ANATOMY

1. **A 20 years male presented to casuality with multiple cuts on wrist. There is injury to a nerve around FDS tendon. Which of the following action is not possible by the patient -**
   a) Opposition of thumb
   b) Adduction of finger
   c) Abduction of fingers
   d) Flexion of MTP joint of 5th finger

2. **Which of the following structures does not pass in the gap between superior constrictor and inferior constrictor of pharynx -**
   a) Glossopharyngeal nerve
   b) Stylopharyngeus muscle
   c) Internal laryngeal nerve
   d) Styloglossus muscle

3. **Hypoglossal nerve palsy results in -**
   a) Fall back of tongue
   b) Deviation of tongue of one side
   c) Loss of sensations of posterior most tongue
   d) Loss of sensations of anterior 2/3 of tongue

4. **Kugel's artery is associated with -**
   a) Aorta
   b) Left anterior descending artery
   c) Coronary sinus
   d) Left circumflex coronary artery

5. **Dorsal artery of penis is immediately deep to which of the following anatomical layer -**
   a) Tunica albugenia
   b) Tunica vaginalis
   c) Buck's fascia
   d) Cremasteric fascia

6. **Posterior external arcuate fibres of inferior cerebellar peduncle arise from -**
   a) Accessory cuneate nucleus
   b) Dentate nucleus
   c) Emboliform nucleus
   d) Globose nucleus

7. **Epithelium consists of all except -**
   a) Squamous cells
   b) Cuboidal cells
   c) Columnar cells
   d) Parenchymal cells

8. **While resecting lymph nodes of neck region. Drooping of shoulder is due to injury to which nerve -**
   a) Spinal accessory nerve
   b) Suprascapular nerve
   c) Supraclavicular nerve
   d) Nerve to serratus anterior

9. **Pogonion is which of the following anatomical point -**
   a) Median point on anterior surface of chin
   b) Lowest point on the symphysis of mandible
   c) Anterior margin of the foramen magnum
   d) Point midway between lower lip to submental of neck

10. **Somites are derived from -**
    a) Paraxial mesoderm
    b) Lateral plate mesoderm
    c) Ectoderm
    d) Endoderm

11. **Derivatives of neural crest are all except -**
    a) Iris epithelium
    b) Dentine of teeth
    c) Pineal gland
    d) Tunica media of outflow tract of heart

12. **What is McGregor - campbell line -**
    a) Trace from one zygomatico-frontal suture to other, across superior edge of orbit
    b) Trace from occipito-temporal suture to orbit
    c) Traces the line between lower border of mandible
    d) Any of the above

13. **Epithalamus consists of all of the following except-**
    a) Pineal gland
    b) Stria medullaris
    c) Habenular nuclei
    d) Geniculate body

14. **Actions of superior oblique muscle -**
    a) Intorsion and abduction
    b) Intorsion and adduction
    c) Extorsion and adduction
    d) Elevation and abduction

15. **On restriction of which of the following movement, you will investigate both compartments of temporomandibular joint -**
    a) Elevation and depression
    b) Protrusion and retraction
    c) Opening and closing
    d) Rotation

16. **Which of the following is a component of deltoid ligament of ankle -**
    a) Tibiotalar
    b) Talofibular
    c) Talonavicular
    d) Calcaneonavicular

PHYSIOLOGY

17. **Most important factor affecting FEV is -**
    a) Diaphragm
    b) Expiratory muscle
    c) Airway compression
    d) Elasticity

18. **Characteristic response of Trigeminal cardiac reflex is -**
    a) Hypotension + Tachycardia
    b) Hypotension + Bradycardia
    c) Hypertension + Tachycardia
    d) Hypertension + Bradycardia

19. **The oxygen content of arterial blood is 20 ml/dl and venous blood is 16 ml/dl. If the oxygen consumption is 300 ml/min, what is the cardiac output ?**
    a) 500 ml
    b) 750 ml
    c) 5 L
    d) 7.5 L

20. **Which of the following is correct representation regarding characteristic in lungs -**
    a) Alveolar pressure > Venous pressure > Arterial pressure
    b) Alveolar pressure> Arterial pressure > Venous pressure
    c) Alveolar pressure < Venous pressure < Arterial pressure
    d) Alveolar pressure < Arterial pressure < Venous pressure

21. **Which of the following is the action of incretin -**
a) Decrease blood glucose
b) Increased glucagon release
c) Decreased insulin release
d) Increased sugar level

22. **Which of the following physiological change is seen in high altitude acclimatization -**
a) Pulmonary hyperventilation
b) Increased pulmonary artery pressure
c) Pulmonary vasoconstriction
d) Cheynestokes breathing

23. **Phase "O" of cardiac action potential is due to -**
a) Opening of K^+ channels
b) Opening of Ca^{++} channels
c) Opening of Na^+ channels
d) Closure of Na^+ channels

24. **In heavy exercise which of the following is increase maximally in a normal person -**
a) Tidal volume
b) Cardiac output
c) PCO_2
d) Alveolar ventilation

25. **Normal levels of brain natriuretic peptides [BNP]-**
a) 100 pg/ml
b) 200 pg/ml
c) 300 pg/ml
d) 400 pg/ml

26. **Cerebral blood flow is maintained at what rate per minute ?**
a) 10 ml/100 gm
b) 20 ml/100 gm
c) 30 ml/100 gm
d) 50 ml/100 gm

27. **Stimulation of peripheral chemoreceptors in hypoxia involve -**
a) Na^+
b) K^+
c) Cl^-
d) Ca^{2+}

28. **Which of the following factor has no effect on local circuit current in heart -**
a) Ro
b) Ri
c) Rk
d) Rm

BIOCHEMISTRY

29. **Which of the following is incorrect regarding gangliosides -**
a) Found in nervous tissue
b) Consists sialic acid
c) Recepter for bacterial toxin
d) Composed of galactosyl ceramide

30. **Enzymes with cooperative binding of substrate exhibit-**
a) Hyperbola curve
b) Monomeric enzyme
c) Follow routine kinetics
d) Binding of one subunit increase affinity for next subunit

31. **Which of the following is true regarding covalent catalysis -**
a) Decrease free energy of activation
b) Used by fructose 2, 6 bisphosphatase
c) Permanently bind to substrate
d) Shows ping pong mechanism

32. **Ketogenic diet should not be used in which of the following conditions -**
a) Diabetes mellitus
b) Rett's syndrome
c) Obesity
d) Pancreatitis

33. **Which of the following is master regulator gene regulating other genes -**
a) Homeotic gene
b) DNA repair gene
c) Tumor suppressor gene
d) Oncogenes

34. **Fatty acids with odd number of Carbon atoms produce glucose by which mechanism -**
a) Production of acetyl CoA
b) Production of Propinyl CoA
c) Production of Malonyl CoA
d) Any of the above

35. **Which of the following activates lipoprotein lipase?**
a) apocII
b) apo e
c) apo b
d) apo a

36. **All of the following vitamins are used in citric acid cycle except -**
a) Thiamine
b) Riboflavin
c) Niacin
d) Pyridoxin

37. **Which of the following is not true about glutamate dehydrogenase -**
a) Uses both NAD^+ and $NADP^+$
b) Inhibited by ADP
c) Catalyses reversible reaction
d) Releases nitrogen as ammonia

38. **In electron transport chain [ETC], Dimercaprol inhibits -**
a) Complex I
b) Complex II
c) Complex III
d) Complex IV

39. **All of the following are true about Rapoport Luebering cycle except -**
a) Supplies 2, 3 BPG as by product
b) Enzyme involved is 2, 3 bisphosphoglycerate phosphatase
c) Metabolic pathway of mature erythrocytes
d) Two ATPs are produced

MICROBIOLOGY

40. **Which of the following is a coccobacillus -**
a) Pseudomonas
b) Burkholderia
c) Acinetobacter
d) Corynebacterium

41. **Tungiasis is caused by -**
a) Virus
b) Ectoparasite
c) Mycobacterium
d) Endoparasite

42. **Gold standard investigation for Zika virus infection is -**
a) RT-PCR
b) Antigen detection
c) IgM-antibody detection
d) IgG antibody detection

43. **Elek's gel precipitation test is used for -**
a) Corynebacterium
b) CMV
c) EBV
d) Toxoplasma

44. **Medical Treatment of choice for gas gangrene -**
a) Metronidazole + Gentamycin
b) Ceftriaxone + Gentamycin
c) Penicillin + Clindamycin
d) Amikacin + Ciprofloxacin

PREVENTIVE & SOCIAL MEDICINE

66. **Recommended residual chlorine in drinking water should be -**
a) 0·5 PPM b) 1 PPM
c) 2 PPM d) 4 PPM

67. **Which of the following is not used as vaccine -**
a) Surface antigen
b) Inactivated exotoxin
c) Polysaccharide capsule
d) DNA antigen

68. **A 40 years male had taken full course of rabies vaccine 6 months back. Now he has fresh dog bite. What would be management-**
a) 2 doses of anti-rabies vaccine [ARV] on day 3 & 6
b) Only anti-rabies immunoglobulin
c) 2 doses of ARV on day 0 & 3
d) Complete vaccination course

69. **Incorrectly rejecting null hypothesis when it is true is-**
a) Confounding b) Bias
c) Type I error d) Type II error

70. **Amplifier for Japanese encephalitis -**
a) Horse b) Pigs
c) Heron d) Egret

71. **In calculating the mean of a population, doubling the range of acceptable error will reduce the sample size to-**
a) ½
b) ¼
c) No change
d) Cannot be determined

72. **True about Receiver operator characteristic [ROC] curve -**
a) Between specificity and [1-sensitivity]
b) Equivalent to likelihood ratio for a negative result
c) Used to determine a cut-off point
d) Straight line at 45° represent Good results

73. **Antibiotics of choice for carriers of diphtheria -**
a) Penicillin b) Erythromycin
c) Vancomycin d) Cotrimoxazole

74. **Failure rate per 100 women years of exposure is denoted by?**
a) Pearl index b) Quetlet index
c) Brocas index d) Soiling index

75. **Following is the effect of two screening tests applied in series mode to the population -**
a) Increase specificity and decreased sensitivity
b) Increased sensitivity and specificity
c) No effect on sensitivity and specificity
d) Increase sensitivity

76. **Global reference list of 100 indicators includes all except-**
a) Adolescent fertility rate
b) Tuberculosis
c) ART coverage
d) Still-birth rate

77. **Back pain patients were examined for disc protrusion on CT scan. The results are tabulated as follow. What is the likelihood ratio-**

	Confirmed Disc prolapse on MRI	No disc prolapse on MRI
Positive on CT scan	80	56
Negative on CT scan	40	50

a) 0·5 b) 1
c) 1·25 d) 2

78. **Line listing of poliomyelitis is for-**
a) Preparation of polio vaccine
b) Preparation of prophylactic drug
c) Prevention of duplication
d) Prevention of infection

79. **The major stretgy in lymphatic filariasis programme-**
a) Vaccination in endemic area
b) Mass drug administration
c) Chemoprophylaxis to the contacts
d) All of the above

80. **Confounding factors can be eliminated by all except-**
a) Matching b) Randomization
c) Blinding d) Stratification

81. **True about National health policy 2017 is-**
a) Reduce neonatal mortality to 20 by 2025
b) Reduce underfive mortality to 23 by 2025
c) Reduce to stillbirth rate to 15 by 2025
d) Reduction of total birth rate to 2·5 by 2025

PHARMACOLOGY

82. **Bile acid sequestrants decreases LDL & increases HDL by -**
a) 15-30% & 3-5% b) 20-40% & 13-15%
c) 3-5% & 4-8% d) 15-30% & 15-30%

83. **PPI not used for -**
a) GERD
b) Stress ulcer
c) Barretts esophagus
d) NSAIDS induced ulcers

84. **Half life of Basiliximab -**
a) 6hrs b) 7 days
c) 24 hrs d) 14 days

85. **According to CPE ranking for ART drug best penetration to CNS is by which rank -**
a) 4 b) 6
c) 5 d) 7

86. **Decreased expression of NF-KB is seen with -**
a) Steroid intake
b) Calcineurin inhibitor
c) Rifampicin
d) Antimetabolites

87. **Which of the following is immunomodulator & anti-inflammatory -**
a) Tetracycline b) Macrolides
c) Beta-lactam d) Fluroquinolones

88. **Staph resistance to penicillin with the help of which gene-**
a) Mec A b) MecB
c) MecC d) MecD

89.
90.
91.
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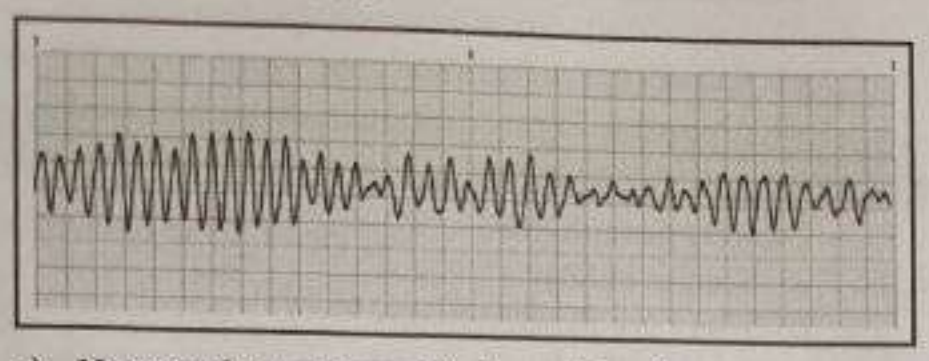
100
10
10

205. **Which of the following is correct regarding the given ECG** *(Also see colour pages)*-



a) Ventricular tachycardia, hypokalemia
b) Ventricular tachycardia, hyperkalemia
c) Atrial fibrillation, hypokalemia
d) Atrial fibrillation, hyperkalemia

206. **Treatment for diarrhea with flushing in carcinoid syndrome-**
a) Lansoprazole
b) Loperamide
c) Octreotide
d) Dolasetron

207. **Ideal time for correction of Hypernatremia with blood Na^+ level of 175 meq/L-**
a) 12 hrs.
b) 12-24 hrs.
c) 24-48 hrs.
d) 48-96 hrs.

208. **According to AHA, BP should be lowered in acute ischemic stroke patient, when BP is -**
a) ≥ 220/120
b) ≥ 220/110
c) ≥ 200/120
d) ≥ 190/100

209. **True about cardioplegic arrest is -**
a) Sudden permanent intentional stoppage of cardiac activity by using Na^+ & K^+ solutions
b) Sudden permanent stoppage of cardiac activity by using Ca^{2+} solution
c) Temporary intentional stoppage of cardiac activity by using K^+ solution
d) Temporary intentional stoppage of cardiac activity by using Hypertonic saline

210. **A child with epilepsy and MRI suggestive of progressive atrophy of left hemisphere, the propable diagnosis is -**
a) Rasmussen encephalitis
b) Sturge weber syndrome
c) Neurofibromatosis
d) Focal cortical dysplasia

211. **Which of the following factor is a poor outcome for thrombolysis in acute ischemic stroke -**
a) Quadriplegia
b) Advanced age
c) Bilateral affection
d) Emboli

212. **Which of the following treatment modality is used for small cell carcinoma of lung-**
a) Lobectomy
b) Pneumectomy
c) Chemotherapy + Radiotherapy
d) Pneumectomy followed by chemotherapy

213. **Hot cross bun sign on Brain MRI is seen in -**
a) Spinocerebellar ataxia
b) Suranuclear palsy
c) Wilson's disease
d) Multiple system atrophy

214. **Nitrates are used in myocardial perfusion study because-**
a) They prevent ischemic attack during study
b) They help to detect infarct area
c) They help to identify viable myocardium
d) They increase coronary blood flow

215. **Which of the following is used in refractory precursor B-cell ALL -**
a) Pembrolizumab
b) Tocilizumab
c) Blinatumomab
d) Vornistat

216. **True about sudden cardiac death are all except -**
a) Increased BP is a risk factor
b) Prevalence increases with age
c) Right ventricular dysplasia is a risk
d) Prevalence decreases with age

217. **Which of the following is true about Charcot-Bouchard aneurysm-**
a) Size is less than 300 micron
b) May be located in Brainstem
c) Increased risk with hypertension
d) All of the above

218. **Transcranial doppler is not commonly used for -**
a) Cerebral embolism
b) Vasospasm
c) AV malformation
d) Stenosis

219. **A 4 years male child is presenting with cryptochidism, short stature and harsh systolic murmur in pulmonic area. This child is at increased risk of developing which of the following -**
a) Pseudo-Pelger-Huet anomaly
b) Juvenile myoclonic epilepsy
c) Burkit's lymphoma
d) Transient myeloproliferative disease

220. **Hypoglycin toxin is associated with -**
a) Refsum disease
b) Zellweger syndrome
c) Jamaican vomiting sickness
d) Decarboxylic aciduria

221. **Calculate the oxygen saturation index on mechanical ventilation if-**
$Fi O_2 = 0.6$
$Sp O_2 = 98\%$
$PaO_2 = 85$ mmHg
Mean airway pressure = 20 cm H_2O
a) 10·5
b) 11·5
c) 12·24
d) 13·34

222. **Tigroid pattern of white matter is seen in -**
a) Canaven's disease
b) Von-Gierke's disease
c) Metachromatic leukodystrophy
d) Adrenoleukodystrophy

223. **A 77 years old male patient on Warfarin, is presenting with intracranial hemorrhage and INR is 3·5. What is the next best step-**
a) EACA
b) Cryoprecipitate
c) FFP
d) Platelet concentrate

128. **ABO incompatability is seen with -**
a) Cryoprecipitate b) PRP
c) FFP d) Single donor platelets

129. **NK X 3-1 stain is related to -**
a) Germ cell tumor
b) Breast carcinoma
c) Melanoma
d) Prostate carcinoma

130. **Microangiopathic haemolytic anemia is associated with all except -**
a) CML
b) TTP
c) Prosthetic heart valves
d) Polyangiitis

131. **Test to differentiate acquired haemophilia A & lupus anticoagulant is -**
a) Dilute RvvT b) vWF
c) Factor VIII assay d) aPTTT

132. **20 male with diagnosis of osteosarcoma with family history of breast carcinoma. His sibling having increased risk of -**
a) Retinoblastoma b) Neuroblastoma
c) Leukemia d) Prostate cancer

133. **Apoptosis is associated with -**
a) TNFRI b) ATM
c) MYN d) CYN

134. **Rhabdomyosarcoma fusion protein -**
a) NTRK3 kinase
b) PAX3 - FKHR
c) Novel growth factor
d) Transcription factor

135. **All of the followings are true about immune reconstitution inflammatory syndrome except -**
a) Seen in CD4 >50
b) Steroid intake patients
c) ART taking patient
d) Opportunistic infection

136. **A 70 years old male came with bleeding and was transfused 12 units of blood. After blood transfusion his blood parameters are: Hb-11gm%, platelets-55000, PT-24, PTT-45,which of the following therapy is best -**
a) EACA
b) Platelets
c) Cryoprecipitate
d) Platelets and cryoprecipitate

137. **Leucocytosis is seen in -**
a) Dengue b) Malaria
c) Chikungunia d) None

FORENSIC MEDICINE

138. **All of the following are associated with burns of hydrofluoric acid except -**
a) Decreased Mg^{+2} b) Decreased K^{+}
c) Decreased Ca^{+2} d) Increased H^{+}

139. **Not seen in hydrofluoric acid burns -**
a) Causes immediate severe burn
b) Pain is mild even in severe burn
c) Calcium gluconate gel is used for treatment
d) Causes progressive tissue destruction

140. **Which of the following burns is best treated with calcium gluconate -**
a) Hydrofluoric acid [HF]
b) Hydrochloric acid [HCl]
c) Sulphuric acid [H_2SO_4]
d) Nitric acid [HNO_3]

141. **During embalming which of the following is preferred while injecting embalming solution to avoid problem in arterial embalming -**
a) Low pressure, High flow rate
b) Low pressure, Low flow rate
c) High pressure, High flow rate
d) High pressure, Low flow rate

142. **Which of the following discoloration is seen in arterial embalming of a jaundice case -**
a) Yellow b) Green
c) Gray d) Branze

143. **Death on operation table should be observed under which section of criminal procedure code -**
a) 26 CrPC b) 39 CrPC
c) 160 CrPC d) 210 CrPC

144. **Lichtenberg flower seen in -**
a) Electrocution b) Lightening
c) Thermal burn d) Chemical burn

145. **Declaration of Helsinki deals with -**
a) Human experiment
b) Torture of foreign nationals and war prisoners
c) Animal experiment
d) Human rights of any national

PEDIATRICS

146. **All of the following are causes of hypotonia in 2 days old newborn except -**
a) Prematurity b) Anterior horn disease
c) Myotonia d) Hypothermia

147. **Primary pathology in potters syndrome is -**
a) Pulmonary hypoplasia
b) Renal agenesis
c) Oligohydramnios
d) Single umbilical artery

148. **Febrile seizure is called as complex when it lasts for -**
a) > 5 minute b) > 10 minute
b) > 15 minute d) > 20 minute

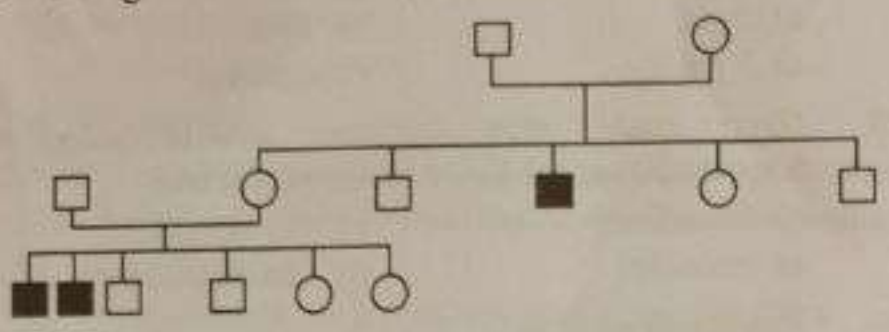
149. **A neonate is presenting with respiratory distress. On clinical examination there is visible chest and xiphoid retraction with inspiratory lag and minimal nasal flaring. Grunting is audible by the help of stethoscope. Silverman Anderson score is-**
a) 4 b) 5
c) 6 d) 7

ENT

150. **Which of the CT scan finding is a contraindication for cochlear implants -**
a) Aberrant carotid
b) Mondini malformation
c) Micheal malformation
d) Sclerosing labyrinthitis

116. **Reticulocyte production index formula is -**
a) HCT/45 × retic count/maturation
b) HCT/45 × maturation / retic count
c) Retic count/45 × maturation
d) 45/hct × retic count/ maturation

117. **Pedigree chart showing which inheritance pattern-**



a) XR
b) AR
c) AD
d) XR

118. **Which of the following is most mature normoblast-**
a) Polychromatic normoblast
b) Basophilic normoblast
c) Orthochromatic normoblast
d) Pronormoblast

119. **Precursors of RBCs in bone marrow are formed in-**
a) Fat cells
b) Macrophages
c) Megakaryocytes
d) Hemopoietic cells

120. **What is the diagnosis of given histopathological specimen** *(Also see colour pages)*?

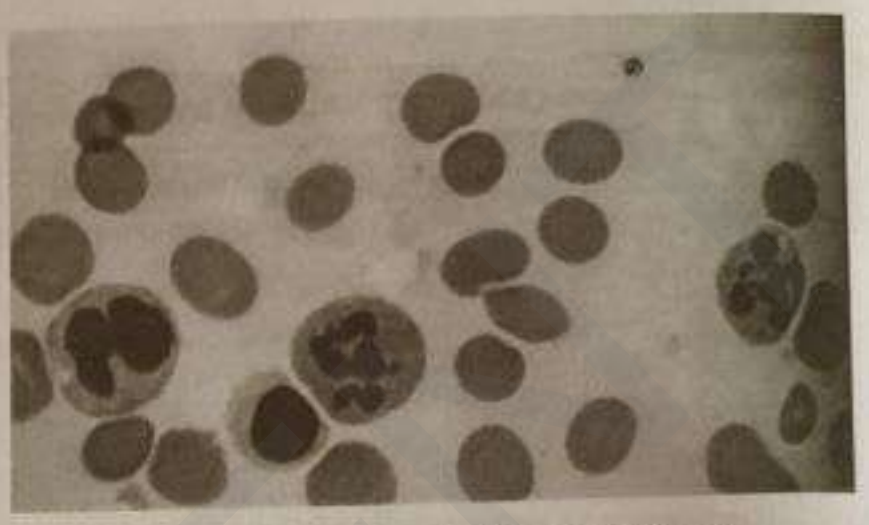
a) MPGN
b) IgA nephropathy
c) FCGS
d) MGN

121. **What is the diagnosis of the given kidney specimen** *(Also see colour pages)*-

a) Flea bitten kidney
b) Hemorrhagic kidney
c) Medullary sponge kidney
d) Askup mark kidney

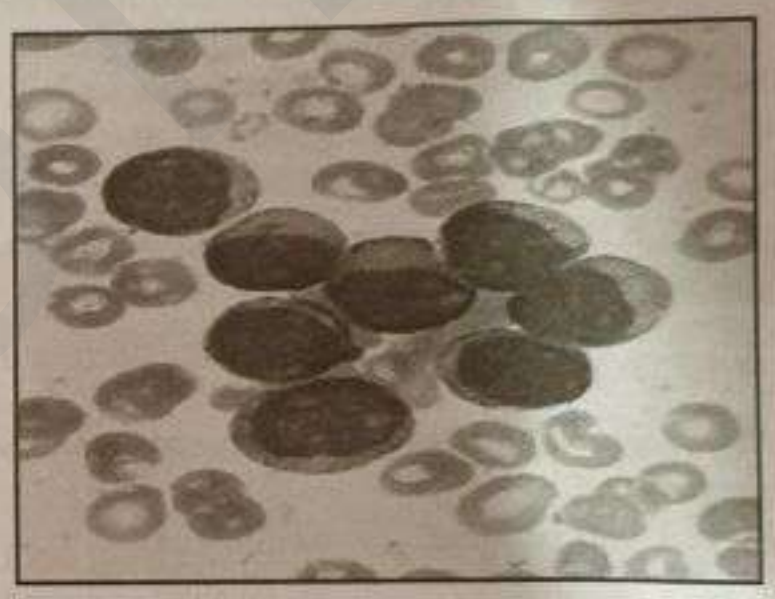
122. **Translocation in infantile fibrosarcoma -**
a) T [11;15]
b) T [12;15]
c) T [13,15]
d) T [10,15]

123. **A 25 years old female is presenting with fever. Her hemoglobin is 8 gm% and peripheral smear is showing following image. The diagnosis is** *(Also see colour pages)*-



a) Fanconis anemia
b) Cooleys anemia
c) Bantis anemia
d) Addisonism

124. **15 years old male is having fever and following image of peripheral smear. The diagnosis is** *(Also see colour pages)*-

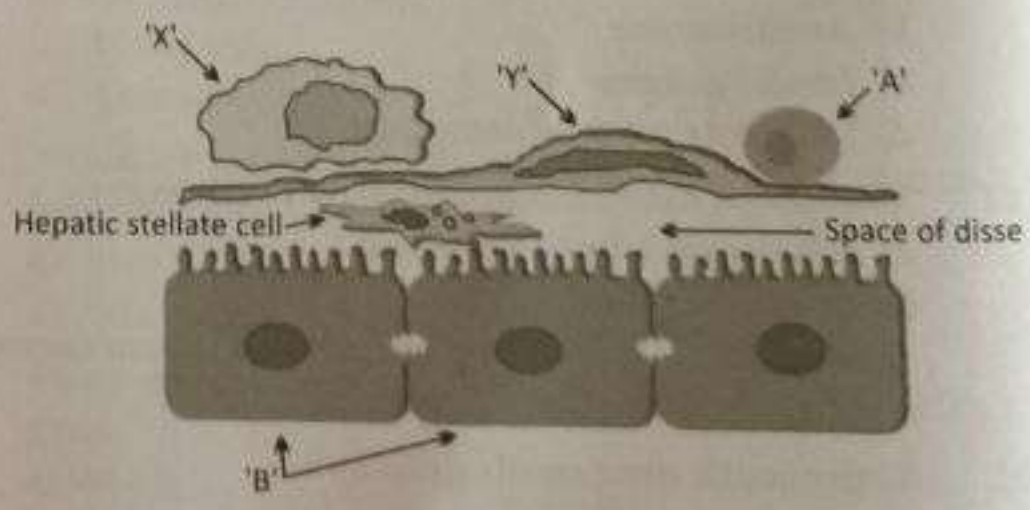


a) ALL
b) AML
c) CML
d) CLL

125. **Cervical LN biopsy showing starry sky appearance. Which of the following translocation is responsible -**
a) T [11,18]
b) T [2,8]
c) T [8, 14]
d) T [8,22]

126. **Treatment of refractory macrophage activation syndrome -**
a) Toclizumab
b) Cyclosporine
c) Etoposide
d) Methylpredinosolone

127. **Liver histology slide; cell shown by letter X is** *(Also see colour pages)*-



a) Stellate cell
b) Endothelial cell
c) Kupffer cell
d) Hepatocyte

89. **All of the following are sensitive to colistin except-**
a) Pseudomonas b) Acinetobacter
c) Klebsiella d) Burkholderia

90. **Which of the following increases defibrillation threshold -**
a) Sotalol b) Amiodarone
c) Enalapril d) Procainamide

91. **Epileptic abnormality in EEG is seen with all except -**
a) Cefepime b) Doxycycline
c) Fluoxetine d) Methyphenidate

92. **Which of the following is not a side effect of fluoroquinolones:**
a) Increased risk of bleeding
b) Hypoglycemia
c) Hyperglycemia
d) Decreased liver enzyme

93. **Resistance to tetracycyline is by -**
a) Efflux b) Overexpression
c) Modification d) Methication

94. **Category X drug use by FDI in pregnancy is -**
a) Cyclophosphamide b) Thalidomide
c) Misoprestole d) Isotretinoin

95. **Acetylcholine receptor subunits are -**
a) $\alpha, \beta, \gamma, \sigma, \varepsilon$ b) $\alpha, \beta, \gamma, \#, \varepsilon$
c) $\alpha, \beta, \delta, \varepsilon$ d) α, β, σ

96. **Which of following contraindicated in end stage renal disease -**
a) Dabigatran b) Apixaban
c) Rivaroxaban d) Edoxaban

97. **Which of following has least risk of developing myopathy with statins -**
a) Small body volume b) Male sex
c) kidney disease d) Alcohol

98. **CYP450 interaction is seen with -**
a) Itraconazole + lovastatin
b) Colestitol + simvastatin
c) Ezetinimibe + atorvastatin
d) Fenstabirose + azetimin

99. **Least side effect is seen with -**
a) TCA
b) Serotoin modulator
c) Monoamine oxidase inhibitor
d) Dopamine norepinephrine uptake inhibitor

100. **Which of the following is associated with sexual dysfunction -**
a) l thyroxine
b) Antihistamine
c) Insulin glargine
d) Leukocyte receptor antagonist

101. **True about Artemenism derivative of all except -**
a) Falciparum is mostly resistant
b) Artemether & artesunate
c) Mechanism of action-endoplasmic reticulum damage
d) Contraindicated in pregnancy

102. **Antiepileptic drug causing diplopia -**
a) Phenytoin
b) Valproate
c) Gabapentin
d) Carbamazepine

103. **Bedaquiline all are true except -**
a) Causes QT prolongation
b) Used in MDR/XDR TB
c) Inhibits cell wall
d) Can penetrate CNS

104. **Dose of fosfomycin in a 40 years old female is -**
a) 3gm b) 6gm
c) 3 gm/kg d) 6gm/kg

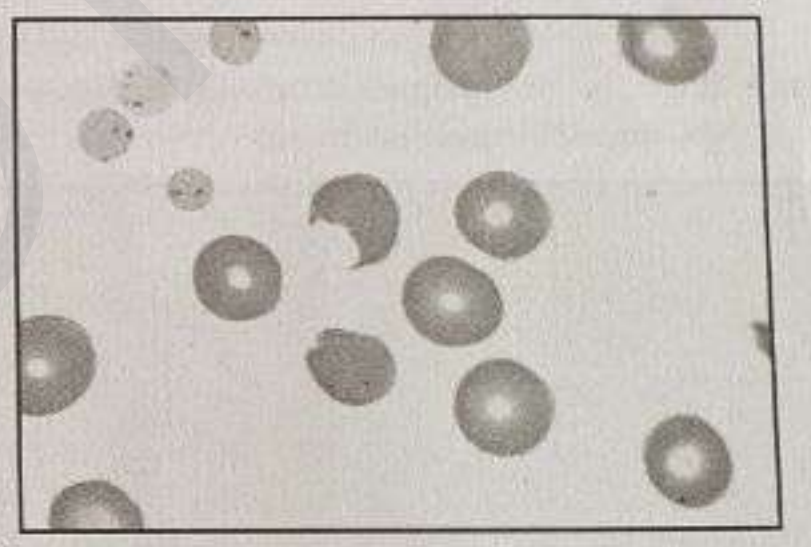
105. **50yrs male with calcium oxalate stone with hypertension, choice of antihypertensive -**
a) Losartan b) Furosemide
c) Atenolol d) Chlorthalidone

106. **Plerixafor used in -**
a) AML b) Acute vs graft disease
c) Ewings sarcoma d) Multiple myeloma

107. **Statins utilizes isoenzyme 3A4 except -**
a) Rosuvastatin b) Atorvastatin
c) Simvastatin d) Lovastatin Solution

PATHOLOGY

108. **The given peripheral smear figure represents which deficiency** *(Also see colour pages)*-



a) G6PD b) ADAMTS 13
c) UMP d) Pyruvate kinase

109. **Cold antibodies are -**
a) IgM b) IgG
c) IgA d) IgA

110. **Cold antibodies have specificity for antigen -**
a) P & Ie b) I & i
c) Le & II d) Se & I

111. **Upper limit of normal value of carotid intima thickness-**
a) 0.95mm b) >1mm
c) 0.55mm d) 0.75mm

112. **35 yrs female diagnosed as CIDP, bone marrow shows plasma cells, which of the following is true -**
a) VEGF b) IL5
c) NOTCH 1 d) Transthyretin

113. **Russel bodies are formed in -**
a) Mast cell b) Basophils
c) Neutrophils d) Plasma cell

114. **Important role in early hemopoiesis is of -**
a) IL1 b) IL 2
c) IL3 d) IL4

115. **40 yr female weight 60 kg, haematocrit 45%, plasma volume is -**
a) 2310 b) 3080
c) 2895 d) 2145

45. **Treatment for wound infection in monkey bite -**
a) Clidamycin + Doxycycline + Acyclovir
b) Fluoroquinolones
c) Same as dog bite
d) Clindamycin + levofloxacin

46. **Vancomycin MIC creep is seen in -**
a) E coli
b) Klebsiella
c) Staphylococcus aureus
d) Candida

47. **A patient had presented with headache and dizziness. CSF examination shows increased eosinophils. Which of the following cannot be a causative organism -**
a) Sporothrix
b) Gnathostoma
c) Baylisascaris procyonis
d) Angiostrongylus

48. **Candida species with high incidence of fluconazolo resistance are all except -**
a) Candida krusei
b) Candida glabrata
c) Candida auris
d) Candida albicans

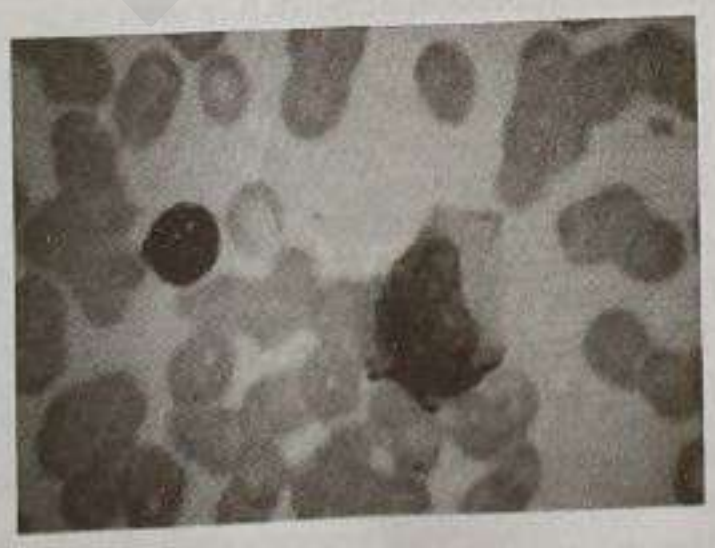
49. **Transavarian transmission is seen in which of the following-**
a) Toxoplasma
b) Burkholderia
c) Rickettsia
d) Ehrlichia

50. **A patient with HIV infective has diarrhea. The stool examination shows 8-10 μm acid fast cocysts. The diagnosis is -**
a) Cryptosporidium
b) Cyclospora
c) Cystoisospora
d) Giardia

51. **True about listerosis in pregnancy -**
a) Increased risk of 2nd trimester fetal loss
b) Raw milk increases the chances of infection
c) Increased risk of neonatal complications
d) Incubation period is 3 days

52. **True about infectious mononucleosis -**
a) Heterophile antibody test is a screening test
b) Presence of reactive lymphocytes
c) Asplenia is a feature
d) Most specific antibodies are heterophile antibodies

53. **A 60 years old patient is presenting with history of fever 2 weeks back with lymphadenopathy, hepatomegaly. The peripheral blood smear is showing following image the causative agent is** *(Also see colour pages)*-



a) EBV
b) HSV
c) HTLV -1
d) HTLV- 2

54. **Autoinfection is seen in all of the following except-**
a) Strongyloides stercoralis
b) Hymenolepsis nana
c) Ascaris
d) Enterobius

55. **Panton-valentine leucocidin is produced by -**
a) MRSA
b) Clostridium
c) Pseudomonas
d) Burkholderia

56. **Gene associated with staphylococcal resistance to penicillin -**
a) Mec A
b) Mec B
c) Mec C
d) Mec D

57. **Which of the following is associated with staphylococcal resistance to semisynthetic penicillin -**
a) β-lactamase
b) α-lactamase
c) PBP 2a
d) PBP2b

58. **Best temperature for isolation of Haemophilus ducreyi-**
a) 6°C
b) 20°C
c) 31°C
d) 45°C

59. **Smallest intestinal helminth is -**
a) H nana
b) Strongyloides
c) Capilleria
d) Balantidum

60. **24 years old female is a patient of ITP for which splenectomy was done 6 months back. She had a dog bite 3 days back and presenting with fever, chills, myalgia, vomiting and diarrhea. The causative organism is -**
a) Streptococcus
b) Eikenella
c) Feline
d) Capnocytophagia

61. **Which of the following antibiotics is not used for ESBL-**
a) Imipenem
b) Piptaz [Piperacillin + Tazobactam]
c) Ceftazidim
d) Amikacin

62. **Pneumococcal vaccine is recommended in all of the following except -**
a) Children less than 2 years
b) Old age > 65 years
c) Adult 2 to 64 years with other medical disorder
d) Adult 2 to 64 years with alcoholism

63. **Difference of E. faecium from E. faecalis -**
a) Susceptibility to vancomycin
b) Susceptibility to Imipenem
c) Fermentation of arabinose
d) Fermentation of glucose

64. **Alkaline-encrusted cystitis caused by which of the following microorganism-**
a) Corynebacterium urealyticum
b) Staphylococcus aures
c) Bacillus anthracis
d) P1 positive E coli

65. **Which of the following is parasitic bioterrorism agent -**
a) Cyclospora
b) Isospora
c) Microspora
d) Cryptosporidium

PREVENTIVE & SOCIAL MEDICINE

66. **Recommended residual chlorine in drinking water should be -**
a) 0·5 PPM b) 1 PPM
c) 2 PPM d) 4 PPM

67. **Which of the following is not used as vaccine -**
a) Surface antigen
b) Inactivated exotoxin
c) Polysaccharide capsule
d) DNA antigen

68. **A 40 years male had taken full course of rabies vaccine 6 months back. Now he has fresh dog bite. What would be management-**
a) 2 doses of anti-rabies vaccine [ARV] on day 3 & 6
b) Only anti-rabies immunoglobulin
c) 2 doses of ARV on day 0 & 3
d) Complete vaccination course

69. **Incorrectly rejecting null hypothesis when it is true is-**
a) Confounding b) Bias
c) Type I error d) Type II error

70. **Amplifier for Japanese encephalitis -**
a) Horse b) Pigs
c) Heron d) Egret

71. **In calculating the mean of a population, doubling the range of acceptable error will reduce the sample size to-**
a) ½
b) ¼
c) No change
d) Cannot be determined

72. **True about Receiver operator characteristic [ROC] curve -**
a) Between specificity and [1-sensitivity]
b) Equivalent to likelihood ratio for a negative result
c) Used to determine a cut-off point
d) Straight line at 45° represent Good results

73. **Antibiotics of choice for carriers of diphtheria -**
a) Penicillin b) Erythromycin
c) Vancomycin d) Cotrimoxazole

74. **Failure rate per 100 women years of exposure is denoted by?**
a) Pearl index b) Quetlet index
c) Brocas index d) Soiling index

75. **Following is the effect of two screening tests applied in series mode to the population -**
a) Increase specificity and decreased sensitivity
b) Increased sensitivity and specificity
c) No effect on sensitivity and specificity
d) Increase sensitivity

76. **Global reference list of 100 indicators includes all except-**
a) Adolescent fertility rate
b) Tuberculosis
c) ART coverage
d) Still-birth rate

77. **Back pain patients were examined for disc protrusion on CT scan. The results are tabulated as follow. What is the likelihood ratio-**

	Confirmed Disc prolapse on MRI	No disc prolapse on MRI
Positive on CT scan	80	56
Negative on CT scan	40	50

a) 0·5 b) 1
c) 1·25 d) 2

78. **Line listing of poliomyelitis is for-**
a) Preparation of polio vaccine
b) Preparation of prophylactic drug
c) Prevention of duplication
d) Prevention of infection

79. **The major stretgy in lymphatic filariasis programme-**
a) Vaccination in endemic area
b) Mass drug administration
c) Chemoprophylaxis to the contacts
d) All of the above

80. **Confounding factors can be eliminated by all except-**
a) Matching b) Randomization
c) Blinding d) Stratification

81. **True about National health policy 2017 is-**
a) Reduce neonatal mortality to 20 by 2025
b) Reduce underfive mortality to 23 by 2025
c) Reduce to stillbirth rate to 15 by 2025
d) Reduction of total birth rate to 2·5 by 2025

PHARMACOLOGY

82. **Bile acid sequestrants decreases LDL & increases HDL by -**
a) 15-30% & 3-5% b) 20-40% & 13-15%
c) 3-5% & 4-8% d) 15-30% & 15-30%

83. **PPI not used for -**
a) GERD
b) Stress ulcer
c) Barretts esophagus
d) NSAIDS induced ulcers

84. **Half life of Basiliximab -**
a) 6hrs b) 7 days
c) 24 hrs d) 14 days

85. **According to CPE ranking for ART drug best penetration to CNS is by which rank -**
a) 4 b) 6
c) 5 d) 7

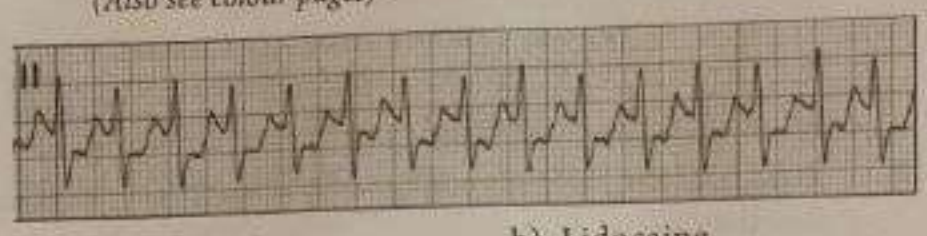
86. **Decreased expression of NF-KB is seen with -**
a) Steroid intake
b) Calcineurin inhibitor
c) Rifampicin
d) Antimetabolites

87. **Which of the following is immunomodulator & anti-inflammatory -**
a) Tetracycline b) Macrolides
c) Beta-lactam d) Fluroquinolones

88. **Staph resistance to penicillin with the help of which gene-**
a) Mec A b) MecB
c) MecC d) MecD

89.
90.
91.
92.
93.
94.
95.
96.
97.
98.
99.
100
10
10

224. **A patient is presenting with palpitation and ECG is showing following image. Which drug should be given** *(Also see colour pages)*-



a) Adenosine
b) Lidocaine
c) Amiodarone
d) Phenytoin

225. **Which of the following is not a component of ventilator associated pneumonia prevention bundle -**
a) Prop up position to 30-45°
b) Chlorhexidine oral wash
c) Daily sedation vacation
d) Changing endotracheal tube every week

226. **Gene involved in arrhythmogenic right ventricular cardiomyopathy [ARVC] -**
a) Desmoplakin
b) PKP2
c) Tibox-2
d) Plakoglobin

227. **Primary defect in semantic variant of primary progressive aphasia-**
a) Poor naming
b) Impaired repetition
c) Slow speech
d) Grammatical mistake

DERMATOLOGY

228. **Which of the following is false regarding splitz nevus?**
a) Usually congenital
b) Benign
c) Histopathologically overlaps with that of melanoma
d) Uncommon occurrence

229. **A man aged 30 years presented with following pustular lesions. He has been taking treatment for acne with doxycycline. His other acne lesions like papules and comedones subsided with treatment but these pustules soon developed and were unresponsive to the medication. Most likely diagnosis is** *(Also see colour pages)*?

a) Pustular acne
b) Perioral dermatitis
c) Gram negative folliculitis
d) Pustular rosacea

230. **Max. Joseph's space is a histopatho-logical feature of -**
a) Psoriasis vulgaris
b) Lichen planus
c) Pityriasis rosea
d) Parapsoriasis

231. **Pseudoisomorphic phenomenon is seen in -**
a) Psoriasis
b) Warts
c) Vitiligo
d) DLE

232. **False about Trichorrhexis invaginata -**
a) Bamboo hair
b) Associated with Netherton syndrome
c) Ball-socket deformity
d) Abnormal keratinization in distal hair shaft

233. **Which of the following statement is incorrect about bullous pemphigoid -**
a) Seen in elderly
b) There are flaccid blisters
c) Autoantibodies against hemidesmosomes in skin
d) There may be pruritis

PSYCHIATRY

234. **Grandiose delusions are seen in all except -**
a) Amphetamine use
b) Frontal lobe tumor
c) Schizophrenia
b) OCD

235. **Cortical atrophy which of the following part of brain is associated with chronic schizophrenia -**
a) Frontal lobe
b) Temporal lobe
c) Parietal lobe
d) Occipital lobe

236. **A 12 years old male has come to the OPD with depression. Which of the following is not a sign of latent bipolarity in the patient -**
a) Psychosis [Psychotic symptoms]
b) Mood lability
c) Psychomotor agitation
d) Rapid onset of depression

237. **A 3 years female child with history of sexual abuse; all are risk factors for future depression except -**
a) Negative attributions towards abuse
b) Parents with history of depression
c) Lower cognitive function
d) Abuse was penetrative

238. **Which of the following is true about anorexia nervosa -**
a) Anorexia nervosa has the maximum mortality amongst all mental disorders
b) According to DSM-V, weight less than 85 percent of expected and BMI < 17.5 are part of diagnostic criteria
c) Patient may or may not reveal verbally about self-perception of being fat
d) According to DSM-V, diagnosis is clinical and severity is based on Body Mass Index *(BMI)*

239. **Childhood obsessive compulsive disorder MRI shows decrease in size of -**
a) Caudate nucleus
b) Globus pallidus
c) Thalamus
d) Cerebellum

ANAESTHESIA

240. **Which of the following has special risk of developing respiratory alkalosis -**
a) SIMV
b) Assist control ventilation
c) Pressure support ventilation
d) intermittent datery ventilation

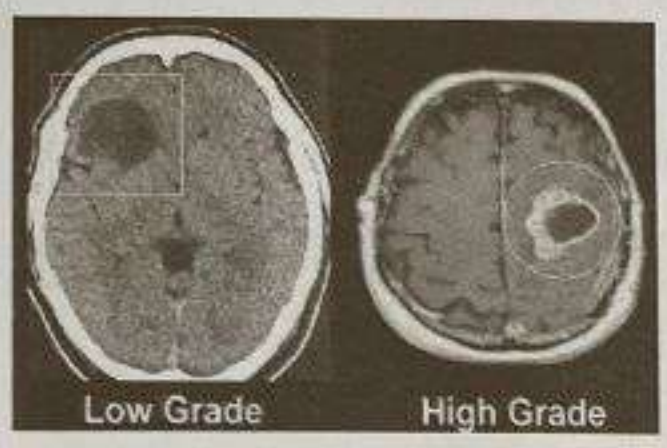
241. **True regarding pulse oximetry are all except -**
a) Measures change in absorption of two different wavelengths of light
b) Measures pulsatile arterial blood saturation
c) Measures pulsatile arterial & venous blood saturation
d) Nail polish can affect the findings

242. **True regarding capnography -**
a) Measure CO_2 in the lung
b) Used for confirmation of tracheal intubation
c) Phase II is inhalational phase
d) All of the above are correct

RADIOLOGY

243. **Wavelength of X-ray is -**
a) 10^{-9} to 10^{-11} meter
b) 10^{-2} to 10^{-8} meter
c) 10^{-12} to 10^{-15} meter
d) 10^{-15} to 10^{-20} meter

244. **The given image in MRI brain is showing** *(Also see colour pages)-*



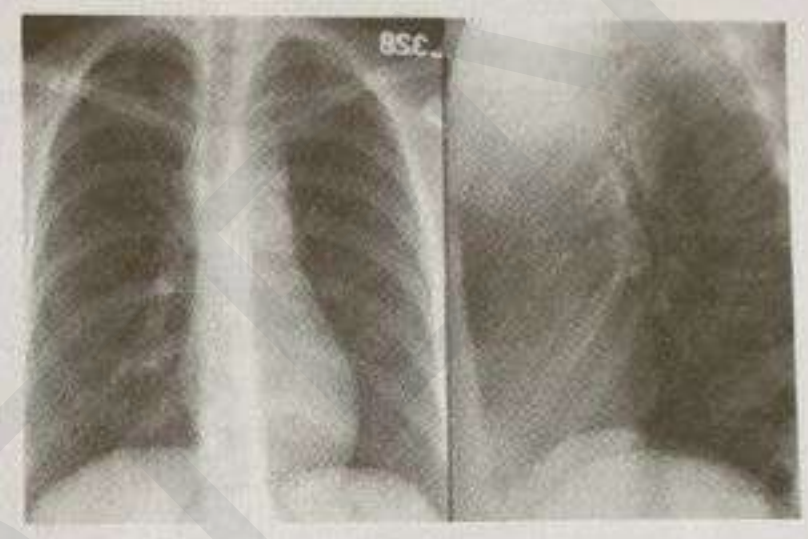
a) Glioma
b) Glioblastoma
c) Astrocytoma
d) Metastasis

245. **Reducing agent in Technetium - 99 scan is -**
a) $SnCl_2$ b) $GaCl_3$
c) $ZnCl_2$ d) Dithiotheatin

246. **MRI showing longitudinal relaxation image is -**
a) T1 weighted image
b) T2 weighted image
c) Transitional MRI
d) Proton density MRI

247. **Worst to best radiographic modality for detection of foreign body -**
a) Gamma Camera > CT scan > Fluoroscopy
b) CT Scan > Gamma Camera > Fluoroscopy
c) MRI > USG > CT Scan
d) CT scan > USG > MRI

248. **Chest X-ray of a patient is shwoing the following image. What can be the diagnosis** *(Also see colour pages)-*

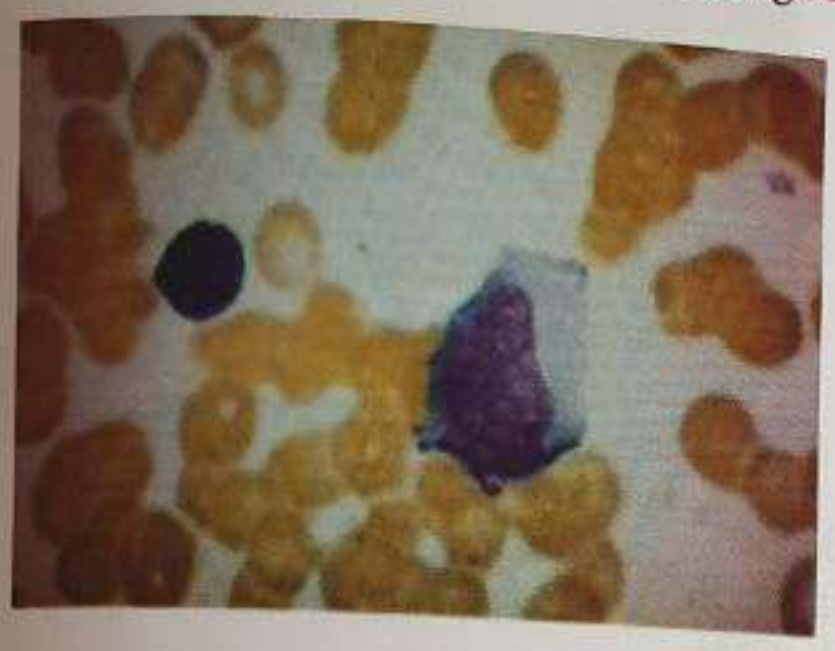


a) Thymoma
b) Mediastinal lymphoma
c) Aortic aneurysm
d) Paravertebral abscess

249. **Size of radiolobelled particle used in lymphoscintigraphy should be -**
a) < 1 nm b) 40 - 70 nm
c) 200-400 nm d) 500-1000 nm

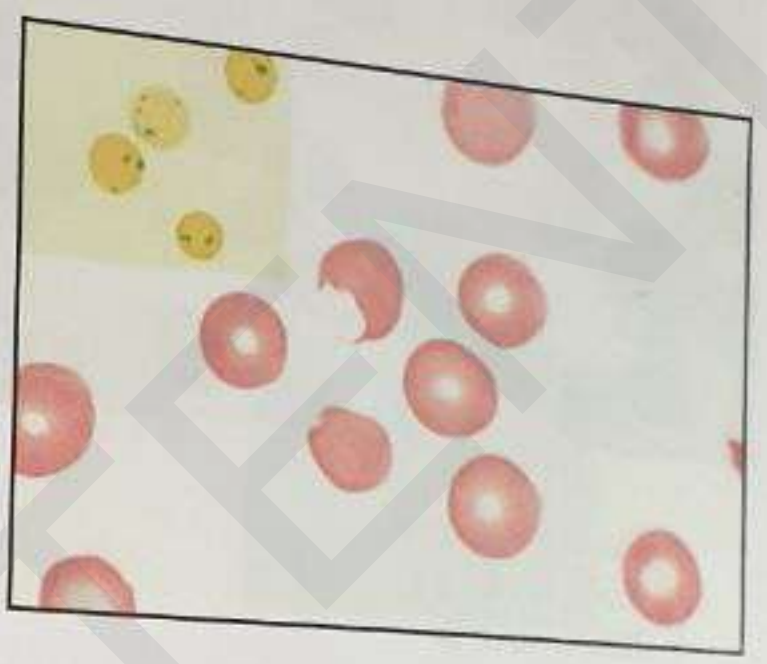
JIMPER MAY - 2019

53. A 60 years old patient is presenting with history of fever 2 weeks back with lymphadenopathy, hepatomegaly. The peripheral blood smear is showing following image the causative agent is-



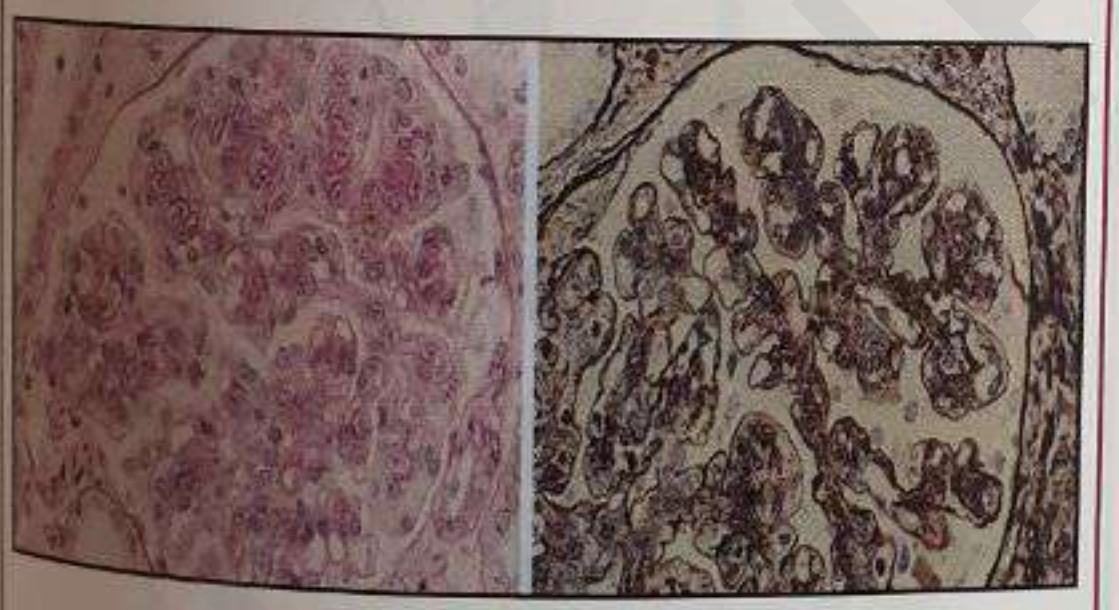
a) EBV
b) HSV
c) HTLV -1
d) HTLV- 2

108. The given peripheral smear figure represents which deficiency-



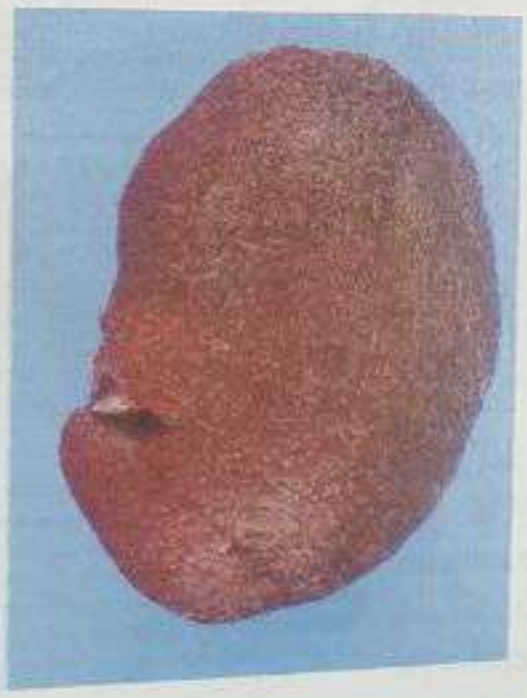
a) G6PD
b) ADAMTS 13
c) UMP
d) Pyruvate kinase

120. What is the diagnosis of given histopathological specimen?



a) MPGN
b) IgA nephropathy
c) FCGS
d) MGN

121. What is the diagnosis of the given kidney specimen-



a) Flea bitten kidney
b) Hemorrhagic kidney
c) Medullary sponge kidney
d) Askup mark kidney

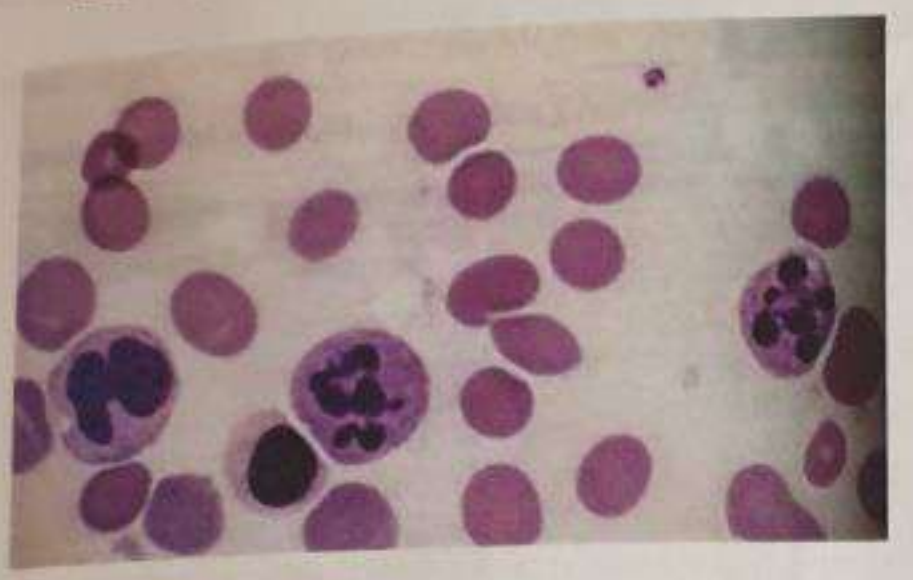
53. **Ans.is 'a' i.e., EBV** [*Ref: **Harrison 20th/e** p. 1358, 1359*]

108. **Ans. is 'a' i.e., G6PD** [*Ref: **Robbins 9th/e** p. 634*]

120. **Ans. is 'a' i.e., MPGN** [*Ref: **Robbins 9th/e** p. 916-920*]

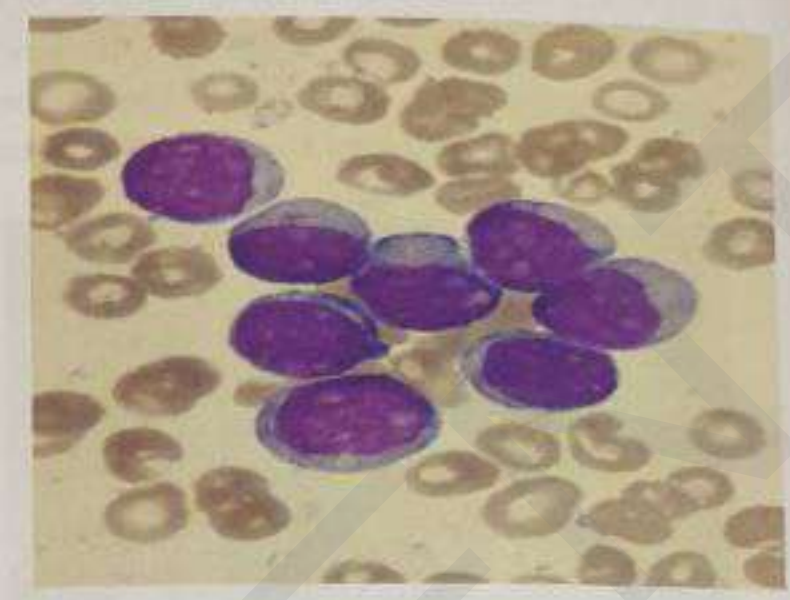
121. **Ans. is 'a' i.e., Flea bitten kidney** [*Ref: **Robbins 9th/e** p. 939*]

123. A 25 years old female is presenting with fever. Her hemoglobin is 8 gm% and peripheral smear is showing following image. The diagnosis is-



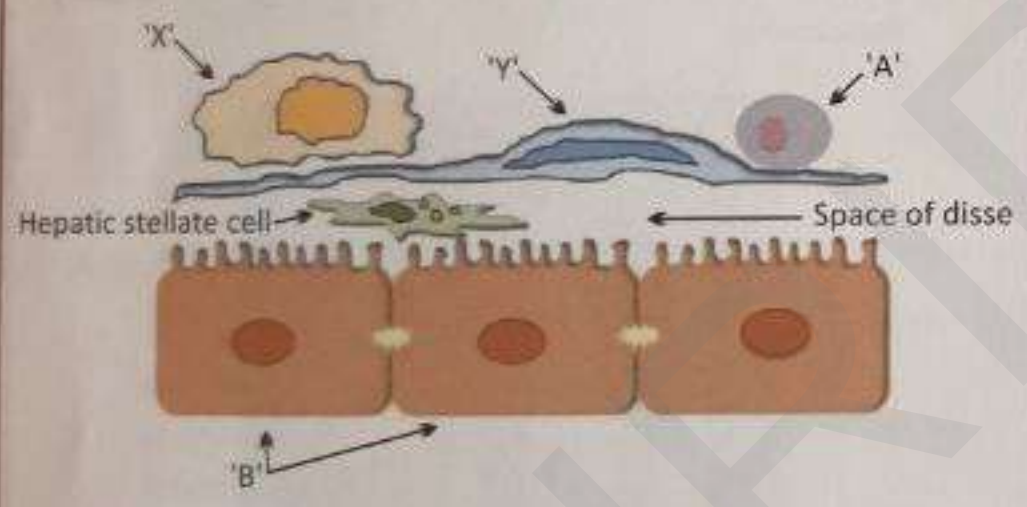
a) Fanconis anemia
b) Cooleys anemia
c) Bantis anemia
d) Addisonism

124. 15 years old male is having fever and following image of peripheral smear. The diagnosis is-



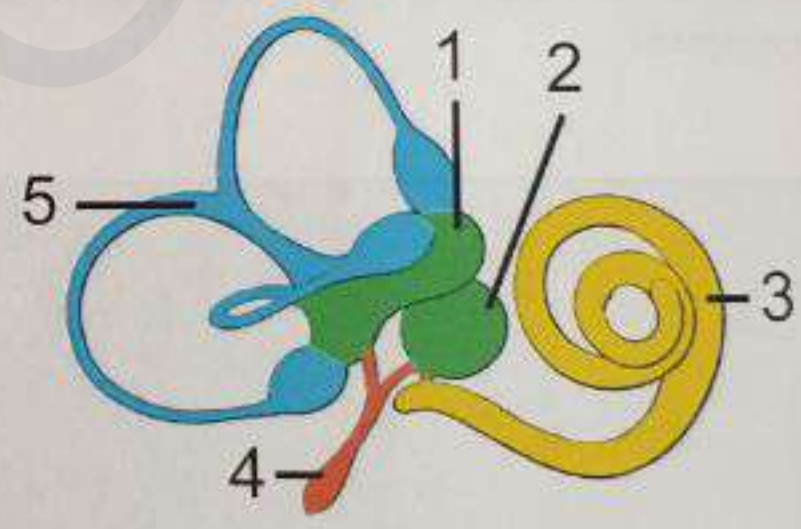
a) ALL
b) AML
c) CML
d) CLL

127. Liver histology slide; cell shown by letter X is-



a) Stellate cell
b) Endothelial cell
c) Kupffer cell
d) Hepatocyte

151. Which of the following structure is marked by number '2' in the given figure-



a) Utricle
b) Saccule
c) Endolymphatic duct
d) Semicircular canal

123. **Ans. is 'd' i.e., Addisonism** [*Ref: **Robbins 9th/e** p. 653*]

124. **Ans. is 'b' i.e., AML** [*Ref: **Robbins 9th/e** p. 595*]

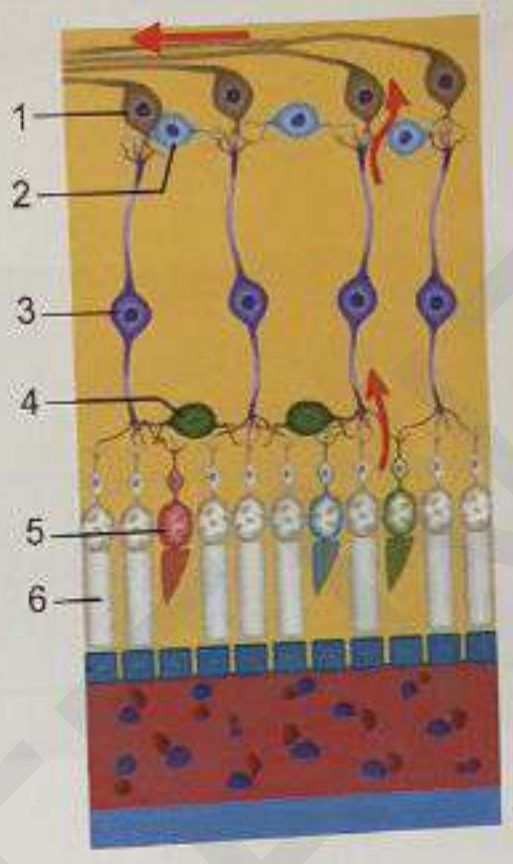
127. **Ans. is 'c' i.e, Kupffer cell**

151. **Ans. is 'b' i.e., Saccule** [*Ref: **Dhingra 6th/e** p. 14*]

161. A patient's fundoscopy examination is showing following image. The diagnosis is-

a) Proliferative diabetic retinopathy
b) Non-proliferative diabetic retinopathy
c) Hypertensive retinopathy grade I
d) Hypertensive retinopathy grade IV

162. Following image is showing layers of retina. The number '2' is indicating-

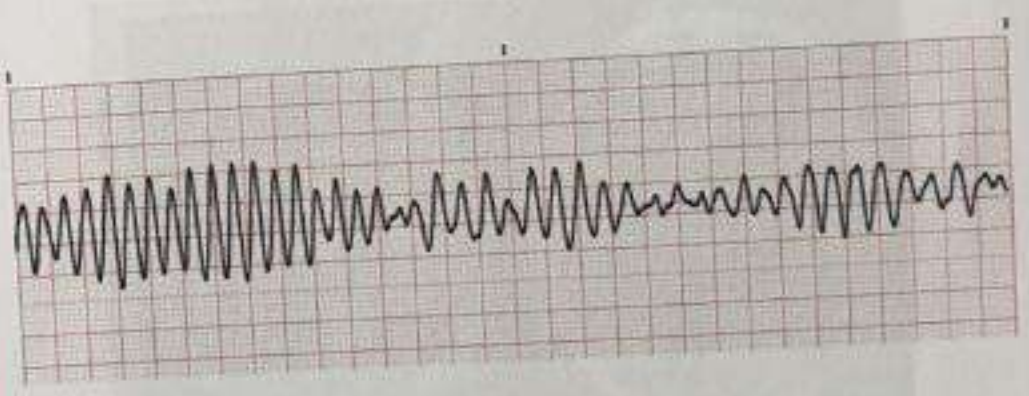


a) Ganglion cell
b) Amacrine cell
c) Bipolar cell
d) Horizontal cell

172. The given X-ray is showing-

a) Malgaigne fracture
b) Bosworth fracture
c) Tillaux fracture
d) Straddle fracture

205. Which of the following is correct regarding the given ECG-



a) Ventricular tachycardia, hypokalemia
b) Ventricular tachycardia, hyperkalemia
c) Atrial fibrillation, hypokalemia
d) Atrial fibrillation, hyperkalemia

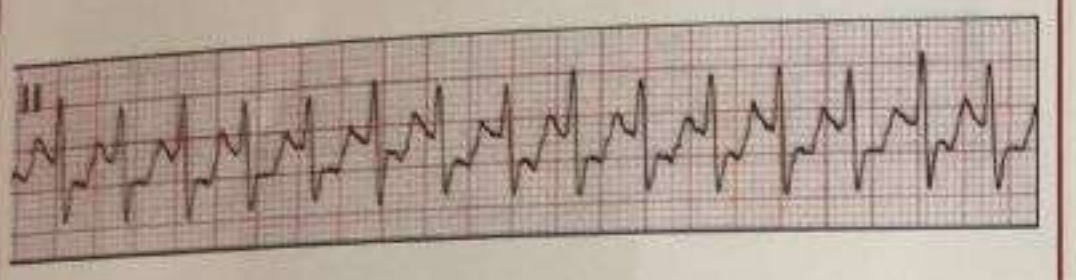
161. Ans. is 'd' i.e., Hypertensive retinopathy grade IV

162. Ans. is 'b' i.e., Amacrine cell [*Ref: Clinical ophthalmology 7th/e p. 786*]

172. Ans. is 'a' i.e., Malgaigne fracture

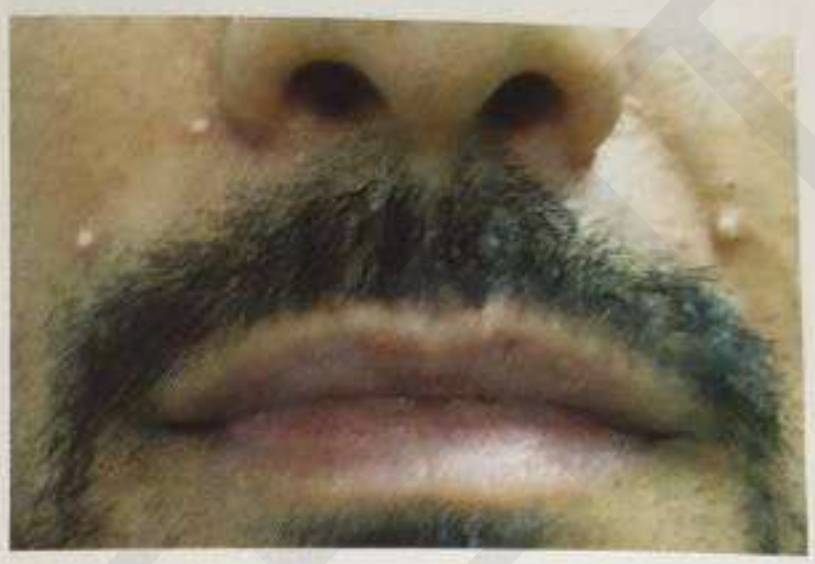
205. Ans. is 'a' i.e., Ventricular tachycardia, hypokalemia [*Ref: Marriott's 12th/e p. 415*]

224. A patient is presenting with palpitation and ECG is showing following image. Which drug should be given-



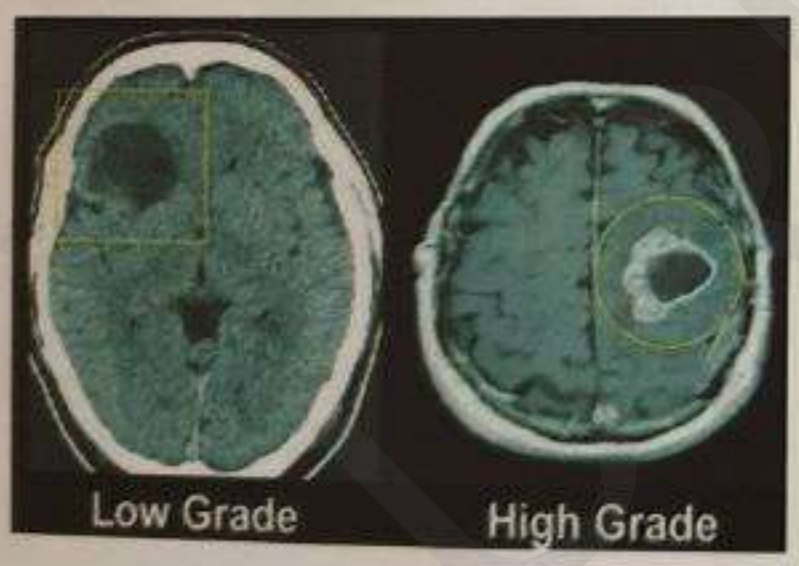
a) Adenosine
b) Lidocaine
c) Amiodarone
d) Phenytoin

229. A man aged 30 years presented with following pustular lesions. He has been taking treatment for acne with doxycycline. His other acne lesions like papules and comedones subsided with treatment but these pustules soon developed and were unresponsive to the medication. Most likely diagnosis is?



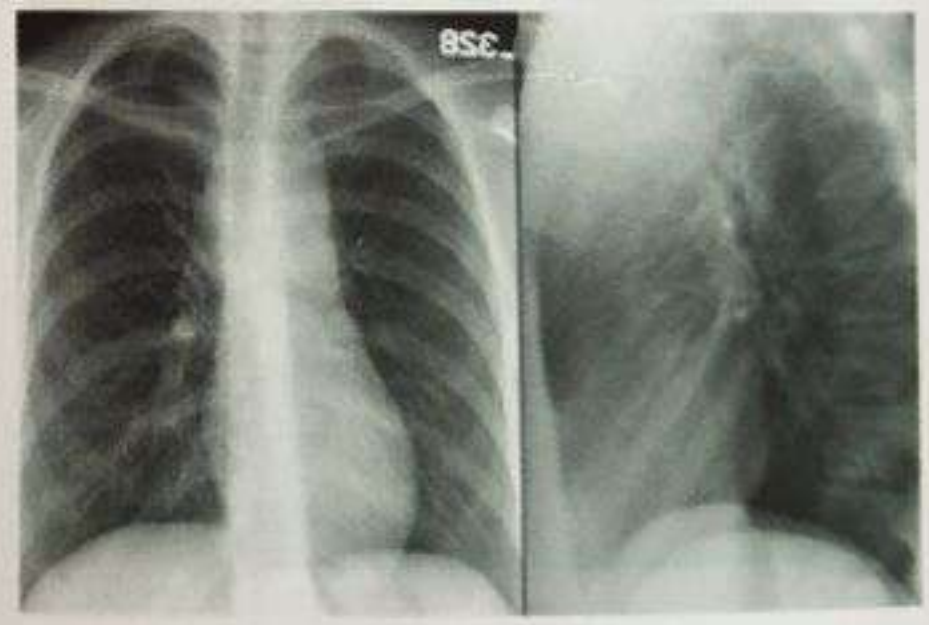
a) Pustular acne
b) Perioral dermatitis
c) Gram negative folliculitis
d) Pustular rosacea

244. The given image in MRI brain is showing-



a) Glioma
b) Glioblastoma
c) Astrocytoma
d) Metastasis

248. Chest X-ray of a patient is shwoing the following image. What can be the diagnosis-



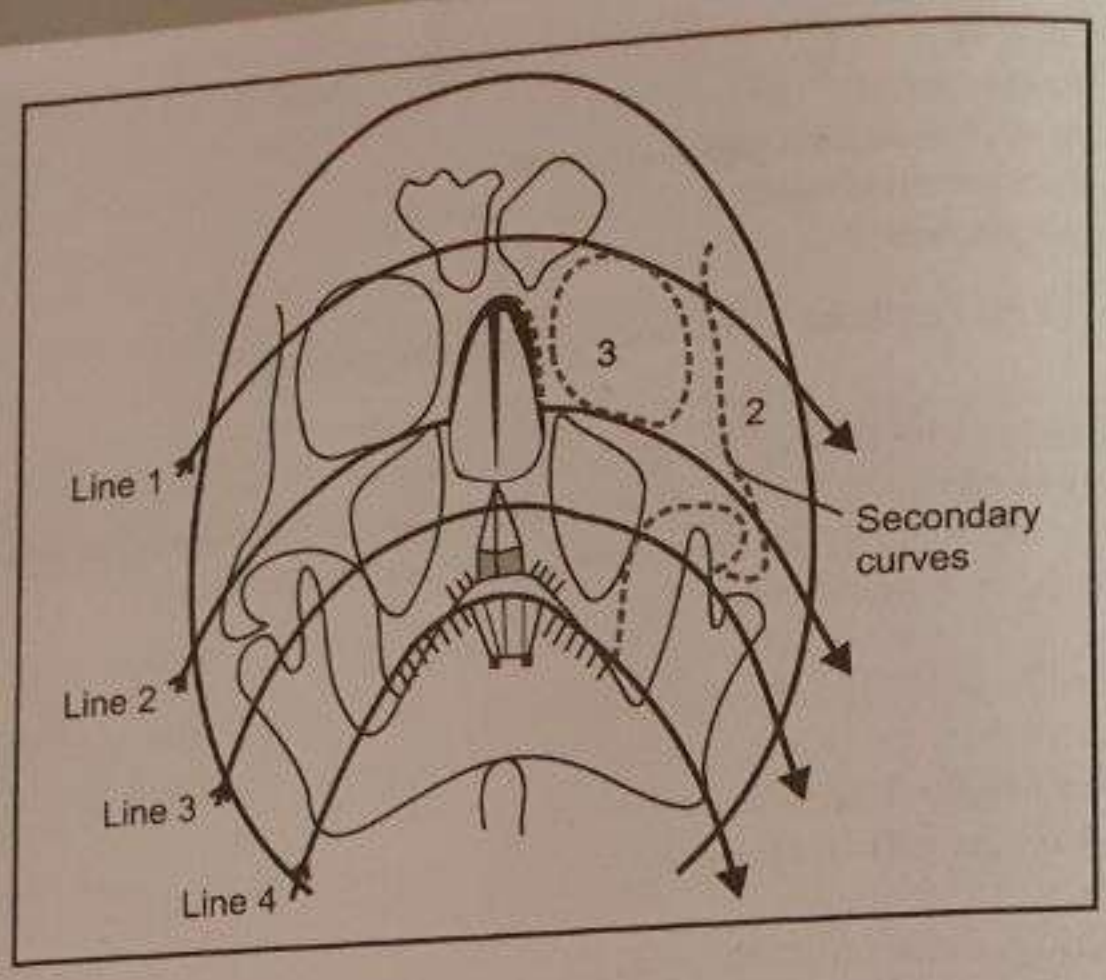
a) Thymoma
b) Mediastinal lymphoma
c) Aortic aneurysm
d) Paravertebral abscess

224. Ans. is 'a' i.e., Adenosine [*Ref: **Harrison 20th/e** p. 1522*]

229. Ans. is 'c' i.e., Gram negative folliculitis

244. Ans. is 'b' i.e., Glioblastoma

248. Ans. is 'b' i.e., Mediastinal lymphoma [*Ref: **Radiology at Glance 1st/e** p. 156*]



13. **Ans. is 'd' i.e., Geniculate body**

- **Epithalamus** consists of habenular nucleus lying in **habenular trigone**[Q], **pineal body**[Q], habenular commissure, posterior **commissures**[Q], and stria medullaris thalami. Pineal gland helps in maintaining rhythm sleep-wake cycle by secreting melatonin.

Parts of Brain		
Parts	**Subdivisions**	**Cavity**
1. Forebrain (prosencephalon)	A. Telencephalon (cerebrum), made up to two cerebral hemispheres and the median part in front of the interventricular foramen. B. **Diencephalon**[Q] (thalamencephalon), hidden by the cerebrum, consists of :- a) Thalamus b) Hypothalamus c) Metathalamus, including the medial and lateral geniculate bodies, and d) Epithalamus, including the pineal body, habenular trigone and posterior commissure e) Subthalamus	Lateral ventricle **Third ventricle**[Q]
2. Midbrain (mesencephalon)	Crus cerebri, substantia nigra, tegmentum, and tectum, from before backwards.	**Cerebral aqueduct**[Q]
3. Hindbrain (rhombencephalon)	A. Metencephalon, made up of pons and cerebellum. B. Myelencephalon or medulla oblongata.	

14. **Ans. is 'a' i.e., Intorsion and abduction** [*Ref: BDC 7th/e Vol. III p. 217 & 5th/e Vol. III p. 114*]

Muscle	Primary Action	Secondary Action
Superior rectus	Elevation	Adduction and intorsion
Inferior rectus	Depression	Adduction and extorsion
Medial rectus	Adduction	
Lateral rectus	Abduction	
Superior oblique	Intorsion	Abduction and depression
Inferior oblique	Extorsion	Abduction and elevation

15. **Ans. is 'c' i.e., Opening and closing** [*Ref: Gray's 39th/e p. 776*]

- The **fibrocartilaginous articular** disc divides the temporomandibular joint into two compartments : Superior (upper) part and inferior (lower) part.
- The **upper joint compartment** formed by the articular disc and the temporal bone is involved in **translational** movement, i.e., sliding the lower jaw forward or backward.

22. Ans. is 'a' i.e., Pulmonary hyperventilation [*Ref: **Guyton 12th/e** p. 529, 530; **Ganong 24th/e** p. 650, 651*]

- Continued stay at high altitude brings about acclimatization. Acclimatization in high altitude means development of ***compensatory mechanisms*** to ward off ill-effects of low barometric pressure. These are : -

1) **Hyperventilation (Increased pulmonary ventilation) :**
   - This is the ***most fundamental response to hypoxia. The low arterial*** PO_2 **(hypoxemia) stimulates the carotid body peripheral chemoreceptors which causes hyperventilation.**
2) **Rise in 2, 3 - diphosphoglycerate (DPG) concentration :**
   - **The DPG concentration of RBCs increase. This causes a rightward shift of oxygen-Hb dissociation curve. This causes increased O_2 delivery to tissues.**
3) **Polycythemia :**
   - Hypoxia stimulates ***erythropoietin release*** which **stimulates erythropoiesis** leading to an ***increase in RBC count and hemoglobin concentration.*** So there is absolute **polycythemia with increased red cell mass.**
4) **Other compensatory mechanisms :**
   - These are : -
     i) **Increase renal excretion of alkali (HCO_3^-)**
     ii) Increased cardiac output immediately, which becomes normal with in few weeks as blood hematocrit increases.
     iii) Increased diffusion capacity of lung
     iv) Increased vascularity of tissues (increased capillary density)
     v) Enhancement of oxidative metabolism by increase in number of mitochondria and content of cytochrome oxidase.
     vi) Increased myoglobin

Note

- Increased pulmonary artery pressure (Pulmonary hypertension due to pulmonary vasoconstriction (option b & c) is a complication (not an acclimatization response).

23. Ans. is 'c' i.e., Opening of Na+ channels [*Ref: **Guyton 12th/e** p. 102; **Ganong 25th/e** p. 520, **24th/e** p. 523*]

- ***Normal RMP in myocardial fibers is about -90 mV.*** The AP in myocardial fibers **has 5 phases** : 0, 1, 2, 3, 4.

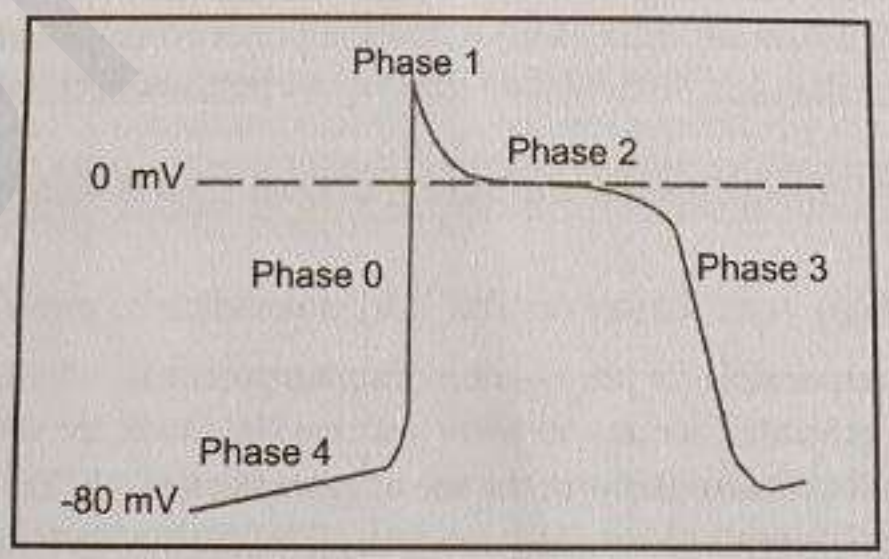
Phase 0 :
- It is the ***phase of rapid depolarization*** and is due to opening of ***fast sodium channels.***

Phase 1 :
- It is the ***initial phase of rapid repolarization.*** It is due to ***closure of fast Na^+ channels.***

Phase 2 :
- This is **plateu phase.** It is due to ***opening of 'voltage gated slow Ca^+ channels***, also called **calcium-sodium channels which causes calcium influx.**

Phase 3 :
- This phase of final repolarization is due to ***opening of K^+ channels.*** The membrane potential comes back to resting membrane potential.

Phase 4 :
- It is the resting phase, i.e., the phase of resting membrane potential.



24. Ans. is 'd' i.e., Alveolar ventilation [*Ref: **Textbook of foundations of Respiratory** p. 156*]

"At rest, minute volume is about 6 L, but it can increase to about 120 L during heavy exercise"

- Thus increase in minute volume is 20 times.

Note : Minute volume denotes alveolar/pulmonary ventilation

"During strenous exercise, the tidal volume usually increases to a maximum of about 50% to 60% of the vital capacity or about 2.5 to 3.0 L"

- *So tidal volume increase 2.5/0.5 to 3/0.5 or 5 to 6 times (normal tidal volume is 500 ml)*

iii) **High membrane resistance (Rm)**
iv) **Low membrane capacitance (Cm)**
v) High space constant
vi) High time constant

BIOCHEMISTRY

29. Ans. is 'None' [*Ref: Harper 30th/e p. 218*]

- All the given options are correct regarding gangliosides.
- Gngliosides are glycolipids.

Gangliosides (Cerebroside + oligosaccharides + N-acetylneuromic acid NANA) :-

- Gangliosides are complex glycolipids, derived from glucocerebroside.
- Ganglioside contain oligosaccharides and one or more molecules of **sialic acid** which is usually **N-acetyl neuramic acid (NANA)** attached to ceramide.
- Several types of gangliosides such as GM_1, GM_2, GM_3 etc have been isolated from brain and other tissues.

Gangliosides = Ceramide + oligosaccharide chain (e.g. glucose + galactose) + NANA
[Galactosylceramide or Glucosylceramide + NANA]
or
Gangliosides = Sphingosine + long chain fatty acid + oligosaccharide chain (glucose + galactose) + NANA

About option C

- GM1 ganglioside in intestinal epithelium acts as a recepter for binding of cholera toxin.

30. Ans. is 'd' i.e., Binding of one subunit increase affinity for next subunit [*Ref: Vasudevan 7th/e p. 58*]

- Enzymes with cooperative binding are multimeric (multiple subunits) and show sigmoid curve. They dont follow routine michaelis - menten kinetics, Rather they follow Hill's equation.

Enzymes with cooperative binding with substrate

- Some enzymes consist of **several interacting subunits** with mutually dependent conformations: binding of substrate to one subunit induces a conformational change in another subunit, thereby changing its catalytic properties. This phenomenon is called **cooperativity.** The activity of enzymes that show cooperativity toward a substrate can be described by a **modified michaelis-menten equation** as follow:

$$\frac{v}{V_{max}} = \frac{(s)^h}{(s)^h + (S_{0.5})^h}$$

- In this equation, $S_{0.5}$ is the concentration of substrate at which the enzyme shows half-maximal activity; the term $S_{0.5}$ is used in place of K_m because it denotes not *one* substrate molecule binding to the enzyme and reacting, but a mean of *several* substrate molecules binding and reacting. h is also called the **Hill coefficient** or **cooperativity coefficient.** It does not have to be an integer. If h is larger than 1, the enzyme is said to display **positive cooperativity.** A linear plot of the activity such in enzyme versus substrate concentration shows an S-shaped relationship. (Negative cooperativity is not discussed here.)
- Example of enzymes that have cooperativity are glucokinase (Hill coefficient 1.5), phosphofructokinase-1 (Hill coefficient 2.0) and amido phosphoribosyltransferase (Hill coefficient 2.0).

31. Ans. is 'a' i.e., Decrease free energy of activation [*Ref: Dinesh puri 3rd/e p. 105*]

- The catalytic mechanisms employed by enzymes are -

Acid-base Catalysis

- The aminoacyl residues of the active site may provide (or sometimes remove) certain chemical groups to the substrate, that enhance its conversion to the transition state. In most cases, the protons donated or accepted by some ionizable group on the enzyme help the formation of the transition state. In other cases, electron pair donors or acceptors, known respectively as *Lewis bases* and *Lewis acids,* participate in the reaction.
- General acid-base catalysis is the most important reason for the pH-dependence of enzymatic reactions.

Covalent Catalysis

- It is based on formation of ***transient*** covalent bonds (between amino acyl residues of the active site and the substrate molecule) during catalysis. Covalent catalysis, for example, is used by ***serine proteases*** which bind their substrate covalently at the serine side chain.
- It is important to note at this stage that any favourable interaction - covalent or non - covalent - between the enzyme and the substrate ***decreases the free energy of activation*** and increases the reaction rate.

Transition State Stabilization

- The active site binds the substrate in a geometry that resembles the transition state of the substrate. This helps stabilization of the substrate molecule in its transition state, which being a reactive form, undergoes conversion into the product. This effect is sometimes referred to as **substrate-strain** because the enzyme effectively bends the substrate into the shape of the transition state.

Proximity Effect

- Proximity effect, also known **as entropy effect,** is based on approximation of the substrates in two-substrate reaction. In absence of the enzyme, a reaction takes place only when two substrate molecules collide in desired geometrical orientation and with sufficient kinetic energy. This is certainly a rare event, with extremely low probability of occurrence. The enzyme, however, binds both the substrates to its active site in the correct geometric orientation, thereby increasing the frequency of productive collisions.

32. Ans. is 'd' i.e., Pancreatitis

- The ketogenic diet (KD) is a high-fat, low-carbohydrate, adequate protein diet.The dietary macronutrients are divided into approximately 55% to 60% fat, 30% to 35% protein and 5% to 10% carbohydrates. Specifically, in a 2000 kcal per day diet carbohydrates amount up to 20 to 50 g per day.
- The hallmark features of KD treatment are the production of ketone bodies (principally β-hydroxybutyrate, acetoacetate and acetone) – products of fatty acid oxidation in the liver – and reduced blood glucose levels. Ketone bodies provide an alternative substrate to glucose for energy utilization.
- According to numerous scientific peer reviewed papers, the ketogenic diet is **usefull** in a number of diseases -
  i) ***Diabetes mellitus***
  ii) Leukodystrophy
  iii) ***Obesity***
  iv) Pyruvate dehydrogenase deficiency
  v) Polycystic ovarian syndrome
  vi) ***Seizures prevention in rett's syndrome***
  vii) Metabolic syndrome
  viii) Amyotrophic lateral sclerosis
  ix) Head trauma
  x) Stroke & cardiovascular disorders
  xi) Alzheimer disease & parkinsonism
  xii) Donohue syndrome
- The ketogenic diet is **contraindicated** in patients with ***pancreatitis, liver failure, disorders of fat metabolism,*** primary carnitine ***deficiency, carnitine palmitoyltransferase deficiency, carnitine translocase deficiency, porphyrias,*** or pyruvate kinase ***deficiency.***

33. Ans. is 'a' i.e., Homeotic gene

- **Homeotic genes** are master regulator genes that direct the development of particular body segments or structures.
- When homeotic genes are overactivated or inactivated by mutations, body structures may develop in the wrong place.
- Most animal homeotic genes encode transcription factor proteins that contain a region called the **homeodomain** and are called ***Hox genes.***
- *Hox* genes are turned on by a cascade of regulatory genes; the proteins encoded by early genes regulate the expression of late genes.
- *Hox* genes are found in many animals, including fruit flies, mice, and humans. Mutations in human Hox genes can cause genetic disorders.

34. Ans. is 'b' i.e., Production of Propinyl CoA [*Ref:* ***Lippincott's 5th/e p. 117, 118; Harper 30th/e p. 785***]

- **Fatty acids (and also ketone bodies)** are oxidized to acetyl-CoA. Acetyl-CoA cannot be used to synthesize glucose (in gluconeogenesis). This is because acetyl-CoA cannot be converted to oxaloacetate, the starting substrate of gluconeogenesis : Reaction of pyruvate dehydrogenase is irreversable (Pyruvate $\xrightarrow{PDH}$ Acetyl-CoA). So, acetyl-CoA cannot be converted to pyruvate which is the immediate precuresor of oxaloacetate (Pyruvate $\xrightarrow{\text{Pyruvate carboxylase}}$ oxaloacetate).
- Now, It can be argued that since acetyl-CoA is converted to oxaloacetate through TCA cycle, it should be convertable to glucose as well. That, however is not so because the oxaloacetate which is generated in TCA cycle is not newly generated it is the same oxaloacetate which enter the cycle at first reaction (oxaloacetate + acetyl-CoA → citrate). The two carbon atoms of acetyl-CoA are lost as carbon dioxide before oxaloacetate is regenerated. Hence, acetyl-CoA has no *structural* contribution to this oxaloacetate
- ***Therfore, Acetyl-CoA and substrates that yield only acetyl-CoA (fatty acids and ketone bodies) can not be utilized in gluconeogenesis).***
- The ***(relative rare)*** fatty acids with ***odd number of carbon atoms*** yield ***propinyl CoA*** as the product of the final cycle of β-oxidation and this can be a substrate for gluconeogenesis as it can be converted to succinyl-CoA, an intermediate of TCA cycle.

Signs	
Lymphadenopathy	95 (83-100)
Fever	93 (60-100)
Pharyngitis or tonsillitis	82 (68-90)
Splenomegaly	51 (43-64)
Hepatomegaly	11 (6-15)
Rash	10 (0-25)
Periorbital edema	13 (2-34)
Palatal enanthem	7 (3-13)
Jaundice	5 (2-10

53. Ans.is 'a' i.e., EBV [*Ref: **Harrison 20th/e** p. 1358, 1359*]

- The image is showing normal lymphocytes on left (compact nucleus and scant cytoplasm) and atypical (reactive) lymphocyte on right (large nucleus with dispersed chromatin and abundant cytoplasm) → Diagnosis is IMN caused by EBV.
- Lymphadenopathy, hepatomegaly and raised blood sugar can be seen in IMN.

54. Ans. is 'c' i.e., Ascaris [*Ref: **Rajesh Karyakarte** p. 239*]

Parasite	Method of causing auto-infection
1. Capillaria philippinensis	• Liberated larvae penetrate intestinal mucosa
2. Cryptosporidium parvum	• Thin-walled oocysts can reinfect the same person
3. Enterobius vermicularis	• Larvae come out on perianal skin, re-enter anal canal and migrate retrograde to caecum. Can also be carried by contaminated hands to mouth
4. Hymenolepsis nana	• Eggs hatch in the same person's intestine, onchospheres enter mucosa to develop into cysticercoid larvae. These in turn migrate back into intestine to develop into adults.
5. Strongyloides stercoralis	• Eggs hatch to liberate rhabditiform larvae that immediately develop into filariform larvae. These larvae penetrate intestinal mucosa.
6. Taenia solium (cystcercosis)	• Reverse peristalsis leading to entry of gravid proglottids/eggs into stomach. Can also be carried by contaminated hand to mouth.

55. Ans. is 'a' i.e., MRSA

- **Staphylococcal leucocidin and gamma lysin** have been grouped as **synergohymenotropic toxins.**
  - i) ***Gamma hemolysin***
    - Composed of two separate proteins
  - ii) ***Leucocidin***
    - Also called the ***Panton - valentine toxin.***
    - Composed of two components (S and F)

56. Ans. is 'a' i.e., Mec A [*Ref: **Essentials of Pharmacology 8th/e** p. 171*]

- Penicillin (and other beta lactams) act on cell wall by binding to penicillin binding proteins, which have high affinity for penicillins and other beta-lactams.
- Sometime there is production of altered PBP called. **PBP2a** which has low affinity for beta lactams. PBP2a production is **chromosomally mediated.**
- **It is the major mechanism of methicillin resistance → Methicillin resistance staphylococcus aureus.**
- The resistance gene is **mec A gene** which is a part of large mobile genetic element - **staphylococcal cassette chromosome** (SCCmec).

57. Ans. is 'c' i.e., PBP 2a [*Ref: **See above explanation***]

- **Methicillin** is a ***semisynthetic*** derivative of penicillin. Thus examiner is asking about methicillin resistance which is caused by PBP2a.

58. Ans.is 'c' i.e., 31°C [*Ref: **mmbr-asm.org***]

Haemophilus Ducreyi

- It is Gram negative but often may appear Gram positive and frequently shows **bipolar staining.**

- The bacilli may be arranged in small groups or whorls or in parallel chains giving a ***"school of fish"*** or ***"rail road track appearance"***.
- ***Chocolate agar, enriched with isovitale X and fetal calf serum, and containing Vancomycin acts as a selective media.***
- An optimum pH for isolation is 6.5 to 7.0 and ***optimum temperature is 28 to 35°C*** (it should be below 35°C).
- ***H. ducreyi causes chancroid also called 'soft sore'***. It is characterized by ***painful, non-indurated*** irregular ulcer which **bleeds easily**. There is ***tender (painful) lymphadenopathy***.
- ***Single dose azithromycin is the drug of choice for treatment***. Ceftriaxone, ciprofloxacin and erythromycin are alternatives.

59. Ans. is 'a' i.e., H nana

• ***Largest protozoa***	→	***Balantidum coli***
• Smallest intestinal amoeba	→	Dientamoeba fragilis
• Smallest tapeworm found in human intestine	→	H. nana
• ***Largest helminth (largest worm)***	→	***T. saginata (beef tapeworm)***
• Largest liver fluke	→	F. hepatica
• ***Largest trematode infecting man***	→	***Fasciolopsis buski***
• Largest Nematode	→	Ascaris
• Smallest Nematode	→	Trichinella
• Only protozoan parasite found in small intestine of man	→	Giardia lamblia
• Only ciliate protozoan parasite of man	→	Balantidum coli
• Parthenogenic worm (female is able to produce fertile eggs or larvae without fertilization)	→	Strongyloides stercoralis

60. Ans. is 'd' i.e., Capnocytophagia [*Ref:* ***Harrison's 20th/e*** *p. 881*]

- **Capnocytophaga canimorsus** can cause septic shock in ***asplenic patients***.
- Infection typically follows a **dog bite**.
- Patients present with ***fever, chills, myalgia, vomiting, diarrhea, dyspnea, confusion and headache.***
- There may be ***exanthem or erythema multiforme***, cyanotic mottling or peripheral cyanosis, petechiae, & ecchymosis.
- About 30% of patients with this fulminant from die of overwhelming sepsis and DIC, and survivors may require amputation because of gangrene.

61. Ans. is 'c' i.e., Ceftazidim [*Ref:* ***www.cdc.gov., Katzung 11th/e*** *p. 785*]

Drugs used for ESBL producing bacteria are:

A) *β-lactamase inhibitor combination*
- Clavulinic acid + Amoxcillin
- Clavulanic acid + Ticarcillin
- Sulbactam + ampicillin
- Tazobactam + piperacillin

B) *Cefamycins : Cefoxitin, Cefotetan*
C) *Carbapenems : Imipenem, meropenem*
D) *Fosfomycin*
E) *Nitrofurantoin*
F) *Colistin*
G) *Amikacin can be Combined with Piptaz*

62. Ans. is 'a' i.e., Children less than 2 years [*Ref:* ***Park 24th/e*** *p. 183*]

Remmendations for Pneumococcal polysaccharide vaccine

- Asplenia or severe dysfunction of the spleen
- Homozygous sickle cell disease and coeliac disease
- Chronic renal disease or nephrotic syndrome
- Immunodeficiency or immunosuppression caused by disease or treatment, including HIV infection at all stages
- Chronic heart disease
- Chronic lung disease
- Chronic liver disease, including cirrhosis
- Diabetes mellitus
- ***Adult with alcoholism***
- ***Everyone above 65 years age*** (in industrialized countries)

Contraindication

- Children < 2 years of age
- Immunosuppressed as a result of malignancy or steroid therapy.

1) **Live vaccines**
   - Live vaccines are produced by organisms which are alive but there pathogenicity (virulence) is reduced. Thus these vaccines are called ***"live attenuated vaccines"***.
   - Important examples of live ***vaccines are BCG, OPV (Sabin oral polio vaccine), measles, mumps, rubella, yellow fever (17D vaccine), typhoid oral (typhoral), chicken pox, influenza, plague, epidemic typhus and hepatitis A.***
2) **Killed vaccines (Inactivated vaccines)**
   - Killed vaccines are prepared by killing (or inactivating) the organism by heat or chemical.
   - Important killed vaccines are ***pertussis (whooping cough), IPV (injectable polio vaccine/salk vaccine), cholera, typhoid, plague, influenza, Japanese encephalitis, KFD, meningococcal meningitis, hepatitis A,*** and ***rabies.***
3) **Subunit vaccines**
   - These are made of single or multiple antigenic components of a microorganism.
   - These are divided into :-

   i) ***Toxoid***
   - Toxoid are produced from **exotoxin**.
   - Toxins produced by organisms are detoxicated. So that toxin losses its toxic effect but the immunogenicity remains intact. After injection, toxoid produces antibodies which neutrilize toxin produced during infection.
   - So, toxoid induces production of antibodies that are active against toxin but not against organism. *Examples → Diphtheria & tetanus toxoid.*

   ii) ***Cellular fraction***
   - Vaccines are obtained from extracted cellular fraction which is major antigenic constituent of organism.
   - Examples are :-
     a) *Polysaccharide based* : ***Meningococcal vaccine*** (cell wall polysaccharide), ***pneumococcal vaccine*** (capsular polysaccharide), ***typhoid vaccine*** (Vi polysaccharide), and ***H. influenza vaccine / Hib*** (capsular polysaccharide).
     b) *Protein / Polypeptide based* : Influenza vaccine (from haemagglutinin / HA and neuraminidase / NA).
     c) *Recombinant protein / Polypeptide* : ***Hepatitis B vaccine.***

   iii) ***Conjugated vaccines***
   - Children under two years of age do not respond well to antigen, such as polysaccharides, which produce antibodies via a T-cell independent mechanism. If these polysaccharide antigens are chemically linked (conjugated) to a protein that T-cells recognize, then these conjugate vaccines can elicit strong immune responses and immune memory in young children.
   - Similar to the polysaccharide-based vaccines, the conjugate vaccines are also sero-type specific, and, therefore, multivalent formulations are required to achieve protection against multiple serotypes. Examples are *S. pneumococcal* and *meningococcal vaccines.*

4) **Mixed vaccines**
   - More than one kind of immunizing agent is included in the vaccine. Examples → *DPT, DT, MMR, TAB, DPTP.*
5) **Polyvalent vaccines**
   - These are prepared from two or more strains of same species, e.g. polio and influenza.

68. Ans. is 'c' i.e., 2 doses of ARV on day 0 & 3

- Here post-exposure prophylaxis in previously vaccinated individual is required.

Type of prophylaxis	Schedule
Post-exposure	
a) **Intramuscular**	
• Routine	***Day 0, 3, 7, 14, 28, 90*** (all one site)
• Abbreviated multisite (2-1-1)	Day 0 (2 sites), 7 (one site), 21 (one site)
b) **Intradermal**	
• 2 sites (2-2-2-0-2-0)	Day 0, 3, 7, 28 (all two sites each)
• ***8 sites (8-0-4-0-1-1)***	Day 0 (8 sites), 7 (4 sites), 28 (one site), 90 (one site)
Pre-exposure	Day 0, 7 and 21 or 28
Post-exposure in priviously immunized	
• 1 site 2 days intradermal	Day 0, 3
• Intramuscular	Day 0
• Single visit 4-site intradermal	Day 0 (4 sites)

69. Ans. is 'c' i.e., Type I error [*Ref:* ***High Yield Statistics*** *p.* 46]

- There are two basic type of statistical errors : -
  1) *Type I error*
  2) *Type II error*

Type I error

- It is also known as an ***error of first kind or*** α***-error*** or ***false positive.***
- **This type of error rejects null hypothesis when it is true** → ***False rejection of null hypothesis.***
- That means in real there is no difference (as null hypothesis says) but we observe a difference (by rejecting the null hypotesis due to error).
- In very simple words "we observe a difference when it is not true" → ***false positive.***
- One of the simplest example of this would be if a test shows that a women is pregnant when in reality she is not, i.e., she is false positive for pregnancy.
- ***Probability*** of type-I error is given by ***'P-value'*** (probability of declaring a significant difference when actually it is not present).
- ***Significance*** (α) ***level*** is the maximum tolerable probability of type I error.
- ***Significance*** (α) ***level is fixed in advance*** and calculation of P value (probability of type I error) can be less than, equal to or greater than the significance (α) level.
- If the probability of type I error (P -value) is less than significance (α) level, the results are declared statistically significant.
- Therefore, to declare the results statistical significant, type I error (α-level) should be kept to minimum [below significance (α) level].
- Type I error is more serious that type II error.

Type II error

- It is also known as an error of ***second kind of*** β***-error*** or ***false negative.***
- **This type of error accept/fail to reject the null hypothesis when it is false** → ***False acceptance of null hypothesis.***
- That means we fail to observe a difference when in truth there is one → ***False negative.***
- An example of this would be if a test shows that a woman is not pregnant when in reality she is i.e., she is false negative.

70. Ans. is 'b' i.e., Pigs [*Ref:* ***Park 24th/e p. 302 & 23rd/e p. 285***]

- JE is caused by **flavivirus**, a ***group B arbovirus***. It is a ***zoonotic disease*** infecting mainly animals and incidentally man.
- In south, epidemics have occured in **Karnataka**, Andhra pradesh, Tamil-Nadu and Kerala. Now ***Gorakhpur district of U.P. contributes largest number of cases.***
- **Main vector of JE transmission is culex mosquito** ***(culex tritaeniorhynchus)***, a **zoophilic** rural mosquito that ***breeds in rice paddy fields, shallow ditches and pools***. Other important vector species are ***culex vishnuii*** and ***culex gelidus***.
- ***Pigs are amplifier host*** i.e., infected pigs ***do not manifest overt symptoms*** but circulate the virus so that mosquito get infected and can transmit virus to man. **Horses** are the only domestic animals showing symptoms of JE. ***Man is an 'incidental dead-end host'***, there is ***no man-to-man transmission***. *'Cattle and buffaloes'* act as *mosquito attractants*, i.e. infected but are not the natural hosts. ***Herons (birds)*** are the *reservoir hosts.*
- There are two natural cycles of JE virus :
  i) ***Pig → mosquito → pig***
  ii) Ardeid bird → mosquito → Ardeid bird
- ***Most of the cases are subclinical, ratio of overt disease to inappearent infection varies 1:1000***, i.e., ***cases show tip of iceberg***. For clinical cases incubation period is **5-15 days.** The disease passes through sequential stages of prodrome, acute encephalitis, and late stage with sequelae. ***There is no rash at the site of mosquito bite.***
- ***Case fatality rate is 20-40%.*** The endemicity of cases is ***1-2 case per village.***
- ***The vast majoirty of cases (about 85%) occur among children < 15 years of age.*** *But JE is* **infrequent in infancy.**

71. **Ans. is 'b' i.e., ¼** [*Ref:* ***Read below***]

- Stadard Error (SE) $= \dfrac{\text{Standard deviation (SD)}}{\sqrt{\text{Sample Size } (\eta)}}$
- *Thus on doubling the standard error (i.e. 2SE), sample size becomes one fourth.*
- *For example if SE of a population is 4, then*

$$4 = \frac{SD}{\sqrt{\eta_1}} \text{ or } SD = 4 \times \sqrt{\eta_1}$$

- *Now SE becomes double, i.e. 8, So*

$$8 = \frac{SD}{\sqrt{\eta_2}} \text{ or } SD = 8 \times \sqrt{\eta_2}$$

72.

Thus,

$$8 \times \sqrt{\eta_2} = 4 \times \sqrt{\eta_1}$$

$$2 \times \sqrt{\eta_2} = \sqrt{\eta_1}$$

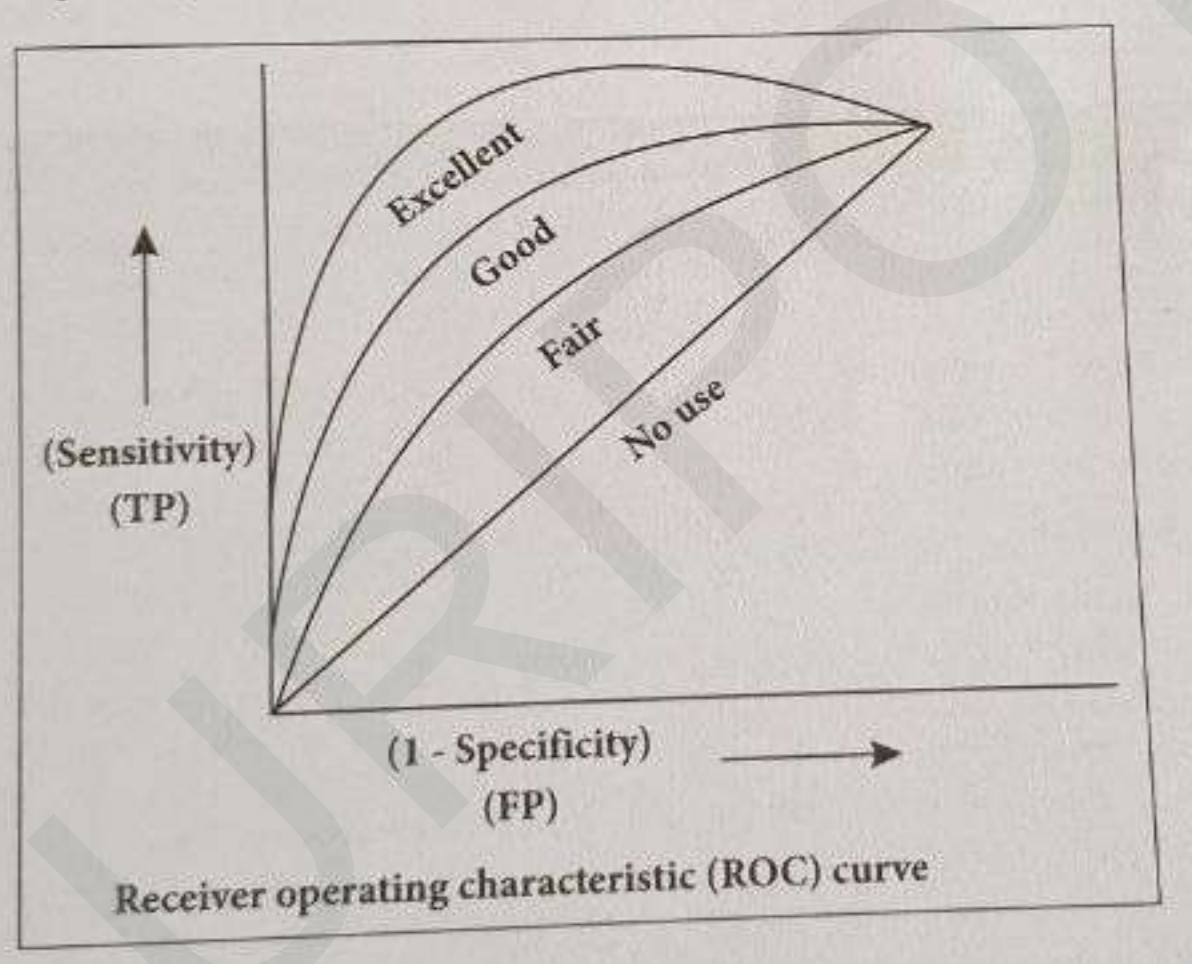
$$4 \times \eta_2 = \eta_1$$

$$\eta_2 = \frac{\eta_1}{4}$$

Ans. is 'c' i.e., Used to determine a cut-off point [*Ref:* ***Park 24th/e*** *p.149;*
A Dicitionary of Public Health by J Kishore *p.446–47*]

Receiver operator characteristic (ROC) curve:

- Is a graphical representation between sensitivity and specificity of a diagnostic test
- ROC curve is '*drawn between Sensitivity and (1-Specificity)*'
  - ROC curve is drawn between True positives and False positive error rate
- In clinical tests, ROC curve is 'used to determine a cut-off point'
- ROC curve is 'equivalent to Likelihood ratio for a positive result (LR+)'
- Types of ROC curves:
  - *Straight line at 45° (line a):* No benefit by this test/cut-off
  - *Straight lines above line a (Line b and c): Fair, Good results by this test/cut-off*
  - *Uppermost line touching Y-axis and then horizontal line (Line d):* Excellent results by this test/cut-off (Perfect ROC: 100% sensitivity & 100% specificity).



Receiver operating characteristic (ROC) curve

Ans. is 'b' i.e., Erythromycin

- Control of diphtheria requires :-

A) **Control in cases and carrier**
  - It includes early diagnosis and treatment, along with isolation.
  - **Cases are treated by diphtheria antitoxin plus penicillin or erythromycin.**
  - **Carriers are treated by only erythromycin (no antitoxin).**
  - **Isolation period** is for at least 14 days or until proved free of infection, i.e. 2 consecutive nose and throat swabs, taken 24 hours apart, should be negative before terminating isolation.

B) **Control for contacts (prophylaxis for contacts)**
  - **Non-immunized** close contacts of diphtheria should be given ***penicillin/erythromycin,*** *diphtheria antitoxin, and* ***vaccination (by toxoid).***
  - In **immunized** contact nothing is required if the booster dose was taken within previous 2 years, and if booster dose was taken more than 2 years before, only a booster doses of toxoid is required.

C) **Prophylaxis for community**
  - It is done by vaccination, usually started at 6 weeks of age.

74. **Ans. is 'a' i.e., Pearl index** [*Ref. Park 24th/e p. 544 & 23rd/e p. 510*]

PEARL INDEX

- ***Contraceptive methods are evaluated by Pearl index.***
- ***Pearl index is "failure rate per hundred women years of exposure (HWY)".***

$$\text{Failure rate per HWY} = \frac{\text{Total accidental pregnancies}}{\textbf{Total months of exposure}} \times 1200$$

- In applying the above formula, the *total accidental pregnancies shown in the numerator, must include every known conception, whatever its outcome.* The factor 1200 is the number of months in 100 yrs.
- **A failure rate of 10 per HWY** would mean that in the lifetime of an average women ***about one fourth or 2.5 accidental pregnancies would result,*** since the average fertile period of a women is about 25 yrs.

75. **Ans. is 'a' i.e., Increase specificity and decreased sensitivity**

Multiple Diagnostic tests

Series Mode	Parallel Mode
• Decreased sensitivity	• Increased sensitivity
• Increased specificity	• Decreased specificity
• Increased positive predictive value	• Increased negative predictive value

76. **Ans. is 'd' i.e., Still-birth rate** [*Ref: www.whoref.com*]

Global reference list of 100 indicators

Health Status
Mortality by age and sex
• Life expectancy at birth
• Adult mortality rate between 15-60 years
• Under-five mortality rate
• Infant mortality rate
• Neonatal mortality rate
Mortality by cause
• Maternal mortality ratio
• TB mortality rate
• HIV/AIDS mortality rate
• Malaria mortality rate
• Mortality between ages 30 and 70 years from cardiovascular diseases, cancer, diabetes, or chronic respiratory diseases
• Suicide mortality rate
• Mortality rate from road traffic injuries
Fertility
• Adolescent fertility rate
• Total fertility rate
Morbidity
• New cases of vaccine preventable diseases
• New cases of IHR and other notifiable diseases
• HIV incidence
• HIV prevalence
• Sexually transmitted infections incidence rate
• TB incidence rate
• TB notification rate
• TB prevalence rate
• Malaria parasite prevalence among children 6-59 months
• Malaria incidence rate
• Cancer incidence, by type of cancer

Mental Health

- Coverage of services for severe mental health disorders

Health systems

Quality and safety of care

- Perioperative mortality rate
- Institutional maternal mortality ratio
- Maternal death reviews
- ART retention rate
- TB treatment success rate
- Second line treatment coverage among MDR-TB cases
- Service-specific availability and readiness

Access

- Service utilization
- Health service access
- Hospital bed density
- Availability of essential medicines and commodities
- Median consumer price ratio of selected medicines

Health workforce

- Health worker density and distribution
- Output training institutions

Health information

- Birth registration coverage
- Death registration coverage
- Completeness of reporting facilities / districts (general, by disease type)

Health financing

- Current expenditure on health by general government and compulsory schemes % CHE
- Total current expenditure on health % GDP
- Out-of-pocket payment for health as a share of total current expenditure on health
- Externally sourced funding as share of total current expenditures
- Total capital expenditure on health as share of GDP
- Incidence of catastrophic health expenditure
- Incidence of impoverishment due to OOP

Health security

- IHR core capacity index

77. Ans. is 'c' i.e., 1·25

- In the given table :
  - True positive (TP) are 80
  - False positive (FP) are 56
  - True negative (TN) are 50
  - False negative (FN) are 40

- So sensitivity $= \frac{TP}{TP + FN} = \frac{80}{80 + 40} = \frac{80}{120} = 0\text{-}67$ or 67%

88. Ans. is 'a' i.e., Mec A [*Ref: Lobanovska M and PillaG .Penicillin's Discovery and Antibiotic Resistance: Lessons for the Future? YALE JOURNAL OF BIOLOGY AND MEDICINE 90 (2017), pp.135-145*]

- Methicillin-resistant strains soon emerged, and only in 1981 was this mechanism of resistance unraveled: ***these strains harbored an altered PBP, designated PBP-2a, which showed a reduced affinity for penicillin, thereby conferring resistance to penicillin***. PBP-2a is encoded by mecA, a gene located on the S. aureus chromosome , which resides within the mobile genomic island SCCmec(staphylococcal cassette chromosome mec) .

89. Ans. is 'd' i.e., Burkholderia [*Ref: Matthew E. Falagas Sofia K. Kasiakou Louis D. Saravolatz. Colistin: The Revival of Polymyxins for the Management of Multidrug-Resistant Gram-Negative Bacterial Infections Clinical Infectious Diseases, Volume 40, Issue 9, 1 May 2005, Pages 1333–1341.*]

- Colistin has excellent bactericidal activity against most gram-negative aerobic bacilli, including :
  - ***Acinetobacter species***
  - ***P. aeruginosa***
  - ***Klebsiella species***
  - ***Enterobacterspecies***
  - ***Escherichia coli***
  - ***Salmonella species***
  - ***Shigella species***
  - ***Citrobacter species***
  - ***Yersinia pseudotuberculosis***
  - ***Morganella morganii***
  - ***Haemophilus influenzae***
- Colistin has also been shown to possess a considerable in vitro activity against ***Stenotrophomonas maltophilia*** strains (83%–88% of the tested isolates were susceptible to colistin in 2 recent studies).
- Colistin has also been reported to be potentially active against several mycobacterial species, including ***Mycobacterium xenopi, Mycobacterium intracellulare, Mycobacterium tuberculosis, Mycobacterium fortuitum, Mycobacterium phlei, and Mycobacterium smegmatis***.
- Following are resistant to colistin :
  - ***Pseudomonas mallei***
  - ***Burkholderia cepacia***
  - ***Proteus species***
  - ***Providencia species***
  - ***Serratia species***
  - ***Edwardsiella species***
  - ***Brucella species***
- In addition, colistin is not active against gram-negative and gram-positive aerobic cocci, gram-positive aerobic bacilli, all anaerobes, fungi, and parasites.

90. Ans. is 'b' i.e., Amiodarone [*Ref: ToshiyukiIshikawa .Effects of Anti-arrhythmic Drugs for Pacing Threshold and Defibrillation ThresholdVolume 27, Issue 3, 2011 p. 239-241*]

Effects of anti-arrhythmic drugs for defibrillation threshold		
Increase	No change	Decrease
Amiodarone (chronic stage)	β blocker	Amiodarone (acute stage)
Atropine	Disopyramide	Sotalol
Diltiazem	Procainamide	nifekalant
verapamil flecainide	Propafenone	

91. Ans. is 'b' i.e., Doxycycline [*Ref: Epilepsy Foundation. (2019). Seizure Complications of Antibacterial Treatment. [online] Available at: https://www.epilepsy.com/learn/professionals/co-existing-disorders/infectious-states-seizures/seizure-complications [Accessed 14 Jul. 2019]; Methylphenidate Hydrochloride Extended Release Tablets (generic Concerta) made by Mallinckrodt and Kudco | FDA [Internet]. U.S. Food and Drug Administration. 2019 [cited 14 July 2019]. Available from: https://www.fda.gov/drugs/drug-safety-and-availability/methylphenidate-hydrochloride-extended-release-tablets-generic-concerta-made-mallinckrodt-and-kudco*]

- Following antibiotic-related seizure complications :

Penicillin :

- The beta-lactam ring is a key feature of penicillin epileptogenesis. Ring substitution can influence convulsant activity. For example, substitution of a benzylic hydrogen with an amino group (as in ampicillin and amoxicillin, for example) reduces epileptogenic potential. Drugs characterized by the presence of a ureido group (e.g., piperacillin) appear less epileptogenic than penicillin.

Cephalosporin :

- Ceftriaxone, Cefotetan, Ceftazidime, and **Cefepime** (heterocyclic ring at position 3 and a heteroaromatic nucleus at position 7 of 7-aminocephalosporanic acid)—show similar evidence of epileptogenesis but less than that of penicillin. Compounds having one heterocyclic ring at position 7, such as cefuroxime and cefixime, show no epileptic activity.

Oxazolidinones	Altered target	Mutation leading to reduced binding to active site	E. faecium and S. aureus
Quinolones	Altered target Efflux	Mutation leading to reduced binding to active site (s) Membrane transporters	Mutations in gyr A in enteric Gram-negative bacteria and S. aureus Mutations in gyr A and per C in S. pneumoniae. Nor - A in S. aureus
Tetracyclines	Efflux Altered target	New membrane transporters Production of proteins that bind to the ribosome and alter the conformation of the active site	Tet genes encoding efflux proteins in Gram-positive and Gram-negative bacteria tet (M)and tet (O) in Gram-positive and Gram-negative bacteria species
Chloramphenicol	Antibiotic inactivation Efflux pump	Chloramphenicol acetyl transferase New membrane transports	CAT in S. pnemonia cml A gene and flo gene efflux in E. coli
Sulfa drugs	Altered target	Mutation of genes encoding DHPS	E. coli, S. Aureus. S. pneumoniae

94. Ans. is 'b & d' i.e., Thalidomide & Isotretinoin [*Ref: Sachdeva P, Patel B, Patel B. Drug use in pregnancy; a point to ponder!. Indian Journal of Pharmaceutical Sciences. 2009;71(1):1.*]

Risk category of drugs during pregnancy		
Category		**Examples**
A No risk	Adequate studies in pregnant women have failed to demonstrate a risk to the foetus	Inj. Mag. sulfate, thyroxine
B No evidence of risk in humans	Adequate human studies are lacking, but animal studies have failed to demonstrate a risk to the foetus or Adequate studies in pregnant women have failed to demonstrate a risk to the foetus, but animal studies have shown an adverse effect effect on the foetus	Penicillin V, amoxicillin, cefactor, erythromycin, paracetamol, lidocaine
C Risk cannot be ruled old	No adequate studies in pregnant women, and animal studies are lacking or have shown an adverse effect on foetus, but potential benefit may warrant use of the drug in pregnant women despite potential risk	Morphine, codeine, atropine, corticosteroids, adrenaline, thiopentone, bupivacaine
D Benefit may out weigh potential risk	There is evidence of human foetal risk, but the potential benefits from use of the drug may be acceptable despite the potential risk	Aspirin, phenytoin, carbamazepine, valproate, lorazepam, methotrexate
X Contraindicated	Studies in animals or humans have demonstrated foetal abnormalities, and potential risk clearly outweighs possible benefit	Estrogens, **isotretinoin**, ergometrine, **thalidomide**

95. Ans. is 'c' i.e., α, β, δ, ε [*Ref: Keywords A, Keywords I, Keywords M, Voices E, Month A, Expert A et al. Acetylcholine receptor anatomy [Internet]. Openanesthesia.org. 2019 [cited 14 July 2019]. Available from: https://www.openanesthesia.org/acetylcholine-receptor-anatomy/*]

Acetylcholine receptor anatomy

- The acetylcholine receptor (AChR) is a membrane protein that binds to the neurotransmitter acetylcholine (Ach). These receptors can be divided into two main types of distinct receptors, nicotinic and muscarinic. Nicotinic acetylcholine receptors (nAChR) are pentameric ligand-gated ion channels, whereas muscarinic acetylcholine receptors (mAChR) are seven-helix G-protein coupled membrane proteins.
- Nicotinic acetylcholine receptors (nAChR) These ligand-gated ion channels are present at the neuromuscular junction and signal muscular contraction with stimulation. ***The mature nicotinic acetylcholine receptor at the postsynaptic (muscular) membrane is composed of 5 subunits (two α, and one each of β, δ, and ε subunits)***. These subunits are arranged in a barrel or cylindrical shape around a central pore. Each of the two α subunits has an acetylcholine-binding site. The protein-receptor complex spans the entire membrane and extends from cytoplasm to beyond the extracellular membrane. Acetylcholine binds to the α subunit; both α subunits must be bound to an acetylcholine molecule in order to trigger conformational change of ion channel to allow influx of calcium and sodium ions intracellularly, and to allow efflux of potassium out of cell.
- The fetal or immature receptor is also referred to as "extrajunctional" because it can be located anywhere in the muscle membrane, inside or outside the neuromuscular junction. It consists of α, β, δ, and γ subunits; there are two subunits of α and one each of the others.

- MAOI, monoamine oxidase inhibitor; SE, side effect; SNRI, serotonin norepinephrine reuptake inhibitor; SSRI, selective serotonin reuptake inhibitor; TCA, tricyclic antidepressant.

100. Ans. is 'b' i.e., Antihistamine

- The obtained results suggest that autoimmune hypothyroidism in men is characterized by sexual and mood disturbances and that ***hypothyroid patients with sexual dysfunction and depressive symptoms benefit from L-thyroxine treatment.***
- Many other drugs including ***Antihistamines,*** pseudoephedrine, opioids and recreational drugs may cause sexual dysfunction and should be considered when assessing the patient.
- Many medical conditions and their treatments contribute to sexual dysfunction.Commonly implicated drugs include ***antihypertensives, antidepressants, antipsychotics and antiandrogens.***

101. Ans. is 'a & d' i.e., Falciparum is mostly resistant & Contraindicated in pregnancy [*Ref: Desai M, Gutman J, L'lanziva A, Otieno K, Juma E, Kariuki S, et al. Intermittent screening and treatment or intermittent preventive treatment with dihydroartemisinin–piperaquine versus intermittent preventive treatment with sulfadoxine–pyrimethamine for the control of malaria during pregnancy in western Kenya: an open-label, three-group, randomised controlled superiority trial. Lancet. 2015;386:2507–19.*]

Artimisinin derivatives (Artesunate, artemether, α/β Artether)

- These are the **fastest acting erythrocytic schizontocide.**
- **Mechanism of action** → The endoperoxidase bridge in its molecule interact with heme in the parasite. Iron mediated cleavage of the bridge releases a highly reactive free radicals species that binds to membrane proteins, causes lipid peroxidation, damages **endoplasmic reticulum,** ***inhibits protein synthesis*** and ultimately results in the lysis of the parasite.
- WHO recommends ***artemisinin-based combination therapies (ACTs) for the treatment of uncomplicated malaria caused by the* P. falciparum parasite**. By combining 2 active ingredients with different mechanisms of action, ACTs are the most effective antimalarial medicines available today. WHO currently recommends 5 ACTs for use against P. falciparum malaria. The choice of ACT should be based on the results of therapeutic efficacy studies against local strains of P. falciparum malaria.

[WHO update]

- ACT could be safely administered during the ***second and third trimester*** of pregnancy.

102. Ans. is 'c' i.e., Gabapentin; 'd' i.e., Carbamazepine [*Ref: ROFF HILTON, E., HOSKING, S. and BETTS, T. (2004). The effect of antiepileptic drugs on visual performance. Seizure, 13(2), pp.113-128*]

Antiepileptic drugs causing diplopia		
• ***Carbamazepine***	• Levetiracetam	• Vigabatrin
• Felbamate	• Excarbamazepine	• Tiagabine
• ***Gabapentin***	• Primidone	
• Lamotrigine	• Topiramate	

103. Ans. is 'c' i.e., Inhibits cell wall > 'd' i.e., Can penetrate CNS

- Bedaquiline works by blocking an enzyme inside the ***Mycobacterium tuberculosis bacteria called ATP synthase.*** This enzyme is used by the bacteria to generate energy. Without the ability to generate energy, the TB bacteria die and the patient's condition can start to improve.
- Bedaquiline is used in combination with other TB drugs to treat pulmonary TB in adults when they have multi drug resistant TB (MDR-TB). MDR-TB is when the TB bacteria that a person is infected with, are resistant to two of the main TB drugs isoniazid (INH) and rifampicin (RMP). This means that the drugs don't work.
- It should only be used when effective TB treatment cannot otherwise be provided. It is also sometimes used when other drugs cannot be used because of their side effects.
- It should be always be used in combination with at least 3 other TB drugs which drug susceptibility testing has shown that the patient is susceptible to. If drug susceptibility testing is not available then bedaquiline should be used with at least 4 other drugs to which the patient is likely to be susceptible.
- The most ***common side effects*** are headache, dizziness, feeling sick, being sick, joint pain and increases in liver enzymes. Side effects can be experienced by more than one in ten people.
- Another potentially significant side effect is that ***QTc prolongation*** was noticed during treatment. A prolonged QT interval means some alterations in the heart's electrical activity. There were also a higher number of reported deaths in the bedaquiline group, although these were not necessarily caused by bedaquiline.
- The role of BDQ for treatment of MDR tuberculous meningitis remains unclear; it was hypothesize that BDQ may be among second-line antituberculosis drugs with ***poor penetration in CSF.***

104. Ans. is 'a' i.e., 3gm [*Ref: Summary of product characteristics*]

Fosfomycin 3 g granules for oral solution

- Fosfomycin trometamol is a broad spectrum antibiotic, derived from phosphonic acid.
- *It inhibits the enzyme phosphoenolpyruvate transferase, which catalyses the formation of n-acetylmuramic acid from n-acetyl aminoglucose and phosphoenolpyruvate. N-acetylmuramic acid is required for the build-up of peptidoglycan, an essential component of the bacterial cell wall. Fosfomycin has a mainly bactericidal action.*
- Fosfomycin is indicated for the treatment of acute uncomplicated lower urinary tract infections in adults.
- Fosfomycin is indicated for periprocedural prophylaxis in diagnostic and surgical transurethral procedures.

Dose
- Woman >18 years : 3 g OD
- Man > 18 years : 3 gm every 2 days.

105. Ans. is 'd' i.e., Chlorthalidone [*Ref: The Evidence-Based Use of Thiazide Diuretics in Hypertension and Nephrolithiasis [Robert F. Reilly, Aldo J. Peixoto and Gary V. Desir*]

- The patient is having renal stones. Thus, thiazide diuretics which causes decrease calcium excretion are ideal. Chlorthalidone is a thiazide diuretics.
- ***Thiazide-type diuretics are commonly used in the treatment of hypertension and nephrolithiasis.***
- The hypocalciuric action of thiazides is the most likely mechanism whereby this drug class reduces calcium-containing kidney stone recurrence.
- The second potential explanation for why thiazide diuretics reduce stone recurrence is that they have favorable effects on other urinary constituents (magnesium and oxalate) that may reduce stone risk. They increase magnesium excretion, which may reduce stone formation.

106. Ans. is 'd' i.e., Multiple myeloma [*Ref: **Plerixafor – Mozobil FDA label document***]

- *Plerixafor, a hematopoietic stem cell mobilizer, is indicated in combination with granulocyte-colony stimulating factor (G-CSF) to mobilize hematopoietic stem cells to the peripheral blood for collection and subsequent autologous transplantation in patients with non-Hodgkin's lymphoma and multiple myeloma.*
- ***Plerixafor is an inhibitor of the CXCR4 chemokine receptor*** and blocks binding of its cognate ligand, stromal cell-derived factor-lq (SDF-1a). SDF-la and CXCR4 are recognized to play a role in the trafficking and homing of human hematopoietic stem cells (HSCs) to the marrow compartment.

107. Ans. is 'a' i.e., Rosuvastatin [*Ref: Brunton L, Knollmann B, Hilal-Dandan R. "Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 13th Edition". New York: McGraw Hill Medical (page number-803); Tripathi K. Essentials of medical pharmacology p. 306; Sharma H, Sharma K. Sharma & Sharma's principles of pharmacology p. 584*]

- Statins that do not use the CYP3A4 isoenzyme metabolic pathway are referred to as statin non-3A4 substrates (***pravastatin, fluvastatin, and rosuvastatin***).

Important facts
• *Statins are the most powerful LDL lowering drugs.*
• *Statins are the most effective and best tolerated hypolipidemic drugs.*
• ***Statins have no effect on lipoprotein (a)***
• ***All statins, except rosuvastatin and pravastatin are metabolized.***
• ***All statins are absorbed orally, maximum absorption is for fluvastatin.***
• ***Food increases absorption of all statins except pravastatin.***
• *Lovastatin and simvastatin are prodrugs, while pravastatin, fluvastatin, atorvastatin and rosuvastatin are administered in active form.*
• ***Pitavastatin is most potent followed by rosuvastatin.***
• *Fluvastatin and lovastatin are least potent.*
• *Rosuvastatin and atorvastatin are long acting.*
• ***Rosuvastatin is the longest acting.***
• *Rosuvastatin causes greater rise in HDL - cholesterol than other statins.*
• *Pravastatin has minimum drug interactions, minimum food interactions, minimum CNS penetration and minimum risk of myopathy.*
• ***Pravastatin decreases plasma fibrinogen level.***

v) The glomelular capillary wall shows a **double contour** or **tram track appearance** because of ***duplication of basement membrane*** as a result of new basement membrane synthesis.
vi) Within the basement membrane there is interposition of cellular elements that give rise to the appearance of **split basement membrane.**

- Type I and II MPGN differ in their ultrastructural features.
  - ***Type I*** → Subendothelial deposits.
  - ***Type II*** → Intramembranous deposition.

121. Ans. is 'a' i.e., Flea bitten kidney [*Ref: **Robbins 9th/e** p. 939*]

- Image is showing Flea bitten kidney.

Flea bitten kidney

- Shows multiple small pinpoint hemorrhages on the cortical surface of kidney from rupture of arterioles or capillaries. It is seen in :
  - Malignant hypertension
  - Infective endocarditis/ SABE
  - PSGN
  - TTP
  - HSP
  - PAN
  - HUS
  - RPGN
  - Wegener's granulomatosis

122. Ans. is 'b' i.e., T(12; 15)

Infantile fibrosarcoma

- Malignant neoplasm composed of uniform, cytologically malignant spindled fibroblasts or myofibroblasts occurring under age 10.
- Genetics- ***t(12;15) (p13; q26)*** present in most cases :
  - Involves NTRK3 tyrosine kinase receptor
  - Same translocation has been identified in congenital mesoblastic nephroma
  - Cytogenetic confirmation required if patient >2 years of age

123. Ans. is 'd' i.e., Addisonism [*Ref: **Robbins 9th/e** p. 653*]

- The given peripheral smear shows macrocytic RBC , hypersegmented neutrophils and one megaloblast; these features are seen in megaloblastic anemia. Out of the given options addisonism causes megaloblastic anemia.
- Fanconis anemia is a rare autosomal recessive aplastic anemia. It is caused by defects in a multiprotein complex that is required for DNA repair. There are associated multiple congenital anomalies like hypoplasia of kidney & spleen & bone anomalies which mostly involve thumbs or radii. Peripheral smear shows normocytic normochromic RBC.
- Cooley's anemia /Thalassemia major- patient is homozygous for β thalassemia genes. In severe cases requires blood transfusions. It manifests 6-9mths after birth, as hemoglobin synthesis switches from HbF to HbA. hb is very low. **There is markedly increased HbF.** repeated blood transfusion. Most common cause of death is cardiac failure due to iron overload-dilated > restrictive CMP. Survival 10-20yrs. Peripheral smear shows Anisocytosis, poikoilocytosis, **target cells,** basophilic stippling, **microcytic hypochromic RBC,** target cells, schistocytes, Nucleated RBC, howel jolly bodies
- **Banti anemia is a rare anemia** which is characterized by abnormal enlargement of the spleen (splenomegaly) due to obstruction of blood flow in some veins and abnormally increased blood pressure (hypertension) within the veins of the liver (e.g., hepatic or portal veins), or the spleen (splenic veins).the patient presents with aplastic anemia.
- **Addisonian or pernicious anemia** (PA), is characterized by the presence in the blood of large, immature, nucleated cells (megaloblasts) that are forerunners of red blood cells. (Red blood cells, when mature, have no nucleus). It is thus a type of megaloblastic anemia.

124. Ans. is 'b' i.e., AML [*Ref: **Robbins 9th/e** p. 595*]

- The history is of a 15 year old boy with fever. The peripheral smear shows all WBC with high nucleocytoplasmic ratio & prominent nucleoli, one of the cell shows a pink rod known as Auer rod- all these are blasts. These are myeloblast. So the diagnosis is acute myeloid leukemia.

	Lymphoblast	Myeloblast
Size	Small	Large
Cytoplasm	Scanty	Moderate
Granules, auer rods	Absent	Present
Chromatin	Coarse/clumped	Open
Nucleoli	2	2-5
Special stain	PAS	MPO, SBB, NSE

125. Ans. is 'c' i.e., t(8,14) [*Ref: **Robbins 9th/e** p. 597, 598*]

- Starry sky pattern is characteristic of Burkitt's lymphoma.

Translocation	Associated diseases
t(8;14)	Burkitt's lymphoma
t(11;14)	Mantle cell lymphoma
t(14;18)	Follicular lymphoma
t(8;21)	Acute myeloblastic leukemia with maturation
t(9;22)(q34;q11) Philadelphia chromosome	Chronic myelogenous leukemia (CML), acute lymphoblastic leukemia (ALL)
t(15;17)(q22;q21)	Acute promyelocytic leukemia
t(9;12)(p24;p13)	CML, ALL
t(12;21)	ALL
t(11;18)	MALT lymphoma
t(2;5)	Anaplastic large cell lymphoma
t(11;22)	Ewing's sarcoma
t(17;19)	ALL

126. Ans. is 'b' i.e., Cyclosporine

Macrophage-activation syndrome

- **Macrophage-activation syndrome** is a severe, potentially life-threatening, complication of several chronic rheumatic diseases of childhood. It occurs most commonly with systemic-onset juvenile idiopathic arthritis (SoJIA). Less commonly with with systemic lupus erythematosus (SLE), Kawasaki disease, and adult-onset Still's disease.
- **Etiology** - There is uncontrolled activation and proliferation of macrophages, and T lymphocytes, with a marked increase in circulating cytokines, such as IFN-gamma, and GM-CSF.
- The hallmark clinical and laboratory features include high fever, hepatosplenomegaly, lymphadenopathy, pancytopenia, liver dysfunction, DIC, hypofibrinogenemia, hyperferritinemia, and hypertriglyceridemia. Despite marked systemic inflammation, ESR is paradoxically depressed, caused by low fibrinogen levels.
- ***Treatment :- first line treatment is by parenteral administration of high dose corticosteroids. Steroid-resistant cases or refractory MAS require the addition of cyclosporine A.***
- High-dose intravenous immunoglobulins, antithymocyte globulins, etanercept, etoposide and plasmapheresis are other option.

127. Ans. is 'c' i.e, Kupffer cell

- X is Kupffer cell, these are part of mononuclear phagocytic system.
- 'Y' is endothelial cells
- A is Rit cell and 'B' are hepatocytes (Parenchymal cells)
- Hepatic parenchyma is organized into cribiform, anastomosing sheets or "plates" of hepatocytes, seen in microscopic sections as cords of cells. Hepatocytes immediately abutting the portal tract are referred to as the limiting plate, forming a discontinuous rim around the mesenchyme of the portal tract. There is a radial orientation of the hepatocyte cords around the terminal hepatic vein.
- Between the cords of hepatocytes are vascular sinusoids. Blood traverses the sinusoids. The sinusoids are lined by fenestrated and discontinuous endothelial cells, which demarcate an extrasinusoidal space of Disse, into which protrude abundant microvilli of hepatocytes.
- Scattered ***Kupffer cells*** of the mononuclear phagocyte system are attached to the luminal face of endothelial cells, and scattered fat-containing perisinusoidal stellate cells are found in the space of Disse. These stellate cells play a role in the storage and metabolism of vitamin A and are transformed into collagen-producing myofibroblasts when there is inflammation of the liver.

128. Ans. is 'd' i.e., Single donor platelets [*Ref:* ***Mollison's Blood Transfusion in Clinical Medicine***]

- **Crossmatching** is testing before a blood transfusion to determine if the donor's blood is compatible with the blood of an intended recipient. Compatibility is determined through matching of different blood group systems, the most important of which are the ABO and Rh system, and/or by directly testing for the presence of antibodies.
- In all of the following ie cryoprecipitate, PRP, FFP for transfusion, While the same ABO as the patient is the first choice, any ABO type component may be used. For single donor platelets, there are chances of contamination with RBC which cannot be seen with naked eye; ABO compatiblilty is done.
- Universal donor blood, which is both type O and Rh negative, can be given if the recipient's blood group is not known. Some institutions will only release O+ for male and O- blood for female patients. This serves two purposes. First, it preserves the lower stock of O- blood and secondly, this eliminates the risk of O- negative mothers forming anti-D (Rh) antibodies from exposure to O+ blood. Anti-D (Rh) can cross the placenta during pregnancy and attack an unborn child's RBCs if they are D (Rh) positive causing haemolytic disease of the newborn.

129. Ans. is 'd' i.e., Prostate carcinoma [*Ref: Handbook of Practical Immunohistochemistry*]

- Due to its highly restricted expression in prostate epithelial cells, NKX3.1 can be used as a diagnostic biomarker for prostate cancer and other metastatic lesions originating in the prostate

130. Ans. is 'a' i.e., CML [*Ref: **Robbins 9th/e** p. 644*]

Microangiopathic hemolytic anemia

- Characterised by fragmentation of RBC due to narrowing or obstruction of small blood vessels. In some disorders, the endothelial layer of small vessels are damaged with resulting fibrin deposition & platelet aggregation. As RBC travel through these damaged vessels they are fragmented resulting in intravascular hemolysis.
- It is seen in:
  - **DIC**
  - **TTP**
  - **HUS**
  - **Malignant hypertension**
  - Vasculitis **(Angitis)** in collagen diseases like SLE
  - Disseminated cancer
  - **HELLP syndrome & eclampsia**
  - **Prosthetic cardiac valves**
  - Peripheral smear shows fragmented RBC/schistocytes, burr cells, helmet cells, triangle cells & spherocytes

131. Ans. is 'a' i.e., Dilute RvvT [*Ref: practical-haemostasis.com*]

- ***Dilute Russell's Viper Venom Time [dilute Rvvt]***:- Russell's viper venom contains a potent activator of factor X which in the presence of phospholipid [PL], prothrombin and calcium ions clots fibrinogen to fibrin. In individuals with a lupus anticoagulant [LA] the antibody binds to the phospholipid inhibiting the action of the RVV and prolonging the clotting time.
- As the RVV directly activates factor X, the test is unaffected by deficiencies of factors XII, XI, IX or VIII.
  - Prolonged DRVVT which corrects with normal plasma → Clotting factor deficiency
  - Prolonged DRVVT which corrects with phospholipid → Lupus anticoagulant

132. Ans. is 'a' i.e., Retinoblastoma [*Ref: **Robbin's 9th/e** p. 294*]

- A young male having osteosarcoma points out to genetic etiology. Most commonly its associated with p53 & Rb gene.
- **Li-Fraumeni syndrome** is usually caused by inherited mutations that turn off the TP53 tumor suppressor gene. These mutations give a person a very high risk of developing one or more types of cancer, including breast cancer, brain tumors, osteosarcoma, soft-tissue sarcoma and adrenal cortical tumors.
- Inherited changes in the **retinoblastoma** (RB1) tumor suppressor gene increase the risk of developing retinoblastoma
- The given patient has a family history of breast cancer, which makes that this patient is having Li-Fraumeni syndrome. So the patient is having increased risk of leukemia.

133. Ans. is 'a' i.e., TNFRI [*Ref: **Robbin's 9th/e** p. 57*]

Proapoptic	Anti-apoptic
Apaf-1 (Apoptosis activating factor -1)	Bcl-2/BCl-X
cytochrome C	FLIP
Bak	
Bax	
Bim	
AIF	
P53 gene	
Caspases	
TNFRI	
Fas [CD95]	
FADD (Fas associated death domain)	

134. Ans. is 'b' i.e., PAX3 - FKHR

Rhabdomyosarcoma (RMS)

- Pediatric soft-tissue sarcoma with myogenic phenotype.
- The most common soft-tissue sarcoma in children, adolescents and young adults.
- RMS can be broadly divided into two major histopathologic subtypes: alveolar (ARMS) and embryonal (ERMS).
- Most ARMS cases display recurrent chromosomal translocation that fuses two transcription factor-encoding genes together; the PAX3 gene (in a minority of cases the PAX7 gene) and the FOXO1 gene.
- t(2;13), ‡ * t(1;13)—alveolar rhabdomyosarcoma (ARMS

- It is widely regarded as the cornerstone document on human research ethics.

PEDIATRICS

146. Ans. is 'c' i.e., Myotonia [*Ref: Nelson 20th/e p. 2500*]

- *Myotonia* means inability of muscles to relax & there is tonic spasm of muscle.
- ***Hypotonic infants***, such as ***preterm*** or ill infants lie with their arms and legs spread out. They, therefore, expose a greater area of skin for heat loss than do well, term infants who hold their arms and legs flexed against the body.
- ***Hypothermia*** in neonate can cause decreased activity, lethargy, and ***hypotonia***.
- Hypotonia in the newborn is a common presenting feature of systemic illness or neurologic dysfunction at any level of the central or peripheral nervous system. It is defined as reduced resistance to passive range of motion in joints.

Causes include (but are not limited to):

Central (most common)	• **Sepsis** • Hypoxic ischemic encephalopathy • Intracranial hemorrhage • Cerebral malformations • Chromosomal abnormalities (e.g. Trisomy 21, Prader-Willi syndrome) • Congenital infections (TORCH) • Drug effects (e.g. benzodiazepines, magnesium toxicity) • Inborn errors of metabolism • Endocrine: hypothyroidism • Benign congenital hypotonia
Spinal cord	• Birth trauma (especially breech delivery) • Syringomyelia
Anterior horn cell	• Spinal muscular atrophy • Neurogenic arthrogryposis
Neuromuscular junction	• Myasthenia gravis (transient/congenital) • Infantile botulism
Peripheral nerves	• Congenital hypomyelinating neuropathy • Hereditary motor and sensory neuropathies (Dejerine-Sottas disease) • Hereditary sensory and autonomic neuropathy • Guillain Barre syndrome (very rare)
Muscle	• Congenital myopathies (e.g. central core disease, Nemaline rod myopathy, myotubular myopathy, congenital fiber type disproportion and multicore myopathy)

147. Ans. is 'b' i.e., Renal agenesis [*Ref: Nelson 18th/e p. 537*]

- *The primary pathology in Potter's syndrome is Bilateral renal agenesis which leads to pulmonary hypoplasia and oligohydramnios.*
- *Bilateral renal agenesis* or **Potter syndrome** is associated with maternal oligohydraminos, pulmonary hypoplasia and potter *facies (widely separated eyes with epicanthic folds, low set ears, broad compressed flat nose, receding chin). The condition is incompatible with life, death occurs shortly after birth due to pulmonary hypoplasia.*

- ***This question is repeat from Jipmer Nov. 2017***

148. Ans. is 'c' i.e., > 15 minute [*Ref.: O.P. Ghai 8th/e p. 556; CPDT 18th/e p. 720*]

- There are following types of febrile convulsions :-
  1) ***Simple benign***
     - It is **more common**. It lasts for ***less than 10 minutes*** and is **generalized** in nature. There is usually single seizure in same day. ***No post-ictal neurological deficit occurs.***
  2) ***Complex (atypical)***
     - It lasts for more than 15 minutes and is focal in nature. More than one seizure occur in same day.

149. Ans. is 'b' i.e., 5

Silverman Anderson retraction score					
Score	Upper chest	Low chest retraction	Xiphoid retraction	Nasal flaring	Grunt
0	Synchronized	None	None	None	None
1	Lag on inspiration	Just visible	Just visible	Minimal	Stethoscope only
2	See- saw	Marked	Marked	Marked	Naked ear

- **A score of >6 is indicative of impending respiratory failure**

Coming back to question

- There is visible chest retraction (score 1), visible xiphoid retraction (score 1), inspiratory lag (score 1), minimal nasal flaring (score 1), and grunting audible by stethoscope (score 1) → Total score is 5.

ENT

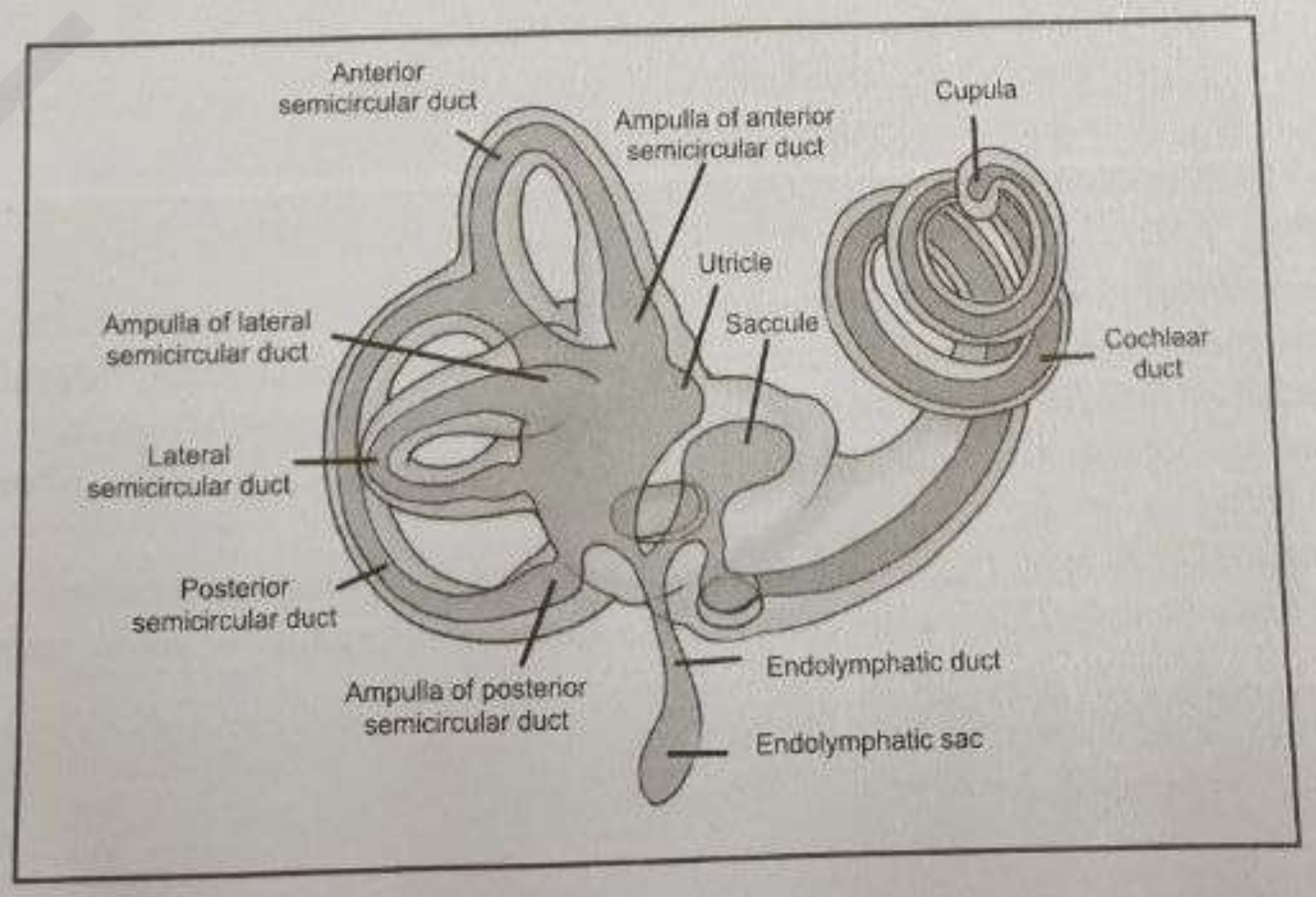
150. Ans. is 'c' i.e., Micheal malformation

- **Contraindications to cochlear implantation** may include deafness because of lesions of eight cranial nevre or brain stem.
- They can be analyzed in two ways; relative and absolute. ***The absence of cochlear development demonstrated on CT and MRI as in Micheal deformity and cochlear atresia and lack of auditory nevre are some of the absolute contraindications.***
- Several other absolute contraindications may be severe mental disease, severe mental retardation to cooperate with speech training and acute or chronic otitis media and mastoiditis without eradication of the disease.
- Certain medical conditions like pulmonary, cardiac and hematologic conditions, uncontrolled epilepsy and not being available for rehabilitation remain relative contraindications.
- But secretory otitis media is not a surgical contraindication for cochlear implantation.

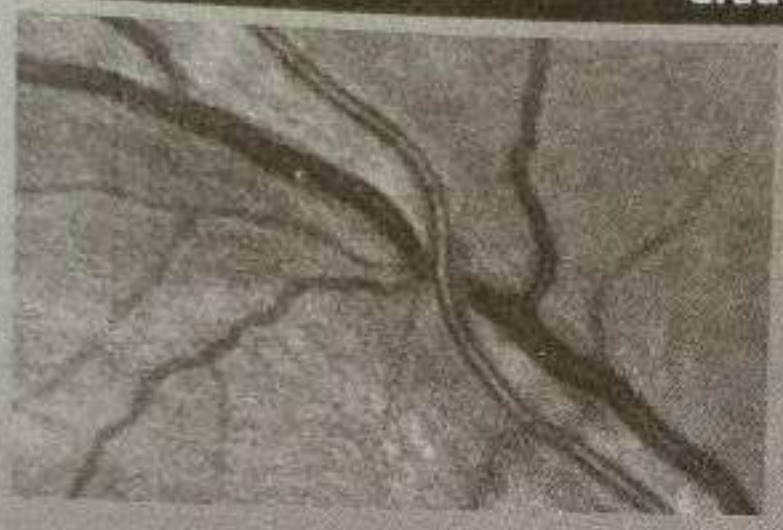
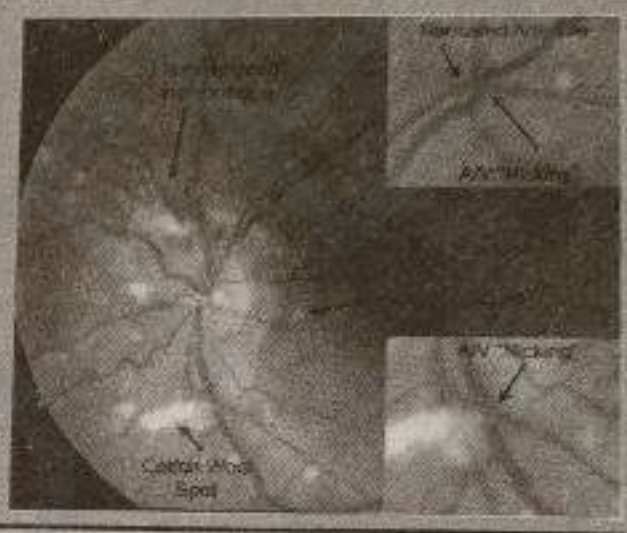
Absolute	Relative
• Agenesia of Cochlea • Agenesia of Cachlear Nerve • Severe mental disease • Acute/chronic otitis media and mastoiditis without eradication of the disease • Mental retardation to cooperate with speech training	• Inappropiate medical conditions (e.g. pulmonary, cardiac, hematologic) • Uncontrolled epilepsy • Not being available for postoperative rehabilitation

151. Ans. is 'b' i.e., Saccule [*Ref: **Dhingra 6th/e** p. 14*]

- It is a figure of **membranous labyrinth.**
- In the given figure 1 is utricle, 2 is saccule, 3 is cochla, 4 is endolymphatic duct and 5 is semicircular canal.



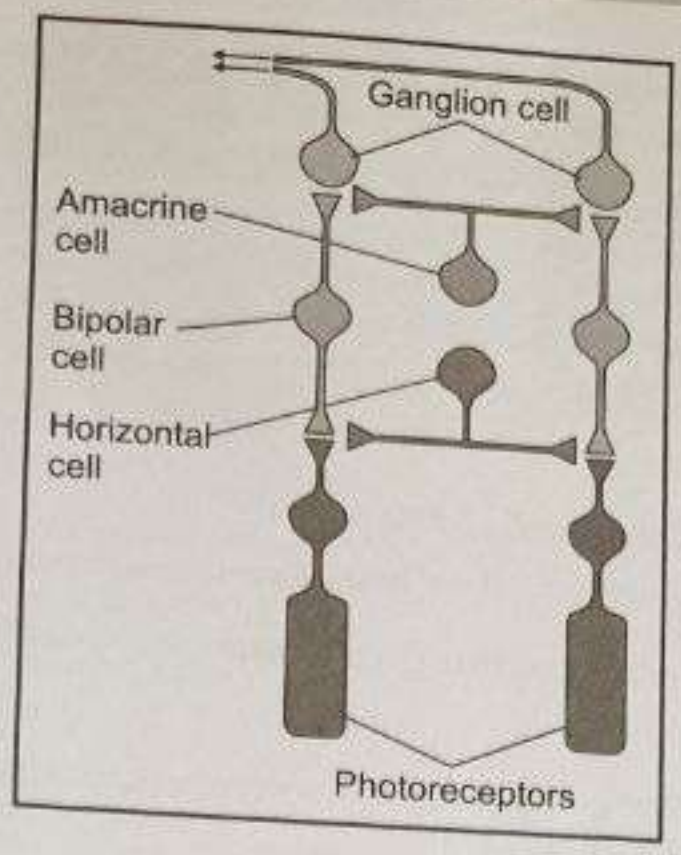
Grade I	Grade II
	
Narrowing of arteriole (blue arrow)	• Arteriolar narrowing (black arrow) • Salu's sign, i.e. deflection of vein at AV crossing (white arrow)

Grade III	
	
• Bonnet sign: Banking to AV crossing • Gunn sign (Marcus-Gunn sign) : Tapering of vein on either side of AV crossing	

Grade IV

162. Ans. is 'b' i.e., Amacrine cell [*Ref: Clinical ophthalmology 7th/e p. 786*]

- *1 is Ganglionic cell*
- *2 is Amacrine cell*
- *3 is Biopolar cell*
- 4 is Horizontal cell
- 5 is Cone
- 6 is Rod



163. Ans. is 'b' i.e., Induced by moving object [*Ref: **Yanoff and Ducker's 4th/e** p. 919*]

- The most important function of the oculomotor system is to stabilize image of the visual world on the retina, especially on the fovea centralis, the site of sharpest vision. Retinal images shifts during voluntary head movements or movements in the surrounding world. These shifts should be avoided, since these shifts would disturb vision and constant spatial perception. These functions are fulfilled by six different oculomotor subsystems involved in generating different eye movements type -

A) Versions :- Eye movements in which both eyes move in the same direction are called versions. Versions comprise following types of eye movements ;-

i) ***Saccades*** :- These are **rapid** conjugate eye movements that allow a visual target to be centered over fovea and occur as the gaze shifts from one object to another. Direction and velocity of saccades is too rapid for visual processing and cannot be corrected during their course. Saccades are two types :-

a) ***Voluntary:***- Serve to bring new objects of interest on the fovea centralis

b) ***Reflex saccades (Involuntary or reflective)*** :- Are generated to correct preceding slow deviations of the eyes from target following vestibular optokinetic stimulation (=rapid phases of the vestibular and optokinetic nystagmus).

ii) ***Smooth pursuit (following eye movements):***- These are ***voluntary, slow*** conjugate eye movements that keep moving objects of interest stable on the retina. They are much slower so that their direction and velocity can be continuously corrected during their course.

iii) ***Vestibuloccular reflex (VOR):***- These are slow conjugate eye movements, so the image of the fixated object remains stable on the retina during head and / or body movement (Note:- smooth pursuit is used when object is moving while VOR is used when observer's head/ body is moving).

iv) ***Optokinetic movement:***- These are ***slow reflexive (involuntary)*** conjugate movements generated during prolonged movements of the visual surrounding, for example viewing trees from a moving train. Prolonged stimulation in one direction induces an optokinetic nystagmus with smooth pursuit movement in the direction of the stimulus movement, and a rapid saccadic eye movement in opposite direction.

B) Vergences:- Eye movements in which eye moves in opposite directions are named vergences. Vergences movements are ***slow*** and ***disconjugate*** and ensures that fixated objects of interest moving towards or away from observer can be kept stable on the fovea. These may be :-

i) ***Convergence*** :- Both eye move in nasal direction, i.e., visual axes fuse.

ii) ***Divergence*** :- Both eyes move in temporal direction, i.e, visual axes deviate.

ORTHOPAEDICS

4. Ans. is 'c' i.e., Smith fracture

- Colle's fracture is an ***extra-articular*** fracture at the ***distal end*** of radius, at its ***cortico-cancellous junction***. It is the ***most common fracture in person over 40 years of age*** and especially in women after menopause ***(Postmenopausal females)***. The association of the fracture with osteoporosis is now well established and it is one of the ***fragility fracture***, seen in osteoporosis. The fracture nearly always caused by fall on outstretched hand.
- ***Colle's fracture occurs as a result of falling onto wrist in extension.***

- **It is a fracture of distal third of radius with palmar displacement**. Hence, it is called as reverse colles fracture (In colles fracture there is dorsal displacement).
- ***Smith fracture is caused by a falling onto flexed wrist.***

Chopart fracture-dislocation	A fractue dislocation through inter-tarsal joints
Malagaigne's fracture	A fracture of pelvis having a combination of ipsilateral fracture of pubic rami anteriorly and sacro-iliac joint disruption posteriorly.
Dashboard fracture	Fracture of posterior lip of acetabulum with posterior dislocation of hip.
Straddle fracture	Bilateral superior and inferior pubic rami fractures of the pelvis.
Jones fracture	Aulsion fracture at the base of 5th metatarsal

172. Ans. is 'a' i.e., Malgaigne fracture [*Ref: **Read below***]

- The give X-ray is showing pubic rami fracture (yellow arrows) and sacrum fracture causing SI disruption (white arrow) → **Malagaigne's fracture**

- ***See above table***

- **Bosworth's** fracture is fracture of distal fibula where proximal fibular fragment is trapped behind tibia.

173. Ans. is 'b' i.e., Navicular

Name	Site affected
• **Perthes's disease**	Femoral head
• Panner's disease	Capitellum
• **Kienbock's disease**	**Lunate bone**
• **Osgood Shlatter's disease**	**Tibial tubercle**
• Sever's disease	Calcaneal tuberosity
• **Kohler's disease**	Navicular bone
• Scheurmann's disease	Ring epiphysis of vertebrae
• Calve's disease	Central bony nucleus of vertebral body
• ***Frieberg's disease***	**Osteochondritis of 2nd metatarsal head.**
• ***Islene disease***	**Osteochondritis of 5th metatarsal head**
• ***Johansson-Larson's disease***	Osteochondritis of lower pole of patella.
• ***Preiser's disease***	Spontaneous avascular necrosis of scaphoid.

SURGERY

174. Ans. is 'a' i.e., T2 N1 M1 [*Ref: **Park 24th/e** p. 752*]

- The information in question
  - i) Tumor size 3 cm without extension beyond thyroid (T_2).
  - ii) Spread to lymph node/Lymph node positive (N_1).
  - iii) Distant metastasis to lung (M_1).

TNM Staging of thyroid carcinoma

Tumor

TX	:	The primary tumor cannot be evaluated.
T0	:	There is no evidence of a tumor.
T1	:	The tumor is 2 centimeters (cm) or smaller and limited to the thyroid.
T1a	:	The tumor is 1 cm or smaller.
T1b	:	The tumor is larger than 1 cm but less than 2 cm.
T2	:	The tumor is larger than 2 cm but smaller than 4 cm and is limited to the thyroid.
T3	:	The tumor is larger than 4 cm, but the tumor does not extend beyond the thyroid gland.
T4	:	The tumor is any size and has extended beyond the thyroid.
T4a	:	The tumor has spread beyond the thyroid to nearby soft tissues, the larynx, trachea, esophagus, or recurrent
	:	laryngeal nerve.
T4b	:	The tumor has spread beyond the regions in T4a (above).

Node (N)		
NX	:	The regional lymph nodes cannot be evaluated.
N0	:	There is no evidence of cancer in the regional lymph nodes.
N1	:	Cancer has spread to the lymph nodes.
N1a	:	Cancer has spread to the lymph nodes around the thyroid (called the central compartment; the pretracheal, paratracheal, and prelaryngeal lymph nodes).
N1b	:	Cancer has spread beyond the central compartment, including unilateral cervical (lymph nodes on 1 side of the neck), bilateral cervical (lymph nodes on both sides of the neck), contralateral cervical (the opposite side of the tumor), or mediastinal (the chest) lymph nodes.
Metastasis (M)		
MX	:	Distant metastasis cannot be evaluated.
M0	:	Cancer has not spread to other parts of the body.
M1	:	Cancer has spread to other parts of the body.

175. Ans. is 'a' i.e., High dose I^{131}

- The lung is a common organ of metastasis from differentiated thyroid carcinoma (DTC). Respiratory failure is the most common cause of death. ***^{131}I therapy is a widely accepted treatment for patients with lung metastasis from DTC.***
- ***High-dose ^{131}I therapy*** can be used as a diagnostic tool to identify tumor location, and a therapeutic effect may be present in individual cases.
- The information obtained with diagnostic radioiodinescans has the potential to impact staging and risk stratification, the decision to proceed with, or to omit ^{131}I therapy,and the long-term follow-up strategy. For making a rational decision on the prescribed therapeutic ^{131}I activity, the primary goal of ^{131}I therapy should be determined before ^{131}I dose administration and must take into account clinical and histopathologic information and the findings on preablation radioiodine scintigraphy for each individual patient. An understanding of the purpose of therapeutic ^{131}I administration is essential :-
  i) **Remnant ablation**, defined as the use of ^{131}I for elimination of normal residual functional thyroid tissue (thyroid remnant) for facilitating long-term follow-up and to maximize the therapeutic effect of any subsequent ^{131}I treatment;
  ii) **Adjuvant ^{131}I therapy**, defined as the use of ^{131}I for elimination of suspected but unproven metastatic disease;
  iii) **Targeted ^{131}I therapy**, defined as the use of ^{131}I for treatment of known local-regional and distant metastases.
- The initial ^{131}I treatment should be targeted at destroying residual or metastatic carcinoma, with the absorbed dose of radiation in the tumor as the best predictor of success for ^{131}I therapy.

176. Ans. is 'd' i.e., All of the above [*Ref: **Diagnostic ultrasound E book** p. 283*]

Acute Appendicitis: Sonographic Diagnosis

Identify Appendix
- Blind ended
- Noncompressible
- Aperistaltic tube
- Gut signature
- Arising from base of cecum (typically appendix is caudal to the base of the cecum but it may also be retrocecal and retroileal).
- Diameter greater than 6 mm (some use 7 mm for greater specificity).

Supportive features
- Inflamed perienteric fat
- Pericecal collections
- Appendicolith

- ***Definition of submucosa is lost in perforated cases.***

177. Ans. is 'c' i.e., More common in females [*Ref: **Sabiston 20th/e** p. 1284*]

- Meckel's diverticulum is the most common congenital anomaly of the GI tract.
- It is a remnant of vitellointestinal duct.
- Meckel's diverticulum is a ***true diverticulum*** as it has all the ***3 layers*** of the intestine.
- ***It is situated at the anti-mesenteric border of small intestine.***
- Male to female ratio is 3: 2.
- Approximately 60% of Meckel's diverticula contain ***heterotopic mucosa***, of which more than 60% consists of ***gastric mucosa.*** Second most common ectopic mucosa is that of Pancreas (**Pancreatic acini**). Other mucosas are – colonic mucosa, Brunner's gland, pancreatic islets, and endometriosis and hepatobiliary tissue.
- A useful but crude mnemonic used traditionally for describing Meckel's diverticula is 'Rule of two'.

186. Ans. is 'c' i.e., Depo-Provera [*Ref: **Read below***]

- All can be used in the given patient. However Depo-provera is best answer.

"DMPA (Depo-Provera) has an added benefit of preventing ovarian cyst formation and rupture".

World Health Organization Recommendations

- For patients with cardiovascular disease considering starting contraception, the World Health Organization has specifically made ***recommendations regarding deep vein thrombosis (DVT)/pulmonary embolism (PE).***
- *Combined oral cantraceptives (COCs), combined injectable contraceptives, and combined patch/vaginal ring contraceptives should all be avoided in those with a history of DVT/PE, acute DVT/PE, DVT/PE while receiving established anticoagulant therapy, major surgery with prolonged immobilization, or known thrombophilia (eg, factor V Leiden; prothrombin mutation; protein S, protein C, antithrombin deficiencies).*

Acceptable forms of contraception for these patients include

i) A copper intrauterine device (IUD),
ii) A progestin-only pill,
iii) A progestin-only levonorgestrel-releasing IUD,
iv) Progestin-only implants containing levonorgestrel/etonogestrel, and
v) Progestin-only injections using depot medroxyprogesterone acetate/norethisterone enanthate.

- Because progestin-only ("mini") pills and progestin implants do not predictably diminish heavy menstrual bleeding, these methods are less appropriate than DMPA or the LNG-IUD for anticoagulated women with heavy bleeding. Preventing ovulatory hemorrhage in anticoagulated women requires an agent that suppresses ovulation reliably Hence, ***DMPA(Depo Provera) is appropriate in this context,*** whereas the LNG-IUD, implants, and minipills (which do not consistently prevent ovulation) are not.
- Other methods of preventing pregnancy include barrier methods such as condoms (male and female), diaphragms, and cervical caps.

187. Ans. is 'c' i.e., ALP [*Ref: **Dutta's 9th/e** p. 6-10*]

- ***Alkaline phosphatase (ALP)*** normally increases during pregnancy because of production of placental isoenzyme and by term may reach three times the normal adult upper reference value. The value of 178 IU/L is likely to be normal. Pregnant women with isolated raised alkaline phosphatase in this range do not need any further investigation.
- *AST, ALT, Gamma-glutamyl transferase (GGT), LDH and total bilirubin levels are not much altered in normal pregnancy and therefore their altered levels may be used for assessment of liver function.*

Liver and Pancreatic Function Tests	
Parameter	**Value (Term)**
• AST	4-36 (IU/L)
• ALT	2-30 (IU/L)
• Total bilirubin	0.1-1.1 mg/dL
• LDH	80-500 U/L
▪ Amylase	10-100 IU/L
▪ Lipase	20-150 IU/L

- **Prothrombin time (PT)** is also used.

Normal Values of Blood Coagulation Profite		
	Test	**Value**
1.	**Bleeding time** (Duke's method) (Ivy's method)	1-3 min 1-9 min
2.	**Coagulation time -** (Wright's tube method) (Lee and White method)	 3-7 min 4-9 min
3.	**Clot observation test** (Weiner's)	6-12 min
4.	**Clot retraction time**	30 min
5.	**Fibrindex or Thrombin test**	Formation of a clot within 1 min
6.	**Prothrombin time**	8.5-13.1 sec
7.	**Thrombin time**	16-17 sec
8.	**Platelet count**	1.5-4 lac/mm^3
9.	**Euglobullin clot lysis time (ECL T)**	2-4 hours

- Other techniques may be used when all the above maneuvers have failed:
  - Deliberate fracture of the clavicle by finger pressure (fracture heals rapidly) or **cleidotomy**: One or both clavicles may be cut with scissors to reduce the shoulder girth. This is applicable to a living anencephalic baby as a first choice or in a dead fetus. **Zavanelli maneuver** (pushing the fetus back to the uterus and delivering by cesarean section) or **symphysiotomy** is done rarely.

190. Ans. is 'b' i.e., Increased respiratory rate [*Ref: Dutta's 4th/e p. 50*]

Respiratory system

Elevation of diaphragm	Breathing becomes diaphragmatic
Sub costal angle	Increase from 68 degree to 103 degree
Transverse diameter of chest	Increase by 2 cms
Chest circumference	Increase by 5-7 cms
Mucosa	Hyperaemic and congested
Respiratory rate	Unaffected
Vital capacity	Unaffected
Tidal volume	Increased by 40%
Residual volume	Decreased by 20%
Total lung capacity	Decreased by 5%
Functional residual capacity	Decreases
Inspiratory capacity	Increases
Resting minute volume	Increases
Oxygen consumption	• Increases 20% during pregnancy • Increases 40-60% during labour

191. Ans. is 'a' i.e., 5% [*Ref: with text*]

"Upto 4% of pregnancies may have cardiovascular complications despite no known prior disease" — medscape.com

Also know

Metcalfe's criteria for heart disease in pregnancy	
Signs	**Symptoms**
• Persistently dilated neck veins (↑ JVP) • Cyanosis/clubbing • Systolic murmur > Grade 3 • Diastolic murmur • Marked cardiomegaly • Sustained arrhythmia • Persistent split 2nd heart sound	• Orthropnea • Nocturnal cough • Chest pain • Hemoptysis • Synocope

Other facts

- *Most common acquired vulvular heart disease in Pregnancy: Mitral stenosis*
- *Most common congenital heart disease in pregnancy: Aterial septal defect*
- *Most common cyanotic CHD in pregnancy: Fallot's tetrology*
- *Heart disease with maximum maternal mortality: Eisenmenrger's syndrome*
- *Most common cause of maternal heart disease causing mortility in pregnancy: Mitral stenosis*
- *MC time of heart failure in pregnancy: Immediate postpartum > 2nd stage of labor > Late 1st stage of labor > 28-32 weeks of pregnancy.*

Heart Diseases in which Termination of Pregnancy is Advised Pregnancy is Contraindicated

1. Marfans syndrome with aorta involvement (> 45 mm)
2. Coarctation of aorta
3. Eisenmenger syndrome
4. Severe mitral stenosis or severe symptomatic aortic stenosis

192. Ans. i

193. An

5. Any heart disease which belongs to NYHA class 4 or class 3
6. Ejection fraction < 45%.
7. Previous Peripartum cardiomyopathy with any residual impairment of LV function.
8. Pulmonary arterial hypertension due to any cause.

192. Ans. is 'b' i.e., Injury to perineal skin and muscles

First degree	Injury to perineal skin only
Second degree	Injury to perineum involving muscles but not the anal sphincter
Third degree	Injury to perineum involving the anal sphincter complex
IIIa	Less than 50% of External anal sphincter (EAS) torn
IIIb	More than 50% of EAS torn
IIIc	Both EAS and Internal anal sphincter (IAS) torn
Fourth degree	Injury to the perineum involving the anal sphincter complex, (EAS and IAS) and anal epithelium

193. Ans. is 'd' i.e., Diagnostic gold standard is Gram staining of amniotic fluid

- **Chorioamnionitis or intraamniotic infection** is an acute inflammation of the membranes and chorion of the placenta, typically due to ascending polymicrobial bacterial infection in the setting of membrane rupture.
- The risk factors for this condition include:
  - **Young maternal age** (less than 21 years old)
  - Low socioeconomic status
  - **First pregnancy**
  - Long labor
  - Prolonged rupture of membrane
  - **Premature birth**
  - Multiple vaginal examinations during labor (only a risk factor in women with ruptured membranes)
  - Pre-existing infections of the lower genital tract
  - Internal fetal or uterine monitoring
- The key clinical findings associated with clinical chorioamnionitis include fever, uterine fundal tenderness, maternal tachycardia (>100/min), fetal tachycardia (>160/min) and purulent or foul amniotic fluid.
- ***Maternal fever is the most important clinical sign of chorioamnionitis. Temperature > 100.4°F is considered abnormal in pregnancy.***

Diagnosis of chorioamnionitis

a) **Clinical signs and symptoms**
   - As suggested by the name, clinical chorioamnionitis is diagnosed solely based on clinical signs since access to uncontaminated amniotic fluid or placenta for culture is invasive and usually avoided. Typically, the presence of fever > 100.4 is required in addition to two other signs (uterine tenderness, maternal or fetal tachycardia and foul/purulent amniotic fluid).

b) **Laboratory tests**
   - Findings from laboratory or bedside testing may aid in ruling in or out the diagnosis of chorioamnionitis, particularly when the clinical signs and symptoms are equivocal.

Clinical and amniotic fluid laboratory diagnosis of chorioamnionitis		
Test	Result suggesting chorioamnionitis	Comments
Clinical parameters		Generally non-specific
Fever	Temperature > 100.4 twice or > 101 once	95-100 sensitive
Maternal tachycardia	> 100/min	50-80 % sensitive
Fetal tachycardia	> 160/min	40-70 sensitive
Fundal tenderness	Tenderness on palpation	4-25% sensitive
Vaginal discharge	Foul - smelling discharge	5-22 % sensitive
Aminotic fluid parameters		
Culture	Microbial growth	Diagnostic gold-standard

Complications

- Peritonitis
- Hematometrocolpos
- UTI
- Urinary retention

197. Ans. is 'd' i.e., Contains 2 million primordial follicle [*Ref: Essentials of human embryology p. 950*]

- In humans, no new ova are formed after birth. During fetal development, the ovaries contain over 7 million primordial follicles.
- However, many undergo atresia (involution) before birth and others are lost after birth.
- **At the time of birth, there are 2 million ova**, but 50% of these are atretic.
- The million that are normal undergo the first part of the first meiotic division at about this time and enter a stage of arrest in prophase in which those that survive persist until adulthood.
- Atresia continues during development, and the number of ova in both of the ovaries at the time of puberty is less than 300,000.
- Only one of these ova per cycle (or about 500 in the course of a normal reproductive life) normally reaches maturity; the remainder degenerate.

Normal ovarian volume in neonates & childhood

Chronological age	Mean volume (cm3)
Birth to 3 months	1.1
4-12 Months	1.1
13-24 Months	0.7
2 years	0.8
3 years	0.7
4 years	0.8
5 years	0.9
6 years	1.2
7 years	1.3
8 years	1.1
9 years	2.0
10 years	2.2
11 years	2.5
12 years	3.8
13 years	4.0.2
Postpubertal	9.8

198. Ans. is 'c' i.e., Metropathia hemorrhagica

Metropathia hemorrhagica

- Also called as cystic glandular hyperplasia or Schroeder's disease.
- Seen in premenopausal women.
- Basic fault lies in ovaries.
- There is slow increase in secretion of estrogen with no negative feedback inhibition of FSH. Net effect is gradual rise in the level of estrogen with concomitant phase of amenorrhea for about 6-8 weeks.
- Initially amenorrhea then anovulation.
- As there is no progestational support so shedding ofendometrium takes place leading to heavy bleeding forlonger time.

Microscopic appearance:

- Marked hyperplasia of endometrial components.
- Some glands are small and others are large giving an appearance of **SWISS CHEESE** appearance.
- Absence of secretary changes.
- Glands are empty and lined by columnar epithelium.
- Areas of necrosis in superficial layers.
- Follicular cysts in the ovaries.
- There is absence of secretory endometrium with **absence of Corkscrew glands.**

MEDICINE

199. Ans. is 'b' i.e., GABRA-1 [*Ref: www.ghr.nlm.nih.gov*]

- Genes involved in Juvenile myoclonic epilepsy are :
  i) ***EFHC1*** — Most common
  ii) ***GABRA1***

ANAESTHESIA

240. **Ans. is 'b' i.e., Assist control ventilation** [*Ref: Essential of clinical anaesthesia p. 782*]

- **Assist-Control (AC) mode** is one of the most common methods of mechanical ventilation in the intensive care unit.
- AC ventilation is a volume-cycled mode of ventilation. It works by setting a fixed tidal Volume (VT) that the ventilator will deliver at set intervals of time or when the patient initiates a breath. The VT delivered by the ventilator in AC always will be the same regardless of compliance, peak, or plateau pressures in the lungs.
- ***A potential disadvantage of the assist-control mode is respiratory alkalosis*** in a small subset of patients whose respiratory drive supersedes the chemoreceptors and mechanical receptors.
- These conditions are typically identified with the first arterial blood gas results, and the assist-control mode of ventilation can then be changed to an alternate mode.

241. **Ans. is 'c' i.e., Measures pulsatile arterial & venous blood saturation** [*Ref: Dorsch & Dorsch 4th/e p. 827-829*]

- Pulse oximetry is used to **measure the oxygen saturation in blood (SPO_2)**. Probe is applied on pulsatile tissue beds like finger nail, toe nail, ear lobule, tip of nose to measure SpO_2. ***Normal SPO_2 is 97 to 98%.***

Principle of pulse oximetry

- ***Oxygenated hemoglobin (with high SpO_2) absorbs more infrared (940 nm) light and reduced hemoglobin (low SpO_2) absorbs more red (660 nm) light.*** Pulse oximetry uses these two wavelength to measure arterial oxygen saturation. Probe of pulse oximeter emits these two wave lengths (940 & 660 nm) ***into pulsatile tissue bed.*** Variable amount of these lights are absorbed by oxygenated and reduced hemoglobin. A photodetecter placed on the opposite side senses the ratio of red and infrared light based on which the proportion of oxygenated and reduced hemoglobin is estimated and displayed.
- **Oximetry is also used to determine oxygen concentration of hemoglobin by using isobestic points.**
- **Isobestic point** is a specific wave length at which two chemical species has the same absorptivity of light. For example oxygenated hemoglobin absorbs more infrared (940 nm) light and reduced hemoglobin absorbs more red (660 nm) light. However at 590 nm and 800 nm, both oxygenated and reduced hemoglobin has same absorption. So isobestic points of these two hemoglobin forms are **590 nm & 800 nm.**

What Does a Pulse Oximeter Measure?

There are Two numberical values obtained from the pulse oximeter monitor -

- **The oxygen saturation of haemoglobin in arterial blood.** The value of the oxygen saturation is given together with an audible signal that varies in pitch depending on the oxygen saturation. A falling pitch indicates falling oxygen saturation. Since the oximeter detects the saturation peripherally on a finger, toe or ear, the result is recorded as the peripheral oxygen saturation, described as SpO_2.
- **The pulse rate** in beats per minute, averaged over 5 to 20 seconds. Some oximeters display a pulse waveform or indicator that illustrates the strength of the pulse detected. This display indicates how well the tissues are perfused. The signal strength falls if the circulation becomes inadequate.

- Learning point: A pulse oximeter is an early-warming device.
- A pulse oximeter continuously measures the level of oxygen saturation of haemoglobin in the arterial blood. It can detect hypoxia much sooner than the anaesthesia provider can see clinical signs of hypoxia such as cyanosis. This ability to provide an early warning has made the pulse oximeter essential for safe anaesthesia.

Factors causing inaccurate reading in pulse oxi.meter

- **Carboxyhaemoglobinemia**
- **Methaemoglobinemia**
- Anaemia
- Poor peripheral pulsation
- Hypovolemia and vasoconstriction
- Vasodilatation
- **Nail polish**
- Shivering
- SpO_2 below 60%
- **Skin pigmentation**

- **Recent studies show that pulse oximetry readings are unaffected by fetal hemoglobin.**

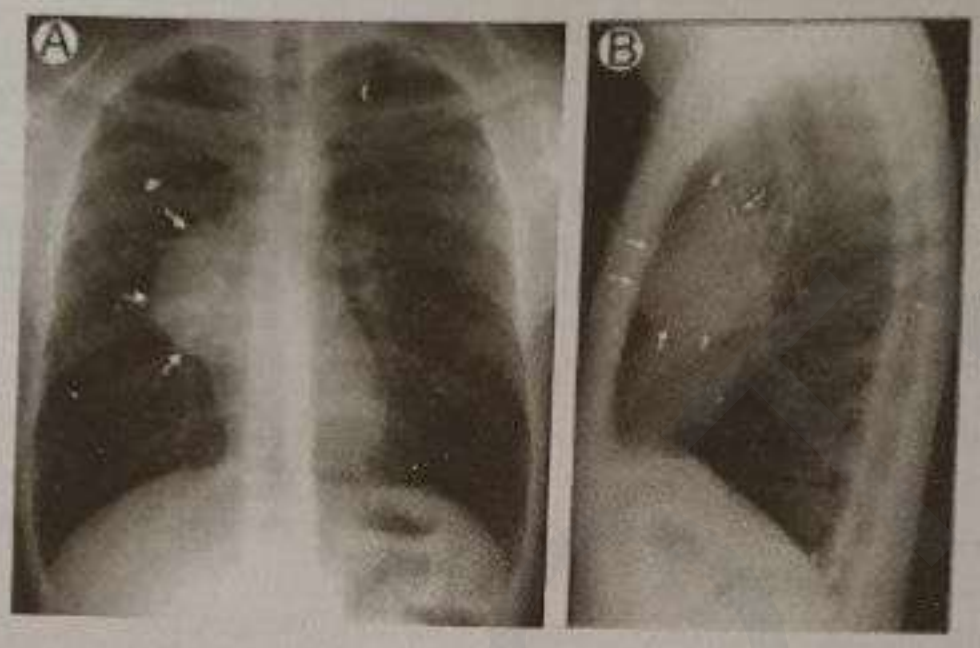
242. **Ans. is 'b' i.e., Used for confirmation of tracheal intubation** [*Ref: Miller's 7th/e p. 1427*]

- Capnography is the continuous **measurement of end tidal CO_2 ($ETCO_2$), i.e., CO_2 in exhaled air.** Normal value is ***35-45 mm Hg (4% to 6%).***
- Capnography works on the principle that ***infrared light is absorbed by carbon dioxide.*** A beam of infrared light is passed across the gas sample to fall on to a sensor. The presence of CO_2 in the gas leads to a reduction in the amount of light falling on the sensor which changes the voltage in the circuit.

Technique	Sensitivity %	Specificity %	Kappa %
MRI	20.83	100.00	9.52
Ultrasound	33.33	100.00	16.67
CBCT	79.17	100.00	60.32

248. Ans. is 'b' i.e., Mediastinal lymphoma [*Ref: Radiology at Glance 1st/e p. 156*]

- If PA chest X-ray (in left image) is showing lobulated widening of **superior/anterior medistinum** and on lateral X-ray (in Right image) there is obliteration of retrosternal clear space (space behind stenum).
- This is characteristic of lymphoma.
- Two most common anterior mediastinal masses are thymoma and lymphoma.
- **Thymoma** with have will defined mass in anterior mediastinum with clear margins.



- **Aortic aneurysm** will show abnormal aortic contour/size on chest X-ray.

- **Paravertebral abscess** will be in **posterior** mediastinum (so it can be excluded very easily as mass in question is in anterior mediastinum).

249. Ans. is 'b' i.e., 40 - 70 nm [*Ref: with text*]

"The optimal colloidal size for lymphoscintigraphy is believed to be approximately 50-70 mm" .....Radio journal

- Most radionuclide lymphatic flow studies use particulate materials.
- The agents studied include 99mTc-sulfur colloids, 99mTc-nano- and microaggregated albumin, 99mTc-antimony sulfide colloidal gold particles, liposomes, and emulsions administered into the interstitial space of animals and humans.
- Particles smaller than a few nanometers usually leak into blood capillaries, whereas larger particles (up to about 100 nm) can enter the lymphatic capillaries and be transported to lymph nodes.
- However, even large particles were detected in venous blood immediately after subcutaneous injection, probably as a result of direct capillary disruption by the needle.
- ***The optimal colloidal size for lymphoscintigraphy is believed to be approximately 50–70 nm.*** Individual estimates vary from 1 to 70 nm.
- Larger particles (100 nm) are believed to be trapped in the interstitial compartment for a relatively long period.

■■■

ANATOMY

1. **Ans. is 'a' i.e., Opposition of thumb** [*Ref: BDC 6th/e Vol. I p. 134, 128*]

- Nerve related to FDS tendon in wrist is median nerve (in carpal tunnel).
- Thus, there is injury to median nerve. Among the given options, only opposition of thumb will be affected in median nerve injury. Adduction (by Palmar interossei) and abduction (by dorsal interossei) of fingers and flexion of MTP joint of little finger (4th lumbricle) are done by ulnar nerve.
- Injury ***at wrist or in carpal tunnel*** produces low median nerve palsy.
- Long flexors of fingers are spared and there is paralysis of thenar muscles only.
- Following features are seen : -
  - i) *Pen test for abductor pollicis brevis paralysis.*
  - ii) ***Loss of opposition and abduction of thumb.***
  - iii) *Ape thumb deformity*
  - iv) *Loss of sensation of lateral 3½ fingers and lateral 2/3 of palm.*
- In contrast to high median nerve palsy, pointing index and Benediction test are not seen as long fexors are spared in low median nerve palsy.

2. **Ans. is 'c' i.e., Internal laryngeal nerve** [*Ref: BDC 7th/e Vol. III p. 244-245 & 5th/e Vol. III p. 219*]

GAPS BETWEEN PHARYNGEAL MUSCLES AND RELATED STRUCTURES

I. **Between base of the skull and superior constrictor i.e. above superior constrictor (Sinus of Morgagni) :**
   1. Levator veli palatine
   2. ***Auditory tube(eustachian tube)***
   3. Ascending palatine artery

II. **Between superior and middle constrictors :**
   1. Stylopharyngeus muscle
   2. Glossopharyngeal nerve

III. **Between Middle and Inferior constrictors :**
   1. Internal laryngeal nerve
   2. Superior laryngeal vessels

   These structures pierce the thyrohyoid membrane.

IV. **Between lower border of inferior constrictor and esophagus :**
   1. Recurrent laryngeal nerve
   2. Inferior laryngeal vessels

About option d

- Styloglossus muscle also passes through same gap.

"Styloglossus passes between the superior and middle constrictors to be attached to the side to tongue" — (web)

3. **Ans. is 'b' i.e., Deviation of tongue of one side** [*Ref: Keith moore 4th/e p. 1110*] — Clinical

- **Injury to hypoglossal (12th) nerve** paralyzes ipsilateral half of the tongue. When **tongue** is protruded, its *tip deviates towards* ***paralyzed side because of unopposed action of genioglossus muscle*** on the normal side of tongue.
- Hypoglossal nerve is a pure motor nerve (there is no sensory loss in hypoglossal palsy).

Hypoglossal nerve (XII nerve)

- It is a **purely motor nerve**. Its functional components are :-
  - i) **General somatic efferent :**
    - Arise from **hypoglossal nucleus** and ***innervates all intrinsic and extrinsic muscles of tongue*** (except palatoglossus)
  - ii) **General somatic afferent :**
    - Proprioceptive sensations from tongue muscles reach **mesencephalic nucleus of V nerve.**
- Hypoglossal nerve arises from medulla and leave cranial cavity through ***hypoglossal canal (anterior condylar canal)*** in neck, nerve passes forward on the superficial surface of hyoglossus. ***Some fibers of ventral ramus of C_1 nerve join the hypoglossal nerve and are distributed through its branches.***

Branches

- It addition to its own fibers, the nerve also carries some fibers from C_1 spinal nerve.
  1. **Branches of hypoglossal nerve proper :** Supply all muscles of tongue except palatoglossus.
  2. **Branches of hypoglossal nerve containg C_1 fibers :** These are :-
     - i) ***Meningeal branch*** : Supply dura mater of posterior cranial fossa.

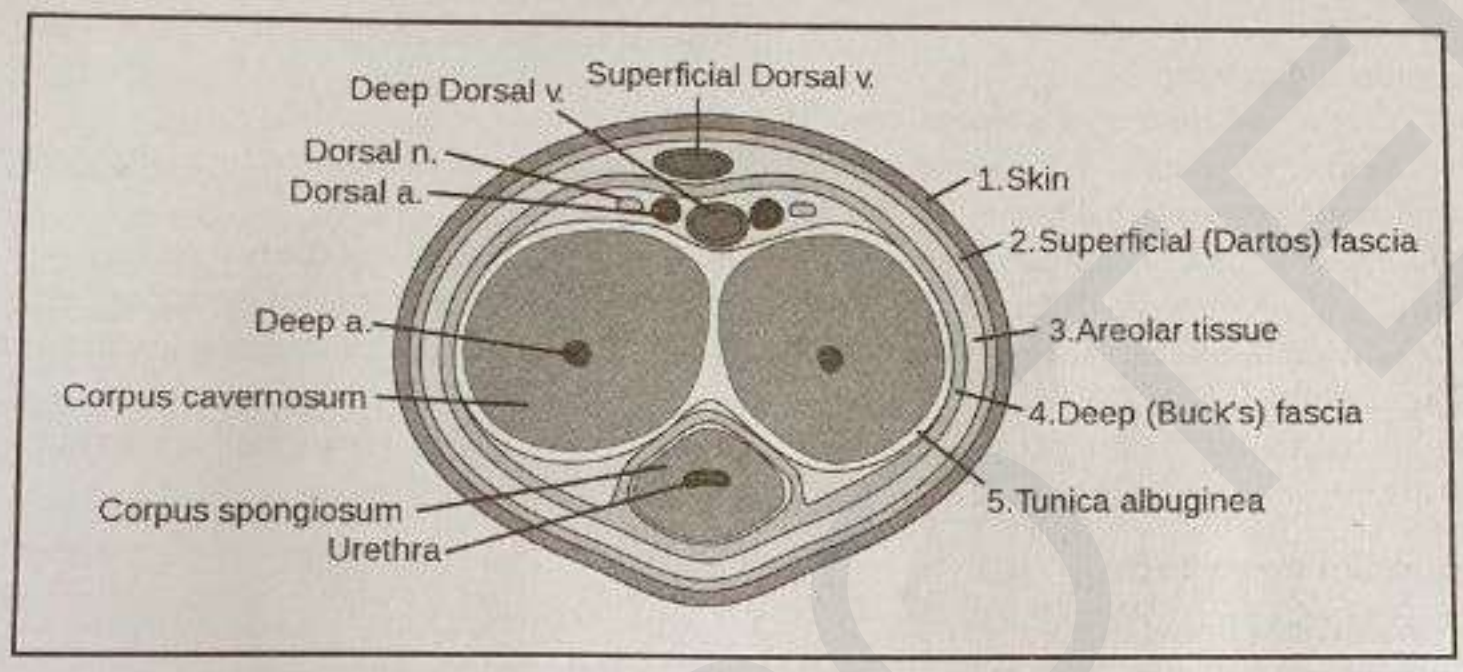
ii) ***Descending branch (descending hypoglossi or upper root of ansa cervicalis)*** : forms ansa cervicalis by communicating with inferior root of ansa cervicalis.
iii) ***Branch to thyrohyoid*** (C_1)
iv) ***Branch to geniohoid*** (C_1)

4. Ans. is 'd' i.e., Left circumflex coronary artery

- **Kugel's artery (arteria anastomotica auricularis magna)** is an anastomotic artery -
  i) Between proximal part of left circumflex artery and distal part of same artery (left circumflex artery) or distal part of right coronary artery.
  or
  ii) Between proximal part of right coronary artery and distal part of same artery (right circumflex artery).

5. Ans. is 'c' i.e., Buck's fascia [*Ref: **Gray's 39th/e** p. 775*]

- **Buck's fascia** is the deep fascia of **penis**.
- Dorsal artery of penis, Deep artery of penis (Deep dorsal artery) and dorsal nerve are deep to buck's fascia.



Ans. is 'a' i.e., Accessory cuneate nucleus

- The **posterior external arcuate fibers (dorsal external arcuate fibers)** take origin in ***the accessory cuneate nucleus;*** they pass to the **inferior cerebellar peduncle** of the same side.
- It carries proprioceptive information from the upper limbs and neck. It is an analogue to **the dorsal spinocerebellar tract** for the **upper limbs**. In this context, the "cuneo-" derives from the **accessory cuneate nucleus**, not the **cuneate nucleus**. (The two nuclei are related in space, but not in function).

Ans. is 'd' i.e., Parenchymal cells [*Ref: **Brijesh Kumar** p. 29*]

- In general, three different shapes of cells are seen in epithelia -
  i) Squamous
  ii) Cuboidal
  iii) Columnar
- Epithelial cells have three surfaces: a *basal surface* which is in contact with the basement membrane, an *apical surface* facing the surface of the epithelium and a *lateral surface* which is in contact with the same surface of the neighbouring epithelial cells.

Ans. is 'a' i.e., Spinal accessory nerve

- **Drooping of shoulder** is due to paralysis of trapezius which is supplied by ***spinal part of accessory nerve (spinal accessory nerve)***.

Also know

- **Pectoralis major is the most common muscle to be congenitally absent^{Q} (Poland syndrome)**. Sternocostal origin is the most commonly missing part.
- **Winging of scapula is caused most commonly by serratus anterior palsy^{Q}. This is typically caused by damage to long thoracic nerve^{Q} (nerve to SA)**. Secondary to serratus anterior palsy, a winged scapula is also caused by **trapezius palsy^{Q} and rhomboid palsy^{Q}, involving spinal accessory nerve and the dorsal scapular nerve respectively**. To test The ***Winged scapula*** due to serratus anterior palsy, with the arm flexed and the elbow extended the outstretched hand is pushed against a wall.
- **Dropped shoulder is caused by paralysis of trapezius^{Q}.**
- **Muscles which cross both shoulder and elbow :- biceps^{Q} and triceps (only long head^{Q})**
- **Bicipital aponeurosis** passes superficial to the ***brachial artery^{Q} and median nerve.*** It lies deep to **superficial veins^{Q}.**

- **Muscles with dual nerve supply (hybrid muscles) :-**
  1) ***Brachialis***^{Q} :- Supplied by radial nerve (proprioception) and musculocutaneous (motor).
  2) ***Pectoralis major and minor*** :- Supplied by medial and lateral pectoral nerve.
  3) ***Flexor digitorum profundus*** :- Supplied by ulnar nerve (medial half) and median nerve (lateral half).
  4) ***Flexor pollicis brevis***^{Q} :- Supplied by median nerve (superfical head) and deep branch of ulnar nerve (deep head).
  5) ***Subscapularis***^{Q} :- Supplied by upper & lower subscapular nerves.
- **Palmaris brevis is a remnant of panniculus carnosus**^{Q}.
- **Third head of coracobrachialis is denoted as struther's ligament**^{Q}.
- **Rotator cuff consists of supraspinatus**^{Q}**, infraspinatus**^{Q}**, teres minor**^{Q} and **subscapularis**^{Q}**. Most commonly tendon damaged among rototars is supraspinatus**^{Q}.

11.

9. **Ans. is 'a' i.e., Median point on anterior surface of chin**

- **Nasion (Na)** - The junction of the nasal and frontal bones at the most posterior point on the curvature of the bridge of the nose
- **Pogonion (Pg)** - The most anterior point on the contour of the chin
- **Gnathion (Gn)** - The most outward and everted point on the profile curvature of the symphysis of the mandible, located midway between pogonion and menton.
- **Menton (Me)** - The lowest point on the symphysis of the mandible
- **Basion (Ba)** - The anterior margin of the foramen mangnum. The midpoint of the curvature between upper and lower surfaces of the basilar portion of the occipital bone
- **Orbitale (Or)** - A point midway between the lowest point on the inferior margin of the two orbits
- **Gonion** - A point midway between the points representing the middle of the curvature at the left and right angles of the mandible
- **Articulare (Ar)** - A point midway between the two posterior borders of the left and right mandibular rami at the intersection with the basilar portion of the occipital bone
- **Porion (Po)** - The midpoint of th upper contour of the external auditory canal (Anatomic Porion) or a point midway between the top of the image of the left and right ear-rods of the cephalostat (Machine Porion)

10. **Ans. is 'a' i.e., Paraxial mesoderm**

- Mesoderm is divided into three parts :-
  1. **Paraxial mesoderm :**
     - It is organized into **somites** which in turn gives rise to :-
       i) ***Sclerotomes :*** Form axial skeleton including **vertebrae, ribs** and parts of neurocranium.
       ii) ***Myotomes :*** Form all **voluntary (skeletal) muscles of head, trunk and limbs.**
       iii) ***Dermatomes :*** Form dermis of skin, especially over dorsal regions.
  2. **Intermediate mesoderm :**
     - It gives rise to major portion of **urogeninal system :-**
       i) ***Urinary organs :*** Kidney, **ureters, trigone of bladder,** posterior wall female urethra, posterior wall of upper half of prostatic part of male urethra, inner glandular zone of prostate.
       ii) ***Reproductive organs :*** Gonads (**testis** and **ovary**), **epididymis,** ducts deferens, seminal vesicle, ejaculatory duct, uterus, uterine tube and upper part of vagina.
  3. **Lateral plate mesoderm :**
     - It forms :-
       i) ***Somatopleuric mesoderm (parietal layer)***
          - All connective tissues including specialized connective tissues like **bone**, cartilage, adipose tissue.
          - Dermis of skin over ventrolateral body wall and limbs.
          - Superficial and deep fascia.
          - Ligaments, tendons, aponeurosis.
          - Parietal pleura, parietal peritoneum and tunica vaginalis of testis.
          - Dura-mater.
          - Lid muscles, extraocular muscles.
          - **Sclera, choroid**, vitreous.
          - **Corneal stroma, iris and ciliary body (except epithelium).**
       ii) ***Splanchnopleuric mesoderm (visceral layer)***
          - **Smooth muscle and connective tissue of respiratory tract, gut, blood vessels and heart**
          - **Adrenal cortex**
          - Mesothelium (visceral layer) of pleural, peritoneal and pericardeal cavities.
          - Mesenchyme surrounding pericardial coelom gives rise to myocardium and serous pericardiun.
          - Spleen and lymph nodes.
       iii) ***Spetum transversum***
          - Diaphragm
          - Fibrous pericardium

12.

iv) *Angiogenic mesoderm*
- Endocardium of heart
- **Endothelium of blood and lymphatic vessels**
- **Microglia,** tissue macrophages
- **Circulating blood cells**

11. Ans. is 'c' i.e., Pineal gland [*Ref: Textbook of human embryology -786*]

Derivatives of neuroectoderm

i) ***From neural tube*** : CNS (**brain, spinal cord**), **astrocytes, oligodendrocytes, ependymal cells, retina,** pineal gland, neurohypophysis (posterior pituitary), **all cranial and spinal motor nerves.**

ii) ***From neural crest*** : Neural crest derivatives are :-

a) Neural derivatives
- Sensory neurons of 5th, 7th, 8th, 9th, 10th cranial nerve ganglia (trigeminal, geniculate, sphenopalatine, submandibular, cochlear, vestibular, otic and vagal parasympathetic ganglia).
- Sensory neurons of **spinal dorsal root ganglia.**
- **Sympathetic chain ganglia and plexus** (celiac/preaortic/renal ganglia, enteric plexus in GIT, i.e. **Auerbachs and Meissner's**)
- **Parasympathetic ganglia** and plexus of GIT.
- **Schwann cells** of peripheral nerves, satellite cells of all ganglia.
- **Adrenal medulla**, chromaffin cells, **para follicular C-cells of thyroid gland.**
- Melanocytes and **melanoblasts.**
- Glomus cells

b) Mesenchymal derivatives
- Dermal bones of skull : Frontal, parietal, temporal, nasal, vomer, palatine, mandible, maxillae.
- Leptomeninges : arachnoid and **pia mater** (Durameter is mesodermal).
- **Dentine of teeth (odontoblasts).**
- Eye : choroid, sclera, **iris epithelium**, pupillary muscles (**sphincter and dilator pupillae, ciliary muscles**).
- Pharyngeal arch cartilages.
- **Retinal pigmented epithelium.**
- Connective tissues of head including dermis, tendon, ligaments.
- Bulbar and conal ridges of heart.

Option d requires specific mention

Tunica media
- Tunica media of proximal vessels of heart develop from **neural crest cells.**
- Tunica media of **dorsal aorta** develops from **para-axial mesoderm.**
- Tunica media of most of the blood vessels develop from **lateral plate mesoderm** (splanchnopleuric layer).

12. Ans. is 'a' i.e., Trace from one zygomatico-frontal suture to other, a cross superior edge of orbit
- Facial bone fractures result from direct trauma and usually follow one of only a small number of patterns. 'McGrigor-Campbell' lines can be used as a simple aid to interpretation. The eye follows these lines to check for these common fracture patterns.
- **Line 1**- Joins two fronto-zygomatic sutures. It runs along the superior orbital margin on each side & centrally across the region of the glabella.
- **Line 2**- Traced from the zygomatic arch. If follows the zygomatic bone & continues along the inferior orbital margin across the frontal process of the maxilla & lateral wall of the nose through the septum.
- **Line 3**- Starts at the condyle of the mandible & traces across the mandibular notch & coronoid process to the lateral wall of the maxillary antrum.
- Line 4- Follows the occlusal curve of the upper & lower teeth.

- The **lower joint compartment** formed by the mandible and articular disc is involved in **rotational movements (elevation & depression)**

  - The lower part of the joint allows mainly the hinge-like depression and elevation of the mandible.
  - The upper part of the joint allows the head of the mandible to translocate forward (protrusion) onto the articular tubercle and backward (retraction) into the mandibular fossa.

- **Opening of mouth** involves ***both depression and protrusion.***
- The inferior compartment allows for the pure rotation of the condylar head, which corresponds to the first 20 mm or so of the opening of the mouth. Beyond 20 mm of opening, the mouth can no longer open without the superior compartment of the TMJ becoming active. At this point, if the mouth continues to open, not only is the condylar head rotating within the lower compartment of the TMJ; but the entire apparatus (condylar head and articular disk) translates, or slides forward in the glenoid fossa and down the articular eminence of the temporal bone; thus incorporating an anterior movement into the further opening of the mouth. This can be demonstrated by placing a resistance fist against the chin and trying to open the mouth more than 20 mm.
- **Closing of mouth** involves opposite movements.

16. Ans. is 'a' i.e., Tibiotalar

- Important ligaments around ankle are -
  a) Ligaments ***on medial side***
     - **Deltoid ligament consisting of :**
       - **Tibionavicular**
       - **Tibiocalcaneal**
       - **Tibiotalar (Both ant. and post.)**
  b) ***Ligaments on lateral side***
     - **Lateral ligament** consisting of :
       - **Talofibular (ant. and posterior)**
       - **Calcaneofibular**
  c) ***Syndesmotic* ligaments**
       - **Anterior tibiofibular**
       - **Posterior tibiofibular**
       - **Inferior transverse ligament**
       - **Introsseous ligament**

PHYSIOLOGY

17. Ans. is 'c' i.e., Airway compression [*Ref: Understanding of medical physiology 7th/e p. 786*]

Forced expiratory volume (FEV)

- The most commonly used forced expiratory volume (also called ***timed vital capacity***) is the ***FEV_1, which is the volume of air that is expired in the first second of the FVC, i.e., the maximum volume of air that the subject can expire in the first second of forced expiration.***
- FEV1 becomes more meaningful when it is expressed as a percentage of FVC : ***It is the FEV1/FVC ratio and not the FVC that is the cornerstone of diagnosis of obstructive long disease.***
- Normally, FEV_1/FVC is 83% (> 70%).

"Airway obstruction is the most common cause of reduction in FEV1"

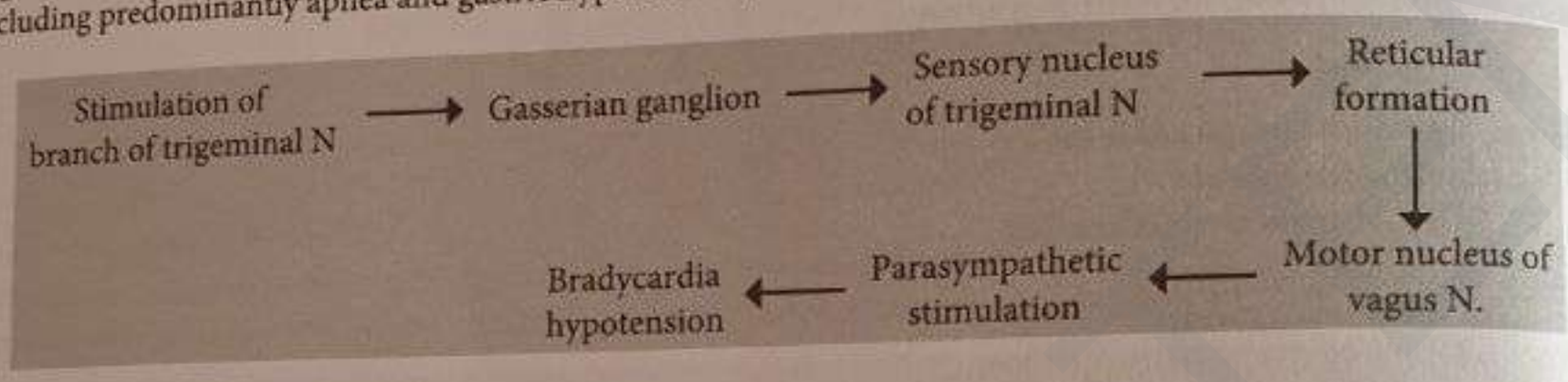
Dynamic airway compression

- **During inspiration,** small airways get stretched. This is (1) partly due to the increase in the volume of the lungs : when the lungs expand, they stretch the ***small airways,*** thereby increasing their diameter, and reducing the airway resistance; and (2) partly due to more negative intrapleural pressure. Hence ***airway resistance is lower during inspiration.***
- ***Conversely, during expiration, (specifically during forced expiration)*** the lung volume gets smaller, and the positive intrapleural pressure compresses the ***small airways,*** especially respiratory bronchioles. Some small airways might even collapse. **Due to this dynamic compression of airways, airway resistance is higher in expiration.**
- These simple facts explain many important physiological and pathological observations viz : -
  i) The expiratory flow rate cannot be increased beyond a certain maximum inspite of increasing the muscular effort during expiration.
  ii) **In forced expiration, the expiration stops in later stages due to complete collapse of smaller airways** and that is why residual air remains in the lungs. So, dynamic compression of airways is responsible for residual volume.
  iii) Patients find expiration much more difficult than inspiration during an attack of bronchial asthma.
  iv) In asthma, wheezing and ronchi originate in small airways, and are therefore expiratory. In contrast, if ronchi are due to obstruction of large airways by mucosal swelling or viscid secretions (as in bronchitis), the heard during both inspiration and expiration.

- Airway resistance changes with lung volume. **Airway resistance is low at higher lung volumes and it increases markedly when the lung volume is low**, especially when the lung volume decreases below its (FRC). This is because of compression of small airways at lower lung volumes.

18. Ans. is 'b' i.e., Hypotension + Bradycardia [*Ref: **Understanding of medical physiology 7th/e** p. 787*]

- The **trigeminal cardiac reflex (TCR)** is a unique brainstem reflex that manifests as typical hemodynamic perturbations including ***sudden lowering of heart rate (HR), mean arterial blood pressure (MABP), cardiac arrhythmias, asystole, and other autonomic reactions such as apnea and gastric hypermotility.***
- It results from stimulation of any branch of the fifth cranial nerve along its course. This stimulation triggers the nerve to send neuronal signals via the **Gasserian ganglion** to the sensory nucleus of the trigeminal nerve. In the sensory nucleus, the signals are linked through a powerful excitatory and polysynaptic connection to the reticular formation. This is considered as the afferent pathway of the reflex. Through short internuncial fibers to the reticular formation, the afferent pathway is connected to the efferent pathway of the reflex, which in significant part arises from parasympathetic neurons in the motor nucleus of the vagus nerve. The stimulation of the vagus nerve is responsible for bradycardia and hypotension as well as other manifestations including predominantly apnea and gastric hypermotility.



19. Ans. is 'd' i.e., 7.5 L [*Ref: **Read below***]

- First have a look about formula for calculation of cardiac output.

Fick principle

- Amount of a substance taken up by an organ (or by the whole body) per unit of time is equal to the arterial level of substance minus the venous level (A-V difference) times the blood flow.
- For lung the substance is oxygen (oxygen consumption per minute) and blood flow is equal to cardiac output.
- So, amount of oxygen taken up by lung = Cardiac output × Arteriovenous oxygen difference.

Now calculations

- Oxygen consumption is 300 ml/min
- Arterio-venous oxygen difference = 20 - 16 = 4 ml/dl or 0.04 ml of oxygen/per ml of blood (as oxygen consumption is given in ml, we should convert every unit to ml; and 1 ml = 0.01 dl).
- So, cardiac output = 300/0.04 = 7500 ml or 7.5 L

20. Ans. is 'c' i.e., Alveolar pressure < Venous pressure < Arterial pressure [*Ref: **Read below***]

- Pulmonary artery pressure = 20 ± 5 mm Hg
- Pulmonary venous pressure = 16 ± 5 mm Hg
- Alveolar pressure = Range –1 to –2 cm H_2O (minus 0.74 mm Hg to minus 1.48 mm Hg) in inspiration to +1 to +2 cm H_2O (+ 0.74 to + 1.48 mm Hg) in expiration.

21. Ans. is 'a' i.e., Decrease blood glucose [*Ref: **Understanding of medical physiology 7th/e** p. 331*]

- Incretins are gut hormones that are secreted from enteroendocrine cells into the blood within minutes after eating.
- ***Their major physiological role is to regulate the amount of insulin that is secreted after eating.***
- Incretins are hormones that are released from the gut into the bloodstream in response to ingestion of food, and they then modulate the insulin secretory response to the products within the nutrients in the food. The insulin secretory response of incretins, called the incretin effect, accounts for at least 50% of the total insulin secreted after oral glucose. Therefore, by definition, ***incretin hormones are insulinotropic (i.e., they induce insulin secretion) at usual physiological concentrations seen in the plasma after ingestion.***
- There are two incretins, known as ***glucose-dependent insulinotropic peptide (GIP) and glucagon-like peptide-1*** (GLP-1), that share many common actions in the pancreas but have distinct actions outside of the pancreas.
- GIP exerts glucose-dependent stimulatory effects on insulin secretion, thereby ensuring prompt insulin-mediated uptake of glucose into tissues.It is synthesized in and released in response to nutrients from enteroendocrine cells (called K cells) primarily in the proximal small intestine (duodenum and jejunum).In addition to being insulinotropic, GIP is involved in fat metabolism in adipocytes: it enhances insulin-stimulated incorporation of fatty acids into triglycerides, stimulates lipoprotein lipase activity, modulates fatty acid synthesis, and promotes β-cell proliferation and cell survival.
- GLP-1 stimulates insulin secretion, inhibits gastric emptying, ***inhibits glucagan secretion***, and decreases gluconeogenesis.
- ***Both incretins decrease glucose levels by inducing insulin release.***
- ***Both incretins are rapidly deactivated by an enzyme called dipeptidyl peptidase – 4 (DPP4)***

22. Ans. is 'a' i.e.,

- Continued
compensa
1) Hyper
2) Rise i
3) Polyc
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Note

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23. Ans. is 'c' i

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24. Ans. i

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"Maximal cardiac outputs range from about 25 to 40 L/min"

- *So cardiac output increase is 5 to 8 times (normal is 5 L/min)*

"During exercise, PaO_2 remains constant. The same is true for $PaCo_2$ and pH, until they increase during heavy exercise"

25. **Ans. is 'a' i.e., 100 pg/ml** [*Ref:* ***Textbook of -Laboratory assessment 2th/e*** *p. 712*]

Normal values
Atrial natriuretic peptide (ANP) → 22-77 pg/ml (22-77 ng/L)
Brain natriuretic peptide (BNP) → < 100 pg/ml (100 ng/L)

26. **Ans. is 'd' i.e., 50 ml/100 gm** [*Ref:* ***Ganong 25th/e*** *p. 607*]

"Cerebral blood flow is maintained at ~ 50 ml per 100 gm of brain tissue per minute"

- The normal blood flow and oxygen consumption in different organs and tissues is different. Under resting conditions the distribution of cardiac output, blood flow and oxygen consumption in major organs and tissues are as follow : -
  - ***Total blood flow i.e., ml/min (blood flow to whole organ) :*** **- Liver (1500) > Kidney (1260) > Skeletal muscle (840) > Brain (750) > Skin (462) > Heart (250).**
  - ***Blood flow per unit mass (ml/100gm/min) :*** **- Kidney (420) > Heart (84) > Liver (57·7) > Brain (54) > S8) > Skeletal muscle (2·7).**
  - ***Total oxygen consumption, overall (ml/min) :*** - Liver > Skeletal muscle > Brain > Heart > Kidney > Skin.
  - ***Oxygen consumption per unit mass (ml/100 gm/min) :*** - Heart > Kidney > Brain > Liver > Skin > Skeletal muscle.
  - ***Percentage of total cardiac output :-*** Liver (27.8 %) > **Kidney (23.3%)** > Skeletal muscle (15.6%) > Brain (15.%) > Skin (8.6) > Heart (4.7%). Sequence is same as for total blood flow as the total blood flow to an organ is the percentage of cardiac output to that organ.

27. **Ans. is 'b' i.e., K^+** [*Ref:* ***Understanding of medical physiology 3rd/e*** *p. 712*]

- The peripheral chemoreceptors which regulate respiration are located in the ***carotid body and aortic bodies.*** These bodies are located in the connective tissue associated with the vessel wall, at the bifurcation of the common carotid, and on the arch of aorta, respectively. The characteristic cells of both these structures are ***called glomus cells.*** **Type I glomus cells** have a high dopamine content, which they possibly employ as a neurotransmetter. Peripheral chemoreceptors convey information to the DRG of neurons in medulla, for which purpose ***the afferent neurons from the carotid bodies pass through glossopharyngeal*** *nerve* and from the ***aortic bodies pass through vagus nerve.***
- **The most potent natural stimulus for peripheral chemoreceptors is low arterial PO_2 (hypoxic hypoxia).** The other stimuli which activate peripheral chemoreceptors are **high arterial PCO_2,** and **an increase in arterial hydrogen ion concentration (acidosis or low pH).** The response to activation of peripheral chemoreceptors is an increase in pulmonary ventilation through an increase in the rate and depth of breathing.
- *Hypoxia stimulate the release of dopamine which then binds and activates action potentials in the afferent fibers. Hypoxia appears to affect* **O_2-sensitive potassium channels**, *with hypoxia reducing the* **potassium cation efflux**, *thus depolarizing the glomus cells*

- ***This question is a direct repeat from DNB & NEET***

28. **Ans. is 'c' i.e., Rk** [*Ref:* ***Read below***]

- Local circuit of current flow is responsible for propagation of action potential.
  - Once the action potential is generated at one area there is excess Na^+ inside the cell (AP spike is due to influx of Na^+)
- So, Na^+ is in excess inside the cell (intracellularly) at the site of generation of AP. These Na^+ ions diffuse sideways intracellularly to adjacent areas (i.e., from high concentration to low concentration). So positive charge moves to adjacent areas proximally & distally.
- Sodium ions diffuse sideways in both direction, i.e., area ahead of action potential and area behind action potential, as both of these resting areas have lower concentration of Na^+ ions than area of depolarization. **This movement of Na^+ ions** (positive charge) **intracellularly is called local circuit current flow** because it is associated with extracellular movement of negative charge in opposite direction.
- When this local circuit is set up it leads to deplorization of adjacent areas. And if depolarization reaches threshold (-55 mV) there is generation of AP in adjacent area (area next to Previous action potential).
- There are many factors that affect the nerve conduction. **Propagation of action potential (nerve conduction) is favoured by :**
  i) **Low axoplasmic resistance (Ri)**
  ii) Low external longitudinal resistance (Ro)

35. **Ans. is 'a' i.e., apoc II** [*Ref: Harper 30th/e p. 257 & 29th/e p. 242*]

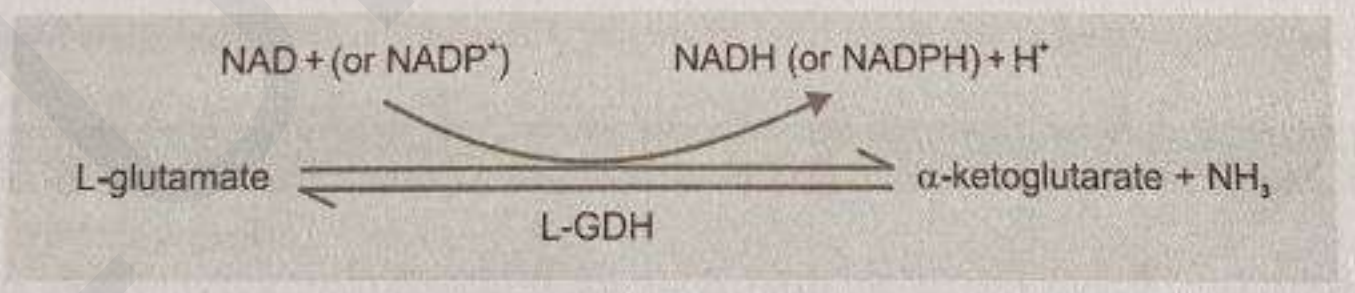
Type	Found in	Site of synthesis	Function
Apo-A			
A-I	HDL, **Chylomicrons**	Liver, intestine	**Major structural protein of HDL, major activator of LCAT.**
A-II	HDL, Chylomicrons	Liver, intestine	Structural protein of HDL, Inhibits lipoprotein lipase (LPL), stimulate hepatic lipase, inhibits LCAT
A-IV	HDL, Chylomicrons	Intestine	Promotes lipoprotein lipase (LPL) mediated triglyceride lipolysis
A-V	Chylomicrons, VLDL	Liver	
Apo-B			
B-100	LDL, VLDL, IDL	Liver	Structural protien of VLDL, IDL; **only apoprotein of LDL; mediate uptake of LDL by LDL receptors *of liver***
B-48	**Chylomicrons chylomicron remnants**	Intestine	Structural protein of chylomicrons
Apo-C			
C-I	**Chylomicrons**, VLDL, Liver HDL		Inhibits cholesteryl ester transfer protein (CETP), **Activates LCAT and LPL**
C-II	Chylomicrons, VLDL, HDL		**Activates lipoprotein lipase (major activator)**
C-III	Chylomicrons VLDL, HDL Liver	**Liver**	**Inhibits lipoprotein lipase**
Apo-D	HDL	Spleen, brain, testes, adrenal	
Apo-E (arginine rich)	**Chylomicrons, chylomicron remnants,** VLDL, HDL	Liver	Mediates uptake of chylomicron remnants and IDL by LDL receptors in liver

36. **Ans. is 'd' i.e., Pyridoxin** [*Ref: Harper 30th/e p. 167*]

- Four of the B vitamins are essential in the citric acid cycle :
  1) **Riboflavin**, in the form of flavin adenine dinucleotide (FAD), a cofactor for ***succinate dehydrogenase.***
  2) ***Niacin***, in the **form of nicotinamide adenine dinucleotide** (NAD) the electron acceptor for ***isocitrate*** **dehydrogenase, α-ketoglutarate dehydrogenase**, and **malate *dehydrogenase***
  3) **Thiamin (vitamin B_1)**, as thiamine diphosphate, the coenzyme for decarboxylation in α-***ketoglutarate dehydrogenase*** reaction.
  4) ***Pantothenic acid***, as part of coenzyme A, the cofactor attached to "active" carboxylic acid residues such as acetyl-CoA and succinyl CoA.

37. **Ans. is 'b' i.e., Inhibited by ADP** [*Ref: Harper 30th/e p. 292*]

- **Glutamate dehydrogenase (GDH)** catalyzes reversable oxidative deamination of glutamate to α-ketoglutarate



- Glutamate dehydrogenase occupies central position in nitrogen metabolism. **GDH is a mitochondrial matrix enzyme. Hepatic** glutamate dehydrogenase releases the nitrogen of amino group of glutamate as ammonia, i.e. GDH catalyses **reversible oxidative deamination** of glutamate into α-ketoglutarate and ammonia. ***It is an unusual enzyme in being able to utilize both NAD+ and NADP+ as co-substrates.*** Liver GDH is an allosteric enzyme which is **inhibited by ATP, GTP, and NADH and is activated by, leucine, valine, isoleucine, ADP and GDP.**
- **As it is a mitochondrial enzyme, levels of GLDH do not raise following generalised inflammatory conditions of liver like viral hepatitis**. It is found to increase only following necrotic damage to liver parenchymal cells (Unlike AST and ALT, levels of which get elevated even in acute hepatitis). **Hence GLDH levels are estimated to differentiate acute inflammatory liver damage from toxic necrotic liver disorders. In other words, GLDH is used to check safety of drugs.**

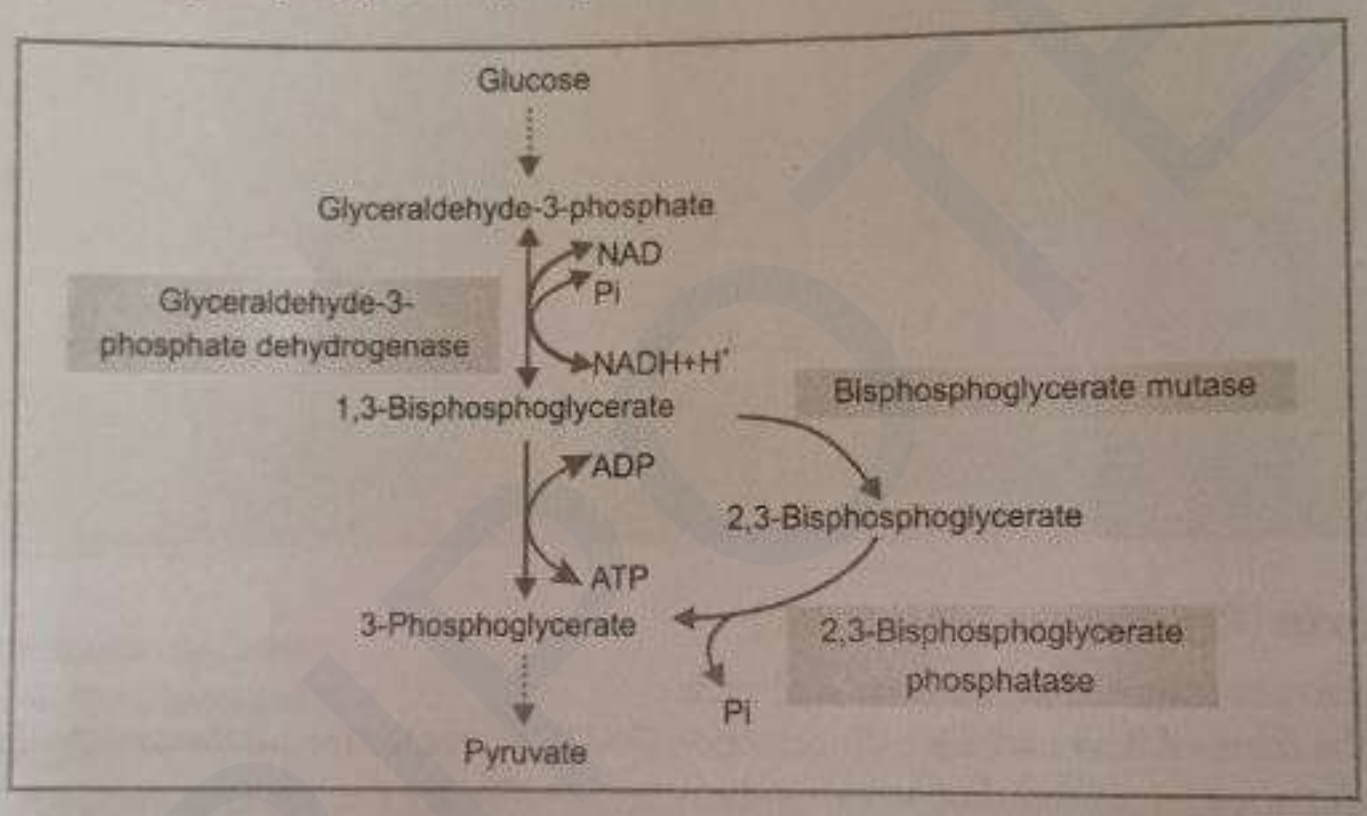
38. Ans. is 'c' i.e., Complex III [*Ref: Harper 30th/e p. 129, 132*]

Inhibitors of Electron transport chain (Respiratory chain)
• ***Complex I*** :- Barbiturates ***(amobarbital)***, piercidin A, ***rotenone***, chlorpromazine, guanithidine.
• ***Complex II*** :- Carboxin, TTFA, malonate.
• ***Complex III*** :- Dimercaprol, BAL, actinomycin A, Naphthyloquinone.
• ***Complex IV (cytochrome c oxidase)*** :- ***Carbon monoxide (CO), cyanide (CN^-), H_2S,*** azide (N^3)

39. Ans. is 'd' i.e., Two ATPs are produced [*Ref: Harper 30th/e p. 172*]

Rapoport Luebering cycle (Bisphosphoglycerate shunt)

- **This cycle occurs in erythrocytes (RBCs).**
- In this production of ATP by substrate phosphorylation from 1,3-BPG is bypassed by taking diversion pathways, i.e., ***side reaction of glycolytic pathway.***
- In this cycle, 1,3-BPG is converted to **2,3 BPG** by an enzyme ***bisphosphoglycerate mutase.*** Then 2,3 BPG is converted to 3-phospholycerate by ***2,3-bisphosphoglycerate phosphatase.***



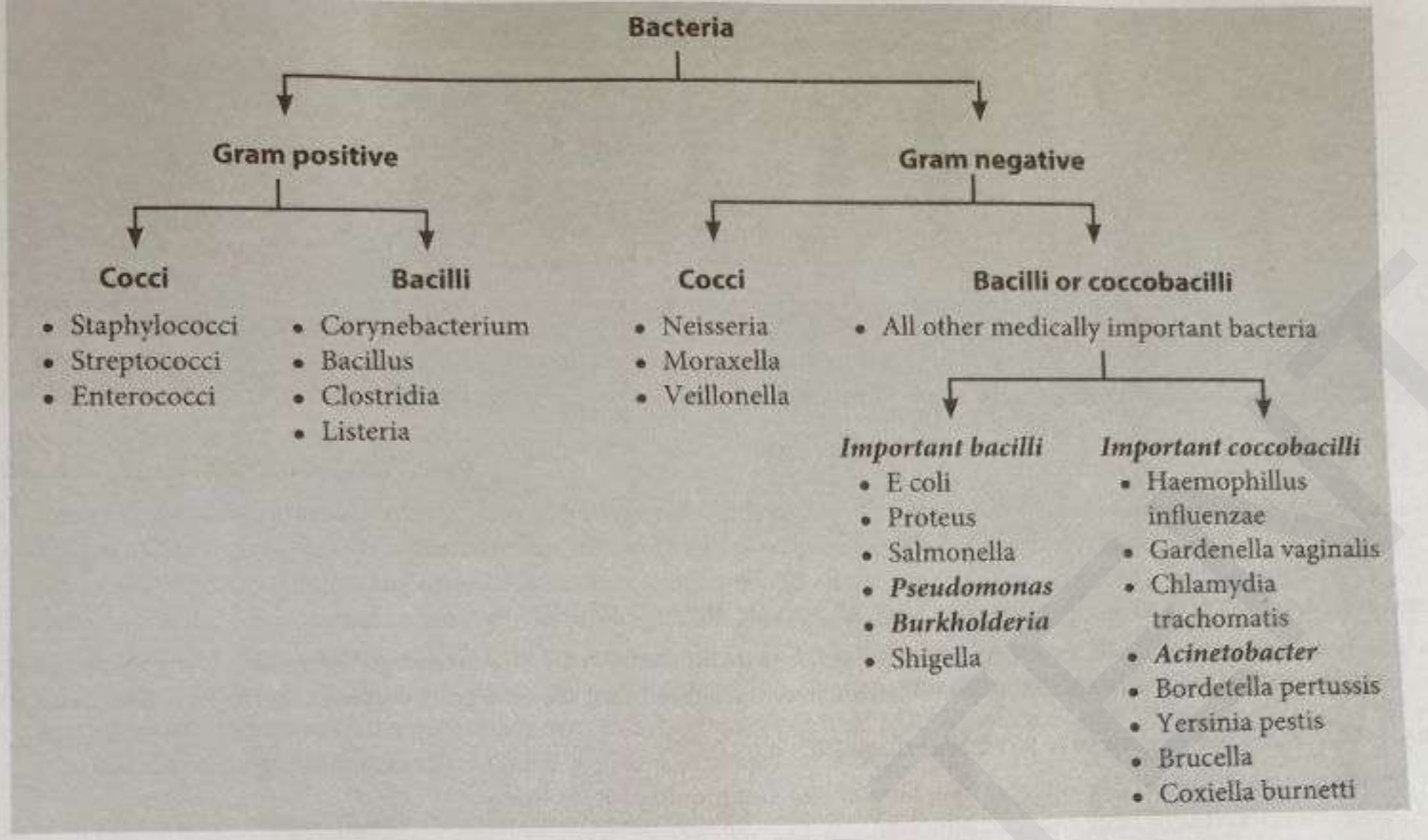
Singnificance of Rapoport Luebering cycle

- It prevents accumulation of ATP not needed by the erythrocyte.
- **It supplies 2,3-BPG required for the transport of oxygen by hemoglobin. 2,3-BPG regulates the binding** and release of **oxygen from hemoglobin.**
- 2,3-BPG present in erythrocytes acts as a buffer.
- Thus, **if the glycolysis of RBCs is impaired there will be impared synthesis of 2-3 BPG which, in turn, causes** left shift of O_2 **dissociation curve and increase oxygen affinity of hemoglobin.**
- **Only one ATP molecule is formed at substrate level as step by phosphoglycerate mutase is bypassed.**

MICROBIOLOGY

40. Ans. is 'c' i.e., Acinetobacter [*Ref: Essentials of microbiology 3rd/e p. 786*]

- Acinetobacter is a coccobacillus, especially on solid media.
- Pseudomonas, corynebacterium and Burkholderia are bacilli :



41. **Ans. is 'b' i.e., Ectoparasite** [*Ref: Rajesh Karyakarte 4-5*]

- **Tungiasis** is caused by **sand flae (Tunga penetrans)**. Sand flea is an **ectoparasite**.
- You should have an idea about ectoparasite & endoparasite.

Parasite

- A parasite is an organism that lives in/on another organism, called host.
- Parasite usually cannot exist independently, i.e., without host, a parasite cannot live, grow and multiply.
- Parasites may be of following types:
  - i) ***Endoparasite***
    - A parasite that lives **inside** the body of host.
    - Most of the parasites (protozoa like plasmodium & others; nematodes like Ascaris & others; cestodes like Taenia & others; and trematodes like schistosoma & others) are endoparasite.
  - ii) ***Ectoparasites***
    - A parasite that resides ***on the external surface (body surface)*** of the host
    - These are mostly **arthropods** (***flies, mites, ticks, flea lice etc***)
    - Typical examples are ***sarcoptes scabiei*** (a mite causing scabies), ***Louse (causing Pediculosis)*** and **Tunga penetrans** (a sand flea causing **Tungiasis**).

42. **Ans. is 'a' i.e., RT-PCR** [*Ref: **Principles of Emerging microbiology** p. 831*]

- Infection with Zika virus may be suspected based on symptoms and recent history of travel (e.g. residence in or travel to an area with active Zika virus transmission).
- A diagnosis of Zika virus infection can only be confirmed through laboratory tests on blood or other body fluids, such as urine, saliva or semen.
- ***The current gold standard diagnostic test indenfies the presence of zika virus RNA in blood or urine. RT-PCR is a quick, reliable sensitive & specific method.***

43. **Ans. is 'a' i.e., Corynebacterium** [*Ref: **Harrison 20th/e** p. 1018-1099*]

- Elek gel precipitation test is done to test the production of exotoxin by corynebacterium diphtheriae.

Serological Tests		Disease
• Paul Bunnell test	→	I. M. N.
• Wassermann reaction	→	Syphilis
• ***Rose waaler test***	→	***R.A.***
• Schick test	→	Diphtheria
• Dick test	→	Scarlet fever
• Widal test	→	Typhoid
• VDRL	→	Syphilis
• Kahn's test	→	Syphilis
• Weil felix test	→	Rickettsiae
• Ascoli's test	→	Anthrax
• Elek's gel precipitation	→	Diphtheria
• Nagler reaction	→	Cl. perfringens
• String test	→	V. cholerae

44. Ans. is 'c' i.e., Penicillin + clindamycin [*Ref: Harrison 20th/e p. 938-939*]

- ***Surgical debridment is the most important prophylactic and therapeutic measure in gas gangrene.*** Drug of choice is ***penicillin which is given along with clindamycin***. Other measures for treatment are anti-gas gangrene serum (AGGS) and hyperbaric O_2.

45. Ans. is 'c' i.e., Same as dog bite [*Ref: Harrison 20th/e p. 1021*]

- Antibiotic treatment of dog bite, cat bite, human bite and monkey bite is same -
- Amoxicillin/clavulinic acid

  or
- Ampicillin/sulbactam

Management of Wound Infectiong Following Animal and Human Bites

Biting Species	Commonly Isolated Pathogens	Preferred Antibiotic (S)*	Alternative in Penicillin Allergic Patient	Prophylaxis Advised for Early Uninfected Wounds	Other Considerations
Dog	Staphylococcus aureus, Pasteurella multocida, anaerobes, Caphocytophaga canimorsus	Amoxicillin/clavulanate (250-500 mg PO tid) or ampicillin/sulbactam (1.5-3.0 g IV q6h)	Clindamycin (150-300 mg PO qid) plus either TMP-SMX (1 DS tablet PO bid) or ciprofloxacin (500 mg PO bid)	Sometimes	Consider rabies prophylaxis.
Cat	P. multocida, S. aureus, anacrobes	Amoxicillin/clavulanate o ampicillin/sulbactam as above	Clindamycin plus TMP SMX as above or fluoroquinolone	Usually	Consider rabies prophylaxis. Carefully evaluate for joint/bone penetration.
Human occusional	Vindans streptococci, S. aureus Haemophilus influenzae, anaerobes	Amoxicillin/clavulanate or ampicillin/sulbactam as above	Erythromycin (500 mg PO qid) or a fluoo-quinolone	Always	
Human clenched-first	As for occlusional, plus eikenella corrodens	Ampicillin/sulbactam as above or imipenem (500 mg q6n)	Cefoxitin	Always	Examine for tendon, nerve or joint involvement
Monkey	As for human bite	As for human bite	As for human bite	Always	For macaque monkeys, consider B virus prophylaxis with acyclovir.
Snake	Pseudomonas aeruginosa, Proteus spp. Bacteroides tragillis, Clostridium spp.	Ampicillin/Sulbactam as above	Clindamycin plus TMP SMX as above or a fluoroquinolone	Sometime, especially with venomous snakes	Administer antivenin for venomous snakebite.

Rodent	Streptobacillus moniliformis, Leptospira Spp. P. multocida	Penicillin VK (500 mg PO qid)	Doxycyline (100 mg PO bid)	Sometimes	
Aquatic animal (alligator, pirahna, snak, moray eel, barracuda)	Aeromonas hydrophifa, marine vibrio spp. (Vibrio vuinficus)	Third-generation cephalosporin (e.g., ceftriaxone, 1 g IV q24h) plus doxycycline (100 mg PO bid	Clindamycin plus levofloxacin (750 mg PO qd) plus doxycyclin	Always	Obtain prompt surgical consultation, as ridk for necrotizing infection is high with Aeromonas and Vibrio spp.

46. Ans. is 'c' i.e., Staphylococcus aureus

- In recent years, a continuing increase in the prevalence of Methicillin-Resistant *Staphylococcus aureus* (MRSA) has been observed.
- Vancomycin, a glycopeptide antibiotic, has been the primary choice for the treatment of MRSA infections.
- Although MRSAs with intermediate or resistant to vancomycin remain rare, many reports have described MRSA strains with vancomycin MICs increased to the high end of the Clinical and Laboratory Standards Institute (CLSI) susceptibility range with minimum inhibitory concentration (MIC) = 2 mg/L. This MIC shift has been defined as "MIC creep".
- A growing number of studies suggest that the vancomycin MIC creep is associated with an increased probability of failure.
- In response to evidence that vancomycin was poorly effective against MRSA isolates with MIC >4 mg/L, the CLSI lowered the vancomycin susceptibility breakpoint for *S. aureus* to ≤2 mg/L in 2006.

Also know

- **E. coli** encoding blaNDM -5 associated UTI with unusual **MIC creep**-like phenomenon against imipenem.

47. Ans. is 'a' i.e., Sporothrix [*Ref: **Read below***]

- Question is very simple.
- Examiner is just asking about eosinophilic meningoencephalitis.
- Eosinophilic meningoencephalitis is caused by a variety of helminthic infections. And among the given options, sporothrix is a fungus.

Causes of eosinophilic meningoencephalitis

- Angiostrongylus Cantonensis (larva)
- Echinococcus granulosus (Hydatid cyst)
- Gnathostoma spinigerum (larva)
- Paragonimus westermani (adult)
- Schistosoma japonicum (egg)
- Spirometra sp (larva)
- Toxocara sp (larva)
- Taenia multiceps
- ***Taenia solium*** (cysticercus cellulosae)
- Baylisascaris procyonis

48. Ans. is 'd' i.e., Candida albicans [*Ref: **Read below***]

- Various studies show different levels of resistance in different species of candida. However, among the given option, Candida albicans has low incidence.
- Cadida infections are caused by the five most common species :-
  i) *Candida albicans*
  ii) *Candida parapsilosis*
  iii) *Candida glabrata*
  iv) *Candida tropicalis*
  v) *Candida Krusei*
- Current treatment guidelines include fluconazole as a primary therapeutic option for the treatment of these infections, but it is only fungistatic against candida spp and both inherent and acquired resistance to fluconazole have been reported.

"Candida albicans has a low incidence of fluconazole resistance, approximately 0.5-2%. C. tropicalis, C. parapsilosis, and C glabrata, on the other hand, have higher rates at 4-9%, 2-6% and 11-13%, respectively. C auris can exhibit a rate of resistance to fluconazole as high as 93%"

— (Berkow and Lockhart)

- *Candida krusei shows resistance upto 97%.*

63. Ans. is i.e., 'b & c' Susceptibility to Imipenem & Fermentation of arabinose [*Ref: **Various sources***]

"Some laboratories use biochemical methods to identify enterococcus fecalis and enterococcus faecium, which are the most prevalent species in humans and which differ in their epidemiology, antimicrobial susceptibility and virulence properties. E. faecium is more likely to show high-level resistance to penicillin and carbapenems (imipenem) than E. faecalis. However, E.faecalis, is more likely to produce biofilms than E. faecium"

"E facium is almost always resistance to ampicillin/amoxicillin and carbapenems (imipenem) and E. faecalis is occasionally"

- E. faecium ferments arabinose and melibiose whereare E. faecalis ferments sorbitol.
- E. faecalis (but not E. faecium)-
  - i) *Shows tolerance to tellurite*
  - ii) *Reduces methylene blue, tetrazolium, and litmus*

64. Ans. is 'a' i.e., Corynebacterium urealyticum [*Ref: **Essentials of Microbiology 3rd/e** p. 123*]

- ***Alkaline-encrusted cystitis*** is characterized by ***deposition of ammonium magnesium phosphate*** in bladder.
- **C urealyticus** is ***urease positive*** corynbacterium which causes alkaline-encrusted cystitis.

65. Ans. is 'd' i.e., Cryptosporidium [*Ref: CDC.gov*]

CDC Category A, B, and C Agents

Category A

- Anthrax (*Bacillus anthracis*)
- Botulism (*Clostridium botulinum toxin*)
- Plague (*Yersinia pestis*)
- ***Smallpox (Variola major)***
- Tularemia (*Francisella tularensis*)
- Viral hemorrhagic fevers
  - Arenaviruses : Lassa, New World (*Machupo, Junin, Guanarito, and Sabia*)
  - Bunyaviridae : Crimean Congo, Rift Valley
  - Filoviridae : Ebola, Marburg
  - Flaviviridae : Yellow fever; Omsk fever; Kyasanur Forest

Category B

- Brucellosis (*Brucella spp.*)
- Epsilon toxin of *Clostridium perfringens*
- Food safety threats (e.g., *Salmonella spp., Escherichia coli 0157:H7, Shigella*)
- Glanders (*Burkholderia mallei*)
- Melioidosis (*B. pseudomallei*)
- Psittacosis (*Chlamydia psittaci*)
- Q fever (*Coxiella burnetii*)
- Ricin toxin from Ricinus communis (*castor beans*)
- Staphylococcal enterotoxin B
- Typhus fever (*Rickettsia prowazekii*)
- Viral encephalitis [alphaviruses (e.g., Venezuelan, eastern, and western equine encephalitis)]
- Water safety threats (e.g. *Vibrio cholerae*, ***Cryptosporidium parvum***)

Category C

- Emerging infectious diseases threats such as Nipah, hantavirus, and SARS coronoavirus.

PREVENTIVE & SOCIAL MEDICINE

66. Ans. is 'a' i.e., 0·5 PPM [*Ref: **Park 24th/e** p. 752*]

Priciples of chlorination

- Water should be clear and ***free of turbidity.***
- ***Chlorine demand*** of the water should be estimated, which is the ***amount of chlorine needed to destroy bacteria, oxidize all organic matter and neutrilize all ammonical substances present in water.*** The point at which the chlorine demand of water is met is called **break point chlorination.** *If further chlorine is added beyond break point, free chlorine begins to appear in water.*
- ***The recommended residual chlorine for drinking water is 0.5 mg/litre (0.5 PPM) while recommended contact period is 1 hour.***
- It is worth noting here that recommended residual chlorine level for drinking water is 0.5 mg/ litre, while ***for swimming pool sanitation it is 1.0 mg/ litre and for water bodies & post disaster it is 0.7 mg/litre.***

67. Ans. is 'd' i.e., DNA antigen

- Vaccine is an immuno-biological substance designed to produce specific protection against a given disease. It stimulates the production of protective antibody and other immune mechanisms. Vaccine may be of following types;-

Thus,

$$8 \times \sqrt{\eta_2} = 4 \times \sqrt{\eta_1}$$

$$2 \times \sqrt{\eta_2} = \sqrt{\eta_1}$$

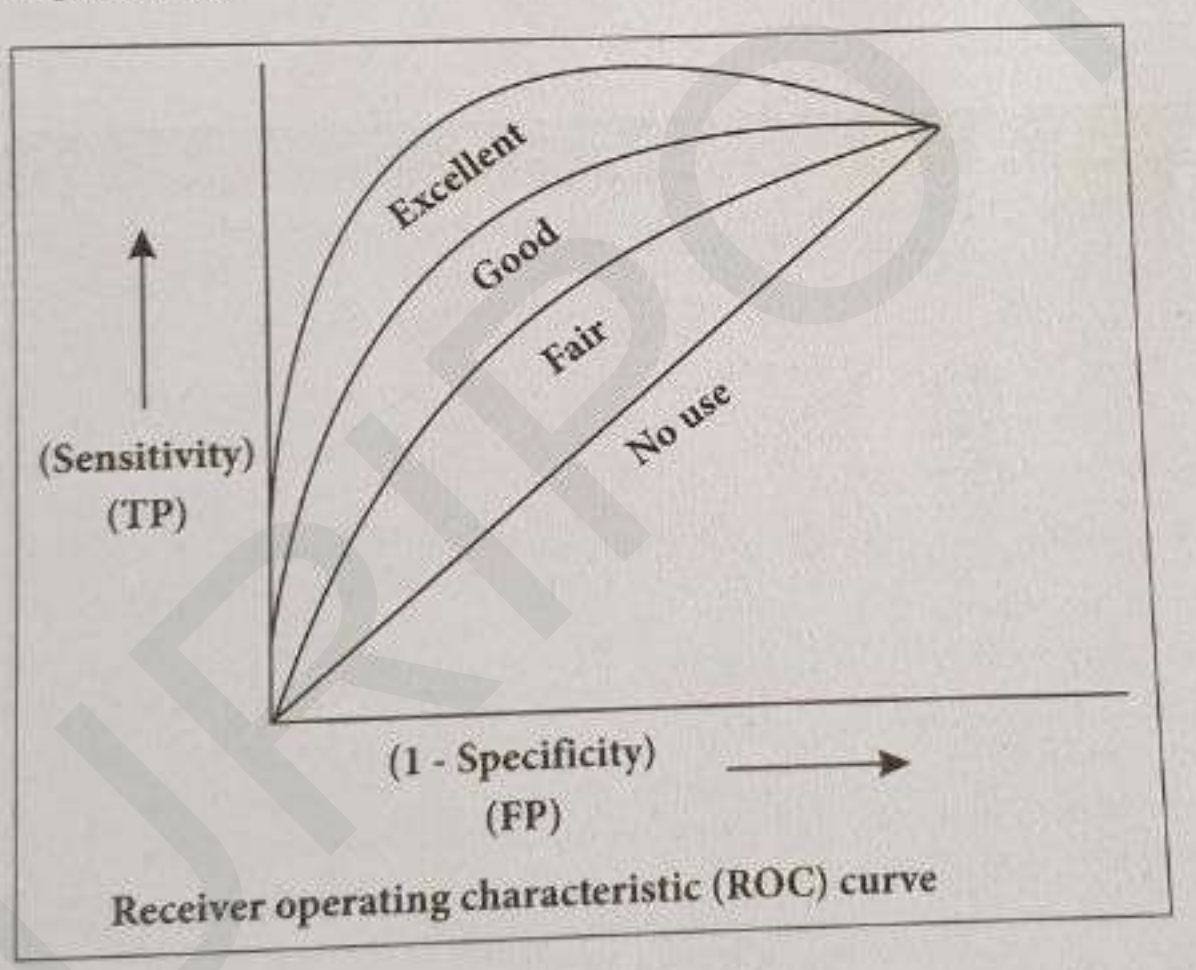
$$4 \times \eta_2 = \eta_1$$

$$\eta_2 = \frac{\eta_1}{4}$$

Ans. is 'c' i.e., Used to determine a cut-off point [*Ref: **Park 24th/e** p.149;*
***A Dicitionary of Public Health by J Kishore** p.446-47*]

Receiver operator characteristic (ROC) curve:

- Is a graphical representation between sensitivity and specificity of a diagnostic test
- ROC curve is '*drawn between Sensitivity and (1-Specificity)*'
  - ROC curve is drawn between True positives and False positive error rate
- In clinical tests, ROC curve is 'used to determine a cut-off point'
- ROC curve is 'equivalent to Likelihood ratio for a positive result (LR+)'
- Types of ROC curves:
  - *Straight line at 45° (line a)*: No benefit by this test/cut-off
  - *Straight lines above line a (Line b and c): Fair, Good results by this test/cut-off*
  - *Uppermost line touching Y-axis and then horizontal line (Line d)*: Excellent results by this test/cut-off (Perfect ROC: 100% sensitivity & 100% specificity).



Ans. is 'b' i.e., Erythromycin

- Control of diphtheria requires :-

A) **Control in cases and carrier**
  - It includes early diagnosis and treatment, along with isolation.
  - **Cases are treated by diphtheria antitoxin plus penicillin or erythromycin.**
  - **Carriers are treated by only erythromycin (no antitoxin).**
  - **Isolation period** is for at least 14 days or until proved free of infection, i.e. 2 consecutive nose and throat swabs, taken 24 hours apart, should be negative before terminating isolation.

B) **Control for contacts (prophylaxis for contacts)**
  - **Non-immunized** close contacts of diphtheria should be given ***penicillin/erythromycin,*** *diphtheria antitoxin, and **vaccination (by toxoid).***
  - In **immunized** contact nothing is required if the booster dose was taken within previous 2 years, and if booster dose was taken more than 2 years before, only a booster doses of toxoid is required.

C) **Prophylaxis for community**
  - It is done by vaccination, usually started at 6 weeks of age.

- Specificity $= \frac{TN}{TN + FP} = \frac{50}{50 + 56} = \frac{50}{106} = 0{\cdot}47$ (or 47%)

- Thus likelihood ratio $= \frac{\text{Sensitivity}}{\text{1-specificity}} = \frac{0{\cdot}67}{1\text{-}0{\cdot}47} = \frac{0{\cdot}67}{0{\cdot}53} = 1{\cdot}26$

78. **Ans. is 'c' i.e., Prevention of duplication** [*Ref: **Park 24th/e** p. 223*]

Line listing of cases

- Line listing of reported cases was started in the year 1989 to check for duplication (same case reported more than once if the child visited more than one health facility), year of onset of illness (to screen children with residual paralysis who developed poliomyelitis prior to the year of reporting), identification of high risk pockets (by analysis of residential status) and documentation of high-risk age groups.
- Line listing of cases made it possible to take appropriate follow-up action in areas from where the cases had been reported. The line lists have also provided useful epidemiological data for programme purposes. For example, it provided information on the age at onset of illness and to understand the urgency for the early completion of the OPV immunization schedule.
- All cases of acute flaccid paralysis must be reported immediately to the chief medical officer/district immunization officer with the following details:
  - Name, age and sex of the patient.
  - Father's name and complete address.
  - Vaccination status.
  - Date of onset of paralysis and date of reporting.
  - Clinical diagnosis
  - Doctor's name, address and phone number.

9. **Ans. is 'b' i.e., Mass drug administration** [*Ref: **Park 24th/e** p. 439*]

- In India, the National Health Policy (2002), envisages elimination of lymphatic filariasis (ELF) by 2015. The eliminated is defined as lymphatic filariasis ceases to be public health problem, when the number of microfilaria carriers is less than 1 per cent and the children born after initiation of ELF are free from circulating antigenaemia (presence of adult filaria worm in human body).
- The strategy of lymphatic filariasis elimination is through:
  a) Annual Mass Drug Administration (MDA) of single dose of antifilarial drug for 5 years or more to the eligible population (except pregnant women, children below 2 years of age and seriously ill persons) to interrupt transmission of the disease.
  b) Home based management of lymphoedema cases and up-scaling of hydrocele operations in identified CHCs/district hospitals/ medical colleges.

. **Ans. is 'c' i.e., Blinding** [*Ref: **Park 25th/e** p. 90 & **24th/e** p. 87*]

Methods to eliminate confounding factors	
i) Randomization (Best)	iii) Matching
ii) Restriction	iv) Stratification
	v) Stastical modeling
Methods to eliminate bias	
i) Randomization	ii) Blinding

Ans. is 'b' i.e., Reduce underfive mortality to 23 by 2025

NATIONAL HEALTH POLICY- 2017

Goal

- The policy envisages as its goal the attainment of the highest possible level of health and well-being for all at all ages, through a preventive and promotive health care orientation in all developmental policies, and universal access to good quality health care services without anyone having to face financial hardship as a consequence.
- This would be achieved through increasing access, improving quality and lowering the cost of healthcare delivery.

Objectives

Maternal & Child health

- To reduce
  - Infant mortality rate to 28 by 2019
  - MMR to 100 by 2020

82. Ans. is 'a' i.e., 15-30% & 3-5% [*Ref: Tripathi K. Essentials of medical pharmacology p. 634; Sharma H, Sharma K. Sharma & Sharma's principles of pharmacology p. 328*]

Mechanism of action and pattern of lipid lowering effect of important hypolipidaemic drugs

Drugs (daily dose)	*Mechanisms of action*	*Effect on lipids (%)*
HMG-CoA reductase inhibitors Lovastatin (10-80 mg) Simvastain (5-40 mg) Atorvastatin (10-80 mg) Rosuvastatin (5-20 mg)	↓ CH synthesis by inhibition of rate limiting HMG- CoA reductase	LDL ↓ 20-55 HDL ↑ 5-15 TG ↓ 10-35
Bile acid sequestrants Cholestyramine (4-16 g) Colestipol (5-30g)	↓ Bile acid absorption, ↑ hepatic conversion of CH to bile acids, ↑ LDL receptors on hepatocytes	LDL ↓ 15-30 HDL ↑ 3-5 TG not affected, may ↑ in some

Fibric acid derivatives Gemfibrozil (1200 mg) Bezafibrozil (600 mg) Fenofibrate (200 mg)	↑ Activity of lipoprotein lipase, ↓ release of fatty acids from adipose tissue	LDL ↓ 5-20 HDL ↑ 10-20 TG ↓ 20-50
Nicotinic acid (2-6 g)	↓ Production of VLDL ↓ lipolysis in adipocytes	LDL ↓ 15-25 HDL ↑ 20-35 TG ↓ 20-50
• Gemfibrozil may ↑ LDL-CH when TG levels are high; bezafibrate and fenofibrate not likely to raise LDL-CH.		

83. Ans. is 'b' i.e., Stress ulcer [*Ref: **Brunton L, Knollmann B, Hilal-Dandan R. "Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 13th/e". New York: McGraw Hill Medical p. 909; Sharma H, Sharma K. Sharma & Sharma's principles of pharmacology** p. 390*]

- PPIs are the agent of choice for :
  - Duodenal and gastric ulcer disease
  - Gastroesophageal reflux disease (GERD)
  - Zollinger Ellison syndrome (ZES)
  - NSAIDs induced ulceration
  - H. pylori associated ulcers
  - ***PPIs may protect against carcinogenesis in Barrett's esophagus***

84. Ans. is 'b' i.e., 7 days [*Ref: **Tripathi K. Essentials of medical pharmacology** p. 878*]

IL-2 receptor Antagonist

CD-25 molecule is expressed on the surface of **immunologically activated T cells**

↓

It acts as **high affinity receptor for IL-2**

↓

Cell proliferation and differentiation is promoted

↓

Anti CD-25 antibodies have been developed as **IL-2 receptor antagonist**

↓

To specifically **arrest the activated T cells**

- ***Daclizumab*** – Humanized chimeric monoclonal anti CD-25 antibody . It is combined with the glucocorticoids , calcineurin antagonist and/or azathioprine/MMF , It is used to prevent renal and other transplant rejection reaction. **Plasma half life is 3 weeks**. It is also used in combination regimens for maintenance of graft .
- ***Basilixizumab- It is anti CD-25 antibody with high affinity for IL-2 receptor, But shorter half life ie. 1 week. Clinical use is similar to Daclizumab.***
- *Both Daclizumab and Basiliximab can cause anaphylactic reactions and promote opportunistic infections.*

85. Ans. is 'a' i.e., 4 [*Ref: Letendre S. Background and rationale of the CPE score. Presented at the 2nd International Workshop on HIV & Aging. Baltimore; 2011; Letendre S. Central nervous system complications in HIV disease: HIV-associated neurocognitive disorder. Top Antivir Med 2011;19:137–142*]

- The 2010 CPE (CNS Penetration Effectiveness) ranking system is a proposed method for measuring the penetrative ability of different antiretroviral drugs into the CNS. Each drug is given a rank ranging from 1 to 4 based on pharmacokinetic and pharmacodynamic data, drug characteristics, results of clinical studies, and effectiveness in reducing CSF viral load or improving cognition. ***A rank of 4 represents the best penetration or effectiveness.***

86. Ans. is 'a' i.e., Steroid intake [*Ref: Sharma H, Sharma K. Sharma & Sharma's principles of pharmacology p. 764, 891*]

Glucocorticoids (Mechanism of Action)

Glucocorticoids suppress the initiation and generation of fresh immune response

↓

Inhibition of cytokine synthesis and release of IL1, IL2, IL6 and TNF alpha

↓

Suppression of Bizarre immune response, by inhibiting the activation of cytotoxic T lymphocyte function and proliferation

↓

Decrease in neutrophil and monocyte chemotaxis and lysosomal enzyme release

↓

Induce transcription of gene for Inhibitor factor (IF-KB)

↓

This binds to nuclear factor (NF- KB) transcription factor preventing translocation to Tc cell nucleus

↓

Transcription of genes for variety of inflammatory and immune mediators is inhibited

↓

Glucocorticoids mainly suppress cellular immune responses

Calcineurin Inhibitors (Mechanism of Action)

TH – cell is activated

↓

Cytoplasmic calcium complexed with calmodulin stimulates phosphatase enzyme called calcineurin

↓

Activated Calcineurin cause dephosphorylation of nuclear factor for activated T cells (NFAT)

↓

This enters nucleus to enhance IL-2 gene transcription

↓

Cyclosporine binds to cyclophilin and forms complex and inhibits Calcineurin

Rifampicin (Mechanism of Action)

- ***Rifampicin binds and inhibits bacterial DNA- dependent RNA polymerase so that synthesis of new RNA is inhibited***

Anti-Metabolites (Mechanism of Action)

- ***Inhibit one or more enzymes or the reactions that are necessary for DNA synthesis.***

87. **Ans. is 'b > a, c, d' i.e., Macrolides > Tetracycline, Beta-lactam, Fluroquinolones** [*Ref: Tauber SC, Nau R. Immunomodulatory properties of antibiotics.Curr Mol Pharmacol. 2008 Jan;1(1):68-79; Riesbeck K. Immunomodulating activity of quinolones: Review. J. Chemother. 2002;14:3–12; Dalhoff A., Shalit I. Immunomodulatory effects of quinolones. Lancet Infect. Dis. 2003;3:359–371*]

- ***There is growing evidence that certain antibiotics exert their beneficial effects not only by killing or inhibiting the growth of bacterial pathogens but also indirectly by immunomodulation.***
- The anti-inflammatory properties of ***macrolides*** in chronic inflammatory pulmonary disorders were recognized and has been well documented. The most frequent and consistently reported ***immunomodulatory effect*** of macrolides is a ***reduced neutrophilic inflammation.***
- Recent data suggest that several antibiotics such as ***tetracyclines and cephalosporins*** may have a beneficial immunomodulatory or neuroprotective effect on neuro-immunological and neurodegenerative diseases including multiple sclerosis and amyotrophic lateral sclerosis. Moreover, the non-bacteriolytic but bactericidal antibiotics ***rifampicin, clindamycin and aminoglycosides*** kill bacteria without releasing high quantities of proinflammatory cell wall components.
- Possible cascade of intracellular processes leading to stimulatory or inhibitory effects on cytokines, chemokines, and other components of the immune system *have been proposed* in case of ***fluoroquinolones.***

Monobactam : • Aztreonam possesses greater convulsant properties than some cephalosporins, but much less than penicillin and cefazolin
Carbapenem : • The proconvulsive activity of imipenem appears to increase when it is used in combination with cilastatin. This could be due merely to elevated imipenem levels in the presence of cilastatin. (Cilastatin inhibits renal tubular secretion of imipenem.) Alternatively, cilastatin might increase CSF levels of imipenem by inhibiting CSF elimination. Cilastatin alone can induce seizures, but at doses much higher than those used clinically.
Fluoroquinolones : • Proconvulsant effects of quinolones have been attributed to direct pharmacodynamic effects and to pharmacokinetic and dynamic interactions with co-administered drugs. Direct pharmacodynamic proconvulsant mechanisms of quinolones may relate to gamma-aminobutyric acid (GABA)-like substituents, which act as GABA-receptor antagonists

Antidepressant Drugs

- The complex neurotransmitter effects of antidepressant drugs make it impossible to offer simplistic assumptions about their proconvulsant effects. Recent experimental studies of AEDs used to treat depression lead to the conclusion that it is unlikely that alterations in serotonin and norepinephrine levels are related to an increased risk of seizures. In fact, some studies suggest that ***fluoxetine and doxepinemay occasionally have anticonvulsant properties.***

Methylphenidate

- Seizures ***There is some clinical evidence that stimulants may lower the convulsive threshold*** in patients with prior history of seizures, in patients with prior EEG abnormalities in absence of seizures, and, very rarely, in patients without a history of seizures and no prior EEG evidence of seizures. In the presence of seizures, the drug should be discontinued.

92. Ans. is 'd' i.e., Decreased liver enzyme [*Ref: Brunton L, Knollmann B, Hilal-Dandan R. "Goodman & Gilman's: The Pharmacological Basis of Therapeutics, 13th/e". New York: McGraw Hill Medical (page number-1049); Tripathi K. Essentials of medical pharmacology. (page number-704); Sharma H, Sharma K. Sharma & Sharma's principles of pharmacology. (page number-720); Mandell L, Tillotson G. Safety of Fluoroquinolones: An Update. Canadian Journal of Infectious Diseases. 2002;13(1):54-61*]

Adverse effects

1. GI disturbance - Nausea, vomiting, bad taste, anorexia ***(most common).***
2. CNS - Dizziness, headache, restlessness, anxiety, insomnia, tremor, seizures → due to ***GABA antagonistic action.***
3. Cartilage damage in weight bearing joints → ***contraindicated in children.***
4. Tendonitis and tendon rupture.
5. Skin/hypersensitivity -- Rash, pruritis, urticaria.
6. Blood disorders
7. ***Phototoxicity by lomefloxacin (maximum), sparfloxacin and pefloxacin.***
8. Sparfloxacin, gatifloxacin and moxifloxacin can ***prolong QT interval*** (Torsades de pointes).

"Fluoroquinolone type antimicrobials can cause hypoglycemia or hyperglycemia."

"Both hypoglycemic and hyperglycemic episodes can occur during FQs therapy"

93. Ans. is 'a' i.e., Efflux [*Ref: Kapoor G, Saigal S, Elongavan A. Action and resistance mechanisms of antibiotics: A guide for clinicians. Journal of Anaesthesiology Clinical Pharmacology. 2017;33(3):300.*]

Resistance mechanism of individual antibiotics			
Antibiotic class	**Resistance type**	**Resistance mechanism**	**Common example**
Aminoglycoside	Descreased uptake Enzymatic modification	Changes in outer membrane AGE's	P. aeruginosa Gram-negative bacteria
Beta-lactams	Altered PBP Enzymatic degradation	PBP 2a Penicillinase which are classified as per ambler classification	Mec A in S. aureus, CONS, S. pneumoniae Gram- negative bacteria
Glycopeptides	Altered target	D-alanyl-alanine is changed to D-alany-D-lactase	Vancomycin resistance in E.faecium and E. faecalis
Macrolids	Altered target Efflux pumps	Methylation of ribosomal active site with reduced binding Mef type pump	erm-encoded methylases in S. aureus, S. pneumoniae, and S. pyogenes S. pneumoniae and S. pyogenes

- The α subunit is also the site of action of acetylcholine receptor agonists and antagonists.
- Finally, the ganglion type nicotinic receptor is a type of nicotinic acetylcholine receptor that is located in the autonomic ganglia.
- ***Muscarinic acetylcholine receptors (mAChR) These receptors are seven transmembrane G-protein coupled receptors.*** The structure of the receptors varies between tissues and different times in development. There are five described subtypes of muscarinic receptors (M1-M5). mAChR play major role in the parasympathetic nervous system for diverse functions, including regulation of smooth muscle activity, wakefulness, hormone secretion, heart rate.

96. **Ans. is 'a' i.e., Dabigatran** [*Ref: Aursulesei V, Costache I. Anticoagulation in chronic kidney disease: from guidelines to clinical practice. Clinical Cardiology. 2019*]

"Dabigatran is contraindicated if eGFR is < 30 mL/min".

Dabigatran has maximal renal elimination (≥ 80%)

- Anticoagulant of choice in end stage renal disease : refer to tables given below

www.ncbi.nlm

Stage	1	2	3a	3b	4	5
eGFR category	Normal and high	Mild reduction	Mild-moderate reduction	Moderate - severe deduction	Severe reduction	Kidney failure
eGFR (mL/min/1.73m²)	≥ 90	60-89	45-59	30-44	15-29	< 15

Oral anticoagulant	Machanism of action	Prodrug	Pharmacokinetic properties		
			Metabolism	Dialyzable	Dose adjustment
Warfarin	Vitamin K antagonist	No	Predominantly via cytochrome P450 type 2C9 (CYP2C9)	No	No
Dabigatran	Direct inhibitor of free thrombin and fibrin - bound thrombin	Yes	Renal excretion 80%	Yes	Yes **Contraindicated if eGFR < 30 ml/min**
Rivaroxaban	Free and clot- bound Xa factor inhibitor, prothrombinase activity inhibitor	No	Renal excretion 66%, 36% as unchanged drug	No	Yes
Apixaban	Free and clot bound Xa factor inhibitor	No	Metabolized in liver via CYP3A4, renal excretio 27% and in feces	Partial	No
Edoxaban	Free Xa factor and tissue factor inhibitor	No	10% hydrolyzed by carboxylesterase 1, 50% unchanged upon renal excretion	No	Yes

. **Ans. is 'b' i.e., Male sex** [*Ref: Sathasivam S, Lecky B. Statin induced myopathy. BMJ. 2008; 337 (Nov.06 3): a2286-a228*

Factors that may increase the risk of statin induced myopathy

- Advanced age (> 80 years old)
- Female sex
- Low body mass index
- Multisystem diseases (for example, diabetes mellitus)
- Diseases affecting kidney or liver function
- Hypothyroidism (untreated)
- Drug interactions, especially with drugs that are inhibitors or substrates of the cytochrome P450 pathway (for example, nicotinic acid, calcium channel blockers, ciclosporin, amiodarone, thiazolidinediones, macrolide antibiotics, azole antifungals, protease inhibitors, warfarin).

- Vigorous exercise
- Intercurrent infections
- Major surgery or trauma
- Diet (excessive grapefruit or cranberry juice)
- Genetic factors (for example, polymorphisms of the cytochrome P450 isoenzymes or drug transporters, inherited defects of muscle metabolism, traits that affect oxidative metabolism of fatty acids).

98. Ans. is 'a' i.e., Itraconazole + lovastatin [*Ref: Sathasivam S, Lecky B. Statin induced myopathy. BMJ. 2008;337(Nov.06 3):a2286-a2286*]

- Statins (e.g. lovastatin) are substrates for CyP 3A4 and itraconazole is an inhibitor for the same (see following table)

CYP	Substrate		Inducers	Inhibitors
3A4 (Most comman metabolizing enzyme)	• Amiodarone • Astemizole • Cisapride • Cyclosporine • Cortisol • Dapsone • Spironolactone	• CCBS • Macrolides • Protease inhibitors • Tacrolimus • **Verapamil** • **Statins** • Testosterone	• Barbiturates (Phenobarbitone) • **Glucocorticoids** • **Carbamazepine** • **Phenytoin** • **Rifampicin** • Pioglitazole	• **Erythromycin** • Clarithromycin • Fluconazole • Ketoconazole • **Itraconazole** • **Ritonavir** • **Verapamil** • **Grape fruit juice**
2D6	• Antidepressants (TCA, SSRI, MAOI) • Most β-blcokers **(Carvedilol)** • Most antiarrhythmics			• Quinidine • Paroxetine
2C9	• Phenytoin • Warfarin • Tolbutamide		• Barbiturates • Rifampicin	• Cimetidine • Erythromycin
2C19	• Clopidogrel • Omeprazole		• Barbiturates • Rifampicin	• Fluconazole
1A2	• Warfarin • Theophylline		• Rifampicin	• Ciprofloxacin
2E1	• Acetominophen • Enflurane • Halothane		• Ethyl alcohol	• Disulfiram

99. Ans. is 'b' i.e., Serotoin modulator [*Ref: **Santarsieri D, Schwartz T. Antidepressant efficacy and side-effect burden: a quick guide for clinicians. Drugs in Context. 2015;4:1-12***]

- **Classes, SEs, and prescribing considerations for ADT.**

Class	Drugs	SE	Considerations
TCA	Imipramine Amitriptyline Doxepin Desipramine Nortriptyline	Weight gain, sedation, dry mouth, nausea, blurred vision, constipation, tachycardia	Generally not first-line therapy due to increased anticholinergic and cardiotoxic SE
MAOI	Isocarboxazid Phenelzine Tranylcypromine Selegiline	Weight gain, fatigue, sexual dysfunction, hypotension	Generally not first-line therapy due to serotonin syndrome and hypertensive crises
SSRI	Fluoxetine Paroxetine Sertraline Citalopram Escitalopram	Headaches, GI distress, insomnia, fatigue, anxiety, sexual dysfunction, weight gain	Often first-line treatment due to ***safer SE profile***. Subtle SE differences must be weighed by the prescriber
SNRI	Venlafaxine Desvenlafaxine Duloxetine Levomilnacipran	Nausea, insomnia, dry mouth, headache, increased blood pressure, sexual dysfunction, weight gain	SEs are similar to but may be slightly more frequent than with SSRI

- **Simvastatin and lovastatin are lipophilic therefore their CNS penetration is more than hydrophilic agents like parvastatin and fluvastatin.**
- *Atorvastatin has additional antioxidant property.*
- ***Because HMG-CoA reductase activity is maximum at midnight, all statins are administered at bed time to obtain maximum effectiveness. However, this is not necessary for atorvastatin and rosuvastatin, which have long plasma t½.***
- *Statins also have pleotropic effects (antioxidant, antiinflammatory and antiproliferative properties) which are responsible for lowering the risk of athrosclerosis.*
- ***Statins are the first choice drugs for primary hyperlipidemias with raised LDL and total CH (Type IIa, IIb, V) as well as for secondary hypercholesterolaemia.***

PATHOLOGY

108. Ans. is 'a' i.e., G6PD [*Ref: **Robbins 9th/e** p. 634*]

- The given peripheral smear shows the characteristic **'bite cells'** seen in G6PD deficiency. The inset shows precipitates of denatures globin ie Heinz bodies by supravital stains.
  - **G6PD deficiency** is a X linked recessive haemolytic anaemia, in which there is episodic hemolysis caused by exposure to oxidant stress. Both intravascular & extravascular hemolysis takes place. On the **peripheral smear**, it shows bite cells caused by the splenic removal of denatured hemoglobin, ***Heinz bodies-precipitate*** of denatured globin in RBC & spherocytes. Polychromasia may be seen representing increased RBC production.

109. Ans. is 'a' i.e., IgM [*Ref: **Robbins 9th/e** p. 644*]

- **Autoimmune hemolytic anemias/AIHA**- includes those anemias in which the hemolysis is caused due to presence of antibodies. The diagnosis of immunohemolytic anemias requires the detection of antibodies and/or complement on patient red cells. This is done using the direct Coombs antiglobulin test. The immunohemolytic disorders are classified as most centered on the characteristics of the responsible antibody including cold and warm antibodies.

	Warm AIHA MC	Cold AIHA
Onset	**Abrupt**	**Insidious**
Temp. of reaction of ab with RBC	37°C	0 to 4°C
Antibody	IgG, sometimes IgA	**IgM**, complement
Type of hemolysis	**Extravascular**	Both intravascular & extravascular
Jaundice	Present	Absent
	Splenomegaly present	RBC clumps-Raynauds phenomenon-PCR
Etiology	• **CLL**, Lymphoma, multiple myeloma • Autoimmune ds-**SLE**, RA, UC, **scleroderma**, antiphospholipid antibody • Drugs : methyl-dopa, penicillin • **PAN**	• Mycoplasma • Viruses - IMN, CMV, HIV, influenza • Lymphoma

110. Ans. is 'b' i.e., I & i [*Ref: **www.sciencedirect.com/topics/medicine-and-dentistry/cold-agglutinin***]

- Most cold agglutinins react with polysaccharides on the red cell surface.
- The principal targets are the ***i antigen (a straight-chain paragloboside)*** and ***the I antigen (a branched paragloboside with the same composition as the i antigen).***
- Less common are the Pr glycoproteins and sialylated polysaccharides.
- The erythrocytes of almost all adults are I+ and lack the i antigen. The i antigen is characteristic of newborns, because the enzyme that converts i to I becomes active only after birth.

111. Ans. is 'a' i.e., 0.95mm [*Ref: **escardio.org/Journals/E-Journal-of-Cardiology-Practice/Volume-13/Intima-media-thickness***]

- **Carotid intima-media thickness (IMT)** is a marker of subclinical atherosclerosis and should be evaluated in every asymptomatic adult or hypertensive patient at moderate risk for cardiovascular disease.
- Its measurement is advised for target organ damage; asymptomatic vascular damage could be detected with ultrasound scanning of carotid arteries searching for vascular hypertrophy or asymptomatic atherosclerosis. Damage is defined as the presence of *IMT* ***>0.9 mm or plaque.***

- The other markers of asymptomatic vascular (target organ) damage are: pulse pressure ≥ 60 mmHg, carotid-femoral pulse wave velocity > 10 m/s and ankle-brachial index < 0.9.

112. Ans. is 'c' i.e., NOTCH 1

- **Chronic inflammatory demyelinating polyradiculoneuropathy** (CIDP) is an autoimmune disease presenting with weakness and numbness in a remitting or chronic progressive course.
- It is known to have several clinical presentations and several associated diseases.
- **CIDP has been associated with multiple myeloma, monoclonal gammopathy of undetermined significance (MGUS), and other paraproteinemias.**
- **The NOTCH ligand, JAG2, was found to be overexpressed in malignant plasma cells from multiple myeloma (MM) patients and cell lines but not in nonmalignant plasma cells from tonsils, bone marrow from healthy individuals, or patients with other malignancies.**
- IL6 is a growth factor secreted by plasma cells. High levels of IL6 are seen in patients with active disease & are associated with poor prognosis.
- Myeloma cells are capable of secreting VEGF contributing to new vessel formation in the bone marrow in myeloma. In turn, the microvascular endothelial cells as well as the marrow stromal cells are stimulated by the VEGF resulting in increased secretion of interleukin (IL)-6, which has been shown to be a potent growth factor for the malignant plasma cells.
- Interleukin-5 is associated with the cause of several allergic diseases including allergic rhinitis and asthma.

113. Ans. is 'd' i.e., Plasma cells [*Ref: **Robbins 9th/e** p. 601*]

- Plasma cell tumours are characterized by dysregulated synthesis and secretion of immunoglobulin.
- This sometimes leads to ***intracellular accumulation*** of intact or partially degraded immunoglobulins.
- This produces certain variants of plasma cells which are :
  - **Flame cells :** Characterized by presence of fiery red cytoplasm.
  - **MOTT cells :** Characterized by presence of multiple blue grape like cytoplasmic droplets.
- Besides these there are cells containing variety of other inclusions including :
  - ***Fibrils***
  - ***Crystalline rods***
  - ***Russel bodies (cytoplasmic)***
  - ***Dutcher bodies (nuclear)***

114. Ans. is 'a' i.e., IL1 [*Ref: **Robbins 9th/e** p. 86, 87*]

- **Interleukin 1** (IL-1) is the primary mediator of the acute-phase response and is responsible for many changes that are associated with the onset of infection:
  - It induces fever and has profound endocrinologic metabolic and hematologic effects.
  - ***IL-1 induces the production of several different hematopoietic growth factors including granulocyte-macrophage, granulocyte and macrophage colony-stimulating factors and interleukin 6 by a variety of accessory cells. In addition, IL-1 acts synergistically with colony-stimulating factors in the proliferation of primitive hematopoietic progenitor cells.***
  - IL-1 may be used as a therapeutic agent to accelerate bone marrow recovery after myelosuppression.

115. Ans. is 'd' i.e., 2145 [*Ref: **Internet***]

- Blood is composed of plasma & cells, so plasma is blood volume minus cells
- Haematocrit represents the cells.
- So plasma volume is = total blood volume × (1- Hematocrit)
- The plasma volume calculation is usually performed on the assumption that the patient's total blood volume (TBV) is 70 mL per kg body weight for males and 65 mL per kg body weight for females.
- So in given question weight of female is 60kg, so patients total blood volume is= 60 × 65= 3900 ml
- Plasma volume= 3900 × (1- 45%) = 3900 × (1-0.45)= 2145 ml

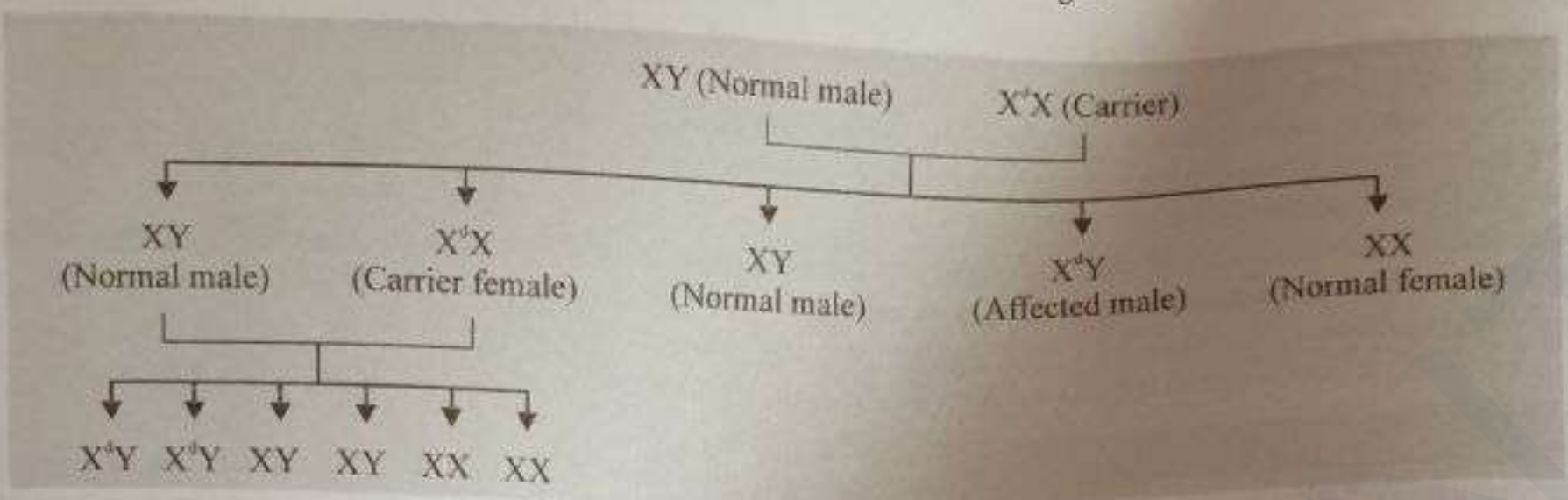
116. Ans. is 'a' i.e., HCT/45 × retic count/maturation [*Ref: **Mercks mannual***]

- Reticulocyte is an immature RBC, which still has few RNA remnants but no nucleus.
- Normal value for reticulocyte is 0.5-2%
- Reticulocyte production index (RPI), also called a corrected reticulocyte count
  - A calculated value used in the diagnosis of anemia.
  - It is necessary because the raw reticulocyte count is misleading in anemic patients.
  - The problem arises because the reticulocyte count is not really a count but rather a percentage: it reports the number of reticulocytes as a percentage of the number of red blood cells.
  - In anemia, the patient's red blood cells are depleted, creating an erroneously elevated reticulocyte count
  - Reticulocyte production index= HCT/45 × retic count/maturation time

- Where maturation time represents the maturation time of RBC's (in days) at various levels of anemia.
- Maturation = 1.0 for Hct ≥40%.
- Maturation = 1.5 for Hct 30-39.9%.
- Maturation = 2.0 for Hct 20-29.9%.
- Maturation = 2.5 for Hct <20%.

117. Ans. is 'a' i.e., XR

- Only males are manifesting disease and females are acting as carrier.
- It will be easier to solve this question if I will change the represention of Pedigree -



- This is a X linked recessive inheritance. Features of X linked inheritance are:
  - **As male has only one X chromosome, the male with affected X gene will always manifest the disease**
  - On the other hand, female has 2 X chromosomes, **heterozygous female will be carrier** because of expression of normal allele on the other X chromosome
  - Females with Turner syndrome have only 1 X chromosome will therefore manifest the disease
  - **50% boys of carrier mothers will be affected**
  - **All daughters of affected fathers will become carrier**
  - **No son of affected father will be affected.**

118. Ans. is 'c' i.e., Orthochromatic normoblast

- In the process of red blood corpuscle maturation, a cell undergoes a series of *differentiations*. During maturation of RBC from bone marrow –there is reduction in cell size & cytoplasm changes from basophilic to acidophilic due to appearance of haemoglobin. The following stages of development all occur within the bone marrow :
  1. A hemocytoblast, a multipotent hematopoietic stem cell,
  2. A common myeloid progenitor or a multipotent stem cell,
  3. A unipotent stem cell,
  4. A pronormoblast, also commonly called an proerythroblast- ferritin molecules can be seen by electron microscopy
  5. Basophilic or early normoblast, also commonly called an erythroblast,
  6. A polychromatophilic or intermediate normoblast- haemoglobin can be seen by Romanovasky stains. Mitosis occurs upto this stage & mitosis is most active at this stage
  7. ***An orthochromatic or late normoblast***
  8. A reticulocyte- nucleus is absent in reticulocyte
- So among the given options the most mature one is orthochromatic normoblast. So that's the answer.

119. Ans. is 'd' i.e., Hemopoietic cells [*Ref: **Robbins 9th/e** p. 580*]

- The precursors of RBC in bone marrow are hematopoietic cells

- ***See above explanation***

120. Ans. is 'a' i.e., MPGN [*Ref: **Robbins 9th/e** p. 916-920*]

- The given kidney biopsy shows a hypercellular glomerulus, lobulated glomeruli, ***Double contour of GBM*** with silver stain, such appearance is characteristic of MPGN/ membranoproliferative glomerulonephritis.

Membranoproliferative glomerulonephritis

- Membranoproliferative glomerulonephritis (MPGN) is characterized by alteration in GBM, proliferation of glomerular cells and leukocytic infiltration.
- Because the proliferation is predominantly in the mesangium, a frequently used. Synonym is ***mesangiocapillary glomerulonephritis.***
- MPGN is divided into two major types on the basis of distinct ultrastructural, immunofluorescent, and pathologic findings -
  - i) Type I
  - ii) Type II (Dens - deposit disease)
- **On light microscope, both types have following similar features :**
  - i) The glomeruli are hypercellular → Due to exocapillary and endocapillary proliferation.
  - ii) The glomeruli have lobular appearance accentuated by the proliferating mesangial cells and increased mesangial matrix
  - iii) Parietal epithelial crescent in many cases
  - iv) GBM is thickened, which is most evident in the peripheral capillary loops.

as it releases its acidic hydrogen ion and fluoride ion in the presence of cations such as calcium and magnesium. This often-delayed reaction is responsible for the 'pain out of proportion' to physical examination findings, a result believed to be related to the local hyperkalemia effect secondary to calcium binding. Cell membrane permeability to potassium is increased by local calcium depletion; in addition, fluoride ions are believed to directly inhibit Na^+K^+ pumps. Both result in local hyperkalemia, neuronal depolarization and intense pain.

The systemic effects are primarily related to electrolyte disturbances – mainly **hypocalcemia** – but also **hypomagnesemia**, **acidosis**, fluorosis and **hyperkalemia**, which can lead to disturbances of renal, hepatic and cardiac function.

Note : Acidosis means increase H^+ (about option d).

"Calcium gluconate gel is standard practice to treat HF burns in most centres"

139. Ans. is 'b' i.e., Pain is mild even in severe burn [*Ref: **See above explanation***]

"Pain is out of proportion to physical findings"

140. Ans is 'a' i.e., Hydrofluoric acid (HF) [*Ref: **www.ncbi.nlm.nih.gov***]

"Calcium gluconate gel is standard practice to treat HF burns in most centres"

- Treatment of acid burns consists of -
  i) Immediate rinsing copious amounts of water and
  ii) Alkalization with sodium bicarbonate, calcium hydroxide (lime water) or soap solutions.
- Some chemical require unusual treatment measures -
  ii) *Fluorine is best neutralized with magnesium oxide*
  ii) *Calcium gluconate is also used in HF burns*

141. Ans. is 'd > a' i.e., High pressure, Low flow rate > Low pressure, High flow rate

[*Ref: **Textbook of An Embalmer's Tales** p. 9*]

- The ***rate of flow*** is the amount of embalming solution that enters the body in a given period and is measured in ounces per minute.
  - Too much fluid flowing into the artery at once will cause swelling. For this reason, ***the rate of flow should be kept moderate low***.
- The ***pressure*** is the force required to distribute the embalming solution throught the body.
  - The pressure is what will help with diffusion of arterial solution and ***can be moderately high***.

- *Some embalmers prefer a low pressure and a high rate of low to reduce the possibility of tissues swelling from excess pressure.*

142. Ans. is 'b' i.e., Green [*Ref: **with text***]

"Normal jaundic is yellow, but when too much embalming fluid is pumped into a body that yellow turns to a Gamora colored green"
— www.calebwide.com

143. Ans. is 'b' i.e., 39 CrPC [*Ref: www.ncbi.nlm.nih.gov*]

- As per section ***39 code of Criminal procedure,*** all deaths occuring in due course of surgery and anaesthesia should be treated as unnatural deaths and should be reported to police.

144. Ans. is 'b' i.e., Lightening [*Ref: **KSN Reddy essentials** p. 293*]

Lightening burns

- Lightening refers to discharge of current between a negatively charged cloud and positively charged article on earth. During lightening, injuries result due to following **mechanisms** :-
  i) **Direct effect of high voltage current**.
  ii) **Heat, i.e. super heated air causing burns**.
  iii) **Expanded and displaced air, which acts as a blast wave.**
  iv) **Sledge hammer blow by compressed air pushed before the current (sledge hammer effect and blow death).**
- The characteristic finding in lightening burns is **filigree burns/arborescent burns/arborescent marking/litchenberg flower**. In this burns are seen as **coloured branching patterns,** especially on shoulder and flanks. This branching distribution like **inverted tree**, does not correspond to blood vessels.
- Lichtenberg's flowers are superficial, thin, irregular and tortuous markings on the skin.
- These markings have a general pattern resembling the branches of a tree.
- This fern-like pattern of erythema in the skin is usually found over the shoulders or the flanks.

145. Ans. is 'a' i.e, Human experiment [*Ref: **https://en.wikipedia.org/wiki/Declaration_of_Helsinki***]

Declaration of Helisinki

- The **Declaration of Helsinki (DoH)** is a set of ethical principles regarding human experimentation developed for the medical community by the World Medical Association (WMA).

152. **Ans. is 'c' i.e., Middle ethmoidal sinus**

Inferior meatus

- It is the largest meatus. It's highest point is the junction of anterior and middle 1/3rd. **Nasolacrimal duct opens in the inferior meatus** just anterior to its highest point (it is closed by a mucosal flap called **Hasner's valve**).

Middle meatus

- It lies below the middle turbinate (middle concha), i.e. between middle turbinate and inferior turbinate. The important structures in middle meatus are :-
  i) ***Hiatus semilunaris***
  ii) Ethmoidal infundibulum :- ***Frontal sinus, maxillary sinus and the anterior ethmoidal sinuses drain into it.***
  iii) Anterior / Posterior fontanelle :- Accessory ostia are found mostly in the posterior fontanelle.
  iv) Uncinate process :- It partly covers the opening of maxillary sinus.
  v) ***Bulla ethmoidalis :- Middle ethmoidal sinuses open on or above it.***
- ***Atrium*** is a shallow depression in front of the middle turbinate. ***Agger nasi*** is an elevation just anterior to the attachement of middle turbinate.

Superior meatus

- It lies below the superior turbinate and ***posterior ethmoidal sinuses open into it.***

Spheno-ethmoidal recess

- It lies above the superior turbinate and ***receives the opening of sphenoid sinus.***

153. **Ans. is 'a' i.e., Vagus nerve** [*Ref; Scott's Brown 9th/e Vol.1 p. 1195-1196*]

Complications of tonsillectomy

- Complications of tonsillectomy may be :-
  i) Immediate
  ii) Delayed

Immediate complications

1) *Primary haemorrhage :* Occurs at the time of operation. It can be controlled by pressure, ligation or electrocoagulation of the bleeding vessels.
2) ***Reactionary haemorrhage : Occurs within a period of 24 hours.***
3) Injury to tonsillar pillars, uvula, soft palate, tongue or superior constrictor muscle due to bad surgical technique.
4) Injury to teeth.
5) Aspiration of blood.
6) *Facial oedema :* Some patients get oedema of the face particularly of the eyelids.
7) *Surgical emphysema*

- Primary hemorrhage occurs due to damage to :-
  i) *Paratonsillar veins*
  ii) *Arteries supplying tonsil*
- The tonsil is supplied by five arteries :-
  1) **Tonsillar branch of facial artery. This is the main artery.**
  2) **Ascending pharyngeal artery from** external carotid.
  3) **Ascending palatine,** a branch of facial artery.
  4) **Dorsal linguae** branches of lingual artery.
  5) Descending palatine branch of maxillary artery.

Dalayed complications

1) *Secondary haemorrhage :* Usually seen between the 5th to 10th post-operative day. It is the result of sepsis and premature separation of the membrane. Usually, it is heralded by bloodstained sputum but may be profuse.
2) *Infection :* Infection of tonsillar fossa may lead to parapharyngeal abscess or otitis media.
3) *Lung complications :* Aspiration of blood, mucus or tissue fragments may cause atelectasis or lung abscess.
4) *Scarring in soft palate and pillars.*
5) *Tonsillar remnants :* Tonsil tags or tissue, left due to inadequate surgery, may get repeatedly infected.
6) *Hypertrophy of lingual tonsil :* This is a late complication and is compensatory to loss of palatine tonsils.

- Taste disturbance is an ususual complication of tonsillectomy due to direct or ***indirect damage to glossopharyngeal nerve or its lingual branch.***

Fleck corneal dystrophy	AD
Posterior dystrophy	
Fuchs dystrophy	AD
Posterior polymorphous corneal dystrophy	AD
Congenital hereditary endothelial dystrophy	AR

157. Ans. is 'a' i.e., Age related macular degeneration [*Ref: **Essentials of ophthalmics** p. 786*]

- **Photodynamic therapy (PDT)** is a form of light therapy using light-sensitive compounds that when exposed to light selectively become toxic to targeted cells (phototoxicity).
- Most PDT applications involve three components:
  1) ***A photosensitizer (the photosensitive intravenous drug, verteporfin)***
  2) ***A light source (low power, long duration infrared laser)***
  3) ***Tissue oxygen***
- The combination of these three components leads to chemical destruction of tissues which have taken-up the photosensitizer and have been locally exposed to light of appropriate wavelength to produce reactive oxygen species (ROS).
- ***PTD was initially developed for subfoveal choroidal neovascularization in age related macular degeneration.***
- Indications of PTD are -
  i) *Choroidal neovascularization in age related macular degeneration*
  ii) *Choroidal neovascularization in pathological myopia*
  iii) *Choroidal haemangioma*
  iv) *Central serous chorioretinopathy*
  v) *Polypoidal choroidal vasculopathy*
  vi) *Peripapillary choriodal neovascularization*

158. Ans. is 'd' i.e., Stargardt's disease [*Ref: **Clinical ophthalmology 3rd/e** p. 711*]

- **Stargardt's macular dystrophy** is an ***autosomal recessive*** disorder characterized by an elliptical atrophic maculopathy giving a ***beaten - bronze appearance.***
- It leads to ***bilateral gradual diminution of vision*** during ***first or second decade*** of life.
- Fundus examination is frequently normal early on the course of disease, even when patients already complain of vision loss. At this stage, the clinical diagnosis of Stargardt may be missed and patients' complaints can be easily interpreted as functional visual loss. Later on, typical fundus manifestations arise, including pigment mottling, frank macular atrophy, a bull's eye maculopathy and fundus flecks. ***Fundus flecks are pisciform, round or dot-like yellow-white lesions typically found in Stargardt patients.***
- In Stargardt, **fluorescein angiography** reveals a "dark-choroid" sign in up to 62% of patients. This sign, not exclusive of Stargardt disease, derives from a **lack of** early choroidal hyperfluorescence, which is blocked by high-grade lipofuscin accumulation in the RPE, thus improving visualization of the small retinal capillaries that become easily evident over the dark, **non-fluorescent** and high-contrast choroid. Fundus flecks are seen as small irregular hyperfluorescent lesions. Their presence over a ***"dark-choroid" background*** further suggests the diagnosis of Stargardt disease.

159. Ans. is 'd' i.e., Polyhexamethylene biguanide [*Ref: **Infections of eye 1st/e** p. 619*]

- *Acanthamoeba is a free-living genus of* **amoeba** that is abundant in the environment. Acanthamoeba has tremendous capacity to survive in diverse conditions and has been **isolated from soil** and dust, fresh water, well water, sea water, sewage and air. In **contrast to many other pathgenic amoeba, this organism is not naturally parasitic and does not require a host.**
- In human, acanthamoeba causes : - ***i) Keratitis; ii) Granulomatous encephalitis, iii) Fulminant meningoencephalitis***
- Patient presents with ***very severe pain*** (which is out of proportion to the degree of clinical signs), watering, photophobia, blurred vision and blepherospasm. On examination, following characteristic features are seen : -
  i) ***Initial lesions (Epithelial lesions)*** :- Initially the Acanthamoeba keratitis shows ***typical reticular pattern due to radial keratoneuritis (Radial perineuritis). At this stage it is commonly mistaken for herpes simplex keratitis because of pseudodentritic epithelial lesion (dentritic ulcer morphology).***
  ii) ***Advanced cases (Stromal involvement)*** :- Over a period of weeks stromal signs develop with ***central or paracentral ring shaped lesion*** with stromal infiltrate and an overlying epithelial defect, ultimately presenting as ***ring abscess.*** There may be radial perineuritis, Wessely (inflammatory) ring and hypopyon.
- Treatment is started with a combination of anti-amoebic and trophozoicidal drugs, 0·02% **polyhexamethylene biguanide PHMB (Drug of choice)**, propamidine and neomycin.

Ans. is 'c' i.e., FGF is involved in pathogenesis [*Ref: **Essentials of ophthalmology 3rd/e** p. 712*]

- **Choroid neovascularization**, as the name suggests, is proliferation of new capillaries in choroid.
- Choroid is vascular coat of eye just beneath retina.

The eyeball is made up of three coats : -

1) **Fibrous coat (outermost layer)** : - Anterior 1/6th is transparent and called **cornea**. Posterior 5/6th is opaque and called sclera.
2) **Vascular coat (middle layer)** : - Middle layer consists of, from anterior to posterior, **Iris, ciliary body and choroid**.
3) **Nervous coat (inner most layer)** : - It consists of **retina**.

- **Choroided neovascular membrane (CNVs)** is formation new blood vessels that grow ***beneath the retina in choroid***.
- ***The most important cytokine in pathogenesis is vascular endothelial growth facture (VEGF)*** as it induces vascular prolifration.
- Choroidal neovascular membranes (CNVMs) are associated with many diseases. The most common causes are
  1) Age-related macular degeneration (AMD)
  2) Presumed ocular histoplasmosis syndrome (POHS)
  3) Myopic macular degeneration
  4) Trauma
  5) Angioid streaks
  6) Many cases are idiopathic.

Clinical features

- Patients with choroidal neovascular membranes (CNVMs) may report the following:
  - Decreased central vision
  - Central or paracentral, relative or absolute scotomas
  - Distortion (metamorphopsia)
  - Central light flashes or flickering
  - Impaired color vision
  - Prolonged recovery from light stress

Treatment options

- Following treatment options are available -
  i) ***Ranibizumab intravitreal injection*** : It is an anti-VEGF antibody (***VEGF is involved formation of new vessels in CNVs***).
  ii) ***Photodynamic therapy (PTD) (especially in AMD)***
  iii) Various surgical procedures without proven return

161. Ans. is 'd' i.e., Hypertensive retinopathy grade IV [*Ref: **Read below***]

- The image is showing papilloedema, which is seen in grade IV hypertensive retinopathy.
- The appearance of the fundus in hypertensive retinopathy is determined by the degree of elevation of the blood pressure and the state of retinal arterioles. **Focal attenuation of a major retinal arteriole is one of the earliest sign. Diffuse (generalized arteriolar attenuation,** broadening of the arteriolar light reflex and arteriovenous crossing changes may also occur.

Keith - Wagner - Barker classification	
Grade I	• Mild to moderate narrowing or sclerosis of arterioles
Grade II	• Moderate to marked narrowing or sclerosis of arterioles • Arteriovenous crossing changes :- 'S' shaped deflection of veins at AV crossing :- **Salus sign**
Grade III	• Retinal arteriolar narrowing and focal constriction • Prominent arteriovenous crossing changes with following signs :- i) Banking of veins distal to AV crossing → **Bonnet sign** ii) Tapering of veins on either side of crossing → **Marcus - Gunn sign (Gunn sign)** iii) Right angle deflection at AV crossing → **Salu's sign** • Retinal edema, **cotton - wool patches (soft exudate)** • Hard exudate may also occur. • **Superficial (flame shaped) hemorrhages**
Grade IV	Grade III changes plus papilledema, macular star

- ***This is the most common carpal bone fractured***, and among the wrist fractures, it is second only to the fracture lower end of radius. **It is common in young adults** though it can be seen in patients of 10-70 years of age. The common mode of injury is ***fall on an outstretched hand with hyperextension and radial deviation at wrist.***
- Benett's fracture is an intra-articular fracture dislocation of the ***palmar base of first metacarpal bone*** of the thumb with either ***subluxation or dislocation of first carpometacarpal joint, i.e. trapezometacarpal joint.*** **The common mechanism of injury is an axial blow directed against the partially flexed metacarpal, in most cases during "First fights".** Patient complains of pain, swelling and tenderness over the base of the thumb. Movements of thumb are restricted.

165. Ans. is 'a' i.e., Segond fracture [*Ref: **Campbell's 14th/e** p. 714*]

- **Segond fracture** is an avulsion fracture at tip of lateral tibial plateau. It is the only radiological sign (when present) of ACL injur

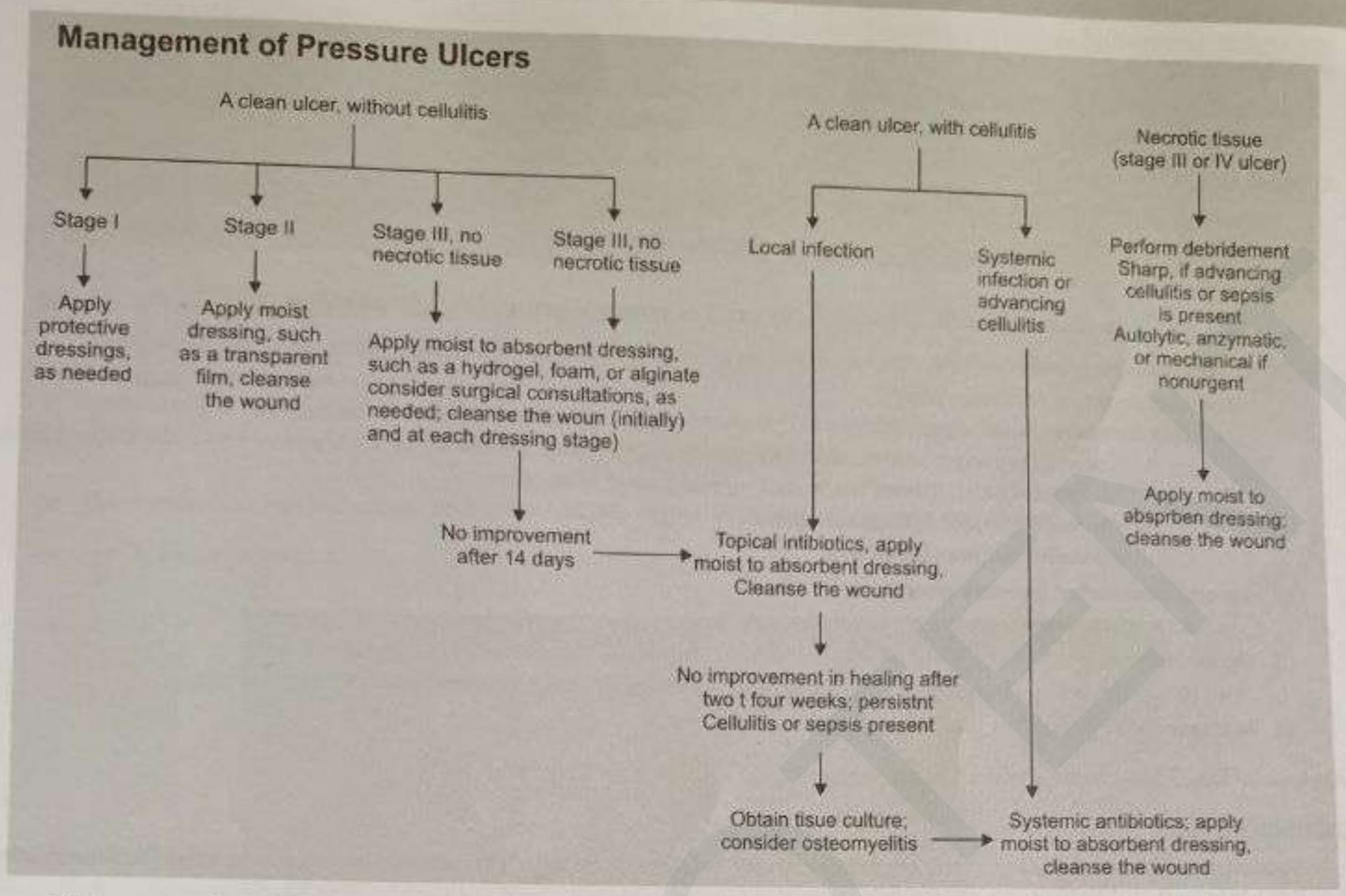
166. Ans. is 'd' i.e., MRI done to rule out osteomyelitis [*Ref: **Textbook of plastic surgery 3rd/e** p. 712*]

Treatment of bed sore

- Bed sores are pressure sores, often develop on skin over bony prominences like lower back (over sacrococcygeal prominenc over greater trochanter & hips, and back of heel.
- If not treated early bed sores can become deep.

NPUAP Staging System for Pressure Ulcer

Stage	Description
Suspected deep-tissue injury	Purple or maroon localized area of discolored, intact skin or blood-filled blister caused by damage to underlying soft tissue from pressure or shear; the discoloration may be preceded by tissue that is painful, firm, mushy, boggy, or warmer or cooler compared with adjacent tissue
I	Intact skin with nonblanchable redness of a localized area, usually over a bony prominence; dark pigmented skin may not have visible blanching and the affected area may differ from the surrounding area; the affected tissue may be painful, firm, soft, or warmer or cooler compared with adjacent tissue.
II	Partial-thickness loss of dermis appearing as a shallow, open ulcer with a red pink wound bed, without slough; may also appear as an intact or open/ruptured serum filled blister; this stage should not be used to describe skin tears tape burns, perineal dermatitis, macerations, or excoriations
III	Full-thickness tissue loss; subcutaneous fat may be visible but bone tendon or muscle is not exposed; slough may be present, but does not obscure the depth of tissue loss; may include undermining and tunneling
IV	Full-thickness tissue loss with exposed bone, tendon, or muscle; slough or eschar may be present on some parts of the wound bed; often includes undermining and tunneling
Unstageable	Full-thickness tissue loss with the base of the ulcer covered by slough (yellow, tan, gray, green, or brown) or eschar (tan, brown, or black) in the wound bed.



- ***High protein diet*** is always recommended to improve tissue healing.
- Position of the patient should be changed regularly to decrease the pressure at one point.
- Recent studies show improvement with ***topical insulin***.
- ***Negative pressure wound therapy*** can be used to decrease the size of sore.
- ***Surgical repair*** in the form of debridment and tissue cover may be required if bed sore is not healing or it is deep.

167. Ans. is 'a' i.e., Ligamentum flavum [*Ref: **Orthopaedics and Trauma for medical students and junior residents by Galwin** p. 274-75*]

The three column concept of spinal stability

- Denis (1983) proposed the 3-column concept of spinal stability. He divided the above-enumerated bony and softtissue structures into three columns-anterior, middle and posterior as follows :-
  i) ***Anterior column*** consisting of the anterior longitudinal ligament, the anterior portion of the annulus fibrosus and the anterior half of the vertebral body.
  ii) ***Middle column*** consisting of the posterior portion of the vertebral body, the posterior portion of the annulus and the posterior longitudinal ligament.
  iii) ***Posterior column*** consisting of the pedicles, facets, laminae and the posterior ligament complex (ligamentum flavum, interspinous ligament, supraspinous ligament and the facet joint capsule).

168. Ans. is 'd' i.e., Multifocal motor neuropathic disorder

Middle finger test

- In examination of the hand, wrist and elbow, it is important to ***differentiate between lateral epicondylitis, elbow synovitis and posterior interosseous nerve (PIN) entrapment***. The middle finger tests aids in this differential diagnosis but its accuracy remains controversial.
- In lateral epicondylitis (tennis elbow), may co-exist with an entrapment neuropathy of the radial nerve and its branches.

Pathophysiology

- Inability to extend the middle and ring fingers against resistance may arise from PIN syndrone.
- Extending the middle and ring fingers against resistance can cause the pain associated with PIN syndrome as the proximal supinator and extensor muscles tighten and compress the poster interosseous branch of the radial nerve in the area of the supinator and the arcade of Frohse.
- Reportedly resisted middle finger extension aggravates posterior interosseous nerve (PIN) compression by pulling on part of the ECRB muscle tendon unit. However, tears of the ECRB origin can cause tennis elbow so pulling on the ECRB may elicit pain and tenderness secondary to tennis elbow and not because of additional posterior interosseous nerve (PIN) compression.

Instructions

1. Ask the patient to extend the elbow, pronate the forearm and flex the wrist.
2. Provide resistance as the patient tries to extend his/her middle and ring finger.

Diagnoses

- Lateral epicondylitis
- Radial tunnel syndrome
- PIN syndrome

169. Ans. is 'd' i.e., Retinacular branch of medial circumflex femoral artery [*Ref: Snell's 9th/e p. 587*]

- Femoral head is supplied by :-
  1) **Medial circumflex femoral artery**
     - It is the ***major blood supply*** of femoral head and supplies the femoral head through following branches :-
       i) ***Lateral (superior) retinacular artery:*** also called ***lateral ascending cervical artery*** and is the major blood supply of femoral head. ***It involves in AVN of head most of the time.***
       ii) ***Medial (inferior) retinacular artery***
       iii) ***Posterior retinacular artery***
  2) **Lateral circumflex femoral artery**
     - It supplies through *anterior retinacular artery.*
  3) **Obturator artery**
     - It is a minor supply and supplies through *artery of ligamentum teres (medial epiphyseal artery).*
  4) **Intramedullary vessel in the femoral neck**

170. Ans. is 'a' i.e., Early neurological involvement [*Ref: Apley's 10th/e p. 813, 814*]

Iafferson's fracture

- Sudden severe load on the top of the head may cause **a *'bursting' force* which fractures the ring of the atlas (Jefferson's fracture).** Thus it is a type of ***axial compression force.***
- It is the ***most common type of fracture of the Atlas.***
- ***There is no encroachment on the neural canal and usually no neurological damage.***
- With the exception of pain or loss of sensation in the greater occipital nerve distribution, neurological sequelae are uncommon and more likely to be related to associated injuries.
- Fracture of atlas are associated with injury elsewhere in cervical spine in upto 50% of cases; odontoid fractures and hangman's fracture in particular should be excluded.
- X-ray characteristics are :-
  - **Open mouth (odontoid) view** may show asymmetry of the lateral masses of C1 on C2 with overhang.
  - A bilateral overhang > 6-9 mm suggest disruption of transverse ligament and potential late instability.
  - **On lateral radiograph** presumptive evidence of transverse ligament disruption is >4 mm atlanto-dens interval.
- Most of the time fracture can be diagnosed by these X-rays.
- ***CT Scan is particularly helpful in defining the fracture.***
- The ***treatment is typically conservative*** :-
  - *Undisplaced stable injuries* are managed by semirigid cervical collar or halo-vest until fracture unites.
  - *Unstable injury with transverse ligament rupture (> 7 mm displacement of lateral mass) is managed by halotraction followed by halovest immobilization for a total of 3 - 4 months.*
  - ***If a late instability or nonunion is present, atlanto - axial (C_1 - C_2) arthodesis and atlanto - occipital (cervico - occipital) fusion is done.***

171. Ans. is 'b' i.e., Tarsometatarsal dislocation [*Ref: Maheshwari 6th/e p. 2-5*]

Eponym	Fractures of lower limb
Bumper fracture	Comminuted, depressed fracture of the lateral tibial condyle
Pott's fracture	Bimalleolar ankle fracture
Cotton's fracture	Trimalleolar ankle fracture
Pilon fracture	Comminuted intra-articular fracture of distal tibial end
March fracture	Fatigue fracture of the shaft of 2nd and 3rd metatarsal
Maisonneuve's fracture	An ankle fracture associated with spiral fracture of neck of the fibula
Pilon fracture (Explosion fracture)	A comminuted intra-articular fracture of the distal end of the tibia and fibula
Aviator's fracture	Fracture of neck of the talus
Lisfranc's fracture-dislocation	A fracture dislocation through tarso-metatarsal joints.

Rule of two
• 2% prevalence • 2 inch in length • 2 feet proximal to ilcocecal valve. • Half of these who are symptomatic are younger than 2 yrs of age

- Meckel's diverticula are **asymptomatic**. Symptoms arise only when any complication occurs.

Complications

Most common complication
• In children & young adults (< 18 yrs of age) → bleeding • In adults → intestinal obstruction • Overall → ***bleeding***

178. Ans. is 'b' i.e., Duodenum

Curling ulcers	Cushing ulcers
• *Are stress ulcers associated with* ***burns*** • *Most commonly found in the* ***first part of duodenum***	• *Are stress ulcers associated with* ***head injury*** • Most common sites are ***stomach*** > duodenum > esophagus. • ***Cushing's ulcers are more prone to perforate*** than other stress ulcers.

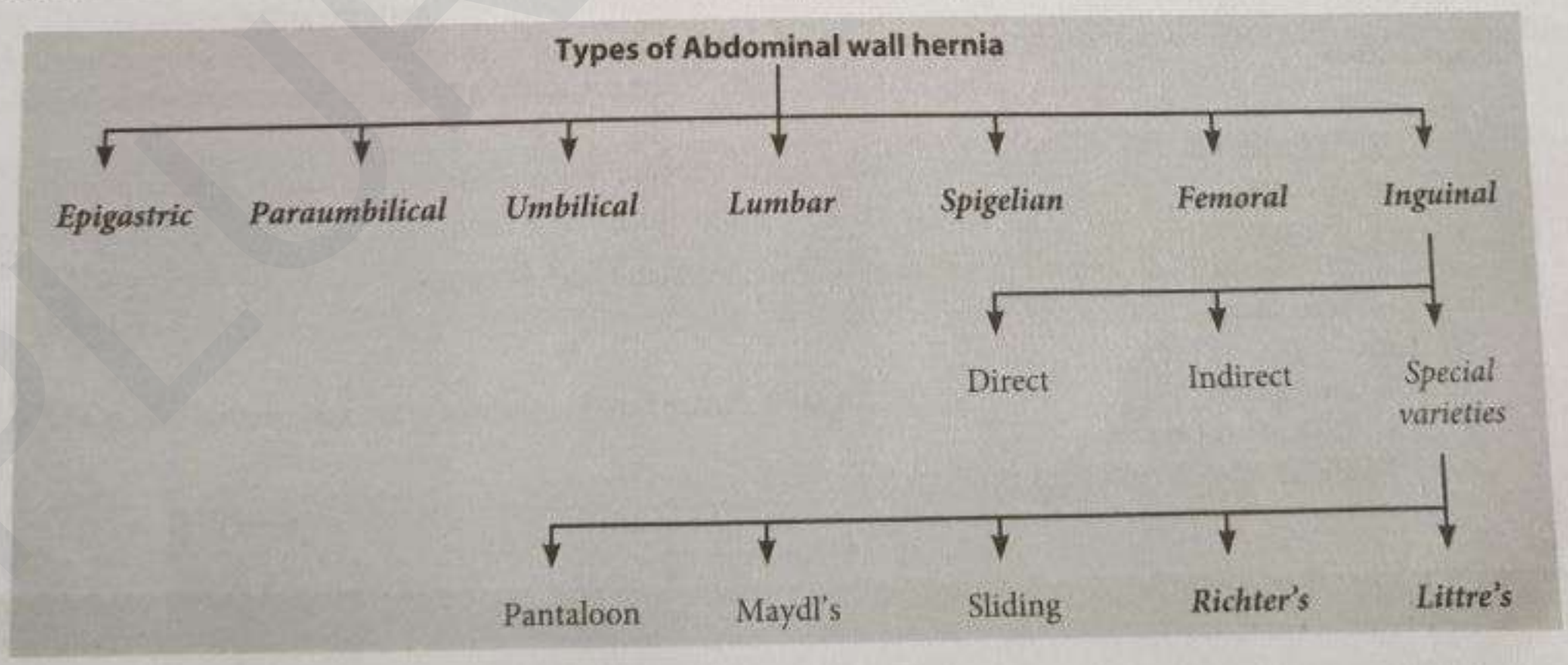
179. Ans. is 'b' i.e., Ascites

Radiological features of ascites

- Obliteration of inferior edge of liver.
- Widening of distance between flank stripe & asding colon.
- Ascitic fluid between liver & lateral abdomen wall may result in visualization of a lucent band -**Hellmer's sign**
- **Dog ear sign or 'Mickey mouse ears'** sign (100-150ml) -fluid density lateral to rectal gas shadows.
- Separation and floating of bowel loops.
- Bulging properitoneal flank stripe.
- Poor definition of major abdomen organs and psoas.
- Overall abdominal haziness.

180. Ans. is 'a' i.e., Peterson hernia [*Ref: Textbook of GI surgery 3rd/e p. 786*]

- **Peterson hernia** is an ***internal hernia*** (not ***abdominal wall hernia***) in the potential space posterior to a gastrojejunostomy.



181. Ans. is 'c' i.e., Most common fistula in Crohn's disease is enterocutaneous fistula

[*Ref: Textbook of GI surgery 3rd/e p. 712*]

- ***Most (80%) of the small intestine fistulas are iatrogenic that result from complications of abdominal surgery.*** Abdominal surgery may cause fistulas by:-
  i) *Anastomotic leakage (Disruption of anastomotic suture line).*
  ii) *Injury to bowel or its blood supply.*
  iii) *Laceration of the bowel by wire mesh or retention suture.*

- In general, the **more proximal the fistula** in the intestine, the **more serious the problem**, with **greater fluid** and **electrolyte loss**.
- The **drainage** has a **greater digestive capacity**, and the **distal segment** is **not available** for **absorption** of **nutrients**.

- Crohn fistulas are more often internal and less commonly external (to the skin). ***Ileosigmoid fistulas, usually a complication of a diseased terminal ileum that invades the sigmoid colon, are the most common type of fistula between two loops of bowel.*** Enteroenteric, gastrocolic, duodenocolic, enterovesical, rectovaginal, and perianal fistulas are other potential complications of Crohn disease. Perianal fistulas are the most common external fistulas in patients with Crohn disease.

182. Ans. is 'a' i.e., Vascular supply through 8th & 9th inercostal arteries

- ***Breast reduction surgery (also called reduction mammoplasty)*** is done to reduce the size of breast in patients with large breasts
- Large breasts may cause significant in convinience to patient-
  i) *Neck & shoulder pain.*
  ii) *Increasted chances of infections at mammary folds.*
  iii) *Cosmetic disturbance.*
- The reduction mammoplasty reduces the skin envelope and volume of breast tissue.

Surgically relevant anatomy

- The most important aspect of the anatomy is the understanding of the blood supply supply to the nipple areola complex. The Internal Mammary artery, Intercostal arteries and the Lateral Thoracic artery supply the breast.
- The ***internal mammary artery*** is responsible for about 60% of the blood supply to the breast, the ***medial or superomedial pedicle being based on the anterior perforating branches of this vessel especially the 2nd and 3rd***, which anastomose with the branches of the Lateral Thoracic artery.
- The lateral thoracic artery supplies about 30% of the blood supply to the breast, the branches course inferomedially and anastomose with the branches of the Internal Mammary and Intercostal arteries.
- The Intercostal arteries, 3rd 4th and 5th are the least important of the arteries supplying the breast. ***The 4th and 5th are responsible for the viability of the inferior pedicle.***

Types of vascular pedicles

- Types of pedicle (carrying blood supply) may be of following types :-
  i) *Horizontal pedicle*
  ii) *Verticle bipedicle*
  iii) ***Inferior pedicle → Most commonly used***
  iv) Superior pedicle
  v) Cental pedicle
  vi) Lateral pedicle
  vii) Medial pedicle

Complications

A) ***Early***
- *Hematoma*
- *Seroma*
- *Flap necrosis*
- ***Nipple -areolar complex (NAC) loss → Most devastating complication.***
- *Infection*

B) ***Late***
- *Assymetry*
- *Lack of proper shape*
- *Under or over resection*
- *Unsightly scar*

OBS & GYNAE

. Ans. is 'b' i.e., Performed in 3rd trimester [*Ref: Dutta's 9th/e p. 104, 105*]

Chorionic Villi Sampling

- ***Study material:*** *Chorionic villi from which trophoblastic cells are used for study.*
- ***Time:*** *Between 10-13 weeks.*

Indications:

- *To detect chromosomal anomalies*

10.	**Fibrinogen**	300-600 mg%
11.	**D-dimer** (breakdown product of fibrin)	0.1-1.8 (µg/mL)

188. Ans. is 'c' i.e., 400 ml/min [*Ref: Dutta's 9th/e p. 30*]

Summary of Fetal Hemodynamics		
• Fetal blood flow through the placenta	400 mL/min	
• Pressure in the umbilical artery	60 mm Hg	
• Pressure in the umbilical vein	10 mm Hg	
• Fetal capillary pressure in villi	20-40 mm Hg	
	Umbilical artery	**Umbilical vein**
• O_2 saturation	50-60%	70-80%
• PO_2	20-25 mm Hg	30-40 mm Hg

189. Ans. 'b' i.e., Mc Roberts maneurase [*Ref: Dutta's 9th/e p. 380, 381*]

- It is shoulder dystocia.

Shoulder dystocia		
• The term shoulder dystocia is defined to describe a wide range of additional obstetric maneuvers to deliver the fetus after the head has been born and gentle traction has failed to deliver the shoulder.		
Risk factors		
• H/o of Previous dystocia • Obesity • ***Diabetes*** • Macrosomia (> 4.5 mg)	• Prolonged 1st & 2nd stage of labor • Secondary arrest of labor • Mid-pelvic instrumental delivery • Induced labor	• Postmaturity • Multiparity • Anencephaly
Complications		
Fetal		**Maternal**
• Asphyxia • Sternomastoid hematoma • Perinatal morbidity/ mortality	• Branchial plenus injury • Humerus/clavicle fracture	• Cervical or vaginal or perineal tear • Rupture of uterus or bladder • Sacroiliac joint dislocation
Management		

- Following maneuvers are commonly used for delivery of shoulder -
  - Head and neck should be grasped and taken posterioly while suprapubic pressure is applied by an assistant slightly toward the side of fetal chest. This will reduce the bisacromial diameter and rotate the anterior shoulder toward the oblique diameter. **This maneuver is simple as well as effective. It needs only one assistant.**
  - **McRoberts maneuver**: Abduct the maternal thighs and sharply hyperflex them onto her abdomen. There is rotation of symphysis pubis upward and decrease in angle of pelvic inclination. This straightens the lumbosacral angle, rotates the maternal pelvis upward and increases the anterior-posterior diameter of the pelvis. This maneuver is effective and is successful in about 90% of cases. Suprapubic presssure may be used together. This procedure, when possible, may be done first (RCOG-2012).
  - **Wood's maneuver**: General anesthesia is administered. The posterior shoulder is rotated to anterior position (180°) By a corkscrew movement. This is done by inserting two fingers in the posterior vagina. Simultaneous suprapubic pressure is applied. This pushes the bisacromial diameter from the anteroposterior diameter to an oblique diameter. This helps easy entery of the bisacromial diameter into the pelvic inlet.
  - **Extraction of the posterior arm**: The operator's hand is introduced into the vagina along the fetal posterior humerus in the sacral hollow. The arm is then swept across the chest and thereafter delivered by gentle traction. This procedure may cause either fracture clavicle or humerus or both.
  - **"All Fours" Position:** Changing the mother on to all fours may increase the pelvic dimensions and allow the fetal position to shift. Downward traction on the posterior shoulder helps to free the impacted shoulder. This may be done for a mobile and slim woman in a community setting.

Gram stain	Bacteria or white blood cells (>6/ HPF)	24% sensitive, 99% Specific
Glucose level	<15 mg/dl	Affected by maternal hyperglycemia 57% sensitive, 74% specific
Interleukin - 6	>7.9 ng/ml	81 % sensitive, 75% specific
Matrix Metalloproteinase	Positive result	90% sensitive and 80% specific
White blood cell count	>30/cubic mm	57% sensitve, 78% specific
Leukocyte esterase	Positive (dipsticks)	85-91% sensitive, 95-100 % specific

194. Ans. is 'a' i.e., BRCA1 have greater risk in subsequent pregnancies than BRCA2 carriers

- Researchers confirm the lower risk of breast cancer from multiple pregnancies and from breast feeding seen in average risk women extends to those at the highest risk of breast cancer, according to the largest prospective study of BRCA1 and BRCA2 mutations carriers to date. Women with BRCA1 mutations who had two, three or four or more full-term pregnancies were at 2 percent, 30 percent, and 50 percent decrease risk of breast cancer compared to women with a single full-term pregnancy.
- In contrast, women with BRCA2 mutations did not have a decrease in risk from multiple pregnancies except if they had four or more pregnancies. Women with BRCA1 mutations who had only one full-term pregnancy were at an increased risk of breast cancer as were women with BRCA2 mutations who had fewer than four pregnancies.
- ***Ultrasound is used first to assess a discrete lump,*** but if cancer is confirmed, ***mammography is necessary (with fetal shielding) to assess the extent of disease and the contralateral breast.*** Tissue diagnosis is with ultrasound-guided biopsy for histology rather than cytology,as proliferative change during pregnancy renders cytology inconclusive in many women.
- **Surgical treatment** including loco-regional clearance can be undertaken in all trimesters. Breast conserving surgery or mastectomy can be considered, based on tumour characteristics and breast size, following multidisciplinary team discussion. Reconstruction should be delayed to avoid prolonged anaesthesia and to allow optimal symmetrisation of the breasts after delivery. Sentinel node assessment using radioisotope scintigraphy does not cause significant uterine radiation, 14 but blue dye is not recommended as the effect upon the fetus is unknown. Sentinel node biopsy is indicated in women who have a negative result from a preoperative axillary ultrasound and needle biopsy. If the axilla is positive, axillary clearance is indicated.
- ***Radiotherapy is contraindicated until delivery*** unless it is life saving or to preserve organ function (e.g. spinal cord compression). If necessary,radiotherapy can be considered with fetal shielding or,depending on gestational age, early elective delivery could be discussed. Routine breast/chest wall radiotherapy can be deferred until after delivery.
- ***Systemic chemotherapy is contraindicated in the first trimester because of a high rate of fetal abnormality,*** but is safe from the second trimester and should be offered according to protocols defined by the risk of breast cancer relapse and mortality. Anthracyline regimens are safe; there are fewer data on taxanes, which should be reserved for high-risk (node-positive) or metastatic disease. Standard antiemetics including 5HT3 serotonin antagonists and dexamethasone should be used.

195. Ans. is 'a' i.e., Taxane + carboplatin for 3 to 6 cycles

- Chemotherapy for ovarian cancer usually involves getting two different types of drugs together. Getting a combination of drugs instead of just one drug alone seems to work better as a first treatment for ovarian cancer.
- ***Usually, the combination includes a platinum compound (usually cisplatin or carboplatin), and a taxane, such as paclitaxel or docetaxel . These drugs are usually given as an IV (put into a vein) every 3 to 4 weeks.***
- ***The typical course of chemotherapy for epithelial ovarian cancer involves 3 to 6 cycles of treatment,*** depending on the stage and type of ovarian cancer.

96. Ans. is 'c' i.e., Infertility

- The **hymen** is a membrane that surrounds or partially covers the external vaginal opening.
- **Imperforate hymen** covers the entire vaginal area with no openings at all.
- *It is caused by a failure of the hymen to perforate during fetal development.*
- ***It is the most common obstructive anomaly of the female reproductive tract.***
- An imperforate hymen is present from birth, but many girls won't know they have it until puberty.
- Symptoms **often appear** when a girl reaches puberty, and may include abdominal pain and swelling that can last days. Physical symptoms generally occur because of a buildup of menstrual blood trapped in the vagina. That blood can also spill into the uterus and fallopian tubes.
- Other symptoms of an imperforate hymen include -
  - Lack of a menstrual cycle despite having other signs of sexual maturity, such as developing breasts and pubic hair.
  - Abdominal or pelvic pain, often come and going each month.
  - Back pain.
  - Painful urination or no urination at all. This can occur when pooled blood presses against the urethra. The urethra is a tube that carries urine from the bladder to outsidethe body.
  - Bowel problems, such as constipation.

Treatment is surgical, i.e., ***hymenotomy (opening of hymen)***

204. Ans. is 'b' i.e., Mexiletine [*Ref: **Read below***]

Antiarrhythmics	
Class I A (***Quinidine,*** Procainamide, Disopyramide, Moricizine)	Both ventricular and supraventricular (atrial)
Class I B (***Lidocaine,*** **mexiletine**, Phenytoin)	**Ventricular**
Class IC (Propofenon, flecanide, encanide)	Both ventricular and supraventicular (atrial)
Class II (Beta blockers)	Both ventricular and supraventricular (atrial)
Class III (Amiodarone, bretylium, Ibutilide, dofetilide)	Both ventricular and supraventricular (atrial)
Class IV (calcium channel blockers)	Supraventricular (atrial)
Miscellaneous • Digoxin • Adenosine	 Supraventricular (atrial) Supraventricular (atrial)

205. Ans. is 'a' i.e., Ventricular tachycardia, hypokalemia [*Ref: **Marriott's 12th/e** p. 415*]

- The given ecg is showing:
  - Irregular rhythm
  - Fast heart rate
  - Wide & bizzare QRS complex; and some QRS complexes are of small amplitude and some are of large amplitude.
- This is a case of ***Torsades De Pointes,*** an atypical typical type of ***polymorphic ventricular tachycardia.***
- **Hypokalemia** is a cause of Torsades De Pointes.

Torsades De Pointes

- Torsades de pointes represents a commonly occuring ***ventricular tachycardia*** with variations in morphology, i.e. **Polymorphic VT.**
- This French term translates as ***"twisting of the points".***
- Torsades de pointes VT is characterized by undulations of continually varying amplitudes that appear alternately above and below the baseline.
- The wide ventricular waveforms are not characteristic of either QRS complexes or T waves, and the rate varies from 180 to 250 beats per minute.

ECG features of Torsades De Points		
Rhythm	:	Irregular
Rate	:	Fast (200-250 bpm)
P wave	:	Absent
PR interval	:	Not measurable
QRS	:	Wide, bizarre; Mix of small and large amplitude.

206. Ans. is 'c' i.e., Octreotide [*Ref: **Textbook of clinical oncology 3rd/e** p. 716*]

- For diarrhea, ***somatostatin analogue (octreotide) is used.*** If diarrhea is not controlled, **Telotristat** is added. It is an ***inhibitor of tryptophan hydroxylase,*** a rate limiting enzyme in serotonin synthesis.
- If still disease is not controlled, chemotherapeutic agents are used (everolimus, IFN α-2b, 5-FU, capecitabine, streptozocin, temozolomide etc).
- ***Surgical resection is curable***

207. Ans. is 'd' i.e., 48-96 hrs. [*Ref: **Read below***]

- ***Normal blood sodium level is 135-145 meq/L.***
- *Hypernatremic dehydration is characterized by serum sodium > **150 meq/L**. It is characterized by deficit of total body water relative to total body sodium levels due to either loss of free water or infrequently the administration of hypertonic sodium solutions.*
- *Because of the dangers of overtly rapid correction, **hypernatremia should not be corrected rapidly**.*
- *The goal is to decrease the serum sodium by less than **12 mEq/L every 24 hr**, at a rate of **0.5 mEq/h**.*
- In the given question, sodium level is 175 meq/L (i.e. 30 meq/L above the normal upper limit of sodium level).
- So we have to correct, total 30-35 meq/L of sodium.
- Ideal correction is 0.5 meq/L per hour. So, to correct 30 meq/L, ideal time is 60 hours.

208. Ans. is 'a' i.e., ≥ 220/120

- According to American Heart Association (AHA), only extreme hypertension (SBP > 220-mmHg or diastolic BP > 120 mmHg) should be treated in acute ischemic stroke.

AHA guidelines for Blood pressure management in acute ischemic stroke

- In patients with ischemic stroke, the perfusion pressure distal to the obstructed vessel is low, and the distal vessels are dilated. Blood flow in these dilated vessels is thought to be dependent upon the systemic blood pressure.
- The arterial blood pressure is usually elevated in patients with an acute -stroke. This may be due to chronic hypertension, an acute sympathetic response, or to other stroke-mediated mechanisms. In many cases, however, the acutely elevated blood pressure is necessary to maintain brain perfusion. A neuroimaging study with CT or MRI is critical to help guide blood pressure therapy in stroke patients.
- The observation that the blood pressure frequently rises spontaneously following cerebral ischemia is consistent with this protective hypothesis, although a stress response to the acute event and to hospitalization may also contribute.
- The hypertensive effect is transient, as blood pressure falls by as much as 20/10 mmHg within 10 days.
- ***Most consensus guidelines recommend that blood pressure NOT be treated acutely in the patient with ischemic stroke unless the hypertension is extreme (systolic blood pressure >220 mmHg or diastolic blood pressure >120 mmHg),*** or the patient has active ischemic coronary disease, heart failure, aortic dissection, hypertensive encephalopathy, acute renal failure, or pre-eclampsia/ eclampsia.
- When treatment is indicated, cautious lowering of blood pressure by approximately 15 percent during the first 24 hours after stroke onset is suggested.
- If pharmacologic therapy is given, intravenous labetalol is generally the drug of choice.
- Special considerations apply to blood pressure control in patients with ischemic stroke who are eligible for thrombolytic therapy. Before lytic therapy is started, treatment is recommended so that systolic blood pressure is ≤ 185 mmHg and diastolic blood pressure is ≤ 110 mmHg.
- The blood pressure should loe stabilized and maintained below .
- 180/10 mmHg for at least 24 hours after intravenous tPA treatment.

209. Ans. is 'c' i.e., Temporary intentional stoppage of cardiac activity by using K^+ solution [*Ref: Read below*]

- For the majority of cardiac surgical interventions arresting the heart is inevitable, with systemic arterial perfusion and oxygenation being transferred to a heart lung machine.
- Until the present day, **cardioplegic arrest** remains the gold standard of cardioprotection and requires ***a potassium rich solution*** sending the heart into a depolarized arrest .
- ***Cardioplegic arrest is the temporary intentional stoppage of electrical and mechanical cardiac activity, usually by potassium-containing solutions, used to protect heart muscle by decreasing its metabolic demand during open-heart surgery with cardiopulmonary bypass.***

210. Ans. is 'a > b & c' i.e., Rasmussen encephalitis > Sturge-weber syndrome & Neurofibromatosis [*Ref: Read below*]

- *Cerebral hemiatrophy* (atrophy of one side of cerebral hemisphere) with epilepsy can be seen in all three options (a, b, c).
- *However, in sturge-weber syndrome* and neurofibromatosis there are other more common manifestations (which have not been *mentioned in question). Thus best answer is Rasmussen encephalitis.*

Possible aetiologies of cerebral hemiatrophy are the followings:

- ***Rasmussen's encephalitis (RE)*** *is a rare but severe* immune-mediated brain disorder leading to unilateral hemispheric atrophy, *associated progressive neurological dysfunction with intellectual decline, and intractable seizures.*
- *The typical features of RE are* ***onset in childhood with a peak of incidence at the age of 6 years*** and development of slowly *progressive, neurological deterioration including hemiparesis, cognitive impairment, aphasia when the dominant hemisphere is involved, and imaging evidence of* ***progressive, usually unilateral, cerebral atrophy. Seizures are the most common initial symptom.***
- *The earliest MRI changes include firstly cortical swelling, with a hyperintense T2/FLAIR signal* **(Stage 1)**. *Later, normal volume and hyperintense signal were seen* **(Stage 2)**, *followed by atrophy and hyperintense signal* **(Stage 3)** and ***then progressive atrophy with normal signal*** **(Stage 4)**.

Differential Diagnoses of Cerebral Hemiatrophy in Childhood

Congenital

- *Idiopathic*
- *Intrauterine vascular injury*

Acquired

- *Birth trauma*
- *Perinatal intracranial haemorrhage*
- ***Rasmussen encephalitis***
- *Postictal cerebral hemiatrophy, Prolonged febirile Seizures*
- *Infection like Herpes Encephalitis, TORCH syndrome, HIV*
- *Vascular/Haematological abnormalities like Dyke Davidson Mason syndrome,* ***Sturge-Weber syndrome****, Crossed Cerebral Cerebellar Diaschiasis, DiaschiasisCommisuralis, Hemiplegia-Hemiatrophy Hemiconvulsion syndrome*
- *Ischaemia*
- *Neoplasia like basal ganglial germinoma*

- Radiation
- Phakomatosis ***(Neurofibromatosis)***
- Miscellaneous-Linear Nevus syndrome, Fishman syndrome, Silver-Russell syndrome, Infantile hemiplegia syndrome, Congenital malformation, Intrauterine coactation of aorta, Perinatal anoxia/hypoxia; Mitochondrial encephalopathy, lactic acidosis, and stroke-like episodes (MELAS).

211. Ans. is 'b' i.e., Advanced age

"A higher NIHSS score at the time of onset of stroke and advance age in acute ischemic stroke patients are independent predictors of poor outcome after thrombolysis".

- **Use of thrombolytics in Acute ischaemic stroke**
  - *The use of* ***thrombolytics*** *in acute ischaemic stroke has been extensively studied.*
  - *There drugs were thought to clear the arterial occlusion associated with ischemic stroke.*
  - ***But there is always danger of intracranial hemorrage associated with these drugs.***
    - *The use of all other thrombolytics except Recombinant tissue plasminogen activator (rTPA) has been stopped because of high rates of intracranial hemorrhage associated with these drugs.*
    - ***rtPA (recombinant tissue plasminogen activator)*** *is the only fibrinolytic which has been indicated in the management of accute ischemic stroke.*
- **Even this drug is reported to cause intracranial hemorrhage. So certain conditions have been laid down regarding the use of (rtPA).**
- These are -
  a) ***Administration of rtPA -***
     - *It should be administered through intravenous accese with two peripheral I.V. lines. Adminster* ***0.9mg/kg*** *(maximum 90mg)* ***iv*** *as* ***10%*** *of total dose by bolus followed by remainder of total dose over* ***1 hr.***
  b) ***Continuous cut off blood pressure monitoring.***
  c) ***No other antithrombotic t/t for 24h.***
  d) ***If there is decline in neurological status or there is uncontrolled B.P., stop infusion, give cryoprecipitate and reimage brain emergently.***
  e) ***Avoid urethral catheterization.***
     - **Indications of rtpA therapy -**
       a) *rtpA should be given within 3 hrs of onset of stroke. Efforts should be made that rtpA is given as early as possible within this 3 hr window period.*
       b) *CT scan shows no hemorrhage or significant edema.*
       c) *Age > 18 years*

212. Ans. is 'c' i.e., Chemotherapy + Radiotherapy [*Ref: CECIL 7th/e p. 786*]

Small cell carcinoma of lung (Oat-cell carcinoma)

- ***Small cell carcinoma have a strong relationship to cigarrete smoking (also squamous cell carcinoma). They occur both in major bronchi (central) and in the periphery of lung.*** This ***highly malignant*** tumor has a distinctive cell type. The epithelial cells have following features -
  - *Scant cytoplasm*
  - *Ill defined cell borders*
  - *High mitotic count*
  - ***Finely granular nuclear chromatin (salt and pepper pattern).***
  - ***Small → Smaller than small resting lymphocytes***
  - *Absent or incospicuous nucleoli*
- Necrosis is common and extensive. **Azzopardi effect** (Basophilic staining of vascular walls) is frequently present. Basophilic staining of vascular walls due to encrustation by DNA from necrotic tumor cells is frequently present. It contains ***neurosecretory granules***. These granules are similar to those found in the **neuroendocrine argentaffin (kulchitsky) cells** present along the bronchial epithelium of fetus and neonate. This suggests derivation of this tumor from neuroendocrine progenitor cells of the lining bronchial epithelium.
- It also contains :-
  i) Polypeptide hormore e.g. ***PTH like peptide***
  ii) Neuroendocrine markers → ***chromogranin, Synaptophysin, Leu7.***
- ***Small cell carcinoma of lung is the most aggressive and most malignant lung tumor, with worts prognosis.*** It is characterized by widespread metastasis early in the course, ***with common spread to mediastinal (hilar) lymph nodes,*** liver, bones, adrenal gland and brain. **Most common site of metastasis is brain.**
- Small cell carcinoma is the ***most common type of lung cancer associated with ectopic horomone production and paraneoplastic syndrome.***
- ***It is the most common type of lung cancer responsive to chemotherapy and radiotherapy.***

13. Ans. is 'd' i.e., Multiple system atrophy

- The **hot cross bun sign** refers to the MRI appearance of the pons in a variety of neurodegenerative diseases.
- T2 hyperintensity forms a cross on axial images through the pons, representing selective degeneration of pontocerebellar tracts.

It has been described in

- Multiple System Atrophy (MSA)
- Spinocerebellar atrophy types 2 and 3
- Cerebral vasculitis (causing Wallerian degeneration of pontocerebellar tracts).
- variant Creutzfeldt- Jakob Disease (vCJD)
- JC virus granule cell neuronopathy.

214. Ans. is 'c' i.e., They help to identify viable myocardium

- Nitrates can be used to improve resting myocardial blood flow in patients with severe coronary artery disease. This may enhance tracer uptake during rest myocardial perfusion imaging. Recent studies using nitrates at rest have shown ***increased detection of reversible ischaemia*** in this patient group with the 201Tl and 99Tcm perfusion tracers MIBI and tetrofosmin.
- NTG preferentially reduces CVR (coronary vascular resistance) in the viable myocardium with ischemia. After NTG, tracer uptake in the ischemic myocardium will be relatively increased compared with that in the nonviable and nonischemic myocardium, leading to improvements in viability detection.
- NTG does not necessarily increase global or regional absolute MBF in patients with coronary artery disease or in healthy volunteers. However, NTG preferentially decreased CVR in the viable myocardium with ischemia without altering CVR in nonischemic or nonviable myocardium. The changes in CVR caused by NTG will relatively increase flow tracer uptake in viable myocardium with ischemia, in comparison with flow tracer uptake in nonischemic or nonviable myocardium. Thus, administration of a flow tracer after NTG is considered effective in identifying viable myocardium.

215. Ans. is 'c' i.e., Blinatumomab

- **Blinatumomab** is a Bispecific CD19-directed CD-3 T-cell engager that binds to CD19 expressed on the surface of cells of B-cell lineage origin and CD3 expressed on T-cells. It activates endogenous T-cells by connecting CD3 in T-cell receptor complex with CD19 on benign and malignant B-cells. ***It is indicated for treatment of relapsed or refractory B-cell precursor ALL.***
- **Tocilizumab** is ***IL-6 receptor antagonist*** (monoclonal antibody against IL-6). It is used in :-
  i) *RA & JIA*
  ii) *Giant cell arteritis*
  iii) *SLE*
- **Pembrolizumab** is ***anti-PD1*** antibody. It is used in -
  i) *Advanced melanoma*
  ii) *Small cell lung Ca & some non-small cell lung Ca.*
  iii) *Head & neck Ca.*
  iv) *PD-L1 positive cervical and gastric Ca.*
  v) *Bladder & renal Ca.*
  vi) *Classical Hodgkins lymphoma and Mediastinal large B-cell lymphoma.*
- **Vorinostate** is ***histone deacylase inhibitor.*** It is used in ***cutaneous T-cell lymphoma.***

216. Ans. is 'd' i.e., Prevalence decreases with age [*Ref:* ***Read below***]

- ***The incidence of SCD (sudden cardiac death) increases markedly with age regardless of sex or race.***
- At any age, women have a lower incidence of SCD than men, even after adjustment for CHD risk factors.
- There are many factors that can increase a person's risk of sudden cardiac arrest and sudden cardiac death.
- The two leading risk factors include:
  - **Previous heart attack** (Myocardial infarction)
  - **Coronary artery disease:** risk factors such as, older age, male sex, cigarette smoking, ***hypertension***, diabetes mellitus, hypercholesterolemia, obesity, and family history of CHD have all been associated with an increased risk of SCD

Other risk factors include:

- **Ejection fraction** of less than 40 percent, combined with ventricular tachycardia
- Prior episode of sudden cardiac arrest
- Family history of sudden cardiac arrest or SCD
- Personal or family history of certain abnormal heart rhythms, including **long QT syndrome, Wolff-Parkinson-White syndrome** extremely low heart rates or heart block
- **Ventricular tachycardia or ventricular fibrillation** after a heart attack
- History of **congenital heart defects** or blood vessel abnormalities
- History of syncope
- **Heart failure:**
  - Dilated cardiomyopathy
- **Hypertrophic cardiomyopathy:**
  - Significant changes in blood levels of potassium and magnesium (from using diuretics, for example), even if there is not organic heart disease
  - Obesity
  - Diabetes
  - Recreational drug abuse
  - Taking drugs that are "pro-arrhythmic" may increase the risk for life-threatening arrhythmias.

217. Ans. is 'd' i.e., All of the above [*Ref: Essentials in clinical medicine 13th/e p. 412*]

- **Charcot-Bouchard aneurysms** are minute aneurysms which develop as a result of chronic hypertension and appear ***most commonly in the basal ganglia*** and other areas such as the thalamus, pons (part of braistem) and cerebellum, where there are small penetrating vessels (***diameter <300 micrometers***).
- Chronic hypertension causes **lipohyalinosis** of small arterioles so that there is a defect in the muscular coat and only a thin intimal layer with some surrounding gliosis. This makes Charcot-Bouchard aneurysms prone to rupture, with the inability to control bleeding by vasomotor spasm.
- Rupture of Charcot-Bouchard aneurysms is probably the most common cause of **intracerebral hemorrhage** and is commonly seen in patients on anticoagulation .
- Patients will present depending on the region and size of the hemorrhage:
  - **Putaminal hemorrhage** usually presents with ipsilateral deviation of the eyes due to descending capsular pathways from the frontal eye field
  - **Phalamic hemorrhage** often presents with downward deviation of eyes and lack of pupillary response to light
  - **Pontine hemorrhage** usually causes coma due to disruption of the reticular activating system (unless small) and quadriparesis due to disruption of the corticospinal tract.

218. Ans. is 'None >c' i.e., AV malformation [*Ref: With text*]

"Transcranial Doppler ultrasound (TCD) is used to evaluate blood as it flows to the brain. It is used to help in the diagnosis of emboli, stenosis, vasospasm from a subarachnoid hemorrhage (Bleeding from ruptured aneurysm), and other problems"

— Essentials of sonography

- Transcranial doppler ultrasound is also used for AV malformation but not as frequently as for other three options.
- Transcranial Doppler (TCD) ultrasound provides rapid, noninvasive, real-time measures of cerebrovascular function. TCD can be used to measure flow velocity in the basal arteries of the brain to assess relative changes in flow, diagnose ***focal vascular stenosis,*** or to detect ***embolic signals*** within these arteries.
- TCD is the most convenient way to monitor vascular changes in response to interventions during acute cerebrovascular events at the bedside.
- Common uses are :

Subarachnoid Hemorrhage and Cerebral Vasospasm

- Angiographic cerebral vasospasm (VSP) occurs in two-thirds of patients with aneurysmal SAH with half becoming symptomatic. There is a significant direct correlation between VSP severity after SAH and flow velocities in most cerebral arteries.

Intracranial Steno-Occlusive Disease

- TCD can be used to detect stenosis and occlusion of the carotid siphon, proximal MCA, ACA, PCA, and basilar as well as intracranial vertebral arteries.

Acute Ischemic Stroke

- TCD is particularly useful in acute ischemic stroke where repeated TCD studies can be used to track the course of an arterial occlusion before and after thrombolysis.

Collateral Flow

- Knowledge of collateral flow patterns of the basal arteries of the brain has significant clinical implications in the management of patients with cerebrovascular atherothrombotic disease. TCD can be used to provide real-time information regarding the direction and the velocity of blood flow in known intracranial collateral channels, which become active in acute and/or chronic steno-occlusive cerebrovascular diseases.

Microemboli Detection

- TCD is the only medical device that can detect circulating cerebral microemboli, both solid and gaseous, in real-time.

Cerebral Circulatory Arrest

- A decrease in cerebral perfusion pressure associated with increases in ICP and PI result in compression of the intracranial arteries and cessation of flow to the brain, leading to cerebral circulatory arrest (CCA). The pattern of cerebral blood flow leading to CCA and brain death can be visualized by TCD and monitored continuously at bedside.

9. Ans. is 'd' i.e., Transient myeloproliferative disease [*Ref: **Read below***]

- Information in this question are :
  i) *Cryptorchidism*
  ii) *Short stature*
  iii) *Harsh systolic murmur in pulmonic area (suggestive of pulmonic stenosis).*
- This child is having Noonam syndrome.
- ***About 10% of children with Noonam syndrome are affected by transient myeloproliferative disorder.***

Noonan syndrome

- Noonan syndrome is an **autosomal dominant** disorder which affects ***both females and males.*** The most *phenotypic features resemble females of turner syndrome,* but they have normal sex chromosome and ***normal karyotype (46 XX or 46 XY),*** i.e. ***male or female with turner phenotype.*** It is due to ***mutation on chromosome 12.***

- Important features are ***short stature,*** webbed neck, low set ears, cubitus valgus, ptosis, micrognathia, hypertelorism, ***down slanting palpebral fissure (antimongoloid slant),*** clinodactyly, ***cryptorchidism, i.e. undescended small testis,*** pectus carinatum or pectus excavatum, ***sensorineural hearing loss,*** congenital heart diseases (***supravalvular pulmonary stenosis***: most common ASD, ***hypertrophic cardiomyopathy,*** and defect in conduction/rhythm), and delayed puberty : ***Testosterone levels are often low***

220. Ans. is 'c' i.e., Jamaican vomiting sickness

- **Hypoglycin A** is a naturally occurring **amino acid** derivative found in the unripened fruit of the **Ackee** tree .
- It is toxic if ingested, and is the causative agent of ***Jamaican vomiting sickness.***
- Hypoglycin A is a **protoxin,** meaning that the molecule is not toxic in itself but is broken down into toxic products when ingested. The **branched-chain alpha-keto acid dehydrogenase complex,** that normally converts **leucine, isoleucine,** or valine into **acyl-CoA** derivatives, converts Hypoglycin A into highly toxic ***MCPA-CoA (methylenecyclopropylacetate-CoA).*** MCPA-CoA inhibits fatty acid oxidation. In addition, MCPA-CoA blocks some enzymes that are required for **gluconeogenesis.**
- The reduction in gluconeogenesis and the reduction in fatty acid oxidation are thought to be the cause of most of the symptoms of Jamaican vomiting sickness. The blocking of fatty acid metabolism causes cells to start using glycogen for energy. Once glycogen is depleted, the body is unable to produce more, which leads to a severe case of hypoglycemia.

221. Ans. is 'c' i.e., 12·24 [*Ref:* ***Read below***]

- There are two different terms : (i) Oxygenation index; and (ii) Oxygen saturation index.

$$\text{Oxygenation index} = \text{MAP (in Cm } H_2O) \times FiO_2 \times 100 : PaO_2$$
$$= 20 \times 0{\cdot}6 \times 100 : 85 = 14{\cdot}18$$

$$\text{Oxygenation saturation index} = \text{MAP} \times Fi\,O_2 \times 100 : SpO_2$$
$$= 20 \times 0{\cdot}6 \times 100 : 98 = 12{\cdot}24$$

222. Ans. is 'c' i.e., Metachromatic leukodystrophy [*Ref:* ***Textbook of Neuroradiology 3rd/e p. 312; www.radiopaedia.com***]

- The **leopard skin sign** (also known as **tigroid pattern** or **stripe sign**) results from dark-spots or stripes (spared perivascular white matter) within bright demyelinated periventricular white matter on T2W images.
- It is characteristically seen in:
  - Metachromatic leukodystrophy
  - Pelizaeus-Merzbacher disease
  - Autosomal recessive spastic ataxia of Charlevoix

223. Ans. is 'c' i.e., FFP [*Ref:* ***Read below***]

- Intracranial hemorrhage is life threatening complication. Immediate FFP (Fresh Frozen Plasma) should be given:

Management of warfarin induced bleeding

- Management of warfarin induced bleeding is guided by clinical state and INR.
  i) ***INR is < 5 but above therapeutic range → Temporarily discontinue warfarin and restart at a lower dose once the INR is within the therapeutic range.***
  ii) ***If INR is between 5 to 9*** → Vitamin K1 (phytonadione) at 1-2·5 mg oral.
  iii) ***INR is between 9-20*** → Vitamin K1 at 5 mg oral.
  iv) ***If INR is > 20 or serious bleeding → Immediate hemostatic competence is necessary. Fresh frozen plasma*** is transfused immediately supplemented with ***10 mg vit K1 intravenous.*** Fresh frozen plasma replenishes the vit K dependent factor immediately. ***Alternative*** to fresh frozen plasma, ***fresh blood transfusion*** (supplies clotting factors) or ***prothrombin complex concentrate*** (containing factor II, IX and X) can be used. This treatment renders the patient refractory to oral anticoagulants but not to heparin.

Now see the question

- Urgent reversal of warfarin therapy is required when immediate hemostatic competance is necessary because of serious life threatening bleeding or when INR > 20.
- In these situations FFP is the treatment of choice, which is supplemented with vit K1.

224. Ans. is 'a' i.e., Adenosine [*Ref:* ***Harrison 20th/e p. 1522***]

- The ECG is showing PSVT : There is regular fast rhythm with narrow QRS complex. P wave is absent (as it is buried in QRS complex).

"Drug of choice for PSVT is Adenosine"

- ***Agents of First choice include :***
  - Adenosine and verapamil
  - Adnosine is preferred because of its extremely short half life, and lesser incidence of side effects
- **Agent of second choice are :**
  - β blocker

225. Ans. is 'd' i.e., Changing endotracheal tube every week [*Ref: AACN Protocal for practice p. 786*]

- The ***ventilator associated pneumonia bundle (VAP bundle)*** is an effective method to reduce VAP rates in ICU.
- It has following components:-
  i) *Elevation of the head of the bed to 30° (Prop up position).*
  ii) *Daily oral care with chlorhexidine every 2 hours.*
- Sedation vacation: reduce sedation to a level that allows patient to awaken once every 24 hours.
- Peptic ulcer prophylaxis within 24 hours of start of mechanical ventilation.
- Deep vein thrombosis prophylaxis (pharmacological and/or leg compression) within 24 hours of start of mechanical ventilation.

226. Ans. is 'b' i.e., PKP2 > 'a' i.e., Desmoplakin & 'd' i.e., Plakoglobin [*Ref: www.ncbi.nlm.nih.gov*]

- Arrhythmogenic right ventricular cardiomyopathy (ARVC) – previously referred to as arrhythmogenic right ventricular dysplasia (ARVD) – is characterized by progressive fibrofatty replacement of the myocardium that predisposes to ventricular tachycardia and sudden death in young individuals and athletes.
- It primarily affects the right ventricle, and it may also involve the left ventricle.
- The mean age at diagnosis is 31 years.
- The common genetic causes known to be associated with ARVC are: DSC2, DSG2, DSP, JUP, **PKP2**, and TMEM43. Less common genetic causes include CTNNA3, DES, LMNA, PLN, RYR2, TGFB3, and TTN. A subset of these 13 genes encode components of the desmosome.
- ***PKP2 is the most major causative gene for ARVC. PKP2 encodes plakophilin-2.***
- JUP was the first gene identified as causative for ARVC among the desmosome genes, and the structure of **plakoglobin**, which is encoded by JUP, is similar to that of plakophilin. However, ***the mutation frequency of JUP in ARVC patients is low as compared to that of other desmosome genes.***
- DSP is the largest among the desmosome genes and encodes **desmoplakin**. DSP mutations have been identified in ARVC patients. Although DSP is the largest among the desmosome genes, the number of reported mutations is small compared to other genes.

227. Ans. is 'a' i.e., Poor naming

- **Primary Progressive Aphasia (PPA)** is a neurological syndrome in which language capabilities become slowly and progressively impaired. PPA is caused by neurodegenerative diseases, such as Alzheimer's Disease or Frontotemporal Lobar Degeneration. PPA results from deterioration of brain tissue important for speech and language. Although the first symptoms are problems with speech and language, other problems associated with the underlying disease, such as memory loss, often occur later.
- Primary progressive aphasia symptoms vary, depending on which portion of the brain's language areas are involved. The condition has three types, which cause different symptoms.
  1. **Semantic dementia:** people gradually lose their knowledge of words
  2. **Progressive non-fluent aphasia (PNFA):** people's speech becomes effortful and they might say the wrong word or use the wrong grammar
  3. **Logopenic aphasia (LPA):** people start to develop pauses in their speech as they try to find the right word

Semantic dementia (semantic variant of PPA)

- Patients with semantic dementia typically present with a gradual worsening of both expressive and receptive language function. ***Patients complain of difficulty in remembering the names of places, people or objects or attributing the correct function to named objects.***
- Early on the deficits are largely isolated to temporal lobe function, and especially language. Later frontal symptoms also develop indistinguishable from the frontal variant of frontotemporal dementia, thus supporting the inclusion of semantic dementia as a frontotemporal lobar degeneration

Variant clinical features		Cortical atrophy	Pathology	Alternative nomenclature
svPPA	• Poor confrontation naming • Impaired single word comrehension • Three or more of the following poor object and/or person knowledge; surface dyslexia; spard repetition; spared motor speech	Anterior temporal lobe	• FTLD-TDP (69%) • AD (25%) • FTLD-tau (6%)	• Semantic dementa or SD • Semantic PPA or PPA-S

lvPPA	• Impaired single word retrieval • Impaired repetition of phrases and sentences • Three or more of the following : speech sound errors, spared motor speech, spared single word comprehension and object knowledge, absence of agrammatism	Left posterior perisylvian; inferior parietal	• AD (50%) • FTLD-TDP (38%) • FTLD-tau (12%)	• Logopenic progressive aphasia or LPA • Logopenic PPA or PPA-L • Progressive mixed aphasia or PMA
navPPA	• Grammatical simplification and errors in language production • Effortful, halting speech with speech sound errors • Two or more of the following : impaired syntactic comprehension; spared content word comprehension; spared object knowledge	Left posterior frontoinsular	• FTLD-tau (52%) • AD (25%) • FTLD-TDP (19%)	• Progressive nonfluent aphasia or PNFA • Agrammatic PPA or PPA-C

AD Alzheimer's disease; FTLD-tau frontotemporal lobar degeneration with tau-positive pathology; FTLD-TDP frontotemporal lobar degeneration with ubiquitin and TDP-43-positive pathology; lvPPA logopenic variant primary progressive aphasia; navPPA nonfluent/agrammatic variant primary progressive aphasia; PPA primary progressive aphasia; SD semantic dementia; svPPA semantic variant primary progressive aphasia.

DERMATOLOGY

228. Ans. is 'c' i.e., Histopathologically overlaps with that of melanoma [*Ref: IADVL 3rd/e p. 188-89*]

Spitz nevus is an uncommon, benign, melanocytic nevus that is usually acquired and has histologic features that overlap with those of melanoma.

Spitz nevus (Epithelioid and Spindle-Cell Nevus)

- ***It is an uncommon, benign, melanocytic nevus that is usually acquired and has histologic features that overlap with those of melanoma.***
- Spitz nevi were previously diagnosed as melanomas due to their similar appearance under a microscope, until it was found that they did not show malignant behavior. They tend to grow very rapidly, reaching a size of approximately 1 cm within 6 months and thereafter remaining static. A Spitz nevus can arise de novo or in association with an existing melanocytic nevus.
- These lesions are more common in the younger population, with 70% of cases diagnosed during the first two decades of life. Both sexes are affected equally with fair skinned individuals being most frequently affected.
- The cause of the Spitz nevus is currently unknown. Some cases of Spitz nevi have a unique aberration of genes on chromosome 11p which is not observed in melanomas.
- The Spitz nevus appears as a symmetric, well-circumscribed, smooth-surfaced or warty, firm, <1 cm, dome-shaped papule or nodule. The Spitz nevus is usually a solitary lesion. Spitz nevi are uniform in color and may be pink, red, red-brown, tan, blue-black, or even non-pigmented. They are most commonly located on the face, neck, and legs, although the upper extremities and trunk may be affected. Palms, soles, and mucous membranes are usually spared.
- Patients may present with possible bleeding and itching of the lesion, although these symptoms are not common as most patients are asymptomatic.
- Misdiagnosis of Spitz nevi as melanomas and misdiagnosis of melanomas as Spitz nevi is a possibility. In one study, 6.5% of cases diagnosed clinically as melanomas were Spitz nevi. Histopathologic differentiation from melanomas is equivocal in up to 8% of cases.
- Excision of lesions suspected of being Spitz nevi with histopathologic evaluation of the margins of the specimen is indicated. Certain atypical features of the Spitz nevus such as a diameter greater than 1 cm, asymmetry, or ulceration warrant a wider margin of normal skin during the initial excision. All patients should have regular follow-ups.

9. Ans. is 'c' i.e., Gram negative folliculitis

- ***Typical history of treatment for acne with doxycycline and other acne lesions like papules and comedones showing response to the treatment but these pustules developing during the treatment and were unresponsive to doxycycline indicate towards the diagnosis of gram negative folliculitis*** (see the description below).

About other options

- ***Pustular acne should have responded to doxycyline treatment like other acne lesions.***
- ***Perioral dermatitis presents as grouped follicular reddish papules, papulovesicles, and papulopustules on an erythematous base with a possible confluent aspect.*** The papules and pustules have primarily a perioral distribution.

- ***Papulopustular rosacea is characterized by persistent erythema, telangiectasia and skin inflammation in the form of papules or pustules in a central facial distribution.*** In severe cases, these episodes of inflammation can lead to chronic facial oedema.

Perioral dermatitis

Papulopustular rosacea

Gram-negative folliculitis (GNF)

- It is one of the most common mimics and complications of acne and acne rosacea. ***GNF in acne patients is a relatively rare complication of prolonged antibiotic therapy and should be considered in acne and acne rosacea patients who have flare-ups of pustules or cysts after prolonged courses of such antibiotics as doxycycline and minocycline.***
- There is no sexual or racial predilection for the development of GNF. Teenagers seem to suffer less frequently than older persons because they have had less exposure to tetracycline antibiotics.
- It is thought that antibiotics—tetracycline in particular—change the normal florae of the skin, allowing gram-negative bacteria that colonize the anterior nares to spread to the facial skin. In addition, the presence of seborrheic dermatitis is thought to increase the risk of GNF.
- ***While acne is a disease of closed and open comedones, red papules, pustules, and cysts, GNF is a disease primarily of pustules (and to a lesser extent, cysts).***
- ***GNF has a distinct clinical appearance, so a diagnosis can be established based on the clinical history (failure of oral tetracycline) and a physical exam showing numerous fragile pustules.***
- GNF is caused by a variety of gram-negative bacterium, including: Escherichia coli, Serratia marcescens, K. pneumoniae, K. oxytoca, and Proteus mirabilis. Pseudomonas aeruginosa is a ubiquitous gram-negative rod that can also cause GNF.
- The classical treatment of GNF calls for isotretinoin 0.5-1.0 mg/kg for five months. Antibiotic regimens involving double-strength TMP/SMX can be successful if used for two to four months. Although it seems that topical treatment with benzoyl peroxide or azelaic acid would be helpful, GNF requires oral medication.
- Children, persons with diabetes, and immunodeficient patients may be more susceptible to gram-negative infections and may require treatment with a second- or third-generation cephalosporin in addition to conventional therapies.

230. **Ans. is 'b' i.e., Lichen planus** [*Ref: **Venkataram 1st/e** p. 59; **Behl 10th/e** p. 265*]

Histopathology in Lichen planus

1) ***The basic pathology in lichen planus is the damage to the basal cell layer of epidermis leading to hydropic degeneration of basal cells.***
2) ***Epidermal thickening*** especially of granular cell layer → ***Hypergranulosis.***
3) ***Hyperkeratosis*** (Thickening of stratum cornuem)
4) ***Acanthosis*** (Thickening of Stratum) malpighi.
5) ***Subepidermal - lichenoid band*** due to deposition of lymphocytes & histiocytes in upper dermis.
6) Dropping of melanin pigment from damaged keratinocytes of epidermis into dermis → ***pigment incontinence.***
7) This melanin is engulfed by macrophages which results information of ***cytoid bodies (civatte or colloid bodies).***
8) **Max Joseph Histological cleft** → Separation of epidermis in small clefts.

231. **Ans. is 'b' i.e., Warts** [*Ref: **Roxburgh's - Common Skin disease 17th/e** p. 130- 32; **Fitzpatrick's Dermatology in General Medicine 6th/e** p. 407- 434, 463- 474; **Rooks Textbook of Dermatology 7th/e** p. 35.1-35.63, 42.1-42.14; **Pasricha- Treatment of skin disease 4th/e** p. 184- 89*]

Isomorphic phenomenon	Pseudo-isomorphic phenomenon
Psoriasis *(characteristic)*	*Plane warts*
Lichen planus	*Molluscum contagiosum*
Kaposi S_A	*Eczematous lesions*

Mollscum Contagiosum
Warts
Vitiligo
Discoid lupus Erythematosus

232. Ans. is 'd' i.e., Abnormal keratinization in distal hair shaft [*Ref: **Rooks** 7th/e p. 48.1*]

- **Netherton syndrome** is an **autosomal recessive** genodermatosis which is characterized by :-
  i) *Congenital ichthyosiform erythroderma.*
  ii) ***Atopic diathesis (atopic dermatitis, allergic rhinitis, asthma).***
  iii) ***Trichorrhexis invaginata.***
  iv) *Growth retardation.*
  v) *Skin infection*
  vi) *Increased stratum corneum protease activities and elevated kallikrein levels in the stratum corneum*
- **Trichorrhexis invaginata (bamboo hair)** is a hair shaft abnormality that occurs as a result of an intermittent Keratinizing defect of the hair cortex. ***Incomplete conversion of the sulfhydryl –SH group onto S-S disulfide bonds*** in the protein of the cortical fibers leads to cortical softness and subsequent invagination of the ***fully keratinized distal hair shaft*** into the softer, ***abnormally keratinized proximal hair shaft.***
- Intussusception of the distal hair shaft into the proximal hair shaft result in a distinctive ball-and-socket hair shaft deformity.
- The affected hairs are brittle and breakage is common, resulting in short hairs.

233. Ans. is 'b' i.e., There are flaccid blisters [*Ref: **Rook's** 7th/e p. 36*]

- There are tense bullae in bullous pemphigoid. There may be mild itching (mild pruritis).

Bullous Pemphigoid

- Bullous pemphigoid is a chronic, autoimmune, **subepidermal** blistering disorder.
- Bullous pemphigoid is characterized by the presence of immunoglobulin G autoantibodies specific for the **hemidesmosomal pemphigoid antigens 1 (BPAG1) and 2 (BPAG2).**
- There is deposition of **C3 and IgG at basement membrane** *around dermoepidermal junction.*
- ***Acantholysis is*** absent as the disease is subepidermal (acantholysis occurs in epidermal diseases).
- Age group involved is **60-80 years.**
- There are **tense bullae (in contrast to P. vulgaris where bullae are faccid).**
- Bullae are on **erythematous base** (in contrast to P.vulgaris where bullae occur on normal skin).
- Bullae are distributed on **lower part of body (lower abdomen, inner thigh, groins, interiginous area).**
- Distribution is ***bilaterally symmetrical*** (in contrast to P.vulgaris where assymmetric distribution is there).
- ***Moderate itching*** is there (in contrast to P.vulgaris where no or minimal itching occurs).
- ***Nikolsky's Sign is negative*** (positive in P.vulgaris).

PSYCHIATRY

234. Ans. is 'd' i.e., OCD [*Ref: **Read below***]

- Question is very simple.
- Delusions are feature of psychosis. OCD is a neurosis.

	Psychosis	Neurosis
Insight	***Absent***	***Present***
Contact with reality	Impaired	Preserved
Personality & Behavio	Impaired	Relatively preserved
Judgement	Impaired	Preserved
Delusions & Hallucinations	Present	Absent
Disorders	Schizophrenia, mood disorders (depression, mania, bipolar disor der), other psychotic disorders	Anxiety disorder (***Panic***), Phobia, OCD, Dissociative-conversion disorder

- ***Grandiose delusion (expansive delusions) :-*** **False belief that one is exceptionally powerful, talented or important.** These delusions seen ***most commonly in mania***, However, can also occur in ***schizophrenia*** and organic states.

About option 'a' & 'b'

- Most common cause of grandiose delusion is Mania. *Amphetamine use and frontal lobe tumor* are organic causes of mania.

Organic Causes of Mania		
Neurological conditions • ***Frontal lobe tumor*** • Temporal lobe epilepsy • Wilson's disease • Huntington's disease • Encephalitis	**Systemic conditions** • Hyperthyroidism • Uremia (Renal failure) • Hemodialysis • IMN • Vitamin B12 & B3 deficiency • Carcinoid	**Drugs** • Corticosteroids • ***Amphetamines*** • Cocaine • Levodopa • INH • Sympathomimetics • Hallucinogen

235. **Ans. is 'a' i.e., Frontal lobe** [*Ref: **Radiopaedia.org***]

"Ventricular enlargement with cortical atrophy (particularly in the frontal lobes) is seen in patients with chronic schizophrenia."
--------Radiopedia.org.

- All the lobes can be involved but best answer is frontal lobe.
- Ventricular enlargement with cortical atrophy (particularly in the frontal lobes) is seen in patients with chronic schizophrenia. Ventricular size has been reported to increase with progression of the disease.
- Further research has found that **temporal lobe** volumes in patients with schizophrenia are smaller compared to control patients. This includes a reduction in the size of the **amygdala-hippocampus** complex, which is responsible for memory formation and emotional reactions (both of which are blunted in schizophrenia).
- The **superior temporal gyrus** (which is part of **Wernicke's area**) is also reduced in volume, which could possibly explain the catatonic behavior and problems with language seen in certain patients with schizophrenia.
- Some studies have also identified **parietal lobe** (particularly the **cingulate** and **supramarginal gyri**) and **occipital lobe** atrophy, although these are not common and are often present in later stages of the disease.
- On initial screening, a reduction in the size of the **caudate** is observed. With neuroleptic medication exposure, the size of basal ganglia structures appears to increase. The size of the **thalamus** also appears to be reduced, although it is difficult to ascertain this on both CT and MRI. The **corpus callosum** is also thicker in patients with schizophrenia.

236. **Ans. is 'c' i.e., Psychomotor agitation** [*Ref: **Textbook of clinical Psychiary** 7th/e p. 786*]

- Psychomotor retardation (not psychomotor agitation) is a sign of latent bipolarity.
  "Compared with major depressive disorder (unipolar depression), bipolar depression is more likely to manifest psychosis, melanocholic symptoms, psychomotor retardation and atypical symptoms"
- Clinicians need to be cautious of such 'agitated depression' (depression with mixed features) in young adults - especially it they seem to be exacerbated by antidepressant monotherapy. These concerns are reflected in the 2013 update of DSM-5, which focused on mixed features and may allow more diagnoses to be made in younger patients while maintaining diagnostic flexibility over time. Differentiating features of bipolar depression which may assist with earlier diagnosis of bipolar diathesis include hypersomnia, other 'atypical' depressive symptoms such as 'leaden paralysis' and hyperphagia, psychotic features including pathological guilt, psychomotor slowing, 'flatness' of mood, an abrupt onset or offset of episodes, postpartum onset, a prodrome of cyclothymia or hyperthymia (trait mildly elevated mood), a seasonal pattern of symptoms, lability of mood, irritability, sub-threshold manic symptoms and a family history of bipolar disorder.

237. **Ans. is ??? May be 'd'** [*Ref: **Handbook of Depression** p. 256*]

- ***Maternal depression and abuse*** have independent effects on depression, and the combination may be associated with ***higher levels of depression*** in children.
- Other risk factors for future depression in child sexual abuse are -
  - *Child with low self esteem*
  - *Difficulty relating to peers*
  - *Insecure attachement relationships*
  - ***Dysfunctional attribution*** (***negative attributional***)
  - ***Social-cognitive biases***
  - Neuroendocrine abnormalities (HPA axis abnormalities)
- I could *not find any* reference regarding option 'd'.

238. **Ans. is 'd > c' i.e., According to DSM-V, diagnosis is clinical and severity is based on body mass index (BMI) > Patient may or may not reveal verbally about self-perception of being fat** [*Ref: **Essentials of psychiatry** 7th/e p. 786*]

DSM-5 Diagnostic Criteria for Anorexia Nervosa

a) Restriction of energy intake relative to reqirements, leading to a significantly low body weight in the context of age, sex, developmental trajectory, and physical health. *Significantly low weight* is defined as a weight that is less than minimally normal or, for children and adolescents, less than that minimally expected.
b) Intense fear of gaining weight or of becoming fat, or persistent behavior that interferes with weight gain, even though at a significantly low weight.
c) Disturbance in the way in which one's body weight or shape is experienced, undue influence of body weight or shape on self-evaluation, or persistent lack of recognition of the seriouness of the current low body weight.

Coding note: The ICD-9-CM code for anorexia nervosa is **307.1**, which is assigned regardless of the subtype. The ICD-10-CM code depends on the subtype (see below)

Specify whether:

- **(F50.01): Restricting type** : During the last 3 months, the individual has not engaged in recurrent episodes of binge eating or purging behavior (i.e., self-induced vomiting or the misuse of lexatives, diuretics, or enemas). This subtype describes presentations in which weight loss is accomplished primarily through dieting, fasting, and/or excessive exercise.
- **(F50.02): Binge-eating/purging type** : During the last 3 months, the individual has engaged in recurrent episodes of binge eating or purging behavior (i.e., self-induced vomiting or the misuse of lexatives, diuretics, or enemas).

Specify if:

- **In partial remission**: After full criteria for anorexia nervosa were previously met. Criterior A (low body weight) has not been met for a sustained period, but either Criterior B (intense fear of gaining weight or becoming fat or behavior that interferes with weight gain) or Criterior C (disturbances in self-perception of weight and shape) is still met.
- **In full remission**: After full criteria for anorexia nervosa were previously met, none of the criteria have been met for a sustained period of time.

Specify current severity:

- The minimum level of severity is based, for adults, on current body mass index (BMI) (see below) or, for children and adolescents, on BMI percentile. The ranges below are derived from World Health Organization categories for thinness in adults; for children and adolescents, corresponding BMI percentiles should be used. The level of severity may be increased to reflect clinical symptoms, the degree of functional disability, and the need for supervision.
- **Mild**: BMI $\geq$ 17 kg/m^2
- **Moderate**: BMI 16-16.99 kg/m^2
- **Severe**: BMI 15-15.99 kg/m^2
- **Extreme**: BMI < 15 kg/m^2

BMI = body mass index; ICD-10-CM = International classification of diseases, 10th Revision, Clinical modification

About Option 'a'

- People with severe mental disorders on average tend to die earlier than the general population. This is referred to as premature mortality. There is a 10-25 year life expectancy reduction in patients with severe mental disorders.
- The vast majority of these deaths are due to chronic physical medical conditions such as cardiovascular, respiratory and infectious diseases, diabetes and hypertension. Suicide is another important cause of death.
- Mortality rates among people with schizophrenia is 2 to 2.5 times higher than the general population.
- People with bipolar mood disorders have high mortality rates ranging from 35% higher to twice as high as the general population.
- There is a 1.8 times higher risk of dying associated with depression. People with severe mental illness do not receive the same quality of physical health care as the general population.
- The majority of deaths of patients with severe mental illness that are due to physical medical conditions are preventable with more attentive checks for physical illness, side effects of medicines and suicidal tendencies.

9. Ans. is 'a' i.e., Caudate nucleus > 'b' i.e., Globus pallidus [*Ref: **Various sources***]

- There is hyperactivity, increased glucose metabolism and high caudate glutamate concentration in brain in OCD.
- The region implicated are :-

i) ***Orbito-frontal cortex*** **:**
   - Pediatric OCD patients have significantly greater gray matter density in orbial frontal cortex. Gray matter volume of anterior cingulate is greater in pediatric OCD patients.

ii) ***Basal ganglia*** **:**
   - ***Striatum (especially caudate nucleus) correlate inversely with symptom severity;*** **Caudate nucleus volume is decreased.**
   - ***Globus pallidus is smaller in volume.***

iii) ***Thalamus*** **:**
   - ***Thalamus volume is larger in pediatric OCD patients.***

This question is repeat from Jipmer Dec - 18

Uses of Capnography

1. **It is the surest confirmatory sign of correct intubation in trachea. Incorrect position of tube in esophagus instead of trachea (esophageal intubation) will yield $ETCO_2 = 0$.**
2. ***Intraoperative displacement*** of endotracheal tube → $ETCO_2$ will become zero.
3. Obstruction or disconnections of endotracheal tube → $ETCO_2$ will fall.
4. Diagnosing malignant hyperthermia → $ETCO_2$ increases significantly (more than 100 mg Hg).

Capnogram

A capnogram plots CO_2 concentration over time and consists of four phases :

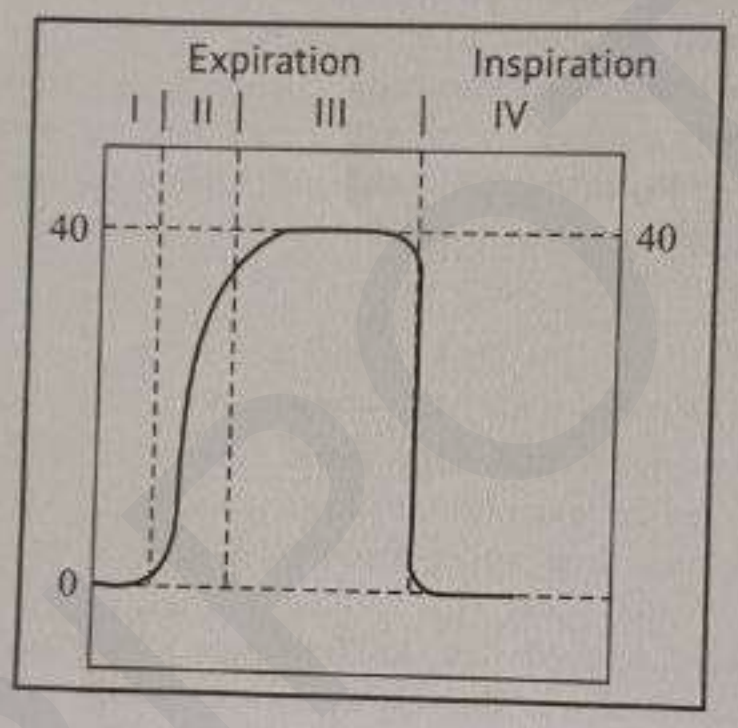
- **The X axis measures time** and the **Y-axis** shows the concentration of CO_2.

The phase I : - The phase I starts with **exhalation**. The first gases that pass over the capnography sensor usually **do not contain carbon-di-oxide** because they are the gases that fill the physiological dead spaces in the "conducting airway" (Lungs, bronchi, trachea, mouth and nose). This phase is the **baseline** of the capnograph.

Phase II : - Phase II is known as the **expiratory upstroke** and trace steep rise in CO_2 level. This phase measures a mixture of dead space (No CO_2) and alveolar (CO_2).

Phase III : - This phase represents the **expiratory plateau** which represents mostly **alveolar gas exhalation.** The plateau is indicative of the homeostasis of the patient. The gases released at the end of expiratory plateu have the **highest concentration of CO_2.** This is also known as the **end tidal point** and is what is measured with calorimetry, capnometry or capnography.

Phase IV : - This phase reflects the **inhalational phase**, which brings oxygenated gases into the lung, returning the gas levels and the capnograph waveform to the beginning of a new cycle and the baseline.



RADIOLOGY

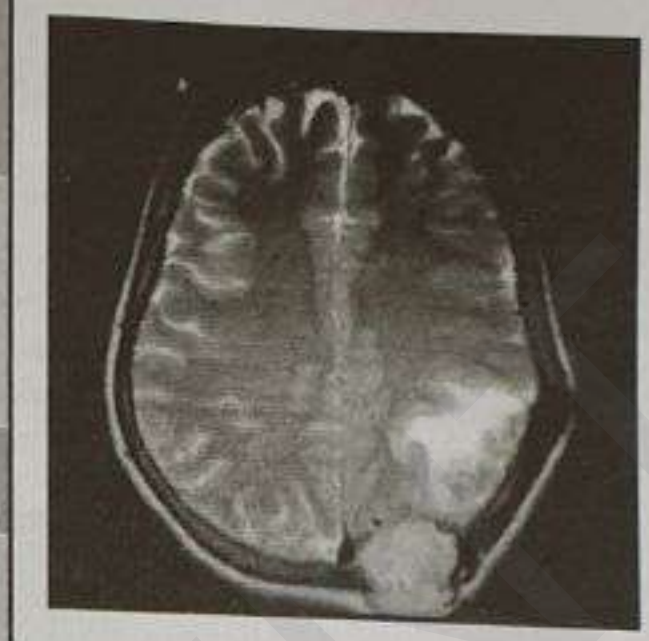
243. Ans. is 'a' i.e., 10^{-9} to 10^{-11} meter

- **X-ray** is an **electromagnetic radiation** with wavelength of about 10^{-9} to 10^{-11} metre (10^{-7}-10^{-9} cm).
- X-rays were discovered by **WC Roentgen** of **Germany** in 1895. **The centenary year for x-rays is 1995.**
- X-ray tubes produce x-ray **by accelerating electrons to high energies.**
- The x-ray tube **filament (cathode)** is heated to incandescense so that it **emits electrons** by thermoionic emmision.
- A high voltage is applied between **filament (cathode)** and **target (anode)** so that the electrons are attracted towards anode and the electrons from the filament are accelerated away from the negatively charged filament to positively charged target.
- **When the electrons hit the anode (the target), x-rays are produced.**
- These x-rays are used to take all **conventional radiography (plane x-ray) and computed tomograph (CT).**

44. Ans. is 'b' i.e., Glioblastoma

- **Glioma** may be -
  i) ***Low grade (simply called glioma or astrocytoma)*** → show only a low density area (dark area) on MRI.
  ii) ***High grade (Glioblastoma)*** → shows more contrast enhancement at peripheri (white on outside) and dark necrosis in the middle (as **shown in the image of question**).
- On MRI, brain **metastases** are typically found in the watershed areas of the brain (areas where blood vessels narrow and act as a trap for clumps of tumor cells)
- Findings on MRI suggestive of intracerebral metastases are tabulated below -

MRI Component	Findings
T1	• Tipically iso- to hypointense • If hemorrhagic, may have intrinsic high signal • Non-hemorrhagic melanoma metastases can also have intrinsic high signal due to the paramagnetic properties of melanin
T1 with contrast	• Enhancement pattern can be uniform, punctate, or ring-enhancing, but is usually intense • Delayed sequences may show additional lesions, therefore contrast-enhanced MRI is the current standard for small mtastases detection
T2	• Typically hyperintenses • Hemorrhage may alter this (hypointense)
FLAIR	• Typically hyperintense with hyperintense peri-tumoral edema
Diffusion weighted imaging (DWI)	• Edema is out of proportion with tumor size and appears dark on trace-weighted DWI



245. **Ans. is 'a' i.e., $SnCl_2$** [*Ref: **Fundamentals in radiology** 7th/e p. 171*]

- Various radionuclides are used in nuclear medicine. **Tc-99 is the most common radionuclides used for imaging in nuclear medicine.**
- Technetium-99m is produced relatively inexpensively using a generator. **Molybdenum-99** suspended on an **alumina** column decays ($t_{½}$ = 66 h) to form **technetium-99m.**
- The singly charged $^{99m}TcO_4^-$ is eluted in preference to the doubly charged $^{99}MoO_4^{--}$ using saline.
- Commercially available technetium-99m radiotracers are generally prepared by the simple addition of technetium-99m eluted from the generator to a kit vial containing a freeze-dried formulation of the active ingredient.
- The preparation of technetium-99m imaging agents is relatively straightforward ; a kit comprising a **reducing agent, usually stannous chloride** ($SnCl_2$), a weak **chelating agent** and the cheland is treated with the generator eluate and the mixture incubated for a short time, often at room temperature, giving a preparation that is ready for injection without purification.
- The technetium-^{99m} half-life of 6 h allows time for preparation of the radiotracer, distribution and patient imaging. The energy of the **γ-ray** emission (140 keV) is ideal for imaging using gamma cameras.

246. **Ans. is 'a' i.e., T1 weighted image** [*Ref: **Fundamentals in radiology** 7th/ e p. 731*]

- NMR relaxation is the processes by which an excited magnetic state returns to its equilibrium distribution. NMR relaxation measurement can be used for spectral assignment and the study of quadrupolar and paramagnetic interactions, and exchange dynamics.
- Any excited magnetic moment (generally excited by a **radio-frequency pulse**) relaxes back to equilibrium on the **z-axis.**
- There are two mechanisms involved: spin-lattice and spin-spin.
- **Spin-spin relaxation** is also referred to as **transverse relaxation** or T_2 and describes the decay of the excited magnetization perpendicular to the applied magnetic field . The observed spectral line-width is related to the spin-spin relaxation but is also affected by magnetic inhomogeneity. This combination of relaxation and inhomogeneity is referred to as the **dephasing timeor** T_2^*.
- **Spin-lattice** relaxation is also referred to as **longitudinal relaxation or** T_1 and describes the return to equilibrium in the direction of the magnetic field. The spin-lattice relaxation (T_1) can be measured from the buildup of magnetization along the static applied magnetic field (conventionally the **z-axis**).

247. **Ans. is 'c' i.e., MRI > USG > CT Scan** [*Ref: **www.ncib.nlm.nih.***]

Sensitivity for detection of Foreigen body				
Technique	For wood	For glass	For barium glass	For stone
MRI	16.67 %	8-33%	41.67%	16.67%
USG	33.33 %	33.33%	33.33%	33.33%
CT scan	33.33 %	83.33%	100%	100%

- Comparison of sensitivity, specificity of MRI, CBCT and ultrasound in detected of foreign body.

- For DNA analysis as a hemoglobinopathies, mall-asenua, sickle cell anemia.
- To detect inborn errors of metabolism line phenylketonuria
- Appropriate for first trimester diagnosis of Down syndrome.

- **Note: It is not suitable to detect structural defects like of neural tube defects.**

Routes

- Transabdominal (done using spinal needle)
- Transcervical (done using specially designed catheter)

Advantages over amniocentesis

- The main advantage of CVS is that, results are available earlier in pregnancy, which allows earlier and safer methods of pregnancy termination when results are abnormal.
- Results can be obtained from direct analysis as well as culture in contrast to amino centers where diagnosis requires cultured cells.
- Preferred procedure for diagnosis needing DNA analysis as villi are a good source of DNA.
- CVS yields a larger amount of tissue and is therefore the method of choice when larger amount of DNA is needed for diagnosis.

Risks:

- Chances of fetal loss/abortion 1-2% (more than amniocentesis)
- If performed earlier than 9 weeks (typically around 7 weeks), increased chances of oromandibular limb hypogenesis and limb reduction defects.
- It can cause rupture of membranes, leakage of amniotic fluid and infection.
- Rh isoimmunization can occur in Rh-negative females.

184. Ans. is 'c' i.e., NPH + Lispro [*Ref: Textbook of Diabetes & prgnancy - 152;*
Textbook of recent uptades in perinatology 3rd/ p. 712; Dutta's 9th/e p. 267]

- The given patient is suffering from gestational diabetes.

Condition	Fasting glucose	2 hour glucose	HbA1c
Normal	< 110 mg%	< 140 mg %	< 6.0 %
Impaired fasting glycemia	> 110 mg% – < 126 mg%	< 140 mg %	6.0-6.4 %
Impaired glucose tolerance	< 126 mg %	> 140 mg %	6.0-6.4 %
Diabetes mellitus	≥ 126 mg%	≥ 200 mg %	≥ 6.5 %

- When insulin is indicated, a ***double mixed regime*** is employed, which includes a combination of -
  i) ***Rapidly acting insuline, and***
  ii) ***Intermediate acting insuline***
- Among the given options only option 'C' has combination of both; Aspart is rapid acting and NPH (Neutral protamine hagedorn also called isophane insulin) is intermediate acting.

1. **Rapid acting Insulin** → Insulin lispro, Insulin aspart, Insulin glulisine.
2. **Short acting** → Regular (soluble) insulin, semilente insulin.
3. **Intermediate acting** → Insulin zinc suspension (Lente), Neutral protamine hagedorn (isophane insulin).
4. **Long acting** → Protamin zinc insulin, Insulin glargine, Insulin determir

185. Ans. is 'b' i.e., Endovascular trophoblasts [*Ref: Dutta's 9th/e p. 28*]

- Trophoblasts can be divided into two types: Villous & extravillous

Trophoblasts

Take part in formation of vill (villous)

i) Syncitiotrophoblasts
ii) Cytotrophoblasts

Note take part in villous structure (EVT)

i) *Endovascular cytotrophoblasts* → invade spiral arteries
ii) *Interstial cytotrophoblasts* → invade myometrium & endometrium