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Abstracts
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Comprehensive assessment of gesture production: a new test of upper limb apraxia (TULIA)

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Background: Only few standardised apraxia scales are available and they do not cover all domains and semantic features of gesture production. Therefore, the objective of the present study was to evaluate the reliability and validity of a newly developed comprehensive test of upper limb apraxia (TULIA).

Methods: The TULIA consists of 48 items including imitation and pantomime domain of non-symbolic (meaningless), intransitive (communicative) and transitive (tool-related) gestures corresponding to 6 subtests. A 6-point scoring method (0–5) was used (score range 0–240). Performance was assessed by blinded raters based on videos in 133 stroke patients, 84 with left hemisphere damage (LHD) and 49 with right hemisphere damage (RHD), as well as 50 healthy subjects (HS).

Results: The clinimetric findings demonstrated mostly good to excellent internal consistency, inter- and intra-rater (test-retest) reliability, both at the level of the 6 subtests and at individual item level. Criterion validity was evaluated by confirming hypotheses based on the literature, for instance, by showing significantly lower total TULIA scores of LHD than RHD patients (154.9 + 59.2 and 193.4 + 23.8, $p < 0.001$, post-hoc Tukey HSD). Construct validity was demonstrated by a high correlation ($r = 0.82$) with the De Renzi Test.

Conclusion: These results show that the TULIA is both a reliable and valid test to systematically assess gesture production. The test can easily be applied and is therefore useful for both research purposes and clinical practice.

Effects of locomotion training with assistance of a robot-driven gait orthosis in patients with multiple sclerosis: a randomised controlled study

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Background: Difficulty in walking is a major feature of multiple sclerosis. A promising intervention to help improve gait function is task-repetitive gait training.

Objective: This randomised controlled study tested the potential efficacy of using a robot-assisted gait trainer (Lokomat®) for treadmill training in MS patients during an inpatient rehabilitation stay and evaluated the changes in mobility after a 9-month follow-up.

Methods: 58 patients (EDSS 5.8 ± 1.1) were randomised to receive either 9 sessions of robot-assisted gait training (RAGT) or the same amount of conventional walking training in a group (CWT) over a 3-week period. 25 patients of the RAGT group and 24 patients of the CWT group completed the study. Additionally, all patients participated in a multimodal rehabilitation programme. Besides mobility measures such as the RMI (Rivermead Mobility Index), the maximum walking distance over 3 minutes and timed 10-m walk, other relevant features such as balance, fatigue, spasticity and wellbeing (VAS) were also measured. In addition, we recorded the locomotor activity with an actigraph one week before the rehabilitation stay and 2 and 9 months later.

Results: After 3 weeks all patients in both treatment groups had improved significantly on all measures, but we could not find any differences between the two treatment options. In the less severely handicapped patients (walking speed >0.4 m/s) there was a trend for the walking group (CWT) to increase their walking speed more than the patients trained on the Lokomat®.

Conclusion: In contrast to previous reports we could not find any advantages for the use of RAGT to improve gait in patients with multiple sclerosis. On the contrary, our results suggest that an increase in walking speed will probably more easily be obtained by a traditional walking training in the gym. After 9 months, mobility as measured with an actigraph declines independently of the walking training chosen.

Gravity perception in cerebellar patients

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Purpose: Patients with midline cerebellar atrophy typically suffer from impaired postural balance. We asked whether this deficit is caused in part by a deficient perception of body position relative to gravity.

Methods: The subjective visual vertical (SVV) was measured in patients with idiopathic late-onset cerebellar ataxia (n = 10) or ataxia telangiectasia (n = 2) and in age-matched healthy subjects (n = 10). Using a motorised turntable, subjects were placed in different roll positions [0, 75° right-ear down (RED), 75° left-ear down (LED)] and asked to align a luminous arrow along the perceived vertical.

Results: Whereas deviations of SVV adjustments were not significantly different between the patients and control subjects,

intra-individual standard deviation of SVV adjustments was significantly (3-way ANOVA, $p < 0.01$) larger in the patients.

Conclusion: Our findings suggest that the precision of verticality perception in patients with midline cerebellar atrophy is impaired, resulting in increased uncertainty of perceived spatial orientation. We hypothesise that this deficit is related to disordered central processing of otolith signals within the affected vestibulo-cerebellar structures (nodulus, flocculus). Postural imbalance, which is often an early sign of cerebellar degeneration, may be a consequence of this increased uncertainty of verticality.

This study was supported by the Swiss National Science Foundation (3200B0-105434), the Betty and David Koetser Foundation for Brain Research, Zurich, Switzerland, and the Centre of Integrative Human Physiology, University of Zurich, Switzerland.

Outcome after delayed axillary nerve reconstruction with interposition of sural nerve grafts

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Introduction: Satisfactory results have been reported after repair of isolated axillary nerve lesions using sural nerve autografts, but a delay between injury and surgical repair of >6 months was found to be one of the most important negative predictors of functional outcome. However, from our experience we believe that good results can be obtained even after a delay of >6 months and we opted in this study to assess the value of delayed axillary nerve reconstruction.

Materials and methods: We evaluated clinical outcome and donor-site morbidity in 12 patients (mean age 37 years [range: 19–66]) who underwent axillary nerve repair with sural nerve graft with a delay between trauma and surgery of 8–20 months (average 11.25). Follow-up examination at least 24 months after treatment included assessment of shoulder range of motion, deltoid muscle strength in near full extension, deltoid extension lag and sensibility. Constant score, subjective shoulder value and the disabilities of the arm, shoulder and hand score (DASH Score) were also assessed.

Results: All patients showed an improved deltoid function of at least M3. Postoperative extension lag as most specific sign of isolated deltoid function improved significantly ($p < 0.002$) from 57.5° to 14.2°. All stated that they would have identical elective surgery again. Relevant donor-site morbidity was not observed.

Conclusion: Although it is beyond doubt that confirmed axillary nerve lesions should be repaired as soon as possible, our data indicate that even delayed axillary nerve grafting may lead to satisfactory functional results with a low morbidity and should therefore be carried out.

Patients with adult-onset cervical dystonia and marked improvement to a sensory trick perform better in multimodal temporal discrimination

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Objective: To assess whether the presence of a sensory trick (ST) is associated with altered temporal discrimination in patients with adult-onset primary cervical dystonia (AOPCD).

Background: One of the most distinctive features of primary focal dystonia is the improvement with STs. The involvement of the sensory system in primary focal dystonias is also reflected by subclinical impairment of tactile spatial and temporal discrimination.

Methods: Patients with AOPCD were included. TWISTER score was applied for clinical assessment. ST was scored according to the TWISTER score with 0 point for an absent effect, 1 point for a partial improvement of abnormal posture and 2 points for a complete resolution of involuntary muscle activity. Temporal discrimination thresholds (TDT) were assessed using unimodal paradigms (two electrical [tactile] stimuli or two visual [LED] stimuli) and with a crossmodal paradigm (one tactile and one visual stimulus). Interstimulus intervals (ISI) were increased with steps of 10 ms starting from an ISI of 0 ms.

Results: 33 patients (24 female / 9 male) with AOPCD were included. Mean age was 56 years with a mean disease duration of 12.3 years and a mean TWISTER score of 25. A complete ST was present in 23%, a partial in 52% and absent in 21%. A shorter disease duration correlated with the presence of an ST ([cc: –0.382] $p = 0.028$) but not current age [cc: –0.017]. Tactile and crossmodal (cm) TDTs were lower in patients with a complete ST (cm TDT: 106.8 ms; cm TOJ [temporal order judgment]: 115.9 ms) compared to patients without the presence of an ST (cm TDT: 136 ms; cm TOJ: 141 ms). In female patients the presence of an ST was significantly correlated with lower TDTs in the crossmodal paradigm (TDT: [cc: –0.560] $p = 0.004$; TOJ: [cc: –0.579] $p = 0.003$) whereas unimodal (tactile or visual) TDTs did not reach significance. In all dystonia patients (females and males) there was a strong trend (cm TDT: [cc: –0.333] $p = 0.058$; cm TOJ: [cc: –0.325] $p = 0.065$) without reaching significance.

Conclusion: The presence of an ST is strongly correlated with better performance in crossmodal (tactile/visual) temporal discrimination in female patients with AOPCD. The parietal cortex is an important structure of multimodal sensory integration and also shows activation (superior and inferior parietal lobule) during ST application in functional imaging studies.

Prevalence of cognitive dysfunction after status epilepticus

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Background: Except for the work of Adachi et al. (2005) there are very few data on neuropsychological outcome of status epilepticus (SE) in adults. Such information is important when dealing with current SE situations. The aim of this work is to quantify and characterise cognitive impairment after SE in adults in the Lausanne neurology clinic.

Methods: Data from 29 patients who suffered from SE and had complete neuropsychological evaluation between 4 days and one year after SE were retrospectively collected using the epilepsy data base between 1.1.2006 and 31.12.2008. Mental retardation (3 patients), degenerative diseases (2 patients), severe aphasia preventing satisfactory evaluation (3 patients) and incomplete testing (1 patient) were exclusion criteria. An aetiological classification was considered based of the International League Against Epilepsy (ILAE): A = acute, R = remote symptomatic, IC = idiopathic/cryptogenic, P = progressive symptomatic. Epilepsy caused by operated and non-operated cerebral tumours was considered progressive. Neuropsychological evaluation showing more than two tests either clinically abnormal or <2 SD from normal were considered abnormal. In this cohort we evaluated which from the following cognitive fields were impaired: language, praxis, memory, executive functions, attention. STESS score (Rossetti 2006, cut off: <3) was obtained for every patient.

Results: Among the 20 collected patients, 10 suffered from generalised status and 10 from partial status. Aetiology was A (13 patients), R (2 patients), IC (4 patients), P (1 patient). Neuropsychological evaluation was abnormal in all 20 analysed patients, and 13/20 were impaired in >3 cognitive domains. Type of SE (partial versus generalised) did not influence cognitive impairment. Patients with STESS score <3 (9/20 patients) and >3 (11/20) were equally impaired. The most impaired cognitive domains were executive function (16 patients), memory (15) and attention (9), while language (6) and praxis (5) were more spared. Concerning aetiology, there was a trend for A to be associated with more severe cognitive impairment (5/13 were impaired in >3 domains) than other aetiologies (Fischer, $p = 0.11$).

Conclusion: SE appears to contribute to a high prevalence of cognitive impairment in several cognitive domains. Cognitive sequels of SE are often underestimated. Aetiology may have a predictor role. This seems a point to consider for the potential of rehabilitation in such a population.

Laterality of pain: modulation by placebo and participants' paranormal belief

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Objective: To investigate the effects of placebo and paranormal belief on the laterality of pain perception.

Background: The right hemisphere is dominantly involved in both the mediation of pain sensation and the belief in paranormal phenomena. We set out to assess a possible influence of long-term belief systems on placebo analgesia in response to unilateral nociceptive stimuli.

Method: 40 healthy participants (20 high and 20 low believers as indexed by the Magical Ideation Scale) underwent a placebo analgesia study measuring stimulus detection, pain threshold and pain tolerance by electrostimulation on the right and left hand. Placebo treatment consisted of the application of a sham cream on the hands.

Results: Placebo had a positive influence on pain perception in the three variables. Enhanced pain sensitivity for the left side was only found for the disbelievers. Placebo treatment resulted in a double dissociation: in believers it increased tolerance exclusively on the left side, in disbelievers on the right side.

Conclusion: Our results confirm laterality effects in pain perception. However, only disbelievers conformed to the expected higher left-sided sensitivity. Placebo effects were dissociated between believers and disbelievers suggesting that short-term reactions to a placebo are modulated by a person's long-term belief system.

Functional neural correlates of pain asymbolia in a patient with frontotemporal degeneration

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Pain asymbolia (PA) is a rare neurological condition, in which pain is perceived but does not cause suffering. PA was previously reported after focal lesions and neurodegenerative diseases. Although the phenomenology of PA is well characterised, its neural underpinnings remain hypothetical and mainly derive from neuroimaging studies on pain processing in healthy subjects. Here we report a 65-year-old male suffering from frontotemporal degeneration and amyotrophic lateral sclerosis (FTD/ALS) in whom PA was among the first symptoms, with normal pain perception but abnormally high tolerance to pain (compared to healthy controls). To identify the neural bases of PA in this patient, we acquired whole-brain fMRI data while we applied either non-painful or painful (pinprick) stimulations to the patient's right hand. We also performed a cognitive and emotional Stroop task to test for dorsal versus ventral anterior cingulate cortex (ACC) functions. Together with the psychophysical results, our fMRI data reveal distinct roles for the ventral ACC and the insula in mediating conscious nociceptive sensations. Our findings reveal for the first time to our knowledge a dissociation between affective and sensory dimensions of pain circuitry in a patient suffering from pain asymbolia.

Laughing during sleep as a manifestation of rapid eye movement sleep behaviour disorder

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Background: Among the wide range of sleep-related behaviours displayed by patients with rapid eye movement (REM) sleep behaviour disorder (RBD), aggressive and violent acts are particularly common, while non-aggressive, pleasant behaviours including laughter have been reported rarely.

Methods: We retrospectively reviewed all consecutive polysomnographic recordings between 2004 and 2008 of patients who met the diagnostic criteria for RBD and describe 6 patients who repeatedly laughed during REM sleep.

Results: Of the 6 patients (3 males), 3 had idiopathic Parkinson's disease, and 3 suffered from multisystem atrophy. Mean age was 59 ± 12 years, mean disease duration was 10 ± 12 years. Other behaviours, observed during REM sleep, included smiling, crying, aggressive behaviour, screaming and somniloquia. Five of 6 patients were severely depressed during daytime. One patient suffered from cognitive disturbances and one from daytime hallucinations. Five patients were treated with levodopa, one with a dopaminergic agonist, one patient had no dopaminergic treatment and 2 patients took antidepressant drugs.

Conclusion: Laughing belongs to the clinical spectrum of RBD, irrespective of treatment. In our case series, 5 of 6 patients were severely depressed during daytime, which give way to the hypothesis whether emotional dream content may be dissociated from daytime mood.

Poster

Session: Freitag, 12.6.2009, 13.35–14.30 Uhr

P 01 A child with neurofibromatosis type 2 presenting progressive radial nerve palsy: case report of an unusual compression neuropathy

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Introduction: Peripheral neuropathies have been recognised as an entity in neurofibromatosis type 2 (NF2) only recently. Peripheral neurological symptoms were thought to be explained mainly by tumoural compression of nerves at the root or the plexus level and rarely due to hyperproliferation of Schwann cells in the distal nerve trunks. Recent studies have reported poly- and mononeuropathies in up to 67% of NF2 patients.

Case report: We report a 13-year-old child with NF2 presenting a chronic progressive weakness of the extension of the dominant right hand. On clinical examination there was a high-grade paresis in the posterior interosseous nerve territory with a slight hypaesthesia of the radial right forearm. The electrophysiological investigation documented an incomplete axonal lesion of the radial nerve at the level of the distal arm. MRI of the cervical spine, the brachial plexus and the radial nerve did not show any lesions. Intraoperatively, an unusual fibrous band between the brachialis- and the brachioradialis muscle compressing the radial nerve at the distal arm level was identified. The compression site was verified by intraoperative neurography. Decompression and external neurolysis were performed. Histological examination of a biopsy of the superficial ramus of the radial nerve demonstrated a marked hypercellularity but no tumour. At 7-month postoperative follow-up there was progressive recovery of the hand function.

Conclusion: Our case documents a favourable course after surgical decompression of the radial nerve. A combination of an exceedingly rare compression neuropathy in a child with a rare neurogenetic disease made us consider a connection with the NF2. In nerve biopsies of NF2 patients an elevated proliferation of Schwann cells can be identified. We suspect that our patient had a predisposition for nerve compression due to local hypercellularity leading to nerve compression at an unusual site. We conclude that NF2 patients presenting with progressive mononeuropathies should primarily be investigated with MRI for neoplasia. Even if no lesion can be depicted, surgical exploration should be considered.

P 02 Asymmetric prefrontal cortex functions predict asymmetries in number space

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Introduction: Little is known about the neuropsychological factors that determine asymmetries in "number space", an abstract form of space with small numerical magnitudes represented to the left of large numerical values. Healthy right-handers display a small number preference (SNP) when emitting numbers of a given range without following any generative rule (e.g. in randomisation or guessing task). We established left hemisphere (LH) and right hemisphere (RH) prefrontal cortex functions in healthy volunteers and predicted to find an association between observed asymmetries and an SNP in a random number generation (RNG) task.

Methods: 197 right-handed subjects performed a verbal and a nonverbal fluency task, reflecting LH and RH frontal cognitive capacities. The SNP was assessed in a task requiring the randomisation of the digits 1 to 6 ("Mental Dice Task"). Control neuropsychological tasks included verbal and nonverbal learning, recall and recognition.

Results: We found a significant SNP in RNG. Specifically, digits 1 to 3 were named more frequently than digits 4 to 6. Individual SNPs correlated moderately, but significantly, with the difference between nonverbal and verbal fluency performance. This finding indicates that a relative superiority in RH over LH prefrontal functions manifests itself also in a bias towards the left side of number space. Asymmetries in learning and memory tasks were not related to direction or size of SNPs.

Conclusion: These findings add to the growing evidence for a genuinely spatial character of number space. They confirm the presence of SNPs in randomisation tasks and suggest that asymmetries in non-spatial, higher cognitive functions mediated by the prefrontal cortex are predictive of a unilateral orientation in representational space.

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P 03 Devil's sign seen in a focal neuromyotonia

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We present a rare case of focal neuromyotonia in a 73-year-old lady. The clinical picture showed a fixed contraction of the 3rd and 4th finger of the left hand. However, there was no weakness of the arm and hand muscles and no percussion myotonia. Sensibility and reflexes were normal as was the rest of the neurological examination. Similar to other published cases, our patient suffered from COPD and was treated with beta-2 sympathomimetics.

This clinical picture shows a rare but rather salient differential diagnosis of Dupuytren's contracture and should, especially in patients with COPD, be seen by a neurologist performing an EMG of the affected muscles to prevent the patient from a long and ineffective treatment "odyssey".

P 04 Encephalopathy in traumatic fat embolism syndrome

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We describe a case of cerebral fat embolism in a young man following a traumatic fracture of the lower limb with symptoms of hypoxia and an organic psycho-syndrome.

A previously healthy 20-year-old man was admitted to the hospital with a closed and undislocated fracture of the tibia and fibula after a skiing accident and treated conservatively by applying an above-knee cast and analgetics. He was referred to us one day later due to bilateral blindness. On admission the patient was fully conscious, well oriented with stable vital parameters, neurological examination was completely normal apart from the reported bilateral amaurosis. After 2 h of admission he became irritable, confused, was not obeying commands, showed episodes of tachycardia and started to desaturate (O_2 saturation below 80%). He was put on oxygen supplementation via facemask, which improved his saturation. EEG showed intermittent rhythmic delta activities (IRDAs) and a diffuse slowing as an unspecific sign of a cerebral dysfunction. Diffusion-weighted brain imaging revealed multiple bihemispheric hyperintense white-matter lesions resembling a "starfield pattern". No petechial rash was seen. Blood tests, including haemoglobin and platelet levels, extra- and intracranial Doppler sonography and transthoracic echocardiography gave normal results.

During the next days the patient slowly recovered from the state of confusion and oxygen saturation reached normal levels. Vision also became normal again. A follow-up MRI 3 months after discharge showed postischaemic border zone lesions without signs of acute infarction.

P 05 Evolution of striatal degeneration in McLeod syndrome

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Introduction: McLeod neuroacanthocytosis syndrome is an X-linked multisystem disorder with central nervous system manifestations resembling Huntington's disease. Neuroimaging studies are revealing striatal atrophy with predominance of the caudate nucleus. Previous cross-sectional magnetic resonance imaging studies showed an association of volume loss in the caudate nucleus and putamen with disease duration.

Methods: In the present study we longitudinally examined three brothers with genetically confirmed McLeod syndrome using an observer-independent and fully automated subcortical segmentation procedure to measure striatal volumes.

Results: In comparison with 10 healthy control subjects, the volumes of the caudate nucleus of the 3 patients were significantly smaller as confirmed by z-score transformations. On an individual basis, volumes in the 2 more severely affected and older patients were smaller than in the less affected, younger brother. Longitudinal MRI-based measurements over 7 years demonstrated a significant decrease of both caudate nucleus volumes in each patient.

Conclusion: Our findings indicate that structural magnetic resonance imaging combined with fully automated computational morphometric analyses represents an objective and observer-independent imaging tool for representation of progressive striatal degeneration in McLeod syndrome. Moreover, this methodology might be valuable for volumetric studies in other rare neurodegenerative disorders and is a promising alternative approach instead of the time-consuming and error-prone manual in-vivo morphometry.

P 06 Hysteresis effects of the subjective visual vertical during continuous quasi-static whole-body roll rotation

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Healthy human subjects, when roll-tilted in darkness, make systematic errors in estimating subjective visual vertical (SVV). Typically, roll tilt underestimation occurs at angles beyond 60° (A-effect). At smaller tilt angles, overestimation may occur (E-effect). At ~135° whole-body roll tilt, Kaptein and Van Gisbergen (2004, 2005) found an abrupt A/E transition, the exact location of which depended on the preceding rotation direction indicating hysteresis. Since this was observed using relatively fast roll velocity, it remains unclear whether the described hysteresis is dynamic or static. To clarify this uncertainty, we continuously rotated 9 healthy subjects

about the earth-horizontal naso-occipital axis, while they performed SVV adjustments every 2 s. Starting from the upright position, three full quasi-static constant velocity rotations (2°/s) were completed in both directions (CW: clockwise; CCW: counterclock-wise). SVV deviation from earth verticality was plotted as a function of whole-body roll position. A bimodal Gaussian distribution function was fitted to SVV differences between CW and CCW rotations. A-effects (peaks at 88° and 257° chair position) at identical whole-body positions were larger after rotations from upside-down than after rotations from upright (average peak difference: 26°). These results demonstrate static hysteresis for SVV estimation.

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P 07 Language and syntactic impairment in late bilingual aphasia in the acute and chronic stages of cortical lesion

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Background: Data on clinical evaluation of aphasia in acute stage of cortical lesion are still lacking. While overlapping of cortical representation between the two languages in bilingual speakers is widely accepted (Mahendra and al., 2003; Perani et al., 1998), the age of acquisition and proficiency in the second language (L2) seem to modulate syntactic processing (Abutalebi et al., 2002; Weber-Fox and Neville, 1996). According to this hypothesis, the aim of this study is to analyse if late age of acquisition of L2 is associated to a greater syntactic impairment in L2 in bilingual aphasic patients and whether site of lesion modulates the difference in syntactic processing of L1 and L2 in those patients.

Methods: 15 bilingual patients, right-handed, with stroke-induced aphasia were evaluated either in the acute, post-acute or chronic phase. The subjects spoke French and either English, German, Italian or Spanish. All were late bilingual (L2 learned 6 years). To estimate proficiency and immersion of both languages pre-onset, a questionnaire was submitted to patients and their families. Patients with a severe Wernicke's or global aphasia were excluded. They were assessed in L1 and L2 through a translated and internally controlled Mississippi Aphasia Screening Test (MAST) or with the Bilingual Aphasia Test (BAT, M Paradis). Then an auditory syntactic judgment task was carried out in each language.

Results: L2 proficiency was between 0.33 and 0.93 (mean = 0.61, SD = 1.98); L1 was scored 1.0 by definition. The immersion in L2 was 42.2% + 26. While only one patient was more impaired in L2 than in L1 on global aphasia score, 7 patients presented a significant inter-language dissociation in the syntactic task. When the site of lesion was taken into account, 4 out of 7 patients with an anterior lesion and 2 out of 3 patients with anterior-posterior lesion presented the dissociation in the syntactic task. Therefore, anterior lesion seemed to be associated with a dissociation between performance in L1 and L2 in the syntactic task. However, in two patients the dissociation goes in the opposite direction than expected with L1 more impaired than L2.

Conclusion: This pilot study suggests that the syntactic judgment can be more impaired in one language than in the other in late bilingual stroke patients, independently of general language impairment, especially in patients with anterior lesions.

P 08 Natalizumab disproportionally increases circulating B cells and decreases the frequency of natural T regulatory cells

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Background: Natalizumab is a humanised monoclonal antibody directed against very late activation antigen 4 (VLA-4) and has a potent effect on disease activity in multiple sclerosis (MS). Blockade of VLA-4 with natalizumab may not only interfere with autoimmunological mechanisms but also with central nervous system (CNS) immune surveillance.

Methods: Longitudinal ex vivo and in vitro study to determine the effect of natalizumab on frequency of distinct immune cells and on the frequency and suppressive function of natural $CD4^+CD25^+$ regulatory T cells (Tregs).

Principal findings: Natalizumab binding to VLA-4 was more marked for B cells than for T cells (49% reduction of VLA-4 expressing B cells compared to 24.5% reduction of T cells). There was an increase of circulating B cells over T cells (2.6 vs 1.5 fold, $p < 0.0001$). Natalizumab led to a relative decrease of $CD4^+CD25^+$ Tregs from 18.9% to 14.1% ($p = 0.003$). The impaired suppressive capacity of Tregs was not restored.

Conclusion: Natalizumab reduces VLA-4 expression on all investigated immune cells but changes were most marked for B cells. A disproportional increase of circulating B cells together with a relative decrease of Tregs may be relevant for the development of opportunistic CNS infections during treatment with natalizumab.

P 09 Non-motor symptoms in Parkin gene-related parkinsonism

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Background: The aim of the study was to explore the prevalence and differences of non-motor symptoms in patients with young-onset Parkinson's disease (PD) with and without mutations in the Parkin gene.

Methods: Twenty-seven patients with young-onset and 27 with late-onset PD (YOPD/LOPD), as well as 16 patients with homozygous or compound heterozygote Parkin mutations filled in the recently validated NMS-Quest, a 30-item self-completed questionnaire that addresses the various non-motor features.

Results: Overall, non-motor symptoms were significantly more prevalent in YOPD (12.07 + 3.9; $p = 0.009$) and LOPD (13.26 + 5.8; $p = 0.001$) compared to Parkin mutation carriers (7.38 + 4.2). The following symptoms were significantly more prevalent in YOPD compared to Parkin mutation carriers: dribbling of saliva, vivid dreams, loss of smell and urinary urgency. Only anxiety was significantly more prevalent in Parkin mutation carriers.

Conclusion: Apart from anxiety, non-motor symptoms appear to be less prevalent in Parkin gene-related parkinsonism. Although these results need further study, the presented data might be helpful in the clinical recognition of specific phenotypes and genotypes in young-onset parkinsonism. The data are in keeping with a different pathological disease process in Parkin gene-related parkinsonism.

P 10 Perceptively modulated reduplicative paramnesia

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Introduction: Reduplicative paramnesia (RP) is the involuntary attribution of a false identity to a place. It is mostly associated with lesions to the right frontal cortex, but other lobes of the right hemisphere or even the left temporo-occipital region may be involved. Related to the lesion localisation, memory, executive, attentional and visuo-spatial dys-

functions are observed individually or in association, making RP mechanism unclear. We are presenting a patient in whom RP was modulated by visiting well-known sites in Geneva.

Methods: A 53-year-old man, native of Portugal but living in Geneva for the last 30 years, presented RP following extensive right fronto-temporal lesions due to traumatic head injury. He claimed that he was hospitalised in his hometown in Portugal and evidence to the contrary was countered with logical arguments. However, semantic knowledge about the two towns was intact. In a field experiment, recorded on videotape, we assessed changes in his spatial orientation when he was shown places with unequivocal evidence about the location.

Results: We visited with him the famous water fountain, where he asserted for the first time to be in Geneva. He maintained this conviction for the whole day, but on the following morning he again believed to live in Portugal. He also acknowledged that he had been in Geneva the day before, but he had no explanation for how he had made the trip of 2300 km between the two cities in one day. The experiment was repeated four weeks later, this time with a visit to the main entrance of the University Hospital. When he perceived the building, he was again certain to actually be in Geneva. From this moment on, his spatial orientation gradually normalised.

Conclusion: Being exposed to a previously known landmark, the patient situated himself correctly in Geneva, but failed when the landmark was ambiguous. Our findings suggest that RP is temporally modifiable by the perception of salient landmarks.

P 11 Spacetime: neglect of early relative to late events after right hemisphere damage

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Introduction: Recent research on interactions between spatial and temporal processing has revealed that healthy subjects represent the flow of time in a left-to-right direction, early events being thus located "left" from later events (J. Santiago et al., Psychon. Bull. Rev. 14/2007). This would imply that, in the presence of left-sided hemispatial neglect, the recall of events in the more distant past is overproportionately hampered relative to a control group without neglect. We set out to test this prediction in a verbal list learning paradigm with known strong recency and primacy effects (i.e. better recall of words from the beginning and end of the list than from its middle range).

Methods: Twenty-two right-handed patients with MR-confirmed cortical lesions in the right hemisphere (RH) were administered a series of neglect tests and a verbal memory task. In the verbal memory task patients had to orally reproduce a list of 10 words in three consecutive runs (same list order in each learning run). After 40 minutes, the patients had to reproduce as many words as possible from memory (without being read the list once more). The critical variable was the number of words produced from the first half of the list ("primacy") relative to those from the second half of the list ("recency"). We compared the patients with clear indication of neglect (deficient performance in 2 or more out of 5 tests; n = 13, all with clinically manifest neglect) with the patients without signs of neglect in any of the 5 tests (n = 9). Both patient groups were comparable in terms of age, education, time since RH damage and lesion size.

Results: Overall, learning and late recall was comparable for the two groups. However, as predicted, the neglect group recalled more words from the second relative to the first half of the list. No comparable recency/primacy asymmetry was apparent for any of the three learning runs.

Conclusion: Presence of hemispatial neglect is associated with retrieval difficulties selective for words of the first half compared to the second half of a list. This finding is compatible with a left-to-right horizontal representation of time as previously described for healthy subjects. It adds to a common coding of space and time in the parietal lobes (V. Walsh, TICS 7/2003) and asks the question of opposite spatial-temporal list order effects in patients with damage to left parietal areas.

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P 12 Spontaneous internal carotid artery dissection presenting as hypoglossal nerve palsy

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Spontaneous dissection of the cervical internal carotid artery (sICAD) is typically associated with a clinical triad consisting of focal cerebral ischaemic symptoms, Horner's syndrome and mostly ipsilateral headache. Lower cranial nerve palsies as the only sign of a sICAD seem to be uncommon and rare. We report two cases and give a review of the literature, showing that this clinical presentation is not that uncommon.

Cranial nerve palsy is reported in 8–16% of sICAD; the lower cranial nerves IX–XII are most commonly affected, in particular the hypoglossal nerve, being affected in approximately 5%. The exact number of isolated cranial nerve palsies as a result of sICAD is unknown but probably underestimated. In patients with diagnosed sICAD a value of less than 5% has been described in the literature. Typically patients with cranial nerve palsies lack cerebral ischaemic lesions. In these patients lower cranial nerve palsies are probably the result of compression by an enlarging internal carotid artery (ICA) due to a subadventitial haematoma, whereas cerebral ischaemic lesions result from a subintimal haematoma, leading to thromboembolism.

The diagnosis should be made by combining different techniques, primarily the application of magnetic resonance imaging.

Treatment should follow the recent guidelines of cervical artery dissection, which in general means initial anticoagulation for three months. In case of spontaneous restitution after three months the oral anticoagulation is stopped. Otherwise prolonged anticoagulation for additional three months may be followed by aspirin, individually adapted anticoagulation.

We recommend thinking of a sICAD as a possible differential diagnosis in patients with isolated lower cranial nerve palsies.

P 13 T regulatory cell function is impaired in relapsing remitting but not in primary progressive multiple sclerosis

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Objective: To analyse Treg function in primary progressive multiple sclerosis (ppMS) in comparison to relapsing remitting multiple sclerosis (rrMS) and healthy controls.

Background: Multiple sclerosis (MS) is an inflammatory autoimmune disorder of the central nervous system which is thought to result from aberrant T cell immune response to self antigens, e.g. myelin basic protein (MBP). Active suppression by $CD4^+CD25^+$ regulatory T cells (Tregs) plays a key role in the control of self antigen-reactive cells and in the induction of peripheral tolerance in vivo. The inhibitory capacity of Tregs is impaired in rrMS. The underlying pathology in ppMS is thought to be substantially different from rrMS.

Methods: 47 untreated MS patients (rrMS: n = 35, n = 12 ppMS) and 43 healthy controls were included (age and gender matched). Treg cells and $CD4^+CD25^-$ cells were isolated by immunodensity and immunomagnetic separation. Suppression activity of Tregs was estimated by 3H-thymidine proliferation assay of peripheral blood mononuclear cells (PBMCs), PBMCs + $CD4^+CD25^-$ cells, and PBMCs + Tregs + $CD4^+CD25^-$ cells. 1×10^4 Treg cells/well and 1×10^4 $CD4^+CD25^-$ cells/well were stimulated with 5 µg of MBP as an antigen and 1 µg of Pokeweed Mitogen (PWM).

Results: Co-culturing of Tregs with $CD4^+CD25^-$ cells significantly reduced MBP and PWM induced proliferation in comparison with $CD4^+CD25^-$ cells alone in healthy controls. Suppression of MBP-induced proliferation was similarly observed in controls and ppMS patients (89 vs 70%) but significantly less than in rrMS patients (45%, $p < 0.03$).

Conclusion: In contrast to rrMS, the pathology in ppMS does not involve a failure to control peripheral immune maintenance by Tregs. Impaired Treg function seems not to be involved in ppMS.

P 14 Tracking changes of persons with multiple sclerosis comprehensively with an updated version of SaGAS as a complement to the EDSS

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Objective: The restrictive emphasis on ambulation between EDSS 4.0 and 7.5, the limited sensitivity to changes and the inadequate evaluation of upper limb function figure among the shortcomings of the EDSS. Hence the need for an assessment tool that considers hand function separately, measures walking performance precisely and that can be expressed using a clearly defined, clinically relevant interval scoring system.

Methods: We added to the Nine-hole Peg Test (NHPT) and 10-m timed walk (TMTW) the pre-existing components of our Short and Graphic Ability Score (SaGAS) and the 3-min walking distance (3MWD) and simplified the scoring system by using a 1 to 150 scale where a 10-point change represents a clinically meaningful change.

Subjects: 894 consecutive persons with multiple sclerosis (EDSS 5.6 ± 1.3) treated in our rehabilitation clinic were assessed at the beginning and at the end of their rehabilitation stay.

Measures: The performances in time/distance in the 4 measures were expressed as a logarithmical function in 4 subscores (sS) ranging from 0 to 150. The subscores were constructed in such a way that any interval of 10 units corresponds to a clinically relevant change of 20% in the 4 subscores. The SaGAS was computed as the mean of the 4 subscores.

Results: The correlation coefficients between SaGAS and EDSS, Nottingham ADL Index and the Rivermead Mobility Index were all statistically significant. The SaGAS updated was more sensitive than the EDSS for the changes occurring during the rehabilitation stay and had the advantage to depict the domains where the changes had occurred. Previous observations that a 0.5 change in patients EDSS >6.0 corresponds to a 2.0/2.5 change in patients with EDSS <5.5 were confirmed.

Conclusion: The SaGAS updated is a simple, sensitive, continuous and multidimensional non-physician-based measure that appears as an ideal complement to the EDSS for the moderately disabled patients.

P 15 Spinal pseudoathetosis in a patient with multiple sclerosis

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Introduction: Lesions associated with dystonia/athetosis are usually located in the basal ganglia including the striatum, globus pallidus and its connections. If dystonia or athetosis occurs along with proprioceptive loss, the term "pseudoathetosis" has been introduced. The causing lesion can be at all levels of the sensory pathways (i.e. peripheral nerve, root, posterior columns, thalamus, parietal cortex) and of different origin (stroke, multiple sclerosis [MS], syringomyelia, cord compression, systemic lupus erythematosus). We report a video case of a patient with relapsing remitting multiple sclerosis and spinal pseudoathetosis.

Methods/results: This 41-year-old female patient was diagnosed with relapsing remitting multiple sclerosis in the year 2005 and had three relapses since then under therapy with Interferon Beta 1a. She came to our attention now because of acute involuntary movements of her right arm. Her right arm felt clumsy and numb. She did not have other symptoms and walking was well preserved. During examination she had involuntary dystonic/athetoid postures and movements of her right hand, which were more obvious during voluntary movements and absent at rest. She had a complete loss of proprioception of her right arm with only mildly reduced vibration sense. Power and reflexes were normal. We admitted her for high-dose intravenous steroid treatment with the suspicion of a relapse. The MRI (head and neck) showed a new demyelinating gadolinium-enhancing intrinsic lesion in the posterior part of the cervical cord on level C3 including the right posterior column. Somatosensory evoked potentials of the median nerve showed good responses at peripheral and spinal level with an absent cortical response on the right side. After 2 weeks she noticed some improvement of her involuntary movements, which went in parallel with an improvement of her proprioception.

She has been videotaped at admission and after 6 weeks with nearly complete resolution of her movement disorder and proprioception.

Conclusion: With this illustrative video case of a patient with pseudoathetosis and MS we want to highlight the following points: (1) If limb dystonia/athetosis is due to a proprioceptive loss, the term "pseudoathetosis" is used. (2) The causing lesion can be at all levels of the sensory pathways. (3) In MS pseudoathetosis is the presenting symptom or consequence of a relapse and is likely to be due to a spinal lesion affecting the dorsal columns.

P 16 Anti-N-methyl-D-aspartate receptor (anti-NMDA-R) encephalitis with ovarial teratoma – case report

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Introduction: Anti-NMDA receptor associated encephalitis is a recently described new entity of encephalitis with a very characteristic and nearly pathognomonic disease progression and movement disorder most often affecting young females with ovarian teratoma. The prodromal phase with flu-like symptoms (stage 1) is followed by the psychiatric stage 2 followed by stage 3 with unresponsiveness (catatonia), central hypoventilation and autonomic instability. In stage 4 a hyperkinetic movement disorder with facial predominance additionally occurs before recreation takes place after several weeks to months (stage 5). In most patients an ovarian teratoma with neural elements can be found.

We are reporting an illustrative video case of a young woman with ovarian teratoma-associated encephalitis.

Methods/results: Our 38-year-old previously healthy female patient was hospitalised on a psychiatric ward because of acute schizophrenia and progressed within 3 days to a catatonic state. She had antipsychotic treatment with haloperidol without much success. Thereafter central hypoventilation and hypersalivation occurred leading to intubation on day 6 and referral to our intensive care unit. Two days after intubation orofacial movements started (orofacial automatisms, jaw opening and closing with severe tongue biting) with intermittent synchronised spread to the extremities and diaphragm. CSF showed lymphocytic pleocytosis (33/µl), normal MRI of the brain and a generalised delta activity in EEG. Because of this characteristic movement disorder in combination with a catatonic state an abdominal CT scan was performed which showed a 17-mm ovarian teratoma on the right side. 12 days after initial hospitalisation the tumour was removed and two cycles of intravenous immunoglobulin (IVIG) were applied. During the first 4 weeks after operation and IVIG treatment the clinical picture remained unchanged even though we have been able to further reduce the sedation with propofol. Overall, we expect a favourable prognosis after early removal of the teratoma. The result of anti-NMDA-antibodies was positive.

Conclusion: This case is very illustrative regarding the typical disease course and also from the perspective of movement disorder. It is very important to recognise this entity because early causal therapy with removal of the disease-causing ovarian teratoma and IVIG therapy is essential for a good outcome.

P 17 Observational study evaluating the use of transdermal and oral therapy for Alzheimer's disease

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Introduction: Acetylcholinesterase inhibitors (AChEIs) play a key role in Alzheimer's disease (AD) pharmacotherapy. However, oral AChEI administration is frequently associated with two problems: (1) gastrointestinal and peripheral side effects and (2) lack of adherence to therapy (compliance). Riva-

stigmine patch is the first transdermal AD therapy with the potential to improve both the safety profile and compliance, thereby ameliorating the efficacy of AD treatment.

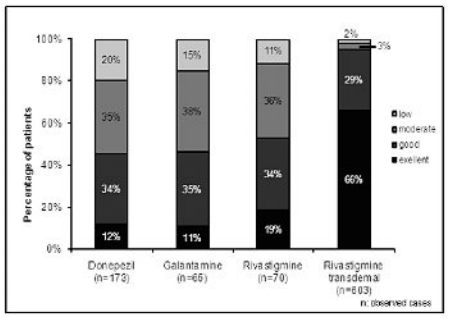
Methods: In this observational study physicians had the choice to either initiate an oral or a transdermal pharmacotherapy in treatment-naive AD patients, or to switch treated AD patients to another oral treatment or to transdermal pharmacotherapy (TT). In order to assess TT in comparison to oral treatment, physicians evaluated outcome parameters of AD therapy (fig. 1 and fig. 2). Adverse events were recorded during the treatment period.

Results: 196 physicians (89 specialists, 107 GPs) with 626 AD patients (58% females; 78.8 ± 7 years) participated in the study. The average duration between symptom onset and AD diagnosis was 10.3 months, and the duration between diagnosis and initiation of AD pharmacotherapy was 3.8 months. At baseline, 44% of the patients received no pharmacotherapy, while 50% were treated with oral AChEI (11% galantamine, 11% rivastigmine caps., 28% donepezil), 6% received memantine and 7% other medication (including patients on double therapy). 7 patients were switched to another oral therapy while for 619 patients rivastigmine TT was initiated. Insufficient efficacy, side effects and lack of compliance were the prevalent reasons for a switch to TT. Patients with TT were monitored for 2 months (mean). Results on compliance, handling, patient satisfaction and caregiver satisfaction with the medication are presented in figures 1 and 2. Physicians rated the efficacy of the TT as good or excellent in 80% and maintained TT in 88% of the patients. The most frequent side effects with TT were: nausea (2%), vomiting (0.5%) and diarrhoea (0.8%). Local skin reactions (mostly erythema) were reported in 4.7% of the patients, while 3.7% of the patients discontinued TT due to skin reactions.

Conclusion: In comparison to oral AD therapy, transdermal treatment with rivastigmine substantially improved compliance, patient and caregiver satisfaction and showed an excellent tolerability profile.

Figure 1
Evaluation of compliance and handling with transdermal AChEI medication in comparison to oral AChEIs.

a) Compliance



b) Handling of medication

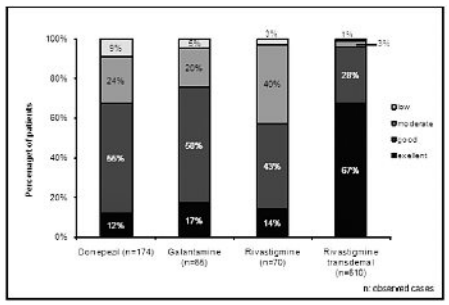
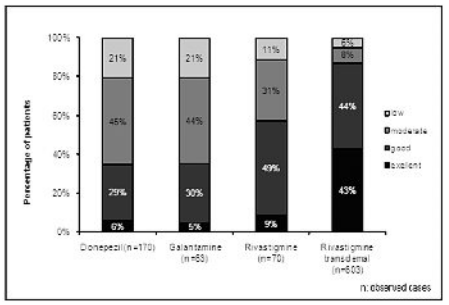
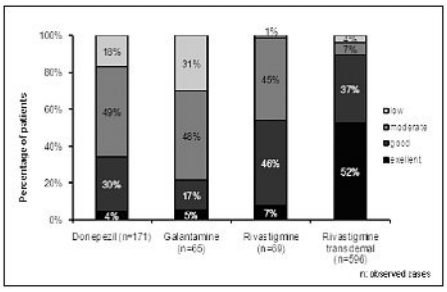


Figure 2
Patient and caregiver satisfaction with transdermal AChEI in comparison to oral AChEIs.

a) Patient satisfaction



b) Caregiver satisfaction



P 18 Improvement of disabling camptocormia after subthalamic deep-brain stimulation in a patient with advanced Parkinson's disease

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Background: Deep-brain stimulation (DBS) is an effective treatment for the improvement of motor function in Parkinson's disease (PD) [1]. However, it has been noted that outcome of DBS is less favourable regarding axial PD symptoms [1]. Camptocormia is a disabling axial symptom occurring in advanced PD and is characterised by an extreme forward flexion of the thoracolumbar spine.

Case: We present the case of a 54-year-old patient with advanced PD. He was suffering from severe motor fluctuations, prominent axial symptoms, including postural instability, and camptocormia. When standing in the 'off' medication state, his camptocormia was roughly 40°, whereas the symptom improved to 20° under best dopaminergic medication. After bilateral subthalamic DBS camptocormia further improved to 5°.

Conclusion: The observation in our PD patient shows that DBS may be superior to dopaminergic medication to improve levodopa-responsive camptocormia.

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