



AMREF INTERNATIONAL UNIVERSITY

SCHOOL OF MEDICAL SCIENCES

DEPARTMENT OF REHABILITATIVE MEDICINE

BACHELOR OF SCIENCE IN PHYSIOTHERAPY

END OF TRIMESTER EXAMINATIONS JANUARY TO APRIL 2024

COURSE CODE: PHT 224

COURSE TITLE: NEUROSCIENCE

DATE: 11TH APRIL 2024

TIME: 4:15PM-6:15PM

INSTRUCTIONS TO CANDIDATES

Answer All Questions

Section A: Multiple Choice Questions (MCQ)

30 Marks.

Section B: Short Answer Questions (SAQ)

20 Marks.

Section C: Long Answer Question (LAQ)

20 Marks

TIME: 2 Hours

SECTION A: MULTIPLE CHOICE QUESTIONS (MCQ) 30 MARKS

1. After his motorcycle accident 1 year ago, Jim's personality and behavior have changed significantly. He now has severe short-term memory problems and is disorganized, foul-mouthed, and impulsive. Jim can neither foresee the consequences of his actions nor does he possess insight into his behaviors. Damage of which cerebral lobe would largely be responsible for these problems?
 - A. Occipital
 - B. Temporal
 - C. Frontal
 - D. Parietal
2. After his brain injury, Jack has difficulty regulating his temperature, has experienced acne due to hormonal imbalances, and is unable to assume a normal sleep-wake cycle. Which neurological structure is primarily thought to be responsible for these functions?
 - A. Hypothalamus
 - B. thalamus
 - C. cerebellum
 - D. brainstem
3. Which cranial nerves are being assessed when a therapist tests extraocular eye movements?
 - A. Optic nerve (CN 2), oculomotor nerve (CN 3), trochlear nerve (CN 4)
 - B. Optic nerve (CN 2), oculomotor nerve (CN 3), abducens nerve (CN 6)
 - C. Oculomotor nerve (CN 3), trochlear nerve (CN 4), trigeminal nerve (CN 5)
 - D. Oculomotor nerve (CN 3), trochlear nerve (CN 4), abducens nerve (CN 6)
4. Mr. Murakami presents with drooping of his right face, right eyelid ptosis, inability to completely close his right eyelid, and mouth deviation to the right. Additionally, he reports that he has become hypersensitive to noise in his right ear. This condition is called _____ and results from damage to cranial nerve _____.
 - A. Bell palsy; CN 7 facial nerve
 - B. Trigeminal neuralgia; CN 5 trigeminal nerve
 - C. Bell palsy; CN 5 trigeminal nerve
 - D. Trigeminal neuralgia; CN 8 vestibulocochlear nerve
5. Ms. Chaudhari has a neurological disorder caused by demyelination of neurons in the CNS. The disease process is characterized by periods of exacerbation and remission over many years. Sensory symptoms include numbness, paresthesias, and causalgia. Motor symptoms include abnormal gait, bladder and sexual dysfunction, vertigo, and fatigue. This disease is known as:
 - A. Amyotrophic lateral sclerosis
 - B. Multiple sclerosis
 - C. Myasthenia gravis
 - D. Muscular dystrophy

6. Mr. Greenspan was diagnosed with a severe degenerative neurological disorder affecting both the central and peripheral nervous systems. Upper and lower motor neurons denervate, resulting in muscle atrophy, spasticity (of upper motor neurons), and flaccidity (of lower motor neurons). In advanced stages of the disease, a wider spread of muscle weakness in the throat, neck, head, and shoulders occurs. Death commonly follows denervation of the respiratory muscles. This disease is known as:
- A. Amyotrophic lateral sclerosis
 - B. Multiple sclerosis
 - C. Myasthenia gravis
 - D. Muscular dystrophy
7. After 5 years of taking a cholinergic drug to reduce the symptoms of schizophrenia, Frank has developed tardive dyskinesia, a condition causing muscular spasms and involuntary motor movements such as lip smacking, tongue protrusion, head snapping, and jerking of the arms and legs. This disorder results from:
- A. An increased effect of acetylcholine (ach) at the neuromuscular junction due to long-term cholinergic drug use
 - B. Blockage of acetylcholine at the neuromuscular junction causing neurotransmitter fatigue and resulting in skeletal paralysis
 - C. Anoxia, or lack of oxygen, at the neuromuscular junction resulting in failed synaptic transmission and muscle weakness
 - D. Denervation of the ach receptors causing muscle atrophy and weakness
8. Mr. Stanilopolis recently fell. He told his therapist that he fell because he was not wearing his glasses. However, his daughter reports to the therapist that her father commonly walks with a broad-based gait, uses furniture in the home to help him stabilize his balance while walking, and frequently loses his balance in dim light and unlevel surfaces. The daughter also states that her father commonly complains of dizziness (vertigo), ear ringing (tinnitus), and decreased hearing. Upon examination, the therapist finds an abnormal presence of nystagmus. She suspects impairment of which neurological system?
- A. Visual system
 - B. Proprioceptive system
 - C. Vestibular system
 - D. Autonomic nervous system

9. In the above question, Mr. Stanilopolis's therapist administers the Romberg test to assess his balance. She asks Mr. Stanilopolis to stand with eyes closed, feet together, and shoulders flexed to 90 degrees (held in front of the body). Mr. Stanilopolis begins to sway and loses his balance. When using the Romberg test and removing visual cues, a patient's postural stability is based on:
- Vestibular and proprioceptive information
 - Reticular formation and cerebellar information
 - Parasympathetic and sympathetic nervous system information
 - Basal ganglia information
10. Ann and Amanda are in a car traveling to school. Amanda is a passenger in the front seat while Ann drives. Amanda is using this commuting time to catch up on reading for her classes. Fifteen minutes into the drive, Amanda begins to sweat and feel nauseated. She first attributes her discomfort to a lack of breakfast. Amanda continues to read but feels increasingly dizzy, faint, and nauseous. She tells Ann, who recognizes Amanda's condition as motion sickness and advises her to stop reading and instead watch the oncoming traffic. Ann recognizes that motion sickness is often caused by:
- An incongruence between proprioceptive and vestibular system signals reaching the cortex
 - Incongruent signals traveling to the cortex from the reticular activating and inhibiting systems
 - Parasympathetic nervous system dominance (over sympathetic nervous system activity)
 - An incongruence between visual and motion signals reaching the vestibular system
11. James has been in a persistent vegetative state for 5 days after an auto vehicle accident. Although an electroencephalogram indicates no cortical activity, James' vegetative functions (eg, temperature, heart rate, respiration, blood pressure, and gag and cough reflexes) continue to be maintained. The neurological system responsible for the control of vegetative functions is the:
- Vestibular system
 - Autonomic nervous system
 - parasympathetic nervous system
 - Sympathetic nervous system
12. Mr. Shibata has intense burning that extends down both legs. This condition is called _____ and is a form of _____.
- Causalgia; dysesthesia
 - Thermohypoesthesia; thermesthesia
 - Paresthesia; hyperalgesia
 - Allodynia; hyperalgesia

13. After a soccer injury in which 16-year-old Tommy injured his left shoulder and arm, he developed a chronic neurovascular disease characterized by debilitating pain, edema, restricted movement, and muscular atrophy in his left upper extremity. Tommy also experiences burning, stabbing, and throbbing sensations that make touch to his left upper extremity intolerable. This syndrome is called:
- A. Fibromyalgia syndrome
 - B. Causalgia
 - C. Stocking and glove syndrome
 - D. Complex regional pain syndrome
14. After an acute infectious illness, Mr. Benfenati has developed a progressive ascending muscular weakness in his limbs (flaccid paralysis occurs first in his lower extremities and progresses to his upper extremities), with a symmetric pattern. He also reports paresthesias and numbness in his distal extremities. After 1 month, Mr. Benfenati experiences a complete recovery. This disease process is called:
- A. Diabetes neuropathy
 - B. Poliomyelitis
 - C. Guillain-barré syndrome
 - D. Myasthenia gravis
15. After Alex's spinal cord injury, he can no longer feel sensation (discriminative touch, pressure, vibration, proprioception, and kinesthesia) at or below his injury level at T10. Which spinal cord tract is responsible for discriminative touch, pressure, vibration, proprioception, and kinesthesia?
- A. Dorsal columns
 - B. Lateral spinothalamic
 - C. Anterior spinothalamic
 - D. Cuneocerebellar
16. Alex, in the above question, has also lost his bilateral sense of pain and temperature at and below the lesion level. Which spinal cord tract is responsible for the sensation of pain and temperature?
- A. Dorsal columns
 - B. Lateral spinothalamic
 - C. Posterior spinocerebellar
 - D. Rostral spinocerebellar
17. Alex has no voluntary movement below T10. His lower extremity muscles are spastic; all reflexes in the lower extremities are hyperreflexive. Which spinal cord tract is responsible for voluntary movement?
- A. Medial longitudinal fasciculus
 - B. Vestibulospinal
 - C. Spinocerebellar
 - D. Corticospinal

18. After his auto vehicle accident, Lorenzo lies in a coma with his upper and lower extremities in spastic extension. This condition is called _____ and results from a lesion to the _____.
- Decorticate rigidity; corticospinal tracts
 - Decerebrate rigidity; corticospinal tracts
 - Decorticate rigidity; extrapyramidal spinal cord tracts in the brainstem
 - Decerebrate rigidity; extrapyramidal spinal cord tracts in the brainstem
19. Mr. Tomlinson had a right hemisphere stroke 2 weeks ago. When his therapist passively moves his left elbow joint into extension, the elbow joint is initially highly spastic and cannot be moved. With sustained stretch on the elbow flexors, the spasticity suddenly gives way and the elbow joint can be moved into extension. This type of spasticity is referred to as:
- Cogwheel rigidity
 - Lead pipe rigidity
 - Clonus
 - Clasp knife phenomenon
20. Mr. Okonjo has been diagnosed with Parkinson disease. When the therapist attempts to range his elbow joint, the joint resistance is jerky and characterized by a pattern of release/resistance. This type of rigidity is known as:
- Cogwheel rigidity
 - Lead pipe rigidity
 - Clonus
 - Clasp knife phenomenon
21. Mandeep's SCI occurred at level T6, and he uses a wheelchair for mobility. When his wife attempts to move his foot onto the footplate of the wheelchair, his ankle flexor muscles uncontrollably oscillate, causing his lower extremity to rhythmically jerk and spasm. This phenomenon is called _____ and can be reduced by _____.
- cogwheel rigidity
 - clonus
 - placing the spastic muscle (ankle flexors) on a sustained stretch, thereby facilitating the Golgi tendon organs
 - performing a quick stretch of the spastic muscles (ankle flexors) to facilitate the muscle spindles
- 1, 3
 - 2, 3
 - 1, 4
 - 2, 4

22. Mr. Kronberger is in a progressed stage of Parkinson disease. He has the type of hypertonicity in which his muscles are resistant to passive stretch on both sides of a joint and the resistance is not velocity dependent. This type of hypertonicity is called _____ and is caused by _____ motor neuron damage.
1. spasticity
 2. rigidity
 3. upper
 4. lower
- A. 1, 3
B. 1, 4
C. 2, 3
D. 2, 4
23. Mr. Choi has been diagnosed with a tumor in his right secondary somatosensory area. As a result, he has difficulty identifying objects with his left hand (with vision occluded). The umbrella term for this disorder is called:
- A. Tactile agnosia
B. Primary sensation
24. For example, when small objects are placed in Mr. Choi's left hand (with vision occluded), he cannot interpret them. This is called:
- A. Two-point discrimination
B. Agraphesthesia
C. Astereognosis
D. Atopognosia
25. Mrs. Malinowski has a tumor located in V4. She is able to accurately see and interpret objects when they are still. However, she is unable to interpret objects in motion (such as moving cars on a street). This is referred to as:
- A. Achromatopsia
B. Akinetopsia
C. Abarognosia
D. Topographical disorientation

26. Mrs. Novak had a left cerebral hemisphere stroke located in the inferior gyrus of the premotor area. She can understand language that is spoken to her, but when she tries to respond, she cannot form meaningful sentences. This type of aphasia is called _____.

1. Broca aphasia
2. Wernicke aphasia
3. receptive aphasia
4. expressive aphasia

- A. 1, 3
- B. 2, 3
- C. 1, 4
- D. 2, 4

27. Mr. Owusu sustained a left hemisphere middle cerebral arterial stroke. He may experience all of the following except for which one?

- A. Right side hemiplegia and hemiparesthesia
- B. Cognitive impairment
- C. Affective (emotional) involvement
- D. Ataxic gait

28. Ms. Brayden had a cerebrovascular accident caused by an occlusion to the superior cerebellar arteries. She may experience all of the following except for which one?

- A. Ataxic gait
- B. Hypotonicity and hyporeflexia
- C. Dysmetria and nystagmus
- D. Loss of pain and temperature on the contralateral side

29. E's doctors ordered this test after he was admitted to the emergency room with an acute spinal cord injury. This test uses magnets and radio waves to detect subtle electromagnetic fields in soft tissue. This test can provide high resolution images of Mateo's injury level and is called:

- A. Positron emission tomography
- B. Magnetic resonance imaging
- C. Single photon emission tomography
- D. Computed tomography

30. Mr. Polito has been diagnosed with myasthenia gravis. This disease is caused when the body inappropriately produces antibodies against a specific neurotransmitter receptor site. This neurotransmitter is stored in the neuromuscular junction and is responsible for musculoskeletal movement. When this neurotransmitter is inhibited, muscle weakness and fatigue occur. This neurotransmitter is called:
- A. GABA
 - B. Dopamine
 - C. Norepinephrine
 - D. Acetylcholine

SECTION B: SHORT ANSWER QUESTIONS (SAQ)

20 MARKS

ANSWER ALL QUESTIONS. Each question is 5 marks

1. Describe training techniques in autonomous stage of motor learning (5 marks)
2. What are the components of the motor pathway responsible for her shuffling gait Parkinson's, and describe how the pathology results in this impairment (5 marks)
3. Your patient is a 72-year-old woman admitted to the hospital for the second time in 2 weeks. The first admission was 10 days ago due to a fall with subsequent internal bleeding. At that time her anticoagulant therapy (Coumadin for atrial fibrillation and previous transient ischemic attack [TIA] for 5 years) was discontinued, she stabilized, and was discharged home after the fifth day. The physician did not resume Coumadin due to the risk for falls and bleeding. She was admitted yesterday via the emergency department with a diagnosis of left anterior cerebral artery (ACA) cerebrovascular accident (CVA). Based on her history, was this more likely a hemorrhagic stroke or an infarct? Explain your answer (5 marks).
4. Describe the withdrawal reflex (5 marks)

SECTION C: LONG ANSWER QUESTIONS (LAQS)
ANSWER ANY TWO QUESTIONS

20 MARKS

1. A). Discuss the different spinal cord injury syndromes (5 marks)

B). Describe the stimulus, response, and number of synapses involved in the phasic stretch reflex (5 marks)

2. A). Define akinesia/hypokinesia, rigidity, freezing, visuoperceptual impairments, postural instability, resting tremor, and hyperkinesia. (7 marks)
B). Compare changes in neural activity in Parkinson's disease with Huntington's disease (3 marks)

3. Your patient is a 72-year-old woman admitted to the hospital for the second time in 2 weeks. The first admission was 10 days ago due to a fall with subsequent internal bleeding. At that time her anticoagulant therapy (Coumadin for atrial fibrillation and previous transient ischemic attack [TIA] for 5 years) was discontinued, she stabilized, and was discharged home after the fifth day. The physician did not resume Coumadin due to the risk for falls and bleeding. She was admitted yesterday via the emergency department with a diagnosis of left anterior cerebral artery (ACA) cerebrovascular accident (CVA).
 - a) Contrast the impairments in strength you would expect from an ACA CVA with those resulting from a middle cerebral artery (MCA) (2 marks)
 - b) What do you expect to find when you assess her somatosensation? Why? (6marks)
 - c) Which of her limbs is likely to develop hypertonicity and hyperreflexia? (2 marks)