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Abstracts
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Percutaneous vertebroplasty in multiple myeloma

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Purpose: Back pain is a frequent complication of multiple myeloma (MM). Percutaneous vertebroplasty (PV) is a relatively new technique to stabilise and provide pain relief from spinal diseases such as MM.

Methods and materials: All cases of back pain due to MM treated by PV at our institution between 1998 and 2003 were retrospectively reviewed. A total of 114 vertebral levels and 4 pelvic lesions were treated in 31 patients (21 male, 10 female) with a mean age of 65 years (range 40–89). The maximum number of levels treated in a single patient was 12 over two sessions. Baseline and post-procedure pain levels and incidence of complications were determined from the medical record.

Results: Complete pain relief was achieved in 17 patients (54.8%), 70 to 90% pain relief in 6 patients (19.4%), 50% pain relief in 3 patients (9.6%), and no pain relief in 5 patients (16.1%). The only symptomatic complication was a transient L5 radiculopathy, related to a local cement leak that spontaneously resolved in 3 weeks.

Conclusions: Percutaneous vertebroplasty is a safe and effective treatment for pain due to axial MM lesions. This minimally invasive technique thus appears as an useful new tool which should in selected cases be combined to other already approved therapies in the management of MM bone disease.

Monovoxel magnetic resonance ^{1}H-spectroscopy as a tool to follow the progression of brain tumours malignancy

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Aim: Magnetic resonance imaging (MRI) is a powerful tool to detect the presence of cerebral tumours. However, even with MRI, it is actually difficult to determine the degree of malignancy of a tumour. The gold standard is histological methods after cerebral biopsy. Magnetic resonance spectroscopy (MRS) improves standard MRI by showing the metabolites concentration in a given voxel inside the tumour. Repeated follow-up MRS thus might show variation of metabolites, either due to the progression of the tumour or due to the response to radio-/chemotherapy. The question that this study aims to answer is the following: is it possible to assess by MRS alone, with a reasonable sensibility, the progression from a low-grade to an intermediate/high-grade tumour?

Method: Criteria of inclusion was cerebral tumour confirmed by cerebral biopsy, and no previous radiotherapy before the first MRS. 20 patients, 14 men and 6 women, with at least three dynamic MRS, have been included in the study. Age varies from 69 to 22 years, with a mean age of 43.3 ± 12 years. For each patient, one or more regions of interest (ROI) in the tumour were chosen, and the relative MRS were obtained, for a total of 30 ROI. After a first spectrum, the patient was followed every three/six months by MRS. The voxel was kept in size and location as in the first examination. A general graph showing variation of all metabolites versus time was drawn for every patient, and graphs with variations of NAA/Choline (NAA/Cho), myo-Inositol/Creatinine (mI/Cr) and Choline/Creatinine (Cho/Cr) vs time were made. If a chemo/radiotherapy was started during the follow-up, the beginning of treatment was indicated on the graph too.

In order to distinguish the effect of tumour progression vs therapeutic response, the patients have been subdivided into four categories. Those with histological evidence of tumour progression without therapy (n = 5), those with stable tumour status without therapy (n = 14), those without progression with therapy (n = 3), and finally those with tumour progression and therapy (n = 4). Our analysis is focused on four metabolic parameters which have been recognised as good markers for tumour monitoring: lipids, NAA/Cho, Cho/Cr, mI/Cr.

Results: (A) Tumour progression without therapy was characterised by elevated lipids (100%), decreased NAA/Cho (80%), unchanged Cho/Cr (100%), and mixed behaviour of mI/Cr (increased 40%, stable 40%, decreased 20%). (B) Stable tumour without therapy was characterised by stable lipids levels in 57%, stable NAA/Cho in 79%, and stable Cho/Cr in 79%. Lipids increased in 36% and decreased in 7%. NAA/Cho decreased in 14% and was associated with increase in Cho/Cr (14%). The ratio mI/Cr was less consistent with stable values in 36%, increasing values in 50%, and decreased values in 14%. (C) Therapy response of stable tumour was characterised by stable lipids together with stable or increased NAA/Cho and stable or decreased Cho/Cr in 66%. In 33% cases, therapeutic response resulted in increased lipids, decreased NAA/Cho and increased Cho/Cr. (D) Therapeutic response of progressive tumours was characterised by decreased lipids in 50%, and unchanged NAA/Cho and Cho/Cr whereas lipids were stable (remained high) or further increased in 50%.

Conclusion: As proposed in the literature, increase in lipids, decrease in NAA and increase in Choline are associated in tumour progression. If we consider these three parameters together, serial proton spectroscopy is sensitive for tumour progression in absence of therapy. Nevertheless, false positives were diagnosed in stable tumours with and without treatment. Finally, we did not find that mI/Cr, a putative marker for tumour progression, correlated with tumour status.

Myopathy as a rare primary presentation of sarcoidosis

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Introduction: Neurological manifestations occur in only 5% of patients with sarcoidosis. Asymptomatic infiltration of muscles has been reported in a number of patients but clinically relevant weakness is extremely rare.

Case report: A 69-year-old woman presented with a 9-year history of slowly progressive, painless muscle weakness. Pre-existing was a femoral nerve paresis after hip replacement which was said to be the cause of her progressive gait disturbance. On neurological examination a generalised muscle weakness was found, most pronounced in the proximal extremity muscles without sensory disturbances. Electromyographic changes were pointing toward a myopathic disease. Biopsy of the deltoid muscle showed a gra-

nulomatous myositis with noncaseating epitheloid granulomas. The following extensive work-up revealed a so far unknown sarcoidosis with enlarged mediastinal lymph nodes and morphological criteria of sarcoidosis in the broncho-alveolar lavage. CRP was 11 (normal <8), other laboratory values including angiotensin-converting enzyme were within normal limits. The patient was started on cortisone and improved initially to some extent.

Conclusion: In rare cases slowly progressive muscular weakness can be due to previously unknown systemic disease like sarcoidosis with no or little involvement of other organ systems. Correct diagnosis has major impact on treatment.

Factors influencing the haemodynamic effect of segmented Z-stents in side-wall aneurysms

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Objective: To study haemodynamic effect of a segmented Z-stent by computer simulation in an idealised side-wall aneurysm model.

Methods: A 3D lateral wall aneurysm (10 mm diameter, 5 mm neck) on a parent vessel (diameter 4 mm, length 20 mm) was simulated by FEM with a commercial flow simulation software, in steady flow condition. Fluid was assumed to be Newtonian, with physiological rheologic conditions. Different parameters were studied by simulating a segmented Z-stent. The design pattern was kept similar while varying the stent strut size, the segment length and the stent position. The stent effective porosity was determined by using Matlab which calculated the ratio between the total stent area and neck area. The mean speed in the aneurysm was calculated for each condition and plotted versus the effective porosity.

Results: Effective porosity ranged from 77.5 to 96.22% by varying the strut size from 150 to 25 µm. The segment length made vary the porosity of 3.79% (range from 79.05 to 82.84% for a strut size of 125 µm). Position of the stent exhibited effective porosity changes of 4.29% (range from 78.53 to 82.84% for a strut size of 125 µm). Statistical analysis showed best match with linear regression. The best flow reduction was obtained with a 150 µm stent strut size, pos2, and 1.5 mm segment length.

Conclusion: For this given Z-stent, our simulation estimated the critical area of interest to involve stents of a strut size between 75 to 100 µm, where there appears less influence by stent segment length and relative stent position. The stent strut size was the major parameter which had an effect on blood flow.

Lesion analysis in high-resolution MR-images of patients with tactile agnosia using cytoarchitectonic mapping

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We present two patients with aperceptive tactile agnosia of the right hand. While somatosensory discrimination of roughness (microgeometrical domain) was significantly reduced in both patients, somatosensory discrimination of cuboids (macrogeometrical domain) was significantly impaired only in the patient with the more posterior parietal lesion. The underlying lesion was a chronic infarction of (fronto-)parietal cortex. Aim of the study was the exploration of neuroanatomical correlates in terms of cytoarchitectonic areas. 3D-MR images of the brain and lesions were segmented separately and spatially normalised using a multiscale registration algorithm based on an elastic model. Cytoarchitectonic probability maps of the Brodmann areas (BA) deduced from histological sections of post-mortem brains were transformed to the standard space. Relying on the voxel overlap between the 50% isocontours of the probabilistic maps and the lesion, we were able to quantitate the lesion within BA 4a, 4p, 3a, 3b, 1 and 2 in both patients. Furthermore, the landmarks of ventral and anterior intraparietal sulcus made it possible to localise a second lesion within superior parietal lobule in the patient with the additional failure in the macrogeometrical domain. We conjecture degradation of sequential processing within postcentral gyrus for texture recognition and additionally, disturbed parallel processing for shape within superior parietal lobule.

A propos d'un cas de vasculite cérébrale dans le cadre d'une polyarthrite rhumatoïde séropositive

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Nous rapportons le cas d'un patient de 70 ans souffrant de polyarthrite rhumatoïde traitée par corticostéroïdes, méthotrexate et hydroxychloroquine qui développera 5 ans après le début de la maladie, une atteinte pleuro-péricardique et une vasculite cérébrale focale. Le tableau neurologique, initialement caractérisé par des crises comitiales partielles secondairement généralisées et une aphasie fluente, se normalisera parallèlement à la majoration du traitement immunosuppresseur (aziathiopine et corticostéroïdes) et le traitement anticomitial pourra progressivement être abandonné. Une année après le diagnostic, les lésions radiologiques cérébrales pariétales et temporales gauches auront disparu à leur tour. Les critères diagnostiques cliniques et radiologiques ainsi que le diagnostic différentiel de cette complication rare sont discutés.

Suivi par angio-IRM d'anévrysmes cérébraux stentés

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Objectif: Le but de l'étude est d'évaluer un protocole d'IRM pour le suivi d'anévrysmes stentés. Suite à l'étude ISAT, le traitement endovasculaire tend à devenir le traitement de choix des anévrysmes cérébraux. Le stenting intracrânien se développe actuellement pour le traitement de certains cas notamment lorsque le coiling seul est insuffisant. Il est donc nécessaire de développer également un moyen d'effectuer de manière non-invasive le suivi radiologique de ces cas après traitement endovasculaire par stent.

Matériel et méthode: Douze patients porteurs d'anévrysmes (6 femmes et 6 hommes, âgés de 25 à 65 ans) ont été traités par stent (stents métalliques INX ou en nitinol Neuroform). Le protocole IRM comprenait des séquences de diffusion, pondérées en T_1 et T_2 dans le plan axial ainsi que des séquences d'angio-IRM avant et après injection de contraste.

Résultats: Les patients ont été traités par une combinaison de stents et de coils (6 anévrysmes de la circulation antérieure, 6 de la circulation vertébrobasilaire). L'angio-IRM montrait une diminution de signal au niveau du stent avec un flux distal présent; le signal était plus fort au niveau du stent après injection de gadolinium. Avec les stents de type Neuroform (en Nitinol) on obtient un meilleur signal endoluminal en angio-IRM par rapport aux images obtenues en présence de stents métalliques. Au niveau des coils on a pu mettre en évidence un hyposignal limité. L'IRM de diffusion a permis de démontrer l'absence d'incidents ischémiques survenus après l'intervention.

Conclusions: Notre protocole d'IRM permet de manière peu invasive et sert à suivre des patients traités par une combinaison de coils et de stents pour des anévrysmes intracrâniens. L'angio-IRM injectée donne un meilleur remplissage luminal au niveau du stent.

Focal cortical dysplasias: surgical outcome in 67 patients in relation to histological subtypes and dual pathology

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In this study the impact of histological subtypes and dual pathology on the surgical out-

come in patients with intractable epilepsy due to focal cortical dysplasia (FCD) was investigated.

67 patients with FCD were retrospectively analysed at follow-up periods of 6 to 48 months after epilepsy surgery. Histological subtypes were classified according to Palmini and seizure outcome according to Engel. Considering outcome at the last follow-up, Engel Ia was achieved in 63% of patients with mild malformation of cortical development, 67% with FCD1a, 55% with FCD1b, 43% with FCD2a, and 50% with FCD2b. Considering outcome at follow-up periods over 12 and 24 months, Engel Ia was achieved in significantly more patients with FCD1 than with FCD2, and Engel IV occurred most frequently in patients with FCD2a. Outcome in patients with dual pathology was favourable (66% Engel Ia). In all subgroups, no relevant change in outcome was observed over time.

In conclusion, although a predominantly temporal localisation of FCD1 may have played a role, a similarly better outcome in FCD1 was also observed in extratemporal epilepsy, suggesting that the histological subtype is at least a cofactor influencing the postsurgical outcome.

Bilateral brachial plexus involvement on magnetic resonance imaging in a patient with clinically asymmetrical Lewis-Sumner syndrome

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Introduction: Lewis-Sumner syndrome (LSS) is a very rare multifocal demyelinating neuropathy, characterised by an asymmetrical clinical involvement with weakness and sensory impairment. Electrophysiological studies show a reduced conduction velocity (CV) and conduction blocks (CB). In one study of patients with LSS the clinically affected brachial plexus appeared diffusely swollen on magnetic resonance imaging (MRI).

Case report: We present a case with typical asymmetrical clinical symptoms, but the brachial and lumbar plexus involvement on MRI was symmetrical. The weakness, affecting the proximal left arm and the distal right leg, was asymmetrical as was the sensory impairment, affecting parts of the left arm and the left foot. Electrophysiological studies showed conduction blocks in two nerves with slowed conduction velocity in three motor and one sensory nerves. In contrast to the few previously reported cases our patient showed diffuse symmetrical swelling of the clinically affected as well as the unaffected plexus including involvement of the asymptomatic right side.

Conclusion: MRI is a helpful tool in the diagnosis of multifocal demyelinating neuropathies as the LSS. Diffusely swollen brachial and lumbar plexuses might not only be found at clinically involved sides but also give a hint toward so far asymptomatic involvement of other sides.

Patienten bevorzugen eine nicht-operative Therapie lumbaler radikulärer Schmerzsyndrome: Abbruch einer randomisierten Vergleichsstudie zwischen konservativ-multimodaler Therapie und Mikrodiskektomie

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Methode: Die Patienten wurden 14tägig standardisiert konservativ behandelt. Anschliessend erfolgte eine Randomisierung in eine konservative oder operative Weiterbehandlung. Im Falle der signifikanten Besserung – nach definierten Kriterien – oder bei Auftreten von Ausschlusskriterien wurden die Patienten einer Beobachtungsgruppe zugeteilt.

Ergebnisse: Auf der Basis der Ein-/Ausschlusskriterien konnten 54 von 191 stationär eingewiesenen Patienten mit radikulären Rückenschmerzen und Bandscheibenprolaps eingeschlossen werden. Eine signifikante Besserung nach 14 Tagen lag bei 18 Patienten (33%) vor; ein Patient lehnte eine weitere Studienteilnahme ab. 35 Patienten (65%) wurden randomisiert. Über 80% der 17 «operativ» randomisierten Patienten bevorzugten eine weitere konservative Therapie und nur 3 Patienten der «konservativ» randomisierten Gruppe wünschten eine Operation. Somit wurde bei 6 Patienten eine standardisierte Mikrodiskektomie und bei 29 Patienten eine weitere konservative Therapie durchgeführt. Dies führte zum Studienabbruch. Die randomisierten Patienten berichteten bei einer telefonischen Befragung, dass der vorwiegende Grund für die Zurückweisung des Randomisierungsergebnisses war, dass sie – obwohl nach den Studienkriterien nicht signifikant gebessert – eine subjektiv ausreichende Besserung erfahren hatten und daher keine operative Therapie wünschten.

Schlussfolgerung: Die konservativ-multimodale Therapie lumbaler Radikulopathien bei Bandscheibenprolaps hat einen hohen Stellenwert. Bei Therapieentscheidungen sollten in jedem Fall die Patientenpräferenzen mit berücksichtigt werden.

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Infrarot-Thermographie zur Identifikation sympathisch unterhaltener Schmerzen bei einem Patienten mit chronischer Lumboischialgie nach multiplen lumbalen Wirbelsäulenoperationen

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Anamnese: Der 37jährige, mittlerweile IV-berentete Maurer stellte sich Ende April 2004 mit chronischen Schmerzen (NRS 6) links paravertebral in Höhe der mittleren LWS ausstrahlend in das linke Gesäss, den linken dorsalen Ober-/Unterschenkel bis in die linke Grosszehe vor. In der Vorgeschichte lumbale Diskektomie 1991, lumbale Spondylodese 1993, lumbale Metallentfernung 1994, erneute lumbale Spondylodese 1996 sowie Hüftkopfnekrose beidseits mit Hüft-TP rechts 2000, Revision 2003. Seit 1993 beklagt er einen kaltschweissigen Fuss links.

Befund: Diskrete Quadricepsparese rechts M4, ansonsten keine Paresen. Keine Atrophien. PSR links abgeschwächt, ASR stgl., kein Babinski. Hypästhesie/Hypalgesie im Dermatom L5/S1 links, Thermhypästhesie gesamtes linkes Bein. Linker Fuss kaltschweissig, sonst klinisch keine vegetativ-trophischen Störungen. Fersen-/Zehengang und Gangbild regelrecht. Infrarot-Thermographie: Kälterer Fuss links im Seitenvergleich (am Grosszehengrundgelenk rechts 27,9°C / links 26,0°C) als Hinweis für sympathische Dysregulation und sympathisch unterhaltene Schmerzen.

Verlauf: Am 9.6.2004 wurde mit 15 mg Lidocain 2% und 40 mg Triamcinolon eine Blockade des N. ischiadicus links durchgeführt. Schmerzreduktion von initial NRS 8 auf NRS 4, später für ungefähr 5 Stunden weitgehende Schmerzfreiheit im linken Bein.

Schlussfolgerung: Durch die Infrarot-Thermographie kann in Ergänzung zur klinischen Untersuchung eine sympathische Dysregulation und somit eine sympathisch unterhaltene Schmerzkomponente gesichert werden. Der Stellenwert dieser Untersuchung für die Praxis ist erst nach Durchführung systematischer Untersuchungen beurteilbar.

The voices of wrath: brain responses to angry prosody in meaningless speech

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Functional brain imaging in humans and neurophysiology in animals suggest that emotional stimuli evoke enhanced sensory responses in the visual system, and such enhancement may arise without voluntary attention. We conducted two fMRI experiments to examine whether a similar influence of emotion separate from attentional control may exist in the human auditory system. Angry relative to neutral prosody in meaningless speech stimuli produced a selective activation of the posterior superior temporal sulcus (STS), equally so when presented to the task-relevant or task-irrelevant ear during dichotic listening. Activity in STS was specific to voice features, but not affected by the distinctive acoustic envelope or the fundamental

tone of emotional prosody presented alone in non-speech stimuli. Selective attention to voices from the task-relevant ear produced additional increases in anterior STS, regardless of prosody. Such enhancement in stimulus processing by affective cues may reflect a fundamental principle of brain organisation, shared by voice and face perception.

Improved detection and localisation of focal cortical dysplasia by voxel-based 3D MRI analysis

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Focal cortical dysplasia (FCD), a frequent cause of pharmaco-resistant epilepsy, can be difficult to detect in MRI. We present three novel post-processing techniques which improve lesion detection by enhancing image properties not readily accessible by visual analysis.

A T_1-weighted MRI volume data set is normalised and segmented. The distribution of grey and white matter is analysed on a voxelwise basis and compared with a normal database. Based on this analysis, 3-dimensional maps are created which characterise different features of FCD, i.e. abnormal thickness of the cortical ribbon, abnormal extension of grey matter into white matter, and blurring of the grey-white matter junction.

These methods were applied to the MRI data of 25 epilepsy patients with histologically proven FCD. In each feature map the locations of the maximum deviations from the normal database were automatically determined and compared with the sites of the lesions or the subsequent resections in the conventional MRI.

With all feature maps combined, this approach was able to identify 23 out of 25 dysplastic lesions, 4 of which had totally or partly not been recognised in conventional MRI.

The automated post-processing of MRI presented here facilitates the detection of FCD and increases the sensitivity of MRI.

Improved detection of early CT signs in cerebral infarction by voxel-based CT analysis

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CT signs of acute cerebral infarction (e.g., attenuation of involved structures due to oedema, loss of grey-white matter differentiation) may be difficult to detect within the first hours after symptom onset. Here, we present a novel technique for post-processing of CT scans to enhance these signs.

A CT scan with 512×512 matrix and axial cuts of 5 mm through infra- and supratentorial space is interpolated to a volume data set and normalised to a customised CT template. The distribution of grey and white matter is analysed on a voxelwise basis and compared with a normal database consisting of the normalised CT scans of 30 healthy subjects. Based on this analysis, a 3-dimensional map is created which characterises density loss of brain tissue as compared to the normal database.

In a preliminary study this technique was applied to the CT scans of 12 patients with acute infarction (CT within 1–6 hours after symptom onset). The resulting feature maps displayed the infarction much more clearly than the original CT scans, even in 3 cases in which the lesion was initially not detected in the CT.

The novel post-processing technique presented here may facilitate the interpretation of CT scans in acute cerebral infarction.

Evaluation du rachis opéré par IRM ouverte

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L'IRM ouverte, positionelle et cinétique (IRM p/c, English p/k MRI, i.e. upright standing and weight bearing MRI) peut révéler des sténoses dynamiques et récidives de hernies discales «occultes», apparaissant lors de mise en charge et de mouvements, qui ne sont pas visible lors d'un examen pratiqué en position couchée. L'IRM p/c pourrait devenir l'examen de choix lors de «Failed Back Surgery syndrome», pour la visualisation de pseudarthroses et de pathologies du niveau adjacent après spondylodèses rigides, ainsi que comme contrôle de qualité après chirurgie restabilisatrice.

Apport de l'IRM ouverte dans l'évaluation du rachis dégénératif

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L'IRM ouverte permet un examen fonctionnel du rachis sous charge et dans des positions variables, spécialement dans des positions symptomatiques pour les patients. Les avantages d'un tel examen, par rapport à l'IRM en position couchée sont: la mise en évidence de pathologies «occultes», apparaissant lors de mouvements et de mise en charge, comme les hernies discales mobiles, les instabilités avec sténoses dynamiques. Cet examen devrait pouvoir remplacer la myélographie fonctionnelle et éviter les refus d'examen de malades claustrophobes.

Axial myopathy and parkinsonism

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We report 2 patients with parkinsonism exhibiting pronounced forward flexion of the trunk, called camptocormia or bent spine syndrome. Age of the patients was 70 and 76 years, disease duration 6 and 12 years, respectively. One patient was diagnosed with multiple system atrophy. His parkinsonism responded poorly to dopaminergic treatment. After a two-year course posture deteriorated severely, associated by impaired postural reflexes and slight autonomic failure. The second patient was diagnosed with Parkinson's disease and responded favourably to dopaminergic treatment. She also developed severe forward flexion of the trunk after a six-year course. Temporarily, she suffered from abdominal dystonia which could be controlled with apomorphine infusion treatment. The common feature, characterising the main functional deficit in both patients, was the inability to actively erect the trunk while passive extension of the trunk was possible. Electromyography of paraspinal muscles revealed a myopathic pattern with high frequency, spiky motor unit potentials of short duration and abnormal spontaneous activity consisting of fibrillations and positive sharp waves. The nature of the observed association between parkinsonism and chronic myopathy confined to trunk extensor muscles is unclear. Focal myopathy may reflect one factor beside others causing abnormal posture in parkinsonism.

Optimising the tolerability of topiramate through reduction of antiepileptic co-medication

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Introduction: Topiramate (TPM) has been associated with a wide range of adverse effects including cognitive side-effects like memory and speech disturbances.

Objective: To evaluate the impact of reduction of antiepileptic co-medication on the range of side effects of TPM.

Method: Naturalistic, observational study in Switzerland. In total, 108 patients with epilepsy with an average age of 32 (± 20) years were included by neurologists and neuropaediatricians. During the observation period of one year patients were put on TPM and additional antiepileptic co-medication was gradually reduced, if possible.

Results: The ratio of patients on TPM monotherapy increased from 6% at the beginning to 36% at the end of the observation period. The average number of antiepileptic drugs (AEDs) per patient could be reduced from 1.6 to 1.1. 71% of the patients completed the study, with all of them continuing the TPM treatment.

A comparison of the patient groups treated either with a combination therapy (TPM plus ≥1 AED) or with TPM monotherapy at the end of the study revealed a side effect rate of 19 and 13%, respectively. Furthermore, in the combination-therapy subgroup a variety of known side effects was observed whereas in the TPM-monotherapy group the range

of side effects was reduced to paresthesia, ataxia and amenorrhoea (4.3% each).

Response rates (patients with >50% seizure reduction) were 81% for the combination-therapy group and 92% for the TPM-monotherapy group.

Conclusion: Compared to previous regulatory trials, this naturalistic setting demonstrated a decrease in the total side-effect rate for TPM, especially of cognitive side effects like memory and speech disturbance. This may be associated with the reduction of adjunctive AEDs. The benefits in the tolerability profile for TPM monotherapy are not offset by a reduced efficacy.

Electrical neuroimaging in presurgical epilepsy evaluations

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Electroencephalography (EEG) is one of the most important tools for localising the epileptogenic region in patients undergoing presurgical epilepsy evaluations. However, most EEG applications fail to capitalise on all of the data's available information, particularly that concerning the location of active sources in the brain. In our unit 125-electrode EEG recordings of interictal epileptiform activity are used, together with electric source imaging (ESI), as a standard procedure in the presurgical evaluation of patients with pharmaco-resistant partial epilepsy. This investigation is an integrated part of the presurgical work-up, which also includes EEG video monitoring, MRI, PET, interictal/ictal SPECT, and neuropsychology.

In a recent study we have evaluated the feasibility, clinical yield, and localisation precision of ESI of interictal epileptic activity. A consecutive series of 44 patients with intractable epilepsy of various aetiology, who underwent a comprehensive presurgical epilepsy evaluation, were subjected to a 125-channel EEG recording. A standardised realistic head-shape source imaging procedure was applied to the averaged spikes of each patient. In 32 patients the presurgical work-up identified a focal epileptogenic area. The 125-channel EEG source imaging correctly localised this area in 29 of these patients (90.6%). Imprecise localisation was explainable by simplifications in the recording and analysis procedure, which we accepted for the benefit of speed and standardisation. In a subgroup of 24 operated patients, the sublobar precision of the 125-channel EEG source imaging was evaluated by calculating the distance of the source maximum to the resected area. This analysis revealed zero distance in 19 cases (79%). We conclude that high-resolution interictal EEG source imaging is a valuable non-invasive functional neuroimaging technique. The speed, ease, flexibility, and low cost of this technique warrant its use in clinical practice.

Searching for a face in the crowd: effects of emotional cues and lesions in posterior pulvinar

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Detection of behaviourally relevant stimuli in a scene with multiple stimuli, such as searching for a friend in a crowd of faces, requires attention to be directed to the location of the stimulus for selective processing and identification. However, attention is more rapidly drawn to stimuli with salient features, such as those with an odd "pop-out" colour. In experiment 1, we examined visual search for faces in healthy subjects, using a task where a target face had to be found among a group of 8 other faces (all a neutral expression). The target differed from these distractors by identity alone, by identity plus colour, or by identity plus happy or fearful expression. Subjects were faster to detect target faces with a different identity when these had a fearful or happy expression, as compared to those with a neutral expression, but they were even faster for target faces with a salient difference in colour. In experiment 2, we examined the effect of pulvinar lesion on this search task, given recent proposals that this thalamic nucleus may play a crucial role in attention to salient and emotional stimuli. Preliminary results in 3 patients with focal damage to the right pulvinar show a non-significant slowing of search in the contralesional visual field, with a preserved facilitation for the detection of emotional (fearful and happy) faces on both sides. However, there was no additional benefit for face targets with a salient difference in colour. These data suggest that right pulvinar may be involved in guiding spatial attention based on simple visual features such as colour, but not responsible for emotional influences in attention.

Techniques minimalement invasives du rachis lombaire. Expérience clinique et revue de la littérature

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Nous rapportons notre expérience, plus de 400 patients traités sur 2 ans, par techniques minimalement invasives pour les différentes pathologies du rachis lombaire: lombalgie chronique ou aiguë, pathologie des articulaires postérieures et conflit discoradiculaire.

L'indication, la technique et le protocole de prise en charge de ces patients sera décrits.

Nos résultats varient entre 68 à 72% d'amélioration pour ces différentes pathologies, évalués sur la réduction de la douleur (EVA), la réduction de prise d'antalgique et l'amélioration de la qualité de vie pour un délai variant entre 6 à 12 mois.

Nous conclurons sur une revue sur les données récentes de la littérature.

Time-resolved 3D contrast-enhanced MRA of craniocervical vessels with GRAPPA based-parallel imaging

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Objectives: 2D CE-MR projection angiography (termed MR-DSA) using complex subtraction [1, 2] demonstrates vessel perfusion at a high temporal resolution. This technique has proved to be highly effective to demonstrate neurovascular pathologies (e.g. dural arteriovenous fistula) – that cannot be depicted with alternative MR imaging methods [3], and has become an important adjunctive diagnostic tool for neurovascular imaging [4]. We hypothesised that time-resolved 3D CE-MRA with parallel imaging offers the possibility to evaluate neurovascular pathologies with both a high temporal and spatial resolution.

Methods: With the use of a twelve- or eight-channel head coil and GRAPPA-based parallel imaging [5] a complete 3D volume could be acquired within 1.8 to 2.1 s (RF-spoiled FLASH sequence, acceleration factor 3, 30 reference lines, 2.2×1.6 mm^2 in-plane resolution). 12 patients with craniocervical vascular pathologies were investigated with 3D CE-MRA. Image analysis included the comparison of conventional DSA data in all patients.

Results: Time-resolved 3D MR-DSA proved to be a robust method to visualise craniocervical perfusion from the arterial to the venous phase and to be efficient to demonstrate the underlying vascular pathology in all cases.

Conclusions: 3D CE-MRA has the potential to replace 2D projection MRA for the detection of neurovascular pathologies. This technique does not suffer from signal cancellations along slice direction, which represents a major difficulty in 2D MR-DSA.

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Analyse rétrospective de la prise en charge de l'AVC ischémique aigu dans un hôpital régional

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Introduction: Tous les cas admis à l'hôpital des Cadolles pour une suspicion d'AVC entre 2001 et 2002 ont été analysés rétrospectivement (dossier clinique et radiologique) par rapport à la possibilité d'une thrombolyse.

Résultats: Chez 120/222 patients (54%), le diagnostic d'AVC ischémique a été confirmé. Le délai moyen entre l'alarme et l'arrivée à l'hôpital étant de 43,4 ± 12,7 minutes, dont la moitié correspond au temps passé au domicile du patient. Si l'on fait abstraction du facteur temps, 31/120 patients (25,8%) correspondaient aux critères de thrombolyse de l'étude NINDS, et la proportion de candidats à une thrombolyse augmenterait de 38,3% si l'indication était élargie à d'autres types d'AVC (lacunaire, aphasie isolée p. ex.). Six patients (5%) sont arrivés dans un délai autorisant un transport dans un centre universitaire et 4 (3,3%) ont bénéficié d'une thrombolyse i.v.

Conclusion: A moins de critères de triage spécifiques pour l'AVC et d'un effort majeur d'éducation du public, le plus grand nombre restera privé de la possibilité d'une thrombolyse. Compte tenu de l'étroitesse de la fenêtre thérapeutique pour une lyse intraveineuse (3 h), la pratique de la thrombolyse dans des centres régionaux sélectionnés pourrait également contribuer à rendre ce traitement plus accessible.

Residual eye torsion following ocular counterroll

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Torsional eye position determined in the upright position after sustained static head tilt differs from the original ocular torsion measured prior to the tilt. Using a motorised turntable, 8 healthy human subjects were rotated quasi-statically (0.05 deg/s/s, 2 deg/s velocity plateau reached after 40 s) from the upright position about the naso-occipital axis. Three full whole-body rotations were completed. Subjects fixed upon a blinking laser dot straight ahead in otherwise complete darkness. 3D eye movements were recorded with modified dual search-coils (wires exiting inferiorly). Torsional positions of the right eye at consecutive upright body positions were analysed. Torsional eye position before the beginning of the chair rotation was defined as zero torsion. On average, the right eye was intorted by 1.3, and extorted by 2.0 deg, after the first full chair rotation in the clockwise and counterclockwise direction, respectively. The torsional offset did not significantly change after the two subsequent rotations. We conclude that residual torsion observed after static ocular counterroll is the result of static hysteresis, i.e. a position lag of the eyes, which depends on the direction of head roll.

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Dissociable contribution of somatosensory and superior lateral temporal cortices in social face recognition

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Faces are multi-dimensional stimuli bearing many important social communicative signals, such as gaze direction and emotion expression. To test whether perception of these two facial dimensions relies on different cortical areas within the right hemisphere, we used single-pulse TMS in healthy participants while they performed two distinct tasks on the same face stimuli. TMS was applied over either the right somatosensory cortex or right superior lateral temporal cortex, 100 or 200 ms after the presentation of a face that had various eye gaze directions and emotional expressions. Participants performed a speeded sequential matching task on the faces across the two task conditions (same/different gaze direction; same/different emotion expression). Our results indicate a significant task × stimulation site interaction, showing a selective TMS-related interference following stimulations of the somatosensory cortex during the emotional expression task. Conversely, TMS of the superior lateral temporal cortex interfered with the gaze direction task. We also found that the interference effect was specific to the stimulus content in each condition, affecting the speed of judging gaze shifts (not static eye positions) with TMS over the right superior temporal cortex and the speed of judging fearful expressions (not happy expressions) with TMS over the right somatosensory cortex. These results provide for the first time a double-dissociation in normal viewers for social face recognition during transient disruption of non-overlapping brain regions, supporting a critical role for somatosensory and superior lateral temporal regions in the perception of fear expression and gaze shift in seen faces, respectively.

Cervical and thoracic myelopathy due to spinal meningiomas

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Background: Spinal meningiomas are a rare but possible cause of cervical and thoracic myelopathy. This report is based on an exceptional case load for a small centre like Chur and includes 9 patients within 2.5 years.

Objective: To analyse the clinical features of this benign tumour, which is insufficiently known by non-neurosurgeons.

Methods: Seven women with a median age of 64 years (47–78 years) and two men with a mean age of 69 years (68–70 years) were operated for a spinal meningioma between January 2002 and July 2004, one in the cervical region, one at the cervicothoracic junction and 7 in the thoracic region and seen again after 6–12 months following uneventful microsurgical resection.

Results: The length of history was 1–2.5 years, all patients had sensory deficits, 8 were paraspastic, 7 had gait disturbances related to spinal ataxia, including 6 motor deficits ranging from isolated deltoid paresis to paraparesis: 3 patients were moving but no longer able to walk and incontinent. Local or radicular pain was present in only 4 cases (50%). One lady underwent an orthopaedic total knee replacement 5 months prior to admission that did not improve her walking ability. Histologic examination revealed 5 transitional and 3 psammomatous meningiomas. Postoperative neurorehabilitation was needed by 8 patients, except for the cervical patient with mild and quickly resolving cervical deficits. The last patient operated in July 2004 was reoperated for a postoperative epidural haematoma and is still in rehabilitation centre. All other patients improved and were able to walk without help when seen for follow-up. Two recovered completely, one patient still had some neurogenic bladder problems.

Conclusions: Progressive sensory deficits with gait disturbance should lead the general practionner to refer the patients to a specialised centre. The duration of symptoms (1–2.5 years) prior to MRI investigation shows that spinal meningiomas are not enough considered in the differential diagnosis by many physicians.

Confusional arousals as an escape mechanism from 'hypersynchronisation'? A speculative case report

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Confusional arousals (CAr) are considered to occur without any specific short-term heralding signs and to be caused by a disturbance of the arousal mechanisms. We used low-resolution-brain-electromagnetic-tomography (LORETA) to continuously assess the localised cortical neuronal activity during one night in a 31-year-old patient with somnambulism. The patient experienced three CAr with complex motor activity. The tempo-

rally averaged current density (CDe) per voxel was computed for each frontal, temporal, limbic, parietal and occipital brain lobe. We found that CDe increased almost monotonically before CAr in all brain lobes, but the precisest relationship existed in the frontal lobes. CDe at the moment of the first CAr may be used as a critical threshold (CTh): 46 min after the first confusional arousal, CDe crossed CTh again and –1/+1 s (left and right frontal lobe respectively) the second CAr occurred. The third CAr followed 188 min later, +44/+77 s after CDe increased above CTh for the third time. We speculate that this tight temporal correlation between CDe in the frontal lobes and the occurrence of CAr might express a causal link. Assuming that CDe reflects synchronised cortical activity, CAr could be the clinical manifestation of an escape mechanism that prevents the frontal lobes from being driven into 'hypersynchronisation'.

Radiosurgical treatment of gelastic epilepsy

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Hypothalamic hamartomas are a frequent cause of severe progressive symptomatic epilepsy with gelastic, complex partial and secondarily generalised tonic clonic seizures. Medical treatment is generally ineffective, and resective neurosurgical techniques have been accompanied by severe side effects.

Radiosurgical techniques have been suggested as a feasible therapeutic alternative. In pilot series, both external radiosurgery by Gamma-knife (Regis et al., Neurology 2000) and interstitial radiosurgery using stereotactically implanted ^{125}I-seeds (Schulze-Bonhage et al., Neurology 2004) have shown promising results. So far, it is unknown which method is superior with regard to immediate and long-term efficacy and tolerability.

An ongoing prospective, randomised trial of radiosurgical treatment by either external LINAC radiosurgery or stereotactic interstitial radiosurgery at the University Clinic of Freiburg is presented which is open for the inclusion of patients with gelastic epilepsy. Inclusion criteria are well demarcated hypothalamic hamartomas on MR imaging with a diameter of 5–30 mm, pharmacoresistance to at least two first-line antiepileptic drugs, relevant seizure-related clinical impairment and an age of at least 5 years. Exclusion criteria are pregnancy or prior neurosurgical interventions in the hypothalamus. Study end points are time to seizure freedom and achievement of long-term seizure control within a follow-up period of 3 years.

Illusory persistence of touch after right parietal damage: neural correlates of tactile awareness

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We studied a patient who experienced "palinesthesia" or an illusion of persistent touch following tactile stimulation on the left hand, subsequent to right parietal damage. This subjective sensation was accompanied by transient increases in objective measures of tactile threshold. The patient had mild deficits in superficial tactile perception, but showed severe left-sided extinction for *offsets* of tactile stimuli during bilateral stimulation, not for *onsets* of stimuli. Functional magnetic resonance imaging (fMRI) revealed increased neural activity during palinesthesia selectively arising within the ipsilesional-right primary somatosensory (SI) cortex, but no abnormality within left SI and bilateral secondary somatosensory cortices (SII). Right SI responded to the onset of new tactile stimuli on the left hand but not to their offset. By contrast, any tactile events on either hand modulated activity in contralateral SII regions, even undetected left-sided offsets. These data demonstrate that illusory persistence of touch following stimulation on the hand may result from sustained neural activity in restricted region of primary somatosensory cortex outlasting the offset of tactile stimuli. These findings also provide direct evidence for a critical role of SI in mediating conscious somatosensory experience on contralateral parts of the body.

Acute ischaemic stroke and sleep apnoea: evolution of clinical findings and diffusion-weighted MRI in the first 3 days after stroke onset

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Background and objectives: Sleep apnoea (SA) is present in about 50% of patients with acute ischaemic stroke. Our hypothesis is that in the acute phase of stroke moderate-severe SA (MSSA) leads to clinical stroke progression or to an enlargement of the ischaemic volume more pronounced than in patients with mild or no SA.

Design/methods: We include patients with ischaemic stroke and admission within 24 hours after stroke onset. Stroke severity is estimated by NIH and Scandinavian Stroke Scale (NIHSS, SSS) at admission (day 1) and day 3. Sleep breathing is assessed by an ambulatory device (Autoset® Embletta pds, ResMed) the first night after admission. MSSA is defined by an apnoea-hypopnoea index (AHI) ≥25. MR imaging is performed on a 1.5 T MR system at day 1 and day 3. Stroke volumes are measured on DWI.

Results: We have so far evaluated 18 patients. MSSA was present in 5 patients, 2 of these patients (40%) had a clinical stroke progression, 4 patients (80%) had a clear-cut increase (>50%) of stroke volume. In 13 patients SA was mild or absent. Two of these (15%) had a clinical stroke progression and 6 of them (46%) had a clear-cut increase of stroke volume.

Conclusions: Preliminary results of this ongoing project suggest that MSSA in patients with acute ischaemic stroke may be linked to clinical stroke progression and significant (DWI volume ≥50%) MRI stroke progression.

Imagerie de l'instabilité vertebrale. Du diagnostic au traitement: expérience à propos de 30 patients

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Le spondylolysthésis dégénératif est le résultat d'une instabilité lombaire locale associant un facteur discal et atteinte dégénérative des articulaires postérieures.

Nous avons évalué sur une série de 30 patients, la localisation, la dégénérescence, le type et le degré de glissement disco-somatique, ainsi que le degré de subluxation et de rotation des articulaires postérieures.

L'analyse a été réalisée sur les clichés dynamiques (flexion-extension, cliché assis de profil), le scanner lombaire et l'IRM et pour certain patient une sacco-radiculographie.

Le spondylolysthésis s'effectue dans le sens du plateau supérieur l'un sur le rachis supérieur produisant un rétrolysthésis et dans le sens du plateau inférieur sur le rachis inférieur produisant un antélysthésis. Par ailleurs, lorsque le patient présentait une symptomatologie unilatérale, une composante rotatoire > à 5° associé à un glissement latéral était retrouvé.

Nous conclurons sur la thérapeutique avec d'une part sur les résultats cliniques de notre équipe chirurgicale qui utilise la technique ELIF ainsi que la surveillance radiologique de cette technique et d'autre part les résultats prometteurs du traitement des instabilités disco-vertébrales débutantes par radiofréquence.

Valeur virtuelle ou réelle de la séquence FLAIR après gadolinium sur une IRM à bas champ dans les pathologies cérébrales

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Objectifs: Comparer les séquences pondérées en T_1 et en FLAIR après injection de gadolinium sur une résonance magnétique (IRM) à bas champ et les avantages respectifs de ces deux techniques dans les pathologies intracérébrales.

Matériel et méthodes: Pendant une période de 6 mois une analyse prospective a été entreprise sur une machine à bas champ (Philips 0,23 Tesla): un protocole standard a été utilisé avec des séquences T_1 et T_2 axiales ainsi qu'une séquence FLAIR coronale avant injection; une séquence FLAIR après injection était adjointe à tous les protocoles nécessitant du produit de contraste. 26 patients ont été inclus dans l'étude.

La détection et la description de la sémiologie des principales pathologies infectieuses, ischémiques, inflammatoires et tumorales et l'analyse de l'apport respectif du FLAIR et du T_1 avec gadolinium dans ces affections ont pu être évalués.

Résultats: Dans les anomalies intraparenchymateuses la séquence classique pondérée en T_1 et la séquence FLAIR sont quasi superposables; en revanche, la supériorité de la séquence FLAIR est indéniable dans l'évaluation et l'appréciation de l'extension des pathologies lepto-méningées.

Conclusions: La connaissance des nouvelles informations données par la séquence FLAIR avec injection de gadolinium est particulièrement utile pour la détection et le traitement précoces des pathologies inflammatoires, infectieuses et tumorales leptoméningées qui sont dans la plupart des cas des urgences neurologiques.

Functional consequences of parietal damage on activation of retinotopic visual cortex in patients with left spatial neglect

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Right parietal cortex is thought to control visuospatial attention by top-down modulation of visual areas. Right parietal lesions may cause left spatial neglect and visual extinction, with unawareness of left hemifield stimuli despite anatomically intact visual cortex. The deficit is exacerbated by distractors and perceptual load. To elucidate the neurophysiological substrates of such disorders, we used fMRI and retinotopic mapping in right parietal patients with left spatial neglect but intact visual field. Salient checkerboard stimuli were presented either in the right, left, or both hemifields, or in none, while patients performed either an easy (low load) or difficult task (high load) on stimuli presented at central fixation. Increased attentional load for stimuli at fixation produced widespread decreases in the response to contralateral stimuli within visual cortex of the damaged right hemisphere, progressively increasing along the ventral visual pathways from V1 towards higher areas, such as V4 and beyond. In V4, responses to contralateral stimuli were totally abolished during high central load. Visual activation in the intact left hemisphere was either unchanged or increased during high attentional load. These results demonstrate major functional biases in early visual cortex due to unilateral parietal lesion, with reduced activation in the damaged hemisphere when attention is engaged on a demanding task at fixation. This provides a plausible neural substrate for the loss in visual perception caused by parietal damage in neglect patients.

Evaluation strategies for ictal SPECT data

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We present methods for analysis of ictal SPECT data in a group of patients exhibiting medial temporal lobe seizures. The hypothesised seizure focus in the hippocampal area could be verified by subtraction SPECT images. Co-registration of the resulting images with high resolution MR images facilitated their precise anatomical location. The relation between the subject-specific hyperperfusion pattern and the morphological findings was evaluated by merging subtraction SPECT with voxel-based 3D-MRI analysis. Due to the common specific semiology, the analysis could be refined by a categorical analysis using statistical parametric mapping, SPM: paired comparison of ictal and interictal stages, and unpaired comparison of ictal stage in the patients with normal volunteers show the group-specific patterns for the ictal stage. The categorical analysis has limitations, such as missing regions of a network which do not attain the defined level of significance. Therefore, we also applied a voxel-based principal component analysis (PCA) that provides images of voxels of the brain which vary together. PCA permits the comparison of patients and controls, subgroup of patients or different conditions within a group of subjects using inferential statistics and behavioural measures. These comparisons reveal the physiological interpretation of the PC images and the relation to function.

DWI und DTI des Gehirns post mortem: Korrelation von radiologischen mit forensisch-autoptischen und histo-neuropathologischen Befunden

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Die diffusionsgewichtete MRI des Gehirns erlaubt neue Einblicke in die Pathophysiologie des Gehirns. In der klinischen Neuroradiologie findet die Methode vorwiegend im Rahmen der Diagnostik ischämischer Veränderungen Verwendung, während einzelne Berichte über DWI bei drohendem Hirntod ebenfalls vorliegen. Die ersten Erfahrungen mit DWI und DTI-Scans am postmortalen Gehirn sollen vorgestellt und mögliche Anwendungsbereiche in der Rechtsmedizin sowie der klinischen Medizin diskutiert werden.

Methode: 26 Verstorbene aus dem Untersuchungsgut des Rechtsmedizinischen Instituts Bern sowie 2 gesunde Lebende wurden mittels DWI/DTI (1.5 T Scanner; line-scan Technik; b werte von 5 und 1000, field of view: 24 × 18,5 mm Schichtdicke; 6 Diffusionsrichtungen; TR: 3424 ms, TE: 92 ms) untersucht. Ergänzend axiale T_1- und T_2-gewichtete Aufnahmen des Gehirns. Die apparenten Diffusionskoeffizienten (ADC) wurden in jeweils 40 anatomischen Regionen gemessen. Eine Auswertung der DTI-Daten erfolgte in Fällen mit Rotationstrauma des Gehirns. Alle Verstorbenen wurden einer forensischen Autopsie und neuropathologischen Untersuchung unterzogen.

Resultate: Bei den Lebenden wurden ADC-Werte zwischen 0,67 und 0,84 × 10^{-5} cm^2/s festgestellt. Im Vergleich dazu fanden sich bei den Verstorbenen deutlich reduzierte ADC-Werte zwischen 0,18 und 0,26 × 10^{-5} cm^2/s ohne und zwischen 0,29 und 0,41 × 10^{-5} cm^2/s mit Berücksichtigung der Temperatur von 2%/Grad. Das Gehirn der Verstorbenen zeigte sich in den DWI-Bildern im Sinne eines «white brain» hyperintens. In Fällen traumatischer Schädigung des Gehirns liessen sich Faserrupturen mittels DTI darstellen.

Schlussfolgerungen: Die erniedrigten ADC-Werte und das Bild des «hellen Gehirns» stehen im Einklang mit den hypoxischen Veränderungen bei Hirntod. Die Möglichkeit der Feststellung von Axonverletzungen in der nicht-invasiven DTI erweitert das Spektrum der bislang hauptsächlich auf die Diagnostik von Blutungen gestützten forensischen Neuropathologie und lässt zukünftig neue Erkenntnisse in der Traumatologie des Gehirns erwarten.

Stenting and combined thrombolysis in acute carotid artery subocclusion

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We report on 3 patients that were treated by a combined interventional and pharmacological approach for carotid subocclusion. All patients presented with acute stroke and were included in our protocol using a combination of intravenous and local intra-arterial thrombolysis. Based on Angio-CT and DSA findings, a subocclusion of the carotid artery was detected and additionally stenting undertaken. The results are discussed.