

# Neuropsychiatry News

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Editors **Norman Poole and George El-Nimr**

Editorial Board **Eileen Joyce**

Address for correspondence

**Norman Poole**

**Department of Neuropsychiatry**

**Clare House**

**St. George's Hospital**

Email: [norman.poole@gmail.com](mailto:norman.poole@gmail.com)

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Graphic Design **Jamie Paton – [jamie@twhe.co.uk](mailto:jamie@twhe.co.uk)**

# Chair of the Faculty of Neuropsychiatry

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## Eileen Joyce

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**Professor of Neuropsychiatry, National Hospital for Neurology and Neurosurgery  
Chair of the Faculty of Neuropsychiatry, Royal College of Psychiatrists**

I was honoured to be elected as Chairman of the Faculty of Neuropsychiatry earlier this year and have spent the last 6 months getting to grips with the complex structure of the College and my responsibilities within it. The experience has been fascinating and invigorating. I have learned that the Faculty is valued by the College and has a lot to contribute. For example, our expertise is recognised by the number of requests for advice – not a day goes by when I do not get at least one email inviting comments on NICE guidelines or other relevant initiatives of external bodies. This is also borne out by our annual conference being regularly over-subscribed. Thanks go to George El-Nimr for consistently organising meetings that are clearly of interest and relevance to the College membership (look out BNPA!)

As the effective communication of our activities is crucial for the success of the Faculty, I am taking this opportunity to let you know about two major College initiatives that involve us and indicate exciting times ahead for neuropsychiatry! Before doing so however, I would like to acknowledge the long way we have come in the College thanks to the work of my predecessors

– I only hope I can emulate their success in the years to come. We were initially accepted as a Special Interest Group in Neuropsychiatry (SIGN) 15 years ago. The first chair was Howard Ring followed by Simon Fleming. In 2008 we were promoted to a College Section (SoN), chaired by Jonathan Bird and then by Rafey Faruqi. In 2014 we became a Faculty and Rafey steered this transition until earlier this year.

Apart from the Academic Faculty, which has a special remit, we joined Eating Disorders and Perinatal Psychiatry as Faculties with no GMC sub-speciality recognition. We did try however! Looking back through my distant emails, I found that Shoumi Deb started to develop training competencies for neuropsychiatry in 2008. Niruj Agrawal then led the development of a full curriculum for submission to the GMC in 2012. Unfortunately this was declined because the GMC decided not to approve any medical sub-speciality for higher training, favouring instead the process of 'credentialing'.

Credentialing is defined as 'a process which provides formal accreditation of attainment of competences (which include knowledge, skills and performance) in a defined area of practice, at a level that provides confidence that the individual is fit to practise in that area..' It is intended to be a one-year, post-CCT certification for individuals practicing in a defined area. The current state of play is that, during 2016–2017, the GMC is working with a group of 'early adopters' to evaluate and test the cost effectiveness and efficacy of a credentialing model (

## Editorial

uk.org/education/27299.asp). In the College, the Liaison Faculty has been funded to pilot a credential which will be completed in Spring 2017 (<http://www.rcpsych.ac.uk/workinpsychiatry/faculties/liaison/credentialpilot.aspx>). If successful and approved by the College and GMC, it is anticipated that this model will be rolled out and adopted by other interested groups.

What are we doing about it? The Faculty Executive Committee has approved in principle the development of a post-CCT credential in neuropsychiatry. The next step is to review and prune our existing curriculum so that we can be ready if and when we get the go-ahead to proceed. To this end we have established a curriculum working group. It is envisaged that we will hold a workshop on neuropsychiatry credentialing at one of our Faculty conferences in 2017 or 2018 – once we know the outcome of the Liaison Faculty pilot and the Neuroscience Commission.

The Neuroscience Commission has been established to overhaul the core curriculum with the aim of enabling psychiatrists of the future to understand the relevance of findings from neuroscience to their clinical work. This is funded by a grant from the Gatsby Foundation and The Wellcome Trust and will run for two years. Wendy Burn, our immediate past Dean, is co-chairing the project with Mike Travis, a British trained psychiatrist working in the USA who undertook a similar project there. Wendy is currently doing a

roadshow to advertise the project and here are links to her presentations:

- [www.rcpsych.ac.uk/pdf/CALC\\_PGME2016WendyBurnPlenary.pdf](http://www.rcpsych.ac.uk/pdf/CALC_PGME2016WendyBurnPlenary.pdf)
- [www.rcpsych.ac.uk/pdf/Neuroscience\\_Presentation\\_June\\_2016\\_WB.pdf](http://www.rcpsych.ac.uk/pdf/Neuroscience_Presentation_June_2016_WB.pdf)

A Spring Neuroscience Conference has also been organised by the project team and is open to all ([www.rcpsych.ac.uk/traininpsychiatry/conferencetraining/conferences/neuroscienceday.aspx](http://www.rcpsych.ac.uk/traininpsychiatry/conferencetraining/conferences/neuroscienceday.aspx)) Yours truly is a member of the Commission and the work of deciding the content of the curriculum will begin in 2017.

Returning to the theme of communication, I am very pleased that Norman Poole will continue with his high-quality editorial direction of the Newsletter, published every six months. Look out also for our updated website, being created by Kevin Foy, which will provide regular updates about Faculty activity. In the reverse direction, we welcome input from you about how we can improve what we do, so please keep in touch via Kitti Kottasz ([kitti.kottasz@rcpsych.ac.uk](mailto:kitti.kottasz@rcpsych.ac.uk)).

With best wishes  
**Eileen Joyce**

# What's in a Name?

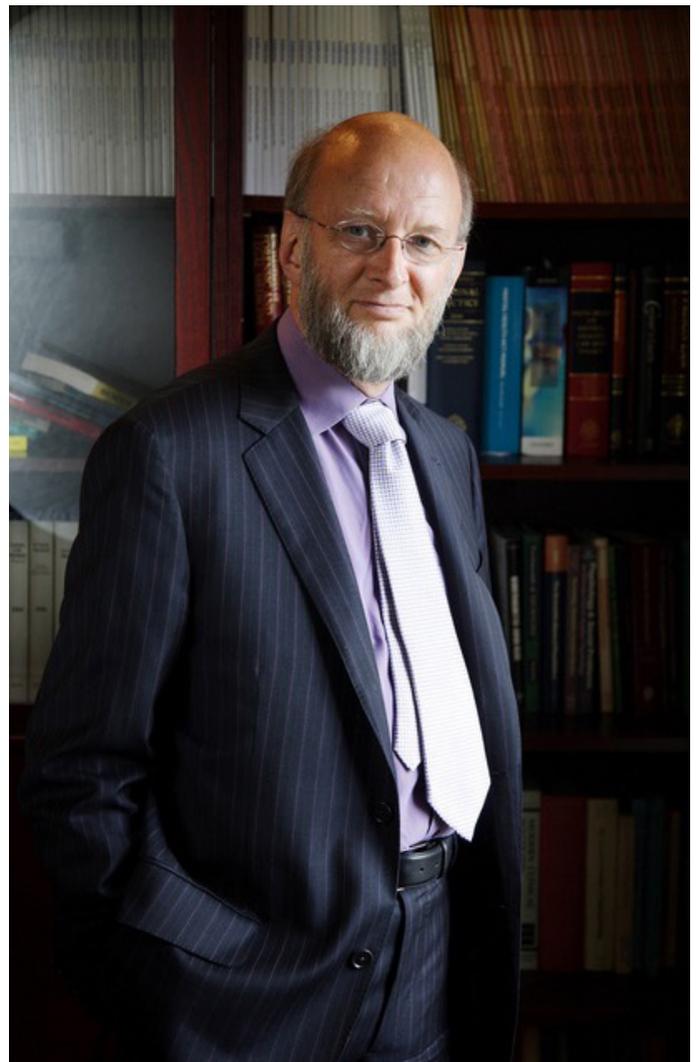
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## Professor Keith Rix

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If you take *Private Eye* you are likely to have seen the article 'Psychological warfare' about 'court experts' (p36, *Eye* 1423) and in particular the case of Graham Rogers, a trained educational psychologist, who has acted as an expert in several high profile cases but has been criticised by some fellow psychologists. One of the issues has been his provision of services in the areas of educational, practitioner, forensic and counselling psychology in that, allegedly contrary to British Psychological Society (BPS) guidelines, he should be registered with the Health and Care Professions Council (HCPC) in order to provide services in these 'protected title' areas. He has also provided expert evidence in family cases seemingly in contravention of BPS and Family Justice Council guidelines to the effect that psychologists acting as expert witnesses should be HCPC-registered unless they are academics.

Law and practice about protected titles are confusing if not perplexing and curious. 'Doctor' is not a protected title but 'nurse' is even though the prefix 'Doctor' has been a recognised courtesy title for medically qualified practitioners for the last hundred years and, albeit controversially, for dentists in that



those who have used the title, which the General Dental Council does not prohibit, in advertising their services have fallen foul of the Advertising Standards Authority. Anyone can call themselves a 'lawyer' but the titles of 'solicitor' and 'barrister' are protected. 'Architect' is a protected title but 'engineer' is not. 'Neuropsychiatrist' is not a protected title.

So where is this going? These are some considerations which have been in the back of my mind when considering the implications for psychiatrists of the cases of the eminent paediatrician Professor Sir Roy Meadow, the psychiatrist Dr Richard Pool and the neuropathologist Dr Waney Squier, all criticised for giving expert opinion evidence outside their field of expertise, and when considering in particular the implications for psychiatrists acting as experts in cases of a neuropsychiatric nature. My interest in the particular implications for cases of a neuropsychiatric nature has been stimulated by a review of reported legal cases involving neuropsychiatric evidence which I have carried out as preparation for a chapter on neuropsychiatry and the law which I am writing with Jonathan Bird.

What struck me first was how often expert evidence of a neuropsychiatric nature is given by general psychiatrists and has been given in a number of cases by a particular neurosurgeon. Not only has this occurred without any judicial or other criticism but in the case of the neurosurgeon it has been with the court's express approval.

For example, in *C v Dixon* [2009] EWHC 708 (QB), a case of brain injury following a road traffic accident, there was an issue as to the impact of frontal lobe difficulties or organic personality disorder. A general psychiatrist gave evidence that the claimant's disabilities were far less than the professionals believed. The court rejected this on the basis that it was not borne out by the lay evidence and the judge expressed a preference for the opinion of the neuropsychiatrist to that of the general psychiatrist but there was no suggestion that this was a matter outside the general psychiatrist's field of expertise. Similarly in *Marchent v Allied Domecq* [2003] EWHC 82 (QB) the court preferred the objective and convincing evidence of the neuropsychiatrist to that of the general psychiatrist who had no particular experience in head

injury but there was no suggestion that the general psychiatrist was outside his area or field of expertise.

In *AC v Omar Farooq, The Motor Insurers Bureau* [2012] EWHC 1484 (QB) Dr Ahmed El-Assra, was identified in the judgment as a neuropsychiatrist. In *Ahmad v Cleasby* [2006] EWHC 3687 (QB), Dr Martyn Rose, a neurosurgeon by training and consultant in neurological rehabilitation, was recognised by the court as "both a distinguished and experienced neuropsychiatrist" although he had no qualification in psychiatry, such as the MRCPsych, or in psychological medicine, such as a DPM, albeit that I recall that for some years he had approval under s.12 of the Mental Health Act 1983.

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In *Huntley v Simmons* [2010] EWCA Civ 54 the issue was the community treatment and prognosis of someone with brain damage. It was argued that the principally relevant specialist expertise in this case was not neuropsychiatric or neurological but neuropsychological but the judge did not agree. While he acknowledged that the neuropsychological opinions were of great importance, he was not persuaded that the issue in question was one on which a neurologist or neuropsychiatrist was unable to express a valid opinion, adding:

*Clinicians do not operate in impermeable boxes. Although Dr Upton is a neuropsychiatrist by speciality, his particular clinical expertise is in the care and treatment in the community of patients with brain damage; and he told me that the nature of his practice meant that he had very considerable experience of the kinds of regime which he believed should have been implemented in the present case but had not been.*

So what is to be made of these judgments? What are their implications for expert evidence in neuropsychiatric cases? The first is that, as was made

explicit in *Dixon v Were* [2004] EWHC 2273 (QB), the court's approach may be to regard it as a matter of weight rather than admissibility of evidence:

*(A)s neuropsychiatry deals with problems arising or appearing to arise after brain damage, whereas general psychiatry is principally concerned with illness, (the neuropsychiatrist's) evidence is entitled to particular weight.*

If one party instructs a general psychiatrist and the other party instructs a neuropsychiatrist, the court may attach more weight to the evidence of the neuropsychiatrist. It does not follow that the evidence of the general psychiatrist will be ruled inadmissible and the general psychiatrist reported to the General Medical Council.

The second implication is that psychiatrists, and indeed other medical specialists, such as a neurosurgeon, may acquire recognisable expertise in neuropsychiatry without having undergone a formal training in neuropsychiatry. This is reflected in the law of expert evidence. An expert is a "skilled person", one who has by dint of training and practice, acquired a good knowledge of the science or art concerning which his opinion is sought" (*R v Bunnis* (1964) 50 WWR, 422). As Malek recognises in *Phipson on Evidence* (2013), it is possible to "acquire expert knowledge in a particular sphere through repeated contact with it in the course of one's work, notwithstanding that the expertise is derived from experience and not formal training". Our College has recognised this in *Responsibilities of psychiatrists who provide expert opinion to courts and tribunals* (Rix, Eastman and Adshead, 2015) where it states:

*... many doctors, over their careers, move practice and acquire considerable expertise in areas not recognised by their category on the specialist register, but evidenced through their continuing professional development and the processes of appraisal and revalidation*

Although this point is made in relation to the category under which a psychiatrist's name appears on the GMC's specialist register, the implication is that a psychiatrist, or indeed a neurosurgeon, albeit not formally trained in neuropsychiatry, may acquire considerable and recognised expertise in neuropsychiatry through their clinical practice and

repeated contact with neuropsychiatric matters in the course of their work and sufficient to be recognised by the court as having expertise in neuropsychiatry. But note the references to continuing professional development, appraisal and revalidation. A psychiatrist who has not had a formal training in neuropsychiatry should, if providing expert evidence in a neuropsychiatric case, be able to provide evidence that neuropsychiatric topics have formed part of their CPD as set out in their personal development plans and that their experience of neuropsychiatry has been addressed in their annual appraisals.

Reassuring as these reported cases are, they are largely, perhaps entirely, cases in which the experts agreed to provide expert evidence before the judgment in *Pool* became widely known. I have anecdotal evidence of general psychiatrists now being reluctant, and in some cases unwilling, to provide expert evidence in cases of a neuropsychiatric nature. I have in the past given expert evidence in cases of a neuropsychiatric nature but if instructed in such a case now I would set out in some detail my experience of neuropsychiatry, which was mainly as a liaison psychiatrist, including a weekly case conference with neurologists, neurosurgeons and neuroradiologists, and refer to some of my research involving alcohol-related brain damage, but point out that the evidence of a neuropsychiatrist might be found by the court to carry more weight than mine. As I have said in my *BJPsych Advances* article on the *Pool* case (Rix, 2015):

*Provide sufficiently detailed information as to your qualifications, training and experience and the nature and setting of your everyday practice to put your instructing solicitors in the best possible position to judge the appropriateness and sufficiency of your expertise.*

*Avoid holding yourself out as an expert in a particular area or field in the sense of being seen to persist with a demand that you are accepted as an expert witness. Instead state that what your qualifications, training or experience are which may make it appropriate for you to be instructed but make it clear that you expect your instructing solicitors to satisfy themselves as to the sufficiency of your expertise and as to your suitability before confirming instructions.*

It does not matter whether the appointed expert is a card-carrying neuropsychiatrist. It would not matter if 'neuropsychiatrist' was a protected title or if the GMC recognised 'neuropsychiatry' as a specialty for the purposes of specialist registration. What matters are the expert's training and experience and their relevance to the neuropsychiatric issues in the case. Set out what you believe to be your relevant training and experience and be explicit about any relevant gaps before you accept instructions. Then confine your evidence to your field of expertise. If you do so you ought not fear criticism, or worse, for straying outside your field. At worst you should anticipate no more than that the court might give more weight to another expert who has more relevant experience.

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# The Butler Did It And Maybe Had Epilepsy!

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**Marco Mula MD PhD**<sup>1,2,3</sup>

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<sup>1</sup> Atkinson Morley Regional Neuroscience Centre, St George's University Hospitals NHS Foundation Trust, London, UK

<sup>2</sup> Department of neuropsychiatry, South West London & St George's Mental Health Trust, London, UK

<sup>3</sup> Institute of Medical and Biomedical Sciences, St George's University of London, UK

Correspondence:

**Marco Mula MD, PhD**

Atkinson Morley Regional Neuroscience Centre,  
St George's University Hospitals NHS Foundation Trust,  
Blackshaw Road, London SW17 0QT, United Kingdom

Tel. +442087254322 Fax +442087254591

Email: [mmula@sgul.ac.uk](mailto:mmula@sgul.ac.uk)

That the butler is the murderer is a classic mystery fiction cliché despite the limited number of noir novels having felonious butlers as main characters. Over time, murderous manservants were turned into shorthand for a cheap ending and became the target of easy jokes. Epilepsy shares a very similar and unfortunate past, regarding a potential role in criminal behaviour. The pseudoscientific formalisation of a relationship between epilepsy and crime probably starts with Cesare Lombroso. On 13th March 1884, in the military barracks of Pizzofalcone, near Naples, the 20 year-old soldier Salvatore Misdea, affected by epilepsy, slaughtered 7 comrades and wounded

13, saving only two, who were from Calabria as himself. Lombroso was asked to prepare an expert witness report by the Court and, in his final report, Lombroso wrote "... the same physiognomy, the same anomalies of the teeth, the same vanity, laziness, love for orgy, nothing was lacking; yet Misdea was bearing in the face, in the skull and in his habits, the features of the born criminal, extended to the whole body, and identified at the maximum degree".

Salvatore Misdea was condemned to death and executed a few months later. It was at the end of that trial that the idea of a link between epilepsy and crime flushed through the mind of Lombroso who subsequently wrote, in "Luomo delinquente": *The Criminal Men* "...the great criminality is a form of equivalence of epilepsy"<sup>(1)</sup>. According to Lombroso, there was an "epileptoid" substrate in criminality, a concept deeply influenced by Morel's theory of "epileptic equivalents"<sup>(2)</sup>, meaning that epilepsy could often be present not with convulsions, but with a number of behavioural manifestations including criminal acts. In *The Criminal Men* Lombroso stated that especially some "impulsive crimes" could in fact represent epileptic equivalents and the "moral madness" was a form of "larval epilepsy", thus establishing "the perfect identity between crime and epilepsy"<sup>(1)</sup>. Interestingly, Lombroso developed at the same time the hypothesis that epilepsy and crime were also linked to geniality.

According to Lombroso, genius and epilepsy shared a number of similarities, such as genetics, the tendency to suicide, religious fervour and mental rambling. Still, genial intuition and epileptic seizures were both sudden and intermittent <sup>(3)</sup>.

It is now evident that Lombroso's theory of a connection between epilepsy and the criminal personality was completely wrong <sup>(4)</sup> but it has exerted a negative influence on both medical and public opinion, which continues up to now, and strongly contributed to the stigmatization of patients with epilepsy <sup>(5)</sup>. No doubt that the twentieth century has gone by with all its incredible progress in science, but epilepsy still remains characterized by a significant social burden and stigma which are partially due to this long-lasting negative Lombrosian heritage.

### Epilepsy, crime and aggressive behaviour: what is the evidence?

There is general agreement that psychiatric disorders are more frequently encountered in patients with epilepsy as compared to the general population with prevalence rates in the region of about 20%–30% for mood and anxiety disorders and 2%–7% for psychoses <sup>(6)</sup>.

In general terms, episodic dyscontrol and aggressive behaviour was reported in epilepsy by different authors <sup>(7–12)</sup>. However, in several cases, it was rather a general impression not supported by scientific evidence and possibly influenced by old-fashioned prejudices towards epilepsy echoing Lombrosian theories.

Psychiatric symptoms in epilepsy have been historically classified according to their temporal relation with seizures as peri-ictal, ictal, and interictal. Ictal symptoms are the clinical expression of an epileptic seizure. Peri-ictal refers to symptoms either preceding (preictal) or following (postictal) the ictus while interictal symptoms are those that occur independently by seizure activity.

Aggressive behaviour as an ictal phenomenon with stereotyped automatisms is extremely rare. A large survey of several thousand seizures documented on prolonged videoEEG monitoring reported an incidence of 1 out of 1000 seizures with aggressive conducts <sup>(13)</sup>. However, in all these cases, violent motor automatisms during seizures were misinterpreted as threatening or

assaultive. In fact, although the aggressive act may appear orchestrated, it is poorly directed and doesn't involve intricate skills or purposeful and detailed behaviours <sup>(14)</sup>. The aggressive conduct is directed towards nearby objects or persons, involving mainly pushing and shoving. Typical epileptic phenomena such as staring, oral and motor automatisms, may be present. The patient is usually amnesic for these episodes, expressing profound remorse <sup>(15–17)</sup>. In the few cases observed in telemetry units, aggressive automatisms showed to be related to epileptic activity rising from the amygdala and spreading through the diencephalic regions <sup>(18)</sup>.

No clear lateralising features have been described, although associated symptoms point to the non-dominant hemisphere <sup>(14)</sup>. The attribution of violent behaviours to an ictal event is not always simple and video-EEG monitoring is always diriment. Treiman recommended five criteria to determine whether a specific violent act was the result of an epileptic seizure: **(a)** an established diagnosis of epilepsy; **(b)** the VideoEEG documentation of epileptic automatisms; **(c)** the VideoEEG documentation of the aggressive behavior; **(d)** the aggressive act should be characteristic of the patient's habitual seizures; **(e)** a clinical judgment should be made by the neurologist as to the possibility that the violent act was part of a seizure <sup>(19)</sup>.

Peri-ictal aggressive behaviour is often associated with confusion or psychosis. In fact, in post-ictal psychoses, violent behaviour is reported in 22.8% of cases <sup>(20)</sup>. Available data clearly suggest that aggressive behaviour in epilepsy is largely unrelated to seizures and mainly due to underlying psychiatric comorbidities. A review paper focusing on homicide and epilepsy identified 30 articles and 176 cases published up to 2013 <sup>(21)</sup>. In 78% of cases, there was no temporal relationship with seizures. In the remaining 22%, the violent episode occurred as a post-ictal event in the majority of cases.

Patients were usually young males, with low average intelligence and a history of behavioural problems starting during childhood. Alcohol abuse and stressful situations represented common precipitating factors. According to DSM-5, violent/aggressive behaviour can occur in disruptive, impulse-control or conduct disorders or antisocial personality disorder. These disorders are all characterised by problems in emotional

## “ As it happens for impulse control disorders, patients with antisocial personality disorder frequently act on impulsive urges without considering the consequences

and behavioural self-control and often start during childhood. In the large chapter of impulsive control disorders, intermittent explosive disorder is the most pertinent to this discussion. It is characterised by aggressive outbursts that should be impulse and/or anger based in nature and must cause marked distress, cause impairment in occupational or interpersonal functioning or be associated with negative financial or legal consequences. Antisocial personality disorder is defined by a pervasive pattern of disregard for the rights of other people that often manifests as hostility and/or aggression. It also starts during childhood although conduct disorder is often considered the precursor to the antisocial personality disorder.

As it happens for impulse control disorders, patients with antisocial personality disorder frequently act on impulsive urges without considering the consequences. This difficulty with impulse control results in loss of employment, accidents, legal difficulties, and incarceration. A typical and distinguishing feature for antisocial personality disorder is the lack of genuine remorse for the harm they cause others and these patients become quite adept at feigning remorse when it is in their best interest to do so.

It is quite striking that there are no data about prevalence of these disorders in patients with epilepsy<sup>(22)</sup>. Despite the huge amount of publications on the controversial issue of personality changes in epilepsy, no studies investigated antisocial personality disorder or impulse control disorders. Studies investigating interictal aggressive symptoms are also limited. During

the 70s, Rodin reported prevalence rates of aggressive behaviour in unselected samples of patients with epilepsy in the region of 4.3%<sup>(23)</sup> while Currie et al. up to 7%<sup>(24)</sup>.

More recently, a multicentre study using an ad-hoc questionnaire showed that patients with epilepsy have slightly less aggressive responses as compared to the general population with cognitive impairment and polytherapy being the major implicated variables<sup>(25)</sup>. However, when the authors looked at aggressive behaviour in patients with and without comorbid psychiatric disorders, the latter group presented significantly more aggressive behaviour. Prevalence rates are not reported as aggressive symptoms are reported as a dimension.

Neuroanatomical correlates of aggressive behaviour in temporal lobe epilepsy are described in a couple of papers which reported a reduction in neocortical grey matter in the frontal areas but no association with hippocampal pathology<sup>(12,26)</sup>. Finally, the potential effect of antiepileptic drugs (AEDs) should be mentioned.

Clinicians are now recognising that AEDs can be associated with treatment-emergent psychiatric adverse events in patients with epilepsy<sup>(27)</sup>. These side effects are not as frequently reported outside epilepsy. A previous psychiatric history and a history of a propensity toward aggressive behaviour should routinely be sought from patients, family members, and carers in order to identify patients at increased risk of psychiatric reactions to AEDs. Some AEDs seem to be more prone to trigger aggressive behaviour in predisposed individuals<sup>(28,29)</sup> but several variables are implicated<sup>(22)</sup>.

### Conclusions

Current data shows no clear evidence supporting a relationship between criminal behaviour and epilepsy per se. The possibility of violent or assaultive behaviours as part of epileptic automatisms is extremely remote and probably more appropriate to a cheap crime movie rather than a Court. A detailed assessment of the associated psychopathology represents the main starting point for any discussion regarding this specific subject taking into account the potential psychotropic effect of AEDs in selected cases.

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# Huntington's Disease And Criminality: The Ethical Dimension

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**George El-Nimr**

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Consultant Neuropsychiatrist, Clinical Tutor and Clinical Lead for Neuropsychiatry services in North Staffordshire.  
Academic Secretary for the Faculty of Neuropsychiatry

Studies from around the world have linked Huntington's disease (HD) with a propensity towards criminality (Reed & Chandler 1958, Parker 1958, Dewhurst et al 1970). This has undoubtedly compounded the stigma that is already associated with this devastating familial condition, adding further shame to HD sufferers and their families.

This article will seek to critically present the historical background of such an assumed link and its repercussions. Given the serious consequences of even raising the possibility of a connection between criminality and specific disorders, it is argued that such investigation in itself poses ethical considerations, aside from the quality of the science that forms the basis for conclusions.

The purpose of establishing such a link is in itself dubious. While it could be argued that this kind of correlation could be of some use in service planning,



the potential to abuse such claims and use them as the basis for erroneous speculations is significant. It could equally be argued that the anticipated harm to patients, owing to the enhanced stigma, would well outweigh any potential benefit. Even if such correlation turned out to have a strong scientific base, the impact on the significant proportion of patients who do not present with any criminal tendencies should not be underestimated. It has repeatedly been seen that all sufferers of a given condition can easily be "tarded by the same brush". While exclusive reliance on values and ethics, in the absence of science to support it, can be open to

spurious interpretations and superstition, “values-free” science can equally lead to outcomes that are the exact opposite to what was intended. This potential harm may be further intensified when such speculation is presented as science; a form of “science” that is based on shaky ground that would not stand scrutiny if people had the skills and resources to examine the evidence.

### HD and eugenics

In 1909, the British geneticist William Bateson confirmed the heritability status of HD as a Mendelian autosomal dominant. This was shortly after the rediscovery of Gregor Mendel's theory at the turn of the twentieth century. This further insight into the heredity of HD coincided with the increasing recognition of the eugenic movement, which put HD under the spotlight with calls for strict scrutiny over how “the spread of illness” could be controlled. Charles Davenport was a biologist from North America and director of a highly regarded biological laboratory in New York. He had founded the Eugenics Record Office. Davenport was quite outspoken in advocating stringent control measures, in keeping with his eugenic view of the world.

### Origins of HD

A number of attempts were made to identify families from the New England region, where the first descriptions of HD originated. Ancestry was traced back to the early 17th century, from the East Anglian areas of England. Extensive pedigrees were studied and allocated within groups that could be traced back to original members. It was claimed that the considerable migration to the USA had then led to further spread of the HD gene in the States.

Hired by Davenport, physician Elizabeth Muncey commenced an extensive pedigree study of families with HD in New York and New England. The study went back over 10 generations and the data was published in 1916.

In 1932, Percy Vessie a eugenic-minded Connecticut psychiatrist reported that only three individuals from the village of Bures in Suffolk were founder members of a large HD group that had been traced over a 300 year period. Vessie's work built on Muncey's data and claimed that those three married couples were the most likely source of HD in the States. Such individuals

were originally given pseudonyms but subsequently full names were revealed by Critchley (1934, 1964, 1973).

### HD linked to witchcraft

Vessie was the first to suggest that early ancestors of HD were taken for witches during the Salem witch-hunt of the 1690s. A couple of years later, Critchley suggested that witchcraft and criminality should be regarded as indicative of a “Huntingtonian psychopathy”. Similarly, further tracing in East Anglia was extended by Van Zwanenberg (1974) and Maltzberger (1961). The detailed and exaggerated descriptions outlined in these papers (as opposed to adopting a robust scientific approach) have flagged up the possibility of linking HD with the horrific witchcraft trials during the early colonial period. Nevertheless, unequivocal connection of patients with possible HD in these offences was not evidenced.

### Consequences for HD sufferers

With eugenics gaining more popularity, attracting highly regarded professionals from various fields and political spectra and speaking in the name of science, it was not long before calls were made for drastic actions, such as compulsory sterilisation and immigration restrictions. Surveillance of families was also called for on the basis of the “discovery” – which was later seriously challenged – that only a few ancestors were responsible for “producing” a huge number of HD sufferers. This work, entitled ‘Huntington's chorea in relation to heredity and Eugenics’, was published in the *American Journal of Insanity* and quickly gained further popularity, often quoted in subsequent literature as one of the well-established texts in relation to HD!

### Flawed data

As already alluded to, re-examination of the original data used by Vessie and other authors who reiterated the connection between HD and witchcraft revealed several errors. It is now recognised that Vessie's main claim around witchcraft and its relation to HD was heavily dependent on a case of mistaken identity, which was in turn influenced by Muncey's flawed information. Caro and Haines (1975) and Caro (1977) had challenged that the principal person named by Critchley as the likely source of the HD gene, did not actually exist! More to the point, as will be seen later, the assumptions that associated HD gene carriers with witchcraft and criminality were

thought to be simply wrong. To the disappointment of HD families, that account was still given by Critchley a number of years down the line (1984). Indeed, Vessie's highly controversial theory around the link between HD and witchcraft appears to be quoted more often than its subsequent more scientific criticism. In their article published in August 1980, Hayden et al have clearly stated that "it is on record that the earliest transmitters of the gene to the USA, clashed with the law of their adopted country as a result of repeated crimes and misdemeanours", citing Vessie's 1938 paper. The authors went as far as alerting the legal profession and prison authorities of "this disorder" and its implications.

Hayden et al (1980) also reported on the findings of a national survey in South Africa (approximately 500 cases of HD). They indicated that there were "repeated instances of antisocial behaviour, including suicide, assaults, stabbings, shooting, theft, two reports of murder and other more minor crimes... Sexual aberrations have included indecent exposure, prostitution and rape. Similar offences have been reported by numerous other authors – citing Parker 1958, Hans and Glimore 1969 and Oliver & Dewhurst 1969".

While some of the conclusions are based on national survey results which at face value seem more robust, it would certainly be relevant to revisit such data and further analyse diagnostic criteria (genetic testing was obviously not available then), source of data, frequency of specific crimes, comparisons with national rates of reported crimes, etcetera. It is interesting for example to see suicide which is likely to be a result of various factors related to mental health, disease process and cognitive dysfunctions, being listed as an antisocial behaviour.

### Attitudes to HD

In today's world view, it is unsettling to read Vessie's testimony "that parents in New England down to the

present day teach their children to fear, hate, and shun these 'living examples of sin'. It is also quite shocking to learn that Vessie had based a conclusion of the probable diagnosis of HD on the misbehaviour of men and the fact that witchcraft accusations had been made against one woman and her relatives. Witchcraft trials of women in the Bures group were thought by Vessie to have revealed "the true story of HD in the USA". Patients were therefore described not as sufferers from a medical condition but rather as "undesirables" and even potential criminals that

should be avoided. The historical and even ongoing stigmatisation of patients with HD would obviously not be helped by such claims, especially when these narratives were endorsed by highly regarded professionals giving them unwarranted credibility.

Following on from these descriptions published in the Journal

of Nervous and Mental Disease, an article entitled 'The Witchcraft Disease' was published in The Literary Digest, a well-known US magazine. Equally disturbing, in 1933, The Lancet commented on Vessie's work "we (Britons) may congratulate ourselves on their loss for ... there can be no doubt that Wilkie, Nichols, and Jeffers (Vessie's pseudonyms for the three men) and their progeny were undesirable character, and would nowadays be classified as belonging to the social problem group". Furthermore, in 1939, MacDonald Critchley indicated that all members of families with HD were "liable to bear the marks of a grossly psychopathic taint and the story of feeble-mindedness, insanity, suicide, criminality, alcoholism and drug addiction becomes unfolded over and over again".

By 1972, Critchley had become the president of the World Federation of Neurology and had no hesitation in repeating Vessie's claims that earlier cases of HD were identifiable "by reason of their sociopathic traits and their criminality". Such accounts have undeniably accentuated the

“parents in New England down to the present day teach their children to fear, hate, and shun these ‘living examples of sin’”

notion that some people are of less "worth" than others and patients with certain conditions or disabilities should be perceived and treated as potentially violent, dangerous and even criminals. In a 1984 editorial in *Psychological Medicine*, Critchley himself pointed to the stigma that HD carried at the time of Able and his son George Huntington; locally being "attributed to a curse which had befallen a remote ancestor who had mocked the suffering of Christ upon the cross". In the same paper, Critchley highlighted Davenport and Muncey's regrets that there was no embargo on entry of HD original families to the USA, neither was the practice of compulsory sterilisation which could have spared the country 900 cases of such a devastating disease.

Quite interestingly, however, Critchley went on to acknowledge that this would have also deprived the country of two leading educators, one or two surgeons, a couple of State senators, two or three congressmen and several ministers of religion. However, he also talked about "a notorious mass-murderer in Toronto who had eleven close relatives with Huntington's chorea. Their ancestry was traced back to a migrant who left England early in the eighteenth century".

### Counter-evidence

Adopting a more robust and more impartial scientific approach, Jensen et al (1998) looked into rates and type of crime committed by patients with HD. The study also included unaffected relatives and a control group. This work was based on information from the Danish registries, including 99 males and 151 females with HD that were compared with 334 non-affected first degree relatives and matched control groups. While criminal behaviour was shown to be higher in patients with HD, the reported crimes were of minor nature. In fact, serious crimes such as arson, rape or murder had no representation at all in the studied sample. In another study by Dewhurst et al (1970), the authors identified eighteen convicted patients (out of 20 pedigrees involving 50 cases), they listed 14 patients convicted with assault, 13 offences against property, 9 of cruelty to children, 2 of malicious damage, along with one case of blackmail and one arson.

In the context of Jensen's study, it was acknowledged that since only offences that led to convictions were registered and hence studied, there is a possibility

that cognitive impairment had contributed to the inability of the "offenders" to use their legal right when arrested or defend themselves when tried. Patients with cognitive difficulties are arguably more likely to be arrested in the first place when acting illegally. It is also known from clinical practice that patients with HD can easily get frustrated and impulsive when criticised (e.g. by the arresting policemen), leading to them becoming more likely to be convicted and possibly contributing to the increase in the conviction rate in the studied group. It is also worth noting that this observation was only limited to male patients.

The data has also suggested that such behaviour is more likely to be related to the disease process, rather than environmental factors. Some of the findings are in contrast with the conclusions of Oliver (1970), which highlight that unaffected siblings "also became victims of their disturbed environment", presenting with various problems including criminal behaviours. Jensen's study does certainly put historical claims into perspective, confirming that such possible increase of criminal behaviour in patients with HD is limited to a small number of patients, essentially of male gender and refers only to crimes of less severity than historically thought.

It is certainly worth reminding ourselves that stigma has had its impact on epidemiological research of HD. It could be argued that some of the studies that showed an increase in the crime rate in HD may have only included patients whose clinical manifestations were significant enough to alert various services. There could well be a significant number of families who, due to shame, fear and stigma, have chosen to hide from the eyes of a society that shows such readiness to pass tenuous judgments and make unfounded assumptions to support specific views or achieve certain outcomes. After all, who would want to volunteer to participate in a survey that attempts to verify an already established set of assumptions?

It could even be further argued that apart from seeking essential medical and social care, one of the few situations when families or individuals would volunteer to make the diagnosis known to others is for it to be used as a defence in a criminal court of law! The relevance of the disorder to either criminal responsibility or criminal culpability would be important

issues for legal representatives to explore in such situations. Examples of already established cases for this include *R v Norman* (2009), *R v Baird* (2002), *R v Lamour* (2004) and *R v Jans* (2000), as discussed by Freckleton (2010). Needless to say, such legal battles, albeit potentially helpful to patients, would have an automatic repercussion on other families with HD and add further fuel to an already existing stigma.

### Bad science?

While stigmatisation and unjustifiable labelling have long been ascribed to ignorance, it appears that 'bad science' can not only co-exist with stigma but also enhance and even ultimately promote it. This is clearly seen in the history of attitudes towards people with HD who have repeatedly expressed their views in various fora. One implicit wish expressed by patients throughout the history of the disease is to be able to freely talk about their condition without the fear of being judged or misunderstood. Clinicians have indeed come across families where the 'H-word' referring to Huntington's disease, is not to be mentioned in the household, let alone the wider community.

The history of exploration of a link between HD and criminality has led to a context in which science is used "against" the sufferers of the disease, and there is no sign that this ethical dimension was seriously considered or efforts made to mitigate against this consequence. It is thus argued that science devoid of values could actually be more harmful to humanity than ignorance.

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# Neuropsychiatry in secure care

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## Czarina Kirk

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Consultant Neuropsychiatrist  
Secure Services  
Lancashire Care NHS Trust



### Motive

For decades it has been recognised that there were many people in prisons who reported having had a brain injury. Moreover, when the rates and statistics on recidivism were explored, individuals with a history of brain injury were over-represented (Williams et al, 2010). It was also evident that epilepsy was more common in prisons than in the general population (Gunn, 1969; Titensor & Collins, 2008), although the actual figures have since been challenged. Despite these observations, little research was completed. Statistics of prevalence ranged from 15 –80% of prisoners in US having ABI. Figures in the UK were closer to 25–60%. Dr Ivan Pitman, Neuropsychologist with the Disabilities Trust conducted a study in HMP Leeds:

“[I]n depth interviews were carried out with 139 of the 289 men who had sustained a TBI. The results indicate that:

- almost three quarters (73%) had sustained their first injury before committing their first offence – which may reveal a causal link between such injuries and offending
- 43% had been in prison on 5 or more occasions
- 92% had experienced a mild or moderate TBI and 8% a severe TBI
- 30% had experienced more than 5 TBIs
- the mean age at which the first TBI was sustained was 18”

Regardless of the fluctuating statistics it was obvious that ABI was having a significant impact on both admission to prison and repeat offending. Recidivism was estimated to be costing the UK economy £3 billion per year. The Cabinet Office (Marshall, 2013) and Bradley (Bradley, 2009) reports highlighted the need to divert people with health needs out of prisons in order for appropriate care and treatment to be given. Bradley's views were pivotal and stated “While public protection remains the priority, there is a growing consensus that prison may not always be an appropriate environment for those with severe mental illness and that custody can exacerbate mental ill health, heighten vulnerability

and increase the risk of self-harm and suicide. In addition, recent studies of mental health services for prisoners suggest that there is still some way to go in achieving equivalence with mental health services in the community". But where would they go?

Secure services, meanwhile, identified that people with neurocognitive impairment had increased length of stay, were more likely to be secluded and were less amenable to both drug and psychological therapies. Ashworth High Secure (Special) Hospital was simultaneously identifying similar issues within their population, following concerns about a number of patients who were in long term seclusion and made a decision to have a specific ward for people who had "neurocognitive" deficits. This triggered interest in NHS commissioners. A pathway was needed. A pathway for step-down from High Secure and a viable court/prison diversion.

### Opportunity

The opportunity arose in the mid 2000's to develop specific secure services for people with acquired brain injury and neuropsychiatric conditions. The independent sector were the first to respond and St George Healthcare Group opened the first secure ABI service in 2006 at St Mary's Hospital in Warrington. It offered a total of 42 Medium and Low secure care beds and within 3 years the hospital was almost full with shortened hospital stays and successful discharges. Having watched the success of St Mary's the NHS soon followed so in 2011 Guild Lodge (Lancashire Care NHS Foundation Trust) opened 18 medium secure, 15 low secure and 9 secure step down beds as a North West of England regional unit. St Andrew's Hospital, Northampton opened the Rose Unit in 2013 (medium Secure).

Given the relatively small number of beds compared to the evident need, admission criteria were developed. Each of the three units has differing inclusion/exclusion criteria including gender (the services are male only at present); progressive neurological conditions; primary diagnosis of dementia; or learning disability (Guild Lodge). St Mary's hospital do not exclude progressive neurological conditions and a successful secure service provision for people with Huntington's disease who have either presented with severe challenging behaviour in the community (disinhibition / aggression)

or via the criminal justice route – charges of assault. All of the services receive admissions from prisons – remand and sentenced prisoners, other psychiatric services – usually PICUs or main business forensic units and occasionally directly from community or medical wards (neurosurgery/ neuro-rehabilitation units). Admission is usually at least 3 months post brain injury to allow for a clearer assessment following post traumatic amnesia. Predominantly, service users are admitted under the Mental Health Act – Section 3 and 37 (with or without restriction) are the most frequently found, but also section 45a, 47/49 and less frequently Section 35 and 36. All transferred prisoners are subject to Ministry of Justice restrictions as are those with a restriction order (S.41).

Guild Lodge also offers an assessment service to assist local commissioning teams with specialist placements and contribute to Forensic In-reach liaison. Similar non-NHS assessments are undertaken by St Mary's and St Andrew's – providing specialist opinions on risk management. Both St Mary's and St Andrews accept admissions for the whole of the UK and Ireland. The predominant diagnosis on admission is Organic Personality Disorder, however, there is frequently a secondary diagnosis of schizophrenia or organic delusional disorder and very high levels of alcohol and polysubstance misuse and dependency. Increasingly it has become apparent that there is a need for a service for people with Alcohol Related Brain Damage – in particular for the under 40s.

### Means

The success and uniqueness of these services is dependent on two main factors – the environment and the staff. The essential elements of the environment are to optimise the opportunity for recovery while maintaining security. Low stimulus areas with clear signage and predictable routines are key, as are non-ambiguous security protocols, including restricted items lists, search, and visiting procedures. Of course, the security policies were already in place but they needed to be adapted to serve the needs of the service users as well as meeting Ministry of Justice secure hospital requirements.

Training, based on cognitive rehabilitation (Schoelles & Uhl, 2011), was developed for care teams who were often from main business forensic services.

Highly structured, activity based rehabilitation programmes were no longer aspirational but essential. Rehabilitation coaching (Band 2 or 3) was engaged to replace "obs" – the latter being the use of 1 to 1 observing staff to reduce risk. Traditional views on the use of sedative medications and seclusion were being challenged. Complex physical health, including epilepsy, was common place as was complex psychiatric co-morbidity. Liaison with physical healthcare teams and epilepsy training was developed. Contracts with Speech and language therapists and physiotherapists were purchased.

To lead and progress these changes in the mid-noughties, a new breed of forensic psychiatrist was required. This was an exciting time for me as a Neuropsychiatrist. I had been employed in 2005 in my first Consultant's post to work in a brain injury in-patient unit but had one session a week in Ashworth High Secure hospital. I was so fortunate to have worked with an enthusiastic and dynamic team there, whose mission it was to train the whole of Ashworth staff and educate them on specialist needs of people with cognitive impairment – and they did it! In doing so we raised the profile of neuropsychiatry and I took the opportunity to learn the forensic psychiatry trade. Forensic Neuropsychiatry.

Forensic neuropsychiatry cannot exist in isolation. We work collaboratively with forensic neuropsychologists. These are neuropsychologists who have been trained in specialist risk assessment and in providing adapted offence management programmes, such as adapted sex offender programmes.

### Execution

So what of all those prisoners with brain injuries? It was evident from the (incredibly diverse) statistics that a screening tool would be required to ascertain the severity and impact of acquired brain injury to determine suitability for admission. The Disabilities Trust developed such a tool – The Brain Injury Screening Index (BISI) which is to be embedded within the Prison admissions healthcare screen on System-one. The BISI is an 11 question screening tool to help identify people with a brain injury, and it also gives an indication of the level of severity of the injury. The BISI is not a diagnostic tool, but records an individual's self-reported history of brain injury. They are also piloting Brain Injury Link workers

within three prisons to perform further assessment, train prison staff, facilitate transfer to hospital if appropriate and also to support those who don't need hospital but who are struggling with prison life – in particular having problems with completing offence management programmes such as Life Minus Violence.

### Charges Brought

With improved criminal justice liaison teams and mental health in-reach teams more people are being assessed with a view to diversion into hospital for assessment or treatment. But access to specialist secure ABI beds remains difficult – these are costly beds, staff ratios are high, and predominantly based in the North West of England. This has resulted in admissions being offered to only the most complex and challenging individuals who cannot be cared for in prison. These high levels of acuity and complexity have driven the speciality on, but challenged resources. Anecdotally, we are seeing significant reduction in usage of PRN benzodiazepines and seclusion compared to normal business secure wards in Guild Lodge. Indeed at St Mary's hospital, in their 10 year history, the seclusion room has not been used for a service user with a brain injury!

The culture of seclusion has been decimated. This has been due to the success of training in which we emphasise the counter-production of sedating someone who is cognitively impaired or secluding someone who cannot recall the antecedents of the incident and is frequently unable to express remorse or victim empathy. Ultimately, reduced length of stay in hospital and a reduction in recidivism will determine the cost effectiveness of our services. NHS England commissions for secure care and they are committed to continuing this specialist provision, however, this will be dependent on ensuring these goals are met and met within budget, particularly during this era of austerity. With currently only one NHS service there remains an opportunity for other services to develop, bridging the very large geographical gap.

### Conviction

Our services are excellent training environments – that unique blend of psychiatry, neurology, cognitive impairment and criminality providing trainees with an opportunity to develop in all areas of their portfolio. The neuropsychiatry MDT with rehabilitation, hope and recovery, blends with the risk assessments, Multi-

Agency Public Protection plans and Ministry of Justice restrictions of the forensic services. The opportunity for research is extensive. The focus over the past decade has, understandably, been on establishing services, training staff and ensuring investment and future commissioning. Over the next decade, however, we need to review what impact these new services have had on rates of recidivism and also on length of stay in High secure and Medium secure services where many of our service users had been floundering in a status quo of incident, sedation, incident, seclusion cycle.

Of course an important part of our role and expertise is the preparation of court reports. One of the most common requests is assessment of Fitness to plead and stand trial. As neuropsychiatrists we are adept at assessing capacity and therefore we have a head start in assessing fitness to plead. We are also asked for opinions on capacity to form criminal intent. Take, for example, a murder committed in the post-ictal period or a sexual offence committed by someone who has severe frontal lobe damage and has no memory of the incident. This puzzle solving is the reason we decided to be neuropsychiatrists – delving past the offence, nodding to the neurological disorder, through the mental illness and substance misuse and putting together the individual pieces at “the material time” to determine capacity, sanity or insanity, and applying the M’Naghten Rules (indeed, learning what they are!). And when the puzzle has been completed and the picture becomes clear we are then asked by the court to opine on disposal – the need for treatment or more assessment – if a piece of the puzzle is missing.

## Sentencing

Would I chose a different career path? Absolutely not – not yet at any rate! This is a challenging job. The service user group have complex needs. Striking the balance between rehabilitation and restriction is fraught with difficulties. Inspiring hope when faced with a lengthy prison term or restriction order, takes tenacity. Convincing Hospital managers and Commissioning teams that our outcomes justify the costs – well, you have to be in it for the long game. Research and outcome measure development will make that a little less like an emotional plea for leniency and more like concrete evidence. Standing before a jury of my peers I am charged with being a Forensic Neuropsychiatrist. I plead guilty and plea to the jury to come join me. I am sentenced to continuing to develop and improve this service with the help and support of colleagues. SEND HER DOWN!

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# Neurobiology of Aggression

**Professor Shoumitro (Shoumi) Deb<sup>1</sup> MBBS, FRCPsych, MD.**  
**Dr Tanya Deb<sup>2</sup> MA (Oxon), BMBS, MRCPsych.**

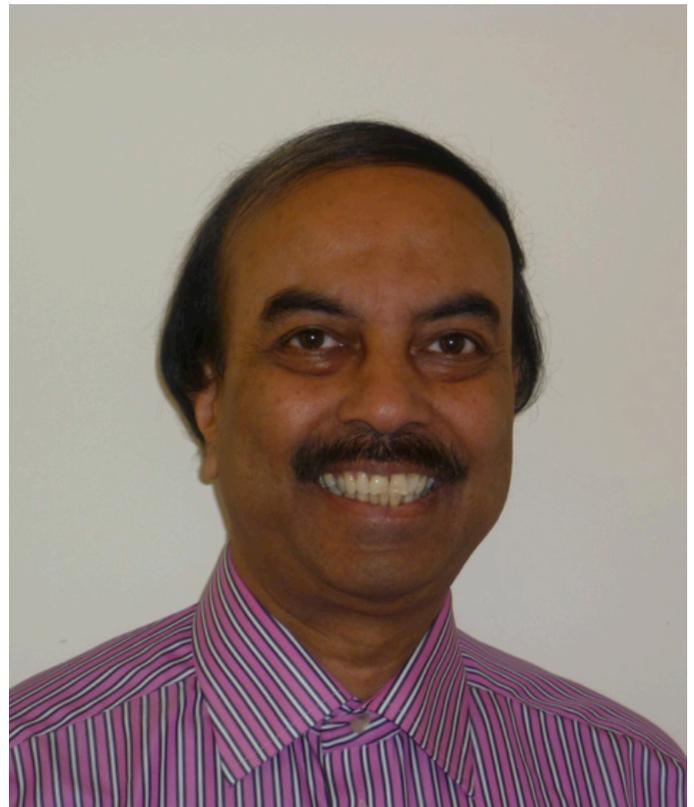
<sup>1</sup>Imperial College London, Division of Brain Sciences.

<sup>2</sup>Academic Clinical Fellow, Institute of Psychiatry, Psychology and Neuroscience.

## Introduction

Aggression is prevalent in many neuropsychiatric disorders (see Table 1) and is a common reason for referral to neuropsychiatry clinics. Effects of aggression can be far reaching (see Table 2). Aggression is a complex phenomenon and multiple factors influence aggressive behaviour. Both neurobiological and psychosocial factors play a major role in predisposing to, precipitating and maintaining aggression, which must be taken into account in the formulation for its management. In addition, co-morbidities of physical disorders, psychiatric disorders, psychological symptoms, and drug and alcohol related problems can contribute. Therefore, a thorough multi-disciplinary assessment followed by inter-professional input is necessary for successful management. Although both pharmacological and non-pharmacological managements are available, overall evidence in their support is not always unequivocal (see review by Deb, 2016). The ultimate goal should be to improve patients' and their carers' quality of life. In addition, understanding the underlying neural mechanisms affecting this complex behaviour will help with the management. In this paper we have presented a brief discussion on the current knowledge on the "neurobiology of aggression".

First we will briefly discuss a few related concepts. For example, 'violence' may be seen as an extreme

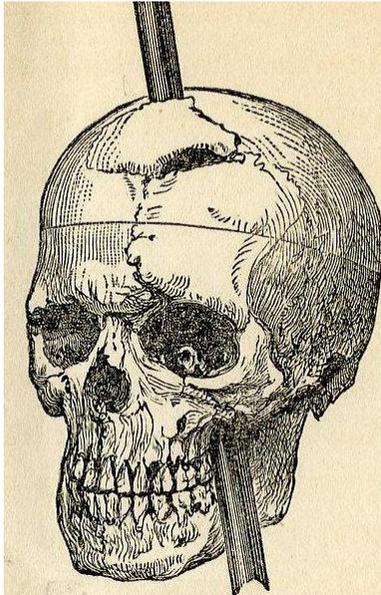


form of aggression. 'Anger', on the other hand, is an emotional state, which could precipitate aggression but is neither necessary nor essential for aggression. 'Hostility' is an attitudinal state that may lead to aggression, and 'impulsivity' is a behaviour that leads to 'urgency', when people act without thinking about the consequences. 'Anxiety' may underlie many acts of aggression.

There is no universal definition for aggression but one proposed by Baron and Richardson (1994) is that aggression is "Any form of behaviour directed toward the goal of harming or injuring another living being who is motivated to avoid such treatment." On the other hand, the World Health Organization (WHO) has defined 'violence' as "The intentional use of physical

force or power, threatened or actual, against oneself, another person, or against a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation (WHO, Krug et al., 2002)."

**Figure 1: Schematic representation of Phineas Gage skull with the inserted rod**



Different types of aggression have been described. For example, aggression could be verbal or physical which could be directed to others, self or objects, including property. Two primary types of aggression have been described in clinical practice. Reactive aggression results from a disproportional response to a stressful stimulus (part of the 'fight or flight' reaction). People often show evidence of agitation and autonomic arousal during these episodes. This is the most common type of aggression found in neuropsychiatric patients as well as in the general population. On the other hand, instrumental or proactive aggression is often a pre-meditated, cold blooded, goal directed action. This is perhaps more commonly associated with antisocial personality disorder, and to some extent borderline personality disorder.

Different hypotheses have been put forward in order to try to explain these two different types of aggression. The somatic marker hypothesis (Tranel et al., 1999) is a cognitive neuroscience based idea that is said to be behind reactive aggression. Conversely, proactive aggression is explained by psychosocial hypotheses

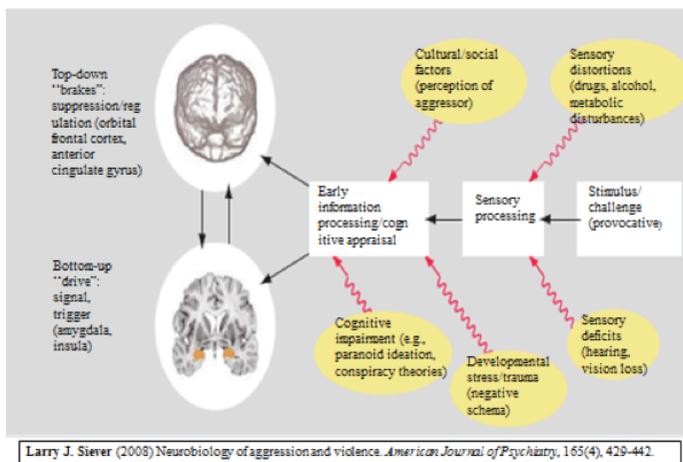
such as 'dysfunctional social learning' (see review by Blair, 2000). A similar concept in the context of intellectual disability (ID) is the reinforcement of maladaptive behaviour in childhood by the family or the community. According to the recent DSM5 classification (APA, 2013), Intermittent Explosive Disorder (IED) is perhaps the closest to a reactive aggression diagnosis and Conduct Disorder (CD) and to a lesser extent Oppositional Defiant Disorder (ODD) to instrumental aggression (see Deb et al., 2016). Nevertheless, it is not always easy in clinical practice to distinguish between these two fundamental types of aggression (see review by Parrott & Giancola, 2017). The evidence for a neural substrate for aggression comes from lesion studies, neurosurgical studies, central and peripheral biomarkers, genetic studies, and structural and functional neuroimaging studies of human and animals (see review by Deb & Deb, 2017).

### Neuroanatomy of aggression

Our understanding of neural substrates of aggression perhaps starts with the most famous lesion study in the history of cognitive neuroscience, based on the story of Phineas Gage (Harlow, 1868). Gage was a railroad worker in the USA and a tamping rod went through his skull during an accident and damaged his left anterior cingulate gyrus and right ventromedial pre-frontal cortex (see Figure 1). Before the accident Gage was a pleasant friendly man but after the accident there was a marked change in his behaviour in that he became irritable, lost his temper easily and lacked social judgement. His behaviour changed to the extent that his friends stated that Gage is "no longer Gage." Interestingly there were no localising neurological signs or speech or cognitive abnormalities that one would expect from such a severe brain injury. This is perhaps the first example of our understanding that brain injury could change human behaviour even in the absence of localising neurological signs.

The second piece of evidence in support of a neuroanatomical basis for aggression perhaps comes from lesion studies carried out on animals by Klüver and Bucy (1939). They showed that after bilateral ablation of the amygdala monkeys became placid, less aggressive and fearless, showed changed sexual behaviour and a tendency to put objects in their mouths. Indeed since then many reports of Klüver Bucy syndrome have been described in humans with a variety of lesions in anterior temporal regions (Lilly et

Figure 2: Neuroanatomy of aggression



al., 1983). The role of the amygdala in aggression has further been supported by neurosurgical studies (Lee et al., 1998). In a retrospective study of 481 patients who underwent bilateral stereotactic amygdalotomy for intractable aggression, Ramamurthi (1988) reported excellent improvement in 70% – 76% of patients. In Elst et al.'s study (2000) amygdala volume was found to be severely reduced in a subgroup of 20% of patients with epilepsy who showed aggression and intermittent explosive disorder. Although it appears that in general people with epilepsy do not show an increased rate of aggression when compared with people who do not have epilepsy, some patients with complex partial seizures with temporal lobe foci may show increased aggression (Ito et al., 2007). Aggression could be manifested at pre-ictal, ictal, post-ictal, and inter-ictal phases of epileptic seizures (see review by Deb, 2007). In addition Tonkogony and Geller (1992) reported aggression in patients with temporal lobe tumours.

A recent meta-analysis of 28 voxel based morphometry (VBM) studies of adolescents with conduct disorder showed reductions in the grey matter in the insula, amygdala, frontal and temporal regions (Rogers et al., 2016). Positron Emission Tomography (PET) studies also showed similar findings in psychiatric patients with a history of violence (Volkaow et al., 1995). A recent Diffusion Tensor Imaging (DTI) study showed abnormalities in the uncinated fasciculus (UF), which is a major limbic-prefrontal white matter connection in adolescents with conduct disorder when compared with age matched control groups who did not show conduct disorder (Sarkar et al., 2013). A subsequent study from the same group showed more widespread

brain area involvement including cerebellar areas (Sarkar et al., 2016).

It is proposed that reduction in the top-down control from the pre-frontal cortex, particularly fronto-medial pre-frontal cortex or over-activity in the limbic system, particularly the amygdala and cingulate gyrus is likely to lead to aggression (see review by Coccaro & Siever, 2003). Siever's recent review paper on the subject (2008) presented this hypothesis in a simplified form using a schematic diagram (see Figure 2). This schema shows that potentially provocative stimuli come to our brain through sensory organs like eyes and ears and are initially processed in the sensory areas such as the visual cortex, auditory cortex etc. Then they are interpreted in the primary association areas then the secondary association areas in the brain in frontal, parietal and temporal cortices. Ultimately the emotional interpretation of these stimuli takes place in the limbic system. However, before an action is taken through the afferent connections of the limbic area such as the hypothalamus, something important happens. The pre-frontal cortex will make a logical assessment of the emotional interpretation in order to judge potential threat associated with the potentially provocative stimuli and depending on past experience stored in the system, the prefrontal cortex will either allow or inhibit an act of aggression.

Things could go wrong at any stage in this pathway. For example, if there are sensory deficits such as impaired hearing, vision etc. or any sensory disorder caused by drug and alcohol etc. this may cause mis-interpretation of stimuli and lead to aggression. Similarly interpretation in the secondary association areas may be affected by cognitive impairment such as dementia, intellectual disability, delirium, delusions or even early cultural/ social factors which may lead to aggression. However, ultimately they will be the subject of the tug-of-war between the prefrontal cortex (ventro-medial prefrontal cortex + part of the anterior cingulate gyrus) and the limbic system (amygdala + insula + part of the anterior cingulate gyrus) as described previously in the text.

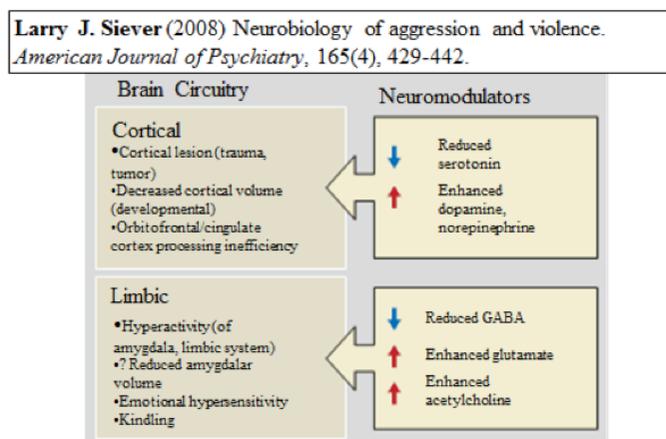
### Neurochemistry of aggression

Given the preponderance of aggression in males one would expect that testosterone may play a major role in causing aggression. There is some support for this in the literature but the evidence is not as clear cut in

humans as it is in animal studies (see review by Filley et al., 2001). The three neurotransmitters that have been studied most in the context of aggression are serotonin, dopamine and noradrenaline.

Most studies showed an association between low serotonin and aggression, however, some studies have failed to do so (see review by Willner, 2015). It has been proposed that serotonin perhaps influences the top-down inhibitory response of the pre-frontal cortex to the limbic system (Siever, 2008). It is also proposed that different 5-HT receptors may play a different role in this context. For example, it has been suggested that 5-HT<sub>2A</sub> antagonism as opposed to 5-HT<sub>2C</sub> agonism may be effective in ameliorating aggressive behaviour (Siever, 2008). Some suggested that although 5HT<sub>1A</sub> receptors are found in many cortical and subcortical brain areas, it is far from clear whether their anti-aggressive activity is modulated through the prefrontal cortex (Willner, 2015).

**Figure 3: Neurochemistry of aggression**



However, nor-adrenaline seems to work in the opposite way than 5HT, in that it is an increase in nor-adrenaline level in the pre-frontal cortex that is associated with aggression (Siever, 2008). Indirect evidence in support of a role for nor-adrenaline comes from some genetic and animal studies. For example, the gene coding for the Monoamineoxidase (MAO-A) receptors has been linked to aggression. People with an underactive MAO-A gene have been found to show an increased level of aggression, associated with reduced volume of the amygdala and anterior cingulate gyrus (Meyer-Lindenberg et al., 2006). An allele of MAO-A has also been associated with borderline personality disorder (PD) (Ni et al., 2007).

Both animal and human studies show evidence that perhaps an increased level of dopaminergic transmission is associated with an increased level of aggression (see review by Coccaro & Siever, 2003). On the other hand, unilateral striatal dopamine deficiency is shown to be associated with increased levels of aggression in vervet monkeys (Meleg et al., 1996). Greater striatal dopamine transporter density (perhaps indicating increased dopaminergic transmission) was shown to be associated with impulsive violent offenders than controls (Kuikka et al., 1998, cited in Coccaro & Siever, 2003). It has been proposed that D2 receptors may be involved in the organisation of aggression perhaps by being involved in the general permissive role of arousal than aggression per se (Siever, 2008). Other neuromodulators that have been studied in the context of aggression are Gama-amino-butyric acid (GABA) (Fish et al., 2002), opioid (Roy et al., 2015a, b), oxytocin (Ragnauth et al., 2005), vasopressin (Wersinger et al., 2007), and acetylcholine (Steinberg et al., 1997).

Mapping neurochemical abnormalities associated with aggression onto the neuroanatomical impairments are not always straightforward. However Siever (2008) suggested reduced serotonin and enhanced dopamine and noradrenaline activities in cortical areas, and reduced GABA activity as opposed to enhanced glutamate activity as well as increased acetylcholine activity in limbic areas modulate aggression in humans (see Figure 3). Therefore, one would hope that SSRIs (by increasing serotonin), new generation antipsychotics (by reducing dopamine) and beta-blockers (by reducing noradrenaline in the cerebral cortex) will increase cortical inhibition on the limbic system and reduce aggression. Similarly, mood stabilisers by stabilising GABA - glutamate imbalance in the limbic system will reduce over-activity leading to reduced aggression. However, RCT based evidence does not necessarily support these simple predictions (see review by Deb, 2016).

In relation to the neurochemistry of aggression perhaps there are three things worth keeping in mind. First, the role of any particular neuromodulator in aggression is far from clear at the moment (see Willner, 2015). Second, many of these neurotransmitters may cause aggression by indirect effects. For example, it has been proposed that serotonin is involved in influencing impulsivity and dopamine is responsible

for reward behaviour rather than aggression per se (Scarr et al., 2013). Third, there are often interactions among neurotransmitters and they do not always act alone. For example, it has been proposed that it is the dysfunctional interaction between serotonin and dopamine in the prefrontal cortex, and also the imbalance between GABA and Glutamate function that leads to aggression (Seo et al., 2008).

## Conclusion

In this brief report we have summarised the recent evidence on the neurobiological mechanisms of aggression. As stated before, whereas it is important for clinicians to understand possible neural substrates for aggression in order to develop the right formulation for management, it is equally important to take into account all the other physical, psychiatric, psychological and social/ environmental factors into account in order to achieve the treatment goal. Whereas reduction of aggression is the primary aim of management, the ultimate goal should be to improve the quality of life for the patients and their family carers with particular emphasis on impact on employment, finance, leisure activities, family relationships, social relationships, independent living, physical and mental health.

This paper is based on a recent key-note speech given by Professor Shoumi Deb in Cardiff during the RCPsych ID Faculty's annual residential conference, and a draft book chapter written by Professor Shoumi Deb and Dr Tanya Deb for the forthcoming Oxford Textbook of Neuropsychiatry. We have presented below a small number of key references but the full list of references is available from Professor Deb ([s.deb@imperial.ac.uk](mailto:s.deb@imperial.ac.uk)).

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**Table 1**

Neuropsychiatric disorder	Prevalence
TBI	37–71% (deb, 1999; Silver, 2005)
Dementia	48–82% (aggression + agitation)
ASD	16–28% (ODD) (Lai, 2014)
ADHD	>50% (Saylor & Aman, 2016)
ID	15–33% (Sigafos, 1994; Hemmings, Deb, Chaplin, Hardy, Mukherjee, 2014)
Psychiatric outpatients (all ages)	6.3%; 3.1% (IED) (Coccaro, 2005)
Personality Disorder	14.4% violence (Johnson, 2000)
Drug and alcohol abuse	12–16 x higher vs 5 times in Scizo + affective D. (Swanson, 1990)
Epilepsy	Controversial (Deb, 2007)
Children in the UK	8% (B); 5% (G) (CD) (Nice, 2013)

**Table 2: Main effects of aggression**

Hinders rehabilitation

Causes major disability and impairment for patients

Source of major stress for family, friends and carers

Leads to social isolation and loss of placement

May lead to unnecessary hospitalisation, use of medication and restraint

Has financial implications for patients, family and the wider society

## Case Report

# Impulse Control Disorder, Parkinson's disease and criminality?

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### Jasvinder Singh

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Consultant Neuropsychiatrist  
Walkergate Park, NTW NHS foundation Trust  
Newcastle upon Tyne

The disease named after Dr James Parkinson is a neurodegenerative disorder primarily affecting substantia nigra, which is a rich dopamine source for the whole brain. The loss of dopamine results in classical symptoms of Parkinson's, which include rigidity, tremors, postural instability and bradykinesia. It is one of the commonest neurological disorders affecting up to 160/100,000 with an annual incidence of 15–20/100,000.<sup>1</sup> It usually affects people over 60 years of age but 1:10 people are affected younger than 50; it occurs more commonly in men than women.

Neuropsychiatric symptoms such as depression, anxiety, apathy, psychosis and dementia are well recognised in Parkinson disease.<sup>2</sup> However, a small proportion of patients also experience compulsive behaviour, classified as an impulse control disorder (ICD), while taking dopamine replacement therapy, particularly dopamine agonists. Impulsive behaviour is defined as an irresistible temptation to carry out certain activities despite their being harmful to the person and/or others. Typical ICDs include compulsive buying, pathological gambling, compulsive sexual behaviour and binge or compulsive eating. Such behaviour can have a detrimental impact on the patient and carer: for instance, marital breakdown, financial debts and criminal prosecution. The condition poses a challenge to the treating clinician and wider MDT.



The prevalence estimates of impulse control disorders in Parkinson's disease has been estimated to be 13.6% and it ranges from 1.7% to 6.1% for gambling, 2% to 4% for compulsive sexual behaviour and 0.4 to 3% for compulsive buying<sup>3</sup>. There have been no prevalence studies of ICD related eating disorders in Parkinson's disease. Other impulse control disorder seen include Dopamine Dysregulation Syndrome (DDR) – addiction like consumption of dopaminergic medication – and punding, a stereotyped repetitive purposeless behaviour. The frequency of ICD is found to be similar for men and women although compulsive sexual

behaviour is reported more in men and compulsive buying and eating more in women, perhaps reflecting trends in the general population.<sup>3</sup>

ICDs have also been reported in association with levodopa treatment and after deep brain stimulation surgery.<sup>4</sup> A large DOMINION study investigating ICD in Parkinson disease showed interesting results. Levodopa treatment has a dose–effect association on ICDs, while dopamine agonists demonstrate no such effect.<sup>3</sup> Furthermore, either dopamine agonist initiation or dose increase can lead to ICD. In patients already taking dopamine agonists, the addition of levodopa can increase the risk of ICDs by approximately 50%.

It is interesting that ICD only occurs in a subset of PD patients, which undermines an exclusive aetiological role for dopamine agonists. There must be additional susceptibility factors. Identified risk variables include younger age at onset, being unmarried, current cigarette smoking, and a family history of gambling.<sup>3</sup> Likewise, impulse control disorders in Parkinson's disease show an overlap with impulse control spectrum disorders seen in the general population like addictions and obsessive–compulsive disorder. This overlap may be explained by the shared pathophysiological mechanisms involving imbalance between ventral and dorsal stream of fronto–subcortical circuits.<sup>6</sup> D2 and D1 receptors in the dorsal striatum may mediate the motor effects of dopamine replacement therapy, whereas these receptors are more abundant in ventral striatum associated with addiction and reward. The dopamine agonists seem to be selective for D3 receptors relative to D2 and D1, whereas levodopa has the opposite effect, possibly explaining the higher propensity of dopamine agonists to cause ICDs.<sup>6,7</sup>

There is a dearth of robust evidence for treatment of ICD in Parkinson disease. The current best evidence suggests drug modification including reducing and stopping the offending drug.<sup>6</sup> Although, it is important to be aware that ICDs may persist despite cessation of the dopaminergic medication.

### Criminal Responsibility

There are numerous court cases involving the criminal responsibility of individuals taking DRT. In France, the pharmaceutical company GlaxoSmithKline compensated a man €160,000. His defense claimed,

“the drug made him addicted to internet gambling,” which led to him spending his family's savings and stealing to support the compulsion. He also complained that the drug made him pursue sexual relations in a compulsive manner.<sup>8</sup> In another example, a 58–year–old headmaster in the UK was tried on charges of child pornography but was acquitted after the judge ruled his behaviour was the consequence of dopaminergic medications for his PD. The Defendant alleged in his defence that the drug had altered his sexual preferences.<sup>9</sup> Another case in the UK involved a man being given conditional discharge for indecent exposure. In his summing up the judge said, “a hard–working and respectable family man, who suffered from Parkinson's disease exposed himself to young girls due to the effects of the drugs he was taking to treat his condition.”<sup>10</sup> Our patient has a similar history to the cases quoted above. Pre–morbidly he was a respectable family man with no forensic history whose life changed dramatically upon initiation of anti–Parkinson's disease medications.

### Case Report

Mr XY is a 55–year–old retired gentleman who had been diagnosed with Idiopathic Parkinson disease approximately 6 years earlier. He underwent bilateral deep brain stimulation of the subthalamic nuclei after which he recovered well and was able to continue working. He had no previous mental health problems or history of poor impulse control, such as gambling or alcohol dependence. He was commenced on a combination of levodopa and the dopamine agonist Pramipexole but due to inadequate control of motor symptoms the doses were progressively increased. It is suspected that the dose increase led to an ICD. He began visiting internet chat rooms, using pornography, and binge eating. His impulse control deteriorated to the point he began approaching women and teenage females. He would approach them in public places and engage in sexually inappropriate behaviour. Neurocognitive assessment demonstrated a degree of executive dysfunction and on mental state examination revealed low mood, anxiety and emotional lability.

Psychosexual therapy was administered with some success. However, immediately upon reducing then stopping the Pramipexole, the impulsive behaviours resolved. Sadly it was too late as police had already

**“The Judge took into account his lack of prior convictions, an excellent work ethic, severe Parkinson’s disease and, to some degree, the impact of the medications on his behaviour.”**

charged him for various offences, including stalking, public indecency, and sexually inappropriate behaviour. His case went to the crown court where he pleaded guilty. Some of the charges were dropped because treatment with Pramipexole was considered a mitigating factor. The Judge took into account his lack of prior convictions, an excellent work ethic, severe Parkinson's disease and, to some degree, the impact of the medications on his behaviour. He received a 4 months sentence suspended for two-years sentence, a 2 year restraining order (he must remain 200 meters from school grounds unless accompanied by a person over 21), £230 fine and he must report to a probation officer fortnightly.

The medical expert for the defense stated, “he would have had very little control over his behavior, without awareness at the time of how inappropriate this was. It is therefore likely that his behavior for which he has been charged was influenced by his Parkinson's disease medication, and in particular the Pramipexole”. He concluded, “his behavior would not have occurred if he didn't have Parkinson disease for which he was receiving treatment”. This period in his life had a significantly deleterious effect upon him: he feels remorseful and guilty about the behaviour towards the teenage females; his reputation has been besmirched; and his request to move to a specially adapted home due to mobility problems has been denied on the grounds of his criminal record.

## Discussion

It is not uncommon for patients with neurological disease to become involved in the criminal justice system. Recent studies have found the prevalence of TBI in prison population is around 60%. It is however difficult to estimate the prevalence of other neurological conditions in the prison population. Plus many of these patients might not end up in the prison, making it even more difficult to establish the rate of neurological disease in forensic populations. However, changes in personality and behaviour are fairly common in patients with Parkinson disease; either as a direct result of the condition leading to problems with executive functioning or due to iatrogenic causes like medication.

Mounting a robust defense can be difficult for this group of patients. It can be hard to argue the counterfactual that a patient would not have developed the condition if they were not on medication, and difficult to establish the specific aetiology of the impulse control disorder. These patients often hide the extent and nature of their impulses from families and friends.

Although our patient no longer displays the behaviour, its effect persists. Premorbidly he was a man diligent and hard working but now questions this, undermining his self-esteem. Not due to a personal failing but as a consequence of medications altering neurochemicals in his brain. The question is raised, who is responsible here? The person who displayed the behaviour or the clinician who did not pick up these signs or, possibly, explain the potential side effects. The latter seems unlikely as ICD is a well recognised side effect and one hopes it would have been explained. Does it raise neuroethical issue for treating clinicians? Under what circumstances should drugs be prescribed given the potential for serious side effects?<sup>11</sup>

This is a good example where crime could possibly have been prevented if necessary steps had been taken to identify risky impulsive behaviour. It is recommended that patients prescribed this medication and their carers should be warned of impulse control disorder as a potential side effect. It could be recommended that a partner takes control over finances and monitors use of the internet. The clinicians treating the patient should inquire about any premorbid history of impulse control disorder or traits known to be associated with increased risk. Patients often don't tell about these problems

unless asked directly so prescribers should ask routinely about behaviour suggestive of impulse control disorder, particularly when medications are added or doses increased. There is a need to develop screening tools to identify this problem. Currently available tool is QUIP, which has 80% sensitivity and specificity and can be done in 5 mins.

It is essential to identify impulse control disorder in Parkinson's patients so that measures can be taken to avoid any potential risks to the patient and the relative. We endorse joint collaborative working between neurologist and psychiatrists in helping this group of patients.

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## Winner: Essay Prize

# Does transcranial direct current stimulation improve attentional function in Lewy body dementia?

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**James Ashcroft**

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Manchester University  
Medical School

I am a final year medical student and recently completed a Master of Research degree in which I investigated the effects of transcranial direct current stimulation (tDCS) upon attentional function in Lewy Body Dementia (LBD). This research was conducted in partnership with the Institute of Neurosciences, Kolkata, India and the Institute for Ageing, Newcastle University, UK.

I will talk further about what LBD is, the process of transcranial direct current stimulation, the aim and hypothesis of my study, our methodology and outcomes, conclusions and discussion points, and directions for future work.

You may have heard more of LBD in the last year or so as the disease has recently been brought into the public eye by the tragic suicide of Robin Williams, who, on autopsy, was discovered to be suffering from LBD. So what is LBD? Lewy bodies are aggregations of alpha-synuclein proteins, which play a largely unknown role in neuron maintenance and function. These aggregations are neurotoxic and create a dementia picture. However, this picture differs from the classic Alzheimer's type we associate with dementia. Memory loss



is typically a much less prominent feature in LBD, whilst movement symptoms, rapid eye movement sleep disorders, autonomic nervous system dysfunction, hallucinations and attentional dysfunction are significantly more prominent. The current mainstay of treatment for LBD revolves around cholinesterase inhibitors which have limited effectiveness.

This study was designed at the Institute for Ageing in Newcastle and undertaken at a specialist neurological hospital in Kolkata, where I worked and implemented tDCS. The history of tDCS begins when Luigi Galvani discovered that the muscles of

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I saw the dull yellow eye of the creature open; it breathed hard, and a convulsive motion agitated its limbs

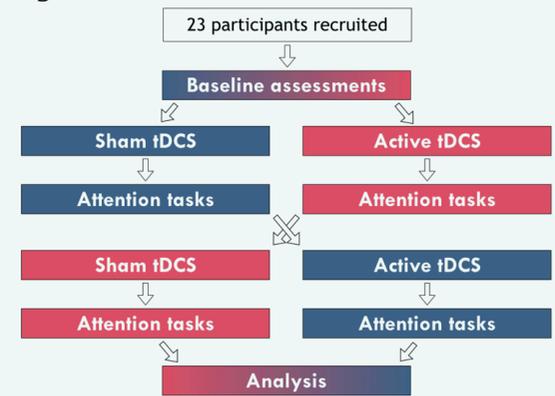
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deceased frogs twitched when struck by an electrical spark in 1780. Galvani's work was continued by his nephew, Giovanni Aldini, who most famously electro-stimulated the deceased murderer George Forster using direct current electrode rods in 1803. Records state that 'on application the criminal began to quiver, the muscles were horribly contorted and one eye was actually opened'. Quietly observing this early experiment was Mary Shelley, who was later inspired to write in her timeless novel *Frankenstein*, 'By the glimmer of the half-extinguished light, I saw the dull yellow eye of the creature open; it breathed hard, and a convulsive motion agitated its limbs.' It is often forgotten that in the following year (1804) Aldini found success by improving mood in melancholy patients by applying direct current. Since the days of Aldini the use of direct current has made limited progress. Recently, however, direct current has been investigated once again in the form of tDCS, which has shown promising results improving movement symptoms in stroke and Parkinson's disease (PD) patients; symptoms associated with major depression disorders; and working memory and attention in healthy individuals.

tDCS enables us to apply a direct current which alters the resting neuronal state within a specific area of cortex, giving increased neuronal firing immediately and a later after effect of long term potentiation through synaptic plasticity. To achieve this, an anode is secured to the scalp overlying the cortical area of interest and a cathode is secured to an unrelated area of tissue, most commonly the deltoid. For this study we attempted to stimulate the left dorsolateral prefrontal cortex (DLPFC) which has been identified in imaging and stimulation studies as being heavily implicated in the process of attention. Previous tDCS of the left DLPFC in PD patients has given transient improvements in working memory, selective attention and trail making tests.

This study aimed to assess whether a single session of tDCS improves attentional

Figure 1

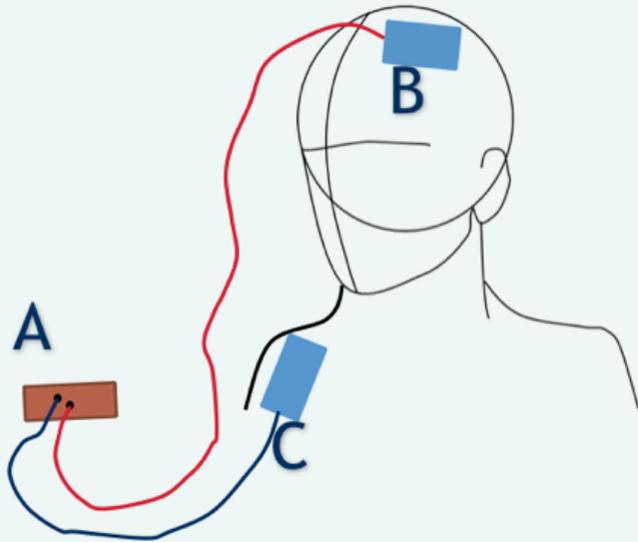


function in LBD patients. We hypothesised that tDCS of the left DLPFC could give a transient improvement in attention in this cohort.

Twenty three participants were recruited from the Institute of Neurosciences. Participants met the diagnostic criteria for probable Parkinson's disease dementia and were assessed for eligibility through cognitive and motor function baseline assessments. All participants were randomised before being allocated to sham or active tDCS with a cross-over design (see figure 1.) Immediately following the application of tDCS four attention tasks were completed by the participants. Participants returned no earlier than three days and no later than seven days later to receive active tDCS if they had received sham stimulation in the first session or vice-versa. The four attention tasks were repeated by participants after the second tDCS session and data was then compared and analysed.

The tDCS was given as a 20 minute session at a current density of 0.08mA/cm<sup>2</sup> through two 35cm<sup>2</sup> electrodes and a battery powered stimulator. The battery powered stimulator was code programmed by the Institute for Ageing and produced a brief initiating stimulation as part of the sham protocol to replicate any side effects felt by the participant, allowing for a double blinded study. The international 10 – 20 system was used to place the anode over the left DLPFC and the cathode was placed

Figure 2



Battery powered stimulator (A)  
Anode was placed over the left DLPFC (B)  
The cathode was placed over the right deltoid muscle (C)

over the right deltoid muscle (see figures 2 & 3.) The attention tasks were performed using one or two button boxes and a laptop system.

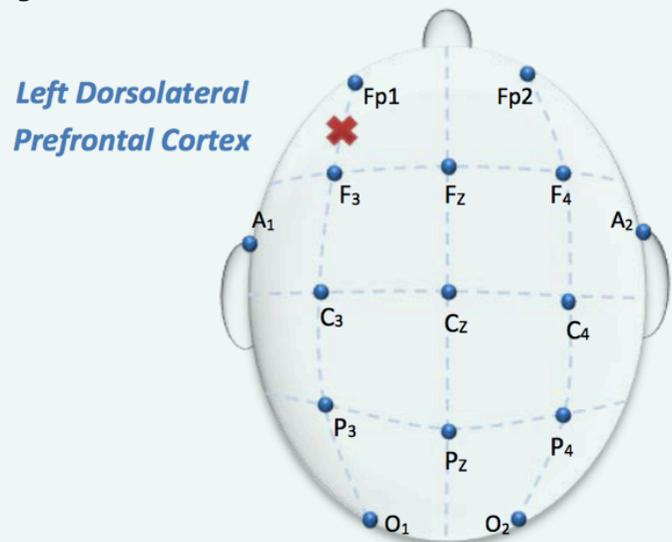
Attention tasks (see figure 4) included a simple reaction time task (SRT), where an 'X' appeared on the screen and the participant was required to activate a button box with their right hand as soon as the 'X' appeared; a choice reaction time task (CRT), where an arrow appeared on the screen pointing to the right or left and the participant was required to activate a button box with their right or left hand depending on the direction of the arrow; a digit vigilance task (DV), where a number in the centre of the screen randomly cycled between 0 – 9 and the participant was required to activate a button box with their right hand every time the number landed on 9; and an attentional network task (ANT), where four arrows appeared on the screen pointing to the right or left, and the participant was required to activate a button box with their right or left hand depending on the direction of the majority of arrows. Analysis of the ANT was split into congruent trials where all four arrows pointed in the same direction, easy incongruent trials where three adjacent arrows pointed in the same direction, and hard incongruent trials where three arrows pointed in the same direction but only two of those were adjacent to each other.

Before analysing the effect of tDCS on the results of these attention tasks, I feel it is important to note that

the setup of electrodes and stimulation was simple and required minimal time, and throughout the course of the study a small proportion of participants had some local skin irritation underlying the electrodes but no severe adverse effect of tDCS were recorded. tDCS could therefore be a simple, safe and cheap therapy that could be particularly useful in patient who have no access to regular healthcare or cannot afford regular review.

Unfortunately, however, no significant difference was found between post-sham tDCS and post-active tDCS mean percentage of correct responses in the SRT, CRT or DV trials. Further to this result, no significant difference was found between post-sham tDCS and post-active tDCS mean correct response reaction time in the SRT trials. Finally, with regards to the ANT, no significant difference was found between post-sham tDCS and post-active tDCS mean correct response reaction time in congruent, easy incongruent, hard incongruent and all incongruent trials.

Figure 3

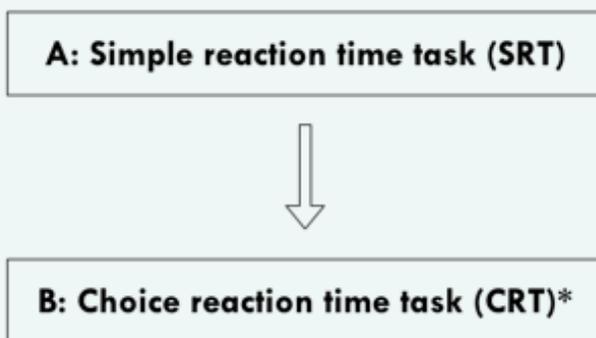


From these results we can conclude that a single session of active tDCS of the left DLPFC did not lead to improvements in attention in LBD patients. There are some important points to be discussed regarding this result and the future of tDCS. There is difficulty in comparing this study with previous DLPFC tDCS studies which reported task specific results. Attention tasks with a working memory component have found the most promising results, which may call into question the role of the DLPFC. Select previous studies stimulating the DLPFC result in positive findings in attentional function have implemented tDCS whilst

participants are undertaking attention tasks (as opposed to immediately after stimulation), which may utilise maximal increased neuronal firing and avoid dissipation of the stimulation. In this study the attention tasks took up to 60 minutes to perform, in which time the residual immediate effects of the tDCS we were testing may have begun to dissipate.

Figure 4

## ATTENTION TASKS



However the most recent and convincing evidence regarding tDCS has resulted from studies implementing repeated sessions of tDCS over an extended period of time which results in long term potentiation of the stimulated cortex. In one recent study a twenty day tDCS protocol over a one month period lead to an improvement of movement symptoms in PD patients which persisted six months post-stimulation. Repeated sessions of tDCS may have the ability to change the structure of the cortex through synaptic plasticity which could lead to significant results and this is the future direction of this investigation into the effects of tDCS upon attentional function in LBD patients.

*I would like to thank the Institute for Ageing in Newcastle who gave support and guidance whenever necessary throughout the project, the Institute of Neurosciences in Kolkata for nurturing my interest in academia and allowing me to experience an entirely new way of life, and to all the patients and carers involved in the study who have enabled us to progress in disentangling the effects of tDCS.*

# A review of in-patient referrals from a regional neurosciences centre at St Georges Hospital to the Neuropsychiatry Team.

**Dr Samr Dawood, Dr Robert Fung, Dr Norman Poole, Dr Melanie Wood, Dr Laura Stacey and Dr Niruj Agrawal, South West London and St George's Mental Health NHS Trust, London**

## Introduction

Inpatient referrals from various neurosciences wards in the Atkinson Morley Regional Neuroscience Centre of St George's Hospital constitute a significant part of the workload for neuropsychiatry service at St George's. We aimed to explore the pattern of referrals and to evaluate our service by reviewing the information on referral forms and electronic records.

## Method

All in-patient referrals received in 2014 were reviewed. Patients' electronic records were also reviewed to retrieve the primary psychiatric diagnosis for each patient as well as retrieving other necessary data for the purpose of this study.

## Results

- A total of 129 referrals were identified over the year. The most common age groups were 51–60 and 31–40. The female/male ratio was 1.35:1
- A majority of referrals (60.5%) came from acute neurology team, (14.7%) from neurosurgery, (9.3%) from stroke units, (4.4%) from Neuro-intensive care unit. Urgent referrals constituted (7%) of referrals. Most referrals (90%) were seen within 2 working days from the date of referral. 75% of referrers had documented having discussed the referrals with the patient.

- Common reasons (Table 1) quoted in the referrals included depression (50%), functional symptoms/functional overlay (27%), anxiety (22%), cognitive/confusion (17%), agitation/aggression (13%), suicidal (12%) and psychotic (12%).
- The majority of patients (91%) met criteria for an ICD10 defined mental disorder. The most common primary psychiatric diagnoses (Table 2) were, mood disorder (22%), dissociative disorder (18%), adjustment disorder (9%), organic mood disorder (8.5%), delirium (5%), and organic personality disorder (5%).
- There was a good correlation between the neurology team's descriptions of problems and final neuropsychiatric diagnoses: "Agitation" was associated with organic disorders; "Depression" was associated with mood disorders, adjustment disorder and no mental disorder; "Suicidal" was linked to adjustment disorder and organic mood disorder; and "Functional symptoms/overlay" was associated with somatoform and dissociative disorders.

## Discussion

- In comparison with two other surveys of liaison referrals from neurology wards (1,2), organic mental disorder is the largest category in our sample, with a higher percentage compared to the other studies (Table 3). However, this encompasses a heterogeneous group of conditions as distinct from Fitzgerald et al's focus on organic mood disorders.
- Functional neurological disorder is common in all 3 samples (Table 3), consistent with previously reported frequency of functional disorder in neurological

Table 1:  
Distribution of Reasons for Referrals for the Whole Sample

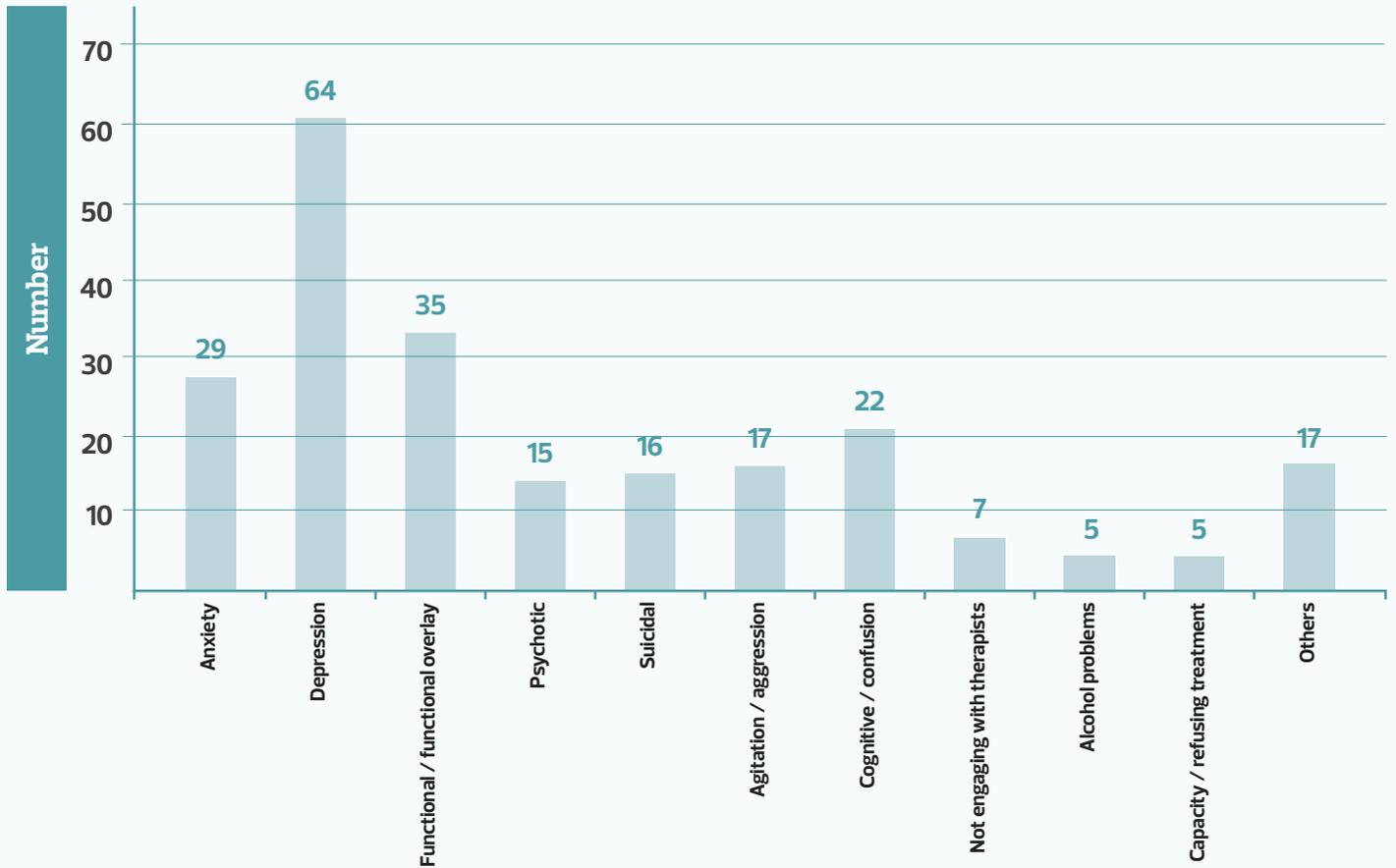
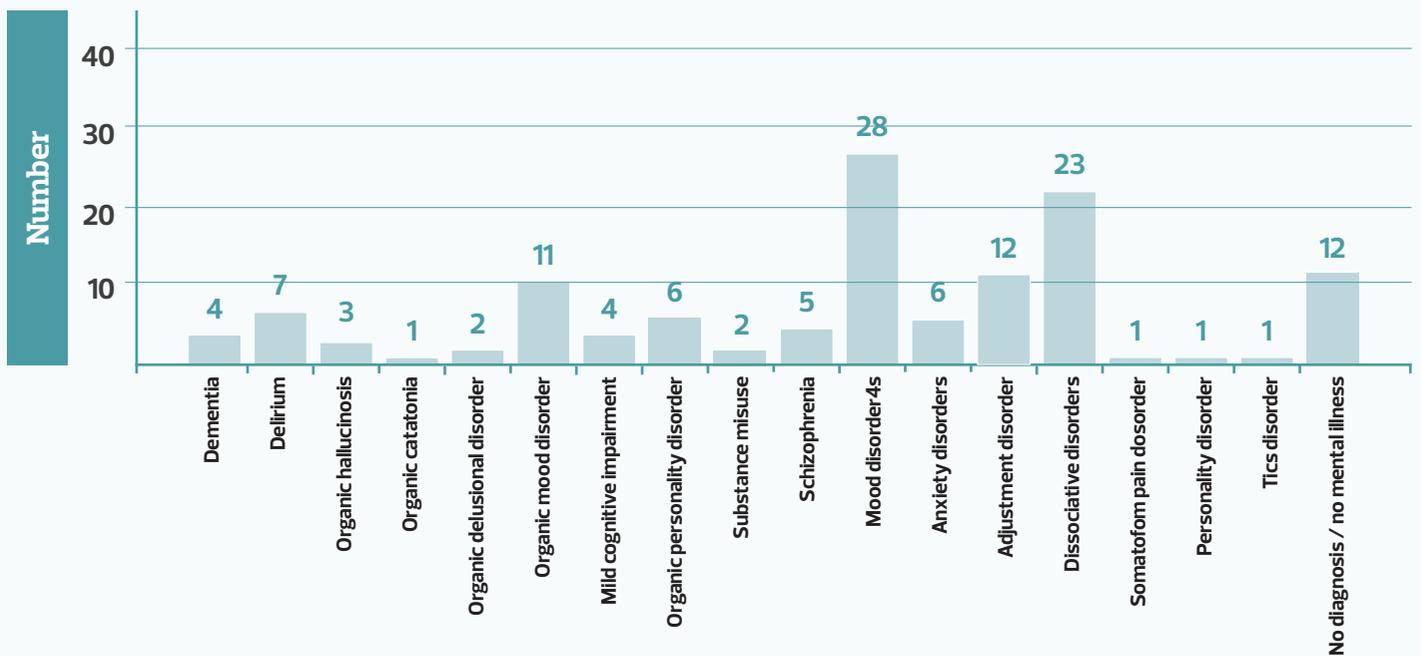


Table 2:  
Distribution of Patients per Diagnostic Categories



settings. This contrasts with a recent survey of general liaison psychiatry services who diagnosed medically unexplained symptoms in only 2.6% of referrals (3).

- Neurologists' initial impressions correlate well with the eventual diagnosis. However, the total number of referrals was lower than expected (4). Perhaps only the more severely disordered patients were identified for referral.

## Conclusions

- We assess and manage a wide spectrum of neuropsychiatric conditions on the inpatient neuroscience wards, in keeping with other neuropsychiatric liaison services.
- Neuropsychiatric liaison work requires specialist training and experience to properly deliver services in such highly specialised settings

- Neurologists are good at identifying common and severe mental disorders but may require a more proactive liaison-style approach to increase recognition rates further

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Table 3:

Comparison between the Percentages of Diagnoses Categories of our study with the findings of previous two studies; P Fitzgerald, D Herlihy, B Sweeney, EM Cassidy. et al /2008 <sup>(1)</sup>, and Jonge P, Huyse F J, Herzog T. et al /2001. <sup>(2)</sup>

Present Study		P Fitzgerald, D Herlihy, B Sweeney, EM Cassidy et al 2008 <sup>(2)</sup>		Jonge P, Huyse FJ, Herzog T. et al 2001 <sup>(3)</sup>	
Diagnosis ICD-10	%	Diagnosis DSM-IV	%	Diagnosis ICD-10	%
Mood disorders	21.7%	Major depression	24%	Mood disorders	15.1%
Somatoform disorder and dissociative disorders	18.6%	Somatoform disorders (including conversion disorders)	23%	Somatoform disorder and dissociative disorders	19.3%
Anxiety disorders / adjustment disorders	12.2%	Anxiety disorders / adjustment disorders	11%	Anxiety / stress disorders	15.5%
Organic disorders (including dementia)	24%	Organic mood disorder	5%	Organic disorders	16%
Delirium	5.4%			Delirium	3.8%
Substance use disorders	1.55%	Substance use disorders	20%	Substance use disorders	4.4%
Schizophrenia	3.9%	Psychotic disorders	5%	Schizophrenia	2.7%
Others	2.33%	Others	12%	Others	7.9%
No mental illness / no diagnosis	9.3%			Unknown	15.1%

# Similarity between Encephalitis Lethargica and NMDA–receptor antibody Encephalitis

Malys MK<sup>1</sup>, Bonsall D<sup>2</sup>, Linighan R<sup>2</sup>, Leite MI<sup>2,3</sup>, Irani SR<sup>2,3</sup>, Okai D<sup>2</sup>

<sup>1</sup> St Catherine's College, University of Oxford, Manor Road, Oxford, OX1 3UJ, UK <sup>2</sup> Department of neuroscience, John Radcliffe Hospital, Oxford University Hospitals NHS Foundation Trust, Oxford OX3 9DU, UK. <sup>3</sup> Nuffield Department of Clinical Neurosciences, University of Oxford, John Radcliffe Hospital, Oxford, OX3 9DS, UK

## Background

Encephalitis lethargic (EL) is a term coined by Constantin von Economo in 1917, detailing a range of neurological and psychiatric symptoms of three categories: (1) The somnolent–ophthalmoplegic type that typically manifest with flu-like symptoms, progressive depressed conscious level, oculomotor abnormalities, dyskinesia, pyramidal or cerebellar signs. (2) An akinetic–mute type with parkinsonism and catatonia. (3) A hyperkinetic form with psychomotor agitation, impulsive–compulsive behaviours and psychosis. Rail1 subsequently operationalized the diagnostic criteria based on nine core phenomena.

NMDA–receptor antibody encephalitis (NMDARE) was originally defined in young women with an acute psychiatric disturbance, seizures, obtundation and a movement disorder in association with an ovarian teratoma and autoantibodies against the NMDA receptor. There has since been increasing recognition of NMDARE in patients of all ages, commonly manifesting with prominent psychiatric symptoms, personality change; and physical symptoms of seizures, dysautonomia, hyperkinesia and parkinsonism. There has been a recent release of operationalised consensus taskforce criteria for NMDARE2, allowing for systematic and direct comparisons of all aspects of the two conditions is now possible.

We observed similarities between the two diagnoses and thought to explore this further.

## Objectives

- 1 To characterise all cases of confirmed NMDARE, admitted to the John Radcliffe Hospital, Oxford, within a 12–month period using a range of standardised rating tools to assessment of their clinical characteristics.
- 2 To explore the operationalised phenotypic overlap between NMDARE and the historical diagnosis of Encephalitis lethargica (EL) with the hypothesis that the former is a subset of the latter condition.

## Methods

- 1 Retrospective case note review of all patients admitted to the John Radcliffe Hospital with NMDARE over the preceding 12–months mapping neurological and psychiatric features to both sets of diagnostic criteria.
- 2 Rating scales completed by the treating MDT:
  - A Neuropsychiatric Inventory–Nursing Home (NPI–NH), is a clinician administered, 12 item, 12–point scale (scoring range 0–144), comprising frequency by severity of a range of neuropsychiatric symptoms. Scoring was based on the week of and the week preceding admission.
  - B The Bush–Francis Catatonia Scale (BFCRS) is a 23 item, 3–point scale (scoring range 0–69) covering a range of the most widely observed catatonic features including autonomic disturbance.

## Results

All five patients were young females, with average age of 20 (range 16–26). The duration of symptoms prior to hospital admission varied from 3 to 10 weeks. Two patients had their illness start whilst they were abroad. All patients were treated with prednisolone, one had PLEX and three had IVIG and one surgery to remove a teratoma. Three patients had an ITU admission at some point during their treatment – two as a result of severe autonomic instability and one as a result of challenging behaviour that could not be contained on the neuroscience ward, to allow for immunosuppression. Three had contact with psychiatry prior to their transfer to the JR, and one was admitted to a psychiatric ward post discharge. Four were discharged home and one to a neurorehabilitation facility. All have subsequently returned to work or school with seemingly normal function.

## Example case

26-year-old Caucasian female admitted to her local hospital following a flu-like illness, drowsiness and confusion that started on holiday. She was transferred to the JR following the development of a headache, neck stiffness, and worsening confusion.

There was no relevant medical or psychiatric history. Physical examination revealed brisk reflexes but was otherwise unremarkable. MRI head showed an extensive cerebritis. Full body CT was normal. EEG showed slow wave activity in the temporal lobes. CSF study showed a lymphocytosis, raised protein, and NMDA receptor antibody levels of 1:100.

Three days into her admission she had a number of brief self-terminating seizures. She developed mutism with pallilia, and catatonia during the day. At night she was often markedly agitated requiring 1:1 nurse specialising on the ward unresponsive to lorazepam. She was started on levetiracetam, and intravenous methylprednisolone.

Within a week of admission, the patient developed persistent abnormal orofacial dyskinesia, episodes of limb rigidity, opsoclonus, myoclonus, occasional oculogyric crises and worsening dystonia. Despite the start of phenytoin, levetiracetam and an increase

in prednisolone, she continued to deteriorate with intermittent periods of respiratory distress and hypertension. She developed hyperkinetic stereotyped movements, became sexually disinhibited and developed a number of non-sustained, non-systematised delusions, with visual and auditory hallucinations.

Over the following three weeks, she started to show signs of a slow return of her speech. Her disinhibition worsened and she became aggressive swearing at the doctors, setting off the fire alarms and seemingly responding to auditory hallucinations. The decision was made to transfer her to ITU for plasma exchange following a period of agitation required six security staff restraint. Following treatment there was a brief recovery lasting two days but a return of psychosis and agitation. The patient was therefore transferred to her local psychiatric hospital where she was started on olanzapine. Three weeks later, her psychotic symptoms had resolved and she was re-admitted for a cyclophosphamide treatment.

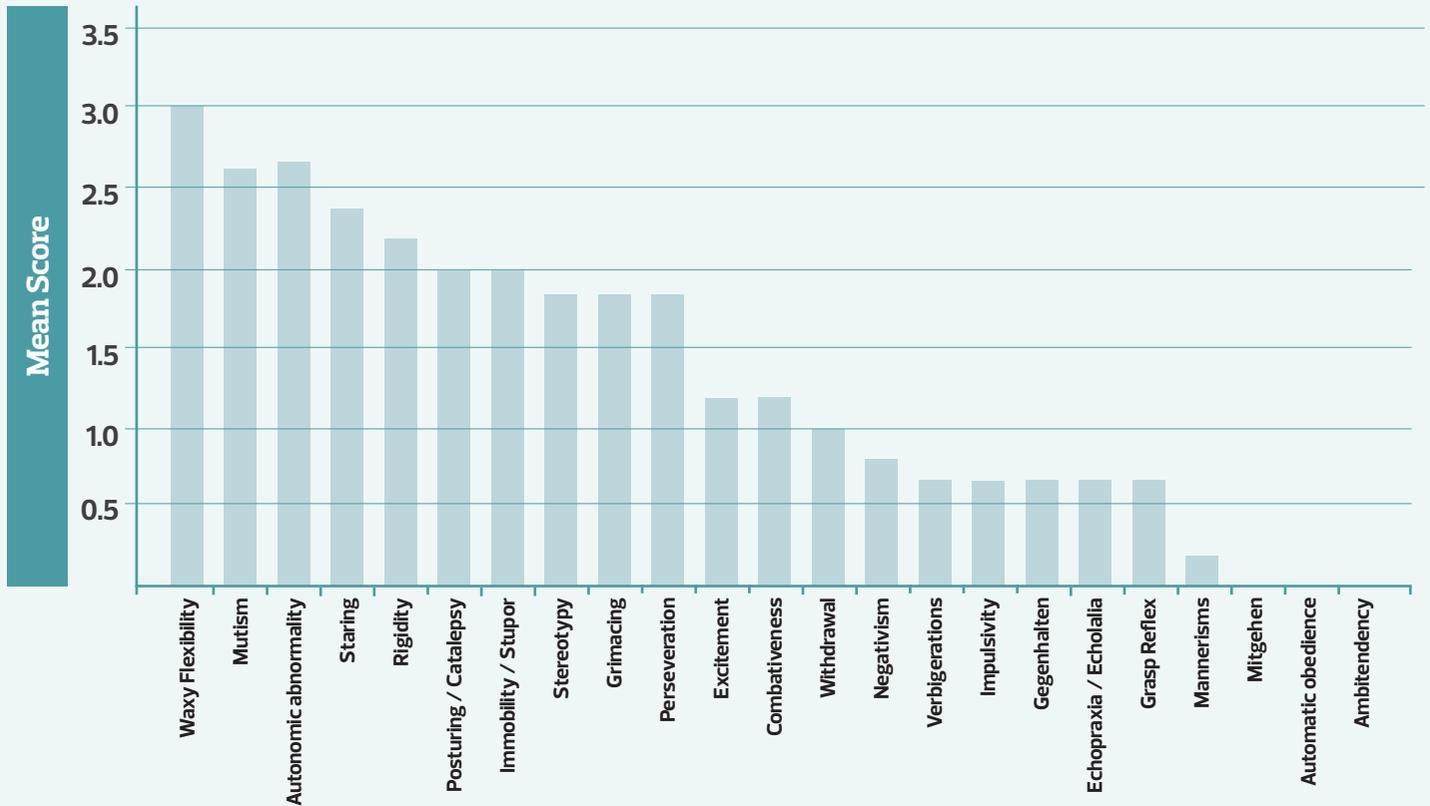
Outpatient follow up revealed a post encephalopathic parkinsonism with residual short-term memory deficits and evidence of personality change that slowly resolved over 18 months. She is shortly due to return to work.

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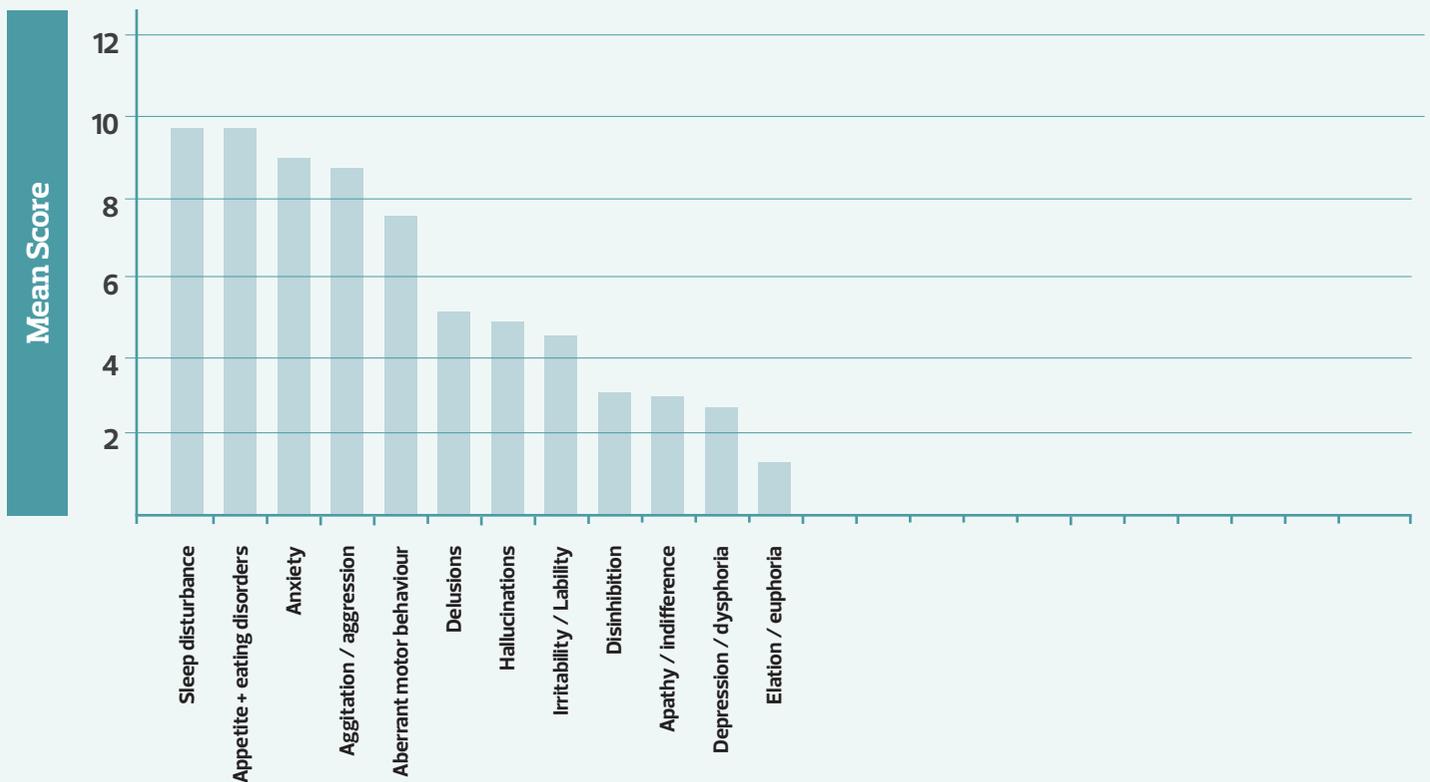
**Table 1:**  
**Bush–Francis**  
**catatonia scale**

The median score for the BFC was 29 (range 16–37). Waxy flexibility, fixed stare, mutism, and autonomic abnormalities were the most prevalent of all the catatonic features.



**Table 2:**  
**Neuropsychiatric**  
**inventory**

Median score for the NPI was 69 (range 59–79). Sleep disturbances, change in appetite (usually preference for sweet things), agitation and aggression, and anxiety were the most prevalent of the neuropsychiatric symptoms.



**Table 1:** Information on presence or absence of symptoms and signs in patients with NMDARE in relation to Rail's criteria for EL and NMDARE Taskforce criteria for NMDARE.

Rail's diagnostic criteria							
Diagnosis ICD-10	19, F, W. Indian/Caucasian	16, F, Caucasian	26, F, Caucasian	16, F, Indian origin	23, F, Indian origin	% of patients	% of 8 Rail's patients
Encephalitic illness	✓	✓	✓	✓	✓	100%	75%
Parkinsonian features*	✓	✓	✓	✓	✓	100%	100%
Oculogyric crises**	✗	✗	✓	✓	✓	60%	38%
Alterations in sleep cycle	✓	✓	✓	✓	✓	100%	25%
Ocular or pupillary changes	✗	✗	✓	✓	✓	60%	25%
Involuntary movements	✓	✓	✓	✓	✓	100%	25%
Mental changes	✓	✓	✓	✓	✓	100%	25%
Corticospinal tract signs	✓	✗	✓	✓	✓	80%	50%
Respiratory disturbance	✗	✗	✓	✓	✓	60%	25%

Taskforce diagnostic criteria for NMDARE						
<b>4 or more***</b>	Abnormal (psychiatric) behaviour or cognitive dysfunction	✓	✓	✓	✓	✓
	Speech dysfunction (pressured speech, verbal reduction, mutism)	✓	✓	✓	✓	✓
	Seizures	✗	✓	✓	✓	✓
	Movement disorder, dyskinesias, or rigidity/ abnormal postures	✓	✓	✓	✓	✓
	Decreased level of consciousness	✓	✓	✓	✓	✓
	Autonomic dysfunction or central hypoventilation	✗	✓	✓	✓	✓
<b>and 1 or more</b>	Abnormal EEG (focal or diffuse slow or disorganised activity, epileptic activity, or (extreme delta brush)	✓	✓	✓	✓	✓
	CSF with pleocytosis or oligoclonal bands	✗	✗	✓	✗	✓
<b>OR</b>	Presence of IgG anti-GluN1 antibodies in CSF	✓	✓	✓	✓	✓
<b>Teratoma</b>		✗	✗	✗	✓	✗

- \* Developing acutely or after a delay of months or years
- \*\* Similar features occurring in patients taking levodopa or other dopaminergic drugs or neuroleptics must be excluded
- \*\*\* Rapid onset (less than 3 months) of at least four of the six following major groups of symptoms
- ✓ presence of symptom/sign
- ✗ absence of symptom/sign

# Request For Help

**Dr. M.V. Lambert**

Consultant Neuropsychiatrist

## Request

I have been asked to lead a working group in mental health in the North East in people with a special interest in epilepsy. As part of my job as a neuropsychiatrist specialising in epilepsy I have realised that there don't seem to be any patient information sheets from the neuropsychiatric disorders associated with epilepsy such as depression, anxiety, psychosis etc.

"Rather than reinventing the wheel" I wonder if any of the other neuropsychiatry of epilepsy units already have patients information sheets and I wonder if I could ask you to contact the members of the epilepsy working group to see if this is the case. If not I would be keen to develop some leaflets and obviously would do so working with the faculty of neuropsychiatry's epilepsy working group.

Thank you for your help.

**Dr. M.V. Lambert**

**GMC No. 3240777**

**[michelle.lambert@ntw.nhs.uk](mailto:michelle.lambert@ntw.nhs.uk)**

