

## QUESTION 1

A 24 year old North African woman first noticed head tremor at the age of 16. The tremor spread to affect her hands and her walking gradually became slower. She was able to perform her activities of daily living. Her past medical history was unremarkable. She did not smoke or drink, so was not aware of the responsiveness of her tremor to alcohol. Her parents were distantly related but were not first or second cousins. She was the eldest of 5 siblings. A 15 year old brother had progressive tremor of the hands and head, as did her paternal grandfather.

Examination revealed a marked 'no-no' head tremor but otherwise normal eye movements and cranial nerves. In her upper limbs there was bilateral mild intention tremor and dysmetria and depressed reflexes. She had decreased vibration sense and made occasional proprioceptive errors in her fingers. In her legs the reflexes were depressed, mild heel-shin ataxia was present, vibration sense was decreased but proprioception preserved in her toes. Tone and power were normal and plantar responses flexor.

Investigations revealed a normal FBC, ESR, CK, U&E, LFT, glucose, TFT, Vitamin B12, phytanic acid, white cell enzymes, lipoprotein electrophoresis, cerebral MR scan and nerve conduction studies. Somatosensory evoked potentials were absent from upper and lower limbs.

Which of the following is the most likely diagnosis?

- A. Refsum's disease
- B. Hereditary essential tremor
- C. Familial isolated vitamin E deficiency
- D. Friedreich's ataxia
- E. Primary orthostatic tremor

## QUESTION 2

A 70 year old male presented with a 12 month history of progressive gait disorder that began after a cataract extraction. His past medical history included hypertension and glaucoma for 10 years, severe depression treated with amitriptyline and lithium for 14 years and hypercholesterolaemia (5 years). For 50 years he had smoked 20 cigarettes and averaged 2 glasses of wine each day. On two recent occasions having stood up he could not walk and was brought home by taxi. He had some urinary frequency and urgency.

Examination revealed cupped optic discs, slight facial impassivity and minimally increased tone in his neck and limbs. Power, reflexes and sensation were normal and plantar responses flexor. He had difficulty starting to walk and then walked with a broad based shuffling gait with reduced armswing.

Which of these is the most likely diagnosis?

- A. Multiple system atrophy
- B. Drug induced parkinsonism
- C. Normal pressure hydrocephalus
- D. Small vessel ischaemic cerebral white matter disease
- E. Progressive supranuclear palsy

### QUESTION 3

A 67 year old lady presented with a six week history of worsening headache with some occasional visual hallucinations of seeing "fruit cakes" drifting across her vision. In addition she had episodes of losing vision briefly especially when bending over. She had no significant previous medical history and no systemic symptoms. There was no relevant family history. She was on no medication, smoked ten a day and did not drink alcohol heavily.

On examination she had a body mass index of 30 with bilateral papilloedema and visual acuities of 6/9 bilaterally with enlarged blind spots. She had no other neurological signs outside of some intermittent confusion.

Her routine blood tests were normal outside of an ESR of 68 and CRP of 70. Her CT scan and MRI scan of her brain were normal. An MRV revealed some narrowing in the posterior part of the superior sagittal sinus. Her lumbar puncture revealed an opening pressure of +43 cm of CSF with a normal glucose and protein but with 11 cells. These cells were reported as being polymorphs. Chest X-ray was normal and CT of her chest and abdomen revealed an abdominal aortic aneurysm of diameter 7 cm. Repeat CSF done two and four weeks after initial presentation continued to show raised pressure despite anticoagulation with subcutaneous clexane.

Which is the most likely diagnosis?

- A. Isolated sagittal sinus thrombosis
- B. Malignant meningitis
- C. Paraneoplastic syndrome
- D. Idiopathic intracranial hypertension
- E. Vasculitis

#### QUESTION 4

A 66 year old lady presented with hip and shoulder myalgia which was progressive and began two months prior to her being seen in the Neurology Outpatients Department. One month after she developed these symptoms she developed a right-sided headache which persisted and was associated with double vision, blurred vision, facial paraesthesiae and numbness on the face. Her previous medical history revealed her to have had diphtheria as a child. She was on no medication and there was no relevant family history.

On examination she had a dysarthria with a right-sided sixth nerve palsy and reduced sensation over the face in a snout distribution. There were no limb signs.

Investigations revealed her to have a normochromic, normocytic anaemia with a haemoglobin of 10.9 g/l and an ESR of 96. Liver function tests, renal function and autoantibody profile was negative and her chest X-ray showed old TB only. Her MRI showed a number of white matter lesions, including some in the brainstem.

What is the most likely diagnosis?

- A. Multiple sclerosis
- B. Temporal arteritis
- C. Wegener's granulomatosis
- D. Subacute bacterial endocarditis
- E. Acute disseminated encephalomyelitis

## QUESTION 5

A 36-yr old Caucasian teacher was admitted with ascending weakness over a week. She had had progressive walking difficulties since a teenager, and prior to presentation had been managing with a stick and ankle splints. Since her twenties she had progressive nyctalopia which in the last few years had progressed to photopic visual impairment. She had been diagnosed with bulimia nervosa since her teens, although she often vomited without any expressed desire to lose weight and denied that she consistently binged prior to vomiting. She had had a severe bout of vomiting over the week prior to the current presentation. She had previously seen an audiologist for vertigo and difficulties with following conversation. She was on cinnarizine and propranolol (for anxiety) on admission.

On examination, she was slightly obese, had bilateral foot drop and wasting of the lower legs. The 4<sup>th</sup> and 5<sup>th</sup> digits of her hands and feet were short. Tone was reduced and power absent (0/5) on all movements about the ankle. Power was slightly reduced (4+/5) on knee and hip movements. Reflexes were absent in the legs and present with reinforcement in the arms. There was minimal ataxia in the upper limbs (difficult to assess in lower limbs due to weakness). Sensation was reduced to vibration and joint-position sense up to and including the knees. Cranial nerve testing revealed anosmia, constricted visual fields, visual acuity 6/12 bilaterally, miotic pupils equally reactive, and fundoscopy showed bilateral optic atrophy (undilated exam). The rest of the examination was unremarkable.

The most effective form of treatment this patient can be offered is:

- A. Dietary advice
- B. Physiotherapy
- C. Plasma exchange
- D. Intravenous immunoglobulins
- E. Glucocorticoids

## QUESTION 6

A patient comes to your clinic complaining of brief episodes of vertigo. The vertigo seems to be induced by movements of the head and you suspect the diagnosis of benign paroxysmal positional vertigo (BPPV).

Which one of the following triggers for vertigo is highly specific for a diagnosis of BPPV?

- A. Moving the head from side to side ("no-no")
- B. Alcohol consumption
- C. Standing from a sitting position
- D. Turning over in bed
- E. Stopping anti-vertiginous drugs

## QUESTION 7

A 22 year old woman presents with a severe paraparesis, which evolved over several days. She now cannot walk and is incontinent. Three months before, she had had left optic neuritis and the following month she had had right optic neuritis. She had received steroids on both occasions and her vision had improved, but was still not normal. She was otherwise well. She was on the oral contraceptive pill and there was no family history of any neurological disease.

On examination, she had bilateral optic atrophy, visual acuities of 6/36 and a dense spastic paraparesis with a mid-thoracic level. There were no other abnormalities.

Blood tests, including ANA and B12, were normal. A MRI brain was normal, but a MRI of the spinal cord showed a long enhancing swollen lesion from the lower cervical segments to T12. VEPs were bilaterally delayed. Her spinal fluid contained 20 lymphocytes, protein 0.7 and no oligoclonal bands.

What is the most likely diagnosis?

- A. Transverse myelitis
- B. Multiple sclerosis
- C. Devic's disease
- D. Spinal cord tumour
- E. CNS lupus

## QUESTION 8

A 32 year old woman is admitted with two months of seizures and a longer history of personality change and difficulties at work. She seems to have had delusions about some of her family and work colleagues. On the ward, she is seen to have a fluctuating level of awareness, at times being quite lucid and at other times rambling and being quite aggressive. She has been incontinent a few times. She has two witnessed convulsions on the ward. She complains of difficulty sleeping in hospital and there are reports of violent behaviour at night from the nurses.

On examination, she is cognitively impaired (MMSE 23/30, Addenbrooke's Cognitive Examination (ACE) 75/100) with particular problems in memory and attention. She has some twitching in her quadriceps muscles. There are no other signs, in particular no myoclonus. Her blood pressure chart shows quite a lot of fluctuation.

Investigations show normal screening blood tests, a diffusely abnormal EEG, a normal MRI brain (except some rather equivocal comments about brightness in the hippocampus) and oligoclonal bands in acellular CSF.

What is the most likely diagnosis?

- A. Variant Creutzfeldt-Jacob disease
- B. Motor neurone disease with frontotemporal dementia
- C. Morvan's syndrome
- D. Complex partial status
- E. Multiple sclerosis

## QUESTION 9

A 66-year-old transport manager is referred to the Neurology Outpatient Department with a persistent headache.

He had complained of a daily or near daily headache since May 1997. The headache was bilateral, involving the vertex, temporal and occipital regions with a throbbing, often severe, pain, associated sometimes with mild nausea. The severe pain exacerbations lasted 3 hrs and occurred on five days out of seven but never more than once a day.

He complained of an additional daily or near daily headache since August 1997 that was right- or left-sided with orbital, maxillary and mandibular pain. It was severe, felt like a tight sensation and lasted an hour without treatment.

He was being treated by his GP for migraine and for the last few years had been established on a regime of pizotifen 1.5mg daily and sumatriptan 50mg for exacerbations.

He had a normal neurological examination, including normal optic fundi, a normal general examination, including blood pressure, and no focal areas of cranial tenderness.

Regarding the initial assessment of this patient, which of the following statements is most likely to be correct?

- A. Brain imaging is indicated based on the fact that he has persistent headache and is over the age of 65 years.
- B. A likely diagnosis is episodic tension-type headache that has evolved to chronic tension-type headache.
- C. The patient has developed medication overuse headache.
- D. The patient cannot have cluster headache as his attacks are not daily.
- E. Amitriptyline is the treatment of choice for this patient's headaches.

## QUESTION 10

A 33 year old woman with focal epilepsy, well controlled with carbamazepine, seeks advice regarding contraception.

Which of the following statements represents the most correct advice?

- A. A combined oral contraceptive (COC) containing 50µg estradiol will be as effective as a standard dose COC taken by someone not on anti-epileptic drugs (AEDs).
- B. Lower dose progesterone-only pills and lower dose parenteral progesterone implant Implanon (Organon) are effective alternatives.
- C. Depo-Provera, prescribed at standard dose and intervals, will provide effective contraception.
- D. Emergency contraception with levonorgestrel is unaffected by enzyme-inducing AEDs.
- E. She should change her carbamazepine to oxcarbazepine as this does not interfere with the pill.

## QUESTION 11

A 27 year old, HIV positive patient presents with a short history of headache, malaise and lethargy. The examination reveals a confused patient with a low-grade fever and neck stiffness. A diagnosis of tuberculous meningitis is suspected.

Which of the following findings in the cerebrospinal fluid (CSF) is most likely to be against the diagnosis?

- A. CSF glucose of 1.3 mM
- B. CSF protein of 1.5 g/L
- C. CSF white cell count of 1000 cells/cubic mm
- D. Low serum chloride level
- E. Mixture of polymorphonuclear leucocytes and lymphocytes in CSF

## QUESTION 12

A 33 year old warehouse worker was referred by his occupational health doctor. He had been having difficulty lifting heavy boxes for some months since joining the firm from his previous job working in an office. He had also had trouble keeping up with colleagues on the football pitch. Examination confirmed asymmetrical proximal upper limb weakness and less marked ankle dorsiflexion weakness. He had difficulty whistling. Normal blood results included ESR, thyroid function and calcium. CK was mildly elevated at 350 IU.

Which of the following investigations is most likely to establish the correct diagnosis in this patient?

- A. EMG/NCS study
- B. Deltoid muscle biopsy
- C. Genetic testing
- D. Chest CT scan
- E. Tensilon test

### QUESTION 13

A 62 year old civil servant was admitted with a two day history of headache, fever and nausea, which had developed one week after a weekend trip to Spain. He had no past medical history of note. On examination he was systemically unwell but neurological examination was entirely normal and he was not confused. A CT brain scan was normal. Inflammatory markers were raised and so he was treated with intravenous cefotaxime.

Two days later he deteriorated and became increasingly drowsy and confused with signs of meningeal irritation and worsening headache. He developed bilateral sequential sixth nerve palsies over the course of 24 hours and episodes of profound bradycardia were observed on a cardiac monitor

An MRI scan of his brain with contrast was entirely normal. CSF examination was performed: opening pressure 40 cm CSF, glucose 0.3 mmol/L (matched serum glucose 5.5), protein 3.6 g/L, White cell count 204 /cubic mm of which 80% were polymorphs, erythrocytes 40 / cubic mm. Organisms were seen on gram stain, and grew such that they were identifiable within 12 hours of culture.

What is the most likely organism causing this gentleman's meningitis?

- A. *Neisseria meningococcus*
- B. *Streptococcus pneumoniae*
- C. *Cryptococcus neoformans*
- D. *Listeria monocytogenes*
- E. *Mycobacterium tuberculosis*

QUESTION 14

A 72 year old lady reports difficulty in getting out of low chairs for three years and having to use her arms to assist walking upstairs for two years. In the last year and a half she has had some falls: her legs appear to give way, especially on prolonged standing. In the last year she has had some difficulty opening jam jars and with turning door keys. In the last few months, she has noticed difficulty swallowing with a tendency to choke on dry food. There are no sensory or sphincter symptoms.

General physical examination reveals marked wasting in the distal forearms (left > right) and in the proximal legs (quadriceps > hamstrings). There is no rash. There are no fasciculations. Cranial nerve examination is normal apart from mild weakness of neck flexion. Limb tone is normal. Mild to moderate weakness is found in the distribution of the wasting but foot dorsiflexion is also bilaterally weak. The reflexes are depressed. There are no sensory or cerebellar signs.

The following blood tests are normal: FBC, ESR, U&E, fasting glucose, CRP, serum protein electrophoresis, creatine kinase, thyroid function tests, autoantibodies. Nerve conduction studies show mildly reduced sural SNAPs but are otherwise within normal limits. Electromyography demonstrates extensive fibrillation potentials and positive sharp waves in the distal muscles of all limbs. Interspersed with generally normal motor units are polyphasic units of short duration in both proximal and distal muscles. A muscle biopsy is performed and the following histochemical features are observed:

Fig1:

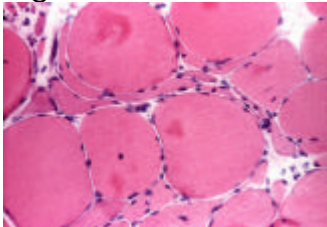


Fig2:

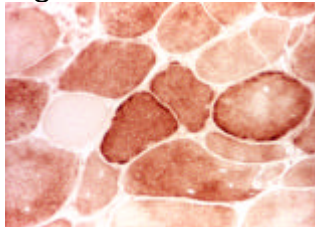


Fig3:

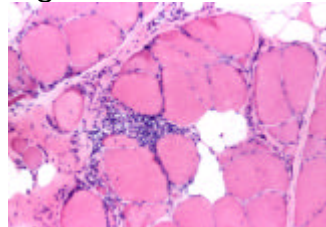
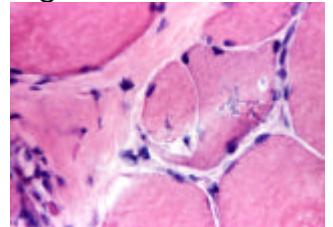


Fig4:



What is the most likely diagnosis?

- A. Motor neurone disease
- B. Mitochondrial disease
- C. Polymyositis
- D. Inclusion body myositis
- E. Distal myopathy

## QUESTION 15

A 40 year old right-handed engineer presented with a sudden onset of left-sided hemiplegia with sensory loss which resolved after several days.

The patient reported a 10-year history of seizures. The seizures were characterised by an olfactory déjà vu phenomenon. The attacks lasted for a few minutes and were followed by several hours of lethargy. These episodes would occasionally occur following binge drinking.

There was a past history of migraine with visual aura. Of the patient's four siblings one was said to have 'multiple sclerosis' but the exact nature of the diagnosis was unclear. His mother suffered from migraine and his father from diabetes but there was no other family history of note.

On examination his BP was 125/75. There was a minor pyramidal weakness on the left side with brisker reflexes. Left foot tapping was marginally diminished on the left. The patient's abstract reasoning was mildly impaired. The remainder of the clinical examination was unremarkable.

The following investigations were normal, negative or non-diagnostic: full blood count, liver function, thyroid function, ESR (8 mm/hour), syphilis serology, blood lactate, CSF lactate, amino acid profile, vitamin B12, folate, lupus anticoagulant, protein C & S, APC resistance, anti-thrombin III antibody, autoantibody screen, angiotensin converting enzyme level in serum and CSF, visual, brainstem and somatosensory evoked potentials, magnetic resonance imaging (MRI) of the neck vessels and cardiac echocardiography. An EEG showed only mild non-specific left temporal disturbances of cerebral activity. CSF examination revealed an opening pressure of 16.5 cm of water, glucose 4 mM/l (peripheral 7 mM/l), protein 0.96 g/l, lymphocytes  $2 \times 10^6$ /l, red cells  $1 \times 10^6$ /l, and no oligoclonal bands.

What is the most likely diagnosis?

- A. Todd's paresis
- B. Cerebral tumour
- C. CADASIL
- D. Cerebral vasculitis
- E. Alcohol induced seizures

## QUESTION 16

A 44 year old woman is referred with a four year history of deteriorating gait. In her family history she has two daughters aged 16 and 18. There is a history that her maternal uncle died in early childhood of a "neurological disorder". On examination she has signs of a spastic paraparesis with extensor plantar responses and clonus. Sensory examination is normal. The rest of the neurological examination is normal.

Imaging of the brain and spine is normal. Routine CSF examination is normal with no evidence of oligoclonal bands.

Which of the following is the most likely diagnosis?

- A. Primary Progressive Multiple Sclerosis
- B. Primary Lateral Sclerosis
- C. Hereditary Spastic Paraplegia
- D. Adrenomyeloneuropathy
- E. B12 deficiency

## QUESTION 17

You are called to the Intensive Care Unit to give an opinion about a young boy of 16 who is apparently 'locked in'. Suspecting a brainstem or cerebral catastrophe, the ITU staff are considering withdrawing respiratory support. The patient had presented to haematology one year earlier with Idiopathic Thrombocytopenic Purpura which had been treated with IVIG and subsequently with steroids and azathioprine. Because his platelet count had continued to fall cyclophosphamide had been added in two months ago. Two weeks later he presented to his local hospital with a severe chest infection. He was given broad-spectrum antibiotics including aminoglycosides and treated for possible opportunistic infections, including *Pneumocystis* Pneumonia and CMV pneumonitis. He developed ARDS, was transferred to a regional ITU and was treated with steroids and Extracorporeal Membrane Oxygenation. His illness was further complicated by renal failure and deranged liver function tests.

By the time your opinion is sought he has recovered from multiorgan failure and no longer has a systemic inflammatory response syndrome. You are told that his lung function is now good. However, several attempts at weaning from the ventilator have failed.

On examination you find that he has intact brain stem reflexes but there is no voluntary movement except for the extraocular muscles. Consciousness appears normal. There is profound bilateral facial weakness, four limb flaccid paralysis and flexor plantar responses. The tendon reflexes are just elicitable. Peripheral neurophysiology shows normal nerve conduction velocities and F-wave latencies but on EMG the muscle is 'inexcitable'. The CPK level is within normal limits and all other routine electrolytes are normal. Brain imaging is reported to be normal.

What is the most appropriate test to perform at this stage?

- A. Lumbar puncture
- B. Repeat MRI brain scan with contrast
- C. Muscle biopsy
- D. EEG
- E. Nerve biopsy

## QUESTION 18

A 56 year old woman had had right sided headaches for several months. The headaches were non-specific in character. For three months she had ill-defined blurring of vision on right lateral gaze, without frank diplopia. She had noticed redness of the right eye for a similar period. Her general practitioner had diagnosed iritis but topical steroids had had no effect. At times she had noticed a pulsatile noise, principally referred to the right ear.

On examination, there were dilated conjunctival vessels on the right. There was a hint of right proptosis. No frank ophthalmoplegia was detected nor was an orbital bruit audible.

The most likely diagnosis is:

- A. Neurosarcoidosis
- B. Orbital varices
- C. Carotico-cavernous fistula
- D. Dural fistula
- E. Cavernous aneurysm

## QUESTION 19

A 19 year old right handed au pair was admitted with a 9 day history of headache. The pain was of abrupt onset, frontal and occipital, associated with nausea and malaise. There was no vomiting or photophobia. She complained of neck soreness for 3 days. The headache had improved after 3 days but then worsened again for 3 days prior to admission. It was exacerbated by sneezing. She had no personal or family history of migraine. She had been taking the combined oral contraceptive pill for 2 months. She was a non-smoker.

On examination she was afebrile, and normotensive. She was alert and orientated with no meningism. Disc margins were indistinct but venous pulsation was visible on the right. Cranial nerves were otherwise intact and the rest of her neurological examination was unremarkable.

Investigations:

FBC normal, ESR 20 mm/hr, biochemical profile normal, coagulation screen normal, blood sugar 6.5 mmol/l.

Emergency (out of hours) unenhanced CT brain scan was reported as normal by the on-call neurology SpR.

CSF examination: opening pressure 25 cm CSF, protein 0.7 g/dl; glucose 4.0 mmol/l, 9 RBC, <1 WBC, no xanthochromia.

Which of the following is the most likely diagnosis at this stage?

- A. Migraine
- B. Idiopathic intracranial hypertension
- C. Venous sinus thrombosis
- D. Sinusitis
- E. Subarachnoid haemorrhage

QUESTION 20

An 80 year old right handed lady had a past medical history of end-stage renal failure secondary to diabetes and renovascular disease, ischaemic heart disease, hypertension, hypercholesterolaemia, and ischaemic stroke two years previously. She was admitted on the general medical take at her local DGH after several witnessed generalised tonic-clonic seizures in rapid succession. On arrival in A/E she had a GCS of 3/15, which quickly improved following termination of the seizures, but she remained 'confused', without focal signs. Her pulse was regular and her blood pressure, which had always been difficult to manage, was 227/96 mmHg.

Investigations included:

Na<sup>+</sup> 141 mmol/l; K<sup>+</sup> 3.9 mmol/l; Urea 17.5 mmol/l; creatinine 501 ? mol/l; Hb13.5 g/dl; platelets 230 x10<sup>9</sup>/l; WCC 8.1 x10<sup>9</sup>/l.

She had an urgent CT brain scan (unenhanced). Two representative sections are shown below.

Fig1:

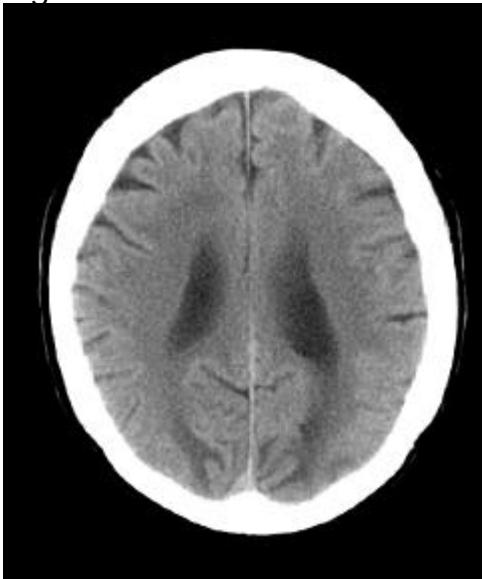
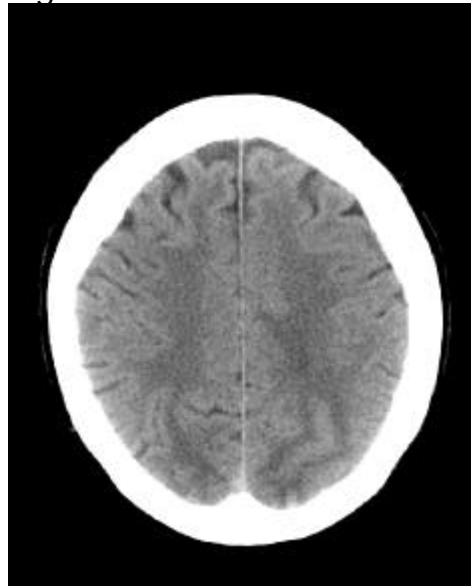


Fig2:



Which of the following tests would be most helpful diagnostically?

- A. Carotid doppler ultrasound
- B. CSF examination
- C. T2-weighted MR imaging
- D. Echocardiogram
- E. MR DWI (diffusion weighted imaging)