

PGY

4110-

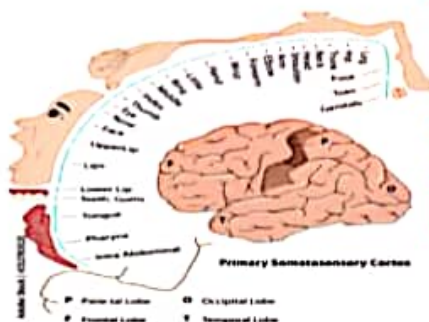
NEUROSCIENCES

HIGH YIELD AKA
PAPER

COMPILED BY *SIR
GIVEN M AND M.K
SHEPHERDS*



**The Effect of Limb Amputation
on the Somatosensory Homunculus**



75 Buspirone:

is an anxiolytic

- ☒ A. Is a sedative-hypnotic ☐
- ☒ B. Does not cause psychomotor retardation ☐
- ☒ C. Impairs cognitive functions ☐
- ☒ D. Acts by enhancing GABA ☐

✓76 Carbamazepine

- ☒ A. Is an anticonvulsant ☐
- ☒ B. Induces liver enzymes ☐
- ☒ C. Is a benzodiazepine ☐
- ☒ D. Is used to treat trigeminal neuralgia ☐

477 Side effects of chlorpromazine include:

- ☒ A. Diarrhoea ☐
- ☒ B. Parkinsonism ☐
- ☒ C. Postural hypotension ☐
- ☒ D. Bradycardia ☐

dopamine suppresses tncos

78 When levodopa is used to treat Parkinson's disease it:

- ☒ A. Has useful anti-emetic activity ☐
- ☒ B. May be combined with carbidopa to reduce peripheral metabolism of levodopa ☐
- ☒ C. Is converted into a false neurotransmitter ☐
- ☒ D. Can cause psychotic behaviour ☐

79 Concerning the pharmacotherapy of pain syndromes:

- ☒ A. Benzodiazepines have some benefit in the management of tension-type headache ☐
- ☒ B. Opioid analgesics are contraindicated in neuropathic pain ☐
- ☒ C. Hydrocortisone can be used to relieve the headache that arises due to tumour associated cerebral oedema ☐
- ☒ D. Valproate is very effective in relief of acute migraine headache ☐

80 Concerning psychotropic drugs:

- ☒ A. Cannabis overdose causes death by respiratory depression ☐
- ☒ B. Cocaine is a general central nervous system depressant ☐
- ☒ C. Nicotine causes psychomotor retardation ☐
- ☒ D. Phenobarbital is an effective antidote in diazepam overdose ☐

81 Concerning the cerebellum:

- ☒ (a) The axons of the Purkinje cells constitute the sole output of cerebellar cortex ☐
- ☒ (b) Each hemisphere connects with the opposite cerebral cortex ☐
- ☒ (c) There is no sensory loss, motor mental impairment in pure cerebellar disease ☐
- ☒ (d) A lesion of the vermis typically causes dyscoordination of the limbs ☐

6. In the natural progression of cerebrovascular accident (CVA):

- T(a) Hyperreflexia is typical in a completed CVA
- T(b) Hypertonia is especially marked in a pure 'pyramidal' lesion e.g. in the medullary pyramid
- F(c) Excellent recovery can be expected after a pure pyramidal lesion
- T(d) Aspirin definitely reduces incidence of stroke after a TIA

7. The thalamus: (non of grey matter)

- T(a) Plays an essential role in arousal
- F(b) Is important for cognition and awareness
- T(c) Acts as an important sensory relay station
- T(d) Has each half of the body represented topographically

8. In the cerebellum:

- T(a) The axons of the Purkinje cells constitute the sole output of the cerebellar cortex
- T(b) Each hemisphere connects with the opposite cerebral cortex
- F(c) There is no sensory loss, motor weakness, or mental impairment in pure cerebellar disease
- T(d) A lesion of the vermis typically causes dyscoordination of the limbs

9. Regarding the reticular formation (RF) and the limbic system:

- T(a) The only proven functions of the RF are associated with wakefulness, arousal, and posture control
- T(b) The hypothalamus is the main outlet for the limbic system
- F(c) The amygdaloid nucleus is mainly concerned with memory
- F(d) The hippocampus is important in behavioural disorders

10. Idiopathic Parkinson's disease (IPD):

- F(a) For clinical symptoms to arise the dopamine content of the striatum must be reduced by at least 50%
- T(b) The nigrostriatal pathway is the most severely affected in Parkinson's disease
- T(c) D2-receptors are increased in the striatum of untreated patients
- T(d) Dopamine inhibits cholinergic interneurons and stimulates GABAergic ones in the neostriatum

Regarding the structure of the eye:

- ☒ (a) The sclera is an intact fibrous layer (not pierced by vessels)
- ☒ (b) The sclera becomes continuous with the dura mater at the lamina cribrosa
- ☒ (c) The choroid blends gradually into the retina in front and the sclera behind
- ☒ (d) The choroid is highly pigmented

28. About the choroid:

- ☒ (a) It is one of the most vascular tissues in the body
- ☒ (b) It helps maintain the intraocular pressure (IOP)
- ☒ (c) It has a crucial role in stabilizing intraocular temperature
- ☒ (d) The papillary margin of the iris is the thinnest part of the iris

29. Ciliary body (CB) and lens:

- ☒ (a) The ciliary muscle is inserted into the posterior aspect of the suspensory ligament (zonule) of the lens
- ☒ (b) Ciliary muscle contraction directly reduces zonule elastic tension
- ☒ (c) Numerous sympathetic fibres supply the ciliary muscle
- ☒ (d) The posterior surface of the CB is grooved into about 70 folds (pars plicata)

30. In the retina:

- ☒ (a) All layers are derived from neural ectoderm
- ☒ (b) A photoreceptor is inhibited by its specific stimulus
- ☒ (c) A single bipolar cell often synapses with a single cone cell from the fovea
- ☒ (d) Ganglion cells are silent in the dark

31. Impairment of vision in:

- ☒ (a) Albinism can be related to a lack of melanin, e.g. in the iris and the pigment layer of the retina
- ☒ (b) Melanism can lead to blindness due to excess melanin in the pigment layer
- ☒ (c) Familial lipid degeneration, e.g. Tay-Sachs disease, is due to damage of rods and cones
- ☒ (d) Solar retinopathy occurs mostly in the peripheral fields of vision

17. Alprostadil in the management of erectile dysfunction
- A. Is contraindicated in men with hypogonadism
 - ☒ B. Is contra-indicated in patients with sickle cell disease ✓
 - C. Intra-urethral administration is more effective than intra-cavernosal injection
 - D. Not widely used due to the severe hypotension it causes
18. Which of the following cancers is most chemosensitive?
- ☒ A. Choriocarcinoma
 - B. Cancer of the cervix
 - C. Malignant melanoma
 - D. Hepatocellular carcinoma
19. For which of these malignant disorders is chemotherapy the primary therapeutic modality for localised tumours?
- A. Breast carcinoma
 - B. Bladder carcinoma
 - ☒ C. Wilm's tumour
 - D. Cancer of the pancreas
20. Which of these cytotoxic drugs acts by inhibiting microtubule function?
- A. Chlorambucil
 - ☒ B. Vincristine ✓
 - C. Methotrexate
 - D. Etoposide
21. Which of these cytotoxic drugs is a folate antagonist?
- A. Cyclophosphamide
 - B. Doxorubicin
 - C. Hydroxyurea
 - ☒ D. Methotrexate ✓
22. The cytotoxic drug of choice for choriocarcinoma is:
- A. Vincristine
 - ☒ B. Methotrexate ✓
 - C. Daunorubicin
 - D. Cyclophosphamide
23. For which of these malignant disorders is prednisolone most useful as part of the regimen to cure the cancer?
- ☒ A. Acute lymphocytic leukaemia ✓
 - B. Prostate cancer
 - C. Breast cancer
 - D. Lung cancer
24. Which of these cytotoxic drugs is least toxic to the bone marrow?
- A. Doxorubicin
 - B. Busulfan
 - C. Cyclophosphamide
 - ☒ D. Vincristine ✓

SECTION A (30 Marks)

Q1. Using this format describe the physiology of neurotransmitters (15 Marks)

Name	Place of synthesis and their activities	Physiological effects
------	---	-----------------------

Q2. Response of effector organs to autonomic nerve impulses and circulating neurotransmitters (15 marks)

Part A

Effector organs	Noradrenergic Impulses	
	Receptor Type	Responses
I. Heart:		
a) S-A node	β_1, β_2	Increased firing of Action Potential
b) Atria	β_1, β_2	Increased Conduction
c) A-V node and conduction system	β_1, β_2	Increased conduction and contractility
d) Ventricles	β_1, β_2	Increased contractility and conduction
II. Arterioles:		
a) Coronary, Renal, Pulmonary, Abdominal	α_1, α_2	Constriction
b) Skin and Mucosa, salivary glands, Cerebral	β_2	Dilation
III. Systemic Veins:	α_1, α_2	Constriction
IV. Lung:	β_2	Dilation
a) Bronchial Muscles	α_1, β_2	Relaxation Constriction

3. The condition known as REM (Rapid Eye Movement) sleep is:

- (a) That point at which the individual becomes aware and alert
- (b) Characterized by slow high-voltage regular EEG activity
- ☒ (c) Referred to as paradoxical sleep
- (d) Related to EEG patterns seen in comatose patients
- (e) Characterized by total lack of all muscular activity

4. Cortical speech centres:

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

5. The Thalamus:

- ☒ (a) Acts as an important sensory relay station
- (b) Has each half of the body represented topographically
- (c) After infarcting can have spontaneous excessive pain
- (d) Is important for cognition and awareness
- ☒ (e) All are correct

SECTION D (15 questions, 30 Marks)

For each question write down T (True) or F (False). 2 marks will be given for right judgement and ½ mark will be deducted for wrong judgement.

Tractus vestibulospinalis and tractus reticulospinalis medialis:

- F (a) Stimulate the alpha- and beta-fibers of the flexor muscles
- T (b) Stimulate the alpha- and beta-fibers of the extensors muscles T
- T (c) Inhibits the flexor muscles T
- F (d) Inhibits the extensors muscles

In the area of skin supplied by a peripheral nerve, following transaction of the nerve:

- F (a) Touch sensation is lost but pain sensation remains
- F (b) Pain and temperature sensation are lost but touch remains
- F (c) Sensation remains normal
- T (d) All types of sensation are lost T

1009 1.0 + 18.75

SECTION C: MULTIPLE CHOICE QUESTIONS - ONE CORRECT ANSWER 40 MARKS

Circle the answer of your choice. Each question carries 1 mark. No penalty for any wrong answer

- The stretch reflex:
 A the receptor organ is the extrafusal muscle fiber
 B it does not normally respond to very minor degrees of stretch
 ✓ C the muscle spindles involved in this reflex are most plentiful in the large antigravity muscles
 D the gamma-efferent fibers that supply the spindles are unmyelinated
 E none of the above

- In spinal shock:
 A the duration is a function of cerebral dominance
 B bladder function is lost
 ✓ C A and B are correct
 D noxious stimuli applied to the skin after spinal transaction evokes flexion response immediately
 E all are correct

- The dermatome rule is used: *(A form that visceral pain is referred to dermatomes supplied by the same plexus)*
 A clinically by physicians to determine level of pain perception
 ✓ B to explain referred pain
 C to discern the slow pain response
 D to determine the extent of cutaneous tissue damage
 E A and C are correct

- Which of the following is/are not part of the analgesia system?
 A periaqueductal gray matter *3rd ventricle*
 ✓ B periventricular nuclei of the hypothalamus *(in mesencephalon) at upper part*
 C raphe magnus nucleus *secret*
 D lateral spinothalamic tract *spinal cord in sacrum*
 ✓ E A and C are correct *local anal vesicles to secrete Catecholamine*

- 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

- Synaptic innervations of a number of cells by one fiber is an example of:
 A convergence
 B chronaxie
 ✓ C rheobase
 D divergence
 E reverberation

NEUROPHARMACOLOGY

Drugs used in the management of affective disorders

- Develop a pharmacotherapy plan for a patient with depression
- Compare the side effect profiles of various antidepressant drugs
- Recommend appropriate therapy for patients with acute mania
- List the parameters for monitoring anti-epileptic drugs used in the treatment of bipolar disorder
- A patient is taking tranylcypromine. What advice would you give him regarding food and drugs?

Anti-psychotic drugs

- Describe how you would manage an acutely psychotic patient with appropriate pharmacotherapy
- Discuss the management of the adverse effects of anti-psychotic drugs
- Discuss the role of atypical anti-psychotic drugs in the treatment of schizophrenia

Anti-epileptic drugs

- Seizure medications can be withdrawn after a certain seizure-free interval. Comment on this statement. How should the withdrawal be done?
- What are the different types of seizures based on clinical presentation? List the recommended drugs of choice and alternative therapies for different types of seizures. Describe the mechanisms of actions for anti-epileptic activity of all the drugs that you mention
- List the most common adverse effects and monitoring parameters for drugs used in the management generalized tonic clonic seizures
- Describe major drug-drug interactions between phenytoin and other drugs
- Discuss potential drug-related problems for established and new anti-epileptic drugs
- Based on patient characteristics, describe how you would develop an appropriate pharmacotherapy plan for treatment of partial seizures
- Outline the drug management of status epilepticus

Parkinson's Disease

- Describe how you would develop an optimal pharmacotherapeutic plan for a patient with Parkinson's Disease. What treatment options are available?
- Comment on the use of apomorphine in the treatment of Parkinson's Disease
- What information would you give to a patient with Parkinson's Disease about the disease and drug therapy?

Drug management of pain

- List the predictable side effects of opioids and describe how they should be managed.
- What would be your approach to pain control in a heroin drug abuser who has developed a malignancy associated with continuous severe pain?
- Mention four groups of drugs that are used in the treatment of neuropathic pain. What are their mechanisms of action in analgesia? Give one specific example in each group

11. Which one of the receptors is responsible for monitoring the rate of muscle stretch?

- (a) Nuclear bag intrafusal fibers
- (b) Nuclear chain intrafusal fibers
- ☒ (c) Golgi tendon organs
- (d) Pacinian corpuscles
- (e) Ruffini corpuscles

12. 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

13. 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

14. 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 the left side below mid thoracic 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

15. Interruption of motor pathways in the internal capsule on one side of the body causes :

- ☒ (a) Spastic paralysis on opposite side of the body
- b) Spastic paralysis on same side of the body
- c) Loss of touch and pressure
- d) None of the above
- e) All of the above

27. Descending tracts reaches the spinal cord includes:

- ☐ (a) Cerebular tracts
- ☐ (b) Pyramidal tracts.
- ☐ (c) Corticobulbar tracts.
- ☒ (d) Vestibulospinal tracts.

28. In a living neurone at rest:

- ☐ (a) There is more sodium inside cell making the inside positive.
- ☐ (b) The entry of potassium ions is active.
- ☐ (c) Sodium entry is regulated by levels of extracellular calcium.
- ☐ (d) The rate of potassium exit depends on its lipid solubility.

29. Transmitters in somatic peripheral nervous system:

- ☒ (a) Acetylcholine
- ☐ (b) Noradrenaline
- ☐ (c) Glycine
- ☐ (d) Adrenaline

30. The sensation of high-frequency vibration is involved:

- ☐ (a) Golgi tendon organs.
- ☐ (b) Meissner's corpuscles.
- ☐ (c) Naked endings between cells.
- ☒ (d) Pacinian corpuscles.

21. Thermoperception: ✓ ✓

- ☐ (a) The end organs of Drause and Ruffini subserve cold and heat.
- ☐ (b) Thermoreceptors that respond to cold (cold spots) are more plentiful than those that respond to heat (hot or spots).
- ☐ (c) Maximal discharge from 'hot spots' is between $++40$ and 45°C .
- ☐ (d) Cold spots show a rapid discharge when the temperature exceeds $+45^{\circ}\text{C}$.

22. In the functioning of sensory Nerve endings: ✓

- ☐ (a) Free nerve endings are found innervation visceral structures.
- ☐ (b) Free nerve endings are found in the muscles.
- ☐ (c) Neissner's corpuscles are embedded in onion-like layers of connective tissue found in ligaments.
- ☐ (d) End bulbs of Krause are responsible for measurement of pressure

23. Concerning neural conduction:

- ☐ (a) The nodes of Ranvier are present in all nerves.
- ☐ (b) Nodes of Ranvier contain a very large concentration of Na^{+} channels.
- ☐ (c) In demyelinating conditions conduction rates are increased.
- ☐ (d) Compound action potentials increase as the stimulus is increased

24. Raising the skin temperature to 55°C activates:

- ☐ (a) Ruffini endings
- ☐ (b) Nociceptors
- ☐ (c) Merkel's cell endings.
- ☐ (d) Meissner's corpuscles

25. The rate and magnitude of muscle stretch are encoded by:

- ☐ (a) Golgi tendon organs.
- ☐ (b) Ruffini endings.
- ☐ (c) Muscle spindles
- ☐ (d) Pacinian corpuscles

26. Sensation:

- ☐ (a) Fine touch is transmitted in the dorsal columns.
- ☐ (b) All general sensory tracts synapse in the thalamus.
- ☐ (c) The post central gyres is not only sensory area.
- ☐ (d) The bagus is a mixed nerve.

6. The CSF:

- T (a) Helps maintain a constant intracranial volume.
- T (b) Removes waste products of cerebral metabolism.
- T (c) Has a nutritive role for the brain.
- ✓ F (d) Forms an hydraulic cushion, almost halving the virtual weight of the brain.

7. In the functioning of sensory nerve endings:

- T (a) There is an overlap between the specific receptors for different modalities (pain, temperature, touch, vibration, and pressure).
- F (b) Free nerve endings are found innervating individual cells.
- F (c) Free nerve endings are only found in the skin and surface epithelium.
- F (d) Meissner's corpuscles are embedded in onion-like layers of connective tissue found in dermal papillae.

8. In Chemical synaptic transmission:

- F (a) All synaptic clefts have much same width.
- F (b) Presynaptic vesicles only discharge into the cleft after an AP has arrived at the presynaptic terminal.
- F (c) Arrival of an AP at the presynaptic membrane allows Ca^{2+} to enter the cleft.
- T (d) NTs such as Ach, NA, and amino acids are made in axon terminals.

9. Changes in the postsynaptic membrane:

- F (a) Once there is a net transfer of cations from the cleft into the subsynaptic cytoplasm then a propagated AP is inevitable.
- F (b) In polysynaptic input (e.g. motoneuron in spinal cord) even an excess of one EPSP over inhibitory potentials (IPSPs) can produce a spike potential (AP) at the axon hillock.
- F (c) In the skeletal muscle end plate IPSPs exceed EPSPs when the muscle is at rest.
- T (d) Sensitivity to EPSPs is greater the greater the polarization of the membrane.

10. In reflex actions:

- F (a) The interval between the stimulus and the final effect is chiefly determined by the length of the afferent and efferent nerves.
- F (b) Spatial summation refers to simultaneous threshold stimulation of two or more nearby afferent nerves.
- T (c) Synapses are the first part of a reflex to become fatigued.
- T (d) Flexor reflexes are probably the most primitive of all reflexes.

11. Regarding reflexes:

- T(a) Tonic neck reflexes cause characteristic movements of the limbs in response to movements of the head.
- F(b) The red nucleus is very important in integrating postural reflexes in man.
- T(c) Superficial abdominal reflexes involve transmission via the spinal cord.
- F(d) The vagus (X) nerve is the afferent pathway for the gag reflex.

12. The stretch reflex:

- F(a) It does not normally respond to very minor degrees of stretch.
- F(b) The receptor organs the extrafusal muscle fibre.
- F(c) The muscle spindles involve in this reflex are most plentiful in the large antigravity muscles.
- F(d) The Y-efferent fibers that supply the spindles are unmyelinated.

13. In musculo-tendinous proprioception:

- F(a) Y-efferent activity only takes place in stretched muscle.
- F(b) Muscle spindles are essentially tension monitors in muscle.
- T(c) Golgi tendon organs respond to muscle vibration.
- T(d) Golgi tendon organs are silent when a muscle is at rest.

14. In descending tracts in the spinal cord:

- T(a) The lateral corticospinal tract extend laterally to the surface of the spinal cord.
- F(b) The vestibulospinal tract is a major crossed tract from the opposite vestibular nuclei.
- T(c) Reticulospinal fibres are scattered through out the anterior white columns.
- T(d) Reticulospinal fibres predominately excite flexor motoneurons.

15. In the ascending tracts in the spinal cord:

- T(a) The fasciculus gracilis and cuneatus contain fibres that mediate tactile discrimination.
- F(b) The lateral spinothalamic tract carries crude touch and pressure.
- T(c) The spinocerebellar tracts convey impulses form Golgi tendon organs.
- F(d) All afferent fibres cross the mid line at some stage in the spinal cord.

36 in descending tracts in the spinal cord:

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

37. Concerning neural conduction:

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

38. The cerebellum:

- F (a) Modifies the discharge of spinal motor neurons
- T (b) ✓ Is essential for finely coordinated movements
- T (c) ✓ Has an afferent input from the motor cortex
- T (d) ✓ Has an afferent input from muscle proprioceptors .

39 Which is the effect of damage to the motor area of the cerebral cortex?

- TF (a) There is paralysis of voluntary movements on the opposite side of the body
- FT (b) ✓ All movements are in-coordinated but there is no paralysis
- F (c) There is paralysis of voluntary movements on the same side of the body
- FT (d) ✓ Limbs on the opposite side are rigid but not paralysed

40. Cortical speech centers:

- F (a) Wernicke's and Broca's areas are situated in same gyrus
- F (b) Both sides of the brain are needed for sensible fluent speech
- F (c) Destruction of Wernicke's area (sensory aphasia) impairs comprehension of written language
- T (d) ✓ Destruction of Broca's area causes complete loss of speech while comprehension is retained

END OF TEST

SECTION B (60 MARKS)

Answer True (T) or False (F). A ½ Mark will be given for right judgement, and a ¼ Mark will be deducted for wrong judgement.

1. About the neuron:

- F (a) The soma or body lacks mitochondria
- F (b) The soma is quite resistant to oxygen lack.
- F (c) All nerve terminals can synthesize their own neurotransmitters (NTs).
- T (d) Unipolar cells have a single process that divides into an axon and a dendrite.

2. In the neuron:

- T (a) Mitochondria are distributed throughout both soma and axon.
- F (b) Information from dendrites is transmitted to axon hillock by cumulative electrical changes in the plasma membrane of the cell.
- F (c) Protein synthesis occurs throughout the soma and axon.
- T (d) There is no ability to replicate.

3. Within the CNS:

- F (a) Neuro-neuronal synapses are either axo-dendritic or axosomatic.
- F (b) Neuroglia is derived from mesoderm.
- F (c) Neuroglia contributes only a small proportion to the volume of the adult brain.
- F (d) Epithelial cells form a tight CSF-brain barrier similar to the vascular blood-brain barrier.

4. In the secretion and absorption of cerebrospinal fluid (CSF):

- F (a) CSF is actively secreted by the endothelial cells of the choroids plexus.
- T (b) There are tight junctions between the epithelial cells that line the choroids plexuses.
- T (c) The vascular endothelial cells in the choroid plexus are loosely bound.
- T (d) Absorption in venous sinuses is strictly unidirectional in normal people.

5. Volume and Composition of CSF:

- F (a) About half of the CSF is in the ventricles at any one time.
- T (b) CSF has a similar composition to plasma except for protein.
- F (c) CSF protein levels are about half that in plasma.
- F (d) CSF glucose level is more than in plasma.

CSF has a very similar composition to plasma except that it is almost protein-free.

- ✓ d) Hypokinetic movement and normal speech
- e) Damage to the medium spiny neurons in the striatum

✓ 56) Parkinsonism is associated with: the following except:

- a) Tremors and rigidity
- b) Hypokinesia
- c) Ataxia
- d) Unstable gait
- ✓ e) Numbness in the extremities

✓ 57) Which of the following best describes the activity in the cerebellum?

- a) Spinocerebellum- Balance and eye movement
 - ✓ b) Cerebrocerebellum- Motor execution (planning reviewed)
 - c) Vestibulocerebellum- Motor planning
 - d) Middle cerebellar peduncle- Afferent and efferent pathways
 - e) Superior cerebellar peduncle- Multiple parallel pathways
- Handwritten notes:*
 Spinocerebellum → status & position of individual group of muscles (proprioceptive)
 Vestibulocerebellum → balance & eye movement
 middle cerebellar peduncle → afferent & efferent

✓ 58) Which match best describes the activity in the basal ganglia

- a) Chorea- Lenticular nucleus
- ✓ b) Hemiballismus- Subthalamic nucleus
- c) Parkinsonism- corticostriatal pathway
- d) Chorea- caudate nucleus
- e) A and D are correct

✓ 59) The major source of input to the caudate nucleus is

- a) Globus pallidus
- b) Subthalamic nucleus
- c) Putamen
- d) Association areas of the cortex, like prefrontal cortex
- ✓ e) Motor and somatosensory cortex

60) Efferents from all of the following basal ganglia structures use inhibitory neurotransmitters except

- a) Caudate
- b) Putamen
- c) Globus Pallidus internal
- ✓ d) Subthalamic nucleus *near midbrain*
- e) Substantia nigra, pars reticulata

45. About the choroids:
- ☒ T (a) It is one of the most vascular tissues in the body
 - ☒ T (b) It helps maintain the intraocular pressure ✓
 - ☒ F (c) The papillary margin of the iris is the thinnest part of the iris
 - ☒ T (d) The iris is well supplied with sensory branches of the trigeminal nerve ✓

46. Impairment of vision in:
- ☒ T (a) Albinism can be related to a lack of melanin, e.g. in the iris and the pigment layer of the retina ✓
 - ☒ T (b) Melanism can lead to blindness due to excess melanin in the pigment layer
 - ☒ F (c) Solar retinopathy occurs mostly in the peripheral fields of vision
 - ☒ T (d) Retinal detachment occurs as the pigment layer and the rest of the retina separate

b) Tripsin and sphincter	Relaxation ✓	
Male sex organs	Erection ✓	
Pancreas	↑ Secretion ✓	
a) Acini		
b) Islets	↑ Insulin and glucagon ✓	

SECTION B. SHORT NOTES (20 MARKS)

Write short notes on four (4) of the following 6 questions. Each question carries 5 marks.

1. ✓ Chemical divisions of the autonomic nervous system (ANS)
2. Transmission in sympathetic ganglia.
3. ✓ Named all of the cranial nerves.
4. ✓ Cortical motor areas
5. Control of axial and distal muscles
6. ✓ Complications of spinal cord transection

SECTION C

In question 1 – 14 select the single best answer (14 Marks).

1. Interruption of the motor pathways in the internal capsule on one side of the body causes:-
 - a) Flaccid paralysis on the opposite side of the body.
 - b) Spastic paralysis on the same side of the body.
 - c) Loss of pain sensation on the same side of the body.
 - ✓ d) Spastic paralysis on the opposite side of the body.
 - e) Flaccid paralysis on the same side of the body.
2. A primary function of the basal ganglia is:
 - a) Slow-wave sleep
 - b) Sensory integration

origin
level of one
regulation
Upward in the brain
level of one

95. Regarding vestibular apparatus function:

- T (a) The semicircular canals respond to all rotational positions of the head
- T (b) Small changes in the volume of the endolymph cause an illusion of movement which is unrelated to the actual body/head position
- T (c) A detachment of mineral crystals in the vestibular apparatus is likely to cause vertigo plus tinnitus
- F (d) Optokinetic nystagmus is typified by a slow involuntary oscillatory eye movement ~~fast~~

96) In vestibular testing

- T (a) The sequence, sitting, then lying down; then turning the head from side to side produces, in normal children, mild to moderate vertigo/nystagmus
- F (b) As above: a sudden onset of vertigo/nystagmus indicates a central cause for the condition
- T (c) As above: Compound nystagmus (horizontal and rotary) occurs in patients with benign paroxysmal vertigo
- T (d) When lying with head-up tilt of 30° the 'horizontal canal' is in fairly true horizontal plane

97. The conea:

- F (a) Contains very few capillaries
- T (b) Is richly supplied with nerve fibres
- F (c) Transparency is due to its cells having no nuclei
- F (d) Has its outer lined by tight-junctioned columnar epithelium

98. Regarding the structure of the eye:

- F (a) The sclera is an intact fibrous layer (not pierced by vessels)
- T (b) The sclera becomes continuous with the dura mater at the lamina cribrosa
- F (c) The choroid blends gradually in to the retina in front of the sclera behind
- F (d) The choroid is highly pigmented

99. About choroid:

- T (a) It is one of the most vascular tissues in the body
- T (b) It helps maintain intraocular pressure (IOP)
- T (c) It has a crucial role in stabilizing intraocular temperature
- F (d) The papillary margin of the iris is the thinnest part of the iris

Iris is thinnest at its attachment to the ciliary and easily detaches in a condition called iridodialysis

100. Concerning the cerebellum

- T (a) Provides timing signals in voluntary movement
- T (b) Functions in motor learning
- T (c) Has an overall inhibitory output to the upper motor neurons
- T (d) Sends error signals to the rest of the cortex
- F (e) Contains medium spiny neurons in the deep cerebellar cortical structures

✓50 Damage to the Broca's area is known as

- a) Expressive aphasia - or motor aphasia
- b) Broca's aphasia
- c) Receptive aphasia
- d) B and C are correct
- e) A and B are correct ✓

Broca's aphasia is expressive aphasia

Wernicke's
- Sensory
- receptive
- Wernicke's aphasia

✓51 Autonomic ganglia refers to

- a) Axons of autonomic neurons
- b) Dendrite endings of autonomic postganglionic neurons
- c) Cell bodies of autonomic neurons ✓
- d) Neurotransmitters in autonomic nervous system
- e) None of the above

✓52 The cranial nerve nuclei that contain parasympathetic preganglionic neurons are ✓

- a) Edinger-Westphal nucleus ✓ - CN III
- b) The superior salivary nuclei, - } CN VII
- c) The inferior salivary nuclei
- d) The dorsal motor nucleus and the nucleus ambiguus ?
- e) All of the above are correct ✓

27, 110
37, 110 → (K)

✓53 Which of the following activity is likely to be seen in the striatum prior to initiation of movement of a limb:

- a) Inhibition signals from cortex
- b) Excitatory input from the subthalamic nucleus
- c) No activity in the medium spiny neurons
- d) Tonic inhibition in the VAVL Thalamic complex
- e) Inhibitory outflow from the motor cortex

Neo-striatum
= Subthalamic + Putamen

✓54 Interruption of motor pathways in the internal capsule on one side of the body causes:

- a) Spastic paralysis on the opposite side of the body ✓
- b) Spastic paralysis on the same side of the body
- c) Loss of touch and pressure
- d) Loss of proprioception on the same side of the body
- e) None of the above

✓55) Huntington's disease is characterized by all except:

- a) Selective degeneration of striatal GABAergic and cholinergic neurons projecting to the putamen ✓
- b) Autosomal dominant disorder ✓
- c) Uncontrolled movement of the limbs ✓

* Huntington's is an Autosomal dominant disorder with hyperkinetic motor effects.

40. Inhibition of fear and loss of emotion are prominent signs after lesions of
- (a) Mammillary bodies
 - (b) Amygdaloid nuclei and limbic system ✓
 - (c) Cerebral frontal lobes
 - (d) Cerebral motor cortex
 - (e) None are correct

SECTION C (30 Marks)

For each question write down T (True) or F (False). 2 marks will be given for right judgement and ½ mark will be deducted for wrong judgement.

41. Relay stations for the taste are:

- FF (a) Accessory nucleus ✓
- FF (b) Inferior colliculus
- TT (c) Nucleus tractus solitarius
- FF (d) Superior colliculus

42. Receptors for the taste of salt are situated on:

- FF (a) Mucus of mouth
- FF (b) Epithelium of the lips ✓
- FF (c) The root of tongue and epiglottis ✓
- FT (d) The tip and lateral parts of tongue ✓

43. The potential for the smell generated by stimulation are:

- TT (a) Free nerve endings of n. trigeminus ✓
- FE (b) Limbic system ✓
- FE (c) Nucleus tractus solitarius
- FE (d) Epithelium situated in the nasal cavity

44. In which sequences does afferent acoustic impulses pass on CNS?

- F (a) Cochlea, cochlear nuclei, lateral lemniscus, accessory nucleus, medial geniculate nucleus, primary acoustic cortex
- F (b) Cochlea, anteroventral nucleus, postventral nucleus, lateral lemniscus, superior olive, medial geniculate nucleus, primary acoustic cortex
- TT (c) Cochlea, anteroventral and postventral nuclei, dorsal cochlear nucleus, superior olive, accessory nucleus, lateral lemniscus, inferior colliculus, medial geniculate nucleus, primary acoustic cortex
- F (d) Cochlea, dorsal cochlear nucleus, superior olive, anteroventral and postventral nuclei, accessory nucleus, inferior colliculus, lateral lemniscus, medial geniculate nucleus, primary acoustic cortex

The humours in the eye:

- T (a) ~~The vitreous humour is very liable to inflammation in deep, penetrating eye injury~~
- F (b) The vitreous humour occupies the posterior chamber of the eye
- T (c) All the aqueous humour is reabsorbed in the anterior chamber
- T (d) The total volume of aqueous humour is turned over every hour

Ocular physiology and pathology:

- T (a) In normal conditions the intraocular pressure (IOP) ranges from 10 to 20 mmHg
- T (b) Ophthalmoscopy is more effective than perimetry in testing for glaucoma
- T (c) The ophthalmopathy of Grave's disease is mainly due to sympathetic overactivity
- T (d) The IOP is likely to be increased in the upgaze position in thyrotoxicosis

The iris:

- F (a) Primary open-angle glaucoma is more common in far-sighted people
 - F (b) Elderly people often read better in dim than in bright light
 - F (c) Closed-angle glaucoma is most common in the very elderly F (POAG)
 - F (d) The semi-dilated pupil offers the least resistance to the flow of aqueous
- The most common type* (pointing to F(a))
closed (pointing to F(c))

In the perception of light:

- T (a) In humans, all the photopigments contain carotinoids derived exclusively from the diet
- F (b) Apart from the periphery and fovea, the retina has rods and cones in about equal numbers
- T (c) Cones have a lower threshold to light than rods
- F (d) The rods react maximally at the yellow/red end of the spectrum

Regarding rods and cones:

- F (a) Cone pigments regenerate much more slowly than rod pigments
- F (b) Dark adaptation takes about 5 min to reach maximum (Dun)
- T (c) Alcohol dehydrogenase is needed to incorporate vitamin A into the 'visual cycle'
- F (d) Red-tinted goggles cut out the entry of red wavelengths into the eye and so allow reasonable vision while one is in either a dark or a bright environment

with aging (cortical thinning)
on order of about 10 μ m.

In the cerebral cortex:

- ~~T~~ F (a) The grey matter is normally about 1 cm thick (1.5-3mm)
~~F~~ T (b) Granule (stellate) cells are plentiful in the primary sensory cortex
~~F~~ T (c) An understanding of concepts is predominantly a function of the right hemisphere
~~T~~ T (d) Over 90% of corticospinal fibres are myelinated

2. Cortical speech centres:

- ~~F~~ T (a) Both sides of the brain are needed for sensible fluent speech (only the left)
~~F~~ F (b) In left-handed people Broca's and Wernicke's areas are mostly found in the right cerebral hemisphere
~~F~~ F (c) Wernicke's and Broca's areas are situated in the same gyrus
~~F~~ T (d) Destruction of Broca's area (motor aphasia) causes complete loss of speech while comprehension is retained

3. The electroencephalogram (EEG):

- ~~F~~ T (a) The EEG is due to firing of cortical neurons (AP generation)
~~F~~ T (b) In an alert adult with closed eyes, alpha waves predominate
~~T~~ T (c) Faster frequencies tend to predominate in most diseases that affect cerebral function
~~T~~ T (d) Irregular small waves are characteristics of mental activity

4. In epilepsy:

- ~~F~~ (a) Seizures result from paroxysmal asynchronous discharge of cortical neurons
~~T~~ (b) Very high spikes occur during the seizure
~~T~~ (c) During seizures the brain ECG K^+ often rises dramatically
~~F~~ (d) Most patients eventually progress to an intractable stage

5. In cerebrovascular accidents (CVA):

- ~~T~~ F (a) Most cases are due to haemorrhage
~~F~~ (b) An embolus of only 1 mm across can block any vessel on the cerebral surface and trigger a stroke
~~F~~ (c) Prothrombotic states include a rise in antithrombin III
~~T~~ (d) A transient ischaemic attack (TIA) usually lasts < 10 min

17. Regarding vestibular function:

- (a) ☒ The semicircular canals respond to all rotational position 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
- (e) ☒ a, c, and d are correct

18. In the perception of light:

- (a) ☒ In humans, all photo pigments contain carotinoids derived exclusively from the diet
- (b) ☒ Night blindness is one of the earliest signs of Vit. A deficiency
- (c) ☒ The rods react maximally at the yellow/red end of the spectrum
- (d) ☒ Cones have a lower threshold to light than rods
- (e) ☒ a and b are correct

19. Regarding rods and cones:

- (a) ☒ Cone pigments regenerate much more slowly than rod pigments
- (b) ☒ Dark adaptation takes about 80 min to reach maximum
- (c) ☒ Colour blindness is more common in females than in males
- (d) ☒ Apart from the periphery and fovea, the retina has rods and cones in about equal numbers
- (e) ☒ a and d are correct

20. Visual optics:

- (a) ☒ The optical centre or nodal point of the eye is normally close to the fovea
- (b) ☒ After removal of the lens one can only see near objects
- (c) ☒ Normal people can discern two light sources 1 mm apart at 10 m
- (d) ☒ Objects are usually blurred if each eye has marked different reaction
- (e) ☒ a, b and d are correct

21. As part of the visual pathways:

- (a) ☒ Frontal eye fields control ipsilateral eye movement
- (b) ☒ A complete visual field is represented in each lateral geniculate body
- (c) ☒ The fovea projects mainly into the contra-lateral optic tract
- (d) ☒ Only the central parts of the retina are topographically aligned in the primary visual area
- (e) ☒ b and c are correct

23. Which of these drugs is the most selective inhibitor of serotonin reuptake?

- A. Nortriptyline
- B. Amoxapine
- ☒ C. Fluvoxamine
- D. Maprotiline

T/F
PKT { ① - fluoxetine (2 spec.)
② - Dox. PKT (2015/2)

24. Which of these drugs is most likely to result in a hypertensive crisis when given concurrently with ephedrine?

- A. Amitriptyline
- B. Fluoxetine
- C. Trazodone
- ☒ D. Tranylcypromine

Neuropharm - this 2015/2017

25. Which of these drugs is least likely to cause seizures?

- A. Pethidine
- ☒ B. Propofol
- C. Enflurane
- D. Lithium

26. Which of these local anaesthetics has the longest duration of action?

- A. Chloroprocaine
- B. Lignocaine
- ☒ C. Bupivacaine + Tetracaine
- D. Prilocaine

27. All the following local anaesthetics are vasodilators except:

- A. Lignocaine
- B. Bupivacaine
- ☒ C. Cocaine
- D. Tetracaine

(CDMA)

→ Rxd using anti-convulsants.

28. Which of these drugs is most likely to increase lithium toxicity?

- A. Carbamazepine
- ☒ B. Frusemide
- C. Valproate
- D. Diazepam

- A loop diuretic. hence can be used in kidney failure or CHF

29. Which of these drugs is most likely to be associated with "on-off" and "wearing off" phenomena during treatment of Parkinson's disease?

- A. Bromocriptine
- ☒ B. Levodopa
- C. Apomorphine
- D. Pergolide

30. Which of these local anaesthetic agents is most likely to be the safest in a patient with severe hepatic impairment?

- A. Lignocaine
- B. Prilocaine
- C. Mepivacaine
- ☒ D. Tetracaine

Ceftriaxone
Amoxicillin

52. The left lateral geniculate nucleus receives inputs from:

- ☒ (a) The left eye only
- ☐ (b) The right eye only
- ☐ (c) The left ear only
- ☐ (d) The right ear only

53. ~~Tractus rubrospinalis and tractus reticulospinalis lateralis:~~

- ☐ (a) Inhibits contraction of the flexor muscles ☒
- ☒ (b) Inhibits function of alpha-and gamma-motoneurons of the extensor muscles ☒
- ☐ (c) Stimulates contraction of the flexor muscles ☒
- ☐ (d) Stimulates contraction of the extensor muscles ☒

54. Tractus vestibulospinalis and tractus reticulospinalis medialis:

- ☐ (a) Stimulate the alpha- and beta-fibers of the flexor muscles ☒
- ☒ (b) Stimulate the alpha- and beta-fibers of the extensors muscles ☒
- ☐ (c) Inhibits the flexor muscles ☒
- ☐ (d) Inhibits the extensors muscles ☒

55. In the area of skin supplied by a peripheral nerve, following transaction of the nerve:

- ☒ (a) Touch sensation is lost but pain sensation remains ☒
- ☐ (b) Pain and temperature sensation are lost but touch remains ☒
- ☐ (c) Sensation remains normal ☒
- ☒ (d) All types of sensation are lost ☒

5. The Thalamus:
- (a) ☒ Acts as an important sensory relay station
 - (b) ☒ Has each half of the body represented topographically
 - (c) ☒ After infarcting can have spontaneous excessive pain
 - (d) ☒ Is important for cognition and awareness
 - (e) ☒ All are correct
6. In the inner ear:
- (a) ☒ At rest inside a hair cell is about $+150\text{ mV}$ compared to endolymph $+80\text{ mV}$
 - (b) ☒ The electrolyte composition of endolymph is similar to intracellular fluid
 - (c) ☒ During sound transmission only individual basilar fiber vibrate
 - (d) ☒ The shortest fibres of the basilar membrane are at the apex
 - (e) ☒ a and b are correct
7. A patient has no reaction of the pupil to the light. What the muscle is damaged?
- (a) Oculomotor muscle
 - (b) Ciliary muscle
 - (c) ☒ Dilator pupillae muscle
 - (d) ☒ Sphincter pupillae muscle
 - (e) a and d are correct
8. A patient after trauma of the head has asthenia, muscular dystonia and imbalance of the body. Which part of CNS can be damaged?
- (a) Nucleus ruber
 - (b) Substantia Nigra
 - (c) ☒ Cerebellum
 - (d) Formatio reticularis
 - (e) Frontal cortex
9. A patient falls asleep after trauma of brain. Which part is damaged in this case?
- (a) Formacio reticularis
 - (b) Nucleus of cranial nerves
 - (c) ☒ Cerebral cortex
 - (d) Nucleus of subastancia Nigra
 - (e) Thalamus
10. After traffic accident a patient has trauma spinal cord at the level T1-2. He has paralysis and absence of tactile sense of right side and absence pain and temperature senses of left side. Which physiological mechanism of these symptoms:
- (a) Complete damage of spinal cord
 - (b) Damage of pyramidal tract both side
 - (c) Damage of anterior horns both side
 - (d) ☒ Brown-Sequard syndrome
 - (e) All are correct
- (paralysis, ataxia and loss of PT_{12})
Sensation due to spinal cord hemisection

gallbladder, Trigone and Sphincter	<i>different</i> <i>Relaxes. Increased tone wrong!</i>
acinar glands	<i>Increased secretion</i>
pancreas islets	<i>Increased secretion...? of...</i>

SECTION B (40 Marks)

Questions 1 – 40 select the one that is the best in each case. Each question carries 1 mark.

The effects of stimulation of the β -adrenoreceptors are:

- ☒ (a) Relaxes of ciliary muscle of eye for far vision
- (b) Increased melatonin synthesis and secretion in pineal gland
- (c) Decreased contractility and conduction velocity of heart ventricles ✓
- (d) Contracts gallbladder and ducts ✗
- ☒ (e) b and c are correct ✗

The effects of stimulation of the cholinergic postganglionic nerve fibers are:

- (a) Contraction (mydriasis) of radial muscles of iris
- ☒ (b) Contraction of ciliary muscle for near vision
- (c) An increase motility and tone of stomach
- (d) A decrease motility and tone of intestine
- ☒ (e) b and c are correct ✗

The effects of stimulation of the noradrenergic nerve fibers are:

- (a) Decrease in heart rate of the sino-atrial node -
- (b) Decrease in conduction velocity of the atrio-ventricular node
- ☒ (c) Increase in contractility and conducting velocity of the ventricles ✓
- ☒ (d) Dilatation of coronary and pulmonary arterioles ✗
- (e) c and d are correct

Cortical speech centres:

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

Wernicke's → Comprehension of written language

22. Ocular movement:
- (a) Axes of eyeball are always parallel in normal people
 - (b) Visual acuity is heightened during saccadic movements
 - (c) Saccadic movements occurs when eye follow a moving object
 - (d) Saccadic movements are generated in the nuclei of third, fourth and sixth cranial nerves
 - ☒ (e) All are wrong T.
23. On electroencephalogram of adult man there is delta rhythm. Which is physiological status of the cerebral cortex?
- (a) Moderate activity
 - (b) Ephileptic status
 - (c) Very high activity
 - ☒ (d) Very deep sleep ✓
 - (e) Convulsion status
24. Transmitter in the brain are:
- (a) Acetylcholine
 - (b) Noradrenaline
 - (c) Glutamate
 - (d) Adrenaline
 - ☒ (e) All are correct
- Handwritten notes for Q24: A box containing "ACh", "NA", "Glu", and "Ad" is next to the options. A separate box contains "ANCA".
25. In the cerebellum:
- (a) The axon of the Purkinje cells constitute the sole output of the cerebellar cortex
 - (b) Each hemisphere connects with the opposite cerebral cortex ✓
 - (c) A lesion of the vermis typically causes dyscoordination of the limbs
 - (d) Ataxia is worsened when the eyes are closed
 - ☒ (e) a and b are correct ✓
26. The capacity to display rage:
- ☒ (a) Is eliminated when the cerebral cortex is removed
 - (b) Is due to an imbalance of activity in large and small fibers
 - ☒ (c) Is not affected by removal of the hypothalamus ✓
 - (d) Does not require any structure above the level of the hypothalamus
 - (e) Is the major function of the ANS
27. Activation of regional areas of the cortex
- ☒ (a) Is accomplished by the reticular activating system T. ✓
 - (b) Is accomplished by the diffuse thalamocortical system
 - (c) Is induced only by painful stimuli
 - (d) May be associated with the direction of our attention to one area of our environment
 - (e) Is determined solely by blood flow

28. Activation of various portions of the reticular formation
- (a) Can increase reflex activity
 - (b) Can cause a complex motor movement such as speech
 - (c) Can decrease reflex activity
 - (d) ~~F~~ Cannot affect the reflex activity
 - (e) ☒ Acts to modulate reflex activity in conjunction with other brain structures
29. The condition known as REM (Rapid Eye Movement) sleep is:
- (a) ~~F~~ That point at which the individual becomes aware and alert
 - (b) ~~F~~ Characterized by slow high-voltage regular EEG activity
 - (c) ☒ Referred to as paradoxical sleep
 - (d) Related to EEG patterns seen in comatose patients
 - (e) ~~F~~ Characterized by total lack of all muscular activity
30. The Cerebellum:
- (a) Has a totally inhibitory output from its cortex
 - (b) Has an excitatory output from its deep nuclear layers
 - (c) ☒ Receives cortical input from mossy and climbing fibers
 - (d) Has the same arrangement of cells as in most of the cerebellar cortex
 - (e) ~~F~~ Has a conscious interpretation of motor activity
31. The Cerebellum:
- (a) ☒ Is associated with very rapid motor activity
 - (b) May be a timing device for measuring duration of rapid motor activity
 - (c) ~~F~~ Receives input from most of the cerebral cortex
 - (d) ~~F~~ Is only activated by painful stimuli
 - (e) ~~F~~ Is only associated with unlearned motor movements
32. The sympathetic division of the autonomic nervous system is characterized by:
- (a) Presynaptic inhibition
 - (b) ☒ Thoracolumbar outflow from the spinal cord
 - (c) Short postganglionic fibers
 - (d) Adrenergic preganglionic fibers
 - (e) The vagus nerve, which is its major component
33. Which of the following statements are true about about Purkinje cells?
- (a) They give rise to the only axons leaving the cerebellar cortex
 - (b) These cells are intermittently active
 - (c) ☒ They are always excitatory influences on the deep cerebellar nuclei
 - (d) They are the smallest cells of the cerebellum
 - (e) All are correct

82. In the natural progression of cerebrovascular accident (CVA)

- T (a) Hyperreflexia is typical in a completed CVA
- T (b) Hypertonia is especially marked in a pure 'pyramidal' lesion, e.g. in the medullary pyramid
- F (c) Excellent recovery can be expected after a ~~pure~~ pyramidal lesion
- T (d) Aspirin definitely reduces incidence of stroke after TIA

83. Idiopathic Parkinson's disease (IPD)

- F (a) For clinical symptoms to arise the dopamine content of the stratum must be reduced by at least 50%
- T (b) The nigrostriatal pathway is the most severely affected by Parkinson's disease
- T (c) D2-receptors are increased in the striatum of untreated patients
- T (d) Dopamine inhibits cholinergic interneurons and stimulates GABAergic ones in the neostriatum

84. Parkinson's disease (PD) and Parkinsonism:

- T (a) Methyl-phenyl tetrahydropyridine (MPTP) induced parkinsonism is a progressive condition once it is established
- F (b) The tremor in PD is exacerbated by alcohol
- * F (c) The tremor of PD is present even when the subject is asleep
- F (d) The 'on-off' phenomenon usually occurs in the first year of L-dopa treatment

85. In idiopathic Parkinson's disease:

- T (a) Anticholinergic drugs are very helpful in the control of hypokinesia
- T (b) Inhibitors of monoamine oxidase B are useful in the treatment of PD
- T (c) A deficiency of ceruloplasmin may present with parkinsonism
- T (d) Full expression of tardive dyskinesia (TD) requires an intact dopaminergic nigrostriatal

86. Learning and Memory:

- T (a) Short term memory (primary memory) has small capacity
- T (b) Working memory (similar to short-term memory) is located mainly in the frontal lobes
- T (c) One cannot access short term memory in retrograde amnesia
- T (d) One cannot transfer information from primary to secondary memory in anterograde

87. Rapid eye movement (REM) sleep:

- F (a) In REM sleep there is a general rise in skeletal muscle tone
- T (b) REM generating neurons lie in the pons
- F (c) Normally REM sleep occurs within 10 min of falling asleep
- F (d) At birth REM accounts for about 50% of sleep

11. Parkinson's disease (PD) and parkinsonism:

- ☒ (a) Methyl-phenyl tetrahydropyridine (MPTP) induced parkinsonism is a progressive condition once it is established
- ☒ (b) The tremor in PD is exacerbated by alcohol
- ☒ (c) The tremor of PD is present even when the subject is asleep
- ☒ (d) The 'on-off' phenomenon usually occurs in the first year of L-dopa treatment

12. In idiopathic Parkinson's disease:

- ☒ (a) Anticholinergic drugs are very helpful in the control of hypokinesia
- ☒ (b) Inhibitors of monoamine oxidase B are useful in the treatment of PD
- ☒ (c) A deficiency of ceruloplasmin may present with parkinsonism
- ☒ (d) Full expression of tardive dyskinesia (TD) requires an intact dopaminergic nigrostriatal pathway

13. Learning and memory:

Levin

- ☒ (a) Short-term memory (primary memory) has a small capacity
- ☒ (b) Working memory (similar to short-term memory) is located mainly in the frontal lobes
- ☒ (c) One cannot access short-term memory in retrograde amnesia
- ☒ (d) One cannot transfer information from primary to secondary memory in anterograde amnesia

14. Rapid eye movement (REM) sleep:

- ☒ (a) In REM sleep there is a general rise in skeletal muscle tone
- ☒ (b) REM generating neurons lie in the pons
- ☒ (c) Normally REM sleep occurs within 10 min of falling asleep
- ☒ (d) At birth REM accounts for about 50% of sleep

15. Pathophysiology of sleep:

- ☒ (a) Anxiety and Irritability are associated with deprivation of REM sleep despite adequate NREM sleep
- ☒ (b) Sleep-walking occurs in deep stage 3-4 NREM sleep
- ☒ (c) Hypnic jerks, bruxism (teeth grinding), and head-banging occur in REM sleep
- ☒ (d) Recurrent short episodes of NREM during the day cause little or no trouble for those so affected

40. Inhibition of fear and loss of emotion are prominent signs after lesions of
- (a) Mammillary bodies
 - (b) Amygdaloid nuclei and limbic system ✓
 - (c) Cerebral frontal lobes
 - (d) Cerebral motor cortex
 - (e) None are correct

SECTION C (30 Marks)

For each question write down T (True) or F (False). 2 marks will be given for right judgement and ½ mark will be deducted for wrong judgement.

41. Relay stations for the taste are:

- F (a) Accessory nucleus
- F (b) Inferior colliculus
- T (c) Nucleus tractus solitarius
- F (d) Superior colliculus

42. Receptors for the taste of salt are situated on:

- F (a) Mucus of mouth
- F (b) Epithelium of the lips
- F (c) The root of tongue and epiglottis
- T (d) The tip and lateral parts of tongue ✓

43. The potential for the smell generated by stimulation are:

- T (a) Free nerve endings of n. trigeminus ✓
- F (b) Limbic system
- F (c) Nucleus tractus solitarius
- F (d) Epithelium situated in the nasal cavity

44. In which sequences does afferent acoustic impulses pass on CNS?

- F (a) Cochlea, cochlear nuclei, lateral lemniscus, accessory nucleus, medial geniculate nucleus, primary acoustic cortex
- F (b) Cochlea, anteroventral nucleus, postventral nucleus, lateral lemniscus, superior olive, medial geniculate nucleus, primary acoustic cortex
- T (c) Cochlea, anteroventral and postventral nuclei, dorsal cochlear nucleus, superior olive, accessory nucleus, lateral lemniscus, inferior colliculus, medial geniculate nucleus, primary acoustic cortex ✓
- F (d) Cochlea, dorsal cochlear nucleus, superior olive, anteroventral and postventral nuclei, accessory nucleus, inferior colliculus, lateral lemniscus, medial geniculate nucleus, primary acoustic cortex

НАЧАЛО 4

2

-

22. In disorders of hearing:

- ☒ (a) A tuning fork on the mid line of the forehead (> 512 Hz) is heard best by the affected ear in middle or outer ear disease (Weber's test)
- ☒ (b) A continual 'minivibration' of hair cells is abnormal
- ☒ (c) Ischaemic damage of the basilar membrane can result in tinnitus
- ☒ (d) Tinnitus can be a prominent symptom in polycythemia Vera

23. In the vestibular apparatus (semicircular canals, utricle, saccule):

- ☒ (a) The fluid in the vestibular apparatus is separate from that in the scala media
- ☒ (b) The vestibular nerve originates in bipolar neurons in the internal auditory meatus
- ☒ (c) Linear acceleration is chiefly sensed by the semicircular canals
- ☒ (d) A nodding movement of head is detected by the semicircular canals

24. Regarding vestibular apparatus function:

- ☒ (a) The semicircular canals respond to all rotational positions of the head
- ☒ (b) Small changes in the volume of the endolymph cause an illusion of movement which is unrelated to the actual body/head position
- ☒ (c) A detachment of mineral crystals in the vestibular apparatus is likely to cause vertigo plus tinnitus
- ☒ (d) Optokinetic nystagmus is typified by a slow involuntary oscillatory eye movement with a fast return

25. In vestibular testing:

- ☒ (a) The sequence, sitting, then lying down, then turning the head from side to side produces, in normal children, mild to moderate vertigo/nystagmus
- ☒ (b) As above: a sudden onset of vertigo/nystagmus indicates a central cause for the condition
- ☒ (c) As above: compound nystagmus (horizontal and rotary) occurs in patients with benign paroxysmal positional vertigo
- ☒ (d) When lying with head-up tilt of 30° the 'horizontal canal' is in a fairly true horizontal plane

26. The cornea:

- ☒ (a) Contains very few capillaries
- ☒ (b) Is richly supplied with nerve fibres
- ☒ (c) Transparency is due to its cells having no nuclei
- ☒ (d) Has its outer surface lined by tight-junctioned columnar epithelium

88. Pathophysiology of sleep:

- (a) Anxiety and irritability are associated with deprivation of REM sleep despite adequate NREM sleep
- ✓ (b) Sleep-walking occurs in the deep stage 3-4 NREM sleep
- (c) Hypnic jerks, bruxism (teeth grinding), and head-banging occur in REM sleep
- (d) Recurrent episodes of NREM during the day causes little or no trouble for those who are affected

89. Olfaction:

- ✓ (a) Smell is represented bilaterally in the parahippocampal gyri
- ✓ (b) Hysterical anosmia can be diagnosed by a sharp response to sniffing ammonia
- ✗ (c) Receptor organs for smell are free nerve endings of unipolar cells
- ✓ (d) Only material dissolved by the body secretions can be smelled

90. Taste

- ✗ (a) Most taste fibres eventually end up in the opposite post-central gyrus
- ✓ (b) Substances have to be dissolved in order to stimulate taste buds
- ✗ (c) The sensation of bitterness is mainly detected around the tip of the tongue
- ✓ (d) The taste receptor cell is a modified nerve cell

91. Regarding sound energy:

- ✗ (a) Pitch reflects the pressure attained with each sound wave
- ✓ (b) Humans can hear over a range of 40-20000 Hz
- ✓ (c) Loudness is more accurately expressed in bels than in phonics
- ✓ (d) The bel scale is logarithmic. Usually expressed in decibels (dBs)

92. In the inner ear:

- ✗ (a) The perilymph is virtually identical with CSF
- ✗ (b) The electrolyte composition of endolymph is very similar to ECF
- ✗ (c) The shortest fibres of the basilar membrane are at the apex
- ✗ (d) During sound transmission only individual basilar fibres vibrate

93. In the inner ear:

- ✓ (a) At rest inside a hair cell is about -70 mV compared to endolymph
- ✓ (b) Apices of the hair cells face endolymph, and the bases face perilymph
- ✓ (c) Bending cilia of hair cells in one direction evokes a positive potential and evokes a negative potential (inhibition) if bent in the opposite direction
- ✗ (d) Basilar membrane responds only to high frequency vibrations

94. In the vestibular apparatus (semicircular canals, utricle, saccule):

- ✗ (a) The fluid in the vestibular apparatus is separate from that in the scala media
- ✓ (b) The vestibular nerve originates in bipolar neurons in the internal auditory meatus
- ✗ (c) Linear acceleration is chiefly sensed by the semicircular canals
- ✓ (d) A nodding movement of the head is detected by the semicircular canals

68 Anti-seizure drugs that can cause hepatotoxicity include:

- ☒ A. Phenytoin
- ☒ B. Lamotrigine *rarely*
- ☒ C. Valproate
- ☒ D. Felbamate

69 Drugs that are effective in myoclonic seizures include:

- ☒ A. Tiagabine
- ☒ B. Phenobarbital
- ☒ C. Clonazepam
- ☒ D. Carbamazepine

70 Opioid analgesics that are effective in severe pain include:

- ☒ A. Codeine
- ☒ B. Hydromorphone
- ☒ C. Sufentanil
- ☒ D. Propoxyphene

71 Pure antagonists on opioid receptors include:

- ☒ A. Naltrexone
- ☒ B. Buprenorphine
- ☒ C. Nalbuphine
- ☒ D. Pentazocine

72 Drugs that are hallucinogenic include:

- ☒ A. Ketamine
- ☒ B. Diazepam
- ☒ C. Nabilone
- ☒ D. Mescaline

*73 Drugs that have some benefit in the management of benign hereditary tremor include:

- ☒ A. Prednisolone
- ☒ B. Salbutamol
- ☒ C. Levothyroxine
- ☒ D. Metoclopramide

74 Which of these drugs are likely to have some benefit in suppressing the chorea that occurs in Huntington's disease?

- ☒ A. Haloperidol (antagonist of D2 receptor), also Tetrabenazine
- ☒ B. Bromocriptine
- ☒ C. Selegiline (↑ dopamine)
- ☒ D. Chlorpromazine

28093836

28
50

The University of Zambia
School of Medicine
Department of Pharmacology
PHM 412
Final Exam
Semester II

Date: 10/02/12

Total Marks: 100

I. Answer all of the following multiple choice questions. There is only one right answer. Write 'T' adjacent to the most appropriate answer.

1. The following organism is notorious for developing antimicrobial resistance rapidly:

- T(a) Streptococcus pyogenes
(b) Meningococcus
(c) Treponema pallidum
(d) Escherichia coli ✓

f

2. Widespread and prolonged use of an antibiotic leads to emergence of drug resistant strains because antibiotics:

- (a) Induce mutation in the bacteria
(b) Promote conjugation among bacteria
(c) Allow resistant strains to propagate preferentially ✓
T(d) All of the above

f

3. The most important mechanism of concurrent acquisition of multidrug resistance among bacteria is:

- T(a) Mutation
(b) Conjugation ✓
(c) Transduction
(d) Transformation

f

34. The outflow from the spinal cord that is the sympathetic nervous system:
- (a) Contains only adrenergic fibers F
 - (b) Includes a ganglionic synapse T
 - (c) Contains only cholinergic fibers F ✓
 - (d) Ceases to function after section of the upper medulla ✓
 - (e) b and d are correct
35. Regarding hippocampal functions:
- (a) They have reciprocal EEG activity with the cerebral cortex ✓
 - (b) Stimulation and lesions can produce olfactory hallucinations ✓
 - (c) Stimulation while under anesthesia can result in arousal and wakefulness which ceases when the stimulation is turned off ✓
 - (d) Bilateral lesions in humans have suggested memory deficiencies
 - (e) All are correct
36. Sleep and wakefulness are related to which of the following structures?
- (a) The intralaminar nuclei of the thalamus
 - (b) The posterior nucleus of the hypothalamus
 - (c) The periaqueductal gray
 - (d) The reticular formation ✓
 - (e) All are correct
37. Clinical symptom(s) of cerebellar damage include:
- (a) Adiadokokinesis
 - (b) Asynergia
 - (c) Ataxia
 - (d) Intention tremor
 - (e) All are correct ✓
38. Which of the following is common to both excitatory postsynaptic potentials (EPSPs) and inhibitory postsynaptic potentials (IPSPs)?
- (a) Spatial summation
 - (b) Temporal summation
 - (c) A and B are correct ✓
 - (d) Alteration in Ca^{2+} concentration in the cell
 - (e) All are correct
39. Regarding cerebellar cortex function:
- (a) After lesions, disturbances are contralateral to the lesion
 - (b) It coordinates somatic motor activity and regulates muscle tone
 - (c) Sensory information received by the cerebellum is acted upon
 - (d) Speech is rarely disrupted after cerebellar damage ✓
 - (e) All are correct

SECTION B

In questions 61-100 each consists of a stem and four statements
'F' if the statement is true/false respectively against the letter a
corresponding to the statement. Each question carries 2 marks
be deducted for incorrect judgment.

61 Drugs that are effective in the management of absence seizures include:

- ☒ A. Ethosuximide ✓ T
- ☒ B. Carbamazepine
- ☒ C. Valproate ✓ T
- ☒ D. Phenytoin

62 General anaesthetics that are analgesic at sub-anaesthetic doses include:

- ☒ A. Propofol
- ☒ B. Thiopentone
- ☒ C. Ketamine
- ☒ D. Nitrous oxide

63 Anti-seizure drugs that act by inhibiting glutamate receptors include:

- ☒ A. Felbamate
- ☒ B. Lamotrigine release inhibition was observed in animal studies
- ☒ C. Valproate
- ☒ D. Ethosuximide

64 Anti-seizure drugs that act by inhibiting sodium channels include:

- ☒ A. Clonazepam
 - ☒ B. Phenytoin
 - ☒ C. Lamotrigine
 - ☒ D. Ethosuximide ✓
- (phenytoin, valproate, lamotrigine, carbamazepine)

65 Drugs that are used in the treatment of convulsive status epilepticus include:

- ☒ A. Valproate ✓
- ☒ B. Chlormethiazole ✓
- ☒ C. Lamotrigine ✓
- ☒ D. Midazolam ✓

66 Anti-seizure drugs that induce cytochrome P450 enzymes include:

- ☒ A. Valproate - inhibitor
 - ☒ B. Felbamate - inhibitor
 - ☒ C. Clonazepam
 - ☒ D. Ethosuximide
- | Inhibitors | Inducers |
|------------|---------------|
| Felbamate | Carbamazepine |
| Valproate | Phenytoin |
| Clonazepam | Primidone |

67 Magnesium sulphate:

- ☒ A. Can be given intramuscularly (IM/IV)
- ☒ B. Can cause respiratory depression
- ☒ C. Alters calcium metabolism (physiological antagonist to Ca)
- ☒ D. Is contra-indicated in pregnancy (Mg sulphate is used to treat eclampsia & pre-eclampsia)

11. Relay stations for taste are:
- (a) Accessory nucleus
 - (b) Inferior colliculus
 - (c) Nucleus tractus solitarius ✓
 - (d) Superior colliculus
 - (e) All are correct
12. The effects of stimulation of the α -adrenoreceptors are:
- (a) Stimulation contraction of intestine sphincters
 - (b) Stimulates motility and tone of ureter ✓
 - (c) Stimulates secretion of the pancreatic acine
 - (d) Contracts (mydriasis) of radial muscles of eye iris
 - (e) a, b and d are correct ✓
13. 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
14. In the Cerebellum:
- (a) The axons of the Purkinje cells constitute the sole output of the cerebellar cortex
 - (b) Each hemisphere connects with the opposite ^{cerebral} cortex ✓
 - (c) A lesion of the Vermis typically causes dyscoordination of the limb
 - (d) There is sensory loss and mental impairment in pure cerebellar disease
 - (e) a and b are correct ✓
15. Regarding the reticular formation and the limbic system:
- (a) The hippocampus is important in behavioural disorders
 - (b) The reticular formation has exceptionally long dendrites and axons
 - (c) The hypothalamus is the main outlet for the limbic system
 - (d) The amygdaloid nucleus is mainly concerned with memory
 - (e) b and c are correct ✓
16. Learning and memory
- (a) Short-term memory has a small capacity ✓
 - (b) Short-term memory is located in the frontal lobes ✓
 - (c) One can access short-term memory in retrograde amnesia ✓
 - (d) One cannot transfer information from primary to secondary memory in anterograde amnesia ✓
 - (e) All are correct ✓

39. The following statements concern the interior of the lower part of the medulla
- (a) the discussion of the pyramids represents the crossing over from one side of the medulla to the other of one-quarter of the corticospinal
 - (b) the central canal of the spinal cord is not continuous upward to the medulla.
 - (c) the substantia gelatinosa is not continuous with the nucleus of the spinal tract of the trigeminal nerve
 - (d) The medial lemniscus is formed by the anterior spinothalamic tract and the spinototal tract
 - (e) The internal arcuate fibre emerge from the nucleus gracilis and nucleus cuneatus

40. Visceral pain is most often due to

- (a) Electrical stimulation
- (b) Chemical stimulation
- (c) Stretch ✓
- (d) Compression
- (e) Temperature

owns

✓41 If you are placed in a chair and spun around from left to right

- (a) You will display left nystagmus
- (b) You will display right nystagmus ✓
- (c) You will have your left semicircular canal maximally stimulated
- (d) The pursuit phase will be on the left
- (e) No nystagmus will occur

✓42. The auditory cortex is

- (a) Necessary for perception of temporal patterns of sound T
- (b) Not necessary for understanding speech F *(one of the 2° auditory areas, Wernicke's area is important for the interpretation of spoken)*
- (c) Tonotopically organized T
- (d) Represented by high frequencies in the anterior portion F
- (e) Only found in the left hemisphere F

✓43. The terminology used to denote deep sensation is

- (a) Proprioception
- (b) Eteroception
- (c) Chemomoreception
- (d) Interoreception ✓
- (e) Nociception

Exteroception

- Deals with more familiar senses such as touch, smell, taste, sight and hearing.

Interoreception

- Deals with what is going on inside one's body
e.g. "feelings" the emotions.

16. In disorder of sleep:

- T(a) Daytime sleepiness, pre-sleep dream, sleep paralysis, and cataplexy confirm the diagnosis of narcolepsy.
- T(b) During sleep it is abnormal for apneic periods to recur more than five times per hour.
- T(c) Central sleep apnea is accompanied by exaggerated respiratory movements.
- T(d) Obstructive sleep apnea and obesity often go together.

17. Olfaction:

- T(a) Smell is represented bilaterally in the parahippocampal gyri.
- T(b) Hysterical anosmia can be diagnosed by a sharp response to sniffing NH_3 .
- F(c) Receptor organs for smell are free nerve endings of unipolar cells.
- T(d) Only material dissolved in body secretions can be smelled.

18. Taste:

- F(a) Most taste fibres eventually end up in the opposite post-central gyrus.
- T(b) Substances have to be dissolved in order to stimulate taste buds.
- F(c) The sensation of bitterness is mainly detected around the tip of the tongue.
- T(d) The taste receptor cell is a modified nerve cell.

19. Regarding sound energy:

- F(a) Pitch reflects the pressure attained with each sound wave cycle.
- T(b) Humans can hear over a range of 40-2000 Hz.
- T(c) Loudness is more accurately expressed in bels than in phons.
- T(d) The bel scale is logarithmic. Usually expressed in decibels (dBs).

20. In the inner ear:

- F(a) The perilymph is virtually identical with the CSF.
- F(b) The electrolyte composition of endolymph is very similar to ECF.
- F(c) The shortest fibres of the basilar membrane are at the apex.
- F(d) During sound transmission only individual basilar fibres vibrate.

21. In the inner ear:

- F(a) At rest inside a hair cell is about -70 mV compared to endolymph.
- T(b) Apices of the hair cells face endolymph, and the bases face perilymph.
- T(c) Bending cilia of hair cells in one direction evokes a positive potential and evokes a negative potential (inhibition) if bent in the opposite direction.
- F(d) The tunnel of Corti is filled with endolymph.

↳ Corticolymph

66. Which of these drugs are effective in stopping generalised tonic-clonic status epilepticus?

- ☒ A. Valproate
- ☒ B. Lorazepam
- ☒ C. Phenytoin
- ☒ D. Lamotrigine

67. Which of these are dose-related adverse effects of phenytoin?

- ☒ A. Ataxia
- ☒ B. Hirsutism
- ☒ C. Sedation
- ☒ D. Hepatitis

68. Which of these drugs are recommended for the treatment of drug induced parkinsonism?

- ☒ A. Benztropine
- ☒ B. Selegiline
- ☒ C. Haloperidol
- ☒ D. Levodopa

69. Indicate whether the statements given below are true or false

- ☒ A. Levodopa used effectively can control Parkinson's disease throughout a patient's life
- ☒ B. Levodopa is the treatment of choice in Parkinsonism regardless of the cause
- ☒ C. Dopamine receptor antagonists can reduce the motor symptoms of Huntington's chorea in some patients
- ☒ D. Baclofen can be used to alleviate muscle spasm in cerebral vascular disorders

70. Concerning neuroleptic drugs

- ☒ A. All neuroleptic drugs are agonists on dopamine receptors
- ☒ B. Clozapine has many extrapyramidal effects
- ☒ C. Neuroleptic drugs increase prolactin secretion by stimulating dopamine receptors in the anterior pituitary
- ☒ D. Tardive dyskinesia, one of the motor adverse effects of neuroleptic drugs, usually declines as treatment progresses

71. Concerning tricyclic antidepressants

- ☒ A. They include imipramine and amitriptyline
- ☒ B. They block the re-uptake of noradrenaline and serotonin
- ☒ C. They have a wide therapeutic margin
- ☒ D. Their unwanted effects include diarrhoea and hypertension

hypo

53. Concerning anxiolytics/sedatives/hypnotics, which of the following drugs are correctly matched to the statements given?

- F A. Phenobarbital indicated for the treatment of sleep disorders
 - T B. Zolpidem is also used in the management of muscle spasms
 - T C. Buspirone has no hypnotic properties
 - T D. Chlormethiazole can be used to suppress seizures that occur in alcohol withdrawal syndrome
(and also used for status epilepticus)
- Barbiturates are only used for seizure disorders (phenobarbital) & gen anaesthesia (thiopental)*

54. Concerning benzodiazepines

- F A. They inhibit gamma amino butyric acid activity
- F B. Short-acting benzodiazepines are the most appropriate for the management of alcohol withdrawal syndrome *(long acting)* *short acting → Emclon*
- F C. Diazepam is the drug of choice for absence seizures *(Ethosuximide)*
- T D. Benzodiazepines are effective as mood stabilisers in bipolar disorder
Mood stabilisers: Li, carbamazepine, valproate, lamotrigine, Oxcarbazepine.

55. Which of the following statements are true concerning anxiolytic/sedative/hypnotic drugs?

- T A. All benzodiazepines are lipid soluble
- F B. Buspirone is an effective anti-convulsant *(anxiolytic only)*
- T C. Zolpidem is used in the management of short-term insomnia
- F D. Chlormethiazole is contraindicated in alcohol withdrawal syndrome

56. Which of the following drugs are correctly matched with the attached statement?

- T A. Apomorphine: has anti-emetic properties
 - F B. Selegiline: has been associated with rapid deterioration of Parkinson's disease
 - T C. Carbidopa: inhibits DOPA decarboxylase in the periphery
 - T D. Amantadine: can cause hallucinations
- Selegiline delays & Progression of PD
fastens the rate to move fwd*

57. Drugs used in the treatment of insomnia include:

- T A. Zolpidem
- F B. Phenobarbitone
- F C. Buspirone
- T D. Nitrazepam

58. Clinical Indications of barbiturates include:

- T A. Anxiety disorders
- T B. Epilepsy
- T C. General anaesthesia
- T D. Insomnia

The premotor cortex:

- (a) receives sensory input ☐
- (b) is involved in the adjustment of motor activity to current sensory input ☒
- (c) is not necessary for fine motor movement ☐
- (d) is part of the extrapyramidal tract ☐
- (e) is localized only in the frontal lobe ☐



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 C are correct ☐

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 - areas 1, 2, 3 ☒
- (e) B and D are correct ☒

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

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

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

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

anterior horn predominantly motor neurons
α, β, γ motor neurons
- somatomotor activity

9. Which of these anti-mycobacterial drugs is only active against mycobacterium tuberculosis?
- A. Rifampicin
 - B. Ethambutol
 - ☒ C. Isoniazid ✓
 - D. Streptomycin
10. Which of these drugs is least likely to be hepatotoxic?
- A. Isoniazid
 - B. Pyrazinamide
 - C. Rifampicin
 - ☒ D. Ethambutol ✓
11. Which of these drugs does not act through interfering with synthesis of the mycobacterial cell wall?
- A. Isoniazid
 - ☒ B. Rifampicin ✓
 - C. Pyrazinamide
 - D. Ethambutol
12. Which of these anti-tuberculosis drugs is contra-indicated in pregnancy?
- ☒ A. Streptomycin ✓
 - B. Ethambutol
 - C. Pyrazinamide
 - D. Isoniazid
13. Which of these drugs is not used in the treatment of leprosy?
- A. Rifampicin
 - B. Dapsone
 - ☒ C. Pyrazinamide ✓
 - D. Clofazimine
14. Which of these drugs is most active against atypical mycobacteria?
- A. Isoniazid
 - B. Streptomycin
 - C. Erythromycin
 - ☒ D. Clarithromycin ✓
15. Which of these drugs requires dose reduction in severe renal impairment?
- A. Rifampicin
 - B. Isoniazid
 - ☒ C. Ethambutol ✓
 - D. None of the above
16. Sildenafil citrate
- A. Increases synthesis of cyclic GMP
 - B. Is a vasoconstrictor
 - ☒ C. Can cause hypotension ✓
 - D. Is contraindicated in benign prostate hypertrophy

57. In dermatophytosis which of the following drugs is not indicated:
- A. Fluconazole
 - B. Terbinafine
 - C. Terfenadine
 - ☒ D. Amphotericin B
58. Ganciclovir is preferred over acyclovir in the following condition:
- A. Herpes simplex keratitis
 - B. Herpes zooster
 - C. Chicken pox
 - ☒ D. Cytomegalovirus retinitis in AIDS patients
59. Select the drug that is active against both HIV and hepatitis B virus:
- ☒ A. Lamivudine
 - B. Indinavir
 - C. Didanosine
 - D. Efavirenz
60. All the following drugs act on cell membrane except:
- A. Nystatin
 - ☒ B. Griseofulvin
 - C. Amphotericin B
 - D. Polymyxin B O.

END OF TEST 3

Protein	2.9	0.010
Urea	12	12
Glucose	1.0	1.2
Uric acid	1.5	5

Cerebrospinal fluid (CSF):

- (a) has a higher concentration of glucose than blood $\times F$ \rightarrow $\frac{1}{2}$ glucose of blood
- (b) contains more protein per unit volume than blood $\times F$ \rightarrow more protein
- (c) is formed at a rate that is proportional to the CSF pressure \checkmark $P_c = P_{\text{fluid}} + P_{\text{tissue}}$
- (d) is absorbed at a rate that is proportional to the CSF pressure
- (e) is removed largely through dural sleeves of the spinal nerve roots

16. This question concerns peripheral and central neurotransmitters and neuromodulators, which statement is most appropriate?

- (a) Noradrenaline is not found in neurons in the central nervous system
- (b) Glutamate is an inhibitory transmitter
- (c) The peptide substance P is found in peripheral motor nerve axons
- (d) Somatostatin, vasointestinal peptide and cholecystokinin are peptides which are found both in the gut and in neurons of the brain
- (e) GABA receptors are found in the peripheral tissues

17. Which one of the receptors is responsible for monitoring the rate of muscle stretch?

- (a) Nuclear bag intrafusal fibers
- (b) Nuclear chain intrafusal fibers
- (c) Golgi tendon organs \checkmark
- (d) Pacinian corpuscles \rightarrow pressure & vibration
- (e) Ruffini corpuscles \rightarrow touch & pressure

18. Which one of the following statements best describes cold receptors?

- (a) Cold receptors produce a sensation of warmth when their firing frequency is very low
- (b) Sudden decreases in temperature always increase their firing frequency of cold receptors \checkmark
- (c) Cold receptors are tonic receptors that slowly increase their firing rate when the temperature is decreased
- (d) Cold receptors do not fire at skin temperatures above body temperature
- (e) Cold receptors produce a sensation of pain when their firing frequency is very high

SECTION D

In questions 1-20 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. X marks will be deducted for incorrect judgment.

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

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

2. Sensory disturbance consisting of:

- FT(a) Pain, sensory loss and paraesthesiae in one leg suggests a spinal cord lesion
- TF(b) Loss of pain, temperature but not touch sensation suggests a lesion in the thalamus
- T(c) Loss of all sensations in the skin region suggests a peripheral nerve or posterior root lesion
- T(d) Loss of two-point discrimination but not touch sensation suggests a lesion in the thalamus

3. Posterior damage in the spinal cord may impair:

- F(a) The ability to stand steadily with the eyes closed
- T(b) Touch sensation
- TF(c) The flexor plantar response to stimulation of the sole
- T(d) Vibration sense

4. Lower motor neuron disease:

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

5. The ankle jerk reflex is exaggerated:

- FT(a) When the muscles are voluntarily contracted
- TF(b) Immediately after complete spinal cord transection at the cervical level
- T(c) In extrapyramidal system disorders such as Parkinsonism
- FT(d) When cerebellar function is lost

83. The following statements concern the peripheral nervous system.

- F(a) There are ten pairs of cranial nerves.
- T(b) There are eight pairs of cervical spinal nerves.
- F(c) The posterior root of a spinal nerve contains many efferent motor nerve fibers.
- F(d) A spinal nerve is formed by the union of an anterior and a posterior ramus in an intervertebral foramen.
- F(e) A posterior root ganglion contains the cell bodies of autonomic nerve fibers leaving the spinal cord.

84. The following statements concern the central nervous system:

- F(a) A CT brain scan cannot distinguish between white matter and gray matter.
- F(b) The lateral ventricles are in direct communication with the fourth ventricle.
- T(c) An MRI of the brain uses the magnetic properties of the hydrogen nucleus excited by radiofrequency radiation transmitted by a coil surrounding the patient's head.
- F(d) Following trauma and sudden movement of the brain within the skull, the large arteries at the base of the brain are commonly torn.
- F(e) The movement of the brain at the time of head injuries is unlikely to damage the small sixth cranial nerve.

85. The following statements concern the cerebrospinal fluid:

- F(a) The cerebrospinal fluid in the central canal of the spinal cord is unable to enter the fourth ventricle.
- T(b) With the patient in the recumbent position, the normal pressure is about 60 to 150 mm of water.
- F(c) It plays only a minor role in the protection of the brain and spinal cord from traumatic injury.
- F(d) Compression of the internal jugular veins in the neck lowers the cerebrospinal fluid pressure.
- F(e) The subdural space is filled with cerebrospinal fluid.

86. The following statements concern the vertebral levels and the spinal cord segmental levels:

- F(a) The first lumbar vertebra lies opposite the L3-4 segments of the cord.
- F(b) The third thoracic vertebra lies opposite the third thoracic spinal cord segment.
- T(c) The fifth cervical vertebra lies opposite the seventh cervical spinal cord segment.
- T(d) The eighth thoracic vertebra lies opposite the ninth thoracic spinal cord segment.
- F(e) The third cervical vertebra lies opposite the fourth cervical spinal cord segment.

10. Which of the following structures may result in incoordination, reduced postural stability, and/or phasic stretch reflexes?

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

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

- (a) is excited mono synaptically by Golgi tendon organ afferents
- (b) has myoendplates 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 ✓

12. Raising the skin temperature to 52°C activates:

- (a) Meissner's corpuscles - touch 40% Pain - Rs - Nociceptors
- (b) Merkel's cell endings - touch 25% Naked N endings - cold temp
- (c) Nociceptors
- (d) Pacinian corpuscles - vibration - pressure
- (e) Ruffini endings - heat + pressure

13. The sensation of high-frequency vibration is signaled by:

- (a) Golgi tendon organs
- (b) Meissner's corpuscles
- (c) Muscle spindles
- (d) Nociceptors
- (e) Pacinian corpuscles

14. The cell type that forms cerebrospinal fluid is the: *Ependyma*

- (a) Ependymal cell
- (b) Neuron
- (c) Oligodendroglial cell → form myelin sheath
- (d) Satellite cell
- (e) Schwann cell → surround axons

b) Bronchial Glands	α_1, β_2 ✓	Increased mucous secretion ✓
V. Salivary Glands:	α_1, α_2 ✓	Reduced secretion ✓ Secretion constriction
VI. Urinary bladder-detrusor	$\alpha_1, \alpha_2, \beta_2$ ✓	Contracted ✓ Relaxation
VII. Stomach:		Contract ✓
a) Motility and tone	$\alpha_1, \alpha_2, \beta_2$ ✓	Decreased motility and tone ✓
b) Sphincters	$\alpha_1, \alpha_2, \beta_2$ ✓	Contracted ✓
c) Secretions	$\alpha_1, \alpha_2, \beta_2$ ✓	Decreased secretion ✓ Stimulated
VIII. Intestine:		
a) Motility and tone	α_2, β_1 ✓	Decreased motility ✓
b) Sphincters	α_1, β_2 ✓	Contracted ✓ Relaxation
c) Secretions	$\alpha_1, \alpha_2, \beta_2$ ✓	Relaxation ✓ Decreased secretion

Part B

Effector Organs	Cholinergic impulses response
Eye:	
a) Radial muscle of iris	No response ✓
b) Sphincter muscle of iris	Relaxed ✓ Contracted (Circled)
c) Ciliary muscles	Contraction for near vision ✓

92. The following statements concern the nucleus of termination of the tracts listed below:

- (a) The posterior white column tracts terminate in the inferior colliculus.
- (b) The spinoreticular tract terminates on the neurons of the hippocampus.
- (c) The spinotectal tract terminates in the inferior colliculus.
- (d) The anterior spinothalamic tract terminates in the ventral posterolateral nucleus of the thalamus.
- (e) The anterior spinocerebellar tract terminates in the dentate nucleus of the cerebellum.

93. The following statements relate sensations with the appropriate nervous pathways:

- (a) Two-point tactile discrimination travels in the lateral spinothalamic tract.
- (b) Pain travels in the anterior spinothalamic tract.
- (c) Unconscious muscle joint sense travels in the anterior spinocerebellar tract.
- (d) Pressure travels in the posterior spinothalamic tract.
- (e) Vibration travels in the posterior spinocerebellar tract.

94. The following statements concern the anterior surface of the medulla oblongata:

- (a) The pyramids taper inferiorly and give rise to the decussation of the pyramids.
- (b) On each side of the midline, there is an oval swelling called the olive, which contains the corticospinal fibers.
- (c) The hypoglossal nerve emerges between the olive and the inferior cerebellar peduncle.
- (d) The vagus nerve emerges between the pyramid and the olive.
- (e) The abducent nerve emerges between the pons and the midbrain.

95. The following general statements concern the medulla oblongata:

- (a) The caudal half of the floor of the fourth ventricle is formed by the rostral half of the medulla.
- (b) The central canal extends throughout the length of the medulla oblongata.
- (c) The nucleus gracilis is situated beneath the gracile tubercle on the anterior surface of the medulla.
- (d) The decussation of the medial lemnisci takes place in the rostral half of the medulla.
- (e) The cerebellum lies anterior to the medulla.

96. The following statements concern the interior of the lower part of the medulla:

- (a) The decussation of the pyramids represents the crossing over from one side of the medulla to the other of one-quarter of the corticospinal fibers.
- (b) The central canal of the spinal cord is not continuous upward into the medulla.
- (c) The substantia gelatinosa is not continuous with the nucleus of the spinal tract of the trigeminal nerve.
- (d) The medial lemniscus is formed by the anterior spinothalamic tract and the spinotectal tract.

33. Which of the following aminoglycoside has the widest spectrum of activity?
 A. Kanamycin
 B. Tobramycin
 C. Amikacin
 D. Gentamycin
34. Cotrimoxazole is a drug of choice in the treatment of:
 A. Amoebic dysentery
 B. Pneumocystis jirovecii
 C. Bacillary dysentery
 D. Enteric fever
35. Which of the following antibiotic is known to be a hepatic enzyme inhibitor:
 A. Tetracycline
 B. Penicillin
 C. Quinolones
 D. Erythromycin
36. Amphotericin is the drug of choice for all except:
 A. Aspergillosis
 B. Blastomycosis
 C. Esophageal candidiasis
 D. Cryptococcosis
37. Widespread and prolonged use of an antibiotic leads to emergence of drug resistant strains because antibiotics:
 A. Induce mutation in the bacteria
 B. Promote conjugation among bacteria
 C. Allow resistant strains to propagate preferentially
 D. All of the above
38. The most important mechanism of concurrent acquisition of multidrug resistance among bacteria is:
 A. Mutation
 B. Conjugation
 C. Transduction
 D. Transformation
39. Select the sulfonamide drug which is active against pseudomonas and is used by topical application for prophylaxis of infection in burn cases:
 A. Sulfadiazine
 B. Silver sulfadiazine
 C. Sulfadoxine
 D. Sulfamethoxazole
40. Indicate the enzyme(s) inhibited by fluoroquinolones:
 A. Both 'B' and 'C'
 B. Topoisomerase II
 C. Topoisomerase IV
 D. DNA gyrase

72. Concerning mono-amine oxidase inhibitors

- ~~FA~~ A. Action on MAO-A, rather than MAO-B, is probably more important for antidepressant action
- T B. They commonly cause hypotension as a side effect
- FC. Can cause central nervous system stimulation and arousal
- ~~FD~~ D. Have been associated with severe hypotension when taken with tyramine containing foods such as cheese *hyper*

73. Which of the following drugs are used in the treatment of muscle spasms

- T A. Baclofen
- T B. Diazepam
- FC. Chlorzoxazone
- ~~FD~~ D. Phenobarbital

74. Which of the following drugs are used in the treatment of insomnia?

- T A. Thiopental
- ~~FB~~ B. Zolpidem
- ~~TC~~ C. Buspirone
- T D. Propranolol

75. Which of the following drugs do not have anti-convulsant effects?

- T A. Flumazenil
- FB. Diazepam
- FC. Chlorzoxazone
- ~~TD~~ D. Buspirone

76. Which of the following drugs can induce Parkinsonism?

- T A. Haloperidol
- FB. Diazepam
- FC. Bromocriptine
- D. Amitriptyline

77. Which of the following drugs would be helpful in countering psychosis induced by levodopa in the treatment of Parkinson's disease?

- ~~FA~~ A. Haloperidol T
- ~~FB~~ B. Clozapine T
- ~~FC~~ C. Bromocriptine F
- ~~FD~~ D. Amantadine F

1. Adverse effects of chlorpromazine include ✓

- ☒ A. Depression with suicidal risk
- ☒ B. Parkinsonism
- ☒ C. Cholestatic jaundice
- ☒ D. Dermatitis

2. Drugs used in the management of generalized tonic-clonic seizure disorder include

- ☒ A. Chlorpromazine
- ☒ B. Lithium
- ☒ C. Ethosuximide
- ☒ D. Phenytoin

3. Which of the following anti-psychotic drugs have high affinity for 5-HT₂ receptors?

- ☒ A. Chlorpromazine
- ☒ B. Clozapine
- ☒ C. Risperidone
- ☒ D. Haloperidol

4. Which of the following drugs are used in the management of bipolar disorder?

- ☒ A. Lithium
- ☒ B. Phenobarbital
- ☒ C. Diazepam
- ☒ D. Valproate

Benzodiazepines

- ☒ A. Are commonly used in the management of depression
- ☒ B. Act at the GABA receptor
- ☒ C. Tend to cause agitation and restlessness
- ☒ D. Can worsen the seizure associated with alcohol withdrawal syndrome

Regarding hypnotics and anxiolytics

- ☒ A. Beta adrenoceptor antagonists act centrally to reduce anxiety (act peripherally)
- ☒ B. The effects of zolpidem can be antagonized by flumazenil
- ☒ C. Antidepressants are rapidly acting anxiolytic drugs
- ☒ D. Chlormethiazole has low addictive potential (long term use causes tolerance & physical dependence)

25. Concerning finasteride:

- ☒ A. Can reduce prostate size in benign prostate hypertrophy
- B. Is useful in the treatment of simultaneous benign prostate hypertrophy and erectile dysfunction
- C. Is the anti-androgen drug of choice in prostate cancer
- D. Blocks alpha-adrenoceptors in the prostate gland

26. Androgen deprivation therapy in prostate cancer:

- A. Drugs used include tamoxifene
- B. Androgen receptor blockers include buserelin
- C. Is contra-indicated in metastatic prostate cancer
- ☒ D. Includes degarelix

27. For which of these chemicals would oral administration of activated charcoal be most useful in reducing absorption in the gut?

- A. Lithium
- B. Ferrous sulphate
- C. Methanol
- ☒ D. Theophylline

28. For which of these chemicals would haemodialysis be least useful in eliminating the chemical from the body?

- A. Aspirin
- ☒ B. Digoxin
- C. Methanol
- D. Lithium

29. Which of the following would be most beneficial as an antidote for methanol poisoning?

- A. Diazepam
- B. Ethylene glycol
- ☒ C. Ethanol
- D. Propylene glycol

30. The metabolic pathway of paracetamol that leads to hepatotoxicity is:

- ☒ A. Oxidation
- B. Glutathione conjugation
- C. Glucuronidation
- D. Sulphate conjugation

31. In pseudomembranous colitis the drug of choice is:

- A. Ciprofloxacin
- B. Neomycin
- ☒ C. Vancomycin
- D. Cefuroxime

32. Beta-lactam antibiotics include all except:

- A. Penicillin
- B. Carbapenem
- C. Monobactam
- ☒ D. Macrolides

41. The following tetracycline has the potential to cause vestibular toxicity:
- ☒ A. Minocycline
 - B. Demeclocycline
 - C. Doxycycline
 - D. Tetracycline
42. Select the class of antibiotics which act by interfering with bacterial protein synthesis, but are bactericidal:
- A. Tetracyclines
 - ☒ B. Aminoglycosides
 - C. Macrolides
 - D. Lincosamides
43. Compared to erythromycin, azithromycin has:
- A. Extended antimicrobial spectrum
 - B. Better gastric tolerance
 - C. Longer duration of action
 - ☒ D. All of the above
44. 'Red man syndrome' has been associated with rapid intravenous injection of the following antibiotic:
- ☒ A. Vancomycin
 - B. Clindamycin
 - C. Cefoperazone
 - D. Piperacillin
45. Adverse effects of ketoconazole include the following except:
- A. Gynaecomastia
 - B. Oligozoospermia
 - ☒ C. Kidney damage
 - D. Menstrual irregularities
46. Choose the azole antifungal drug which is used only topically:
- A. Ketoconazole
 - B. Fluconazole
 - C. Itraconazole
 - ☒ D. Econazole
47. Select the drug that is fungicidal and acts by inhibiting fungal squalene epoxidase enzyme:
- A. Ketoconazole
 - ☒ B. Terbinafine
 - C. Tolnaftate
 - D. Hamycin
48. Which of the following viruses is most susceptible to acyclovir?
- ☒ A. Herpes simplex type I virus
 - B. Herpes simplex type II virus
 - C. Varicella-zoster virus
 - D. Epstein-Barr virus

19. Which one of the following statements about pain sensation is correct?

- (a) Painful sensations can be elicited by any sensory neuron if its firing frequency is high enough.
- (b) Painful sensation arising from a particular area of the skin occurs only when pain fibers from that area of the skin are stimulated.
- (c) A lesion of the anterolateral tract on both sides of the spinal cord will produce loss of all painful sensations arising from skin region innervated by sensory roots caudal to the site of the lesion.
- (d) Pain fibers conduct impulses to the spinal cord and to skin regions surrounding the site of a painful stimulus.
- (e) All the above are correct.

20. Which one of the following sensory systems uses unmyelinated fibers to convey information to the central nervous system (CNS)?

- (a) Proprioception
- (b) Vision
- (c) Vibration
- (d) Temperature
- (e) Pressure

Aδ and C fibres
↓
myelinated ↓
unmyelinated

37. Visual optics:

- ~~F(a) The optical centre or nodal point (N) of the eye is normally close to the fovea~~
F(b) After removal of the lens one can only see near objects
T(c) Objects are usually blurred if each eye has marked different refraction
T(d) Normal people can discern two light sources 1mm apart at 10m

38. As part of the visual pathways:

- T(a) A complete visual field is represented in each lateral geniculate body
T(b) The fovea projects mainly into the contralateral optic tract
F(c) Only the central parts of the retina are topographically aligned in the primary visual area
T(d) Gross vision can be sensed in the superior corpora quadrigemina

39. Pupillary reflexes and reactions:

- T(a) The consensual response has the same magnitude as the direct response
F(b) A lesion involving the mid-brain decussation of optic fibres can cause bilateral loss of light reflexes with retention of the near reflex, lid reflexes, and psychosensory reactions
F(c) A lesion of the ciliary ganglion can cause an ipsilateral Argyll Robertson pupil
T(d) The stimulus to accommodation is a blurring of the actual image

40. In the control of pupillary size:

- T(a) It is normal to have oscillations of the pupil on exposure to light before it settles to its final size
T(b) It is normal for a light-constricted pupil to slowly dilate despite keeping the light source constant
F(c) Local irritative lesions of the IIIrd nerve usually affect the sympathetic more than parasympathetic control
F(d) A progressive unilateral extradural haemorrhage causes ipsilateral pupillary constriction prior to dilation

7. A 23-year-old woman was unconscious when admitted to the emergency department. While crossing the road, she had been hit on the side of the head by a bus. Within an hour, she was found to have a large doughlike swelling over the right temporal region. She also had signs of muscular paralysis on the left side of the body. A lateral radiograph of the skull showed a fracture line running downward and forward across the anterior inferior angle of the right parietal bone. Her coma deepened, and she died 5 hours after the accident.

88. Select the most likely cause of the swelling over the right temporal region in this patient.

- ☐ (a) Superficial bruising of the skin
- ☐ (b) Hemorrhage from a blood vessel in the temporalis muscle
- ☐ (c) Rupture of the right middle meningeal vessels
- ☐ (d) Edema of the skin
- ☐ (e) Hemorrhage from a blood vessel in the superficial fascia

89. Select the most likely cause of the muscular paralysis of the left side of the body in this patient.

- ☐ (a) Laceration of the right side of the cerebral hemisphere
- ☐ (b) Right-sided epidural hemorrhage
- ☐ (c) Left-sided epidural hemorrhage
- ☐ (d) Injury to the cerebral cortex on the left side of the brain
- ☐ (e) Injury to the right cerebellar hemisphere

90. The following statements concern the cell of origin of the tracts listed below:

- ☐ (a) The fasciculus cuneatus arises from the cells in the substantia gelatinosa.
- ☐ (b) The anterior spinal thalamic arises from the cells in posterior root ganglion.
- ☐ (c) The fasciculus gracilis arises from the cells in the nucleus dorsalis (Clarke's column).
- ☐ (d) The anterior spinocerebellar arises from the cells in the posterior root ganglion.
- ☐ (e) The lateral spinothalamic arises from the cells in the substantia gelatinosa.

91. The following statements concern the courses taken by the tracts listed below:

- ☐ (a) The fasciculus gracilis does not cross to the opposite side of the neural axis.
- ☐ (b) The spinotectal tract does not cross to the opposite side of the spinal cord.
- ☐ (c) The lateral spinothalamic tract does not cross to the opposite side of the spinal cord.
- ☐ (d) The posterior spinocerebellar tract does cross to the opposite side of the neural axis.
- ☐ (e) The anterior spinothalamic tract immediately crosses to the opposite side of the spinal cord.

UNIVERSITY OF ZAMBIA

SCHOOL OF MEDICINE

DEPARTMENT OF PHYSIOLOGICAL SCIENCES

PGY 4210 TEST THREE (2015/16 ACADEMIC YEAR)

COMPUTER NUMBER: _____

SURNAME: _____

FIRST NAME: _____

MIDDLE NAME(S): _____

DATE: FRIDAY 8TH JULY 2016

TIME: 08:00 – 09:15

DURATION OF TEST: 75 MINUTES [INCLUSIVE OF TIME TO READ THROUGH THE TEST PAPER AND TO WRITE YOUR PARTICULARS]

INSTRUCTIONS

1. There are 60 questions in this paper
2. You must answer ALL the questions
3. There is no negative marking for wrong answers, but 1 mark will be deducted for each unanswered question
4. Choose the one best answer by encircling the letter corresponding to the answer

Total Marks: marks 60

49. The antiviral action of amantadine is exerted through:

- ☒ A. Interaction with the viral M2 protein
- B. Interaction with a virus directed thymidine kinase
- C. Inhibition of a viral protease enzyme
- D. Inhibition of viral RNA mediated DNA synthesis

50. Prolonged use of the following drug has been implicated in the causation of sub-acute myelo-optic neuropathy (SMON):

- A. Diloxanide furoate
- ☒ B. Quinolodochlor
- C. Emetine
- D. Furazolidone

51. The drug of choice for neurocysticercosis is:

- ☒ A. Albendazole
- B. Niclosamide
- C. Praziquantal
- D. Ivermectin

52. Which of the following drugs is LEAST effective luminal amoebicide?

- ☒ A. Metronidazole
- B. Diloxanide furoate
- C. Iodoquinol
- D. Paromomycin

* 53. Maximum incidence of phototoxicity is associated with:

- A. Norfloxacin
- ☒ B. Sparfloxacin
- C. Lomefloxacin
- D. Cotrimoxazole

54. Di-ethyl-carbamazine is used for treatment of:

- ☒ A. Filariasis
- B. Dracunculiasis
- C. Schistosomiasis
- D. Taeniasis

55. Ivermectin used in treatment of:

- ☒ A. Filariasis
- B. Ascariasis
- C. Teniasis
- D. Hookworm infestation

56. Eye drops of which sulphonamide is used clinically?

- ☒ A. Sulphacetamide
- B. Sulphamethoxazole
- C. Sulphamethoxazole
- D. All

6. In the upper motor neurone lesion affecting one side of the body, the following signs and symptoms occur in the affected limb:

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

7. In the descending tracts in the spinal cord:

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

8. The ascending tracts in the spinal cord:

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

Sensory nerves terminating in the grey matter of the spinal cord:

- F (a) ✗ Elicit reflex responses T F
- T (b) ✓ Enter the cord through the sensory roots T
- F (c) ✗ Enter the cord through the corticospinal tracts F
- F (d) ✗ Have facilitatory functions T F

The primary sensory endings of a muscle spindle in a voluntary muscle is stimulated by:

- F (a) ✗ Shortening of an antagonist muscle
- F (b) ✗ Relaxation of the muscle when under load
- T (c) ✓ Shortening of the extensor fibers of the muscle
- T (d) ✓ Stimulation of the gamma efferent to the muscle spindle

by drugs likely to increase

- TA. Ethanol
- FB. Cimetidine
- FC. Rifampicin
- FD. Flumazenil

60. Flumazenil:

- TA. Blocks the actions of zolpidem
- FB. Blocks the actions of phenobarbital
- TC. Is a benzodiazepine antagonist
- TD. Can be used to treat benzodiazepine overdose

61. Concerning zolpidem:

- FA. Is used in the management of epilepsy
- FB. Has higher risk of development of dependence compared to benzodiazepines
- FC. Risk of seizures limits its clinical use
- TD. It is used in relieving the muscle spasms of tetanus

62. Anti-seizure drugs that act by enhancing GABA-mediated neuronal inhibition include:

- PA. Ethosuximide
- FB. Carbamazepine
- TC. Clonazepam
- TD. Phenobarbital

63. Which of these anti-epileptic drugs are used in the management of generalised tonic-clonic seizures?

- TA. Carbamazepine
- TB. Lamotrigine
- FC. Ethosuximide
- TD. Phenytoin

64. Which of the following drugs are selective serotonin re-uptake inhibitors?

- FA. Imipramine
- TB. Fluoxetine
- FC. Phenelzine
- FD. Isocarboxazid

65. The drugs that are effective for myoclonic seizures include:

- FA. Carbamazepine
- FB. Phenytoin
- TC. Clonazepam
- TD. Valproate

~~NEURSCIENCE~~ (ANATOMY)

The spinal cord has

- (a) an outer covering of gray matter and an inner core of white matter.
- (b) an enlargement below that forms the conus medullaris.
- (c) anterior and posterior roots of a single spinal nerve attached to a single segment.
- (d) cells in the posterior gray horn that give rise to efferent fibers that supply skeletal muscles.
- (e) a central canal that is situated in the white commissure.

The medulla oblongata has

- (a) a tubular shape.
- (b) the fourth ventricle lying posterior to its lower part.
- (c) the midbrain directly continuous with its upper border.
- (d) no central canal in its lower part.
- (e) the spinal cord directly continuous with its lower end in the foramen magnum.

80. The midbrain has

- (a) a cavity called the cerebral aqueduct.
- (b) a large size.
- (c) no cerebrospinal fluid around it.
- (d) a cavity that opens above into the lateral ventricle.
- (e) a location in the middle cranial fossa of the skull.

81. The following statements concern the cerebellum:

- (a) It lies within the middle cranial fossa.
- (b) The cerebellar cortex is composed of white matter.
- (c) The vermis is the name given to that part joining the cerebellar hemispheres together.
- (d) The cerebellum lies anterior to the fourth ventricle.
- (e) The dentate nucleus is a mass of white matter found in each cerebellar hemisphere.

82. The following statements concern the cerebrum:

- (a) The cerebral hemispheres are separated by a fibrous septum called the tentorium cerebelli.
- (b) The bones of the vault of the skull are named from the lobes of the cerebral hemisphere over which they lie.
- (c) The corpus callosum is a mass of gray matter lying within each cerebral hemisphere.
- (d) The internal capsule is an important collection of nerve fibers, which has the caudate nucleus and the thalamus on its medial side and the lentiform nucleus on its lateral side.
- (e) The cavity present within each cerebral hemisphere is called the cerebral ventricle.

16

Volume and composition of cerebro-spinal fluid (CSF):

- F (a) ✓ About half of the CSF is in the ventricles at any one time F 20-25% in ventricle and cerebral canal
- F (b) ✓ CSF has similar composition to plasma except for protein F
- F (c) ✓ CSF protein levels are about half that in plasma F Trace Protein levels
- F (d) ✓ CSF glucose falls dramatically in tuberculosis and meningitis

17. In reflex actions:

- F T (a) ✓ The interval between the stimulus and the final effect is chiefly determined by the length of the afferent and efferent nerves F
- F T (b) ✓ Spatial summation refers to simultaneous threshold stimulation of two or more nearby afferent nerves F
- T (c) ✓ Synapses are the first part of a reflex to become fatigued T
- T (d) ✓ Flexor reflexes are probably the most primitive of all reflexes T

18. In the transmission of painful stimuli:

- T (a) ✓ Pain receptors are polymodal in nature T
- T (b) ✓ Sharp, rapid, intense pain is carried by heavily myelinated fibres F T
- T (c) ✓ Unmyelinated C fibres only carry slow dull diffuse, aching pain T
- T (d) ✓ Some pain fibres remain uncrossed in the spinal cord T

19. Thermoperception:

- F T (a) ✓ The end organs of Krause and Bulfinch detect cold and heat F
- T (b) ✓ Thermoreceptors that respond to cold (cold spots) are more plentiful than those that respond to heat (hot spots) T
- T (c) ✓ Maximal discharge from hot spots is between 40 and 45 °C T
- T (d) ✓ Cold spots show a rapid discharge when temperature exceeds 45 °C T

20. What are the results of unilateral damage to the cerebellum in man?

- T (a) ✓ Disturbances of posture and disorganization of voluntary movement T
- F (b) ✓ Hemiplegia on the same side F
- F T (c) ✓ Hemiplegia on the opposite side
- T (d) ✓ Loss of sense of position on the same side of the body causing uncoordinated movements if the eyes are shut.

Hemiparesis = Paralysis of one half of the body
Side arising from stroke

1. Drugs that exert anti-malarial effects through inhibiting haem polymerase include:
A. Artemether
☒ B. Halofantrine ✓
C. Atovaquone
D. Doxycycline
2. Which of these anti-malarial drugs is correctly matched to the given contraindication?
A. Quinine: lactation
B. Artesunate: renal disease
☒ C. Doxycycline: pregnancy ✓
D. Lumefantrine: anaemia
3. Which of these anti-malaria drugs is correctly matched to the given adverse effect?
☒ A. Mefloquine: hallucinations ✓
B. Dihydroartemisinin: nephrotoxicity
C. Halofantrine: hepatotoxicity
D. Primaquine: retinopathy
4. Pick out the right statement:
A. Quinidine is used for malaria chemoprophylaxis
B. Arte-ether is given orally
C. Primaquine is a rapidly acting blood schizonticide
☒ D. Artesunate is one of the drugs recommended for severe P. Falciparum malaria ✓
5. Which of these anti-malarial drugs has been associated with black-water fever?
A. Chloroquine
☒ B. Quinine ✓
C. Amodiaquine
D. Mefloquine
6. Which of these anti-malarial drugs is least likely to be associated with cardiac arrhythmias?
A. Halofantrine
☒ B. Lumefantrine ✓
C. Mefloquine
D. Quinidine
7. Which of these drugs is used for eradication of hypnozoites in P. Vivax malaria infections?
☒ A. Primaquine ✓
B. Mefloquine
C. Quinine
D. Chloroquine
8. Which of these drugs is the slowest acting blood schizonticide?
A. Quinidine
B. Atovaquone
C. Clindamycin
☒ D. Halofantrine ✓

47. Tricyclic antidepressants

- FA. Can be taken with monoamine oxidase inhibitors in patients showing poor therapeutic response
- FB. Have a wide therapeutic index and safe in overdose
- FC. Are commonly associated with weight loss
- TD. Can cause severe hypertension in a patient taking food that is rich in tyramine

48. In psychotic disorders

- TA. Positive symptoms tend to be refractory to treatment with first generation neuroleptics
- FB. Atypical neuroleptics have a strong affinity for dopamine D2 receptors (low affinity for D1)
- TC. Risperidone is less likely to cause extrapyramidal symptoms compared to haloperidol
- FD. Neuroleptic drugs with anti-muscarinic activity have the greatest potential for causing Parkinsonism

49. Which of the following anti-epileptic drugs is correctly matched with the stated adverse effect?

- FA. Valproate: gingival hyperplasia F
- FB. Phenytoin: teratogenicity T
- FC. Carbamazepine: hyper-uricaemia F
- FD. Phenobarbital: learning impairment in children T

50. Concerning fluoxetine

- TA. Serotonin syndrome can result when given concurrently with a monoamine oxidase inhibitor
- FB. Inhibits re-uptake of noradrenaline
- FC. Is highly sedative
- FD. Is useful in management of partial seizures

51. Drugs that are indicated in the management of absence seizures include

- FA. Carbamazepine
- FB. Phenytoin
- TC. Clonazepam + Ethosuximide, the drug of choice
- TD. Valproate

52. Concerning management of Parkinsonism

- FA. Levodopa is less associated with development of dyskinesias than bromocriptine FALSE
- FB. Bromocriptine is the drug of choice in Parkinsonism induced by anti-psychotic drugs FALSE (anti-muscarinics are used)
- TC. Catechol-O-methyl transferase inhibitors are indicated as add-on therapy in patients experiencing motor fluctuations on levodopa/carbidopa TRUE

Bromocriptine is a dopamine agonist that provides symptomatic benefit & may reverse fluctuations & dyskinesias

8. A patient after trauma of the head has asthenia, muscular dystonia and imbalance of the body. Which part of CNS can be damaged?

- (a) Nucleus rubor
- (b) Substantia Nigra
- ☒ (c) Cerebellum
- (d) Formatio reticularis
- (e) Frontal cortex

9. A patient falls asleep after trauma of brain. Which part is damaged in this case?

- (a) Formatio reticularis
- (b) Nucleus of cranial nerves
- ☒ (c) Cerebral cortex
- (d) Nucleus of substantia Nigra
- (e) Thalamus

10. Sleep and wakefulness are related to which of the following structures?

- (a) The intralaminar nuclei of the thalamus
- (b) The posterior nucleus of the hypothalamus
- (c) The periaqueductal gray
- ☒ (d) The reticular formation - *document*
- (e) All are correct

11. On electroencephalogram of adult man there is delta rhythm. Which is physiological status of the cerebral cortex?

- (a) Moderate activity
- (b) Epileptic status
- (c) Very high activity
- ☒ (d) Very deep sleep
- (e) Convulsion status

12. Activation of various portions of the reticular formation:

- (a) Can increase reflex activity
- (b) Can cause a complex motor movement such as speech
- (c) Can decrease reflex activity
- ☒ (d) Cannot affect the reflex activity
- (e) Acts to modulate reflex activity in conjunction with other brain structures

D. Pentazocine - mixed opioid agonist-antagonist
causes dysphoria

16. Which of these opioid analgesics is a partial agonist on opioid receptors?
A. Pentazocine
B. Buprenorphine - Morphine Antagonist also
C. Naltrexone
D. Codeine - mild to moderate
17. Which of these drugs has no role in migraine prophylaxis?
A. Clonidine
B. Nifedipine ✓ - BP.
C. Propranolol
D. Amitriptyline
18. Which of these drugs is most beneficial in improving cognitive functions in patients with Alzheimer's disease?
A. Amantadine
B. Benztropine
C. Memantine ✓
D. Bromocriptine
19. Centrally acting cholinesterase inhibitors include:
A. Rivastigmine, Tacrine and Donepezil.
B. Memantine
C. Pralidoxime
D. Benzhexol
20. Which of these drugs does not have anti-convulsant properties?
A. Thiopental
B. Zolpidem
C. Chlormethiazole
D. Propofol - causes Bradycardia (antidote is Atropine).
21. Which of these drugs is least useful for mood stabilization in bipolar disorder?
A. Valproate.
B. Diazepam ✓
C. Lithium
D. Carbamazepine
↓
Lithium
22. Which of these drugs produces the least physical dependence?
A. Nicotine
B. Ethanol
C. Dronabinol ✓
D. Chlormethiazole

9. In which sequences does afferent acoustic impulses pass on CNS?

- ~~F~~ (a) Cochlea, cochlear nuclei, lateral lemniscus, accessory nucleus, medial geniculate nucleus, primary acoustic cortex
- ~~T~~ (b) Cochlea, anteroventral nucleus, postventral nucleus, lateral lemniscus, superior olive, medial geniculate nucleus, primary acoustic cortex
- ~~T~~ (c) Cochlea, anteroventral and postventral nuclei, dorsal cochlear nucleus, superior olive, accessory nucleus, lateral lemniscus, inferior colliculus, medial geniculate nucleus, primary acoustic cortex
- ~~F~~ (d) Cochlea, dorsal cochlear nucleus, superior olive, anteroventral and postventral nuclei, accessory nucleus, inferior colliculus, lateral lemniscus, medial geniculate nucleus, primary acoustic cortex

10. The sympathetic division of the autonomic nervous system is characterized by:

- ~~F~~ (a) Presynaptic inhibition
- ~~T~~ (b) Thoracolumbar outflow from the spinal cord
- ~~T~~ (c) Short postganglionic fibers
- ~~T~~ (d) Adrenergic preganglionic fibers

11. In the vestibular apparatus:

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

12. In unilateral vestibular disease typical features include:

- ~~F~~ (a) The sensation that the external world is revolving
- ~~F~~ (b) A tendency to stagger when walking
- ~~F~~ (c) A tendency to fall in the dark
- ~~T~~ (d) Nausea and vomiting

13. Smell and taste are similar in that:

- ~~F~~ (a) The primary sensory areas for both are in the neocortex
- ~~T~~ (b) The receptors for both are chemoreceptors
- ~~F~~ (c) The receptors for both are teleceptors
- ~~T~~ (d) Both play an important role in determining the flavor of food

6. Seizures are the manifestation of periods of uncontrolled, rapid, synchronized firing of groups of cortical neurons, sometimes in localized areas (partial seizures) and sometimes in widespread areas in both hemispheres (generalized seizures). Most medications used to reduce the frequency of seizures do one or more of the following

- Bind to voltage-gated Na^+ channels and slow the rate at which they move from an inactivated state to the "resting" (deinactivated) state.
- Act at synapses that use GABA as a neurotransmitter, by enhancing the opening of GABA-gated ion channels, by blocking the reuptake of GABA from the synaptic cleft, or by blocking the enzymatic degradation of GABA.
- Block the type of voltage-gated Ca^{++} channel that is prominent in thalamic neurons.

(a) Give one example of a drug (other than valproate) that acts by each of the mechanisms mentioned above and mention one type of seizure disorder for which each drug is used. (6 Marks)

(b) Mention two adverse effects (other than anorexia, nausea, vomiting, constipation or diarrhoea) for any of the two drugs you have mentioned in (a) above (4 Marks)

(c) In form of a table classify central nervous system neurotransmitters, mentioning one major action mediated by each neurotransmitter (10 Marks)

1. 2. A patient has been found with an infection that results in increased levels of prostaglandins E_2 that reaches the temperature regulatory sites in the anterior hypothalamus, raising the set point and causing fever.

(a) Briefly outline the anatomic zones of the hypothalamus taking into account arrays of nuclei with distinctive patterns of connection (5 Marks)

(b) Explain the physiology of the hypothalamus (10 Marks)

(c) Dopamine is one of the hormones secreted from the hypothalamus. List three endocrine functions of dopamine. Name one drug that is a dopamine receptor agonist in the hypothalamus and give one endocrine clinical indication of this drug. (5 marks)

3. 2015/14 Paper (Layer 8 Grey matter)
END OF EXAM

Neuroanatomy

1. Blood brain barrier
2. Internal Capsule
3. Spinal bifida
4. Upper motor Neuron Lesion
5. Lumbar Puncture
6. Histology of the Retina

END OF EXAM.

20
20
20
20
10
38
60



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

Regarding the reticular formation and the limbic system:

- (a) The hippocampus is important in behavioural disorders
- (b) The reticular formation has exceptionally long dendrites and axons
- (c) The hypothalamus is the main outlet for the limbic system
- (d) The amygdaloid nucleus is mainly concerned with memory
- (e) b and c are correct

5. Learning and memory:

- (a) Short-term memory has a small capacity
- (b) Short-term memory is located in the frontal lobes
- (c) One can access short-term memory in retrograde amnesia
- (d) One cannot transfer information from primary to secondary memory in anterograde amnesia
- (e) All are correct

6. In the inner ear:

- (a) At rest inside a hair cell is about +150 mV compared to endolymph
- (b) The electrolyte composition of endolymph is similar to intracellular fluid
- (c) During sound transmission only individual basilar fiber vibrate
- (d) The shortest fibres of the basilar membrane are at the apex
- (e) a and b are correct

7. A patient has no reaction of the pupil to the light. What muscle/s is damaged?

- (a) Oculomotor muscle
- (b) Ciliary muscle
- (c) Dilator pupillae muscle
- (d) Sphincter pupillae muscle
- (e) a and d are correct

28.8

DATA CARCINOMA

- Develop a pharmacotherapy plan for the management of chronic cancer pain
- Discuss the use of abortive and prophylactic agents in the management of migraine headache

Sedative-hypnotics

- Design a therapeutic plan for treatment of insomnia
- List the advantages of using benzodiazepines instead of barbiturates for sleep disorders

Anaesthesia

- What is balanced anaesthesia? Give the rationale for its use and describe an example of balanced anaesthesia. Mention the major adverse effects and precautions you would take for all the drugs that you mention.

Drug Abuse and Drug Dependence

- Describe a pharmacotherapeutic program for rehabilitating a client who is physically dependent on heroin
- Design a pharmacotherapeutic plan to control the symptoms and signs of alcohol (ethanol) withdrawal and to prevent further withdrawal complications
- Discuss the pharmacological options available for the treatment of alcohol (ethanol) dependence

**A RIVER DOES NOT FLOW THROUGH A FOREST WITHOUT
BRINGING DOWN TREES**

LUSAKA APEX MEDICAL UNIVERSITY
FACULTY OF MEDICINE
DEPARTMENT OF PHYSIOLOGICAL SCIENCES

MBChB 4th years

CONTINUOUS ASSESSMENT TEST 2

TIME: 60mins

INSTRUCTIONS TO CANDIDATES:

- 1) Write your computer number on the question paper and answer sheet
- 2) Follow instructions pertaining to each section carefully

Computer number.....

3. A patient that is examined by an ophthalmologist reveals the following symptoms. ✓
The pupil reflex is negative when the left eye is highlighted by a flashlight. The accommodative reflex is positive. When the patient sees approaching objects, the axis of his eyeballs becomes convergent and pupils constrict.

(a) Draw the a well-labelled diagram showing the possible damaged pathways (5 Marks) ✓

(b) Describe the physiology of visual accommodation (5 Marks) ✓

(c) With suitable examples, name two groups of drugs that affect pupillary response to light and visual accommodation. Describe the effects of these drugs on the pupil and describe how they affect accommodation. What are their mechanisms of action? Mention one ophthalmic clinical indication for each group of drug. (10 Marks)

4. A patient has paralysis of the facial muscle so that his mouth is retracted to the left. Both of his eyes can still be closed even though his right eye contraction has weakened. He has developed paralysis of his right hand but both of his legs can still be moved normally.

(a) Where was the possible location of the patient's lesion? (5 Marks) ✓

(b) Is this an UMN or LMN lesion? Explain why both of his eyes can still be closed (5 Marks) ✓

(c) Name three drugs (each from a different drug class) that can be used to relieve skeletal muscle spasticity in patients with spastic neurological disorders and describe their mechanisms of actions (10 Marks)

5. A 33 year old woman began to have episodes about 3 years ago in which loud sounds caused her eyes to twitch and made the outside world appear to rotate resulting in unsteadiness and loss of balance. Testing revealed that loud low-frequency sounds delivered to her right (but not left) ear caused a vertical torsional nystagmus. During the fast phase, her eyes moved downwards and rotated counter clockwise direction (as seen by others).

(a) Draw a well labelled diagram showing the major anatomical features of the vestibular labyrinth (5 Marks)

(b) Explain the physiology of the vestibular function (10 Marks)

(c) With suitable examples, name two groups of drugs that you could have used in the acute phase of this patient's disorder and explain how these drugs work in her condition (5 marks)

14. Neurons in the taste pathway have cell bodies in:

- ~~F~~ (a) Ganglia on cranial nerves
- ~~F~~ (b) The medial geniculate body
- ~~T~~ ~~F~~ (c) The nucleus of the tractus solitarius T
- ~~F~~ (d) The inferior colliculus

15. The autonomic nervous system:

- ~~T~~ ~~F~~ (a) Has preganglionic fibres which functions exclusively by means of acetylcholine
- ~~T~~ (b) Has post-ganglionic fibres in both parasympathetic and sympathetic divisions T
- ~~F~~ (c) Is not characterized by EPSP and IPSP membrane changes F
- ~~F~~ (d) Is not organized on the basis of the reflex arc F

3. Relay stations for the taste are:

- ☒ (a) Accessory nucleus
- ☒ (b) Inferior colliculus
- ☒ (c) Nucleus tractus solitarius T
- ☒ (d) Superior colliculus

4. Receptors for the taste of salt are situated on:

- ☒ (a) Mucus of mouth
- ☒ (b) Epithelium of the lips
- ☒ (c) The root of tongue and epiglottis
- ☒ (d) The tip and lateral parts of tongue T

5. Otoliths are mainly involved in sensing:

- ☒ (a) Sound amplitude and frequency
- ☒ (b) Angular velocity and acceleration
- ☒ (c) Linear velocity T
- ☒ (d) Linear acceleration T

6. Hearing loss is best diagnosed as either conductive or sensorineural by:

- ☒ (a) Examination of the tympanic membrane with an otoscope T
- ☒ (b) Testing vestibular function F
- ☒ (c) Comparing air and bone conduction thresholds T
- ☒ (d) Looking for a low frequency hearing loss T

7. A pheromone is a substance which:

- ☒ (a) Initiates ovulation and spermatogenesis
- ☒ (b) Is secreted by the olfactory receptors
- ☒ (c) Affects behavior of other species F
- ☒ (d) Produce analgesia

8. The potential for the smell^{is} generated by stimulation are^{of}

- ☒ (a) Free nerve endings of n. trigeminus
- ☒ (b) Limbic system
- ☒ (c) Nucleus tractus solitarius
- ☒ (d) Epithelium situated in the nasal cavity T

ATA CARCINOMA

can result from reduction in blood flow in multiple arteries at the same time, e.g. after cardiac arrest. This patient's left internal carotid artery was occluded, leading to reduced flow in the left ophthalmic, anterior cerebral, and middle cerebral arteries. The reduced flow in the anterior and middle cerebrals (either because of incomplete occlusion or coming from the circle of Willis) was able to save proximal parts of their territories from infarction, but the flow had run out before distal parts of the arteries were reached.

READING ASSIGNMENT

CEREBROVASCULAR

- Definition
- Types
- Symptoms
- Diagnosis
- Treatment
- Prevention
- Prognosis

"WHEN LIFE IS DRAGGING YOU BACK WITH DIFFICULTIES JUST KNOW ITS GOING TO LAUNCH YOU INTO SOMETHING GREAT....AN ARROW CAN ONLY BE SHOT BY PULLING IN BACKWARDS"

II. Lacrimal glands	increased secretions
III. Salivary glands	increased salivary secretions
IV. Gallbladder and ducts	increased production of bile due to contraction of gallbladder
V. Urinary bladder, Trigone and Sphincter	contraction of bladder and trigone and relaxation of Sphincter
VI. Lacrimal glands	OK increased lacrimation
VII. Pancreas islets	increased secretions

SECTION B (30 Marks)

Each question carries 10 marks.

1. Explain the physiological significance Weber's and Rinne's tests.
2. Explain the physiology of electroencephalogram and its changes during sleeping.
3. Explain the physiology of taste.

SECTION C (15 Marks)

In questions 1-15 select one that is the best in each case. Each question carries 1 mark.

1. Inhibition of fear and loss of emotion are prominent signs after lesions of
 - (a) Mammillary bodies
 - (b) Amygdaloid nuclei and limbic system
 - (c) Cerebral frontal lobes
 - (d) Cerebral motor cortex
 - (e) None are correct
2. Relay stations for taste are:
 - (a) Accessory nucleus
 - (b) Inferior colliculus
 - (c) Nucleus tractus solitarius
 - (d) Superior colliculus
 - (e) All are correct

8. Which of these drugs can be used for both induction and maintenance of general anaesthesia?
- ☒ A. Propofol
 - B. Etomidate *should not be used for maintenance due to cardiovascular factors*
 - C. Thiopentone
 - D. All the above drugs
9. Which one of these general anaesthetics would be most suitable for maintenance anaesthesia in a patient with hypovolaemic shock?
- A. Propofol
 - B. Etomidate
 - C. Thiopentone
 - ☒ D. Ketamine
10. Which of these drugs is most teratogenic?
- A. Clonazepam
 - ☒ B. Valproate *- used for treat bipolar disorder, migraine headaches and epilepsy. - can also act as mood stabiliser*
 - C. Carbamazepine
 - D. Magnesium sulphate
11. Which of these drugs has the highest propensity to cause aplastic anaemia?
- A. Valproate
 - B. Vigabatrin
 - ☒ C. Felbamate *- act liver failure*
 - D. Clonazepam
12. The anti-convulsant drug of choice for convulsions that occur in eclampsia is:
- A. Carbamazepine
 - B. Valproate
 - C. Phenytoin
 - ☒ D. Magnesium sulphate *- (im IV)*
13. Which of the following opioid analgesics is least likely to cause bradycardia?
- A. Morphine
 - B. Codeine
 - ☒ C. Pethidine *labour pain*
 - D. Methadone
- Tetrazine = C-section + Dextrose*
14. Which of the following opioid analgesics has the highest potential for producing physical and psychological dependence?
- A. Pethidine
 - B. Pentazocine
 - ☒ C. Morphine
 - D. Codeine
15. Which of these opioid analgesics is agonist on kappa opioid receptors and antagonist on mu opioid receptors?
- A. Buprenorphine
 - B. Naloxone
 - C. Naltrexone

- D. pain fibers conduct impulse to the spinal cord and to brain regions surrounding the site of a painful stimulus
- E. all the above are correct

Which one of the following sensory system uses unmyelinated fibers to convey information to the CNS?

- A. proprioception ~~X~~
- B. vision
- C. vibration
- ☒ D. temperature
- E. pressure

The styloid process of the temporal bone

- A. develops from the second branchial pouch
- B. is absent in a new born baby
- ☒ C. is formed by endochondral ossification
- ☒ D. has four muscles attached to it
- E. the stylomandibular ligament has the origin as the process.

The parathyroid glands:

- ☒ A. are usually four on each side
- B. develops from the endoderm of the second pharyngeal pouch
- C. are exocrine in nature
- ☒ D. consist of cords of principal and oxyphil cells
- E. shrivel and disappear in old age

The following are all features of the facial nerve in the petrous part of the temporal bone except:

- A. the greater petrosal nerve
- B. geniculate ganglion
- C. nerve to stapedius
- ☒ D. tympanic plexus
- E. chorda tympani

The following foramina match with the structures that pass through them except:

- | | | |
|--|---|----------------------------|
| <input checked="" type="radio"/> A. stylomastoid foramen | - | posterior auricular artery |
| B. foramen of Vesalius | - | emissary vein |
| C. foramen spinosum | - | middle meningeal artery |
| <input checked="" type="radio"/> D. foramen rotundum | - | maxillary nerve |
| E. jugular foramen | - | hypoglossal nerve |

V | S - V₁
R - V₂
O - V₃

25. Concerning air sinuses

- A. frontal sinuses are present at birth
- B. sphenoid sinus is not present at birth
- C. the floor of the maxillary sinus overlies the second premolar tooth
- ☒ D. ethmoidal sinuses all have one common opening
- E. the sinuses are all symmetrical.

50

- A. oculomotor
- ☒ B. trigeminal
- C. trochlear
- D. vagus
- E. hypoglossal

4. The inferior sagittal sinus:
- A. flows backwards along the inferior border into the cavernous sinus
 - ☒ B. joins the great cerebral vein (of Galen) to form the straight sinus
 - C. unites with the superior sagittal sinus at the confluence of sinuses
 - D. it receives a few cerebral veins from the lateral surface of the cerebral hemisphere
 - ☒ E. A and C only

5. The opening of the nasolacrimal duct in the nasal cavity is located in the:
- A. superior meatus
 - B. middle meatus
 - ☒ C. inferior meatus
 - D. bulla ethmoidalis
 - E. hiatus semilunaris

6. The superior orbital fissure lies between the:
- ☒ A. lesser wing of the sphenoid and the orbital plate of the frontal bone
 - B. lateral pterygoid plate and ethmoid bone
 - C. maxillary and ethmoid bone
 - D. sphenoid and ethmoid bone
 - ☒ E. greater and lesser wings of the sphenoid
- Inferior => Greater wing and orbital surface of maxillary*

Regarding the structure of the tongue:

- A. its musculature is mostly of the smooth type
- B. fungiform papillae are more numerous than filiform papillae
- ☒ C. it is divided into the right and left halves by a median fibrous septum
- D. circumvallate papillae are supplied by the lingual nerve
- ☒ E. none of the above

The tympanic nerve is a branch of the:-

- A. facial nerve
- ☒ B. glossopharyngeal nerve ✓
- ☒ C. maxillary division of the trigeminal nerve
- D. mandibular division of the trigeminal nerve
- E. vagus

The superior meatus communicates with the:

- A. anterior ethmoidal air cells
- ☒ B. frontal air sinus
- ☒ C. posterior ethmoidal air cells
- D. maxillary air sinus
- E. all of the above

ANSWER EACH SECTION IN A SEPARATE ANSWER BOOKLET

Section A. Answer both questions in this section. Each question carries 20 marks.

1. You have just graduated your 4th year with a Bachelor of Science in Human Biology (BSc.HB) and now in 5th year doing your first rotation in the Department of Paediatrics and Child Health at the University Teaching Hospital (UTH). Your consultant paediatrician asks you to look at Xelesi Zulu (picture below), a 3 month old infant, who is a referral from Chipata General Hospital (CGH), Eastern Zambia. She has been brought by her mother and admitted in ward AO1 with a complaint of an enlarging head for the past 2 months. [20]



- a. The consultant points at you to state any 3 important signs you can identify in Xelesi [3]
- b. He further tells you that Xelesi suffers from a condition that arises from abnormal excessive accumulation of cerebrospinal fluid (CSF) in the ventricular system of the brain causing increased Intracranial pressure (ICP).
- Name the condition that Xelesi has [1]
 - Mention any 2 congenital and 2 acquired causes of this condition [4]
 - Anatomically, briefly describe the flow of CSF in the ventricular system [10]
- c. The consultant concludes by stating that surgery is the practical modality of treating this condition. State the two surgical methods currently available for Xelesi. [2]

EXAM FINAL 2015

SECTION 1. In this section select ONE question OF YOUR CHOICE from THREE in BOTH parts A and B.
Each Individual question carries 20marks.

A. Neurophysiology

- ✓ 1. List 12 neurotransmitters and the principal sites in the nervous system at which they are released.
- ✓ 2. Compare ossicular, air and bone conduction. Explain common tests with a tuning fork to distinguish between sensorineural and conduction deafness.
- ✓ 3. Discuss the function of the corticospinal and corticobulbar tracts in skilled voluntary movement.

B. Neuroradiology

- ✓ 1. Formation and circulation of CSF and abnormalities in circulation
- ✓ 2. Origin and course of the facial nerve. Discuss also defects seen in its injury.
- ✓ 3. Formation and distribution of blood supply of the vertebral artery

SECTION 2

Answer any **FOUR** of the given six questions in parts A, B and C. Each Individual question carries 5 marks. Each answer should consist of 5 – 10 sentences.

A. Neuropharmacology

- ✓ 1. Ketamine: pharmacological properties, clinical uses and adverse effects
2. Drugs used in the management of alcohol withdrawal syndrome
3. Drug management of status epilepticus
4. Drug management of bipolar disorder
5. Drug management of migraine headache
6. Clinical uses of benzodiazepines

B. Neurophysiology

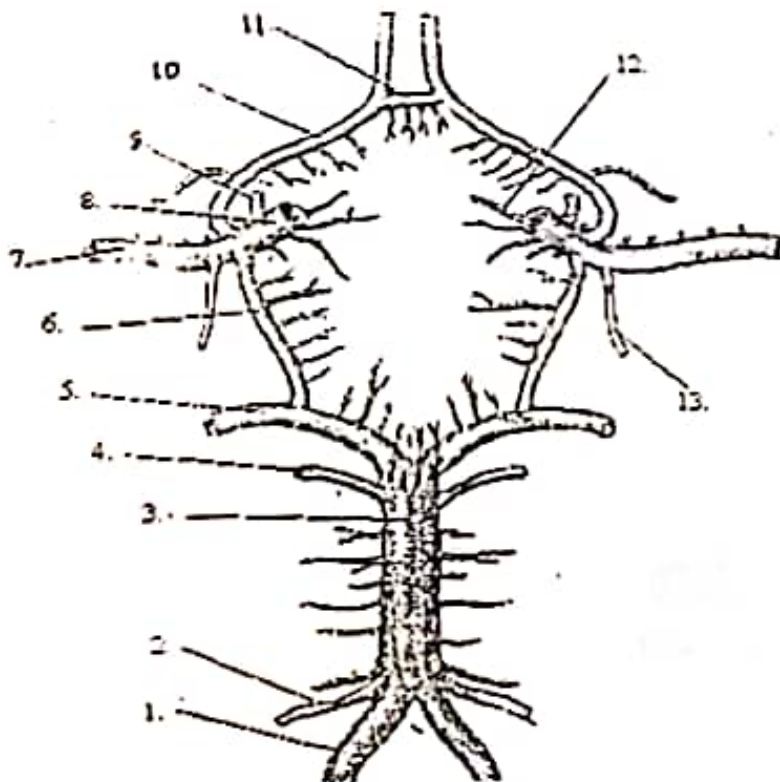
1. Olfactory thresholds and discrimination. List some olfactory thresholds
- ✓ 2. Substances evoking primary taste sensations
- ✓ 3. Amputees may feel pain and some other sensations in a limb that is no longer there. Explain the mechanism of pain in the absent limb
- ✓ 4. Give examples of stretch reflexes, including those that are frequently tested clinically ✓
- ✓ 5. Define hyperopia, myopia, astigmatism, presbyopia and strabismus ✓
- ✓ 6. Explain how the receptors in the semicircular canals detect rotational acceleration and how the receptors in the saccule and utricle detect linear acceleration

The cerebrospinal fluid (CSF).

- A has a higher concentration of glucose than blood
 - B contains more protein per unit volume than blood
 - C is formed at a rate that is proportional to the CSF pressure
 - ☒ D is absorbed at a rate that is proportional to the CSF pressure
 - E is removed largely through dural sleeves of the spinal nerves roots.
5. An automobile accident causes an injury of the sciatic nerve. As a consequence of the injury, you would expect:
- A death of all of the dorsal root ganglion cells whose axons were interrupted
 - ☒ B release of antibodies to nerve growth factor from Schwann cells ensheathing the damaged axons
 - C regrowth of the axons distal to the injury at a rate of 400mm/day
 - D chromatolysis of motor neurons in the lumbosacral spinal cord
 - E eventual complete restoration of sensory and motor function
16. Concerning the peripheral and central neurotransmitters and neuromodulators, which statement is most appropriate?
- A noradrenaline is not found in neurons in the CNS
 - B glutamate is an inhibitory transmitter
 - C the peptide substance P is found in peripheral motor nerve axons
 - ☒ D somatostatin, vasointestinal peptide and cholecystokinin are peptides which are found both in the gut and in neurons of the brain
 - E GABA receptors are found in the peripheral tissues
17. Which one of the receptors is responsible for monitoring the rate of muscle stretch?
- A nuclear bag intrafusal fibers
 - B nuclear chain intrafusal fibers
 - ☒ C Golgi tendon organs
 - D Pacinian corpuscles
 - E Ruffini endings
18. Which one of the following statements best describes cold receptors?
- A cold receptors produce a sensation of warmth when their firing frequency is very low
 - ☒ B sudden decrease in temperature always increases the firing frequency of cold receptors
 - C cold receptors are tonic receptors that steadily increase their firing rate when the temperature falls
 - D cold receptors produce a sensation of pain when their firing frequency is very high
19. Which one of the following statements about the pain sensation is correct?

3. Discuss the function of the corticospinal and corticobulbar tracts in skilled voluntary movement. 10marks
4. Discuss the Physiology of the hypothalamus. 10marks
5. About the ear [10]
 - a. What is the name given to inflammation of the middle ear? [1]
 - b. The internal ear is made of the bony labyrinth and the membranous labyrinth. List the parts that make:
 - I. Bony labyrinth [3]
 - II. Membranous labyrinth [4]
 - c. Name the receptors in the ear for: [2]
 - I. Hearing
 - II. Balance
6. Arterial circle of Willis. Label the numbered arteries 1-10

- | | |
|--|-------------------------------|
| 1. vertebral artery | 8. Internal carotid artery |
| X 2. Labyrinthine (Internal auditory) artery | 9. Ophthalmic artery |
| 3. Basilar artery | 10. Anterior cerebral artery |
| 4. Superior cerebellar artery | 11. Anterior communicating " |
| 5. Posterior cerebral artery | 12. Hypophyseal artery |
| 6. " communicating artery | 13. Anterior choroidal artery |
| 7. Middle cerebral artery | |



A 7 year old girl was evaluated for recurring attacks of weakness, each lasting 2 to 3 hours. Her parents said they usually occurred after she rode her bicycle for long distances or ran around a lot with other children but that recently she had had one after simply eating two bananas. Laboratory tests showed normal serum electrolytes, normal thyroid function, and normal nerve conduction velocities.

1. What are the possible causes of weakness in this child?
2. Normal muscle fibers fire sustained trains of action potentials in response to moderate depolarization by current injection. The patient's muscle fibers, obtained by biopsy, depolarized more than normal in response to a comparable stimulus, fired a brief burst of action potentials, and then became electrically inexcitable. Why might a depolarizing, normally excitatory stimulus cause a muscle (or neuronal) membrane to become electrically inexcitable?
3. Why might exercise or eating bananas trigger such episodes?

ANSWERS

1. Weakness implies probable malfunction of upper motor neurons, lower motor neurons, neuromuscular junctions, or muscles themselves.
2. Voltage-gated Na^+ channels are the key substrate of action potentials, and blocking their activity makes muscle and neuronal membranes inexcitable. This patient's muscle membranes clearly contain a complement of such channels because they are able to fire bursts of action potentials. However, voltage-gated Na^+ channels inactivate after opening and are unavailable until the membrane repolarizes; hence, keeping Na^+ channels in the inactivated state makes a membrane inexcitable. Patients with some forms of periodic paralysis have a relatively small percentage of mutant Na^+ channels that inactivate abnormally slowly. After a burst of action potentials, they remain open, continue to depolarize the membrane, and prevent normal channels from deinactivating.
3. Increasing plasma K^+ concentration from the normal resting value of about 4 mmol/L to 6-7 mmol/L is sufficient to cause the sequence of events described in answer 2.2. enough K^+ is released from skeletal muscle during exercise to reach this value, and K^+ -rich foods such as bananas, fruit juices, and avocados can do the same thing.

CASE 2

Seizures are the manifestation of periods of uncontrolled, rapid, synchroized firing of groups of cortical neurons, sometimes in localized areas (partial seizures) and sometimes in widespread areas in both hemispheres (generalized seizures). Most medications used to reduce the frequency of seizures do one or more of the following:

- a. Bind to voltage-gated Na^+ channels and slow the rate at which they move from an inactivated state to the "resting" (deinactivated) state.
- b. Act at synapses that use GABA as a neurotransmitter, by enhancing the opening of GABA-gated ion channels, by blocking the reuptake of GABA from the synaptic cleft, or by blocking the enzymatic degradation of GABA.
- c. Block the type of voltage-gated Ca^{++} channel that is prominent in thalamic neurons.

1. What might be the basis for the lowering of seizure frequency by each of these categories of drugs?

ANSWERS

- a. The duration of the absolute and relative refractory periods is largely determined by the rate at which voltage-gated Na^+ channels deinactivate. Slightly slowing this rate would reduce the maximum firing frequency of neurons but have no effect on their low frequency behavior.
- b. GABA is the principal neurotransmitter mediating fast inhibitory transmission in the brain, so agents that enhance GABA transmission would generally reduce the excitability of neurons in the cortex (and elsewhere). This could be done by increasing the conductance of ligand-gated GABA receptors, or by making more GABA available.
- c. Some forms of epilepsy are characterized by rhythmic bursts of action potentials that arise from oscillatory interactions between the thalamus and the cortex. The thalamic contribution to the interaction is based on the slow waves produced by the opening of voltage-gated Ca^{++} channels, so blocking these channels helps break the cycle.

3. A visual deficit confined to one eye indicates damage anterior to the optic chiasm (e.g. retina, optic nerve).
4. The problems in this patient's legs can most easily be explained by damage on the right side of the thoracic or upper lumbar spinal cord. (Damage higher in the spinal cord would affect more than the legs. Damage in the brainstem or higher would affect only the contralateral side of the body). However, spinal cord damage would obviously not cause visual deficits, so multiple lesions must be involved in this case. This is a classic presentation of multiple sclerosis, in this case involving demyelinating plaques in the spinal cord and optic nerve.
5. Shining light in the normal eye causes both a direct and a consensual reflex, and both pupils constrict. Moving the light to the impaired eye decreases the afferent input to the pupillary light reflex, causing both pupils to constrict less (i.e. dilate). Moving a light back and forth between the eyes like this is called a swinging flashlight test, and pupillary dilation in response indicated an afferent pupillary defect.

Which is not a feature of the central nervous system in mammals?

- A. spinal cord
- B. cerebral cortex
- C. sympathetic post-synaptic neuron
- D. cerebellum
- E. brain stem

Which of the following is 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

More than half of the fibers descending and ascending the spinal cord:

- A. provide multisegmental reflex pathways
- B. are referred to as propriospinal fibers
- C. include pathways of reflex coordination of simultaneous movement of body parts
- D. are involved in nociception
- E. A, B, and C are correct

An alpha-motor neuron that innervates a postural muscle such as the soleus muscle:

- A. is excited monosynaptically by Golgi tendon organ afferents
- B. forms endplates on 3 to 6 skeletal muscles 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

Raising the skin temperature to 52°C activates:

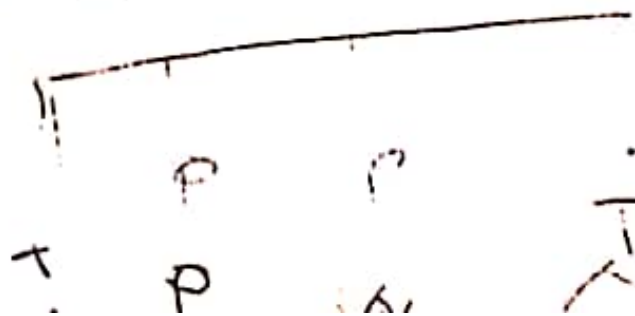
- A. Meissner's corpuscles
- B. Merkel's cell endings
- C. nociceptors
- D. Pacinian corpuscles
- E. Ruffini endings

2. The sensation of high-frequency vibration is signaled by:

- A. Golgi tendon organs
- B. Meissner's corpuscles
- C. Muscle spindles
- D. Nociceptors
- E. Pacinian corpuscles

The cell type that forms cerebrospinal fluid is the:

- A. ependymal cell
- B. neuron
- C. oligodendroglial cell
- D. satellite cell
- E. astrocyte



CASE 3

A worried 22 year old woman arrived at her physician's office complaining of numbness and tingling in her legs and difficulty seeing with her left eye. She said the problem had started that morning and gotten progressively worse throughout the day. She was found to have impaired position sense and moderate weakness in her right leg although perception of pinprick there was normal. Position sense and strength were normal in her left leg, but she had difficulty perceiving pinprick there. Stroking the sole of her right foot caused dorsiflexion of the right big toe; when the sole of her left foot was stroked, she said it tickled and tried to withdraw the foot. Visual acuity of the right eye was 20/20. When she closed her right eye, she said everything looked fuzzy and dim, and visual acuity of that eye was 20/300. Both pupils were the same size; both constricted when light was shone into her right eye, and both dilated when the penlight was swung over to her left eye.

1. What could account for the problems in her right leg?
2. What could account for the problems in her left leg?
3. What could account for her visual problems?
4. Is there any place in the nervous system where a single lesion could cause this collection of deficits?
5. How could shining a light into one eye cause both pupils to dilate? ~~What about?~~ [↑] ✓

ANSWERS

1. A selective deficit in position sense in the right leg is likely to indicate damage to the right fasciculus gracilis in the thoracic or upper lumbar spinal cord, or partial damage to the posterior column-medial lemniscus pathway at some level rostral to this. Weakness of the right leg, coupled with a Babinski sign, indicates damage to the corticospinal system. This could be damage on the right side of the thoracic or upper lumbar spinal cord (lateral corticospinal tract), partial damage at higher spinal levels on the right, or partial damage on the left above the pyramidal decussation.
2. A selective deficit in pain and temperature perception indicates damage to the anterolateral pathway on the right side of the thoracic or upper lumbar spinal cord, or partial damage at some higher CNS level.

UNIVERSITY OF ZAMBIA
SCHOOL OF MEDICINE

NEUROSCIENCE

NES410 CONTINUOUS ASSESSMENT TEST 1-2013

Date: 30th January 2013

Maximum Marks: 100

Time: 3 (Three) Hours

Computer No. 28010230

SECTION A

40 MARKS

Answer all the four questions

Describe physiology of neurotransmitters(NT) using the format below: (10)

Type of NTs	Place of Action	Physiological effect and mechanism of action

- Describe the physiology of pain sensation (10)
- Give a brief and concise account of the origin, course, distribution and functional components of the VII cranial nerve (10)
- Describe the sensory nerve supply to the tongue (10)

SECTION B SHORT NOTES

20 MARKS

Write Short notes on All the four (4) questions

- physiology of thermoreception
- physiology of cerebrospinal fluid
- otic ganglion
- upper motor neuron lesion

2. Celia is a 32-year-old woman who had no medical problems. One day while shopping in a department store, she was admiring a dress while walking and did not notice a clothing rack rapidly being pushed in her direction. Because she was not paying attention to what was in front of her, she collided with the clothing rack, hitting her face. She immediately noticed pain in her nose and forehead. Because her nose was bleeding, she was taken to the emergency room, where skull x-rays were performed, which revealed a small fracture in the cribriform plate that was too small for any therapy. She was sent home with pain medications and told to return if there were any further sequelae.

Two weeks later, after the swelling and bleeding had subsided somewhat, while eating dinner at a restaurant, Celia noted that she was unable to smell the food. This continued with subsequent meals, so she consulted a neurologist who tested her sense of smell with several substances including coffee grounds. He concluded that her anosmia (inability to smell) was a result of her head trauma and appeared to exist on both sides of her nose.

- Briefly describe the physiology of smell. 10 marks
- With the aid of a diagram show the central olfactory pathway and the various projections to the different cortical areas. 10 marks

Section B. Each question carries (20 marks). Answer both questions in this section.

- List the pharmacological effects and clinical uses of the following drugs:
 - Dronabinol
 - Amphetamine
 - Sumatriptan
 - Risperidone

[Write 5 – 10 sentences on each drug]

2. Describe the mechanisms leading to the following in the vestibular apparatus of the inner ear.

- Rotational acceleration. 10 marks
- Linear acceleration. 10 marks

Section C (20 marks). Answer any 4 questions out of 6

- Discuss the clinical features and drug management of ethanol withdrawal syndrome [10 – 20 sentences] – 10 marks
- Discuss the drug management of convulsive status epilepticus [5 – 10 sentences] – 5 marks
 - Pharmacological properties and clinical uses of benzodiazepines [5 – 10 sentences] – 5 marks

SECTION A

In questions 1 – 25 select the one that is the best in each case. Each question carries 1 mark.

- 1) 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

- 2) Damage to the Broca's area is known as

- a) Expressive aphasia
- b) Broca's aphasia
- c) Receptive aphasia
- d) B and C are correct
- ☒ e) A and B are correct

Wernicke's area
→ W. Aphasia or
Receptive aphasia.
- Sensory aphasia

- 3) Autonomic ganglia refers to

- a) Axons of autonomic neurons
- b) Dendrite endings of autonomic postganglionic neurons
- ☒ c) Cell bodies of autonomic neurons
- d) Neurotransmitters in autonomic nervous system
- e) None of the above.

- 4) The cranial nerve nuclei that contain parasympathetic preganglionic neurons are

- a) Edinger-Westphal nucleus
- b) The superior salivary nuclei
- c) The inferior salivary nuclei
- d) The dorsal motor nucleus and the nucleus ambiguus
- ☒ e) All of the above are correct

- 5) The sympathetic division of the autonomic nervous system is characterized by:

- (a) Presynaptic inhibition
- ☒ (b) Thoracolumbar outflow from the spinal cord
- (c) Short postganglionic fibers
- (d) Adrenergic preganglionic fibers
- (e) The vagus nerve, which is its major component

F (d) ✓ Loss of thermoregulatory sweat production in the legs

32. This question is concerned with the major tracts that originate in particular areas of the brain and that descend the spinal cord to determine motor output:

T (a) ✓ The axons of the majority of pyramidal tract neurons synapse directly with spinal motoneurons

F (b) ✓ Complete section of the pyramids in the medulla results in a permanent loss of precision in the performance of motor tasks

T (c) ✓ The vestibulospinal tract to the lumbar spinal cord controls extensor rather than flexor motoneurone output

T (d) ✓ Most tectospinal tract neurons control motoneurons that are used to achieve orientation of the head on the body

33. What are the results of unilateral damage to the cerebellum in man?

T (a) ✓ Disturbances of posture and disorganization of voluntary movement

F (b) Hemiplegia on the same side

F (c) Hemiplegia on the opposite side

T (d) ✓ Loss of sense of position on the same side of the body causing uncoordinated movements if the eyes are shut

34. Transaction of the brain stem immediately below the superior colliculus results in:

F (a) Stimulation of the gamma activating system of the muscle spindles

F (b) Decrease in muscle tone

F (c) Diminished postural reflexes

F (d) Loss of most of the functions of the reticular system

35. The autonomic nervous system:

T (a) ✓ Has preganglionic fibres which function exclusively by means of acetylcholine

T (b) ✓ Has post-ganglionic fibres in both parasympathetic and sympathetic divisions

F (c) Is not characterized by EPSP and IPSP membrane changes

F (d) Is not organized on the basis of the reflex arc

CASE 4

A 71 year old hypertensive woman awoke one morning unable to move her right arm and leg. Her daughter, who lived next door, took her to the hospital, where she improved somewhat over the next several days. By the end of the week, her right leg was still so weak that she was unable to walk; she had increased knee-jerk and ankle-jerk reflexes on the right and a right Babinski sign. Her right arm had mostly recovered its strength, and her face was normal except for a slight drooping of the right side of her mouth. Her mental status was normal, as was sensation of all types. As the strength in her right arm improved, however, she noted that it had become extremely uncoordinated. She had marked ataxia, for example, when extending her right index finger from her nose to an examiner's finger and back, whether or not her eyes were open.

1. What might account for the remaining weakness in the patient's leg?
2. What might account for the ataxia in the patient's arm?
3. Can this pattern of deficits be explained by damage at one site in the nervous system?

ANSWERS

1. Intact ability to repeat indicates damage outside the perisylvian language zone. Diminished fluency with mostly intact comprehension indicates anterior damage. This is transcortical motor aphasia.
2. Posterior continuation of the damage described in question 19.1 would cross the precentral and postcentral gyri in the region of the arm/hand representation.
3. This is a tough one. Occlusion of an artery leaving either the circle of Willis or the vertebrobasilar system causes damage that is typically worse in the territory fed by proximal parts of the artery (e.g. after middle cerebral artery occlusion, damage is worse in the perisylvian zone than farther away from the lateral sulcus). This is because other arteries can partially supply more peripheral parts of the territory through end-to-end anastomoses. The damage in contrast, seems to be near the area of overlap between middle cerebral and anterior cerebral arteries, in what is referred to as a watershed zone. Watershed infarcts

26. In the descending tracts in the spinal cord:

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

27. Blockage of parasympathetic activity causes a reduction in:

- T (a) ✓ Sweat production
- F (b) Resting heart rate
- F (c) The stretch of skeletal muscle contraction
- T (d) ✓ Intestinal motility

28. The pyramidal system:

- T (a) ✓ Destruction causes weakness and clumsiness
- T (b) ✓ Has fibres which originate from the pre-motor area
- F (c) Is also concerned with gross movements
- F (d) Controls posture

29. In the cerebral cortex:

- T (a) ✓ The grey matter is normally about 1 cm thick
- F (b) Granule (stellate) cells are plentiful in the primary sensory cortex
- F (c) An understanding of concepts is predominantly a function of the right hemisphere (music & mathematical ability - Left)
- T (d) ✓ Over 90% of corticospinal fibres are myelinated

Cerebral

White = 60%

Grey = 40%

Left
Logic, science
and maths

Right
Art and Creativity

? motor cortex → Pyramidal cells

30. Damage to the cerebral cortex may cause loss of:

- T (a) ✓ Pain sensations on the opposite side of the body
- F (b) ✓ Skilled movements in the absence of paralysis
- F (c) Ability to identify an object by its tactile characteristics
- F (d) Vision in one eye only

31. Long-term consequences of transection of the spinal cord in the lower cervical region include:

- F (a) Inability to erect the penis and ejaculate semen
- F (b) Inability to regulate sympathetic tone in leg blood vessels in response to baroreceptor stimulation
- F (c) Paralysis of bladder muscle

SECTION B

In questions 21 – 45 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. ½ mark will be deducted for incorrect judgment.

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

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

22. Lower motor neuron disease:

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

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

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

24. The lateral lobe of cerebellum (neocerebellum):

- T(a) ✓ Integrates the vestibule – cerebello – spinal reflexes
- F(b) Receives inflow from the cerebropontine fibres
- F(c) Primarily integrates proprioceptive information from joints and ligaments received from the dorsal spino-cerebellar tract
- T(d) ✓ Controls rapidly alternating voluntary movement

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

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

16. The Wernickes area

- (a) Receives no sensory input
- (b) Is found in the occipital lobe
- (c) Is responsible for the motor aspects of speech
- ☒ (d) Is the area of the brain for speech comprehension
- (e) Is localized only in the frontal lobe

17. Changes in personality and judgment are often associated with a _____ lesion.

- ☒ a) Frontal lobe
- b) Parietal lobe
- c) Broca's area
- d) Wernicke's area
- e) Visual area

18. Changes in motor aphasia are often associated with a _____ lesion.

- a) Frontal lobe
- b) Parietal lobe
- ☒ c) Broca's area
- d) Wernicke's area
- e) Visual area

19. Changes in sensory aphasia are often associated with a _____ lesion.

- a) Frontal lobe
- b) Parietal lobe
- c) Broca's area
- ☒ d) Wernicke's area
- e) Visual area

20) Regarding cerebral dominance

- a) The right hemisphere is dominant for language
- ☒ b) The left hemisphere is dominant for music and mathematical abilities
- c) The left hemisphere has absolutely no way of communicating with the right hemisphere
- d) Cerebral dominance is a concept that defines how the two hemispheres work together to modify behaviour
- e) None of the above

6. 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
7. 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
8. 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
9. 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
10. 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