Both studies were randomised, open-label, two-period crossover, multi-center studies. After treatment of both migraines, patients expressed preference by response to an interviewer-administered global preference question. Patients were then asked to choose the *single most important reason for preference* (SMIRP) from a 15-item list of potential drivers of preference.
Results 374 US and 381 international patients treated two migraines and expressed preference. Of these groups, 372 US and 314 international patients declared a SMIRP. The most commonly selected SMIRP was faster pain relief chosen by 49% (rizatriptan) and 53% (sumatriptan) of US patients and 57% (rizatriptan) and 53% (sumatriptan) of international patients. No other single determinant was chosen by more than 14% of the US patients and 12% of international patients in either treatment group. Rizatriptan was preferred over sumatriptan in both studies.
Conclusion By a wide margin, the speed of headache relief was the most important driver of preference for both populations. These results suggest that this driver of patient preference crosses patient populations, and supports the generalizability of preference as a valuable clinical endpoint in migraine.

P 2155

Efficacy and safety of eletriptan versus naratriptan for the treatment of a single migraine attack: results of a multi-center, randomised, placebo-controlled comparative trial

A. E. MacGregor[1], G. Garcia-Ramos[2], B. Hilliard[3], J. Hettiarachchi[3]
[1]The City of London Migraine Clinic, London, UNITED KINGDOM, [2]Fundación Clinica Médica Sur, Mexico City, MEXICO, [3]Pfizer Pharmaceuticals Group, New York, NY, USA

Introduction In previous clinical trials, eletriptan has been found to be more effective than sumatriptan and Cafergot® [1,2]. This study compared the efficacy and safety of oral eletriptan (40mg) to oral naratriptan (2.5mg) and placebo in treating a single migraine attack.
Method Randomised patients (n=483) received eletriptan 40mg (n=192), naratriptan 2.5mg (n=199) or placebo (n=92) in a double-blind, double-dummy parallel-group study. Patients treated one moderate or severe migraine headache during the 12-week study period. The primary efficacy endpoint was 2h headache response.
Results Eletriptan 40mg achieved significantly higher headache response than either naratriptan or placebo at 2h (56%, 42% [P<0.01], and 31% [P<0.0001]). Eletriptan was also superior at 1h (34%, 25% [P<0.05] and 21% [P<0.01]) and 4h (80%, 67% [P<0.01] and 44% [P<0.0001]). Pain-free rate at 2h was higher for eletriptan (35%, 18% [P<0.0005] and 19% [P<0.005]), and eletriptan patients had higher functional status at 2h than naratriptan or placebo (60%, 50% [P<0.05] and 44% [P<0.0005]). Sustained relief at 24h was higher for patients using eletriptan (38%, 27% [P<0.05] and 19% [P<0.01]) as were sustained pain-free rates (22%, 11% [P<0.01] and 12% [P<0.05]). Adverse events (AEs) were generally mild or moderate with similar incidence of all-causality AEs among the treatment groups. Eletriptan had significantly higher treatment acceptability (P<0.0005) and 24-hour global evaluation (P<0.0005) than naratriptan or placebo.
Conclusion Eletriptan 40mg has higher efficacy and acceptability than naratriptan 2.5mg or placebo in the treatment of acute migraine.
Literature
1. Goadsby PJ *et al* (2000). *Neurology;* **54**:156–163.
2. Diener H-C *et al* (2002). *Eur Neurol;* **47**:99–107.

P 2156

Efficacy of eletriptan in treatment of acute migraine in patients unsuccessfully treated with NSAIDs: results of an open-label study

R. Macalintal-Canlas[1], S. Lim[2], Y. C. Chia[3], S. Wang[4], Y. M. Cheong[5], J. Denaro[6], J. Hettiarachchi[6]
[1]Makati Medical Center, Legaspi Village, Makati, PHILIPPINES, [2]Singapore General Hospital, Singapore, SINGAPORE, [3]University Malaya Medical Centre, Kuala Lumpar, MALAYSIA, [4]Taipei Veteran General Hospital, Taipei, TAIWAN REPUBLIC OF CHINA, [5]Pfizer Pharmaceutical Group, Selangor, MALAYSIA, [6]Pfizer Pharmaceuticals Group, New York, NY, USA

Introduction Although their efficacy has not been well documented, nonsteroidal anti-inflammatory drugs (NSAIDS) are widely used for acute and prophylactic treatment of migraine. Therefore the benefits of acute treatment with eletriptan, a selective 5-$HT_{1B/1D}$ agonist, were examined in patients inadequately treated with NSAIDS.
Method In a 12-week open-label study, subjects (n=113) who had an inadequate response to NSAIDS for two of the last 3 consecutive migraine attacks or who could not tolerate NSAIDS treated a single migraine attack with eletriptan 40 mg.
Results At 2 h post dose, eletriptan 40 mg achieved headache response in 66% of subjects (95% CI, 55–77%) increasing to 87% at 4 h (95% CI, 80–95%). Eletriptan improved functional response in 70% of patients at 2 h (95% CI, 59–81%) and 82% at 4 h (95% CI, 73–92%). Migraine recurrence did not occur in most patients (76%; 95% CI, 65–87%). When present at baseline, the associated symptoms of migraine were largely relieved at 2 h including nausea (59%; 95% CI, 45–73%), photophobia (70%; 95% CI, 57–84%), and phonophobia (67%; 95% CI, 53–82%). Most subjects considered their migraine symptoms improved and resumed normal activities faster with eletriptan. Adverse events were generally mild or moderate and transient. Eletriptan was highly preferable and acceptable to NSAID users with 71% of subjects satisfied with treatment.
Conclusion Eletriptan 40 mg was effective, highly acceptable and well tolerated in the treatment of migraine pain and associated symptoms amongst subjects who were unsuccessfully treated with NSAIDS.

P 2157

Eletriptan: dose-response relationship for efficacy within the clinical dose range

T. Steiner[1], D. Dodick[2], J. Hettiarachchi[3]
[1]Imperial College, London, UNITED KINGDOM, [2]Mayo Clinic Scottsdale, Scottsdale, AZ, USA, [3]Pfizer Pharmaceuticals Group, New York, NY, USA

Introduction Eletriptan demonstrates linear pharmacokinetics within its clinical dose range of 20–80mg[1,2]. This analysis evaluates a dose-response relationship for efficacy of eletriptan in acute migraine therapy based on standard outcome measures: 2-hour headache response and pain-free rates and sustained headache-response and sustained pain-free rates.
Method First-dose, first-attack data were pooled from 7 phase III randomised, double blind trials of similar design comparing eletriptan 20mg (E20, n=434), 40mg (E40, n=1918) and 80mg (E80, n=1444) with placebo (n=1055). "Headache response" (reduction to mild or no pain) at 2h was sustained if it became no worse (i.e., no recurrence) in 24 hours without further medication. Pain-free outcomes required no pain at 2h and (if sustained) no recurrence or further medication in 24h.
Results Headache response and pain-free rates at 2h were: E20 50% and 16%; E40 60% and 27%; E80 66% and 33%. Sustained headache response and pain-free rates showed similar and statistically significant (P<0.0001) dose-related increases: E20 30% and 11%; E40 44% and 21%; E80 48% and 25%; all 3 doses of eletriptan were significantly (P<0.05) superior to placebo (14% and 4%) on these measures. Recurrence rates were inversely dose-related (P<0.0001): E20 28%; E40 23%; E80 21%.
Conclusion Eletriptan 20–80mg shows efficacy in the acute treatment of migraine headache, which is clearly dose-related across this therapeutic range. Clinicians may use this to patients' advantage, titrating the dose to meet their individual needs.
Literature
1. Shah AK et al (2002). *J Clin Pharmacol.* (in press)
2. Milton KA et al (2002). *J Clin Pharmacol.* (in press)

P 2158

A randomised, double-blind, placebo-controlled, parallel-group evaluation of sumatriptan 50mg and 100mg tablets administered during the mild pain phase of a menstrually associated migraine attack.

M. Ilmavirta[1], J. V. Loftus[2], D. Boswell[2]
[1]Medical Research Centre Toritutkain Ltd, Jyvaskyla, FINLAND, [2]GSK, Greenford, UNITED KINGDOM

Introduction Retrospective and prospective studies show that sumatriptan 100mg tablets are effective and well tolerated in the treatment of menstrually associated migraine (MAM), measured by pain reduction from moderate/severe, to mild/none. Recent data shows that sumatriptan taken at the mild pain phase produces a higher response rate.
Method The objectives of this study, conducted in 12 countries worldwide, was to determine the efficacy of sumatriptan 100mg (primary) and 50mg (secondary) in MAM by measuring the percentage of subjects with complete pain relief 2 hours after treatment. Migraine sufferers reporting regularly occurring MAM and whom experience moderate/severe MAM pain preceded by mild pain were eligible. Subjects were randomised in a 1:1:1 ratio to treat one MAM within 3 months, ideally within one hour of onset of mild pain.
Results Complete relief at 2 hours was achieved by: 22% (29/132) taking placebo, 58% (77/133) taking sumatriptan 100mg, ($p<0.001$ versus placebo), and 51% (71/138) taking sumatriptan 50mg, ($p<0.001$ versus placebo) in the primary endpoint population and 27% (17/64) taking placebo, 73% (49/67) taking sumatriptan 100mg, ($p<0.001$ versus placebo), and 62% (34/55) taking sumatriptan 50mg ($p<0.001$ versus placebo) in subjects dosing within one hour of mild pain (per protocol population, n=187) AE's in the sumatriptan 100mg, 50mg and placebo treated groups were 20%, 13% and 6% respectively. No SAE's occurred.
Conclusion Sumatriptan 100mg and 50mg tablets were effective and well tolerated in the treatment of MAM. Additionally, the results add to the evidence that early treatment during mild pain increases efficacy.

P 2159

Efficacy of eletriptan and zolmitriptan in the treatment of acute migraine: Results of a comparative, placebo-controlled study

H. Massiou[1], T. J. Steiner[2], H. Diener[3], J. Schoenen[4], N. Muirhead[5], C. Sikes[5]
[1]Hôpital Lariboisière, Antony, FRANCE, [2]Imperial College, London, UNITED KINGDOM, [3]University Essen, Essen, GERMANY, [4]University of Liège, Liège, BELGIUM, [5]Pfizer Pharmaceuticals Group, New York, NY, USA

Introduction This study compared eletriptan 40mg and 80mg with zolmitriptan 2.5mg and placebo.
Method In a double-blind, double-dummy, parallel-group, placebo-controlled study, 1337 patients were randomised to receive eletriptan 80mg (E80; n=396), eletriptan 40mg (E40; n=392), zolmitriptan 2.5mg (Z2.5; n=405) or placebo (PBO; n=144) for one migraine attack. In vitro dissolution testing and a formal bioequivalence study demonstrated bioequivalence of zolmitriptan tablet and capsule.
Results Results are presented for E80, E40, Z2.5 and PBO, respectively. Headache response rates were 74%, 64%, 60% and 22% at 2h (P=0.0001, E80 vs. Z2.5) and 40%, 28%, 25% and 5% at 1h ($P<0.0001$, E80 vs. Z2.5). E80 and E40 were superior to PBO at both time points ($P<0.0001$). At 30 min, E80 was superior to Z2.5 (12% vs. 7%;$P<0.05$). Two-hour pain-free rates were 44%, 32%, 26% and 6% ($P<0.0001$, E80 vs. Z2.5). Headache recurrence rates within 24h were 33%, 29%, 38% and 52%. Post-hoc analysis showed sustained response rates at 24 h of 47%, 44%, 35% and 11% ($P<0.001$ E80 vs. Z2.5, $P<0.01$ E40 vs. Z2.5, $P<0.0001$ eletriptan vs. PBO). E80 was superior to Z2.5 for sustained pain-free rate (29% vs. 17%; $P<0.0001$). Adverse events were generally mild or moderate and transient with the most common being asthenia (8%, 3%, 3%, 0%) and nausea (4% all groups). Both eletriptan doses were rated more acceptable than Z2.5.
Conclusion E80 has significantly greater efficacy at 2h than Z2.5 in the acute treatment of migraine. Both eletriptan doses are superior to Z2.5 over 24h as assessed by sustained response and patient acceptability.

P 2160

Significant 1-hour pain-free rates with zolmitriptan 2.5 mg orally disintegrating tablet in treatment of migraine: results of a large double-blind, placebo-controlled trial

M. M. Tuchman[1], E. Spierings[2], S. Abu-Shakra[3], W. Wasiewski[3]
[1]Palm Beach Neurological Center, Palm Beach Gardens, FL, USA, [2]Brigham and Women's Hospital, Boston, MA, USA, [3]AstraZeneca, Wilmington, DE, USA

Introduction The objective of our study was to evaluate the clinical efficacy of zolmitriptan 2.5 mg orally disintegrating tablets for the acute treatment of migraine.
Method This was a 25-center, randomised, double-blind, placebo-controlled, parallel-group, 2-attack study (608 adult migraineurs; 304 per treatment group). The ITT populations 281 in the zolmitriptan group and 284 in the placebo group who treated at least one mild, moderate or severe migraine attack (90% of the zolmitriptan and 87% of the placebo group treated 2 attacks).
Results Zolmitriptan 2.5 mg orally disintegrating tablet showed superior efficacy to placebo in achieving a pain-free status at 2 hour (primary endpoint): zolmitriptan 40% vs. 20% of placebo group (n=535 and 530 attacks, respectively; $p<0.001$). Pain-free response rates were superior to placebo starting at 1 hour (zolmitriptan 13%, placebo 8%, $p<0.01$), and at 1.5 hrs (25% vs. 14%; $p<0.001$). Significantly more patients in the zolmitriptan group achieved sustained pain-free rates (31%) vs. placebo (14%; $p<0.001$). Zolmitriptan 2.5 mg was well tolerated and AEs considered treatment-related were reported by 25% of patients in the zolmitriptan 2.5 mg group and 10% in the placebo group.
Conclusion Achieving pain free status is now considered an ideal measure of treatment efficacy in migraine. This study is one of the few clinical trials to prospectively study pain-free response rates in headaches of any severity as a primary endpoint. Zolmitriptan 2.5 mg orally disintegrating tablet demonstrated high pain-free rates vs. placebo as early as 1 hour after treatment.
Supported by AstraZeneca, LP.

P 2161

Treatment of mild migraine with oral zolmitriptan 2.5 mg provides high pain-free response rates and prevents progression to more severe migraine in patients with significant migraine-related disability

C. Lucas[1], J. A. Klapper[2], Ø. Røsjø[3], A. Poole Jørgensen[4], T. Soisson[5], B. Charlesworth[6]
[1]Hospital Salengro, Lille, FRANCE, [2]Colorado Neurology and Headache Center, Denver, CO, USA, [3]Private Practice, Oslo, NORWAY, [4]Sjolyst Medisinske Senter, Oslo, NORWAY, [5]Lariboisere, Paris, FRANCE, [6]AstraZeneca, Macclesfield, UNITED KINGDOM

Introduction Preliminary evidence from post-hoc analyses and open-label studies indicates that treatment in the mild phase of a migraine provides higher pain-free rates. This is the first prospective controlled study to assess pain-free response in the treatment of mild migraine.
Method 302 patients with migraine attacks that typically commence mild but progress to moderate/severe intensity, and with moderate or severe migraine-related disability, were randomised to oral zolmitriptan 2.5 mg or placebo for the treatment of a single migraine attack in the mild phase. The primary endpoint was 2-hour pain-free response rate. Time to headache progression was one of the secondary endpoints investigated.
Results 280 patients were included in the ITT population. Zolmitriptan was associated with significantly higher pain-free response rates compared with placebo at 1.5 (29.4% vs. 14.2%) and 2 hours (43.4 vs. 18.4%) post-dose. This response was even more marked in patients who treated early: in the zolmitriptan group, 56.6% of patients who treated a mild migraine within 15 minutes of headache onset were pain free at 2 hours compared with 20.0% of placebo recipients. Oral zolmitriptan prevented progression of migraine from a mild to a more severe attack within 2 hours of treatment in a significantly greater number of patients than placebo (46.3% vs. 29.6%; p=0.0064).
Conclusion In patients who typically experience significant migraine-related disability, treatment of migraine in the mild phase with oral zolmitriptan 2.5 mg produces high pain-free response rates and significantly reduces the progression of mild migraine to more severe headache compared with placebo.

P 2162

Zolmitriptan formulations provide fast relief in the acute treatment of migraine

B. Charlesworth, R. Yates
AstraZeneca, Macclesfield, UNITED KINGDOM

Introduction Patients who suffer from the debilitating symptoms of migraine need fast, effective pain relief.
Method In a randomised placebo-controlled study 656 patients were treated up to 2 moderate/severe attacks with zolmitriptan 5mg ODT or matching placebo.
Results The conventional zolmitriptan tablet was significantly more effective than placebo in patients with menstrually-associated migraine from 30 minutes after dosing.[1] Similarly, the zolmitriptan orally disintegrating tablet (ODT) has been shown to be effective from 30 minutes after treatment. In a randomised placebo-controlled study of 656 patients treating up to 2 moderate/severe attacks with zolmitriptan 5mg ODT or matching placebo, the headache response rate at 30 min was 16.5% for zolmitriptan vs 12.5% for placebo ($p<0.05$). In a separate study, the zolmitriptan ODT 2.5mg tablet produced at least a 1-point improvement in headache pain intensity at 30 mins post-dose (22% vs 15%; $p<0.05$). Zolmitriptan nasal spray has an even faster onset of action. Pharmacokinetic data have shown that zolmitriptan is detectable in the plasma as early as 5 minutes after nasal administration. In a multicentre, double-bind study, headache response for zolmitriptan nasal spray 5mg showed a significant difference compared with placebo from 15 mins after treatment (10.6% vs 5.1%, respectively).
Conclusion Patients can be assured that whichever formulation of zolmitriptan they choose will provide fast, effective relief from migraine. The zolmitriptan conventional tablet and the ODT have a 30 min speed of onset and the nasal spray formulation works even faster (within 15 mins).
Literature
[1]Loder L, et al. (2002). Oral Zolmitriptan Exhibits Efficacy as Early as 30 Minutes in Menstrually Associated Migraine: Results of a Large Multicenter Placebo-Controlled Study. Neurology 58 (7) Suppl 3: s 55.002.

P 2163

Migraine, triptan treatment and the risk of cardiovascular disease, stroke and mortality

G. C. Hall[1], M. M. Brown[2], J. Mo[3], K. D. MacRae[4]
[1]Grimsdyke House, Barnet, UNITED KINGDOM, [2]University College, London, UNITED KINGDOM, [3]Pfizer inc., New York, NY, USA, [4]University of Surrey, Guilford, UNITED KINGDOM

Introduction It is unknown whether the reported increased risk of stroke and chest pain with migraine is associated with triptan use. The aim of this study is to evaluate the incidence of cardiovascular outcomes, stroke and mortality in a migraine cohort, stratified by triptan treatment.
Method A retrospective cohort study of 63,575 subjects with migraine recorded in the UK General Practice Research Database, grouped into triptan "users" and "non-users". Controls were matched by age, sex and practice.
Results Triptans were less frequently prescribed to the young, elderly, males and those with cardiovascular and cerebrovascular risk factors. Adjusted hazard ratios (HR) showed a statistically significant increased risk of stroke (1.51, 95% CI 1.26–1.82) and ischaemic heart disease excluding MI (IHD) (1.24 95% CI 1.09–1.41) in "non-users" but not in "users" (1.13, 95% CI 0.78–1.65 for stroke; 1.22, 95% CI 0.96–1.53 for IHD). Decreased risk of all-cause mortality (HR 0.72, 95% CI 0.65–0.80) was observed in "non-users". Of those classified (33%), the risk of ischaemic (HR 2.49, 95% CI 1.62–3.83) but not haemorrhagic stroke (HR 1.34, 95% CI 0.90–1.99)) was significantly increased. Observed HRs for "users" and "non-users" respectively were 0.93 (95% CI 0.60–1.42); 1.11 (95% CI 0.91–1.36) for myocardial infarction (MI), 0.99 (95% CI 0.58–1.68); 0.83 (95% CI 0.66–1.03) for cardiovascular mortality.
Conclusion These data suggest that triptan therapy is not associated with increased risk of cardiovascular disease, stroke, or mortality. No association was found between migraine and MI or cardiovascular mortality. The association in "non-users" between stroke and migraine and the hypothesis that lower mortality results from confounding by socio-economic status needs investigation.

P 2164

Ultrasonography in migraine diagnosis

I. Melnichuk
Ukrainian State Medical University, Kiev, UKRAINE

Introduction Migraines are the second most common form of primary headaches, affecting approximately 10 to 15% of the global population during their most productive years. This condition frequently impacts the migraine sufferer's quality of life.
Method The correct diagnosis of migraines is based on the International Headache Society's (IHS) diagnostic criteria from 1988, a careful clinical history, and neurological examinations. Based on a study involving 22 migraine patients, only 3 of them had aura, which consists of: difficulties in speech, blurred vision, and numbness in the face and one hand. During their migraine attacks, 21 of the patients had an Ultrasonography migraine pattern. This consisted of: 1) a high level of lineal velocity blood in the sinus durae matter collateral to the side of the head, and 2) asymmetrical measurements consisting of more than 30%, in the bloodstream, in supratrochlearis arteries. Only 1 patient had a high level of lineal velocity blood in the sinus durae matter. This can be explained in the presence of a different phase of the migraine attack. The other Ultrasonography (US) criteria was normal in the other patients.
Conclusion My suggestion is that we use Ultrasonography (US) for the visualization of migraine attacks and that we include Ultrasonographic images in the probable critiquing of migraines.

P 2165

Migraine and patent foramen ovale on transcranial Doppler

I. Domitrz, J. Mieszkowski
Department of Neurology, Medical Academy, Warsaw, POLAND

Introduction Pathomechanism of migraine and migraine aura is unknown. Migraine has been reported as possible risk factor for ischemic stroke. The relationship between migraine and stroke is stronger in patients suffering from migraine with aura (MA) compared to those in whom aura does not accompany the migraine attacks. Some authors reported coexistence of migraine and patent foramen ovale (PFO). The aim of our study was to evaluate the frequency of PFO in patients with migraine with aura and compare it with the prevalence of PFO in healthy age-matched control group.
Method We assessed 38 patients (30 females and 8 males) suffering from migraine with aura and 50 controls (28 females and 22 males). In order to detect PFO the contrast transcranial Doppler was performed during Valsalva manoeuvre.
Results The prevalence of PFO was found in 18 of 38 patients with migraine with aura (47%) compared to 11 of 50 control subjects (22%). The difference between MA patients and control patients was statistically significant ($p=0.0077$).
Conclusion These findings suggest that at least some attacks of migraine with aura may be due to paradoxical embolism.

P 2166

Increased neuromuscular excitability in migraine patients: a concomitant sign or an association with latent tetany?

J. Opavsky
Faculty of Physical Culture, Palacky University, Olomouc, CZECH REPUBLIC

Introduction The study was focused on the detection of the clinical signs of an increased neuromuscular excitability in migraine patients due to a described association between migraine and tetany.
Method 42 subjects (40 women and 2 men, mean age of 40.5 years) with the diagnosis of migraine with or without aura, repeatedly followed-up during the last 2 years, underwent a neurological examination focused on the signs of an increased neuromuscular excitability. In all of them, the presence of the Chvostek's sign (CS) and in 28 of them, the presence of the Tromner's sign (TS) were assessed. The CS and TS have been frequently detected in subjects with tetany.
Results A repeatedly positive CS was proven in 28 of the subjects under study (66.6%). An inconstant presence of this sign was detected in 5 subjects (12%). A repeatedly positive TS was proven in 15 of 28 subjects (53.6%). An inconstant presence of this sign was detected in 3 subjects of this subgroup (10.7%). Repeated, as well as inconstant common occurrence of these two signs was registered in 13 of 28 subjects (46.4%).
Conclusion The frequent detection of the positive CS and TS in the subjects under study is consistent with the hypothesis of hyperexcitability in migraine. For migraine patients, special attention should be given to these clinical signs of an increased neuromuscular excitability and it is recommendable to carry out a biochemical study focused on magnesium and calcium metabolism and EMG ischaemic test for the detection of tetany.

P 2167

Evaluation of lipid peroxidation representing oxidative stress in patients with migraine

Y. Altunkaynak[1], M. Ozturk[1], V. Sozmen[1], N. Erdal[2], E. Altunkaynak[2], F. Ismen[2], S. Baybas[1]
[1]Bakirkoy State Hospital for Neurologic and Psychiatric Diseases, Istanbul, TURKEY, [2]Taksim State Hospital, Istanbul, TURKEY

Introduction Lipid peroxidation represent typically oxidative stress. The cellular damage caused by free radicals in biological systems implied oxidative stress plays an important role in the etiopathogenensis of migraine. In this study, to determine oxidative stress/antioxidant state profile in patients with migraine during attacks and interictal periods, we evaluated the levels of the substances reacting with tiobarbutric acid representing lipid peroxidizing products (TBARS), and uric acid and albumin representing extracellular antioxidant systems.
Method The study group consisted of 26 female (mean age 32±8.57) and 13 male (mean age 32.28±10.15) patients migraine and equal number of healthy subjects with the same gender distribution and mean age. Parametric student-t, Wilcoxon matched and Spearman correlation were used for statistical analysis.
Results The initial and attack serum levels of TBARS in patient group were 3.85±0.49μM and 4.75±0.64μM respectively. The initial and attack serum levels of uric acid in the patient group were 4.15±0.89 and 3.89±0.89 mg/dl respectively. The initial and attack serum levels of albumin in the patient group were 5.0±0.29 and 4.95±0.33 mg/dl respectively. The serum levels of TBARS in the patient group were significantly higher than the control group globally ($p<0.001$). Comparison of TBARS values during initial and attack periods revealed TBARS levels were significantly higher during attack periods ($p<0.001$). Uric acid levels were significantly lower during attack period ($p<0.001$). Albumin levels were not significantly different in two groups ($p>0.05$).

Conclusion Conclusively, the TBARS levels are significantly higher during initial and attack periods in the patients with migraine and this result shows lipid peroxidation rises in the patients.

P 2168

The effects of exercise on migraine headache and its relationship with blood nitric oxide level

S. Osun Naryn[1], L. Pinar Yanicodlu[1], D. Erbap[2], V. Öztürk[1], F. Ydyman[1]
[1]Department of Neurology, Izmir, TURKEY, [2]Department of Neurology, Ankara, TURKEY

Introduction The purpose of this study is to observe the effects of moderate level aerobic exercise program on migraine attacks.
Method Besides the medication of migraine, a moderate level of aerobic exercise program, 3 times a week for 1 hour, was provided to randomly selected 20 classical migrainous women; while 20 similarly subjects received only medical therapy.
Results At the end of 4 months therapy, although the pain severity, frequency and duration in both group decreased significantly; the "Visual Analogue Scale Scores" showed that, exercised group benefited from the therapies more than non-exercised group. Also "Pain Disability Index", and "Gutmann Scale Scores" which are criteria of the "life quality" of the subjects, showed, a significant relief in the exercised group; compared to non-exercised and only medically treated group. After the treatment period of 4 months; a significant increase of serum nitric oxide (NO) levels in exercised group, but not in the non-exercised group was detected.
Conclusion These results support previous reports about "possible coupling between exercise and endogenous NO formation". The physical fitness scores of the exercised subjects comparing to non-exercised controls, might help to explain the beneficial effects of physical exercise and NO formation to cardiovascular benefits, besides the pain reduction and stress relevant.

P 2169

Middle cerebral artery hemodynamic changes following CO_2 inhalation, nitroglycerine and sumatriptan

D. Russell[1], R. Brucher[2]
[1]Rikshospitalet, Oslo, NORWAY, [2]University of Applied Sciences, Ulm, GERMANY

Introduction The aim of this study was to assess blood flow and cross-section area index changes following CO_2 inhalation, nitroglycerine and sumatriptan using transcranial Doppler (TCD).
Method 5 healthy subjects (aged 26–54 years) took part in the study. Frequency-weighted first moment calculations of Doppler power were used to calculate blood flow indexes using specially designed software (BR02) and these arbitrary values were calibrated off-set to 0 flow. Cross-section area (CSA) indexes were calculated by dividing the calibrated blood flow indexes by the maximum velocities. Accuracy of this method has been assessed in an in vitro closed loop study. In 5 subjects CO_2 was inhaled via a mask in a concentration which was gradually increased to 8% during 6 minutes. 3 of the subjects were given 1 mg nitroglycerine sublingually and 3 subjects were given 12 mg sumatriptan subcutaneously. TCD monitoring was continuously carried out on the left MCA from 5 minutes before to 30 minutes after these procedures.
Results Blood flow indexes (increases from 50–100%) and maximum velocities showed a linear relationship during CO_2 inhalation, whereas the CSA indexes remained almost constant in all five subjects (mean±1 SD, 99±2.2%). Nitroglycerine administration in 3 subjects caused CSA index increases of 25, 17 and 29%, whereas sumatriptan in 3 subjects caused CSA index decreases of 24, 13 and 12%.
Conclusion In this study of healthy subjects using TCD we found that MCA blood flow indexes and velocities showed a linear relationship during CO_2 inhalation whereas MCA cross-section area indexes remained approximately constant. Nitroglycerine, on the other hand, caused a vasodilatation of the MCA and sumatriptan an MCA vasoconstriction. These results suggest that this method should now be assessed in more extensive clinical studies.

P 2170

Depressive symptoms in headache subtypes

G. Gesztelyi[1], D. Bereczki[2]
[1]Neurology and Headache Outpatient Clinic, City Health Service of Debrecen, Debrecen, HUNGARY, [2]Department of Neurology, University of Debrecen, Debrecen, HUNGARY

Introduction The efficacy of antidepressants in primary headaches and the role of serotonin both in migraine and in depression imply that depression and primary headaches might be related.
Method 183 consecutive patients with primary headaches (migraine, tension-type headache and cluster headache), or cervicogenic headache and sciatic pain were enrolled in 2 neurological practices. The frequency, duration and severity of the headache/pain and disease duration were recorded by a standard questionnaire. Severity of depressive symptoms was evaluated by the 21-item Beck Depression Inventory (BDI).
Results Mean age of the patients was 40.4±12.7 years. Mean BDI scores were 10.8±8.2 in migraine (n=46), 14.9±11.7 in tension-type headache (n=46), 14.5±10.3 in cervicogenic headache (n=43), 15.0±10.1 in patients with sciatic pain (n=19), and 19.2±14.6 in a heterogeneous group with combined headaches (n=28). Data of the single patient with cluster headache is not presented. In the total group BDI score depended on pain frequency (Spearman R=0.27, P=0.0002) and severity (Spearman R=0.25, P=0.0008). Although migraine patients had the lowest BDI score, there was no statistically significant difference among patients with migraine, tension-type headache, cervicogenic headache and sciatic pain (P=0.27, Kruskal-Wallis ANOVA). When a multiple regression model was used including headache subtype, age, frequency and severity of pain and disease duration, again, only pain frequency (P=0.00002) and severity (P=0.003) emerged as significant predictors of the severity of depressive symptoms.
Conclusion Severity of depressive symptoms in headache patients is determined rather by the frequency and severity of the pain than by the subtype of the headache.

P 2171

The necessity of C2 ganglionolysis in select patients for the treatment of cervicogenic headaches

S. Kamran
Hamad General Hospital, Doha, QATAR

Introduction The aim of this study was to evaluate the effectiveness of C2 ganglionolysis for chronic headaches.
Method We previously reported 52 patients undergoing cervical RFTC for cervicogenic headaches. Patients were selected by

Sjaastad criteria underwent cervical facet injections with at least 80% headache relief. Those who did not obtain headache relief were included in this study. These patients underwent diagnostic greater occipital nerve block (GO). Selected patients underwent RFTC of C2 (C2 ganglionolysis). Patients were followed for 6 months with headache days per month and VAS pre and 6 months post treatment. One interventional procedure was performed.
Results 10 patients were included in the study. The headache involved retro auricular and retro orbital locations. (n=6) reported partial (50%) and (n=4) no headache relief after first RFTC. (n=10) reported 100% headache relief with GO block. These patients underwent C2 ganglionolysis (unilateral 7, bilateral 3). All reported complete headache relief while on the table. Pretreatment headache days /month 4 to 12 (average 7), VAS 4 to 8 (average 6) was reduced to headache days /month 0 to1 and VAS to 0 to 2, at 6 months. No complications were reported.
Conclusion C2 headache when mixed with CH is difficult to separate. These patients may not obtain any or partial relief with medial branch RFTC. A complete headache relief with GO block followed by C2 ganglionolysis can obtain complete headache relief. However, on clinical basis were not able to determine when the C2 ganglionolysis was necessary. A larger study is underway to answer further questions. The C2 ganglionolysis is a safe and effective technique.

P 2172

Oxcarbazepine prophylaxis for chronic headaches

J. Krusz[1], R. B. Nett[2]
[1]Anodyne PainCare, Dallas, TX, USA, [2]San Antonio Headache Institute, San Antonio, TX, USA

Introduction We wanted to study a new anticonvulsant agent that has blocking effects on sodium and calcium channels, and inhibition of glutamate release. These actions are found in other agents that have been shown to be useful in treating chronic migraines and other headaches.
Method 85 patients were selected for add-on or initial therapy with open-label oxcarbazepine from 2 headache clinic populations. Patients had chronic migraine headaches that had failed at least one, and often 2 or more, neuronal stabilizing agents (n=65). Average number of migraines per month was 7.8, with 12 additional tension-type headaches per month. 35 had coexistent chronic neuropathic pain. Oxcarbazepine was started at 150mg per day and slowly titrated to maximal effect. Patients kept headache diaries and rated severity on a 0 to 10 scale.
Results 46 patients responded to oxcarbazepine treatment with 38 reporting greater than 50% reduction in migraine frequency and 8 with 25–50% reductions. 4 patients with chronic daily headache had resolution of their headaches. 10 patients did not respond and 6 discontinued due to side effects; 3 were lost to follow-up. 20 patients have just been started. Average dose was 1450 mg per day in 2 doses. Remaining migraines in responders were at least 30% less severe (0 to 10 scale).
Conclusion This open-label study with oxcarbazepine shows very good efficacy in a difficult to treat population of refractory migraine and tension-type headache patients. It is at least as effective as other neuronal stabilizing agents that have been tried for similar populations. It would be warranted to perform double-blind studies with oxcarbazepine in the prophylaxis treatment of migraines and other headache syndromes.

P 2173

Chronic paroxysmal hemicrania with sensory disturbances in the distribution of the trigeminal nerve: a presentation of 3 cases.

S. Sabetay[1,2], B. Weller[1,2], Y. River[1,2]
[1]The Department of Neurology, Bnai-Zion Medical Center, Haifa, ISRAEL, [2]The Technion School of Medicine, Haifa, ISRAEL

Introduction Chronic Paroxysmal Hemicrania (CPH) is an episodic disorder with facial pain and autonomic disturbance.
Method We present 3 patients fulfilling criteria for the diagnosis of chronic paroxysmal hemicrania, including the positive response to Indomethacin treatment.
Results Our patients had distinct sensory disturbance in the distribution of the ipsilateral trigeminal nerve (particularly the ophthalmic branch) during the attack. Imaging studies of the brainstem were negative. On 2 patients we performed the blink reflex test (repetitive and single stimulation) on the affected side and contralaterally. During the attack, we obtained prolonged time interval for the R2 wave bilaterally following stimulation of the affected side. In addition, we found loss of attenuation of R1 & R2 on repetitive stimulation.
Conclusion As known so far, chronic paroxysmal hemicrania syndrome does not involve facial sensory disturbance. Our observation indicates a possible role of the pontine tegmentum in generating the pain, sensory loss, and associated autonomic manifestations. It is perhaps the first series of patients in the medical literature with CPH and episodic trigeminal sensory loss.

P 2174

"Symptomatic" migraine: case report

A. Roceanu, G. Iana, O. Bajenaru
Emergency University Hospital, Bucharest, ROMANIA

Case report A 45 year old woman was admitted to the Department of Neurology of the University Hospital of Bucharest following an extremely severe left-sided temporo-occipital throbbing headache, accompanied by visual disturbances, nausea and vomiting.
She had a 6-year history of such attacks of unilateral headache preceded most of the time by visual positive (phosphenes) or negative (scotomas) phenomena, which started specially in the right visual hemi-field and sometimes migrate across the visual field. Since than, she was labelled as migraine with aura.
For the last 6 months she noticed an increase in frequency and also in the duration and intensity of these attacks and their lack of response to the usual medication (non-steroidal anti-inflammatory drugs, antiemetics). There was no family history of migraine.
Physical and neurological examination on admission disclosed a slight papilloedema and a right Babinsky sign which warranted an imaging procedure. A cerebral computed tomography showed a left-sided occipital arteriovenous malformation which was confirmed by a cerebral angiography.
Conclusion About 10–12% of the population are migraine sufferers, and routine CT scanning is too expensive for a screening headache evaluation to a patient with normal physical and neurological examination. A careful history with correct interpretation of the patient diary, a thorough physical and neurolo-

gical examination may raise the suspicion of "symptomatic" migraine due to associated structural cerebral lesions and the indication for neuroimaging procedures.

P 2175

Idiopathic intracranial hypertension without papilloedema

M. Moghaddasi[1,2], A. Freydoonnejad[3], B. Zamani[2]
[1]Rasool Akram Hospital, Tehran, ISLAMIC REPUBLIC OF IRAN, [2]Iran University of Medical Sciences, Tehran, ISLAMIC REPUBLIC OF IRAN, [3]Ministry of Petroleum Main Hospital, Tehran, ISLAMIC REPUBLIC OF IRAN

Introduction Idiopathic intracranial hypertension (IIH), also known as pseudotumour cerebri, (1,2) is characterized by headache, papilloedema, minimal or absent focal neurologic sign and normal CSF findings, all occurring in the absence of enlarged ventricles or an intracranial mass on CT scanning or MRI. (1,3) Pseudotumour cerebri has a number cause or pathogenetic association, (4) but the most common form of the syndrome has no firmly established cause – i.e. it is idiopathic and is now generally referred to as idiopathic intracranial hypertension. (2)
Case report A 45-year-old woman was referred with complaint of headache 5 months prior to admission. Headache described as a dull and a feeling of pressure lasting a few hours a day and 3–4 days a week. It was mainly localized in occipital and radiating to frontal region as an occasion. It was pulseless occasionally with nausea without vomiting. There was no photophobia or phonophobia and no more complaint except for transient diplopia. Past medical history was negative for systemic disease such as hypo or hyperthyroidism, hyperparathyroidism, Cushing disease etc. Some medication such as Brufen, Inderal, Surmontil, Triptysol and Sodium valproate was given in last few months with no improvement. On arrival: BP=130/90, RR=18, PR=78, Wt=105 kg. Systemic physical examination was normal. In neurological examination mental status was normal, cranial nerves exam including fundoscopy, Snellen visual acuity and confrontation perimeter were all normal except for right abducens paresis. Brain MRI with and without GD was normal. Lumbar puncture was performed and showed: CSF pressure=400 mm H2O, WBC=0, RBC=5, protein=15mg/100, sugar=55mg/100 (concomitant blood sugar=95), Gram stain and sedimentation for malignant cell were negative. Laboratory testes such as CBC, PBS, ESR, TFT, ANA, ANCA, RPR, PPD were all normal.
Patient was diagnosed as IIH and underwent lumbar puncture every other day. The patient's headache gradually subsided and diplopia improved. After five successive LP, the CSF pressure fell to 200 mm H2O and the patient was discharged with Acetazolamide 250 mg tds. Two weeks later the CSF pressure was 240 mm H2O and after 3 alternate day lumbar puncture, the CSF pressure fell to 190 mm H2O and the patient discharged with Acetazolamide.
Conclusion IIH in its classic form present with headache and papilloedema that raised the suspicion of hydrocephalus or tumours, when brain imaging showed normal size ventricles without evidences of a mass lesion and subsequent lumbar puncture showed only raised of CSF pressure, then it is called pseudotumour or IIH. Although papilloedema is a cardinal feature of IIH, but in rare cases it may occur without papilloedema, (3) or pseudopapilloedema, (5) therefore it is advised that in the presence of obesity and chronic headache, a spinal tap may be indicated to exclude the presence of IIH without papilloedema.

P 2176

The effectiveness of prophylactic treatment of sertraline on headache and neuropsychological parameters of menstrual migraine patients

A. Erdemoglu[1], O. Oguzturk[2]
[1]Kirikkale University, Ankara, TURKEY, [2]Kirikkale University, Kirikkale, TURKEY

Introduction The aim of the study was to investigate the effectiveness of sertraline on headache parameters, depression and anxiety scores of menstrual migraine patients.
Method 30 patients, age ranged between 22–35 (mean. 301±1.3), were admitted to the Neurology department between 2001–2002 and were diagnosed as menstrual migraine. 30 healthy age and sex-matched patients were included into the study. Headache frequency, severity and duration were recorded. Sertraline was administered for three months. Zung, Beck Depression tests, STA-I and STA-II tests were performed.
Results Mean headache frequency was 3.2±0.6 and 1.1±0.4, mean headache severity 8.6±0.7 and 4.3±1.1 in pre and post treatment, respectively ($p<0.01$). In pre-treatment, the daily activities were limited in 86% of patients and 43% of patients in post-treatment ($p<0.01$). The anxiety and depression scores differed between menstrual migraine patients and control group. A significant correlation was observed between the scores of anxiety ($p<0.05$) and depression (0.04) and headache frequency and severity. The headache parameters, anxiety and depression scores was significantly changed at the end of the study.
Conclusion Sertraline is found to be a safe and effective agent in reducing in headache parameters besides anxiety and depression scores of menstrual migraine patients. In treatment of menstrual migraine patients, the level of anxiety and depression should be evaluated and treated properly for optimal results.

P 2177

Levetiracetam, given intravenously, for acute intractable migraines

J. Krusz[1], D. Daniel[2]
[1]Anodyne PainCare, Dallas, TX, USA, [2]Trinity Pharmacy, Dallas, TX, USA

Introduction Levetiracetam, the S-enantiomer of piracetam, blocks high-voltage (N-type) calcium channels. It has been shown, for the first time (Krusz, 2001) to have value in migraine prophylaxis, given orally. We decided to prepare and utilize a sterile intravenous form of this agent for use in treating acute intractable migraines in the headache clinic.
Method Sterile, preservative-free levetiracetam, 200mg/ml or 400mg/ml was prepared in a laminar flow hood by a compounding pharmacist (DD). Particulate matter was filtered out through a series of filtrations and the solution was stabilized at a pH of 6.0. The resulting solution was clear. 16 patients with intractable migraine who failed usual abortive therapy at home were seen in the clinic. 2 patients were treated twice with IV levetiracetam. 6 were female and 10 male. Average age was 46.8 years (range 28–58). Headache severity in 2 patients was #5/10 and more than #7/10 in the rest. An IV line was started with normal saline. No other medications were given, orally or IV. A test dose of 400mg levetiracetam was given and then 400-600mg was given every 5 minutes to maximum effect.
Results 8 patients had complete resolution of their migraine. Average decrease of severity was 77.2%, at an average dose of 4167mg (range 400–11200mg) over 56 minutes. 1 patient had no response. No side effects were reported by any patient.

Conclusion This preliminary open-label study with intravenous levetiracetam in the treatment of migraine shows very good efficacy and is comparable to other available acute IV agents. It is well tolerated over a wide dose range with no toxicity.

P 2178

Zolmitriptan orally disintegrating tablet is preferred over sumatriptan tablet in acute treatment of migraine

B. Charlesworth, on behalf of the ZEST study group
AstraZeneca, Macclesfield, UNITED KINGDOM

Introduction A zolmitriptan formulation has been developed that dissolves in the mouth without the need for water. This study evaluated patient preference for zolmitriptan 2.5mg orally disintegrating tablet (ODT; Zomig Rapimelt®) or sumatriptan 50mg tablet for acute treatment of migraine.
Method Patients meeting IHS criteria for migraine were randomised to zolmitriptan 2.5mg ODT or sumatriptan 50mg tablet to treat a single migraine attack. Patients returned to the clinic within 1 week of treatment and were given the alternate treatment to treat a second migraine attack within 12 weeks.
Results Of the 186 patients in the ITT population, 168 treated with both formulations and answered the preference question. Overall, 60.1% of patients preferred zolmitriptan ODT, while 39.9% preferred sumatriptan tablet ($p=0.0130$). A significantly greater proportion of patients felt that zolmitriptan ODT was the least disruptive treatment (83.6% vs 16.4%), was easier to take (85.5% vs 14.5%), was more convenient to take (86.1% vs 13.9%) and enabled them to maintain an active lifestyle (65.5% vs 34.5%) compared with the sumatriptan tablet (all $p<0.0001$). The zolmitriptan ODT was rated as excellent or good by 69.5% of respondents compared with 52% for the sumatriptan tablet. Overall preference favoured zolmitriptan ODT among patients with baseline nausea or vomiting. More than 90% of patients stated that zolmitriptan ODT allows migraine to be treated any time and anywhere.
Conclusion A significant majority of adults with migraine prefer zolmitriptan ODT to sumatriptan tablet and consider the zolmitriptan ODT to be convenient and allows treatment anytime a migraine strikes.

P 2179

Intradermal Botulinum toxin, type A, treatment for cervicogenic migraine

J. Krusz
Anodyne PainCare, Dallas, TX, USA

Introduction Botulinum toxin, type A, has been used to treat migraine headaches, but the results of past studies have varied and are not always dose-dependent. I chose an intradermal route for this agent, on the basis that nociceptive fibers are most numerous in the skin and that cutaneous sensory input from the cervical region may contribute to migraine headaches.
Method 14 patients with IHS-criteria migraine headaches were treated; 12 had failed neck surgery and 10 were primarily unilateral in headache location. 4 had bilateral cervicogenic migraines. All had cervical muscle spasm, evidenced by examination. Botulinum toxin, type A, (100 units) was given intradermally at the site of greater and lesser occipital nerve inlets, on the side of migraine symptoms.
Results 9 patients reported decrease in migraine headaches and spasm on the side of intradermal administration. Average decrease in migraine frequency was over 70%, and remaining headaches were 50% less severe. Average duration of toxin effect was 12 weeks (range=5–19 weeks). 3 were treated more than once, but more than 4 months apart. 3 patients did not respond to treatment, although 1 had cessation of muscle spasm. 2 patients were just injected.
Conclusion Botulinum toxin, type A, given intradermally is quite effective in reducing cervicogenic migraines. This new delivery site for the toxin raises speculation about mechanisms of action via uptake into nociceptive fibers with transport to the dorsal horn of the spinal cord. Blockade of pain transmission at central facilitative sites may then occur, as these may contribute to persistent cervicogenic migraines. Double-blind studies with botulinum toxin, type A, to replicate these open-label observations are definitely warranted.

Headache and pain 2

P 3079

Systemic nitroglycerine decreases CGRP-afferents to rat caudal spinal trigeminal nucleus, an effect modulated by estrogen

A. Pardutz[1], A. Parducz[2], L. Vecsei[1], J. Schoenen[3,4]
[1]Dept. of Neurology, University of Szeged, Szeged, HUNGARY, [2]Institute of Biophysics, Hungarian Academy of Sciences, Biological Research Center, Szeged, HUNGARY, [3]Research Center for Cellular & Molecular Neurobiology, Neuroanatomy & Physiology Laboratories, University of Liège, Liège, BELGIUM, [4]Department of Neurology, University of Liège, Liège, BELGIUM

Introduction Systemic administration of nitroglycerine, a nitric oxide (NO) donor, triggers in migraine patients, but not in healthy volunteers, a delayed attack of which the mechanisms are unknown. Migraine is after puberty by far more prevalent in women and attacks can be triggered by abrupt falls in plasma estrogen levels, which accounts in part for sexual dimorphism, but lacks an established neurobiological explanation.
Method We studied therefore the effect of subcutaneous nitroglycerine (10 mg/kg) on the innervated area of calcitonin gene-related peptide (CGRP) containing afferents to the superficial laminae of the spinal portion of trigeminal nucleus caudalis (sTNC) and its modulation by estrogen.
Results In male rats, nitroglycerine produced after 4 hours a significant decrease of the area innervated by CGRP-immunoreactive afferents. These effects were not observed in the superficial laminae of thoracic dorsal horns. The effect of nitroglycerine was similar in ovariectomized females (ovx). In estradiol-treated ovariectomized females (ovx+E2) the area in laminae I-II of sTNC covered by CGRP-immunoreactive fibers was lower and not significantly changed after nitroglycerine. The bouton size of CGRP profiles was smaller in ovx+E2 animals; after nitroglycerine it decreased significantly only in males and ovx rats.
Conclusion NO donor nitroglycerine, is thus able to differentially influence CGRP containing fiber populations in the superficial laminae of the rats' TNC. Estradiol modulates the basal expression of this transmitter and blocks the nitroglycerine effect. These data may contribute to a better understanding of the cellular mechanisms by which estrogen can influence migraine severity and the triggering of attacks by NO.

P 3080

Nitroglycerine induces long-lasting hyperalgesia in rats – a neuropharmacological study

C. Tassorelli[1], D. C. Wang[2], R. Greco[1], G. Morelli[3], G. Sandrini[1], G. Nappi[4]
[1]Lab. Integrative Autonomic Systems, IRCCS Neurological Institute C. Mondino Foundation, Pavia, ITALY, [2]Shangai Medical University, Shangai, CHINA, [3]Dept. of Biomedical Science, Pharmacology Unit, University of Modena, Modena, ITALY, [4]IRCCS Neurological Institute C. Mondino and Chair of Neurology, La Sapienza University, Pavia/Rome, ITALY

Introduction Nitric oxide is a gaseous substance that plays an important role in nociceptive transmission and central sensitisation. Nitroglycerine is a nitric oxide donor whose effects on the central nervous system have been extensively investigated in recent years. Neuro-physiological and neuropharmacological studies have demonstrated that derived-derived nitric oxide evokes biological effects on neuronal activity in rat brain.
Method In the present study, we sought to evaluate the effects of nitroglycerine, on the behavioural nociceptive responses induced in rats by the formalin test, a well-known test of tonic pain based on the injection of algogenic agents intradermally, at different times from the drug administration. The possible role of cyclo-oxygenase (COX) activity and NMDA receptors was investigated by means of neuropharmacological probes.
Results Following systemic nitroglycerine administration, an increase was observable in the number of flinches during phase II of formalin test, from 1 to 4 hours post-injection. 4 hours after the injection of nitroglycerine, a significant increase was also observed in phase I of formalin test. Pre-treatment with indomethacin, a COX inhibitor significantly reduced the number of flinches in both phases of the text. MK-801, a non-competitive NMDA receptor antagonist, blocked nitroglycerine-induced nociceptive behaviour in a dose-dependent manner.
Conclusion These findings suggest that systemic nitroglycerine induces a long lasting hyperalgesic state that is mediated by cyclo-oxygenase and glutamate-dependent mechanisms.

P 3081

Patients with migraine prefer zolmitriptan orally disintegrating tablets over conventional sumatriptan tablets and rizatriptan orally disintegrating tablets

A. Dowson[1], B. Charlesworth[2]
[1]Kings Headache Services, London, UNITED KINGDOM, [2]AstraZeneca, Macclesfield, UNITED KINGDOM

Introduction Zolmitriptan orally disintegrating tablet (ODT) enables patients to treat migraine quickly, conveniently and discreetly when water is not readily available, and is useful for patients with migraine who have nausea or difficulty swallowing conventional tablets.
Method In an international survey, when migraineurs were asked which formulations of migraine medication they would prefer.
Results The most popular choice was a tablet that dissolves in the mouth and can be taken without liquids. Preference data from patients treated with zolmitriptan ODT indicated that the majority of patients felt the ODT could be taken sooner (70%) and was more convenient to take (78%) than conventional tablets, and liked the orange taste of the ODT (80%). This was confirmed in a crossover study, in which patients treated their migraine attacks with zolmitriptan ODT 2.5mg and with sumatriptan conventional tablet 50mg. A significantly greater proportion of patients preferred zolmitriptan ODT overall (60.1% vs. 39.9%; p=0.0130), and for convenience and ease of use, compared with sumatriptan tablet. Similar preferences were seen among patients with nausea or vomiting at baseline, or with difficulty swallowing tablets. Another comparative study (in migraineurs during a migraine-free period) found that migraineurs strongly and significantly favoured zolmitriptan ODT over the rizatriptan wafer (70% vs. 27%; p<0.001), in terms of taste and convenience. Preference for individual features of the taste and packaging also significantly favoured zolmitriptan ODT over rizatriptan wafer.
Conclusion These studies show that zolmitriptan ODT is the preferred formulation for migraineurs compared with both conventional sumatriptan tablets and the rizatriptan ODT.

P 3082

Benign thunderclap headache – retrospective evaluation of 71 patients admitted to our Neurological Dept between 1990 – 2002.

J. Staszewski, J. Kotowicz
Military Medical Academy, Warsaw, POLAND

Introduction Thunderclap headache (THC) is a descriptive term of sudden and hyperacute headache most often occurring for the first time in life. It may represent a serious underlying disease such as subarachnoid haemorrhage, unuttered aneurysm but can also occur in the absence of pathologic conditions.
Method The aim of this retrospective study was to evaluate the incidence of idiopathic and symptomatic thunderclap headaches in patients admitted to the Department of Neurology. We also focused on and analysed idiopathic THC regarding to it syndromes, course and concomitant diseases.
Results The diagnosis of idiopathic THC was established in 71 of 368 patients presented to the Neurological Dept. between 1990–2002 with thunderclap headache. Most patients with idiopathic THC complained of "thunder-like" headache with mainly occipital localisation. No history of similar headaches or positive family history was noticed. Neurological examina-tion revealed transient focal symptoms in 20% of patients, 42% presented with nausea or vomiting, 18% had neck stiffness. The most common concomitant diseases were acute or chronic infections and hypertension. 40% of patients had elevated inflammatory markers which normalised during hospitalisation in 20% of cases. We observed seasonal incidence with the highest incidence in summer and winter.
Conclusion 20% of patients presented to the Neurological Dept. with THC consist of idiopathic, benign condition of unknown aetiology. Observed seasonal incidence with coexisting signs of infection in 40% of patients may suggest the role of inflammatory process in benign THC pathogenesis.

P 3083

Triptan tablet consumption per attack (24 hours) in Spain: survey extension to include almotriptan

R. Leira[1], M. Machuca[2], A. Lopez-Gil[3], J. Pascual[4]
[1]Hospital Clinico Universitario, Santiago de Compostela, SPAIN, [2]Community Pharmacy, Sevilla, SPAIN, [3]MSD de España, Madrid, SPAIN, [4]Hospital Universitario "Marques de Valdecilla", Santander, SPAIN

Introduction The objective of our study was to compare patient self-reported tablet consumption of rizatriptan 10mg per attack with that of almotriptan 12.5mg in migraine patients in a pharmacy setting and to combine these data with a previous triptan survey.

Method Patients attending a pharmacy for a triptan prescription recorded the baseline pain intensity, the number of tablets of triptan per attack and 2 hour satisfaction. Univariate comparisons: ANOVA or Student t Test and Chi-square or Fisher exact test. A generalised estimating equation method was used to correct for within-subject correlation. Adjusted OR [95% CI] confidence intervals were calculated.
Results A previous survey showed that rizatriptan tablet consumption (mean±SD; 1.24±0.56) was lower than for sumatriptan (1.75±1.2, $p<0.05$); zolmitriptan (1.61±0.86, $p<0.05$) and naratriptan (1.46±0.62, $p=0.05$). In this survey, 118 patients were recruited and yielded 297 evaluable migraine attacks (rizatriptan=118; almotriptan=97; nontriptan=82). Rizatriptan consumption (1.22±0.49) was significantly lower than for almotriptan (1.55±0.65, $p<0.001$). The proportion of attacks treated with one triptan tablet was higher for rizatriptan (80.4%) than for almotriptan (53.6%, $p=0.001$). Almotriptan treated attacks had a more than three times greater likelihood of taking a second dose than rizatriptan (AdjOR 3.42 [95% CI 1.75–6.69], $p=0.008$). Patients were significantly more (27%) satisfied at 2 hours with rizatriptan (88.3%) than with almotriptan (69.2%) (AdjOR 3.32 [95% CI, 1.38–8.08], $p=0.008$).
Conclusion Triptan tablet consumption and likelihood of using more than one tablet per attack was significantly lower with rizatriptan than with other triptans. Patients were significantly more satisfied at 2 hours with rizatriptan than with almotriptan.
Supported by a grant from Merck & Co., Inc.

P 3084

Familial occurrence of migraine with aura in a population-based study

D. Cologno[1], A. De Pascale[2], G. Manzoni[1]
[1]Headache Centre-Institute of Neurology, Parma, ITALY, [2]National Health Service Unit FG-1, San Severo (Foggia), ITALY

Introduction To better define a possible genetic basis for migraine with aura (MA), we investigated its familial occurrence in a sample of MA patients (17 women and 9 men) recruited from an epidemiological study of MA among the general population.
Method The patients were selected out of a total of 1,392 subjects (842 women and 550 men) representative of the general population aged 18 to 65 years in the southern Italian town of San Severo. MA family history was determined through direct interviews with all living first-degree relatives of the 26 MA patients who could be reached by investigators, i.e. 119 people (71 women and 48 men). MA diagnosis was made according to the 1988 International Headache Society (IHS) criteria.
Results Of our 26 MA patients, 7 (6 women and 1 man) had a family history of MA, with a total of 7 first-degree relatives affected by the disease (1 mother, 2 fathers, 1 brother, 1 sister and 2 children). Based on the MA lifetime prevalence rate (1.6%) in the San Severo general population, the relative risk (RR) of MA in the first-degree relatives of our patients was 3.68, i.e. 4.16 for females and 2.77 for males.
Conclusion Our RR rate was very close to that of Russell (3.79 in 1995), but markedly lower than that of Kalfakis et al. (11.8 in 1996). Though comparable to Russell's, our RR rate was estimated from substantially different MA lifetime prevalence rates, both for the general population and for relatives of MA patients.

P 3085

Mood disorders in migraine with aura subjects: an epidemiological study on the general population

D. Cologno[1], A. De Pascale[2], G. Manzoni[1]
[1]Headache Centre-Institute of Neurology-University of Parma, Parma, ITALY, [2]National Health Service Unit FG-1, San Severo (Foggia), ITALY

Introduction In our epidemiological study of migraine with aura (MA) among the general population of the southern Italian town of San Severo, we investigated the presence of mood and anxiety disorders in a sample of 26 patients (17 women and 9 men) with MA.
Method The patients were recruited from a representative sample (1392 subjects aged 18 to 65 years) of the San Severo general population. As controls we recruited 52 non-MA subjects sex- and age-matched (±2 years) to our MA patients. Both cases and controls were tested with the Italian-language M.I.N.I. 4.4 version of the SCID structured interview based on the 1994 diagnostic criteria for DSM-IV, in order to determine the presence of mood and anxiety disorders.
Results Comparison between data from the interviews with MA patients and controls showed: 1) episodes of major depression and dysthymia in 26.9% of MA patients versus 25.0% of controls; 2) manic and/or hypomanic episodes in 3.8% of MA patients versus 5.8% of controls; 3) PAD in 30.7% of both MA patients and controls; 4) agoraphobia with or without PAD in 50.0% of MA patients versus 48.1% of controls; 5) social phobia in 7.7% of both MA patients and controls; and, 6) generalized anxiety disorder in 30.8% of MA patients versus 38.5% of controls.
Conclusion We did not find any statistically significant differences. Our findings appear at a variance with those reported so far by other authors, who suggested a close correlation between MA and mood and anxiety disorders, in particular PAD.

P 3086

The Spectrum of Headaches experienced by Migraineurs in a primary care setting

L. Newman[1], S. Tepper[2], C. Dahlof[3], A. Dowson[4], F. Malik[5], J. V. Loftus[5]
[1]St Lukes Roosevelt Hospital Centre, New York, NY, USA, [2]New England Headache Centre, Stamford, CT, USA, [3]Gothenburg Migraine Clinic, Gothenburg, SWEDEN, [4]Kings College Hospital, London, UNITED KINGDOM, [5]GSK, Greenford, UNITED KINGDOM

Introduction This prospective, international, open-label study was designed to examine the association of headache impact and migraine diagnosis in subjects presenting with headache to primary care physicians (PCP). The spectrum, impact and the frequency of IHS migraine, migrainous, and tension headaches was also determined.
Method Newly diagnosed migraine (n=271) and non-migraine subjects (n=105) completed a headache impact test and headache survey at baseline, and diaries for the first 6 headaches treated during the study. At study completion an expert panel reviewed the diaries, providing a final IHS diagnosis. The number of attacks subjects experienced meeting criteria for migraine (1.1/1.2), migrainous (1.7), or tension headache (2.1) was also determined.
Results Diary review by the panel resulted in the following diagnostic groups: non-migraine (n=22), misdiagnosed migraine (n=86), and migraine (n=265). The spectrum of headache and percentage of attacks experienced were: in the mi-

graine diagnosed group: 51% migraine (1.1), 22% migraine (1.2), 23% Migrainous (1.7) and 4% Tension headache (2.1). In the misdiagnosed group results were: 26% migraine (1.1), 10% migraine, (1.2), 47% migrainous and 17% tension headache. Misdiagnosed cases were 2–3 times as likely to have migrainous or tension headache. Using diary data, the misdiagnosed and migraine groups were similar in reporting moderate or severe headache pain, both at 91%. Misdiagnosed cases were more likely to report bilateral pain.
Conclusion Migraineurs experience a spectrum of headaches. Diagnostic errors are more likely to occur when one focuses on headache frequency instead of the migraine features of headache.

P 3087

Association of headache impact test (HIT-6) and IHS migraine diagnosis in the primary care setting

S. Tepper[1], C. Dahlof[2], L. Newman[3], A. Dowson[4], B. Pham[5], J. Kwong[6], A. Scott[6]
[1]New England Headache Center, Stamford, CT, USA, [2]Gothenburg Migraine Clinic, Gothenburg, SWEDEN, [3]St. Lukes Roosevelt Hospital Center, New York, NY, USA, [4]Kings College Hospital, London, UNITED KINGDOM, [5]GlaxoSmithKline, Mississauga, ON, CANADA, [6]GlaxoSmithKline, Research Triangle Park, NC, USA

Introduction This prospective international study examines the association of headache impact and IHS migraine diagnosis in subjects presenting with headache to primary care physicians (PCP).
Method Subjects not previously diagnosed with migraine (N=377) completed baseline and monthly HIT-6 and diaries for three months. At study end, experts blinded to HIT-6 score reviewed the diaries and provided a final IHS diagnosis. The accuracy of HIT-6 in identifying IHS 1.1 or 1.2 migraine diagnosis were evaluated by receiver operating characteristics (ROC) curve, sensitivity, specificity, positive and negative predictive values for HIT-6 scores of 56, 60 and 63.
Results 76% of subjects received IHS migraine diagnosis after expert review. The full range of HIT-6 scores (36 to 78) has a diagnostic accuracy (area under the ROC curve) of 67%. The probabilities of migraine diagnosis for HIT-6 scores >/=56, >/=60 and >/=63 were 0.80, 0.82 and 0.84, respectively (positive predictive values). The percentages of migraineurs having a score >/=56, >/=60 and >/=63 were 91%, 85% and 67%, respectively (sensitivity). The probabilities of non-migraine were 0.46, 0.44, and 0.36 for scores <56, <60 and <63, respectively (negative predictive values). The percentages of non-migraine subjects having a score <56, <60 and <63 were 25%, 39% and 60%, respectively (specificity). Using a cut-off score of 60, HIT-6 identified migraine diagnosis correctly 74% of the time.
Conclusion Subjects with high HIT-6 scores are likely IHS migraineurs. Patients with migraine features who report low HIT scores may require additional clinical evaluation. HIT-6 may facilitate migraine diagnosis in the PCS.

P 3088

Increased time at work and improved productivity while at work with Rizatriptan 10 mg: a multi-work site study in Spain (MILEBA)

A. Lopez[1], M. J. A. Láinez[2]
[1]Mutual Cyclops, Palma de Mallorca, SPAIN, [2]Hospital Clinic Universitario, University of Valencia, Valencia, SPAIN

Introduction The objective of our study was to examine the impact of rizatriptan 10 mg on work and productivity in employed migraine sufferers.
Method Employed individuals with migraine (IHS criteria), at 20 companies with 27 work sites, were recruited by the on-site Occupational Medicine Specialists in a prospective study. Patients were administered a questionnaire with a 3 month recall period at baseline and at a 3 month follow-up visit on their experiences with rizatriptan pre/post intervention. Work-related outcome measures included work missed due to absence, percent effectiveness in paid work performance, productive time on the job, and total work loss due to migraine. Wilcoxon tests were used to compare work-related outcomes.
Results A total of 259 patients (68.5% female, mean age 39 years, 75.1% without aura) completed the study. Pre-intervention treatments used by patients prior to exposure to rizatriptan 10 mg were: 78.8% paracetamol or composed analgesics, 45.2% NSAIDS, 33.2% ergotamine, and 17.8% others. Mean changes in work-related outcome measure for 3 month recall period pre and post intervention were: days absent from work (1.86 vs 0.6, p<0.001); percent effectiveness in paid work performance (57.3% vs 69.2%, p<0.001); productive time lost while on the job (3.4 vs 1.5 days, p<0.001); and total work day equivalents lost due to migraine (5.2 vs 2.1, p<0.001).
Conclusion In an employed population of migraine sufferers, treatment with rizatriptan 10 mg significantly decreased (>60% reduction) total migraine-related work loss compared to their experiences with previous medications. These findings have important implications for selecting appropriate treatment in a disabled employed migraine population.

P 3089

Improved quality of life with Rizatriptan 10 mg vs previous migraine treatment in an employed population: a multi-work site study in Spain (MILEBA)

M. J. A. Láinez[1], A. López[2]
[1]Hospital Clinic Universitario. University of Valencia, Valencia, SPAIN, [2]Mutual Cyclops, Palma de Mallorca, SPAIN

Introduction The objective of our study was to assess the impact of rizatriptan 10 mg on quality of life in employed migraine sufferers primarily using other acute treatments.
Method Employed individuals with migraine (IHS criteria), at 20 companies with 27 work sites, were recruited by the on-site Occupational Medicine Specialist in a prospective study. Patients were administered a generic quality of life questionnaire (SF-36) at baseline to record their quality of life while on previous migraine treatment and at a 3 month follow-up visit to record their quality of life after treatment with rizatriptan 10 mg. Wilcoxin tests were used to compare post-intervention to pre-intervention quality of life scores.
Results A total of 259 patients (68.5% female, mean age 39 years old, 75.1% without aura) completed the study. Pre-intervention treatments used by patients prior to exposure to rizatriptan 10 mg: 78.8% paracetamol or composed analgesics, 45.2% NSAIDS, 33.2% ergotamine, and 17.8% others (6.5% of all patients had previously used a triptan). Comparing post-intervention to the pre-intervention SF-36 scores, we observed significant improvements (p<0.001) in the overall 5 out of 8 domains (physical functioning, bodily pain, vitality, social functioning, and mental health).
Conclusion Treatment of migraine with rizatriptan 10 mg significantly improved quality of life compared to patient experiences with previous migraine treatment in a cohort of employed migraine sufferers.

P 3090

Changes in head motion after saline induced neck pain

M. Berger[1], J. Berger[1], S. Lechner-Steinleitner[1], F. Gerstenbrand[2]
[1]Neuroorthopedic Department, University Hospital of Neurology, Innsbruck, AUSTRIA, [2]Institute for Restorative Neurology and Neurorehabilitation, Ludwig Boltzmann Institute, Wien, AUSTRIA

Introduction In previous studies the kinematic analysis of painful head movements in patients showed characteristic changes in velocity, amplitude, synkineses, acceleration and deceleration. The aim of the present study was to investigate the amount and duration of these changes in healthy volunteers after pain stimulation by injection of hypertonic saline.
Method 12 volunteers participated in the study (six females; six males; age range: 22–30 years; mean: 26 years). The head movements were recorded by Cervicomotography (Berger 1990), a method using a magnetic field measuring system (Flock of Birds) and special software programmes. 0.5 ml hypertonic sa-line was injected paravertebrally right of the seventh cervical vertebra. A one minute lasting head rotation was measured three times before the injection, immediately after the injection and one, three and twenty-four hours after the injection. The course of pain intensity was recorded by a visual analogue scale.
Results The saline induced pain lasted from 3 to 7 minutes with a medium duration of 4.5 minutes. 1 and especially 3 hours after the injection a significant reduction of the range of movement (ROM) was seen. Significant changes could be detected in other kinematic parameters too, as mean maximum velocity, mean velocity, pain inhibition, harmony of movement etc. Only after 24 hours all parameters have returned to their baseline.
Conclusion It could be clearly demonstrated that movements remain changed even after the pain has already subsided.

P 3091

Lamotrigine for chronic neuropathic pain

J. Krusz
Anodyne Pain Care, Dallas, TX, USA

Introduction Lamotrigine is an anticonvulsant with pharmacological actions that include activity in blocking voltage-gated sodium channels, as well as several blocking activities at calcium channels (N and P-type). These mechanisms of activity have been shown to be useful in pain and headache in many compounds that possess them. I chose to evaluate lamotrigine in a population of refractory chronic pain patients.
Method 35 patients (25 males, 10 females) were given lamotrigine as an add-on medication for their painful symptoms. All had some form of neuropathic pain: 21 had cervical or lumbosacral symptoms; 3 had facial pain; 5 had complex regional pain syndrome pain; 4 had diabetic or other endocrinopathic pain; 2 had neuroma pain. All had failed at least two or more other attempts at treatments with neuronal stabilizing agents for their pain.
Results Patients rated their pain on a 0 to 10 numeric rating scale (NRS). Average length of treatment was 4 months or more. Average dose was 260 mg per day. The average reduction in pain scores, rated on a NRS, was 70.9% in 14 patients. 6 patients were non-responders, and 2 were dropped due to side effects (drowsiness and rash). 5 were lost to follow up or did not follow the titration schedule accurately and 8 were just started on lamotrigine.
Conclusion Lamotrigine was found to be an effective agent for refractory neuropathic pain syndromes with an excellent margin of safety and tolerability in this open-label study. Further double-blind studies are warranted with this agent.

P 3092

Intradermal Botulinum toxin, type B, treatment for cervicogenic migraine

J. Krusz
Anodyne Pain Care, Dallas, TX, USA

Introduction Botulinum toxin, type B, is primarily used intramuscularly for a number of disorders, including spasm and headache. This study used intradermal sites of administration of the toxin to study its effect in cervicogenic migraines. This is based on the high concentration of nociceptive fibers in the skin and the possibility that cutaneous inputs from the cervical region may contribute to these migraines.
Method 10 patients were given open-label botulinum toxin, type B, intradermally. All had unilateral IHS-criteria migraines with muscle spasm; 4 had failed cervical surgery and all had known cervical structural pathology by MRI. 2500 or 5000 units of type B toxin were given intradermally by raising a skin wheal on the side of the migraine at the level of the greater and lesser occipital nerve inlets.
Results 5 patients reported a significant decrease in migraine frequency, at least 75%. Spasm was also reduced to the same or greater amount. 3 of these patients reported greater than 90% reductions and average duration of effect was 16 weeks (range= 10–24 weeks). 2 patients did not have any significant change in migraine pattern, and 3 were just injected. Remaining migraines were easier to abort. One patient reported transient flu-like symptoms.
Conclusion This study shows the effectiveness of a new site of delivery of botulinum toxin, type B, in treating cervicogenic migraines. Intradermal delivery suggests, speculatively, anterograde transport of toxin to the dorsal horn in nociceptive fibers where pain transmission may be blocked via any number of mechanisms, including central sensitisation, windup and blockade of specific facilitatory neuromodulators. Double-blind studies to replicate these open-label findings are warranted in the study of botulinum toxin, type B.

P 3093

Pain responsiveness in cervical dystonia: different doses of Botulinum toxin type-a

M. A. Relja
Department of Neurology, Medical School, University of Zagreb, Zagreb, CROATIA

Introduction Effectiveness of Botulinum Toxin Type-A (BTX-A) against pain associated with cervical dystonia has been established. However, several studies suggest that a direct antinociceptive effect distinct from reduction in muscle spasm may be involved in this process. The aim of the present study was to investigate the effectiveness of different doses of BTX-A in pain associated with cervical dystonia.
Method We studied 31 patients with painful cervical dystonia (age range 24–63 years). Using a randomised, double-blind, cross-over design (3 treatment periods of 4-month duration) we injected patients with three different doses of BTX-A (50, 100 and 150 U of BTX-A as BOTOX) in the most affected muscles. The patients' baseline level of pain and the Toronto Western Spasmodic Torticollis Rating Scale (TWSTRS) were assessed.

Clinical assessments were performed each week during the 12-month study. Side effects were monitored during the study.
Results Our results showed that significant pain relief (p 0.05) was obtained in patients during each treatment period (50, 100, and 150 U) already one week after injection. On the contrary, TWSTRS-Total score was significantly decreased at 2-weeks post injection, but only during two treatment periods with higher doses of BOTOX (100 and 150 U). The major benefit of BTX-A application on pain reduction compared with dystonia improvement was the duration of action and the lower beneficial dose. No systemic side effects were noted during the study.
Conclusion Our results appear to demonstrate for the first time that BTX-A may have a direct antinociceptive effect distinct from the effect on muscle relaxation.

P 3094

Primary headache disorders – analysis of 2816 patients in a Turkish population

G. Akhan, R. Altan Filiz, A. Yaman, H. Koyuncuoglu, S. Kutluhan
Süleyman Demirel University, Medical School, Dept. of Neurology, Isparta, TURKEY

Introduction Primary headache disorders (PHD) show cultural and geographical variations in both frequencies of subtypes and clinical characteristics. The aim of this study was to provide the frequency, sex ratio, age distribution and clinical characteristics of subtypes of PHD diagnosed according to the criteria of International Headache Society (IHS) in a Turkish population.
Method A retrospective study was conducted in the neurology outpatient clinics of the hospital of Süleyman Demirel University Medical Faculty, Isparta, Turkey, between the years of 1994 and 1999. A total of 2816 patients admitted to the hospital with headache and were diagnosed PHD on the basis of IHS classification.
Results Of the 2816 patients 2342 (83%) being female and 474 (17%) male; 926 (32%) were diagnosed chronic tension-type headache, 925 (32%) migraine without aura, 696 (25%) episodic tension-type headache, 126 (4%) migraine with aura and 143 (7%) other disorders. Mean age of all patients was 38+/–13.7 years. There was preponderance in females of all the subgroups of disorders. The most frequent group of prodromal symptoms were psychosomatic symptoms and mood changes in patients diagnosed migraine without aura, chronic tension-type head-ache and episodic tension-type headache. Precipitating and improving factors showed great similarities in all of the four groups of disorders.
Conclusion Our study demonstrates a higher frequency of chronic and episodic tension-type headaches than expected. Female predominance in all subgroups of PHD and the clinical characteristics of disorders are consistent with Western literature.

P 3095

Changes in headache frequency in Greek recruits during basic training period

K. Spiggos[1], K. E. Karageorgiou[1], K. Giatas[2]
[1]Athens General Hospital, Athens, GREECE, [2]General Airforce Hospital, Athens, GREECE

Introduction The aim of our study was to present part of an observational study concerning epidemiology of headaches among Greek National Service recruits. In the present part, we investigate for changes in migraine and tension-type headache recurrence frequency during basic training period, among those who reported headaches with the corresponding features on a regular basis.
Method We asked 2130 recruits (age range 18–33) the single question of "having being experiencing at least 1 headache every 3 months in their previous life". Those who gave an affirmative answer were interviewed through a 30-points questionnaire investigating type and frequency of their headaches. Questions concerned the 3-months period during the same season of time 1 year ago, and the 3-months period of their basic training. According to our questionnaire, we classified subject's headaches in 3 groups; migraine, tension headache and other or not identifiable type. In this presentation, we have excluded the latter group, as well as data concerning newly-presented headaches, and changes in type of headache during the follow-up. Comparisons involved headache recurrence frequency between the two periods, among subjects with migraine and tension headache. We adjusted our data for possible confounding by change of climate (highland to lowland).
Results In our study, 298 subjects reported headaches. The characteristics that emerged from their answers allowed us to positively identify 77 subjects with migraine (age range 18–31), and 154 with tension headache (age range 19–30). Headache recurrence frequency was significantly increased among tension-type group (70 subjects showed no change, 52 showed increase and 32 showed decrease in headache recurrence frequency, P=0.029). Subjects with migraine did not show any significant change (only a trend for increase) in the recurrence frequency of their condition (47, 17, and 14, respectively, P=0.059).
Conclusion It seems that a physically and psychologically stressful condition, such as basic military training of National Service recruits, does not act significantly on the frequency of migrainous headaches. On the other hand, the frequency of tension-type headaches tends to aggravate. Considering psychological factors, these results add to the body of evidence for the organic origin of migraine, in comparison with tension-type headaches.

P 3096

Prevalence of migraine and tension-type headache among primary and secondary school students in Belgrade-Yugoslavia

Z. J. Martinovic[1], M. Milovanovic[1], M. Jarebinski[2]
[1]Institute for Mental Health, Beograd, YUGOSLAVIA, [2]Institute of Epidemiology, Beograd, YUGOSLAVIA

Introduction Most migraine and tension-type headache studies in children and adolescents are clinic-based, and therefore tend to underestimate its real prevalence. On the other hand, in the most population-based studies diagnosis was made by questionnaire based on International Headache Society criteria, so restrictive in paediatric migraine. The objective of our study was to estimate the lifetime prevalence of migraine and tension-type headache in primary and secondary school students in Belgrade.
Method A total of 1663 primary school students (age 7–15 years) and 3605 secondary school students (age 15–19 years) answered the question about recurrent headaches during life. Diagnosis of idiopathic or symptomatic headaches, in the sample of patients with reported recurrent headaches was made by clinical interview and examination done by neurologist (headache specialist).
Results Of 413 students with recurrent headaches, idiopathic headaches occurred in 76.7% of primary school students, and in 80.2% of secondary school students. The lifetime prevalence of

migraine in those aged 7–15 years was 3.5%, and in 15–19 aged 3.7%. The lifetime prevalence of tension-type headaches was 2.0% and 2.8%, respectively. Female to male ratio of migraine prevalence in primary school students was 1.7 and in secondary school students 2.7 ($p<0.01$). Female to male ratio of tension-type headache prevalence did not change significantly with age (1.5 and 1.3; $p>0.05$).

Conclusion Our results proved that migraine and tension-type headache are very frequent among the population aged 7–19 years. The migraine prevalence from childhood to adolescence did not change significantly, but the female to male ratio became higher in adolescence.

P 3097

Familial hemiplegic migraine – case report

P. Abreu, E. Azevedo, S. Vieira
Neurology Department, Hospital S. João, Porto, PORTUGAL

Introduction Familial hemiplegic migraine (FHM) is a rare disorder in which the migrainous attacks are marked by the occurrence of transient hemiplegia, often with other neurological deficits including sensory symptoms, appearing before or during the headache. The episodes are similar in all affected members of the family. It has an unknown pathogenesis, and the gene responsible for this autosomal dominant disease was mapped to chromosome 19p13.

Case report A 21-year-old male, previously diagnosed as having partial epilepsy and on carbamazepine, was admitted due to episodes since 7 years old comprising vision disturbance with sparkling scotoma and left hemiparesis for 20–30 minutes. An intense, sometimes throbbing, frontotemporal bilateral headache, with nausea/vomiting and phono/photophobia, followed this clinical picture. The headache usually was lasting 4–5 hours and was often refractory to non-steroid anti-inflammatory drugs. Interictal neurological examination was normal. Cerebral magnetic resonance was normal and EEG showed nonspecific changes on right occipital region. The patient has a familial history of 6 similar cases with an autosomal dominant pattern. It was possible to observe his father (50 y.o.) and brother (15 y.o.), both with a previous diagnosis of partial epilepsy and on carbamazepine, and confirmed the stereotype of the episodes.

Conclusion FHM may be mistaken by other neurological entities that course with transient focal neurological dysfunction and headache, as occurs with partial epilepsy and transient ischemic attacks. The correct characterization of each episode is very important, allowing a correct diagnosis and therapeutic management. In this particular case the accurate anamnesis suggests FHM.

P 3098

Importance of the inflammation mechanisms in the vascular headaches

M. I. Alpaidze, M. Z. Beridze, R. R. Shakarishvili
State Medical Academy of Postgraduate Education, Tbilisi, GEORGIA

Introduction Migraine pain caused by regional decrease of cerebral blood flow develops mild ischemia and inflammation with releasing of free radicals acting on pain inducing receptors. This study aimed at investigating the role of inflammation in developing migraine.

Method 114 patients, aged 10 to 25 years were investigated. Control comprised of 40 healthy individuals, transcranial Dopplerography was conducted 4 times. The mixed culture of autologous lymphocytes (MCAL) was investigated according to the method of Hafler et al. 1974. Count of blast transformed lymphocytes defined in controlling and experimental cultures was processed by "mythomicin-C". Levels of IL-1β and TNF-α were studied by enzyme-linked immunosorbant assay (ELISA). T-paired test was used for statistical evaluation.

Results In attack-free periods 88% of patients did not reveal changes in MCAL compared to control. Count of blast transformed lymphocytes in 72% of patients was significantly reduced (1.5 ± 0.1 versus 8.0 ± 1.1 $P<0.01$). The level of IL-1β was significantly higher in 32.7% of patients (24.2% with unilateral and 6.8% with bilateral carotid siphon spasm) compared to control (157 ± 113pg/ml versus 482 ± 154 pg/ml p,0.01), while the TNF-α did not show significant changes. During attack periods the level of IL-1β was elevated (482 ± 154pg/ml versus 335 ± 178 pg/ml $P<0.5$) in 35.4% (29% with unilateral and 4.1% with bilateral carotid siphon spasm). TNF increased without statistical significance in 44% of patients.

Conclusion Patients with unilateral and bilateral carotid siphon spasm were found to have elevated levels of IL-1β and autoimmune reactions this can result in production of immune complexes and toxic free radicals impacting the pain-inducing receptors.

P 3099

Migraine and co-morbidities

Z. Tomic, K. Willheim, A. Jurjevic, M. Bucuk
KBC Rijeka, Rijeka, CROATIA

Introduction It is not uncommon with migraineurs to find symptoms of other disorders which "accompany" migraine. These "co-morbidities" are often precipitants of a migraine attack.

Method In studies carried out in the Dept. of Neurology, Clinical Health Centre in Rijeka, we analysed randomly the case history of 250 migraineurs. We established the presence of "co-morbidities of migraine" in 80 migraineurs (32%) irrespective of gender and age. Diagnosis of migraine was made on the basis of IHS classification.

Results In a group of subjects with "co-morbidities" the following was expressed in percentages:

– pains in neck musculature, interscapular pain and fibromyalgia were present in 27 (33.75%) migraineurs.
– insomnia: most commonly with apnoea during sleep in 15 (18.75%).
– gastric disorders: gastritis, duodenal ulcer in 12 (15%).
– arterial hypertension in 11 (13.75%).
– bronchial asthma, chronic bronchitis and allergic diathesis in 10 (12.5%).
– depressive syndrome in 7 (8.75%).
– epilepsy in 5 (6.25%).
– diabetes in 5 (6.25%).
– migrainous stroke in 3 (3.75%).

We noticed a relatively high presence of myalgic discomfort with a somewhat lower level of insomnia combined with other psychological and psychiatric disorders, which point to the longstanding stated hypothesis on the existence of a "migrainous personality". Next is migraine accompanied by arterial hypertension and then disorder of the respiratory tract (allergic diathesis). Migraine accompanied by epilepsy has been shown to be rare in our studies.

Conclusion The results of our studies are compatible with recent literature.

P 3100

Head image disorder in patients with various chronic headache syndromes

S. Sabetay[1,2], Y. River[1,2]
[1]*The Department of Neurology, Bnai-Zion Medical Center, Haifa, ISRAEL,* [2]*The Technion School of Medicine, Haifa, ISRAEL*

Introduction Headache and migraine constitute a multidimensional experience with painful, emotional and cognitive aspects. The head image projected on the body schema is a person's subjective representation against which the integrity of the neck/head is judged. It appears that many patients with chronic and episodic headache have a distorted size, shape and awareness of the head.
Method A questionnaire was designed, including the epidemiology, character and severity of headache, the Beck depression scale and a sub-scale with 10 descriptors typifying different distortions of head image.
Results 53 consecutive patients were included in our pilot study: 31 migraine patients, 9 patients with tension headache, 6 patients with mixed headache and 4 patients with trigeminoautonomic cephalalgia. 87% of migraine patients and 66% of tension type headache patients reported various distinct head image disorders. Whereas the patients with tension type headache reported increased size and weight solely during the headache episode, patients with migraine had unusual distortions such as unawareness of parts of the head, changes in position of the ear/temples, and reduplicative phenomena. The migraine patients rated their distress with regard to this experience as significant. Additionally, their experience either preceded or followed the headache phase. No significant correlation between the Beck depression scale and the presence of the head image disorder was found. However, the degree of distress correlated with depression.
Conclusion Head image disorder is common among patients with headache and more so among migraine patients. This experience outlasts the headache phase and generates considerable distress.

P 3101

Review of gabapentin dosing in five placebo-controlled clinical trials for neuropathic pain

M. Backonja[1], E. Mutisya[2]
[1]*University of Wisconsin, Madison, WI, USA,* [2]*Pfizer, Inc., New York, NY, USA*

Introduction Gabapentin was studied for the treatment of neuropathic pain in five double-blind, placebo-controlled, multicenter studies. The objective of our study was to investigate the relationship between gabapentin dose and neuropathic pain reduction.
Methods 1357 patients with painful diabetic neuropathy (two studies), post-herpetic neuralgia (two studies), and neuropathic pain of various etiologies (one study) were analysed. The studies utilized a 3–4 week dose titration period followed by 4 weeks at fixed dose (600–3600 mg/day). Patients rated their pain daily using an 11-point Likert scale.
Results Gabapentin, at doses between 1800 and 3600 mg/day, led to lower mean daily pain scores compared with placebo levels. Additionally, more patients had a 50% or greater improvement in pain scores on gabapentin. Both measures tended to improve with increased dose up to the maximum of 3600 mg/day. Efficacy was sustained for the duration of the studies. Older patients had a somewhat greater treatment effect, possibly due to increased drug exposure related to decreases in renal clearance or changes in GI transit times. Race and gender did not influence the treatment effect.
Conclusion Gabapentin, at a dose range of 1800 to 3600 mg/day, produces a sustained and dose-dependent reduction in neuropathic pain. The effect is enhanced in older patients and appears to be correlated with gabapentin exposure.

P 3102

Epidural corticosteroid injections in management of the sciatica

M. Dvorak[1], V. Horny[1], I. Matusova[1], J. Vyletelka[2], L. Gurcik[1]
[1]*Regional Hospital Zilina, Zilina, SLOVAKIA,* [2]*Regional Hospital, Levoca, SLOVAKIA*

Introduction Epidural injections are the main focus of interest in management of sciatica, after the period of back surgery development.
Methods In patients with sciatica after 4 weeks of unsuccessful conservative management or in patients with failed back surgery syndrome epidural injections of local anaesthetics and depot preparations of corticosteroids were recommended. There were 1214 patients managed by lumbar epidural injections. We apply corticosteroid, local anaesthetics and normal saline in the epidural space. We performed caudal route epidural injections in 268 patients during 4 years.
Results In comparison of a group of patients with epidural injections to the control group we found significant improvement in the former group of patients. The effect of caudal route of epidural injections was evident mainly in patients who had undergone back surgery.

P 3103

How to treat the patients with low back pain?

V. G. Karepov
Multidisciplinary Medical Center "M.E.T.E.O.R.", Tel Aviv, ISRAEL

Introduction The aim of the study was to determinate the efficacy of therapeutic approaches in patients with low back pain (LBP). The results of LBP treatment are far from the ideal.
Method Consecutive patients with non-acute (one month duration) LBP were divided into 2 groups: with and without sciatica. The treatment included 3 stages: A. Anti-inflammatory drugs (NSAIDs) at the beginning; B. Single spinal manipulation; C. Therapeutic complex included repeated spinal manipulations, massages, electrical stimulation, electromagnetic fields, and low-power cold infrared laser (twice a week, for 4 weeks). Self-report method was used for treatment evaluation. The results were compared after each stage of the treatment. Chi-square test was used for statistical analysis.
Results 79 patients had LBP without sciatica (Group 1), and 46 patients suffered from the LBP with sciatica (Group 2). Alleviation of the LBP after NSAIDs using was reached in 63 (79.7%) patients without sciatica, and in 17 (37.0%) patients with sciatica, OR=6.7 (CI=4.1–8.3), $p<0.001$. LBP improved after single spinal manipulation in 32 (40.5%) patients in Group 1 and in 19 (41.3%) patients in Group 2, differences were statistically non-significant (ns). Complex treatment was successful in 64 (81.0%) patients without sciatica and in 37 (80.4%) patients with sciatica, (ns).
Conclusion NSAIDs were effective in the patients without sciatica, but had low efficacy in the patients with sciatica. Single spinal manipulation was not so effective in the patients with or

without sciatica. Complex therapy was very potent approach in all patients with non-acute LBP.

P 3104

Levetiracetam as treatment for chronic pain

J. Krusz
Anodyne Pain Care, Dallas, TX, USA

Introduction Levetiracetam, a new anticonvulsant with effects that block high voltage (N-type) calcium channels, has recently been shown by the author to be useful for the treatment of migraines.
Method 38 patients were selected from a chronic pain population. Most (n=35) had failed 2 or more prior attempts using other agents to treat painful symptoms. 28 were on such therapy at the time levetiracetam was added. 22 had radicular neck or back symptoms due to disc disease or failed surgery; 6 had diabetic neuropathy and 5 had complex regional pain syndrome, type 1. 4 had carpal tunnel syndrome or other peripheral nerve entrapment; 1 had facial pain. All patients rated the severity of their pain on a 0 to 10 numeric rating scale (NRS). Levetiracetam was begun at 250 mg in the evening; doses were increased every 3–5 days. Dosing range was 1500–6500 mg, with an average duration of treatment of 8.5 months.
Results 10 patients reported an average 69.4% reduction in their NRS pain scores with levetiracetam. Another 6 reported 25–50% reductions in pain while 4 reported less than 25% reduction. 5 patients dropped out due to side effects (3=nausea, 2=drowsiness), 4 were noncompliant or lost to follow-up and 9 are in the early titration phase.
Conclusion This study shows efficacy of treatment of chronic neuropathic pain with levetiracetam. This agent is well tolerated and may offer an alternative to other neuronal stabilizing agents, either as a primary medication or as add-on therapy. Further studies, using double-blind methods, are warranted.

P 3105

Zonisamde as a treatment for chronic pain syndromes

J. Krusz
Anodyne Pain Care, Dallas, TX, USA

Introduction Zonisamide has pharmacological activity in blocking sodium channels, T-type calcium channels and in modifying serotonergic and dopaminergic transmission. It may be useful in treating chronic pain.
Method 42 patients with chronic neuropathic pain disorders were treated with zonisamide in an outpatient setting. 28 had cervical/lumbar discogenic pain, including failed surgeries; 5 had complex regional pain syndrome; 6 had nerve entrapment syndrome pain; 3 had facial pain syndromes. Zonisamide was begun at 100 mg every fourth night (for 4 doses), with progression to every third night (for 5 doses) and then every other night. Further dosing changes were made every 2–3 weeks. 38 patients had failed 2 or more prior attempts and 37 were on such therapy when zonismide was started. Each patient rated his or her pain severity on a 0 to 10 numeric rating scale (NRS), together with duration of pain in hours.
Results 26 of 42 patients treated with zonisamide reported improvement in pain scores: 10 patients (24%) reported a better than 60% reduction in daily pain scores; 8 patients reported 30–60% reductions and 8 reported less than 30% reductions. Only 2 patients were lost due to side effects (drowsiness); 4 were lost to follow-up, 8 did not respond to therapy and the balance have just been started. 15 patients were able to taper or stop their existing anticonvulsant therapy.
Conclusion Zonisamide may provide an alternative for treatment of refractory neuropathic pain in a difficult-to-treat patient population that has failed prior attempts. Double-blind studies are warranted with zonisamide.

P 3106

Spinal nerve root stimulation in radicular pain

B. Kepplinger
Landesnervenklinik Mauer, Mauer bei Amstetten, AUSTRIA

Introduction During the last three decades spinal cord stimulation (SCS) has progressed continuously but in some cases SCS is not sufficient for pain control, e.g. due to postoperative epidural fibrosis. An alternative to SCS could be the method of nerve root stimulation (NRS).
Method Lead placement for NRS is performed similar to the SCS-technique, but the epidurally introduced lead is forwarded in caudad direction toward the neural foramen of the affected nerve root. The electrode is forwarded through the neural foramen and is placed partly in the extraforaminal space. Lead implantation is carried out percutaneously, after test stimulation a battery powered, telemetrically programmable stimulator is implanted.
Results In 12 patients with monoradicular, lumbar/sacral pain due to postoperative epidural fibrosis we attempted to carry out NRS. 3 times the lead could not be introduced into the caudad-epidural space, 3 times the electrode could not be guided into the neural foramen due to major fibrosis. In 6 cases the electrode could be placed in the neuro-foramen and forwarded to the lumbo-sacral nerve plexus. Test stimulation provided optimal stimulus sensation with high-grade (80%) pain reduction and patients consecutively were provided with an internalised stimulation system.
Conclusion Benefit of NRS compared to SCS is a higher degree of pain alleviation, constant stimulus sensations, less lead displacements and lower energy consumption.

P 3107

Occipital neuralgia relieved with C2 ganglion radiofrequency lesioning – case report.

D. Sporis, D. Chudy
University Hospital Center, Zagreb, CROATIA

Introduction Occipital neuralgia is the term used to describe chronic occipital pain which can be a condition associated with migraine, tension headache, cervical strain and cervicobrachial syndrome, however idiopathic occipital neuralgia is characterized by paroxysmal, electric shock-like pain from the occipital region to the vertex of the head. The exact mechanism, which causes such pain syndrome, is not known.
Case report The 42 years female patient was referred to our hospital with a seven-year history of severe right occipital neuralgia. The medication therapy such as non-steroid analgesics, carbamazepine, gabapentin, and diazepam was without benefit. She was also treated with local anaesthetics and steroids infiltration with some short-term improvement, which lasted a maximum of a few days. X ray examination of the cervical spine and scull, EMG and MRI of the head and cervical spine revealed no lesion or any sign of compression of relevant anatomical structures. Routine biological investigations, including those for blood and urine levels of calcium phosphate, magnesium and serum creatine kinase, were normal. She underwent right C2 ganglionectomy and in the seven-month follow up period she has no recurrence of pain.

Conclusion Patients with idiopathic occipital neuralgia who have not experienced improvement after medical treatment became the candidates for surgical therapy. Ganglionectomy C2 in idiopathic occipital neuralgia is a very effective and low risk surgery.

P 3108

Spinal nerve root stimulation in radicular pain due to postoperative epidural fibrosis

B. Kepplinger, D. Schafelner, C. Derfler, P. Kalina
Landesnervenklinik Mauer, Mauer bei Amstetten, AUSTRIA

Introduction Epidural spinal electrical stimulation (ESES) has been improved continuously during the last 30 years, although still the result of stimulation in some cases is not satisfactory. In case of monoradicular pain, e.g. due to postoperative epidural fibrosis, the patient would need stimulus sensations for pain control in the respective dermatome, which cannot be guaranteed in all cases of ESES treatment. An alternative to ESES is the direct stimulation of the affected nerve root.
Method Lead placement for nerve root stimulation (NRS) is performed similar to the ESES-technique, but the epidurally introduced lead is not forwarded in cranial but in caudad direction toward the neural foramen of the respective (affected) nerve root. The lead tip (electrode) can be forwarded through the neural foramen and the electrode can be placed partly in the extraforaminal space and stimulation in this case also can provide a plexus stimulation. With this technique only lower lumbar (L3–L5) and sacral (S1–S4) nerve roots can be treated. Lead implantation is carried out percutaneously, after a test stimulation period of 3 days to one week a battery powered stimulator is implanted. Stimulation parameters can be programmed telemetrically.
Results NRS was attempted to be carried out at our institution in 12 patients with monoradicular, lumbar and sacral pain due to postoperative epidural fibrosis. In 3 cases the lead could not be introduced into the epidural space in the described caudat directed way, in 3 other cases the electrode could not be guided properly into the neural foramen due to major fibrosis. In these 6 cases the procedure was changed to ESES. In the rest of the cases the electrode could be placed into the neural foramen and in four cases also forwarded through the foramen to the lumbosacral nerve plexus. Test-stimulation provided optimal stimulus sensation with high-grade (80%) pain reduction. In all this cases consecutively a stimulation system was internalised too. These patients undergo NRS for a period of 2 months to 2 and a half years with 8 month in mean.
Conclusion The benefit of NRS compared to ESES is the higher degree of pain alleviation, the achievable constant stimulus sensations, less electrode displacements and lower energy consumption.