

## 2021 NEUROSCIENCE TEST 2

SECTION A. IN QUESTIONS 1-70. SELECT ONE BEST ANSWER FOR EACH QUESTION.

1. Idiopathic parkinsonism develops when there is reduction in which neurotransmitter?
  - a) Glutamate
  - b) Serotonin
  - c) GABA
  - d) Dopamine
2. Which of the following drugs may induce parkinsonism syndromes?
  - a) Dopamine receptor antagonists
  - b) Monoamine oxidase inhibitors
  - c) Catechol- O -Methyltransferase Inhibitors
  - d) Amantadine
3. All of the following are the goals of therapy in parkinson's disease except:
  - a) Increase dopaminergic activity
  - b) Reduce cholinergic activity
  - c) To provide control of signs and symptoms for as long as possible
  - d) Cure the disease
4. Which of the following statements is correct concerning the best drugs to use for long term management of parkinsonism
  - a) Levodopa and peripheral decarboxylase inhibitor
  - b) Anti-muscarinic drugs only
  - c) Dopamine agonists only
  - d) Monoamine oxidase inhibitors and anti-muscarinic drugs
5. Which of the following drugs is best to use for early symptomatic management of 1-methyl-4-phenyl-1-,2,3,6-tetrahydropyridine (MPTP) induces parkinsonism
  - a) Rasagiline
  - b) Catechol- O -Methyltransferase Inhibitors
  - c) Acetylcholine-Blocking Drugs
  - d) Apomorphine
6. Which of the following drugs used in the management of parkinsonism are most likely to induce drug interactions
  - a) Levodopa
  - b) Apomorphine
  - c) Selegiline

- d) Amantadine
7. All of the following statements about the dopamine receptor agonists is correct except:
- a) Have lower incidence of the response fluctuations and dyskinesias unlike levodopa therapy
  - b) May be used for treatment of patients with parkinsonism who are taking levodopa and have end-of-dose akinesia
  - c) Treatment of patients with parkinsonism who are becoming resistant to treatment with levodopa
  - d) Has more adverse effects than levodopa
8. Long term levodopa use may lead to all of the following except:
- a) "Wearing off phenomenon"
  - b) "On-off phenomenon"
  - c) Increase in anti-parkinsonism effects of levodopa
  - d) Dyskinesias and dystonias
9. All of the following statements concerning the pharmacological attempts in the managements of parkinsonism disease except:
- a) Restore dopaminergic activity
  - b) Alleviate many of the motor features of the disorder
  - c) Restore the normal balance of cholinergic and dopaminergic influences on the basal ganglia
  - d) Stop the progress of the disease
10. Which of the following drugs used in the management of Parkinsonism should be used with care in patients with a history of seizures and heart failure?
- a) Acetylcholine-Blocking Drugs (Biperiden)
  - b) Amantadine
  - c) Apomorphine
  - d) Entacapone
11. Which of the following correctly matches the classification of skeletal muscle relaxants and the drugs under each class
- a) Drugs acting centrally – benzodiazepines
  - b) Drugs acting peripherally at the neuromuscular junction (competitive blockers) – Succinylcholine
  - c) Drugs acting peripherally at the neuromuscular junction (non-competitive blockers) - atracurium
  - d) Drugs acting directly on skeletal muscle: baclofen
12. Which of the following is a correct benefit of the use of synthetic competitive NMJ blockers over tubocurarine
- a) Blocks the autonomic ganglia
  - b) Does not affect histamine release

- c) Cause less or no hypotension
  - d) Increases histamine release
13. Which of the following drugs may be used to block the action of neuromuscular junction blockade?
- a) Neostigmine
  - b) Alcuronium,
  - c) Gallamine
  - d) Suxamethonium
14. Which of the following statements is correct about flaccid paralysis caused by the use of the muscle cells caused by succinylcholine
- a) Flaccid paralysis refers to the depolarizes the skeletal muscle membrane
  - b) Flaccid paralysis occurs when muscle cells becoming unresponsive to further stimulation
  - c) Flaccid paralysis refers to muscular fasciculations and twitching
  - d) Flaccid paralysis occurs due to rapid metabolism of succinylcholine by pseudocholinesterases.
15. The following is an adverse effect of Succinylcholine
- a)  $\uparrow$  intraocular pressure
  - b) hypokalemia
  - c) hypothermia
  - d) Tachycardia
16. Neuromuscular junction blockers are used for all of the following except:
- a) Adjuvant to general anaesthesia to induce muscle paralysis
  - b) Used during endotracheal intubation
  - c) Intermediate acting and long-acting agents are used to provide muscle contraction during surgery
  - d) Useful in procedures such as laryngoscopy
17. What is the mode of action of the direct acting muscle relaxants, called dantrolene?
- a) Depresses the monosynaptic and polysynaptic reflexes in the spinal cord
  - b) Facilitate GABA activity
  - c) Inhibits muscle contraction by preventing calcium release from the sarcoplasmic reticulum
  - d. Acts by inhibiting the release of acetylcholine from motor nerve terminals resulting in flaccid paralysis of skeletal muscles

18. Which of the following is a drug of choice for treatment of malignant hyperthermia?
- a) Botulinum toxin
  - b) Succinylcholine
  - c) Pancuronium
  - d) Dantrolene
19. Drug tolerance refers to
- a) Decrease in response to the drug effects thereby giving the need to progressively increase the dose to produce the original effect
  - b) An increase in response to the drug effects thereby giving the need to progressively decrease the dose to produce the original effect
  - c) To a decreased disposition of the drug after chronic use
  - d) An inability to compensate for the drug's effects
20. All of the following are CNS stimulants except:
- a) Cocaine,
  - b) Amphetamines,
  - c) Nicotine
  - d) Cannabis
21. Which of the following is a CNS depressant
- a) Methylene-dioxy-methamphetamine (MDMA, Ecstasy),
  - b) Benzodiazepines
  - c) Pethidine
  - d) Fentanyl
22. Which of the following can alleviate the symptoms of nicotine tolerance and dependence
- a) Amphetamine
  - b) Cocaine
  - c) Barbiturates
  - d) Fentanyl
23. All of the following may be used in the treatment of alcohol withdrawal symptoms **EXCEPT**:
- a) Benzodiazepines
  - b) Propranolol as an adjunct to benzodiazepines,
  - c) Clonidine
  - d) Bupropion
24. All of the following drugs are used in treatment of alcohol abuse except:
- a) Naltrexone
  - b) Acamprosate
  - c) Selegiline
  - d) Disulfiram



25. Which of the following drugs are used in the treatment of opioid dependence

- a) Mescaline
- b) Psilocybin
- c) Methadone
- d) Clonidine

26. All of the following drugs are used in the treatment of the manic phase of bipolar disorder except;

- a) Anti-psychotic drugs
- b) Carbamazepine
- c) Lithium
- d) Anti-depressants

27. All of the following are used as mood stabilizers in bipolar disorder except:

- a) Fluvoxamine
- b) Valproate
- c) Gabapentin
- d) Lithium

28. Which of the following antidepressant drugs are preferred in the treatment of unipolar depressive episodes and the depressive phase of bipolar disorder in the elderly?

- a) Tricyclic anti-depressants (TCAs)
- b) Selective serotonin reuptake inhibitors (SSRIs)
- c) Monoamine oxidase inhibitors (MAOIs)
- d) Atypical anti-depressants

29. All of the following are mechanisms by which antidepressant drugs work EXCEPT:

- a) Increase cyclic AMP
- b) Reduction (down-regulation) of post-synaptic beta-adrenoceptors
- c) Increased responsiveness of post-synaptic serotonin 5-HT<sub>1A</sub> receptors
- d) Desensitization of presynaptic noradrenaline and serotonin auto-receptors

30. Which of the following drugs may induce suicidal ideation in children, adolescents and young adults

- a) Tricyclic anti-depressants (TCAs)
- b) Monoamine oxidase inhibitors (MAOIs)
- c) Selective serotonin reuptake inhibitors (SSRIs)
- d) Atypical anti-depressants

31. All of the following statements are true about antipsychotic drugs except:
- a) Relieve psychotic symptoms but do not cure the underlying condition
  - b) Long term use of anti-psychotic drugs can stop episodes of psychosis
  - c) Anti-psychotic drugs can reduce or relieve symptoms of psychosis such as delusions and hallucinations
  - d) Are known as neuroleptic drugs
32. Which of the following is a mechanism of action of antipsychotic drugs
- a) Blockade of the post-synaptic beta-adrenoceptors and cyclic AMP
  - b) Blockade of dopamine (D2 and D4) and/or 5-HT<sub>2</sub> receptors
  - c) Inhibition of the monoamine oxidase (MAO)
  - d) Inhibition of the inositol monophosphate
33. All of the following are indications of lithium therapy **EXCEPT**:
- a) Tourette syndrome
  - b) Prophylaxis and treatment of bipolar disorder
  - c) Prophylaxis and treatment of acute mania
  - d) Prophylaxis of resistant recurrent depression
34. All of the following are adverse effects of the blockade of dopamine D<sub>2</sub> receptors **EXCEPT**:
- a) Parkinsonism
  - b) Hyperprolactinaemia
  - c) Weight loss
  - d) Sedation, weight gain
35. Which of the following is true concerning the second generation neuroleptics
- a) Are effective in suppressing both positive and negative symptoms of schizophrenia
  - b) Have higher incidence of adverse motor effects and endocrine effects
  - c) Blocks only the 5-HT<sub>2</sub> receptors
  - d) Are classified as either High potency or low potency neuroleptics
36. In the management of dementia all of the following drugs may be used **EXCEPT**:
- a) Acetylcholinesterase inhibitors
  - b) Antipsychotic drugs
  - c) Sedatives
  - d) Memantine

37. The medical treatment for Alzheimer Disease include all of the following **EXCEPT**

- a) Cholinesterase inhibitors and memantine
- b) Neuroleptics,
- c) Beta-blockers
- d) Anti-muscarinic drugs

38. Which of the following statements is correct concerning the mode of action of memantine in the treatment of dementia?

- a) Blockade of NMDA receptors
- b) Inhibition of cholinesterase
- c) Blockade of dopamine receptors
- d) Block reuptake of noradrenaline

39. All of the following is correct concerning the medical treatment for AIDS Dementia Complex (ADC) **EXCEPT**:

- a) In advanced HIV with ADC - ART can partially or completely reduce symptoms of ADC
- b) Antidepressant drugs may improve symptoms of depression
- c) Antipsychotic drugs may help improve severe agitation or aggression, hallucinations, or delusions.
- d) Use of sedatives like Benzodiazepines

40. All of the following concerning antidepressant drugs is correct **EXCEPT**:

- a) All antidepressants have similar therapeutic efficacy
- b) Selection of antidepressant drugs is based on many factors including patient co-morbidities, associated adverse effects, drug interactions.
- c) Antidepressant drugs have delayed therapeutic efficacy effects seen after 2-4 weeks
- d) All the patients respond similarly to the various antidepressant drugs.

41. The primary motor cortex:

- (a) Receives no sensory input
- (b) Is active in the adjustment of motor activity to current sensory input
- (c) Is not necessary for fine motor movement
- (d) Gives rise to the extrapyramidal tract
- (e) Is localized only in the frontal lobe

42. The functions of the basal ganglia include:

- (a) The inhibition of muscle tone if they are all stimulated
- (b) Coordinate fine movements of the digits
- (c) The globus pallidus is not involved in setting background muscle tone
- (d) The caudate nucleus and putamen inhibit gross motor movement
- (e) B and D are correct

43. The pyramidal tract:

- (a) Is composed solely of axons from pyramidal cells
- (b) Is a crossed pathway
- (c) Projects solely to the thalamus
- (d) Originates from several areas of the cortex including area 4, frontal lobe, and the parietal lobe
- (e) B and D are correct

44. Which of the following functions are not attributable to the level of the spinal cord and/or lower brain?

- (a) Walking motions
- (b) Reflex control of blood vessels
- (c) Equilibrium
- (d) Subconscious activities
- (e) None of the above

45. Which of the following are not located in the anterior horn of the spinal cord?

- (a) Anterior motor neurons
- (b) Interneurons
- (c) Gamma motor neurons
- (d) Alpha motor neurons
- (e) None of the above

46. A lesion of which of the following structures may result in incoordination, reduced postural tone, and pendular phasic stretch reflexes?

- (a) Midbrain locomotor system
- (b) Motor cortex
- (c) Premotor cortex
- (d) Cerebellum
- (e) Superior colliculus

47. An alpha- motoneuron that innervates a postural muscle such as the soleus muscle:

- (a) Is excited mono synaptically by Golgi tendon organ afferents
- (b) Forms endplates on 3 to 6 skeletal muscle fibers
- (c) Contributes to the patellar reflex
- (d) Belongs to a fast fatigable motor unit
- (e) Is inhibited disynaptic when the antagonist muscle is stretched

48. Lesions that produce complete inhibition of fear responses and loss of emotion can often be seen in lesions involving the:

- (a) Sensory cortex
- (b) Amygdaloid nuclei



- (c) Olfactory lobes
- (d) Medulla oblongata
- (e) None are correct

49. Premotor cortex project to brainstem is concerned with all EXCEPT:

- a) Posture control
- b) Fine movement
- c) Provides partly to corticospinal output
- d) Partly corticobulbar output
- e) All of the above

50. Babinski's sign is produced by damage to :

- a) Lateral corticospinal tract
- b) Medial corticospinal tract
- c) Anterior corticospinal tract
- d) None of the above
- e) All of the above

51. After falling down a flight of stairs, a young woman is found to have a partial loss of voluntary movement on her right side and loss of temperature with pain on left side below midthoracic level. The lesion probably is transaction at:

- a) Lumbar spinal cord
- b) Pons-right side
- c) Thoracic spinal cord-left
- d) Right half of thoracic spinal cord
- e) None of the above

52. Concerning the Cerebellum

- a) Provides timing signals
- b) Motor learning
- c) Has an overall inhibitory output to the upper motor neurons
- d) Sends error signals to the rest of the cortex
- e) All the above are true

53. The Pyramidal system

- a) Made up of axons whose cell bodies are in the frontal lobe
- b) Corticospinal tract is an uncrossed pathway
- c) Corticobulbar fibres descend to the spinal cord
- d) Controls distal muscles
- e) None of the above is true

54. The functions of the basal ganglia include:

- (a) The inhibition of muscle tone if they are all stimulated

- (b) Coordinate fine movements of the digits
- (c) The globus pallidus is not involved in setting background muscle tone
- (d) The caudate nucleus and putamen inhibit gross motor movement
- (e) B and D are correct

55. Which one is not a feature of the central nervous system of mammals?

- (a) Spinal cord
- (b) Cerebral cortex
- (c) Sympathetic post-synaptic neuron
- (d) Cerebellum
- (e) Brain stem

56. The hypothalamus is associated with:

- (a) Food intake
- (b) Perception
- (c) Water control
- (d) Appropriate integration and control of cardiovascular regulation
- (e) All of the above

57. In the vestibular apparatus:

- (a) The fluid in the vestibular apparatus is separate from that in the scala media
- (b) Small collections of calcium carbonate crystals are found in the cupola of the semicircular canals
- (c) Linear acceleration is sensed by the sacculus and utricles
- (d) A nodding movement of head is detected by the semicircular canals
- (e) A and D are correct

58. All belong to the limbic system except:

- a. Diencephalon
- b. Basal ganglia
- c. Corpus callosum
- d. Hippocampus
- e. Dentate nucleus

59. Amygdala's main function is:

- a. Homeostasis
- b. Olfaction
- c. Memory
- d. Emotions and drives
- e. Vestibular function

60. The hippocampal formation is responsible for

- a) Short term memory
- b) Retrieval of information from long term memory
- c) Working memory
- d) Consolidation of recent memories into long term memories
- e) None of the above

61. A corticospinal neuron in primary motor cortex can do all of the following EXCEPT

- a. Project to multiple motor neuron pools in the spinal cord
- b. Participate in the initiation of movement
- c. Code for the direction of movement
- d. Code for the extent of the movement
- e. All of the above

62. Concerning the motor cortex. All the following are correct EXCEPT

- a. Contains cell bodies for the upper motor neurons
- b. Is located in the precentral gyrus
- c. Contains the somatosensory cortex
- d. The premotor cortex is responsible for executive functions
- e. Damage to the posterior parietal cortex can result in a number of apraxias (inability to make complex coordinated movements)

63. All of the following statements about the basal ganglia are correct EXCEPT

- a. The net effect of excitation of the direct pathway is to inhibit the cortex
- b. Dopaminergic neurons of the substantia nigra signal unexpected reward or unexpected absence of reward
- c. The basal ganglia have both motor and cognitive functions
- d. The Subthalamic nucleus is the origin of the only purely excitatory pathway within the basal ganglia intrinsic circuitry
- e. Parkinson's disease results from damage to the dopaminergic neurons

64. The following are common in cerebellar damage EXCEPT

- a. Nystagmus
- b. Delay in initiating movements
- c. Impaired ability to estimate time movements
- d. Intention tremors
- e. Resting tremors

65. Classic conditioning is an example of

- a) Semantic memory
- b) Episodic memory
- c) Implicit memory

- d) Declarative memory
- e) Non associative memory

66. The following vestibular ocular reflex (VOR) depends on the following EXCEPT

- a) Trochlear nucleus
- b) Medial longitudinal fasciculus
- c) Nystagmus
- d) Superior vestibular nucleus
- e) Lateral vestibular nucleus

67. Which of the following hypothalamic nuclei is most important for encoding the set point for daily circadian rhythms?

- a) Supraoptic nucleus
- b) Arcuate nucleus
- c) Suprachiasmatic nucleus
- d) Preoptic anterior nucleus
- e) Paraventricular nucleus

68. The lateral corticospinal tract

- a) Undergoes a 50% decussation in the caudal medulla
- b) Arises exclusively from the primary motor cortex
- c) Is an uncrossed pathway
- d) Plays a major role in the fine control of distal musculature
- e) Terminates primarily in the posterior (distal) horn

69. Regarding the premotor cortex. All of the following are correct EXCEPT

- a) Neurons signal the preparation for movement (motor planning)
- b) Neurons signal various sensory aspects associated with particular motor acts
- c) Is sensitive to the behavioural context of a particular movement
- d) Signals correct and incorrect actions
- e) None of the above

70. Regarding the basal ganglia

- a) The striatum is the main output of the basal ganglia
- b) The major outputs of the basal ganglia are the globus pallidus internal segment and the substantia nigra pars reticulata
- c) The nuclei of the basal ganglia exclusively also form the limbic nuclei
- d) Loss of dopaminergic neurons lead in the substantia nigra pars compacta leads to huntington's chorea
- e) All the above are correct



SECTION 1

In questions 71 – 85 each consists of a stem and four statements. Write 'T' or 'F' if the statement is true/false respectively against the letter a, b, c, d, corresponding to the statement. Each question carries 2 marks.  $\frac{1}{4}$  mark will be deducted for incorrect judgment.

71. The hair cells in the semicircular canals are stimulated by:

- (a) Movement of the perilymph
- (b) Linear acceleration
- (c) Gravity
- (d) Movement of endolymph relative to hair cells

72. Poor balance is more likely when there is:

- (a) Semicircular canal rather than cochlear damage
- (b) Spinothalamic tract rather than posterior column damage
- (c) Dim rather than bright light
- (d) Recent rather than long-standing destruction of one labyrinth

73. The cerebellum receives its information concerning muscle movement from the:

- (a) Cortex
- (b) Muscle spindles
- (c) Golgi tendon apparatus
- (d) Medulla

74. Lower motor neuron disease:

- (a) Causes loss of voluntary movements but not of reflex movements
- (b) Causes eventual wasting of muscles concerned
- (c) Does not affect ventilation of the lungs
- (d) Is associated with involuntary twitching of small fasciculi in the affected muscles

75. In the upper motor neurone lesion affecting one side of the body, the following abnormalities occur in the affected limb:

- (a) Wasting of muscles
- (b) Increased response to phasic stretch reflex
- (c) Greater weakness in the flexor muscles of the affected arm than extensors
- (d) Increased firing in the type of afferent fibres from the muscle

76. The lateral lobe of cerebellum (neocerebellum):

- (a) Integrates the vestibule – cerebello – spinal reflexes
- (b) Receives inflow from the cerebropontine fibres

- (c) Primarily integrates proprioceptive information from joints and ligaments received from the dorsal spino-cerebellar tract
- (d) Controls rapidly alternating voluntary movement

77. These areas of cerebral cortex are involved in the following functions:

- (a) The precentral gyrus of the frontal lobe and motor activity
- (b) The temporal lobe and the perception of light touch
- (c) The occipital lobe and visual field of the opposite side
- (d) The parietal lobe and the perception of speech

78. In the descending tracts in the spinal cord:

- (a) The lateral corticospinal tract extends laterally to the surface of the spinal cord
- (b) The vestibulospinal tract is a major crossed tract from the opposite vestibular nuclei
- (c) The vestibulospinal tract predominantly inhibits extensor motoneurons
- (d) Reticulospinal fibres are scattered throughout the anterior white columns

79. The ascending tracts in the spinal cord:

- (a) The fasciculus gracilis and cuneatus contain fibres that mediate tactile discrimination
- (b) The lateral spinothalamic tract carries vibration and pressure modalities
- (c) The spino-cerebellar tracts convey impulses from Golgi tendon organs
- (d) All afferent fibres cross the midline at some stage in the spinal cord

80. In which of the following tracts in the spinal cord do second-order sensory neurons with cell bodies in the dorsal horn ascend to more rostral spinal segments or to the brain?

- (a) Ventral corticospinal tract
- (b) Lateral spinothalamic tract
- (c) Anterior vestibulospinal tract
- (d) Ventral spinothalamic tract

81. Regarding the reticular formation and limbic system:

- (a) The reticular formation is a loose collecting of neurons and fibres extending through the brain stem
- (b) The only proven functions of the reticular formation are associated with wakefulness arousal, and posture control
- (c) The hypothalamus is the main outlet for limbic system
- (d) The amygdaloid nucleus is mainly concerned with memory

82.

In descending tracts in the spinal cord:

- (a) Reticulospinal fibres modulate voluntary movements and mediate control of unconscious movement
- (b) The vestibulospinal tract predominantly inhibits extensor motoneurons
- (c) Vestibulospinal tracts mediate control of conscious movement
- (d) The vestibulospinal tract is uncrossed it synapses on ipsilateral motoneurons

83. Concerning neural conduction:

- (a) Nodes of Ranvier are found only in myelinated nerves
- (b) In demyelinated conditions conduction rates are often increased
- (c) Compound action potentials increase as the stimulus is increased
- (d) Nodes of Ranvier contain a very large concentration of  $K^+$  channels

84. Regarding vestibular function:

- (a) The semicircular canals respond to all rotational positions of the head
- (b) Nystagmus is usually labeled in the direction of slow phase
- (c) Small changes in the volume of the endolymph cause an illusion of movement which is unrelated to the actual body/head position
- (d) Optokinetic nystagmus is typified by a slow involuntary oscillatory eye movement with a fast return

85. Cortical speech centers:

- (a) Wernicke's and Broca's areas are situated in same gyrus
- (b) Both sides of the brain are needed for sensible fluent speech
- (c) Destruction of Wernicke's area (sensory aphasia) impairs comprehension of written language
- (d) Destruction of Broca's area causes complete loss of speech while comprehension is retained

END OF TEST