subjective symptoms that may even persist upon completion of medical treatment. As a result, there are serious problems in the objective evaluation of permanent consequences of the injury. The study included 40 randomly selected whiplash injury victims without previous lesions of cervical spine, and 40 equally selected patients with previously confirmed cervical degenerative changes. They all suffered from permanent whiplash injuries and applied for reimbursement for non-material damage to Zagreb Insurance Company during 2001. Sixty-seven per cent of patients underwent continuous treatment for 5–6 months, however, the sequels of whiplash injury persisted in the form of decreased motility of cervical spine, arm paresthesia, vasospasm of vertebral arteries and permanently narrowed visual field. Pathological findings were verified by objective diagnostic methods: functional X-rays of the cervical part of the spinal cord, electromyoneurographiic examination of arms, transcranial Doppler sonography of vertebrobasilar arteries, visual field assessment by Goldman method, and clinical examination by medical censor. The treatment of injured patients with previous degenerative changes of cervical spine took a longer time, with a higher level of head and neck motility reduction. Ultimately, in terms of reimbursement, they were conceded a lesser degree of permanent physical damage than those without previous cervical spine lesions.

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Increased donor rate in Clinical Hospital "Sestre Milosrdnice"

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Aims: The rate of organ donation represents the level of country development. Certain attempts have been made to increase this rate. As a consequence, the constant increase of potential donors in whom brain death was confirmed was observed. Therefore we present the constant increase of donor rate from the year 2004 to 2008.
Methods: The data of all potential donors in whom the confirmation procedure for brain death was completed, were retrieved and analyzed. The percentage of donor rate in comparison to brain death persons diagnosed and in comparison to all that died in Central intensive care unit and in the whole hospital was calculated. The mean number or organs per donor was also calculated.
Results: The numbers of donors per brain death persons, from 2004 to 2008 were: 5/unknown, 6/10, 8/13, 11/13, 18/22, mean age 51, 50, 39, 48, 44 respectively. The donor rate per Central intensive care unit deaths from 2004 to 2008 was: 5.9%, 5.6%, 5.8%, 10.4%, 12.1%, and per all hospital deaths were: 0.4%, 0.5%, 0.5%, 1.5%, 1.9% respectively. The number of organs per donor from 2004 to 2008 was: 1.6; 2.4; 2.6; 3.0; 2.7.
Conclusion: The constant increase of donor rate and of organs per donor in Clinical hospital ''Sestre milosrdnice'' from 2004 to 2008 is visible. More education is needed in medical school and among professionals to identify brain death persons and possible donors. Campaigns in media should improve the public perception regarding this issue, too.

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Depressive migraine patients are prone to medication overuse

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Background: Depression is a frequent comorbid condition among migraine patients. Nad medication overuse is relatively common among patients with frequent headaches. The aim of our study was to determine the relationship between depression, number of days with headache per month and the number of used medications.
Patients and methods: Sixty-six patients (54 women – mean age 42 years and 8 men – mean age 42 years) with migraine (without or with aura, MO, MA) or tension-type headache (TTH) have been included into the study. MO, MA and TTH were diagnosed according to the ICHD-2 criteria. All patients fulfilled the Beck depression score which classifies depression from 1–13 as minimal (group A), 14–19 as mild (group B), 20–28 as moderate (group C) and 29–63 as severe (group D). Days with headache and the number of medications (analgesics and triptans) was obtained from all patients.
Results: There were 30 patients in group A, 17 in B, 10 in C and 9 in group D. The mean depression score was 7,4; 14.9; 23.1 and 42.1 respectively. There were 41 patients with MO, 10 with MA, 5 with TTH and 5 with MO/MA + TTH. The mean number of days with headache was 11.7 in group A; 11.2 in B;16 in C and 12.5 in D. The mean number of analgesics and triptans used was 24.8 in group A; 25.5 in B; 35.9 in C and 43.5 in D. Although the number of days with headache per month has not significantly differed among groups, patients with moderate and severe depression take more medications for their headaches, $P < 0.05$.
Conclusions: Results of our study showed that patients with higher depression score are more likely to use a higher number of acute medications for their headaches, although the number of days with headache is similar. Our results support earlier observations that medication overuse headache is a part of the spectrum of addictive disorders.

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Prevalence of headache in adolescents

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Background: Headache is the most frequent neurological symptom; however, in adolescents headaches are often undiagnosed. The aim of this study was to examine the prevalence of primary headaches among high school children in the city of Zagreb.
Methods: This was a population-based cross-sectional study conducted in the city of Zagreb. A total of 2100 questionnaires were spread among students in 7 high schools; 2057 questionnaires were suitable for analysis. The questionnaire consisted of demographic data, and questions regarding the presence and clinical characteristics of a headache.
Results: The mean age of students was 17.2 ± 1.2 years, 50.2% were female. A total of 1300 (63.2%) of students declared that they do not suffer from headaches at all (46.2% female), 620 (30.1%) declared that they suffer from headaches frequently (58.4% female) and 137 (6.7%) occasionally (51.1% female) (Gender distribution, $Chi^2 = 25.18$, $P < 0.001$). A majority of them resides in a city (77.1%), 15.6% in a suburban area and 7.3% in a rural area. The significantly associated risk factors for headache were as follows:

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female gender (OR = 1.61, $P < 0.001$) and life satisfaction level (OR for range = 7.73, $P < 0.001$).

Conclusions: The prevalence of self-reported headache among high school children in Zagreb city is relatively high; significant sex difference was observed. Pain among children and adolescents is an important public health problem.

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Management of patients with headache presenting to a neurological emergency room

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Introduction: Patients with headache frequently seek help in a neurological emergency room. In this study we tried to analyse the management of patients presenting with a headache to the emergency room (ER) at the University Hospital "Sestre milosrdnice'' in Zagreb.

Methods: We have retrospectively analysed all patients with headache who were examined in our emergency room during 2007. Patient data were analyzed according to the diagnoses, diagnostic procedures, treatment and further refferal.

Results: Among 6225 patients, 1385 (22.3%) complained of headache; 894 (64.9%) women and 491 (35.4%) men. Migraine with or without aura, tension-type headache or cervicogenic headache had 1009 (72.9%) of patients (67.3% women and 32.7% men); 84 (6%) had intracranial haemorrhage, 33 (2.3%) had primary tumour, 54 (3.8%) metastases, 193 (13.9%) head trauma, 7 (0.5%) head trauma with heamorrhage and 5 (0.4%) had an infective disease. A diagnostic procedure was indicated in 413 (29.8%) of patients: 314 (22.7%) had a CT scan, 85 (6.1%) an EEG and 70 (5%) had an ultrasound examination. Patient refferal was as following: 1022 (73.8%) was dismissed home, 222 (16%) was reffered to other clinics and 141 (10.2%) was hospitalized. Among patients with primary and cervicogenic headaches a diagnostic procedure was performed in 235 (23.2%) while 45 (4.5%) was hospitalized.

Conclusions: Patients with primary headaches frequently seek help in the ER. For patients with primary headaches, better treatment should be provided by GPs and neurologists (headache specialists) in out-patient headache clinics. Mass media campaignes should be carried out in order to bring closer the possibilities of treatment for primary headaches.

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Assessment of breath holding index during orthostasis

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Introduction: The study was to assess the differences of cerebrovascular reactivity in healthy subjects during orthostasis.

Subjects and methods: Twenty healthy volunteers (11 men and 9 women) with no atherosclerotic risk factors were evaluated by means of transcranial Doppler. A breath holding index (BHI) was obtained in supine and standing position using standardized procedure. Student's *t*-test was used for intergroup comparison of mean blood flow velocities (MBFV) and BHI values between supine and standing position and for left to right assessment.

Results: Mean blood flow velocity (MBFV) in a middle cerebral artery in supine position was 66.6 cm/s on the right side and 68.5 cm/s on the left side, and in standing position 60.6 cm/s on the right side, 62.3 cm/s on the left side. There was no significant difference in values of MBFV comparing supine and standing position and also between males and females. Mean BHI in supine position was 1.59 on the right side, 1.65 on the left side, and in standing position 1.63 on the right side, 1.7 on the left side, without significant difference comparing males and females. There was no statistically significant differences in the BHI between supine and standing position ($P = 0.81$ for the right side, $P = 0.68$ for the left side) neither between sides in supine ($P = 0.71$) and standing position ($P = 0.8$).

Conclusion: There was no significant difference in BHI values during orthostatic stress in evaluation of cerebrovascular reactivity.

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Median nerve dimensions measured using high-resolution ultrasound in healthy volunteers

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Objectives: Although electroneuro- and electromyography are still leading diagnostic methods for investigation of peripheral nerves function, they do not provide information regarding their morphology. This study was conducted to evaluate the suitability of ultrasonography in visualization of median nerve in healthy volunteers.

Methods: Twenty-five asymptomatic volunteers (16 women and 9 men) have participated in this study, age ranging from 20–68 years.

Device used was Aloka Prosound Alpha10 Premier with 13MHz probe, using custom preset for musculo-skeletal sonography. Following dimensions of median nerve at the level of pisiform bone were measured bilaterally: cross-sectional area (CSA), circumference, longer and shorter radius. Subsequently, using latter values, flattening ratio was calculated.

Examinees' height was measured and handedness ascertained. Additional epidemiological data taken was the average daily time that individuals spent working on a personal computer as a possible factor for compression of the nerve in examinee's dominant hand.

Results: Median nerve was easily depicted in all of the participants as well as the surrounding soft-tissue structures. Average CSA of median nerve was 9.67 mm^2 (range 5–15 mm^2, with standard deviation of 2.4 mm). Mean flattening-ratio (FR) (*longer radius*/*shorter radius*) was 4.18, ranging from 2.16 to 5.92.

Median height was 173.8 cm and only one subject was left-handed while the others (96%) were right hand dominant. Average daily time spent working on a personal computer (total average of 2.96 hours) did not correlate with CSA or FR values for the dominant hand.

Additionally, in two subjects, an aberrant artery accompanying n. medianus was visualized.

Conclusion: High-resolution sonographic imaging allows assessment of various morphological properties of median nerve, including its various dimensions and echoic architecture. Furthermore, ultrasound imaging is a very convenient (available, quick, inexpensive and noninvasive) method for examination of peripheral nerve morphology and could thus be used to enhance diagnostic efficiency.