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ACNR

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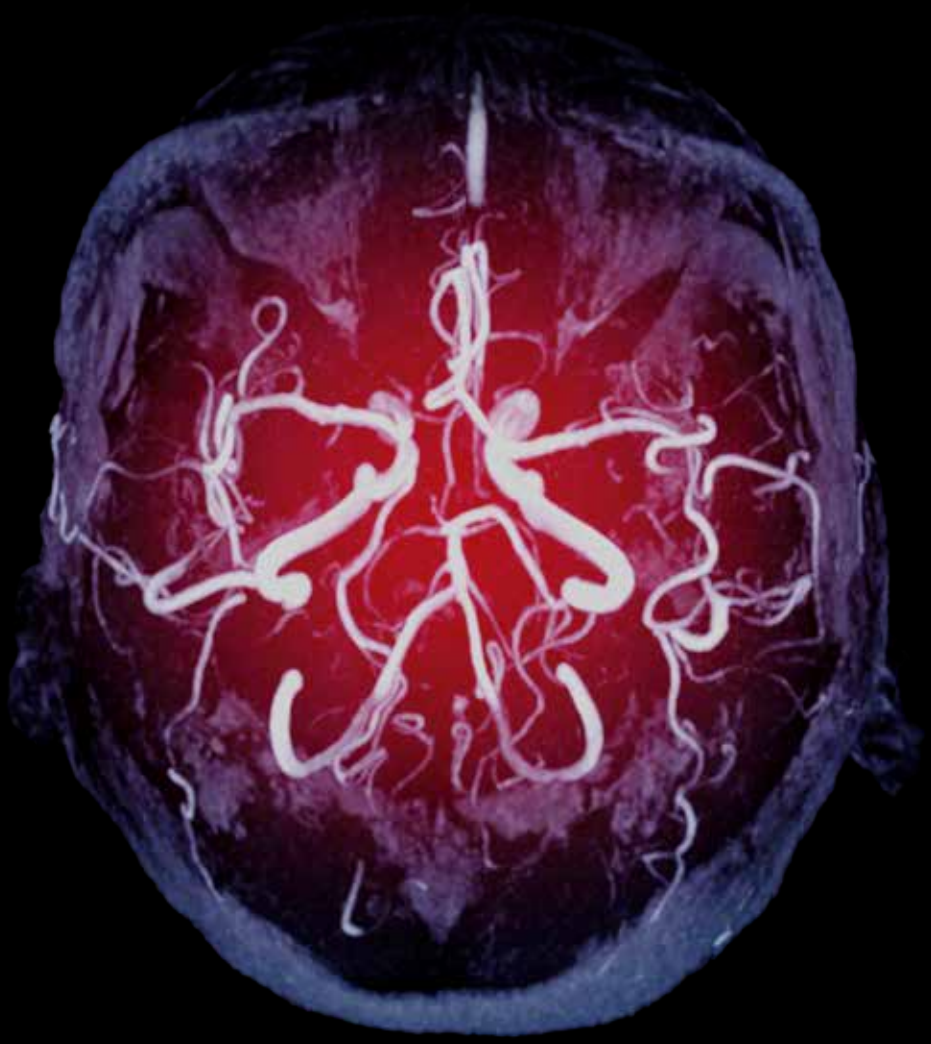
ADVANCES IN CLINICAL NEUROSCIENCE & REHABILITATION



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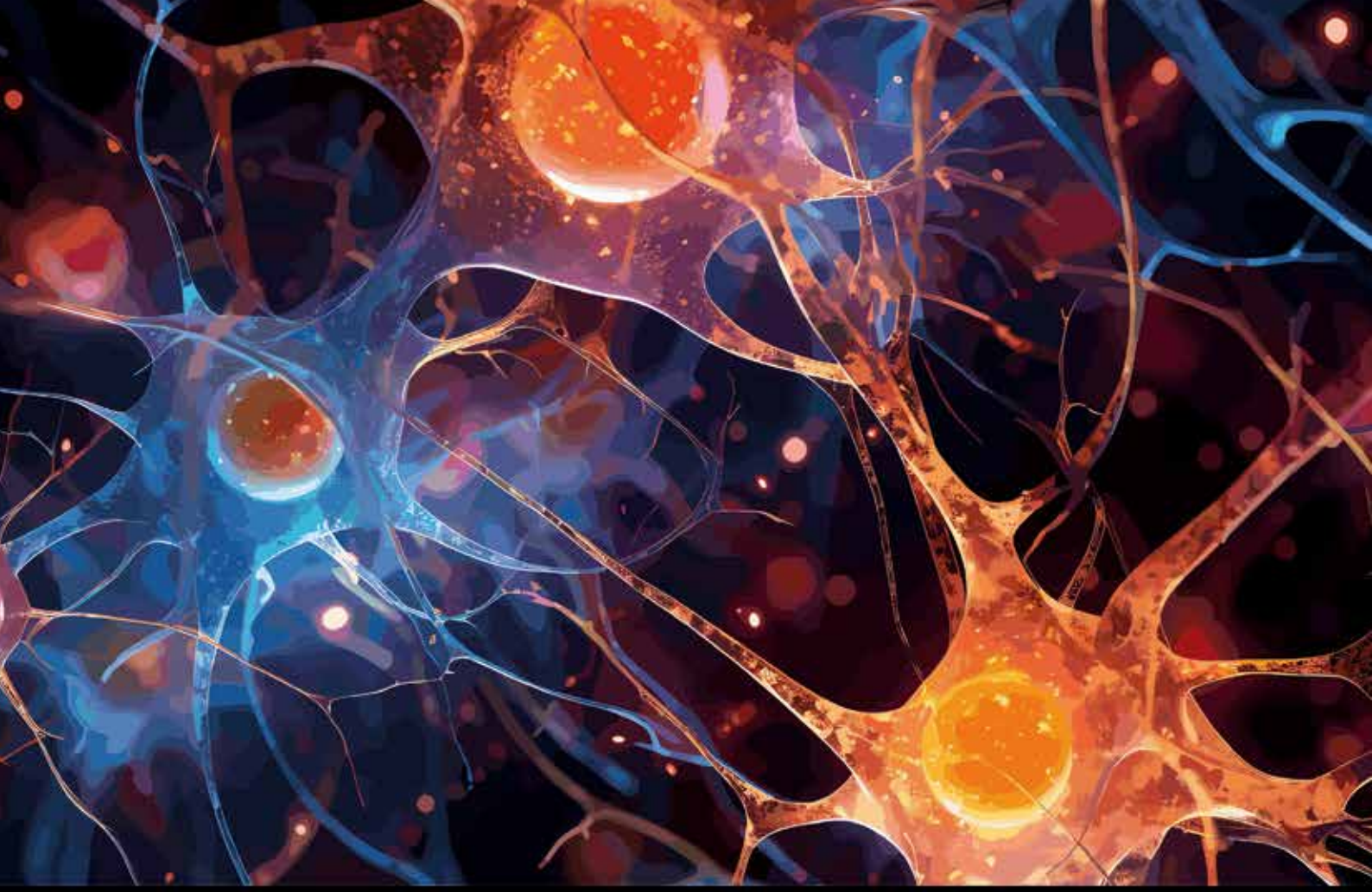

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ROYAL COLLEGE OF PHYSICIANS AND SURGEONS OF GLASGOW
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This issue of ACNR caters well to the neurological omnivore by serving up articles on the central and peripheral nervous system, neuromuscular junction, muscle, and specialised rehabilitation.

In the first article, Mitchell Lycett and Karl Ng from Sydney provide a primer on neurophysiological techniques to assess muscle excitability. The primer can be viewed as a later companion piece to an article on peripheral nerve excitability written for ACNR in 2007 by Karl Ng and David Burke.

Jeremy Chataway introduces a series of articles for ACNR on the topic of multiple sclerosis (MS). In the first article, Charles Wade, Rafaelle Palladino, Sean Apap Mangion and Jeremy Chataway from London look at the importance of managing metabolic co-morbidities and osteoporosis as a therapeutic target in MS.

Georgina Burke from Southampton provides the latest in our myasthenia gravis series covering the essentials of how to approach pregnancy in mothers with myasthenia gravis, with a necessary focus on balancing the safety of the mother against the wellbeing of the unborn baby.

Our Rehabilitation article is by Rachel Higgins, Jenny Parker, Laura O'Flaherty, Nicola Perkins and Orlando Swayne and concentrates on the rehabilitation of patients with Guillain-Barré Syndrome. They divide rehabilitation for this condition into three main stages: prevention, adaptation and restoration.

Andrew Larner from Liverpool contributes an article commemorating the centenary of the life of Arnold Pick whose name is best known to most of us for his contribution to understanding the frontotemporal dementias.

JMS Pearce from Hull reviews the history of akathisia and its associations, from its initial description at the turn of the 20th century as a presumed psychogenic phenomenon, through to its later recognition as an extrapyramidal side effect of antipsychotic treatment.

The conference reports are from Amanda England reviewing The UK Stroke Forum 2023, Chloe Hayward on the 2023 UKABIF Summit, Stephen McKeever and Ava Easton who attended Encephalitis Conference 2023, and Viva Levee who was at the 2023 Traumatic Brain Injury Course.

Our book reviews are from Richard Rees on "A Tattoo on my Brain: A neurologist's personal battle against alzheimer's disease" by Daniel Gibbs with Teresa H Barker, and Sophie Parslew on "Healing the Traumatised Brain – coping after concussion and other brain injuries" by Sandeep Vaishnavi and Vani Rao.

We hope you enjoy this edition of ACNR.

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Co-Editors

A list of our full editorial board can be found at acnr.co.uk/about-acnr/editorial-board

Muscle excitability testing: a primer

Mitchell Lycett, MBBS, FRACP, is a training Neurologist and Clinical Neurophysiologist at Royal North Shore Hospital, Sydney, Australia with a special interest in muscle excitability techniques in primary muscle disorders. He is investigating the utility of these techniques in monitoring disease progression as part of a Research Masters through the University of Sydney. ORCID: https://orcid.org/0000-0002-1300-6378.

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Abstract

Muscle excitability is an experimental technique that probes the properties of the muscle fibre membrane in vivo. In doing so, one can make determinations about the excitability of the membrane during different phases of the muscle velocity recovery cycle, which in turn allows for the assessment of membrane ion channel function. This has been applied to a range of nerve and muscle conditions. To date, it has primarily been used to provide a better understanding of the underlying disease mechanisms and therefore is of relevance to physicians with an interest in neuromuscular conditions. Due to the high intra-individual repeatability and sensitivity of the test, interest is growing in its potential uses as a disease biomarker in therapeutic trials for patients with nerve and muscle diseases.

The assessment of muscle excitability is not an entirely new concept. Standard needle electromyography techniques do measure the presence of spontaneous activity such as fibrillations or positive sharp waves, which provide a very rudimentary assessment of muscle hyperexcitability. This assessment is superficial and does not provide insight into the underlying cellular or electrochemical mechanisms underlying these changes. More useful mechanisms of muscle excitability assessment are now employed in the research setting, and therefore it is useful for physicians interested in neuromuscular disorders to have a basic understanding of these techniques and their utility.

Methods of assessing nerve excitability have been well established on the back of an explosion of research interest in the late 1990s and early 2000s. A detailed description of these techniques is beyond the scope of this article but can be found in Ng & Burke [1] in this journal as well as recent consensus guidelines by Kiernan et al [2]. These techniques can't be readily applied to muscle for a variety of reasons. Z'Graggen and Bostock developed a recording protocol inspired by the microneurography studies of C-fibres using velocity recovery cycles to facilitate more sophisticated assessments of muscle fibre excitability [3,4]. These techniques have been further refined and can now be performed using a standardised protocol run by the same software (QtracS) often used for nerve excitability assessments.

To perform muscle excitability recordings, a stimulating needle electrode (cathode) is inserted into the muscle of interest. This should be placed distal to the muscle endplate region to avoid unintentional motor axon stimulation. A surface electrode (anode) is placed distally. A small current is applied directly through these electrodes to generate muscle fibre action potentials (MFAPs) in a small number of fibres in the vicinity of the needle electrode. A further recording needle electrode is inserted 2 cm proximally to record from the same group of muscle fibres (Figure 1). It is very difficult to stimulate and record from the same single muscle fibre, but recording a compound muscle fibre action potential from a small number of adjacent muscle fibres is more achievable. The procedure is well tolerated. Apart from the minor discomfort associated with initial needle insertion, most subjects are unable to detect the applied electrical stimuli.

In nerve excitability studies the primary variable measured is the stimulus amplitude required to generate an action potential that reaches a defined threshold. In muscle excitability recordings, the major component of the assessment is the acquisition of the muscle velocity recovery cycle (MVRC) [3]. The primary variable measured is the change in the MFAP latency. The MFAP latency reflects the conduction velocity of the muscle fibre membrane, which relates to muscle excitability. The standard practice is to measure changes in MFAP latency in response to 1 to 5 preceding conditioning stimuli (10 ms apart) with a varying interstimulus interval.

In normal subjects, we observe that the MFAP latency progressively shortens with shorter interstimulus intervals, reflecting increased MFAP velocity (supernormality) (Figure 2). Supernormality progressively increases until the muscle relative refractory period (MRRP) is reached. Early supernormality (ESN) is thought to be due to the depolarising afterpotential which follows an action potential and reflects the dissipation of charge across the sarcolemma

Table 1. Spectrum of conditions for which muscle excitability techniques have been applied.

Metabolic Conditions	● Chronic renal failure ● Critical illness myopathy
Primary Muscular Conditions	● Myotonic dystrophy type 1 and 2 ● Sporadic inclusion body myositis
Neurogenic Conditions	● Common peroneal neuropathy ● Radiculopathy ● Orthostatic hypotension
Channelopathies	● Andersen-Tawil syndrome ● Myotonia congenita ● Sodium channel myotonia ● Paramyotonia congenita ● Hypokalaemic periodic paralysis ● Hyperkalaemic periodic paralysis

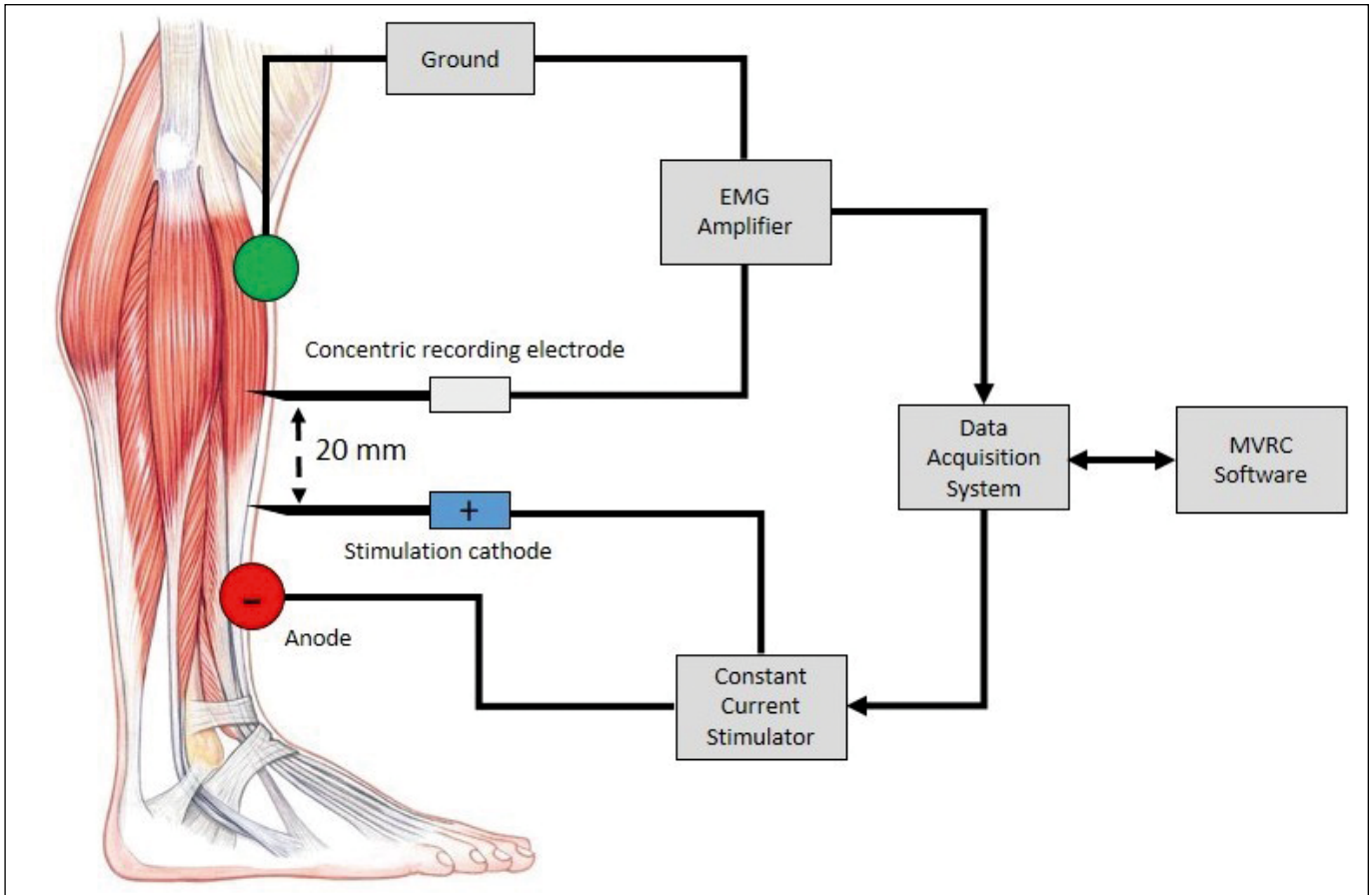

Figure 1. Muscle excitability recording set up for the tibialis anterior muscle. The stimulating needle electrode (cathode) is inserted into the distal muscle, distant from the motor point. A surface anode is placed distally. The electrical stimulus is provided by a constant current stimulator controlled with excitability software through a data acquisition system (DAQ). A recording needle electrode is inserted 20 mm proximally, with signals amplified and then digitised by the DAQ before being fed into the threshold tracking software, which produces a readable output as well as setting up the next stimulus pattern. The brachioradialis is another commonly assessed muscle.

over time [3]. Late supernormality (LSN) is thought to reflect the progressive accumulation of potassium in the sarcolemmal T-tubule system [3].

Other common components of the muscle excitability assessment include the frequency ramp and repetitive stimulation protocols. The frequency ramp protocol again measures changes in MFAP latency but does so in response to trains of progressively increasing frequency conditioning stimuli up to 30 Hz [5,6]. The MFAP latency obtained from the final stimulus in the train is compared to the MFAP latency from the initial stimulus to provide a further assessment of sarcolemmal supernormality, which again is thought to be secondary to potassium accumulation within the T-tubule system [5,6]. The repetitive stimulation protocol involves prolonged stimulation at 20 Hz to mimic the short and long exercise tests [5,6]. This is not always performed but can be useful in the assessment of channelopathies.

It is important to note that muscle excitability is affected by several non-pathological variables such as temperature, electrolytes, muscle fibre subtype and patient age. Reduced muscle temperature, particularly when below 30°C, results in an increased

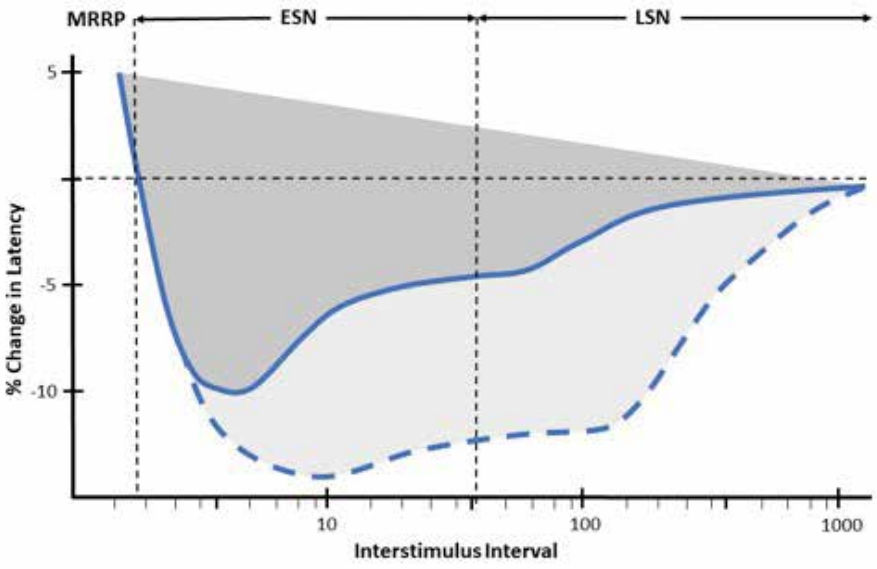

Figure 2. Muscle velocity recovery cycle (MVRC) recording. The obtained MVRC after a single conditioning stimulus is shown with the solid line. The y-axis demonstrates the MFAP latency change, which is shorter as the interstimulus interval is reduced. The phases of late supernormality (LSN) and early supernormality (ESN) are shown. A figurative MRVC after at least one conditioning stimulus is shown, with the dashed line demonstrating that both LSN and ESN increase as the number of conditioning stimuli is increased.

MRRP and to a lesser extent reduced supernormality [7]. Electrolyte concentrations are well known to affect membrane dynamics; muscle excitability is particularly dependent on potassium concentrations, with increasing serum potassium, even within the normal physiological range, resulting in an increased MRRP [8,9]. Muscle fibre parameters also vary between different target muscles. This is thought to be secondary to the differential expression of more oxidative type I and IIA fibres in postural muscles and glycolytic type IIX fibres in non-postural muscles. This was demonstrated by Lee et al. who compared the rectus femoris to the tibialis anterior [5,10]. Elderly subjects undergo type II fibre atrophy, which is a possible explanation for the difference in muscle excitability parameters between younger and older subjects [11,12]. Finally, much like explorations of nerve excitability studies, experimental paradigms such as transient ischaemia have been applied to further the understanding of the mechanisms underlying the physiological changes in sarcolemmal depolarisation. When similar changes are seen in pathological conditions, this allows for useful inferences to be made about the underlying mechanisms of disease states [3].

Muscle excitability techniques have been applied to a growing battery of metabolic, myogenic and neurogenic conditions (Table 1). The most commonly assessed muscle is the tibialis anterior due to ease of access, predictable muscle fibre orientation, well-defined motor point and tolerability. The speed and ease of the assessment allowed with the use of the semi-automated QtracS software is a major advantage of the technique. After isolation of a MFAP, the assessment takes less than 20 minutes. However, there are several factors limiting the transition of this technique from the laboratory and into the neurophysiology clinic. Firstly, the assessment requires specialised software, which is not currently available on commonly available electrodiagnostic systems. Furthermore, despite there being good agreement in the measurements from the same type of muscle collected in different laboratories around the world, there is significant inter-individual variability in muscle excitability recordings, and as such, robust normal values do not exist [11]. In contrast, the intra-individual variability is low, making it a sensitive technique for the longitudinal assessment of muscle membrane properties in the same subject over time. Thus, muscle excitability has the potential to become more useful in measuring the response to therapeutic interventions and therefore be a clinical trial biomarker in muscle-based diseases [13].

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REGULARS - AWARDS

Professor Manoj Sivan Receives Sidney Licht Award

Congratulations to Professor Manoj Sivan who became the first UK recipient of the ISPRM Sidney Licht award. The prestigious Sidney Licht award is given by the International Society of Physical and Rehabilitation Medicine for contributions to the advancement of international physical and rehabilitation medicine. Manoj joins the distinguished list of awardees, which includes Professor Gerold Stucki (awarded in 2005) and Professor Henk Stam (who received this award in 2013). They were honoured at the ESPRM General Assembly dinner in Ljubljana.

A Tattoo on my Brain: A neurologist's personal battle against alzheimer's disease

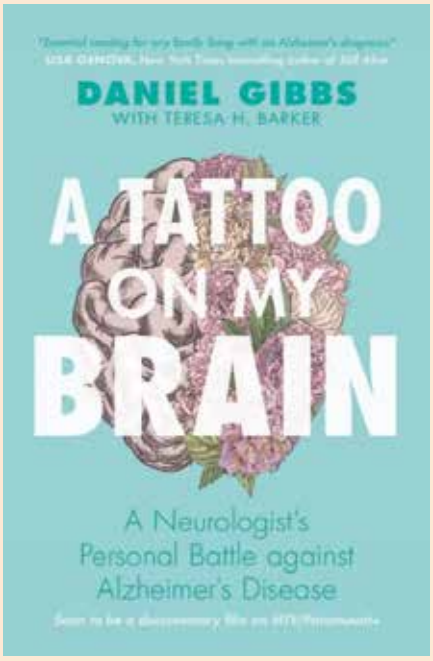
Author: Daniel Gibbs with Teresa H Barker
Published by: Cambridge University Press
Price: £9.99
Pages: 226
ISBN: 978-1009325189
Reviewed by: Richard Rees, St George's University Hospitals NHS Foundation Trust, London, UK.

In his memoir of his journey through the transition from one side of the neurology consulting room desk to the other, Daniel Gibbs charts the prodromal and early manifest stages of his journey with Alzheimer's disease with a mixture of academic intrigue, pioneer's spirit and sufferer's pathos. This book is not a woe-is-me call for sympathy, but both a passionate and dispassionate account of the effects that his diagnosis has on him and his family, as well as the very concrete, practical steps Dr Gibbs has taken to challenge the inevitable progression through all means at his disposal.

One of the key messages that he proposes is that for too long the focus of work in dementia has been the later phases, but that for effective disease modification it is necessary for attention to pivot to the opposite end of the disease spectrum: where the pathology is anatomically limited, and the patient's cognitive and physiological reserve remain robust in order to effect meaningful change in the trajectory of progression. He describes in a way that is accessible for a lay reader, and informative for those with medical training the how and the why of specific lifestyle modifications. These include diet (with a helpful appendix on the MIND diet (Mediterranean-DASH Intervention for Neurodegenerative Delay), social engagement, sleep, and even the positive effects of music and the detrimental effects of the loss of the emotional repertoire that is caused by smell loss.

Key to his journey, and the narrative of the book, is his engagement as a participant in an aducanumab trial. He does so fully cognisant of the fact that he may not benefit from being a participant, but does so in order that the body of knowledge grows, and in the hope that a paper that he's an anonymous participant in leads to a light-bulb moment in the mind of someone who may then create meaningful change in the field. He illustrates his involvement from serial PET studies (in which he describes his progression with well annotated colour plates) to the significant symptomatic Amyloid Related Imaging Abnormality (ARIA) caused by the monoclonal antibody – the related haemorrhage leading to the literal and figurative tattoo left on his brain that gives the book its title.

Dr Gibbs offers the philosophy that "helplessness and hopelessness have been the dominant theme of the conversation for more than a century" (p. 125) and this book is a personal challenge to that. There is no false hope, he leaves the reader in no doubt that he and his family are aware of what the future holds, but there is a call to arms for the medical and scientific audience, as well as the general public, to not take Alzheimer's lying down, but to rise up, individually and collectively to do whatever we can to fight back.



REGULARS - AWARDS

Angelika Zarkali: Life Sciences Rising Talent

Congratulations to ACNR's Conference News Editor Angelika Zarkali (Alzheimer's Research UK Clinical Research Fellow, Neurodegenerative Diseases, UCL Queen Square Institute of Neurology) who was highly commended recently as a Life Sciences Rising Talent. Angelika is a neurologist and neuroscientist investigating the hallucinations and cognitive fluctuations in Lewy body dementia at UCL Queen Square Institute of Neurology. She uses ultra - high field MRI to understand changes in the structure and function of the brain that lead to these distressing symptoms. Her ultimate goal is to develop new treatment approaches for Lewy body dementia. She has a PhD in Neuroscience from UCL.

Cornwall NHS Gains RCPsych Accreditation

Congratulations to Cornwall NHS specialist services for Intellectual disability which has become the first service in the UK to gain the RCPsych CCQI quality standard accreditation. The award is a recognition of the work they do for their patients and community. It highlights the good practice nationally and internationally in neglected areas including treating patients with epilepsy and supporting their carers.

Introduction by Jeremy Chataway

Welcome to this new series in ACNR. The first two articles focus on two aspects of multiple sclerosis (MS). As you will know, nearly 3M globally and around 135,000 in the UK are affected, with large societal, healthcare and individual costs. In the last three decades there have been enormous advances with the development of the disease modifying treatments (DMT), especially for relapsing disease. Depending on how they are categorised, the number now touches 20 with a variety of mechanisms of action.

Yet despite this good news, the majority of the therapeutic effect comes from immunomodulation, and traction on the neurodegenerative aspects has been much less. Whilst there is much phase 2 and phase 3 activity [1], this complex progressive biology remains the cardinal problem, and indeed is likely to start from a very early stage in the disease.

It is well described how a variety of co-morbidities drive disability accumulation in MS, and indeed compared to complex DMT prescription, their attenuation is relatively simple in medical terms, for example, thorough treatment of anxiety and depression (prevalence around 20%). In this issue Charles Wade takes us through the epidemiology of vascular co-morbidities in particular, the effect sizes and how these can be treated to target, using well described risk calculators. There is no doubt they are undertreated and yet the tools exist already. We hope that this opportunity will be made explicit in both primary and secondary care situations, rather than awaiting untreated natural vascular history. The article ends with again the highly modifiable situation of osteoporosis, which in this population, for a variety of reasons, has a higher prevalence than the general population. Again, relatively simple to treat.

Whilst the role of the neurologist may not be to prescribe the losartan or the alendronate, our role is to be aware of these issues, flag them up appropriately, and ensure that they are looked for and treated to target, to avoid later downstream effects. The article contains flow chart summaries of current NICE guidelines for the management of these comorbidities.

In the next issue we have taken the opportunity to summarise current DMT options in progressive MS (PMS). Sean Apap Mangion shows us the evidence, rationale, criteria and risk profile of the two main classes of DMT: siponimod (secondary progressive MS) and ocrelizumab (primary progressive MS). Of particular interest, and a need for some vigilance, is the use of these classes of drugs in a relatively older population - which of course tends to be those with PMS. Issues such as hypertension with siponimod, and an increased risk of viral infection more generally (for example, HSV1 and VZV) are well described. The balance of effectiveness and side-effects needs constant evaluation in the face of chronic treatment. A number of prospective observational cohorts are active and will report over the next few years to further guide our decision making. These will complement a number of phase 3 clinical trials with new compounds such as the Bruton tyrosine kinase inhibitors, which have the potential to act more centrally in the nervous system, and will start to read out in the next 1-2 years.

I hope you enjoy these two articles and they provide useful practical information to make the lives of those suffering from MS, whom you look after, just a little better.

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Charles Wade, BMBS, MRCP, is a Clinical Research Fellow at University College London and a Neurology Registrar at the National Hospital for Neurology and Neurosurgery (NHNN), Queen Square, University College Foundation NHS Trust. After qualifying in medicine at Peninsula Medical School, he completed his foundation training in Oxford and general medical training in London. He is undertaking his PhD in the Queen Square Multiple Sclerosis Centre (QSMSC), UCL Queen Square Institute of Neurology. He has a specialist interest in white matter disorders and his PhD focuses on myelin imaging. Within this he focuses not only on acquired white matter disorders (namely multiple sclerosis) but also on adult-onset inherited white matter disorders (leukodystrophies).
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Conflict of Interest Statement: Jeremy Chataway is ACNR's Primary progressive multiple sclerosis editor. This article has been subject to our normal peer review process, being peer reviewed by two expert, external reviewers prior to acceptance by the editors of ACNR.

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Comorbidity in the multiple sclerosis clinic

Abstract
Comorbid conditions are common in people with multiple sclerosis (MS) and can lead to diagnostic delay and poorer outcomes. Neurologists have an opportunity to identify and address comorbidities within routine care, without major time or resource burden. This review discusses modifiable comorbidities in MS – focusing on hypertension, dyslipidaemia, diabetes, and osteoporosis highlighting their impact and potential intervention.

Introduction

Multiple sclerosis (MS) is an immune-mediated inflammatory, neuro-degenerative disease of the central nervous system (CNS) [1]. Comorbidity refers to the presence of more than one disease or condition in a person at the same time, where these additional diseases are not directly related complications of the primary disease. They are common in people with MS (PwMS), increasing with age, and are likely contributors to disability [2].

The reported prevalence of comorbidities in PwMS varies widely depending on the study, the range of comorbid conditions considered, the geographic region, the socioeconomic status, the MS type and disease history, and factors such as sex, age, and race [3-8]. Though the prevalence of comorbidities in PwMS could be overestimated when compared to the general population due to higher healthcare utilisation, our understanding of their impact is growing [9]. Emerging evidence has shown that the presence of comorbidities in PwMS increases diagnostic delays, prevents enrolment in clinical trials, impacts disease-modifying therapy (DMT) selection and initiation, increases relapse rates and the rate of disability progression, reduces quality of life, increases rates of hospitalisation, and increases mortality [10-18].

Neurologists and the MS multi-disciplinary team (including nurses, pharmacists, and therapists) have continuous, long-term relationships with their patients and will routinely carry out health assessments (clinical examinations, or screening bloods etc) as part of face-to-face appointments, when initiating or monitoring DMTs, or as part of research work. Given the mounting pressures on general practitioners (GPs), there is an opportunity to identify and, when necessary, address modifiable comorbidities within the neurology clinic setting. We hope to show the importance of weaving this into routine MS care, and that this can be done without taking away significant time or resources.

The primary objective of this review is to discuss prevalent modifiable, comorbid disease in PwMS – specifically looking at hypertension, dyslipidemia, diabetes, and osteoporosis. This list is not exhaustive, and other physical risk factors (including body mass index) are not considered here. The impact of smoking and smoking cessation is also beyond the scope of this review but is discussed extensively elsewhere [19]. It is important to also note that this discussion also does not encompass psychiatric disorders, in particular depression and anxiety (with prevalence of up to 35-40% respectively), which are equally as important and potentially treatable [20].

Hypertension

Hypertension has an estimated prevalence of 16-30% in PwMS [3,21,24]. Recent research suggests that hypertension is 25% more common in the MS population compared to non-MS individuals, irrespective of sex and race, and ranks as the third most prevalent comorbidity in MS [25].

Hypertension is a recognised risk factor for numerous disorders, including stroke, coronary artery disease, renal disease, and cognitive decline, all of which can adversely affect ambulatory status, exercise tolerance, and activities of daily living independent of MS. Hypertension is one of the five leading causes of disability in the general population [26]. Several studies suggest hypertension may potentiate brain atrophy, which is particularly relevant in PwMS [27,28].

In MS, hypertension negatively impacts cognitive performance, psychiatric symptoms, progression of visual disability, and progression of lower limb disability [14,29,30]. Furthermore, within the MS population, hypertension is associated with increased mortality risk (though the magnitude of the impact was lower in the MS population than in the matched population) [18].

According to NICE guidance, all adults should have their blood pressure measured at least every five years up to the age of 80 years, and at least annually thereafter. Our recommendation – given the increased prevalence of hypertension in PwMS and the impact it has on their disease – is that more frequent monitoring is sensible. This can be integrated into routine care in most clinical settings, including the face-to-face neurology clinic, DMT monitoring or trial appointment. If the initial clinic BP reading is 140/90 mmHg or higher, the GP can be asked to organise ambulatory blood pressure monitoring (ABPM) or home blood pressure monitoring (HBPM) to confirm the diagnosis. Hypertension is diagnosed if the ABPM or average HBPM is 135/85 mmHg or higher [31].

Many health behaviours can be influenced by brief provider advice embedded within an existing visit for MS care [32]. NICE guidance recommends that managing hypertension starts with education and counselling on lifestyle modifications including weight loss, a healthy diet, reduced alcohol and sodium intake, increased physical activity, and smoking cessation [31]. Regarding diet, evidence bases are now emerging for both the Dietary Approaches to Stop Hypertension (DASH) diet and Mediterranean diet [33,34]. Neurologists can use routine outpatient appointments to ensure that this advice is reiterated and contextualised to MS care just as we have done with smoking and alcohol cessation advice.

In terms of further treatment, research indicates that managing hypertension is not made more difficult by the presence of MS [35]. If the BP remains uncontrolled or the individual is at higher risk of cardiovascular disease, the GP will consider initiating pharmacological treatment, typically starting with an angiotensin-converting enzyme (ACE) inhibitor or an angiotensin receptor blocker (ARB) for those under age 55 years or a calcium channel blocker for those aged 55 and over or of African or Caribbean descent. If necessary, additional medications, such as thiazide-like diuretics or beta-blockers, are added to achieve optimal blood pressure control (Figure 1). The neurologist's role here would be only to stress the importance of medication adherence.

Dyslipidaemia

The NARCOMS study demonstrated that 37% of the PwMS suffered from hypercholesterolaemia, which was higher than the general population. Though this figure is not consistently repeated in the literature, the incidence rates appear to be rising [22,36–38]. Dyslipidaemia is an independent risk factor for various adverse outcomes associated with disability and even death including stroke, cardiovascular events, peripheral artery disease, kidney disease and vascular dementia. In MS, higher levels of LDL, total cholesterol, and triglycerides are associated with worsening disability, increased relapse rates, impaired overall cognitive function, higher T2 lesion volume, increased brain atrophy, and increased mortality [39-44]. Conversely, higher HDL levels are associated with lower levels of acute inflammatory activity on MRI [39].

A working hypothesis is that the pro-inflammatory and thrombogenic processes associated with dyslipidaemia could plausibly contribute to disease progression in MS via

diverse mechanisms at the blood-brain barrier vascular endothelium [45]. This is the basis of the MS-STAT2 trial (ClinicalTrials.gov Identifier NCT03387670) which aims to investigate whether simvastatin, a cholesterol-lowering drug, can slow down the progression of disability in people with SPMS [46]. The hypothesis of the STAT2 trial is that via these pathways, simvastatin has neuro/vasculo-protective properties that could delay disability progression in people with SPMS [47]. This hypothesis is based on previous research, including the phase 2 MS-STAT trial which showed a 43% reduction in atrophy rate compared to control with 80mg/day of simvastatin [48].

NICE guidelines recommend measuring total cholesterol, low-density lipoprotein (LDL) cholesterol, high-density lipoprotein (HDL) cholesterol, and triglycerides every five years in adults aged 40-74 years. This should likely be more often in PwMS, where despite increased prevalence of dyslipidaemia in PwMS, there is poorer treatment [8,49]. Risk assessment tools, such as QRISK3, are then used to determine the likelihood of developing cardiovascular disease (CVD) within the next 10 years, and treatment recommendations are based on this risk assessment [50]. Management begins with education and lifestyle modifications and for the neurologist, these will be very similar to those advised for hypertension. For individuals at increased risk of cardiovascular disease, the recommendation would be pharmacological treatment with statins. The treatment goal is to reduce non-HDL cholesterol by at least 40% from baseline, and if this is not achieved, the statin dose may be increased, or other lipid-lowering medications, such as ezetimibe may be added (Figure 1) [49].

Diabetes

The focus of this section will largely be Type 2 diabetes mellitus (T2DM) rather than Type 1 (T1DM). While previous studies have shown that T1DM and MS share common immune pathogenetic mechanisms, T1DM is usually detected early in life and thus detection or counselling in the neurology clinic is less likely.

The global incidence of T2DM is on the rise, and PwMS are not spared, with one trial suggesting that T2DM rates are rising faster in the MS population than in an aged-matched general population [3], [37]. There appears to be a moderate but significant association of T2DM with MS incidence [51]. Though some of this may reflect increased T2DM diagnosis ascertainment due to higher healthcare utilisation by PwMS following diagnosis, in a recent study, PwMS already had a 30% increased prevalence of T2DM at the time of MS diagnosis when compared to matched controls [8,37].

Diabetes is of course an independent risk factor for disability, not only via nervous system impairment (which will affect up to 70% of those with diabetes), but also by contributing to various chronic conditions such as heart disease and stroke [52]. In MS, diabetes is also known to potentiate disability. A study from Italy using multiple regression analyses revealed that diabetes mellitus was associated with significant reductions in whole brain, grey matter and cortical grey matter volumes in PwMS, and further studies have shown that the presence of comorbidities including diabetes is associated with cognitive dysfunction in MS [42,53].

Treating diabetes likely produces benefits outside lower HbA1c alone. A study by Negrotto et al. investigated the effect of oral antidiabetic medications on paraclinical outcome measures in 50 obese PwMS with metabolic syndrome. The study found that patients receiving metformin hydrochloride and pioglitazone hydrochloride had significantly fewer new or enlarging T2 lesions or gadolinium-enhancing lesions confirmed by brain magnetic resonance imaging after two years of treatment compared to a control group of PwMS with metabolic syndrome who did not receive these medications. Metformin targets Mitochondrial respiratory-chain complex 1, and via numerous downstream effects on mitochondrial function is thought to support blood brain barrier integrity, enhance mechanisms of remyelination, inhibit neuronal apoptosis and possess anti-inflammatory properties [54,55]. Phase 1, 2a and phase 3 trials are now underway to investigate this further, including the recently opened OCTOPUS trial [56].

NICE guidance for diagnosing diabetes involves measuring HbA1c levels. For individuals without diabetes, NICE recommends HbA1c testing every 3-5 years, depending on age and risk factors. Screening for diabetes is also included in the NHS Health Check [57]. Diabetes is diagnosed at levels above 48 mmol/mol (6.5%) and the individual is considered at high risk of developing diabetes if the HbA1c level is 42-47 mmol/mol (6.0-6.4%) [58]. Diabetes management starts with education and comprehensive lifestyle modifications. Though this will of course be complemented by services provided by the GP, the routine MS clinic appointment again provides a useful opportunity to reiterate this advice and focus on the impact good diabetic control will have on their MS outcomes. We know that historically, among those with type 2 diabetes, PwMS had a 56% lower prevalence of antidiabetic usage [8]. Pharmacological treatment will typically be beyond the remit of neurology, but typically involves metformin, with additional oral or injectable medications added as needed to achieve optimal glycaemic control, such as sulfonylureas, dipeptidyl peptidase-4 (DPP-4) inhibitors, sodium-glucose co-transporter-2 (SGLT2) inhibitors, glucagon-like peptide-1 (GLP-1) receptor agonists, or insulin (Figure 1) [58].

Osteoporosis

Bone metabolism disorders are probably under-recognised and under-treated in MS. Research shows a higher prevalence of osteoporosis and osteopenia in PwMS compared to those without the condition, and that these changes occur at a younger age [59,60]. People with progressive forms of MS appear to have more severe osteoporosis than those with relapsing–remitting MS (RRMS) [61].

Potential causes for the increased prevalence of osteoporosis in MS include shared risk factors (female gender, white race, Vitamin D deficiency), direct effects of MS (chronic inflammation, inactivity, recurrent falls and fractures, cognitive impairment, low body weight, visual impairment), and iatrogenic causes (including but not limited to glucocorticoid use) [62]. Low bone mass has however also been shown to occur early in MS (and even in clinically isolated syndrome) as well as in fully ambulant patients, suggesting also that there are possibly shared aetiological and pathogenic factors between the two conditions [63,64].

Osteoporosis is a major cause of morbidity and mortality in MS. The presence of osteoporosis is a significant predictive variable that a fall will result in fracture, and PwMS are at higher risk of fracture than general population [65]. Fractures can have significant impacts on the mobility of PwMS, with secondary deconditioning and long-term hospitalisation. In addition, reduced bone mineral density is associated with increased cognitive impairment in PwMS, suggesting a possible link between MS-related inflammatory and neurodegenerative processes and bone homeostasis [66].

PwMS are routinely prescribed vitamin D due to the association of low vitamin D levels with increased future risk of developing MS and with increased disease activity. Though vitamin D is essential for bone health, vitamin D supplementation alone in MS is not sufficient to prevent bone loss in those who are not vitamin D deficient, and therefore more active approaches to optimising bone health are required [67].

NICE guidelines for diagnosing osteoporosis involve using dual-energy X-ray absorptiometry (DEXA) to measure bone mineral density (BMD). The results are reported as T and Z scores, with osteoporosis defined as a T score of -2.5 standard deviations or lower, and osteopenia defined as a T score between -1 and -2.5 [68]. In the UK, there are no specific guidelines for how often healthy adults should have DEXA scans. However, it is generally recommended that postmenopausal women have a DEXA scan at age 65, and that men over 50 with risk factors for osteoporosis also have a scan.

A neurologist can of course organise a DEXA scan but may feel uncomfortable about interpretation of results or when to repeat the scan without other specialty input. The NICE guidance on the management of MS makes no reference to osteoporosis and reciprocally, scoring systems for bone density such as fracture risk assessment tool (FRAX) do not take MS into account. Bisson et al. showed that the FRAX score underestimates fracture risk in PwMS. Calibration of FRAX and fracture risk improved if osteoporosis was designated as "secondary" to MS, though MS is not currently listed among the secondary osteoporosis conditions [69].

Hearn et al. proposed a screening and management algorithm for osteoporosis in MS

> *Comorbidities complicate treatment and compound disability in MS, but they also represent promising targets of (reasonably simple) intervention that can improve long-term health and quality of life. Neurologists and the MS multi-disciplinary team should incorporate the identification and management of modifiable comorbidity into routine MS care, where it need not take significant time or resources away from scheduled consults.*

[70]. They suggest that anyone with MS who is felt to be at risk from deficiency should have their calcium and vitamin D status checked and replaced. Regarding further investigation, they recommend routine DEXA scans for post-menopausal women and for those with an EDSS over 6.0. They further recommend a high index of suspicion even in those with an EDSS less than 6.0 if they suffer a fracture, receive a prolonged (>3 month) course of glucocorticoid therapy or if they are on antiepileptic medication [70]. They recommend reviewing this at 1-2 yearly intervals. Treatment is with Vitamin D and Calcium preparations, and bisphosphonates (alendronate or risedronate) directed by NICE guidelines (Figure 1), with re-evaluation of a need for continued treatment (with repeat FRAX and/or DEXA) at five years [68].

Conclusion

Managing modifiable comorbidities is an important part of MS care that presents both challenges and opportunities. Comorbidities complicate treatment and compound disability in MS, but they also represent promising targets of (reasonably simple) intervention that can improve long-term health and quality of life. Neurologists and the MS multi-disciplinary team should incorporate the identification and management of modifiable comorbidity into routine MS care, where it need not take significant time or resources away from scheduled consults. Patient education, counselling, and referrals for further care and pharmacological intervention where necessary should become routine practice.

Although there are currently no specific guidelines for how often to screen for comorbidities in PwMS, we recommend regular screening for the discussed modifiable comorbidities, with shorter intervals in cases of concern. Screening need not be formal or repetitive if occurring elsewhere in other healthcare settings but comorbidities and their impact on MS should now be on the radar of the practicing neurologist.

Further research is needed to develop appropriate and MS targeted clinical screening algorithms for all modifiable comorbidities to enable early targeted interventions. Additional studies are needed to refine our understanding of how comorbid conditions contribute to MS progression and reciprocally, how MS contributes to the development of comorbidity.

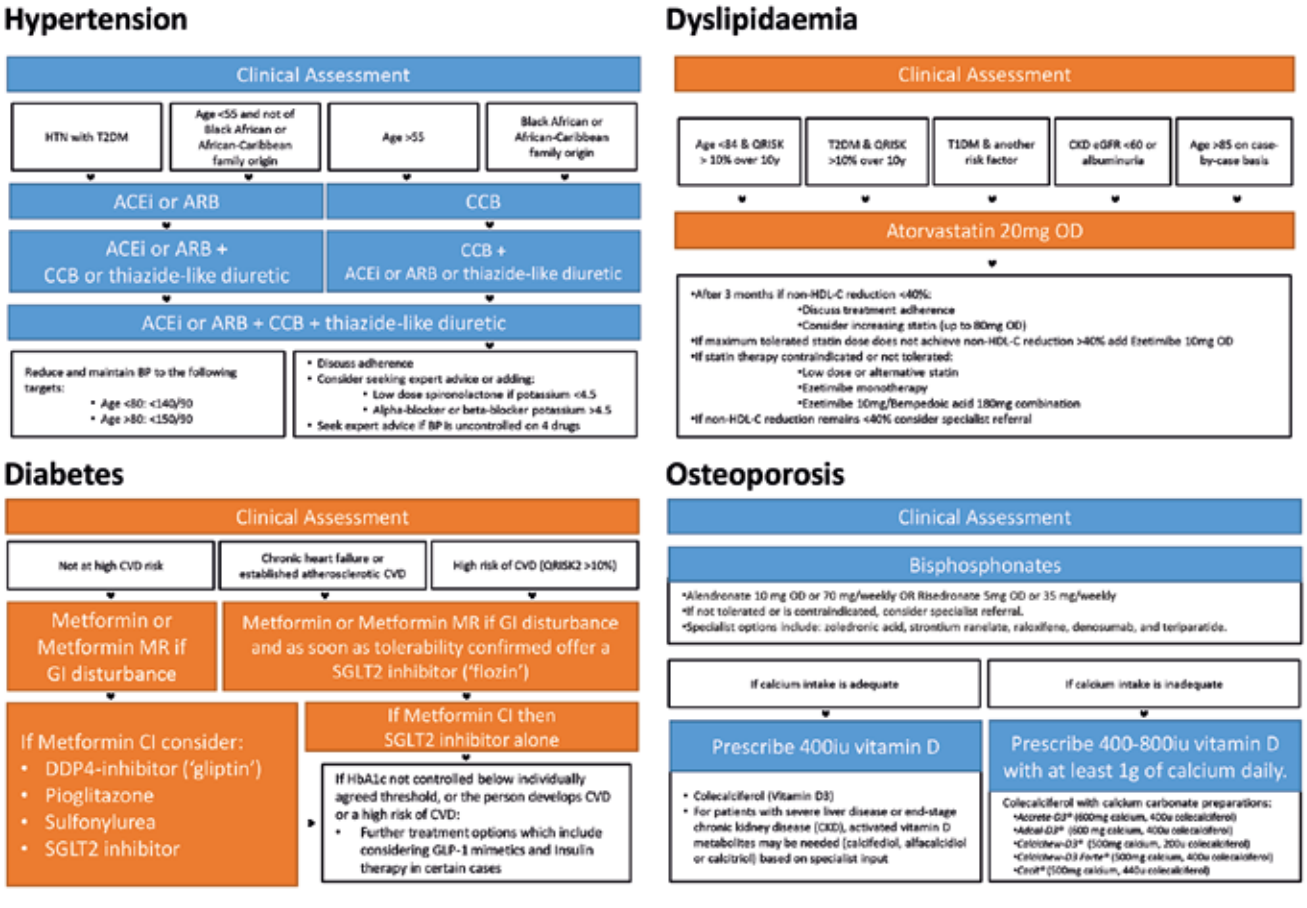

Figure 1: Flow chart summaries of current NICE guidelines for the management of Hypertension, Dyslipidaemia, Diabetes and Osteoporosis [31,49,58,68]. Please note that the up to date full guidance is significantly more extensive and should be referred to before initiating treatment.

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Healing the Traumatized Brain - coping after concussion and other brain injuries

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The target audience of this book is people with brain injuries and their families, and more generally, anyone who wants to learn and understand brain injuries. The book aims to be a guide, explaining how the brain works, what a brain injury is (and its effects), as well as the concept of neuroplasticity (and all aspects of recovering from a brain injury). It also presents promising therapies on the horizon. The contents of the book are in seven parts and are presented systematically.

Part one builds a solid foundation of knowledge about brain structure and function, useful for readers with little knowledge, and a reference point for more knowledgeable readers. It includes useful diagrams which aid comprehension, although a complete novice might find the explanations word-heavy and may benefit from further preparatory reading.

Then, in part two, neural plasticity is discussed: how we can harness it to aid rehabilitation from brain injury, including behavioural therapy, stress management, cognitive rehabilitation, and nutrition (an enlightening read even for readers without brain injuries).

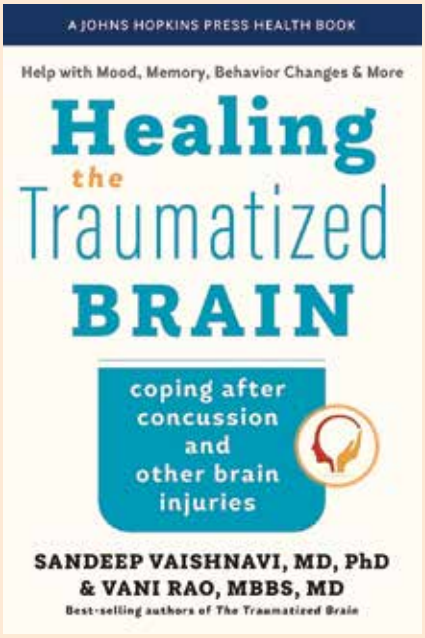
The book then moves on to the problems that may arise from a brain injury and how to manage them, in parts three to six. Each chapter starts with a real-life example of a person who has a brain injury which helps engage the reader, then delves into symptoms and management. The ending of a chapter rounds off with a summary and practical top tips for both the person with a brain injury and their carers. The authors do a wonderful job of emphasising the role of the multidisciplinary team, involving the person with brain injury at its centre.

Part seven of the book expounds potentially new treatments for brain injuries, particularly brain stimulation and the idea of plasticity. Of course, this is the section of book where the need for updated editions may be noticed first.

After part seven are the epilogue, glossary, resources, suggested reading and index; all were easy to navigate, although mostly for readers living in the USA (as a UK reader I saw… shock horror… not a single NHS website in sight).

The authors have an informative, didactic style, using lay language and elaborating when needed. With a compassionate, respectful, and clear voice, which is all the more important in destigmatising mental illness, the authors remind the reader that 'You are not alone. There is hope. There is a way forward'.

My final assessment of 'the traumatized brain' is that it is worth a read. The authors bring a voice to the 'silent' nature of brain injuries. It is a great beginner's guide, although a more specialist book may be needed if the reader wants an in-depth understanding, and so this book is less suitable for experienced clinicians. As such, the publisher's price of £45.50 is rather steep.



Arnold Pick (1851-1924): a centenary appreciation

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Introduction

2024 marks the centenary of the death of Arnold Pick (1851-1924). Many clinicians are aware of the name and of "Pick's disease" although they may be unclear exactly who he was or what this terminology designates. This article seeks to give some brief biographical details, recap Pick's key findings on "Pick's disease", and relate the latter to current thinking about the classification of frontotemporal dementia, an undertaking which prompts the consideration as to whether the eponym should stand or be laid to rest as now obsolete and superseded.

Biography [1,2]

Arnold Pick (Figure 1) was born in Moravia, a province of the Hapsburg Empire, in 1851. He graduated from the Vienna Medical School in 1875; part of his training was with Theodore Meynert and he overlapped with Carl Wernicke. From the late 1870s he worked mostly in Prague, taking the chair of neuropsychiatry at the German University there in 1886 where he remained chairman until his retirement in 1921.

Pick's many publications covered a wide range of interests, including work on aphasia, wherein he introduced the concept of agrammatism. The influence of John Hughlings Jackson's (1835-1911) work on aphasia may be evidenced by Pick's dedication of his monograph of 1913 on agrammatism, *Die agrammatischen Sprachstörungen; Studien zur psychologischen Grundlegung der Aphasielehre*, to Hughlings Jackson, as "the deepest thinker in neuropathology of the past century" [3]. Kertesz reports that "Pick had Jackson's portrait on his desk" and that "Jackson wrote about Pick and popularised his work in England" (ref. 2, p.19). However, other than his mention of Pick in a footnote of his 1894 paper "The Factors of Insanities" ("I know of but a single study of re-evolution, a very valuable one by Professor Pick, of Prague" [4]), I am not currently aware of any other Jackson reference to Pick (he does not appear in Greenblatt's book on Jackson [5]). Luria [6] credited Pick with recognising the manifestations of afferent apraxia shortly after the original description by Liepmann (1905), citing his *Studien über motorische Aphasie* published in Vienna in 1905.

Pick's publications were by no means limited to behavioural neurology or dementia, nor to the Germanophone literature. He appeared several times in the pages of *Brain* [7-9], including a description of reduplicative paramnesia [8]. Indeed, his final paper, "On the pathology of echographia", appeared in *Brain* in 1924 with the by-line "By the late A. Pick. Professor in the German University, Prague" [9], indicating that he continued to write until shortly before his death.

Fig 1. Arnold Pick

Key papers on focal atrophy

Pick published several papers in the late 19th and early 20th centuries describing clinical deficits in association with focal brain atrophy, papers which have been critically discussed [10-12]. These deficits were either linguistic or behavioural in nature.

The first of these papers, dating to 1892, described a man of 71 ("August H.") with progressive aphasia who at post-mortem was found to have marked atrophy of the cortical gyri of the left temporal lobe [13]. Pick reported further cases of language disturbance in association with either frontotemporal atrophy (1901) [14], or left temporal lobe atrophy (1904) [15]. By contrast, a patient with behavioural disturbance (apathy, disinhibition, personal neglect) in association with bilateral frontal atrophy was reported in 1906 [16].

Pick was primarily interested in clinico-anatomical correlation and did not report microscopic pathological findings in any of these cases. Indeed, it was Alois Alzheimer (1864-1915), not Pick, who in 1911 described the histological findings in such cases (the name "Pick's disease" was not introduced until the 1920s). Alzheimer specifically described the argyrophilic intracytoplasmic inclusions ("Pick bodies") and the diffusely staining ballooned neurones ("Pick cells") which may be associ-

ated with some cases of focal lobar atrophy [17]. (Incidentally, I cannot immediately think of any other instance in which microscopic neuropathological abnormalities have acquired the eponym of someone who had no role in their initial description, but I stand open to correction on this point.) This nomenclature is perhaps all the more surprising in light of the reported rivalry between the laboratories of Alzheimer (in Kraepelin's department) and Pick, which may have been one reason for Kraepelin's promotion of "Alzheimer's disease" as of the 1910 edition (8th) of his textbook of psychiatry [18].

Judgment of posterity?

Perhaps only those dedicated to the study of the dementias in general and of the frontotemporal lobar degenerations in particular will keep abreast of the different classifications which have been proposed for these disorders. Previously lumped together as "Pick's disease", this latter terminology has steadily become more marginalised. If used at all now, "Pick's disease" denotes one subtype of frontotemporal lobar degeneration characterised by the neuropathological finding of Pick bodies and Pick cells. A necessary corollary of this formulation is that "Pick's disease" is not, and cannot be, an exclusively clinical diagnosis.

The heterogeneity of the frontotemporal lobar degenerations defined at clinical, pathological, and genetic levels [19] has been responsible for this marginalisation of Pick. An attempt to encompass all these conditions under the rubric of "Pick complex" [20] (i.e. as interrelated variants on the same spectrum, including frontal lobe dementia with or without motor neurone disease, corticobasal degeneration, and primary progressive aphasia) cannot be said to have prospered in the 25 years since its proposal. Current molecular classification of frontotemporal dementias categorises Pick's disease as 3R FTLD-tau, sometimes with coexistent TDP-43 pathology [21].

Accordingly, the term "Pick's disease" may now be regarded as effectively redundant, in fact obsolete, the moreso if one takes into account the fact that Pick did not describe the characteristic neuropathological findings of "his" disease. If so, it will nevertheless remain the case, as pointed out by John Hodges, that the relegation of Pick to a minor place in the terminology of frontotemporal dementia is sad in light of his "monumental contributions" [11]. In my clinical experience the terminology persisted only in non-specialist medical parlance (e.g. primary care referrals to the memory or cognitive clinic) and in some old age psychiatry clinics (wherein patients labelled as "Pick's disease" may nonetheless have received treatment with cholinesterase inhibitors!).

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Myasthenia gravis and pregnancy

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Abstract

Myasthenia Gravis (MG) is an acquired, autoimmune disorder of the neuromuscular junction, resulting in fluctuating skeletal muscle weakness and fatigue. MG prevalence increases with advancing age and is estimated to be 12 per 100 000 in European females below age 50 years [1]. The interplay of MG and pregnancy poses unique challenges for pregnant women and healthcare providers. In the UK, managing MG during pregnancy involves a multidisciplinary approach, bringing together neurologists, obstetricians, anaesthetists, and neonatologists. This collaboration is critical given that about 30% to 40% of women with MG may experience a worsening of their symptoms during pregnancy [2]. This review seeks to highlight the current consensus-based practice in the UK regarding MG management in pregnancy.

Introduction

Neither MG, nor the commonly used drugs in MG are expected to influence fertility. Females with MG tend to have fewer children than healthy women, but this can be explained by reasons other than reduced fertility [3].

To minimise the effects of MG on pregnancy and the newborn, discussion about planned pregnancy is essential and needs to occur early. There should be close collaboration with obstetricians in the preconception stage as well as throughout pregnancy. The aim is for stable disease before conception whilst avoiding treatments associated with teratogenic effects.

Once pregnant, it is important to avoid factors that can cause MG exacerbation, such as giving certain drugs or withdrawing immunosuppression. Infections should be treated promptly, and thyroid status should be checked, if not done before. The clinical course can be variable and so patients need easy access to their myasthenia specialist team.

MG treatment during pregnancy

The recommended treatment pathway for MG is applicable for all patients with MG but during pregnancy, treatments with known teratogenic effects are avoided (see figure and table) [4,5].

Pyridostigmine should be the initial treatment in most patients with MG with the dose adjusted as needed based on symptoms. Corticosteroids and/or non-steroidal immunosuppressive therapy should be introduced when symptoms are not adequately controlled by pyridostigmine alone.

Most females of reproductive age with MG and acetylcholine receptor (AChR) antibodies have an enlarged and hyperplastic thymus and thymectomy early in the disease improves outcome [6]. If possible, surgery should be performed well before pregnancy or otherwise postponed until after pregnancy. Thymectomy may reduce the risk of neonatal myasthenia [7].

Prednisolone and Azathioprine are considered safe in pregnancy [4]. Sometimes additional medications are prescribed to counteract corticosteroid side effects. Vitamin D supplements are recommended for all women during pregnancy and omeprazole is also commonly used. However, bisphosphonates are not usually recommended although the risks are largely unknown. Since bisphosphonates are stored in bone for up to 10 years, in theory a pregnancy occurring several years after bisphosphonate use could still be exposed.

Mycophenolate mofetil, methotrexate and cyclophosphamide are teratogenic immunosuppressive medications and so are generally avoided in all women of reproductive age, at least if there is a chance of pregnancy. The calcineurin inhibitors (e.g., ciclosporin) are considered safe in pregnancy but are generally used second line to azathioprine due to potential toxicity.

Recent advancements in clinical neuroscience have provided deeper insights into the pathophysiology of MG, paving the way for more targeted therapies. Notably, the development of monoclonal antibodies like rituximab and eculizumab have resulted in significant improvement in MG patients. Their safety in pregnancy remains under investigation and timing of dosing is important to prevent significant immunosuppression in the new-born [8].

Plasma exchange (PLEX) and intravenous immunoglobulin (IVIg) are the mainstay of management in myasthenia crisis and are safe to use in pregnancy.

Effect on mother's MG

The relative risk for onset of MG during pregnancy is not increased but there is a 5-fold increased risk of onset of MG during the first 6 months postpartum [4]. 30-40% of women with MG may experience worsening of their symptoms during pregnancy but the clinical course is variable and difficult to predict, even from pregnancy to pregnancy in the same woman. Exacerbations are generally mild - moderate and again, occur more commonly during the first 6 months postpartum [4]. Myasthenic crisis is rare.

Anatomical changes during pregnancy may worsen pre-existing myasthenia symptoms. Pregnancy increases the risk of gastric reflux and those with associated bulbar involvement are at particular risk of subsequent pulmonary aspiration as they are less able to clear secretions and protect their airway. Respiratory muscle weakness in patients with MG can exacerbate the normal reduction in functional residual capacity and volume that occurs in pregnancy which could precipitate respiratory failure.

Complications and adverse outcomes in pregnancy

Most women with MG generally experience uncomplicated pregnancies. However, research suggests that compared to their healthy counterparts, women with MG may have a slightly higher risk of pregnancy complications during delivery. The rates of these complications vary across different studies due to factors such as population, sample size, and study design. Potential complications of MG pregnancies include pre-term birth (12%) and low birth weight (9%), especially in cases where symptoms worsen during pregnancy [4]. To reduce the risk of birth defects, it is recommended that all pregnant women, including those with MG, supplement with folic acid.

Several studies have examined the adverse effects of corticosteroid exposure on pregnancy and birth outcomes. However, these studies are largely observational and fail to adequately explore confounding factors related to the disease or its severity [9]. Corticosteroid use is associated with an increased risk of gestational diabetes mellitus (GDM), elevated blood pressure, infections, and pre-term deliveries. Therefore, screening for GDM through a glucose tolerance test is recommended at 28

Table 1: Summary of the pregnancy complications and adverse outcomes associated with the drugs commonly used to treat myasthenia

Medication	Mode of action	Teratogenicity	Approach in pregnancy	Breastfeeding
Pyridostigmine	Acetylcholinesterase inhibitor	Safe; does not cross the placenta in significant amounts	Continue; select lowest effective dose. Avoid iv use as may produce uterine contractions	Limited data; probably safe
Prednisolone	T-cell inhibition	No convincing evidence for harm	Continue; select lowest effective dose. Screen for GDM	Safe
Azathioprine	Antimetabolite	No convincing evidence for harm	Continue, reduce dose in 3rd trimester if leucopenia	Safe
Mycophenolate mofetil	Antimetabolite	Teratogenic	Discontinue > 3 months before conception	Contraindicated
Methotrexate	Antimetabolite	Teratogenic	Discontinue > 3 months before conception.	Contraindicated
Cyclosporin	Calcineurin inhibitor	Not known to cause problems	Continue (maximum dose 3.5 mg/kg/day)	Probably safe
Tacrolimus	Calcineurin inhibitor	Limited data but no concerns raised	Continue; screen for GDM	Probably safe
Rituximab	Anti-CD20 Ab	B-cell depletion possible in new-born if used in 2nd & 3rd trimester. Avoid live vaccines in infant until B-cells have normalised	License indicates discontinue 12 months before conception; can consider in individual cases	Probably safe
Eculizumab	C5 complement Ab	Limited human data. Doesn't cross placenta in first trimester. Small number of case reports of miscarriage, stillbirth, premature birth and / or low birth weight. Avoid live vaccines in infant for 6 months.	Not licensed	Limited data; probably safe. Avoid live vaccines in infant for 6 months.
Efgartigimod	Neonatal Fc receptor antagonist	No data. Animal data has not shown evidence of adverse developmental outcomes. A reduction in new-born passive immunity is expected due to reduced maternal IgG levels.	Not licensed	No data.
Intravenous Immunoglobulin		Not expected.	Can be used during pregnancy	Limited data; probably safe

weeks of pregnancy or earlier if there are additional risk factors present, such as hypothyroidism or a high body mass index (BMI) [3].

For women with MG, vaginal delivery is generally recommended, as the smooth muscle fibres of the uterus remain unaffected by the condition. While a higher rate of Caesarian section is reported, possibly due to the contribution of striated (skeletal) muscle in the second stage of labour, it should only be performed for obstetric indications and not solely as a precaution to prevent exhaustion. Nitrous oxide (Entonox) can be used as usual, and epidural analgesia is preferred over general anaesthesia. Although most anaesthetic drugs are safe for women with MG, they are highly sensitive to muscle relaxants. Pethidine and other opioids should be avoided, as they may worsen respiratory depression in both the mother and fetus. Additionally, mothers who receive more than 7.5 mg of long-term daily prednisolone should receive parenteral steroids to cover the stress of delivery [4].

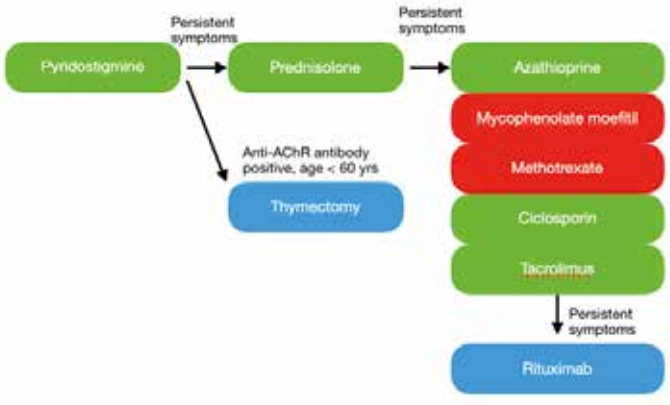

Figure. 1 Recommended treatment pathway for MG [4,5,8]. The green therapies are considered safe in pregnancy, the red ones should be avoided and the blue ones can be used in women of childbearing age but generally not during pregnancy.

In the event of complications, certain obstetric drugs should be avoided. Magnesium sulphate is not recommended for the management of eclampsia in women with MG due to its neuromuscular blocking effects.

Neonatal myasthenia

It is recommended to give birth at a hospital with experience in neonatal intensive care, as approximately 10% of babies born to mothers with MG may experience transient muscle weakness, typically within the first 24 hours after birth. This muscle weakness is reported most often to occur in babies of MG mothers with AChR antibodies but has also been described with muscle specific kinase (MuSK) antibodies, as well as in those without detectable muscle antibodies. It is caused by the transfer of pathogenic autoantibodies through the placenta. As the mother's IgG antibodies break down in the baby, the muscle weakness improves, but it may take several

weeks for normal function to be restored. There is no direct correlation between the maternal antibody titre or the severity of the mother's MG and the risk of neonatal myasthenia [7]. However, having a previous child with neonatal myasthenia increases the risk of the condition in subsequent pregnancies [10].

Arthrogryposis, a rare and often fatal condition characterised by skeletal abnormalities and joint contractures, can occur in children of mothers with MG. This condition arises when the mother's IgG antibodies bind to the foetal-type AChR, leading to restricted foetal movements in utero. In even rarer cases, a persistent myopathy termed "foetal acetylcholine receptor inactivation disorder" occurs, which is attributed to a permanent change in the post-synaptic membrane caused by maternal AChR antibodies during a critical period of foetal development. Maternal treatment with IVIG or PLEX can inhibit the development of arthrogryposis. Therefore, close monitoring of foetal movements is important for all women with MG to detect any abnormalities [10].

Breast feeding

Breast feeding is not known to influence mothers' MG and should be encouraged as there are many advantages, including reducing the risk for autoimmune disease later in life [11]. Maternal IgG levels in breast milk comprise only 2% of that in serum and therefore would not be expected to cause harm.

Maternal transfer of pyridostigmine, prednisolone, azathioprine or their metabolites into breast milk is minimal and breastfeeding is probably safe also for treatment with monoclonal antibodies (e.g., Rituximab) and the calcineurin inhibitors. Known teratogenic MG medications should not be given to mothers with MG who are breast feeding.

Conclusion

MG does not represent a reason for not having children, and the patients should be supported in their wish of becoming pregnant.

Myasthenia gravis in pregnancy demands a delicate balance between managing maternal symptoms and ensuring foetal safety. Understanding these complexities, recognising potential complications, and staying abreast of emerging therapies are crucial to optimising outcomes for both mother and child. Further research is warranted to better guide the management of this challenging intersection of neurology and obstetrics.

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ILAE British Branch 2024 Annual Scientific Meeting

The ILAE British Branch are holding their Annual Scientific Conference at the Titanic Hotel in Liverpool, from 21-23 October, 2024. Please find the link below to the Conference, giving details of the programme, registration and instructions for submitting abstracts and Gowers essays.

www.ilaebritishconference.org.uk

Please note that the deadline date for all abstract and Gowers submissions is Monday, July 1st.

Programme topics include:

- Prediction modelling in Epilepsy / What use are clinical prediction models? / Predicting death and adverse outcomes/ Seizures and encephalitis
- Grey and white matter matter
- Pregnancy and Epilepsy
- Practical approach to mental health and Epilepsy
- Excellence in Epilepsy Award lecture
- Genetic case studies session
- Poster viewing session
- Platform Session & Celine Newman Neurobiology of Epilepsy Session
- ES Networking Event

CPD points are being applied for from the Federation of the Royal Colleges of Physicians of the United Kingdom.

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2. The neuropsychiatry of 'organic' psychotic syndromes.
3. Paediatric Neuropsychiatry: taking a developmental perspective through the lens of Developmental Regression and Intense Imagery Movements (IIM).
4. The placebo effect in neuropsychiatric conditions: implications for clinical trials and disorder mechanisms.
5. Neuropsychiatry in print: what do neurologists need to know.
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Visit rcpsych.ac.uk/events for further details and to register online.

Contact: Rukiyat Babajide on Rukiyat.babajide@rcpsych.ac.uk or 0208 618 4288

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Akathisia

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Akathisia is usually defined as an inability to sit or to remain still. It results from a compulsive need or desire to move frequently. This compelling motion particularly involves the legs – pacing and rocking from side to side, inability to stand or sit still. The patient moves in order to nullify an unwanted, unpleasant sensation; they are largely insuppressible.

It has two elements: 1. A subjective component – the urge to move, an inner restlessness accompanied by tension, irritability, and impatience. 2. An objective component of increased physical movement associated with complex but stereotyped leg crossing, swinging of a leg, lateral knee movements, sliding of the feet, and rapid walking [1]. Vocalisations or moaning are also recognised. With a compelling need to move, it is under only partial voluntary control; but suppression of movement results in distress.

History

A Czech Physician, Ladislav Haškovec (1866-1944) first described the condition in two men, in an article published in Revue Neurologique in 1901 [2]. Haškovec initiated the word akathisie, from the Greek "akathemi," "not to sit." Both men had many vague symptoms (headaches, dizziness, paraesthesiae, tremor), but neither was able to sit still for more than a few minutes and had to keep walking or moving around the room. They claimed their movements were involuntary. Haškovec found no evidence of psychosis or neurological signs. He diagnosed one as hysteria, the other as neurasthenia; thus akathisia was thought to be psychogenic [3].

Only some twenty years later was it appreciated that akathisia could arise from organic causes. In 1923 Robert Bing adopted the term to describe it as a common motor phenomenon in von Economo's post-encephalitic parkinsonism [4]. Sicard described it both in idiopathic and post-encephalitic Parkinson's syndrome [5]. Kinnier Wilson wrote that even though Haškovec used the term akathisia for cases of 'hysterical or psychopathic nature,' it could be applied to Parkinsonian patients. He described:

> *There are patients in whom immobility is actually a prominent symptom and who yet complain in a paradoxical way that "they cannot sit still," or only "with an effort." After a time they simply must get up and walk about, immobility having become intolerable [6].*

The first hint that drugs might induce or aggravate akathisia came from Sigwald in 1947, who reported drug-induced akathisia in a patient with Parkinson's disease (PD), who developed restlessness when treated with the antihistamine promethazine, (a phenothiazine derivative) [7].

After antipsychotic (syn. neuroleptic) drugs became generally available in the 1950s, several reports appeared in the literature of patients being restless, unable to sit, and marching like soldiers to abate the restless feelings. The similarity with the akathisia of the pre-antipsychotic era was recognised. Many believed this iatrogenic effect was the only cause.

In the early 1960s, akathisia was accepted as an 'extrapyramidal' side effect of antipsychotic medications with dopamine receptor blocking properties. Both first and second-generation antipsychotic drugs may cause akathisia. It was shown that it could occur in psychiatrically normal individuals when treated with antipsychotic drugs. It could occur as an immediate or delayed side effect of medication. Estimates of the prevalence of akathisia in antipsychotic-treated patients range between 20% and 40%.

Clinical features

In practice, the condition often goes unrecognised or is misdiagnosed as psychogenic agitation or anxiety, restless legs syndrome, substance abuse, or tardive dyskinesia. However, defining criteria of akathisia have not been established. And it has not been accurately separated from the choreic movements of lips, tongue, jaw, neck, and trunk, which constitute acute and tardive dyskinesias, which commonly coexist.

Some workers confine akathisia to a subjective feeling of restlessness, others insist on objective evidence of restless movements as the main criterion. Most distinguish it from the restless legs syndrome in which localised dysaesthesiae in the legs relieved by voluntary movement or walking occurs mostly during evening/night affecting sleep, with no associated extrapyramidal symptoms. The Barnes Akathisia Rating Scale [8] and the Prince Henry Hospital Akathisia Scale are frequently used in assessment.

Akathisia can begin within hours of starting treatment and usually disappears if treatment is stopped (Acute akathisia). It more often develops some weeks or months later (Tardive akathisia), or on withdrawal or reduction of antipsychotic dosage (Withdrawal akathisia). It tends to persist for many years (Chronic akathisia), is often associated with tardive dyskinesia. It can spontaneously remit, sometimes despite continued antipsychotic therapy (Table 1).

Any dopamine-blocking antipsychotic drug can cause akathisia; the butyrophenones, all the phenothiazines (predominantly dopamine D2 receptor blockers) are the commonest. The thioxanthenes can also cause akathisia. Less often, atypical antipsychotics are incriminated. Several non-antipsychotic drugs have also been reported as causes [9] (Table 2).

Treatment

Treatment is often unsatisfactory and the main aim should be prevention where possible

Table 1. Antipsychotic drugs reported to cause akathisia*

Butyrophenones	haloperidol, droperidol, benperidol
Phenothiazines	chlorpromazine, promazine, fluphenazine, perphenazine, prochlorperazine, trifluoperazine
Thioxanthenes	flupentixol, zuclopenthixol
Second-generation atypical antipsychotic drugs	aripiprazole, clozapine, olanzapine, quetiapine, risperidone

Table 2. Some non-antipsychotic drugs reported to cause akathisia

Antiemetics: metoclopramide, prochlorperazine, domperidone
Antidepressants: tricyclics, selective serotonin reuptake inhibitors (SSRIs fluoxetine, paroxetine, sertraline, venlafaxine)
Calcium channel blockers: cinnarizine, flunarizine (also H1 antagonists)
Others: methyldopa, levodopa, dopamine agonists

> *Akathisia is usually defined as an inability to sit or to remain still. It results from a compulsive need or desire to move frequently. This compelling motion particularly involves the legs – pacing and rocking from side to side, inability to stand or sit still.*

[10]. Combination antipsychotic therapy should be avoided. On uncertain evidence reduction of dosage is often undertaken, provided psychiatric relapse is carefully monitored. Switching to a neuroleptic is less likely to cause extrapyramidal side effects, such as clozapine, olanzapine or quetiapine is also commonly used. Troublesome subjective discomfort can be treated with benzodiazepines, gabapentin, or beta-adrenergic blockers such as propranolol; there is no good evidence to support, or refute, the use of anticholinergic drugs.

**Classification and groupings are still debated*

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Preview: The Comorbidities of Epilepsy Course

Dates: 21 June 2024
Location: St George's, University of London
Course lead: Dr Marco Mula
Fee: From £25
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Dr Ann Donnelly – Consultant Neurologist and Co-Editor, ACNR

The neurorehabilitation of people with Guillain-Barré Syndrome

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Abstract

Guillain-Barré Syndrome (GBS), or Acute Inflammatory Demyelinating Polyneuropathy (AIDP) is a rare, acquired condition which can cause pain, sensory impairment and weakness in the limbs. The severity varies widely from mild non-disabling symptoms to complete flaccid tetraplegia, respiratory failure and autonomic instability. Those with severe weakness are particularly susceptible to the complications of immobility, most prominently shortening of the soft tissues and potentially permanent loss of range in the joints. Here, we set out a multi-disciplinary approach to rehabilitating people with GBS, which we consider as three processes: prevention, adaptation and restoration. We describe how the approach should be tailored and used flexibly over the course of the person's rehabilitation, aiming to maximise recovery and minimise long-term disability.

Key points

1. The rehabilitation of people with Guillain-Barré Syndrome can be considered as three processes: Prevention, Adaptation and Restoration.
2. A comprehensive rehabilitation programme will often require all three processes, however the proportion of each will depend on the degree of nerve regeneration and the presence of factors such as pain and fatigue.
3. Early intervention is essential to maintain joint range of movement and prevent secondary complications of immobility.
4. Ongoing access to community and/or outpatient services is vital to reduce long-term disability, optimise the transition from a hospital setting to the community and increase participation in leisure, work and social activities.

Introduction

Guillain-Barré syndrome (GBS), or Acute Inflammatory Demyelinating Polyneuropathy (AIDP) is a rare neurological disorder estimated to affect 1-2 people in 100,000 per year [1]. It is usually preceded by infection or other immune stimulation that triggers an autoimmune response targeting peripheral nerves and their spinal roots [2]. Demyelination of the peripheral nerves results, which in most cases may be repaired quickly by Schwann cells. However, in more severe cases there may be loss of nerve axons leading to a more prolonged clinical course. The severity of GBS can vary from mild, temporary weakness to severe and chronic paralysis; 30% of people require mechanical ventilation [3] and up to 20% are unable to walk unaided 6 months after onset [4].

The management of people with GBS can be challenging as there are several variants, classified by the pattern of peripheral nerve involvement. Current literature supports a multidisciplinary team (MDT) approach, early rehabilitation and aggressive management of potential obstacles such as soft tissue changes, fatigue, pain and psychological distress [6,7]. However, there is little data on how the MDT should implement and adjust treatment strategies in response to varied and changing impairments.

Approximately 40% of people hospitalised with GBS will require inpatient rehabilitation [8]. This group usually have a degree of axonal involvement, and hence see a slow return in motor activity from proximal to distal over many months as regeneration proceeds. This occurs at a rate of 1-3 mm per day [9]; from the anterior horn cell to an extremity may take as long as 1-2 years. Appropriately timing inpatient

rehabilitation can therefore be challenging due to the slow rate and sometimes incomplete nature of nerve regeneration.

The rehabilitation of people with GBS has been previously identified in two stages [10]; an early stage to reduce the level of disability and prevent secondary complications and a later stage to improve function and participation. We propose that it is more beneficial to consider rehabilitation as a series of processes rather than stages, namely prevention, adaptation, and restoration (Figure 1).

A comprehensive rehabilitation programme will often require all three processes. The proportion of each will depend on the degree of nerve regeneration and factors such as pain, fatigue, mood and psychological adjustment. For example, a person may require a positioning programme to prevent loss of finger joint range of movement but is able to brush their teeth using an adapted toothbrush. They may also have a strengthening programme aiming to restore motor power. We acknowledge that many people with GBS also suffer with respiratory complications that require management; however, this is outside of the scope of this article. This article will detail these three processes and factors to be considered throughout the course of rehabilitation.

Prevention

The MDT should make an early assessment of the person's risk of developing soft tissue shortening and/or joint contracture, considering their positioning over 24-hours. Any joint that a person cannot move through a full range will be at risk, therefore those with more significant weakness will be particularly vulnerable. There is a paucity of evidence for interventions to prevent loss of joint range of movement in GBS. However, there are generally accepted management principles that may reduce this risk and associated complications including pain and pressure sores. A bespoke positioning programme should be implemented at the earliest opportunity, ensuring the resting positions of each joint are changed frequently over the 24-hour period. This may include but is not limited to use of custom and/or prefabricated splints, pillows, wedges, and other bed positioning aids (Image 1 and 2). The application of such interventions may be complicated by the environment (ventilator tubing, lines, catheter etc).

Extra care should be taken in the cases of sensory nerve involvement as the person will be more susceptible to skin breakdown and pressure sores. Allodynia and/or hypersensitivity are common and can be triggered during care tasks and repositioning. Establishing a comfortable method of handling collaboratively with the person with GBS will support desensitisation and reduce distress.

In those with facial nerve involvement, eye care is paramount to prevent secondary exposure keratosis. Ophthalmology services can provide specific recommendations however administering regular eye drops, performing manual blinks and taping the eyes closed at night will help to maintain eye health. Weakness of the facial muscles leads to muscle immobility and secondary tightness. This is a clinical area that is often overlooked yet facial massage and/or specific stretch techniques can prevent muscle tightness and reduce the longer-term impact on eating, drinking, facial expressions and psychosocial well-being.

People with GBS should gradually be exposed to upright postures, and regular periods of sitting out of bed commenced as soon as tolerated. Progression to standing can then be explored using a tilt table, standing frame or appropriate aid dependent on muscle strength. Regular periods of sitting or supported standing can then form components of the 24-hour positioning programme.

Close monitoring for signs of autonomic dysfunction is required (orthostatic hypotension, tachycardia, sweating and respiratory distress). Physical aids such as abdominal binders and compression stockings can be trialled in the first instance if orthostatic hypotension persists. If these are unsuccessful and mobilisation out of the bed cannot be tolerated, medications may be considered. These include mineralocorticoids such as fludrocortisone or sympathomimetics such as midodrine.

Adaptation

In more severe cases of GBS, people are often heavily dependent on others to perform daily tasks. Rehabilitation should focus on enabling and enhancing participation in everyday activities that are meaningful to the person. Initially, this may require an adaptive, compensatory approach.

Establishing a robust means of communication at the earliest opportunity increases independence and can help to manage psychological distress, reduce isolation and alert staff to support care needs. Adapted call bells can be purchased or fabricated (Images 3-5). Voice activation, eye gaze control and facial recognition software can be used to enable independence in contacting family or friends and accessing leisure outlets such as social media, audio books and TV (Table 1). Applications can be made to 'Guillain-Barré & Associated Inflammatory Neuropathies' (GAIN) charity [11] for the provision of a voice-activated device. Technology support is available from organisations such as 'AbilityNet' [12]. Referral to local environmental control services should be considered in severe and/or prolonged cases.

Therapists should evaluate the person's current level of functioning in daily activities to determine what limitations are present [13]. They should consider if the task or environment could be adapted to enhance participation and independence. Table 1 provides some practical examples. The 'AskSARA' service and 'Living Made Easy' website [14] and suggested

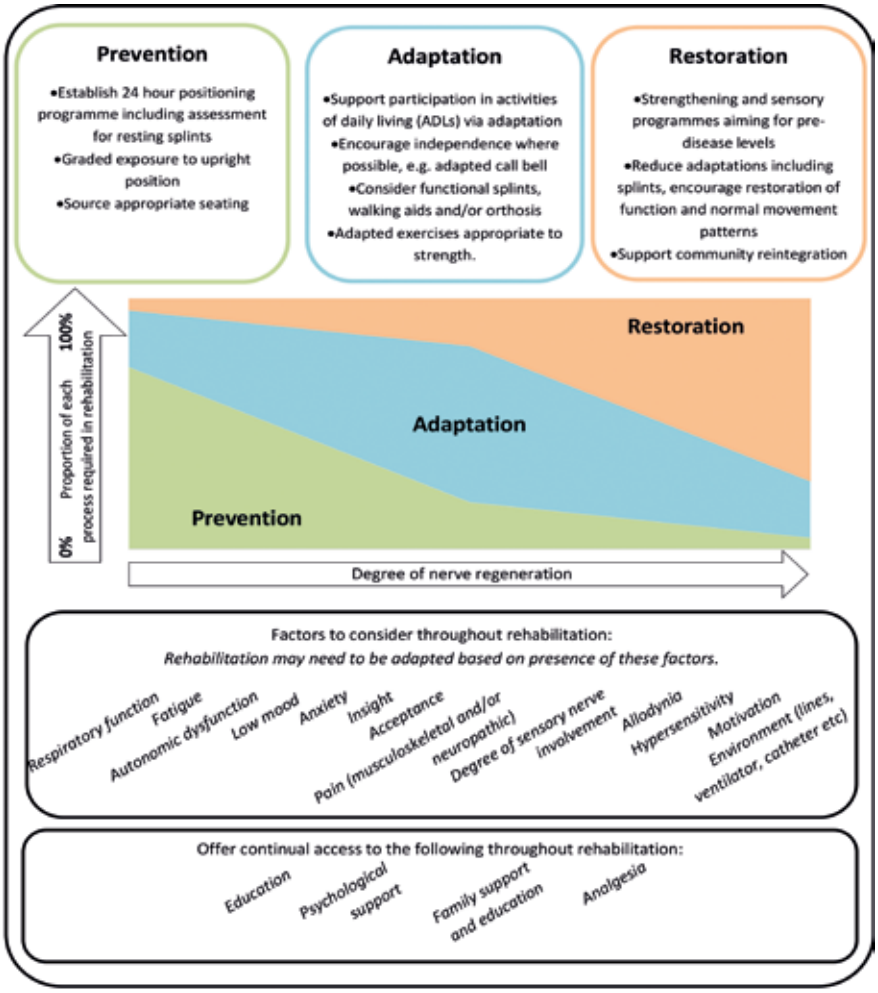

Figure 1: The 3 processes of rehabilitation of people with Guillain-Barré Syndrome

product list compiled by the GBS-CIDP foundation [15] can be helpful resources when considering potential aids.

Performance of daily activities should be regularly monitored and evaluated. As the person regains strength and activity tolerance, task or environmental adaptations should be graded to encourage further independence and participation (Images 6-8). An increasing number and complexity of activities can then be introduced such as work and hobbies (Images 9-10).

Rehabilitation of mobility should proceed concurrently, also using an adaptive approach. A strengthening programme can initially be performed in gravity-eliminated positions and/or utilise adjuncts such as de-weighting equipment. Once able, this should be progressed to gravity-dependent positions using equipment such as a tilt table, electric standing frame and standing hoist and then take the form of functional tasks. Mobility aids and/or orthotics (Table 1) can be considered to enable earlier participation in transfers and mobility and to promote independence.

Restoration

As nerve recovery continues, the rehabilitation approach should focus on restoration, with the goal of returning to pre-disease function and mobility levels. Therapists should aim to reduce environmental and task adaptations, promoting the recovery of underlying impairments. However, some adaptive and preventative approaches may need to continue longer-term, particularly in those with axonal damage. Rehabilitation programmes should aim to address loss of cardiovascular fitness which may be profound, particularly in those that required a prolonged hospital stay.

People with GBS need to be supported to transition from an inpatient rehabilitation setting to the community. Care and time are required to support people to adjust to living with ongoing physical dependence. Education, coaching, connecting with peers and accessing charity support (e.g. GAIN and GBS CIDP Foundation [11,15]) can all support with this difficult transition.

As many as 14% of people with GBS experience moderate-to-severe residual disability. At 10 years, limitations to walking, functional use of the arms, facial weakness and paraesthesia can persist [16]. People may make substantial changes to their job, hobbies and role within their family and reduce their participation in leisure and social activities [17]. Ongoing access to community and/or outpatient services is therefore vital but unfortunately rarely available over prolonged periods. This may include specialist services such as orthotics, vocational rehabilitation and driving assessment centres.

Education, adjustment and psychological support

Formal neuropsychology input is often required for what is effectively a traumatic sequence of events, particularly in those with more severe impairment. It is essential to monitor mood regularly, and to involve psychology or psychiatry colleagues early, as appropriate. The MDT should be mindful that people with GBS are often unable to access specific peer support. There is a lack of GBS specialist centres (unlike spinal cord injury and stroke units) and therefore people are admitted to rehabilitation units with those who have very different conditions and needs.

Discussions about prognosis should ideally happen early in the course of the disease to support with adjustment; however optimal timing of these discussions will vary depending on individual circumstances. The MDT should be realistic, considering prognostic factors [7,18] but aware of the impact this information could have on the person's mood and engagement in rehabilitation. In more severe cases, there may be loss of hope. Coaching and education play important roles, alongside regular collaborative goal setting that allows frequent conversation regarding prognosis, recovery and function.

Pain management

Pain is a common symptom of all variants of GBS, occurring in up to 89% of people during the course of the disease [19]. Intensity can be moderate to severe and may persist one year after GBS onset [20]. Neuropathic pain is associated with reduced quality of life [21] and often affects participation in rehabilitation. Furthermore, the presence of allodynia and/or hypersensitivity may reduce tolerance to carer handling and use of positioning aids and splints. Pain management should therefore be of highest priority, but it may be complex as neuropathic pain often co-exists with nociceptive pain [7]. We recommend careful MDT assessment of pain and the early aggressive up-titration of neuropathic agents, opiates and/or non-steroidal medications as tolerated and as appropriate. Involvement of a specialist pain team and psychology colleagues can be hugely valuable in successfully managing pain.

Fatigue

Severe fatigue affects 60% of people with GBS [22]. Fatigue reduces the person's capacity to engage in rehabilitation and participate in daily activities including socialising with family and friends. It can have a profound impact on quality of life. Fatigue requires active management throughout all phases of recovery employing principles that are applicable to other neurological conditions. This should

Image 1: Composite finger flexion splint

Image 2: Soft and scotch resting splint

Images 3-5: Bespoke adapted call bell graded with increasing proximal strength

Image 3: Head and neck operated adapted call bell with additional padding to protect skin integrity

Image 4: Forearm operated adapted call bell requiring minimal antigravity gross movement

Image 5: Standard call bell attached to armrest operated by increased precision antigravity shoulder and elbow movement

Images 6-8: Graded rehabilitation progression

Image 6: Gross bimanual upper limb task (rolling dough), alignment supported with 'jay' backrest at a height adjusted counter

Image 7: More challenging bilateral upper limb task (grating cheese) with increased postural demand in perched sitting

Image 8: Precision task (chopping) with standard knife in electric standing frame

Images 9-10: Upper limb targeted interventions in leisure ADLs

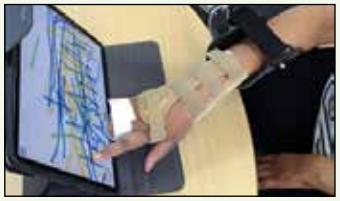

Image 9: Use of splinting with mobile arm support to facilitate participation in ipad use/art in sitting

Image 10: Use of neoprene thumb support to optimise thumb position for gaming control use. Verbal and/or visual feedback can help support adaptive movement patterns.

include a coordinated effort across the MDT; planning the day to balance activity and rest times, pacing and modifying tasks. Education is key in supporting the person to make adjustments to their day, which can be frustrating when this includes periods of rest to avoid a 'boom and bust' cycle.

Conclusion

The rehabilitation of people with GBS requires a holistic MDT approach to acknowledge and manage a wide variety of symptoms and secondary issues related to the diagnosis. Rehabilitation should consist of three processes: prevention, adaptation, and restoration (Figure 1). Early intervention to prevent loss of joint range of movement by establishing a 24-hour positioning programme is essential. Careful consideration must be made to allow the person to interact with their environment, social networks and interests in order to support their adjustment throughout the course of rehabilitation. Therapists can enable this through adaptation of the task or environment. As recovery continues, rehabilitation should evolve to focus on restoration, aiming for pre-disease levels of function and mobility. There are likely to be several factors that influence a person's recovery such as fatigue and pain that should be considered and managed at each stage. Similar rehabilitation principles apply to other severe axonal neuropathies such as critical illness neuromyopathy and rarer diseases such as porphyria and tyrosinaemia.

Table 1. Potential adaptations, equipment and adjuncts for use during rehabilitation

Task area / Mobility	Potential adaptations, equipment and adjuncts
Eating and Drinking	• 'Neater eater' range of products • Hands free drinking system – 'Giraffe' or 'The Hydrant' bottle with flexi straw Hydration pack with bite valve • Lightweight cup • Non spill cup with lid and handles e.g. Kennedy cup • Extra long and/or flexible straws • Functional cutlery splint • Adaptive cutlery e.g. built up handles, angled, straps
Personal Care	• Shower mitt or glove • Lightweight travel electric toothbrush, automatic U-shaped toothbrush • Adapted soap bottles e.g. pump dispensers, automatic dispenser • Adapted taps e.g. motion censored, tap levers • Electric portable bidet • Adaptive clothes e.g. loose fitting, loops, velcro, zip toggle
Communication and Access to Leisure	• Voice control software e.g. Amazon Alexa, Google. • Speech to text software e.g. Dragon, Google, Apple • Adaptive keyboard and/or mouse e.g. trackball • Software adaptations e.g. onscreen keyboard • Adaptive gaming – contact Special Effect for 'star gaze', Xbox adaptive controller, bespoke functional splints • Universal Cuff, straps, mouthstick stylus • Adaptable mounts/holders - Gooseneck adjustable mount, Neater holder • Functional splinting – handwriting, painting, typing, games console • Ergonomic armrest support • Mobile arm support e.g. Saebo
Mobility and Physical Independence	• Tilt table • Electric standing frame • Oswestry standing frame • Standing hoist • Overhead de-weighting system • Powered wheelchair. Adapted controls e.g. joystick, ball, head • Self-propelling wheelchair • Walking frames e.g. pulpit, gutter, rollator • Walking poles and sticks • Customised splints e.g. walking boots, resting splints and backslabs made from soft and scotch material • Non-customised splints e.g. prefabricated resting splints, 'foot-up' splints, ankle-foot orthosis

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The UK Stroke Forum 2023 (UKSF 23)

Conference details: 4-6 December 2023, International Convention Centre, Birmingham, UK. ***Report by:*** Amanda England, Advanced Clinical Practitioner, Dorset Healthcare, UK. ***Conflict of interest:*** None declared.

The UK Stroke Forum 2023 (UKSF 23), the UK's largest multidisciplinary stroke conference, was held at the International Convention Centre (ICC), Birmingham from 4-6th December 2023 and was attended by over 1800 stroke professionals.

2023 was dubbed 'Year of the Guideline' with updates to both the National Clinical Guideline for Stroke (NCG 23) and NICE stroke rehabilitation guideline (NG236) published during the year. The conference opened with a rousing, interactive introduction from 'Singing Medicine' demonstrating the valuable contribution singing can make to stroke rehabilitation. This was followed by the opening plenary 'Reducing Health Equity in Stroke'. Dr Matt Kearney discussed the importance of a preventative approach to cardiovascular disease (CVD). Data has shown over 16,000 heart attacks and strokes would be prevented in 3 years if optimisation rates were increased to 80%. However, optimisation rates have not yet reached pre-pandemic levels, leaving thousands of patients at risk of CVD. Delegates were introduced to CVD ACTION, a smart data tool developed by UCL Partners to support targeted action on areas of health inequality. CVD ACTION enables GP practices and primary care networks to adopt a holistic approach to preventative care by addressing multiple conditions in an individual patient.

The topic of health inequity continued with Juliet Bouverie OBE interviewing Mrs Ann Bamford and Mr Charles Kwaku-Odoi. Ann Bamford emphasised the importance of finding ways to hear the voices of those who are often under-represented in research. Mr Kwaku-Odoi affirmed that research has been highlighting inequalities for many years, however system change was needed to enable voices of ethnic minority groups to be heard.

The conference then divided into several parallel sessions. 'Neuropsychological support after stroke' was a valuable session which emphasised the importance of personalised, holistic care. An account of a stroke survivor's lived experience highlighted that there is no such thing as a minor stroke from a psychological point of view. Case studies were presented which affirmed the value of including specialist neuropsychological support across the stroke pathway, as recommended in NCG 23. Issues such as post stroke apathy, impaired executive function and low mood all have a huge impact on quality of life and ability to engage with rehabilitation. Neuropsychological support enables stroke survivors and their families to create strategies, adjust and re-build in order to work towards building a 'new me'.

Day one concluded with a bonus plenary – 'The changing face of stroke – Implementing the new guidelines into practice'. Louise Clark presented updates in therapy delivery, with NCG 23 recommending a minimum of 3 hours multidisciplinary therapy a day for those with motor recovery goals. This is leading clinicians to think creatively about how services need to be developed to meet this target. Virtual therapy was discussed as well as group work, open gyms to encourage self-directed or carer directed activity, and working with 'rehab partners' to work towards a goal of 6 hours of activity a day.

Day 2 began with a choice of workshops providing perfect opportunities for networking and sharing innovative new ideas, as well as encouraging each other to strive towards improvements in stroke care. Further parallel sessions followed including 'Recent updates in thrombectomy, and their application in daily practice'. Updates on the latest research were discussed, alongside the challenge to deliver thrombolysis to a wider range of patients including those with low NIHSS, low ASPECT and large core, as recommended in NCG 23. Dr Soma Banerjee highlighted the importance of deciding imaging protocols for large core thrombectomy, and affirmed that low NIHSS thrombectomy does not yet have adequate evidence base. Professor Keith Muir discussed updates from the ATTEST-2 trial which strengthens recommendations in favour of Tenecteplase as the standard of care for IV thrombolysis. Professor Christine Roffe compared data from several recent multi-centre RCTs of Endovascular therapy for basillar artery occlusion (BAO) compared to best medical treatment (BASICS 2021, BEST 2019, ATTENTION 2022, BAOCHE 2022). She concluded that despite uncertainties in how best to score ischaemia, the type of anaesthesia and the time limit for thrombolysis, thrombectomy is effective in basillar occlusion. Dr Roffe also highlighted the importance of including brain stem aetiology in differential diagnosis of coma, as subtleties in presentation can often lead to delays in diagnosis of BAO.

Later, the annual Princess Margaret Memorial lecture entitled 'A vision for vision' was delivered by Professor Fiona Rowe. The importance of early visual assessment was emphasised, as recent research has shown 40% of stroke survivors do not or cannot report visual symptoms. However, there is currently a vision service available in only 50% of UK stroke units. This is despite NCG 23 recommending orthoptists should be part of the core stroke team, and patients should have an orthoptist review before discharge, or urgent out-patient review. Professor Rowe also highlighted the V-FAST screening tool, including any new visual problems in the already well-known FAST assessment. This is being developed as a joint project with North-West Ambulance service.

Day 3 began with further parallel sessions including 'Integrated, personalised stroke care'. Mrs Harriett Allen discussed the role of the stroke specialist social worker and how incorporating the role led to improvements in patient and staff experience. Dr Beth Clark highlighted the NHS personalised care operating model which encourages proactive, personalised conversations to develop and agree a plan of care. This ultimately leads to each person having a shareable plan of care which records what matters to them and how they will achieve their outcomes.

This was followed by workshops including 'Cognitive communication disorder (CCD) after stroke'. A case study was presented showing the impact of CCD on quality of life including changes in relationships and inability to return to work. The complexities of CCD were discussed, and the need for further research into the presence of CCD in stroke, as there are currently no UK studies.

The closing plenary 'Game changers and their implications for stroke policy, research and practice' presented areas of stroke research which will make an impact over several years, encourage innovative thought, and challenge the way stroke care is currently delivered.

UKSF 23 was a fantastic opportunity to be immersed in innovations in stroke care. The updated guidelines present real challenges for stroke services, however the many dedicated teams across the UK remain determined to optimise stroke prevention, and to strive towards improved outcomes for survivors across the stroke pathway.

Updated Guidelines 2023:

● National Clinical Guideline for Stroke for the UK and Ireland. London: Intercollegiate Stroke Working Party; 2023 May 4. Available at: www.strokeguideline.org.

● NICE stroke rehabilitation guideline (NG236). Available at: www.nice.org.uk/guidance/ng236

Speakers included in report:

● Mrs Harriett Allen: Clinical Lead for Community Stroke and Neuro team - Manchester Foundation Trust.

● Mrs Ann Bamford: Honorary PPE lead of the Geoffrey Jefferson Brain Research Centre (University of Manchester).

● Dr Soma Banerjee: Head of Speciality and Consultant in Stroke Medicine – Imperial College Healthcare.

● Juliet Bouverie OBE: Chief Executive of Stroke Association.

● Dr Beth Clark: Personalised Care Facilitator – Wessex Academy for Skills in Personalised Care.

● Louise Clark: Stroke Consultant Therapist and SSNAP Associate Director.

● Dr Matt Kearney: Executive Clinical Director for Cardiovascular Health – UCL Partners.

● Mr Charles Kwaku-Odoi: Chief Executive of the Caribbean and African Health Network.

● Dr Matt Lambert: Consultant in Stroke and Medicine for the Elderly, Clinical Lead for Stroke – NHS Tayside.

● Professor Keith Muir: Professor of Clinical Imaging and Consultant Neurologist – University of Glasgow.

● Professor Christine Roffe: Professor of Stroke Medicine – Keele University.

● Professor Fiona Rowe: Professor of Orthoptics at University of Liverpool.

2023 UKABIF Summit

Conference details: 6 November 2023, Salford, UK. ***Report by:*** Chloe Hayward, Chief Executive of UKABIF. ***Conflict of interest:*** Chloe is the Chief Executive of UKABIF.

An extended version of this report can be found online at https://acnr.co.uk/conference-reports/2023-ukabif-summit/

The 2023 UKABIF Summit returned to Salford and Sir Chris Bryant MP, Chair of the All-Party Parliamentary Group for Acquired Brain Injury opened the conference to give an update on the cross-Governmental Strategy for ABI. He spoke of his "frustration" that the Government has "dragged its heels" with no confirmed date for publication. He reiterated his determination that a ten-year Strategy will be put in place.

The UK wide platform for clinical TBI (Traumatic Brain Injury) research, the TBI-Reporter, was the focus of Professor David Menon's presentation. Professor Menon explained that globally there are 50 million new TBIs each year.

Next to take to the stage were three young women talking about their experiences of Acquired Brain Injury. They gave their top 5 tips to act as guidance for educational professionals to support the return to education following a brain injury.

The other morning sessions concentrated on 'women in brain injury' with Katherine Snedaker, Pro-Bono CEO and Founder of PINK Concussions, the first speaker. Her talk 'Sex and Gender differences in Brain Injury and why it matters' looked at brain injuries from sport, domestic violence, accidents and the military. PINK Concussions advocates to develop and implement gender-responsive, evidence based strategies for the identification, management and support of females with brain injuries.

Dr Elisabeth Williams, Senior Lecturer at Swansea University, spoke about Brain Injury: Neck Strength and Rugby: The Importance of Sex and Gender. She explained rugby has the highest concussion rate of contact sport. Statistics show that 85% of male elite players have experienced at least one brain injury. Less data is available for the women's game. Research by Dr Williams and Swansea University has shown female neck strength is 47% lower than male.

Steffy Bechelet and Dr Annmarie Burns of Brainkind led a presentation 'Too Many to Count; Brain Injury in the Context of Domestic Abuse'. They spoke of their research looking at the potential prevalence of brain injury in domestic abuse survivors. They said it is recognised that domestic abuse is one of the top causes of acquired brain injury in women globally.

The final morning session saw Ellie Atkins, Safeguarding Lead at Manchester City Council, tell the story of 'Jessica' in the context of 'How can the Care Act (2014) and Social Work leadership in safeguarding support bespoke approaches working with women with acquired brain injury?'

Ellie spoke about Jessica, a woman who drinks alcohol and sleeps rough in Manchester. The team at Manchester City Council have worked with Jessica for eight years. Ellie finished by saying Jessica is now thriving in a provision for women with an acquired brain injury; she is in recovery from addiction.

The afternoon sessions saw Professor Mike Barnes present 'The role of cannabis in recovery from brain injury'. With regard to Traumatic Brain Injury, medical cannabis can act as a symptom control:

- Analgesic
- Anti-anxiety
- Anti-spastic
- Anti-convulsant.

Liz Twist MP, Vice Chair of the All-Party Parliamentary Group (APPG) for Acquired Brain Injury and Chair of the APPG for Suicide and Self Harm Prevention, gave an update on the National Suicide Prevention Strategy which was published by the Government in September 2023. She spoke about the implications for people with an Acquired Brain Injury and how they may be affected by the risk of suicide and what can be done to prevent it.

Suicide and self harm in prisons was the focus of Hope Kent, PhD Researcher at the University of Exeter. She spoke about research revealing suicides constitute 24% of deaths in police custody and prisoner suicide rates are between 3 times and 8 times the rates for the general population for males and 10 times the general population for females.

She added that 32% of prisoner suicides happen within the first seven days in prison and how it is critical we think about prison screening practices and to be able to identify risk factors.

Dr Eleanor Bryant, Time for Change Wales gave an update on the UK-based survey exploring educators' perception of childhood ABI. The exact prevalence of childhood ABI remains unknown but it is thought at least 40,000 are affected by ABI annually. Eleanor explained the UK-wide survey covered themes such as knowledge of childhood ABI, school policies, procedures and confidence levels in teaching a child with ABI. To date, 193 participants had responded including a range of roles within the education system and a good balance of primary and secondary schools.

The penultimate presentation of the Summit came from Dr Jenna Moffitt, Consultant Neuropsychologist at Cygnet Health Care and Dr Don Brechin from James Cook University Hospital in Middlesbrough. They were looking at 'Tools to Change the Future of Neurorehabilitation Services: Engaging Integrated Care Boards in the Neurorehabilitation Agenda.'

Their work has concentrated on the North East and North Cumbria region. Dr Moffitt and Dr Brechin started collecting data 10 years ago and results showed drivers for change included system pressures, clinical evidence, financial case and patient voices. Lack of funding impacts discharge delays and waiting times. Staffing levels have also been an issue and hospitals have kept patients on wards longer due to the lack of community rehabilitation services.

The Summit closed with Andrew Axon, Park Lane Plowden Chambers talking about 'Navigating litigation to achieve the best results for patients'. Andrew said litigation provides an opportunity to improve an injured person's life. He added the importance of getting to the bottom of an individual's needs; securing rehabilitation and seeking damages so needs can be met in the longer term.

The need for ongoing support after the initial rehabilitation period is crucial. Andrew described visiting a client 12 months after discharge from rehab where they were significantly worse due to lack of ongoing support.

The UKABIF Summit was sponsored by Irwin Mitchell, Cygnet Health Care, Leigh Day and Frenkel Topping Group.

Encephalitis Conference 2023

Conference details: 5 December 2023, Royal College of Physicians, London, UK and remotely. Satellite meeting on 4 December 2023. ***Report by:*** Dr Stephen McKeever, NIHR Academic Clinical Fellow, The Walton Centre NHS Foundation Trust, UK and Dr Ava Easton, Chief Executive Officer, Encephalitis International; University of Liverpool, UK. ***Conflict of interest:*** Dr Easton is the Chief Executive Officer of Encephalitis International.

The 2023 Encephalitis Conference was held at the Royal College of Physicians in London on 5th December 2023. 469 delegates from 57 countries attended in person and online, making it the largest Encephalitis Conference to date. The conference featured global leaders from diverse clinical and scientific backgrounds covering groundbreaking research into infectious and autoimmune encephalitis, as well as many other associated neurological conditions.

Prior to the main conference, satellite meetings were held on 4th December featuring a workshop on "How to Get Your Grant or Fellowship" presented by Dr Mark Ellul, University of Liverpool, UK and Associate Professor Deanna Saylor, Johns Hopkins University School of Medicine, USA and University Teaching Hospital, Zambia, who participated remotely. They shared their experiences of finding and obtaining funding opportunities for researchers based in both high and low-middle income countries. Although the session was primarily aimed at early career researchers, the lessons from their experiences remained relevant to more senior attendees. Key messages conveyed to the audience highlighted the importance of resilience and persistence in the face of rejection. Following the workshop, a data blitz poster presentation session was chaired by Professor Sarosh Irani, Mayo Clinic, Florida, USA; Dr Thomas Pollak, King's College London, UK and Dr James Varley, University of Oxford, UK, where 12 speakers from eight countries presented a fascinating range of pre-clinical and clinical research including new diagnostic tests, biomarkers and clinical trials in encephalitis, setting the bar high for the following day.

The main event on 5th December was kicked off early with a breakfast session, a new addition to the conference, for those professionals new to encephalitis management and research. Professor Benedict Michael, University of Liverpool, UK and Professor Sarosh Irani, Mayo Clinic, USA, presented introductions to infectious and autoimmune encephalitis respectively. The conference was opened by Dr Ava Easton, Encephalitis International and Dr Nick Davies, Chelsea and Westminster Hospital, UK who both chaired the first session starting with a keynote lecture provided by Dr Tarun Dua, World Health Organization. Dr Dua updated delegates with an overview of the World Health Organization's strategic plan to reduce the burden of neurological disorders globally. The approach involves working alongside governments, health and agricultural sectors to implement immunisations and infectious disease eradication. This is aimed to mitigate the risks of emerging infectious diseases that cause neurological disorders reducing morbidity and health inequalities.

Following the first keynote lecture, Dr Sophia Michael and Dr Christine Strippel, Oxford Autoimmune Neurology Group, UK, delivered a joint talk on LGI1 and CASPR2 antibody encephalitis from their international studies of over 240 patients. They described the clinical features and presentations of the participants, as well as the long-term sequelae that persist several years after the onset of these types of encephalitis.

Mr Adrian Gervais, Paris Cité University, France presented fascinating work from his PhD on West Nile Virus (WNV) encephalitis. He presented findings which identified auto-antibodies against IFN-I that can result in IFN-I deficiency and underlie severe WNV infection and encephalitis. Mr Gervais suggested that screening for auto-antibodies for IFN-I could help identify individuals at risk of more severe forms of WNV encephalitis and could indicate that IFN-I therapy is a viable treatment for those individuals. This will require further study.

Joining the conference remotely Dr Tina Damodar, National Institute of Mental Health and Neurosciences (NIMHANS), Bangalore, India updated the conference with Encephalitis International funded research in the development of a novel diagnostic test for scrub typhus, a major cause of acute encephalitis syndrome in India. The condition affects up to half a million people each year and can be treated with oral antibiotics, therefore earlier diagnosis can help direct appropriate treatment and aim to improve outcomes for those affected, reinforcing the importance of this research.

After an initial viewing of the posters, the second session was chaired by Professor Carsten Finke, Charite-Universitätsmedizin Berlin, Germany and Dr Matteo Gastaldi, Neuroimmunology Research Unit Pavia, Italy. The session was kicked off by Dr Joseph Kuchling, Charite-Universitätsmedizin, Berlin, Germany, who provided a radiological perspective with a series of cases of NMDA receptor encephalitis associated with Multiple Sclerosis (MS), informing clinicians to be mindful of overlap with MS when reviewing people with NMDA receptor encephalitis.

Dr Greta Wood, University of Liverpool, UK described findings from the COVID-19 Clinical Neuroscience Study. Within the presentation, she outlined the significant impact COVID-19 has on cognition, equivalent to 20 years of ageing. Additionally, she highlighted the presence of biomarkers of ongoing brain injury in patients with COVID-19 a year after the acute infection. The full results are expected to be published in 2024.

Dr Jakob Theorell, Karolinska Institutet, Stockholm, Sweden provided an immunologist's perspective on autoimmune encephalitis. Dr Theorell presented data indicating an increased prevalence of highly differentiated, antibody producing B lymphocytes were prevalent in the CSF of a series of patients with LGI-1 and CASPR2 antibody encephalitis, providing a potential novel treatment target.

Professor Romain Sonneville, Claude Bernard Bichat Hospital, France presented preliminary results of the EncephalitICa multicentre study regarding the recovery trajectories of intensive care patients with severe encephalitis. The study identified multiple risk factors associated with poor outcomes, which were: increasing age, being immunocompromised and absence of aciclovir use. Professor Sonneville also presented data from one year of follow up including worse quality of life, seizures and severe anxiety and depression occurring with the individuals

affected by severe encephalitis.

The first guest lecture was presented by Professor Tom Solomon CBE, The Pandemic Institute and University of Liverpool, UK who revealed the culmination of 15 years of work with the "crystal clear" results of the DexEnceph study- steroids do not improve the outcomes in Herpes Simplex Encephalitis. The full results of the study will be published separately in 2024. Professor Solomon also provided details regarding Enceph-Ig, a new clinical trial investigating the use of IV Immunoglobulin in autoimmune encephalitis which is currently recruiting.

Poster presentations and judging took place over lunch in the Osler Room of the Royal College of Physicians. Session three was chaired by Professor Angela Vincent, University of Oxford, UK and Dr Thomas Pollak, King's College London, UK. The session was opened by the second keynote lecture of the day presented by Dr James Sejvar, Centers for Disease Control and Prevention (CDC), USA who outlined his epidemiological adventures in encephalitis from lichi-fruit induced encephalopathy in northern India to the West Nile Virus outbreak in the US, as well as the medical mystery of nodding syndrome in East Africa. Dr Sejvar outlined the continually evolving understanding of encephalitis and the need for global vigilance in the emergence of new forms of encephalitis.

Dr Nicole Lichtblau, King's College Hospital London, UK presented data from a cohort of patients with functional neurological disorder (FND) and related neurological disorders that develop after autoimmune encephalitis, which can be longstanding and associated with cognitive decline. Dr Lichtblau also reported on patient perspectives about the development of FND after encephalitis and emphasised that individuals with autoimmune encephalitis may need specialist input for FND management during their follow up.

Ms Charlotte O'Halloran, MSD, UK remotely presented the work of MSD in identifying and breaking down cultural barriers limiting access to vaccinations in Liverpool. She explained the importance of increasing vaccine uptake to prevent infections that can lead to encephalitis and delved into the reasons behind vaccine hesitancy across multiple communities. Ms O'Halloran described the work done by MSD in engaging with community and faith leaders to educate people and reduce vaccine inequalities.

The final session was chaired by Associate Professor Kiran Thakur, Columbia University, USA and Professor Benedict Michael, University of Liverpool, UK. The first presentation of this session was provided by Dr Jonathan Rogers, University College London, UK, who took the audience on a journey through the Queen Square London Neurology archives. These included findings from historical case notes from the early 20th century that described cases of encephalitis lethargica, a condition first described by Constantin von Economo that resulted in at least 500,000 deaths. Dr Rogers discussed the epidemiology of the condition and shared his research on deciphering an underlying cause from the symptoms reported.

The debate of the conference was a self-declared "David v Goliath" performance between Dr Sophie Binks, Oxford Autoimmune Neurology Group, UK (for the house) and Professor Harald Prüss, Charite-Universitätsmedizin Berlin, Germany (against the house). The topic of the debate was: "This house believes that too much time and money is being spent identifying new antibodies in autoimmune encephalitis". Professor Prüss provided a convincing argument against the motion, explaining that identifying new antibodies will lead to the emergence of antibody-selective therapies. However, Dr Binks heavily cited Professor Prüss' own work to support her argument and succeeded in living up to the David v Goliath story by overturning the vote from 28.1% for the motion before the debate, to 55.9% after the debate.

The second invited guest lecture of the day was provided by Dr Sukhvir Wright, Aston University, UK who updated the conference on paediatric autoimmune encephalitis. Dr Wright summarised the significant progress that has been made in the field and highlighted the improvement in diagnostic tests and assays, as well as the increased awareness of encephalitis globally. Furthermore, she explained how we now have a better understanding of the causes of encephalitis which is informing better treatments and directing international collaboration and clinical trials.

Phillippa Chapman, Deputy CEO of Encephalitis International provided a heartwarming presentation of the fantastic work the charity has undertaken throughout 2023, which has now expanded to over 16500 members in 131 countries and is funding research into encephalitis globally. She also unveiled the rebranding, new purpose and vision of the society which is now Encephalitis International.

The close of the conference and calls to action were provided by Dr Ava Easton, Chief Executive Officer, Encephalitis International and Dr Nick Davies, who also awarded prizes. Dr Daniela Esser, University Hospital Schleswig-Holstein, Germany was awarded the prize for best poster with "Compartmentalized, clonally expanded plasma cells drive anti-LGI-1 and anti-CASPR2 autoimmune encephalitis". Meanwhile, the prize for the best oral presentation was awarded to Mr Adrian Gervais, Paris Cité University, France, for his work on West Nile Virus encephalitis described earlier.

The Encephalitis Conference 2023 was an inspiring gathering of minds and leaders that will shape the future of clinical practice and direct research globally into encephalitis, with attendees having a united aim to have a world without death and disability from encephalitis.

The 2024 Encephalitis Conference will be held on 2nd-3rd December 2024 at the Royal College of Physicians and virtual. Join the mailing list of Encephalitis International at www.encephalitis.info to keep up to date for the latest events, fundraising opportunities and research updates in encephalitis.

Senior research fellowships: Parkinson's UK

These fellowships are for people who want to specialise in Parkinson's research by establishing their own independent research group. Applicants should have a strong track record of original and productive research in their area which shows impact across past appointments.

The deadline for preproposal applications is Wednesday 3 July 2024, by 4pm. Apply at https://bit.ly/3UBAELr

Duration and value

Senior research fellowships are initially offered for up to $300,000 for 3 years.

Funding can cover:

- The cost of the applicant's salary
- Appropriate start-up and running costs support for additional research assistance such as a technician or research assistant
- Well justified costs for training opportunities such as attendance at relevant conferences or short courses
- Senior research fellowship award holders can formally apply for a further two years of funding at least six months before the end of the award.

Find out more at https://www.parkinsons.org.uk/research/our-senior-research-fellowships

Traumatic Brain Injury Course

Conference details: 22 November 2023, St Georges Hospital, London, UK. ***Report by:*** Viva Levee, Internal Medicine Trainee (IMT3), Charing Cross Hospital, London, UK.
Conflict of interest: None declared.

This was an excellent, comprehensive and interactive teaching course led by Dr Colette Griffin. Dr Griffin is recognised globally for her work in traumatic brain injury (TBI) and leads the TBI service at St.George's Hospital in London. There was an incredible array of speakers from the multi disciplinary team – including physiotherapists, psychologists, speech and language therapists as well as neurologists, neurosurgeons and neuropsychiatrists. The need for collaborative work, persistence and patience was emphasised. Recovery can be prolonged and hope must be preserved.

The absolute highlight of the day was a truly moving talk given by a survivor of TBI. This patient sustained a traumatic brain injury when he was only 20 years old, and hearing how it completely changed the course of his life and the journey he has gone through over the past 9 years brought me to tears. I really can't even describe the talk to do it justice, but it really put everything we do into perspective and again reinforced the need for patience, resilience and most importantly hope. His speech was eloquent and especially impressive given that it was the first time he has spoken publicly since the injury.

Clinical Presentations of TBI
Dr Colette Griffin, Neurologist
This was a great introduction to the varying presentation of TBI and the main causes (the most common of which is road traffic accidents). The global impact of TBI is shocking, with an estimated annual cost of 33 billion Euros annually in Europe alone. Dr Griffin discussed the classification of TBI and how this helps to stratify patients. She also spoke of medical conditions that can co-exist and exacerbate symptoms related to TBI, such as agitation. Post-traumatic epilepsy was discussed and also commonly occurring endocrine abnormalities.

Surgical aspects of traumatic brain injury
Mrs Fay Greenway, Consultant Neurosurgeon at St George's
As the neurosurgery representative of the TBI team at St George's Hospital, Mrs Fay Greenway presented the surgical aspects of traumatic brain injury. The talk covered the basic physiology of brain autoregulation and the pathophysiology of TBI; using a variety of cases to illustrate different injuries, from extradural haematoma, to diffuse TBI. It covered principles of acute management of TBI – from intracranial pressure monitoring to surgical options, touching on some of the nuances and challenges of decision making in severe head injury – when to operate or not. It highlighted the importance of shared decision making with the families of patients, seeking to understand what the patient themselves would have wanted. The surgical aspect of TBI is very much one, small, part of the care of patients with TBI – recognising the importance of active engagement with the wider TBI team, and valuing everyone's role, is vital for any effective TBI service.

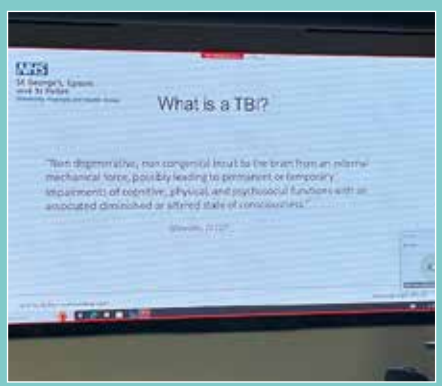
Experience of TBI – from the TBI survivor
This account of hearing how this patient's TBI completely changed the path of his life was honestly amazing and moving. Moreover, hearing how he has adapted and overcome such challenging times was inspiring. He has experienced many of the commonly associated conditions associated with TBI, including a huge effect on his cognitive ability. This was very well described, including the period when he was "unaware of his deficits".

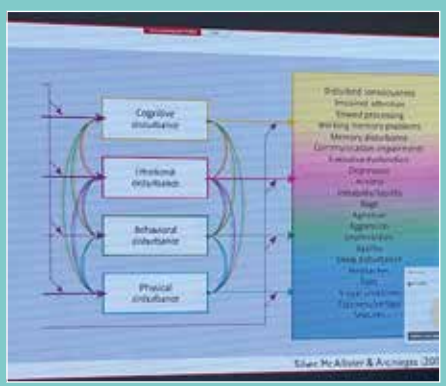
Cognitive changes in TBI
Cheryl Edwards, Psychologist
This lecture broke down how TBI can affect the "cognitive system", which I found very interesting. Post-traumatic amnesia (PTA) was explained, and its importance including how its duration can offer indication of the severity of the TBI and the persistence of cognitive impairment. Measuring tools of PTA were discussed and the need to identify and assess this condition early on was reiterated. Practical advice was given to help patients through this period of PTA including doing things like showing them their scans, review triggers for their agitation, preventing over stimulation and importantly being patient and reassuring.

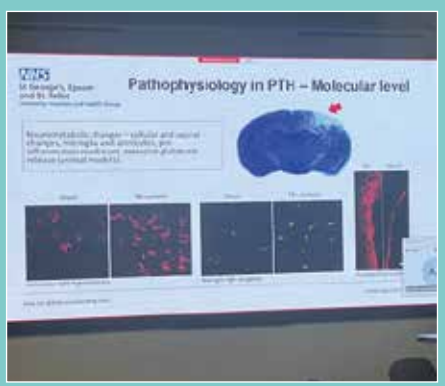
Cognitive Communication in TBI
Jenna Bouscarle, Speech & Language Therapist
This lecture was also very informative and discussed cognitive communication disorders (CCD) which can arise in TBI (also can occur post stroke and in neurodegenerative diseases). Features of CCD were discussed, and she explained that this can be on a continuum (i.e. some people more hypoactive and others might be more verbose and hyperactive). I found it interesting that how people were before their TBI can sometimes impact where they lie on the spectrum. Various cognitive assessment tools were discussed and how to use them. Support strategies for the various manifestations were also broken down and explained which was very useful – for example if the patient is more verbose vs tangential. CCD is one of the biggest predictors in patients returning to work, highlighting its importance.

Behavioural challenges and agitation in TBI
Heather Liddiard, Psychologist
"Challenging behaviour" was defined and discussed in detail, in relation to TBI. Importantly it was explained that behavior is a form of communication. Different factors contributing to behaviour were discussed including emotional factors. Considering how the person was before the injury is very important. Previously undiagnosed neurodevelopmental disorders such as autism can even present post TBI. It was again reiterated to pay attention to anything that could exacerbate challenging behaviour such as medical conditions, delirium, social isolation and drug withdrawal. Assessment and formation was discussed as well as necessary interventions. The main learning point was to be proactive vs reactive, and to think about interventions as the individual, the environment and the communication itself.

Role of Neuropsychiatrist in TBI
Dr Akshay Nair, Psychiatrist
Dr Nair explained what a Neuropsychiatrist is, i.e. a psychiatrist who focuses on organic neurological conditions with associated psychiatric







co morbidities. His area of focus is TBI and Huntington's. He explained the role of the neuropsychiatrist in TBI assessment and management. He explained their role is more in the acute on to subacute and chronic vs the hyperacute. He explained the importance of not treating where possible, and if in the extreme case treatment is needed, to think about this carefully and focus the treatment accordingly. He also advocated to "start low and go slow". When trying to treat with psychiatric medications in TBI, they will not work in the same way as the brain network has been interrupted.

He detailed what is involved in a psychiatric formulation and how he does this with TBI patients in various stages of their injury. It is important for TBI patients to have access to psychiatric treatment throughout the course of their lifetime.

Capacity assessments and the Mental Capacity Assessment (MCA) and Deprivation of Liberty (DoLS)

Daisy Tate, Safeguarding lead at St Georges

This lecture detailed the elements of the capacity assessment – the 5 principles being that you should always presume capacity, to support individuals to make their own decisions, that everyone has the right to make their own decisions, that decisions made by clinicians for those who lack capacity should be in the best interest of the individual and if there is a need to be restrictive in any way they must choose the least restrictive option. Deprivation of liberty was explained also which was very useful. These were related to TBI patients, and the importance of thinking of how to use the MCA and DOLS in their management.

The role of physiotherapy

Sarah Latham, Physiotherapist

Physiotherapists play a key role in the management of TBI patients. He discussed the importance of explaining why various braces were needed and how this communication to patients is key. They assess capacity and confused patients, and help to adopt measures to reduce this confusion and agitation including ensuring consistency, schedules and behaviour guidelines amongst others. They also assess and treat benign paroxysmal positional vertigo (BPPV) – diagnosing with Dix-Hallpike and treating with the Epley Manoeuvre, and do balance assessments.

The management of headache post TBI

Dr Ivy Ong, Neurologist

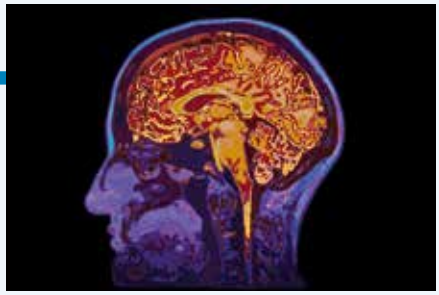
Dr Ong spoke about headaches in the context of TBI. She discussed cases, importantly highlighting that when we see these patients it is important to see things with "fresh eyes" and always challenge and revisit the diagnosis when something does not "add up". It is easy to assume the headache is due to TBI, so it is important to consider re-scanning and reviewing investigations. She spoke of the main phenotypes of headache seen with TBI, and also reiterated the need for a detailed headache history to be able to tease out these various features. She discussed investigations and then management options. She spoke of specific medications that are more or less useful depending on the type of headache, and also the role of mood stabilisers and antipsychotic medications. I found it very interesting to hear about her scientific research projects on mice models, and how this translates to current theories of the pathogenesis of TBI headache. She spoke of newer therapies being reviewed including CGRP inhibitors which will be an exciting area to follow.

The management of vertigo post TBI

Dr Hena Ahmad, Neurologist

This was an excellent and clinically relevant lecture not just for TBI but for any patient presenting with dizziness. Dr Ahmad explained how we should think about dizziness as a symptom and how to elucidate this from patients. She then spoke of the most common causes of dizziness in TBI, including benign paroxysmal positional (with other common causes including vestibular migraine and Ménière's disease). Dizziness is a very important symptom to try to manage in TBI patients, as it is an independent predictor of whether someone will go back to work. Dizziness can be disabling and last several years following the initial injury. She discussed how dizziness should be assessed clinically, including the use of assessment of eye movements and cranial nerves as well as using HINTs (head impulse, nystagmus, test of skew). She discussed important aspects of management for these patients – for example with BPPV treating with the Epley Manoeuvre or Semont.

Preview: Acute Neurology Course



Dates: 7 June 2024 (face to face)
Location: St George's, University of London
Course lead: Dr Kuven Moodley
Fee: From £30
More details: www.sgul.ac.uk/study/professional-education/short-courses/acuteneurology

Why join the course?

The St George's Hospital Acute Neurology Masterclass aims to provide an overview of the management of common and emergency neurological problems presenting to hospital. The acute neurology service at St. George's Hospital is one of the first dedicated services set up in the country.

Attendants of the course will be taught through interactive case-based lectures, each vignette offering practical solutions to acute neurological problems. Topics covered include acute headaches, stroke and stroke mimics, seizures, dizzy spells, funny turns, functional neurological disorders, MS and neuromuscular emergencies.

Audience

General physicians (CMT trainees, medical SpRs, medical consultants), emergency doctors, and neurology ST3s.

Course outcomes

Learners will develop a framework on how to diagnose and treat common acute neurological conditions and neurological emergencies, which includes:

- Approach to diagnosis and management of primary and secondary headache disorders presenting to the ED
- Diagnosis and management of stroke and how to distinguish stroke from stroke mimics
- Diagnostic approach to patients presenting with loss of awareness
- Management of neuromuscular emergencies
- Approach to diagnosis of the "dizzy" patient
- Recognition of functional neurological disorders
- How to diagnose and manage CNS infections

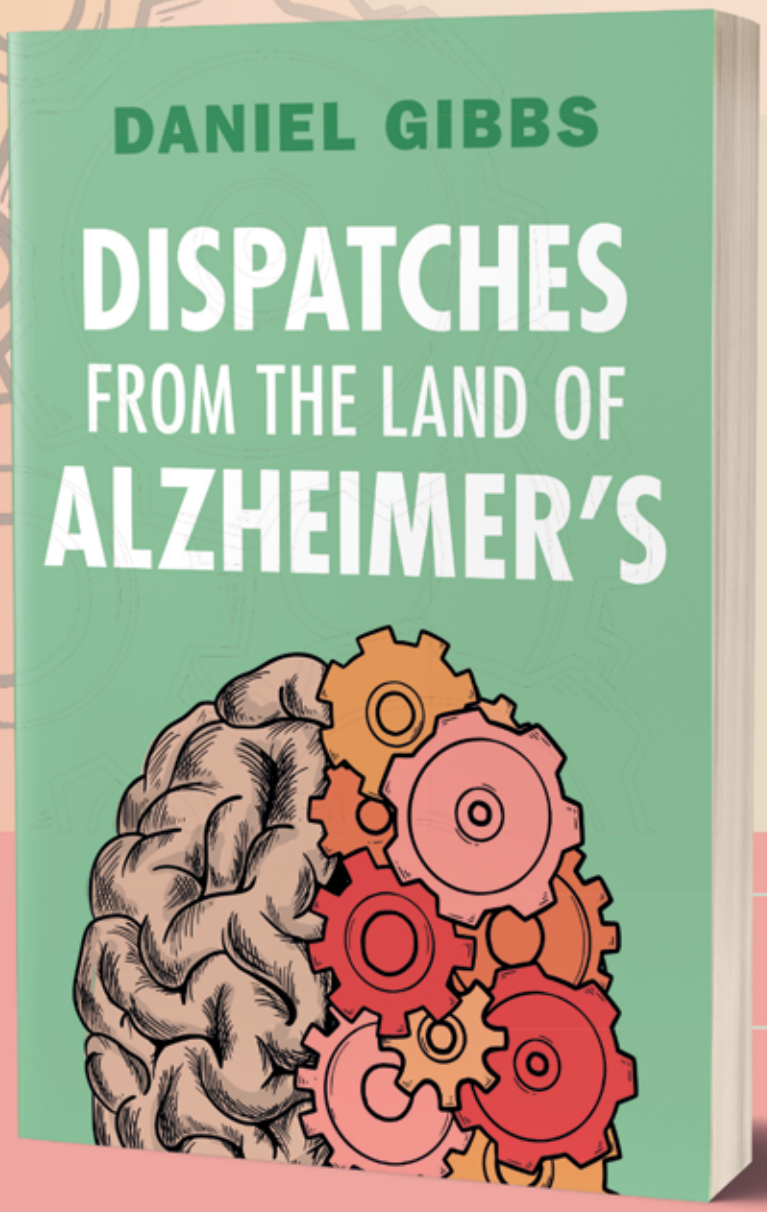
Certification

You will be provided a certificate of attendance and CPD will be sought from the by the Royal College of Physicians of the United Kingdom.

Past students have said...

"Excellent, very clear and well-presented teaching session. Great advice regarding communication strategies for patients with functional neurological disorder."

"Good example of cases, very useful approach to examination of the eye and included useful common presentations."



From the author of

A Tattoo on my Brain

(soon to be made into a MTV/ Paramount+ documentary)

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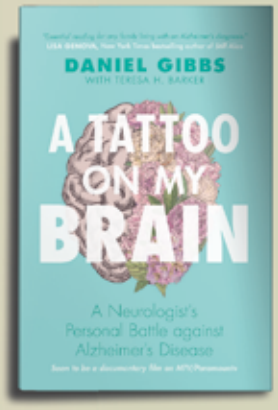

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