Exam Date 25-08-22

पुस्तिका में पृष्ठों की संख्या–**32**
No. of Pages in Booklet **-32**
पुस्तिका में प्रश्नों की संख्या–**180**
No. of Questions in Booklet **-180**

SSAP-22

Paper Code : **05**

SUBJECT : **Neurology**
(Super Speciality)

30/8/22

प्रश्न पुस्तिका संख्या / Question Booklet No. **1000549**

समयः **3.00** घण्टे
Time: **3.00** Hours

अधिकतम अंकः **180**
Maximum Marks: **180**

प्रश्न–पत्र पुस्तिका के पेपर सील/ पॉलिथिन बैग को खोलने पर परीक्षार्थी यह सुनिश्चित कर लें कि प्रश्न पुस्तिका संख्या तथा ओ.एम.आर. उत्तर–पत्रक पर अंकित बारकोड समान हैं। इसमें कोई भिन्नता हो तो परीक्षार्थी वीक्षक से दूसरा प्रश्न–पत्र प्राप्त कर लें। ऐसा सुनिश्चित करने की जिम्मेदारी अभ्यर्थी की होगी।

On opening the paper seal/ polythene bag of the Question Booklet the candidate should ensure that Question Booklet Number and Barcode of OMR Answer Sheet must be same. If there is any difference, candidate must obtain another Question Booklet from Invigilator. Candidate himself shall be responsible for ensuring this.

परीक्षार्थियों के लिए निर्देश

1. सभी प्रश्नों के उत्तर दीजिए।
2. सभी प्रश्नों के अंक समान हैं।
3. प्रत्येक प्रश्न का केवल एक ही उत्तर दीजिए।
4. एक से अधिक उत्तर देने की दशा में प्रश्न के उत्तर को गलत माना जाएगा।
5. प्रत्येक प्रश्न के चार वैकल्पिक उत्तर दिये गये हैं, जिन्हें क्रमशः **1, 2, 3, 4** अंकित किया गया है। अभ्यर्थी को सही उत्तर निर्दिष्ट करते हुए उनमें से केवल एक गोले अथवा बबल को उत्तर–पत्रक पर **नीले बॉल प्वॉइंट पेन** से गहरा करना है।
6. **OMR** उत्तर–पत्रक इस परीक्षा पुस्तिका के अन्दर रखा है। जब आपको परीक्षा पुस्तिका खोलने को कहा जाए, तो उत्तर–पत्रक निकाल कर ध्यान से केवल **नीले बॉल प्वॉइंट पेन** से विवरण भरें।
7. **प्रत्येक गलत उत्तर के लिए प्रश्न अंक का 1/3 भाग काटा जायेगा।** गलत उत्तर से तात्पर्य अशुद्ध उत्तर अथवा किसी भी प्रश्न के एक से अधिक उत्तर से है। किसी भी प्रश्न से संबंधित गोले या बबल को खाली छोड़ना गलत उत्तर नहीं माना जायेगा।
8. मोबाइल फोन अथवा इलेक्ट्रॉनिक यंत्र का परीक्षा हॉल में प्रयोग पूर्णतया वर्जित हैं। यदि किसी अभ्यर्थी के पास ऐसी कोई वर्जित सामग्री मिलती है, तो उसके विरुद्ध आयोग द्वारा नियमानुसार कार्यवाही की जायेगी।
9. कृपया अपना रोल नम्बर ओ.एम.आर. पत्रक पर सावधानी पूर्वक सही भरें। गलत अथवा अपूर्ण रोल नम्बर भरने पर **5 अंक** कुल प्राप्तांकों में से काटे जा सकते हैं।
10. यदि किसी प्रश्न में किसी प्रकार की कोई मुद्रण या तथ्यात्मक प्रकार की त्रुटि हो, तो प्रश्न के हिन्दी तथा अंग्रेज़ी रूपान्तरों में से अंग्रेज़ी रूपान्तर मान्य होगा।

चेतावनी : अगर कोई अभ्यर्थी नकल करते पकड़ा जाता है या उसके पास से कोई अनधिकृत सामग्री पाई जाती है, तो उस अभ्यर्थी के विरुद्ध पुलिस में प्राथमिकी दर्ज कराते हुए विविध नियमों–प्रावधानों के तहत कार्यवाही की जाएगी। साथ ही विभाग ऐसे अभ्यर्थी को भविष्य में होने वाली विभाग की समस्त परीक्षाओं से विवर्जित कर सकता है।

INSTRUCTIONS FOR CANDIDATES

1. Answer all questions.
2. All questions carry equal marks.
3. Only one answer is to be given for each question.
4. If more than one answers are marked, it would be treated as wrong answer.
5. Each question has four alternative responses marked serially as **1, 2, 3, 4**. You have to darken only one circle or bubble indicating the correct answer on the Answer Sheet using **BLUE BALL POINT PEN.**
6. The **OMR** Answer Sheet is inside this Test Booklet. When you are directed to open the Test Booklet, take out the Answer Sheet and fill in the particulars carefully with **blue ball point pen** only.
7. **1/3 part of the mark(s) of each question will be deducted for each wrong answer.** A wrong answer means an incorrect answer or more than one answers for any question. Leaving all the relevant circles or bubbles of any question blank will not be considered as wrong answer.
8. Mobile Phone or any other electronic gadget in the examination hall is strictly prohibited. A candidate found with any of such objectionable material with him/her will be strictly dealt as per rules.
9. Please correctly fill your Roll Number in O.M.R. Sheet. **5 Marks** can be deducted for filling wrong or incomplete Roll Number.
10. If there is any sort of ambiguity/mistake either of printing or factual nature, then out of Hindi and English Version of the question, the English Version will be treated as standard.

Warning : If a candidate is found copying or if any unauthorized material is found in his/her possession, F.I.R. would be lodged against him/her in the Police Station and he/she would liable to be prosecuted. Department may also debar him/her permanently from all future examinations.

इस परीक्षा पुस्तिका को तब तक न खोलें जब तक कहा न जाए।
Do not open this Test Booklet until you are asked to do so.

1. Using Positron Emission Tomography (PET) scanning, activation of which of the following brain areas is seen more commonly in patients with nausea as a prominent part of their migraine, suggesting its role in the pathophysiology of this symptom?
   (1) Anterior thalamus
   (2) Dorsal medulla
   (3) Locus coeruleus
   (4) Prefrontal cortex
2. Which is the most prevalent bloodborne inflammatory cell type within infarcted tissue at 1 hour post stroke?
   (1) Neutrophils
   (2) Macroglia
   (3) Lymphocytes
   (4) Eosinophils
3. A 28–year–old woman with Polymerase Chain Reaction (PCR) – established Herpes Simplex Virus (HSV) encephalitis was slowly improving but then experienced a return of her previous confusion and somnolence, as well as worsening of focal seizures. Which of the following tests would be most likely to uncover the cause of her relapse?
   (1) Metagenomic next-generation sequencing of CSF
   (2) HSV PCR
   (3) Anti – N – methyl – D – aspartate (NMDA) receptor antibody testing
   (4) Anti – myelin oligodendrocyte glycoprotein antibody testing
4. Which of the following is the most common cause of polyneuropathy in patients with multiple myeloma?
   (1) Autoantibodies
   (2) Chemotherapy
   (3) Diffuse compression of peripheral nerves
   (4) Diffuse infiltration of peripheral nerves
5. Which of the following pediatric brain tumor would be most likely to arise in the pineal region?
   (1) Craniopharyngioma
   (2) Diffuse midline glioma
   (3) Germ cell tumor
   (4) Medulloblastoma
6. A patient suspected to be dead by neurologic criteria undergoes an apnea test. Before the ventilator is disconnected, the patient is Normothermic, with a $PaCO_2$ of 40 mm Hg, a PaO_2 of 210 mm Hg, and a systolic blood pressure of 120 mm Hg. In which of the following scenarios would the test be appropriately interpreted as confirming apnea?
   (1) No respiratory movements except agonal gasps after 2 minutes
   (2) No respiratory movements except agonal gasps after 8 minutes
   (3) No respiratory movements of any kind with a $PaCO_2$ of 65 mm Hg
   (4) No respiratory movements of any kind with a $PaCO_2$ of 55 mm Hg

7. "Eye of tiger sign" is found in -
   (1) Huntington's disease
   (2) Wilson's disease
   (3) Dopa responsive dystonia
   (4) NBIA

8. Recent clinical trials of endovascular therapy in patients with acute ischemic stroke and perfusion mismatch treated 6 to 24 hours after symptom onset demonstrated an increased likelihood of which of the following outcomes as compared with medical management?
   (1) Death
   (2) Functional independence
   (3) Intracerebral hemorrhage
   (4) Ischemic lesion growth

9. A 27–year–old woman presents with complaints of difficulty falling asleep. Each night she develops cramps in her legs, forcing her to stand up and walk around to relieve the pain. Her husband complains that she kicks him during the middle of the night. She has no significant past health problems except for heavy menstrual cycles. Recent complete blood count, basic metabolic panel and liver function tests were normal. Which of the following would be the best course of action?
   (1) Serum ferritin level
   (2) Polysomnogram
   (3) Trial of ropinirole
   (4) Nerve conduction study

10. Which of the following is the most accurate description of left – beat jerk nystagmus?
   (1) Rapid leftward eye movement away from the desired position followed by slow drift of the eyes back toward the desired position.
   (2) Rapid rightward eye movement away from the desired position followed by slow drift of the eyes back toward the desired position.
   (3) Slow leftward eye movement away from the desired position followed by further to-and-fro slow movements.
   (4) Show rightward eye movement away from the desired position followed by rapid movement of the eyes back toward the desired position.

11. Which of the following conditions may result in overestimation of the penumbra on CT perfusion in a patient with acute middle cerebral artery syndrome?
   (1) Chronic ipsilateral frontal cerebral infarct
   (2) Hyperthyroidism
   (3) Ipsilateral cervical internal carotid artery stenosis
   (4) Portal hypertension

12. Which of the following medications is FDA approved for the treatment of irritability and aggression in children with autism spectrum disorder?
   (1) Fluoxetine
   (2) Melatonin
   (3) Clonidine
   (4) Aripiprazole

13. In a study, subjects were assigned according to the potential factor that will influence the outcome of the study. What is the type of sampling known as?
    (1) Stratified
    (2) Systemic
    (3) Simple
    (4) Cluster
14. What is the therapeutic action for onasemnogene abeparvovec–xioi for the treatment of spinal muscular atrophy?
    (1) Deletion of SMN2 exon 7
    (2) Enhancement of SMN protein production
    (3) Gene replacement of SMN1
    (4) Improved transcription of SMN1 gene
15. Which of the following represents a potential factor associated with myasthenia gravis that is more refractory to the commonly used immunomodulating therapy for this disorder?
    (1) Presence of anti – muscle specific kinase antibodies
    (2) Male sex
    (3) Absence of thymoma on chest CT
    (4) Older age at time of diagnosis
16. A 30–year–old man comes to the emergency department because of headache, nausea, confusion and visual loss for 16 hours after the accidental ingestion of methyl alcohol. On examination he is severely agitated with diminished vision and poorly reactive pupils bilaterally. Brain MRI is most likely to show abnormalities in which of the following regions?
    (1) Cerebellum
    (2) Inferior olives
    (3) Occipital poles
    (4) Putamen
17. A 50–year–old man undergoes coronary artery stenting performed through a femoral artery puncture. After the procedure, he becomes hypotensive and requires admission to the ICU. His haematocrit drops and he needs blood transfusion. He later notices pain with hip flexion and numbness in the anterior and medial thigh. He also has difficulty flexing the hip and extending the knee and his patellar reflex is absent. Three weeks later, NCS show a reduced saphenous nerve SNAP. On needle EMG, fibrillation potentials are seen in the iliacus and quadriceps muscles. Thigh adductors and muscles below the knee show no abnormalities. Which of the following is correct?
    (1) This is consistent with a femoral nerve injury at the inguinal region.
    (2) This is consistent with a femoral nerve injury in the intrapelvic region.
    (3) This patient has a lumbar plexopathy.
    (4) This patient has an obturator nerve injury.
18. Women with obstructive sleep apnea are more likely to present with which of the following symptoms compared with men with a similar severity of disease?
    (1) Apnea
    (2) Delirium
    (3) Gasping
    (4) Insomnia

19. A 5–month–old infant is brought to the neurologist because of failure to thrive and seizures. Additionally, he is delayed in reaching motor milestones. On examination, the child has hypotonia and is unable to hold up his head. Also, his skin is light, and his hair seems fragile and colorless. Which of the following is not true regarding Menkes syndrome?

(1) Some symptoms may be mistaken for non-accidental trauma.
(2) Diagnosis usually involves low serum copper and elevated ceruloplasmin.
(3) The inheritance is X-linked recessive.
(4) Osteoporosis is common.

20. In a patient with miosis and mild ptosis on the left, the presence of left facial anhidrosis indicates damage to which of the following portions of the sympathetic pathway?

(1) Anywhere distal to the carotid bifurcation
(2) Anywhere distal to the cavernous sinus
(3) Anywhere in the entire pathway
(4) Anywhere proximal to the carotid bifurcation

21. Tonic spasms associated with multiple sclerosis respond well to medications with what mechanism of action?

(1) Activation of opioid Mu receptor
(2) Facilitation of noradrenaline mediated descending inhibition
(3) Interference with calcium channel function
(4) Sodium channel blockade

22. A 48-year-old woman presents with a 5-week history of emesis, dehydration, constipation, urinary retention, weight loss, dry eyes and fatigue. Examination reveals orthostatic hypotension. Pupillometry reveals premature pupillary re-dilation and the Quantitative Sudomotor Axon Reflex Test (QSART) results are reduced at all sites. Which of the following diagnoses is most likely in this patient?

(1) Autoimmune autonomic ganglionopathy
(2) Lambert–Eaton myasthenic syndrome
(3) Multiple system atrophy
(4) Peripheral autonomic neuropathy

23. Which of the following symptoms is more prominent in Lambert-Eaton myasthenic syndrome than in myasthenia gravis?

(1) Diplopia
(2) Dry Mouth
(3) Dyspnea
(4) Dysarthria

24. A 59–year–old man is admitted to the intensive care unit with a subarachnoid haemorrhage from a ruptured anterior communicating artery aneurysm. As a part of his screening for the development of vasospasm, transcranial Doppler velocities in the middle cerebral arteries should be compared to velocities in which of the following vessels?

(1) Basilar artery

(2) Contralateral middle cerebral artery

(3) Contralateral vertebral artery, v4 segment

(4) Ipsilateral internal carotid artery, extracranial segment

25. A 55–year–old woman presents with gradually progressive stiffness and rigidity that started in the axial muscles later progressing to the extremities. There is concern for the possibility of Stiff - person syndrome. Which of the following is the most commonly found antibody in Stiff-person paraneoplastic syndrome?

(1) Anti-GAD antibody

(2) Anti-Amphiphysin

(3) Anti-Ri

(4) Anti-Gephyrin

26. Surgical excision is most clearly indicated for patients with neurocysticercosis having a solitary cyst in which of the following locations?

(1) Subarachnoid space at the cerebral convexity

(2) Cervical nerve root entry zone

(3) Head of caudate

(4) Cerebral aqueduct

27. Which of the following is correct regarding sialidosis?

(1) Sialidosis type I has infantile onset

(2) Sialidosis type II has adult onset

(3) A cherry-red spot is not seen in sialidosis type I

(4) Patients with this disorder often have myoclonic epilepsy

28. A 67–year–old man with a 3–year history of Parkinson disease has had increasingly distressing problems with visual and auditory hallucinations and very severe and disturbing delusions. Which of the following medications is US Food and Drug Administration (FDA) approved for treatment of these symptoms in Parkinson disease?

(1) Clozapine

(2) Lurasidone

(3) Pimavanserin

(4) Quetiapine

29. A 27–year–old female who is currently 8 weeks pregnant presents with a severe headache. The headache is located over the right side of her head with a severe, throbbing pain associated with nausea, photophobia and phonophobia. Her neurological examination is normal. She has an urgent magnetic resonance imaging of the brain that is also normal. Which of the following would be a reasonable first – line agent to treat her headache?
(1) Sumatriptan
(2) Oral morphine
(3) Ergotamine
(4) Acetaminophen

30. Cerebral deposition of which of the following proteins would be the most prevalent finding in the autopsy of an elderly man who had symptoms of REM sleep behaviour disorder, visual hallucinations, mental status fluctuations, cognitive decline, slowness and tremor before his death?
(1) TDP 43
(2) Alpha Synuclein
(3) Tau
(4) Beta Amyloid

31. Substance P is a peptide neurotransmitter involved in which of the following?
(1) Muscle contraction
(2) Circadian rhythm
(3) Pain perception
(4) Sweat production

32. Central activation through which of the following brainstem nuclei is believed to be a key generator of cluster headache attacks?
(1) Main trigeminal nucleus
(2) Solitary nucleus
(3) Spinal trigeminal nucleus
(4) Superior salivatory nucleus

33. Which of the following is the most common neurologic manifestation of dengue infection?
(1) Brachial plexopathy
(2) Encephalopathy
(3) Facial nerve palsy
(4) Ischemic stroke

34. A 27–year–old woman presents with sub-acute paraparesis over the past 2 days. She first noted decreased sensation in her toes, which ascended up her legs, then difficulty with urinary continence, and finally an inability to walk due to weakness. She has never had any similar episodes of weakness or numbness before, although last year she had a 2-week episode of severe vision loss and pain in her right eye that resolved without treatment. Which of the following is the best test to diagnose her underlying condition?
(1) Anti–GQ1b antibody
(2) Pathergy test
(3) Anti–aquaporin–4 antibody
(4) Anti–HTLV–1 antibody

35. Which of the following clinical manifestations is typically a prominent feature of childhood – onset leukodystrophies but is often absent in the adolescent and adult – onset forms of these disorders?
(1) Corticobulbar tract involvement
(2) Demyelinating peripheral neuropathy
(3) Paraparesis
(4) Quadriparesis

36. A US Food and Drug Administration (FDA) – approved antisense oligonucleotide is available for which of the following hereditary conditions?
(1) Cerebrotendinous xanthomatosis
(2) Fabry disease
(3) Transthyretin amyloidosis
(4) Tangier disease

37. A 21–year–old man presented with progressive gait disorder. He had history of bilateral cataracts, cognitive decline and personality changes. Examination revealed dysmetria, broad based gait and evidence of neuropathy. Bilateral masses were noted in the Achilles tendons. Which of the following tests would be most helpful in making a diagnosis in this patient?
(1) Thyroid – stimulating hormone
(2) Analysis of CAG repeat number on chromosome 14
(3) Serum cholestanol levels
(4) Serum cholesterol levels

38. In patients with fewer than three brain metastases, the use of stereotactic radiosurgery alone (rather than stereotactic radiosurgery plus whole – brain radiation therapy) is associated with which of the following outcomes at 3 months after treatment?
(1) Decreased survival
(2) Higher rates of fatigue
(3) Higher risk of needing repeat surgical resection
(4) Lower rates of cognitive deterioration

39. Which of the following statements is correct regarding disorders of corpus callosum development?
(1) They result from abnormalities in the third trimester of pregnancy.
(2) Complete agenesis of the corpus callosum is more common than partial agenesis.
(3) They result from abnormalities in the commissural plate.
(4) Corpus callosum agenesis is rarely seen in isolation.

40. A 14–year–old boy is brought for evaluation of growth retardation, generalized weakness and ataxia. On examination, he has bilateral ptosis and restricted gaze in all directions. An electrocardiogram is obtained and shows complete heart block. Which of the following is the most likely diagnosis?
(1) Kearns–Sayre syndrome
(2) Mitochondrial encephalopathy, lactic acidosis and strokes
(3) Myoclonic epilepsy with ragged red fibers
(4) Leigh's syndrome

41. Body's center of gravity is located -
(1) Anterior to S1 vertebral body
(2) Posterior to S1 vertebral body
(3) Anterior to S2 vertebral body
(4) Posterior to S2 vertebral body

42. A 48–year–old man with a 25–year history of migraine attacks that were well managed with sumatriptan is being switched to lasmiditan after having a recent myocardial infarction. Specific counselling should be given to avoid which activity for 8 hours after taking this medication?
(1) Driving
(2) Eating
(3) Exercising
(4) Fasting

43. Match the following -

(i)	Unpaired Anterior cerebral artery	(a)	Weakness in bilateral lower limb
(ii)	Branch of Posterior cerebral artery	(b)	Broca's aphasia
(iii)	Branch of Middle cerebral artery	(c)	Cortical blindness
(iv)	Posterior inferior cerebellar artery	(d)	Wallenberg's syndrome

(1) (i)-a, (ii)-b, (iii)-c, (iv)-d
(2) (i)-a, (ii)-c, (iii)-b, (iv)-d
(3) (i)-d, (ii)-b, (iii)-c, (iv)-a
(4) (i)-d, (ii)-c, (iii)-b, (iv)-a

44. In regard to brain stimulation methods for treatment of depression, which of the following is correct?
(1) Electroconvulsive therapy is contraindicated in suicidal or psychotic patients.
(2) Vagus nerve stimulation involves application of direct electrical current to the scalp.
(3) Transcranial magnetic stimulation increases risk of seizures only in those with a history of epilepsy.
(4) Transcranial magnetic stimulation, when applied to the left dorsolateral prefrontal cortex, has antidepressant effects.

45. A 54–year–old man is seen in clinic for recurrent episodes of transient head pain. He describes stereotyped episodes of fairly intense pain over his right forehead that occur roughly 20 to 30 times per day and last for only several seconds. He does not report any autonomic symptoms, conjunctival tearing or injection, or sensory changes in his face. Examination is normal when seen in the office; cutaneous stimulation over the forehead and at the supraorbital notch did not elicit his usual pain. Which of the following is the most likely diagnosis?
(1) Carotid–cavernous fistula
(2) Cluster headache
(3) Primary stabbing headache
(4) Short–lasting unilateral neuralgiform headache with conjunctival tearing and injection (SUNCT)

46. Dopamine beta hydroxylase converts dopamine to which of the following?
    (1) L-Dopa
    (2) Tyrosine
    (3) Serotonin
    (4) Norepinephrine

47. Normal two – point discrimination values for fingertip is -
    (1) 1 mm
    (2) 2 to 4 mm
    (3) 8 to 12 mm
    (4) 30 to 40 mm

48. Which of the following is most consistent with urinary dysfunction related to a conus medullaris lesion?
    (1) Normal flow
    (2) Detrusor-sphincter dyssynergia
    (3) Urinary frequency
    (4) Large post-void residual

49. A patient of Rheumatic heart disease – severe mitral stenosis with atrial fibrillation develop ischemic stroke, physician should prescribe him?
    (1) Dabigatran and factor X assay for monitoring
    (2) Warfarin and PT INR test for monitoring
    (3) Aspirin with Clopidogrel
    (4) Atorvastatin High Dose (40 mg)

50. A 53–year–old man is seen in clinic for new–onset right wrist–drop starting 1 week ago. Two weeks before this, he also developed a left–sided foot drop that has persisted since then. Examination is notable for weakness of right wrist and finger extension and sensory loss in the dorsolateral aspect of the right hand, along with left ankle dorsiflexion and eversion and weakness and sensory loss in the left dorsal foot and lateral calf. Which of the following rheumatologic diagnoses is most likely to cause this presentation?
    (1) Polyarteritis nodosa
    (2) Rheumatoid arthritis
    (3) Behcet syndrome
    (4) Sjögren syndrome

51. Which of the following statement is not true?
    (1) Type 2 chiari malformation is associated with lumbar meningomyelocele.
    (2) Type 3 chiari malformation is associated with meningomyelocele or encephalocele in the occipitocervical region.
    (3) Dandy – walker Syndrome is associated with cerebellar agenesis and small fourth ventricle.
    (4) Klippel – feil Syndrome is the congenital fusion of two or more cervical vertebrae.

52. A defect in production of which of the following underlies the pathophysiology of the neurologic findings in vitamin B12 deficiency?
(1) Threonine
(2) Serotonin
(3) Homocysteine
(4) Methionine

53. All of the following are true about Electroencephalogram (EEG) recording, except -
(1) Vertically oriented dipoles are the main recordable dipoles with scalp electrodes.
(2) Superficial excitatory postsynaptic potential will lead to scalp negativity.
(3) Deep inhibitory postsynaptic potential will lead to scalp positivity.
(4) A single electrode detects electrical activity from 6 cm^2 of underlying cortex.

54. Studies in animal models, together with preliminary human trials, suggest that stroke recovery may be enhanced by inhibiting C-C chemokine receptor 5 (CCR5), which is directly involved in which of the following?
(1) Macrophage degranulation
(2) Programmed cell death
(3) Reactive astrocytosis
(4) Recruitment of leukocytes to sites of tissue damage

55. Three days after a subarachnoid haemorrhage, a patient begins to develop neck stiffness and photophobia. This is followed by left-sided weakness and hyperreflexia. Her left plantar response is upgoing. Her physician presumes that these deficits are a delayed effect of the subarachnoid blood. Which of the following is the most appropriate treatment?
(1) Heparin
(2) Warfarin
(3) Nimodipine
(4) Carbamazepine

56. Which of the following imaging characteristics would be most consistent with delayed radiation necrosis as opposed to tumor progression in patients with glioblastoma?
(1) Enhancement with gadolinium
(2) Lesion development adjacent to the initial tumor site
(3) Lower cerebral blood volume levels on perfusion MRI
(4) Presence of hemorrhage

57. In medical emergency, Non-Contrast CT brain in acute stroke patients is done (Specially if patient reach in less than 4 hours of stroke onset) -
(1) to confirm acute stroke
(2) to rule out haemorrhagic stroke
(3) to confirm ischemic stroke
(4) to rule out ischemic stroke

58. Idiopathic intracranial hypertension may commonly cause which of the following secondary symptoms?
   (1) Conductive hearing loss
   (2) Sensorineural hearing loss
   (3) Pulsatile tinnitus
   (4) Persistent tinnitus

59. Which portion of the circuit of Papez is injured in Korsakoff syndrome?
   (1) Hippocampus
   (2) Anterior thalamic nucleus
   (3) Entorhinal cortex
   (4) Mammillary bodies

60. A 56–year–old man with diffuse weakness and fasciculations, prominent facial twitching and gynecomastia should be tested for mutations in the gene for which of the following?
   (1) Androgen receptor
   (2) Insulin like growth factor –1 (IGF-l)
   (3) Progranulin
   (4) Survival of motor neuron 1, telomeric (SMN1)

61. Metformin can cause reduced absorption of which of the following nutrients?
   (1) Copper
   (2) Vitamin B1 (thiamine)
   (3) Vitamin B6 (pyridoxine)
   (4) Vitamin B12 (cobalamin)

62. A 12–year–old girl with Neuromyelitis Optica (NMO) has a dense central scotoma in her right eye as well as a superior temporal visual field defect in her left eye. A lesion at which of the following chiasmal locations would produce these findings?
   (1) Left anterior
   (2) Left lateral
   (3) Left posterior
   (4) Right anterior

63. All of the following are risk factors for the development of thiamine deficiency, except -
   (1) Hyperemesis gravidarum
   (2) Chronic alcoholism
   (3) Treatment of Tuberculosis
   (4) Hemodialysis

64. Which is the example of irritative type symptom in Neurological illnesses?
   (1) Loss of consciousness
   (2) Seizure
   (3) Numbness
   (4) Paresthesia

65. Which of the following neurologic complications is most frequently detected after resective epilepsy surgery of the mesial temporal lobe?
(1) Intermittent nystagmus and vertigo
(2) Mild unilateral limb weakness
(3) Mild visual agnosia
(4) Minor visual field deficits

66. A neurologist is invited to speak to a patient support group for Parkinson disease. She is asked to comment on the utility of exercise for Parkinson disease and any new research in that area. Which of the following is recommended for gait improvement is current exercise programs for patients with Parkinson disease?
(1) Balance platforms
(2) Chair exercises
(3) Treadmill training
(4) Use of standard walkers

67. A 65 –year–old man with an 80–pack–year smoking history complains of recurrent horizontal diplopia, which worsens in the evenings or after reading for prolonged periods. On examination, he has full strength throughout, although he loses power in his shoulder abductors with repeated testing. Which of the following describes the most likely cause of his neuro-ophthalmological complaint?
(1) Acetylcholine receptor – directed antibodies
(2) Calcium channel – directed antibodies
(3) Thyroid–stimulating hormone receptor – directed antibodies
(4) Aquaporin–4 – directed antibodies

68. What is Dixon's Q test used for?
(1) Outliers
(2) Interquartile range
(3) Difference of populations
(4) Medians

69. A 73–year–old female with recent myocardial infarction presents with progressive weakness in her arms and legs. She finds it difficult to brush her hair because her arms become fatigued and she has tea-colored urine. Her examination shows mild proximal weakness in the deltoids and hip flexors bilaterally. Creatine kinase is 7500 U/L (normal is <250 U/L). Which of the following is the most likely diagnosis?
(1) Statin myopathy
(2) Myasthenia gravis
(3) Immune–mediated necrotizing myopathy
(4) Amyotrophic lateral sclerosis

70. A 44–year–old postal worker is admitted to the hospital because of 2 days of chest pain and cough and 1 day of headache, fever and neck stiffness. Chest x – ray shows signs suggestive of inhalational anthrax. Which of the following findings on CSF analysis of this patient would be most suggestive of the possibility of meningitis due to anthrax rather than other forms of bacterial meningitis?
(1) Elevated protein
(2) Hypoglycorrhachia
(3) Increased red blood cell count
(4) Lymphocytic pleocytosis

71. A 43–year–old woman from South East Asia comes to the clinic. She has multiple hypopigmented skin lesions with sensory loss to pinprick and temperature. You notice that she also has claw-hand deformities and bilateral foot drop, and her ulnar and common peroneal nerves are enlarged on palpation. A sural nerve biopsy shows granulomas and acid-fast bacilli. Which of the following is the most likely cause of the neuropathy in this patient?
   (1) Lyme disease
   (2) Hansen disease (leprosy)
   (3) Tuberculosis
   (4) Parasitic infection

72. A 48–year–old man presented for evaluation of insomnia. He reported progressively worsening insomnia over the prior 4 months and that he was only able to sleep a few hours per night. Over the previous 1 to 2 months, he had developed progressively worsening excessive sweating and rapid heart rate. He had no cognitive symptoms on initial presentation and brain MRI was normal. His mother died in her 50s from a similar disorder. Over the ensuing year, he develops significant cognitive impairment and dies after 2 years from complications of dementia. Which of the following is the most likely diagnosis?
   (1) African sleeping sickness
   (2) Fatal familial insomnia
   (3) Gerstmann–Sträussler–Scheinker syndrome
   (4) Kuru

73. In comparing genetic prion disease with sporadic prion disease, which of the following is not true of genetic prion disease?
   (1) Younger age of onset
   (2) Initial parkinsonism or ataxia
   (3) Slower disease course
   (4) Severe personality changes early on

74. An injury to the prefrontal cortex would be most likely to affect which type of memory?
   (1) Working memory
   (2) Episodic memory
   (3) Semantic memory
   (4) Procedural memory

75. Which of the following MRI characteristics is the best predictor of future disability in patients with multiple sclerosis?
   (1) Baseline enhancing lesion number
   (2) Baseline t2 lesion number
   (3) Baseline t2 lesion volume
   (4) Number of new t2 lesions

76. Which of the following is the approximate rate of Cerebrospinal Fluid (CSF) production in an adult?
   (1) 20 mL/hr
   (2) 50 mL/hr
   (3) 2 mL/hr
   (4) 100 mL/hr

77. A 43-year-old man is brought to the emergency department after sustaining injuries from a motorcycle accident. His Glasgow Coma Scale score is 7 (eyes 2, verbal 2, motor 3). No cervical spine injury is noted on imaging, although head CT shows some cerebral contusions and associated edema in the bilateral frontal lobes. Which of the following best describes the role of corticosteroid treatment in this patient?

(1) Corticosteroids could be given if his Glasgow Coma Scale score improves to 8 or higher

(2) Corticosteroids improve mortality but do not change the probability of disability

(3) Corticosteroids should be avoided because of the presence of hemorrhage

(4) No evidence supports corticosteroid treatment in this scenario

78. Which of the following statements is most accurate regarding fetal exposure to radiation during a non-contrast head CT scan of the pregnant mother?

(1) It is equivalent to the dose scattered throughout the mother's body.

(2) It is offset by use of a lead shield.

(3) It may be up to 10 times higher than radiation from the environment.

(4) The greatest risk is after week 20.

79. While studying a spinal cord section, a pathology resident noted that the nuclei of the Schwann cells of the dorsal root ganglia were enlarged nearly 5 times the normal size. This finding is seen in which of the following condition?

(1) Machado-Joseph disease

(2) Friedreich's ataxia

(3) Ataxia-telangiectasia

(4) Amyotrophic lateral sclerosis

80. In addition to acute ischemia, which of the following pathologic processes may be characterized by restricted diffusion on diffusion–weighted imaging?

(1) Chronic demyelination

(2) Chronic ischemia

(3) Encephalomalacia

(4) Primary CNS lymphoma

81. Normal flexion response to plantar stimulation appears at the age of -

(1) 0 to 3 months

(2) 3 to 9 months

(3) 9 to 12 months

(4) 12 to 18 months

82. Which of the following syphilitic manifestations can commonly be seen in early infection?

(1) Meningovascular disease

(2) Tabes dorsalis

(3) General paresis

(4) Syphilitic amyotrophy

83. Which of the following is first–line therapy for epilepsy associated with Glucose Transporter Type 1 (GLUT1) deficiency?
    (1) Functional hemispherotomy
    (2) Ketogenic diet
    (3) Phenobarbital
    (4) Valproic acid

84. Which of the following factors favors surgical clipping over endovascular coiling in the treatment of an unsecured aneurysm after subarachnoid hemorrhage?
    (1) Middle cerebral artery location of aneurysm
    (2) Multiple medical comorbidities
    (3) Older age of the patient
    (4) Poor clinical grade

85. Which test may be indicated early in the disease course for patients with progressive supranuclear palsy?
    (1) CT angiography
    (2) ECG
    (3) Echocardiogram
    (4) Video fluoroscopic swallowing examination

86. Which of the following medications predisposes to development of non-arteritic anterior ischemic optic neuropathy?
    (1) Aspirin
    (2) Levodopa
    (3) Phenytoin
    (4) Sildenafil

87. Which of the following fungal infections is the most likely to be associated with cerebral vasculitis, infarction, aneurysm and hemorrhages?
    (1) Aspergillosis
    (2) Blastomycosis
    (3) Coccidioidomycosis
    (4) Cryptococcosis

88. Which disease is associated with multinucleated globoid cells on brain biopsy?
    (1) Niemann-Pick disease
    (2) Canavan disease
    (3) Krabbe disease
    (4) Fabry disease

89. Which of the following devices may improve gait safety in patients with Parkinson disease?
    (1) Knee Walker
    (2) Lasercane
    (3) Non-wheeled walker
    (4) Quad Cane

90. Cold–induced hyperalgesia can be a manifestation of toxicity from which of the following medications?

(1) Amiodarone

(2) Bortezomib

(3) Colchicine

(4) Oxaliplatin

91. A 7–year–old boy is referred to epilepsy clinic with focal non motor seizures with loss of awareness that persist despite therapy with levetiracetam and oxcarbazepine. His EEG reveals left temporal interictal epileptiform transients. His growth and development have been typical and his neurologic examination is unremarkable. An MRI is obtained, which reveals a lateral temporal cortically based mass with multiple cysts and nodules without enhancement, mass effect or surrounding edema. Which of the following tumours is most likely to be found on resection?

(1) Dysembryoplastic neuroepithelial tumor (DNET)

(2) Gangliocytoma

(3) Ganglioglioma

(4) Meningioma

92. Which of the following cerebellar nuclei is most directly involved with planning and initiation of voluntary movements?

(1) Dentate nucleus

(2) Fastigial nucleus

(3) Globose nucleus

(4) Emboliform nucleus

93. Which of the following clinical features of normal pressure hydrocephalus should be present for consideration of intervention with shunt surgery?

(1) Gait abnormality

(2) Impaired executive functions

(3) Incontinence

(4) Psychomotor slowing

94. Which of the following symptoms is suggestive of opioid-induced hyperalgesia in the setting of increased pain despite treatment with escalating opioid doses?

(1) Acral paresthesia

(2) Diffuse allodynia

(3) Hyperhidrosis

(4) Migratory erythema

95. A 71–year–old woman with known metastatic breast cancer is seen in the emergency department with the acute onset of back pain and leg weakness. She has had some mild progressive back pain for about 1 week, although this acutely worsened earlier in the day, at which point she also noted weakness in both legs. Her examination is notable for 3/5 power in both legs, bilateral ankle clonus, bilateral extensor plantar responses, and a sensory level at T8. Which of the following is the best next step in management?

(1) Administration of high – dose dexamethasone

(2) CT myelogram

(3) IV heparin administration

(4) Lumbar puncture for cytology

96. Which drug can cause Parkinsonism?

(1) Flunarizine

(2) Sildenafil

(3) Ropinirole

(4) Atenolol

97. Which of the following describes a patient with intact vision who is unable to perceive more than one object at a time?

(1) Prosopagnosia

(2) Visual agnosia

(3) Simultagnosia

(4) Amusia

98. Hypokalemic periodic paralysis is an example of -

(1) Motor neuron disease

(2) Muscle disease

(3) Neuromuscular junction disorder

(4) Peripheral nerve disease

99. The gamma aminobutyric acid B ($GABA_B$) receptor is which of the following?

(1) A voltage – gated sodium channel

(2) A ligand – gated chloride channel

(3) A metabotropic receptor

(4) A ligand – gated sodium channel

100. A 22–year–old woman delivers a healthy baby. A few hours after delivery, the woman complains of a severe headache. Shortly afterward, she becomes sleepy but is still arousable to minor stimuli. Her blood pressure is not elevated. Urine protein level is not elevated. She develops right arm and leg paresthesia. MRI of the brain does not show any abnormalities; MRA shows multifocal stenosis involving bilateral MCAs, PCAs and left ACA. What is the most likely diagnosis in this patient?

(1) Eclampsia

(2) Cerebral venous sinus thrombosis

(3) Postpartum cerebral angiopathy

(4) Meningitis

101. Which of the following best describes the safe and effective use of peripheral nerve blocks for management of different headache disorders?
(1) Bilateral peripheral nerve blocks should be avoided because of an excessive cumulative anesthetic dose.
(2) Greater occipital nerve blocks for cluster headache should include both anesthetic and steroid.
(3) Peripheral nerve blocks for migraine are more effective when a combination of anesthetic and steroid is injected.
(4) Trigger point injections and peripheral nerve blocks should not be used as combination therapy in patients with headache disorders.

102. Which side does the patient fall to in unilateral vestibular disease?
(1) Front
(2) Back
(3) Ipsilateral to affected side
(4) Contralateral to affected side

103. Which of the following patient characteristics at onset may predict the need for preventive therapy in children with migraine?
(1) Early menarche
(2) Fracture of a long bone before age 10
(3) History of late measles–mumps–rubella vaccination
(4) Onset before age 6

104. In which of the following etiologic categories does juvenile myoclonic epilepsy belong?
(1) Genetic
(2) Immune
(3) Metabolic
(4) Structural

105. Which of the following is the hallmark finding of logopenic variant primary progressive aphasia?
(1) Agraphia
(2) Decreased comprehension for words but not complex sentences
(3) Disproportionately decreased sentence repetition
(4) Impaired motor articulation

106. A 52–year–old man with a left middle cerebral artery ischemic stroke occupying 75% of the arterial territory experiences significantly worsening clinical status 36 hours after symptom onset. Head CT reveals worsening cerebral edema with mass effect. Which of the following interventions is most likely to reduce the risk of death in this patient?
(1) Hemicraniectomy
(2) IV mannitol
(3) IV recombinant tissue plasminogen activator
(4) Mechanical embolectomy

107. A 30–year–old woman with right temporal seizures treated with levetiracetam is evaluated for amenorrhea. Which of the following is the most likely mechanism?

(1) Increased peripheral transformation of oestrogen to progesterone

(2) Inhibition of testosterone aromatase

(3) Reduced peak prolactin levels during sleep

(4) Suppression of pulsatile luteinizing hormone secretion

108. Which of the following is the approximate rate of Cerebrospinal Fluid (CSF) production in an adult?

(1) 20 mL/hr

(2) 50 mL/hr

(3) 2 mL/hr

(4) 0.5 mL/hr

109. Regarding the surgical treatment of idiopathic Parkinson's Disease (PD), which of the following statement is incorrect?

(1) If the motor symptoms are markedly asymmetric, with the less affected side being minimally involved, unilateral Deep Brain Stimulation (DBS) can be done.

(2) DBS is effective in treating tremor and bradykinesia.

(3) DBS is effective in treating levodopa – unresponsive gait freezing and falls.

(4) Significant cognitive impairment is a contraindication to DBS.

110. The Wisconsin Card Sorting Test is helpful in determining functional abnormalities in which domain of cognitive function?

(1) Language

(2) Visuospatial function

(3) Declarative memory

(4) Executive function

111. Which of the following acquired or genetic thrombophilias has the greatest association with ischemic stroke?

(1) Antiphospholipid syndrome

(2) Antithrombin III deficiency

(3) Factor V leiden mutation

(4) Protein C deficiency

112. Which of the following types of cancers, when metastatic to the brain, has the highest likelihood of hemorrhage?

(1) Colon cancer

(2) Lung cancer

(3) Nonmelanoma skin cancer

(4) Renal cell carcinoma

113. A 33–year–old woman with 5–year history of multiple sclerosis has had worsening bladder symptoms for 6 months, including day-time and night-time urinary frequency. After cutting down her caffeine intake, her daytime symptoms improved; however, she has persistent nocturia, getting up 4 times a night to urinate, which is contributing to significant daytime fatigue. Review of systems is positive for chronic constipation. A basic metabolic panel, urinalysis, and renal and bladder ultrasound are all normal. What of the following interventions should be started in this patient?

(1) Botulinum toxin
(2) Citalopram
(3) Desmopressin
(4) Intermittent self – catheterization

114. A 36-year-old female with a history of multiple sclerosis presents to the emergency department with weakness. On neurological examination she is noted to have new weakness of the left finger flexors and extensors, moderate weakness of the left leg and normal strength on the right. She has loss of vibration and position sense in the left leg, whereas she has loss of temperature and pin prick sense in the right leg. Which is the most likely localization of her symptomatic lesion?

(1) Left side of the cervical cord
(2) Central portion of the cervical cord
(3) Posterior columns in the thoracic cord
(4) Left lateral pontine lesion

115. Which of the following cognitive domains is most frequently affected in multiple sclerosis?

(1) Cued recall
(2) Grammar
(3) Information–processing speed
(4) Long-term memory

116. Which of the following is the most common neurologic manifestation of Zika virus infection in adults?

(1) Encephalitis
(2) Guillain – barre syndrome
(3) Meningitis
(4) Myopathy

117. A 45–year–old man suffers a partial spinal cord transection at T12 on the left. Among the affected Rexed laminae, the substantia gelatinosa appears to be damaged on magnetic resonance imaging. Which of the following leg deficits correlates with this radiographic finding?

(1) Monoplegia
(2) Absent vibratory sensation
(3) Absent noxious stimulus sensation
(4) Ataxia

118. The presence of Rapid Eye Movement (REM) sleep behaviour disorder in a patient with Parkinson disease is associated with which of the following?

(1) Absence of hallucinations
(2) Fewer motor fluctuations
(3) Indolent less aggressive course
(4) Non – tremor – predominant presentation

119. Primary central nervous system lymphomas are most commonly associated with which of the following histologic types?

(1) Burkitt lymphoma
(2) Mantle cell lymphoma
(3) Diffuse large B – cell lymphoma
(4) Follicular lymphoma

120. A 25-year-old female presents with episodes of confusion. These episodes start with a rising feeling in her abdomen followed by anxiety and diaphoresis. Her family states she will mumble and hold her left arm stiff while her right arm picks at her shirt. These episodes will last for 45 seconds before resolving. She is tired and confused after these episodes have occurred. Which of the following is the most likely localization for her symptoms?

(1) Left orbitofrontal lobe
(2) Left lateral temporal lobe
(3) Right occipital lobe
(4) Right mesial temporal lobe

121. Which of the following opioid receptors is involved in analgesia, euphoria, respiratory depression and opioid tolerance?

(1) Mu receptor
(2) Delta receptor
(3) Kappa receptor
(4) Alpha 2 receptor

122. In a patient with Human Immunodeficiency Virus (HIV) who develops cauda equine syndrome, which of the following is the most likely cause?

(1) Borrelia burgdorferi
(2) Cryptococcus neoformans
(3) Cytomegalovirus
(4) JC virus

123. Which of the following proteins is thought to be a primary candidate for the autoimmunity of multiple sclerosis and is the antigen targeted in Experimental Autoimmune Encephalomyelitis (EAE)?

(1) Myelin basic protein
(2) Proteolipid protein
(3) Myelin–associated glycoprotein
(4) Myelin oligodendrocyte glycoprotein

124. Which of the following pathophysiologic processes is most likely associated with a combination of both vasogenic and cytotoxic cerebral edema?

(1) Cerebral metastasis from breast cancer
(2) Ischemic stroke
(3) Normal pressure hydrocephalus
(4) Traumatic brain injury

125. A 40–year–old patient presents to the OPD with recurrent seizures, headache and projectile vomiting. MRI brain reveals cortical based heterogeneous tumour with calcification in the frontal lobe, the histopathological section of the resected tumour shows perineuronal satellitosis. Which of the following is the most common genetic alteration noted in this tumour?
(1) Mutation of the isocitrate dehydrogenase genes
(2) Deletion of portions of chromosomes 1p and 19q
(3) Loss of 9p
(4) Mutation in CDKN2A

126. Which of the following abnormalities on non-contrast CT of the brain is expected to be seen earliest in the setting of acute middle cerebral ischemia?
(1) Hyperdensity of the middle cerebral artery
(2) Loss of the insular ribbon
(3) Loss of sulci in the infarcted territory
(4) Obscuration of the lentiform nucleus

127. A 63–year–old man being evaluated for memory impairment has a positive fluorescent treponemal antibody absorption test and a negative Rapid Plasma Reagin (RPR). His neurologic examination is unremarkable, and he reports no history of sexually transmitted diseases. What would be the most appropriate next step in his evaluation and management?
(1) Begin empiric treatment with penicillin G
(2) Brain MRI with and without contrast
(3) Lumbar puncture and CSF analysis
(4) Continued observation

128. A 38–year–old athlete sustains an injury while playing football. Eight weeks later, he presents to a neuromuscular clinic with right arm weakness. He has Medical Research Council motor power of 4/5 in external rotation of the arm, forearm flexion and shoulder abduction. There is sensory loss over the lateral aspect of the arm and forearm. The biceps deep tendon reflex is absent. On EMG, there are fibrillation potentials in the biceps, brachialis, deltoid, brachioradialis, supraspinatus and rhomboid muscles. EMG examination of the triceps, pronator teres, brachioradialis and intrinsic hand muscles is normal. Which of the following best explains this patient's weakness?
(1) An upper brachial plexus trunk lesion
(2) An axillary nerve lesion
(3) A C5 and C6 root lesion
(4) A lesion to the musculocutaneous nerve

129. A 4–year–old boy with no prior health or developmental concerns is brought to the clinic because of behavioural and developmental concerns. His mother states that he has a hard time speaking to his peers and never seems to look at her in the eyes when she is speaking to him. Unlike his brother and sister, he prefers to be alone and plays with books in his room, frequently turning pages over and over again. She also mentions that anytime they deviate from a plan, such as where to go for dinner, the patient will get angry, almost uncontrollably. What is the most likely diagnosis?
(1) Avoidant personality disorder
(2) Autism
(3) Cerebral palsy
(4) Depression

130. A lesion in which of the following locations would be more likely to be seen in multiple sclerosis than non-specific small vessel disease?
(1) Centrum semiovale
(2) Cerebral cortex
(3) Corona radiata
(4) U fibers

131. A 10–year–old girl is brought for gait instability. On examination, she has reduced light – touch, pinprick and vibratory sensation along with impaired proprioception. There is generalised areflexia. She is also noted to have truncal and limb ataxia and choreoathetosis. On cranial nerve examination, she cannot move her eyes without thrusting her head in the direction of attempted gaze. Examination also shows multiple dilated tuft of capillary loops in the conjunctiva and oral mucosa. Which of the following statements is correct regarding this patient's most likely diagnosis?
(1) It is autosomal dominant in inheritance.
(2) It results in impaired DNA repair.
(3) It results from a trinucleotide repeat expansion.
(4) Patients with this disorder have hypergammaglobulinemia.

132. On magnetic resonance spectroscopy, which of the following patterns would be most characteristic of a neoplastic process as opposed to other causes of brain lesions?
(1) Absence of a lactate peak
(2) Decreased choline to creatine ratio
(3) Increase in the choline peak
(4) Increase in the creatine peak

133. The spot sign on CT imaging of patients with intracerebral hemorrhage indicates a higher likelihood of which of the following?
(1) Cavernous malformation as the cause of bleeding
(2) Early hematoma expansion
(3) Hypertension as the cause of bleeding
(4) Neoplastic process as the cause of bleeding

134. A 50–year–old man is evaluate for a 10–month history of cognitive and speech difficulties. He has difficulty naming and even recognizing persons or objects that used to be familiar to him. His father died at age 65, 5 years after developing an illness characterized by personality and behavioural changes. He has a 55–year–old sister who developed progressive difficulty articulating words. On examination, he speaks fluently and has normal attention, executive function and visual spatial memory. He names only 15 of 30 objects in the Boston Naming test and generates a list of only three animals in 1 minute. The brain of his father is available for neuropathologic analysis and shows neuronal loss and gliosis in the frontoparietal regions associated with inclusions immunoreactive for TAR DNA-binding protein 43. Mutations in which of the following genes are most likely to be found in this family?
(1) DCTN1
(2) GRN
(3) MAPT
(4) PRNP

135. A 20–year–old man was involved in a motor vehicle accident and suffered traumatic brain injury. He is intubated and admitted to the neurocritical care unit. An ICP monitor is placed measuring an ICP of 35 cm H_2O. Hyperventilation is started, and 60 g of mannitol is given intravenously. Which of the following is correct regarding therapies for increased ICP?

(1) Hyperventilation will produce a change in the CSF osmolarity, favouring the shift of fluid from neurons into the CSF.

(2) Hyperventilation is a short – lived therapy, and a rebound increase in the ICP may occur.

(3) Hyperventilation should target a partial pressure of CO_2 of 15 to 20 mm Hg.

(4) Mannitol increases CSF osmolarity, creating an osmotic gradient that will drive fluid from the intravascular compartment into the CSF.

136. Mutation in which of the following is not associated with an increased risk of Alzheimer disease (AD)?

(1) Amyloid precursor protein

(2) Presenilin – 1

(3) Presenilin – 2

(4) Gamma secretase

137. Which of the following is incorrect regarding electrophysiologic studies of the peripheral nervous system?

(1) SNAP amplitude is a measure of the number of axons that conduct between the stimulation and recording sites.

(2) Sensory distal latency is the time it takes for the action potential to travel between the nerve stimulation site and the recording site.

(3) Axon loss lesions are invariably associated with reduced conduction velocities

(4) CMAP amplitude depends on the status of the motor axons, neuromuscular junctions, and muscle fibers.

138. In posterior tibial Somatosensory evoked potentials (SSEPs), the P37 peak corresponds with which anatomical location?

(1) Lumbar plexus

(2) Lumbar roots

(3) Cerebral cortex

(4) Dorsal columns

139. The inability of a patient to perform a complex motor act with the nonparetic limb in the presence of a unilateral dominant hemisphere lesion is -

(1) Limb-kinetic apraxia

(2) Ideational apraxia

(3) Sympathetic apraxia

(4) Gait apraxia

140. Exposure to which of the following toxins is most likely to produce a clinical picture similar to tetanus (tetanospasmin)?

(1) Black widow spider venom

(2) Botulinum toxin

(3) Diphtheria exotoxin

(4) Strychnine

141. Which of the following statements is incorrect regarding acquired causes of cerebellar ataxia?
(1) Celiac autoantibodies should be checked in patients with gait ataxia only if there are gastrointestinal symptoms to suggest gluten intolerance.
(2) Hypothyroidism can lead to gait ataxia and thyroid stimulating hormone should be checked in patients with gait ataxia.
(3) The chemotherapeutic agent cytarabine can lead to irreversible cerebellar ataxia.
(4) Mercury and bismuth both can lead to cerebellar ataxia in toxic amounts.

142. Which of the following characteristics differentiates between rimegepant and ubrogepant?
(1) Efficacy
(2) IV versus oral route of administration
(3) Option for repeat dosing
(4) Side effect

143. Which of the following statements is correct regarding the systemic manifestations of Tuberous Sclerosis Complex (TSC)?
(1) Periodic echocardiography is not necessary for patients with cardiac rhabdomyomas.
(2) Renal angiomyolipomas are malignant lesions.
(3) Lymphangiomyomatosis is a benign disorder occurring in male patients with TSC.
(4) Cardiac rhabdomyomas may occur and often regress overtime.

144. A mononeuropathy of which of the following nerves would be expected to cause a pure motor syndrome?
(1) Axillary
(2) Obturator
(3) Posterior interosseous
(4) Tibial

145. A 53–year–old male presents to clinic with a several month history of falls. He has a history significant for smoking. His neurological examination reveals normal cranial nerves, normal strength, decreased sensation to all modalities in his extremities and absent reflexes. He has a positive Romberg and demonstrates sensory ataxia. Pseudoathetosis is present. Which of the following is most commonly associated with this condition?
(1) Anti–N–methyl–D–aspartate (anti–NMDA) receptor antibody
(2) Anti–Jo antibody
(3) Anti–GM1 antibody
(4) Anti–antineuronal nuclear antibody 1 (anti–ANNA–1)

146. A patient presents with a suspected C7 radiculopathy. Which muscles would be expected to show abnormalities on electromyography?
(1) Biceps and brachioradialis
(2) Triceps and flexor pollicis longus
(3) First dorsal interosseous and abductor pollicis brevis
(4) Extensor carpi radialis and anconeus

147. Identify the artery that most commonly loops down inti the internal auditory canal in close proximity to the facial nerve -
(1) Superior cerebellar artery
(2) Anterior inferior cerebellar artery
(3) Posterior inferior cerebellar artery
(4) Vertebral artery

148. A 33–year–old woman is brought to the emergency department after being found on the floor of her apartment with an empty bottle of oral diazepam next to her. She had filled the prescription the prior day, and there is a high suspicion that she had ingested more than 20 tablets in suicidal intent. On examination, she is comatose, and respiratory rate is 8. Which of the following medications should be administered in the treatment of this patient?
(1) Naloxone
(2) Naltrexone
(3) Flumazenil
(4) Thiamine

149. The most striking neurological complication of von Economo encephalitis (encephalitis lethargica), a type of encephalitis that occurred in epidemic proportions along with viral influenza between 1917 and 1928, was which of the following?
(1) Blindness
(2) Hearing loss
(3) Paraplegia
(4) Parkinsonism

150. Ideal temperature for testing cold sensation is -
(1) 5 to 10 degree Celsius
(2) 10 to 15 degree Celsius
(3) 15 to 20 degree Celsius
(4) 20 to 25 degree Celsius

151. An unruptured aneurysm of which of the following arteries confers the highest risk of bleeding?
(1) Anterior choroidal
(2) Anterior communicating
(3) Internal carotid
(4) Posterior communicating

152. A patient with muscle weakness is found positive for antibodies against cN1A. What is the likely diagnosis?
(1) Dermatomyositis
(2) Polymyositis
(3) Inclusion body myositis
(4) Viral myositis

153. Which of the following scalp EEG interictal epileptiform discharge locations is the most specific for mesial temporal lobe epilepsy?
(1) Centrotemporal
(2) Frontotemporal
(3) Medial frontal
(4) Midtemporal

154. Which of the following genetic diseases is associated with decreased number, rather than expansion of a small repeat element?
(1) Facioscapulohumeral muscular dystrophy
(2) Fragile X syndrome
(3) Huntington disease
(4) Myotonic dystrophy type 1

155. A 62–year–old man presents with acute onset of right hemiparesis and global aphasia. He was last seen normal 1 hour ago. His NIHSS score is 20. CT demonstrates no hemorrhage and intravenous tPA is started. A CTA is then obtained, which demonstrated a left MCA occlusion in its proximal segment. What is correct regarding endovascular thrombectomy for this patient?
(1) Endovascular thrombectomy is contraindicated after intravenous tPA
(2) Endovascular thrombectmy is indicated and associated with better clinical outcomes
(3) Waiting period is indicated to determine if there is improvement with intravenous tPA
(4) Endovascular thrombectomy has not been proven to benefit clinical outcomes

156. Which of the following features is characteristic of the region of pancake like contrast enhancement that has been described in the MRIs of patients with cervical spondylotic myelopathy?
(1) It is located at least two spinal segments above the center of T2 hyperintensity.
(2) It is located at or just below the site of maximal stenosis.
(3) It predominantly involves the gray matter.
(4) It resolves immediately after surgical decompression.

157. Which of the following antiepileptic medications is a strong hepatic enzyme inhibitor?
(1) Phenytoin
(2) Valproic acid
(3) Carbamazepine
(4) Levetiracetam

158. A 1–week–old boy remains in the hospital since birth for progressive neurological deterioration. He is now intubated due to coma, poor feeding and recurrent vomiting. Sepsis has been ruled out. Laboratory analysis reveals decreased serum bicarbonate and hypoglycemia. An organic aciduria is suspected and urine gas chromatography/ mass spectrometry confirms this. Which of the following is not true of the organic acidurias?
(1) Glutaric acidemia type 1 produces encephalopathy followed by rapid – onset dystonia or chorea with collections of fluid over frontal lobe and subdural hematoma.
(2) Propionic acidemia presents with severe metabolic acidosis in the setting of neonatal encephalopathy, as well as blood cell dyscrasia such as thrombocytopenia and neutropenia.
(3) Methylmalonic acidemia presents with ketosis, acidosis and neutropenia but has no hepatomegaly.
(4) Respiratory chain deficiencies lead to secondary mitochondrial damage, which leads to further organ damage.

159. A 46–year–old man with a 1–year history of Parkinson disease undergoes 18F–DOPA PET as a baseline for an experimental study. Hypometabolism in which of the following brain regions is most likely to be seen?
(1) Anterior putamen
(2) Caudate head
(3) Caudate tail
(4) Posterior putamen

160. Which of the following conditions is most likely to cause ptosis without any weakness of extraocular muscles?
(1) Botulism
(2) Dermatomyositis
(3) Inclusion body myositis
(4) Myotonic dystrophy

161. A 64–year–old woman is being evaluated in the emergency department 30 minutes after she suddenly developed right hemiparesis and aphasia while visiting her husband in the hospital. Her blood pressure is 150/90 mmHg, the remainder of her examination is consistent with an ischemic stroke in the territory of the left middle cerebral artery, and a CT angiogram shows occlusion of the MI segment of that artery. She is about to be transferred to a nearby stroke center for mechanical thrombectomy. Before being transferred, which of the following medications should be administered?

(1) Atorvastatin
(2) IV heparin
(3) IV recombinant tissue plasminogen activator (rtPA)
(4) Labetalol

162. To which of the following does the vein of Labbé drain?

(1) Vein of Trolard
(2) Vein of Galen
(3) Superior sagittal sinus
(4) Transverse sinus

163. A patient with which of the following dementing illnesses is most likely to show abnormal uptake on a PET imaging study using Pittsburgh Compound B?

(1) Corticobasal degeneration
(2) Frontotemporal dementia
(3) Lewy body dementia
(4) Multiple subcortical infarctions due to diabetic/ hypertensive small vessel disease

164. A patient's primary behavioural abnormalities include abulia, decreased verbal output and lack of interest in therapy. Which of the following is the most likely site of his injury?

(1) Medial prefrontal cortex
(2) Dorsolateral prefrontal cortex
(3) Orbitofrontal cortex
(4) Frontopolar cortex

165. Which of the following is an N-methyl–D–aspartate (NMDA) receptor antagonist?

(1) Rivastigmine
(2) Vigabatrin
(3) Memantine
(4) Donepezil

166. A 12–year–old boy with epilepsy is being evaluated for surgical treatment of Rasmussen's encephalitis. He has progressive cognitive decline, left hemiparesis and left visual field defect and the EEG shows status epilepticus arising from the right hemisphere. Which of the following is correct regarding this condition?

(1) There are autoantibodies against a GABA receptor subunit
(2) The seizures are typically well controlled with AED monotherapy
(3) Histopathology shows perivascular cuffs of lymphocytes and monocytes, as well as glial nodules in the gray and white matter
(4) This disease usually affects adults more than children

167. A 52-year-old man had profuse diarrhea and 20 – kg (44 -lb) weight loss over a 4 – month period followed by confusion, myoclonus, exaggerated startle, tremor, personality change and psychosis. The neurologic syndrome progressed over 6 months. Antibodies against which of the following targets is most likely to be found in this patient?

(1) Acetylcholine (ach) receptor
(2) Contactin–associated protein – like 2 (CASPR2)
(3) Dipeptidyl–peptidase – like protein 6 (DPPX)
(4) Leucine–rich glioma – inactivated protein 1 (LGI1)

168. A patient is asked to show how to use a hammer. The patient acts out cutting with a saw instead of using a hammer. Which of the following correctly identifies this condition?

(1) Ideomotor apraxia
(2) Ideational apraxia
(3) Conceptual apraxia
(4) Limb–kinetic apraxia

169. A 45–year–old man presents to the emergency department with headaches and worsening mental status. He has had 10 days of mild respiratory symptoms and decreased smell and he was diagnosed by his primary care physician as having COVID-19. Upon admission, the patients has a head CT, which shows bilateral thalamic hypodensities; a CT angiogram of the head does not show any occlusion. His D-dimer is elevated to 900 ng/mL. Which of the following should be the next step in management?

(1) Aspirin
(2) Ct venogram of the head
(3) IV recombinant tissue plasminogen activator (rtPA)
(4) Lumbar puncture

170. A 67–year–old woman with a long history of smoking presents with a new horizontal diplopia and headache. On examination, her right eye is deviated inferiorly and laterally, she has mild right ptosis, and she has marked right mydriasis with no reaction to light. Which of the following is the most important next step in her care?

(1) Cerebral angiography
(2) Hemoglobin A1C
(3) Ophthalmology consult
(4) Brain Computed Tomography (CT)

171. Which of the following imaging parameters has the poorest sensitivity in detecting an active MS lesion in the posterior fossa and spinal cord?

(1) Fluid-attenuated inversion recovery images
(2) Gadolinium-enhanced T1- weighted images
(3) Proton density-weighted images
(4) Short tau inversion recovery images

172. The 2017 McDonald criteria include which of the following revisions for demonstration of dissemination in space that was not present in previous versions?

(1) Inclusion of the anterior visual system
(2) Inclusion of symptomatic lesions
(3) Presence of at least three periventricular lesions
(4) Removal of cortical lesions

173. During an acute illness, a patient is found in a "sleep – like" state, not responsive to verbal stimuli, and poorly responsive to tactile stimuli, but he can be aroused by constant and continuous noxious stimulation, and when aroused, his cognitive function is significantly impaired. When the stimulus stops he goes back to his poorly responsive state. Which of the following states of consciousness correlates with the findings on this patent?

(1) Coma
(2) Stupor
(3) Locked–in state
(4) Unresponsive wakefulness

174. Charcot–Marie–Tooth disease is most often caused by mutations in the gene for which of the following proteins?
(1) Connexin 32
(2) Mitofusin 2
(3) Myelin protein zero
(4) Peripheral myelin protein 22

175. Simple random sampling is ideal for which of the following study groups?
(1) A study being conducted on all vaccinated people of an area.
(2) A study on occupational exposure in all workers of the same factory.
(3) A study being conducted on prevalence of acute gastroenteritis in all school children of an area.
(4) A study on prevalence of hypertension in men aged 50 – 75 years in an area.

176. A 25–year–old woman who presents with vision loss is diagnosed with bilateral optic neuritis. Brain MRI scan shows white matter lesions in the periaqueductal area. Which of the following findings is most helpful in confirming a definitive diagnosis?
(1) Positive aquaporin–4 antibodies
(2) Presence of oligoclonal bands in CSF
(3) Periventricular white matter lesions
(4) Positive antinuclear antibody

177. The weakness due to lesion of the pyramidal tract to the upper limb preferentially involves -
(1) Shoulder abductors
(2) Elbow extensors
(3) Wrist extensors
(4) All of the above

178. In which of the following conditions can neurofibrillary tangles be found?
(1) Normal ageing
(2) Subacute sclerosing panencephalitis
(3) Multiple system atrophy
(4) REM behaviour disorder
(5) Alzheimer's disease
(1) 3,4 and 5
(2) 1 and 5 only
(3) 2,3 and 4
(4) 1,2 and 5

179. A 38–year–old man who works at a cellophone manufacturing plant is exposed to high levels of carbon disulphide via inhalation. Which of the following neurologic syndromes is most likely to occur as a result of this acute exposure?
(1) Ataxia
(2) Encephalopathy
(3) Myelopathy
(4) Optic neuropathy

180. Which of the following antiepileptic drugs is most likely to increase the PR interval on ECG?
(1) Ethosuximide
(2) Felbamate
(3) Lacosamide
(4) Phenytoin

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Space for Rough Work