ABN abstracts

Proceedings of the Association of British Neurologists, Cardiff City Hall, Cathays Park, 2 April–4 April 2003

01 EARLY RISK OF RECURRENT STROKE BY AETIOLOGICAL SUBTYPE: IMPLICATIONS FOR STROKE PREVENTION

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The early risk of stroke after a TIA or minor stroke has recently been shown to be higher than was previously supposed. However, stroke is a heterogeneous syndrome and recurrence risk may differ between aetiological subtypes. Data on the risk of early recurrence by subtype are important for the organisation of stroke prevention services and triage.

Methods: We determined the early recurrent stroke risk by aetiological subtype in the Oxford Vascular Study (OxVASC), and performed a meta-analysis with unpublished data from the Oxfordshire Community Stroke Project (OCSP) and published studies reporting equivalent data.

Results: Data on 1670 patients were available from OxVASC, OCSP, and two published studies. Recurrent stroke risk varied significantly between aetiologies (p < 0.001). Patients with stroke due to large artery disease (LAD) had the highest odds of recurrence at both seven days (OR = 3.1, 95% CI = 1.4–6.9) and 30 days (OR = 3.1, 95% CI = 1.9–5.2) days. Odds of recurrence at 30 days for other subtypes were: cardioembolic (OR = 0.9, 95% CI = 0.5–1.6); undetermined (OR = 1.0, 95% CI = 0.6–1.6); and small vessel (OR = 0.2, 95% CI = 0.1–0.6).

Conclusions: The highest risk of early recurrent stroke is in patients with LAD, emphasising the need for carotid endarterectomy and other preventive treatments to be instigated urgently.

02 INTERICTAL CELLULAR ENERGY RESERVES IN MIGRAINEURS WITH PROLONGED AURA OR COMA AND MIGRAINOUS STROKE: A BRAIN 31P-MR-SPECTROSCOPY STUDY

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The pathophysiology of migrainous neurological deficits is poorly understood. A previous 31P-MR-spectroscopy study identified possible reduced interictal cellular energy reserves in migraineurs. We hypothesised that if low cellular energy reserves are pathogenic they may be most marked in patients with a history of very prolonged deficits or migrainous coma.

Methods: We performed interictal brain 31P-MR-spectroscopy in normal controls, and in migraineurs with a history of short deficits (maximum 24 hours), prolonged deficits (>7 days), migrainous coma, and migrainous stroke (persistent deficit, infarct on imaging). We measured phosphocreatine/inorganic phosphate (PCr/Pi), phosphocreatine/ATP (PCr/ATP), and Pi/ATP.

Results: Compared with controls (n = 16), the PCr/Pi-ratio (reflecting cellular energy reserves) was not reduced in migraineurs with short aura (n = 5), or in patients with migrainous stroke (n = 4). However, the ratio was significantly reduced in migraineurs with prolonged deficit or coma (n = 10), and there was an inverse relationship with the duration of the neurological deficit (p = 0.004). There were no significant differences in PCr/ATP and Pi/ATP values.

Conclusion: Reduced interictal cellular energy reserves in some migraineurs may predispose them to to prolonged neurological deficits or coma. However, interictal cellular energy reserves are normal in migrainous stroke, suggesting that the pathological mechanisms of reversible cerebral dysfunction and infarction differ.

03 CHANGING PRACTICE IN ACUTE STROKE MANAGEMENT IN ACCIDENT AND EMERGENCY (A AND E) DEPARTMENT: THE UTILITY OF STROKE RECOGNITION INSTRUMENT FOR A AND E PHYSICIANS

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Introduction: Acute stroke “brain attack” is an acute medical emergency requiring urgent assessment. Despite this management of stroke in the A and E setting is generally given a low priority and diagnostic accuracy is poor. We determined the clinical characteristics of suspected stroke patients referred to A and E department to develop a stroke recognition tool for A and E physicians.

Methods: Information on all suspected stroke/TIA referrals and diagnoses from A and E department were prospectively recorded over a 1 year period. Patients were also examined by a research fellow. A stroke recognition instrument was developed based on the prevalence of signs in strokes and non-stroke patients.

Results: 398 patients were referred (159 strokes; 178 non-strokes; 61 TIsAs). A seven item scoring system (score between -2 and 5) stroke recognition instrument was designed based on history (loss of consciousness and convulsive fits) and neurological signs (face, arm, leg paresis, dysphasia/dysarthria, and visual field defect). When internally validated at a cut off score of >0 it showed a diagnostic sensitivity = 92%, specificity = 86%, positive predictive value = 85% and negative predictive value = 93%. The external validation process is ongoing.

Conclusions: These data suggest that a relatively simple A and E stroke recognition instrument could be utilised by A and E physicians to improve acute stroke diagnosis.

04 DIFFUSION WEIGHTED MAGNETIC RESONANCE IMAGING IN ACUTE ISCHAEMIC STROKE: PATHOPHYSIOLOGICAL INSIGHTS WITH QUANTITATIVE POSITRON EMISSION TOMOGRAPHY (PET)


The core of the irreversibly damaged brain tissue increases in volume over hours following occlusion of the middle cerebral artery. Hyperintense lesions on acute magnetic resonance (MR) diffusion weighted imaging (DWI) have been taken to represent this core and in conjunction with perfusion MRI used to identify MR thresholds for penumbra. Evidence now suggests this DWI lesion is in whole or part reversible, thus contributing to the discrepancies in the results. Clarification of the pathophysiological tissue compartments comprising this lesion is required. A 53 year old patient was imaged 7–9 hours following stroke onset with back to back DWI and quantitative PET mapping of cerebral blood flow (CBF) and cerebral metabolic rate of oxygen (CMRO2). Voxels within the DWI lesion were thresholded out visually and transferred to the coregistered PET maps. Histograms of the values of these voxels for each PET parameter were constructed and CBF and CMRO2 thresholds for penumbra and core from previously documented research applied. The diffusion lesion consisted of core as well as a substantial proportion of penumbra, which varied with different lesion definition. This study for the first time documents that the DWI lesion can contain still viable tissue and therefore may not represent only irreversible core.

05 CELLULAR INFLAMMATION IN ACUTE ISCHAEMIC STROKE: AN IMAGING BASED STUDY


Background: Animal studies have shown that neutrophils are recruited early in cerebral ischaemia and may be responsible for the “no reflow” phenomenon. Human studies have contributed less direct evidence from a number of “in vivo” imaging studies.

Hypothesis: That selectively labelled neutrophils may be mapped to areas of cerebral infarction in acute ischaemic stroke (IS) patients and...
that such a response may be correlated with neurological status and outcome.

**Methods:** Following informed consent, patients with CT (computed tomography) confirmed IS were recruited. Autologous neutrophils were separated, labelled with $^{111}$indium tropaneolone, and injected within 24 hours of ictus. Single photon emission computed tomography (SPECT) studies were performed at set times in conjunction with CT. Regions of interest (ROIs) were defined and asymmetry indices (AIs) calculated. Outcome was measured using the validated National Institute of Health Stroke Scale (NIHSS).

**Results and Conclusion:** Fourteen confirmed IS patients entered the study, six of whom died prior to 3 month follow up. Twenty-four hours of IS ictus, labelled autologous neutrophils were mapped to regions of cerebral ischaemia as defined structurally by co-registration, and may be present from as early as 19 hours following clinical onset. Such accumulation may correlate with early neurological status.

**06 CEREBRAL VENOUS SINUS THROMBOSIS: TREATMENT WITH ENDOVASCULAR THROMBOLYSIS**

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Cerebral venous sinus thrombosis (CVST) may account for up to 2% of strokes in young adults. Conventional treatment consists of anti-coagulation with heparin and/or warfarin. Where this fails, and in severe cases, endovascular approaches, involving direct infusion of thrombolytic agents, have been used.

We present 11 patients (13 procedures), including two children, who received thrombosis with recombinant tissue-type plasminogen activator (t-RPA) for CVST. Six patients had received treatment with heparin, five patients with extensive CVST had not. All were deteriorating clinically prior to thrombolysis.

Nine patients had post-thrombolysis imaging. Partial recanalisation was achieved in six and complete recanalisation in one. None of the patients experienced significant haemorrhage post-thrombolysis, including two patients with haemorrhagic infarction and one with subarachnoid haemorrhage.

Three patients died. All had three or more venous sinuses involved and had features suggesting severely raised intracranial pressure. Their lowest Glasgow Coma Score pre-thrombolysis was lower than that of survivors. Two of those who died presented with seizures.

Eight patients survived. Seven of these, for whom follow up details were available, were fully independent at 6 to 12 months.

Endovascular thrombolysis for CVST can result in sinus and venous recanalisation and lead to an excellent outcome for most patients.

**07 THE CLINICAL APPLICATION OF NEUROIMAGING IN EPILEPSY**

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**Objective:** To evaluate the clinical use of neuroimaging in epilepsy.

**Methods:** The scan reports of 919 outpatients were reviewed. Seventy patients (44 (63%) female, mean age 32 years (range 15–75)) were identified. The duration of syncope varied between 1 and 30 minutes. The average number of episodes was 3 (range 1–10). Symptoms occurred over 1 to 5 years. The final syncope diagnosis was: vasovagal 59% (n = 41), unclassified 21% (n = 15), psychogenic 10% (n = 7), cardiogenic 4% (n = 3), convulsive 3% (n = 2), complicated migraine 3% (n = 2), ECG was performed in 93% (n = 65) of cases. Eight of these (12%) were abnormal. The ECG was abnormal and diagnostically useful in all three cases of cardiogenic syncope (two prolonged PR interval, one sinus bradycardia). The ECG was normal or showed non-specific abnormalities in all other cases.

In conclusion, ECG is recommended but is commonly normal in patients with syncope. However, an abnormality of the baseline ECG is a useful predictor of cardiogenic syncope, suggesting the need to pursue evaluation for cardiac causes in these patients. Equally important, a normal ECG is associated with a low risk of cardiac syncope as the cause.

**09 USE OF ECG IN THE EVALUATION OF SYNCOPE: A RETROSPECTIVE AUDIT**

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The diagnosis of syncope rests principally upon the history, but investigations may be required to support the clinical diagnosis. ECG is recommended in all patients with syncope. We carried out a retrospective audit of patients, with final diagnosis of syncope, seen in the epilepsy unit, University Hospital of Wales, in 2001–2002. The primary objective was to find out whether an ECG was done or not, and if done whether it was normal or abnormal.

Seventy patients (44 (63%) female, mean age 32 years (range 15–75)) were identified. The duration of syncope varied between 1 and 30 minutes. The average number of episodes was 3 (range 1–10). Symptoms occurred over 1 to 5 years. The final syncope diagnosis was: vasovagal 59% (n = 41), unclassified 21% (n = 15), psychogenic 10% (n = 7), cardiogenic 4% (n = 3), convulsive 3% (n = 2), complicated migraine 3% (n = 2), ECG was performed in 93% (n = 65) of cases. Eight of these (12%) were abnormal. The ECG was abnormal and diagnostically useful in all three cases of cardiogenic syncope (two prolonged PR interval, one sinus bradycardia). The ECG was normal or showed non-specific abnormalities in all other cases.

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**10 MEMORY PERFORMANCE AND MAGNETIC RESONANCE SPECTROSCOPY OF THE TEMPORAL LOBES IN IDIOPATHIC GENERALISED EPILEPSY**

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To investigate the relationship between neuronal dysfunction and memory performance in patients with idiopathic generalised epilepsy (IGE) using magnetic resonance spectroscopy (MRS) of the temporal lobes of the brain.

**Methods:** Seventeen patients with IGE and 12 healthy control subjects underwent neuropsychological testing of verbal and visual recall and recognition. Single voxel MRS spectra were obtained in each subject from the white matter of both temporal lobes and the areas were calculated under the three prominent resonances: N-acetyl aspartate (NAA), creatine (Cr), and choline (Cho). Results are expressed in terms of the ratios of: NAA/choline, NAA/creatine and NAA/creatine-choline.

**Results:** The patients performed worse than the controls on four of the neuropsychological measures: visual recall, face recognition, visual recognition and speed of processing (Student’s t test p<0.05). Visual
The relevance of antibodies that neutralise the in vitro effect of IFN-β1a in viral cytopathic assays to multiple sclerosis outcomes is unresolved. Evidence: 48 week results show a 30% relative reduction in occurrence rate of relapse with Rebif® versus Avonex® despite NAB development in 25% of Rebif® patients versus 2% on Avonex®. Indeed, 64% of NAB-ve Rebif® patients remained relapse free versus 52% of all Avonex® patients and 51% of NAB-ve Avonex® patients. A 36% relative reduction in mean 12 active lesion count occurred with Rebif® versus Avonex® (median 0.0 vs 0.5; adjusted mean 0.9; p<0.001). NAB+ Rebif® patients had significantly fewer active lesions than Avonex® patients (mean 0.7 vs 1.9; 1.4; p<0.001). With Rebif®, NAB-ve patients had significantly more active lesions than NAB-ve patients (mean 1.6 vs 0.6; median 0.9 vs 0.0; p=0.008). However, NAB-ve Rebif® values were similar to Avonex® (mean 1.4, median 0.5).

Over 48 weeks, fewer NAB-ve Rebif® patients had relapses than all patients on Avonex®, with comparable MRI outcomes. Rebif® treatment in patients remaining NAB-ve (75%) had a highly significant benefit on relapse and MRI outcomes versus Avonex®, showing the benefit of high and frequent IFNβ-1a dosing.

11 PREVALENCE, PROGNOSIS, AND RISK FACTORS FOR EPILEPTIC SEIZURES IN MULTIPLE SCLEROSIS

Background: Reported prevalence rates of epileptic seizures in multiple sclerosis (MS) patients vary, and knowledge regarding seizure type and prognosis is limited. A causal relationship between inflammatory subcortical lesions and the development of seizures has been postulated, but it is unclear whether other risk factors or a genetic predisposition to epilepsy in MS patients may contribute.

Methods: The prevalence of epilepsy was determined in 400 consecutive MS patients, by personal interview and additional review of medical notes. Patients with a history of seizures were evaluated for seizure onset, type, severity and risk factors for epilepsy. The genetic predisposition to epilepsy was assessed, by obtaining a family history of epilepsy in all probands.

Results: Epileptic seizures had occurred in 18 patients (4.5%); eight had seizures before, and 10 after being diagnosed with MS. Six patients had a single seizure, two had active epilepsy and 10 had epilepsy in remission. The prevalence of epilepsy in first-degree relatives of 400 MS patients was not different from the general population risk.

Conclusion: These results show an increased comorbidity between epileptic seizures and MS. The prognosis of epilepsy was generally good and MS patients did not have an increased genetic predisposition to epilepsy.

12 OLIGODENDROCYTES PRODUCE NEUROTROPHIC AND AXONOTROPHIC FACTORS IN VITRO
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Background: Late onset axonopathy, occurring in the absence of inflammation, is an increasingly recognised feature of multiple sclerosis. The pathophysiology of this process however remains unknown, but loss of neurotrophic support provided by chronically depleted oligodendrocytes is one potential cause. Myelin itself has axonotrophic effects, but the contribution of oligodendrocyte-derived soluble growth factors on neurons has not been previously determined.

Methods: Rat neurons were cultured in oligodendrocyte conditioned media (OCM) or control media. At determined time points, cultures were stained with antibodies against axon specific proteins and axon length measured. Analysis of growth factor production by oligodendrocytes was undertaken by radioimmunoassay and western blotting using antibodies against growth factors.

Results: Oligodendrocytes produce insulin-like growth factor-1 (IGF-1) and glial cell line derived neurotrophic factor (GDNF). OCM promotes both neuronal and axon survival in vitro. Furthermore blocking IGF-1 or GDNF in cultures reduces OCM mediated effects. Analysis of intracellular pathways elucidated signalling mechanisms involved in these processes.

Discussion: We have shown that soluble factors released by oligodendrocytes increase axonal survival in culture, which may have important implications in determining causes of axonopathy in multiple sclerosis. Characterisation of neurotrophic factor production by oligodendrocytes may lead to therapeutic strategies to prevent irreversible axon loss in late stages of the disease.
Conclusion: Ambulatory monitoring is feasible in MS and likely to be reliable and valid. The face validity of counting every step over many days in the patient’s own environment underlies a view that such methodology may become the gold standard for measurement of actual (rather than claimed or derived) walking mobility.

A FUNCTIONAL MAGNETIC RESONANCE IMAGING STUDY OF THE LONGITUDINAL RESPONSE TO PHOTIC STIMULATION FOLLOWING ACUTE OPTIC NEURITIS


Introduction: Previous work using functional magnetic resonance imaging (fMRI) has identified increased activity in extraoccipital regions in patients who had recovered from optic neuritis, which may contribute to recovery. To investigate the spatial and temporal evolution of these regions, a longitudinal study was conducted over 1 year in patients with acute optic neuritis.

Methods: 21 patients were recruited. MRI and clinical examination were performed at baseline, 2 weeks, 1, 2, 3, and 6 months, and 1 year. A longitudinal regression analysis was performed to describe trends in the fMRI response over the first 6 months. A cross sectional study was performed to investigate dynamic differences between patients and controls.

Results: The regression analysis showed recovery of visual cortex function over the first 6 months. The cross sectional analysis demonstrated fMRI activity in the insula, corpus striatum, lateral temporal, orbitofrontal and posterior parietal cortices with a dynamic involvement over time. The peak differences between patients and controls occurred at 1–2 months and subsided after 3–6 months. The extraoccipital responses for affected and fellow eye stimulation showed similar activation patterns.

Conclusions: This work demonstrates strikingly dynamic changes in brain activity outside the visual cortex in patients, compared with controls, during recovery from acute optic neuritis.

A 5 YEAR LONGITUDINAL MRI STUDY OF PRIMARY PROGRESSIVE MULTIPLE SCLEROSIS


Background: There has been little meaningful correlation between clinical and MR changes in primary progressive multiple sclerosis (PPMS), although all studies have been of short duration (2 years or less). In this longitudinal study lesion loads, cord and brain volumes are measured in a PPMS cohort over 5 years and compared to two clinical measures.

Methods: 41 PPMS patients representing a wide range of ages and disease duration attended for MRI and clinical examination on four occasions over 5 years. T2 lesion load, T1 hypointensity load, brain and cord volume were measured at each point by a single observer.

Results: Significant changes were seen in all MR measures over 5 years (p < 0.001) with time plots revealing a wide variety of change between individuals. Modest associations were found between increase in disability and decrease in cord area and increase in T2 load (r = 0.31, p < 0.05 both). Deterioration in cognition was associated with greater rates of brain atrophy (r = 0.31, p < 0.05 also). Changes in cord volume were found to be independent of changes in other MR measures.

Discussion: With longer periods of follow up associations can be found between MR and clinical measures providing some support for their use as surrogates in therapeutic trials in PPMS. Patients with PPMS display a surprisingly wide range of MR and clinical behaviours.

THE PREVALENCE OF MULTIPLE SCLEROSIS IN IRELAND: EVIDENCE FOR A NORTH-SOUTH GRADIENT

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Objectives: To compare the prevalence of MS in two Irish counties: Donegal in the north west of the island and Wexford in the south east.

Methods: Patients with clinically definite or probable MS (Poser criteria) who were resident within the county borders on 1 January 2001 were considered prevalent cases for the study. Sources of ascertainment included a postal survey of general practitioners, county physicians, consultant neurologists, respite facilities and local MS charities. Hospital coding lists and interprision prescription lists were also reviewed. Review of clinical case records and/or patient examination confirmed the diagnosis of MS.

Results: In County Donegal, 229 prevalent cases were identified giving a prevalence rate of 176.1 per 100 000 (95% CI: 154.2–200.1). In Wexford there were 126 prevalent cases resulting in a prevalence rate of 120.7 per 100 000 (95% CI: 100.5–143.7).

Conclusions: The south east of Ireland has a higher prevalence rate of MS than previously reported; however, the rate still remains significantly lower than that in the north. This north-south gradient is possibly due to genetic variations in the background populations; HLA typing in both Donegal and Wexford is ongoing to test this hypothesis.

A POPULATION BASED STUDY INTO LATE ONSET CEREBELLAR ATAXIA (LOCA) IN SOUTH EAST WALES

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Background: Most late onset cerebellar ataxia (LOCA) cases are sporadic; an proportion has an established acquired or genetic aetiology, whereas the remainder are idiopathic (ILOCA). We have conducted a population based study into prevalence and causation of LOCA in SE Wales.

Methods and materials: Multiascertained sources were used to identify all cases prevalent on 1 January 2001 with a predominantly progressive cerebellar ataxia with age at onset over 18 years, in a region with 742 400 inhabitants. Those with acquired aetologies were excluded and a prevalent register constructed from ILOCA and known genetic LOCA cases.

Results: We identified 76 cases: 70 (92.1%) with apparently idiopathic LOCA, and six (7.9%) with established genetic basis. For ILOCA, the crude prevalence rate was 9.4 per 100 000 (95% CI: 7.2–11.6) while for known inherited LOCA, it was 0.81 per 100000 (95% CI: 0.1–2.4). Mean age at onset of ILOCA was 53.2 ± 13.6 years, of whom 58.6% were male. Cases with extracerebellar features (67.3%) exceeded those with a relatively pure cerebellar syndrome (32.7%). Mean disease duration was 9.2 ± 7.4 years and 92% remained ambulant.

Discussion: This population based study is the first in the UK and provides an insight into prevalence and aetiology of LOCA within a defined region, and will provide a basis for the use of expanding genetic tests in LOCA cases.

TIME TO MOVE FROM GUT TO BRAIN: GLUTEN ATAXIA RESPONDS TO GLUTEN-FREE DIET EVEN IN THE ABSENCE OF AN ENTEROPATHY

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The effect of a gluten free diet was studied in 40 patients with gluten ataxia. Twenty four adhered to the diet with elimination of antigliadin antibodies (treatment group (TG)). Thirteen refused or abandoned the diet. Ataxia was persistent in all cases; however, ataxia resolved in 16/24 of the TG but none in controls because of persistent elevation of antigliadin antibodies. Ataxia was assessed at baseline and 1 year. Latency (ms) of finger nose test improved in the TG (3278 ± 1115 to 2506 ± 1713) v controls (3480 ± 1713 to 3800 ± 2125), p = 0.0002. Alternating tapping (taps per 30 seconds) of the index finger of each hand improved in the TG (89.7 to 244.2) v controls (74.5 to 26.8), p = 0.0002. Time (seconds) to completing a 25 hole pegboard improved in the TG (267.2 ± 99.7 to 244.2 ± 82.5) v controls (425.8 ± 200.4 to 514.4 ± 295.4), p = 0.0005. Time standing with feet together without corrective movement improved in 16/24 of the TG but none in controls p = 0.0001 (chi squared). Subjective assessment of symptoms by visual analogue scale improved from baseline in TG (0.17 to 0.06), p = 0.01, v controls (0.3 to 0.19), p = 0.0004 (repeated measures ANOVA). After excluding patients with an enteropathy the relative improvement remained significant. Gluten ataxia responds to the diet even in the absence of an enteropathy.

AGE OF ONSET IS A SIGNIFICANT FACTOR IN DETERMINING THE PHENOTYPE OF PRIMARY TORSION DYSTONIA

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Objective: Primary torsion dystonia (PTD) is clinically and genetically heterogeneous. The study aim is to test the hypothesis that while different gene mutations are responsible for PTD, clinical phenotype is determined by age of onset.

Methods: (1) Fifteen multiplex families with PTD were ascertainment and videotaped examinations of all consenting individuals were rated for affected status and distribution by three neurologists. (2) A systematic review was performed of series of patients with sporadic PTD published on MEDLINE over last 25 years (using PTD synonyms as search terms). Surveys detailing ages and sites of onset were included.

Results: 41 affected individuals in the 15 families, when grouped by site of onset showed a significant caudal to cranial increase in median age of onset (p = 0.0002; lower limb 10 years, upper limb 20.5, cervical 43 and orbit 75). In the analysis of 33 published series of sporadic PTD a similar significant distal to proximal trend was observed (p = 0.0001; upper limb 38 years, cervical 41.1, laryngeal 46.2 and cranial 55.8).

Conclusion: Both the family study and published series of sporadic PTD confirm a significant effect of age at onset on phenotypic presentation of dystonia with a distal to proximal anatomical gradient in the mode of presentation with increasing age.

22 ESSENTIAL TREMOR AND DYSTONIA: EVIDENCE FOR SIMILAR PATHOPHYSIOLOGY?

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Biceps tendon vibration of an immobilised arm produces an illusion of arm extension, the vibration-induced illusion of movement (VIIM). This is subnormal in patients with dystonia and essential tremor. In dystonia the abnormality is corrected by volitional fatigue. To investigate whether the two disorders share other pathophysiological features, the change in VIIM with volitional fatigue was measured in patients with essential tremor.

The VIIM in 18 patients with essential tremor (mean age SE: 62.2 ± 2.5 years) was compared with 18 healthy control subjects (58.9 ± 3.0 years) before and after fatigue. Blindfolded subjects were asked to track the perceived movement of the vibrated arm with the opposite arm. Extension of the tracking arm was measured after 45 seconds. The task was repeated following fatigue of the vibrated arm. Vibration of the immobilised biceps produced a subnormal VIIM in patients with essential tremor (12.8 ± 2.2°), compared to control subjects (28.6 ± 1.7°; p = 0.003 unpaired t test). The VIIM increased following volitional fatigue of the arm (patients: 16.2 ± 2.1°, control subjects: 26.9 ± 2.0°; (1.34) = 21.554; p < 0.001, repeated measures ANOVA).

Abnormal VIIM is a feature of both idiopathic focal dystonia and essential tremor, and in both disorders corrects after fatigue of the vibrated arm. This implies that both disorders share common pathophysiological features, perhaps based on abnormal elasticity of muscle spindles.

23 ASSOCIATION STUDIES OF GENETIC VARIANTS IN THE VASCULAR ENDOTHELIAL GROWTH FACTOR (VEGF) GENE AND PROMOTER REGION IN AMYTROPHIC LATERAL SCLEROSIS PATIENTS AND CONTROLS

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VEGF is a major angiogenic factor and potent mediator of vascular permeability. In 2001 a transgenic mouse with a deletion in the hypoxia response element of the promoter of the VEGF gene was described showing the unexpected phenotype of weakness and wasting and pathological features similar to those of human ALS. Previous studies have shown an influence of certain single nucleotide polymorphisms (SNPs) within the VEGF gene on VEGF levels. We have therefore undertaken genetic association studies of VEGF polymorphisms in ALS patients and age matched controls to determine whether any of these are susceptibility factors for ALS.

Segments of VEGF and its promoter were sequenced in over 100 ALS cases and controls. Polymorphisms, some of them novel, were detected at 12 sites. Analysis of these polymorphisms has identified differences at many sites. Further studies on previously described SNPs and polymorphisms not described at these sites are needed.

24 GASTROSTOMY TUBES FOR MND IN SCOTLAND: FREQUENCY, TIMING AND SURVIVAL

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Aims: To describe the frequency, timing and outcome from gastrostomy in ALS/MND.

Methods: We used Scottish Morbidity returns (SMR1) to identify patients placed on the Scottish MND Register between 1989 and 1998 who were discharged with a diagnostic code for an endoscopic gastrostomy procedure (OPCS4 G44.8). A survival analysis was performed using Kaplan Meier and Cox proportional hazards methods.

Results: 142 PEG episodes were identified in 1226 patients, 130 of which occurred before censoring date of 31 December 1999. The rate of gastrostomy has increased between 1989–1998 and the cumulative incidence was 11%. Mean age at PEG tube was 66.8 years, with a mean disease duration of 24 months. Median survival from PEG insertion was 146 days. The 1 month mortality postgastrostomy was 25%. Gastrostomy did not confer a survival advantage.

Conclusions: We found that gastrostomy feeding tubes are being inserted more frequently in people with ALS/MND. An unexpectedly high early mortality was detected. This may reflect a lack of selection bias compared to previously published series. However, we are reviewing the medical records of MND patients to look for other factors that may have influenced survival after PEG.

25 A RANDOMISED CONTROLLED TRIAL OF MODAFINIL FOR TREATMENT OF DAYTIME SOMNOLENCE IN MYOTONIC DYSTROPHY


Patients with myotonic dystrophy (MyD) frequently suffer from excess daytime sleepiness (EDS). We have investigated the use of modafinil in myotonic dystrophy patients with EDS recruited from a clinic population screened with the Epworth Sleepiness Scale (ESS). Patients scoring 10 and above were invited to participate in a randomised double blind crossover trial of modafinil versus placebo, with 4 weeks in each arm of the study separated by a 2 week washout period. The primary outcome measures were change in both the ESS and the Maintenance of Wakefulness Test (MWT). In agreement with previous smaller studies, sleepiness is not correlated with CTG expansion size. Treatment with modafinil showed a non-significant reduction in median ESS. However, the median MWT score was prolonged by treatment (31.7 to 40 minutes, p = 0.006). There were no significant adverse cardiac effects of the drug in this group of patients (resting 12 lead and 24 hour ECG monitoring). We conclude that selected patients with myotonic dystrophy and EDS may benefit from modafinil. In this patient group the ESS may not be the most reliable measure of sleepiness. Despite the potential for cardiac disease in these patients, the drug was well tolerated with no adverse effects.

26 A NEW PERIAXIN MUTATION IN CMT4F

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Charcot-Marie-Tooth disease has an incidence of 1 in 2500. The molecular basis of many forms of the disease is now known, with 12 genes and more than 22 loci identified linked to the disease. We previously described that autosomal recessive Charcot-Marie-Tooth (CMT) type 4F is caused by mutations in the PERIAXIN gene. To date, seven PERIAXIN mutations have been identified. We now describe a homozygous point mutation in the PERIAXIN gene in a Turkish patient with autosomal recessive demyelinating CMT disease that introduces an early stop codon into the Periaxonin protein (R1070X). We performed immunohistochemistry on a sural nerve biopsy from this patient and showed the presence of a truncated L-periaxonin protein, lacking the C-terminal part. This was confirmed by western blot analysis.

L-periaxonin homodimerises and underpins the DRP2-dystroglycan complex linking the Schwann cell cytoskeleton to the basal lamina, forming a presumed mechanical and functional link. These interactions are not sufficient to prevent demyelination as the R1070X protein contains these binding domains. However, this truncated protein lacks the C-terminal part of L-periaxonin known to interact with the F-box protein.
Fbl6, which directs periaxin for ubiquitination and degradation by the proteasome. The disruption of Periaxin degradation and hence regulation in Schwann cells may lead to demyelination.

**27 GUILLAIN-BARRE SYNDROME REMAINS A HIGH MORBIDITY ILLNESS: REPORT OF A SWANSEA 10 YEAR COHORT**

T.P. Pickersgill, C. Rickards. Morriston Hospital, Swansea, UK

**Introduction and Methods:** Morriston Hospital neurology department is a tertiary referral centre for seven general hospitals in south west Wales with a population base of approximately 800 000. Cases of Guillain-Barré syndrome (GBS) between 1989 and 1998 were identified by searching of coding records, admission books, discharge summaries, neurophysiology records, and ITU databases.

**Results:** 60 (40%) were identified (33 male (55.0%)). Mean (range, SD) age was 50.3 years (14.4–82.3, 19.0) giving a crude incidence of 0.75/10^5/year. Median admission duration was 29 days (2–278, 55.6). 23 (38.3%) were admitted to ITU of which 16 (26.6%) were ventilated for a mean of 30 days. Median length of ITU stay was 14.5 days (1–94, 23.8). Five patients (8.3%) had the Miller Fisher variant. Mortality was 3.3%.

CSF analysis was available on 40 patients: five (12.5%) had pleocytosis (>5 wbc/mm³, maximum 28) and 28/38 (73.7%) had raised protein (median 0.79 g/dl). 39 patients had neuropsychological studies.

**Treatment:** 14 patients required only supportive care or physiotherapy. 12 underwent plasma exchange (PE), 17 received intravenous immunoglobulin (IVIG), two had steroids, and 11 had combination treatment with PE, IVIG or both, immunosuppressants.

**Outcomes:** 49.1% were bedbound at the illness nadir; only 24.6% remained mobile throughout. 39/53 (73.6%) were discharged with a degree of disability, judged to be significant in 17.

**Conclusion:** This cohort has similar age, sex, mortality, admission duration and ITU admission rates to other series reported. Despite advances in treatment, GBS morbidity remains high.

**28 PROTEOMIC ANALYSIS OF MITOCHONDRIAL PROTEIN EXPRESSION IN A CELL CULTURE MODEL OF SOD1-RELATED FAMILIAL AMYOTROPHIC LATERAL SCIROSIS**

C.A. Wood-Allum, S. Allen, P.J. Shaw. Sheffield University, Sheffield, UK

**Introduction:** Amyotrophic lateral sclerosis (ALS) is an incurable, adult onset neurodegenerative disease causing progressive muscle weakness. Some 10% of ALS is familial, of which 20% is the result of mutations to Cu/Zn superoxide dismutase (SOD1). Recently, mitochondrial dysfunction has been implicated in ALS pathogenesis.

**Aims:** This study examines changes in mitochondrial protein expression associated with expression of mutant SOD1 in a cell culture model of SOD1 familial ALS and aims to clarify the molecular basis of the observed mitochondrial dysfunction.

**Methods:** Two-dimensional gel electrophoresis of mitochondrially enriched preparations of NSC34 cells stably transfected with empty vector, normal human SOD1 or G93A mutant human SOD1 was used to identify SOD1 mutation specific changes in protein expression. Phoretix two-dimensional gel analysis software was then used to identify differentially expressed protein spots of statistical significance (non-parametric, paired Wilcoxon test) and MALDI-TOF mass spectroscopy performed on the spots of interest. Database searching was then used to generate candidate protein identities.

**Results:** Three proteins are up regulated in cells expressing G93A mutant human SOD1 compared to those expressing normal SOD1 and two are down regulated. To date, three of these have been identified. One down regulated protein forms part of the mitochondrial antioxidant defence system. The functional significance of these changes is under investigation.

**29 MEETING THE ASSOCIATION OF BRITISH NEUROLOGISTS GUIDELINES: PROVISION OF 24 HOUR ACUTE NEUROLOGY CARE BY NEUROLOGISTS**

C.B. Carroll, J.Z. Zajicek. Derriford Hospital, Plymouth, UK

The ABN has published standards of care for patients with acute neurological disease. Derriford Hospital provides a 24 hour neurology on call service to a population of 500 000 with the equivalent of four consultants, three SpRs and four SHOs with a 37 bed ward. All admissions to the neurology department were analysed prospectively for a 3 month period (March to May 2002).

There were 692 admissions (equating to 2500 per year); forms were completed for 93%. 78% of admissions were emergency, 16% were urgent. The main diagnostic categories were stroke (29%), headache syndrome (13%), and epilepsy or seizures (12%). With regard to emergency admissions, 94% were seen by a neurology SHO within 6 hours and 81% by an SpR or consultant within 24 hours. 55% of patients were commenced on non-neurological wards for their entire admission. Median length of stay for stroke patients was 9.5 days, compared with 4 days for other patients. 37% of patients received a neurology follow up appointment.

Currently each SpR spends 10 hours per week involved in the care of acute neurological admissions. Meeting the ABN guidelines will require an increase in neurology bed provision to at least 15.2 per 100 000 population, with the equivalent of three consultant sessions (11 hours/week).

**30 HEREDITARY SPASTIC PARAPARESIS ASSOCIATED WITH MUTATION IN SPASTIN (SPG4): A DISORDER OF AXONAL TRANSPORT?**

C.J. McDermott, A. Griersson, J. Wood, P.J. Shaw. University of Sheffield, Sheffield, UK

**Introduction:** The commonest cause of HSP is mutation in the spastin gene. Both the normal function of spastin in the CNS and the mechanism by which mutation in spastin causes axonal degeneration are unknown.

**Aim:** To investigate the cellular mechanisms of disease in spastin HSP.

**Methods:** Wild type and mutant spastin expression constructs were differentiated along with antibodies to the spastin protein. Neuronal and non-neuronal cells were transiently transfected with either wild type or mutant spastin and the effects on various cellular functions investigated.

**Results:** Wild type spastin when overexpressed in cultured cells had a punctate, perinuclear cytosolic pattern of staining. This was in marked contrast to mutant spastin which had a filamentous staining pattern which extended into the axonal process of neurons. Over expression of wild type spastin but not mutant spastin was associated with a dramatic reduction in microtubule staining. Mutant spastin overexpression was associated with an abnormal perinuclear clustering of mitochondria, suggestive of an impairment of axonal transport.

**Conclusion:** Spastin is a microtubule severing protein. Mutant spastin loses the ability to sever microtubules and has an abnormal interaction with microtubules. This abnormal interaction causes a disturbance of intracellular transport which is likely to have a deleterious effect on long axons.

**31 CLINICAL UTILITY OF 18F FLUORO-2-DEOXYGLUCOSE (FDG) PET SCANNING IN UNDIAGNOSED PROGRESSIVE NEUROLOGICAL SYNDROMES**

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Patients with neurological syndromes secondary to paraneoplastic disease are often difficult to diagnose using conventional investigations. FDG-PET can improve detection of occult malignancy. We have assessed the sensitivity and specificity of FDG-PET in patients with undiagnosed rapidly progressive neurological syndromes.

**Methods:** From February 2001, 22 patients underwent PET imaging. All investigations were reviewed. PET scans were reported as either highly suspicious (HS), low suspicion of pathological uptake (LS) or no abnormal uptake (NAU). Patients were prospectively followed up.

**Results:** 10 men, 12 women with a mean age of 65 were studied. Presenting syndromes were ataxia (4), neuropathy (12), myeloneuropathy (1), LEMS (1), and miscellaneous (3). Mean follow up was 15 months (2–28). 1/22 patients had positive anti-neuronal antibodies. 10/22 patients scans were HS, five LS, and six NAU. In patients with HS, PET identified a lesion from which a diagnosis was obtained in 8/10 (seven malignancy, one infection). One patient died shortly after PET scanning with presumed lung cancer. In the final patient no evidence of malignancy has been found to date. In the 12 patients with LS or NAU, an alternative diagnosis was made in five at follow up, in the remaining seven patients no malignancy has been found. The estimates for sensitivity and specificity are 100% and 96% respectively.

**Conclusion:** FDG-PET scanning in our population of patients has a high sensitivity and specificity for detection of relevant lesions, with a high yield of occult malignancy. FDG-PET scanning therefore appears a useful tool when applied to patients with undiagnosed rapidly progressive neurological syndromes.
32 SHOULD INTENSIVE PREVENTIVE TREATMENT BE CONTINUED INDEFINITELY AFTER A TRANSIENT ISCHAEMIC ATTACK?
E. Flossmann, T.G. Clark, M.F.G. Murphy, P.M. Rothwell. Radcliffe Infirmary, Oxford; University of Oxford, Oxford; Institute of Health Sciences, Oxford, UK

Background: Several different medical treatments have now been shown in trials to reduce the risk of vascular events during the first few years after a TIA. However, the risk of stroke falls with time, and it is uncertain whether intensive medical treatment should be continued indefinitely, particularly in elderly patients who have remained free of recurrent events for several years.

Methods: We identified 290 patients with a previous TIA who were alive and stroke-free at a median of 3.8 years (interquartile range: 2.2–5.8) after their last TIA, and followed them up for a further 10 years. We determined the risks of stroke, myocardial infarction and vascular death, and also calculated standardised mortality ratios (SMRs).

Results: The 10 year risk of stroke was 18.8% (95% CI = 13.6–23.7, 45 patients). The 10 year risk of stroke, myocardial infarction or vascular death was 42.8% (95% CI = 36.4–48.5, 114 patients), and did not diminish with time. Death due to stroke was no more common than expected (SMR = 1.23, 95% CI = 0.75–1.91, p = 0.4), but there was an excess of coronary deaths (SMR = 1.47, 95% CI = 1.10–1.93, p = 0.009).

Conclusions: The overall risk of vascular events remains high for at least 10–15 years after a TIA. Preventive treatments should therefore be continued in the long term.

33 CEREBROVASCULAR DISEASE AND THE FAILURE OF ELIMINATION OF AMYLOID-β FROM THE AGING AND ALZHEIMER BRAIN: IMPLICATIONS FOR THERAPY
R.O. Weller, H.Y. Yow, I. Mazanti, Z. Walsh, J.A.R. Nicoll. University of Southampton School of Medicine, Southampton; Newcastle upon Tyne, UK

Alzheimer’s disease (AD) is characterised by the accumulation of ubiquitinated tau within neurons and the extracellular deposition of amyloid-β (Aβ) in plaques and in vessel walls as cerebral amyloid angiopathy (CAA). Therapies aimed at reducing Aβ from the brain are being developed so it is essential to understand why Aβ initially accumulates in the ageing brain. Comparisons of CAA with experimental studies suggest the Aβi becomes entrapped within the pericapillary and perivascular channels by which interstitial fluid and Aβi are normally eliminated from brain tissue. Arterial pulsations are a possible motive force for such drainage. With the onset of cerebrovascular disease, arterial pulsations are reduced through increased rigidity and thickening of artery walls or by thrombembolic occlusion. In this study we show that thrombo-embolic occlusion of penetrating cortical arteries is associated with complete block of elimination of Aβi along perivascular drainage channels and the development of severe capillary amyloid angiopathy. These results suggest that cerebrovascular disease is a major factor in the failure of clearance of Aβ from the aging and Alzheimer brain and that this should be considered in the planning of therapeutic strategies that seek to encourage the elimination of Aβi.

34 RABIES REVISITED
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In the developing world rabies is suspected in any patient with progressive paralytic illness with history of contact with wild animals. Although this case will not affect the United Kingdom’s rabies free zone status, this reminds us that in certain occupational groups, this condition can present as an unusual acute neurological illness.

For the last century Great Britain has been an acknowledged rabies free zone. However, several cases were reported in workers handling bats. Associated with those cases was a significant haemorrhage. The case described here is of a 29 year old woman who was bitten by a duabenton bat 6 months prior to presentation. Prior to presentation she had developed painful paraesthesia in the left arm, which had been bitten by a duabenton bat 6 months previously. He had not had rabies vaccination. Respiratory failure preceded areflexic paralysis initially of arms then legs, leading to death.

The CSF analysis, biopsy from the previous bite site, biopsy of skin of nape were inconclusive. Subsequently reverse PCR on saliva samples confirmed diagnosis of rabies-strain ECL 1.

35 TRANSOCCLUTER CLOSURE OF PATENT FORAMEN OVALE IN PATIENTS WITH RECURRENT CRYPTOGENIC POSTERIOR CIRCULATION ISCHAEMIC EVENTS
A.R. Saha, S.J. Brecker, A.Y. Al-Memar. Atkinson Morley’s Hospital, London; St George’s Hospital, London, UK

Secondary prevention for stroke patients with patent foramen ova (PFO) is a subject of considerable debate. We report our single centre experience of transcatheter closure of PFO using Amplatzer PFO occluder device in 10 patients. All patients were under the age of 55 years and had a preceding history of recurrent posterior circulation ischaemic events. Standard diagnostic investigation, including thrombophilia screening and angiography, did not reveal any identifiable risk factor for stroke and thus the ischaemic events were considered cryptogenic. Transoesophageal echocardiography confirmed PFO with a mean size of 25 mm (range 10–35 mm). All patients underwent transcatheter closure with an average procedure time of 45 minutes. There were no immediate or late complications from this procedure. None of the patients had further ischaemic cerebrovascular events during a mean follow up of 20 months. Thus in high risk patients with recurrent cryptogenic strokes, PFO closure appears to be a simple, quick and effective procedure with a low overall complication rate. However to identify patients most likely to benefit from this intervention, further randomised controlled studies are warranted.

36 GOOD OUTCOME IN EARLY PREGNANCY FOLLOWING DIRECT THROMBOLYSIS FOR CEREBRAL VENOUS SINUS THROMBOSIS
S.J.M. Weatherby, N.C. Edwards, R. West, M.T.E. Heasfield. City Hospital, Birmingham, UK

The use of direct thrombolysis for cerebral venous sinus thrombosis (CVST) in pregnancy has not previously been reported.

A 29 year old woman at 10 weeks gestation in her second pregnancy presented with a CVST. In spite of anticoagulation with intravenous heparin her conscious level rapidly deteriorated to a Glasgow coma score of 8, and she developed a left hemiparesis. Direct thrombolysis with a total of 48 mg rtPA (actilyse) was performed. The patient’s GCS improved to 15 but deteriorated 3 days later. After further direct thrombolysis she slowly improved to recover fully 1 month later and delivered a healthy baby at 40 weeks gestation.

Direct rtPA carries risks, including intracerebral and intrapelvic haemorrhage. Although there is a major risk of maternal haemorrhage if alteplase is given at the time of delivery, there does not appear to be a similar risk when therapy occurs outside the intrapartum period. Data from manufacturers of rtPA states that in rabbits embryotoxicity was induced by approximately twice the human dose used for myocardial infarction. The limited use of rtPA in pregnancy in humans does not show a teratogenic risk.

We hope that this case will prove useful to other clinicians facing a similar situation.

37 THE DIFFERENTIAL DIAGNOSIS OF CREUTZFELDT-JAKOB DISEASE: DATA FROM THE NATIONAL CJD SURVEILLANCE UNIT
S.A. Cooper, C.A. Heath, R.S. Knight. University of Edinburgh, Edinburgh, UK

Introduction: The importance of accurate premortem diagnosis of CJD is enhanced by current low postmortem rates. Here we discuss referrals to the UK surveillance system (NCJDSU) of suspected CJD in which an alternative diagnosis has been proven.

Methods and Results: Since 1990 the National Creutzfeldt Jakob Disease Surveillance Unit (NCJDSU) has had 1620 referrals of suspected CJD. Over 50 cases have been visited by an NCJDSU registrar and subsequently had alternative diagnoses proven at postmortem.

The commonest final diagnoses were primary neurodegenerative disorders (29) (Alzheimer’s disease (19)) and cerebrovascular disease (5). Other diagnoses included neoplasia and paraneoplastic disorders (6), inflammatory brain disorders (4) and leucencephalopathy (2). In four cases CJD was excluded with no proven alternative diagnosis. Reasons for initial suspicion of CJD included myoclonus and suggestive EEG changes. On review however, only one EEG was sufficiently
**38 THE PREVALENCE OF OLIGOCOCLONAL BANDS IN THE CEREBROSPINAL FLUID OF PATIENTS WITH PRIMARY NEURODEGENERATIVE DEMENTIA**


Recent European and American guidelines on the diagnosis and management of dementia include advice that younger patients with dementia should undergo cerebrospinal fluid (CSF) examination. Interpretation of the findings can be challenging. The presence of central nervous system (CNS) specific oligoclonal bands (OCB) is considered suggestive of an inflammatory aetiology and their occurrence in degenerative disease is not well established. We reviewed retrospectively the prevalence of OCB, determined using agarose isoelectric focusing, in a series of 131 patients with a final diagnosis of a degenerative dementia who had undergone CSF examination. Seventy (53%) patients had Alzheimer’s disease (AD), forty seven (36%) had frontotemporal lobar degeneration (FTLD), seven (5%) had dementia with Lewy bodies and the remaining seven (5%) patients had other rarer neurodegenerative dementias. Neuropathological examination had been performed in 15 (11%) patients. CNS specific OCB were present in nine (7%) patients in this cohort; four with FTLD, four with AD and one with Creutzfeldt-Jakob disease. All had normal CSF white cell counts. Investigation of these patients, including two with neuropathologically verified AD and one with postmortem confirmed CJD, did not reveal an alternative aetiology for their dementia. Thus a central immune response can occur in primary neurodegenerative dementias albeit uncommonly.

**39 ADULT ONSET DEMENTIA WITH PROMINENT FRONTAL FEATURES IN X-LINKED ADRENOLEUKODYSTROPHY WITH R152C MUTATION IN ABCD1 GENE**

A.J. Larner. Walton Centre for Neurology and Neurosurgery, Liverpool, UK

Objectives and Methods: Clinical, neuropsychological and neuroimaging findings in a patient with biochemically and genetically confirmed X-linked adrenoleukodystrophy (X-ALD), who developed dementia with prominent frontal features in the fourth decade of life, are presented.

Results: Aged 4, the patient was diagnosed with adrenocortical insufficiency after two brothers died from adrenocortical failure; elevated plasma levels of very long chain fatty acids were subsequently demonstrated. Aged 38 behavioural changes developed: verbal aggression, neglect of personal hygiene, predilection for sweet foods. Aged 39 findings in a patient with biochemically and genetically confirmed X-ALD (ABCD1) gene showed a missense mutation (codon 454C>T) predicting the R152C substitution in the transmembrane domain of ALD protein.

Discussion: The commonest adult presentation of X-ALD is adrenomyeloneuropathy; rapidly progressive cerebral disease, typical in childhood, is rare in adults. In the few previous reports of adult onset dementia without prior neurological features, frontal type pattern of deficits is prominent. Conclusion: X-ALD may manifest with frontal type dementia in the fourth decade of life without prior neurological features.

**40 CEREBRAL ATROPHY VARIATION OVER SHORT TIME INTERVALS IN TRANSIENT ISCHAEMIC ATTACK (TIA) PATIENTS**


Introduction: Annual cerebral atrophy rates have been found to be significantly higher in TIA patients compared with age matched controls. A subgroup of 16 cognitively normal TIA patients had serial imaging at 6 monthly intervals over 2 years to examine how rates of atrophy varied.

Method: Consecutively acquired cerebral volumetric magnetic resonance images (MRIs) were registered and atrophy quantified using a validated technique (boundary shift integral). The 16 patients had at least four MRIs separated by 6 month intervals. No patient suffered a further TIA or stroke, vascular risk factors were characterised.

Results: Atrophy rate was not uniform; nine had highest atrophy rates immediately following TIA (average 25.5 ml scan 1–2; 6 ml scan 2–3, 3–4 10 ml), two showed increasing rates throughout the study (4 ml scan 1–2, 15 ml scan 2–3, 27 ml scan 3–4). Five had rates that fluctuated. Individuals’ vascular characteristics changed little with no influence on changes in atrophy rate.

Conclusion: An individual’s atrophy rate varied markedly, perhaps reflecting ‘activation’ periods of cerebrovascular disease. The role of vascular disease in cerebral atrophy has ramifications for quantifying neurodegenerative disease progression, since it is a common comorbid pathology. Future studies, using surrogates of vascular disease activation, are required.

**41 EPILEPSY IN PRIMARY CARE: CHARACTERISTICS OF MONOTHERAPY RESPONDERS VERSUS NON- RESPONDERS**

C. Lawthom, J. Beavis, A. Thapar, S.A. Mensah, P.E.M. Smith, M.P. Kerr. University Hospital of Wales, Cardiff, UK

We present data from a large primary care based cohort of adults with epilepsy comparing characteristics of responders (those achieving seizure freedom) and non-responders treated with monotherapy. Information is derived from patient questionnaires and GP records. The database comprises 514 patients in 42 practices, of whom 72% are managed on monotherapy. Seizure freedom has been achieved in 56% of the monotherapy group compared with a seizure freedom rate of 51% overall.

Gender and living alone did not affect the rates of response to monotherapy. Regular access to specialist services was negatively associated with seizure freedom, possibly reflecting referral patterns to epileptologists. However, information regarding initial or isolated referrals at the time of diagnosis is not available and the data may reflect discharge of well controlled patients from epilepsy services.

As a group, monotherapy patients not attaining seizure freedom experienced higher rates of depression and were more bothered by their seizures. They were more likely to receive disability living allowance and to have regular access to specialist services. These data serve to highlight the cost of ongoing seizures to the patient and to society. Further study may elucidate patient factors amenable to treatment. The primary aim of epilepsy treatment must be the attainment of seizure freedom.

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<th>Abstract 41</th>
<th>Responders (seizure freedom) %</th>
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42 ESTIMATED IMPACT OF SEIZURE FREQUENCY ON SURVIVAL IN EPILEPSY

E. Remak, J. Hutton, K. Peeters, M. Price. MEDTAP International Inc, London, UK; Janssen Pharmaceutica, Beerse, Belgium; Janssen-Cilag, UK

Background: Mortality in epilepsy is significantly greater than in the age matched general population, and seizure frequency is the factor most strongly associated with an increased risk of sudden unexpected death in epilepsy (SUDEP).

Objective: To estimate life expectancy of epilepsy patients according to seizure frequency.

Methods: Age-specific mortality rates were calculated for hypothetical patient cohorts by combining estimates of general population death rates, standardised mortality ratios of epilepsy, and relative risk of SUDEP according to seizure frequency. Four cohorts aged 15 were simulated: epilepsy patients with 0–2, 3–12, or >12 seizures during last year, and a general population control cohort.

Results: Residual life expectancy of epilepsy patients aged 15 was more than 14 years shorter than that of the general population. According to this extrapolation, approximately 40% of patients with recurrent seizures would have died by age 55, whilst around 90% of the group experiencing 0–2 seizures per year, and 95% of the general population cohort would still be alive.

Conclusions: Seizure frequency is strongly associated with survival. All epilepsy patients have an excess mortality compared to the general population, and large gains in life expectancy may be achieved by eliminating seizures even compared with those having relatively few (0–2 annually) seizures.

43 FARADAY, TODD, AND THE ELECTRICAL BASIS OF EPILEPSY

E.H. Reynolds. King’s College London

Robert Bentley Todd (1809–60) was the first to develop an electrical theory of epilepsy in his brilliant Lumleian lectures to the Royal College of Physicians in 1849, which were overlooked by Hughlings Jackson in his own Lumleian lectures on the same subject 41 years later. Todd was Professor of Physiology and Anatomy at King’s College as well as a scientific physician. He conceived of the brain as having battery-like properties that led to the sudden discharge of electrical energy (disruptive discharge of Faraday) in seizures. This intellectual leap was influenced not only by his contemporary Michael Faraday but probably also by his King’s colleagues, JF Daniell, Professor of Chemistry, who invented the first constant current battery and Sir Charles Wheatstone, Professor of Experimental Philosophy, who invented the first electric telegraph. In 1838 Todd, accompanied by Daniell and Wheatstone, attended the Royal Institution to observe experiments on the electric eel by Michael Faraday, who was studying animal electricity amongst other forms of electricity. Todd later used the magnetoelectric rotation mechanism to induce seizures in rabbits and confirm his electrical theory of epilepsy, something Jackson, who relied on David Ferrier for scientific advice, could never have done.

44 PROGRESSIVE GREY MATTER ATROPHY IN CLINICALLY EARLY RELAPSING-REMitting MULTIPLE SCLEROSIS


Previous work has indicated that brain atrophy occurs in multiple sclerosis (MS) subjects in excess of that associated with normal aging, and that this may be observed early in the clinical course of the disease. The dynamics and tissue specificity of this process remain unclear. This study explored the evolution of brain grey matter (GM) and white matter (WM) volume loss (as fractions of total intracranial volumes) in a group of 13 subjects with relapsing–remitting MS (mean age 36.4 years at first scan, mean disease duration at first scan 1.9 years) compared with nine normal control (NC) subjects (mean age 36.7 years at first scan). Subjects were followed up every 6 months for a total of 18 months. In MS compared with NC subjects there was a significant reduction in WM fractional volumes consistently observed over the 18 month period but no apparent progressive WM tissue loss. In contrast, reductions in GM fractional volumes, while observable at baseline, progressed over the follow up period. There was significantly greater longitudinal fractional GM volume loss in MS compared with NC subjects. These results suggest that in MS, the processes of WM and GM atrophy are semi-independent, temporally separated or both.

45 SPINAL CORD LESIONS PLAY ONLY A LIMITED ROLE IN DETERMINING THE DEGREE OF CORD ATROPHY IN MULTIPLE SCLEROSIS

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Objective: To determine the cause of spinal cord atrophy in multiple sclerosis, a major determinant of disability.

Methods: Five different sections of the spinal cord were examined histopathologically in 33 controls and 55 MS cases. In each section the total lesion load and the cross sectional area of the cord were measured. Multiple regression models were used taking into account sex, age, duration of the disease, and location of the cord sections.

Results: The MS cords were smaller than the controls taking into account the location of the sections examined (p<0.001). The duration of the disease seems to play the least important part in determining cord atrophy (p<0.001). Individual lesions have a lesser role, although interestingly, whether lesions caused shrinkage or swelling of the cord locally depends on the location of the lesion. Lesions in the cervical and lumbar cord were associated with significant local atrophy, whereas thoracic lesions were associated with swelling of the cord.

Conclusions: The duration of the illness seems to have a greater role in determining the size of the spinal cord rather than individual lesions. This could either be due to wallerian degeneration from the cumulative number of lesions in the brain and cord or due to an alternative atrophic process.

46 IS INPATIENT REHABILITATION USEFUL IN RELAPSING-REMitting MULTIPLE SCLEROSIS?


Background: Patients with relapsing–remitting multiple sclerosis (RRMS) often make incomplete recovery from disabling exacerbations, despite corticosteroid therapy. Inpatient rehabilitation has been shown to be valuable in progressive MS, but its role in RRMS is less apparent.

Methods: We assessed the effect of rehabilitation in consecutive patients with RRMS admitted to a neurorehabilitation unit. Outcome measures employed comprised the Expanded Disability Status Scale (EDSS), the Barthel Index (BI), and the Functional Independence Measure (FIM) on admission and discharge, as well as a visual analogue scale (VAS) of the patients’ perception of rehabilitation benefit. Confounding factors including the timing of steroid therapy and readmissions were also evaluated.

Results: RR patients improved considerably following rehabilitation, with mean changes of −0.8 EDSS, +4.5 BI and +15.6 FIM points (effect sizes of −1.01, 0.97 and 0.86, respectively), which were significantly greater than other MS subtypes. RR patients rated their admissions highly (mean VAS 8.5, SD 1.5), and the VAS scores correlated modestly with disability measures (Spearman’s r = −0.42, 0.31 and 0.24 versus EDSS, BI and FIM, respectively; p = 0.007–0.040). Repeat admissions and the timing of steroid administration did not affect outcome significantly.

Conclusions: Inpatient rehabilitation can be a valuable adjunct to standard treatments in RRMS, and should be considered in patients with incomplete recovery from relapses who have accrued moderate to severe disability.

47 DISEASE MODIFYING THERAPY FOR MULTIPLE SCLEROSIS: INCREASING AVAILABILITY IN THE UK

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Disparities in the availability of disease modifying drugs (DMDs) for the treatment of multiple sclerosis (MS) are apparent throughout the world. We present national health statistics to show that the UK, where 6% of all patients with MS receive DMDs, compares badly with other countries in Europe (eg 36% in Portugal, 34% in Germany, 31% in France, and 25% in Spain) and worldwide (eg 45% in the USA and 38% in Australia).

A new funding initiative was introduced in the UK in 2002, in which the costs of therapy are shared between the NHS and the drug manufacturer according to a sliding scale of effectiveness. This extremely welcome initiative promises to double the proportion of UK patients who receive DMDs.

However, the full benefits of the risk sharing scheme remain to be achieved; our results show that in 2002 the proportion of patients receiving DMDs in the UK increased by 1% from 2001.
These data help evaluate the rate of progress in increasing availability of DMDs in the UK, and the overall population benefits entailed therein. The success of this positive and cost effective initiative will become apparent as the rate of DMD use approaches parity with other European countries.

48 BRAIN TISSUE DIFFUSION ABNORMALITIES MAY OCCUR EARLY IN RELAPSING-REMITTING MULTIPLE SCLEROSIS

Introduction: Diffusion tensor MR imaging (DTI) has revealed changes in multiple sclerosis (MS) brain tissues which are evident in subjects with relatively long disease durations. However, it remains unclear when these changes begin. This work aimed to explore this in a cohort of subjects with early relapsing-remitting (RR) MS (within 3 years of first symptom onset).

Methods: Sixteen RR MS patients (mean age 32.7 years, median disease duration 1.6 years, median EDSS 1.25) and 17 normal control subjects (mean age 39.1 years) were studied. Fractional anisotropy (FA) and mean diffusivity (MD) histograms were estimated from the normal appearing brain tissue defined as grey and white matter excluding lesions and cerebrospinal fluid. Statistical analysis allowed for age and potential partial volume effects.

Results: A significant decrease in mean FA (p = 0.014) and increase in FA peak histogram height (p = 0.002) was observed in the MS cohort, while the MD analysis showed no significant difference between the cohorts.

Discussion: This suggests that subtle abnormalities occur early in MS that affect the directional preponderance (FA) but not mean amount (MD) of water diffusion. A potential explanation for this combined result is a disruption of white matter fibre tract integrity without oedema.

49 DOUBLE BLIND, RANDOMISED PLACEBO CONTROLLED, CROSSOVER TRIAL OF TOPIRA Mate IN CENTRAL NEUROPATHIC PAIN DUE TO MULTIPLE SCLEROSIS
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Central pain, caused by a lesion or dysfunction of the central nervous system, occurs in between 17% and 52% of people with multiple sclerosis (MS). Randomised controlled trials are needed in this area to inform evidence based prescribing. We conducted a randomised, double blind, placebo controlled crossover trial in 32 patients with MS and dysesthetic central pain states, of topiramate in doses of up to 200 mg per day, at a maximum titration of 25 mg per week. Six patients were male, mean age 47 years (range 23-71, SD 11), mean EDSS 5.3 (2.5-8.5, 1), mean duration of MS since diagnosis 11 years (2-27, 7) and mean duration of pain was at least 9.9 years (1.5-30, SD 7.6). Three patients had primary progressive, 11 secondary progressive, and 18 relapsing-remitting MS.

In a double blind fashion, 12 patients preferred treatment with topiramate, two placebo, four neither treatment and 14 patients withdrew, mostly when taking topiramate. Intention to treat analysis demonstrated no significant differences in average weekly pain levels measured using the Neuropathic Pain Scale 10 item score, or mood or quality of life between each treatment. However in those favouring topiramate a significant reduction in pain was found (11) = -4.216, p<0.001.

50 INFLAMMATION IN EARLY PRIMARY PROGRESSIVE MULTIPLE SCLEROSIS

Background: Established PPMS appears to have less inflammation than other forms of MS. However, it is unclear if this holds true for the rarely studied early PPMS. We looked for evidence of inflammation in early PPMS in a comprehensive clinical and MRI study.

Methods: 34 patients with PPMS with disease duration of less than 5 years attended for clinical and MRI examination, including administration of triple dose gadolinium DTPA (Gd). Intravenous Gd enhancement in early PPMS was greater in female subjects (p = 0.004), and associations were found with younger age (r = 0.40, p = 0.022) and greater disability (r = 0.63, p<0.001). Enhancement was also associated with increased lesion volume and reduced white matter fraction.

Discussion: Inflammation is seen more frequently in early PPMS but is still not seen in the majority of subjects. A better understanding of disease heterogeneity in PPMS may be important for the development of effective therapeutic interventions.

51 A STUDY OF CLINICALLY UNAFFECTED MUSCLES IN PATIENTS WITH A DIAGNOSIS OF PREVIOUS PARALYTIC POLIOMYE LISIS: CLINICAL, ELECTROPHYSIOLOGICAL AND METABOLIC EVALUATION
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Introduction: The late effects of paralytic poliomyelitis can include progressive weakness. Macro electromyography (Macro-EMG) studies provide information about the size of motor units and can indicate the degree of initial motor neuron loss and subsequent reinnervation in muscles of patients with a history of paralytic poliomyelitis. A cohort of 22 patients, fulfilling the criteria of ‘‘post-polio syndrome’’, underwent clinical, electrophysiological, and metabolic analysis.

Method: Macro-EMG analysis of a muscle from a clinically unaffected limb was compared to published normal data. Fasting serum samples were analysed for insulin-like growth factors (Igf’s) and their binding proteins.

Results: The median macro motor unit potential (macro-MUP) amplitude was increased in 17 of the 22 subjects (mean±3 times normal; range=1.2 to 18 times normal). The mean circulating concentration of Igf-II was 36% higher than that of an age and sex matched control population (p=0.001).

Conclusion: There is evidence from Macro-EMG that significant reinnervation can occur in muscles from clinically unaffected limbs in patients with ‘‘post-polio syndrome’’. This may be useful as a prognostic indicator in the evolution of the condition. Changes in circulating Igf-II were also evident, suggestive of altered Gh/Igf regulation in this population.

52 THE ‘‘JUMPING STUMP’’ SYNDROME: IS IT A PERIPHERAL, CENTRAL OR PSYCHOGENIC PROBLEM? A REPORT OF THREE CASES
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Abnormal movements of amputation stumps are reported to occur in 1:1000 amputee patients. Upper and lower limb stump involvement has been reported and various terms, such as spasms, jumps, myoclonus and chorea, have been used to describe the movements. Symptoms onset varies from 2 weeks to 2 years postamputation. Antispastic drugs, antidepressants, and thalamotomies have been used with variable success. The pathophysiology remains unclear.

We present three patients (with video illustration) who experienced abnormal ‘‘clonic’’ movements in their lower limb stumps within 2 months of amputation. The severity of the movement disorder rendered the use of limb prosthesis and hence walking difficult. Peripheral triggers were present in all three patients, as were the phantom limb sensations and or pain. Psychogenic factors related to the preamputation illness seemed to have some role. A trial of intrathecal baclofen was useful in one patient. Clonazepam and oral baclofen were less effective. A hypothesis of a peripherally triggered but centrally mediated mechanism is suggested and the role of deafferentation at the spinal level is discussed.

53 PDFiFE: A PROSPECTIVE MULTICENTRE LONGITUDINAL AUDIT OF QUALITY OF LIFE IN PARKINSON’S DISEASE ACROSS THE UK
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Background: PDFiFE is a collaborative academic led prospective national audit that aims to review Parkinson’s disease (PD) patients on a yearly basis for 5 years monitoring (a) baseline and general changes in Quality of Life (QoL), (b) indirect estimation of the cost effectiveness of
available treatment, (c) prescribing trends across the United Kingdom (UK), (d) and QoL changes which may trigger changes or initiation of treatment.

Methods: Administration of the PDQ-39 scale and audit form monitoring changes in treatment, and comorbidity. Inclusion/exclusion criteria include PD patients at an early (diagnostic and maintenance) stage, drug naive or receiving monotherapy.

Results: In the pilot phase eight core UK centres have started recruiting patients (n = 202). 50/202 patients have completed an initial follow up assessment at a mean duration follow up period of 144 days. By 2003 we hope to collect baseline data on a total of 500 patients and follow up data on 200 patients.

Conclusions: Preliminary data from the pilot phase of this study suggests that administration of the PDQ-39 should be determined by changes or initiation of treatment rather than having fixed measurement points. Initial pilot results indicate levodopa to be the most commonly prescribed drug used for the treatment of early PD within the UK.

54 DIAGNOSTIC ACCURACY IN EARLY PARKINSON’S DISEASE: A CLINICAL AND IMAGING FOLLOW UP STUDY


Objective: Parkinson’s disease (PD) and essential tremor (ET) share certain clinical features, making diagnosis difficult in some cases. Striatal uptake of the dopamine transporter (DAT) radioligand [123I] FP-CIT reflects nigrostriatal integrity and is reduced in PD but normal in ET. We report an 18 month interim analysis of FP-CIT SPECT.

Methods: 34 subjects with a Unified Parkinson’s Disease Rating Scale motor score of 16 or less were enrolled because of clinical uncertainty between PD/tremor disorders. At T = 0 and 18 months clinical confirmation of parkinsonism was sought with visual assessment of FP-CIT uptake.

Results: FP-CIT imaging at T = 0 using 18 month clinical and imaging diagnoses as a comparator has sensitivity of 91% and specificity of 92% for PD. At T = 0, there were 21 abnormal scans (baseline diagnosis 20 PD). At T = 18 scan groupings remained unchanged (normal for PD). At T = 0, there were 21 abnormal scans (baseline diagnosis 20 PD). At T = 18 months clinical and imaging diagnoses as a comparator has sensitivity of 91% and specificity of 92% for PD. At T = 0, there were 21 abnormal scans (baseline diagnosis 20 PD). At T = 18 months clinical and imaging diagnoses as a comparator has sensitivity of 91% and specificity of 92% for PD. At T = 0, there were 21 abnormal scans (baseline diagnosis 20 PD).

Conclusion: In this select group a clinical baseline diagnosis of PD was incorrect for 5/34 (15%) patients reinforcing usefulness of FP-CIT imaging.

55 ASSESSMENT OF ATAXIA SEVERITY USING THE ATAXIA RATING SCALE (ARS) IN LATE ONSET CEREBELLAR ATAXIA (LOCA) PATIENTS

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Background: Currently there is lack of clinically practical and/or validated scales for ataxia. The semiquantitative Ataxia Rating Scale (ARS) is devised and tested for reliability and validity, compared with Barthel, in a cohort of patients with late onset cerebellar ataxia (LOCA).

Methods and materials: Nineteen tasks in four subgroups give a maximum 100 point score: posture and gait = 34, limb = 52, speech = 8 (modified from Frenchay Dysarthria Assessment) and oculomotor = 6. Activities of daily living (ADL) were evaluated using Barthel and ARS in 50 LOCA patients.

Results: ARS scores (mean ± standard deviation; range) were: total (37.82 ± 15; 12 to 75); posture/gait (14.56 ± 6.19; 4 to 29); limbs (19.54 ± 8.37; 4 to 39); speech (1.5 ± 1; 0 to 4); oculomotor (2.3 ± 1.81; 0 to 6). Barthel scores: two patients = severe disability (ADL: 5 to 9); five = moderate disability (ADL: 10 to 14); 38 = mild disability (ADL: 15 to 19); five = independent (ADL: 20). A significant inverted association (Spearman’s r = -0.729; p < 0.01) was shown between total ARS score and ADL index. The 19 tasks in ARS were internally consistent (Cronbach’s α = 0.884).

Conclusions: This study yields a scale with indicative scores for the ataxia components, their impairment and disability in patients with LOCA.

56 ROLE OF ANTINEURONAL AUTOANTIBODIES IN POPULATION BASED SAMPLES OF APPARENTLY IDIOPATHIC LATE ONSET CEREBELLAR ATAXIA (LOCA)

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Background: Antineuronal autoantibodies (Abs) in late onset cerebellar ataxia (LOCA) are associated with paraneoplastic manifestations of certain cancers, as well as increasingly in non-paraneoplastic cases. We have explored their significance in a prevalent, population based sample of patients with apparently idiopathic LOCA (LOCA) in South Wales.

Methods and materials: Sera of 54/70 (77.1%) patients (mean disease duration: 9.1 years; range: 1 to 30) were analysed using indirect immunohistochemistry and/or western blot (IHC/ WB) for anti-Hu, Ma1, Ri, Tr, and Yo Abs, and using immunoprecipitation (IP) for P/Q-type voltage gated calcium channel (VGCC) and glutamic acid decarboxylase (GAD) Abs. Results of each assay were compared with known negative, normal, and positive controls.

Results: On IHC/WB, 6/54 sera showed staining patterns suggestive of anti-Hu (n = 3), Yo (n = 2) and Tr (n = 1), but were excluded on WB. 1/54 revealed an “atypical” staining, with identification of an approximately 30 kDa protein of unknown significance at present. On IP, none was positive for anti-VGCC Abs, and 2/54, who were negative for Abs on IHC/WB, were found to have abnormally high titres for anti-GAD Abs.

Discussion: Our data have revealed 3/54 (5%) amongst LOCA cases with positive Abs and highlights the role of these Abs as diagnostic tools in the investigation of LOCA. To date, studies on further patients are underway.

57 PIRIBEDIL IN ESSENTIAL TREMOR AND PARKINSON’S DISEASE

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Introduction: Piribedil is a non-ergoline dopamine agonist widely used outside the UK. Tremor in Parkinson’s and essential tremor may be unresponsive to treatment and older patients are prone to side effects of anticholinergics and other drugs. We report our experience with piribedil in patients intolerant or unresponsive to other agents.

Methods: Prospective recording of 81 patients treated with piribedil between 1994 and 2002.

Results: Data available in 77 patients with Parkinson’s (86%), essential tremor (8%) or other (6%). Mean age commencing piribedil 70.8 years (range 45–86). Primary indication for piribedil was tremor (83%), improved motor control (12%), and other (5%). Mean treatment duration 112 months (9–688). Mean daily dose achieved 121 mg (20–200). After 3 month trial symptomatic benefit in 69% (n = 53). Piribedil discontinued in 55% (n = 42), either no benefit 13% (n = 10) or side effects 42% (n = 32). Side effects included confusion (n = 8), hallucinations (n = 5), worsening tremor (n = 4), and dyskinesia (n = 3).

In 16 patients aged 80 years (80–91) or over, 14 found symptomatic benefit. Three discontinued because of side effects (nausea, dyskinesia, hypotension). Hallucinations in one disappeared on reduced dose.

Conclusions: Piribedil appears effective at treating tremor in those unresponsive or intolerant of other agents, and is relatively well tolerated in older patients.

58 MELANOMA, LEVODOPA, AND PARKINSON’S DISEASE (PD)

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Cases first reported in the 1970s linked melanoma and levodopa therapy in PD. This unsubstantiated myth persists in cautions contained in the British National Formulary and as a contraindication in product literature and the Physicians’ Desk Reference. A cross referencing a PD database of 668 and a melanoma database of 353 cases, revealed five patients with melanoma and PD of whom four had been treated with levodopa for variable periods before

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the onset of melanoma. Although greater than the number expected by chance, this and previous anecdotal data do not support an association.

Levodopa is an intermediate in the formation of melanin after hydroxylation to dopaquinone and subsequent steps. However there is no evidence that possible exogenous priming of melanin synthesis has any influence on growth or recurrence of melanoma tumour cells. By contrast, experiments in vitro suggest that levodopa has a toxic effect on melanoma and it has been tested inconclusively as a treatment.

PD patients who develop or have had melanoma should not be restricted if levodopa therapy is otherwise indicated.

59 EFFICACY AND TOLERABILITY OF INTRANASAL APOMORPHINE POWDER (INAP) 5 MG AS RESCUE THERAPY IN SUBJECTS WITH PARKINSON’S DISEASE (PD) COMPlicated BY MOTOR FLUCTUATIONS

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Objectives: To assess in subjects with PD complicated by motor fluctuations: (a) efficacy of a single INAP (5 mg) dose in reversing an “off” state, (b) latency and duration of effect of a single INAP (5 mg) dose, (c) local tolerability of twice daily INAP (5 mg) over a 7 day period.

Methods: Six subjects with PD complicated by motor fluctuations known to respond to subcutaneous apomorphine (5 mg) were studied. The latency and duration of the “on” state following a single 5 mg dose of INAP was compared to that of their optimised subcutaneous apomorphine dose. Additionally five of the six subjects received INAP (5 mg) twice daily over a 7 day period. Adverse effects were recorded and efficacy assessed before and after the 7 day period. Measurements were based on subject feedback and abbreviated Unified PD Rating Scale scores.

Results: Mean age of subjects: 65 years (60–71), mean disease duration: 14 years (8–25). In all subjects INAP (5 mg) induced an “on” response comparable in latency and duration to that of subcutaneous apomorphine. Mean latency: 22 minutes (5–30), mean duration: 75 minutes (25–153). No significant local or systemic effects were reported.

Conclusion: These studies provide preliminary evidence that INAP (5 mg) is well tolerated and is as efficacious as subcutaneous apomorphine as a rescue therapy in subjects with PD complicated with motor fluctuations. Further studies are planned.

60 ACTIVITY INDICES FOR MEASURING MOBILITY IN NEUROLOGICALLY IMPAIRED PATIENTS

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Aim: This study investigates the reliability of long term ambulatory monitoring in relation to activity levels. Apart from reduced total step counts per day, one feature of impaired walking may be a reduction in overall variability during the day.

Methods: All subjects (10 healthy and 10 neurologically impaired individuals) wore an activity monitor (to record each step taken) continuously for two periods of 7 days. The peak activity index was the highest average step rate for 30 minutes in a day (steps/minute). The sustained activity index was calculated as the maximum number of steps in any continuous period of 20, 30, and 60 minutes duration.

Results: The mean (SD) peak activity index was 59 (5) in healthy and 36 (11) in neurological subjects. The ICC for the peak activity index was 0.98 in the healthy subjects and 0.82 in the neurological subjects. The sustained activity index for healthy subjects at 20, 30 and 60 minutes was 53 (10), 49 (13), 41 (13) (mean, SD) with ICCs of 0.75, 0.71 and 0.57. The sustained activity index in patients for 20, 30 and 60 minutes was 26 (10), 22 (9), 17 (8) (mean, SD) with ICCs of 0.94, 0.90 and 0.95 respectively. Lower measures of sustained activity reliability in healthy subjects compared to the neurological subjects suggest more variability of sustained activity levels in healthy individuals, whilst lower reliability in peak measures of the neurological subjects may indicate an inability to maintain high levels of activity in a repeatable manner.

Conclusion: Activity in the home environment can be quantified reliably. Limitations in mobility may be represented by a lack of variability of activity measures in tasks requiring sustained participation and higher variability in activities requiring maximum effort as well as by absolute step counts over time.

61 LITHIUM RESPONSIVE HYPNIC HEADACHE IN A PATIENT WITH MULTIPLE SCLEROSIS

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Hypnic headache is a rare primary headache disorder, characterised by recurrent, severe, nocturnal headache without autonomic symptoms; predominantly affecting elderly women. The condition is characteristically responsive to lithium. Bilateral headache is typical but, increasingly, cases of unilateral headache are recognised.

We present the case of a 67 year old woman with a 3 year history of exclusively nocturnal headache, occurring once or twice every night, waking her from sleep after several hours. The pain was severe, lasted on average 1 hour, was situated in the left frontal region and was not associated with autonomic, visual or other symptoms. She rarely had daytime headache. A previous diagnosis of multiple sclerosis (MS) was made at the age of 38 on clinical grounds, later confirmed by abnormal visual evoked potentials and a typical MR scan appearance. Her headache disorder had been treated unsuccessfully with simple and complex analgesics, tricyclic and SSRIs antidepressants, indomethacin and antiepileptic drugs.

We think that this is the first description of hypnic headache in a patient with MS and postulate that structural/inflammatory mechanisms may be relevant in the aetiology of what is generally considered a primary headache disorder.

62 BRAIN SCARRING: EFFECTS OF EXTRACELLULAR MATRIX ON ASTROCYTE PHENOTYPE

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Astrocytes are the main supporting cells of the brain and are normally in a quiescent state. Following various brain injuries, astrocytes can form a glial scar which inhibits brain repair. The scar consists of postreactive astrocytes (SAs). In vivo we have found that human cerebral white matter SAs express the proteins embryonic neural cell adhesion molecule, epidermal growth factor receptor, and basic fibroblast growth factor. We wish to identify factors that produce a human SA phenotype thereby finding ways of inhibiting scarring and aiding repair. It would be advantageous to have an in vitro model to identify these factors, but this requires a baseline quiescent astrocyte phenotype. Human cerebral white matter astrocytes cultured in serum have a non-quiescent phenotype. In serum free chemically defined medium astrocytes on the extracellular matrix poly-L-lysine have only a partially quiescent phenotype. By changing the extracellular matrix on which astrocytes are cultured, striking differences in phenotype expression were found. Extracellular matrices (fibronectin, tenascin C, laminin, vitronectin and collagen 1V) which are found in the human brain were used. This has allowed us to closely mimic the phenotype of normal quiescent astrocytes in vivo, therefore establishing a viable model for normal quiescent astrocytes in vitro.

63 COPD ALTERS THE DIAPHRAGM MOTOR AREA RESPONSE TO TRANSCRANIAL MAGNETIC STIMULATION


Background and Methods: The threshold and stimulus response curve to transcranial magnetic stimulation (TMS) of the diaphragm motor area can provide information about cortical excitability in health and disease. We studied five patients with severe COPD (mean FEV1, 20.2% predicted) and eight healthy controls. Stimulation series were delivered over the vertex using a 110 mm double cone coil (Magstim 200 mono-pulse) at a variety of intensities in random order and the surface diaphragm motor evoked potential (MEP) recorded. Series were performed at resting end expiration and then, facilitated, during inspiratory manoeuvres at 20% and 40% of maximum inspiratory pressure (MIP) and then again at rest. Healthy subjects also performed an MIP run at 60% MIP. The stimulus response curves for the COPD patients showed a significant increase from rest to 20% facilitation but no further
increase at 40%. By contrast controls showed a stepwise increase in MEP to 40% with no further increase at 60%.

**Conclusion:** COPD patients have a reduced cortical reserve perhaps because they are already facilitated at rest by an increased work of breathing.

### 64 FEATURES OF PATIENTS WITH COELIAC DISEASE AND COEXISTENT NEUROLOGICAL ILLNESS: A RETROSPECTIVE STUDY

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**Objective:** Detailed case report analysis of patients with coeliac disease (CD) and coexistent neurological dysfunction.

**Methods:** Patients recruited via voluntary reporting scheme coordinated by the British Neurological Surveillance Unit (BNSU). Patients’ contact details were obtained from referring consultant. Patients were contacted for signed consent allowing access to their casenotes.

**Results:** In the first 12 months of reporting, there were 17 positive returns (for comparison paraneoplastic syndromes had 47 positive returns). Nine sets of notes (53%) were reviewed (6 male, 3 female). Eight patients gave their signed consent (47%). Three were unable to give signed consent although we have the anonymised notes of one of these patients. One patient declined to participate. One patient did not return consent. We have not received patient contact details of the remaining four neurological diagnoses included epilepsy, learning difficulties, myelopathy, axonal neuropathy and migraine.

**Conclusions:** We found little evidence supporting a hypothesis of a neurological syndrome as a result of CD (CD and coexistent neurological dysfunction is only rarely reported in a neurological setting even compared to other rare conditions). These patients form a heterogeneous group. Adherence to new, stricter GMC guidelines for disclosure of information has made retrospective studies like this increasingly difficult. Further study is needed to confirm or refute an association between CD and neurological illness.

### 65 “MALIGNANT” VENOUS CONGESTION

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A 59 year old man went to his optician asking for new glasses. There was no significant history. He had papilloedema. On the basis of normal imaging and a normal cerebrospinal fluid (CSF), except for a raised pressure of 38 cm of water, benign intracranial hypertension was diagnosed. Three months later he developed partial seizures with secondary generalisation. A magnetic resonance venogram (MRV) showed superior sagittal sinus and right lateral sinus filling defects and he was warfarinised. By the following month he had developed extrapyramidal features and cognitive impairment. Further magnetic resonance imaging (MRI) showed extensive bilateral cerebral white matter changes, the MRV revealed occluded transverse sinuses and a discontinuous sagittal sinus. CSF pressure was elevated with a lymphocytosis. Subsequent extensive investigations were normal. His condition was steroid-responsive. Further MRIs showed new areas of non-enhancing focal signal abnormality in the temporal and cerebellar regions. He continued to deteriorate and died. Postmortem revealed extensive white matter degeneration with focal infarction secondary to acute-on-chronic venous congestion. This is an unusual presentation of “malignant” venous congestion.