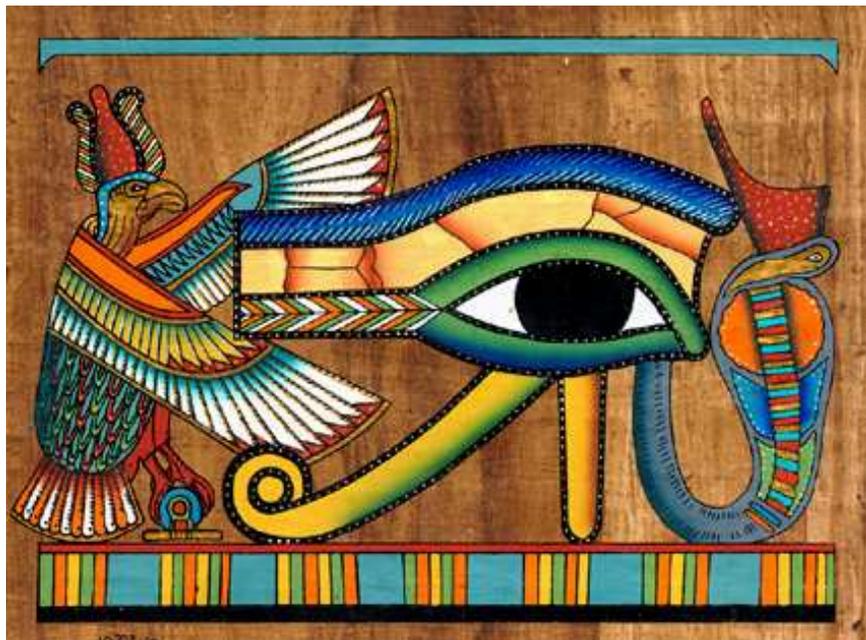


Ophthalmology Series

MCQs in Basic Sciences



CHUA Chung Nen

Mahadhir ALHADY Sulaiman

TAN Aik Kah

NGO Chek Tung

First Edition

MARUDI

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MCQs in Basic Sciences

First Edition

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Marudi Publication

Cover:

The Eye of Horus flanked by a vulture and a cobra. The Eye of Horus is a symbol of protection and healing in ancient Egypt. The vulture represents Upper Egypt and the cobra Lower Egypt.

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Introduction

Basic sciences are the corner stone of medical specialties. They form an important part of examination for doctors who want to pursue a career in medical specialty. This book is written specially for medical doctors who are preparing to take the Basic Sciences Examination in Ophthalmology. The passing of this examination is essential for doctors who wish to enter the Malaysian Universities' Masters Programme in Ophthalmology. For those doctors who are already in the Programme, the questions are useful for those who are preparing for the Basic Sciences components of MRCS Ophth. (Membership of the Royal College of Surgeons in Ophthalmology), MRCOphth (Membership of the Royal College of Ophthalmologists) or MRCS (Membership of the Royal College of Surgeons).

Chua Chung Nen

Mahadhir Alhady Sulaiman

Tan Aik Kah

Ngo Chek Tung

August 2006

Basic Sciences Examination (Ophthalmology)

1. The Basic Sciences Examination (Ophthalmology) [BSE (Ophth)] for entry into the Malaysian Universities' Masters Programme in Ophthalmology will apply to the Masters (Ophthalmology) June 2007 intake.
All Candidates interested in applying for a place in the Masters (Ophthalmology) programme will have to sit for and obtain a pass mark in this examination. A pass in the examination will however NOT guarantee acceptance.
2. The examination will be jointly organised by the Malaysian Universities Conjoint Board of Ophthalmology and the College of Surgeons, Academy of Medicine of Malaysia.
3. The first examination will be held in September 2006. There will be two examinations yearly ie. In March and September. Results will be released 2 weeks after the examination date. Notification of the examination dates and venue will be made approximately 6 months before. Application forms will be made available at the university ophthalmology departments and at the Academy of Medicine and will need to be submitted 2 months before the examination dates. The forms are to be submitted to the secretary, Academy of Medicine of Malaysia, 19, Jalan Folly Barat, 50480 Kuala Lumpur, Malaysia.
4. Results will be released in the form of grades ie. A, B, C, D are pass marks and F is a fail.
5. This examination is prerequisite for acceptance into the Masters Programme and this will apply to both local and international applicants.
6. An examination fee of RM300.00 payable to the "Academy of Medicine" shall apply.
7. There will be no limit to the number of times a candidate can sit for the examination. His/Her best result shall apply for consideration of acceptance to

the Masters programme. The results shall be valid for a period of 3 years.

8. A candidate is eligible to sit for the examination after a minimum of 2 years post basic medical degree qualification and after successful completion of his/her housemanship. Candidates must also be registered with the Malaysian Medical Council or Medical Council of their country.
9. The examination will consist of one Multiple Choice Question (MCQ) paper with 90 questions to be answered over 3 hours. There will be negative marking of the MCQs. Topics will cover the following areas:

	Questions
a) Anatomy	20
b) Physiology	20
c) Pathology	15
d) Immunology	10
e) Microbiology	10
f) Genetics	5
g) Molecular and cell biology	5
h) Pharmacology	5

10. This syllabus is indicative only, and candidates may be asked about relevant topics and conditions that are not necessarily mentioned specifically in the syllabus.

SYLLABUS

1. ANATOMY

Candidates should have knowledge of the structure and function of the head and neck and the central nervous system.

Ocular anatomy and adnexa will NOT be tested in this examination

The cranial cavity

- Osteology of the skull including the bony orbit
- Meninges, blood supply, nerve supply
- Venous sinuses
- Foramina and their contents
- Cranial fossae
- Pituitary gland and its relations
- Trigeminal ganglion

Central nervous system

Cerebral hemispheres and cerebellum

- Surface appearance
- Internal structure
- Cortical areas
- Ventricles
- Formation and circulation of cerebrospinal fluid
- Blood supply and venous drainage
- Microscopic anatomy

Brain stem

- Midbrain
- Pons
- Medulla and fourth ventricle
- Nuclei of cranial nerve

Cranial nerves

- Origin, course and distribution

Spinal canal

- including spinal cord, venous plexus, meninges & subarachnoid space

Specialised anatomy of visual system

- Visual pathways: visual cortex, connections & association area
- Structures involved in control of eye movements
- Autonomic nervous system and the eye

Head and neck anatomy Specific areas to be covered include:

Nose, mouth and paranasal air sinuses

- Lateral wall of nose, septum, vessels and nerves, osteology, anatomy, relations and development of air sinuses

The face and scalp

- Muscles, nerves and vessels, temporal fossa, zygomatic arch, salivary glands, and temporomandibular joint

The infratemporal fossa and pterygopalatine fossa

- Muscles, vessels, nerves, carotid sheath, pterygopalatine ganglion

General topography of the neck

- Posterior triangle, anterior triangle, suprahyoid regions, prevertebral region, root of neck

Respiratory system

- The anatomy of the mouth, pharynx, soft palate and larynx with particular reference to bulbar palsies and tracheotomy

Lymphatic drainage of the head and neck

- Including face

Histology

Knowledge of histological structure of tissue. Particular attention should be paid to the histological appearance of the structures of the head and neck especially in relation to function (see biochemistry, cell biology and physiology).

Embryology

General embryology with particular emphasis to structures of the head and neck.

2. PHYSIOLOGY

There will be an emphasis on normal physiology and an understanding of such fundamental surgical situations as might affect ophthalmic patients, for example, increased intracranial pressure, shock and disturbance of acid-base balance.

GENERAL PHYSIOLOGY

- Maintenance of homeostasis: osmolarity, osmotic and oncotic pressure
- Transport processes in systems and tissues
- Molecular events: The role of calcium in regulation of cell processes (also, see cell biology for control and transmission of information and energy, including nucleus, mitochondria and protein synthesis)
- Normal nutritional requirements
- General metabolic response to trauma and sepsis

Nerve and muscle

- Structure and function of nerve cell

- Resting membrane potential, action potential and its propagation, synaptic potentials
- The motor unit, neuromuscular junction (including contractility—see cell biology) and molecular events
- Smooth muscle
- Pain and its control

Autonomic nervous system

- Organization and anatomy, cholinergic transmission, adrenergic transmission, the adrenal medulla (also, see biochemistry and pharmacology of nervous system)

Blood

- Composition and function of blood
- Iron metabolism, erythropoiesis and anaemias
- Plasma components
- Blood groups
- Blood clotting and fibrinolysis

Respiratory system

- Respiratory mechanisms, including lung mechanics (pressure volume curves) and lung volumes and control (including neural) of ventilation
- Pulmonary blood flow, including ventilation-perfusion ratio
- CO₂ and O₂ transport, carriage and distribution
- Gas exchange in lung
- Assessment of pulmonary function
- Respiratory failure and other common derangements of respiratory function
- Oxygen therapy and ventilatory support

Cardiovascular system

- Blood pressure
- The cardiac cycle
- Control, excitation, and conduction in heart (in relation to ECG)
- Control of circulation
- Blood vessel and transcapillary exchange, measurement of blood flow
- Pathophysiology and management of shock

Acid-base balance/Metabolism

- pH-buffers—acid-base balance
- Bicarbonate/CO₂ buffer
- Disturbances of acid-base balance
- Nutrition

Renal

- Renal circulation
- Glomerular filtration
- Tubular function
- Salt and water: hormonal control (mineralocorticoids), water balance

(body fluid compartments)

- Kidney in control of acid-base balance
- Renin-angiotensin system
- Disturbances of fluid and electrolyte balance

Endocrinology

- Hormone, receptors and secondary messengers
- Hypothalamic-hypophyseal system
- Steroids: adrenal cortex, synthesis of glucocorticoids, and steroid hormones
- Thyroid hormones
- Calcium and phosphate homeostasis
- Carbohydrate metabolism: pancreatic hormones

Central nervous system and special senses

- Cerebrospinal fluid
- Superficial senses, proprioception, monosynaptic and polysynaptic reflexes, synaptic inhibition.
- Central processing of sensory input
- Cerebellar function in motor control
- Cerebral cortex in control of movement
- Basal ganglia
- Organization within the cervical and thoracic spinal cord.

3. GENETICS

- Chromosomes and cell division
- Methods of genetic analysis
- Mendelian inheritance
- X-linked inheritance
- Mitochondrial inheritance
- Linkage analysis and disequilibrium and population genetics
- Chromosome mapping
- Gene mutations
- Oncogenes, and genetics of malignancy
- Principles of gene therapy

4. MOLECULAR AND CELL BIOLOGY

Cell organelles, receptors and receptor signaling

- Plasma membrane
- Cytoskeleton and its relation to cell motility and contractility
- Nucleus
- Cell-cell communication
- Protein synthesis—pre and post-transcriptional and translational control
- Molecular biology of protein synthesis

Receptor physiology

- Secondary messengers and intracellular signaling
- Understanding of molecular biological techniques (also in relation to genetics) including:
 - ❖ Polymerase chain reaction
 - ❖ Northern and Southern Blotting
 - ❖ in-situ hybridization

Extracellular matrix

- Collagen synthesis– types and function
- Proteoglycans, glycoproteins, fibronectin, laminin and glycoasminoglycans

5. PATHOLOGY

Inflammation

- Acute inflammation: chemical and cellular mechanisms
- Wound healing
- Chronic inflammation: granulomata, granulation tissue, ulceration, immune mechanisms, chemical mediators in response to infection and tissue injury
- Graft rejection

Disturbances of growth

- Atrophy, hypertrophy, hyperplasia and metaplasia

Degenerations

- Calcification, hyaline, amyloid

Aging

- Mechanisms, including apoptosis

Neoplasia

- Morphological & cellular characteristics of benign vs malignant tumours
- Carcinogenesis:
 - ❖ gene control
 - ❖ oncogenes
 - ❖ effects of irradiation
 - ❖ cytotoxic drugs
 - ❖ environmental factors

Vascular disorders

- Atheroma
- Thrombosis
- Embolism
- Ischaemia and infarction
- Hypertension
- Aneurysms
- Diabetes

- Angiogenesis

Shock and trauma

- Response to surgical, chemical and radiation trauma
- Principles of the pathological effects of head injury

6. MICROBIOLOGY

Principles of infection

Culture media

Bacteria

- Gram staining and classification
- Exo- and endotoxins
- Mechanisms of virulence and pathogenicity
- Synergistic infections
- Antibiotics: including mechanisms of action, bacterial resistance
- Host defense mechanisms against bacterial infection

Viruses

- Classification
- Structure and replication
- Host defense against viral infection
- Antiviral agents
- Specific antiviral agents: mechanisms of action
- Laboratory methods for viral detection

HIV and AIDS

- Classification, diagnosis, laboratory diagnosis and monitoring of HIV infection
- Opportunistic infections
- Anti-HIV agents

Fungi

- Classification
- Host factors which predispose to fungal infection
- Antifungal agents

Others

- Toxoplasmosis
- Chlamydia
- Acantoamoeba

- Helminthic infections
- Antimicrobials

7. IMMUNOLOGY

- Innate and acquired immunity
- Effector mechanisms of immune response
- Humoral immunity and antibody class and function
- Cellular immunity
- Immunity against microbes (see microbiology)
- T and B cells: cluster differentiation, phenotype, T and B cell activation
- MHC antigens, antigen presenting cells and antigen processing
- Immune mechanisms of tissue damage
- Interleukins, complement
- Immunodeficiency (see microbiology) and immunosuppression (see pharmacology)
- Organ transplantation and pathophysiology of allograft rejection

8. PHARMACOLOGY

- Pharmacokinetics and pharmacodynamics
- Drug receptor and secondary messengers: cellular mechanisms of drug action
- Methods of drug delivery, pharmacokinetics of individual methods
- Pharmacology of:
 - ❖ Cholinergic and adrenergic systems
 - ❖ Serotonin
 - ❖ Histamine
 - ❖ Anti-inflammatory agents
 - ❖ Anti-infective agents
 - ❖ Immunosuppressants
 - ❖ Local anaesthetics
 - ❖ Analgesics
 - ❖ Mechanisms of drug toxicity

TEST 1

ANATOMY

1. The following structures exit the cranium through the foramen ovale:

- a. Greater petrosal nerve.
- b. The mandibular nerve.
- c. The oculomotor nerve.
- d. Accessory meningeal artery.
- e. Sympathetic nerve fibres.

2. The chorda tympani:

- a. contains motor nerves that supply the facial muscles.
- b. contains sensory nerve that supplies the anterior two-third of the tongue.
- c. contains parasympathetic nerves that supply the lacrimal nerve.
- d. contains secretomotor nerves that supply the salivary glands.
- e. passes between the internal jugular vein and the internal carotid artery as it passes anteriorly.

3. The thyroid gland:

- a. moves with swallowing because it is enclosed by the pretracheal fascia.
- b. lies in front of the fourth to sixth tracheal rings.
- c. is supplied by branches of the internal carotid artery.
- d. contains 4 parathyroid glands supplied by the inferior thyroid artery.
- e. increases in size during pregnancy.

4. The following are true about the parotid gland:

- a. It is a mucinous gland.
- b. It is covered by a thick capsule derived from the deep cervical fascia.
- c. The facial nerve exits the gland anteromedially before dividing into 5 branches.
- d. It receives its secretomotor fibres from the vagus nerve.
- e. The parotid duct enter the oral cavity by piercing the masseter.

5. The following structures form the medial wall of the orbit:

- a. Sphenoid bone.
- b. Frontal bone.
- c. Zygomatic bone.
- d. Lacrimal bone.
- e. Maxillary bone.

6. In the orbit:

- a. the superior ophthalmic vein connects the angular vein to the cavernous sinus.
- b. the superior ophthalmic vein passes through the common tendinous ring.
- c. the ophthalmic artery is the first branch of the internal carotid artery.
- d. the ophthalmic artery emerges from the optic canal.
- e. the ciliary ganglion is medial to the optic nerve.

7. The maxillary artery:

- a. arises from the external carotid artery within the parotid gland.
- b. supplies the maxillary incisor teeth by way of its infraorbital branch.
- c. gives rise to the inferior alveolar artery which supplies the maxillary gingival.
- d. gives off its main branches in the pterygopalatine fossa.
- e. gives off the middle meningeal artery.

8. The location of the following foramen is (are) correct:

- a. The stylomastoid foramen in the occipital bone.
- b. The carotid canal in the maxillary bone.
- c. The jugular foramen between the temporal bone and the occipital bone.
- d. The optic canal in the sphenoid bone.
- e. Foramina ovale in the frontal bone.

9. The following are muscles of facial expression:

- a. Platysma.
- b. Buccinator.
- c. Frontalis.
- d. Orbicularis oculi.
- e. Temporalis.

10. The pterygopalatine ganglion:

- a. is a sympathetic ganglion.
- b. is located between the nasal cavity medially and the infratemporal fossa laterally.
- c. contains secretomotor nerve to the parotid gland.
- d. contains preganglionic fibers that arise in the lacrimal nucleus of the facial nerve.
- e. receives preganglionic parasympathetic fibers from the lesser petrosal nerve.

11. The internal carotid artery:

- a. arises from the common carotid artery at the level of the fourth cervical vertebrae.
- b. traverses the foramina transversaria of the cervical vertebra 1-6.
- c. forms the basilar artery.
- d. enters the cranium through the carotid canal.
- e. gives rise to the anterior and middle cerebral arteries.

12. The pituitary fossa:

- a. forms part of the anterior cranial fossa.
- b. contains dura mater that forms the roof.
- c. lies above the body of the sphenoid.
- d. contains cavernous sinus laterally on either side.
- e. is bounded by the anterior and posterior clinoid processes.

13. The fifth cranial nerve:

- a. arises from the midbrain.
- b. provides sensory innervations to the whole face.
- c. innervates the muscle of mastication.
- d. is involved in the blink reflex.
- e. supplies parasympathetic fibres to the salivary gland.

14. The left recurrent laryngeal nerve:

- a. courses superiorly in the groove between the esophagus and trachea.
- b. passes posterior to the sympathetic trunk as it enters the root of the neck.
- c. is a pure motor nerve.
- d. arises from the vagus nerve as it crosses the first part of the subclavian artery.
- e. supplies the cricothyroid muscle.

15. The following structure(s) drain into the middle meatus:

- a. Nasolacrimal duct.
- b. Posterior ethmoidal sinus.
- c. Maxillary sinus.
- d. Sphenoid sinus.
- e. Frontal sinus.

16. The following are true about the ventricular system:

- a. The foramen of Monro connects with two lateral ventricles.
- b. The aqueduct of Sylvius connects the third to the fourth ventricle.
- c. The cerebrospinal fluid leaves the ventricles and enters the subarachnoid space via three foramina.
- d. The third ventricle is directly posterior to the pons.
- e. Astrocytes line the ventricles.

17. The following extraocular muscles can perform intortion of the globe:

- a. Medial rectus.
- b. Superior rectus.
- c. Inferior rectus.
- d. Inferior oblique.
- e. Superior oblique.

18. The cavernous sinuses:

- a. are traversed by interlacing filaments.
- b. extends from the inferior orbital fissure to the apex of the temporal bone.
- c. opens posteriorly into the petrosal sinuses.
- d. contain the internal carotid artery on its lateral wall.
- e. contains the abducent nerve on its lateral wall.

19. The following structures arise from the third pharyngeal pouch:

- a. Superior parathyroid gland.
- b. Thymus.
- c. Tympanic membrane.
- d. The parafollicular cells.
- e. Thyroid gland.

20. The sixth cranial nerve:

- a. supplies the lateral rectus muscle.
- b. innervates the lacrimal gland.
- c. passes through the medial wall of the cavernous sinus.
- d. is involved in the light reflex.
- e. arises from a nucleus closely related to the facial nerve.

PHYSIOLOGY

21. The following are true about potassium:

- a. 90% of the total body potassium is found in the serum.
- b. The concentration of the plasma potassium increases at time of metabolic acidosis.
- c. Potassium leaves the cells in the presence of insulin.
- d. Ingestion of acetazolamide causes potassium loss.
- e. Aldosterone decreases urinary excretion of potassium.

22. Active transport occurs in:

- a. movement of sodium ions across the cell membrane
- b. glucose absorption from the gut.
- c. water reabsorption from the proximal convoluted tubule.
- d. potassium excretion in the distal convoluted tubule.
- e. water reabsorption from the collecting ducts of the kidneys.

23. True statements about the kidney include:

- a. The blood flow accounts for 25% of the total cardiac output.
- b. The blood flow is greater in the renal medulla than in the cortex.
- c. Over 99% of filtered water is reabsorbed by the kidney.
- d. Antidiuretic hormone decreases the water permeability of the collecting duct.
- e. It plays a part in red blood cell production.

24. The hemoglobin-oxygen dissociation curve shifts to the right in cases of:

- a. hypothermia.
- b. increase in 2,3 diphosphoglycerate (2,3 DPG).
- c. increase in hydrogen ion concentration.
- d. increased in $p\text{CO}_2$.
- e. respiratory alkalosis.

25. True statements about the ABO blood group include:

- a. Blood group O is the most common type.
- b. Blood group A is the least common type.
- c. Patients with blood group O is regarded as universal donors.
- d. Patients with blood group B is regarded as universal recipients.
- e. Anti-A and anti-B antibodies are found in patients with blood group AB.

26. In the ECG:

- a. P wave indicates arterial repolarisation.
- b. QRS complex indicates ventricular depolarisation.
- c. The normal QRS complex should be less than 0.12 seconds.
- d. T wave indicates ventricular repolarisation.
- e. Increased PR interval occurs in second degree heart block.

27. The chemoreceptor in the carotid body:

- a. receives a blood flow which is 40 times that of the brain.
- b. is stimulated by a decrease in PO_2 of arterial blood.
- c. is inhibited by a decrease in pH of arterial blood.
- d. is stimulated by an increase in PCO_2 .
- e. is involved in reflex peripheral vasoconstriction.

28. Regarding the total cerebral blood flow:

- a. It accounts for about 15% of the total cardiac output.
- b. It is increased during intense mental activity.
- c. It shows significant increase if there is an increase in carbon dioxide concentration in the arterial blood.
- d. It shows significant decrease if the mean systemic blood pressure is reduced from 140 to 60 mmHg.
- e. It is regulated by the cervical sympathetic nervous system.

29. Following major surgery, the body shows the following responses:

- a. Potassium retention.
- b. Decreased lipolysis.
- c. Increased protein breakdown.
- d. Decreased protein synthesis.
- e. Decreased peripheral glucose uptake.

30. The light reflex of the pupil:

- a. involves the superior colliculus.
- b. involves the occipital cortex.
- c. is impaired if the ciliary ganglion is damaged.
- d. is impaired in destructive lesion of the pretectal nuclei.
- e. is impaired in patients with unilateral cataract.

31. Vagal stimulation causes:

- a. delayed A-V conduction.
- b. a fall in heart rate.
- c. increased atrial contractility.
- d. increased ventricular contractility.
- e. decreased stroke volume.

32. The smooth muscle:

- a. shows no visible striation.
- b. do not contain troponin.
- c. act as a syncytium.
- d. are under somatic nervous control.
- e. are made up of multinucleated cells.

33. In a neuron, the action potential:

- a. is an all or nothing phenomenon.
- b. is associated with an increased permeability of the membrane to sodium ions.
- c. its amplitude decreases as it travels along the nerve fibers.
- d. its velocity is not affected by the diameter of the nerve fibers.
- e. its velocity is faster in nerves that are myelinated than unmyelinated.

34. The following are features of Horner's syndrome:

- a. Small pupil that does not react to light.
- b. Partial ptosis that disappears with topical phenylephrine.
- c. Decreased sweating of the skin around the eye.
- d. Conjunctival injection.
- e. Up drawing of the lower eyelid.

35. Acetylcholine is released at the following sites:

- a. Sympathetic preganglionic neurons.
- b. Sympathetic postganglionic neurons.
- c. Parasympathetic preganglionic neurons.
- d. Parasympathetic postganglionic neurons.
- e. Sympathetic postganglionic neurons that innervates the sweat glands.

36. True statements about raised intracranial pressure include:

- a. Normal intracranial pressure is 150mmHg.
- b. Hyperventilation may be used to reduce intracranial pressure.
- c. It is associated with an increase in the respiratory rate.
- d. It is associated with an increase in blood pressure.
- e. It is associated with an increase in pulse rate.

37. Regarding the cerebrospinal fluid:

- a. The glucose level is lower than that of venous blood.
- b. The pH is lower than that of arterial blood.
- c. The protein level is lower than that of arterial blood.
- d. The PO₂ is the same as that of arterial blood.
- e. The chloride level is higher than that of arterial blood.

38. The following occurs after 24 hours of fasting:

- a. Lipolysis.
- b. Muscle break-down.
- c. Hepatic gluconeogenesis.
- d. The blood glucose concentration is maintained.
- e. The brain switches from using glucose to ketone bodies.

39. The following hormones counteract the hypoglycemic effect of insulin:

- a. Growth hormone.
- b. Cortisol.
- c. Glucagon.
- d. Thyroxine.
- e. Adrenaline.

40. Regarding the thyroid hormones:

- a. They are steroid hormones.
- b. In the serum most of the thyroid hormones are bound to the albumin.
- c. Thyroid hormones sensitize the myocardium to noradrenaline.
- d. T₄ is more active than T₃.
- e. They increase the basal metabolic rate.

PATHOLOGY

41. Regarding aneurysm:

- a. True aneurysm contains all three layers of the vessel wall.
- b. Berry aneurysm typically occurs at the circle of Willis.
- c. Saccular aneurysm involves the whole circumference of the artery.
- d. Dissecting aneurysm occurs when the arterial media is deficient.
- e. Charcot-Bouchard aneurysms occurs in the brain.

42. Dystrophic calcification:

- a. is a form of heterotopic calcification.
- b. occurs in teeth.
- c. is responsible for nephrocalcinosis.
- d. occurs in atheroma.
- e. occurs in phthisical eye.

43. Regarding type II diabetes mellitus:

- a. There is a substantial loss of β -cells in the islets of Langerhans.
- b. It is more common than type I diabetes mellitus.
- c. It is associated with certain HLA groups.
- d. There is an increased risk amongst first degree relative.
- e. The tissue responds to insulin is normal.

44. The following are features of malignant tumours:

- a. Cellular pleomorphism.
- b. Nuclear pleomorphism.
- c. Nuclear hypochromatism.
- d. Increased cytoplasmic: nuclear ratio.
- e. Calcification.

45. Cells found in granuloma include:

- a. Neutrophil.
- b. Langerhan's cells.
- c. Macrophages.
- d. B lymphocytes.
- e. Epithelioid cells.

46. The following viruses are associated with human carcinoma:

- a. Hepatitis A.
- b. Human papilloma virus.
- c. Molluscum contagiosum.
- d. Measles.
- e. Mumps.

47. Local changes that occur in acute inflammation include:

- a. Constriction of the small blood vessels.
- b. Swelling and retraction of the endothelium cells in the vessels.
- c. Monocytes are the first cells seen in the extracellular space.
- d. Histamine concentration is increased.
- e. Stasis of blood.

48. Bleeding time is increased in:

- a. aspirin ingestion.
- b. anemia.
- c. thrombocytopaenia.
- d. vitamin C deficiency.
- e. vitamin A deficiency.

49. In hypovolaemic shock:

- a. there is a loss of more than 20% of the blood volume.
- b. the blood flow to the brain and kidneys are initially maintained.
- c. the urine output decreases.
- d. the pulse rate decreases.
- e. there is a rise in renin concentration.

50. The following genetic conditions are associated with increased risk of cancer:

- a. Chromosome 13 deletion.
- b. Neurofibromatosis type 1.
- c. Neurofibromatosis type 2.
- d. Down's syndrome.
- e. Turner's syndrome.

51. Amyloidosis:

- a. appears as extracellular eosinophilic hyaline material.
- b. is made up of calcified protein.
- c. shows an apple green birefringence in polarised light.
- d. occurs in patients with multiple myeloma.
- e. is a complication of chronic infection.

52. Apoptosis:

- a. is the normal physiological process of programmed cell death.
- b. occurs only in old age.
- c. results in products that are removed by phagocytosis.
- d. causes the plasma membrane to undergo zeiosis.
- e. causes inflammation which may damage surrounding cells.

53. Dysplasia:

- a. involves the transformation of one mature cell type into another.
- b. is a premalignant condition.
- c. is associated with an increased cell number.
- d. is associated with increased cell staining with haematoxylin.
- e. is irreversible.

54. True statements about thrombus include:

- a. It involves mainly the intrinsic and extrinsic clotting cascade.
- b. Platelets form the first layer of thrombus.
- c. It is the main cause of myocardial infarction.
- d. It occurs only in arteries.
- e. It can cause embolism.

55. The following are typical histological changes seen in benign hypertension:

- a. Fibrinoid necrosis of small arteries and arterioles.
- b. Loss of endothelial cells of arterioles.
- c. Hyalinization of the muscular media of the medium sized arteries and arterioles.
- d. Intimal proliferation in medium-sized arteries and arterioles.
- e. Formation of new vessels.

IMMUNOLOGY

56. The following are true about antigen presenting cells (APC):

- a. Langerhan's cells are the antigen presenting cells of the epidermis.
- b. Neutrophils are antigen presenting cells.
- c. CD8+ cells only recognise antigen presenting cells bearing MHC (major histocompatibility complex) class I.
- d. Tumour necrosis factor alpha (TNF α) can turn endothelial cells into antigen presenting cells.
- e. They induce clonal T cell proliferation by producing interleukin-1 (IL-1).

57. The following are true about the Fc regions of immunoglobulins:

- a. They can be cleaved from the Fab regions by papain
- b. They are responsible for antibody binding
- c. They are involved in mast cell binding
- d. They are involved in the activation of the complement cascade
- e. They determine the ability of the immunoglobulins for transplacental transfer.

58. With regard to interferons:

- a. They are produced by B lymphocytes.
- b. IFN β are produced by cells infected with virus.
- c. IFN γ increases MCH class I and II expression in antigen presenting cell.
- d. IFN α are produced by fibroblasts.
- e. They have anti-tumour activity.

59. The following immunoglobulins are monomeric:

- a. Ig A.
- b. IgG.
- c. Ig D.
- d. Ig E.
- e. Ig M.

60. CD4+ cells:

- a. are B lymphocytes.
- b. account for most of the peripheral lymphocytes.
- c. are cytotoxic cells.
- d. regulate the immune functions by secreting interleukin-2.
- e. produce antibodies.

61. Anaphylactic reaction involves:

- a. Langan's giant cells.
- b. histamine.
- c. basophil.
- d. mast cells.
- e. Ig E.

62. Immunoglobulin G:

- a. is the main immunoglobulin in normal conjunctiva.
- b. freely crosses the placenta.
- c. has a molecular weight of 350,000 daltons.
- d. contains two antigen binding sites.
- e. is the most abundant immunoglobulin in plasma.

63. HLA B27:

- a. is a class II major histocompatibility antigen.
- b. is found on antigen presenting cells.
- c. increases the risk of anterior uveitis.
- d. is found in 90% of patients with ankylosing spondylitis.
- e. is found in less than 1% of the general population.

64. Secretory Ig A:

- a. is responsible for mucosal immunity.
- b. is not found in the plasma.
- c. is assembled in the lymph nodes.
- d. is transferred across placenta to the foetus.
- e. inhibits bacterial adhesion to mucosal membrane.

65. Regarding the complement system:

- a. The classical pathway is activated by antibody-antigen complexes.
- b. The alternative pathway is activated by the cell wall of bacteria.
- c. C5b-9 attacks the cell membrane.
- d. Deposition of C3b on the bacterial cell wall causes phagocytosis by leucocytes.
- e. Activation causes recruitment of inflammatory cells.

MICROBIOLOGY

66. The following are true about exotoxins:

- a. It is produced by both Gram positive and negative bacteria.
- b. It can be inactivated by heat.
- c. It is produced by *Clostridium botulinum*.
- d. It stimulates the formation of antibodies when introduced into the body.
- e. It can be detected using the Limulus test.

67. Gram-positive cocci include:

- a. *Staphylococcus sp.*
- b. *Streptococcus sp.*
- c. *Meningococcus sp.*
- d. *Haemophilus sp.*
- e. *Moraxella sp.*

68. Regarding the culture mediums in microbiology:

- a. Blood agar is best for anaerobic microbes.
- b. Chocolate agar is best for the growth of *Haemophilus* and *Neisseria* organisms.
- c. McConkey agar is best for Gram positive bacteria.
- d. Nutrient poor agar with *E.coli* overlay is useful for *acanthamoeba*.
- e. Lowenstein-Jensen medium is best for mycobacteria.

69. Antibiotics that inhibit the bacterial cell wall synthesis include:

- a. Flucloxacillin.
- b. Gentamicin.
- c. Erythromycin.
- d. Vancomycin.
- e. Ciprofloxacin.

70. Hepatitis B:

- a. is a RNA virus
- b. has an incubation period of 2 to 6 weeks
- c. carrier is identified by the presence of surface antigen in the presence of Ig G against hepatitis B.
- d. infected patients become carriers in less than 1% of cases.
- e. is associated with hepatocellular carcinoma.

71. True statements about the herpes zoster virus:

- a. It is a RNA virus.
- b. It can be inactivated by the administration of acyclovir.
- c. It remains in the nerve ganglia for life in patients with previous infection.
- d. Shingle resulted from primary infection of herpes zoster virus.
- e. Acute retina necrosis may be caused by the virus.

72. Cytomegalovirus:

- a. is a double-stranded DNA virus.
- b. is the most common viral infection in HIV patients.
- c. in normal people usually remain dormant in the nerve ganglia.
- d. rarely cause retinitis if the patient has a CD4 counts of more than 200 per mm^3 .
- e. can be eliminated through the use of foscarnet.

73. The following anti-fungal agents act by interfering with the cell wall of the fungi:

- a. Amphotericin B.
- b. Imidazole.
- c. Griseofluvin.
- d. Cyclohexidine.
- e. 5-fluorocytosine.

74. HIV:

- a. is a single-stranded RNA.
- b. gains entry into cells with CD4 cell-surface receptor molecules.
- c. core protein p24 can be used to monitor progression of AIDS.
- d. can be passed from mother to foetus.
- e. causes a drop in the CD4/CD8 ratio.

75. Acanthamoeba:

- a. can be cultured from the nasopharynx of normal people.
- b. is the most common cause of corneal ulcer in contact lens wearer.
- c. can be killed by boiling contaminated water for 10 minutes at a temperature of $70-80^{\circ}\text{C}$.
- d. swimming with contact lenses is a risk factor for acanthamoeba keratitis.
- e. the keratitis can be easily treated with topical antibiotics.

GENETICS

76. The following are true about an X-linked recessive disease:

- a. The fathers never pass the abnormal gene to their sons.
- b. Half the female offsprings of a carrier female will be a carrier.
- c. The maternal age is a factor in passing the abnormal gene to the offsprings.
- d. Female carriers may have variable manifestations of the disease due to random inactivation.
- e. The mother is always the carrier.

77. Human lymphocyte antigens (HLA):

- a. are coded by genes found on the X-chromosome.
- b. are found on red blood cells.
- c. show racial variation.
- d. play an important role in antigen recognition by the T lymphocytes.
- e. matching is important for routine corneal graft.

78. The following are true about the mitochondrial DNA:

- a. It is a double-stranded straight DNA.
- b. Mutation of mitochondrial DNA is more common than nuclear DNA.
- c. It is found in both ova and sperms.
- d. Disease involving mitochondrial DNA show an autosomal dominant inheritance.
- e. Diseases involving the mitochondrial DNA affect only the muscles.

79. The polymerase chain reaction:

- a. typically involves a three-step cycle.
- b. does not require prior knowledge of the DNA sequence being assayed.
- c. cannot be used to detect RNA of interest.
- d. requires the use of oligonucleotide primers.
- e. is highly sensitive and specific.

80. Regarding the nuclear DNA:

- a. Ionic bonds exist between the paired bases.
- b. Less than 5% of the DNA codes for proteins.
- c. Nuclear DNA exists as nucleoprotein complex by wrapping around histones.
- d. Introns exist between coding sequences of the DNA.
- e. Exons code for messenger DNA.

MOLECULAR AND CELL BIOLOGY

81. Regarding the cell membrane:

- a. It contains lipid bilayer.
- b. Glycoprotein is the essential component that maintains the cell membrane fluidity.
- c. Microvilli are usually found in absorptive cells.
- d. It is freely permeable to ions.
- e. Presence of gap junctions allow the transfer of molecules between cells.

82. The following are true about G proteins:

- a. They are first messengers.
- b. When activated, the alpha subunit exchange GDP for GTP.
- c. They are transmembrane signal receptor molecules.
- d. *Vibrio cholerae* secretes an exotoxin that makes G-proteins resistant to inactivation.
- e. The activities of G-proteins are reduced in pseudohypoparathyroidism.

83. Northern blotting:

- a. is used to detect DNA molecules.
- b. involves electrophoresis.
- c. requires the use of hybridisation probe.
- d. requires the use of restriction endonuclease.
- e. allows rapid detection of an infective organism.

84. Type I collagen:

- a. contains two $\alpha 1$ chains and one $\alpha 2$ chain.
- b. is the most common collagen.
- c. is the main type of collagen found in basement membrane.
- d. is found in skin and bone.
- e. is found in cornea.

85. With regard to membrane receptors for hormones:

- a. They are often glycoproteins.
- b. They are important for hormones made up of steroid.
- c. Those for insulin exhibit an intrinsic protein kinase activity.
- d. Glucagon uses calcium as a second messenger.
- e. Catecholamines uses cyclic AMP as a second messenger.

PHARMACOLOGY

86. Atropine:

- a. causes delayed gastric emptying.
- b. causes reduced sweating.
- c. has a sedative effect.
- d. causes ciliary body contraction.
- e. causes paralysis of the iris dilator muscle.

87. Cocaine:

- a. inhibits the reuptake of monoamines at the synaptic space.
- b. decreases body temperature.
- c. has anaesthetic effect when applied locally.
- d. induces miosis of the pupil.
- e. causes tachycardia and hypertension.

88. Regarding the β -blockers:

- a. They have negative inotropic and chronotropic effects.
- b. They commonly induce postural hypotension.
- c. Those with intrinsic sympathetic activities are less likely to cause bradycardia.
- d. They reduce the secretion of glucagons.
- e. They decrease the intraocular pressure by increasing the aqueous outflow.

89. Cytochrome P-450:

- a. is a group of haeme-containing enzymes.
- b. is found mainly in the liver and intestinal mucosa.
- c. is responsible for converting lipophilic molecules into hydrophilic molecules.
- d. is involved in the first-pass metabolism of drugs.
- e. is essential for the analgesic effect of codeine.

90. Phase II drug metabolism:

- a. involves hydrolysis of drugs.
- b. involves conjugation reactions.
- c. decreases drug water solubility.
- d. are underdeveloped in neonates.
- e. results in drug excretion by either the kidneys or liver.

ANSWERS

1. a. F b.T c.F d.T e.F

The mnemonic MALE is useful for remembering the structures that pass through the foramen ovale: Mandibular nerve, Accessory meningeal artery, Lesser petrosal nerve and Emissary vein.

2. a. F b.T c.F d.T e.T

The chorda tympani is a branch of the nervus intermedius which in turn is a sensory component of the facial nerve. It contains the parasympathetic nerve fibres that supply the salivary glands and the sensory nerve fibres that innervate the anterior two-third of the tongue. It passes between the internal jugular vein and internal carotid artery as it travels anteriorly. The greater petrosal nerve that contains parasympathetic nerve fibres to the lacrimal nerve exits the nervus intermedius at the geniculate body.

3. a.T b.F c.F d.T e.T

The thyroid gland is made up of two lobes joined by an isthmus. It is situated in front of the second to fourth tracheal rings. It is supplied by the superior thyroid artery which is a branch of the external carotid artery and the inferior thyroid artery which is a branch of the brachial artery. The four parathyroid glands are supplied by the inferior thyroid artery. The thyroid gland increases in size during pregnancy.

4. a.F b.T c.F d.F e.F

The parotid gland is a serous gland. It is covered by a thick capsule derived from the deep cervical fascia. The facial nerve divides within the parotid gland before exiting it anteromedially. The parasympathetic secretomotor nerve fibres are derived from the glossopharyngeal nerve. The parotid duct pierces the buccinator and runs a short distance before appearing opposite the second upper molar tooth.

5. a.T b.F c.F d.T e.T

The medial wall is made up of the ethmoid bone, the lacrimal bone, a small part of the lesser wing of the sphenoid, and the tip of the maxilla. The frontoethmoidal suture forms its superior border.

6. a.F b.F c.F d.T e.F

The superior ophthalmic vein connects the facial nerve to the cavernous sinus by passing backward through the superior orbital fissure outside the common tendinous ring. The cervical portion of the ICA gives off no branches. The petrous portion gives off caroticotympanic, cavernous, hypophyseal and artery to the pterygoid canal. The ophthalmic artery is NOT the first branch of the internal

carotid artery. It enters the orbit through the optic canal. The ciliary ganglion is situated lateral to the optic nerve.

7. a.T b.T c.F d.F e.T

The maxillary artery and the temporal artery are the terminal branches of the external carotid artery within the parotid gland. The maxillary artery gives off its main branches within the infratemporal fossa and these include the middle meningeal artery and the inferior alveolar artery that supply the mandibular gingiva. It enters the pterygopalatine fossa and splits into small branches that accompany the maxillary nerve. The infraorbital artery is of such branches that supply the maxillary incisor teeth.

8. a. F b.F c.T d.T e.T

The stylomastoid foramen is found in the temporal bone between the mastoid process and the styloid.

The carotid canal is on the inferior surface of the petrous part of the temporal bone.

The jugular foramen is formed between the temporal and occipital bones.

The optic canal is situated in the sphenoid bone

The foramen ovale is found in the greater wing of the sphenoid

9. a.T b.T c.T d.T e.F

All muscles of facial expression arise from the second pharyngeal arch and are supplied by the facial nerve. The temporalis, masseter, lateral and medial pterygoid are muscles of mastication. These muscles arise from the first pharyngeal arch and are supplied by the mandibular branch of the trigeminal nerve.

10. a.F b. T c.F d.T e.F

The pterygopalatine ganglion is a parasympathetic ganglion located between the nasal cavity medially and the infratemporal fossa laterally. Its preganglionic fibers arise from the lacrimal nucleus of the facial nerve and runs in the greater petrosal nerve before synapsing in the ganglion. It contains secretomotor nerve fibres to the lacrimal gland.

11. a.F b.F c.F d.T e.T

The common carotid artery bifurcates at the level of C3. It enters the cranium through the carotid canal and terminates as the middle and anterior cerebral arteries. The vertebral artery transverse the foramina transversaria of the cervical vertebrae 1-6. The basilar artery is formed by the union of the vertebral artery.

12. a.F b.T c.T d.T e.T

The pituitary fossa is part of the middle cranial fossa. It is formed by the body of the sphenoid bone. The dura mater forms its roof. The cavernous sinus is found on either side. It is bounded by the anterior and posterior clinoid processes.

13. a.F b.F c.T d.T e.F

The fifth cranial nerve provides sensation to the face except for a region around the angle of the mandible which is supplied by C2 and C3 in the form of the great auricular nerve. The mandibular branch supplies the muscles of mastication. The corneal sensation is provided by the ophthalmic branch and is involved in the blink reflex. The fifth cranial nerve does not contain parasympathetic nerves fibres of its own.

14. a.T b.F c.F d.F e.F

The left recurrent laryngeal nerve arises from the vagus nerve as it crosses the arch of the aorta. It ascends in the groove between the trachea and esophagus and lies anterior to the sympathetic trunk. It also has a sensory component that supplies part of the mucous membrane of the larynx and trachea. It supplies all the laryngeal muscles except the cricothyroid muscle which is supplied by the external laryngeal nerve.

15. a.F b.F c.T d.F e.T

The superior meatus receives the opening of the posterior ethmoidal sinuses. The middle meatus receives the openings of the anterior ethmoidal sinuses, frontal sinus and the maxillary sinus. The inferior meatus receives the opening of the nasolacrimal duct.

16. a.F b.T c.T d.F e.F

Cerebrospinal fluid is produced by modified ependymal cells of the choroid plexus found in the lateral, third, and fourth ventricles. Cerebrospinal fluids flows from the lateral ventricles via the foramina of Monro into the third ventricle, and then the fourth ventricle via the cerebral aqueduct of Sylvius in the brainstem. From the fourth ventricle, the cerebrospinal fluid either pass into the central canal of the spinal cord or into the cisterns of the subarachnoid space via three small foramina: the central foramen of Magendie and the two lateral foramina of Luschka. The fourth not the third ventricle is found directly posterior to the pons.

17. a.F b.T c.F d.F e.T

Muscle	Primary action	Secondary action	Tertiary action
Medial rectus	Adduction	--	--
Superior rectus	Elevation	Intortion	Adduction
Inferior rectus	Depression	Extortion	Adduction
Inferior oblique	Extorsion	Elevation	Abduction
Superior oblique	Intorsion	Depression	Abduction
Lateral rectus	Abduction	--	--

18. a.T b.F c.T d.F e.F

The cavernous sinuses are so named because it is a reticulated structure traversed by numerous interlacing filaments. They are located on either side of the body of the sphenoid bone, extending from the superior orbital fissure to the apex of the petrous portion of the temporal bone. Each opens into the petrosal sinuses. On the medial wall of each sinus is the internal carotid artery, accompanied by filaments of the carotid plexus; near the artery is the abducent nerve; on the lateral wall are the oculomotor and trochlear nerves, and the ophthalmic and maxillary divisions of the trigeminal nerve. These structures are separated from the blood flowing along the sinus by the lining membrane of the sinus. The cavernous sinus receives the superior ophthalmic vein through the superior orbital fissure, some of the cerebral veins, and also the small sphenoparietal sinus, which courses along the under surface of the small wing of the sphenoid.

19. a.F b.T c.F d.F e.F

The structures that arise from the third pharyngeal pouch are the inferior parathyroid gland and the thymus. The first pharyngeal pouch gives rise to the tympanic membrane.

The second pharyngeal pouch gives rise to the palatine tonsil.

The fourth pharyngeal pouch gives rise to the superior parathyroid gland.

The fifth pharyngeal pouch gives to the parafollicular gland.

20. a.T b.F c.F d.F e.T

The sixth cranial nerve nucleus is found medial to the facial nerve nucleus. It is a pure motor nerve and supplies only the lateral rectus muscle. It enters the orbit by passing through the lateral wall of the cavernous sinus. It is not involved in the light reflex.

21. a.F b.T c.F d.T e.F

Most of the body potassium is found within the cells. The concentration of potassium rises in metabolic acidosis. Potassium enters the cells in the presence of insulin. Ingestion of acetazolamide increases urinary potassium loss. Aldosterone causes sodium retention and potassium loss.

22. a.T b.T c.F d.T e.T

The sodium ion pump is responsible for the active transport of the sodium ions across the cell membrane. Glucose absorption from the gut, potassium excretion in the distal convoluted tubule and water reabsorption from the collecting ducts are other examples of active transport. Water reabsorption from the proximal convoluted tubule occurs due to the concentration gradient.

23. a.T b.F c.T d.F e.T

The kidneys receive about 1.2 liters of blood per minute which is about 25% of the cardiac output. The blood flow is 20 times greater in the renal cortex than the renal medulla. Over 99% of the filtered water is reabsorbed by the kidney. Antidiuretic hormone increases the water permeability of the collecting duct and hence increases water retention. Kidney secretes erythropoietin which is essential for red blood cell production.

24. a.F b.T c.T d.T e.F

Shifting the hemoglobin-oxygen dissociation curve to the right increases the release of oxygen to the tissues. This shift occurs in acidosis, raised temperature and increased 2,3 DPG.

25. a.T b.F c.T d.F e.F

Blood group O is the most common and blood group AB is the least common. Blood group O is regarded as universal donors and blood group AB as universal recipient. Anti-A and anti-B antibodies are found in patients with blood group O. Blood group AB contains no antibodies against any ABO group.

26. a.F b.T c.T d.T e.F

The P waves indicate atrial depolarisation, the QRS complex ventricular depolarisation. T wave represents ventricular repolarisation. Increased PR interval

indicates first degree heart block. The normal QRS complex is less than 0.12 seconds.

27. a.T b.T c.F d.T e.T

The carotid body receives about 2000ml/100g/min which is 40 times that of the brain. It is stimulated by increase in PCO_2 , decrease in PO_2 and pH. When stimulated it causes reflex peripheral vasoconstriction.

28. a.T b.F c.T d.F e.F

The cerebral blood flow accounts for about 15% of the total cardiac output. The cerebral blood flow is autoregulated and the sympathetic nervous system plays little role. Autoregulation is very effective in maintaining the blood flow between mean systemic blood pressure of between 60 to 140 mmHg. In the presence of increased serum acidity as in raised arterial carbon dioxide concentration, the cerebral blood flow is increased.

29. a.F b.F c.T d.T e.T

Following a major surgery, the body shows stress response resulting in:

- potassium retention
- sodium and water retention
- increased protein breakdown, decreased protein synthesis
- increased gluconeogenesis, increased glycogenolysis and decreased peripheral glucose uptake
- increased lipolysis and decreased lipogenesis

30. a.T b.F c.T d.T e.F

The afferent fibers of the pupillary light reflex travel along the optic nerves, chiasm and tracts and leave the posterior portion of the optic tract and enter the midbrain where they synapse with the pretectal nuclei. The axons from the pretectal nuclei then project bilaterally to the Edinger-Westphal nuclei. The parasympathetic fibres that control the light reflex arise from the Edinger-Westphal cell group of the oculomotor nucleus and synapse within the ciliary ganglion. From here, nerve fibers reach the iris via the short ciliary nerves. Cataract does not impair the pupillary light reflex.

31. a.T b.T c.F d.F e.T

Vagal stimulation increases the parasympathetic activities resulting in slowing of the heart rate with delayed A-V conduction and decreased stroke volume. The atrial and ventricular activities are decreased.

32. a.T b.T c.T d.F e.F

The smooth muscle shows no visible striation. It has myosin, actin and tropomyosin but not troponin. It is made up of single nucleated cells that acts as a syncytium. It is innervated by the autonomic nervous system.

33. a. T b.T c.F d.F e.T

The action potential is an all or nothing phenomenon. It is associated with an increased permeability of the membrane to sodium ions. The amplitude does not show any decrease as it travels along the nerve fibers. The velocity increases with the diameter of the fibers and myelination.

34. a.F b.T c.T d.T e.T

Horner's syndrome occurs when there is interruption of the cervical sympathetic neurons that supply the eye. Features of Horner's syndrome include miosed eye that reacts normally to light, partial ptosis that disappears with topical phenylephrine, conjunctival injection due to loss of the sympathetic tone of the blood vessels, up drawing of the lower eyelid with resultant apparent enophthalmos and decreased sweating of the face.

35. a.T b.F c.T d.T e.T

Cholinergic neurons are found at the following:

- all preganglionic neurons
- parasympathetic postganglionic neurons
- sympathetic postganglionic neurons that serve the sweat glands
- sympathetic postganglionic neurons on blood vessels in the skeletal muscle

The rest of the postganglionic sympathetic neurons are noradrenergic.

36. a.F b.T c.F d.T e.T

Normal intracranial pressure is 15 mmHg. Raised intracranial pressure is associated with raised blood pressure, pulse rate, and periodic respiration. Hyperventilation decreases the PCO_2 and can be used to reduce the intracranial pressure by decreasing the blood flow. However, the reduced in cerebral blood flow may exacerbate cerebral ischemia.

37. a.T b.T c.T d.F e.T

The pH and the PO_2 of the CSF are lower than that of the arterial blood. Protein is almost absent in the normal CSF. The glucose in CSF is $2/3$ that of the blood. The chloride level in CSF is higher than that of the arterial blood.

38. a.T b.F c.T d.T e.T

After 24 hours of fasting, the liver undergoes gluconeogenesis as the storage of glycogen is usually insufficient to maintain the blood glucose level. Lipolysis also occurs. Muscle break-down does not occur until much later. The blood glucose concentration is usually maintained. The brain switches from using glucose to ketone bodies which are derived from fatty acid oxidation in the liver.

39. a.T b.T c.T d.F e.T

There are five hormones which counteract the hypoglycemic effect of insulin: glucagon, cortisol, growth hormone, adrenaline and noradrenaline.

40. a.F b.F c.T d.F e.T

Thyroid hormones (99%) are bound to the protein in serum and the most common protein that binds these hormones is the globulin (thyroxine-binding globulin, TBG). Thyroxine sensitizes myocardium to noradrenaline. Thyroxine increases the basal metabolic rate.

41. a.T b.T c.F d.T e.T

Aneurysm is defined as an abnormal localised dilatation of a blood vessel. True aneurysm contains all three layers of the vessel wall. Berry aneurysm is found in the Circle of Willis and is caused by vessel wall deficiency. Saccular aneurysm involves only part of the circumference of the vessel wall whereas fusiform aneurysm involves the entire circumference. Dissecting aneurysm occurs in arterial media deficiency as in Marfan's syndrome.

42. a.T b.F c.F d.T e.T

Dystrophic calcification is a form of heterotopic calcification (of which there are three namely metastatic, dystrophic and age related). Calcification in teeth, bone and otoliths is called orthotopic calcification. Metastatic calcification occurs in hypercalcaemia with deposition as in calculi in the renal tubules (nephrocalcinosis). Dystrophic calcification occurs in dead or damaged tissues in the presence of normal serum calcium concentration. It occurs in atheroma, damaged eye (as in phthisical bulbi) and tuberculoma in the lung.

43. a.F b.T c.F d.T e.F

Type II diabetes mellitus (DM) is more common than type I DM. Unlike type I DM, the β -cells in the islets of Langerhans are usually not lost in type II DM. There is an increased risk of type II DM amongst the first degree relatives of sufferers. Type I DM is associated with certain HLA groups but not type II DM. There is resistance of cellular response to insulin in type II DM.

44. a.T b.T c.T d.F e.F

Malignant cells typically shows cellular and nuclear pleomorphism with nuclear hyperchromatism. There is a decrease in the cytoplasmic: nuclear ratio.

Calcification can occur in both malignant and benign tumours.

45. a.F b.F c.T d.F e.T

A typical granuloma contains giant multinucleated cells (Langhan's cells) surrounded by epithelioid cell aggregates, lymphocytes and fibroblasts. Granulomatous tubercules tend to confluence. Epithelioid cells are activated macrophages resembling epithelial cells. At the periphery are the lymphocytes (T cells) and rare plasma cells and fibroblasts. Langerhan's cells are antigen-presenting monocytic cells found in the skin.

46. a.F b.T c.F d.F e.F

Viruses that are associated with carcinoma include: Epstein-Barr virus (nasopharyngeal carcinoma), hepatitis B and C (hepatocellular cancer), HIV virus (lymphoma, Kaposi's sarcoma), human papilloma virus (cervical cancer).

47. a.F b.T c.F d.T e.F

In acute inflammation, there is vasodilatation, stasis of blood and retraction of the endothelial cells making the blood vessels kinky. Histamine is an important mediator that causes vasodilatation and increased vascular permeability. Neutrophils are the first cells seen in the extracellular space.

48. a.T b.F c.T d.T e.F

Increased bleeding time occurs in:

- Thrombocytopenia
- Disseminated Intravascular Coagulation (DIC)
- Platelet disorders
- Capillary wall abnormalities (such as in vitamin C deficiency)
- Von Willebrand's Disease
- Medications (Aspirin, Warfarin, NSAIDs, Streptokinase, Urokinase)

49. a.T b.T c.T d.F e.T

More than 20% of blood loss is essential for hypovolaemic shock. The blood flow to the brain, heart and kidneys are initially maintained and blood is diverted away from the gastrointestinal tract, skin and skeletal muscle. There is a drop in the urine output. The pulse rate and heart contractions are increased. Renin secretion is increased which help to maintain the plasma volume by conserving water.

50. a.T b.T c.T d.T e.F

Chromosome 13q deletion is associated with retinoblastoma. Neurofibromatosis type 1 is associated with meningioma, glioma and pheochromocytoma. Neurofibromatosis type 2 is associated with bilateral acoustic neuroma. Down's syndrome is associated with acute leukemia.

51. a.T b.F c.T d.T e.T

Amyloidosis is a fibrillar glycoprotein which appears as extracellular eosinophilic hyaline material. It shows an apple green birefringence in polarised light. Amyloidosis may occur in multiple myeloma and in which case the amyloid is made up of the light chain of immunoglobulin. Secondary amyloidosis occurs in chronic infection.

52. a.T b.F c.T d.T e.F

Apoptosis is a normal physiological process of programmed cell death. It occurs in old age as well as during development. The process of apoptosis does not cause inflammation (unlike in necrosis), the plasma membrane undergoes blebbing called zeiosis. The products of apoptosis are removed by phagocytosis.

53. a.F b.T c.T d.T e.F

Dysplasia is associated with increased cell number and nuclear abnormalities such as hyperchromasia (increased cell staining with haematoxylin) and pleomorphism (altered nuclear size and nuclear shape). It may be associated with abnormalities of cellular differentiation. Dysplasia may be caused by diverse cellular insults including physical, chemical and viral insults. It may be reversible in its early stages.

54. a.F b.T c.T d.F e.T

Thrombus refers to a solid mass of blood constituents form within the vascular system, i.e. both arteries and veins. Unlike clotting in which the clotting cascade plays an important role, thrombus is formed by the interaction between the platelets and the blood constituents. It causes myocardial infarction. Fragments of the thrombus may break off into circulation causing embolism.

55. a.F b.F c.T d.T e.F

Intimal proliferation and hyalinization of the muscular media are the two histological features commonly seen in benign hypertension especially in the medium-sized renal arteries and renal arterioles. Fibrinoid necrosis of small arteries and arterioles are seen in malignant hypertension. Loss of endothelial cells of arterioles occur in diabetes mellitus.

56. a.T b.F c.T d.T e.T

CD8⁺ cells recognise APC bearing MHC class I molecules whereas CD4⁺ recognise APC bearing MHC class II molecules.

57. a.T b.F c.T d.T e.T

Antibody binding is carried out by the Fab (antibody) fragments.

58. a.F b.T c.T d.F e.T

Interferons are not produced by B cells. IFN α is produced by infected leukocytes. IFN β is produced by infected fibroblasts. IFN γ is produced by activated T cells and natural killer cells. It increases the function of antigen presenting cells by enhancing the expression of MHC class I and II antigen expression. IFN α and IFN γ also have anti-tumour activity.

59. a.F b.T c.T d.T e.F

Monomeric immunoglobulins contain the basic structure of two identical light chains and two identical heavy chains linked by disulphide bonds. Ig A is dimeric and Ig M pentameric.

60. a.F b.T c.F d.T e.F

CD4⁺ cells are known as T helper cells and accounts for 65% of lymphocytes in circulation. They are responsible for regulating the immune functions and secretes interleukin-2. CD8⁺ cells are known as T suppressor lymphocytes and have suppressor and cytotoxic functions.

61. a.F b.T c.T d.T e.T

Anaphylactic reaction (Type I hypersensitivity) involves the bindings of Ig E (which have reacted with specific antigen) to mast cells or basophils leading to cell degranulation, histamine release and anaphylaxis. Langan's giant cells occur in type IV hypersensitivity.

62. a.F b.T c.F d.T e.T

The glycoprotein immunoglobulin G (IgG) accounts for about 75% of the total immunoglobulins in plasma of healthy individuals. Antibodies of the IgG class express their predominant activity during a secondary antibody response. Thus, the appearance of specific IgG antibodies generally corresponds with the 'maturation' of the antibody response, which is switched on upon repeated contact with an antigen. It crosses the placenta freely. It has two antigen binding sites with a molecular weight of 150000 daltons.

63. a. F b. F c. T d. T e. F

HLA-B27 is a class I major histocompatibility antigen and is found in most cells. Class II HLA antigens and not class I HLA antigens are expressed on antigen presenting cells like the B lymphocytes. It is associated with ankylosing spondylitis (90% of patients have HLA B27) which is associated with increased risk of anterior uveitis. It is also found in 8% of the general population.

64. a. T b. T c. F d. F e. F

IgA is a dimer. It is responsible for mucosal immunity. It is transported across the mucosal epithelium bound to a receptor complex. Secretory IgA is a protectant of mucosal surfaces. It restricts the adhesion of the bacteria to the ocular surface.

65. a. T b. T c. T d. T e. T

The complement system is a complex system of serum proteins that interact in a cascade. There are two pathways by which complement activation is initiated. The classical pathway is activated by antibody-antigen complexes. The alternative pathway can be activated by bacterial polysaccharides. Activation of complement has a number of important biological effects which include the recruitment of inflammatory cells, opsonisation (phagocytosis) of pathogen and killing of the pathogen through attacking the cell membrane.

66. a. F b. T c. T d. T e. F

Exotoxin is produced by the Gram positive bacteria. It is made up of protein and is heat-labile. Botulinum toxin is an exotoxin produced by *Clostridium botulinum*. When injected into the body it causes the formation of antibodies.

Limulus Tests is a sensitive method for detection of bacterial endotoxins. It depends on the in vitro gelation of Limulus amoebocyte lysate (LAL), prepared from the circulating blood (amoebocytes) of the horseshoe crab, by the endotoxin or related compound.

67. a. T b. T c. F d. F e. F

Both *Staphylococcus* and *Streptococcus* species are Gram positive cocci.

Meningococcus is a Gram negative diplococcus.

Haemophilus is a Gram negative bacillococcus.

Moraxella is a Gram negative diplococcus.

68. a. F b. T c. F d. T e. T

Blood agar is best for aerobic microbes. Chocolate agar is a nutrient medium used in culturing fastidious organisms such as *Haemophilus species* and *Neisseria*. It comprises sheep blood that provides factors X (hemin) and V (nicotinamide adenine dinucleotide) necessary for *Haemophilus* growth. McConkey agar is used

in identification of lactose fermenting, Gram-negative enteric pathogens and for inhibiting growth of Gram-positive organisms. Nutrient poor agar with *E. coli* overlay provides nutrient for the growth of *acanthamoeba*. Lowenstein-Jensen medium is used primarily for mycobacteria culture.

69. a.T b.F c.F d.T e.T

Aminoglycosides such as gentamicin inhibit protein synthesis by binding to a portion of the bacterial ribosome. Macrolides such as erythromycin inhibit protein synthesis by binding to a subunit of the bacterial ribosome (50S).

70. a.F b.F c.T d.F e.T

Hepatitis B is a DNA virus. It has an incubation period of 2 to 6 months. About 10% of infected individuals become chronic carrier. Hepatitis B surface antigen (HBsAg) is a protein antigen produced by the virus. This antigen is the earliest indicator of acute hepatitis B and frequently found in infected people before symptoms appear. HBsAg disappears from the blood during the recovery. In some patients, chronic infection occurs and the HBsAg remains positive. Chronic hepatitis B carrier is associated with a high risk of developing hepatocellular carcinoma.

71. a.F b.T c.T d.F e.T

Herpes zoster virus is a DNA virus. It can be inactivated by acyclovir. Following the initial infection (chickenpox) it stays in the nerve ganglia for life and can become reactivated in time of weakened immune system. The reactivation usually takes the form of shingles.

Herpes zoster virus is a cause of acute retinal necrosis.

72. a.T b.T c.F d.T e.F

Cytomegalovirus is a double-stranded DNA virus. It rarely causes problem for the immunocompetent patients. It can be transmitted by blood, cervical secretions, semen, or breast milk. In HIV patients, cytomegaloviral retinitis usually indicates decreased CD4+ counts to less than 50 per mm³. Most cases of cytomegalovirus infection in the immunocompromised are the result of reactivation. The precise site where these viruses remain latent following initial infection of the immunocompetent patient is not yet determined.

73. a.T b.T c.F d.F e.F

Polyene antifungal drugs (Amphotericin, nystatin, and pimaricin) interact with sterols in the cell membrane (ergosterol in fungi, cholesterol in humans) to form channels through which small molecules leak from the inside of the fungal cell to the outside.

Azole antifungal drugs (Fluconazole, itraconazole, and ketoconazole) inhibit cytochrome P450-dependent enzymes (particularly C14-demethylase) involved in the biosynthesis of ergosterol, which is required for fungal cell membrane structure and function.

Grisan (Griseofluvin) binds to tubulin, preventing microtubule assembly.

Glutaramide (Cycloheximide) inhibits protein synthesis at ribosomal level.

Antimetabolite antifungal drugs (5-Fluorocytosine) acts as an inhibitor of both DNA and RNA synthesis

via the intracytoplasmic conversion of 5-fluorocytosine to 5-fluorouracil.

74. a.T b.T c.T d.T e.T

HIV is a single-stranded RNA virus. HIV virus infects cells with CD4 cell-surface receptor molecules, using them to gain entry. p24 is the core protein of HIV and its level can be used to monitor the progression of AIDS. HIV virus can pass from mother to foetus. The drop in CD4 cell counts results in a decrease in the ratio of CD4/CD8 cells.

75. a.T b.F c.T d.T e.F

Acanthamoeba is a free living amoeba. It can be isolated from the nasopharynx of normal people. Corneal infection is rare and usually occurs in contact lens wearer (the most common cause of corneal ulcer in contact lens wearer is bacterial infection). It can be killed by chemical means such as hydrogen peroxide or by boiling contaminated water for 10 minutes at a temperature of 70-80 degrees centigrade. *Acanthamoeba* keratitis is difficult to eradicate.

76. a.T b.T c.F d.T e.F

X-linked recessive disease is always manifested in the male due to the absence of paired X-chromosome. However, some females may also exhibit the signs and symptoms of the disease despite being a carrier. This may occur if the normal X-chromosome is inactivated. The father may pass on the disease if the disease is not fatal at an early age.

77. a.F b.F c.T d.T e.F

HLA genes are found on chromosome 6. They are found on cells with nuclei and not on the red blood cells. They show inter-ethnic variation. HLA are essential for antigen recognition by the T lymphocytes. Matching of HLA is important for organ transplant but routine corneal graft (by virtue of its lack of blood vessels) are not usually needed.

78. a.F b.T c.F d.F e.F

Mitochondria DNA has a double stranded round DNA. It has no intron or repair system and therefore more susceptible to mutation than the nuclear DNA. It is found in the ova but not the sperms and therefore mitochondria diseases show maternal inheritance. Mitochondrial DNA disorders commonly involve the muscle but also the nerves such as in Leber's optic neuropathy.

79. a.T b.F c.F d.T e.T

PCR is an in vitro amplification of a specific DNA segment that allows for the synthesis of millions of copies of that DNA segment in a short span of time. It is necessary to know at least some of the DNA sequence in the region to be assayed before amplification can be performed. The PCR consists of a three-step cycle: denaturation, primer binding, and DNA synthesis. Oligonucleotide primers are essential to detect the DNA of interest. RNA can also be detected with PCR using reverse transcriptase. The technique is highly specific and sensitive. The high sensitivity is one of its major drawbacks because of the major risk of false-positive reaction caused by contamination.

80. a. F b.T c.T d.T e.T

Hydrogen bonds exist between the paired bases. Only about 3% of the nuclear DNA is involved in coding. Nuclear DNA exists as nucleoprotein complex by wrapping around a protein called histones. Introns are found between coding sequence of DNA and exons are the part of DNA that code for protein through messenger RNA.

81. a.T b.F c.T d.F e.T

Cell membrane contains lipid bilayer. Cholesterol is essential for the maintaining fluidity of the cell membranes. Microvilli are found mainly in absorptive cells and they serve to increase the cell surface area. Cell membrane is permeable to lipid molecule but impermeable to ions. Gap junctions between cells allow transfer of molecules between cells

82. a.F b.T c.F d.T e.T

G-proteins are membrane bound receptors that are the binding sites for an external stimulus or first messenger (for example, hormones, light or neurotransmitters). They interact with second messenger pathways that are responsible for a change in the state of the cell, for example, a growth factor binding to a cell surface receptor leads to initiation of mitosis. The coupling of the first and second messengers via G-proteins is a ubiquitous mechanism in human cells. G-proteins are composed of three subunits (α , γ , β). When a ligand binds to its receptors, the α subunit releases GDP and binds GTP which gives it an active conformation allowing it to interact with a second messenger system for example cyclic-GMP. In cholera, exotoxins produced by the bacteria make the G-proteins resistant to inactivation that leads to fluid and electrolyte loss. In pseudohypoparathyroidism, the activities of the G-

proteins are reduced and as a result there is a reduced response to parathyroid hormone, T3 and gonadotrophins.

83. a.F b.T c.T d.T e.F

A northern blot is very similar to a Southern blot except that it is RNA rather than DNA which is extracted, run on a gel and transferred to a filter membrane. It is mRNA which is isolated and hybridised in northern blots. It is used to determine if RNA of a particular sequence is present.

84. a.T b.T c.F d.T e.T

The α chains determine the types of collagen. Type 4 is the main type of collagen found within the basement membrane.

85. a.T b.F c.T d.F e.T

Membrane receptors for hormones are important for protein hormones that are insoluble in the lipid layer of the cell membrane. The receptors rely on intracellular signaling mechanisms involving second messengers to produce their effects. Three second messenger systems are recognized: adenylate cyclase / AMP system (used in ACTH, glucagon, catecholamines) phosphatidylinositol and diacylglycerol systems receptor-linked ion channels. The receptors for insulin have transmembrane proteins with a kinase region that phosphorylates intracellular proteins.

86. a.T b.F c.T d.F e.F

Atropine is a cholinergic antagonist. It causes delayed gastric emptying and reduced sweating. It has a sedative effect when administered systemically. It causes cycloplegia via ciliary body paralysis and mydriasis via iris sphincter muscle paralysis. The mydriasis caused by atropine occurs before cycloplegia.

87. a.T b.F c.T d.F e.T

Cocaine blocks the reuptake of the monoamines into the presynaptic terminals. It potentiates the action of noradrenaline and hence the sympathetic nervous system. It causes tachycardia, hypertension, pupil dilatation and peripheral vasoconstriction. Hyperthermia is common. When applied locally, it has anaesthetic effect.

88. a.T b.F c.T d.T e.F

β -blockers have negative inotropic and chronotropic effects. They cause hypotension but rarely postural hypotension because the α 1-adrenergic receptors that control the vascular resistance are not affected. Those with intrinsic sympathetic activities (ISA) are less likely to cause bradycardia. They should be given with care to diabetic patients because they decrease both glycogenolysis and

glucagon secretion as well as reduce the normal physiologic response to hypoglycemia.

89. a.T b.T c.T d.T e.T

Cytochrome P-450 (CYP) is a group of haeme-containing enzymes (6 isoenzymes are recognised). It is found mainly in the liver and the intestinal mucosa. It is responsible for the phase I drug metabolism which is responsible for the conversion of lipophilic molecule into hydrophilic molecules. P-450 metabolises drugs by oxidation. Because it is found in the intestinal mucosa, it is also involved in the first pass metabolism of some drugs. Codeine needs to be O-demethylated for its effect to occur. In individuals who has absent CYP2D6, codeine loses its analgesic effect.

90. a.F b.T c.F d.T e.T

Phase II drug metabolism involves conjugation reaction and the addition of glucuronic acid is the most common. The process increases drug water solubility and facilitates drug excretion by the kidneys or liver. Conjugating enzymes are deficient in neonates.

TEST TWO

ANATOMY

1. The third ventricle:

- a. forms the roof of the optic chiasm.
- b. is part of the midbrain.
- c. is anterior to the pineal body.
- d. contains choroid plexus in the roof.
- e. is connected to the fourth ventricle by the foramen of Monro.

2. Muscles involved in opening the jaw include:

- a. Medial pterygoid.
- b. Lateral pterygoid.
- c. Temporalis.
- d. Mylohyoid.
- e. Masseter.

3. The adult spinal cord:

- a. extends to the third lumbar vertebrae.
- b. contains a central canal.
- c. receives the majority of its blood supply from the anterior spinal artery.
- d. has a spinal ganglion in each dorsal nerve root.
- e. carries pain sensation that decussates in the medulla oblongata.

4. The human pituitary gland:

- a. is about 2 cm in transverse diameter.
- b. derives its blood supply from the circle of Willis.
- c. is entirely ectodermal in origin.
- d. has independent vascular systems for the anterior and posterior lobe.
- e. is connected to the thalamus by the infundibulum.

5. The retina:

- a. has more cones than rods.
- b. has cones and rods on its inner surface.
- c. contains optic disc which is lateral to the macula.
- d. receives all its blood supply from the central retinal artery.
- e. is the only nervous tissue visible to the naked eye in life.

6. The following are true about the visual pathway:

- a. The fibers synapse in the medial geniculate body.
- b. Congruous hemianopia occurs if there is a lesion in the optic tract.
- c. The visual cortex is on the medial aspect of the occipital lobe.
- d. The superior colliculi are the relay stations for light reflex.
- e. The posterior cerebral artery supplies most of the optic radiation and the visual cortex.

7. The following arteries form the circle of Willis:

- a. Anterior cerebral arteries.
- b. Posterior cerebral arteries.
- c. Middle cerebral arteries.
- d. Basilar arteries.
- e. Posterior communicating arteries.

8. The superior orbital fissure transmits:

- a. the frontal nerve.
- b. the abducent nerve.
- c. the lacrimal nerve.
- d. the trochlear nerve.
- e. the infraorbital nerve.

9. The following drain directly into the internal jugular vein:

- a. Facial vein.
- b. Lingual vein.
- c. External jugular vein.
- d. Superior thyroid vein.
- e. Retromandibular vein.

10. The maxillary sinus:

- a. is lined by stratified squamous epithelium.
- b. is supplied by the greater palatine nerve.
- c. opens into the medial meatus.
- d. is the first sinus to form in life.
- e. is pyramidal in shape with its base being the nasal bone.

11. Pterygo-palatine fossa contains:

- a. Maxillary nerve.
- b. Pterygopalatine ganglion.
- c. Lesser superficial petrosal nerve.
- d. Nerve of pterygoid canal.
- e. Maxillary artery.

12. The following passes through the foramen rotundum:

- a. Maxillary nerve.
- b. Mandibular nerve.
- c. Facial nerve.
- d. Meningeal artery.
- e. Sympathetic nerve.

13. The sternomastoid:

- a. is attached to the first rib.
- b. has the external jugular vein passing over it.
- c. is supplied by the cranial accessory nerve.
- d. rotates axis and skull over atlas.
- e. is used in labored breathing.

14. Structures that contain fifth cranial nerve fibers include:

- a. Otic ganglion.
- b. Geniculate ganglion.
- c. Trigeminal ganglion.
- d. Ciliary ganglion.
- e. Sphenopalatine ganglion.

15. Oculomotor nerve supplies:

- a. the superior oblique muscle.
- b. the ciliary muscle.
- c. the cornea.
- d. the inferior oblique muscle.
- e. the dilator pupillae muscle.

16. The sigmoid sinus:

- a. is a continuation of the transverse sinus.
- b. grooves the temporal bone.
- c. ends below the jugular foramen.
- d. is at risk of thrombosis if there is severe mastoid inflammation.
- e. contains blood from the cavernous sinus.

17. The vagus nerve:

- a. leaves the skull through the jugular foramen.
- b. is enclosed within the carotid sheath.
- c. supplies sensory nerve to the laryngopharynx.
- d. innervates the stylopharyngeal muscle.
- e. supplies parasympathetic nerve to the parotid gland.

18. True statements about the subarachnoid space include:

- a. It extends to the lower border of the second sacral vertebra.
- b. It contains the meningeal vessels.
- c. It contains the cerebrospinal fluid.
- d. It encloses the whole length of the optic nerve.
- e. It is located between the dura mater and the arachnoid mater.

19. The following are true about the middle ear:

- a. The aditus connects the middle ear to the mastoid antrum.
- b. It is supplied by the auriculotemporal nerve.
- c. Has the tensor tympani attached to the stapes.
- d. The chorda tympani nerve crosses on the inner aspect of the tympanic membrane.
- e. The auditory canal opens into its anterior wall.

20. Regarding the sympathetic trunk:

- a. It extends from the base of the skull to the lower lumbar region.
- b. It enters the thorax anterior to the neck of the first rib.
- c. In the thorax it is covered by the pleura.
- d. In the neck lies alongside the bodies of the cervical vertebrae.
- e. The superior cervical sympathetic ganglion is often joined by ansa subclavia.

PHYSIOLOGY

21. In the acid-base balance:

- a. The normal venous plasma is more acidic than the arterial plasma.
- b. Increased hydrogen ions concentration inhibits respiration.
- c. Increased bicarbonate ions concentration inhibits respiration.
- d. The anion gap is increased in ketoacidosis.
- e. Haemoglobin, plasma protein and the plasma bicarbonate ions are the three main major buffer anions in the human body.

22. True statements about the effect various factors have on the caliber of arterioles include:

- a. Decreased oxygen tension causes vasodilatation.
- b. Locally released serotonin causes vasoconstriction.
- c. Angiotensin II causes marked vasoconstriction.
- d. Adrenaline causes vasodilatation in skeletal muscles.
- e. Increased noradrenergic impulse causes vasodilatation.

23. True statements about the events in cardiac cycle include:

- a. During inspiration the filling of the right atrium is increased.
- b. During expiration the filling of the left atrium is reduced.
- c. Blood flows out of the ventricles during isovolumetric contraction period.
- d. Atria contraction occurs during the late phase of the ventricular filling period.
- e. The isovolumetric relaxation period occurs before the ventricular filling period.

24. In response to acute haemorrhage, the following compensatory events occur:

- a. Vasoconstriction of the renal efferent arterioles.
- b. Increased chemoreceptor discharge.
- c. Increased baroreceptor stretch.
- d. Cerebral vasoconstriction.
- e. Raised circulating angiotensin II concentration.

25. When a patient stands up from a lying position, the following occurs:

- a. Cardiac output is reduced.
- b. Heart rate goes up.
- c. Renin secretion is reduced.
- d. A significant drop of cerebral blood flow.
- e. Peripheral vasodilatation.

26. The following are true about coronary circulation in the left ventricle:

- a. It receives as much blood as the right ventricle.
- b. Flow is greater during systole than in diastole.
- c. At rest the blood in the coronary vein is 50% saturated with oxygen.
- d. Noradrenalin causes vasodilatation of the coronary artery.
- e. The blood flow in the coronary artery is inversely proportional to the mean arterial blood pressure.

27. True statements about CO₂ in venous blood:

- a. It is carried mainly by the haemoglobin.
- b. It is converted to bicarbonate ions by carbonic anhydrase in the plasma.
- c. It is transported mainly in the form of bicarbonate ions.
- d. Oxygenated haemoglobin binds CO₂ more readily than deoxygenated haemoglobin.
- e. CO₂ does not cross the blood brain barrier.

28. The airway resistance:

- a. increases with the length of the airway.
- b. increases with the radius of the airway.
- c. is decreased by histamine.
- d. is greater in expiration than inspiration.
- e. can be measured using the peak-flow meter.

29. Parathyroid hormone:

- a. is a peptide hormone.
- b. acts on a cell surface receptor that increases intracellular cyclic AMP.
- c. increases calcium release from bone.
- d. increases 1,25 dihydroxy-vitamin D₃ production in the kidney.
- e. reduces calcium absorption from the gastrointestinal tract.

30. Insulin:

- a. is produced from a single chain precursor.
- b. is made up of two chains: joined by three disulphide bonds.
- c. is synthesised by the alpha cells of the islets of Langerhans.
- d. has an elimination half-life of about 60 minutes after subcutaneous injection.
- e. circulates in the blood mostly bound to globulin.

31. The anterior pituitary gland secretes:

- a. Prolactin.
- b. Adrenocorticotrophic hormone (ACTH).
- c. Thyrotrophin.
- d. Oxytocin.
- e. Anti-diuretic hormone (ADH).

32. True statements regarding adrenaline and noradrenaline include:

- a. Both are produced by the adrenal medulla.
- b. Their release is under the control of the pituitary gland.
- c. Both cause vasodilatation in the skeletal muscles.
- d. Both cause increased peripheral resistance of the blood vessels.
- e. Both cause bronchodilatation.

33. The following are true about blood test result:

- a. Microcytic hypochromic anaemia is seen in iron deficiency anaemia.
- b. Macrocytic anaemia occurs in folate deficiency.
- c. Normochromic normocytic anaemia is seen in chronic disease.
- d. Hypersegmentation of the neutrophilic nucleus occurs in vitamin B12 deficiency.
- e. Decreased erythropoietin production as in renal failure causes microcytic anaemia.

34. The functions of the following sensory receptors are correct:

- a. Pacinian corpuscles for nociception.
- b. Pacinian corpuscles for vibration.
- c. Ruffini's corpuscles for proprioception.
- d. Free nerve endings for touch.
- e. Meissner's corpuscles for touch.

35. Stimulation of the sympathetic nervous system result in

- a. pupillary dilatation.
- b. decreased gastrointestinal motility.
- c. bronchiole smooth muscle constriction.
- d. vasoconstriction of the skin and mucous membrane.
- e. contraction of the bladder detrusor muscle.

36. Monosynaptic reflexes occur in:

- a. corneal reflex.
- b. knee jerk reflex.
- c. withdrawal reflex.
- d. light reflex.
- e. blink reflex.

37. Regarding dark adaptation of the human eye:

- a. it takes a shorter time than light adaptation.
- b. it is biphasic in the normal population.
- c. it is related to the time required to build up rhodopsin stores.
- d. the rods are more sensitive than cones in the dark.
- e. wearing red glasses can shorten the dark adaptation time.

38. The following are true about pain sensation:

- a. Arises by stimulation of free nerve endings.
- b. Is transmitted to the central nervous system by myelinated A fibers.
- c. It ascends the spinal cord in the dorsal column tracts.
- d. The thalamus is important in the perception of pain.
- e. Local anesthetics that reduce potassium influx into nerve fibers can reduce pain sensation.

39. Cerebrospinal fluid (CSF)

- a. about 10% of it drains into cerebral lymphatics.
- b. is produced at the rate not exceeding 100ml per day.
- c. is formed mainly in the choroid plexus.
- d. flows from the lateral ventricles through the aqueduct into the third ventricle.
- e. most of the CSF is found in the skull than in the spine.

40. Regarding the sarcomere in striated muscles:

- a. the region between two adjacent Z lines forms the sarcomere.
- b. the I band contains only the actin filaments.
- c. the H zone contains only the myosin filaments.
- d. the A band is the area where actin and myosin filaments overlap.
- e. sarcomere is not found in cardiac muscles.

PATHOLOGY

41. Angiogenesis:

- a. is an unwanted process during embryological development.
- b. is a neovascular process whereby pre-existing blood vessels give rise to capillary buds which can develop into new vessels.
- c. in proliferative diabetic retinopathy is induced by an increased vitreous concentration of VEGF (vascular endothelial growth factor).
- d. involves proteolytic degradation of the basement membrane of the existing vessels.
- e. requires angiopoietin for the survival of endothelial cells.

42. The following conditions are associated with an increased risk of developing tumours:

- a. Type I neurofibromatosis.
- b. Type II neurofibromatosis.
- c. Down's syndrome.
- d. Turner's syndrome.
- e. Chromosome 13q deletion.

43. Regarding ionizing irradiation:

- a. The main cellular target for radiation is the cell membrane.
- b. Genetic alteration from radiation is usually due to gene deletion.
- c. Gamma rays have deeper penetration than X-rays.
- d. Mitotic cells are more sensitive to radiation than non-mitotic cells.
- e. It can be used to sterilise surgical instruments.

44. The following are true about necrosis:

- a. It is best identified by the dissolution of the nucleus.
- b. Coagulative necrosis occurs in coronary infarction.
- c. Liquefaction necrosis occurs in brain infarction.
- d. Caseous necrosis occurs in tuberculosis.
- e. Enzymatic necrosis occurs in acute pancreatitis.

45. Thromboxane A₂:

- a. acts through cyclic adenosine monophosphate (cAMP) mediation.
- b. is produced mainly by the endothelium of the capillaries.
- c. causes platelet aggregation.
- d. causes vasoconstriction.
- e. production is increased in the presence of prostacycline.

46. Constituents of emboli may include:

- a. air.
- b. amniotic fluid.
- c. tumour.
- d. fat.
- e. talc.

47. In head injury:

- a. missile trauma is caused by penetration of skull.
- b. diffuse axonal injury is caused by secondary brain damage.
- c. diffuse axonal injury only occurs when brain moves within intact skull.
- d. Countercoup lesions occur at site perpendicular to impact.
- e. the brain heals by gliosis.

48. In diabetic retinopathy, the following changes are seen:

- a. Accumulation of lipofuscin in retinal pigment epithelium.
- b. Thinning of the capillary basement membrane.
- c. Increase in number of pericytes.
- d. Microaneurysms in areas of ischemia.
- e. Macroaneurysms.

49. Macrophages:

- a. are derived from blood monocytes.
- b. have shorter life span than neutrophils.
- c. can harbor viable organisms.
- d. are involved in type III hypersensitivity response.
- e. produce cytokines.

50. The following are true about multinucleated giant cells:

- a. They are formed by fusion of macrophages.
- b. They have no phagocytic activity.
- c. Langerhans cell are seen in tuberculosis.
- d. Foreign-body giant cells have nuclei scattered throughout the cytoplasm.
- e. Touton giant cells have clear cytoplasm.

51. The following pathology definitions are correct:

- a. Hypoplasia - failure of a developing organ to reach its full size.
- b. Aplasia - failure of differentiation of an embryonic cell mass to organ-specific tissue.
- c. Dysgenesis - failure of organization of tissue into an anatomically correct organ.
- d. Agenesis - failure of formation of an embryonic mass.
- e. Metaplasia - differentiation of a mature tissue into a different mature tissue.

52. The following stages are involved in leukocyte movement into a site of inflammation:

- a. Division.
- b. Adhesion.
- c. Phagocytosis.
- d. Rolling.
- e. Migration.

53. The following mediators of acute inflammation are derived from cells:

- a. Complement.
- b. Kinin.
- c. Leukotriene.
- d. Cytokines.
- e. Histamine.

54. Regarding oedema:

- a. It is caused by increased escape of fluid from the arteries.
- b. The tissue pressure is important in controlling the amount of oedema.
- c. In oedema secondary to cardiac failure, the permeability of the vessel walls is unchanged.
- d. Transudate contains more protein than exudates.
- e. Increased venous capillary hydrostatic pressure increases oedema.

55. During wound healing:

- a. granulation tissue is the first phase of healing.
- b. giant cells are typical features.
- c. macrophages are common features at the late stage of healing.
- d. healing by first intention occurs in clean and closely approximated wound.
- e. the tensile strength of the scar is determined by the amount of collagen in the wound.

IMMUNOLOGY

56. The following are the main functions of the complement system:

- a. Antibody production.
- b. Opsonization.
- c. Cytolysis of micro-organisms.
- d. Removal of antibody-antigen complexes.
- e. Production of inflammatory mediators.

57. The following are true about the lymph nodes:

- a. The primary follicles are aggregates of B cells.
- b. B lymphocytes are found mainly in the paracortex.
- c. Secondary follicles develop upon antigenic stimulation.
- d. Lymph flows from the marginal sinus through the node to the efferent lymphatics.
- e. Plasma cells are found chiefly in the medulla.

58. The spleen:

- a. receives antigen presenting cells from the conjunctiva.
- b. contains T cells in the white pulp.
- c. contains B cells in the follicles.
- d. has a major haemopoietic function in foetus.
- e. if removed in adults, does not cause long-term adverse effects.

59. Cyclosporin:

- a. is derived from bacteria.
- b. suppresses mainly the humoral immunity.
- c. decreases the production of interleukin-2 (IL-2).
- d. causes bone marrow suppression as its major adverse effect.
- e. is excreted mainly through the kidneys.

60. Regarding T cells (lymphocytes)

- a. They contain Fc receptors.
- b. Helper T cells has regulatory functions.
- c. Suppressor T cells are the primary effector T cells.
- d. Cytotoxic T cells produce interleukins.
- e. All T cells have CD3 proteins.

61. Class II MHC proteins are found on the surface of:

- a. macrophages.
- b. T cells.
- c. dendritic cells.
- d. Langerhans' cells.
- e. neutrophils.

62. B cells (lymphocytes):

- a. play an important part in cell-mediated immunity.
- b. remains in the bone marrow until they are mature.
- c. differentiate into either plasma cells or memory cells on antigen exposure.
- d. can be easily differentiated from T lymphocytes using the light microscope.
- e. constitute 70% of the recirculating pool of small lymphocytes.

63. Anaphylaxis:

- a. occurs 24 hours after the initial stimulus.
- b. causes eosinophilia.
- c. causes degranulation of basophils and mast cells.
- d. is produced by Ig E antibody.
- e. causes urticaria.

64. Hypersensitivity to penicillin:

- a. is mediated by interleukins.
- b. is mediated by Ig M antibody.
- c. is initiated by haptens.
- d. is initiated by Th-2 cells.
- e. does not involve major histocompatibility (MHC) protein.

65. Correct matching include:

- a. Type I hypersensitivity – angioedema.
- b. Type II hypersensitivity - serum sickness.
- c. Type III hypersensitivity - hemolytic anemia.
- d. Type IV hypersensitivity - contact dermatitis.
- e. Type IV hypersensitivity - giant cell arteritis.

MICROBIOLOGY

66. The actions of the following antibiotics are correct:

- a. Sulphonamides interferes with folic acid synthesis.
- b. Metronidazole interferes with DNA synthesis.
- c. Fusidic acid inhibits RNA synthesis.
- d. Chloramphenicol inhibits protein synthesis.
- e. Tetracycline inhibits cell synthesis.

67. Sterilisation:

- a. involves the removal of all microorganisms including the spores.
- b. can be achieved by wiping surgical instruments with alcohol swab.
- c. can be achieved by boiling surgical instruments in water for 10 minutes.
- d. moist heat takes longer than dry heat to sterilize instruments.
- e. ethylene oxide gas is used to sterilise instruments which are heat sensitive.

68. Endotoxins:

- a. are found in the vesicles of bacterial cytoplasm.
- b. elicit an antibody response which may protect the host from future attack.
- c. are produced mainly by Gram positive bacteria.
- d. can often survive autoclaving.
- e. elicit the classical pathway of the complement system.

69. Regarding interferon:

- a. It is a virus specific molecule.
- b. It acts by neutralizing exotoxin.
- c. It enhances the histocompatibility antigen on cell surface and thereby activate the T cells.
- d. It exerts its effect by integrating itself with the DNA of virus infected cells.
- e. It can inhibit cell division in normal tissue.

70. Stains useful for identifying fungus include:

- a. Gram stain.
- b. Haematoxylin and eosin (H & E).
- c. Gomori methenamine silver.
- d. PAS (periodic acid-Schiff).
- e. Giemsa.

71. The following substances are used in Gram staining:

- a. Iodine.
- b. Crystal violet.
- c. Alcohol.
- d. Safranin.
- e. Congo red.

72. True statements about aminoglycosides include:

- a. Are effective against streptococci.
- b. Require aerobic transport mechanisms to enter the bacterial wall.
- c. Act on messenger RNA.
- d. Are not effectively against systemic infection if given orally.
- e. Cause retinal necrosis with intravitreal injection.

73. Regarding drugs used in AIDS:

- a. Highly active anti-retroviral therapy (HAART) typically uses more than two types of anti-retroviral drugs.
- b. Highly active anti-retroviral therapy (HAART) can boost the CD4+ cell count.
- c. Enfuvirtide inhibits HIV viruses from entering the CD4+ cells.
- d. Lopinavir inhibits HIV replication.
- e. Lamivudine is a reverse transcriptase inhibitor.

74. Acyclovir:

- a. is a guanine derivative.
- b. inhibits RNA gyrase.
- c. is activated by thymidine kinase within the host cells.
- d. is active against all viruses within the herpes family.
- e. is more effective against herpes simplex keratitis if given orally than topically.

75. MRSA (methicillin-resistant *Staphylococcus aureus*):

- a. is more likely to cause deeper infection than ordinary *Staphylococcus aureus* strains
- b. is transmitted via the air-conditioning system.
- c. pulsed field gel electrophoresis is useful in the investigation of outbreak.
- d. is resistant to iodine solution.
- e. is sensitive to vancomycin.

GENETICS

76. Karyotype can be obtained from:

- a. erythrocytes.
- b. chorionic villi.
- c. retinoblastoma cells.
- d. sperm.
- e. neutrophils.

77. The following definitions for genetic terms are correct:

- a. Synteny: presence of genes on the same chromosome.
- b. Isochromosome: chromosomes which are identical to each other.
- c. Heteroplasmy: presence of two or more different populations of mitochondria within a cell.
- d. Genocopy: similar genotypes that manifest as different phenotypes.
- e. Autosome: 23 pairs in normal human beings.

78. Increase number of chromosomes occur in:

- a. Turner's syndrome.
- b. Fragile-X syndrome.
- c. Down's syndrome.
- d. Klinefelter's syndrome.
- e. Retinoblastoma.

79. True statements about genetic tests include:

- a. mRNA can be detected with Southern blotting.
- b. DNA can be detected with Northern blotting.
- c. Restriction endonucleases cut the DNA into lengths of about 20 nucleotide base sequences.
- d. Restriction fragment length polymorphism occurs mainly in the coding region of the DNA.
- e. Polymerase chain reaction requires the use of DNA polymerase.

80. True statements about the proto-oncogenes include:

- a. Proto-oncogenes regulate the normal cell division.
- b. Mutated proto-oncogenes are associated with cancer.
- c. Gene translocation can transform proto-oncogenes.
- d. Viral insertion can disrupt normal proto-oncogenes.
- e. Ras oncogenes are the most commonly observed oncogenes in human tumours.

MOLECULAR AND CELL BIOLOGY

81. Regarding the ribosomes:

- a. They are bigger in eukaryotic cells than in prokaryotic cells.
- b. They are found exclusively in the cytoplasm.
- c. They consist of granules made up of RNA and proteins.
- d. They are involved in transcription of protein.
- e. Their functions are inhibited by chloramphenicol.

82. Myelin of the nerves is produced by:

- a. fibroblast.
- b. macrophage.
- c. Schwann cell.
- d. oligodendrocyte.
- e. Muller cells.

83. True statements about cell signalling include:

- a. Activation of a membrane receptor causes an exchange of GTP for GDP.
- b. Protein kinase is inactivated by cAMP.
- c. G-proteins that are bound to GTP are inactive.
- d. The α -subunit of G protein activates adenylate cyclase.
- e. G-proteins are made up of three subunits.

84. The following are true about cholesterol:

- a. Cholesterol is the most abundant sterol found in human tissue.
- b. Cholic acid is a precursor in the biosynthesis of cholesterol.
- c. All the carbon atoms of cholesterol are derived from acetyl CoA.
- d. HMG CoA reductase is the main regulator enzyme of cholesterol synthesis.
- e. It is essential for the production of thyroxine.

85. The following are true about inositol triphosphate (IP₃):

- a. It is increased by activation of α_1 -adrenoreceptors.
- b. It is produced by the action of phospholipase C, a membrane bound enzyme.
- c. It acts as second messengers.
- d. It binds to the membrane of the endoplasmic reticulum and opens the calcium channels.
- e. It causes smooth muscle contraction.

PHARMACOLOGY

86. Regarding prostaglandins:

- a. They are made up of 20-carbon unsaturated fatty acids.
- b. Non-steroidal anti-inflammatory drugs reduce prostaglandins production by inhibiting cyclooxygenase.
- c. They cause pain when applied directly to the nerve endings.
- d. Thromboxane A₂ causes both vasoconstriction and platelet aggregation.
- e. Leukotrienes produce vasoconstriction and increased vascular permeability.

87. The effects of corticosteroids include:

- a. reducing the amount of lymphoid cells in spleen and lymph nodes.
- b. increasing the catabolism of immunoglobulins.
- c. reducing the lysosomal contents of macrophages.
- d. inhibiting the peripheral utilisation of glucose.
- e. promoting the breakdown of proteins.

88. Local anaesthetics:

- a. inhibit the sodium ion pump.
- b. are weak acids.
- c. are all degraded by plasma cholinesterase.
- d. can be made more potent if combined with sodium bicarbonate solution.
- e. the action is prolonged through concurrent adrenaline administration.

89. Histamine causes:

- a. bronchodilatation.
- b. increased gastric acid secretion.
- c. vasodilatation.
- d. negative chronotropic action.
- e. reduced secretion of intrinsic factors.

90. True statements about drug metabolism include:

- a. Lipid-soluble β -antagonists cause bad dreams more often than water-soluble β -antagonists.
- b. Drugs with a high affinity for plasma protein have a very large volume of distribution.
- c. Hepatic drug metabolism often involves conversion of a water-soluble into a more lipid-soluble drug.
- d. Gastrointestinal absorption of lipid soluble drugs occurs more readily than water soluble drugs.
- e. Renal failure significantly increases the plasma protein binding of drugs.

ANSWERS

1. a.T b.F c.T d.T e.F

The third ventricle is found in the hindbrain. It is connected to the lateral ventricles via the interventricular foramen of Monro. It is connected to the fourth ventricle by the aqueduct. The optic chiasm is situated at the junction between the floor and the anterior wall of the third ventricle. The pineal body is a midline body which is posterior to the third ventricle. The choroid plexus in the roof of the third ventricle secretes cerebrospinal fluid.

2. a.F b.T c.F d.T e.F

Lateral pterygoid and mylohyoid are involved in jaw opening.

Medial pterygoid, temporalis and masseter are involved in jaw closing.

3. a.F b.T c.T d.T e.F

The adult spinal cord extends to the lower border of the first lumbar vertebrae or the upper border of the second lumbar vertebrae. It contains a central canal. It is supplied by one anterior spinal artery and two posterior spinal arteries. The anterior spinal artery supplies about 2/3 of the spinal cord. The lateral spinothalamic tract is responsible for carrying most of the pain sensation and it decussate within the spinal cord.

4. a.F b.T c.T d.T e.T

The pituitary gland is about 1 cm in transverse diameter. The meninges blend with the capsule of the gland. The infundibulum connects to the tuber cinereum of hypothalamus.

5. a.F b.F c.T d.T e.T

The retina is the only nervous tissue visible to human eye in life. There are 20 times more rods than cones. Both photoreceptors lie on the outer surface of the retina. The optic disc is medial to the macula. The central retinal artery is the only artery that supplies the retina.

6. a.F b.F c.T d.T e.T

The lateral geniculate body is the centre for visual fibre synapses. Incongruous hemianopia occurs in lesion of the optic tract. Congruous hemianopia occurs if the lesion is in the optic radiation or the visual cortex. The calcarine sulcus on the medial aspect of the occipital lobe is the main visual centre. The superior colliculi are involved in the light reflex. The posterior cerebral artery supplies most of the posterior visual pathway.

7. a.T b.T c.F d.F e.T

The following arteries make up the circle of Willis:

- Anterior cerebral artery (left and right)
- Anterior communicating artery
- Internal carotid artery (left and right)
- Posterior cerebral artery (left and right)
- Posterior communicating artery (left and right)

The basilar artery and middle cerebral arteries, though they supply the brain, are not considered part of the circle.

8. a.T b.T c.T d.T e.F

The following nerves pass through the superior orbital fissure: the lacrimal nerve, the frontal nerve, trochlear nerve, superior and inferior branches of the oculomotor nerve and the nasociliary nerve.

9. a.T b.T c.F d.T e.F

The internal jugular vein receives in its course the inferior petrosal sinus, the common facial, lingual, pharyngeal, superior and middle thyroid veins, and sometimes the occipital. The thoracic duct on the left side and the right lymphatic duct on the right side open into the angle of union of the internal jugular and subclavian veins. The retromandibular vein drains into the external jugular vein.

10. a.F b.T c.T d.T e.T

The maxillary sinus (antrum of Highmore) is the first to develop. The wall is lined by ciliated columnar epithelium.

The adult maxillary sinus is a pyramid which has a volume of approximately 15 ml (34x33x23mm). The base of the pyramid is the nasal wall with the peak pointing toward the zygomatic process.

Branches of the internal maxillary artery supply this sinus. These include the infraorbital (as it runs with the infraorbital nerve), lateral branches of the sphenopalatine, greater palatine, and the alveolar arteries.

The maxillary sinus is innervated by branches of V2 - the greater palatine nerve and the branches of the infraorbital nerve.

11. a.T b.T c.F d.T e.T

The pterygopalatine fossa is the distribution centre for the main vessels and nerves of the middle third of the face. The greater and deep petrosal nerves join together before entering the pterygo-palatine fossa.

12. a.T b.F c.F d.F e.F

Only the maxillary nerve passes through the foramen rotundum. Mandibular nerve and the meningeal artery pass through the foramen ovale. The facial nerve passes through the styloid foramen. Sympathetic nerve accompanies the internal carotid artery and enter the skull through the carotid canal.

13. a.F b. T c.F d.F e.T

The sternomastoid is attached to the clavicle. It has the external jugular vein passing over it under the platysma. It is supplied by the cervical accessory nerve. It draws the head toward the shoulder of the same side. At the same time it rotates the head so as to carry the face toward the opposite side.

14. a.F b.F c.T d.F e.T

The otic ganglion is a parasympathetic ganglion located immediately below the foramen ovale. It communicates with the glossopharyngeal and facial nerves. The geniculate ganglion contains the facial nerve. The trigeminal ganglion contains the fifth cranial nerve. The ciliary ganglion contains the third cranial nerve. The pterygopalatine ganglion (or sphenopalatine ganglion) is a parasympathetic ganglion found in the pterygopalatine fossa. It receives a sensory, a motor, and a sympathetic root. Its sensory root is derived from two sphenopalatine branches of the maxillary nerve. Its motor root is derived from the nervus intermedius through the greater superficial petrosal nerve and is supposed to consist in part of sympathetic efferent (preganglionic) fibers from the medulla. Its sympathetic root is derived from the carotid plexus through the deep petrosal nerve.

15. a.F b.T c.F d.T e.T

The oculomotor nerve supplies all the extraocular muscles except the superior oblique muscle (trochlear nerve) and the lateral rectus (abducent nerve). The ciliary muscle and the sphincter muscle are supplied by it. But the dilator pupillae muscle is supplied by the sympathetic nerve and the cornea by the trigeminal nerve.

16. a.T b.F c.T d.T e.T

The sigmoid is a continuation of the transverse sinus and it ends below the jugular foramen. It grooves the occipital bone. It receives blood from the cavernous sinus via the superior and inferior petrosal sinuses. Because of its close proximity to the mastoid air cells, infection in this region can cause thrombosis if not treated early.

17. a.T b.T c.T d.F e.F

The vagus nerve exits through the jugular foramen. It is enclosed within the sheath. It supplies sensory nerve to the laryngopharynx.

The motor nerve to the stylopharyngeal muscle and the parasympathetic nerve to the parotid gland comes from the glossopharyngeal nerve.

18. a.T b.F c.T d.T e.F

The subarachnoid space is located between the arachnoid mater and the pia mater. It contains cerebral vessels and cerebrospinal fluid. It encloses the whole length of the optic nerve. The meningeal vessels are extradural.

19. a.T b.F c.F d.T e.T

The middle ear has several connections: aditus that connects the middle ear with the mastoid antrum and the auditory canal that opens into its anterior wall. It receives the sensory nerve from the glossopharyngeal nerve. It has two small muscles: tensor tympani that is attached to the malleus and the stapedius attached to the stapes. The chorda tympani nerve crosses the tympanic membrane on its inner surface.

20. a.F b.T c.T d.T e.F

The sympathetic trunk extends from the base of the skull to the coccyx. In the neck, it is covered by the prevertebral fascia and lies alongside the bodies of the cervical vertebrae. It enters the thorax through the neck of the first rib. In the thorax it is covered by the pleura. The middle and inferior sympathetic ganglia are often joined by ansa subclavia, a nerve which curves around the subclavian artery.

21. a.T b.T c.T d.T e.T

The normal arterial pH is 7.4 and that of the venous is slightly lower. Acidosis (increased hydrogen ions concentration) increases respiration and alkalosis (increased bicarbonate ions concentration) decreases respiration. The anion gap is defined as the difference between the concentration of cations other than sodium and the concentration of anions other than chloride and bicarbonate ions. It is increased in ketoacidosis and lactic acidosis. The three main buffer systems in the plasma are the haemoglobin, plasma protein and bicarbonate ions.

22. a.T b.T c.T d.T e.F

Vasodilatation of the arterioles occurs in decreased oxygen tension and the presence of adrenaline in skeletal muscle.

Vasoconstriction occurs in the presence of angiotensin II, increased noradrenergic discharge and locally released serotonin.

23. a.T b.F c.F d.T e.T

During inspiration, there is an increased venous return to the atrium due to reduced intra-pleural pressure. During expiration, the size of the thorax is reduced forcing more blood in the pulmonary veins to enter the left atrium.

The cardiac cycle contains 4 periods: two during the relaxation phase (diastole) of the myocardium, and two during the contraction phase (systole) of the myocardium.

The first period of the cycle is the Ventricular Filling Period (VFP) during diastole. At the start of VFP, blood is moving into the ventricles from the atrium. As electrical impulse occurs from the S-A node, the myocardial cells of the atria depolarize causing the atria to contract and force additional blood into the ventricles. This atrial contraction is recorded on the ECG as the p wave.

The second period of the cycle is the Isovolumetric Contraction Period (ICP) which is the beginning of ventricular contraction. Blood is not ejected from the ventricles during ICP, but pressure is building in the ventricles in order to force the semilunar valves of the aorta and pulmonary artery open. The pressure in the ventricle must exceed the pressure in the aorta for blood to be ejected from the heart.

The third period is the Ventricular Ejection Period (VEP) which is a continuation of the systolic phase of the cardiac cycle. During VEP, pressure within the ventricles has increased well above the pressure in the aorta and pulmonary vein and forced the semilunar valves open and blood is ejected from the ventricles into the arteries. Blood continue to flow until the pressure gradient in the arteries exceeds the pressure of the contracting ventricles. Once equilibrium of the pressures between the ventricles and arteries is reached, the semilunar valves shut and blood flow from the ventricle cease. ICP and VEP are recorded on the ECG as the QRS complex.

The final period is the Isovolumetric Relaxation Period (IRP) and occurs during diastole. The ICP is the resting phase of the cardiac cycle when the ventricles are repolarising and all valves (bicuspid, tricuspid, and semilunar) are closed. The electrical recording for IRP is illustrated on the ECG as the t wave.

24. a.T b.T c.F d.F e.T

A drop in blood volume reduces baroreceptor stretch which in turn increases sympathetic output. This results in generalised vasoconstriction, except for the brain and heart vessels. The renal efferent arterioles constrict more than the afferent arterioles. Hypoxia from a reduced volume increases chemoreceptor discharge.

25. a.T b.T c.F d.F e.F

On assuming an erect position from a lying position, there is a reduction in venous return, which in turn decreases the cardiac output. To maintain the blood pressure, the baroreceptors initiates peripheral constriction. There is an increase in the secretion of renin and angiotensin. Tachycardia occurs to maintain the cardiac output. The cerebral flow remains constant due to autoregulation.

26. a.F b.F c.F d.T e.F

The right ventricle receives less blood than the left ventricle. This is related to the work load each ventricle performed being higher in the left than the right ventricle. During the systole, vessels are compressed by the myocardium and this reduces flow. Coronary venous blood is only about 25% saturated with oxygen in the resting person. Mean arterial blood pressure is an approximate index of cardiac

work. Increased cardiac work will increase the flow because little extra oxygen can be extracted since the venous saturation is only 25%.

27. a.F b.F c.T d.F e.F

CO₂ is converted to hydrogen ions and bicarbonate ions by the carbonic anhydrase in the red blood cells. Most of the bicarbonate ions leave the red blood cells and is carried in the plasma. Only 5% of CO₂ is bound to the haemoglobin. Deoxygenated haemoglobin binds CO₂ better than oxygenated haemoglobin. CO₂ crosses the blood brain barrier readily.

28. a.T b.F c.F d.T e.T

Airway resistance is directly proportional to the length of the airway and is indirectly proportional to the fourth power of the airway radius. It is increased by histamine which causes bronchoconstriction. It is greater in expiration than inspiration. Peak-flow meter can be used to measure airway resistance.

29. a.T b.F c.T d.F e.T

Parathyroid hormone is an 84 amino acid peptide hormone with a half-life of several minutes. It raises serum calcium concentration by increasing calcium release from bone and increasing gastrointestinal absorption of calcium. It increases the renal hydroxylation of Vitamin D₃.

30. a.T b.T c.F d.F e.F

Insulin is secreted by the beta cells of the islets of Langerhans as proinsulin. Insulin contains two chains, A and B, joined by three disulphide bonds. It circulates in the blood mainly as free hormones. Despite its short half-life of 10 minutes, its pharmacological effect is prolonged due to bonding with the tissue receptors.

31. a.T b.T c.T d.F e.F

The anterior pituitary hormone gland secretes prolactin, ACTH and thyrotrophin. The posterior pituitary gland secretes oxytocin and ADH.

32. a.T b.F c.F d.F e.T

Both adrenaline and noradrenaline are produced by the adrenal medulla. They are secreted in response to stress. Adrenaline causes vasodilatation in the skeletal muscles but noradrenaline has no such effect. While adrenaline decreases the peripheral resistance of the blood vessels, noradrenaline increases it. However, both cause bronchodilatation.

33. a.T b.T c.T d.T e.F

Iron deficiency anaemia causes microcytic hypochromic red blood cells. Folate and/or vitamin B12 deficiency causes macrocytic hypochromic red blood cells. Both folate and vitamin B12 deficiency are essential for the maturation of DNA so their deficiency can cause hypersegmentation of the neutrophilic DNA. Chronic disease causes normocytic normochromic anaemia. Erythropoietin is an essential hormone for red blood cell production Its absence causes normochromic normocytic anaemia.

34. a.F b.T c.F d.F e.T

Pacinian corpuscles for vibration and proprioception.

Ruffini's corpuscles for proprioception.

Free nerve endings for nociception.

Meissner's corpuscles for touch.

35. a.T b.T c.F d.T e.F

The sympathetic nervous system produces the 'flight or fight' response. Its stimulation causes pupil dilatation, reduced gastrointestinal motility and causes bronchodilatation. It diverts blood away from the skin and mucous membrane by vasoconstriction and relaxes the detrusor muscle of the bladder

36. a.F b.T c.F d.F e.F

Monosynaptic reflexes usually originate and terminate in the same muscle with a very fast response of about 20 milliseconds. Apart from knee jerk reflex, the other reflexes are polysynaptic reflexes.

37. a.F b.T c.T d.T e.T

Light adaptation takes about 5 minutes and dark adaptation about 20 minutes in the normal population. It is biphasic. The dark adaptation time is related to the time required to build up rhodopsin stores. Wearing red glasses can speed up dark adaptation because red light stimulate rods only minimally in the light.

38. a.T b.F c.F d.T e.T

The majority of pain sensation arises from the stimulation of free nerve endings. Pain sensation is transmitted to the CNS in small unmyelinated C fibers. It is then transmitted to the thalamus in the spinothalamic tracts. Local anaesthetics work by blocking sodium channels in nerve fibers.

39. a.F b.F c.T d.F e.F

There are no lymphatics in the CNS. The normal rate for CSF production is 400-500ml per day. The normal volume is 150ml. There are more CSF in the spine than in the skull (75 ml versus 55ml). CSF is formed mainly by choroid plexus. It flows from the lateral ventricles into the third ventricle and then through the aqueduct into the fourth ventricle.

40. a.T b.T c.T d.T e.F

Sarcomere is the functional unit of striated muscle. It is found in cardiac muscle too. A sarcomere is the region between two adjacent Z lines. The I band is the area of sarcomere that contains only the actin filaments, the A band represents the area of overlap between the actin and myosin filaments. The H zone contains only the myosin filaments.

41. a.F b.T c.T d.T e.T

Angiogenesis is a neovascular process whereby pre-existing blood vessels give rise to capillary buds which can develop into new vessels. It is an essential process in embryological development, wound healing and formation of collateral circulation and tumour growth. VEGF is an important factor that induces endothelial proliferation. Its secretion is stimulated by hypoxia. Its concentration is raised in the vitreous of patients with proliferative diabetic retinopathy. Proteolytic degradation is an important step of angiogenesis which allows the growth of endothelial cells. Angiopoietin induces endothelial cell survival and the stabilization of new capillary tubes; it also aids to inhibit apoptosis.

42. a.T b.T c.T d.F e.T

Type I neurofibromatosis is associated with meningioma, optic nerve glioma and pheochromocytoma.

Type II neurofibromatosis is associated with bilateral acoustic neuroma.

Down's syndrome is associated with an increased risk of leukemia.

Chromosome 13q deletion is associated with the development of retinoblastoma.

43. a.F b.F c.T d.T e.T

The main cellular target for radiation is the DNA and the principal action is strand breakage. Gamma rays are more penetrative than X-rays. Dividing cells are more radiosensitive than non-dividing cells. Radiation can be used to sterilize surgical instruments especially those that are temperature sensitive.

44. a.T b.T c.T d.T e.T

Necrosis is another term for cell death and is best identified by the dissolution of the nucleus. There are several types of necrosis as mentioned in the questions.

45. a.T b.F c.T d.T e.F

Thromboxane A₂ is produced by platelets and plays an important role in platelet aggregation. Its action is mediated via cAMP. Prostacyclin opposes the action of Thromboxane A₂ and inhibits platelet aggregation.

46. a.T b.T c.T d.T e.T

Air emboli can occur due to iatrogenic pumping of air into venous system; nitrogen embolus in decompression sickness. Amniotic fluid emboli occurs in 1:70,000 deliveries. Fat emboli can occur from medullary cavities of long bones during fracture. Tumour emboli lead to distant metastases. Talc occurs in intravenous drug users.

47. a.T b.F c.F d.F e.T

Missile trauma is caused by penetration of the skull. It is also termed open head injury. Diffuse axonal injury is caused by primary brain damage during impact. It can occur in both opened and closed head injury. Countercoup lesions occur at the site diagonal to the site of impact.

48. a.T b.F c.F d.T e.F

In diabetic retinopathy, the capillary basement membrane is thickened. There is a decrease in the number of pericytes. Microaneurysms occur in area of ischemia. Macroaneurysms are not a feature of diabetic retinopathy.

49. a.T b.F c.T d.F e.T

Macrophages have longer life span than neutrophils. They produce tumor necrosis factors and interleukins. They can harbour mycobacterium. They are involved in type IV hypersensitivity response.

50. a.T b.T c.F d.T e.T

Langerhans cells are seen in tuberculosis. Langerhans' cells are antigen presenting cells found in epidermis. Touton giant cells result from lipid ingestion.

51. a.T b.T c.T d.T e.T

All the definitions are correct.

52. a.F b.T c.F d.F e.T

Movement of leukocytes into the site of inflammation involve the following stages: rolling, firm adhesion, tight adhesion, migration

53. a.F b.F c.T d.T e.T

Complement, kinin, clotting factors, fibrinogen are mediators derived from the plasma. All other mediators are released from cells

54. a. F b.T c.T d.F e.T

Oedema is caused by increased escape of fluid from the capillaries and venules. Increasing tissue pressure as in bandaging decreases the oedema. Transudate is seen in cardiac failure in which the fluid escapes due to an increased venous capillary hydrostatic pressure. The permeability of the vessel walls is unchanged in cardiac failure. Transudate as in cardiac failure contains less protein than exudate seen in acute inflammation.

55. a.T b.F c.F d.T e.T

Granulation tissue is the first phase of the healing process. New capillaries and fibroblasts proliferate at the initial stage of wound healing. With time the granulation tissue forms scar which is largely avascular. Giant cells, macrophages and lymphocytes are features of chronic inflammation. Healing by first intention occurs in clean and closely approximated wound. Healing by secondary intention occurs in advanced wounds. The amount of collagen in the wound determines the tensile strength of the scar.

56. a.F b.T c.T d.F e.T

The three main functions of the complement system are: opsonisation, cytolysis of pathogenic organisms, and the production of inflammatory mediators. Opsonisation refers to the process in which C3 is attached to immune complexes, bacteria or bacterial products.

57. a.T b.F c.T d.T e.T

B lymphocytes predominate in the follicles of the cortex. T lymphocytes predominate in the paracortex. Flow of lymph is from the marginal sinus, through the node to the efferent lymphatic. Large numbers of plasma cells are found in the medulla.

58. a.T b.T c.T d.T e.F

The spleen forms the interface between the blood and the lymphatic system. It contains the white pulps and the red pulps. The white pulps surround the arterioles and contain T cells. B cells are found in the follicles. The red pulps remove old or damaged red blood cells from the circulation. Splenectomy predisposes patients to certain infections such as malaria and pneumococcal infections.

59. a.F b.F c.T d.F e.F

Cyclosporin is derived from a soil fungus. It suppresses mainly the cell-mediated immune reactions and the humoral immunity is only little affected. It works by binding to proteins within the cells called cyclophilin which inhibits the production of a number of interleukins especially IL-2. IL-2 is the primary chemical stimulus for T-lymphocyte proliferation. Cyclosporin, unlike other immunosuppressants, do not cause bone marrow suppression. Its main adverse effect is nephrotoxicity. It is metabolised by the liver and excreted in the bile.

60. a.F b.T c.F d.F e.T

B cells, not T cells contain Fc receptors. Cytotoxic T cells are the primary effector T cells. Helper T cells produce interleukins. CD3 proteins differentiate T cells from all other cells in the body.

61. a.T b.F c.T d.F e.F

Class II MHC proteins are found only on surface of certain cells: macrophages, B cells, dendritic cells of the spleen, Langerhans cells of the skin.

62. a.F b.T c.T d.F e.F

B cells play an important part in humoral immunity and T cells cell-mediated immunity. On encountering antigens, B cells may differentiate into plasma cells which produce antibodies. IgMs on the surface of B cells are monomers, circulating IgMs are pentamers. They constitute 30% of circulating lymphocytes while T cells constitute 70%. B and T cells cannot be distinguished using light microscope.

63. a.F b.T c.T d.T e.T

Anaphylaxis is an immediate hypersensitivity response. Eosinophils are attracted by the products released by basophils and mast cells.

64. a.T b.F c.T d.F e.F

Penicillin acts as a hapten which binds to IgM receptor on B cell surface to initiate a hapten-carrier protein complex. The hapten-carrier protein complex is presented in association with class II MHC protein to the helper T cells. The activated helper T cells then produce interleukins which stimulates B cell to produce antibody to the hapten.

65. a.T b.F c.F d.T e.T

Type I hypersensitivity is provoked by re-exposure to a specific antigen. These exposures may be by ingestion, inhalation, injection, or direct contact. It is mediated by IgE antibodies and produced by the immediate release of histamine,

arachidonate and derivatives by basophils and mast cells. The reaction may be local or systemic.

In type II hypersensitivity, the antibodies produced by the immune response bind to antigens on the patient's own cell surfaces. IgG and IgM antibodies bind to these antigens to form complexes that activate the classical pathway of complement activation for eliminating cells presenting with foreign antigen. The reaction takes hours to a day. Hemolytic anemia is an example.

In type III hypersensitivity, soluble immune complexes form in the blood and are deposited in various tissues where they may trigger an immune response according to the classical pathway of complement activation. The reaction takes hours to days to develop. Serum sickness and Arthus reaction are classical examples.

Type 4 hypersensitivity is often called delayed type as it takes two to three days to develop. Unlike the other hypersensitivities which are antibody mediated it is a type of cell-mediated response.

66. a.T b.T c.F d.T e.F

Sulphonamides inhibit the enzyme essential for folic acid synthesis.

Metronidazole interferes with DNA synthesis.

Fusidic acid interferes with protein synthesis.

Chloramphenicol interferes with bacterial protein synthesis.

Tetracycline interferes with bacterial protein synthesis.

67. a.T b.F c.F d.F e.T

Sterilisation is the removal of all microorganisms including the spores. Disinfection is the removal of most but not all microorganisms. Sterilisation can be achieved with moist heat in autoclave which takes shorter period than dry heat. Ethylene oxide gas is useful for heat sensitive instruments. Irradiation and chemical germicides are other techniques of sterilisation.

68. a.F b.T c.F d.T e.F

Endotoxins are lipopolysaccharides derived from the cell wall of gram negative bacteria. They are heat stable unlike exotoxins. They are non-antigenic as against exotoxin. They cause septicemia and fever and activate the alternative pathway of the complement system.

69. a.F b.F c.T d.F e.T

Interferon is a glycoprotein produced by T lymphocytes and macrophages. There are three types: α , β and γ . It has non-specific antiviral properties. Its effects include: direct anti-proliferative action on tumour and virus infected cells; activation of natural killer cells and macrophages and increased expression of class I HLA antigen on tumour or infected cells

70. a.F b.T c.T d.T e.F

Fungus stained pink with H & E; purple with PAS and black with Gomori methenamine silver.

71. a.T b.T c.T d.T e.F

Crystal violet (purple), when applied to bacteria, attaches to negatively charged groups in the cell wall, membrane and cytoplasm. The further addition of iodine strengthens this attachment. The addition of alcohol or acetone-alcohol decolorizes the crystal violet and iodine but causing the stain to diffuse out of the cell. This diffusion is lower in Gram-positive cell walls because of the greater thickness and chemical composition (particularly teichoic acids). Safranin or neutral red is then used as a counter-stain; this binds to free negatively charged groups that are not already binding to crystal violet

72. a.F b.T c.T d.T e.T

Aminoglycosides require aerobic transport mechanisms to enter the bacterial cell. It is not effective against Streptococcus and strict anaerobes which have not oxidative transport mechanisms.

73. a.T b.T c.T d.T e.T

HAART uses three or four antiretroviral drugs. The CD4+ cell counts are usually raised with HAART.

Enfuvirtide is an inhibitor of the fusion of HIV-1 with CD4+ cells.

Lamivudine is a reverse transcriptase inhibitor (RTI). It target construction of viral DNA by inhibiting activity of reverse transcriptase.

Lopinavir is a protease inhibitor (PI). It targets viral assembly by inhibiting the activity of protease, an enzyme used by HIV to cleave nascent proteins for final assembly of new virions.

74. a.T b.F c.F d.F e.F

Acyclovir is activated by viral thymidine kinase and acts by inhibiting DNA polymerase. It is not effective against cytomegalovirus. Both topical and oral acyclovir are effective against herpes simplex keratitis.

75. a.F b.F c.T d.F e.T

The infection caused by MRSA is no more deeper than the ordinary strain. It is an important cause of nosocomial pathogen. It is transmitted between patients via the hands of health workers. Some of whom may be healthy carriers. MRSA is found to colonize the nose, axilla and groins. It is killed by exposure to iodine.

76. a.F b.T c.T d.F e.T

Karyotype is the systemic display of chromosomes from a single somatic cell. There are in total 23 pairs of them. Sperms are germ cells and contain only 23 chromosomes. Normal erythrocytes do not contain nucleus.

77. a.T b.F c.T d.F e.F

Isochromosome refers to an abnormal chromosome created by deletion of one arm or duplication of the other arm. Genocopy refers to different non-allelic genotypes that result in a similar phenotype. Autosome refers to chromosomes other than the sex chromosomes. There are 22 such pairs in human beings.

78. a.F b.F c.T d.T e.F

Turner's syndrome is one chromosome short ie XO. The number is normal for fragile-X syndrome and retinoblastoma. Down's syndrome typically has trisomy 21 and Klinefelter's syndrome is XXY.

79. a.F b.F c.F d.T e.T

Southern blotting is used to detect DNA whereas Northern blotting is for mRNA. Restriction endonucleases cut the DNA into lengths of 4 to 6 nucleotide base sequences.

80. a.T b.T c.T d.T e.T

Oncogenes are derived from normal proto-oncogenes. The mutation can be brought about by point mutation, viral insertion, gene translocation or gene amplification.

81. a.T b.F c.T d.F e.T

Ribosomes are found mainly in the cytoplasm and to a smaller extent in the mitochondria. They are made up of RNA and protein. They are essential for the translation stage of protein synthesis. In transcription, one part of DNA forms a template for the synthesis of messenger RNA and ribosomes are not involved. The ribosomes of eukaryotic cells are larger than that of the prokaryotic cells. In addition, the proteins of the two cells are different. Therefore, chloramphenicol can inhibit the functions of the prokaryotic ribosomes but not that of the eukaryotic ribosomes .

82. a.F b.F c.T d.T e.F

Myelin of the peripheral nerve is produced by Schwann cells whereas that of the central nervous system is produced by oligodendrocytes.

83. a.T b.F c.F d.T e.T

Protein kinase is activated by cAMP. G-proteins bound to GDP are inactive.

84. a.T b.F c.T d.T e.F

Cholic acid is bile acid produced from cholesterol. Thyroxine is not a steroid hormone and therefore is not formed from cholesterol.

85. a.T b.T c.T d.T e.T

IP₃ binds to endoplasmic reticulum membrane and increases the intracellular calcium concentration and this in turn results in smooth muscle contraction, increased secretion from exocrine glands and the force and rate of cardiac contraction.

86. a.T b.T c.F d.T e.T

Prostaglandins are 20-carbon unsaturated fatty acids containing a cyclopentane ring. Cyclooxygenase is the rate determining enzyme in their production and is inhibited by non-steroidal anti-inflammatory drugs.

They sensitise the nerve endings to pain but do not themselves produce pain. Thromboxane A₂ causes both vasoconstriction and platelet aggregation. Leukotrienes are involved in allergic reaction and inflammation. They produce bronchoconstriction, vasoconstriction and increased vascular permeability

87. a.T b.T c.T d.T e.T

Corticosteroids are used to control inflammation because of their ability to reduce immune responses. Some of these abilities include: reducing the lymphoid contents within the lymph nodes and spleen; decreasing certain prostaglandin production such as leukotriene; reducing the macrophage-mediated lysosomal contents; impairing the function of macrophages and increasing the catabolism of immunoglobulins. Inhibition of peripheral glucose utilisation and increased protein breakdown are some of the known side effects of corticosteroids.

88. a.T b.F c.F d.T e.T

Local anaesthetic drugs act by inhibiting sodium influx through sodium-specific ion channels in the neuronal cell membrane. When the influx of sodium is interrupted, an action potential cannot arise and signal conduction is inhibited.

Local anaesthetics (LA) are weak bases. They are either aminoamides or aminoesters. Aminoamides are degraded by hepatic enzymes and aminoesters by the plasma cholinesterase. Local anaesthetic activity can be enhanced by altering the pH of a drug preparation to maximise the amount of drug in the unionised (unprotonated) form. It is well established that local acidosis such as caused by wound infection greatly reduces the action of local anaesthetics. Sodium bicarbonate

makes LA more hydrophobic thereby increasing its cellular penetration. This increases its potency. The use of adrenaline causes vasoconstriction and decreases the rate of removal of LA by the blood.

89. a.F b.T c.T d.F e.F

Histamine causes the triple response: wheal, flare and oedema. The positive chronotropic action results from a direct effect on heart receptors and by baroreceptor reflex due to vasodilatation.

90. a.T b.F b.F d.T e.F

Lipid soluble drugs enters the blood brain barriers more readily and therefore have more central nervous system side effects. A highly plasma protein binding drug stays in the vascular component and therefore has a volume of distribution of about 4-5 liters. Hepatic drug metabolism often converts a lipid-soluble drug into a water-soluble one. Renal failure causes decreased plasma protein concentration and therefore less binding for drugs.

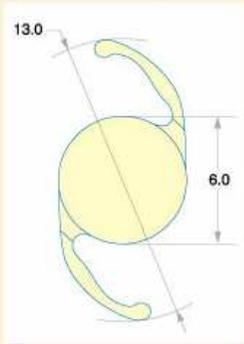
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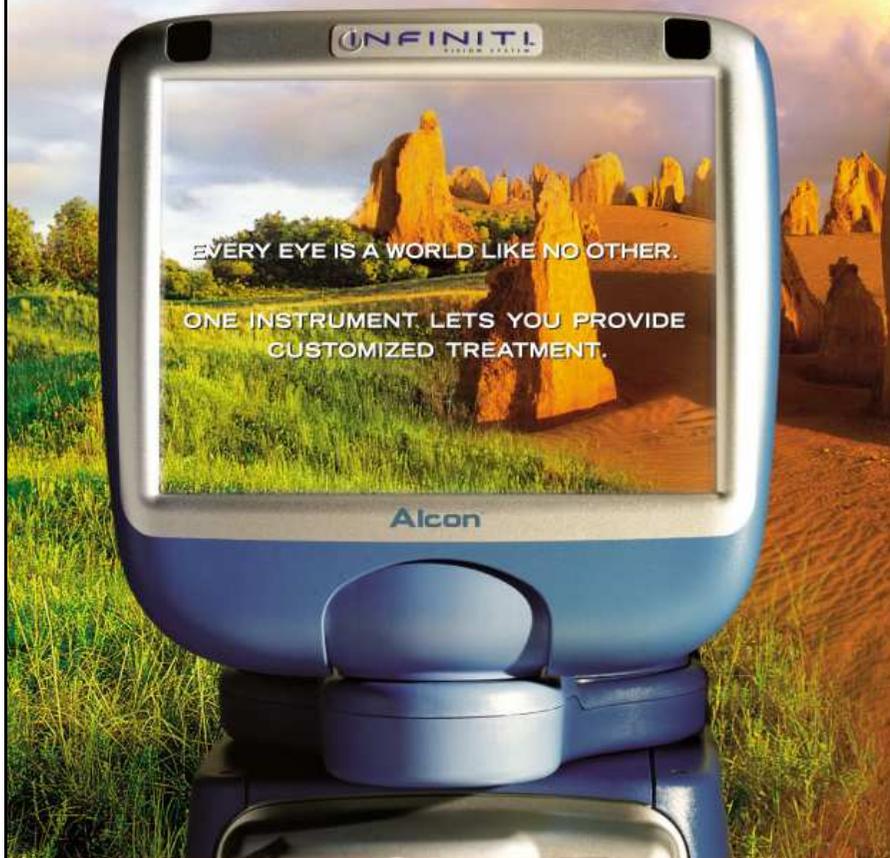
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