

## ARTICLE

# Neurology in the psychiatric patient: how to think about differentials in altered mental status and diagnoses not to miss

Jonathan McLaughlin  & Tim Young

**Jonathan McLaughlin** is a consultant general adult and older adult psychiatrist with Royal Cornhill Hospital, NHS Grampian, Aberdeen, and an MSc student in clinical neurology at University College London, UK. **Tim Young** has been a consultant neurologist at University Hospital Lewisham, Lewisham and Greenwich NHS Trust in London since 2009 and currently works as an associate professor (teaching) and course co-director of the Clinical Neurology by Distance Learning MSc/Diploma/Postgraduate Certificate course at the Queen Square Institute of Neurology, UCL, London, UK.

**Correspondence** Jonathan McLaughlin. Email: [jonathan.mclaughlin@nhs.scot](mailto:jonathan.mclaughlin@nhs.scot)

First received 15 Jul 2021  
Final revision 18 Oct 2021  
Accepted 19 Oct 2021

**Copyright and usage**

© The Author(s), 2021. Published by Cambridge University Press on behalf of the Royal College of Psychiatrists

**SUMMARY**

A wide variety of neurological conditions may present first to a psychiatrist and it is important to be aware of these in differential diagnosis. A careful history, examination and a broad differential diagnosis can help set up an appropriate management plan – with room to change if things change in unexpected ways. In this article we explore common ground shared by psychiatry and neurology and show how incorporation of neurological knowledge can improve the practice of psychiatry. Using four fictional case vignettes of altered mental status we explore important neurological differential diagnoses which could present to the Psychiatrist.

**LEARNING OBJECTIVES**

After reading this article you will be able to:

- identify specific examples of neurological conditions that can present to the psychiatrist
- understand the value a neurological examination can add to a psychiatric assessment
- begin to plan relevant investigations to help distinguish differential diagnoses in patients with altered mental status.

**KEYWORDS**

Clinical neurology; neuropsychiatry; altered mental status; differential diagnosis; cognitive decline.

Psychiatric practice loses a lot without some knowledge of Neurology. Indeed, the two specialties were once a unified field of clinical endeavour. If we see only the distinctive elements of both disciplines, we can lose those ways in which psychiatric practice is enhanced by a knowledge of Neurology and *vice versa*.

In this article we aim to explore common ground shared by both disciplines and to show how incorporation of some neurological knowledge can improve the practice of psychiatry. We will look at this through the lens of four fictional case vignettes

of altered mental status which will serve to draw out the learning objectives.

Our individual case vignettes will focus on aspects ranging from cognitive impairment to movement disorders, any of which may present first to a psychiatrist. These vignettes are informed by clinical experiences but are fictitious and any resemblance to specific cases is unintentional. In each case we will highlight key aspects from the history and examination which can signpost particular differential diagnoses. This dissection of the key points from a case presentation is a fundamental aim. However complex a case may at first appear, by defining the individual characteristics, it is possible to build a sound differential. We will show how to strike a solid balance between precision in diagnostics and still casting the net wide enough to capture important neurological differential diagnoses. We would recommend reading the Case vignettes and then trying to think of your own list of differential diagnoses before proceeding with the case expositions.

**Acute cognitive decline***Case vignette 1*

A 38-year-old male is brought to the accident and emergency department (A&E) by his wife. For 3 days he has had several ‘odd spells’ in which he is reported to be confused. The confusion initially improved intermittently but has not resolved. He has a sense that he is ‘not himself’ and he complains of not knowing what is going on. On certain occasions he has failed to recognise familiar surroundings and people. He has been heard to wonder whether people are trying to ‘trick’ him, although this seems to be more of an attempt to explain things rather than a delusional belief. As the duty psychiatrist you are contacted to review the patient.

The patient is vague and confused. He complains of poor concentration. He was previously well. Apart from recently starting a selective serotonin reuptake inhibitor (SSRI) for depression he takes no other regular medicines. As a child he had ‘fits’ and this was investigated with an electroencephalogram (EEG) at the time. His wife is clear that he has not exhibited any convulsive symptoms in the 10 years

she has known him. She reports he has had a low mood for around 6 weeks after being made redundant. He does not smoke, seldom drinks alcohol and does not use any illicit substances.

His physical observations are normal. His examination (systems and neurological) is normal, although he scores 14/30 on a cognitive screening measure. He particularly loses points on tasks of recall, attention and concentration. He manages well with the orientation tasks. A magnetic resonance imaging (MRI) scan of the head and a lumbar puncture are normal.

### Acute infection and general medical considerations

From first principles we would want to know more about the history. However, we could already try to work up a provisional differential thinking along psychiatric and neurological lines from what we have. There are a large number of general medical differentials to be considered here also. See [Box 1](#) for a general overview.

Infections of the central nervous system (CNS) are important differentials here not to be missed. It could be dangerous to assume, for example, a urinary tract infection as the cause of confusion in an otherwise young and healthy person.

In this vignette we especially need to consider encephalitis. The term encephalopathy is a broader one which has been defined as ‘altered consciousness that persisted for longer than 24 h, including lethargy, irritability, or a change in personality and behaviour’ (Granerod 2010). Encephalitis can be considered to be encephalopathy plus at least two extra features, such as fever, seizures, cerebrospinal fluid (CSF) pleocytosis, EEG evidence for encephalitis or imaging evidence for encephalitis (Granerod 2010). Because of the potentially grave consequences of missing encephalitis, a strong clinical suspicion should be used even if some features are missing.

At the forefront of the possible causes of encephalitis would be herpes simplex encephalitis (Solomon 2012). This is the most common cause of encephalitis, accounting for approximately 19% of cases

(Solomon 2007). Prompt diagnosis is important as mortality can be as high as 70% in untreated cases and as low as 8–20% if early treatment is initiated (Solomon 2007; Singh 2016). In practice, this means treating with intravenous (IV) aciclovir if there is significant clinical suspicion and having a very low threshold for performing a prompt lumbar puncture if there are no contraindications. Confusion, headache, fever and behavioural change are the cardinal features to look out for, although not all features are required for the diagnosis (Sili 2014).

Similarly, with what we know so far of this case, bacterial meningitis is a further entity not to miss. Two organisms cause 80–90% of meningitis in UK adults, namely *Streptococcus pneumoniae* and *Neisseria meningitidis*. The presentation can be non-specific. This is illustrated when we consider that of the classic symptom triad – fever, neck stiffness and altered mental state – only 44% of patients exhibit all three (Brouwer 2010). Where a significant concern of meningitis or encephalitis is present, prompt empirical treatment of the most likely causes should be strongly considered (see [Box 2](#) for a more extensive range of possible aetiologies) (Ellul 2018).

We have given priority here to clinical entities that are associated with high mortality in the acute phase. Autoimmune encephalitis, less likely here, will be discussed in vignette 2.

### Psychiatric differentials

Turning now to psychiatric diagnoses, the history thus far would be atypical for a primary psychosis, but it should not be dismissed outright. The onset, patient age and reported confusion are certainly not typical for schizophrenia. The term ‘confusion’ is sometimes mistakenly used to describe the phenomenon of the delusional mood (Stanghellini 2019). Additionally, catatonia would be another differential that should not be excluded at this point

#### BOX 1 Some general medical differentials of confusion

**Infection** – such as urinary or respiratory tract infections or COVID-19

**Endocrine or metabolic** – such as hypo- or hyperglycaemia, thyroid disease, hypoxia, hepatic encephalopathy

**Iatrogenic** – such as medication-related effects of opiates, tricyclic antidepressants, antihistamines

**Drug of misuse** – such as hallucinogens, stimulants, benzodiazepines, opiates, alcohol

**Environmental** – such as occupational exposure to noxious chemicals or heavy metals

**Inflammation** – systemic inflammation, for example in autoimmune conditions, or CNS inflammation such as demyelinating plaques can cause confusion but do not have strong pointers in vignette 1 so far

**Congenital, degenerative, neoplastic** – there do not seem to be strong risk factors for these so far in this case and the presentation seems to be more acute

**Vascular** – stroke or vasculitis can present with acute confusion but there are no clear risks in vignette 1

**BOX 2** Some infective causes of encephalitis**Viral**

Herpes simplex virus types 1 and 2

Varicella zoster virus

Enteroviruses

Adenovirus

Measles virus

HIV

**Bacterial**

Mycoplasma

Tuberculosis

Borrelia

Listeria

**Opportunistic (immuno-compromised)**

Cryptococcus

Toxoplasma

Cytomegalovirus

and the possibility of a somatoform disorder is also still conceivable.

Other factors, such as illicit drug or alcohol use, migraine with aura or even transient global amnesia, might be considered, but these are not well supported by the history in this case.

We have a picture of altered mental status and behavioural change. The process appears to have started acutely but is ongoing. There is no other neurological abnormality on examination. This does not discount the previously discussed infective causes but, coupled with the normal physical observations, it is important to think about alternative explanations as well.

**Epilepsy, seizures and altered mental status**

One clue that may direct our thinking is the collateral history, which referenced 'fits' as a child. His wife is clear that he has not displayed any recent convulsive symptoms. Importantly, not all seizure disorders manifest convulsive symptoms.

If we start to consider seizures and epilepsy in this case, then we might think about temporal lobe epilepsy, which can cause altered mental status and is the most common cause of adult epilepsy in the UK (Smith 2008). Epilepsy classification by the International League Against Epilepsy (ILAE) has recently undergone a major change (Fisher 2017). Some important new terms resulting from this are highlighted in Table 1.

Focal epilepsies originate in one particular part of the brain (temporal lobe epilepsy, for example). In contrast, generalised onset epilepsy reflects a

**TABLE 1** Comparison of some common older terms for epileptic seizures with the newer terminology based on the International League Against Epilepsy 2017 classification

Old terminology for seizure type	New terminology for seizure type
Simple partial	Focal aware
Grand mal	Depending on circumstances: generalised tonic-clonic focal to bilateral tonic-clonic unknown onset tonic-clonic
Secondary generalised	Focal to bilateral tonic-clonic
Complex partial	Focal impaired awareness
Petit mal	Absence

Source: Fisher (2017).

process apparently originating in both hemispheres. This is the type associated with the classic generalised tonic-clonic semiology. Focal seizures can progress to become generalised seizures. These are now referred to as focal to bilateral tonic-clonic seizures.

An aura may occur before the main seizure and is itself a seizure type (focal aware seizure). Auras are commonly associated with temporal lobe seizures. These can often involve psychic phenomena such as *déjà vu* and *jamais vu*, which can be thought of as focal cognitive seizures. The most common aura in temporal lobe epilepsy is an ascending visceral sensation often starting from the epigastric area, although others occur. These can include unpleasant smells and tastes (typically these are stereotyped), or auditory phenomena. In our case it would be important to ask the patient and his wife about these features, as they will not necessarily be volunteered by the patient, who may think they are irrelevant or even be embarrassed by them.

There can also be a number of post-ictal phenomena in temporal lobe epilepsy. Commonly, these are seen as confusion and headache, which can last for hours, although agitation and aggression can occur, as can post-ictal psychosis. This psychosis occurs after the last seizure and typically happens after a lucid period which often lasts 1–6 days (Adachi 2007; Hilger 2016). In terms of psychopathology, there is often an abnormal mood component, paranoid delusions and confusion, which can persist for the duration of the episode. The psychotic symptoms often spontaneously resolve within several days (Agrawal 2020).

**Non-convulsive status epilepticus**

In our case there does not seem to be evidence of frank psychosis. The patient's talk of 'being

tricked' appears to be an attempt to explain his memory and concentration difficulties, as opposed to a delusional belief. There is a sense from the case details that this started suddenly, may have initially been intermittent and is now a continuing process. In the context of seizure disorders this should lead one to consider non-convulsive status epilepticus (NCSE), an underdiagnosed condition. This is the diagnosis in our patient. Specifically, this is a case of focal non-convulsive status without coma.

NCSE refers to prolonged seizure activity without significant convulsive symptoms. It is caused by continuous focal seizures or focal seizures with incomplete interictal recovery. The symptoms of memory and general cognitive decline in our patient suggest that the epileptic focus may lie in the temporal lobe. The clinician must have a high index of suspicion to make the diagnosis of NCSE, especially in older patients and in those who have suffered an acute stroke. A history of seizures may not be present. Although NCSE can have protean presentations, it is particularly important to consider this diagnosis in the presence of new, sustained, altered consciousness and abnormal eye movements such as nystagmus or repeated blinking (Husain 2003). The investigation of choice is the EEG and when this reveals an ictal pattern the diagnosis can be clear cut. However, often there is a non-specific pattern which is similar to that seen in encephalopathy. In this scenario the EEG and clinical response to treatment may provide a clue as to whether NCSE is the aetiology (Sutter 2016). Neuroimaging should be undertaken for patients in whom NCSE is the suspected diagnosis, as there may be an underlying structural lesion serving as the focus of seizure activity.

The patient in this case had been recently started on an SSRI for depression. This is a potentially important clue in the overall diagnosis, as this may have precipitated the seizure. The patient does appear to have a seizure history as a child. Antidepressants can lower the seizure threshold and can worsen seizure control in people with epilepsy (Johannessen 2016). This may be a direct effect, although there is some evidence to dispute this (Alper 2007; Okazaki 2011). Additionally, in people who are already on anticonvulsant medication, antidepressants can interact and alter plasma levels. There is significant comorbidity between epilepsy and psychiatric conditions and both antipsychotics and antidepressants may alter seizure threshold. However, this is mainly relevant at higher serum doses and so seizures are not an absolute contraindication to their use if needed (Habibi 2016).

Where NCSE is suspected, input from the neurology team would be ideal to help guide

management. Initiation of an anticonvulsant medication and serial EEG recordings are typically required. There is little direct evidence to suggest that NCSE itself causes neuronal damage, although harm could result from accidents or hypoxia.

### *Case vignette 2*

A 24-year-old female is referred to the duty psychiatry team having presented to A&E with police in attendance. Her partner explains that she started behaving bizarrely 10 days before and this has been worsening since. She has no psychiatric history but had experienced some headache and fatigue a few weeks before. The police had detained her at a local barber shop after she entered the premises and began shouting about a conspiracy that implicated the owners as the operators of a device which was sending out radiation and damaging the brains of local residents. She was aggressive, agitated and had to be physically restrained after causing some damage inside the shop. When seen in A&E she is haughty, dismissive and argumentative. She claims that the police and doctors are preventing the 'truth' coming to light about the radiation-emitting device. On several occasions it is clear that she is responding to auditory hallucinations. When asked about this she seems convinced that someone known to her is in the next room and talking through the wall.

She is tachycardic but otherwise her observations are normal. She agrees to a computed tomography (CT) scan of the head, which is normal. Routine blood tests are normal, including inflammatory markers. A urine drug screen does not confirm the presence of any illicit substances. Physical examination, undertaken somewhat opportunistically, has not revealed any abnormalities. She is detained under the Mental Health Act and conveyed to the local psychiatric hospital.

The patient struggles with navigating the acute admissions psychiatric ward and appears confused. Over the first 3 days on the ward she is noted to be holding her arms in odd, fixed positions and occasionally displaying some writhing movements of her limbs. Her presentation gradually changes, in that while previously agitated, she is now largely akinetic and mute. She is being treated with an antipsychotic and is receiving intravenous fluids.

On the fifth day as an in-patient she has a generalised tonic-clonic seizure witnessed by staff. Autonomic dysfunction is also noted, in that she has gone into urinary retention and has been pyrexial.

### *Neuropsychiatric differential diagnosis in psychosis*

This patient is presenting with a psychotic episode. There is an acute onset and no prior psychiatric history is mentioned. As in case vignette 1, a CNS infection needs to be considered.

Illicit drug use should be considered, and a direct and collateral history can help as a urine drug screen will not detect all potential substances. Some prescription medications, such as steroids, can precipitate psychosis and should be asked for in the history (Agrawal 2020). A number of systemic medical conditions can be associated with an organic psychosis,



for example systemic lupus erythematosus (SLE). Psychosis is only seen in 1.5% of people with SLE but it often presents pre-diagnosis or early in the illness (Hanly 2019). This occurrence in early disease will mean that onset of psychosis will often be in the early to mid-20s. This is also the typical period of onset in schizophrenia and therefore makes SLE an important consideration in individuals, particularly females, who present with a first episode of psychosis. There are further neuropsychiatric manifestations of SLE, from cognitive dysfunction to mood disorders, that make it an important condition to consider generally (Mak 2009).

Other causes of vasculitis could also be considered. Although here we are told that the patient's inflammatory markers are normal, offering some degree of reassurance, this does not discount the possibility entirely. Additional features may emerge and, as with any good differential, it should be responsive and incorporate new information when this comes to light.

Infectious diseases such as HIV and syphilis should be considered, particularly in the light of any suggestive history such as recent prodromal flu-like illness or if there is a supporting sexual history. Endocrine and metabolic possibilities should be borne in mind, such as hypo- or hyperglycaemia. Thyroid function should be checked in such a presentation as a routine measure.

In a patient of this age and with psychiatric disturbance, Wilson's disease should not be missed and warrants consideration because it is a potentially reversible cause of psychosis and cognitive decline. Although rare, around one-third of cases of Wilson's disease present with psychiatric symptoms (European Association for the Study of the Liver 2012). When indicated, testing includes serum ceruloplasmin and copper levels, liver function tests and slit lamp examination for Kayser-Fleischer rings. If there is concern about the possibility of Wilson's disease a 24 h urinary copper excretion test should be undertaken (Ferenci 2017).

### *Psychiatric differentials*

A primary psychiatric disorder such as bipolar affective disorder or schizophrenia is quite plausible. Phenomenologically, there is a fair amount in the history that suggests an affective component. Chiefly, the psychomotor agitation and potential egocentrism implied by being 'haughty' and 'dismissive'. There is also a sense that the patient has come to understand a great truth, that she is the sole possessor of this knowledge and must uncover it, thus giving the suggestion of the 'special mission'. However, there is a persecutory feel to the content,

which does not rule out a bipolar illness, but which is less common in the delusional semiology of that disorder (Picardi 2018). The timing of onset is more in keeping with a manic episode in a bipolar illness. In schizophrenia one would typically expect a more insidious onset with an identifiable prodromal phase. A schizoaffective illness is also within the differential, as are entities such as the brief or transient psychotic disorder. A collateral history would be instructive in outlining any major psychosocial stressors.

As the case progresses we have a convincing description of a catatonic patient. There has been progression from excitement to stupor and the movements mentioned may represent catatonic posturing and psychomotor agitation. It is important to remember the excited catatonia phenotype, so as to avoid considering only akinetic and mute patients as exhibiting catatonia. Indeed, the alternation of excitement and stupor is characteristic of catatonia (Bush 1996).

It might seem reasonable to attribute the catatonia to a primary psychotic disorder. But this may be premature. Classically catatonia has been coupled with the major psychiatric diagnoses, principally schizophrenia, but there is now greater recognition that there are a number of aetiologies (Fink 2001).

### *Abnormal movements in the psychiatric patient*

Characterisation of the abnormal movements is an important task and could have implications in progressing our understanding of what is happening in this case. The abnormalities may represent a primary movement disorder and this raises an important diagnosis not to miss in this case (some important abnormal movements are described in Box 3). Antipsychotic treatments can of course precipitate movement disorders. Although in our case the antipsychotic seems to have only been started since the patient was admitted, it is not stated when exactly it was initiated compared with the onset of the movements. Akathisia can occur within 12 h of antipsychotic initiation, acute dystonias within 24 h and acute Parkinsonism within days (Mathews 2005). Despite this, the timeline seems unlikely here and our patient's writhing movements sound more like chorea. Chorea and dystonias are common movement disorders in the context of autoimmune encephalitis, principally *N*-methyl-D-aspartate receptor (NMDAR) antibody-mediated encephalitis. Importantly, catatonia is also described in the disorder (Varley 2019).

### *NMDAR-antibody encephalitis*

The most likely diagnosis in this case is NMDAR-antibody encephalitis, one of a number of causes of

**BOX 3 Some important dyskinesias (abnormal involuntary movements)****Hyperkinetic dyskinesias (excessive movement)**

Akathitic movements: arising from a subjective sense of restlessness and urge to move.

Dystonia: sustained muscle contractions, may be associated with repeated twisting of a body part, sustained postures or both.

Tremor: rhythmic oscillations around a body part.

Chorea: unpredictable, non-repetitive movement fragments that can appear jerky or writhing in nature.

Athetosis: similar to chorea but unbroken, continuous and flowing movements.

Ballism: severe form of chorea with sudden, large-amplitude movements of an entire limb.

Myoclonus: sudden brief jerks or relaxation of muscles or muscle groups.

**Hypokinetic dyskinesias (reduced movement)**

Bradykinesia: slowness of movement.

Rigidity: significant resistance to passive joint movement even at low speed unrelated to musculoskeletal factors such as joint pain. The classical presentation is 'lead pipe' rigidity in Parkinsonism, which may be felt as 'cog-wheel' rigidity if there is also a tremor.

(Sanger 2010; Fahn 2011)

**BOX 4 Some autoimmune causes of encephalitis****Antibodies against neuronal surface antigens**

NMDAR-antibody encephalitis (linked with ovarian teratoma)

Leucine-rich glioma-inactivated 1 (LGI<sub>1</sub>) antibody encephalitis (linked with thymoma)

**Antibodies against intracellular antigens**

Anti-Hu (linked with small cell lung tumours)

Anti-Ma (linked with testicular tumours)

Anti-GAD (linked with type 1 diabetes, coeliac disease and small cell carcinoma)

**Syndromes**

Acute disseminated encephalomyelitis (ADEM)

Bickerstaff's encephalitis

(Gagnon 2016; Ellul 2018)

autoimmune encephalitis (Box 4). A characteristic and classic picture has emerged in this case in keeping with what is now recognised as the most common type of autoimmune encephalitis. This is often a multistage disorder which often starts with a prodromal flu-like illness and progresses to psychosis, movement disorder, catatonia and seizures. With further progression and no treatment, dysautonomia and coma can result. The mortality has been estimated at 7% (Titulaer 2013), the disorder having been first described in 2007 (Dalmau 2007).

Importantly, in our case a CNS infection has not yet been clearly excluded, and a lumbar puncture, if not contraindicated, would be essential. A lumbar puncture poses a challenge in a psychiatric setting, where a significant proportion of these patients can present, on the grounds of available expertise, not to mention the logistics of trying to undertake this investigation in agitated and disturbed patients. Nevertheless, practical difficulties alone should not exclude a lumbar puncture when it is required and safe to do so. In vignette 1 we highlighted the dangers of missing a CNS infection.

In this case, CSF analysis is very important and would confirm the diagnosis, therein complementing blood testing for the associated antibodies (Graus 2016). In addition, an EEG may show characteristic

abnormalities (Graus 2016). Early collaboration with the neurology team is recommended to help guide management, which may include steroids, immunoglobulins or plasmapheresis. Autoimmune encephalitis is often a paraneoplastic process, so patients should be investigated for the possibility of a malignancy. As well as appropriate history and examination, investigations such as a CT of the chest, abdomen and pelvis or a PET scan may be useful. Although it is increasingly recognised that the majority of cases are not related to a cancer, the original description of NMDAR-antibody encephalitis was in young women and girls with ovarian teratoma (Dalmau 2007). Appropriate management and treatment of the malignancy should be curative of the disorder.

**Subacute cognitive decline****Case vignette 3**

A 70-year-old man attends your out-patient clinic. His wife is concerned about 18 months of cognitive decline. He struggles to recall new information and has lost interest in activities he has previously enjoyed, such as reading the newspaper and going for walks. His wife has had to take over household management as he has made various mistakes with this responsibility, for example failing to pay bills on time. He struggles with planning tasks and is more easily frustrated. He has had a number of falls during this period and was admitted to hospital after one such occasion.

On physical examination the patient has a fixed facial expression with infrequent blinking. He has marked rigidity in his limbs. There is a bent-over posture with a small-stepping gait. There is slowness of movement bilaterally and arm swing is also reduced, more on the right-hand side. Cognitive screening has been undertaken and shows fronto-executive dysfunction

as well as visuospatial deficits, impaired attention and poor delayed recall. Blood tests are normal. It later emerged that our patient had been diagnosed with a neurological condition when he was aged 60.

### *Approaching a case of cognitive impairment*

In coming to a diagnosis we need to think first about the timing here. This does not appear to be an acute process and so we may be considering some different potential aetiologies from those discussed already. The chief complaint appears to be cognitive decline leading to functional impairment. There are also features to suggest difficulties in movement. We are going to be thinking about causes of cognitive decline with added problems with movement.

Before thinking about the category of degenerative processes it is worth considering ‘low-hanging fruit’, that is, factors that are potentially reversible. For example, protracted or recurrent infections might be present. See [Box 5](#) for recommended blood tests in working up a case of possible cognitive impairment.

This could be a depressive episode, the so-called pseudodementia phenotype. The loss of interest in previously enjoyed activities may represent anhedonia, and the apparent cognitive impairment might relate more to depressive bradyphrenia.

It is important to search in the history and on examination for any systemic features that might point towards a malignancy. A primary or secondary CNS malignancy here seems much less likely given the fairly protracted timeline ([Batash 2017](#)).

#### **BOX 5** Screening investigations for suspected dementia

##### **In most cases:**

Full blood count  
Erythrocyte sedimentation rate (ESR)  
Urea and electrolytes  
Calcium  
Glycated haemoglobin (HbA<sub>1c</sub>)  
Liver function tests  
Thyroid function tests  
Serum B<sub>12</sub> and folate levels.

##### **If clinically indicated:**

Midstream urine  
Chest X-ray  
Electrocardiogram (ECG)  
Syphilis serology  
HIV

([Arvanitakis 2019](#))

Another differential related to malignancy would be a paraneoplastic syndrome. Such conditions arise when antibodies produced against cancer cells cross-react with antigens which are expressed in the central or peripheral nervous system. See [Box 6](#) for examples of paraneoplastic syndromes that affect the CNS. Several of these syndromes can cause confusion and memory problems.

Normal pressure hydrocephalus is a condition associated with a classic triad of symptoms, namely: cognitive decline, gait disturbance and incontinence. The investigation of choice would be MRI of the brain. If imaging supported this, a trial lumbar puncture might be used as a way of determining likely response to, and therein possible benefit from, CSF diversion strategies ([Shprecher 2008](#)).

We must of course consider a dementia syndrome as the diagnosis in this patient, with all the varying aetiologies that this encompasses. Common entities being common, Alzheimer’s and vascular dementia should be in our minds as differentials at this stage. Frontotemporal dementia is also a possibility and further detail in the history will hopefully guide us. The history is not strongly suggestive of a Lewy body dementia at this point, but it would remain in the differential and we will return to it below.

A general cognitive screening test (e.g. the Mini-Addenbrooke’s Cognitive Examination, Mini-ACE) and a frontal assessment battery may help both to support a diagnosis and provide a baseline for future monitoring. Neuroimaging should also be considered, although this will be informed by the physical examination and, as a general rule, if you are ordering imaging you should have physically examined the patient to aid both the appropriate choice of imaging and clinical interpretation of radiology reporting.

#### **BOX 6** Some paraneoplastic neurological syndromes

**Paraneoplastic encephalomyelitis:** Confusion, amnesia, seizures, brainstem abnormalities, sensory ataxia

**Paraneoplastic limbic encephalitis:** Amnesia, personality change, irritability, depression, seizures

**Paraneoplastic cerebellar degeneration:** Cerebellar signs, e.g. ataxia, nystagmus, dysarthria

**Lambert–Eaton myaesthenic syndrome:** Proximal weakness, constipation, dry mouth

**Paraneoplastic opsoclonus–myoclonus:** Eye movement abnormalities and myoclonic jerk. Associated cancers: small cell lung, breast, gynaecological

([VOLTZ 2002](#))

**TABLE 2** Dementia and movement disorder – a simple differential

Movement disorder presenting with dementia	Differential diagnosis
Ataxia	Multiple sclerosis, prion disease, spinocerebellar ataxias, hydrocephalus, paraneoplastic syndrome
Pyramidal signs	Vascular dementia, multiple sclerosis, frontotemporal dementia–motor neuron disease complex, leukoencephalopathies
Dystonia/chorea	Wilson disease, Huntington’s neuroacanthocytosis
Extrapyramidal signs (akineti–rigid)	Parkinson’s disease dementia, Lewy body dementia, progressive supranuclear palsy, corticobasal syndrome
Myoclonus	Alzheimer’s disease, prion disease, mitochondrial diseases
Gaze palsy	Progressive supranuclear palsy, Gaucher disease, Niemann–Pick disease type C

Source: Clarke (2016).

### How to think about dementia-plus syndromes

In broad terms, we have a patient who is presenting with a possible dementia syndrome and movement disorder. It is useful to have a heuristic about possible differentials when these features co-exist. See Table 2 for a suggested approach to thinking about these symptoms.

The core features of Parkinson’s disease are tremor, rigidity and bradykinesia. These typically show at least some asymmetry in the early stages. From the details of the physical examination there do appear to be Parkinsonian features in our patient. The reduced blink rate and asymmetrical reduction of arm swing are certainly features often seen in Parkinson’s disease, and there also appears to be bradykinesia generally. There is a reduced range of facial expression, termed hypomimia. He is noted to be stiff, has a stooped posture and the description of his gait also fits with a diagnosis of Parkinson’s disease (Kalia 2015).

### The neuropsychiatry of Parkinson’s disease

Although the motor symptoms of Parkinson’s disease are often the symptoms that bring patients to the clinic there are a range of non-motor symptoms. These include sleep disturbance, fatigue, sexual dysfunction, cardiovascular symptoms, and urinary and gastrointestinal symptoms such as constipation. This group of symptoms also includes mood disturbance, principally anhedonia and apathy, as well as difficulties with attention and memory. It is reported that such symptoms can appear years in advance of a diagnosis of Parkinson’s disease, and rapid eye movement (REM) sleep behaviour disorder may precede a neurodegenerative diagnosis such as Parkinson’s disease by several decades (Pont-Sunyer 2015).

Psychiatric symptoms are therefore very common in Parkinson’s disease and it is important to consider the presence of depression and anxiety in

assessing patients with the disease (Martinez-Martin 2007). Cognitive impairment may be the chief complaint in the clinic, yet the main issue may be an affective disorder. These symptoms are amenable to treatment and are associated with significant impairment in quality of life (Aarsland 2017). Cognitive impairment is very common in Parkinson’s disease and it is a consequence of the disease process (Aarsland 2017). It has been reported that cognitive impairment may be found in approximately 20% of people with early and untreated Parkinson’s disease (Aarsland 2009). When compared with age-matched controls, patients with Parkinson’s disease have a four times greater relative risk of developing dementia (Agrawal 2020). Around a quarter of all people with Parkinson’s disease have dementia, with over 80% developing it by 20 years after disease diagnosis (Aarsland 2017; Reid 2011). Patients who are 10 years post-diagnosis, such as our case, will most likely have developed some degree of cognitive impairment, if not frank dementia.

Our patient has most likely developed Parkinson’s disease dementia (PDD). A typical profile of cognitive deficits in PDD involves four main cognitive domains: impaired attention and executive functions, impaired visuospatial function and impaired recall (Clarke 2016). The impairment has to span more than one of these domains and a 1-year rule is applied. This is to say that PDD is diagnosed when the dementia syndrome evolves more than 1 year after a diagnosis of idiopathic Parkinson’s disease (Emre 2007). In the circumstance where dementia develops before or concurrently with Parkinsonism this is termed dementia with Lewy bodies (DLB) or Lewy body dementia. The core features here are fluctuating cognition, which can include pronounced variations in attention and alertness, as well as visual hallucinations and Parkinsonism (Emre 2007). PDD and DLB exist along a



clinical continuum and there can be difficulty defining the specific clinical entity in some patients.

An example of this is that we often think of the visual hallucinations in DLB as being characteristic and a useful point of discernment clinically. Yet this is not the case, as there is a relatively high prevalence of psychosis in Parkinson's disease, ranging from visual and auditory hallucinations to delusions (Ffytche 2017a). There are three contexts in which this can arise. The psychosis can be associated with dementia and it can also be related to the pharmacological treatment of Parkinson's disease. It is also possible for the psychosis to occur independently (Ffytche 2017b).

A final aspect which is important when thinking about cognitive symptoms in Parkinson's disease are the effects of treatment for the disease. Treatment with levodopa can contribute to confusion, and this response is considered a risk factor for developing PDD (Clarke 2016). Dopamine agonists, which are used in early treatment to lessen the need for levodopa, can give rise to impulse control disorders. Common behaviours that can occur with impulse control disorders include hypersexuality, pathological gambling, compulsive eating and compulsive spending (Husain 2016). Hobbyism describes an enraptured focus in a new activity. Punding is the compulsive performance of a previously goal-directed behaviour such as packing or sorting out items which has now become purposeless, repeated and time consuming (Clarke 2016; Weintraub 2017). These features may need to be proactively sought from the history as they may not be volunteered by the patient.

#### *Rarer Parkinson's-plus disorders to consider*

Corticobasal syndrome is a clinical phenotype of a neurodegenerative process termed corticobasal degeneration. In corticobasal syndrome a typical presentation will involve asymmetric Parkinsonism and a characteristic limb clumsiness, which occurs in approximately 50% of cases. This speaks to the pattern of neurodegeneration which evolves, as the name suggests, to involve the basal ganglia and the cortex (Mahapatra 2004). Higher cortical dysfunction is often seen and typically manifests clinically as ideomotor and limb apraxia. Apraxia means an inability to plan and undertake motor tasks that were previously possible for a patient, despite preservation of strength, sensation and simple coordination. In trying to draw out apraxia in the clinic it is useful to ask the patient to mime the performance of a motor activity such as using a hammer and nail, brushing their teeth or combing their hair (Armstrong 2013).

There are two further Parkinsonian conditions worth brief thought in our clinical scenario.

Multiple system atrophy is a condition with varying degrees of Parkinsonism, cerebellar ataxia and autonomic dysfunction. The autonomic nervous system dysfunction can result in symptoms such as significant orthostatic hypotension and difficulty in micturition (Kollensperger 2010). These problems are not present in our patient.

Progressive supranuclear palsy is a disorder involving neurodegeneration which presents with a pattern of symmetrical bradykinesia and rigidity that is more proximal than distal. The Parkinsonism, which is not typically responsive to levodopa, is accompanied by early dysphagia, dysarthria and early cognitive impairment (Litvan 1996). The axial rigidity often leads to a characteristic hyperextended neck posture termed retrocollis. This rigidity also leads to the more upright posture as opposed to the stooped gait in Parkinson's disease. Overactivity of the frontalis muscle and eyelid retraction give a characteristic 'surprised' facies called the procerus sign (Warren 2007).

#### *Case vignette 4*

A 60-year-old right-handed female is referred to the cognitive clinic for assessment. She has noticed over the past 9 months that her writing has deteriorated. Anything she writes is unintelligible to herself and others. She has also noticed some difficulty when dressing, despite having no clear pain, loss of sensation or weakness in her limbs.

A year before this presentation she had been seen by her general practitioner (GP). At that point the chief complaint had been a decline in her reading as well as a history of having had some minor car accidents, such as reversing into her garage door and into several plants that line her driveway. She had been seen by the optician and there was no evidence of any problems with her visual acuity or ocular media. Visual fields seemed broadly intact to a moving target (finger) when her GP saw her in clinic. Her GP thought that she was very anxious at that time and that some social stressors may have been contributing to her reported difficulties, hence referral to psychiatry. She was diagnosed with an anxiety disorder and prescribed an SSRI.

You complete cognitive screening. There are no marked deficits in attention, memory, fluency and language. The patient is unable to write although can spell words verbally when asked. She struggles to read text. She is also unable to perform simple calculations. Curiously, when you are undertaking the finger-nose test, she is unable to identify her index finger. When you ask her to show you her right little finger she is also unable to do this. Indeed, she generally seems unable to discern left from right.

Additionally, when shown a picture and asked to describe it the patient is only able to name specific objects and is unable to comment on what is happening in the picture scene. The patient appears to have some difficulty in fixing her eyes on objects and has an associated problem in that she struggles to reach for objects when asked to do so.

### *Making sense of cognitive complaints*

Trying to localise a problem is often the first step in neurology. In this case, there is a suggestion of both dysgraphia and acquired dyslexia. It is possible that this reflects a dominant hemisphere disorder (probably left hemisphere in a right-handed patient such as this). More specifically, a lesion in the left parietal lobe could explain both dysgraphia and acquired dyslexia. The history of bumping into objects without a clear physical cause raises the possibility of a visuospatial disorder. Visual neglect or a small visual field defect are still possible, as quick visual field testing with a large moving target such as a finger can miss more subtle deficits. Parietal and occipital lobe lesions might be involved in this. Finally, we have the difficulty in dressing that has no obvious cause. A dressing apraxia seems likely here, given the other features, and could additionally suggest non-dominant parietal lobe involvement.

To help us with possible aetiologies of parietal lobe dysfunction we can next consider the timeline in this case. For the most recent problems there is a 9-month history. The patient was seen in the psychiatry clinic a year ago and thus her symptoms may well have been going on for longer than a year. This does not appear to be an acute process, even at onset. There is no suggestion that the difficulties are episodic, although careful history taking will assure us of this. Therefore this is unlikely to be a vascular or infective event. There is a suggestion of steady progression. As ever, there are unlikely diagnoses to be considered which add a caveat to this assertion. Some infective processes do evolve over time, such as neuroborreliosis, syphilis and HIV, although these would be likely to have additional supporting evidence from the history or examination. Screening blood tests in the investigation of cognitive impairment have been mentioned in vignette 3 (Box 5) and are relevant here.

If a series of vascular events, such as ischaemic strokes, were giving rise to the patient's cognitive problems an episodic or paroxysmal chronology superimposed on progressive decline might be seen. This is absent in our case. A seizure, or series of seizures, would not necessarily show progression. Neither of these possibilities appears to be the case with our patient. Sometimes this episodic nature in the history is obscured as the patient may editorialise somewhat in telling the story in the service of brevity, succinctness or embarrassment. Close questioning on the detail will bring this to light.

The main categories of disorder we must next consider encompass neurodegenerative processes and primary psychiatric conditions. Hierarchically, ruling out a degenerative disease will take precedence. There does appear to be progressive decline in more than one cognitive domain here and of para-

mount importance is an attempt to delineate just what cognitive impairments the patient is suffering from. A cognitive screening test must be undertaken at assessment and augmented with some lobar specific screening such as the Frontal Assessment Battery to gain an overview of cognitive performance.

Anxiety is very common and does have an impact on cognitive performance (Eysenck 2007) but it is not a specific finding. Very often the chief complaint in an anxious patient is of forgetting and overall memory performance. This is likely based on deficits in both attention and concentration (Langarita-Llorente 2019). Our patient does not fit that phenotype and instead primarily has a range of complaints that seem to encompass motor skills and visuospatial function.

### *The neurocognitive syndromes*

The difficulties this patient is experiencing conform to the described abnormalities in both Gerstmann syndrome and Bálint syndrome. The former arises due to pathology of the dominant parietal lobe, specifically the inferior parietal lobule. The latter is often a consequence of bilateral lesions affecting the posterior parietal cortex and the parieto-occipital junction (Agrawal 2020). The symptoms and signs in this case therefore localise to the posterior regions of the cerebral cortex, probably bilaterally.

Table 3 outlines the clinical features of various eponymous neurocognitive disorders, including Gerstmann and Bálint syndromes.

### *Posterior cortical atrophy*

From the pattern of cognitive difficulties in our case we were considering a lesion involving the posterior aspects of the cerebral hemispheres. On the MRI brain scan there was severe atrophy of the parietal lobes, which was marked when compared with the surrounding parenchymal volume. This fits with our pattern of neurocognitive defects (Fig. 1 shows an illustrative MRI).

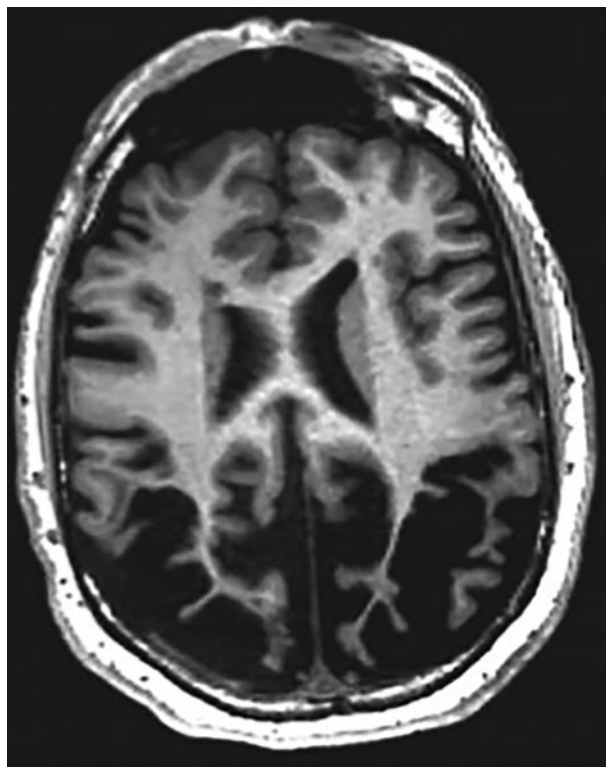
The most likely cause of this pattern of atrophy and the clinical presentation in our patient would be posterior cortical atrophy. This condition, also known as Benson syndrome, is often related to an Alzheimer disease phenotypic variant, although Lewy body dementia or even prion disease can also cause it (Crutch 2012; Holden 2020). The posterior lobar predilection leads to the classic symptoms of parieto-occipital dysfunction.

Posterior cortical atrophy is insidious and gradually progressive. Although not common, it serves as a reminder that neurodegenerative conditions can present in a number of very different ways. Some of these patients may be diagnosed with a functional cognitive disorder owing to the seemingly

**TABLE 3** Some eponymous neurocognitive disorders

Syndrome	Features
Bálint's syndrome (bilateral posterior parietal lobe)	Simultanagnosia (difficulty visualising more than one object at a time) Oculomotor apraxia (defect in directing eyes to visualise an object) Optic ataxia (defect in visually guiding the hand to an object)
Gerstmann syndrome (dominant parietal lobe)	Finger agnosia (inability to recognise or name fingers) Left-right disorientation (inability to distinguish left from right) Agraphia (loss of ability to write) Acalculia (loss of ability to perform calculations)
Anton syndrome (bilateral occipital lobe)	Visual anosognosia (patient denies their blindness and confabulates)
Klüver–Bucy syndrome (bilateral temporal lobe)	Hyperphagia Hyperorality Hypersexuality Docility Visual agnosia (inability to recognise visually presented objects)

Source: Bresch (2002).

**FIG 1** A magnetic resonance imaging scan of the brain showing posterior cortical atrophy resulting in visual impairment. © 2019 Elsevier. Reprinted with permission from Keuss et al (2019).

idiosyncratic problems they present with. It is therefore important to keep in mind that functional cognitive disorders almost exclusively present with concerns about memory. Our patient's concerns are very atypical in this sense and should instil caution about making such a diagnosis until organic causes have been carefully considered (McWhirter 2020).

### Final thoughts

We have shown how considering key neurological differential diagnoses is important in psychiatry to

help prevent delays in the appropriate management of patients. A number of the differentials we have discussed could have adverse consequences if missed. Among psychiatry patients will be some with intercurrent or predominant neurological illness. Detecting such cases, where appropriate with assistance from neurology or general medical services, will help optimise patient care.

As psychiatrists we may believe that we are more inclined, predisposed even, to holistic care in thinking about our patients. This is a great strength and is a principle that we are not only taught from very

early in our training but one that we quickly realise through working with patients with complex problems. Sometimes though, the biological part of our biopsychosocial approach must take a more central role. It is therefore important to keep updated on this front, and this has been the aim of our article. In doing so we will maintain secure and renewed links with our once inseparable and still ever-present cousin, Neurology.

### Author contributions

Both authors made substantial contributions to the conception, writing, revision and final approval of the manuscript.

### Funding

This article received no specific grant from any funding agency, commercial or not-for-profit sectors.

### Declaration of interest

None.

ICMJE forms are in the supplementary material, available online at <https://doi.org/10.1192/bja.2021.67>.

### References

Aarsland D, Bronnick K, Larsen JP, et al (2009) Cognitive impairment in incident, untreated Parkinson disease: the Norwegian ParkWest study. *Neurology*, **72**: 1121–6.

Aarsland D, Creese B, Politis M, et al (2017) Cognitive decline in Parkinson disease. *Nature Reviews Neurology*, **13**: 217–31.

Adachi N, Ito M, Kanemoto K, et al (2007) Duration of postictal psychotic episodes. *Epilepsia*, **48**: 1531–7.

Agrawal N, Faruqi R, Bodani M (2020) *Oxford Textbook of Neuropsychiatry*. Oxford University Press.

Alper K, Schwartz KA, Kolts RL, et al (2007) Seizure incidence in psychopharmacological clinical trials: an analysis of food and drug administration (FDA) summary basis of approval reports. *Biological Psychiatry*, **62**: 345–54.

Armstrong MJ, Litvan I, Lang AE, et al (2013) Criteria for the diagnosis of corticobasal degeneration. *Neurology*, **80**: 496–503.

Arvanitakis Z, Shah RC, Bennett DA (2019) Diagnosis and management of dementia: review. *JAMA*, **322**: 1589–99.

Batash R, Asna N, Schaffer P, et al (2017) Glioblastoma multiforme, diagnosis and treatment; recent literature review. *Current Medicinal Chemistry*, **24**: 3002–9.

Bresch D (2002) Beyond Wernicke's: a lexicon of eponyms in psychiatry. *Journal of Neuropsychiatry and Clinical Neurosciences*, **14**: 155–60.

Brouwer MC, Tunkel AR, van de Beek D (2010) Epidemiology, diagnosis, and antimicrobial treatment of acute bacterial meningitis. *Clinical Microbiology Reviews*, **23**: 467–92.

Bush G, Fink M, Petrides G, et al (1996) Catatonia. I. rating scale and standardized examination. *Acta Psychiatrica Scandinavica*, **93**: 129–36.

Clarke C, Howard R, Rossor M, et al (2016) *Neurology: A Queen Square Textbook*. John Wiley and Sons, Inc.

Crutch S J, Lehmann M, Schott JM, et al (2012) Posterior cortical atrophy. *The Lancet Neurology*, **11**(2): 170–178.

Dalmaj J, Tuzun E, Wu HY, et al (2007) Paraneoplastic anti-N-methyl-D-aspartate receptor encephalitis associated with ovarian teratoma. *Annals of Neurology*, **61**: 25–36.

Ellul M, Solomon T (2018) Acute encephalitis – diagnosis and management. *Clinical Medicine*, **18**: 155–9.

Emre M, Aarsland D, Brown R, et al (2007) Clinical diagnostic criteria for dementia associated with Parkinson's disease. *Movement Disorders*, **22**: 1689–707.

European Association for the Study of the Liver (2012) EASL clinical practice guidelines: Wilson's disease. *Journal of Hepatology*, **56**: 671–85.

Eysenck MW, Derakshan N, Santos R, et al (2007) Anxiety and cognitive performance: attentional control theory. *Emotion*, **7**: 336–53.

Fahn S (2011) Classification of movement disorders. *Movement Disorders*, **26**: 947–57.

Ferenci P (2017) Diagnosis of Wilson disease. In *Handbook of Clinical Neurology: Vol 142 Wilson Disease* (eds A Czlonkowska, M Schilsky): 171–80. Elsevier.

Ffytche DH, Aarsland D (2017a) Psychosis in Parkinson's disease. *International Review of Neurobiology*, **133**: 585–622.

Ffytche DH, Creese B, Politis M, et al (2017b) The psychosis spectrum in Parkinson disease. *Nature Reviews Neurology*, **13**: 81–95.

Fink M, Taylor M (2001) The many varieties of catatonia. *European Archives of Psychiatry and Clinical Neurosciences*, **51**: 8–13.

Fisher RS, Cross JH, French JA, et al (2017) Operational classification of seizure types by the international league against epilepsy: position paper of the ILAE commission for classification and terminology. *Epilepsia*, **58**: 522–30.

Gagnon MM, Savard M (2016) Limbic encephalitis associated with GAD65 antibodies: brief review of the relevant literature. *Canadian Journal of Neurological Sciences*, **43**: 486–93.

Granerod J, Ambrose HE, Davies NW, et al (2010) Causes of encephalitis and differences in their clinical presentations in England: a multicentre, population-based prospective study. *Lancet Infectious Diseases*, **10**: 835–44.

Graus F, Titulaer MJ, Balu R, et al (2016) A clinical approach to diagnosis of autoimmune encephalitis. *Lancet Neurology*, **15**: 391–404.

Habibi M, Hart F, Bainbridge J (2016) The impact of psychoactive drugs on seizures and antiepileptic drugs. *Current Neurology and Neuroscience Reports*, **16**(8): 71.

Hanly JG, Li Q, Su L, et al (2019) Psychosis in systemic lupus erythematosus: results from an international inception cohort study. *Arthritis & Rheumatology*, **71**: 281–9.

Hilger E, Zimprich F, Patariaia E, et al (2016) Psychoses in epilepsy: a comparison of postictal and interictal psychoses. *Epilepsy & Behavior*, **60**: 58–62.

Holden SK, Bettcher BM, Pelak VS (2020) Update on posterior cortical atrophy. *Current Opinion in Neurology*, **33**: 68–73.

Husain AM, Horn GJ, Jacobson MP (2003) Non-convulsive status epilepticus: usefulness of clinical features in selecting patients for urgent EEG. *Journal of Neurology Neurosurgery and Psychiatry*, **74**: 189–91.

Husain M, Schott JM (2016) *Oxford Textbook of Cognitive Neurology and Dementia*. Oxford University Press.

Johannessen C, Henning O, Johannessen SI (2016) Proconvulsant effects of antidepressants – what is the current evidence? *Epilepsy & Behaviour*, **61**: 287–91.

Kalia LV, Lang AE (2015) Parkinson's disease. *Lancet*, **386**: 896–912.

Keuss SE, Bowen J, Schott JM (2019) Looking beyond the eyes: visual impairment in posterior cortical atrophy. *Lancet*, **394**: 1055.

Kollensperger M, Geser F, Ndayisaba JP, et al (2010) Presentation, diagnosis, and management of multiple system atrophy in Europe: final analysis of the European multiple system atrophy registry. *Movement Disorders*, **25**: 2604–12.

Langarita-Llorente R, Gracia-Garcia P (2019) Neuropsychology of generalized anxiety disorders: a systematic review. *Revue Neurologique*, **69**: 59–67.

Litvan I, Agid Y, Calne D, et al (1996) Clinical research criteria for the diagnosis of progressive supranuclear palsy (Steele-Richardson-Olszewski syndrome): report of the NINDS-SPSP international workshop. *Neurology*, **47**: 1–9.

### MCQ answers

1 d 2 c 3 a 4 c 5 e



- Mahapatra RK, Edwards MJ, Schott JM, et al (2004) Corticobasal degeneration. *Lancet Neurology*, **3**: 736–43.
- Mak A, Ho R, Lau C (2009) Clinical implications of neuropsychiatric systemic lupus erythematosus. *Advances in Psychiatric Treatment*, **15**: 451–8.
- Martinez-Martin P, Schapira AH, Stocchi F, et al (2007) Prevalence of non-motor symptoms in Parkinson's disease in an international setting; study using nonmotor symptoms questionnaire in 545 patients. *Movement Disorders*, **22**: 1623–9.
- Mathews M, Gratz S, Adetunji B, et al (2005) Antipsychotic-induced movement disorders: evaluation and treatment. *Psychiatry*, **2**: 36–41.
- McWhirter L, Ritchie C, Stone J, et al (2020) Functional cognitive disorders: a systematic review. *Lancet Psychiatry*, **7**: 191–207.
- Okazaki M, Adachi N, Ito M, et al (2011) One-year seizure prognosis in epilepsy patients treated with antidepressants. *Epilepsy & Behavior*, **22**: 331–5.
- Picardi A, Fonzi L, Pallagrosi M, et al (2018) Delusional themes across affective and non-affective psychoses. *Frontiers in Psychiatry*, **9**: 132.
- Pont-Sunyer C, Hotter A, Gaig C, et al (2015) The onset of nonmotor symptoms in Parkinson's disease (the ONSET PD study). *Movement Disorder*, **30**: 229–37.
- Reid WG, Hely MA, Morris JG, et al (2011) Dementia in Parkinson's disease: a 20-year neuropsychological study (Sydney Multicentre Study). *Journal of Neurology, Neurosurgery and Psychiatry*, **82**: 1033–7.
- Sanger TD, Chen D, Fehlings DL, et al (2010) Definition and classification of hyperkinetic movements in childhood. *Movement Disorders*, **25**: 1538–49.
- Shprecher D, Schwalb J, Kurlan R (2008) Normal pressure hydrocephalus: diagnosis and treatment. *Current Neurology and Neuroscience Reports*, **8**: 371–6.
- Sili U, Kaya A, Mert A, et al (2014) Herpes simplex virus encephalitis: clinical manifestations, diagnosis and outcome in 106 adult patients. *Journal of Clinical Virology*, **60**: 112–8.
- Singh TD, Fugate JE, Hocker S, et al (2016) Predictors of outcome in HSV encephalitis. *Journal of Neurology*, **263**: 277–89.
- Smith PE (2008) The bare essentials: epilepsy. *Practical Neurology*, **8**: 195–202.
- Solomon T, Hart IJ, Beeching NJ (2007) Viral encephalitis: a clinician's guide. *Practical Neurology*, **7**: 288–305.
- Solomon T, Michael BD, Smith PE, et al (2012) Management of suspected viral encephalitis in adults: Association of British Neurologists and British Infection Association National Guidelines. *Journal of Infection*, **64**: 347–73.
- Stanghellini G, Raballo A, Broome M, et al (2019) *The Oxford Handbook of Phenomenological Psychopathology*. Oxford University Press.
- Sutter R, Semmlack S, Kaplan PW (2016) Nonconvulsive status epilepticus in adults – insights into the invisible. *Nature Reviews Neurology*, **12**: 281–93.
- Titulaer MJ, McCracken L, Gabilondo I, et al (2013) Treatment and prognostic factors for long-term outcome in patients with anti-NMDA receptor encephalitis: an observational cohort study. *Lancet Neurology*, **12**: 157–65.
- Varley JA, Webb AJS, Balint B, et al (2019) The movement disorder associated with NMDAR antibody-encephalitis is complex and characteristic: an expert video-rating study. *Journal of Neurology Neurosurgery and Psychiatry*, **90**: 724–6.
- Voltz R (2002) Paraneoplastic neurological syndromes: an update on diagnosis, pathogenesis, and therapy. *Lancet Neurology*, **1**: 294–305.
- Warren NM, Burn DJ (2007) Progressive supranuclear palsy. *Practical Neurology*, **7**: 16–23.
- Weintraub D, Claassen DO (2017) Impulse control and related disorders in Parkinson's disease. *International Review of Neurobiology*, **133**: 679–717.

## MCQs

Select the single best option for each question stem

**1** Which of the following causes of encephalitis is most important to consider when assessing an acutely confused patient in the UK?

- a Varicella zoster virus
- b Enteroviruses
- c Measles virus
- d Herpes simplex virus
- e Adenovirus.

**2** Which of the following neurological conditions is most likely to present with symptoms of *déjà vu* and *jamais vu*?

- a Posterior cortical atrophy
- b Viral encephalitis
- c Temporal lobe epilepsy
- d Normal pressure hydrocephalus
- e Generalised tonic-clonic seizures.

**3** Which of the following clinical signs is a classic feature of Parkinson's disease?

- a Asymmetrically reduced arm swing
- b Brisk knee reflexes and upgoing plantars
- c Increased rate of blinking
- d Eyelid retraction
- e Abnormal cerebellar signs.

**4** A 22-year-old woman with no medical history of note presents with a 1-day history of rapidly worsening confusion and headaches. A standard set of blood tests and an emergency MRI brain scan were reported as 'normal'. Which is the most important next step?

- a Lumbar puncture
- b EEG
- c Appropriate antimicrobials and lumbar puncture
- d Repeat the MRI with contrast
- e Repeat the MRI after 24 h to look for any change.

**5** A 70-year-old man with Parkinson's disease reports much better control since he saw a specialist 3 months before. His wife is concerned, however, that he has suddenly started gambling in the past 2 months. Which of the following is most likely to reveal the cause?

- a An MRI scan of the brain
- b Auto-antibody testing
- c A lumbar puncture
- d An EEG
- e Medicine review.