# Clinical Neurophysiology Knowledge Based Assessment 2022

**Name (Compulsory if Specialist trainee):**

**Grade**: ST3/ ST4/ ST5/ ST6/ Consultant/ Other (please state)

**Deanery**:

Please mark each statement T if true or F is false

**Part 1 Questions**

**1) The features labelled are:**

**A**. Axo-dendritic synapse
B. Synaptic terminal
C. Node of Ranvier
D. Axo-somatic synapse
E. Axon Hillock

**2) The gain of the Op Amp (*A*) is:**

A. x30
B. x10
C. x30k
D. x10k
E. x15k

**3) Which are defining or characteristic features of the EEG spike?**

A. The spike is an epileptiform discharge
B. Spike duration is approximately 20–70 ms
C. The spike is always associated with a slow wave
D. Spike duration is approximately 70–200 ms
E. The spike must be clearly distinguishable from the EEG background with an amplitude typically >50µV

4) **Which of the following is true of the equation: V=kD, Where V is velocity, D is diameter and k is a constant?**

A. K is the Hursh constant
B. k=1.5
C. V is the maximum conduction velocity in peripheral myelinated nerve (in m/sec)
D. D is the diameter of the largest axon in a nerve bundle (in mm)
E. The Hursh equation is only valid at a temperature of 37.5 degrees Celsius

**5) Which statements are correct?**

A. 4-pin male DIN connector
B. 5-pin male DIN connector
C. 4-pin female DIN connector
D. 3-pin female DIN connector
E. 7-pin male DIN connector

**6) The Nyquist Criterion can be stated as:** $fs > 2B$

**Where *B* is the bandwidth of input functions and *fs* is the sampling frequency.**

**If *fs* is 256Hz, which of the following is true?**

A. A bandpass of 5-100Hz is acceptable
B. A low pass filter set at 250Hz is acceptable
C. The amplifier gain must be > x1k
D. A bandpass of 5-500Hz is acceptable
E. A high pass filter set at 30Hz is acceptable

**7) A concentric needle electrode has an impedance of 50 KΩ. To obtain the best signal from the electrode, the amplifier should have:**

A. A gain of at least 10,000.
B. An input impedance which is as high as possible.
C. A bandwidth which is as wide as possible.
D. An input impedance which is the same as the electrode.
E. A ground electrode impedance of > 4000Ω.

**8) To record a biopotential from a human subject, which of the statements is true?**

**A**. The subject should be grounded to the chassis of the amplifier (mains ground)
B. The device safety standard should always be Type CF
C. There should be no easy access to the patient ground other than those specifically marked as such
D. The equipment should always contain an isolation transformer
E. The equipment should remain safe in the case of a single fault condition

**9) A magnetic stimulator for TMS studies….**

A. Can be used on patients who have intracranial metal components
B. Can be used inside an MRI scanner
C. Can be used in patients with epilepsy
D. Can be used in patients with subdural electrode arrays
E. Require the use of non-magnetic surgical instruments if used in theatre

**10) Colour shaded areas denote:**

A. Green - Hippocampus
B. Blue - Amygdala
C. Red - Rhinal Sulcus
D. Yellow - Anterior Parahippocampal Gyrus
E. Green - Entorhinal Area

**Part 2 Questions**

**Stem 1**

**i) What test has been performed?**

A. TMS
B. SSEP
C. Blink Reflexes
D. MEP
E. Cutaneomuscular reflexes

**ii) What would be potential contra-indications to performing this test?**

A. Pregnancy
B. Cardiac Pacemaker
C. Cranial aneurysm clips
D. Mercury dental fillings
E. TMJ dysfunction

**iii) What abnormalities are demonstrated?**

A. Delayed Cortex-Lumbar response
B. Delayed Lumbar-AH response
C. Low amplitude cortical response
D. Reduced amplitude cortical AH response
E. Normal responses

**iv) What other description might be given to "Cortex – Lumbar latency"?**

A. Central Motor Conduction Time
B. Central Sensory Conduction Time
C. Barker's time
D. Bereitschafts potential latency
E. H reflex

**v) In what 3 conditions might one see such abnormalities, particularly taking into account the sub-acute onset of symptoms?**

A. Spinal cord tumours
B. Myelopathy
C. Radiculopathy
D. MS
E. CIDP

**Stem 2**

**i) What is the abnormality shown on the EEG?**

A. Burst Suppression
B. Hypsarrhythmia
C. Generalised Periodic Discharges
D. Centrotemporal spikes
E. Slow waves

**ii) What are the two main EEG differential diagnoses?**

A. Status Epilepticus
B. Hypoxic Ischaemia
C. SSPE
D. CJD
E. Lithium toxicity

**iii) Which if the following is true?**

A. If midazolam attenuates the EEG the diagnosis is status epilepticus
B. The SSEP result performed on day 3 suggests a poor prognosis
C. The SSEP result performed on day 3 suggests a good prognosis
D. The SSEP result performed on day 3 does not have any prognostic value
E. In a patient with a traumatic brain injury and no evidence of neurological recovery SSEPs are helpful prognostically

**Stem 3**

**i) What test has been performed?**

A. Repetitive nerve stimulation
B. Short Exercise Test
C. Long Exercise test
D. Electrophoresis
E. Durkan's test

**ii) What is the abnormality?**

A. Increase in CMAP amplitude after each stimulation
B. Decrease in CMAP amplitude after each stimulation
C. Increase in CMAP duration after each stimulation
D. Decrease in CMAP duration after each stimulation
E. This is a normal response

**iii) In which conditions might one expect to see such findings?**

A. Tetanus
B. Hyperkalaemic Periodic Paralysis
C. Hypokalaemic Periodic Paralysis
D. Botulism
E. Hypocalcaemia

**iv) Given the presence of a cardiac pacemaker and the clinical findings, what is the most likely unifying diagnosis?**

A. Ischaemic vascular disease
B. Vasculitis
C. Neuromyotonia
D. Andersen- Tawil syndrome
E. Parmyotonia Congenita

**v) In what way might you need to modify your NCS/EMG examination, given the presence of a pacemaker?**

A. Decrease stimulation current
B. Decrease stimulation duration
C. No changes required
D. Increase stimulus current
E. Increase stimulus duration

**Stem 4**

**i) What does this test show?**

A. Reduction in the N75-P100 amplitude
B. Prolongation of the N75 latency
C. Prolongation of the N75-P100 latency
D. Abnormal chiasmal cross over
E. All of the above

**ii) What do the findings indicate?**

A. Pre-geniculate demyelination of the optic nerve
B. Post-geniculate demyelination of the optic nerve
C. Macular disease
D. Visual cortex dysfunction
E. All of the above

**iii) List 2 conditions associated with these findings**

A. Transverse myelitis
B. Multiple sclerosis
C. CIDP
D. Guillain-Barre syndrome
E. Neuromyelitis optica

**iv) If you felt that the patient might have non-organic disease and that responses are delayed due to behaviour how might you modify the test?**

A. Direct observation of the patient
B. Use of laser pointer
C. PERG to look for VEP another way
D. Flash VEP
E. None of the above

**v) What investigation should be performed to prove that the changes seen on the VEP are not retinal in origin?**

A. Electro-oculogram
B. OCT
C. Pattern ERG
D. Onset-offset VEP
E. MRI

**Stem 5**

**i) Describe the EEG abnormalities displayed**

A. Frontal Spikes
B. Central Spikes
C. Temporal Spikes
D. Parietal Spikes
E. Occipital Spikes

**ii) Given the age of the patient, the clinical description and the EEG abnormalities which of the following are in the differential diagnosis?**

A. Panayiotopoulos syndrome
B. Idiopathic childhood occipital epilepsy of Gastaut
C. Idiopathic photosensitive occipital lobe epilepsy
D. Idiopathic occipital lobe epilepsy
E. Coeliac disease

**iii) Given the EEG findings above, list what further techniques could have been used in the live EEG recording in order to narrow down the differential and how positive findings through these techniques would direct your diagnosis (2 points)**

A. Intermittent photic stimulation
B. Hyperventilation
C. Use of black out and opaque goggles
D. Sleep deprivation
E. All of the above

**iv) List 2 possible structural abnormalities that could account for the EEG abnormalities**

A. Cortical dysplasia
B. Arnold-Chiari Malformation
C. Arteriovenous malformation
D. Martin-Gruber anastomosis
E. Sagittal sinus thrombosis

**Stem 6**

**i) How would you interpret the NCS findings? (2)**

A. Axonal neuropathy
B. Demyelinating neuropathy
C. Sensory neuropathy
D. Dorsal root ganglionopathy
E. All of the above

**ii) What is the most likely diagnosis?**

A. Anti-GM1 antibodies
B. Hereditary Motor Sensory Neuropathy Type 1
C. Hereditary Motor Sensory Neuropathy Type 2
D. Dejerine-Sottas syndrome
E. Friedreich's ataxia

**iii) What is the underlying associated genetic mutation?**

A. PMP-22 missense mutations
B. PMP-22 deletions
C. MPZ mutations
D. SCA-3
E. Frataxin gene mutations

**iv) List other conditions which might be associated with these findings**

A. Hereditary Neuropathy with liability to Pressure palsies
B. Hereditary Motor Sensory Neuropathy Type X
C. Hereditary Sensory and Autonomic Neuropathy
D. SCA- 2
E. SCA - 6

**v) What further information would you seek from the girl and her parents? (2)**

A. Muscle cramps
B. Joint dislocations
C. Cataracts
D. Cardiomyopathy
E. Bowel problems

**vi) What would the NCS findings suggest in an adult?**

A. Anti-GMb1 antibodies
B. Hereditary Motor Sensory Neuropathy Type 1
C. Hereditary Motor Sensory Neuropathy Type 2
D. Dejerine-Sottas syndrome
E. Motor neurone disease

**Stem 7**

**i) How would you interpret this record?**

A. Hypsarrhythmia
B. Movement artefact
C. Burst Suppression
D. Seizure discharge
E. Normal for gestational age

**ii) What are the common causes of this abnormality in the neonate? (2)**

A. Vitamin E deficiency
B. Hypoxic brain injury
C. Ohtahara syndrome
D. Nurse adjusting blanket
E. Maternal alcoholism

**iii) What other conditions may be associated with this EEG this in adults? (2)**

A. Hypoxic brain injury
B. Hepatic encephalopathy
C. Thiopentone-induced coma
D. End stage Creutzfeldt-Jakob disease
E. Lithium toxicity

**Stem 8**

**i) What is the likely diagnosis?**

A. C5 radiculopathy
B. Thoracic outlet syndrome
C. Brachial neuritis
D. Long thoracic nerve neuroma
E. FSHD

**ii) What risks are associated with EMG of serratus anterior?**

A. Haematoma
B. Neuralgia
C. Cellulitis
D. Pneumothorax
E. Pain

**iii) What other nerves are commonly involved in this condition?**

A. Axillary
B. Musculocutaenous
C. Radial
D. Median
E. Ulnar

**iv) Are any of the following associated with this condition?**

A. Diabetes
B. Hepatitis A
C. Hepatitis E
D. EBV
E. HIV

**v) What is the likely prognosis?**

A. Full recovery in 12 weeks
B. Full recovery in 6-12 months
C. No recovery
D. Partial recovery in 6-12 months
E. Partial recovery in 12-18 months

**vi) Which of the following cause scapula winging?**

A. FSHD
B. LGMDs
C. Polymyositis
D. Poliomyelitis
E. Exposure to certain pesticides (e.g. metaldehyde)

**Stem 9**

**i) What are the contraindications for hyperventilation during an EEG?**

A. COVID-19
B. Pregnancy
C. Moya-Moya disease
D. Hypertension
E. Previous CVA

**ii) What is the most likely diagnosis?**

A. Spinocerebellar ataxia
B. Friedreich's ataxia
C. Juvenile Myoclonic Epilepsy
D. Jeavon's syndrome
E. Huntington's disease

**iii) In this diagnosis what is the EEG likely to show?**

A. Spike and Slow wave discharges
B. Polyspike and Slow wave discharges
C. Photosensitivity
D. Generalised slowing
E. No change

**iv) What considerations should the neurologist bear in mind before treating this patient**?

A. Other medication
B. Likelihood of pregnancy
C. Contraception
D. Driving status
E. Weight

**Stem 10**

**i) What is the most likely diagnosis?**

A. Temporal lobe epilepsy
B. Panayiotopoulos syndrome
C. Benign Childhood Epilepsy with Centrotemporal Spikes
D. Lennox-Gastaut syndrome
E. Cortical dysplasia

**ii) What are the expected EEG findings?**

A. Centrotemporal spikes
B. Generalised spike and slow waves
C. Polyspike and slow waves
D. Increased spikes in sleep
E. Decreased spikes in sleep

**iii) What is the prognosis?**

A. Average IQ drop 10 points
B. Lifelong seizures
C. Self-limiting disease
D. Loss of speech
E. Complete recovery

Please email completed answers to Gareth.payne@wales.nhs.uk