1. **Zygote with zona pellucida reaches uterine cavity by :**

a) 2 days

b) 4 days

c) 5 days

d) 6 days

Correct Answer - B
4 days

2. In spermatogenesis, independent assortment of paternal and maternal chromosomes occurs during-

a) Primary to secondary spermatocyte

b) Spermatogonia to primary spermatocyte

c) Secondary spermatocyte to spermatids

d) Spermatids to spermatozoa

Correct Answer - A
Answer- A. Primary to secondary spermatocyte

- In spermatogenesis, independent assortment of paternal and maternal chromosomes occurs during meiosis I, in which primary spematocyte) to (2n) is converted into two secondary spermatocytes (In).

3. Tongue muscles are derived from

a) Lateral plate mesoderm

b) Occipital myotome

c) Intermediate mesoderm

d) Cervical myotome

Correct Answer - B

Ans: B Occipital myotome

Development of the tongue:-

I. Epithelium:

Ant 2/3 -- lingual swellings of 1st arch and tuberculum impar.

Post 1/3 -- large dorsal part of hypobranchial eminence, i.e, 3rd arch.

Posterior most part -- small dorsal part of the hypobranchial eminence, i.e. 4th arch.

II. Muscles:

Derived from occipital myotomes except palatoglossus which is derived from the 6th arch.

4. Which of the following is remnant of distal umbilical artery?

a) Ligamentum Teres

b) Superior Vescical artery

c) Medial umbilical Ligament

d) Ligamentum arteriosum

Correct Answer - C
Ans.C. Medial umbilical Ligament
Remnant of umbilical artery:-
. Proximal part : Superior vesical artery
. Distal part: Medial umbilical ligament

5. All are derived from neural crest except ?

a) Adrenal medulla

b) Pigment cell in skin

c) Corneal stroma

d) Retinal pigmented epithelium

Correct Answer - D

Ans. is `d' i.e., Retinal pigmented epithelium

Derivatives of neuroectoderm

1. From neural tube : CNS (brain, spinal cord), astrocytes, oligodendrocytes, ependymal cells, retina, pineal gland, neurohypophysis (posterior pituitary), all cranial and spinal motor nerves.
2. From neural crest : Neural crest derivatives are :?
3. 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.

6. Optic vesicle is derived from -

a) Endoderm

b) Mesoderm

c) Neuroectoderm

d) Surface Ectoderm

Correct Answer - C

Answer- C. Neuroectoderm

- An outgrowth from prosencephalon forms optic vesicle (neuroectodermal structure).
- Proximal part of optic vesicle becomes constricted and elongated to form optic stalk
- Growing optic vesicle comes in contact with surface ectoderm which is thickened to form lens placode.

7. Digeorge syndrome is characterized by all except ?

a) Congenital thymic hypoplasia

b) Abnormal development of third and fourth pouches

c) Hypothyroidism

d) Hypocalcemic tetany

Correct Answer - C
Ans. is 'c' i.e., Hypothyroidism

8.

Part of neural tube from which corpus callosum develops

a) Basal lamina

b) Alar lamina

c) Lamina terminalis

d) Basal plate

Correct Answer - C

Ans. is 'c' i.e., Lamina terminalis

- The development of the corpus callosum occurs between the 12th and 16-20th weeks of gestation 6.
- It begins with the genu and then continues posteriorly along the body to the splenium. The rostrum is the last part to be formed.
- Myelination of the corpus callosum occurs in the opposite direction, from the splenium forwards.
- They develop from lamina terminalis which is *cranial part of neural tube* and later lies in the anterior wall of 3^{d} ventricle.
- The corpus callosum, the largest of cerebral commissures, takes the form of an arch over the third ventricle.
- It connects the neocortices of both sides.

9. Epithelial lining of urinary bladder ?

a) Squamous

b) Transitional

c) Cuboidal

d) Columnar

Correct Answer - B
Ans. is 'b' i.e., Transitional

- Urothelium (transitional epithelium) is found in renal pelvis, calyces, ureter, urinary bladder, proximal part of urethra.

10. Female urethra develops from -

a) Urogenital sinus

b) Mesonephric duct

c) Ureteric bud

d) Metanephric Blastema

Correct Answer - A
Ans. A. Urogenital sinus
The female urethra is mainly derived from the urogenital sinus while the urethral plate forms the vestibule and labia minora.

11. All of the following help in formation of IVC except -

a) The posterior intercardinal anastomosis

b) Terminal portion of right vitelline vein

c) Segment of right cardinal vein

d) Subcardinal sinus

Correct Answer - D

Ans. D. Subcardinal sinus

The inferior vena cava is composed of (from caudal to cranial):

. Posterior intercardinal anastomosis.
. The caudal portion of the right supracardinal vein.
. The right anastomosis between the supracardinal and the subcardinal veins.
. A segment of the right subcardinal vein.
. The anastomosis between the right subcardinal and right vitelline veins.
. The terminal portion of the right vitelline vein.

12. Kidney parenchyma is derived from -

a) Ureteric bud

b) Mesonephros

c) Metanephros

d) Paramesonephros

Correct Answer - C
Ans. C. Metanephros
Metanephros : This system will form the nephrons and parenchyma of the definitive kidney.

13. Facial nerve is a derivative of which of the following branchial arch?

a) First arch

b) Second arch

c) Third arch

d) Fourth arch

Correct Answer - B

Facial nerve is a derivative of second branchial arch. Muscles of facial expression derived from it are buccinator, auricularis, frontalis, platysma, orbicularis oris and orbicularis oculi. Additional muscles supplied by it are stapedius, stylohyoid, and posterior belly of digastric.

Branchial arch	**Cranial nerve**	**Muscles**
First mandibular	Trigeminal	Muscles of mastication: masseter, temporalis, medial and lateral pterygoid. Additional muscles: mylohyoid, anterior belly of digastric, tensor tympani, tensor veli palatini
Third	Glossopharyngeal	Stylopharyngeus
Fourth and sixth	Superior laryngeal, recurrent laryngeal branches of vagus	Pharyngeal and laryngeal muscles: cricothyroid, levator veli palatini, constrictors of pharynx, intrinsic muscles of larynx

Ref: Neuroscience for the Study of Communicative Disorders By Subhash Chandra Bhatnagar page 279.

14. Leptotene and pachytene are stages ofwhich phases of meiosis -

a) Prophase I

b) Metaphase I

c) Anaphase II

d) Telophase II

Correct Answer - A
Ans. A. Prophase I
Meiosis 1 is divided into following phases :-
I) Prophase 1: It is further divided into following stages:-
. Leptotene
. zygotene
. Pachytene
. Diplotene
. Diakinais
2) Metaphase 1
3) Anaphase 1
4) Telophase 1

15. Pelvic kidneys are due to all except ?

a) Inability to ascend during fetal life

b) Fusion of the lower poles

c) Being blocked by branches of the aorta

d) p53 mutation

Correct Answer - D

Ans. D. p53 mutation

Pelvic kidney

- A fetal pelvic kidney is a condition that results when the kidneys fail to ascend to their normal position above the waist and remain in the pelvis because they are blocked by blood vessels in the aorta.
- Developing kidneys may also fuse together causing what is known as a 'horseshoe kidney"
- A fetal pelvic kidney or horseshoe kidney is generally diagnosed by ultrasound (sonogram) examination before birth.
- Evaluation of the kidneys is part of the routine ultrasound examination done by many obstetricians as part of their prenatal care around the 20s week of pregnancy.

16. Crypta magna develops from which pouch?

a) 1st

b) 2nd

c) 3rd

d) 4th

Correct Answer - B

Ans. B. 2nd

Medial surface of each tonsil has 15-20 crypts, the largest of which is called Intratonsillar cleft or crypto magna (which represents persistence of the ventral portion of the second pharyngeal pouch).

17. Which of the following is a traction epiphysis?

a) Distal Radius

b) Mastoid process

c) Tibial Condyles

d) Coracoid Process

Correct Answer - B
Ans. B. Mastoid process

18. All of the following are true about the liver except ?

a) It is covered by Glisson's capsule

b) Stellate cells are present in the space of Disse

c) Kupfer cells are the defense cells

d) The lobules in the liver are pentagonal

Correct Answer - D
Ans. D. The lobules in the liver are pentagonal
Liver has hexagonal lobules

19. Hering's canal is present in ?

a) Spleen

b) Liver

c) Kidney

d) Lung

Correct Answer - B
Ans, B. Liver
1he canal of Hering or intrahepatic bile ductules are part of outflow system of exocrine bile product from the liver.
They are found between the bile canaliculi and interlobular bile ducts near the outer edge ofliver lobule.

20. Herring's bodies are present in?

a) Pars tuberalis

b) Pars intermedia

c) Neurohypophysis

d) Pars terminal is

Correct Answer - C
Ans. C. Neurohypophysis
Herring bodies or neurosecretory bodies are structures found in the posterior pituitary (neurohypophysis).

21. All of the following are true about thymus except?

a) The cortical portion is mainly composed of lymphocytes

b) The medulla contains Hassall's Corpuscles

c) It is derived from the fourth Pharyngeal pouch

d) It undergoes atrophy puberty onwards

Correct Answer - C

Ans. C. It is derived from the fourth Pharyngeal pouch

The thymus is a specialized primary lymphoid organ of the immune system. Within the thymus, T cells or T lymphocytes mature.

The thymus is largest and most active during the neonatal and pre-adolescent periods. By the early teens, the thymus begins to atrophy and thymic stroma is mostly replaced by adipose (fat) tissue

Thymus is derived from the third pharyngeal pouch

22. Auerbachs plexus is present in the -

a) Colon

b) Esophagus

c) Stomach

d) All of the above

Correct Answer - D
All of the above

23. Which of the followinglayer is absent in the esophagusa -

a) Adventitia

b) Serosa

c) Muscularis propria

d) Mucosa

Correct Answer - B
Ans. B. Serosa
The esophagus also has an adventitia, but not a serosa

24. Which is the most abundant cartilage-

a) Hyaline cartilage

b) Elastic cartilage

c) Fibrocartilage

d) None

Correct Answer - A
Ans. A. Hyaline cartilage

25. Haustrations are present in -

a) Duodenum

b) Ileum

c) Jejunum

d) Colon

Correct Answer - D

Ans. is 'd'i.e., Colon [Rel BDC #/e Vol.2 p. 2661

. Characteristics features of large intestine (colon) are:-i) 3longitudinal bands, formed by longitudinal muscle coat, called Taeniae coli.
. Sacculation or haustration
. Fat filled peritoneal pouches called appendices epiploicae. These are not found in appendix, caecum and rectum.
. Greater part is fixed except for appendix, transverse colon and sigmoid colon.
. Pyere's patches (present in small intestine) are not present.

26. What is the lining of the lacrimal gland alveoli?

a) Ciliated columnar cells

b) Pyramidal cells

c) Non keratinizing squamous epithelium

d) None

Correct Answer - B
Ans. B. Pyramidal cells
Alveoli of the gland are lined by pyramidal cells, which show lightly stained apical secretary granules.

27. What type of muscles are medial two lumbricals?

a) Unipennate

b) Bipennate

c) Multipennate

d) None

Correct Answer - B
Ans. B. Bipennate

28. Ansa nephroni is lined by ?

a) Columnar

b) Squamous epithelium

c) Cuboidal and columnar epithelium

d) Stratified squamous epithelium

Correct Answer - B
B i.e. Squamous epithelium

29. Four carpal bones are present at what age?

a) 3 years

b) 4 years

c) 5 years

d) 6 years

Correct Answer - B
4 years REF: Parikh 6' edition page 2.9
Between 2 to 6 years, the number of carpal bones present on X ray represents the approximate age in years, as for example, four carpal bones — 4 years.

30. What is the level of the spine of scapula?

a) T7

b) T I 0

c) T4

d) T2

Correct Answer - C
Ans. C. T4
Spine of scapula is at T3T4level

31. Which of the following muscles carries out shoulder abduction from 15 to 90 degrees?

a) Suprapinatus

b) Trapezius

c) Deltoid

d) Serratus Anterior

Correct Answer - C
Ans. C. Deltoid

32. Which muscle acting on the thumb has dual nerve supply?

a) Flexor Pollicis Longus

b) Flexor Pollicis brevis

c) Adductor Pollicis

d) Opponens Pollicis

Correct Answer - B
Ans. B. Flexor Pollicis brevis

33. What is Wartenberg's sign?

a) Inability to maintain Intrinsic plus position

b) Inability to adduct small finger against the ring finger

c) Inability to grasp a book between the thumb and index finger

d) Inability to move the middle finger sideways

Correct Answer - B
Ans, B. Inability to adduct small finger against the ring finger
Wartenberg's sign is inability to adduct the small finger in against the ring fnger due to weakness of palmar interosseous muscles.

34. Sensory region of the ulnar nerve is?

a) Tip of little finger

b) Tip of index finger

c) 1st web space

d) Lateral upper aspect of arm

Correct Answer - A
Ans. A. Tip of little finger

35. Pulp of the index finger is supplied by

a) Median nerve

b) Radial nerve

c) Ulnar nerve

d) Axillary nerve

Correct Answer - A
Ans, A. Median nerve

36. Low radial nerve [just after spiral groove] palsy does not produce ?

a) Loss of wrist extention

b) Loss of elbow extention

c) Loss of finger extention

d) Loss of thumb extention

Correct Answer - B

Ans. B. Loss of elbow extention

- Low radial nerve palsy
  - Injury is after the spird groove.

Low radial nerve palsy may be of two types :

i) Type I: - Injury occurs between the spiral groove and elbow joint.

Muscles involvement is : -

. Elbow ertensors (Triceps, anconeus) are spared.

. Wrist, elbow and finger extensors are paralysed.

. Sensory loss in first web space (on dorsal side)

Ii) Type II: - Injury occurs below the elbow joint.

. Elbow extensors (triceps, anconeus) and wrist extensors (ECRL) are spared.

. Finger extensors (extensor digitorum, extensor digiti minimi, extensor indicis) and thumb extensors (extensor pollicisc longus & brevis) are paralysed.

. Sensory loss in first web space (on dorsal side).

If lesion is low

a) Type 1

- Wrist drop, thumb drop and finger drop.
- Elbow extension is preserved.
- Sensory loss over the dorsum of first web space.

b) Type 2

- Thumb drop and finger drop
- Elbow and wrist extension is preserved
- Sensory loss over the dorsum of first web space

37. Infraspinous fossa of scapula contains which of the following muscles?

a) Subscapularis

b) Infraspinatus

c) Teres major

d) Supraspinatus

Correct Answer - B
Ans. B. Infraspinatus
Infraspinatus attaches medially to the infraspinous fossa of the scapula and laterally to the middle facet of the greater tubercle of the humerus.

38. Structure passing deep to flexor retinaculum at wrist:

a) Ulnar nerve

b) Median nerve

c) Radial nerve

d) Ulnar artery

Correct Answer - B

The flexor retinaculum stretches across the front of the wrist and converts the concave anterior surface of the hand into an osteofascial tunnel, the carpal tunnel, for the passage of:

- The median nerve
- Flexor tendons of the thumb (flexor pollicis longus) and fingers (flexor digitorum superficialis and profundus).
- Radial and the ulnar bursa

It is attached medially to the pisiform bone and the hook of the hamate and laterally to the tubercle of the scaphoid and the trapezium bones.

The attachment to the trapezium consists of superficial and deep parts and forms a synovial-lined tunnel for passage of the tendon of the flexor carpi radialis.

The lower border is attached to the palmar aponeurosis.

39. Coracoacromial ligament resists which movements?

a) Upward displacement of humeral head

b) Abduction of shoulder

c) Inferior displacement of humerus

d) External rotation

Correct Answer - A
Ans. A. Upward displacement of humeral head
The coracoacromial ligament is a flat triangular band that plays a supportive role for the shoulder joint.
Coracoacromial prevents Upward displacement of humeral head.
It has two part, conoid (medial) and trapezoid (lateral). The weight of the upper limb is transmitted to the medial two-third of the clavicle and thence to the axial skeleton through the coraco-clavicular ligment.

40. Coracohumeral ligament inserts on?

a) Greater tuberosity

b) Lesser and greater tuberosities

c) Anatomical neck of humerus

d) Bicepetal groove

Correct Answer - B

Ans. B. Lesser and greater tuberosities

Coracohumeral ligament :

- An extraarticular ligament on the lateral surface ofcoracoid and inserts into the greater and lesser tuberosities, spanning the bicipital groove.
- Sectioning of coracohumeral ligaments produces anteroinferior instability.
- Represents folded thickening of glenohumeral capsule in area of rotator interval between subscapularis & supraspinatus.
- W/body upright & arm in dependent position, coracohumeral & MGHL play important roles in resisting inf translation.

41. What is the action of anconeus?

a) Primary elbow extensor

b) Assists Extension of elbow

c) Wrist extension

d) Thumb Abduction

Correct Answer - B
Ans. B. Assists Extension of elbow
Anconeus = Its role in elbow extension is trivial in humans. It assists in extension of the elbow, where the triceps brachii is the principal agonist, and supports the elbow in full extension.

42. Which muscle helps in climbing a tree ?

a) Latissimus Dorsi

b) Rhomboideus

c) Trapezius

d) Levator scapulae

Correct Answer - A
Ans. A. Latissimus Dorsi
Climbing of tree is helped by:
. Latissimus Dorsi
. Pectoralis major
Latissimus Dorsi is also known as "climber's muscle" or "Tree climbing muscle".

43. Posterior interosseus artery is a branch of ?

a) Common interosseus artery

b) Radial artery

c) Median artery

d) Brachial artery

Correct Answer - A
Ans. A. Common interosseus artery
The common interosseous artery, about 1 cm. in length, arises immediately below the tuberosity of the radius from the ulnar artery.

44. Which muscle protects the brachial plexus in case of clavicle fractures?

a) Subclavius

b) Supraspinatus

c) Subscapularius

d) Teres Minor

Correct Answer - A
Ans. A. Subclavius
The subclavius protects the underlying brachial plexus and subclavian vessels from a broken clavicle.

45. Which of the following is true about deep palmar arch?

a) Mainly formed by the radial artery

b) Ulnar artery has no contribution to it

c) It gives off 5 perforating branches

d) It does not anastomose with the superficial palmar arch

Correct Answer - A

Ans. A. Mainly formed by the radial artery

Deep palmar arch

- It lies across the base of metacarpal bones. It is formed mainly by radial artery and completed by a deep branch of the ulnar artery.

Its branches are:-

- Three palmar metacarpal arteries
- Three perforating arteries
- Recurrent branches
- The deep palmar arch lies deep to the oblique head of adductor pollicis, long flexor tendon, and lumbrical muscles and passes across the base of metacarpal and interossei.

46.

Which part of scapula can be palpated in the infraclavicular fossa?

a) Coracoid process

b) Spine of scapula

c) Inferior angle

d) Supraspinous fossa

Correct Answer - A
Ans. A. Coracoid process
The coracoid process is a thick curved process attached by a broad base to the upper part of the neck of the scapula; it runs at first upward and medial ward; then, becoming smaller, it changes its direction, and projects forward and lateralward.
It is palpable just below the clavicle.

47. Flexor carpi radialis inserts into ?

a) Base of 5th metatarsal

b) Base of 2^{nd} and 3^{rd} metacarpal

c) Scaphoid and trapezium

d) Capitate and hamate

Correct Answer - B

Ans., B. Base of 2^{nd} and 3^{rd} metacarpal

Flexor carpi radialis

- Origin: Medial epicondyle of the humerus.
- Insertion: Base of second and third metacarpals.
- Nerve supply: Median nerve.
- Action: Pronator of the forearm, weak flexor of elbow.

48. What is true about lateral tibial condyle ?

a) Iliotibial tract is attached to the lateral condyle of tibia

b) Ligamentum patellae inserts on it

c) Medial collateral ligament is attached to it

d) Semimembranosus is attached to it

Correct Answer - A

Ans. A. Iliotibial tract is attached to the lateral condyle of tibia

* Tibia is the second longest bone (after femur).
* Proximal end (upper end)
  - Proximal (upper) end of tibia includes medial and lateral condyles, forming tibial plateau. It also includes tibial tuberosity and intercondylar area (area between medial and lateral condyle).
  - Distal end
* Medial malleolus gives attachment to deltoid ligament (medial collateral ligament) of ankle.

49. Weakness of extensor Hallucis longus is due to which nerve root mainly?

a) L5

b) L4

c) S1

d) S2

Correct Answer - A
Ans. A. L5

50. Which of the following is common between the medial and lateral plantar arch?

a) Flexor Digitorum Brevis

b) Plantar Fascia

c) Spring Ligamnet

d) Deltoid Ligament

Correct Answer - B
Ans, B. Plantar Fascia
Plantar fascia acts as a tie beam for both medial and lateral plantar arches.

51. Which tendon is lodged in the groove on posterior surface of lateral malleolus?

a) Peroneus longus

b) Tibialis anterior

c) Tibialis posterior

d) Flexor Hallucis Longus

Correct Answer - A
Ans, A. Peroneus longus
Peroneus longus ends in a long tendon, which runs behind thelateral malleolus, in a groove common to it.

52. All of the following are true about tibialis anterior except ?

a) It is supplied by the superficial peroneal nerve

b) It dorsiflexes the foot

c) It is closely related to the anterior tibial vessels

d) It inserts on the medial cuneiform

Correct Answer - A

Ans. A. It is supplied by the superficial peroneal nerve

Tibialis anterior

- It is situated on the lateral side of the tibia; it is thick and fleshy above, tendinous below.
- The tibialis anterior overlaps the anterior tibial vessels and deep peroneal nerve in the upper part of the leg.

53. Attachment on posterior surface of sacrum?

a) Multifidus Lumborum

b) Iliacus

c) Coccygeus

d) Piriformis

Correct Answer - A

Ans, A. Multifidus Lumborum

Attachements on sacrum

A) Posterior Surface

Multifidus lumborum –

- The deepest muscle arising from the sacrum.
- Some of its fibers cover the uPper two sacral foramina.
- This muscle attaches to the transverse processes of the superior vertebrae and is therefore able to help stabilize the spine.

Erector spinae –

- Partly arises from the posterior sacrum and the sacrospinous ligament.
- It is essential in achieving extension and lateral bending of the head and vertebral column

54. Structures passing through sacral hiatus are ?

a) S4 nerve root

b) S2 nerve root

c) S3 nerve root

d) S5 nerve root

Correct Answer - D
Ans. D. S5 nerve root
Sacral hiatus

- The sacral hiatus corresponds to the posterior caudal opening at the end ofthe sacral canal, which usually occurs at the fifth sacral vertebra (S5), at the posterior surface ofthe sacrum.

55. Longest cutaneous nerve in body ?

a) Lateral cutaneous nerve of thigh

b) Medial cutaneous nerve of thigh

c) Saphenous nerve

d) Sural nerve

Correct Answer - C

Ans, C. Saphenous nerve

The saphenous branch of the femoral nerve (saphenous nerve) is the longest cutaneous nerve. It runs with the great saphenous vein in front of medial malleolus and supplies the skin of anteromedial aspect of the leg and medial border of the foot. The saphenous nerve may be damaged in front of the medial malleolus during venesection of the long saphenous vein.

Therefore, femoral nerve damage can cause sensory loss over the area of the great saphenous vein in the leg.

56. Oblique popliteal ligament is derived from ?

a) Semitendinosus

b) Biceps femoris

c) Adductor magnus

d) Semimembranosus

Correct Answer - D
Ans, D. Semimembranosus
Oblique popliteal ligament

- It is an expansion from the tendon of semimembranosus attachment to intercondylar line of femur.
- It is closely related to popliteal artery and is pierced by middle genicular vessels and nerve and the terminal part of the posterior division of the obturator nerve.

57. Lateral border of the foot receives its sensory supply from ?

a) Saphenous nerve

b) Sural nerve

c) Deep peroneal nerve

d) Sciatic nerve

Correct Answer - B
Ans. B. Sural nerve

58. All of the following is included in chest wall except?

a) Ribs

b) Thoracic Vertebrae

c) Sternum

d) Lumbar vertebrae

Correct Answer - D
Ans, D. Lumbar vertebrae

59. Respiratory bronchioles are formed from ?

a) Principal bronchus

b) Terminal bronchioles

c) Tertiary Bronchus

d) Lobar bronchioles

Correct Answer - B
Ans, B. Terminal bronchioles
Terminal bronchiole emnate into respiratory bronchioles. Repiratory bronchioles proceed into the alveolar ducts, which immediately branch into alveolar sacs (alveoli).

60. Segment of bronchi distal to primary bifurcation?

a) Primary bronchi

b) Terminal bronchiole

c) Respiratory bronchiole

d) Sencondary bronchi

Correct Answer - A
Ans. A. Primary bronchi

61. The cricopharyngeal sphincter is how far from the central incisor?

a) 15cm

b) 25cm

c) 40cm

d) 50cm

Correct Answer - A
Ans, A. 15cm
At the level of T1O vertebra, its passage through esophageal hiatus of diaphram lower esophageal sphincter- 37.5-40 cm (f5-f6 inches) from incisor

62. Which of the following structures is related to the esophagus 22.5cm from the incisor teeth?

a) Arch of aorta

b) Right principal broncus

c) Thoracic Duct

d) Azygous Vein

Correct Answer - A
Ans, A. Arch of aorta
2d constriction is at T4 level where arch of aorta crosses esophagus.

63. Thoracic duct opens into systemic circulation at?

a) junction of SVC and left brachiocephalic vein

b) Junction of left internal jugular and left subclavian vein

c) Directly into coronary sinus

d) Into azygous vein

Correct Answer - B

Ans. B. Junction of left internal jugular and left subclavian vein

Thoracic duct begins as a continuation of the upper end of the cisternachy linear the lower border of T12 vertebra and enters the thorax through the aortic opening of diaphragrn (at T12). It then ascends through the posterior mediastinum and at T5 level crosses from right side to the left side and ascends along left margin of oesophagus to enter the neck. At the level of C7 vertebrae, arches towards left side to open into left brachiocephalic vein at the angle of union of left subclavian and left internal jugular veins.

64. Sympathetic supply of the heart is from ?

a) Vagus

b) Thoracic sympathetic fibres [T1 to T5]

c) Lumbar sympathetic fibres

d) Cervical ganglion

Correct Answer - B
Ans, B. Thoracic sympathetic fibres [T1 to T5]

65. Which of the following are cusps of the aortic valves?

a) Left, right and Anterior

b) Anterior, Right and Posterior

c) Posterior, Left and Right

d) Anterior, Posterior and Left

Correct Answer - C
Ans, C. Posterior, Left and Right
The aortic valve is a semilunar valve with three cusps which include left, right and posterior.

66. Which is the widow's artery in myocardial infarction?

a) Left anterior descending artery

b) Right coronary artery

c) Posterior interventricular artery

d) Left circumflex artery

Correct Answer - A

Ans, A. Left anterior descending artery

The anterior interventricular branch of the left coronary artery, (also left anterior descending artery (LAD), or anterior descending branch) is a branch of the left coronary artery.

Occlusion of this artery is often called the widow-maker infarction and hence this artery is called a widow's artery.

67. Which of the following passes posterior to the hilum of the lung?

a) Vagus

b) Phrenic nerve

c) SVC

d) Right atrium

Correct Answer - A
Ans, A. Vagus

68. What is the level of the pulmonary valve?

a) 3rd intercostal space

b) 4th costal cartilage

c) 3rd costal cartilage

d) 2nd intercostal space

Correct Answer - C
Ans, C. 3rd costal cartilage

69. Lower limit of the inferior border of the lung in the midaxillary line is ?

a) 6^{th} rib

b) 8^{th} rib

c) 10^{th} rib

d) 12^{th} rib

Correct Answer - B

Ans, B. 8^{th} rib

The lower limit of the inferior border of the lung is 2 ribs above the reflection of the pleural.

In the midaxillary line the pleura reflects at the 10^{th} rib and hence the lower limit of the lung is 8^{th} rib.

70. Which is a typical intercostal nerve?

a) First

b) Second

c) Third

d) Seventh

Correct Answer - C
Third
"Typical intercostal nerves are the ones that are confined to their own intercostal spaces in the thoracic wall. The third, fourth, fifth and sixth intercostal nerves are the typical nerves"

71. Great cardiac vein lies in ?

a) Tricuspid valve

b) Anterior interventricular sulcus

c) Posterior interventricular sulcus

d) None

Correct Answer - B

Ans. is 'B' i.e., Anterior interventricular sulcus [Ref **BDC** 4th/e Vol. I, p. 251-252; Keith Moore Clinical Anatomy hlth/e p. 136-137; Snell's Clinical Anatomy9th/e p. 121]

- (Atrioventricular) sulcus → Great cardiac vein, coronary sinus, Small cardiac vein, RCA, LCX.
- Anterior interventricular sulcus → Great cardiac vein, left anterior descending (interventricular) artery.
- Posterior interventricular sulcus → *Middle cardiac vein,* Posterior interventricular branch of RCA.

72. Apex at of the lung lies at what level?

a) Above the clavicle

b) Below the clavicle

c) At the level of the clavicle

d) None

Correct Answer - A

Ans. is 'a' i.e., Above the clavicle ***[Ref BDC 4thie p. 222-228]***

Apex lies in the inlet of thorax, 2-5 cm above the clavicle. It is related *anteriorly* to subclavian artery and vein. Posteriorly it is separated from neck of first rib by (from medial to lateral) sympathetic trunk, fist posterior intercostal vein, superior intercostal artery, and ascending branch of ventral ramus of 1" thoracic nerve.

73. Diaphragm is supplied by ?

a) Phrenic nerve

b) C2,C3,C4 Roots

c) Thoracodorsal nerve

d) Long thoracic nerve

Correct Answer - A

Ans. is 'a' i.e.,Phrenic nerve *[Ref BDC 6th/e* ***Vol*** *I p. 192, fig. 12.12]*

Nerve supply

- **Motor :- Phrenic nerve** (C3C4C5).
- Sensory :- i) centrally by phrenic nerve.
- Peripherally by lower 6 intercostal nerves.

74. Midpoint between suprasternal notch and pubic symphyses passes through which plane?

a) Transpyloric plane

b) Transtubercular plane

c) Trnasxiphoid plane

d) None

Correct Answer - A

Ans. is 'a' i.e.,Transpyloric plane [Ref BDC Vol-2 6th/e p. 229]

Anterior abdominal wall is divided into **9 regions** with the help of two vertical and two horizontal planes.

The horizontal planes include : -

. **Transpyloric plane (of Adison) :- It** lies midway **between the suprasternal notch and pubic symphysis. It passes anteriorly through tips of 9'h costal cartilage and posteriorly through lower border of L, vertebra.** Organs present at this level are **hilum of kidney,** pylorus of stomach, beginning of duodenum, neck of pancreas, **fundus of gall bladder** and origin of SMA.

. **Transtubercular plane :-** It connects the tubercles of iliac crests and pass through upper border of L_5 vertebra.

The two **vertical planes** are right and left **lateral planes** passing through midinguinal point (also called as **midinguinal plane or midclavicular plane).**

The nine regions from above downwads are -

. In middle :- Epigastrium, umblical, hypogastrium.

. **On** right side :- Right hypochondrium, right lumbar, and right inguinal

(iliac) regions.

. **Left side :- Left** hypochordrium, left lumbar and left inguinal (iliac) regions.

75. Muscle lying between anterior and middle layer of thoracolumbar fascia is ?

a) Psoas major

b) Quadratus Lumborum

c) Obdurator internus

d) External oblique

Correct Answer - B

Ans. is 'b' i.e., Quadratus Lumborum *[Ref BDC **6th Ie Vol. 2** p. 343; **Snell 9" /e** p. 695]*

Quadratus lomborum is enclosed between anterior and middle layers. **Erector spinae (paraspinal muscle)** is **enclosed between** middle and posterior layer.

76. Anterior Rectus Sheath just above pubic symphysis is formed by ?

a) External Oblique Aponeurosis

b) The aponeurosis of three muscles including External Oblique, Internal Oblique, and Transversus Abdominis

c) Linea Alba

d) Internal Oblique only

Correct Answer - B

Ans. is 'B' i.e., Aponeurosis of three muscles including External Oblique, Internal Oblique, and Transversus Abdominis

- The anterior wall just above the symphysis pubis (area below the arcuate line) → is formed by aponeurosis of all three muscles (external oblique, internal oblique, transversus abdominis).
- Three aponeurotic layers forming rectus sheath of both sides interlace with each other to form a tendinous raphe, Linea alba. It extends from the xiphoid process to pubic symphysis.
- Linea alba is narrow and indistinct below the umbilicus, as two recti lie in close contact. Linea alba broadens out above the level of the umbilicus.

77. Right suprarenal vein drains into ?

a) Inferior vena cava

b) Right renal vein

c) Left renal vein

d) Accessory Hemiazygous vein

Correct Answer - A
Ans. is 'a' i.e., Inferior vena cava
Arterial supply of adrenal gland is by three arteries:-
1. Superior suprarenal artery (branch of the inferior phrenic artery);
2. Middle suprarenal artery (branch of abdominal aorta); and
3. inferior suprarenal artery (branch of the renal artery).
Venous drainage is through the suprarenal veins.
Right suprarenal (adrenal) vein drains into IVC and left suprarenal vein drains into the left renal vein and then into IVC.
Lymphatics from suprarenal glands drain into lateral aortic (para-aortic) nodes.

78. Which of the following is not derived from the external oblique aponeurosis?

a) Inguinal Ligament

b) Lacunar ligament

c) Line Semilunaris

d) Pectineal Ligament

Correct Answer - C

Ans. is 'c' i.e., Line Semilunaris [Ref BDC 6th/e Vol 2 p. 343; Snell 9[1]Ve p. 695]

External oblique → Inguinal (Pouparts) ligament

- Lacunar ligament Mnemonic : IPL
- Pectineal (cooper's) ligament
- Superficial inguinal ring
- External spermatic fascia
- Internal oblique → Cremasteric fascia & muscle
- Along with tendon of transversus abdominis forms conjoint tendon

79. Stomach is supplied by ?

a) Coeliac trunk

b) Splenic artery

c) Gastroduodenal artery

d) All of the above

Correct Answer - D
Ans. is 'd' i.e., All of the above

80. **What is the number of layers in greater omentum?**

a) 1

b) 2

c) 3

d) 4

Correct Answer - D

The greater omentum is folded back on itself and is therefore made up of four layers of closely applied visceral peritoneum, which are separated by variable amounts of adipose tissue.

81. Stomach wall is mainly drained by all lymphnodes except?

a) Pyloric nodes

b) Short gastric vessel nodal group

c) Right gastroepiploic nodes

d) Inguinal nodes

Correct Answer - D

Ans. is 'd' i.e., Inguinal nodes *[Ref Gray's anatomy 20th edition]*

The stomach is drained by four groups of lymph nodes :

. Left gastric arterial nodal group, which follows the left gastric artery and drain into the celiac nodes. They drain the lesser curvature of the stomach to the left.

. Short gastric and left gastroepiploic vessels nodal group. The lymphatic vessels which drain the left side of the greater curvature of the stomach follows these vessels and drain into the pancreaticosplenic group of nodes.

. Right gastroepiploic nodes, which drain the right half of the greater curvature of stomach as far as the pylorus

. Pyloric nodes which drains the pyloric part of stomach to the hepatic , pyloric and left gastric nodes.

All the vessels enter into the celiac node. From these nodes they pass into the intestinal lymph trunks, which then enter the cisterna chyli or the abdominal confluence of lymph trunks. The cisterna chyli drains into the thoracic duct.

82. All lymph of stomach drains into ?

a) Pyloric nodes

b) Short gastric vessel nodal group

c) Right gastroepiploic nodes

d) Coeliac nodes

Correct Answer - D
Ans. 'D' i.e., Coeliac nodes
All the vessels enter into the celiac node.
From these nodes, they pass into the intestinal lymph trunks, which then enter the cisterna chyli or the abdominal confluence of lymph trunks.
The cisterna chyli drains into the thoracic duct.

83. Gall bladder is realted to which segment of the liver?

a) I

b) II

c) III

d) IV

Correct Answer - D

Ans. is 'd' i.e., IV ***[Ref Gray's 40th Ie p. 1163-1167; Sabiston 18th/e p. 1584]***

- The gall bladder lies on the inferior surface of the liver closely related to segment IV or the quadrate lobe.
- Anatomically liver is divided into a large right lobe and a small left lobe by line of attachment of falciform ligament (anterosuperiorly), fissure for ligamentum teres (inferiorly), and fissure for ligamentum venosum (posteriorly).
- Right lobe is much larger and forms five sixth of liver and left lobe forms only one sixth. Caudate lobe and quadrate lobe are parts of anatomical right lobe.
- The physiological left lobe is composed of 4 segments designated Ito IV and is supplied by left branch of hepatic artery, left branch of portal vein and drained by left hepatic duct.
- The physiological right lobe consists of segment V, VI, VII and VIII and is supplied by right hepatic artery, right branch of portal vein and drained by right hepatic duct.

84. Which segment of liver drains on both sides ?

a) I

b) II

c) III

d) IV

Correct Answer - A

Ans. is 'A' i.e., I

Caudate lobe (segment I)

- It is situated on the posterior surface of the right lobe.
- It is bounded on right by a groove for IVC, on left by fissure for ligamentum venosum, and inferiorly by porta hepatis (containing hepatic artery, portal vein, hepatic duct bile duct, nerve plexus, and lymphatics).
- Just behind the porta hepatis, the caudate lobe is connected to the rest of the right lobe by the caudate process.
- There is a small rounded elevation to the left, called the papillary process.
- Caudate lobe lies in the superior recess of lesser sac and is related to the crura of the diaphragm, right inferior phrenic artery, and coeliac trunk.
- Caudate lobe (anatomical part of the right lobe) belongs physiologically to both right and left lobes because it receives blood from the right and left hepatic arteries; right and left branches of the portal vein, and drains bile into both the right and left hepatic duct. Thus it is considered as the physiologically independent lobe.

85. Caudate lobe of the liver - True is?

a) It receives blood supply from both right and left hepatic arteries

b) It is Segment II of the liver

c) It is situated on the anterior surface of liver

d) It lies between the aorta and ligamentum venosum

Correct Answer - A

Ans. is 'a' i.e., It receives blood supply from both right and left hepatic arteries *[Ref Ramesh Babu p. 249]*

Caudate tube (segment I) is situated on posterior surface of liver between IVC & ligamentum venosum. It receives blood supply from right & left arteries.

86. Superior border of epiploic foramen formed by -

a) Caudate lobe

b) Hepatic artery

c) Bile duct

d) IVC

Correct Answer - A

Ans. is 'a' i.e., Caudate lobe

Epiploic foramen (foramen of Winslow or aditus to lesser sac) is a slit-like opening through which lesser sac communicates with greater sac. It is situated at the level of T12 vertebra. Its boundaries are:-

- Anterior:- Right free margin of lesser omentum (contains portal vein, hepatic artery proper and bile duct).
- Posterior:- IVC, right suprarenal gland and T12 vertebra.
- Superior:- *Caudate lobe of the liver*.
- Inferior:- 1st part of the duodenum and horizontal part of the hepatic artery.

87. Internal anal Sphincter is formed by ?

a) Puborectalis

b) Circular muscles from lower rectum

c) Longitudinal Involuntary muscles

d) None

Correct Answer - B

Ans. is 'b' i.e., Circular muscles from lower rectum ***[Ref BDC 4th/e Vol. H p. 383; Gray's Anatomy 40th ie Chapter 67]***

- External sphincter is contributed by fibers from puborectalis part of levator ani muscle (in upper most part); superficial transverse
- perineal muscles anteriorly and anococcygeal raphe posteriorly (in upper third) and anococcygeal ligament (in middle third).

88. All of the following are true about duodenum except?

a) Fourth part is the shortest part

b) Ampulla of Vater opens through the second part

c) Minor duodenal papilla is in the third part

d) First part appears like a duodenal cap on barium studies

Correct Answer - C

Ans. is 'c' i.e., Minor duodenal papilla is in the third part *[Ref BDC 6[1]* Vol. 2 p. 259-262]*

Third part (Horizonal part) :

- It is 10 cm (4 inches) long. It begins at inferior duodenal flexure and passes towards the left in front of IVC behind superior mesenteric vessels and root of mesentery to meet 4th part of duodenum.

89. Which of the following is a branch of the inferior mesenteric artery?

a) Sigmoid artery

b) Middle colic artery

c) Renal artery

d) Right Colic artery

Correct Answer - A

Ans. is 'a' i.e., Sigmoid artery ***[Ref BDC 6th/e yoi. 2 p. 276]***

Inferior mesentric artery gives following branches ?

. Left colic artery
. Sigmoid arteries
. Superior rectal artery

90. Waldeyer's fascia connects ?

a) Rectum to sacrum

b) Rectum to uterus

c) Rectum to lateral wall of pelvis

d) Rectum to bladder

Correct Answer - A

Ans. is 'a' i.e., Rectum to sacrum *[Ref Clinical anotomy 2'nd le p. 786]*

Support of rectum include

. Fascia of waldeyer : It attaches the lower part of rectal ampulla to the sacrum. It is formed by condensation of pelvic fascia behind the rectum and encloses the superior rectal vessels and lymphatics.
. Lateral ligaments of the rectum : It is formed by condensation of pelvic fascia and encloses middle rectal vessels, and branches of pelvic plexuses.
. Rectovesical fascia of denonvilliers : It extends from rectum (behind) to the prostate and seminal vesicle in front.
. Pelvic peritoneum and related vascular pedicles.

Perinea(body with its muscles.

91. Content of Alcock's canal is ?

a) Internal pudendal artery

b) Internal iliac artery

c) Inferior rectal vein

d) Inferior mesenteric vein

Correct Answer - A

Ans. is 'a' i.e.,Internal pudendal artery *[Ref BDC 6th/e Vol-2 p. 362]*

- Pudendal canal (Alcock's canal) is a fascial canal in the lateral wall of ischeorectal (ischeo-anal) fossa, enclosing pudendal nerve and internal pudendal vessels (artery and vein). It is a space between obturator fascia and lunate fascia. Other believe that it is formed by splitting of the obturator fascia.

92. All of the following organs are in direct contact with the spleen except?

a) Duodenum

b) Stomach

c) Left kidney

d) Colon

Correct Answer - A
Ans. is 'a' i.e., Duodenum
Gross morphology of the spleen
Spleen has two ends (anterior or lateral and posterior or medial), three borders (superior, inferior and intermediate), two surfaces (visceral and diaphragmatic), two angles (anterobasal angle and posterobasal angle) and hilum.
The anterior end is supported by the phrenicocolic ligament.
The superior border is characteristically notched near its anterior end.
The visceral surface is related to the fundus of stomach (at gastric impression), left kidney (at renal impression), splenic flexure of the colon (at colic impression) and tail of the pancreas (at pancreatic impression). Its lower end is related to the *phrenicocolic ligament*. *The diaphragmatic* surface is related to the diaphragm.

93. Glans penis is a continuation of -

a) Corpus spongiosum

b) Ischiocavernosus

c) Corpora Cavernosa

d) Puborectalis

Correct Answer - A

Ans. is 'A' i.e., Corpus spongiosum

- The penis is the male organ of copulation. The penis has a root and a body.
- The root of the penis is situated in the superficial perinea! pouch, attached to the inferior surface of the perineal membrane. It consists of three masses of erectile tissue: the bulb of the penis and two crura. Each crus continues forward to become the corpus cavernusum (in the body) and the bulb is the posterior end of the corpus spongiosum (of the body).
- The body of the penis is the free portion of the penis. It is composed of three elongated masses of erectile tissues:- right and left corpora cavernosa, and median corpus spongiosum. Corpora cavernosae are enveloped by tunica albuginea and corpus spongiosum is also surrounded by tunica albuginea. The penile urethra runs through the whole length of the corpus spongiosum from the bulb at the back to the terminal expanded part of the corpus spongiosum, called the glans penis.

94. Which muscle causes opening of the upper end of esophagus?

a) Epiglottis

b) Thyropharungeus

c) Stylopharyngeus

d) Cricopharyngeus of inferior constrictor

Correct Answer - D

Ans. is 'd' i.e., Cricopharyngeus of inferior constrictor ***[Ref Hall, Arthur C. Guyton, John E. (2005). Textbook of medical physiology (11th ed.). Philadelphia: W.B. Saunders. p. 782-784.]***

Upper esophageal sphinctor

- The upper esophageal sphincter surrounds the upper part of the esophagus.
- It consists of skeletal muscle, but is not under voluntary control.
- Opening of the upper esophageal sphincter is triggered by the swallowing reflex.
- The primary muscle of the upper esophageal sphincter is the cricopharyngeal part of the inferior pharyngeal constrictor.

95. Posterior perforation of stomach, collection of contents occurs in which pouch ?

a) Greater sac

b) Left subhepatic and hepatorenal spaces [pouch of Morrison]

c) Omental bursa

d) Right subphrenic space

Correct Answer - C

Ans. is 'B' i.e., Left subhepatic and hepatorenal spaces [pouch of Morrison]

A posterior gastric ulcer may perforate into the *lesser sac (omental bursa)*. The leaking fluid passes out through epiploic foramen to reach the hepatorenal pouch. Sometimes in these cases the epiploic foramen is closed by adhesions. Then the lesser sac becomes distended, and can be drained by a tube passed through the lesser omentum.

96. Cremastric muscle is formed from ?

a) Fascia from internal oblique

b) Fascia from external oblique

c) Fascia from rectus abdominis

d) Fascia from transversus abdominis

Correct Answer - A

Ans. is 'a' i.e., Fascia from internal oblique

The layers of scrotum from outside to inside are :-

. Skin
. Dartos muscle (smooth muscle layer) continuous with Colles fascia of perineum posteriorly and Scarpa's fascia and Camper's fascia anteriorly .
. The external spermatic fascia, extension from external oblique.
. The cremasteric muscle, continuous with fascia from internal oblique.
. The internal spermatic fascia, continuous with fascia from fascia transversalis.

97. Kidney is covered by what fascia?

a) Sibson's fascia

b) Buck's Fascia

c) Gerota's Fascia

d) None

Correct Answer - C

Ans. is 'c' i.e., Gerota's Fascia ***[Ref Farlex Partner Medical Dictionary Farlex 2012]***

Renal fascia

- There are four coverings around the kidney (from within outwords) :- True capsule (fibrous capsule)
- It is formed by the condensation of fibrous stroma of kidney.
- False capsule (renal fascia or fascia of Gerota)
- It is formed by condensation of extra-peritoneal connective tissue around kidney and is continuous laterally with fascia transversalis. False capsule consists of two layers : anterior "fascia of Toldt" and posterior "fascia of Zuckerkendl".

98.

Narrowest part of ureter is ?

a) Brim of the pelvis

b) Crossing by gonadal vessels

c) Vesicouretric junction

d) Crossing by ductus deferens

Correct Answer - C

Ans. is 'c' i.e., Vesicouretric junction [Ref Campbellis urology 6thle p. 2123; Gray's Anatomy for students 1"/e p. 325]

Ureter measures about 3 mm in diameter, but is constricted at five places

. Pelviureteric junction
. Brim of lesser pelvis (at the level of bifurcation of common iliac artery and crossing of external iliac artery
. Point of crossing of ureter by ductus deferens or broad ligamentl
. Entry in bladder wall (this vesicoureteral junction is the narrowest part of ureter)
. Opening in lateral angle of trigone

99. What is the total length of the colon?

a) 1 metre

b) 1·5 metres

c) 2 metres

d) 4 metres

Correct Answer - B

Ans. is 'b' i.e., 1.5 metres *[Ref BDC Vol. II ele p. 269-273]*

- The large intestine extends from the ileocaecal junction to anus.
- It is 1.5 meters long and is divided into *caecum, ascending colon, right colic (hepatic) flexure, transverse colon, left colic (splenic)flexure, descending colon, sigmoid colon,* the rectum and anal canal.
  Transverse colon is longest part (50 cm) and anal canal shortest (3·8 cm).
- Caecum → 6 cm Sigmoid colon→ 37·5 cm
- Ascending colon -› 12.5 cm Rectum → 12 cm
- Transverse colon → 50 cm Anal canal → 3·8 cm Descending colon → 25 cm

100. Submandibular lymphnodes drain the following areas of the face except?

a) Medial half of eyelids

b) Central part of lower lip

c) Medial part of cheek

d) Central part of fore head

Correct Answer - B

Ans. is 'b' i.e., Central part of lower lip *[Ref BDC Vol. III 6th/e p. 73]* Lymphatic drainage of face

The face possesses three areas from which lymphatic drainage is as follows:?

. Upper area, comparising greater part of forehead, lateral Vi of eyelids, conjunctiva, lateral part of cheek and parotid area, drains into preauricular (superficial) parotid nodes.

. Middle area, comprising central part of forehead, external nose, upper lip, lateral part of lower lip, medial halves of eyelids, medial part of cheek, and greater part of lower jaw, drains into submandibular nodes.

. Lower area, including central part of lower lip and the chin, drains into submental nodes.

101. Larynx below the vocal cords drain into ?

a) Pretracheal lymph nodes

b) Occipital lymphnodes

c) Mediastinal nodes

d) Lymphatics along the superior laryngeal vein

Correct Answer - A

Ans. is 'a' i.e., Pretracheal lymph nodes

- Supraglottic part (Above vocal cord)
- Lymphatics along the superior laryngeal vein and nodes adjacent to the thyrohyoid membrane
- Infraglottic part (Below vocal cord)
- Pretracheal and prelaryngeal nodes
- Vocal cords
- Devoid of lymphatic supply

102. Nerve supply to the angle of the mandible is by ?

a) Posterior primary rami of C2, C3

b) Greater auricular nerve

c) Maxillary nerve

d) Mandibular nerve

Correct Answer - B
Ans. is 'b' i.e., Greater auricular nerve
The skin over the angle of the jaw (mandible) is supplied by the anterior division of the greater auricular nerve.

103. Nerve supply to the tip of the nose is from?

a) The ophthalmic division of the trigeminal nerve

b) Greater auricular nerve

c) The maxillary division of the trigeminal nerve

d) Mandibular nerve

Correct Answer - A

Ans. is 'a' i.e., Ophthalmic division of the trigeminal nerve

Tip of the nose and lower part of the dorsum of the nose are supplied by the external nasal branch of the ophthalmic division of the trigeminal nerve.

104. Dangerous space in the neck is found between?

a) Buccopharyngeal fascia and alar fascia

b) Prevertebral fascia and alar fascia

c) Buccopharyngeal fascia and Prevertebral fascia

d) None

Correct Answer - B

Ans. is 'b' i.e.,Prevertebral fascia and alar fascia ***[Ref "Severe soft tissue infections of the head and neck: a primer for critical care physicians". Lung. 187 (5): 271-9.]***

- The danger space or alar space, is a region of the neck. The common name originates from the risk that an infection in this space can spread directly to the thorax, and, due to being a space continuous on the left and right, can furthermore allow infection to spread easily to either side.
- It is bounded superiorly by the skull base, anteriorly by the alar fascia and posteriorly by the prevertebral fascia. It comes to an end at the level of the diaphragm.
- The retropharyngeal space is found anterior to the danger zone, between the alar fascia and buccopharyngeal fascia

105. Which muscle is attached to the disc of the temporomandibular joint?

a) Buccinator

b) Lateral pterygoid

c) Masseter

d) Temporalis

Correct Answer - B

Ans. is 'B i.e., Lateral pterygoid *[Ref BDC 4[15]/e Vol. 3* p. *145; Last's anatomy 11"'/e*

Lateral pterygoid

- origin→ Upper head: Infra temporal surface & crest of greater wing of sphenoid. Lower head: Lateral surface of lateral pterygoid plate.
- Nerve supply→ Pterygoid fovea on Anterior division of the neck of man → mandibular nerve. an audible, Articular disc and capsule of temporomandibular joint.
- Action → Depresses the mandible. Protrusion and side to side movement.

106. Maxillary tubercle gives attachment to ?

a) Lateral pterygoid

b) Medial pterygoid

c) Temporalis

d) Masseter

Correct Answer - B

Ans. is 'b' i.e., Medial pterygoid *[Ref BDC Vol III 6th Ie* p. *116]*

Medial Pterygoid

- Origin: *Superficial head:* Tuberosity of maxilla. *Deep head:* Medial surface of lateral pterygoid plate & pyramidal process of palatine bone.
- Insertion: Medial surface of angle mandible & adjoining ramus.
- Nerve supply: Branch from trunk of mandibular nerve
- Action : Elevates the mandible, Protection & side to side movement.

107. Vidian nerve is also known as?

a) Nerve of Pterygoid canal

b) Greater Petrosal nerve

c) Lesser Petrosal nerve

d) Greater Auricular nerve

Correct Answer - A

Ans. is 'a' i.e., Nerve of Pterygoid canal

- The nerve of the pterygoid canal (Vidian nerve) is formed by the junction of the greater petrosal nerve and the deep petrosal nerve within the pterygoid canal containing the cartilaginous substance, which fills the foramen lacerum.
- It passes forward through the pterygoid canal with its corresponding artery (artery of the pterygoid canal) and is joined by a small ascending sphenoidal branch from the otic ganglion.
- It then enters the pterygopalatine fossa and joins the posterior angle of the pterygopalatine ganglion.

108. **Which of the following nuclei belong to the general visceral afferent column?**

a) Facial nerve nucleus

b) Trigeminal nucleus

c) Dorsal nucleus of vagus

d) Nucleus ambiguus

Correct Answer - C

Visceral afferent fibers, also called **general visceral afferent fibers,** convey sensation from the alimentary tract, heart, vessels, and lungs by way of nerves IX and X. A specialized visceral afferent component is involved with the sense of taste; fibers carrying gustatory impulses are present in cranial nerves VII, IX, and X. *The general visceral afferent column is represented by part of the dorsal nucleus of the vagus nerve.*

Ref: Waxman S.G. (2010). Chapter 8. Cranial Nerves and Pathways. In S.G. Waxman (Ed), *Clinical Neuroanatomy,* 26e.

109. Right Recurrent laryngeal nerve loops around?

a) Right subclavian artery

b) Right axillary artery

c) Right External carotid artery

d) Right Superior thyroid artery

Correct Answer - A

Ans. is 'a' i.e., Right subclavian artery ***[Ref Larsen, William J. (1993). Human embryology]***

Recurrent laryngeal nerve

- On right side it arises in the root of neck and winds around first part of right subclavian artery. It may be anterior (superficial) or posterior (deep) to inferior thyroid artery.
- On left side it arises in thorax (superior mediastinum) and wind's around the arch of aorta immediately behind the attachment of ligamentum arteriosum. It is usually posterior (deep) to inferior thyroid artery or between its branches.
- Recurrent laryngeal nerve supplies all intrinsic muscles of larynx (except cricothyroid) and mucous membrane of larynx below vocal fold. It also gives branches to deep cardiac plexus, trachea, esophagus and inferior constrictior.
- Inferior thyroid artery is ligated away from gland to avoid injury to nerve. Left nerve is more liable to damage.

110. Left recurrent laryngeal passes between ?

a) Trachea & larynx

b) Trachea & esophagus

c) Esophagus and bronchi

d) Esophagus and aorta

Correct Answer - B

Ans. is 'b' i.e., Trachea & esophagus ***[Ref Gray's 38th/e p. 786]***

The paths of the left and right recurrent laryngeal nerves very slightly with the left recurrent laryngeal nerve dividing from the main vegus nerve at the level of the aortic arch.

The left recurrent laryngeal nerve than dips posteriorly around the arotic arch to assend through the superior mediastinum to enter the groove between the esophagus and trachea.

The right recurrent laryngeal nerve divides from the main vagus nerve at the level of the right subclavian artery to enter the superior mediastinum.

The right recurrent laryngeal nerve then dips posteriorly around the subclavian artery to assend in the grove between the esophagus and trachea.

111. Structures pierced by the parotid duct are all except?

a) Buccopharyngeal fascia

b) Buccinator muscle

c) Buccal fat pad

d) Investing layer of deep cervical fascia

Correct Answer - D

Ans. 'd' i.e., Investing layer of deep cervical fascia

The parotid duct (Stenson's duct)

- Parotid duct emerges from the anterior border of the gland and passes forward over the lateral surface of the masseter and can be palpated at the tense anterior margin of the masseter muscle.
- In its course duct pierces buccal fat pad, buccopharyngeal fascia and buccinator muscle (obliquely) and opens on the mucous membrane of cheek opposite to second upper molar tooth.
- When intraoral pressure is raised (during blowing) the duct is compressed between the buccinator and mucous membrane, preventing inflation of the duct.

112. Which layer of the scalp is vascular?

a) Pericranium

b) Superficial fascia

c) Skin

d) Aponeurosis

Correct Answer - B

Ans. is 'b' i.e., Superficial fascia

The scalp is a soft tissue that covers the calvaria of the skull. It consists of five *layers* and can be memorized by a mnemonic using the initial letters of the word. SCALP:?

- Skin
- Close network of connective tissue (superficial fascia)
- Aponeurosis (galea aponeurotica) with occipitofrontalis muscles
- Loose areolar (subaponeurotic) tissue
- Pericranium (outer periosteum of the skull)

113. All of the following pass through the Sinus of morgagni except -

a) Auditory tube

b) Levator veli palatini

c) Ascending palatine artery

d) Stylopharyngeus

Correct Answer - D
Ans. 'd' i.e., Stylopharyngeus
Sinus of Morgagni is the large gap between the upper concave border of the superior constrictor and the base of the skull.
The structures passing through it are:
1. Auditory tube
2. Levator veli palatini
3. Ascending palatine artery
4. Palatine branch of ascending pharyngeal artery

114. Chorda tympani is a branch of ?

a) Facial nerve

b) Trigeminal nerve

c) Greater auricular nerve

d) External laryngeal nerve

Correct Answer - A

Ans. is 'a' i.e., Facial nerve ***[Ref: BDC 6th le Vol 3 p. 371]***

Branches of facial nerve

. In fallopian (facial canal) :- Greater petrosal (greater superficial petrosal) nerve, nerve to stapedius, chorda tympani.
. At its exit from stylomastoid foramen :- Posterior auricular, digastric nerve, stylohyoid nerve.
. Terminal branches :- Temporal, zygomatic, buccal, marginal mandibular, and cervical.

115. Chorda-tympani does not carry which fibers?

a) Preganglionic parasympathetic fibers for sublingual glands

b) Preganglionic parasympathetic fibers for submandibular gland

c) Preganglionic parasympathetic fibers for parotid gland

d) Taste fibers from anterior two third of tongue

Correct Answer - C

Ans. is 'c' i.e., Preganglionic parasympathetic fibers for parotid gland

Chorda tympani is a branch of facial nerve mainly carrying taste sensations from the anterior 2/3rd of the tongue

The chorda tympani carries two types of nerve fibers from their origin with the facial nerve to the lingual nerve that carries them to their destinations:

Special sensory fibers providing taste sensation from the anterior two-thirds of the tongue.

Preganglionic parasympathetic fibers to the submandibular ganglion, providing secretomotor innervation to two salivary glands: the submandibular gland and sublingual gland and to the vessels of the tongue, which when stimulated, cause dilation of blood vessels of the tongue.

116. Which of the following pass through the Hypoglossal canal?

a) Hypoglossal nerve

b) External jugular vein

c) Facial nerve

d) Mandibular nerve

Correct Answer - A

Ans. is 'a' i.e., Hypoglossal nerve *[Ref BDC 6th/e Vol. 3 p. 18-20]*

117. Which muscle is antagonist to orbicularis oculi that is not supplied by facial nerve?

a) Levator Palpebrae superioris

b) Orbicularis oris

c) Superior oblique

d) Inferior oblique

Correct Answer - A

Ans. is 'a' i.e., Levator Palpebrae superioris

Orbicularis oculi closes the eye and is supplied by the facial nerve. Levator Palpebrae superioris opens the eyelid and is supplied by the oculomotor nerve.

118. All of the following are main branches of Trigeminal nerve except ?

a) Mandibular nerve

b) Maxillary nerve

c) Ophthalmic nerve

d) Optic nerve

Correct Answer - D

Ans. is 'd' i.e., Optic nerve *[Ref BDC 6th/e Vol 3* p. 369]

Divisions of trigeminal nerve

. Ophthalmic division (Ophthalmic nerve : V1)
. Maxillary division (Maxillary nerve : V2)
. Mandibular division (Mandibular nerve : V3)

119. Extension of the retropharyngeal space is between ?

a) Alar fascia and buccopharyngeal fascia

b) buccopharyngeal fascia and prevertebral fascia

c) Alar fascia and Prevertebral fascia

d) None

Correct Answer - A

Ans. is 'a' i.e., Alar fascia and buccopharyngeal fascia

Retropharyngeal space

- The retropharyngeal space is a potential space of the head and neck, bounded by the buccopharyngeal fascia anteriorly and the alar fascia posteriorly. Together with the lateral pharyngeal space, these spaces are termed the parapharyngeal spaces.
- It contains the retropharyngeal lymph nodes.
- Because serious infections of teeth can spread down this space into the posterior mediastinum, it is often confused with the danger space. The danger space is actually between the alar fascia and the prevertebral fascia and extends from the cranial base above to the level of the diaphragm.
- It is limited above by the base of the skull, and below where the alar fascia fuses with the buccopharyngeal fascia at about the level of T4 and the carina.

120. Delphian nodes are ?

a) Prelaryngeal nodes

b) Occipital nodes

c) Coeliac nodes

d) None of the above

Correct Answer - A

Ans. is 'a' i.e., Prelaryngeal nodes

The Delphian node (prelaryngeal) along with paratracheal nodes, pretracheal nodes, perithyroidal nodes makeup level VI cervical lymph nodes, and is not routinely excised in radical neck dissections. It receives lymph from the thyroid and larynx.

The Delphian node gains its name from the Oracle of Delphi, whose prophecy, in this case, would be of an unpleasant death secondary to laryngeal cancer.

The involvement of this node can be a result of diffuse nodal involvement in head and neck squamous cell carcinoma or isolation from the direct lymphatic spread of laryngeal cancer through the anterior commissure. Thyroid carcinomas may also involve this node.

121. Straight sinus is formed by?

a) Inferior Sagittal Sinus

b) Internal Jugular veins

c) Superior Sagittal Sinus

d) Tranverse sinus

Correct Answer - A

Ans. is 'a' i.e., Inferior Sagittal Sinus

The straight sinus, also known as tentorial sinus or the sinus rectus, is an area within the skull beneath the brain that receives venous blood.

Straight sinus is *formed by the union of the inferior sagittal sinus with the great cerebral vein.* It is considered a continuation of the inferior sagittal sinus.

It drains into the transverse sinus, most commonly in the left one.

The straight sinus is situated within the dura mater, where the falx cerebri meets the midline of tentorium cerebelli.

In cross-section, it is triangular, contains a few transverse bands across its interior, and increases in size as it proceeds backward.

122. Which artery supplies the paracentral lobule?

a) Medial Striate artery

b) Calloso Marginal artery

c) Pericallosal artery

d) Frontopolar artery

Correct Answer - B

Ans. is 'b' i.e., Calloso Marginal artery *[Ref BDC Vol. 3 6th/e* p. *461, 462]*

Calloso marginal artery is a branch of anterior cerebral artery that supplies the paracentral lobule which has a role in control of micturition

Anterior cerebral artery

Has following branches :-

. Medial striate artery (recurrent artery of Heubner) : It supplies caudate nucleus (ventral part), putamen, and anterior limb and genu of internal capsule.

. Fronto-polar artery : It supplies medial and orbital surfaces of frontal lobe.

. Orbital branches : It supplies medial and orbital surfaces of frontal lobe.

. Calloso-marginal artery : It supplies the paracentral lobule and parts of gyrus cinguli.

. Pericallosal artery : It supplies medial surface of parietal lobe and precuneous.

123. Nucleus of basal ganglia

a) Dentate

b) Thalamus

c) Caudate

d) Red nucleus

Correct Answer - C
Ans: C i.e. Caudate nucleus
The basal ganglia have five nuclei on each side of the brain.
- Caudate nucleus
- Putamen
- Globus pallidus
- Subthalamic nucleus
- Substantia nigra

The caudate nucleus and putamen collectively form the striatum.
The putamen and globus pallidus collectively form the lentiform nucleus.
The globus pallidus is divided into external and internal segments

124. Most lateral nucleus of cerebellum is ?

a) Dentate

b) Globose

c) Fastigial

d) Emboliform

Correct Answer - A
Ans. is 'A' i.e., Dentate
There are four deep cerebellar nuclei (from lateral to medial) : dentate, emboliform, globose, and fastigial.
The globose and the emboliform nuclei are sometimes lumped together as the interpositus nucleus.

125.

Superior marginal gyrus is a part of?

a) Parietal lobe

b) Frontal lobe

c) Temporal lobe

d) Occipital lobe

Correct Answer - A
Ans. is 'a' i.e., Parietal lobe
The superior marginal gyrus is a portion of the parietal lobe.
This area of the brain is also known as Brodmann area 40 based on the universally used brain map created by Korbinian Brodmann to define the structures in the cerebral cortex.

126.

Pars dorsalis is a part of ?

a) Cerebrum

b) Cerebellum

c) Pons

d) Thalamus

Correct Answer - C

Ans. is 'c' i.e., Pons ***[Ref Farlex Partner Medical Dictionary Farlex 2012]***

Pars Dorsalis

- The part of the pons bounded laterally by the middle cerebellar peduncles and anteriorly by the ventral part of pons; it is continuous with the tegmentum of the mesencephalon and contains long tracts such as the medialand lateral lemnisci, cranial nerve nuclei, and reticular formatin.

127. Arbor vitae are seen in ?

a) Cerebrum

b) Cerebellum

c) Pons

d) Thalamus

Correct Answer - B

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

- The arborvitae is the cerebellar white matter, so-called for its branched, tree-like appearance.
- In some ways, it more resembles a fern and is present in both the cerebellar hemispheres.
- It brings sensory and motor information to and from the cerebellum.
- The arborvitae is located deep in the cerebellum.
- Situated within the arborvitae are the deep cerebellar nuclei; the dentate, globose, emboliform and the fastigial nuclei.
- These four different structures lead to the efferent projections of the cerebellum.

128. Total volume of CSF is?

a) 150 ml

b) 500 ml

c) 50 ml

d) 800 ml

Correct Answer - A

Ans. is 'a' i.e., 150ml

The major source of CSF is the choroidal plexus of all 4 ventricles, mainly in two lateral ventricles. Other sources of CSF are ependymal cells of the ventricles and the brain itself, via perivascular spaces. The total volume of CSF in an adult is about 125-150 ml. The rate of formation of CSF is about 500-550 ml/day. Thus the CSF is replaced 3-4 times every day.

The watery part of CSF is secreted by transduction but each of its constitutions is actively transported. $Na^{\cdot}$ is secreted into the CSF with the help of Na^{+} ATPase. Glucose enters CSF through facilitated diffusion mediated by GLUT-1. HCO_3 is secreted with the help of carbonic anhydrase.

129. Lateral lemniscus terminates into ?

a) Lateral geniculate body

b) Superior colliculus

c) Inferior colliculus

d) Inferior olivary complex

Correct Answer - C

Ans is 'c' i.e., Inferior colliculus ***[Ref BDC 6th /e Vol. .3 p. 374]***

130. Internal capsule- All of the following are parts except ?

a) Anterior limb

b) Sublentiform part

c) Retrolentiform

d) Prelentiform

Correct Answer - D

Ans. is 'd' i.e., Prelentiform

The internal capsule is divided from before backwards into following parts:

- Anterior limb
- Posterior limb
- Retrolentiform part
- Genu
- Sublentiform part

131. Substantia ferruginea is found in -

a) Fourth ventricle

b) Thalamus

c) Midbrain

d) Third ventricle

Correct Answer - A

Ans. is 'a' i.e.,Fourth ventricle ***[Ref Medical Dictionary, 2009 Farlex and Partners]***

It is a shallow depression, of a blue color in the fresh brain, lying laterally in the most rostral portion of the rhomboidal fossa near the cerebral aqueduct; it lies near the lateral wall of the fourth ventricle and consists of about 20,000 melanin-pigmented neuronal cell bodies the norepinephrine-containing axons of which have a remarkably wide distribution in the cerebellum as well as in the hypothalamus and cerebral cortex. Also called as locus cinereus, locus ferrugineus.

132. Infundibular diverticulum is an extention of ?

a) 1st and 2th ventricles

b) 3rd ventricle

c) 4th ventricle

d) None

Correct Answer - B

Ans. is 'B' i.e., 3rd ventricle

Third ventricle is a midline cavity of diencephalon. It is a median cleft between *two* thalami. Anterosuperiorly it communicates with lateral ventricle through the interventricular foramen (foramen of Monro). Posteroinferiorly it communicates with fourth ventricle through cerebral aqueduct (Duct of Sylvius).

There are four extensions (recesses) of third ventricle : (a) Suprapineal recess, (b) Pineal recess, (c) Infundibular recess, and (d) Optic recess.

133. Which of the following is a complete sulcus in the brain?

a) Calcarine sulcus

b) Paracentral sulcus

c) Both

d) None

Correct Answer - A

Ans. is 'a' i.e., Calcarine sulcus

The calcarine sulcus (or calcarine fissure) is an anatomical landmark located at the caudal end of the medial surface of the brain of humans and other primates. Its name comes from the Latin "calcar" meaning "spur". It is a complete sulcus.

For accommodation in a limited space within the rigid cranial box, the cerebral cortex is folded into numerous gyri or convolutions separated by sulci or fissures. Eventually the total surface area of the cortex of human brain is increased to about 2200 cm^2, in which only about one third of the cortex is exposed as gyri and two third is hidden in the sulci.

134. Which of the following is derived from the neural tube except?

a) Retina

b) Brain

c) Dorsal root ganglia

d) Pineal gland

Correct Answer - C

Ans. is 'c' i.e.,Dorsal root ganglia *[Ref Textbook of human embryology -786]*

Nervous system develops from ectoderm (neuroectoderm). Nervous system develops from neural tube which in turn devtlops by process of neurulation, i.e. formation of neural plate and its infolding into neural tube.

135. Cerebellovestibular fibres pass through ?

a) Superior cerebellar peduncle

b) Middle cerebellar peduncle

c) Inferior cerebellar peduncle

d) None

Correct Answer - C

Ans. is 'c' i.e.,Inferior cerebellar peduncle ***[Ref BDC Vol. III 6th Ie p. 405]***

Inferior cerebellar peduncle →

. Posterior spinocerebellar
. Cuneocerebellar (posterior external arcuate fibres)
. Olivocerebellar
. Parolivocerebellar
. Reticulocerebellar
. Vestibulocerebellar
. Anterior external arcuate fibres
. Striae medullares

136. Long spinous process is seen in ?

a) Cervical vertebrae

b) Thoracic Vertebrae

c) Lumbar Vertebrae

d) Sacrum

Correct Answer - B

Ans. is 'b' i.e., Thoracic Vertebrae *[Ref: BDC 5th/e Vol. 3 p. 40]*

137. Movement occuring at atlanto-axial joint?

a) Flexion

b) Bending

c) Rotation

d) Nodding

Correct Answer - C

Ans. is 'c' i.e.,Rotation *[Ref: Clinical anatomy 3rdie p. 786]*

Movments permitted at atlanto-occipital joint are : -

- Flexion and extension (nodding of head), and (ii) *Lateral flexion (bending of neck)*.
- Movements permitted at atlanto-axial joints are side-to-side rotation of head (looking towards right-or-left).

138. Spinal segmental artery is a branch of ?

a) Ascending spinal artery

b) Basilar artery

c) Posterior spinal artery

d) Anterior spinal artery

Correct Answer - A

Ans. is 'a' i.e.,Ascending spinal artery ***[Ref Spinal Cord Medicine. Demos Medical Publishing.]***

Arterial supply of spinal cord

139. Which of the following is not a permanent mucosal fold?

a) Heister's valves

b) Transverse rectal fold

c) Plicae circularis

d) Gastric rugae

Correct Answer - D

Ans. is 'd' i.e., Gastric rugae ***[Ref Inderbir Singh Histology p. 240;*** **BDC** ***4th/e Vol. H p. 241, 245, 274, 378; Gray's 40th Ie*** **p.** ***1138, 1120, 1151, 1132, 1178]***

Gastric rugae of stomach, and longitudinal folds in mucosa of upper rectum and colon are temporary mucosal folds and are obliterated by distension. Whereas, plica circularis (valves of kerkring) of small intestine, crescentic mucosal folds of cystic duct (spiral valve of Heister), transverse (horizontal) rectal folds (Houston's valves or plica transversalis) and permanent longitudanal rectal columns or folds (found in

140. Lipid rafts are seen in?

a) Ribosomes

b) Mitochondria

c) Plasma membrane

d) ER

Correct Answer - C
Ans. C. Plasma membrane.
* Lipid rafts are regions in plasma membrane that accumulate Cholesterol and glycolipids (glycosphingolipids).
  - So there regions are slightly thicker than other areas of plasma membrane.
  - Because f distinct molecular composition of lipid rafts, they can act us microcompartment within cells, giving the cell an additional way to organize pathways.
  - Involved in the regulation of signal transduction.
Types of lipid rafts:
* Planar lipid rafts (noncaveolar or glycolipid rafts)
  - Continuous with plane of cell membrane (they are not invaginate).
Caveolae:
* Specialized types of lipid rafts which are flask like invaginations of plasma membrane.
* Produced where caveolin protein is present in lipid bilayer membrane.

141. Marker of endoplasmic reticulum?

a) Acid phosphatase

b) Glucose-6-phosphatase

c) Catalase

d) LDH

Correct Answer - B

Ans. B. Glucose-6-phosphatase.

Organelle or fraction Markers

- Plasma membrane - Adenyl cyclase, Na+IC ATPase
- Lysosome - Acid phosphatase
- Golgi apparatus - Galactosyl transferase, Golgi mannosidase II, Sialyl transferase, G1cNAc transferase.

Endoplasmic reticulum - Glucose-6-phosphatase

- Peroxisome - Catalase, Urate (uric acid) oxidase
- Cytosol - Lactate dehydrogenase
- Nucleus - DNA
- Ribosome - High content of RNA

142. Following is a feature of simple diffusion?

a) Against a concentration gradient

b) Easy for non-polar substance

c) More in thick membrane

d) Requires carrier protein

Correct Answer - B

Ans. B. Easy for non-polar substance

Simple diffusion:

- Refers to diffusion of molecule across the membrane following a concentration gradient or chemical gradient, but without the help of any carrier protein.

Factors influencing:

A) Rate of diffusion is directly proportionate :-

- Concentration (chemical) gradient
- Cross-sectional area of the membrane through which diffusion takes place
- Lipid solubility of the substance

B) Rate of diffusion is inversely proportionate:-

- Thickness of diffusion membrane
- Size of the particle
- Charge or polarity of substance
- So, simple diffusion is favored by small size, lipid solubility and absence of polarity (non-polar substance) and charge (neutral molecule) through a thin, large membrane where the concentration gradient is more.

143. Most common mechanism for transport into the cell?

a) Diffusion

b) Primary active transport

c) Antiport

d) Cotransport

Correct Answer - A
Ans. A. Diffusion.
(Ref Principles of medical physiology p.3.)
Most important and most common mechanism of transport is passive diffusion.

144. True about Nernst equation?

a) Used to calculate equilibrium potential

b) Calculated for non-ionic solution

c) Nernst potential for Cl is -90 my

d) All are correct

Correct Answer - A

Ans. A. Used to calculate equilibrium potential.

[Ref: Ganong 24th le p.9; Principles of medical physiology p.8]

- RMP value is calculated on basis of Nernst equation.
- Also referred "Nernst potential/Equilibrium potential/Diffusion potential of K+.

145. ECF concentration of 1C· is 150 meq/L and ICF concentration of Ie is 5 meq/L.

What is the equilibrium potential for K^+ is?

a) +60 mV

b) -60 mV

c) -90 mV

d) +90 mV

Correct Answer - C

Ans. 'c' i.e., -90 mV

Nernst Equation –

- Can be used to find the cell potential at any moment in during a reaction or at conditions other than standard-state.

$$E = E^\circ - \frac{RT}{nF} \ln Q_c$$

- E = cell potential (V) under specific conditions
- E= cell potential at standard-state conditions\
- R = ideal gas constant = 8.314 J/mol-K
- T = temperature (kelvin), which is generally 25C (298 K)
- n = number of moles of electrons transferred in the balanced equation
- F = Faraday's constant, the charge on a mole of electrons = 95,484.56 C/mol
- lnQc = the natural log of the reaction quotient at the moment in time.

$$E_K = \quad \log \quad = 90 \text{ mV}$$
$$+1 \qquad 5$$

146. Nernnst equation related to equilibrium potential does not depend upon?

a) Concentration gradient

b) Electric gradient

c) Non-ionic solution

d) Concentration of ions in two solution

Correct Answer - C
Ans. C. Non-ionic solution
[Ref Guyton 12th/e p.50; Principles of medical physiology p. 8]
Nernst equation is for ionic solution.

147. Due to Donnan-Gibbs effect?

a) Concentration of K^+ is greater in ECF

b) Concentration of cl is greater in ECF

c) Total ions are more in ICF

d) All are true

Correct Answer - C

Ans. C. Total ions are more in ICF

[Ref Principles of medical physiology p.7]

Gibbs-Donnan equilibrium:

- The mammalian cells (intracellular fluid) contains non-diffusible anion like proteins and organic phosphate where as K' and Cl- are diffusible cation and anion, respectively.
- The ECF contains 1K+ and Cl- as diffusible cation and anion respectively.

Due to Gibbs-Donnan equilibrium :-

- Concentraion of Cl- is greater in ICF than ECF (concentration of diffusible cation is greater in compartment with non-diffusible anion).
- Concentration of Cl is greater in ECF than ICF.
- Total number of ions is greater in ICF than ECF.
- All these effects help to maintain the shape and volume of cells by distributing diffusible ions across the membrane according to physiological demand.

148. ATPase is which type of pump?

a) Secondary active

b) Electrogenic

c) Symport

d) All of the above

Correct Answer - B
Ans. B. Electrogenic
[Ref Ganong 24th/e p.51, 10; Guyton 12th/e p.53]
Sodium-potassium pump:
* Most important pump for primary active transport in body.
* An Electrogenic pump.
* Responsible for maintaining Na+ & K+ conc. difference across cell membrane.
Mechanism:
* ICF - High K+ concentration.
* ECF - High Na+ concentration.
* Both Na+ & K+ transported against concentration gradient.
* Uses energy by hydrolyzing ATP;
Functions:
* Pump contains ATPase activity.
* Na+-K+ pump extrudes -
  - 3 Na+ out from cell.
  - Pumps 2 K+ into cell.
  - Coupling ratio of Na+-K+pump - 3:2.

149. Diffusion related to 0_2 transport across respiratory membrane is an example of?

a) Simple diffusion

b) Facilitated diffusion

c) Active diffusion

d) Osmotic diffusion

Correct Answer - A
Ans. A. Simple diffusion.
[Ref. Ganong 25thle p. 51 & 24thle p. 53]

- Simple diffusion - Movement of fats, oxygen, CO, through lipid portion of membrane.
- Facilitated diffusion - Movement of glucose and some amino-acids.
- Primary active transport - Ions K+, Na*,
- Secondary active transport - Glucose or or amino-acid into the cell along Na` (Sympoft or cotransport) 1-1+ out of the cell against Na+ (Antiport or countertransport).

150. Measurement of intracellular fluid in a 50 years old male is done by?

a) Dilution method

b) Evans blue

c) D_20

d) Indirectly

Correct Answer - D

Ans. D. Indirectly.

[Ref Ganong 23th/e p. 3-6; Guyton 12th/e p. 286-288]

- Most of the fluid is calculated directly by dilution method, except for intracellular fluid (ICF) and interstitial fluid.
- Both these are calculated indirectly by calculating other body fluids.
- ICF = Total body water volume - ECF volume Interstitial fluid = ECF volume - Plasma volume.

151. Calculation of interstitial fluid in a 50 years old is done by?

a) TBW minus ECF

b) ECF minus plasma volume

c) ICF minus ECF

d) TBW minus ICF

Correct Answer - B

Ans. B. ECF minus plasma volume.

[Ref Ganong 23th/e p. 3-6; Guyton 12th/e p. 286-288]

- Most of the fluid is calculated directly by dilution method, except for intracellular fluid (ICF) and interstitial fluid.
- Both these are calculated indirectly by calculating other body fluids.
- ICF = Total body water volume - ECF volume Interstitial fluid = ECF volume - Plasma volume.

152. Excitability of cells is maximally affected by change in concentration of which ion?

a) IC^{+}

b) Na*

c) a-

d) Ca+2

Correct Answer - D
Ans. D. Ca+2
[Ref Principles of medical physiology p.801]
Effects of ion concentration change on membrane potential:
* Hypercalcemia
- An increase in extracellular Ca2+ concentration can stabilize the membrane by decreasing excitability.
* Hypocalcemia
- Calcium ion is membrane stabilizers.
- A decrease in extracellular Ca2+ concentration increases the excitability of nerve by decreasing the amount of depolarization necessary to produce the action potential.
- Hyperexcitability is seen.

153. Non-specific pain pathway is for?

a) Nociceptive pain

b) Neuropathic pain

c) Idiopathic pain

d) Inflammatory pain

Correct Answer - C

Ans. C. Idiopathic pain

[Ref Textbook of psychotherapy p.6]

Pain may be divided into: -

Nociceptive pain:

- It is musculoskeletal pain that results from injury or inflammatory or degenerative disorders, e.g. bone fracture or arthritis or burn.

Neuropathic pain:

- It is due to dysfunction/damage of nerves, e.g. prolapse intervertebral disc.

Mixed pain:

- It has components of both nociceptive and neuropathic pains.

Idiopathic or unspecified pain:

- It is purely psychological in nature and is therefore called psychogenic pain.

154. Dull visceral pain is carried by which type of neurons?

a) A gamma

b) Aa

c) C fibres

d) B

Correct Answer - C
Ans. C. "C" fibers.
[Ref Ganong 24th\e p. 92 & 23rdle p. 89]

- A viscus does not have any other sensation (e.g. touch, temperature etc) except pain.
- Due to sparse distribution of pain receptors, visceral pain is poorly localized.
- Visceral pain sensation is carried by type - C afferents in the sympathetic system (from thoracic and abdominal viscera) and parasympathetic system (from pelvic viscera).

155. 'C' fibers carry sensations through which pathway?

a) Posterior column

b) Anterior spinothalamic tract

c) Lateral spinothalamic tract

d) All of the above

Correct Answer - C
Ans. C. Lateral spinothalamic tract.
[Ref Ganong 23rdie p.648; Goyton 12th le p.573].
C fibers carry Pain (slow pain) and temperature sensation.
These are carried by lateral spinothalamic tract.

156. Types C nerve fibers are?

a) Sensory

b) Motor

c) Mixed

d) Any of the above

Correct Answer - A
Ans. A. sensory.
Type C fibers:

- Postganglionic autonomic fibers.
- Sensory function afferent to temperature & pressure.
- No motor function.

157. Warmth sensation is carried by?

a) A a fibers

b) A (3 fibers

c) A y fibers

d) A S fibers

Correct Answer - A
Ans. a. A a fibers
[Ref Ganong 25"Ye p. 94 & 24"le p. 92; Principles of physiology p. 512]
Temperature (warmth/cold) sensation is carried by Aδ & C fibers.

158. True about myosin?

a) Thin filament

b) Covers active site of action

c) Has ATPase activity

d) Ca' binding protein

Correct Answer - C

Ans. C. Has ATPase activity

[Ref Ganong 241th le p.100, 102]

- The shortening of muscle fiber occurs due to sliding of actin filaments on myosin filament.
- However, there are four muscle proteins involved in the process: - Actin, Myosin, Tropomyosin, and troponin.

Myosin:

- Myosin is the protein that constitutes the thick filaments. Myosin of skeletal muscle is myosin-II.
- Myosin participates in the contractile mechanism and also acts as an ATPase.

159. In cardiac muscles, T-tubules are present at?

a) Z lines

b) A lines

c) I lines

d) A-I junction

Correct Answer - A
Ans. A. "Z" lines.
[Ref Principles of medical physiology p.794]

- The cardiac muscle cell contains actin, myosin the sarcotubular system and other organelles seen in skeletal muscles.
- However, the T system of cardiac muscle is located at Z lines rather than at A-I junction, where it is located in skeletal muscles.

160. In a muscle fiber at rest, the length of the I band is 1 mm and A band is 1.5 mm. What is the length of the sarcomere

a) 0.5 mm

b) 2.5 mm

c) 3.5 mm

d) 5 mm

Correct Answer - B

Ans. B. 2.5 mm.

- Sarcomere is the portion of myofibril between two Z lines.
- Thus, length of sarcomere in given question = 0.5 mm (1/2 I band) + 1.5 mm (A band) + 0.5 mm (1/2 I band) = 2.5 mm.

161. White fibers are present in which muscle?

a) Calf muscles

b) Back muscles

c) Gluteal muscles

d) Hand muscles

Correct Answer - D

Ans. D. Hand muscles.

[Ref Principles of medical physiology p.118]

Type of muscle fibers:

- Type 1 (red) or type 2 (white).
- Most of the muscle in human body contains both types of fibers, i.e. most muscles in the body have both types of motor units.
- But, some muscles have more type 1 fibers (type 1 motor units) than type 2, and vice-versa.

Accordingly, skeletal muscles can be divided into :

Red muscles

- These muscles contain more type 1 (red) fibers, therefore are slow twitch muscles and contain more myoglobin content.
- These are muscles which require prolonged contraction, for example, muscles which help in maintaining posture, i.e. Back muscles gluteus muscles (at back of hip) and calf muscles.

White (pale) muscles

- These muscles contain more type 2 (white) fibers and are fast twitch muscles.
- These are muscles which help rapid contractions and finer movements.
- Examples are Hand muscles and extra ocular

muscles.

162. Function of muscle spindle is?

a) Movement of a limb

b) Muscle tone maintenance

c) Goal oriented muscle contraction

d) All of the above

Correct Answer - B

Ans. B. Muscle tone maintenance

[Ref Understanding of medical physiology p.138]

- If a skeletal muscle is stretched, it respond by contracting.
- In other words, if a muscle is stretched, it tends to become shorter and more stiff, thereby resisting stretch.
- This is because of receptor sensitive to stretch within the muscle.
- Stretch receptor within a muscle is called "muscle spindles".

Stretch reflex has two principal functions:

1) To maintain muscle tone

- Tone is a tendency of a muscle to resist being stretched.
- Muscle tone is not only important for maintaining posture but also facilitates locomotion and makes all voluntary movement smooth.

2) To make muscles respond to stretch and release.

163. Afferents for stretch reflexes are carried by which fibers?

a) Aa

b) Ay

c) Type B

d) Type C

Correct Answer - A
Ans. A. Aa
[Ref Ganong 24th/e p. 229]
Sensory innervation (afferent) of muscle spindle:

- Two types of sensory nerve fibers (afferent) originate from the intrafusal fibers :
- Annulospiral (Primary) ending are wound around the central region of both nuclear bag fiber and nuclear chain fiber.
- These are Aα (or Iα) fibers.
- Flower-spray (Secondary) endings innervate the peripheral parts (ends) of nuclear chain fiber.
- These are Aβ or (or II) fibers.

164. Spinal cord has how many synapses in golgi tendon reflex?

a) 1

b) 2

c) 3

d) 4

Correct Answer - B
Ans. B. 2
[Ref: Principles of medical physiology p. 786]

- Strech reflex through muscle spindle → Monosynaptic
- Golgi tendon reflex → Bisynaptic.

165. Inverse stretch reflex is a?

a) Monosynaptic reflex

b) Bisynaptic reflex

c) Polysynaptic reflex

d) Nonsynaptic reflex

Correct Answer - B
Ans. B. Bisynaptic reflex
[Ref Principles of medical physiology 3rd/e p.786]
Golgi tendon reflex (inverse stretch reflex) is bisynaptic reflex.

166. Facilitatory presynaptic neurotransmitter is?

a) GABA

b) Glycine

c) Glutamate

d) Aspartate

Correct Answer - C:D
Ans. is 'c > d' i.e., Glutamate > Aspartate
[Ref Understanding of medical physiology 1"/e p.412]

- Glutamate is the chief excitatory neurotransmitter in the brain and spinal cord.
- Aspartate seems to be the chief excitatory neurotransmitter of cortical pyramidal cells.

167.

Nissl's granules are found in which part of nerve cell -

a) Axon hillock

b) Axons

c) Node of Ranvier

d) Body

Correct Answer - D

Ans. D. Body

[Ref Chaudhri 7h/e Principles of medical physiology-7]

Nissl Bodies (Nissl granule or tigroid body):

- Nissl bodies are large granular body found in neuron.
- Present all over the soma (body), excepting axon hillock and they extend to some extent in the dendrites, but not within the axon.
- These granules are rough endoplasmic reticulum with free ribosomes and are the site of protein synthesis.
- They are thought to be involved in the synthesis of neurotransmitter such as acetylcholine.
- Nissl bodies are basophilic granules.
- Chromatolysis (disappearance of Nissl bodies) is an important histological sign of neuronal injury.
- When the demand of the protein synthesis is great the nissl granules overwork and many altogether disappear (chromatolysis).

168. Stereocilia are found in?

a) Eye

b) Nose

c) Tongue

d) Epididymis

Correct Answer - D
Ans.D. Epididymis
* Stereocilia are found in three places
- Hair cells of inner ear
- Epididymis
- Ductus deferens.

169. Stereocilia are present in?

a) Taste buds

b) Hair cells

c) Retina

d) Nose

Correct Answer - B
Ans. B. Hair cells.
[Ref Ganong 25th/e p.202]

- Hair cells have a common structure.
- The tallest hair cell is called as Kinocilium and the progressively shorter hair cells are called as Stereocilia.
- These hair cells are connected together by tip links which has mechanically sensitive cation channels.

170. CSF pressure is increased in all except -

a) Forced inspiration

b) Coughing

c) Valsalva manoeuvre

d) Crying

Correct Answer - A

Ans. A. Forced inspiration.

[Ref Essential of medical physiology p. 950]

- Events like coughing, valsalva manoeuvre, and crying increase the pressure by decreasing absorption.
- Compression of IJV (internal jugular vein) also raises the CSF pressure.

171. CSF is present in which space?

a) Central canal of spinal cord

b) Ventricles of brain

c) Subarachnoid space

d) All of the above

Correct Answer - D
Ans. D. All of the above.
[Ref Ganong 24th/e p.603; Principles of medical physiology p. 293]
* Cerebrospinal fluid (CSF) is a clear, colorless, almost protein free filtrate (transduate) of blood.
* It is present,
  - Around the brain (in subarachnoid space) and inside the brain (in its ventricles).
  - Around the spinal cord (in subarachnoid space) and inside the spinal cord (in its central canal).

172. Function of Ghrelin?

a) Stimulate water absorption

b) Increase appatite

c) Regulation of temperature

d) Stimulate lipogenesis

Correct Answer - B
Ans. B. Increase appatite
[Ref Clinical endocrinology p.48; Ganong 24th/e p.487]
* Ghrelin is a peptide secreted by oxyntic cells in gastric fundus that are characterized by round, compact, electron-dense secretory granules.
* Ghrelin promotes food intake, i.e., stimulate appetite (orexigenic).
* Increases with anorexia.
* In human, ghrelin induces lipolysis.
* Ghrelin is released from the stomach in fasting state.
- Increases hunger by inhibiting the ventromedial hypothalamus (satiety center).
- Stimulates GH secretions.

173. Location of visual cortex?

a) Precentral gyrus

b) Postcentral gyrus

c) Sylvian fissure

d) Calcarine sulcus

Correct Answer - D
Ans. D. Calcarine sulcus
[Ref Principles of medical physiology p.531]

- The occipital lobe is the visual processing center of brain containing most of the anatomical region of visual cortex.
- Primary visual area is brodmann area 17 (also called VI) on medial side of occipital lobe in calcarine sulcus.
- It is also called as striate area or striate cortex because it can be identified by a large stripe of myelin, the stria of gennari.

174. Parvocellular pathway for vision is concerned with?

a) Fine details of object

b) Movements of object

c) Flickering features

d) Depth of vision

Correct Answer - A

Ans. A. Fine details of object

[Ref Ganong 24th/e p.190]

- Parvocellular pathway (arises from layer 3, 4, 5, 6 of LGB).
- Axons from parvocellular terminate in layer 4 of the visual cortex.
- Parvocellular pathway carries signals for color vision, texture, shape and finer details.

175. Sweat glands are supplied by all except?

a) Cholinergic neurons

b) Sympathetic neurons

c) Adrenergic neurons

d) C-fibers

Correct Answer - C

Ans. C. Adrenergic neurons

[Ref Understanding of medical physiology p. 786]

- Nerve supply of sweat gland is unique in that it is sympathetic but cholinergic (most other sympathetic sites are noradrenergic).
- Post-ganglionic sympathetic fibers are Type-C fibers.

176. Gustatory pathway involves which nerve?

a) Facial

b) Glossopharyngeal

c) Vagus

d) All of the above

Correct Answer - D
Ans. D. All of the above
[Ref Principles of medical physiology p.87]

- Fibers innervating taste buds are branches of cranial nerves, i.e., branches of facial, glassopharyngeal, and vagus nerves.
- The taste buds in the anterior two-thirds of the tongue are innervated by lingual branches of the facial nerve.
- The taste buds in the posterior third of the tongue are innervated by glossopharyngeal nerve.
- Taste receptors in the pharyngeal part of tongue and on the hard palate, soft palate, and epiglottis are innervated by fibers of the vagus nerve.

177. Function of cerebellum?

a) Regulation of tone

b) Coordination of eye movement

c) Planning & initiation of movement

d) All of the above

Correct Answer - D

Ans. D. All of the above

Functions of the cerebellum:

- Regulation of tone, posture and equilibrium.
- Smoothening and coordination of voluntary movements. The most important function and the best known function of cerebellum is coordination of movements.
- Coordination of eye movements
- Planning and initiation of movements
- Learning of frequently performed voluntary movements.

Timing and comparison:

- The cerebellum is believed to be a timing device that times the duration of agonistic muscle activity and latency of antagonistic activity, So that any movement is halted at the correct point.

178. Which of the following is not a metabotropic receptor for serotonin?

a) 5HT,A

b) 5HT,13

c) $5HT_2A$

d) 5HT3

Correct Answer - D

Ans. D. 5HT3

[Ref: Ganong32 p. 139; Principles of medical physiology p.786]

Metabotropic receptors:

- Are G-protein coupled receptors which act through second messenger.

Serotonin included:

- With the exception of the 5-HT3 receptor, a ligand gated ion channel, all other 5-HT receptors.

179. Two point discrimination is mainly a function of which touch receptors?

a) Merkel's disc

b) Ruffini's end organ

c) Paccinian corpuscle

d) Meissner's corpuscle

Correct Answer - A
Ans. A. Merkel's disc
[Ref Principles of medical physiology p. 647] Tactile (touch) receptors
F**or touch (superfical touch):-**

- Meissner's corpuscle (detect texture of surface, i.e. rough or smooth), Merkel's disc (detect two point discrimination).

180. Which of the following defines vital capacity?

a) Air in lung after normal expiration

b) Maximum air that can be expirated after normal inspiration

c) Maximum air that can be expirated after maximum inspiration

d) Maximum air in lung after end of maximal inspiration

Correct Answer - C

Ans. C. Maximum air that can be expirated after maximum inspiration

Vital capacity (VC):

- 4700 ml.
- Amount of air that can be exhaled with maximum effort after maximum inspiration (ERV+TV+IRV).
- Used to assess strength of thoracic muscles as well as pulmonary function.

181. Functional residual capacity in normal adult is?

a) 500 ml

b) 1200 ml

c) 2400 ml

d) 3200 ml

Correct Answer - C
Ans. C. 2400 ml
[Ref: Ganong 24th/e p.629-631]

- Volume of air in the lungs at the end of a normal expiration.
- In other words, FRC = ERV + RV.
- About 2400 ml.

182. What is maximum voluntary ventilation?

a) Amount of air expired in one munute at rest

b) Maximum amount of air that can be inspired and expired in one minute

c) Maximum amount of air that can be inspired per breath

d) Maximum amount of air remaining in lung after forced expiration

Correct Answer - B

Ans. B. Maximum amount of air that can be inspired and expired in one minute

[Ref Guyton 12th/e p. 472, 473; Ganong 24th/e p. 633]

Maximum voluntary ventilation (MVV):

- It is the maximum amount of air that can be moved into and out of the lungs in 1 minute by voluntary effort.
- About 125-170 L/min.

183. True about Carboxyhemoglobin?

a) Take up 0_2 very quickly

b) Causes histotoxic hypoxia

c) Causes left shift of Hb-0_2 dissociation curve

d) All are true

Correct Answer - C

Ans. C. Causes left shift of Hb-0_2 dissociation curve

[Ref Understanding of medical physiology p.173].

- COHb cannot take up 02; liberates CO very slowly and shifts dissociation curve of remaining HbO, to left, decreasing the amount of 02 released.
- CO poisoning causes anemic hypoxia because the amount of Hb that can carry O2, is reduced but the total Hb amount of blood is unaffected by CO.

184. What is the difference between Hb-0 dissociation curve and Hb-CO curve?

a) CO shifts the curve to left

b) CO has more affinity to Hb

c) Co-Hb curve is similar to 0_2-Hb curve

d) All are true

Correct Answer - D

Ans. D. All are true

[Ref Understandings of medical physiology p. 786]

- COHb cannot take up 02; liberates CO very slowly and shifts dissociation curve of remaining Hb02 to left, decreasing the amount of O2, released.
- The affinity of Hb for CO is 200-250 times its affinity for 02.
- So CO-Hb dissociation curve is almost identical to 02 Hb dissociation curve except that partial pressure are at a level of 1/250.

185. Not true about Bohr effect?

a) Decrease affinity of 0_2 by increase PCO,

b) Left shift of Hb-0_2 dissociation curve

c) It is due to H*

d) All are true

Correct Answer - B

Ans. B. Left shift of Hb-0_2 dissociation curve

[Ref Ganong 24th/e p.644, Understanding of medical physiology p.789]

Bohr effect:

- Increase in PCO2 decreases the 02 affinity to hemoglobin and shifts the oxygen dissociation curve to right; it is called Bohr effect.
- The effect of raised PCO2 is mediated by increase in hydrogen ion concentration.
- Hydrogen ions shift the curve by binding with hemoglobin.
- Deoxygenated hemoglobin (Deoxyhemoglobin) binds II' more actively than does oxygentated hemoglobin (oxyhemoglobin).
- Ions bind to deoxyhemoglobin and reduce the accessibility of oxygen to haem groups.
- That is why in the presence of more hydrogen ions, less oxygen can combines with hemoglobin at a given P02 and the oxygen dissociation curve shifts rightward.

186. Which of the following explains uptake of 0, in fetal circulation ?

a) Bohr's effect

b) Halden's effect

c) Higher affinity of HbF for 0,

d) None of the above

Correct Answer - C

Ans. C. Higher affinity of HbF for 0,

[Ref Smith's anaesthesia 3rdle p. 77]

- Fetal hemoglobin's greater affinity for oxygen improves oxygen uptake at the placenta.
- A greater affinity for oxygen is an advantage for uptake at the placenta.

187. Which of the following explains delivery of 0_2 in fetal circulation?

a) Bohr's effect

b) Halden's effect

c) Higher affinity of HbF for 02

d) None of the above

Correct Answer - A
Ans. A. Bohr's effect
Uptake of 0, at placenta → Due to high affinity of HbF for 02
Delivery of 02 at tissue level → Due to Bohr effect.

188. True of 02-Hb dissociation curve?

a) Straight line curve

b) 100% saturated at $P0_2$ of 100 mmHg

c) Cooperative binding

d) Hb molecule can carry 6 molecules of 0,

Correct Answer - C

Ans. C. Cooperative binding

Molecular basis:

- "Due to phenomenon "Cooperative binding of Oxygen to hemoglobin".

Steps involved:

- Hemoglobin, a tetramer
- Four O2 molecules binds 1 Hb molecule.
- 1st O2 molecule bonds with greatest difficulty.
- Increases affinity to next O2 molecule.

189. Which increases affinity of hemoglobin for 0,-

a) Acidosis

b) Hyperthermia

c) High pH

d) High PCO2

Correct Answer - C

Ans. C. High pH

Conditions associated with increased affinity of hemoglobin for oxygen:

- High pH.
- Decreased H+ ion concentration (alkalosis).
- Reduced PCO2
- Reduced body temperature.
- Reduced 2,3-bisphosphoglycerate (2,3 -BPG)/2,3-diphosphoglycerate (DPG)
- Fetal hemoglobin.
- CO poisoning.

190. In comparison to hemoglobin, effect of myoglobin on Bohr effect?

a) Increased

b) Decreased

c) Same

d) No Bohr effect

Correct Answer - D

Ans. D. No Bohr effect

[Ref Principles of medical physiology p. 711]

Myoglobin:

- Single polypeptide chain.
- Human myoglobin contains 152 amino acids with a molecular weight of 17,500.
- Heme is attached to 92"d histidin residue.
- One molecule of myoglobin can combine with one molecule of oxygen.
- Myoglobin has higher affinity to oxygen than that of Hb.
- Myoglobin has high oxygen affinity while Bohr effect, cooperative effect and 2, 3-diphosphoglycerate effect can absent.

191. Function of chloride shift in RBCs?

a) Right shift of Hb-O, curve

b) Left shift of Hb-0_2 curve

c) Transport of CO2

d) Diffusion of 0_2 in alveoli

Correct Answer - C

Ans. C. Transport of CO2

[Ref Ganong 24th/e p.644; Principles of medical physiology p. 819]

Transport of CO2:

* Carbon dioxide is transported in blood as plasma bicarbonate.
* Red blood cells (RBCs) play a major role in the mechanism because RBCs contain the enzyme carbonic anhydrase that catalyzes the reaction CO2 + H20 = HCO3 + H.
* Hence when CO2 diffuses into the RBC, it reacts chemically with water to generate HCO3.
* The H+ ions are mopped up by hemoglobin, which is an excellent buffer.
* This enables the reaction to proceed in the forward direction.
* The HCO3- ions generated diffuse out into the plasma in exchange for Cl ions that diffuse into RBCs simultaneously.
* The movement of chloride ions into RBC is called Chloride shift.
  - The above events results in an increase in total number ions inside the RBC, which increases its osmolarity.
  - As a result, water enters the RBC through osmosis.

192. Closing volume is related to which of the following?

a) Tidal volume

b) Residual volume

c) Vital capacity

d) None

Correct Answer - B

Ans. B. Residual volume

[Ref Principles of medical physiology p. 240, 241]

- The closing volume is the point at which dynamic compression of the airways begins, especially during forced expiration.
- Lower (dependent) parts of the lungs has lesser transmural pressure, therefore they begin to close early.
- Therefore, closing volume is the lung volume above residual volume at which airway in the lower, dependent parts of the lungs begin to close off.
- Closing capacity is the lung volume (including residual volume) at which airways in the lower, dependent parts of the lungs begin to close off, i.e., Closing capacity = closing volume + residual volume.
- Closing capacity and volume are tested for small airway function.
- Critical closing volume is the minimum volume and pressure of gas necessary to prevent small airway collapse. It is somewhat near residual volume.

193. Central chemoreceptors are not stimulated by?

a) T PCO_2

b) T El' in CSF

c) Hypoxia

d) All stimulate

Correct Answer - C

Ans. C. Hypoxia

[Ref Ganong 25th/e p. 658]

Central chemoreceptors:

- Located in a chemosensitive area on the ventral surface of the medulla near the exit of the ninth and tenth cranial nerves.
- The primary stimulus for the central chemoreceptors is an increase in the hydrogen ion concentration.
- Stimulation of central chemoreceptors by increased hydrogen ion concentration leads to excitation of the respiratory neurons, thereby producing an increase in the rate and depth of respiration.
- Central chemoreceptors are directly stimulated by an increase in H* concentration in CSF and brain inerstitial tissue, which is brought about by change in arterial PCO2 (PaCO2).
- Not stimulated by hypoxia; rather like any other cells, they are depressed by hypoxia.

194. Chemical regulation of respiration is not affected by?

a) $P0_2$

b) PCO2

c) pH

d) Mean BP

Correct Answer - D
Ans. D. Mean BP
[Ref Principles of medical physiology; Ganong 24th/e p.662-663]
Chemical Regulation
Central chemoreceptors: TFP Concentration in CSF (1, pH of CSF); T PCO, of blood.
Peripheral chemoreceptors: LP02, TPACO2, acidosis (4 pH)

195. True about high altitude acclimatization?

a) Left shift 010_2- Hb curve

b) Decreased RBC count

c) Hypoventilation

d) Increased erythropoietin

Correct Answer - D

Ans. D. Increased erythropoietin

[Ref Ganong 24th/e p. 650, 651 & 23'/e p. 617-619; Guyton 12i p. 529, 530]

Acclimatization:

Imporal compensatory mechanisms at high altitude are :-

- Hyperventilation:- Causes CO2 washout, .1., PCO2 and respiratory alkalosis.
- Increased 2, 3 DPG:- Rightward shift of 02-Hb dissociation curve.
- Polycythemia and increased Hb:- Due to increased erythropoietin release which causes absolute polycythemia with increased red cell mass.
- Others:- Increased renal excretion of alkali (HCO3-), increased tissue vascularity, increased oxidative metabolism, Increased diffusion capacity of lung, increased myoglobin.

196. Respiratory exchange of gases is strated from?

a) Branchi

b) Alveoli

c) Bronchiole

d) Tissue level

Correct Answer - B
Ans. B. Alveoli
[Ref Ganong 25th/e p.639-640]
External respiration:

- It consists of exchange of gases (02 and CO2) in the alveoli.
- There is diffusion of 02 from alveolar air into pulmonary capillary blood and diffusion of CO2 into opposite direction.

197. Distending capacity of lung is maximum at?

a) Apex

b) Base

c) Mid region

d) Posterior lobe

Correct Answer - A
Ans. A. Apex
[Ref Understandings of medical physiology p.791]

- "The air spaces at the apices of the lungs tend to be relatively distended, due to weight of the lungs effectively dragging itself downwards, putting traction on the upper part of the lung and stretching the apical air spaces open."

198. Action potential in cardiac muscles is due to which ions?

a) K*

b) Na*

c) Ca'

d) Cl?

Correct Answer - A:B:C

Ans. b > a & c

- Na+, K+ and Ca+, all are involved in full cycle of action potential in cardiac muscle.
- But, the main phase (phase 0 or depolarization) is due to Na+ ions.
- Phase 0 (phase of rapid depolarization) → opening of fast sodium channels with Na* influx.
- Phase 1 (initial phase of rapid repolarization) -4 closure of fast sodium channels.
- Phase 2 (plateu phase) → opening of voltage gated slow Ca** channels with calcium influx.
- Phase 3 (final repolarization) → opening of K* channels with efflux.
- Phase 4 -4 Resting membrane potential.

199. Heart sound occuring just before closure of AV?

a) S1

b) S2

c) S3

d) S4

Correct Answer - D
Ans. D. S4
[Ref CECIL p.212]

- S4 occurs just before 1st heart sound (1st heart sound is due to closure of AV valve, i.e. mitral & tricuspid valve).

200. Baroreceptors are related to which vessels?

a) Internal carotid artery

b) External carotid artery

c) Subclavian artery

d) Brachiocephalic trunk

Correct Answer - A
Ans. A. Internal carotid artery
[Ref Ganong 24thle p.590, 591; Principles of medical physiology p.791]

- Baroreceptors are mechanoreceptors that are located in the adventia of carotid artery and aorta, at specialized locations called sinuses.

201. Effect of positive G?

a) Increased cerebral arterial pressure

b) Increased venous return

c) Decreased cardiac output

d) Increased pressure in lower limb

Correct Answer - C

Ans. C. Decreased cardiac output

[Ref Ganong 25thie p.576, 24th le p.607-608, Principles of medical physiology p.632]

Effects of positive G:

- Throwing of blood in the lower part
- Increased lower limb venous pressure
- Decreased cerebral arterial pressure
- Decreased, venous return
- Decreased, cardiac output
- Gray-out and Black-out.

202. Which of the following cause increase in pulmonary arterial pressure?

a) Histamine

b) Hypoxia

c) ANP

d) PGI2

Correct Answer - B

Ans. B. Hypoxia

[Ref Ganong 24th/e p.637]

- Hypoxia causes vasoconstriction in pulmonary blood vessels causing increase in pulmonary arterial pressure.

Effect of various stimulations on pulmonary vessels:

Vasoconstriction:

- alpha-adrenergic
- Thromboxane-A2
- Angiotensin II
- LTC4, LTD4
- Endothelins
- Hypoxia
- Hypercapnia

203. Most important cerebral vasodilator?

a) H^+

b) Na^+

c) Cal^+

d) None

Correct Answer - A

Ans. A. H^+

[Ref R.K. Marya 3rdie p. 156]

The main metabolic factor responsible for the vasodilatation associated with cerebral activity is the CO2 produced by the activated neurons.

Increase in blood PCO2 also produces cerebral vasodilatation.

The vasodilatory effect of CO2 is indirect and is mediated by formation of local H^+ which has a direct vasodilatory effect on cerebral blood vessels.

A fall in blood PO ,produces cerebral vasodilatation and an increase in blood PO ,produces cerebral vasoconstriction.

204. Renin secretion is decreased by?

a) Sympathetic stimulation

b) Prostacycline [PGI2]

c) Nacl in distal tubules

d) Hypotension

Correct Answer - C

Ans. C. Nacl in distal tubules

[Ref Ganong 241th le p.674, 670]

Principal regulators of renin secretion:

- The juxtaglomerular cells themselves are the sensors of the afferent arteriolar pressure. Lowered pressure stimulate renin release
- Increased NaC1 in distal tubules is sensed by macula densa and the signal is transmitted to JG cells.
- This results in decreased Renin release.
- Opposite occurs when decreased NaC1 is delivered in distal tubule, i.e., increased renin release.
- Adenosine is probably the mediator of signal.
- The JG cells are innervated by sympathetic fibers. They release renin in response to sympathetic discharge, and by circulating catecholamines.
- Prostacycline (PGI2) stimulates renin secretion through a direct action.

205. True about function of distal convoluted tubule?

a) Reabsorbe Na* by Nal(+2c1- channel

b) Reabsorbe IC' by Nei(' channel

c) Water reabsorption by ADH

d) All are correct

Correct Answer - C
Ans. C. Water reabsorption by ADH
Over-all impact of reabsorption in early distal tubule is to dilute urine by removing solutes.
Late segment of distal tubule is functionally similar to cortical collecting duct.
Principal (P) cells reabsorb sodium & water from lumen (By ADH & secrete potassium into lumen.
Intercalated (I) cells reabsorb potassium & secrete hydrogen into lumen.
Cl- is reabsorbed into late distal tubule.

206. Function of Lacis cells in nephron?

a) H^+secretion

b) Na^+reabsorption

c) Renin secretion

d) Regulation of vasoconstriction / vasodilatation of arterioles

Correct Answer - D

Ans. D. Regulation of vasoconstriction / vasodilatation of arterioles

[Ref Principles of medical physiology p.412]

- Juxtaglomerular/Extraglomerular mesangial cells (Lacis cells) forming connection via actin and microtubules which allow for selective vasoconstriction/vasodilation of the renal afferent and efferent arterioles with mesangial cell contraction.
- Note: Lacis cells also contain some renin.
- But Renin is mainly secreted by juxtaglomerular cells.

207. Plasma inulin of a person is 4 mg/ml and urine flow rate is 20 ml/min. What will be GFR if urine inulin is 50 mg/ml?

a) 125 ml/min

b) 250 ml/min

c) 500 ml/min

d) 1000 ml/min

Correct Answer - B
Ans. B. 250 ml/min
[Ref Ganong 23rd le p.678, 679]
GFR - Urine inulin x Urine flow
GFR =- 250 ml/min.

208. True about aquaporins are all except ?

a) Protein

b) Aquaporin-1 in PCT

c) Aquaporin-2 in loop of Henle

d) Aquaporin-2 in CD

Correct Answer - C

Ans. C. Aquaporin-2 in loop of Henle

[Ref Ganong 24thie p.683-690]

- Aquaporins are protein channels which help in rapid diffusion of water
- Proximal tubles and thin descending limb of loop of Henle → aquaporin - 1, which is independent of ADH.
- Late distal tubule and collecting duct → aquaporin - 2, dependent on ADH.

209. Maximum fat absorption in GI tract occurs in?

a) Duodenum

b) Jejunum

c) Ileum

d) Calcium

Correct Answer - B
Ans. B. Jejunum
After fat digestion, fatty acids and monoglycerides are absorbed in small intestine especially in the jejunum and some amount also in ileum.
In side the enterocyte, fatty acids and monoglycerides again form triglycerides.
These triglycerides are incorporated into chylomicrons and transported to lymphatics and from there to blood vessels.

210. If the ileum is excised, what will increase in stool?

a) Bile salts

b) Bile acids

c) Iron

d) Calcium

Correct Answer - A
Ans. A. Bile salts
Bile (Major constituent bile salts) is absorbed in terminal ileum.
Iron and calcium are absorbed in duodenum.

211. Which of the following acts as "Gatekeeper" in the GIT?

a) Na^+-amino acid cotransporter

b) Na^+ K^+ ATPass

c) Calcium channel

d) Ne-glucose cotransporter

Correct Answer - C
Ans. C. Calcium channel
[Ref www.ncbi.nlm.nih.gov]

- Epithelial calcium channels (E CaCs) act as 'gatekeeper' for transepithelial Ca" transport.
- Prime target for hormonal control of active Ca(2+) flux from the urine space or intestinal lumen to the blood compartment.
- This review covers the distinctive properties of these highly Ca(2+)-selective channels and highlights the implications for our understanding of the process of transepithelial Ca(2+) transport.

212. True about basic rhythm of GIT?

a) Fluctuate between -65 and -40 mV

b) Initiated by zymogen cells

c) Pacemaker cells are present in proximal stomach

d) All of the above

Correct Answer - A

Ans. A. Fluctuate between -65 and -40 mV

[Ref Principles of medical physiology p.915]

- The smooth muscle cells of gastrointestinal tract has spontaneous rhythmic fluctuations in membrane potential between about -65 and -45 mV.
- This is called basic electrical rhythm (BER).
- This BER is initiated by pacemaker cells called intersititial cells of Cajal.

213. Daily fecal urobilinogen excretion in healthy adults?

a) 20-40 gm

b) 40-280 gm

c) 20-40 mg

d) 40-280 mg

Correct Answer - D
Ans. D. 40-280 mg
[Ref: Principles of medical physiology p.212]
The normal daily excretion of urobilinogen in the feces ranges from 40 to 280 mg, averaging 150 mg.
A total daily excretion of 140 mg of urobilinogen would represent the catabolism of 3.99 grams of hemoglobin.

214. Maximum daily degradation of hemoglobin in normal adults?

a) 2 gm

b) 4 gm

c) 6 gm

d) 8 gm

Correct Answer - D
Ans. D. 8 gm
A total daily excretion of 140 mg of urobilinogen would represent the catabolism of 3.99 grams of hemoglobin.
Normal maximum urobilinogen in feces is 280 mg, i.e. 8 grams of hemoglobin catabolism.

215. cAMP activates?

a) Protein kinase 'A'

b) Protein kinase 'C'

c) Nuclear transcription

d) Phospholipare

Correct Answer - A

Ans. A. Protein kinase 'A'

Hormones acting through adenylyl cyclase (AC):

- Corticotropin releasing hormone (CRH), FSH, LH, TSH, ACTH (corticotropin), ADH, Vasopressin (V2 receptors), Parathormone, Catecholamine) e.g., adrenaline (most actions), Glucagon, hCG, Calcitonin, Somatostatin, acetylcholine (M2), Dopamine (1), Angiotensin II (epithelial cells), GABA-B, Histamine (H2).

216. Mechanism of action of 5-a reductase?

a) Breakage of C_4C_5 double bond

b) Breakage of C-N bond

c) Breakage of amide bond

d) Breakage of N-N bond

Correct Answer - A

Ans. A. Breakage of C_4C_5 double bond

5-alpha reductase causes reduction (breakge) of C4-05 double bond (A4.5) with the help of NADH as a cofactor.
It converts (reduces) testosterone to dihdrotestosterone.

217. Glucose transporter affected in diabetes mellitus?

a) GLUT-2

b) GLUT-5

c) GLUT-4

d) SGLT-2

Correct Answer - C
Ans. C. GLUT-4
[Ref Principles of medical physiology p.790]

- GLUT-4 is responsible for facilitating the transport of glucose into the cells in response to insulin.
- For this reason, mutation in GLUT-4 have been associated with type 2 diabetes.
- The GLUT-4 gene is located on short arm of chromosome 17 (17p13).

218. Gene for insulin responsive glucose transporter is located on chromosome?

a) 7

b) 21

c) 17

d) 13

Correct Answer - C
Ans. C. 17
[Ref Principles of medical physiology p.790]

- GLUT-4 is responsible for facilitating the transport of glucose into the cells in response to insulin.
- For this reason, mutation in GLUT-4 have been associated with type 2 diabetes.
- The GLUT-4 gene is located on short arm of chromosome 17 (17p13).

219. True about ACTH and cortisol [corticosteroid] secretion?

a) Maximum secretion in the evening

b) ACTH has negative feed-back control

c) ACTH has major effect on mineralocorticoid secretion

d) ACTH is derived from POMC

Correct Answer - B:D

Ans. B & D. ACTH has negative feed-back control (D) ACTH is derived from POMC

[Ref Understandings of medical physiology p.539]

- ACTH is derived from precursor molecule pro-opiomelanocortin (POMC).
- ACTH stimulates the adrenal cortex to increase the synthesis and release of glucocorticoids. At normal physiological concentration, the effect of ACTH on secretion of mineralocorticoid (aldosterone) and androgen is minimal. However, at higher concentration synthesis and release of these hormone can also increase.
- The secretion of ACTH is subjected to negative feedback (inhibition) by glucocorticoids.
- ACTH secretion shows diurnal (circadian) rhythm with minimum secretion at evening and maximum secretion at early morning.

220. Secretion of cortisol is highest at?

a) Mid-night

b) Early morning

c) Afternoon

d) Evening

Correct Answer - B
Ans. B. Early morning
[Ref Textbook of clinical endocrinology p. 78]

- The secretion of ACTH and consequently that of cortisol follows a circadian rhythm due to hypothalamic (Suprachiasmatic nucleus) control.
- ACTH secretion is minimum during night and maximum early in the morning (6-8 am).

221. All are true regarding intracellular receptors, except?

a) Act by regulating gene expression

b) Fastest acting receptors

c) Glucocorticoid receptors

d) DNA contains hormone responsive elements

Correct Answer - B
Ans. B. Fastest acting receptors
[Ref Ganong 24th Ie p.406; Harper 28th/e p.4281]
This is slowest acting tranduction mechanism because protein synthesis takes some time.

222. Hormone which affects IC* ion concentration?

a) GH

b) Thyroxine

c) Insulin

d) Estrogen

Correct Answer - C
Ans. C. Insulin
[Ref Guyton IIth/e p.710]

- Insulin lowers serum IC' concentration i.e., causes hypokalemia. The hypokalemic action of insulin is due to stimulation of K+ intake by the cells mainly in muscle and adipose tissue. Insulin increases the activity of Na+ - K. ATPase in cell membrane, so that more K+ is pumped into cells.

223. Tissue factor activates?

a) Intrinsic pathway

b) Contact pathway

c) In vitro pathway

d) In vivo pathway

Correct Answer - D
Ans. D. In vivo pathway
[Ref Ganong 23thie p.5.31-53.5]
Blood coagulation pathways are divided into:-
Intrinsic pathway (contact pathway):

- It is largely an 'in vitro' pathway and is activated when factor XII (Hageman factor or contact factor) comes in contact with negatively charged surface, e.g. glass, kaolin etc.

Extrinsic pathway:

- It is largely an in vivo pathway is activated by tissue factor (thromboplastin) at the site of tissue injury.

224. Tisse factor activates?

a) Preaccelerin

b) Hageman facter

c) Labile facter

d) Prothrombin

Correct Answer - A
Ans. A. Preaccelerin
[Ref Ganong 23rd le p.531-535]
Preaccelerin (factor VII) is activated to factor Vila by tissue factor.
Tissue factor is the cofactor for both factor VII and Vila.

225.

Maximum storage of magnesium occurs in which part of body?

a) Adipose tissue

b) Skeletal muscles

c) Blood

d) Bone

Correct Answer - D

Ans. D. Bone

[Ref Principles of medical physiology p.114]

- An adult contains approximately 25 grams of magnesium.
- About 60% of the magnesium is present in bone, of which 30% is exchangeable and functions as a reservoir to stabilize the serum concentration.
- About 20% is present is skeletal muscles, 19% in other soft tissues and less than 1% in ECF.

226.

Phosphate/phosphorus is present in which part of cell?

a) Cell membrane

b) DNA

c) RNA

d) All of the above

Correct Answer - D
Ans. D. All of the above
[Ref Principles of medical physiology /e p.116]
Phosphorus is a component of DNA, RNA, ATP and also the phospholipids that form all cell membranes.
Nearly every cellular process that uses energy obtains it in the form of ATP.
Thus, it is an essential element for all living cells and important for energy utilization in the body.

227. Exercise mediated increase in muscular blood flow is mediated by which sympathetic fibers

a) Adrenergic

b) Noradrenergic

c) Dopaminergic

d) Cholinergic

Correct Answer - D

Ans. D. Cholinergic

- An exercise is a form of stress, and like most stresses, is accompanied by sympathetic overactivity.
- Skeletal muscles have both sympathetic noradrenergic vasoconstrictor fibers and sympathetic cholinergic vasodilator fibers.
- Vasoconstrictor nerve fibers act mainly on veins.
- Venoconstriction improves venous return and helps in improving cardiac output.
- On the other hand, sympathetic cholinergic fibers, which are unique to skeletal muscles, bring about arteriolar dilatation and thereby increase muscle blood flow.

228. Premature ejaculation occurs in which phase of sexual cycle?

a) Excitement phase

b) Plateu phase

c) Orgasmic phase

d) Resolution

Correct Answer - C
Ans. C. Orgasmic phase
[Ref Oxford textbook of psychiatry p.227]
Orgasm phase:

- Premature ejaculation occurs in this phase
- Reflexive muscle contraction occurs in pelvis
- It is the shortest phase and lasts only a few seconds

229. Erection of penis occurs in which phase of sexual *cycle?*

a) Excitement phase

b) Plateu phase

c) Orgasmic phase

d) Resolution

Correct Answer - A
Ans. A. Excitement phase
Ref Oxford textbook of psychiatry p.227]
Excitement phase

- There is increased physiological excitement such as high BP and heart rate.
- There is erection of penis (in males) and swelling of clitoris & labia minora (in females).
- Testes swell, scrotum tightens
- There is vaginal lubrication

230. Shortest phase of sexual cycle?

a) Excitement phase

b) Plateu phase

c) Orgasmic phase

d) Resolution

Correct Answer - C
Ans. C. Orgasmic phase
[Ref Oxford textbook of psychiatry p.227]
Orgasm phase:

- Premature ejaculation occurs in this phase
- Reflexive muscle contraction occurs in pelvis
- It is the shortest phase and lasts only a few seconds

231. Inhibition of Na* ATPase leads to?

a) Decreased Na* in the cell

b) Increased Ca' in the cell

c) Increased K* in the cell

d) Increased Cl- in the cell

Correct Answer - B
Ans. B. Increased Ca' in the cell
[Ref Principles of medical physiology 3rdle p. 786]
3Na+/1Ca+ exchanger (Sodium/Calcium exchange pump):

- It moves 3Na+ into the cell in exchange one Ca+ going out

232. Hypercoagulable factor is?

a) Protein C

b) Protein S

c) Factor V Leiden

d) Antithrombin III

Correct Answer - C
Ans. C. Factor V Leiden
[Ref Textbook of clinical hematology p. 786]
Factor V Leiden is the most common inherited hypercoagulable state.
Occurs when a specific mutation in a protein that is more resistant to be turned off, leading to an increased risk of thrombosis.

233. Apnea-hypopnea index is used for?

a) Emphysema

b) Asthma

c) Hyaline membrane disease

d) Obstructive sleep apnea [OSAI

Correct Answer - D

Ans. D. Obstructive sleep apnea [OSAI

[Ref Harvard ed] Apnea Hypopnea Index (AHI)

- The AHI is the number of apneas or hypopneas recorded during the study per hour of sleep.
- It is generally expressed as the number of events per hour.

Based on the AHI, the severity of OSA is classified as follows:

- None/Minimal: AHI < 5 per hour
- Mild : AHI 5, but < 15 per hour
- Moderate : AHI 15, but < 30 per hour
- Severe : AHI 30 per hour.

234. True about heterophilic receptors?

a) Involved in binding of GH to cell membrane

b) Bind to same ligand/hormone

c) Involved in cell adhesion

d) All are correct

Correct Answer - C

Ans. C. Involved in cell adhesion

[Ref Textbook of clinical pathology p.1132]

Cell-cell and cell-tissue-interactions occur through following types of receptors:

- Homophilic & heterophilic receptors.

Heterophilic receptors:

- These receptors recognize distinct ligands (called adhesion epitopes) of opposing cell membranes or tissue (called "lock and key bonds" or "links").

235. Third order neurons of sensations from face arise in?

a) Medulla

b) Spinal nucleus of trigeminal

c) Thalamus

d) Brainstem

Correct Answer - C
Ans. C. Thalamus
General sensations from the face are carried by trigeminal nerve. From VPM nucleus of thalamus, third order neurons project to postcentral gyrus (primary sensory cortex).

236. Somatic efferent of which arise from medulla?

a) Oculomotor

b) Trochlear

c) Abducent

d) Hypoglossal

Correct Answer - D
Ans. D. Hypoglossal
General somatic efferent (motor) nuclei of Hypoglossal nucleus:

- It lies in medulla and through hypoglossal nerve supplies muscles of tongue, except palatoglossus.

237. Actin is which type of protein?

a) Fibrous

b) Globular

c) Both

d) None

Correct Answer - C
Ans. C. Both
[Ref Principles of medical physiology p.731]
There are two types of actin filaments:

- F-actin → Fibrous protein
- G-actin → Globular protein

238. NAD^+ Acts as a coenzyme for ?

a) Xanthine oxidase

b) L-amino acid oxidase

c) Succinate dehydrogenase

d) Malate dehydrogenase

Correct Answer - D

Ans. 'D' Malate dehydrogenase

NAD -linked dehydrogenases Pyruvate dehydrogenase, isocitrate dehydrogenase, malate dehydrogenase, a-ketoglutarate dehydrogenase, glutamate dehydrogenase, glyceraldehyde-3-P dehydrogenase, lactate dehydrogenase, 13-hydroxy acyl CoA dehydrogenase, glycerol 3-P dehydrogenase (cytoplasmic).
NADP*-linked dehydrogenases Glucose-6-P dehydrogenase, 6-Phosphogluconate dehydrogenase, 3-ketoacyl reductase, Enoyl reductase, gulonate dehydrogenase.
FAD-linked dehydrogenases Succinate dehydrogenase, fatty acyl CoA dehydrogenase, glycerol-3P dehydrogenase (mitochondrial).

239. Enzyme involved in the transfer of hydrogen ion is

a) Hydratase

b) Oxidase

c) Peroxidase

d) Dehydrogenase

Correct Answer - B:D

Ans. is 'b' i.e., Oxidase & 'd' i.e., Dehydrogenase [Ref Harper 30th/e p. 198; Vasudevan 5th/e p. 210]

- Enzyme involved in oxidation-reaction are :?
  Cause removal of hydrogen
- Dehydrogenases : Use NAD or FAD as acceptor
- Oxidases : Use oxgen as acceptor, Add oxygen
- Oxygenases

240. Which of the following is a constitutive enzyme?

a) Hexokinase

b) Glucokinase

c) p galactosidase

d) Cyclooxygenase-2

Correct Answer - A
Ans. is 'a' i.e.,Hexokinase

241. Sequence of complexes in the electron transport chain is -

a) NADH dehydrogenase → Q → Cytochrome bc1 → Cytochrome aa3 → O,

b) NADH dehydrogenase → Q → Cytochrome aa3 → Cytochrome bcl→ O,

c) NADH dehydrogenase → Cytochrome aa3 → Q → Cytochrome bcl→ O,

d) NADH dehydrogenase → Cytochrome bcl → Q → Cytochrome aa3 → O,

Correct Answer - A

Ans. is 'a' i.e., NADH dehydrogenase → Q → Cytochrome bcl → Cytochrome aa3→ 02

Electron transport chain is made up of 5 stationary complexes and 2 mobile complexes

242. Regarding energy production by the electron transport chain, which is true?

a) The complexes are arranged in a decreasing order of redox potential

b) The complexes are arranged in a decreasing order of ability to get reduced

c) The complexes are arranged in a decreasing order of state of oxidation

d) The complexes are arranged in a decreasing order of energy level

Correct Answer - D

Ans. is 'd' i.e., The complexes are arranged in a decreasing order of energy level *[Ref Essential of biochemistry p. 712]*

- ETC help in ATP generation
- It is explained by Mitchell's chemiosmotic theory. According to this theory, the complexes are arranged in an increasing order of redox potential. Redox potential is a measure of ability to get reduced. So the complexes are arranged in an increasing order of ability to get reduced. As more a substance is oxidised higher will be the ability to get reduced, the complexes are arranged in an increasing order of state of oxidation. As state of oxidation is inversely proportional to energy level, the complexes are arranged in a decreasing order of energy level.
- So, when electrons move from one complex to another, it means electrons move from a complex of high energy to a complex of low energy and that liberates energy. This energy is used for pumping hydrogen ions from the mitochondrial matrix to just outside the innermitochondrial membrane. After

hydrogen ions accumulate outside

the inner mitochondrial membrane, hydrogen ions go through FO Component of ATP synthase.

243. Electron transport chain all are true except

a) Complexes are arranged in an increasing order of redox potential;

b) Mitochondrial Glycerol phosphate dehydrogenase sends its electron directly to Q

c) l0 Hydrogen ions are translocated when NADH enters into an electron transport chain

d) 7 Hydrogen ions are translocated when FADH2 electrons get into electron transport chain.

Correct Answer - D

Ans. is 'd' i.e., 7 Hydrogen ions are translocated when FADH2 electrons get into electron transport chain

- NADH electrons get into electron transport chain through complex I. Energy difference between NADH and Q is in such a way that when electrons move from complex I to Q, 4 hydrogen ions get translocated.
- Similarly 4 ions get translocated when electrons move from Q to complex III and 2 1-1' ions get translocated when electrons move from complex III to IV. So totally 10 1-1^{+} ions get translocated when electrons from NADH get into electron transport chain. Complex V or ATP synthase complex works in such a way that when 10 H* ions go through F_0 component, 1 ATP is generated. So when 10 Hydrogen ions are translocated, 2.5 ATPs can be generated.
- FADH, electrons get into electron transport chain through either complex II or they directly get into Q, in either case, no energy is liberated. No hydrogen ions are translocated. When electrons move

from Q to Complex III, 4 hydrogen ions and when electrons move from III to IV 2 hydrogen ions are translocated. So totally 6 hydrogen ions are translocated when FADH2 gets into electron transport chain. ATP synthase complex generates 1 ATP for every 4 hydrogen ions translocated through F, component. So for 6 hydrogen ions, it is 1.5 ATP

244. Atractiloside act as ?

a) Uncoupler

b) Inhibitor of oxidative phosphorylation

c) Inhibitor of complex I of ETC

d) Inhibitor of complex III of ETC

Correct Answer - B

Ans. is 'b' i.e., Inhibitor of oxidative phosphorylation

Inhibitors of electron transport chain?

- Inhibitors of respiratory chain may be divided into three groups : ?

1. Inhibitors of electron transport chain proper

- These inhibitors inhibit the flow of electrons through the respiratory chain. This occurs at following sites.
- Complex I (NADH to CoQ) is inhibited by : - Barbiturates (amobarbital), Piericidin A (an antibiotic), rotenone (an insectiside), chlorpromazine (a tranquilizer), and guanethidine (an ntihypertensive). These inhibitors block the transfer of reducing equivalents from FeS protein to CoQ.
- Complex II is inhibited by : - Carboxin and TTFA inhibit transfer of electon from FADH2 to CoQ, whereas malanate competitively inhibit from succinate to complex II. Complex III (Cytochrome b to cytochrome CI) is inhibited by : - Dimercaprol, antimycin A, BAL
- (British antilewisite), Naphthyloquinone. These inhibitors block the transfer of electrons from cytochrome b to cytochrome
- Complex IV (cytochrome C oxidase) is inhibited by : - Carbon monoxide, CN-, H_2S and azide (N3-). These inhibitors block the transfer of electrons from cytochrome aa3 to molecular oxygen and therefore can totally arrest cellular respiration.

2. Inhibitors of oxidative phosphorylation

- These compounds directly inhibit phosphorylation of ADP to ATP. Oligomycin inhibits F_o component of F_0F, ATPase. Atractiloside inhibits translocase, a transport protein that transports ADP into mitochondria for phosphorylation into ATP.

3. Uncouples

- As the name suggests, these componds block the coupeling of oxidation with phosphorylation. These compounds allow the transfer of reducing equivalents in respiratory chain but prevent the phosphorylation of ADP to ATP by uncoupling the linkage between ETC and phosphorylation. Thus the energy instead of being trapped by phosphorylation is dissipated as heat. Uncouplers may be :-

. Natural :- Thermogenin, thyroxine

. Synthetic :- 2, 4-dinitrophenol (2, 4-DNP), 2, 4-dinitrocresol (2, 4-DNC), and CCCP (chlorocarbonylcyanidephenyl hydrazone).

245. Which of the following is the respiratory centre of cell?

a) Mitochondria

b) Microsome

c) Lysosome

d) Nucleus

Correct Answer - A

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

- As mitochondria harbours the electron transport chain. In electron transport chain, the electrons from NADH and FADH2 are transferred through the various complexes to finally Oxygen.
- Oxygen is then converted to water. This way all fuels get oxidised to Carbondioxide. In other words in miotochondria, Oxygen is utilised and Carbon dioxide generation is supported. Hence it is called as the respiratory centre of the cell.

246. Cellulose is biochemically -

a) β (1,4) L glucose

b) ?, (14) D glucose

c) β(1,4) D glucose

d) ? (1,4) L glucose

Correct Answer - A

Ans. is 'a' i.e., β (1,4) L glucose

- Cellulose is a component of cell wall.
- Cellulose is a structural homopolysaccharide made up of glucose molecules linked by 13(1,4) linkages.
- Humans cannot digest cellulose because human digestive enzymes cannot break 43(1,4) linkages present in oligosaccharides and polysaccharides.
- This is why vegetarian diet is considered to provide fibre to the diet.

247. D and L isomerism is -

a) Optical isomerism

b) Functional isomerism

c) Epimerism

d) Enantiomerism

Correct Answer - D

Ans. is d.i.e., Enantiomerism

- Enantiomerism is a type of stereoisomerism in which two molecules have the same molecular formula and the same structural formula but they differ in spatial orientation with respect to all the carbon atoms and they are named based on the orientation in the penultimate carbon atom.
- In the penultimate carbon atom, if OH is on the right side, it is D form, if OH is on the left side, it is L form. The other name for enantiomerism is Racemism.

248. **Which among the following glucose transporter present in beta cells ?**

a) GLUT1

b) GLUT2

c) GLUT3

d) GLUT4

Correct Answer - B

GLUT2 is the glucose transporter present in the betacells and liver cells.It has a high Km for glucose.Hence entry of glucose is directly proportional to the glucose level.It is an insul;in independent transport.

GLUT3 is present in brain and **GLUT4** medites insulin dependent transport of glucose into muscle and adipose tissue.

Ref: Murray R.K., Granner D.K. (2011). Chapter 40. Membranes: Structure & Function. In D.A. Bender, K.M. Botham, P.A. Weil, P.J. Kennelly, R.K. Murray, V.W. Rodwell (Eds), *Harper's Illustrated Biochemistry*, 29e.

249. All of the following are converted to cr-ketoglutarate on catabolism except-

a) Glutamate

b) Histidine

c) Proline

d) Glycine

Correct Answer - D

Ans. is 'd' i.e., Glycine ***[Ref Harper 30th/e*** **p.** ***162, 25^{0}/e p. 166, 167]***

250. Glucogenic aminoacids give rise to all of the following intermediates of citric acid cycle except-

a) Isocitrate

b) c ketoglutarate

c) Succinyl CoA

d) Fumarates

Correct Answer - A
Ans. is 'a' i.e., Isocitrate

251. What is the precursor of proline in Krebs cycle?

a) Oxaloacetate

b) c ketoglutarate

c) Succinyl CoA

d) Fumarates

Correct Answer - B

Ans. is 'b' i.e., c ketoglutarate ***[Ref Essentials of Biochemistry p. 232; Harper 29`'/e p.***

- Proline is an alpha aminoacid with a pyrrolidine ring
- It is a non polarimino acid with NH as one of its functional groups
- It disrupts a helix
- It is a nonessential amino acid and is synthesized from a non-essential aminoacid glutamate
- Glutamate in the presence of y glutamate kinase gets converted to glutamate 5 phosphate, which in the presence of y glutamate dehydrogenase gets converted to y glutamate semialdehyde. y glutamate semialdehyde spontaneously cyclises to form y pyrroline carboxylate which in the presence of reductase forms proline

252. used in citric acid cycle are all except-

a) NAD

b) FAD

c) NADP

d) GDP

Correct Answer - C

Ans. C. NADP

Enzyme	**Reducing equivalent**	**ATP**
Isocitrate dehydrogenase	1 NADH	2.5
alpha ketoglutarate dehydrogenase	1 NADH	2.5
Succinyl CoA	ATP/GTP	1
Succinate dehydrogenase	FADH2	1.5
Malate dehydrogenase	NADH	2.5
	total	10

253. All of the following steps act as sources of energy in citric acid cycle except -

a) Citrate synthase

b) Isocitrate dehydrogenase

c) Succinyl Thiokinase

d) Succinate Dehydrogenase

Correct Answer - A
Ans. is 'a' i.e.,Citrate synthase

254. True about glucokinase is -

a) It is present in all cells

b) It is a constitutive enzyme

c) It has a high km

d) It is inhibited by glucose 6 phosphate

Correct Answer - C

Ans. is 'c' i.e.,It has a high km

S. No.	Property	Hexokinase	Glucokinase
1	Location	All cells	Liver and Pancreatic (3 cells
2	Affinity	High	Low
3	Km	Low	High
4	Inhibition by glucose 6 phosphate	Yes	No
5	Induction by Insulin	No (Constitutive enzyme)	Yes (Inducible Enzyme)

255. All of the following are true about lactate utilisation in liver except -

a) Total net number of ATP formed because of cori's cycle is 6

b) Cori's cycle shifts the metabolic burden from muscle to liver

c) Cori's cycle can not be sustained indefinitely because it is energetically unfavourable

d) Cori's cycle is linked to glycogen synthesis in muscle

Correct Answer - A

Ans. is 'a' i.e., Total net number of ATP formed because of coil's cycle is 6

CORI'S CYCLE

- Muscle uses a molecule of glucose through anaerobic glycolysis and gets 2 ATPs. In this process, glucose becomes two molecules of lactate. The 2 lactate molecules through circulation reach liver. In liver, the two molecules of lactate are utilised through gluconeogenesis to form a glucose molecule at the expense of 6 ATPs. The glucose formed in liver reaches muscle and is utilised for again anaerobic glycolysis if the muscle is still exercising. In case muscle is done with exercising, the glucose which reaches the muscle from liver is used for glycogen synthesis.

256. Which of the following is true about effect of insulin and glucagon on gluconeogenesis?

a) Insulin favours the formation of fructose 2,6 bisphosphate

b) Fructose 2, 6 bisphosphate is an inhibitor of glycolysis

c) Insulin acts through a kinase

d) Glucagon stimulates PFK.2 activity of the tandem enzyme

Correct Answer - A

Ans. is 'a' i.e., Insulin favours the formation of fructose 2,6 bisphosphate

- Glycolysis and gluconeogenesis are reversal of each other. Hence the two pathways should be regulated in such a way that when one pathway is active, the other one has to be inactive. Otherwise they will end up in futile cycles.

257. Key enzyme of gluconeogenesis are all except?

a) Pyruvate carboxylase

b) PEP carboxykinase

c) Pyruvate kinase

d) Glucose-6-phosphatase

Correct Answer - C
Ans. is 'c' i.e., Pyruvate kinase

- Mitochondrial pyruvate carboxylase catalyzes the carboxylation of Pyruvate to Oxaloacetate, It is an ATP-requiring reaction, Biotin is the coenzyme.
- Phosphoenolpyruvate Carboxykinase: Catalyzes the decarboxylation and phosphorylation of oxaloacetate to phosphoenolpyruvate(PEPCK) (Cytosol) using GTP as the phosphate donor.
- The conversion of glucose-6-phosphate to glucose is catalyzed by glucose 6-phosphatase

258. In glycogen synthesis the active form of glucose used is-

a) Glucose 6 phosphate

b) Glucose I phosphate

c) UDP glucose

d) UTP glucose

Correct Answer - C

Ans. is 'c' i.e., UDP glucose

- Glycogen synthesis occurs in liver and Skeletal Muscle
- UDP glucose is the active form of glucose which gets added to the growing glycogen
- The number of high energy phosphates required for attaching a glucose molecule to growing glycogen is 3
- The rate limiting enzyme of glycogen synthesis is glycogen synthase
- Glycogen synthase gets activated by dephosphorylation
- Glycogen synthase attaches glucose residues one by one along a straight chain, linked by a(1,4) linkages. This continues until 11 to 13 residues are attached in a straight chain.
- At branch points in glycogen, a(1,6) linkages should be formed.

259. UDP glucose is not used in ?

a) Uronic acid pathway

b) Glycogen synthesis

c) Galactose metabolism

d) HMP shunt

Correct Answer - D
Ans. is 'd' i.e., HMP shunt
UDP-glucose is derived from glucose-6-phosphate via glucose-l-phosphate.
The major fate of UDP-glucose is the synthesis of glycogen.
Other uses of UDP-glucose are -
1. In uronic acid (glucoronic acid) cycle to generate UDP glucuronate.
2. Galactose metabolism
3. Glycosylation of proteins, lipids and proteoglycans.

260. Neonatal hypoglycaemia which does not respond to counter regulatory hormone administration is diagnostic of -

a) Her's disease

b) Cori's disease

c) Anderson's disease

d) Von Gierke's disease

Correct Answer - D

Ans. is 'd' i.e.,Von Gierke's disease

- Glycogen storage disorders presenting with hypoglycaemia are Type I (Von Gierke's disease), Type III (Cori's disease or Forbe's disease), Type VI (Her's disease), Type IX (Fanconi Bickel syndrome)
- The only Glycogen storage disorder which presents as hypoglycaemia not responding to counter regulatory hormone administration is Von Gierke's disease
- Muscle involvement is not a feature of Type I(Von Gierke's disease), Type IV (Andersoen disease), Type VI (Her's disease), Type IX (Fanconi Bickel syndrome)
- Andersen disease or Type IV is the only glycogen storage disease which presents with neither hypoglycaemia nor with muscle involvement. It presents as hepatomegaly and cirrhosis

261. Which of the following is a serine protease

a) Chymotrypsin

b) Pepsin

c) Carboxypeptidase

d) Caspases

Correct Answer - A
Ans. is'a'i.e., Chymotrypsin IRef: Chatterjee 7h/e p. 4j5-361
* The term Protease is used to represent the group of enzymes that catalyze the cleavage ofpeptide bonds in proteins and peptide molecules with the participation of water as co-reactant. In simple words, proteases catalyze the cleavage of peptide bonds by hydrolysis (addition of water
Serine proteases:-
* These posses a critical serine residue at the active site.
- Example of serine proteases are trypsin, chymotrypsin, elastase, and thrombin.
* Serine proteases are inhibited by disopropylphosphofluridate which binds covalently to serine residue.
- The active site of serine proteases contain three critical amino acids serine, histidine and aspartate. These residues are often referred to as catalytic triad

262. **Essential fatty acids are except:**

a) Arachidonic acid

b) Linoleic acid

c) Palmitic acid

d) Linolenic acid

Correct Answer - A
The essential fatty acids are polyunsaturated fatty acids, ***linoleic acid (18:26) and linolenic acid (18:33).***

Arachidonic acid (20:46) is derived from dietary linoleic acid and is present primarily in membrane phospholipids.

Important derivatives of linolenic acid are eicosapentaenoic acid (20:63) and docosahexaenoic acid (DHA, 22:63) found in human milk and brain lipids.Palmitic acid is a common saturated fatty acid. Arachidonic acid (20C: ro6) is not nutritionally essential because chain elongase system can convert linoleic acid (l8C: <o6) into Arachidonic acid (20C: o6). So arachidonic acid is considered as conditionally essential, because it has to be supplied
in the diet if linoleic acid is not supplemented.
Ref : Botham K.M., Mayes P.A. (2011). Chapter 23. Biosynthesis of Fatty Acids & Eicosanoids. In D.A. Bender, K.M. Botham, P.A. Weil, P.J. Kennelly, R.K. Murray, V.W. Rodwell (Eds), *Harper's Illustrated Biochemistry*, 29e.

263. Which of the following is a transfatty acid?

a) Oleic acid

b) Elaidic acid

c) Stearic acid

d) Arachidonic acid

Correct Answer - B

Ans. is 'b' i.e., Elaidic acid ***[Ref Harper 30"/e p. 213]***

- There are two types of fatty acids :
- Saturated
- Unsaturated
- Cis - trans isomerism is for unsaturated fatty acids.
- Stearic acid is a saturated fatty acid (No cis-trans isomerism)
- Only important unsaturated trans-fatty acid is Elaidic acid (trans-9-octadecenoic)

264. Activators of Acetyl CoA carboxylase are all except

a) Acyl coA

b) Citrate

c) Glutamate

d) Dicarboxylic acid

Correct Answer - A

Ans. is 'a' i.e., Acyl CoA [Ref Harper 29thle p. 217, 220]

Allosteric modulation of acetyl CoA carboxylase

. Activaters : Citrate (tricarboxylic acid); glutamate (dicarboxylic amino acid) & other dicarboxylic acids; ATP

. Inhibitors : Acyl CoA

265. Arachidonic acid oxidation involves how many cycles of beta oxidation?

a) l0

b) 20

c) 9

d) 8

Correct Answer - C

Ans. is 'c' i.e., 9

- Number of acetyl CoA formed in (3-oxidation of fatty acids = Number of carbon atoms/2.
- Number of cycles of (beta-oxidation required -No of carbon / 2(-1)
- Hence arachidonic acid with 20 carbon atoms undergoes p oxidation to form 10 acetyl CoA by going through (20/2) - 1 cycles i.e., 9 cycles.

266. All are true about beta oxidation of fatty acids except -

a) Carnitine acyl transferase I is the rate limiting enzyme of fatty acid oxidation

b) Carnitine acyl transferase I is stimulated by Acyl CoA

c) Carnitine Acyl transferase I is stimulated by malonyl CoA

d) Carnitine Acyl transferase I defect causes a decrease in acylcarnitine levels

Correct Answer - C

Ans. is 'c' i.e., Carnitine Acyl transferase I is stimulated by malonyl CoA

- As CATI is the rate limiting enzyme of fatty acid oxidation, its substrate is acyl CoA. As we know that all enzymes get stimulated by their substrates, acyl CoA stimulates CATI.
- Malonyl CoA is a product of acetyl CoA carboxylase (ACC). ACC is the rate limiting enzyme of fatty acid synthesis, an anabolic pathway.
- So, malonyl CoA is an intermediate of anabolic pathway. Hence it is a signal of high energy (Anabolism happens only in high energy status). When the energy is already high, we do not want fatty acids to be further oxidised. We want fatty acids to be only stored. So, malonyl CoA, a signal of high energy inhibits CATI.
- In short, anything which signals low energy stimulates fatty acid oxidation (CATI). So, ADP, NAD, FAD, Glucagon , Acyl CoA stimulate fatty acid oxidation
- Anything which signal high energy inhibit fatty acid oxidation. So, ATP, NADH, FADH2, Insulin and malonyl CoA inhibit fatty acid oxidation.
- Fatty acid oxidation defects present as non ketotic

hypoglycaemia,

hyperammonemia, dicarboxylic aciduria. And all fatty acid oxidation defects also present with increase in acyl carnitine levels. One exception is CATI defect. In CATI defect, as acyl CoA is not converted to acyl Carnitine, free carnitine levels are high and acyl carnitine levels are low.

267. All are true about beta oxidation of fats acids except -

a) Occurs in mitochondria

b) Occurs in peroxisome

c) Results in hydrogen peroxide generation

d) Fatty acid oxidation defects present with ketosis

Correct Answer - D

Ans. is 'd' i.e., Fatty acid oxidation defects present with ketosis

- Fatty acid oxidation defect causes non-ketotic hypoglycemia.
- Fatty acid oxidation happens in mitochondria and in peroxisomes.
- The difference between mitochondrial oxidation and peroxisomal oxidation is that in mitochondria, when the 13 carbon atom is oxidised, the hydrogen atoms are removed. Those hydrogen atoms are used for reducing NAD and FAD to form NADH and FADH2. NADH and FADH2 enter into electron transport chain to form ATP. In peroxisome, the hydrogen atom removed from (3 carbon atom is used to reduce 0_2 forming $F1_20_2$. Only because 11_20_2 is formed in peroxisome by (beta oxidation the organism is called so)

268. Which of the following is true about Beta oxidation of fatty acids?

a) Stearic acid on oxidation provides 106 ATPs

b) Odd chain fatty acid oxidation provides only propionyl coA

c) Fatty acid oxidation defects cause hypoglycemia

d) Ketone bodies are formed by incomplete oxidation of fatty acid during starvation to increase energy production

Correct Answer - C

Ans. is 'c' i.e., Fatty acid oxidation defects cause hypoglycaemia

Defect in fatty acid oxidation causes hypoglycemia.

About other options

- Stearic acid oxidation produces 122 ATPs.
- Even chain fatty acids are (3-oxidized to acetyl CoA. Odd chain fatty acids are also (3-oxidized normally but the last step produces a 3-carbon propionyl CoA along with an acetyl CoA (instead of 2 molecules acetyl CoA that occurs in even chain fatty acids).
- Ketone body formation (ketogenesis) occurs when there is a high rate of fatty acid oxidation in liver which provides excessive *acetyl* CoA, substrate for ketogenesis.
- When ketone bodies are formed, as we can't expect the 10 ATPs which *we* get from every acetyl CoA through citric acid cycle, the formula for energetics of incomplete oxidation of fatty acids is :

269. Which of the following is true about properties of VLDL/LDL-

a) In electrophoresis, VLDL migrates more cathodal than LDL

b) LDL is formed from liver

c) LDL is formed from Chylomicron

d) VLDL remnants reach extrahepatic tissues

Correct Answer - B

Ans. is 'b' i.e., LDL is formed from liver

- Lipoprotein electrophoresis of a fasting sample shows three bands - HDL, VLDL, LDL in that order from anode to cathode.
- VLDL is synthesized in liver that contains high triglyceride, ChE, cholesterol, phospholipid and Apo B-100. (VLDL particles resemble chylomicrones in composition except that VLDL contains Apo B-100 instead of Apo B-48).
- VLDL particles are secreted in the plasma and as with chylomicron, Apo E and Apo C are transferred from HDL to VLDL. Now VLDL contains Apo B-100, Apo E and Apo C.
- In plasma, triglycerides of VLDL are hydrolysed by same lipoprotein lipase (see above) and apo C is transferred to HDL and the remmants are called IDL.
- 40-60% of IDL is removed by liver via LDL receptor mediated endocytosis, this process require Apo E which acts as ligand for LDL receptors.
- Remaining IDL is remodeled by hepatic (liver) lipase which hydrolyzes more triglyceride to form LDL that contains maximum cholesterol.
- 70% of LDL is removed by liver via LDL receptor and 30% is utilizedby peripheral tissues as a source of

cholesterol.

270. Reverse cholesterol transport - all are true except-

a) Transport of cholesterol from extrahepatic tissues to liver

b) ATP Binding Cassette Transporter protein is involved in the conversion of HDL3 to HDL2

c) Lecithin Cholesterol Acyl Transferase helps in the conversion of Spheroidal HDL to Discoidal HDL

d) Cholesterol Ester Transfer Protein helps in increasing HDL level

Correct Answer - D

Ans. is 'd' i.e., Cholesterol Ester Transfer Protein helps in increasing HDL level

- Reverse Cholesterol Transport is the transport of Cholesterol ester and phospholipid from extrahepatic tissues to liver.
- HDL is released by both liver and intestinal cells.
- In both the cases, they are released as discoidal HDL
- Apo Al activates Lecithin Cholesterol Acyl Transferase and it converts discoidal HDL to Spheroidal HDL (HDL3)
- HDL3 activates ABC1 (ATP Binding Casette Transporter 1) to collect cholesterol and phospholipids from extra hepatic tissue membranes. This way HDL3 size increases and density decreases. Hence it forms HDL2.
- This HDL2 reaches liver to empty its contents into liver.
- On the way to liver, if HDL2 encounters IDL, Cholesterol Ester Transfer Protein (CETP) transfers Choelsterol ester from HDL2 to IDL, converting IDL to LDL. Hence CETP decreases HDL level and increases LDL level.

271. Progesterone synthesis requires -

a) LDL

b) VLDL

c) HDL

d) Chylomicron

Correct Answer - C

Ans. is 'c' i.e.,HDL

- Granulosa cells use follicular fluid HDL as a source of cholesterol for the synthesis of progesterone.
- Under the influence of LH, corpus luteal cells take up cholesterol from follicular fluid HDL and convert cholesterol into progesterone.

272. Site of small chain fatty acid absorption is -

a) Ileum

b) Duodenum

c) Ascending colon

d) Rectum

Correct Answer - C

Ans. is 'c' i.e., Ascending colon

- Short chain fatty acids (SCFA) are fatty acids with 2 to 6 carbon atoms. They are the major end-products of the microbial digestion of carbohydrates in the alimentary canal. These short chain fatty acids, butyrate particularly is important for colon health because it is the primary energy source for colonic cells and has anti-carcinogenic as well as anti-inflammatory properties that are important for keeping colon cells healthy. Butyrate inhibits the growth and proliferation of tumor cell lines in vitro, induces differentiation of tumor cells, producing a phenotype similar to that of the normal mature cell, and induces apoptosis or programmed cell death of human colorectal cancer cells
- The highest concentrations are observed in the large intestine (caecum and colon) of all the mammals.
- Human caecum and proximal colon have high luminal concentrations of organic nutrients (non-starch polysaccharides from plant cell walls, and proteins not absorbed by the small intestine) which maintain high bacterial growth rates. Against this fermentative background, antiperistalsis ensures retention and thorough mixing of faeces in the proximal colon, which is the site of maximal SCFA production. SCFA absorption is

concentration dependent and occurs

most readily in the proximal colon (Includes cecum, ascending colon and transverse colon).

273. HMG CoA is precursor of all except-

a) Ubiquinone

b) Dolichol

c) Bile pigments

d) Ketone body

Correct Answer - C
Ans. is 'c' i.e., Bile pigments

- 3 - Hydroxy 3 methyl glutaryl CoA or HMG CoA is formed from acetyl CoA.

274. Refsum's disease is due to deficiency of which of the following enzyme?

a) Malonate dehydrogease

b) Thiophorase

c) Succinate thiokinase

d) Phytanic alpha oxidase

Correct Answer - D
D i.e. Phytanic alpha oxidase
Refsum's disease is a rare autosomal recessive disorder caused by deficiency of phytanic a oxides (Nelson) / a?hydroxylase (Lippincot) / Phytanoyl CoA hydroxylase (Lehninger) results in accumulation of phytanic acid due to its *decreased a - oxidation (i.e. hydroxnlation at a carbon* by fatty acid a hydroxylase)

275. What is the parameter that is used to assess lipid peroxidation?

a) Malondialdehyde

b) CRP

c) hsCRP

d) Carboxymethyl lysine

Correct Answer - A

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

- ROS can be produced by either breakage of covalent bond, addition of electrons to a molecule or removal of hydrogen by other radicals. They are generally highly reactive species and typically act as electrophilic species or oxidant agents. The most important radicals or pro-oxidant molecules involved in disease processes are superoxide (0_2-), hydroxyl radical (OH), hydrogen peroxide **(H_20_2)** and certain oxides of nitrogen, like nitric oxide (NO) and peroxynitrite (ONOO-)2
- Since it is complex measuring free radicals directly in vivo, it is necessary to carry out the quantification of cellular components which can react with these free radicals, such as proteins, DNA and mainly lipids. Once lipid peroxides are unstable compounds, they tend to degrade rapidly in a variety of sub products. *MDA (Malondialdehyde) is one of the most known secondary products of lipid peroxidation, and it can be used as a marker of cell membrane injury.*
- MDA is a three-carbon, low-molecular weight aldehyde formed by cyclization of aldehydes which have unsaturation in a or 13 positions
- Several methods have been developed to assess MDA, including

quantitative methods using spectrophotometry or fluorimetric detection, high performance liquid chromatography (HPLC), gas chromatography and immunological techniques

- Other markers of oxidative stress include conjugated dienes, ethane and pentane gases, isoprostanes and 4-HNE (4 - hydroxy 2-nonenal)

276. All are true about ketone bodies except ?

a) Acetoacetate is primary ketone body

b) Synthesized in mitochondria

c) Synthesized in liver

d) HMG CoA reductase is the rate-limiting enzyme

Correct Answer - D
Ans. is 'd' i.e., HMG CoA reductase is the rate-limiting enzyme

277. All are features of Abetalipoproteinemia, EXCEPT:

a) Plasma levels of cholesterol and triglyceride are extremely low

b) Manifest in early childhood with diarrhea

c) Progressive pigmented retinopathy seen

d) Neurological manifestation as ataxia in first decade

Correct Answer - D
Plasma levels of cholesterol and triglyceride are extremely low in this disorder, and chylomicrons. Abetalipoproteinemia usually presents in early childhood with diarrhea and failure to thrive.

The neurological manifestations like decreased distal lower extremity vibratory and proprioceptive sense, dysmetria, ataxia, and the development of a spastic gait, often by the third or fourth decade.

Patients also develop a progressive pigmented retinopathy presenting with decreased night and color vision.

Ref: Harrisons Principles of Internal Medicine, 18th Edition, Page 3153

278. Amino acid in synthesis of neurotransmitter

a) Glutamate

b) Proline

c) Cysteine

d) Alanine

Correct Answer - A

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

Aminoacid	Neurotransmitter
Glutamate	**Glutamate &** GABA
Glycine	Glycine
Phenylalanine & Tyrosine	Dopamine, Norepinephrine &Epinephrine
Tryptophan	Serotonin

279. Maximum buffering capacity of a buffer is maximum at pH

a) Less than pka

b) More than pka

c) Equal to pka

d) Has no relation with pka

Correct Answer - C

Ans. is 'c' i.e., Equal to pka *[Ref Harper 30th/e* p. *21 & 29th1e p. 20, 21, 18; Vasudevan 6thie* p. *22, 23]*

- Maximal buffering capacity occurs at pH equal to pka of buffer.
- Therefore, to work as a best buffer at physiological pH amino acid should have pka value close to physiological pH (7.4).
- Amino acids can have buffering action due to three ionizable groups :-
- a-carboxyl group :- Different amino acids have pka value of a-carboxyl group between 3.5-4. So, carboxyl group of amino acids has maximum buffering capacity between pH 3.5-4.
- a-amino group :- Different amino acids have pka value of a-amino group between 8.0-9.0. Thus, a-amino group has maximum buffering capacity between pH 8.0-9.0.
- Special ionizable group (in some amino acids) :- Among special ionizable group of amino acids, imidazole group of histidine has pka value 6.5-7.4, which is closest to physiological pH. Hence, histidine (due to imidazole group) has maximum buffering capacity at physiologial pH.

280. Essential amino-acid deficiency affect nitrogen balance by

a) Increasing protein degradation

b) Decreasing protein degradation

c) Decreasing protein synthesis

d) Increasing protein synthesis

Correct Answer - C

Ans. is 'c' i.e., Decreasing protein synthesis *[Ref Principles of medical Biochemistry p. 464]*

- Nitrogen balance is the difference between ingested nitrogen and excreted nitrogen.
- Nitrogen balance = N ingested - N excreted
- Because dietary proteins are an important source of nitrogen, nitrogen balance is an important index of protein and amino acid metabolism.
- In healthy adults, nitrogen balance is zero, i.e. a state of nitrogen equlibrium exists, where nitrogen intake is equal to nitrogen excretion.
- Negative nitrogen balance (excretion exceeds intake) in dietary protein deficiency
- In adult, even of protein starved, at least 30-40 gm of amino acids are degraded each day; this amount defines the minimum dietary requirment. If dietary supply drops below this limit, a negative nitrogen balance occurs and the body protein is lost. Essential amino acid deficiency has the same effect because relative deficiency.

281. Creatinine is formed from :

a) Arginine

b) Lysine

c) Leucine

d) Histamine

Correct Answer - A
Glycine, arginine and methionine all participate in creatine biosynthesis

282. Acidic amino acids are -

a) Asparagine

b) Arginine

c) None

d) Lysine

Correct Answer - A
Proline is a *unique* amino acid and has an *immino group* (=NH) instead of an amino (NH_2) group found in other amino acid.
Methionine & Cysteine are sulfur containing aminoacids.
The property of photochromicity (i.e. absorbance of ultraviolet light at 250-290nm esp 280nm) is seen with aromatic amino acid (tryptophan > tyrosine > phenylalanine).
Hydrophobic (non polar) aminoacids have no charge on their R group or side chain. Aliphatic (eg methyl, methylene, thioether & imino) side chains and aromatic side chains are nonpolar. So methyl (CH_3) side chain of alanine; propyl (C3H7) side chain of valine; butyl (C_4H_9) side chain of leuicine & isoleucine; thioether side chain of methionine; and *imino group/ pyrrolidine containing side chain of proline* are nonpolar.
Methyl (CH3) side chain of *alanine is nonpolar*. Serine, threonine, tyrosine containing hydroxyl group and cysteine containing sulfhydryl group, are polar aminoacids with neutral/uncharged/nonionic side chain. Positively charged basic amino (NH_3^+)group side chain of *histidine, arginine* and lysine ; and negatively acidic carboxyl (COO-) side chain of *aspartic acid and glutamic acid* is polar.

283. Function of tyrosinase is

a) Synthesis of norepinephrine

b) Synthesis of dopamine

c) Synthesis of melanin

d) All of the above

Correct Answer - C

Ans. is 'c' i.e., Synthesis of melanin *[Ref Harper 29th/e p. 288-290]*

Note- Tyrosine hydroxylase and tyrosinase catalyzes the conversion of tyrosine to Dopa, but both are defferent enzymes. Tyrosine hydroxylase is involved in catecholamines synthesis in adrenal medulla and sympathetic ganglia, whereas tyrosinase is involved in melanin synthesis in melanoblasts of skin.

284. Cofactor for dopamine hydroxylase ?

a) Fe

b) Mg

c) Mn

d) Cu

Correct Answer - D
Dopamine 8-hydroxylase is a 'copper' containing monooxygenase that requires ascorbic acid and molecular oxygen.
It catalyzes the formation of norepinephrine.

285. Rate limiting enzyme in catecholamine synthesis?

a) Dopa decarboxylase

b) N-methyltransferase

c) Dopamine hydroxylase

d) Tyrosine hydroxylase

Correct Answer - D
Ans. is 'd' i.e., Tyrosine hydroxylase

286. Enzyme which acts on aspartate

a) Serum Glutamate Pyruvate Transaminase *(SGPT)*

b) Serum Glutamate Oxaloacetate Transaminase *(SGOT)*

c) Ornithine transcarbmaylase (OTC)

d) Argininosuccinate lyase *(ASL)*

Correct Answer - B

Ans. is 'b' i.e., Serum Glutamate Oxaloacetate Transaminase (SGOT)

- SGPT catalayses the transamination between Alanine and a Ketoglutarate.
- Alanine + a Ketoglutarate Pyruvate + Glutamate
- It is in no way related to aspartate.
- SGOT catalyses the transamination between Aspartate and a Ketoglutarate

287. True about glutamate dehydrogenase is A/E

a) Liver mitochondrial enzyme

b) Use both NAD* or $NADP^+$ coenzyme

c) Inhibited by ADP & activated by GTP

d) Reversible oxidative deamination

Correct Answer - C
C i.e. Inhibited by ADP & activated by GTP
During first few days of fasting, there is *rapid breakdown of muscle protein, providing aminoacids (alanine & glutamine mainly) that are used by liver for gluconeognesisQ.*
In the fasting state, the output of alanine from skeleton muscle is in far excess of its concentration in the muscle proteins that are being catabolized. Because it is also formed by transamination of pyruvate produced by glycolysis of muscle glycogen. Alanine is exported to the liver, where it is transaminated *back to pyruvate, which serves as a substrate for gluconeogenesisQ.*

288. Allosteric stimulator of glutamate dehydrogenase is

a) ATP

b) GTP

c) Palmitoyl CoA

d) Leucine

Correct Answer - D

Ans. is 'd' i.e.,Leucine

- GLDH is allosterically stimulated by ADP, GDP, leucine, valine and isoleucine.
- It is inhibited by ATP, GTP, palmitoyl CoA and Zinc.

289. Which of the following is a biologically important tripeptide?

a) Thyrotropin releasing hormone

b) Thyroid stimulating hormone

c) Gonadotropin releasing hormone

d) Follicle Stimulating hormone

Correct Answer - A

Ans. is 'a' i.e., Thyrotropin releasing hormone

- Tripeptide is a peptide with 3 aminoacids and 2 peptide linkages.
- Biologically important tripeptides include glutathione, TRH (Thyrotropin Releasing Hormone) and melanostatin.
- TSH is a glycoprotein not a peptide. It is made up of two subunits - a and (I a subunit is a polypeptide with about 92 aminoacids. It is a structural analogue of a subunit of FSH. LH and HCG. B subunit is a polypeptide made up of 118 aminoacids.
- GnRH (Gonadotropin releasing Hormone) is a decapeptide with 10 aminocids.
- FSH is a glycoprotein with two subunits - a and p. a subunit is a polypeptide with about 96 aminoacids. It is a structural analogue of a subunit of TSH. LH and HCG. p subunit is a polypeptide made up of 111 aminoacids.

290. Carbamoyl Phosphate synthetase I [CPSI] true is

a) It is present in cytoplasm

b) It is involved in pyrimidine synthesis

c) N- Acetyl Glutamate is an allosteric stimulator of CPSI

d) Glutamine is the amino group donor for CPSI

Correct Answer - C

Ans. is 'c' i.e., N- Acetyl Glutamate is an allosteric stimulator of CPSI

PROPERTY	**CPS - I**	**CPS - II**
Pathway	**Urea cycle**	**Pyrimidine synthesis**
Subcellular location	Mitochondria	Cytoplasm
Amino Group donor	Ammonia	Glutamine
Allosteric regulation	Stimulated by N - Acetyl Glutamate(NAG)	Inhibited **by** the products - pyrimidine nucleotides,Uridine,Cyt & Thymidine

291. Carbamoyl phosphate synthetase I is:

a) Lysosolic enzyme

b) Cytosolic enzyme

c) Mitochondrial enzyme

d) All of the above

Correct Answer - C
Mitochondrial carbamoyl phosphate synthetase I is an enzyme that catalyzes a reaction that produces carbamoyl phosphate.
This enzyme catalyzes the reaction of ATP and bicarbonate to produce carbonyl phosphate and ADP. Carbonyl phosphate reacts with ammonia to give carbamate
Cytosolic carbamoyl phosphate synthetase II uses glutamine rather than ammonia as the nitrogen donor and functions in pyrimidine synthesis.

292. HHH syndrome is due to defect in ?

a) Tryptophan metabolism

b) Histidine transporter

c) Branched chain AA metabolism

d) Ornithine transporter

Correct Answer - D

Ans. is 'd' i.e., Ornithine transporter *[Ref Textbook of clinical paediatrics* p. *496]*

- Hyperornithinaemia, hyperammonaemia, homocitrullinuria (HHH) syndrome is an autosomal recessive disorder of ornithine transport caused by mutations in gene SLC 25A15 encoding the ornithine transorter protein (ORNT1).
- There is defective activity of the ornithine transporter across the mitochondrial membrane, which causes a functional deficiency of two mitochondrial enzymes:
- Ornithine transcarbomylase : Which catalyses the condensation of ornithine and carbamoylphosphate to citrulline.
- Ornithine-8-aminotransferase (OAT) : Which metabolizes the ornithine to .'-pyrroline-5-carboxylate and ultimately glutamate and proline.
- Ornithine accumulates in the cytoplasm and its deficiency in mitochondria causes a secondary urea cycle disorder and hyperammonemia.

Carbamoylphosphate accumulates and undergoes allternate metabolism to form :

. Homocitrulline - Excreted in urine
. Orotic acid
. Plasma

293. All of the following can determine protein structure except

a) Edman's Sequencing

b) X ray crystallography

c) Optical rotatory dispersion

d) Spectrophotometry

Correct Answer - D

Ans. is 'd' i.e., Spectrophotometry

Methods used for studying primary structure :

A) Sanger's sequencing

- Sanger's reagent is (1 fluro 2,4 Dinitrobenzene)

B) Edman's Sequencing

- Edman's reagent is Phenylisothiocyanate

C) Reverse Sequencing

- It has to be supplemented by Mass Spectrometry

Methods used for studying secondary structure:

. Optical Rotatory Dispersion

. Ocular Dichorism

Methods used for studying tertiary structure:

. X-ray Crystallography

. UV spectroscopy

. NMR spectroscopy

294. Edman's reagent is used for

a) DNA sequencing

b) Protein sequencing

c) Protein Denaturation

d) DNA denaturation

Correct Answer - B

Ans. is 'b' i.e., Protein sequencing

- Edman's reagent is Phenyl isothiocyanate.
- Phenyl isothiocyanate is used for sequencing proteins
- Phenyl isothiocyanate binds to a aminogroups. In a protein, only aminoterminal aminoacid's a aminogroup will be free.
- Hence when Phenylisothiocyanate is added to a peptide which is adsorbed on to a glass fibre coated with a polymer, in the presence of 12% trimethylamine, it reacts with the amine group of N terminal aminoacid.
- By acid hydrolysis, the first aminoacid is cleaved from the polypeptide chain and the aminoacid is identified by chromatography.
- The cycle is continued. This way 50 aminoacids can be sequenced.

295. Most abundant aminoacid in brain is

a) Glutamate

b) Aspartate

c) Glutamine

d) Asparagine

Correct Answer - A

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

- Glutamate is the most abundant free alpha aminoacid found in Brain.
- It is an acidic polar aminoacid.
- It is the predominant excitatory neurotransmitter of brain.
- It is synthesised in brain from glutamine and a Ketoglutarate.
- Glutamate is released from presynaptic excitatory neurons in a calcium dependent manner.
- Glutamate acts on both inotropic and metabotropic receptors.
- Inotropic receptors of glutamate include :
- Kainate receptors
- AMPA receptors
- NMDA receptors

296. Cystine has how many molecules of cysteine?

a) 1

b) 2

c) 3

d) 4

Correct Answer - B

Ans. is 'b' i.e., 2

- Cysteine is a sulphur containing aminoacid
- It is a polar but uncharged aminoacid
- Cysteine with a sulfhydryl group can get oxidised and forms a dimer (2) called as cystine.
- Cysteine acquires its polar nature only by virtue of its sulfhydryl group.

297. Vitamin given in homocysteinuria are all except

a) Vitamin B6

b) Vitamin B12

c) Folate

d) Thiamine

Correct Answer - D

Ans. is 'd' i.e., Thiamine

- Major fate of homocysteine is that it gets converted into cysteine in the presence of cystathionine l synthase. Cystathionine p synthase is dependent on pyridoxal phosphate.
- Hence defect of cystathionine p synthase can result in homocysteinuria. This is called as classical homocysteinuria. This condition responds to *B6 administration,* as the enzyme cystathione p synthase is dependent on B6.
- Minor fate of homocysteine is that it gets converted into methionine in the presence of methionine synthase. Methionine synthase is dependent on *methyl cobalamine (coenzyme form of Vitamin B12).* Methyl group donor for methylcobalamine is *methyl THFA.*
- Homocysteinuria is also caused by defect of methionine synthase. As this enzyme is dependent on Vitamin B12 and THFA, homocysteinuria responds to B12 and THFA administration

298. Glutathione is used to detoxify which free radical?

a) Hydrogen peroxide

b) Superoxide

c) Peroxyl radical

d) Singlet Oxygen

Correct Answer - A

Ans. is 'a' i.e., Hydrogen peroxide

- Glutathione is a tripeptide.
- It is gamma glutamyl cysteinyl glycine
- It is denoted as GSH - because it has cysteine with a sulphydryl group
- It is used to detoxify hydrogen peroxide and lipid peroxides in the presence of glutathione peroxidase.
- Glutathione can also detoxify peroxyl radical. Peroxyl radical can not get reduced by enzymatic reactions. They get detoxified by antioxidants like vitamin E and Glutathione
- Singlet oxygen gets detoxified principally by polyphenol antioxidants
- Superoxide radicals are detoxified by Superoxide dismutase (SOD) using Zinc as electron acceptor or donor (Some classes of SODs use iron or Nickel as electron acceptor or donor)

299. Match enzyme with the disease caused due to its deficiency -

Enzyme	Disease
Fumarylacetoacetate	A. Tyrosinemia Type II
Tyrosine transaminase	hydroxylase
Tyrosinase	B. Homogentisate Oxidase
Alkaptonuria	C. Tyrosinemia Type I
	D- Albinism

a) I→ D, 2 → C, 3 → A, 4→ B

b) I → A,2 → C,3 →D, 4 → B

c) 1 → C,2→ D,3 → A,4 → B

d) I→ C, 2→ A, 3→ D, 4→ B

Correct Answer - D

Ans. is 'd' i.e., 1 -[p] C, 2 → A, 3 → D, 4 → B *[Ref Harper 29th/e* p. *289]*

300. Which of the following has two amino groups-

a) Glycine

b) Arginine

c) Lysine

d) Asparagine

Correct Answer - B

- Histidine has two imino groups.
- Lysine has one amino group.
- Arginine has two amino groups