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Abstracts
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Eingeladene Referenten (alphabetisch)

Treatment for chronic low back pain: from the neurosurgical point of view

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The definition of chronicity for low back pain is unclear, the duration usually longer than 3 months. The reasons for back pain are manifold, a diagnostic cause cannot always be found, which makes analysis of treatment regimens difficult. The majority of patients presenting with complaints of chronic low back pain should be treated with non-operative measures in favour of an intensive, multidisciplinary and psychosocial rehabilitation. There are several conditions that often require neurosurgical intervention for a minority, but in all cases surgery should be considered as a last resort, after conservative manoeuvres have been exhausted. Work-related and psychosocial factors are very important in predicting the possible postoperative outcome as well as the negative influence of repetitive surgery on the long-term outcome of so-called "failed-back-surgery"-patients.

A basic tenet of the successful neurosurgical treatment is to treat only after a clear diagnosis is made. The evaluation consists of a detailed history and physical exam. The MRI has become the standard radiographic study to diagnose the majority of spine conditions, completed with Plain and Dynamic X-rays, CT scans coupled with a Myelogram, Discography and Nuclear Bone Scans. Additional tests with limited accuracy are diagnostic blocks of the facet joint, the sacroiliac joint, the nerve root and the epidural space.

Operative indications for *Disc Herniation* include unremitting pain, incontinence or progressive motor loss. Microdiscectomy is still superior to other less-invasive techniques. The literature does not support the use of routine fusion along with discectomy.

The treatment of *Degenerative Disc Disease (DDD)* remains one of the most controversial topics in the spine-literature. The primary treatment is nonsurgical. In early stages of this disease with unrelenting back pain and disability despite conservative therapy for at least 6 months, patient selection is the key determinant in successful outcome of total disc replacement. Properly selected patients are younger than 50 years with more than 4 mm remaining disc height and intact posterior elements without signs of facet joint degeneration at the diseased and adjacent levels. The discogenic pain must be verified using provocative discography in terms of memory-pain and morphological leakage into the anulus (the false-positive rate drops by verifying a nonpainful control disc first), combined with negative facet blocks. The good short- and mid-term results of disc-arthroplasty are to be demonstrated in the long term. Accurate placement of the device is important for proper functioning of the prosthesis. This implies the exposure of the full disc-breadth mobilising the big veins with associated potential complications which can be life-threatening, one cannot stress enough. In late stages of symptomatic DDD with lumbar spondylosis, true segmental instability (due to spondylolisthesis, lateral olisthesis or scoliosis) and arthritic facets surgical fusion has a significant role in treating disabling low back pain, but patients must be selected with great caution, and those with one-level disease will do best. The success of fusion is related not only to its ability to eliminate the motion through the disc but also to eliminate the pain focus within the disc. So fusion techniques include lumbar interbody fusion with cage devices from posterior (PLIF), transforaminal (TLIF) or anterior (ALIF), as well as combined anterior fusion and posterior instrumentation. The extensive muscle stripping required to perform posterolateral fusion is an important negative factor and may lead to late weakness and fatigue ("fusion-disease"). Thus minimally invasive fusion techniques with percutaneous instrumentation should be preferred resulting in shorter hospital stay and better return-to-work rate.

In *Spinal Stenosis* pain originates from the degenerated joints, from mechanical compression of the spinal nerves and from an impaired blood supply to the nerves. Decompressive surgery is superior to nonsurgical treatment in patients with severe symptoms and it remains superior although the relative benefit of surgery declines over time. The indications for fusion are not as clear. Here the fusion becomes preventative, it will prevent further instability and subluxation following decompressive surgery. Factors increasing the risk for postoperative slippage are unstable preop. films, complete facetectomy, extensive decompression and preexisting spondylolisthesis. Posterolateral instrumented fusions or interbody fusions become the procedure of choice.

In cases of hypertrophic facets with secondary central and lateral spinal stenosis, hyperlordosis and degenerative retrolisthesis a soft interspinous silicone spacer appears to be a good therapeutic option in order to prevent fusion in younger patients and to perform a less-invasive stabilising procedure in elderly patients. These interspinous implants reduce the intradiscal pressure and improve sagittal stability through ligamentotaxis with little resistance to axial rotation and lateral bending. The fulcrum moves to posterior easing the burden of the facets. First optimistic results are to be confirmed by prospective long-term studies.

The surgical treatment of symptomatic *Isthmic Spondylolisthesis* is depending on the degenerative changes of the discs involved and includes repair of the pars defect, decompression only (Gill procedure), in situ instrumented fusion with or without decompression, and reduction, fixation and fusion. The late results of removing the posterior elements were poor. In adult patients with radicular symptoms only, decompression may be beneficial. In cases of heavy weighted patients, almost normal disc height and performed reduction manoeuvres interbody-fusion-techniques (PLIF, TLIF or ALIF) are superior to posterolateral fusion with instrumentation. A high incidence of screw breakage, pseudarthrosis and loss of reduction and lordosis is reported in the literature, when interbody fusion was not used. The correction of lumbosacral kyphosis is more important than translational slip correction.

In *Degenerative Spondylolisthesis (Pseudospondylolisthesis)* structural loosening due to arthritic changes results in slipping of the entire vertebra with bony arch, developing not only foraminal but central spinal stenosis. Thus spinal decompression of involved neural structures is followed by fusion techniques to prevent further slip progression. In elderly patients with collapsed disc spaces posterolateral in situ fusion with instrumentation is the less-invasive procedure of choice.

Spinal compression fractures, caused by *Osteoporosis* or osteolytic spine *Metastases,* are a significant cause of progressive worsening back pain in the elderly population.

Percutaneous vertebroplasty and kyphoplasty are minimally invasive techniques for many patients of advanced age who have limited surgical options to provide substantial pain relief within minutes to hours following the procedure. In addition kyphoplasty is able to restore vertebral height and to reduce kyphotic deformity. The procedures are associated with acceptable complication rates. Kyphoplasty improves the safety because less pressure is required for cement-injection into an expanded cavity.

In all neurosurgical procedures accurate diagnosis and proper patient selection is the clue to treat patients with chronic low back pain successfully.

Endoscopic pituitary surgery: anatomical and surgical aspects

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Objective: This study describes the technique, anatomical landmarks and important surgical aspects of the endoscopic transnasal transsphenoidal binostril surgery by treating adenomas of the pituitary gland.

Methods: The endoscopic approach is performed using a rigid endoscope device with suction and irrigation channel. Through the endonasal route the nasal cavity is exposed on both sides. After anatomical and if necessary fluoroscopic orientation the sphenoid ostium is enlarged on both sides using a diamond drill. Then, the endoscope device is placed inside the sphenoid sinus without using a nasal speculum and the tumour removal is performed through the other nostril with a binostril biportal technique in an endoscope-controlled way with conventional micro-instruments. The empty sela cavity is closed and reconstructed by gel foam. After surgery, no nasal packing is used. Hospitalisation stay is on average 5 days.

Results: The use of this technique results in less intraoperative trauma of the nasal cavity, without paraseptal or sublabial incision and without intraoperative use of nasal speculum. Endoscopic transnasal exposure allows clear anatomical orientation within the sphenoid sinus and optimal control on tumour removal during transsphenoidal pituitary surgery. The endoscopic binostril approach offers reduced postoperative complications caused by the approach. The technique and the absence of nasal packing causes reduced postoperative discomfort and improved upper-airway function in the postoperative course.

Conclusion: The endoscopic transnasal transsphenoidal binostril technique offers a minimally invasive treatment by the operative management of pituitary tumours.

Medikamentöse Schmerztherapie bei neurochirurgischen Patienten nach dem WHO-Stufenschema

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Die Behandlung von Schmerzen hat in den letzten Jahren in der Medizin immer mehr an Bedeutung gewonnen. Gerade in den chirurgischen Fachgebieten spielt die Schmerztherapie neben der Behandlung postoperativer Schmerzen auch im Bereich der chronischen Schmerzen eine immer wesentlichere Rolle.

Auch in der Neurochirurgie ist der Schmerz ein häufiges Symptom, weshalb Patienten behandelt werden. Z.B. Kopfschmerz bei intrakraniellen Prozessen oder Gesichtsschmerzen (Trigeminusneuralgie) sowie Schmerzen ausgehend von der gesamten Wirbelsäule, hier ist besonders der Rückenschmerz zu hervorzuheben.

Die Behandlung sollte multimodal sein. Die Pharmakotherapie ist eine der Hauptsäulen der Schmerztherapie und hat die weitaus grösste Bedeutung für die Behandlung von akuten und chronischen Schmerzen.

Zur Behandlung chronischer Schmerzen ist ein Vorgehen nach dem WHO-Stufenschema zu empfehlen.

Anhand des WHO-Stufenschemas werden die einzelnen Medikamentengruppen, Dosierungen, Wirkmechanismen, Nebenwirkungen und deren Prophylaxe aufgezeigt. Auch der Stellenwert der COX-2-Hemmer wird diskutiert werden müssen. Zuletzt wird die interessante Gruppe der Adjuvantien (Antidepressiva und Antiepileptika) behandelt, welche zur Therapie neuropathischer Schmerzen immer häufiger eingesetzt werden.

Schwindel beim älteren Menschen

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Das vestibuläre System des älteren Menschen
- Histologische Befunde
- Physiologische Befunde
- Kopfimpulstest beim 60jährigen und älteren Patienten

Allgemeiner Exkurs
- Kriterien vestibulärer versus nicht-vestibulärer Schwindel
- Nicht-vestibulärer Schwindel / Trümmel
  - Orthostatische Hypotension, Hypertension
  - Husten- and andere Valsalva-artige Situationen
  - Multiinfarkt-Syndrome (Presby-Vertigo)
  - Herzkrankheiten mit Brady- oder Tachyarrhythmie, Adams-Stokes-Anfälle, low cardiac output, Aortenstenose
  - Status febrilis, schwere Allgemeinerkrankung
  - Psychogen (Depression, Angst), Hyperventilation
- Vestibulärer Schwindel / Trümmel
  - Lagerungsschwindel
  - Migräne-Äquivalente
  - Neuritis vestibularis
  - Zentral-vestibuläre Syndrome
  - Psychophysiologischer Schwindel
  - Beidseitiger Labyrinth-Ausfall (autoimmun/ototoxisch/idiopathisch)

Typische Schwindel-Ursachen beim älteren Menschen
- Syndrom der transient-ischämischen Attacken des hinteren Kreislaufes
- Multisensory Dizziness
- Bilaterale Vestibulopathie des älteren Menschen?
- Kombinationen
  - Lagerungsschwindel plus ...
  - ... plus Depression/Angst

Behandlung
- Keine vestibulären Sedativa ausser bei Brechreiz – Erbrechen
- Angepasstes vestibuläres Training

Population-based studies on incidence, survival rates and genetic alterations in astrocytic and oligodendroglial gliomas

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Published data on prognostic and predictive factors in patients with gliomas are largely based on clinical trials and hospital-based studies. In this contribution, we report on incidence rates, survival and genetic alterations from population-based studies of astrocytic and oligodendrogliomas that were carried out in the Canton of Zurich (approximately 1.16 million inhabitants). A total of 987 cases were diagnosed between 1980 and 1994 and patients were followed up at least until 1999. While survival rates for pilocytic astrocytomas were excellent (96% at 10 years), the prognosis of diffusely infiltrating gliomas was poorer, with median survival times (MST) of 5.6 years for low-grade astrocytoma WHO grade II, 1.6 years for anaplastic astrocytoma grade III and 0.4 years for glioblastoma. For oligodendrogliomas the MST was 11.6 years for grade II and 3.5 years for grade III. TP53 mutations were most frequent in gemistocytic astrocytomas (88%), followed by fibrillary astrocytomas (53%) and oligoastrocytomas (44%), but infrequent (13%) in oligodendrogliomas. LOH 1p/19q typically occurred in tumours without TP53 mutations and were most frequent in oligodendrogliomas (69%), followed by oligoastrocytomas (45%), but were rare in fibrillary astrocytomas (7%) and absent in gemistocytic astrocytomas. Glioblastomas were most frequent (3.55 cases per 100,000 persons per year) adjusted to the European Standard Population, amounting to 69% of total incident cases. Observed survival rates were 42.4% at 6 months, 17.7% at one year and 3.3% at 2 years. For all age groups, survival was inversely correlated with age, ranging from an MST of 8.8 months (<50 years) to 1.6 months (>80 years). In glioblastomas, LOH 10q was the most frequent genetic alteration (69%), followed by EGFR amplification (34%), TP53 mutations (31%),

p16INK4a deletion (31%) and PTEN mutations (24%). LOH 10q occurred in association with any of the other genetic alterations and was the only alteration associated with shorter survival of glioblastoma patients. Primary (de novo) glioblastomas prevailed (95%), while secondary glioblastomas that progressed from low-grade or anaplastic gliomas were rare (5%). Secondary glioblastomas were characterised by frequent LOH 10q (63%) and TP53 mutations (65%). Of the TP53 mutations in secondary glioblastomas, 57% were in hot-spot codons 248 and 273, while in primary glioblastomas mutations were more evenly distributed. G:C→A:T mutations at CpG sites were more frequent in secondary than primary glioblastomas, suggesting that the acquisition of TP53 mutations in these glioblastoma subtypes may occur through different mechanisms.

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Deep brain stimulation in rare movement disorders

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Chronic deep brain stimulation (DBS) has replaced radiofrequency lesioning in functional stereotactic neurosurgery over the past few years in Western countries. The option of postsurgical modification and optimisation of stimulation settings and its principal reversibility has widened the indications for DBS. Apart from its most frequent application in the treatment of Parkinson's disease chronic DBS has been used in a variety of other movement disorders including essential tremor, kinetic tremors associated with multiple sclerosis and trauma, primary and secondary dystonia, chorea and hemiballism and tics. In particular with bilateral surgery side effects have been minimised. Pallidal DBS has become an accepted treatment option in adult and paediatric patients with generalised primary dystonia. This has been confirmed recently by a prospective multicentre study with blinded evaluations. In particular, the phasic components of dystonia respond well to chronic DBS. Pallidal DBS is a useful alternative also for patients with complex cervical dystonia. Patients with segmental dystonia and rarer manifestations such as Meige syndrome or camptocormia have been reported to achieve substantial benefit with DBS, but data are more limited. Secondary dystonia, in general, appears to respond less well to DBS. There is a discrepancy, however, in objective rating scales and patient self-assessment in some studies. Tardive dystonia is the subject of several ongoing studies. Chronic DBS has been shown to be effective both with regard to the motor tics and the behavioural manifestations in Gilles de la Tourette syndrome in pilot studies. Since in rare movement disorders the optimal target sometimes has not been clearly established, multifocal DBS is evolving as an important tool to select the appropriate target.

Diagnostic and therapy of acute cerebral ischaemia on the ICU

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Space-occupying cerebral infarction is characterised by massive brain oedema associated with clinical deterioration. Progressive brainstem function occurs finally leading to death as a result of herniation in malignant middle cerebral artery (MMI) and in cerebellar infarction. Early recognition of developing herniation is an important task of the neurologist on the stroke unit or the neurological intensive care unit.

Clinical as well as CT and MRI parameters predict MMI: (1) severe neurological deficit (NIHSS score at admission ≥19), (2) nausea, gaze palsy, vomiting or systolic blood pressure >180 mm Hg within the first 24 hours, (3) proximal brain vessel occlusion (MCA main stem, carotid-T), (4) cranial CT (CCT) findings such as major early signs of ischaemia covering >30–50% MCA territory, CCT lesion volume >240–400 mL, hyperdense MCA sign, local brain swelling or midline shift, (5) or MRI parameters such as large lesion volumes in diffusion weighted MRI (DWI) or large perfusion weighted MRI (PWI) lesion volumes with little tissue-at-risk-of-infarction ($ADC_{<80\%}$ >82 ml, $TTP_{>+4s}$ >162 ml).

Conservative treatment results in mortality rates of approximately 80%. Therefore, aggressive therapeutic approaches are recommended for this group of patients. Decompressive craniectomy has been shown to reduce mortality and to improve outcome in patients with MMI in several case series. There is some evidence that early craniectomy is more effective than decompression at later time points. In a prospective case series, a stepwise reduction of time between stroke onset and surgery from 39 to 21 hours resulted in a further reduction of mortality from 27 to 16%. Therefore, the early identification of patients likely to develop MMI appears crucial.

Neurological assessment and vascular imaging are therefore paramount for the identification of patients jeopardised by malignant stroke development. Stroke MRI with the combination of PWI, DWI and MRA allows the predicition of space-occupying MCA stroke within the first hours after stroke onset and can help select patients for aggressive and potentially life-saving therapies such as decompressive hemicraniectomy.

Interventional pain therapy with implantable pumps

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Intraspinal drug infusion using fully implantable pump and catheter systems is a safe and effective therapy for selected patients with chronic pain. Intrathecal administration should be considered when an oral, transdermal, sublingual or parenteral application or other treatments failed or led to too many side effects.

The *benefits* of lower dosage combined with higher efficacy of intrathecal delivery far outweigh its risks. Fixed flow or programmable implantable pumps offer advantages in terms of sterility, comfort and freedom of movement.

Risks: There are three main categories of adverse events associated with intrathecal use: pharmacologic and humoral side effects, complications of surgery and device-related complications. It is important that these adverse events are recognised and managed in order to optimise patient outcomes. Many complications either resolve on their own or can be managed pharmacologically, sterilely or with device or dosage adjustment. More serious complications may require reimplantation or complete discontinuation of therapy.

Patient selection: Candidate patients to receive an implantable pump should be rigorously selected: the patient's response to pain with drug of choice (>50% initial NRS), the absence of risks of complications (sepsis, intracranial hypertension, local infection, coagulation disorders), the patient's compliance, a good circulation of cerebrospinal fluid, a thorough psychological evaluation and no current suit for seeking gain in compensation for their initial injury.

Drugs: As alternative to opoids or in order to potentialise the efficacy of opoids it may be necessary to use other intrathecal drugs (partially experimental): the adrenergic agonist clonidin, the local anaesthetic bupivacain, the NMDA agonist ketamin and other agents, e.g. baclofen, gabapentin, midazolam, zionotide, neostigmine, adenosine or ketorolac.

Intrathecal drug therapy shows not only better tolerance and efficacy in treatment but is also cost effective in the long term despite high initial costs of implantable devices.

For this procedure it is mandatory that the patient is treated by a specialised interdisciplinary pain centre with experience in intrathecal drug therapy.

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Mild cognitive impairment

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Mild Cognitive Impairment (MCI) means organic cognitive impairment that is not sufficiently severe to be called dementia. MCI patients are able to perform most activities of daily living without assistance. The notion of MCI in older people can be approached from two sides: from the point of view of "normality", we ask what level of cognitive performance is not normal any more. This is a descriptive and psychological approach. From the other "medical" point of view a different question is asked, namely, what is the profile of prodromal dementia. The term MCI is used in both senses. To date, there is no agreement how MCI should be replaced by a set of new and precise terms. One step in this direction is the definition of "amnesic MCI", i.e. a condition with profound memory impairment but no other significant cognitive or functional impairment. "Amnesic MCI" is considered to be typical, but not specific for prodromal Alzheimer's Disease (AD). It is the latest point in time to slow down an incipient dementing illness. A reliable detection of preclinical AD will be of paramount importance once a drug becomes available that truly modifies the pathophysiology of Alzheimer's Disease.

The diagnosis of MCI is similar to that of dementia. It includes history taking, physical examination, laboratory and imaging studies to exclude competing, non-degenerative causes of mental impairment. If vascular lesions are present, a diagnosis of "vascular MCI" may be given, provided there is no indication of a superimposed pre-AD state.

Differential diagnoses of MCI include:
- normal age-related decline of cognitive performance
- non-organic, i.e. psychogenic and psychiatric causes of complaint and/or cognitive decline
- pre-existing condition, i.e. residual states of psychosis, head trauma, etc. that are superimposed by age-related decline
- substance abuse
- covert medical or neurological illness

Petersen et al.'s operational definition of *amnestic MCI* (*Arch Neurol 2001;58:1985–92)* apply the following criteria:
- memory complaint, preferably corroborated by an informant
- impaired memory function for age and education
- preserved general cognitive function
- intact activities of daily living
- not demented

However, these criteria do not make explicit statements about some issues which are quite important for diagnosis, namely:
- time frame of deterioration of memory
- progressive or stable memory impairment
- tests, test norms and cut-off-values to be applied
- definition of "preserved general function" and "intact activities of daily living"
- mode of assessment of functional deficits applied to detect conversion to dementia
- should competing non-degenerative causes of dementia be actively excluded?
- should the focus be placed on Alzheimer's Disease (AD)? Certainly, any dementing illness will pass through an MCI stage, and these prodromal stages are quite different from each other.

These are some suggested restrictions:
- focus on conditions that have been acquired and are not due to a recognisable circumscribed cerebral damage, psychiatric medical illness
- focus on conditions that are progressive rather than stable
- application of memory tests of memory that include delayed recall
- results of memory tests should be below minus one standard deviation on tests standardised for age and education
- activities of daily living should be completely intact for basic activities but may be mildly impaired for complex activities, such as handling financial affairs
- "amnesic MCI" is a presumed prodromal stage of AD.

The *conversion rate of MCI to dementia* is known to depend on the description and mode of recruitment of the studied patient samples. In a review of 19 follow-up studies, Bruscoli and Lovestone (Int Psychoger 2004; 16:129–40) described a mean annual conversion rate of 7.5 in community volunteers, but of 15% in clinic attenders (overall range: 2 to 31%). Apart from mode of recruitment, other sources of between-study variance are the tests, the norms and the cut-offs that are applied to assess MCI, furthermore, the type of assessment of functional deficits applied in order to detect conversion to dementia.

To prove the efficacy of future drugs designed to slow the progression of Alzheimer's Disease will require that study populations are carefully selected. Overinclusion of memory-impaired patients who are never going to convert will severely reduce the statistical power of clinical studies. The search for *predictors of conversion* in populations of MCI patients is therefore a major research issue. A regular finding is that the level of neuropsychological test performances at baseline is, on average, lower in patients who convert to dementia by a given follow-up date. However, this is not instrumental for individual prognosis. Other methods to predict future conversion to AD are:
- APO-E genotyping
- CSF phospho-tau ↑, β-Amyloid ↓
- EEG variables
- PET cerebral metabolic imaging
- volumetric MRI measurements of entorhinal/hippocampal tissue and of atrophy rates over time

In a follow-up study of ours, we examined a cohort of MCI patients who had recently developed memory impairment and who were presumed to be at high risk to develop AD. 120 consecutive MCI patients (age >55, mean age: 76) were included. Clinical judgment was applied to appreciate the magnitude and significance of neuropsychological and functional impairments. 20 patients were lost to follow-up. In 100, follow-up was performed, one to three times, 0.75 to 3.5 years later (mean: 1.6 years). 80 were re-examined at our clinic, and in 20, data were acquired by interview with primary care physicians. All patients who converted to dementia received neuroimaging. Of 100 patients who were followed up, 48 converted to dementia (AD in 45, Lewy body / Parkinson dementia in 3 cases). 43 remained MCI, and in 9, a new diagnosis was given (reversion to normality, depression, substance abuse, epilepsy). Converting and stable patients showed only minimal differences in mean baseline neuropsychological test scores. The observed annual conversion rate of 30% (48% divided by 1.6 years) is twice as high as the mean rate for clinic attenders calculated by Bruscoli and Lovestone. This indicates that inclusion of MCI patients without recognisable non-degenerative disturbances may help to define groups of patients that are "enriched" with prodromal dementia. However, there was also a substantial minority of nine subjects in whom the diagnosis of MCI was revised at follow-up. This confirms that the degree of prognostic accuracy that can be attained by a purely clinical definition of MCI is limited.

A *medical therapy* of amnesic MCI is presently not available. Acetyle choline esterase inhibitors have not proved to be effective in several clinical trials with MCI patients and are not licensed for treatment in these patients.

In summary,
- MCI is a descriptive term, not a medical diagnosis in the strict sense. There are many definitions, most of which are not precise and will include quite different groups of patients.
- Clear definition and careful selection of MCI patients is mandatory for research and will have major implications for the design and success of future pharmacological studies.
- Neuropsychological prediction of future conversion to dementia does not seem to be sufficiently reliable. However, patients with unequivocal memory impairment and no other recognisable pathology are at a high risk to develop AD.
- Biological methods may provide better predictors of conversion to dementia. To date, CSF but no blood tests are available that can show tau- and amyloid concentrations indicative of AD. It is not proved that these tests achieve higher diagnostic accuracy than clinical methods.

Changing paradigms in the multidisciplinary management of malignant glioma: the role of chemotherapy and radiation

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Glioblastoma was considered resistant to chemotherapy. In a randomised trial temozolomide (TMZ) was added or not to standard radiotherapy (RT). Survival was prolonged in the group of patients (pts) receiving upfront TMZ/RT. At 2 years, 27% of pts in the TMZ/RT group were alive compared to 10% in the RT group.

Tumour tissue was available in 50%. Tumours with a methylated *MGMT* gene promoter, thus a silenced gene and inability of repair DNA damage caused by TMZ, were the subset that benefited from the addition of TMZ. Patients with a silenced gene treated with TMZ/RT had a 2-year survival of 46%, compared to 14% in the unmethylated group.

Oligodendroglioma with LOH 1p/19q has been associated with responsiveness to chemotherapy. The addition of PCV before or after RT was evaluated in 2 randomised trials. None demonstrated a significant impact on survival by early addition of chemo (compared to giving chemo at progression only), although progression-free survival was improved. Outcome for pts with 1p/19q LOH was superior underlining this being a distinct pathologic entity.

New trials in glioblastoma aim at overcoming MGMT expression by an intensified TMZ schedule, or improving survival by addition of novel targeted and anti-angiogenic agents. Extrapolation of combined modality strategies to lower grade glioma must be cautioned and trials for anaplastic astrocytoma and oligodendroglioma will evaluate TMZ/RT and the relative benefit of prolonged TMZ administration. For low-grade glioma a randomised trial is evaluating the administration of TMZ versus initial radiotherapy for progressing or high-risk pts. Common to all trials is the need of availability of paraffin-embedded or better, fresh frozen tumour tissue. Future treatments will be tailored according to specific molecular tumour profiles.

Surgical approaches in epilepsy: the Lausanne-Geneva experience

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160 patients underwent 186 surgical procedures: 17% were invasive recordings, 155 were therapeutics; 55 children (35%) and 105 adults benefited from surgery. Age varied from 3 months to 56 years. There were slightly more female patients (53%). All patients underwent a presurgical evaluation.

105 adults underwent 125 surgeries. 21 consisted in invasive recordings, i.e. 10 subdurals and 14 depth electrodes. 102 patients had a therapeutic intervention. 60% of surgeries consisted in lobectomies; lesionectomies accounted for 22%; stimulation and cortectomy accounted for 5% each.

Pathology: Gliosis was most frequent, while dysplasia was demonstrated in 25% of cases, benign tumour and cavernoma in 5% each. Median interval between seizure onset and surgery was 17 years.

One death occurred in the early postoperative period. 3 patients sustained postoperative haemorrhage without deficit. One patient required a CSF shunt. One abscess developed at a depth electrode site (0.6%). 75% of patients have remained seizure free.

55 children (3 months to 16 years) underwent 61 surgeries, including 5 subdurals grids and 2 depth electrodes recordings. Therapeutic surgeries (53) consisted in one third lobectomies, one third lesionectomies, one third multilobar resection including hemispherotomy. There were few cortectomies. Pathology consisted in developmental abnormalities in 65% while gliosis, chronic encephalitis and other lesions accounted for 35%. There were 2 infections requiring removal of bone flap. There were no permanent neurological sequelae. 76% have remained seizure-free since surgery.

Pharmacoresistant epileptics are surgical candidates. 75%, adults or children, are seizure free after surgery. Early operation is to be considered.

Deep brain stimulation in advanced Parkinson's disease

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93 patients suffering from advanced Parkinson's disease underwent bilateral STN-DBS. All patients were the object of a protocolised presurgical evaluation consisting in neurological, pharmacological (ON and OFF), psychological and psychiatric assessments, followed by consensual multidisciplinary decision relative to the surgical indication. Targeting was done with MRI stereotaxy. Surgery was carried out in 2 stages: (1) stereotactic implantation of electrodes under local anaesthesia, physiological and clinical monitoring; (2) placement of neurostimulators under GA. Median age at surgery was 63 (42–81). All were in HY >3 and suffered motor fluctuations.

Follow-up ranged from 1 to 87 months. 30 patients have a FU of at least 48 months confirming the sustained beneficial effect. Improvement is as follows: UPDRSm 42% (similar to preop drugs effect), dyskinesia 99%, fluctuations 95%, medication reduction 66% LDE, 30% off-drugs. Unfavourable prognostic factors: older age, gait disturbance, low response to L-Dopa test.

Complications were: one frame displacement; electrodes malposition leading to repositioning in 4 patients; one air embolus; one seizure and one panic crisis requiring rescheduling; one delayed infection and two connector wounds dehiscence requiring surgery; six transient confusional state; one haemorrhage with transient motor manifestation.

Bilateral chronic STN-DBS is effective and safe, and currently the best surgical method for treatment of advanced PD disease.

Neurology of the elderly. Muscle pain and muscle weakness

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Actual muscle pain in elderly people is rare. Most often it is associated with polymyositis and dermatomyositis. By contrast, painful muscle cramping is frequent in older people. They are called idiopathic if no obvious cause is identified but not infrequently newly appearing cramps in the elderly indicate a neuromuscular disorder. Other causes are electrolyte disturbances (especially low calcium, low potassium, low magnesium), haemodialysis, uraemia, diabetes, thyroid disease, venous insufficiency and ischaemic claudication. In any case cramps require proper investigations to rule out underlying disease.

Significant muscle weakness is always due to neuromuscular disease. If the weakness is associated with altered sensation, the cause is either mono- or polyneuropathy. The only exception is multifocal motor neuropathy (MMN) where focal weakness occurs without sensory deficit. Isolated weakness and wasting clearly points towards motor neuron disease (MND) or myopathy. In older people inclusion body myositis (IBM) is by far the most common myopathy. Muscle pain and muscle weakness require neurophysiological tests and a muscle biopsy to make the proper diagnosis.

In terms of treatment steroids and intravenous immunoglobulins (IVIG) are the gold standard for polymyositis and dermatomyositis. Beyond that therapeutic options for cramps and weakness are limited. Rehabilitative measures can alleviate handicap caused by weakness.

Session: Donnerstag, 27.10.2005, 11.45–12.15 Uhr

Thermo- and kryorhizotomy in chronic lumbalgia. A comparison of two historical groups

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Object: Thermo- and kryorhizotomy are treatment options in facet syndrome. We compared two historical groups treated with thermo- or kryorhizotomy after successful facet joint infiltration.

Method: 46 patients were recognised and successfully infiltrated. 15 were treated by thermorhizotomy, 15 by kryorhizotomy. In both groups 6 patients were previously operated. To define a positive facet joint infiltration, a 50% pain reduction was requested. Psychological screening was done preoperatively by use of the "Hamburger Angst und Depressionsscala" (HADS). To assess the postoperative outcome the "Low Backpain outcome score" (LBOS) and the "Funktionsfragebogen Hannover" (FFBH) were used.

Results: In both groups patients did not show a significant improvement. Patients with a good postoperative outcome were previously not operated and had low HADS Score. VAS improvement before and after infiltration did not show any correlation with outcome.

Conclusion: Positive facet joint infiltration seems not to be sufficient for the diagnosis of facet joint syndrome and indication for rhizotomy. We recommend preoperative assessment for anxiety and depression.

Technical note: implantation of plate electrodes for spinal cord stimulation with aid of spinal anaesthesia and intraoperative dorsal column activation

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Background: The implantation of plate electrodes via laminotomy is classically performed in local anaesthesia, which is stressful for the patient. In general anaesthesia test-stimulation is difficult. According to Lind G et al. we evaluated the method of plate electrode implantation with the aid of spinal anaesthesia.

Methods: In 11 patients with different causes of neuropathic pain we implanted electrodes in continuous spinal anaesthesia. After laminotomy, between thoracic vertebrae 8–10, the plate electrode was inserted into the epidural space. Guided by the patient's specifications the electrode position was verified until paraesthesia covered the painful region.

Results: In all patients it was possible to create paraesthesia in the area of former pain distribution. The intraoperatively needed threshold stimulus was moderately higher than one needed for postsurgical stimulation. Patients described the procedure as comfortable and not painful.

Conclusion: Spinal anaesthesia for implantation of plate electrodes via laminotomy is a comfortable method for patient and surgeon. The time needed for evaluation of the effective electrode position can exceed the duration of effect of a single shot spinal anaesthesia, therefore a continuous spinal anaesthesia offers an excellent alternative. In spite of motor block and anaesthesia caused by the spinal anaesthesia an activation of the dorsal column is possible and the paraesthesia can be described precisely by patients.

Gemeinsame Freie Mitteilungen SNG und SGN

Session: Donnerstag, 27.10.2005, 15.45–16.45 Uhr

A local strategy to treat neurokinin-1-receptor positive gliomas: targeted alpha- and beta-radiopeptide brachytherapy using DOTAGA-substance P

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Aim: Since NK-1 receptors are consistently overexpressed in malignant gliomas, we assessed biodistribution, toxicity and response of the peptidic vector DOTAGA-Arg-1-substance P following labelling with the 2 energetically different beta-emitters Lut-177 and Y-90 and the alpha-emitter Bi-213 in a phase I study.

Methods: Twenty patients with glioblastoma multiforme, astrocytoma, oligodendroglioma or oligoastrocytoma were enrolled. The target was validated by autoradiography with DOTAGA-substance P. The radiopharmaceutical was injected into a CSF port connected to an intralesional catheter which has been inserted stereotactically. Pretherapeutic assessment of dose distribution of the radiopharmaceutical was performed using In-111-DOTAGA-Arg-1-substance P.

Results: NK-1 receptors were found to be universally overexpressed in all types of malignant gliomas. 16 of these 20 tumours were targeted using Y-90-labelled substance P (tissue range 5 mm). In 4 tumours at functionally critical brain areas the lower energy beta-emitter Lut-177 (range 1–2 mm) and the alpha-emitter Bi-213 were used. Initially impaired neurological functions in 12/20 cases gradually improved or stabilised in 10/12 patients. Symptomatic transitory radiogenic oedema was the major toxicity observed.

Conclusion: Targeted diffusible radiopeptide brachytherapy has the potential to become a versatile new tool as either alpha- and/or beta-therapy for the local control of low-grade and high-grade gliomas.

Functional and morphological characterisation of tumour infiltrating dendritic cells in malignant gliomas

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Object: Although many mechanisms are responsible for aggressive behaviour of GBM, the role of systemic immunosuppression by these tumours appears to be a critical component of the pathogenesis. Dendritic cells (DC) play a critical role in orchestrating host anti-tumour immunity. Previous work implicates defects and/or impaired maturation/migration of DC as a critical defect in the immune response against cancer. The goal of our study was to identify and characterise glioma infiltrating DC by immunohistochemistry (IHC) and by isolation of DC from freshly resected tumour specimen.

Methods: IHC was performed on 15 gliomas. The mononuclear cell population isolated from tumour tissue was evaluated by 3-color-FACS analysis and tumour-derived DC were characterised morphologically and functionally. In addition, the stimulatory capacity of monocyte-derived DC from tumour patients were compared with controls in allogenic MLR and the levels of IL-12 and IFN-α production were assessed by ELISA.

Conclusions: DC were found to be present in high-grade gliomas at very low numbers and mainly in an immature state. The origin of glioma-derived DC was myeloid and the T cell stimulatory capacity was reduced in allogenic MLR. Interestingly, the capacity of monocyte-derived mature DC of patients was also reduced albeit not being statistically significant to controls. Taken together, these results suggest that inhibition of DC development/function represents an additional mechanism by which GBM can escape immune recognition.

Intramedullary spinal cord tumours: lessons learned from 73 consecutive cases

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Introduction: Intramedullary tumours (IMT) of the spine only represent 3% of all tumours located in the central nervous system. About 60% of the IMT are gliomas and normally 70% are located in the cervical or upper thoracic spine.

Material and methods: 73 patients (mean age of 41 years) underwent surgery for IMT between 1995 and 2004. We found ependymomas in 27 patients, low-grade astrocytomas in 15, haemangioblastomas in 11, cavernomas

in 5, gliotic changes in 4, others in 15. 85% were located cervically or thoracically. Mean duration between the onset of symptoms and the operation was 35 months. Preoperative signs were loss of sensibility, paresis, pain, incontinence or sexual dysfunction.

Results: Total resection was achieved in 49 (67%) cases, subtotal in 16 (22%), biopsy was performed in 8 (11%) cases. The symptoms immediately postoperatively were unchanged or better in 66%, 34% showed a worsening. The mean follow-up period was 22 months, only 11% showed an increase in neurological deficits after this period. 15% had a relapse of tumour, especially those with astrocytomas where the tumour was only totally resectable in 3 cases. In all cases with ependymomas and haemangioblastomas a worsening was only seen in 3 patients.

Conclusion: It is possible to resect most ependymomas, haemangioblastomas and cavernomas totally; a further therapy is not necessary. Relapse of tumour was only seen in 4 cases where the resection was subtotal. In astrocytomas a total resection is an exception, subtotal removal plus decompression might be the choice of treatment.

Long-term results of thalamic "deep brain stimulation" for essential tremor

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Thalamic deep brain stimulation is known to be an effective neurosurgical technique for treating severe essential tremor (ET), but its long-term efficacy and complication rate have not been well documented to date. In this study, we compiled the long-term results of all patients who underwent deep brain stimulation for ET at the Inselspital, Berne, from 1997 to 2004. The duration of follow-up ranged from 3 to 67 months (median: 48). The 18 patients studied (44 to 84 years old at the time of surgery) had a long-lasting improvement in tremor as long as 5 years after surgery. In particular, there was a significant ($p < 0.05$) postoperative improvement of the activities of daily living rating scale by 42% after 1 year (n = 17). After 5 years there was still an improvement by 52% (n = 4). The complications included one case of initially severe, but later mild postoperative dysarthria, one of infection, and two of distal cable malfunction (3 and 5 years after surgery). No patient sustained a brain haemorrhage or a disabling motor or sensory neurologic deficit. Other non-surgical complications were rare and generally mild. In particular, there was no significant increase in depression after surgery as measured by the Hamilton Rating Scale for Depression.

In conclusion, thalamic deep brain stimulation is a safe method for treating severe essential tremor. It brings about a lasting reduction in tremor for at least 5 years after surgery and significantly improves the activities of daily living.

Amygdalohippocampal stimulation for intractable temporal lobe epilepsy

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High-frequency (HF) amygdalo-hippocampal stimulation (AHS) has recently been proposed as a therapeutic option for intractable temporal lobe epilepsy. Although preliminary results are promising, long-term efficacy as well as stimulation paradigms or implantable device are still under evaluation. We report our experience regarding the surgical technique and effect on seizure control. 5 patients with intractable epilepsy unsuitable for resective surgery were selected for unilateral AHS. 4 cases showed strictly unilateral epileptogenic zone located in the mesial temporal lobe, one bilateral predominantly left. A 3D T_1-weighted MRI was performed under stereotactic conditions. The Pisces-Quad electrode was implanted through a posterior approach. External extension was provided to perform deep EEG recordings for 3–4 days. The Soletra stimulator was then implanted under general anaesthesia. Monopolar stimulation was delivered simultaneously through the 4 contacts at a frequency of 130 Hz, pulse width 450 µs and amplitude up to 1 V. Follow-up from 5 months to 3 years shows a significant decrease (50–95%) of seizure frequency in all the patients. No stimulation-induced side effects were noticed. HF-AHS is safe and effective as an alternative treatment for medically intractable temporal lobe epilepsy in selected cases. Further controlled trials and fundamental research are needed to assess long-term efficacy and a refined understanding of mechanisms of action of electrical stimulation.

Functional organisation of the human primary motor cortex

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Motor control of the human hand is based on a strong corticospinal tract originating in the primary motor cortex (M1). An important feature of the motor cortex is the somatotopy. However, while larger body parts are somatotopically represented in M1, the representations of smaller body parts are overlapping. The rules governing this overlapping motor cortical organisation are still unclear.

Using transcranial magnetic stimulation (TMS), we examined the spatial representation of thumb movement in M1 in healthy humans (n = 10). A 2-dimensional map was reconstructed for the representation of the TMS-induced thumb movement directions "Flexion" and "Extension". In addition the representations of the thumb muscles were reconstructed depending on the movement direction. The mapping of the probability of inducing a movement in a particular direction showed a spatial segregation of the cortical representation of the thumb direction. In contrast, the localisation of the centres of gravity for the thumb muscles were overlapping and showed a relationship of dependence on the movement direction, indicating a functional connectivity. Our results substantiate the concept of the corticospinal control being functionally rather than anatomically organised. There exists a spatial segregation of the functional aspects of a movement, like the direction, in M1 but a distributed overlapping representation of anatomical structures, like the hand muscles.

Freie Mitteilungen SGN

Session: Freitag, 28.10.2005, 9.30–10.30 Uhr

Multi slice computerised tomography angiography (MSCTA) vs digital subtraction angiography (DSA) in the postoperative evaluation of patients with clipped aneurysms: a comparative study

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The accuracy of MSCTA for postoperative examination of clipped intracranial aneurysms was compared to intra-arterial DSA.

Forty-nine consecutive patients with 60 clipped aneurysms (41 ruptured) were studied with postoperative MSCTA and DSA. The radiological studies were reviewed independently by two observers for the quality of the images, the clip artifacts, the completeness of aneurysm occlusion, the patency of the parent vessel, as well as the duration and the cost of the examination.

The quality of MSCTA was good in 42 (86%). Poor quality MSCTAs (14%) were due to late acquisition of images in 3 cases and the presence of clip or motion artifacts in 4. Occlusion of the aneurysm on good quality MSCTA was confirmed in all but two cases with a small (2 mm) remnant which were confirmed on DSA. One parent vessel occlusion seen on DSA was missed on MSCTA. The sensitivity and specificity for detecting neck remnants in MSCTA were both 100%, and for evaluating vessel patency 80% and 100%, respectively. Interobserver agreements were 0.765 and 0.86. The mean examination duration was 13 minutes for MSCTA vs 75 minutes for DSA. MSCTA was highly cost effective.

Current generation MSCTA is an accurate non-invasive test for assessment of clipped

aneurysms in the anterior circulation. The high sensitivity and low cost warrant its use for postoperative routine control examination after clipping. DSA has to be performed if MSCTA result is doubtful or for the posterior circulation.

Saccular aneurysms model in the rabbit for testing endovascular devices and techniques

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Animal models have contributed to the development and skill training of microsurgical techniques needed for the treatment of intracranial aneurysms since the 1960s. Consequentially, an animal model should also be considered as an integral part of the training and development of endovascular techniques for the treatment of saccular aneurysms in academic centres. The methods introduced in our institution are: (1) endovascular formation of the aneurysm using intraluminal porcine elastase and balloon dilation (2Fr Fogarty) of the vessel (CCE), and: (2) microsurgical creation of the aneurysm using an autologous venous pouch. Angiography and MRA were performed 1 and 3 months after aneurysm formation in order to confirm size and patency prior to endovascular obliteration using different devices and techniques. Technical aspects of the procedures, radiological and histological findings will be presented. The introduction of these experimental methods in our centre will allow the testing, training and development of endovascular devices and techniques prior to their introduction in clinical practice.

Surgical revascularisation in European Moyamoya angiopathy in children of <5 years of age

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Background: Diagnosis of childhood Moyamoya angiopathy in Europe is on the increase. Management of children, especially <5 years of age, is presented since this group is at a special risk of cognitive and developmental impairment due to repeated ischaemia in the frontal brain regions if not treated earlier.

Methods: Fifty-five patients with Moyamoya angiopathy were managed from 1997 to date in our department. Childhood Moyamoya was seen in 38 (mean age 3 years) and adult Moyamoya in 17 patients (mean age 36 years). Seventeen children were <5 years of age (mean age 2 years). Cerebral revascularisation procedures were performed after thorough preoperative workup (clinical examination, CT/MRI, transcranial Doppler, 6-vessel-cerebral angiography and $H_2{}^{15}O$-PET with diamox challenge).

Results: Direct STA-MCA bypass was performed bilaterally in 13 patients and unilaterally in 4 patients. Additional STA-ACA (STA-branch of anterior cerebral A.) bypass was performed in 6 patients. In 13 patients additional indirect revascularisation was also performed. Acute postoperative ischaemia (non-operated side) was seen in one patient. Three-year follow-up in 10 patients showed good clinical outcome with normal physical and mental development. Three patients await further follow-up of whom one patient (4 months of age) awaits additional surgical revascularisation.

Conclusion: Early diagnosis and surgical revascularisation in Moyamoya children especially <5 years of age is emphasised.

Microvascular decompression (MVD) in trigeminal neuralgia (TN): fact or fiction?

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Objectives: Vascular compression of the trigeminal nerve root, especially at the root entry zone (REZ), is one explanation for intractable trigeminal neuralgia (TN). Many patients have been treated successfully with microvascular decompression (MVD), but the compression hypothesis does not always correlate with intraoperative findings.

Results: We present 42 cases with TN treated with MVD: diagnosis with MRI, MR-Angio and DSA; trigeminal nerve compression by BA (4), SCA (14), AICA (9), veins (4), unspecified blood vessels (7). In 5 cases there was no visible vascular contact (sham operation); 2 were immediately painfree, 3 needed a 2nd operation. All were subsequently painfree. No operative mortality.

Discussion: Surprisingly, sham-MVD can cure TN effectively: by decompression, minimal trauma or isolation of the nerve? Vascular compression on REZ can only exist within a zone of 3 mm which is only defined microscopically. Also the high recurrence rate in venous compression is unexplained. Veins do not pulsate or recollaterise. Maybe the operative manipulation of the sensory root dampens its abnormal activity.

Conclusion: The compression hypothesis is attractive and leads to a surgical procedure (MVD). But there are still no explanations for the pathophysiology of TN and the efficiency of MVD. Further investigations are needed for optimal treatment.

Efficacy of endovascular treatment for aneurysms and vasospasm of middle cerebral artery (MCA)

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Purpose: It was suggested that MCA aneurysms are not as well suited to endovascular therapy. Our purpose was to analyse safety, technical feasibility and efficacy of endovascular coil embolisation in a consecutive series of ruptured aneurysms of the MCA.

Materials and methods: 34 patients with acute haemorrhage were considered for endovascular treatment. They were classified as H&H grading: Gr. I (2), Gr. II (10), Gr. III (7), Gr. IV (10), Gr. V (5). The Glasgow Coma Scale grading was: Gr. 15 (10), Gr. 14–13 (8), Gr. 12–7 (2) and Gr. 6–3 (14). Aneurysms' size were: small <5 mm (7), medium 6–10 mm (8), large 11–25 mm (16) and giant >25 mm (3).

Results: In 6 cases the primary occlusion was subtotal: 4 cases underwent a re-treatment, one case was referred for surgery. 4 cases with total occlusion showed on follow-up recurrence of aneurysm lumen: one case was re-treated, 3 cases with small neck remnant remain under observation. The general occlusion rate was: complete cured 30/34, incomplete occlusion 4/34. The Glasgow Outcome Scale grading at 6 months was: good recovery (19), moderately disabled (11), severely disabled (1), dead (3). Treatment for vasospasm (4) was performed by intra-arterial spasmolytic therapy and angioplasty.

Conclusion: Despite the difficult morphological characteristic, the endovascular treatment may be the most efficient therapeutic option for ruptured middle cerebral artery aneurysms.

Surgery for posterior hippocampus via supracerebellar transtentorial SCTT approach – historical, epileptological and clinical considerations

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Background: We have developed a supracerebellar transtentorial (SCTT) approach to the posterior hippocampus having realised that for the selective amygdalo-hippocampectomy (AHE; epilepsy surgery) the trans-Sylvian approach does not allow to access the posterior hippocampus. Compared to other approaches this SCTT approach has a lower risk of damaging the visual and/or speech (dominant hemisphere) cortical fields.

Cases and methods: Since 1997 the SCTT approach – exclusively done in the sitting position – has been performed 32 times in 31 patients: 22 patients suffered from a right-sided lesion in the posterior hippocampus,

9 of a leftsided (2 Ammonsclerosis-intractable epilepsies also after the AHE, 3 cavernous angiomas, 1 AVM, 3 aneurysms at the P2-P3 junction, 7 low-grade gliomas, 15 high-grade gliomas and 1 melanoma metastasis). 7 patients in this study had the combined approaches of SCTT and AHE for removal of the lesion extending the whole length of the hippocampus (of years interval in 2 epilepsy cases, and one stage or of short interval in 5 other cases).

Results: One patient suffered from an approach-related infarction in the superior cerebellar artery territory while 30 patients in this series of 32 SCTT had no postoperative deteriorations. In the follow-up after surgery all patients showed marked reduction of epileptic seizures.

Conclusion: The SCTT approach performed in sitting position is an effective and safe procedure for the surgical management of lesions at the posterior hippocampus.

Freie Mitteilungen SNG

Session: Freitag, 28.10.2005, 9.30–10.30 Uhr

Non-rapid eye movement (NREM) sleep is enhanced after striatal middle cerebral artery infarcts in mice

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Introduction: Human studies provide evidence that ischaemic strokes provoke sleep-wake disturbances, which unfavourably influence stroke recovery. These reports, however, have not been unequivocal. We therefore studied sleep-wake disturbances and spectral electroencephalogram (EEG) changes in mice submitted to focal cerebral ischaemia induced by middle cerebral artery (MCA) occlusion.

Methods: Following implantation of polysomnography electrodes and baseline sleep recordings, mice were submitted to sham surgery (control group) or 30 min of intraluminal MCA occlusion (inducing ischaemic striatal brain injury). One and twelve days after the stroke, sleep recordings were again performed. Vigilance states and EEG power spectra were analysed.

Results: We found a sustained enhancement of NREM sleep after striatal stroke, associated with reduced REM sleep above the healthy hemisphere that is detectable both during the light and dark phase of the day and still persists at twelve days after ischaemia. Elevations in NREM sleep are associated with increased theta activity and reduced beta activity in EEG power spectra.

Conclusion: The enhanced NREM sleep, together with decreased REM sleep and reduced beta power may reflect dysbalances of sleep-promoting and/or alertness-inducing subcortical-cortical loops. Based on these results, we hypothesise that pharmacological strategies improving sleep quality might ameliorate recovery of function after stroke.

Clinically relevant rise of International Normalised Ratio (INR) values in patients with ischaemic stroke and symptomatic seizures: drug interaction between phenprocoumon and valproate

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Co-treatment with the oral anticoagulant phenprocoumon and valproate is common, especially in patients suffering from cardioembolic stroke and symptomatic seizures. There are no reports of clinically relevant interactions between these drugs. We reviewed the data of all in- and outpatients of our neurological department within the last 38 months. Two groups of patients were identified: group 1 was treated with valproate in addition to an established phenprocoumon therapy, whereas in group 2 phenprocoumon was started either at the same time or in addition to valproate. For group 1, the latest available International Normalised Ratio (INR) values were achieved, mean values calculated and correlated to the maximum INR values shortly after the initiation of valproate. 15 patients received a combined treatment with valproate and phenprocoumon. They were divided into group 1 (11 patients) and group 2 (4 patients). Means of INR values in group 1 before treatment with valproate ranged between 1.6 and 3.2 (SD 0.05–1.22) and rose significantly after initiation of valproate (mean +87%, range from +45 to +138%). In group 2, the intended INR values were achieved with low doses of phenprocoumon. We conclude that there is a clinically relevant interaction between valproate and phenprocoumon. Patients on valproate need low doses of phenprocoumon for active anticoagulation. In patients receiving valproate with preexisting phenprocoumon a potentially hazardous rise of INR has to be observed.

Investigating the effects of L-Dopa on idiopathic and atypical Parkinson syndromes by using "principal component analysis"

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The clinical response to L-Dopa is an important criteria used for the diagnosis of Parkinson's disease. However, how to quantify the response to L-Dopa is still matter of debate. Usually, global change in the motor part of the UPDRS rating scale (UPDRS III) is used to evaluate treatment outcome. In this way, the whole clinical information is reduced to only one parameter, potentially losing important information.

"Principal component analysis" (PCA) is a mathematical technique that allows a reduction of a complex data set to a few independent factors. The aim of this study was to use PCA to analyse the response to L-Dopa.

The UPDRS III was performed before and after a standardised L-Dopa challenge in 57 patients (41 idiopathic, 16 atypical Parkinson syndromes). After analysing the UPDRS III with PCA, we used analysis of variance to compare the two groups.

PCA resulted in 6 factors reflecting all aspects of Parkinson syndrome and explaining 69% of the UPDRS III variance. L-Dopa influenced each factor in a significantly different way but overall response to L-Dopa was better in the idiopathic group ($p < 0.05$).

In conclusion, PCA allows an objective analysis of the response to L-Dopa in a more precise way than usually done. The information of the UPDRS III can be reduced to 6 independent factors that react in a different way after L-Dopa challenge.

Does anticoagulation harm in acute cervical artery dissection?

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Cervical artery dissection (CAD) is one of the major causes of stroke in the young adult. Although based on rather incomplete evidence, intravenous followed by oral anticoagulation is the treatment of choice in most medical centres. Since clinical observations suggested even a worsening after initiation of anticoagulation, our objective was to study the dynamics of residual flow and clinical development in a larger series of CAD. We studied over 4 years all sequentially admitted patients suffering from acute CAD who received anticoagulation. Colour-coded duplex flow imaging (CDFI) and either by CT-, MR- or RX-angiography were performed at admission. Follow-up CDFI and neurological examinations have been performed in all patients. 33 patients (21 men; mean age: 46.4 years) have been diagnosed with acute CAD. Involved were: in 16: the internal carotid artery (ICA), in 2: both ICA, in 9: the vertebral artery (VA), in 5: both VA and in 1 combined ICA-VA. All patients were anticoagulated in the acute phase (0–3 days). Residual flow on CDFI in the dissected vessel worsened in 17 patients (51.5%) of whom 4 (12%) suffered from secondary haemorrhage at the site of stroke accompanied by clinical worsening in 9 (27%). These findings show that worsening either haemodynamically or clinically is not rare (>50%) and could be due to anticoagulation. Whether anticoagulation should not be used more carefully or even delayed in patients with acute CAD should be investigated in a prospective trial.

Differential use of acoustic cues by patients with Parkinson's disease and normal controls for perception of affective prosody

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Prosody or speech melody plays an important role in human vocal communication. The neural mechanisms underlying prosody analysis have not been clarified yet. Lesion studies and recent functional imaging experiments suggest that basal ganglia have an important function in processing speech melody.

We investigated the ability of patients with treated early Parkinson's disease (PD) and of healthy age-matched controls (NC) to identify happy and sad prosody and to discriminate different levels of emotional intensity. Naturally spoken utterances were used in which emotional prosodic intensity was digitally varied by manipulation of either fundamental frequency range ("pitch") or duration of stressed vowels ("temporal cue"). Both accuracy and reaction time were analysed in a forced choice design.

Overall, NC and PD showed no significant differences in identifying "happy" and "sad" emotions from prosody. Interestingly, PD responded significantly faster than NC. There was no difference between PD and NC in discriminating emotional intensity based on pitch variations. In contrast, PD were impaired in discriminating emotional intensity between two utterances when intensity varied as a result of pure temporal cue manipulation.

In conclusion, our results further support the view of a specific function of the basal ganglia in prosody processing, especially in evaluating temporal cues.

Epilepsy, ataxia and neuropathy associated with anti-GAD antibodies

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Anti-GAD (Glutamic Acid Decarboxylase) antibodies are described in insulin-dependent diabetes mellitus in stiff-person syndrome, but also in other neurological syndromes, including cerebellar ataxia and rarely epilepsy. These antibodies interfere with GABA-synthesis and inhibitory processes. Here we report on a 58-year-old male patient of African origin, who was referred to us for chronic focal epilepsy of unknown origin. EEG recordings suggested a left frontal epilepsy, with normal MRI and PET. He also had had a vitamin B_{12} deficiency since 6 months, requiring parenteral treatment. Aside from weekly seizures, he developed walking difficulties within a few weeks, requiring permanent assistance. His neurological exam revealed a gait ataxia, a left-sided hemiataxia and an upbeat nystagmus as well as a moderate sensory neuropathy. An extensive research revealed antibodies against GAD, gastric parietal cells and thyroid tissue (without thyroiditis). Both the ataxia and the epilepsy improved significantly after treatment with corticosteroid and azathioprim: he now walks again with a stick over 2 kilometres and has been seizure-free since 2 months, except one seizure during valproate withdrawal. Anti-GAD antibodies should be actively researched in pharmacoresistant epilepsy, in particular if other neurological abnormalities are present. There are only few reports on treatment of such conditions: the present case indicates the usefulness of rapid immuno-modulatory therapy.

Poster SGN

P 101 Experimental intracerebral haemorrhage in the rat

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Current experimental models of intracerebral haemorrhage are limited by high mortality, morphological variation and suboptimal reproduction of the human pathophysiology. We present a modification of the autologous blood-infusion technique in the rat with the goal to reduce these limitations.

The modification consists in a mechanical microlesion preceding the infusion of blood. A cannula (23G) is stereotactically placed into the striatum of Wistar rats. Subsequently, a parenchyma lesion is created by a rotating microcatheter inserted through the cannula, followed by delayed deposition of 30 ml autologous blood. This is compared with insertion of the cannula alone and the microlesion with or without infusion of non-haemorrhagic fluid (albumine). Morphology and haematoma volume are quantified and the animals behaviourally analysed using standardised tests.

Mortality was zero. The haematoma volume was constant and significantly higher in the blood-infusion group (15.2 ± 1.5 mm^3) than in controls (cannula: 0.11 ± 0.02 mm^3, lesion: 0.51 ± 0.21 mm^3, lesion + albumine: 6.47 ± 1.76 mm^3). The borders were sharply delineated and the perihaematomal area histologically preserved. Rats with haematomas showed a decreased spontaneous rotational behaviour with a tendency to turn right and persisting deficits in the forelimb placement test.

Every step of haematoma production is controlled and standardised, exactly reproducing the human pathology. The model can be further adapted on specific questions.

P 102 Online Pearson's correlation of spontaneous arterial and intracranial pressure fluctuations in patients with diffuse severe head injury

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Correlation of mean arterial blood pressure (MABP) and intracranial pressure (ICP) fluctuations is an indicator of disturbed cerebral autoregulation, which is a prognostic determinant of poor outcome in patients with severe head injury (SHI). The aim of our study was therefore to evaluate the potential of an online calculation program analysing Pearson's correlation between spontaneous fluctuations of MABP and ICP in patients with SHI.

A specially developed Visual Basic based software to assess the correlation between MABP and ICP was evaluated in 20 patients. ICP and MABP were recorded every 30 seconds and the mean values were calculated over a 10-minute period to smooth monitoring artefacts. Pearson's correlation (r) was performed separately thereafter for every following 3 hours. Values registered during the ICU period in patients with good outcome (GOS 4–5) at 12 months after SHI were found to be significantly lower as compared to patients with poor outcome (GOS 1–3), ($r = 0.07 \pm 0.03$ versus 0.23 ± 0.04, respectively).

We conclude that online Pearson's correlation calculation between spontaneous fluctuations of MABP and ICP is a stable, easy and low cost analysis technique in the daily routine ICU environment. The difference between the r-values in patients with good and poor outcome is significant and encourages a larger and wider patient population-based study.

P 103 Intraoperative magnetic resonance imaging-guided transsphenoidal surgery for giant pituitary adenomas

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Objectives: Giant pituitary adenomas (GPAs), defined as ≥40 mm in one extension, present a challenging subgroup of pituitary adenomas, and in a majority of cases only subtotal resection is accomplished by the transsphenoidal approach. Intraoperative magnetic resonance imaging (iMRI) may contribute to a radical one-stage resection with low complication rates.

Patients and methods: From November 2004 until February 2005, six patients were operated for GPAs in the PoleStar N20. In all patients, an iMRI-guided transsphenoidal approach was chosen. Clinical and neuroradiological outcome was assessed at three months postoperative.

Results: Age ranged between 34 and 60 years. All patients showed preoperative visual field defects, three had hormonal insufficiency, one patient showed acromegaly and one presented with occlusive hydrocephalus. Five adenomas were non-secreting, while one was hormonally active (growth hormone). Preoperative MRI showed invasion of the cavernous sinus in three and extension to foramina Monroi in three patients. Resection was total in four and subtotal in two patients. Three patients developed transient central DI and one of them transient SIADH thereafter. Endocrinological status, three months postoperative, worsened in one, remained unchanged in four and improved to normal in one patient.

Conclusion: IMRI contributes to more radical resection, low complication rates and prevention of additional procedures in transsphenoidal surgery for GPAs by intraoperative detection and localisation of residual adenoma and risk structures in areas not visually accessible.

P 104 Hyperprolactinaemia as a diagnostic tool in pituitary lesions

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Purpose: Hyperprolactinaemia is found in various pituitary tumours. Differentiation of prolactinomas, commonly responding to medical treatment, from other lesions that are treated with surgery is a common task.

Methods: 113 pituitary tumour patients presenting with hyperprolactinaemia and operated at our clinic were evaluated for tumour size, prolactin levels and response to treatment.

Results: 39 patients presented with inactive tumours, prolactin (PRL)-levels ranging from 20.5 to 198.9 µg/l with a tumour volume from 0.38 to 38.79 cm^3. 18 cystic lesions showed PRL-levels from 19.0 to 107.0 µg/l with volumes between 0.41 and 19.63 cm^3. These two groups showed hardly any difference to 8 microprolactinomas with PRL-levels between 60.6 and 372.9 µg/l and volumes ranging from 0.01 to 0.52 cm^3, though 36 macroprolactinomas showed PRL-levels from 38.0 to 21 878 µg/l and volumes from 0.52 to 51.31 cm^3. There was no significant correlation between tumour size and PRL-levels. A normalisation of PRL-levels was noted in the non-prolactinoma group after ample decompression of the pituitary stalk, whereas most prolactinomas needed adjuvant drug therapy. A sub-group of the non-prolactinomas were treated with dopamine-agonists before surgery; this resulted in subnormal PRL-levels, though tumour size remained stable or increased.

Conclusion: Pituitary tumour patients with PRL-levels <250 µg/l may benefit from surgery, in particular if mass lesion symptoms are present.

P 105 C5 radiculopathy with severe deltoid paralysis. Outcome after surgical decompression. Series of eight cases

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Introduction: Deltoid muscle has almost complete motor innervation from the C5 nerve root. This would suggest that neurological recovery could be poor in severe deltoid paralysis after surgical decompression in patients that arrive to our observation not promptly and painless.

Objective: To retrospectively investigate the response to surgical decompression in severe C5 radicular paralysis.

Patients and methods: Between 2000 and 2005, 8 patients underwent anterior cervical decompression and fusion for the treatment of deltoid paralysis due to cervical disc herniation, spondylotic radiculopathy or trauma. There were 2 women and 6 men, with a mean age of 52.5 years (17–81). Measurements were taken before surgery and postoperatively at d 3, m 2, m 4, m 6 and last follow-up.

Results: The severity of deltoid paralysis before surgery was M2 in 7 cases and M1 in one case. All patients were operated on C4/C5 level with C5 nerve root decompression ipsilateral to deltoid paralysis. The duration of paralysis varied between 1 and 20 days (mean: 10.4 days). Five patients showed paracentrally C4/C5 herniated soft disc, two patients an osteophytic C5 nerve impingement and one case with a traumatic C5 nerve compression. After surgery 7 patients improved to M5, one patient achieved M4, with maximal recovery within 6 months.

Conclusion: Outcome after surgical decompression is favourable, even when intervention is performed late (>3 days) and irrespectively to the cause of compression.

P 106 Acute paraplegia after lumbar myelography: decompensation of a herniatad thoracic disc. Case report and literature review

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Objective and importance: A case with acute onset of paraplegia after lumbar myelography is presented. The patient had a previously unknown herniated intervertebral thoracic disc. We aetiologically hypothesise a spinal herniation due to an increasing intraspinal pressure gradient after the lumbar puncture.

Clinical presentation: A female patient of 71 years was suffering from exacerbated lumbar pain and slowly progressive weakness of both legs. After lumbar myelography the patient developed an acute paraplegia and a sensory level at L2 within a few hours.

Intervention: MR-imaging revealed a herniated disc at the level T10/11, causing a high-grade obstruction of the thoracic spinal canal. For decompression a costotransversectomy at the level T10/11 and resection of the obstructing disc tissue have been performed. The patient showed a nearly complete recovery of the paraplegia within a few days.

Conclusion: Even though lumbar pain may predominate, careful patient history and a meticulous neurological examination can hint at an additional intraspinal obstructive lesion above the lumbar level. Non-invasive radiological examinations should be performed prior to invasive diagnostic or therapeutic procedures. In rare cases, where paraplegia occurs after lumbar puncture, immediate spinal MRI and, when indicated, surgical decompression should be initiated to improve the clinical outcome. Even a severe deficit due to an acute spinal herniation may show remarkable improvement in cases.

P 107 Successful epilepsy surgery in the Duke-Davidoff-Masson syndrome

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The Duke-Davidoff-Masson syndrome (DDMS) was described for the first time in 1933. Its origin is unknown. The syndrome is characterised by variable degrees of facial asymmetry, atrophy of one hemisphere, ipsilateral thickening of the skull, seizures, discrete contralateral hemiparesis and limb atrophy, sometimes mental retardation of variable degree. Here we report 2 patients (A: male, B: female) with DDMS who suffered from pharmacoresistant epilepsy. Comprehensive work-up, including intracranial monitoring in patient B, revealed seizure onset in the affected hemisphere, i.e. right anterior temporal (A) and left parieto-temporal (B). Both underwent successful surgical treatment of their epilepsy.

Conclusion: Despite diffuse MRI abnormalities, patients with DDMS may have an epilepsy disorder with a circumscribed focus, amenable to surgery.

P 108 Electrocorticography (ECOG) monitoring during intracranial vascular surgery: a new approach to detect ischaemia during temporary clipping

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To detect a neuronal threshold of tolerance to ischaemia, the usefulness of ECOG during intracranial vascular surgery was tested and compared to the scalp EEG and correlated with the postoperative neurological status

and the radiological findings. Twenty-one patients harbouring intracranial aneurysms were monitored by simultaneous scalp EEG and ECOG during the surgery. Patients were classified to group A (6 patients without temporary clipping) and group B (15 patients with temporary clipping). Scalp and ECOG recordings were obtained in both groups. Focal modifications of the ECOG pattern with high frequency and delta waves were observed in 5 patients in group A and in all patients in group B. These anomalies were followed by burst suppression pattern in 2 cases (33%) in group A and in 8 cases (53%) in group B. These changes were detected only in two cases (9%) on the scalp EEG. Corticographic changes resolved in all patients in group A and in 8 patients (53%) in group B. Six patients, in whom the ECOG anomaly appeared during temporary clipping and persisted after removal of the temporary clip, presented new neurological deficit or new hypodensity on CT. The GOS was good in 85% of cases. The ECOG is more specific than the scalp EEG. The persistence of specific anomalies shown on ECOG were associated with new neurological deficit or new hypodensity. A better comprehension of these anomalies could determine the duration of temporary clipping and surgical strategy.

P 110 CT-&-Screw-guided implantation of intraventricular CAMINO®-Probe after traumatic head injuries

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Objective: The main technical limitation during implantation of ventricular catheters for ICP monitoring and therapeutic CSF drainage after severe traumatic brain injury (TBI) constitutes narrowed and/or shifted ventricles. The objective of this study was the validation of a suitable and fast CT-guided insertion technique.

Methods and results: We prospectively studied 9 patients (3 women and 6 men; age: 30.7 ± 9.2) who suffered TBI with initially Glasgow coma scale <8 who developed intractable ICP >20 mm Hg between day 0 and 10. The technique of the CT-guided insertion of the intraventricular bolt pressure monitoring catheter and transducer (CAMINO® Model 110-4HM, Integra Neurosciences, Plainsboro, NJ) will be described. In 8 out of 9 patients accurate CT-guided placement was achieved in the first attempt. ICP values could be reduced and kept within normal limits (≤20 mm Hg) in 8 patients within 12 hours after the procedure by CSF drainage.

Conclusions: CT-guided implantation is a suitable technique that prevents iatrogenic parenchymal lesions secondary to blind puncture attempts. Secondary brain injuries can be avoided by urgent CSF drainage. Immediate postinterventional control of the catheter tip position.

P 111 Norepinephrine induces dilatation in the rabbit basilar artery after subarachnoid haemorrhage in vivo

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Objective: Following aneurysmal subarachnoid haemorrhage (SAH) norepinephrine (NE) is given to ameliorate CBF in order to prevent SAH-induced cerebral vasospasm (CVS). The objective of this study was to determine whether continuous intravenous NE infusion contributes to angiographic changes after SAH in the rabbit basilar artery (BA).

Methods: SAH was induced infusing autologous blood in the cisterna magna of the rabbit. NE was administered intravenously and serial angiographies were performed after increasing systolic BP up to highest possible levels. The magnitude of BA spasm was determined by comparison of baseline, pre- and post-NE-administration angiograms on day 5 and was calculated as percent change (mean ± SEM) of intraluminal diameter based on relative numbers of pixels.

Results: A total of 127 angiograms in 46 rabbits were performed. NE after SAH induced dilation of the BA (17% ± 10.8, n = 11) whereas SAH-induced CVS could be documented in animals without NE (–18% ± 6.1, n = 11) ($p < 0.05$). Changes of BA diameter were significant compared to control group (n = 11) ($p < 0.05$).

Conclusions: This study demonstrates the novel finding that NE causes dilation of the BA in the SAH rabbit animal model. These findings support the observation of improvement of CBF in SAH patients undergoing hypertension therapy with NE.

P 112 Response to radiotherapy is not associated with loss of heterozygosity (LOH) for chromosomes 1p36 and 19q13 in WHO grade II astrocytic gliomas

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Loss of heterozygosity (LOH) of 1p36 and 19q13 is probably both prognostic for survival and a predictive marker of chemosensitivity in patients with WHO grade II gliomas. Patients with WHO grade II oligoastrocytomas (OA) and astrocytomas (A) respond to radiotherapy. We investigated whether or not the presence of these deletions might be related to response to radiotherapy in those tumours.

Among patients with gliomas WHO grade II (OA, A) treated between 1991 and 2000 we selected those who received radiotherapy either at primary diagnosis or after tumour progression. The tumour volume was measured after radiation therapy. Tumour response was assessed according to MacDonald criteria. The presence of loss of heterozygosity (LOH) for chromosome 1p (4 loci) and 19q (3 loci) was assessed on archival, paraffin-embedded tumour specimens. Thirty-eight patients received radiotherapy. There were 31 A and 7 OA. The tumour volume was available for 27 patients (71%), 12 having received radiotherapy at primary diagnosis and 15 at tumour progression. There was no CR. Five patients had a PR (18.5%), 8 patients MR (29.6%), 12 patients a SD (44.4%) and 2 had PD. The LOH status could be assessed in 17 and 16 patients for 1p and 19q, respectively. Of 12 patients with intact chromosome 1p36, 6 had either PR or MR and 6 had either SD or PD. Approximately 50% of patients with astrocytic WHO grade II tumours show objective tumour response after radiotherapy. Tumour response is not associated with LOH for 1p36 and 19q13.

P 113 Specificity and sensitivity of high resolution, biplane digital subtraction angiography in the diagnosis of patients with suspected glioblastoma multiforme: impact on the management of non-surgical cases

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In most patients suspected to have glioblastoma multiforme (GBM) based on MRI, biopsy is performed to rule out a hypothetic curable lesion. Since we routinely perform preoperative digital subtraction angiography (DSA) in patients suspected to have a GBM, we investigated the diagnostic specificity and sensitivity of angiographic signs in this patient population.

Patients suspected to have a GBM based on MRI, with a preoperative DSA and with a histological diagnosis were included. Neuroradiologists blinded for the histological diagnosis assessed the presence of tumour-blush, pathological vessels (PV) and an early venous drainage (EVD) in order to answer following questions: Is it a tumour? A malignant tumour? A GBM?

186 patients were eligible for the study (32 biopsies, 154 surgical resections). No major complications resulted from angiography. Preliminary data showed: (1) The presence of PV associated with EVD at DSA was 100% specific for the presence of a malignant tumour (83% a malignant glioma, 15% a metastasis, 2% a PNET). (2) PV associated with EVD at DSA was present in 73% (sensitivity) of GBMs and 82% of all malignant tumours.

In patients with supratentorial, intracerebral lesions compatible with a GBM based on MRI the presence of PV and an EVD in DSA is highly specific and sensitive for the

presence of a malignant tumour, mostly a malignant glioma. In these patients, especially those in whom no therapy is planned, the risk of biopsy can be avoided.

P 114 Conventional microsurgical clipping of contralateral aneurysms of the middle cerebral artery – analysis on 14 cases

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Background: In special situations a contralateral approach to MCA aneurysms is required. We studied the feasibility and safety of the procedure and investigated the predicting factors for the difficulty of this approach.

Cases and methods: Between 1993 and 2005 14 patients had the contralateral approach for the MCA aneurysmal clipping: in 8 patients one of the aneurysms had ruptured, 4 patients presented incidental aneurysms and 2 patients were suffering from the combination of incidental aneurysms and brain tumours. The right pterional approach was performed in 8 patients and the left in 6. We studied whether the angiographical morphometric data correlated with the operative difficulty: semiquantified scales from 1 (no difficulty) to 3 (difficult).

Results: The contralateral clipping was successful without complications in all patients but in one (lateral lenticulostriate artery damage). The following neuroimaging data seemed importantly related to the difficulty of this approach: (1) distance between the contralateral aneurysm and midline (30 mm) or the bifurcation of contralateral internal carotid artery (10 mm), (2) aneurysmal size (5 mm), (3) dome projection, (4) aneurysm location especially in relation to the sphenoid ridge, (5) status of contralateral M1 branches and Sylvian veins, and (6) brain slackness.

Conclusion: Clipping of a contralateral MCA aneurysm is a feasible procedure. The preoperative neuroradiological analysis contributes to the success and safety of this procedure.

P 115 Posttraumatic intradiploic meningoencephalocele mimicking posttraumatic intradiploic cerebrospinal fluid cyst

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A 21-year-old man presented with a progressively enlarging post-traumatic intradiploic meningoencephalocele localised parasagittal and postcoronal on the left side. The parietal bulging existed for about 3 years. His complaints were bulging of the scalp, tension type headache and aesthetical aspects without neurological deficits. CT revealed a bone cyst associated with a round defect in the left parietal bone, bulging of the outer table and defective inner table. MRI showed an intradiploic cyst containing cerebrospinal fluid and brain tissue. These findings were confirmed by neurosurgical exploration and repaired with neuropatch and bone cement cranioplasty.

This kind of post-traumatic intradiploic meningoencephalocele is a rare adult variation of a growing skull fracture and one of three reported intradiploic cysts containing brain.

P 116 Effects of intrathecal nitroglycerin on subarachnoid haemorrhage-induced cerebral vasospasm in the rabbit in vivo

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Objective: Decreased bioavailability of nitric oxide (NO) has been associated with the development of delayed subarachnoid haemorrhage (SAH)-induced cerebral vasospasm (CVS). The objective of this study was to determine whether continuous intrathecal infusions of nitrite will prevent CVS.

Methods: Nitroglycerin (0.5 µl/h) or a control saline infusion was infused into the cisterna magna via ALZET® osmotic pump in rabbits after induction of SAH with autologous blood. The magnitude of basilar artery (BA) spasm was determined by comparison of pre- and post-treatment angiograms, and was calculated as percent change (mean SEM) of intraluminal diameter based on relative numbers of pixels.

Results: Continuous intrathecal infusion of nitroglycerin prevented CVS in the rabbit in vivo model. These preliminary results show a reduction of vasospasm in the SAH/NITRO ($n = 6$) group compared to the SAH/SALINE ($n = 3$) on day 5 ($14\% \pm 9.8$; $p < 0.1$). There was no clinical or pathological evidence of nitrite toxicity.

Conclusions: These preliminary data demonstrate the dilation effect of an intrathecal administered NO-Donor on the BA with and without induced SAH whereas in the SAH group without NO vasospasm occurred. Final results of ongoing experiments will be presented.

P 117 Age at diagnosis and loss of heterozygosity (LOH) on chromosomes 1p and 19q in oligodendroglial tumours

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Introduction: Age is one of the strongest predictors of survival in patients with low- and high-grade gliomas. Mechanisms which mediate age-related prognosis are unknown. We tested whether loss of heterozygosity of 1p and 19q, which itself represents an indicator of chemotherapy response and survival in oligodendroglial tumours, shows an age-related distribution.

Methods: 49 WHO II and 34 WHO III tumours were studied. 19 WHO II tumours and 12 WHO III tumours were pure oligodendrogliomas. LOH was determined by PCR amplification of 7 microsatellite polymorphisms on 1p and 19q followed by electrophoretic allele identification.

Results: Age was in a range between 17 and 73 years at glioma diagnosis, with an age peak between 35 and 55 years. LOH occurred in all age groups with a similar incidence. The percentage of LOH-positive tumours varied between 60 and 85%. It was higher in WHO III tumours than in WHO II tumours.

Conclusion: LOH of 1p and 19q in our series did not show a characteristic age distribution. This suggests that mechanisms which confer age-related survival advantage in oligodendroglial tumours are not directly related to the LOH of chromosomal regions 1p and 19q.

P 118 The selective vasopressin V1a receptor antagonist SR49059 reduces ischaemia-induced brain oedema in the rat

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At present there exists no pharmacologic treatment for fulminating brain oedema. Since evidence indicates that brain Aquaporin (AQP) 4 water channels are modulated by vasopressin V1a receptors, we examined the oedema-reducing properties of the selective V1a antagonist SR49059 following middle cerebral artery (MCA) occlusion.

48 male rats were randomly assigned to sham procedure, continuous intravenous vehicle or SR49059 infusion at 480 µl/h, 640 µl/h, 720 µl/h starting 60 min before, 30 min or 60 min following MCA occlusion. Laser Doppler confirmed a 60% blood-flow

reduction during occlusion. After a 2-hour period of ischaemia and 2-hour reperfusion, the animals were sacrificed for assessment of brain-water content, sodium and potassium concentration. A drug effect on the blood-brain barrier integrity was excluded by Evan's blue perfusion. Statistics were performed using an ANOVA followed by a Tukey post-hoc analysis.

SR49059 treatment reduced brain-water content in the infarcted area given at 640 µl/h ($p = 0.036$), 720 µl/h 60 min before ($p = 0.002$) or 60 min ($p = 0.005$) after MCA occlusion. The consecutive sodium shift into the brain was also prevented ($p = 0.001$), while the potassium loss was inhibited only by a pre-treatment ($p = 0.003$).

These findings imply that in ischaemia-induced brain oedema the selective vasopressin V1a antagonist SR49059 inhibits brain oedema and the subsequent sodium shift into the brain. This substance offers a new avenue in brain-oedema treatment.

P 119 Chirurgische Therapie von intramedullären Rückenmarkmetastasen

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Intramedulläre Metastasen sind selten. Mit längeren Überlebenszeiten unter effektiver onkologischer Therapie erleben aber doch manche Patienten eine ZNS-Metastasierung, die auch das Rückenmark betreffen kann.

Drei Patienten (53, 62, 58; 2 Männer, eine Frau) wurden mit einer kompletten Resektion von intramedullären Metastasen behandelt. Primärtumouren waren ein Ösophaguskarzinom, ein Melanom und ein nichtkleinzelliges Bronchuskarzinom.

Neurologische Ausfälle und diffuse Rücken- bzw. Nackenschmerzen waren die auslösenden Symptome. Die Tumoren lagen auf Höhe C2/3, Th 5–6 und im Epikonus. Nur beim dritten Patienten wurde präoperativ eine Metastase vermutet. In der Bildgebung fiel bei allen ein ausgeprägtes Ödem im Mark auf.

Alle Tumoren wurden komplett reseziert, mit dem Ziel der Diagnosestellung und Vermeidung einer langdauernden Steroidmedikation. Monitoring, mikrochirurgischer Laser und Ultraschall wurden intraoperativ verwendet.

Die postoperative Überlebenszeit 5, 10 und 14 Monate. Nur der Patient mit Bronchuskarzinom wurde mit lokaler Radiotherapie nachbehandelt.

Zwei Patienten blieben ohne signifikante neurologische Ausfälle. Der dritte, präoperativ nicht gehfähige Patient erlangte innerhalb von 2 Wochen wieder Gehfähigkeit und Sphinkterkontrolle.

Die mikrochirurgische Resektion von intramedullären Metastasen im Rückenmark ist möglich und aufgrund der Fall-basierenden Erfahrung auch funktionell sinnvoll.

P 120 Endoskopische Ventrikulo-Zisternostomie zur Hydrozephalusbehandlung

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Hydrozephalus wird seit langem erfolgreich mit Liquorshunts behandelt. Dieser Erfolg hat vielen Patienten geholfen, lange und mit guter Lebensqualität zu überleben. Allerdings sind Probleme aufgetreten, die ein Liquorshunt nach sich ziehen kann. Mit der endoskopischen Ventrikulostomie (Endoscopic Third Ventriculostomy – ETV) kann man diese Probleme vermeiden und eine relativ normale Liquorzirkulation wiederherstellen.

Präoperative Bildgebung ist ein T_2-MR in zwei Ebenen zur Darstellung des Ventrikelbodens und der vaskulären Anatomie der präpontinen Zisterne, insbesondere der A. basilaris.

Über ein präkoronares Bohrloch wird der Seitenventrikel punktiert, ein Endoskop eingeführt und zum Boden des 3. Ventrikels vorgeschoben. Dort wird rostral der Corpora mamillaria eine Öffnung in die präpontine Zisterne erzeugt.

In einem postoperativen T_2-MRI-Bild wird der Flussartefakt durch den Boden des 3. Ventrikels dokumentiert.

Indikationen für die ETV sind: obstruktiver Hydrozephalus, vor allem bei Aquäduktstenose, tektalen Mittelhirngliomen, Tumoren der hinteren Schädelgrube, der Pinealisregion, des Hirnstamms. Auch bei posthämorrhagischem Hydrozephalus ist ein Versuch mit ETV sinnvoll.

Resultate: Je nach Indikation ist die Erfolgsrate zwischen 90% bei Aquäduktstenose und 50% bei posthämorrhagischem Hydrozephalus.

Komplikationen: Sekundärer Verschluss, Blutungen, Augenmuskelparesen und selten Gefässläsionen sind beschrieben.

P 121 Influence of needle diameter in thermo- and cryorhizotomy treating facet joint syndrome. Case report

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Object: Different needle diameters seem to influence outcome after thermo- and cryorhizotomy in the treatment of facet joint syndrome.

Method: A 58-year-old patient diagnosed with facet joint syndrome. Conventional X-rays of the lumbar spine showed olisthesis in L5/S1. Diagnosis was established with facet joint infiltration at L4/5 and L5/S1. Psychological screening was done by HADS (Hamburger Angst- und Depressionsscala). Thermorhizotomy was done three times within 13 months, each with different needle diameters, once cryorhizotomy. The postoperative outcome was screened by LBOS (Low back-pain outcome score) and FFbH-R (Funktionsfragebogen Hannover-Rücken).

Results: The patient improved over 13 months according to LBOS from fair to good and according to FFbH-R from good to excellent. Every rhizotomy showed a postoperative improvement. Bigger needle diameters correlated with a better outcome.

Conclusion: Repeated thermo- and cryotherapies show a cumulative effect. Needle diameter correlates with outcome. We recommend psychological screening preoperatively.

P 122 Cerebellar haemorrhage after lumbar myelography. A case report

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Background: Lumbar puncture is a frequently employed procedure in neurosurgery. Known complications include epidural, subdural and subarachnoidal haemorrhage, primarily in the presence of coagulation abnormalities.

Objective: To present a case of cerebellar haemorrhage after lumbar myelography in an adult patient without known risk factors for such a complication and to review the literature regarding intracranial bleedings as a complication.

Result: A 50-year-old man underwent a lumbar myelography for evaluation of back pain after lumbar surgery. Post-interventionally he developed a postspinal headache needing an epidural blood patch. Next day he was dismissed and returned to the emergency department after a few hours with a decreasing level of vigilance and progressive brain stem signs. The CT revealed a cerebellar haemorrhage and blood within the third and fourth ventricle. After occipital craniotomy the patient showed a full recovery. Multiple reports of epidural and subdural haematomas post myelography were found on literature review, mostly occurring in the setting of coagulation abnormalities.

Conclusion: The case presented is unusual in that the patient lacks any known risk factors for haemorrhagic complications and the haemorrhage was found intracerebellar. A MEDLINE review showed that 8% of the cases discovered showing a haemorrhage are without known risk factors. Two percent of patients showed a parenchymal haemorrhage, in these cases a risk factor was present.

P 123 Surgical, epileptological and neuropsychological outcome of "curative" epilepsy surgery at the Centre for Epilepsy Surgery of the Inselspital in Berne: a consecutive, personal series

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Epilepsy surgery offers a high likelihood of seizure control in a well-selected population of patients with focal epilepsy refractory to medical treatment. We report our results in a

consecutive series of patients treated by the same surgeon and followed according to a prospective protocol.

Routine preoperative evaluation of surgical candidates included video-EEG recording with or without invasive electrodes, high-resolution MRI, neuropsychological assessment and SPECT. Postoperative follow-up was performed according to a prospective protocol including neuropsychological assessment and postoperative MRI. The analysis was restricted to a group of patients consecutively treated by the same surgeon (L. M.).

Thirty-four out of forty-three patients (79%) had temporal lobe epilepsy, mostly mesiotemporal sclerosis (16 patients, 47%), which was treated by selective, transsylvian hippocampectomy. Overall, 78% and 73% of the patients were seizure free (Engel Class I) 1 and 2 years after surgery, respectively. There was no postoperative, permanent neurological morbidity. The neuropsychological results after temporal lobe surgery were excellent compared to literature.

Overall, our results are comparable to those reported by centres of excellence for epilepsy surgery. We hypothesise that our neuropsychological results might in part be related to the selectivity of the temporomesial resection.

P 124 Magnesium sulfate in the management of patients with aneurysmal subarachnoid haemorrhage: a dose-adapted randomised controlled trial

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Despite maximal treatment, nearly 50% of patients with symptomatic cerebral vasospasm (CVS) develop delayed ischaemic deficit after subarachnoid haemorrhage (SAH). The safety and effectiveness of $MgSO_4$ in preventing CVS and improving neurological outcome after SAH have been discussed recently. We present results of a prospective, randomised, single-blinded and placebo-controlled pilot study. Since $MgSO_4$ can lead to hypotension and bradycardia, the safety of high-dose $MgSO_4$ admission was assessed. Patients with SAH were prospectively randomised to receive intravenous $MgSO_4$ or placebo for 14 days. All patients were treated according to a standardised protocol. The goal was to raise the serum magnesium level to twice the baseline serum level with a maximum serum level of 2 mmol L-1. Therefore, the dose was individually adapted. The application of $MgSO_4$ was discontinued when the patient developed bradycardia or severe hypotension. A total of 63 patients with aneurysmal SAH were included, 30 patients received placebo and 33 patients $MgSO_4$. Out of 33 patients in the verum group, $MgSO_4$ was discontinued in 16 patients due to bradycardia or hypotension. The occurrence of CVS and the outcome were statistically not different between the placebo and verum group. If the subgroup of patients, who tolerated $MgSO_4$ for 14 days, were compared to the placebo group, a statistically significant better neurological outcome was found. $MgSO_4$ did not reduce CVS but seems to improve clinical outcome.

P 125 Outcome scales – clinical outcome and quality measurement in neurosurgery

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Continuous quality management and evaluation of patient outcome is rapidly gaining importance due to the contradiction between the rising demand in best medical service and keeping the health systems in economic balance. From the aspect of improving quality, it is need for a helpful tool for the neurosurgeon to monitor his patient care and document his surgical results. As outcome and satisfaction depend not only on effective surgery, multiple medical or non-medical aspects had to be taken into account. We introduce a multi-scale outcome questionnaire for patient outcome assessment developed in our clinic for that very reason. It is to be filled out daily, documenting approved scales like GCS, GOS or MMS, and information about patient satisfaction, imaging and events. Not only complications are to be recorded, but all treatments like analgesics, antibiotics or antiepileptic drugs. Even performed radiation or oncologic therapy is being documented. The questionnaire was frequently modified over several years to its up-to-date version. To secure best user compliance, the recent form shows slight modifications of some scores, in order to reduce ineffective handling. The time consumption is under 30 seconds per patient and is performed by the physician in charge. With this envisaged tool we are now able to chart single or multiple patient outcomes and produce data for statistical analysis. The current paper form is planned to be transformed into a palm-based documentation system.

P 126 Spontaneous intracranial hypotension: case report with repeated chronic subdural haematomas and resolve during myelography

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Spontaneous intracranial hypotension (SIH) may cause recurrent subdural haematomas. Aim of this case report is to show clinical features, diagnostic procedures, complications and methods of treatment.

A 42-year-old patient presented with orthostatic headaches, which first appeared after gardening. As intermittent treatment with steroids only resulted in temporary clinical improvement, he was admitted to our hospital. A cranial MRI showed bilateral subdural haematomas with thickened meninges, typical of SIH. The right-sided subdural haematoma was evacuated through a burr hole. However, the patient deteriorated developing dysphagia requiring a minicraniotomy. Slight improvement could be achieved by hydration therapy. Follow-up CTs showed a slow reduction in the midline-shift to the left. An MRI of the spinal axis demonstrated a cervicothoracic epidural fluid collection but no CSF-leak. CT myelography (CTM) also did not show a CSF-leak. After a pathological synacthen-test, re-treatment with steroids resulted in rapid clinical improvement. 3 weeks later, an MRI showed a smaller epidural fluid collection and the patient was discharged home asymptomatic without further treatment.

As demonstrated here, a trivial traumatic event can cause CSF leak resulting in SIH. Remarkably in our case are the recurrent subdural haematoma, dysphagia and the corticoid dependency which can all be related to a downward shift of the brain. Interestingly, improvement started immediately after CTM.

P 127 Improvement of dystonia and self-mutilating behaviour by motor and limbic GPi stimulation in Lesch-Nyhan syndrome (LNS)

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LNS is a rare X-linked hereditary disorder characterised by self-mutilation and movement disorders such as spasticity and dystonia. GPi stimulation has been reported to improve dystonia but its effectiveness on the self-mutilating behaviour remains unclear. According to the architectural organisation of the striatopallidal complex, we present 4 patients of LNS who were stimulated in the motor (posterior) and limbic (anterior) portion of the GPi.

A stereotactic 3D T_1-weighted MRI was performed under general anaesthesia. The limbic and motor pallidal targets were determined visually in order to place contact 1 of the DBS electrode at the target. Postoperative stereotactic MRI was performed to control the position of the electrodes in the AC-PC referential. Stimulators were implanted in the subcostal region bilaterally with a Y-shaped extension cable. Monopolar stimulation (PW = 450 ms, rate = 130 Hz) was performed on both distal contacts of each electrode.

The position of contact 1 was AP = 1.62 (± 0.89), LAT = 18.18 (± 1.78) and VERT = –0.51 (± 2.22) for the motor Gpi and AP = 5.85 (± 0.69), LAT = 13.78 (± 1.30) and VERT = 0.73 (± 2.13) for the limbic GPi. Remarkable improvement of the self-mutilating behaviour and reduction in the fre-

quency and amplitude of dystonic symptoms were observed.

Our data support the fact that dystonia and self-mutilation are improved by stimulation of the motor and limbic portion of GPi respectively. The presence of 2 stimulation sites suggests that distinct neuronal pathways are involved in the pathogenesis of motor and limbic symptoms of LNS.

P 129 Persistent cognitive affective syndrome after removal of lower cerebellar vermis structures

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Anatomical, physiological and functional neuroimaging studies suggest that the cerebellum participates in the organisation of higher order functions, but there are very few descriptions of clinical relevant cases in adults that address this possibility.

We present a 22-year-old medulloblastoma patient who developed autism and associated disinhibition with bizarre linguistic eccentricities after removal of a large medulloblastoma of the lower vermis (VI,VII and VIII lobules).

Pre-, post- and intraoperative imaging is shown, 3-month follow-up presented, neuropsychological assessments demonstrated.

A hypothesis for the underlying anatomical connections as well as an alternative approach to the lower vermis to reduce complications are given.

P 130 An unusual case of a lead dysfunction after "deep brain stimulation"

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We present the case of a 76-year-old woman who has been suffering from Parkinson's disease since 1980. In 1993 a bilateral pallidal deep brain stimulation (DBS) was successfully implanted because of severe motor fluctuations with very good postoperative effects on levodopa-induced dyskinesia.

Ten years later, the dyskinesia on the left side acutely worsened after a fall. In addition, the patient experienced paraesthesia of the right scalp.

The radiological control of the whole system did not show any cable abnormality. In contrast, electrophysiological testing revealed a malfunction of the system with low electrical impedance of the lead. Thereafter we performed a surgical exploration of the lead in the head region where the patient experienced paraesthesia.

We found a defective isolation of the lead over several millimetres. All symptoms disappeared after revision of the cable.

Conclusion: In case of a hardware failure not only the radiological visible metallic parts of the system should be considered but also the isolation. Localising an electrical leak due to a defective isolation can be difficult and may require surgical exploration.

P 131 Outcome after acute subdural and epidural haematoma: a single centre experience

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Introduction: Since the early 1980s there have been enormous improvements in modern neurotraumatology due to development of diagnostic, evacuation/rescue and treatment possibilities. We present and analyse influencing factors on outcome after acute traumatic epidural and subdural haematoma.

Methods: Retrospective study of 77 consecutive patients (age 45 ± 20 years) undergoing craniotomy 01/01/2000 and 31/12/2003 at Neurosurgical University Hospital Berne. Clinical features and influencing factors were evaluated in respect to outcome.

Results: 37 patients presented with an EDH and 46 patients with an SDH; 6 patients with both. Average GCS at time of intubation was 8 (± 3). Mechanisms of injury included: falls 59%, bike accidents 13%, motor-bike accidents 8%, car accidents 7%, force to head 7%, and ski accidents and pedestrians 3%, respectively. 16% of patients were inebriated. At time of intubation 21% were hypoxic and 9% of patients hypotensive. Perioperative ICP probes were inserted in 14% of patients. Average time to intubation was 3 hours (± 2.8 hours) and average time to surgery was 4.2 hours (± 3 hours). Average ICU stay was 4.5 days (± 3.9 days) and average Glasgow Outcome Scale was 3.5 (± 1.7). The overall mortality was 23% and 61% of the patients had a favourable outcome (GOS 4 or 5).

Conclusion: In the last 2 decades dramatic improvements in neurotraumatology were achieved in Switzerland. Nevertheless, the impact of these developments on outcome are unknown. Statistical analysis and influencing factors will be presented.

P 132 Global gene expression analysis in Moyamoya angiopathy

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Moyamoya angiopathy (MA) consists of bilateral stenosis beginning at the terminal portion of the intracranial internal carotid artery along with stenosis of the anterior, middle or posterior cerebral artery. Typically, an abnormal network of collaterals forms in the basal ganglia, and hence the Japanese word "moyamoya", meaning "a puff of smoke drifting in the air", represents the angiographic image of these collateral vessels.

The experience of 38 MA cases treated in Zurich allowed us to understand this disease in terms of its clinical, neuroradiological and haemodynamic pattern of presentation and has enabled us to develop a surgical strategy for achievement of optimal cerebral revascularisation by the means of the EC-IC Bypass surgery.

In November 2004, we initiated a global gene expression analysis by Affymetrix GeneChip array. The purpose is to elucidate the underlying genetic determinants of MA pathogenesis and to characterise the vascular growth factor (VGF) expression in superficial temporal artery (STA) samples. In parallel, pathological characteristics of all STA samples were confirmed by Hematoxylin&Eosin and Elastica van Gieson stainings. VGF dysregulation was investigated by immunohistochemical stainings for basic fibroblast growth factor, hepatocyte growth factor and its receptor c-Met. Finally, specific gene quantification by Light Cycler analysis will allow the characterisation of pre- and post-transcriptional modifications of previously selected genes.

P 133 Bonnet bypass: report of two cases

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In the absence of an adequate ipsilateral donor vessel for classical EC-IC bypass surgery, the alternate technique of a "Bonnet bypass" permits the interposition of a vascular graft between the contralateral STA and the ipsilateral MCA, ACA or PCA.

We present two cases of re-established cerebral perfusion by a Bonnet bypass. First, a 69-year-old man with recurrent TIAs. Severe atherosclerotic disease (SAD) included occlusion of the left common carotid artery (CCA). PET studies showed severe left-hemispheric hypoperfusion. Lacking an adequate donor vessel for classical bypass surgery, we interposed the right brachiocephalic vein between the right STA and the left MCA. Second, a 64-year-old man with a right hemisyndrome and aphasia. SAD included high-grade stenosis of the left CCA. The initially performed EC-IC bypass (left STA to left MCA) did not re-establish sufficient left-hemispheric perfusion. Therefore, a radial artery interposition graft was inserted between the right STA and the left MCA.

Bypass flow was evaluated by Micro-Doppler and angiography. PET evaluated perfusion improvement. The first patient showed a period of clear neurological improvement, but died 3 weeks after surgery from cardio-pulmonal decompensation. The second patient showed permanent regression of all symptoms.

Thus, a Bonnet bypass represents an effective mean of cerebral revascularisation for those patients without ipsilateral extracranial arterial branches available for classical bypass surgery.

P 134 High predictive value of hemizygous deletions at the Notch2 locus for survival of primary brain tumour patients

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Loss of heterozygosity (LOH) on chromosome 1p predicts the response to chemotherapy in 70% of malignant oligodendrogliomas, pointing to a genetic factor for the response that distinguishes oligodendrogliomas (OGs) from highly resistant glioblastomas (GBMs).

Haplotypes were defined on a somatic deletion map on chromosome 1 of OGs and GBMs. Predictive values were determined using receiver operating characteristic (ROC) analysis.

The highly preserved centromeric recombination breakpoint, clustered within 1 centi-Morgan between markers D1S2696 and D1S2344, was prevalent in OGs, but not in GBMs ($p < 0.0001$). Hemizygous deletions at D1S2696, located within intron 12 of the Notch2 gene, strikingly correlated with better outcome ($p = 0.0001$). The molecular genetic classification equally well predicted survival time as histological classification including immunohistochemistry ($p < 0.0001$) and was independent of patient age and sex. By ROC analysis a cut-off of 24-month survival time was defined resulting in a sensitivity for molecular classification of 80.8% and specificity of 92.0%.

Simple, rapid and highly reproducible molecular classification using marker at Notch2 locus adds independent prognostic information to histological classification and identifies a subgroup of OG-like GBMs with long-term survival.

P 135 Significance of ultrasound in the follow-up of patients with decompressive craniotomy for stroke and severe head injury

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Objective: Emergency care, intensive care treatment, thrombolysis and surgical procedures have improved survival in patients with stroke and severe cranio-cerebral trauma. However, the sequelae such as intracerebral haemorrhage due to thrombolysis, brain oedema, posthaemorrhagic hydrocephalus or abscess-formation, subdural or subcutaneous CSF collections may evolve. These complications need to be detected and treated as soon as possible, but daily CT scans are not feasible in respect to the patients' severe condition as well as financial considerations. The bedside examination of sonography offers an alternative.

Methods: Thirty consecutive patients with decompressive craniotomy were examined. Percutaneous ultrasound was administered in the ICU and evaluated for parenchymal alterations, haemorrhage, hydrocephalus, vessel abnormalities. The results were retrospectively correlated with the CT scans.

Results: Stroke was caused by arterial clotting or subarachnoid haemorrhage. Haemorrhage occurred in half of the patients treated with thrombolysis. One third of the patients suffered from severe head injury, half of whom experienced secondary infarction. Parenchymal changes, haemorrhages and hydrocephalus were easily detected or ruled out by transcutaneous ultrasound and matched CT findings.

Conclusions: Transcutaneous ultrasound in craniectomised patients offers a non-strenuous and non-expensive imaging method for daily bedside use in the ICU to detect cerebral complications in time.

P 136 Treatment of a vertebral impaction fracture using the SKy Bone Expander

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Objective: The author describes his experience stabilising an impaction fracture using the SKy Bone Expander.

Background: Until recently, vertebroplasty was the treatment of choice for vertebral compression fractures. The procedure involves the insertion of a needle into the core of the affected vertebra and injection of bone cement, which stabilizes the bone and usually prevents further collapse. The procedure fails to restore vertebral height and kyphosis. Recently, a new technique named balloon kyphoplasty has been introduced, where vertebral height is restored and angle of kyphosis corrected. The recently introduced SKy Bone Expander introduces a new concept in kyphoplasty by using an expandable rigid polymer device rather than a hydraulic one. This enables improved control over devices' position and expansion direction and eliminates risk of device failure. The fact that the SKy Bone Expander always expands to the same predefined shape and size is highly beneficial in treating vertebral fractures, when reconstruction controllability is of paramount importance. The following case report demonstrates the SKy Bone Expander's ability to correct an impaction fracture by creating a defined void, restoring vertebral height all while minimising risk of structural deterioration and filler material extravasation.

History: A 70-year-old woman presented with low back and leg pain, which had started spontaneously six weeks earlier. The patient had secondary osteoporosis and a PE-net, preventing abdominal reconstruction of the lumbar spine. Radiographs revealed an old L1 vertebral collapse and a new L3 impaction fracture (type A1.3).

Surgical procedure: Local anaesthesia was used. A unilateral, percutaneous right-sided intrapedicular approach was employed for device insertion. Once positioned in the vertebra through a cannula 5 mm in diameter, the SKy was fully expanded, then contracted and withdrawn, creating a void and restoring vertebral height. The 8cc of bone cement, which was injected only after it had obtained a paste-like texture, remained confined within the created defined void.

Results: The procedure lasted 60 minutes. The anterior segment was augmented 23% so that the anterior wall height (H^{ant}) reached 84% of the H^{ant} of the adjacent superior vertebra. Height restoration of the vertebral body's medial lateral segment reached 89%. No adverse events were encountered. The patient was back pain free immediately post-op, with leg pain gradually reducing to 30% of pre-op intensity.

Conclusions: As can be seen (fig. 1–3), the SKy Bone Expander created a well-defined void and reconstructed the vertebra. Cement,

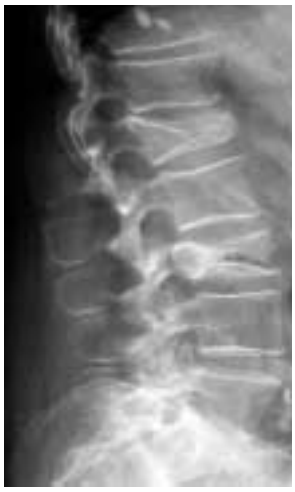

Figure 1
An L3 impaction vertebral fracture. An old fracture can be seen in L1.

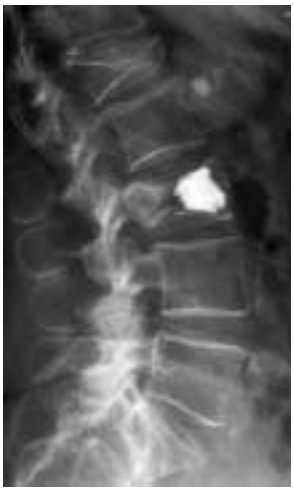

Figure 2
Post-op image portraying the defined void created by the SKy after stabilisation with bone filler material.

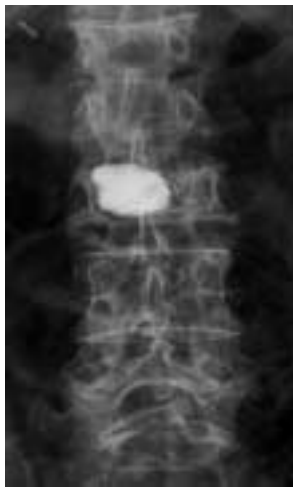

Figure 3
A/P image of the vertebra.

packed into the controlled void, stabilised the fracture. Ease of use, safety and controllability of the device were definite advantages, especially in this fissured fracture case.

P 137 Current implications of cerebral revascularisation; 8 years of experience in Lausanne and Geneva

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During the past 10 years there has been a revival of interest in cerebral revascularisation (CR). To determine the current indications for CR, we retrospectively evaluated 20 consecutive patients operated between June 1997 and June 2005 at our centres. There were 11 men and 9 women. The preoperative workup included CT angiography, intraarterial angiography and brain-perfusion studies. The mean age was 45. Two patients underwent two separate CR procedures. The indications were complex intracranial aneurysms (14 cases), Moyamoya syndrome (4 surgeries in 3 cases) and arterial occlusive diseases (4 surgeries in 3 cases). The techniques included 19 extracranial to intracranial bypasses (STA-MCA anastomosis in 13 cases, ECA-ICA in 6 cases [radial graft in 4 and saphenous vein in 2]) and 3 intracranial to intracranial bypasses (side-to-side anastomosis in 2 and end-to-end in one case). The immediate patency rate was 95.4%. Two patients experienced cerebral infarction and one exhibited hyperperfusion haemorrhage. Eighteen out of twenty patients had improved or stable postoperative status. Two patients died during follow-up. One due to the severity of primary haemorrhage and the other as result of other medical problems. The indications of CR should carefully be assessed by cerebral blood-flow studies. Bypass surgery appears to be an appropriate treatment in selective cases of complex aneurysms or arterial occlusive disease when medical or endovascular treatment has no option to offer.

Poster SNG

P 201 Hypocretin deficiency predicts severe objective excessive daytime sleepiness in narcolepsy with cataplexy

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Aims: To assess the relationship of CSF hypocretin-1 and clinical/neurophysiological findings in patients with narcoleptic-cataplexy (NC).

Methods: Clinical symptoms, standardised scales (Epworth Sleepiness Scale, Ullanlinna Narcolepsy Scale, Swiss Narcolepsy Scale, Stanford cataplexy score), sleep studies (polysomnography, multiple sleep latency test [MSLT]) and HLA-typing in 12 narcolepsy-cataplexy patients with undetectable CSF-hypocretin (Hcrt– = CSF levels <30 pg/dl) were compared to six narcolepsy-cataplexy patients with CSF hypocretin levels >30 pg/dl (Hcrt+).

Results: Frequency/severity of cataplectic attacks, frequency of hypnagogic hallucinations and sleep paralysis were similar in Hcrt– and Hcrt+ patients. Scores on Epworth Scale ($p = 0.5$), Ullanlinna narcolepsy scale ($p = 0.4$) and Swiss narcolepsy scale ($p = 0.3$) did not differ between both groups. On MSLT Hcrt– had shorter mean sleep latencies (1.4 ± 0.8 min vs 3.5 ± 1.9 min; $p = 0.05$) and a higher frequency of sleep onset REM periods (≥2 SOREMPs; $p = 0.03$) compared to Hcrt+ patients. No differences were found in any PSG-parameter or frequency of DQB1*0602 positivity ($p = 1.0$).

Conclusions: Hypocretin deficiency defines a homogenous group of narcolepsy-cataplexy patients characterised by shorter sleep- and REM-sleep latencies and a higher frequency of SOREM episodes on MSLT.

P 202 Sleep-wake disturbances after traumatic brain injury

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Aims: Sleep-wake disturbances (SWD) frequently complicate the course of traumatic brain injury (TBI). The aim of this study is to assess their prevalence and characteristics.

Methods: 53 consecutive patients (mean age 37 years) were recruited within 1 week after TBI. Assessment included brain CT, HLA typing and cerebrospinal fluid hypocretin-1 measurements. Six months later, clinical outcome (according to Glasgow Outcome Scale = GOS) and presence of SWD were determined by means of standard questionnaires and neurophysiological tests (not reported here).

Results: TBI was mild (Glasgow Coma Scale = GCS 13–15) in 21, moderate (GCS 9–12) in 12 and severe (GCS in 3–8) in 20 patients. Clinical outcome after six months was as follows: good recovery (n = 26), mild disability (n = 26) and severe disability (n = 1). SWD were reported by 62% of the patients. The most common complaints were increased fatigue (29%), excessive daytime sleepiness (EDS, defined by an Epworth Sleepiness scale >10, 26%) and increased night sleep time (≥1 hour more than pre-TBI) (26%). Insomnia was reported by 2%. There was no correlation between SWD and the following parameters: severity or localisation of TBI, sex, age, GOS, HLA typing and initial hypocretin-1 levels (decreased in 95% of patients).

Conclusion: SWD, particularly fatigue and EDS (but not insomnia) are frequently reported after TBI. In this preliminary analysis we could not identify any predictors for the development of SWD after TBI.

P 203 Sleep apnoea and blood pressure levels in the acute phase of stroke as predictors of clinical outcome after 3 months

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Background: Sleep apnoea (SA) is frequent in acute ischaemic stroke patients and associated with increased systolic and diastolic blood pressure (BP) levels. The aim of this study was to assess the evolution of SA and BP after the acute phase.

Methods: We studied 20 consecutive patients admitted within 96 hours after onset of ischaemic stroke. Sleep breathing and BP levels were monitored using portable devices in the acute phase (2 ± 1 days after stroke) and 3 months later (116 ± 38 days). Clinical evolution was monitored using NIHSS, SSS and modified Rankin Disability Scale (mRS). The severity of SA was estimated by the apnoea-hypopnoea index (AHI).

Results: AHI ($p = 0.041$) and BP levels ($p \leq 0.001$) decreased significantly in the subacute phase of stroke. The decrease of the AHI was mainly due to a decrease in central apnoeas ($p = 0.016$) whereas the number of obstructive apnoeas did not change significantly. Mean BP values in the acute phase correlated with (1) number of initial obstructive apnoeas ($r^2 = 0.7$, $p = 0.001$) and (2) worse functional outcome at 3 months ($r^2 = 0.7$, $p = 0.003$). The number of obstructive apnoeas in the acute phase and functional outcome at 3 months were also correlated ($r^2 = 0.5$, $p = 0.04$).

Conclusions: AHI and BP values improve after the acute phase of ischaemic stroke. In the first 3 days after stroke increased BP values and number of obstructive apnoeas predict a worse clinical outcome 3 months after stroke.

P 204 Congenital aplasia of the internal carotid artery

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Introduction: Agenesis, aplasia and hypoplasia of the internal carotid artery (ICA) are very rare congenital anomalies, occurring in less than 0.01% of the population. We report a case of congenital absence of ICA incidentally diagnosed by extracranial Duplex sonography (ECD) and confirmed by magnetic resonance imaging (MRI) and MRI angiography.

Case report: A 57-year-old healthy man presented with a bruit over the right internal and external carotid arteries. ECD demonstrated a hypoplastic right common carotid artery (CCA) and a relatively large external carotid artery (ECA). The ICA could neither be seen on imaging nor on flow measurement. MRI angiography confirmed our results. MRI scan of the base of the skull showed absence

of the right carotid channel and aplasia of the ICA which led us to the diagnosis of a congenital absence of the ICA.

Discussion: Absence of the ICA is a very rare anomaly. Our case represents type A of the six pathways of collateral circulation in association with the absence of the ICA described by Lie [1].

Conclusion: Diagnosis of absent ICA and the underlying cerebral vascular pattern is important regarding the clinical and surgical problems related to this condition. Because of the documented increased prevalence of intracranial aneurysm formation these patients should be followed carefully.

Reference

1 Lie TA. Congenital Anomalies of the Carotid Arteries.
Amsterdam: Excerpta Medica; 1968. p. 35–51.

P 205 Involuntary movements during yawning of an otherwise plegic arm in a patient with acute ischaemic stroke

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Yawning is a complex behaviour of unclear function. The face movements may be accompanied by generalised limb extensions. This behaviour has been observed in single cases with arm plegia after ischaemic brain infarctions involving the pyramidal system at different levels, i.e. at the level of the motor cortex, the internal capsule and the pons. We report a recent case of a 67-year-old man with ischaemic stroke. On neurological examination the patient exhibited a plegic right upper extremity. Within a few hours, we could observe yawning associated with involuntary movements of the plegic upper extremity. Using video-monitoring, the abnormal behaviour could be detailed during sleep and wakefulness as abduction in the shoulder and flexion in the elbow against gravity. Magnetic resonance imaging revealed an extended infarction involving the precentral gyrus and caudate nucleus. We conclude that the involuntary movements associated with yawning in an otherwise plegic arm may show a more complex motor pattern than originally described and the abnormal behaviour may be present even in the initial phase of flaccid paresis. Referring to experiments in the cat, some evidence indicates that the observed behaviour is most likely generated in the caudal medulla, since cells in the lateral reticular nucleus of lower medulla have both respiratory and locomotor rhythms. The associated movements of the extremities are probably inhibited in healthy subjects by central motor programs.

P 206 Functional connectivity as evidenced by principal component analysis of tactile object discrimination – an event-related fMRI-study

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The aim of the present study is to elucidate the neural networks underlying somatosensory object discrimination using a principal component analysis of event-related fMRI-data. Seven right-handed volunteers had to discriminate with their right hand pairs of parallelepipeds consecutively presented according to differences in the long axis. Differences in the long axis of the pairs applied were above (Pa) and below threshold (Pb) for explicit discrimination, or were identical. Reference task was simple manipulation of spheres. Each subject was analysed separately using the haemodynamic response modelled by statistical parametric mapping, SPM, to provide thirteen images of presentation per subject used in the principal component analysis. Presentations of object 1, P1, and object 2, P2, were modelled separately. Additional regressors described the delay period between P1 and P2, when the information about object 1 had to be held in memory for comparison with object 2, R1, and the pause after the decision, R2. Of the first 32 components, explaining 85% of the variance, four showed significant differences between consecutive presentations, and between Pa and Pb. The component images showed patterns suggesting object exploration, object comparison, performance stress and decision making. The involvement of superior parietal lobule, within the object exploration and object comparison pattern, substantiates its role for tactile praxis and recognition of shape characteristics.

P 207 Transgenic VEGF induces post-ischaemic neuroprotection, but facilitates haemodynamic steal phenomena

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Therapeutic angiogenesis is a clinically promising strategy in ischaemic disease. The consequences of enhanced vessel formation are poorly understood. We characterised the effects of brain-selective overexpression of human VEGF in mice submitted to 90 or 30 min of middle cerebral artery (MCA) occlusion, followed by 24 or 72 h reperfusion. Transgenic VEGF alleviated neurological deficits and infarct volume and reduced disseminated neuronal injury and caspase-3 activity after focal ischaemia. Brain swelling was not influenced by VEGF, while sodium fluorescein extravasation was moderately increased, suggesting that VEGF induced mild blood-brain barrier leakage. To elucidate whether enhanced angiogenesis improves regional cerebral blood flow, 14C-iodoantipyrine autoradiography was performed. Autoradiographies revealed haemodynamic steal phenomena with reduced blood flow in ischaemic areas and increased flow values outside the MCA territory in VEGF-tg mice. To elucidate the mechanisms underlying VEGF's neuroprotection, Western blots were used. Increased Akt and ERK-1/-2 and reduced MAP kinase p38 and JNK-1/-2 activities were found in ischaemic VEGF-tg mice. Delivery of the PI3K/Akt inhibitor reversed VEGF's neuroprotective function. Thus, VEGF protects neurons from ischaemic death by a direct PI3K/Akt-dependent neurotrophic action. Strategies aiming at increasing vascular density in the whole brain, e.g. by VEGF overexpression, may worsen rather than improve post-ischaemic blood flow.

P 208 Spontaneous intracranial hypotension (SIH) with extraordinary high cerebrospinal fluid protein

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A 45-year-old woman was admitted to our hospital with a 3-week history of orthostatic headache combined with tinnitus, nausea, emesis, photo- and phonophobia. There was no previous history of lumbar puncture or of surgical or traumatic opening of the dura.

On admission the patient was in reduced general condition but afebrile. The neurological examination revealed meningism, otherwise the clinical findings were within normal limits.

MR-imaging revealed diffuse meningeal enhancement and bifrontal subdural hygromas.

Cerebrospinal fluid (CSF) showed a markedly increased protein of 6.1 g/l (0.15–0.45 g/l) with a slight pleocytosis, other values were normal. Clinical manifestation and radiological presentation were consistent with spontaneous intracranial hypotension (SIH).

SIH with extraordinary high levels of CSF-protein is very rare. Only few cases were reported so far. The cause of elevated CSF-protein is controversially discussed in the literature.

P 209 Chronic sleep deprivation

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Clinical and laboratory findings of patients with chronic sleep deprivation (CSD) are poorly known. Here we report clinical and laboratory findings of 16 patients with CSD seen at our centre over a period of 2 years. Assessment included clinical history, neurological examination, standard sleep-

wake questionnaire (SQ), polysomnography (PSG), multiple sleep latency test (MSLT) and a 2-week actigraphy. The diagnosis of CSD was made based on the following criteria: (1) subjective excessive daytime sleepiness ([EDS], Epworth Sleepiness Scale, ESS >9), (2) absence by history, clinical examination or PSG of other causes of EDS, (3) history/SQ or actigraphy suggesting chronic sleep insufficiency.

Results: There were 2 women and 14 men, mean age 39 ± 10 years. The referral reasons included EDS (53%), absence-like episodes (33%), concentration and/or cognitive disturbances (7%). The ESS was 15 ± 3. The estimated sleep duration (SQ) was 380 ± 54 minutes on weekdays (WD), and 502 ± 148 minutes on weekends (WE), respectively. Actigraphically, the rest/asleep time/24 hours was 355 ± 55 minutes on WD and 412 ± 82 minutes on WE, respectively. On PSG, short sleep latency (7 ± 4 minutes), high sleep efficiency (94 ± 5%) and an increased slow wave sleep (17 ± 5%) were typically found. On MSLT the mean sleep latency was 5 ± 3 minutes. One patient had 3 SOREMPs.

Conclusion: These data suggest a variable clinical presentation but relatively stereotyped (and diagnostic) laboratory findings in CSD.

P 210 Wound botulism in an injection-drug user

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A 32-year-old female injection-drug user presented with abscesses on both forearms, complaints of progressive limb-weakness, difficulty speaking, swallowing and shortness of breath over the last few hours. On neurological examination she showed dysphonia and dysarthria, partial ptosis, dyspnoea and generalised weakness with diminished reflexes. Sensory and cognitive functions were preserved. Within hours the patient required mechanical ventilation. Blood count and biochemical profile, spinal fluid examination as well as computed tomography revealed no abnormalities. Due to the presentation wound botulism was suspected and antitoxin was administered within 12 hours of admission. Swab samples taken during wound debridement later confirmed *Clostridium botulinum.* Furthermore, the mice inoculated with the patient's serum showed signs of botulism.

Neurophysiological studies on day three showed normal sensory responses, compound muscle action potential amplitudes (CMAP) were reduced with normal latencies and conduction velocity. On repetitive nerve stimulation with 30 Hz (RNS) an increment of 50% was found.

Wound botulism should be suspected in a patient with acute descending paralysis, with involvement of autonomic and cranial nerves, especially in injecting drug users. In 2004 only 2 cases of wound botulism were reported to the Swiss Federal Office of Public Health (BAG).

P 211 Neurophysiological studies in patients with Parkinson's syndrome and sleep-wake complaints

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Aims: To report the results of sleep-wake studies in 37 consecutive patients with Parkinson's syndrome (PD) and sleep-wake complaints.

Patients and methods: Eleven (30%) women and 26 (70%) men, mean age of 65 ± 10 years with Parkinson's disease (60%) and atypical PD (40%) were examined. They were most often referred for suspected REM sleep behaviour disorder (RBD, 73%), excessive daytime sleepiness (EDS, 41%) and suspected sleep-disordered breathing (SDB, 22%). Polysomnography (n = 37), multiple sleep latency test (MSLT, n = 24) and 2-week wrist actigraphy (n = 11) were performed.

Results: Patients with reduced sleep efficiency (<85%) had significantly higher UPDRS III scores and tended to have been suffering from the disease longer. In the polysomnography most frequently increased muscle tone in REM sleep (68%), sleep efficiency <85% (59%) and reduced sleep spindles (57%) were found. RBD (46%), SDB (32%) and periodic limb movements in sleep (PLMS >10/h, 32%) were also observed. The mean sleep latency on MSLT was <5 minutes in 6 (25%) of 24 patients. Sleep onset REM periods occurred in 5 (5%) of 104 naps. In 9 (82%) of 11 patients actigraphy documented abnormally increased mean rest/sleep periods per day (>40%).

Conclusion: Increased muscle tone in REM sleep, sleep-maintenance insomnia, reduced spindle activity, short mean sleep latencies on MSLT and increased rest/sleep amounts on actigraphy are the most common objective sleep-wake findings in patients with PD and sleep-wake complaints.

P 212 Seronegative myasthenia gravis

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Background: About 10 to 20% of patients with symptoms of generalised myasthenia gravis do not have detectable antibodies against the skeletal muscle acetycholine receptor (AChR). Some of the patients with a seronegative myasthenia gravis have antibodies against a muscle protein called MuSK (muscle-specific receptor tyrosin kinase). The presence of anti-MuSK antibodies is assumed to be associated with a more severe course of the disease.

Case report: A 39-year-old woman presented with generalised fatigue during the last year, blurred vision and weight loss of several kilograms due to difficulty swallowing during the last three months. Clinical examination revealed bilateral ptosis and abduction deficit of the right eye. Upon injection of edrophonium chloride (Tensilon), symptoms did not improve the first two times, but did improve after the third and fourth repetition of the test. No decrement response to repetitive nerve stimulation was recorded. No thymoma was visible in a computer tomography scan of the thorax. Antibodies to AChR were not detectable, but a positive anti-MuSK titer was found.

Conclusion: Seronegative myasthenia gravis often presents with atypical symptoms and clinical, electrophysiologic and radiologic findings. With the identification of antibodies directed against other components of the neuromuscular junction, some of these patients can be diagnosed and adequately treated.

P 213 A clinical observation of the therapeutic value of Stalevo® in 131 Parkinson's disease patients in daily clinical practice in Switzerland

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Levodopa is the most effective treatment for Parkinson's disease (PD), but long-term therapy is often associated with motor complications such as wearing-off (WO). Stalevo® enhances the benefit of L-Dopa, inhibiting both DDC and COMT.

Objective: To evaluate the therapeutic value with Stalevo® in daily practice.

Methods: A clinical observation with Swiss Neurologists and GPs. PD patients not fully stabilised or with unsatisfactory treatment were converted to Stalevo®. General clinical status and WO-symptoms were evaluated at visit 1 (baseline) and 2 (at least 4 weeks after conversion). Efficacy, safety, tolerability and treatment satisfaction with Stalevo® were evaluated at visit 2 in comparison to visit 1.

Results (preliminary): 45 neurologists and GPs participated. 131 patients have been enrolled, 122 completed. Mean age was 72.0 (± 10.3) including all Hoehn and Yahr stages, with the majority (44.4%) in stage 3. Physicians judged treatment with Stalevo® "very good and good" for tolerability in 84%, for patient satisfaction in 76%, for compliance in 92% and for convenience and dosing in 94% of the patients. In 80% of patients the goal of conversion was achieved. 82% of the patients continued the therapy with Stalevo®. Patients significantly improved regarding their clinical status, WO-symptoms and dyskinesias (all p = 0.0000). Adverse events have been reported in 13 patients (9.9%) with one severe (agitation).

Conclusion: This clinical observation emphasises the efficacy and convenience of Stalevo®.

P 214 Basilar artery occlusive disease – a case report with benign outcome

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Occlusion of the basilar artery is generally considered a very serious event and asso-

ciated with a high mortality rate. We present a case of a 70-year-old woman with occlusion of the basilar artery in the proximal and middle segment and bilateral occlusion of the vertebral arteries distal both PICAs. The patient had several transient ischaemic attacks within a time span of 7 weeks with intermittent ataxia, dysarthria, dysphagia and perioral numbness. Neurological work-up at that time revealed stenosis of the basilar artery and a rightsided pontine stroke. When occlusion became complete, additional symptoms occurred like hemiparesis with sensory loss and vertigo.

Clinical fluctuations of these symptoms were very sensitive to postural change initially but stabilised after about 2–3 weeks. Initial therapy was heparin, later switched to warfarin.

We conclude that during an initial period with TIAs due to basilar artery stenosis collateral circulation developed and prevented more severe neurological deficit when complete occlusion occurred. While collateral circulation is developing, haemodynamic changes and alteration of position seem to be critical and alter neurological symptoms.

P 215 Swiss Narcolepsy Scale: a valid tool for the diagnosis of narcolepsy

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Background: In a recent study (J Sleep Res 2004;13:395–406) we reported the high sensitivity (96%) and specificity (98%) of a new scale in a series of 57 patients with narcolepsy. This so-called Swiss Narcolepsy Scale (SNS) includes 5 questions ([1] inability to fall asleep; [2] being unrefreshed in the morning; [3] taking a nap at noon; [4] knee buckling during cataplexy; and [5] sagging of the jaw during cataplexy).

Aim: (1) To assess the value of the SNS in a new series of patients with narcolepsy and (2) to compare its sensitivity and specificity with those of two other scales suggested in the literature (Ullanlinna Narcolepsy Scale [UNS], Ann Neurol 1994;35:709–16, Epworth Sleepiness Scale [ESS]).

Patients and methods: We prospectively studied by a standard questionnaire which includes the SNS, the UNS and the ESS 17 patients with narcolepsy (N) and 202 patients with excessive daytime sleepiness of other origin (H). The diagnosis of narcolepsy was made according to international criteria.

Results: For the diagnosis of narcolepsy the following sensitivities and specificities were found: SNS (score <0) 88% and 87%; UNS (score ≥14) 88% and 75%; ESS (score >14) 56% and 73%. All hypocretin-deficient patients had an SNS score <0.

Conclusions: This study confirms the value of the SNS in diagnosing narcolepsy and suggests its superiority when compared with the UNS and ESS.

P 216 Metabolic deactivation of low-grade glioma during chemotherapy

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Introduction: Low-grade glioma (LGG) can respond to various chemotherapy regimen. Here we report an LGG patient in whom continuous low-dose temozolomide chemotherapy induced minor tumour response on magnetic resonance imaging (MR). In contrast positron emission tomography (PET) imaging with 18F-fluoroethyl-tyrosine (FET) showed disappearance of abnormal tumour tracer uptake.

Methods: A 28-year-old female patient with progressive oligoastrocytoma WHO II was treated with continuous low-dose temozolomide chemotherapy over 12 months. We used the FLAIR sequences to calculate the tumour size with MR. Tumour-to-contralateral cortex (T:C) count ratios were used to quantify tumour amino acid uptake with PET.

Results: Chemotherapy was well tolerated. The baseline tumour area was 5.19 cm^2. During treatment the tumour MR volume decreased by 20% at six and 34% at 12 months ('minor response'). FET T:C ratios were 1.57 at baseline, and 1.11 at six and 1.04 at 12 months (compared to baseline reduction of 83 and 93% respectively).

Conclusion: Continuous temozolomide is capable to inactivate LGG at the biochemical level, even if the tumour volume shows only minor response on MR. It is conceivable that deactivation of tumour biochemical pathways precede morphological changes by a hitherto unknown time period. This discrepancy challenges the concept of response assessment in gliomas. Molecular imaging using amino acids and PET is worthwile to be assessed more extensively.

P 219 Detection of regional blood perfusion changes in epileptic seizures with brain perfusion CT

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Objective: To describe ictal and postictal changes in perfusion computed tomography.

Methods: Fifteen patients (mean 47 years, 21–74 years) had perfusion CT following a motor seizure with secondary generalisation. Asymmetry indices were calculated and statistically evaluated for the parameters rCBV, rCBF and MTT. Fourteen patients underwent routine EEG. All EEGs were analysed visually and surface voltage maps were computed and compared with the region of cerebral perfusion changes.

Results: In three patients regional hyperperfusion was present during non-convulsive status epilepticus and correlated with the ictal EEG and the clinical semiology. In six patients postictal focal slowing of the EEG correlated with regional hypoperfusion. Postictal perfusion studies and EEG were normal in six patients presenting with a first epileptic seizure. Cluster analysis showed that rCBF was the only parameter that could differentiate these three groups of patients. Analysis of rCBV and MTT values differentiated only between the ictal and the interictal/postictal patients.

Conclusion: Regional perfusion changes during and immediately after epileptic seizures can be detected by perfusion CT in selected patients. From this preliminary study it seems that rCBF is best suited to differentiate between these conditions.

P 220 Propofol versus barbiturates for refractory status epilepticus: a multicentre, randomised clinical trial. Call for centres

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Background: Refractory status epilepticus (SE) develops in 31–44% of patients with SE, with a mortality of 16–23%. Coma induction is advocated for its management. Propofol and barbiturates are the most used agents, but no comparative study has been performed. In consideration of the uncertainty regarding the relative effectiveness, despite several retrospective data, a prospective investigation is needed.

Objective: To assess the effectiveness (SE control, adverse events) of a first course of propofol versus barbiturates in the treatment of refractory SE, in adults with refractory SE not due to cerebral anoxia.

Design: Randomised, single blind, multicentre, bi-national clinical trial comparing propofol with pentobarbital (USA) or thiopental (CH).

Treatments: Coma induction with standardised doses of the study medication titrated towards burst suppression. After 36–48 hours, reduction to 50% of the maintenance dose.

Primary endpoint: Proportion of patients with control of SE after 3 half-lives following dose reduction.

Sample size: A total of 150 patients will be needed to detect a relative difference of 30% in the proportion of success (power = 0.8; two-sided $\alpha = 0.05$). Ten centres, each recruiting 5 patients per year for three years, will be needed for completion of this study.

Funding: Grant requests are being submitted to the SNF (CH) and the Epilepsy Foundation (USA).