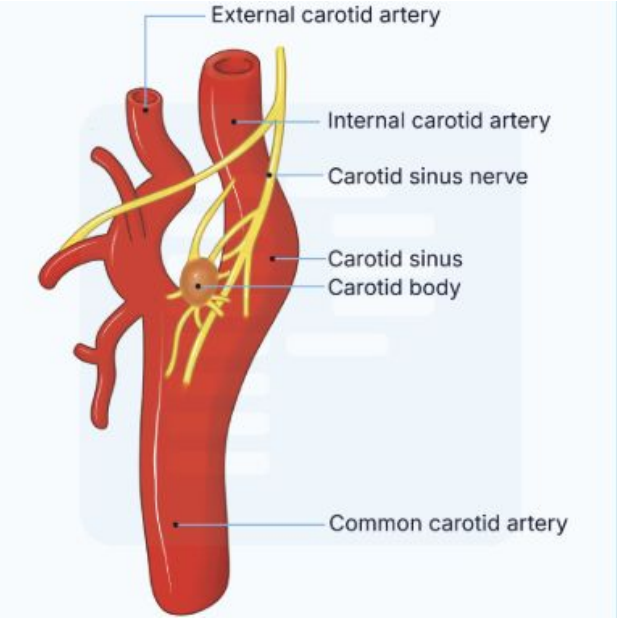
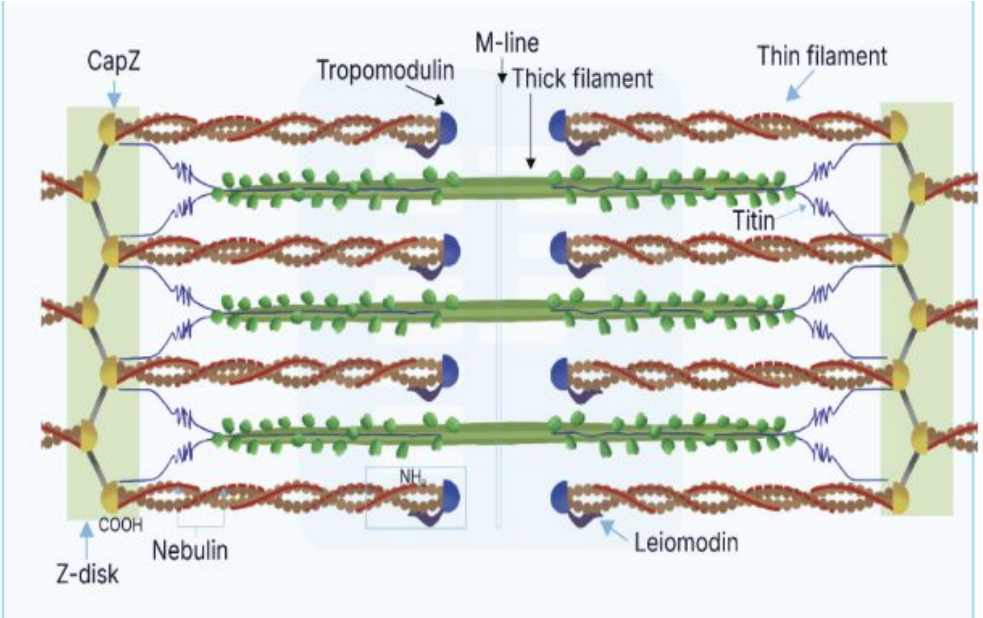
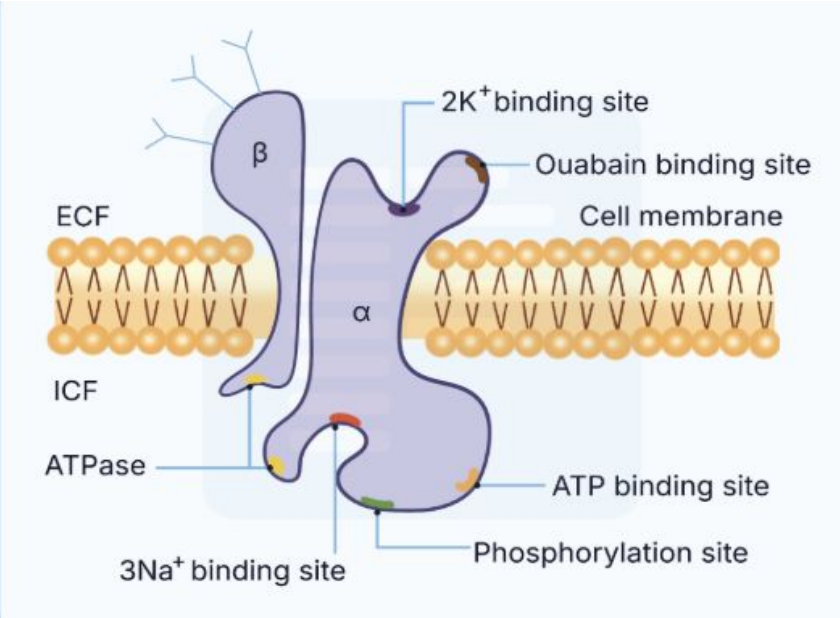
PHYSIOLOGY


External carotid artery
Internal carotid artery
Carotid sinus nerve
Carotid sinus
Carotid body
Common carotid artery


CapZ
Tropomodulin
M-line
Thick filament
Thin filament
Titin
COOH
Nebulin
Z-disk
Leiomodin


β
α
2K+ binding site
Ouabain binding site
ECF
Cell membrane
ICF
ATPase
ATP binding site
Phosphorylation site
3Na+ binding site

Q1. Which hormone will decrease with aging in a female?

a. LH
b. FSH
c. Testosterone
d. Epinephrine

Hormones that **decrease** with age	Hormones that **increase** with age

Aromatase enzyme causes

1. Testosterone —----------

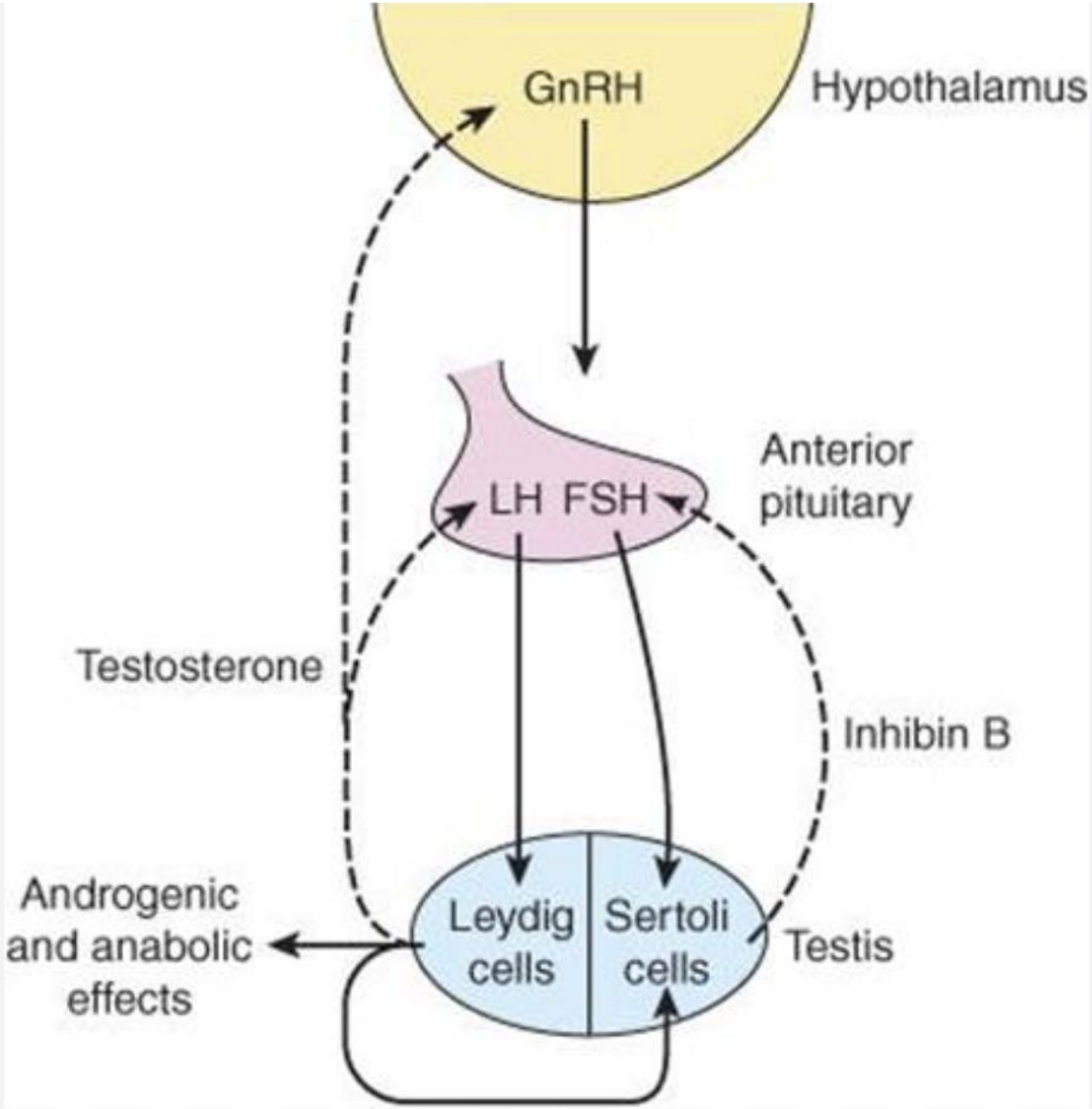
2. Androstenedione—----------

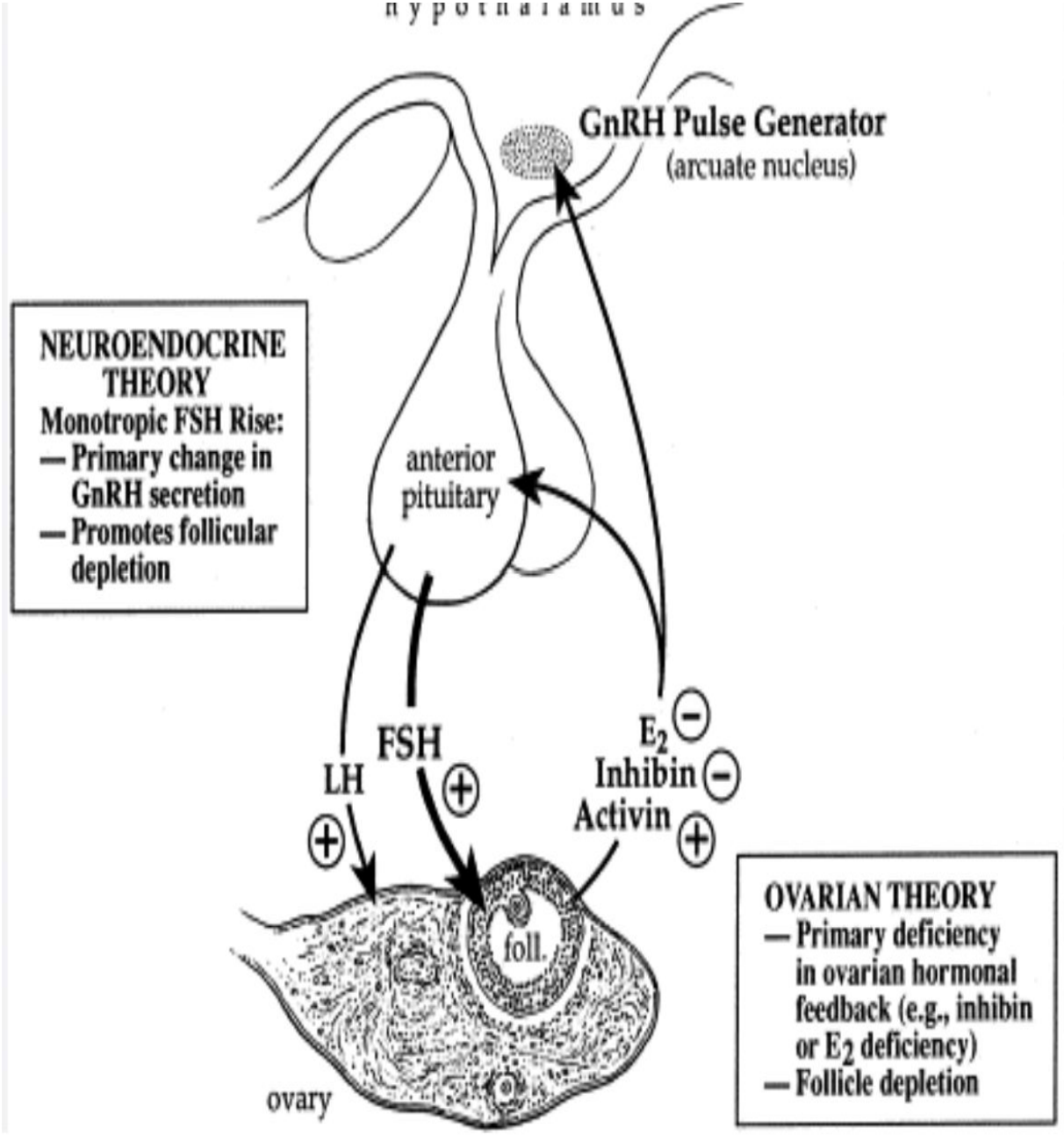
-Normal testosterone levels in women

- Site of testosterone production in women

Increased testosterone in females seen in-

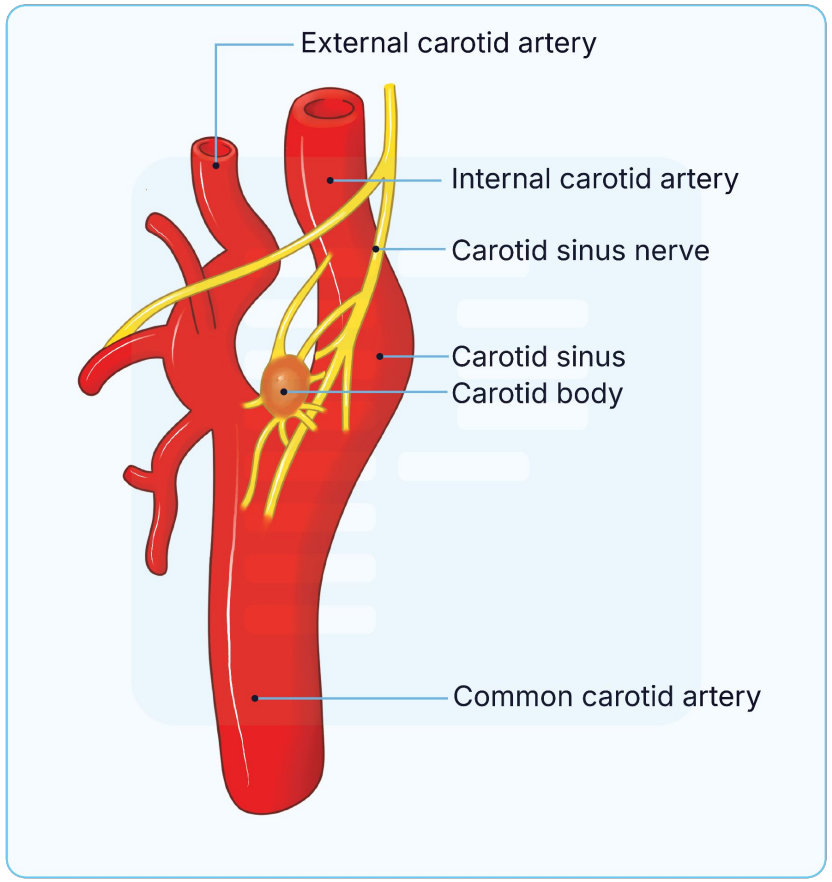
PCOS, ovarian tumors , Adrenal adenoma and Congenital adrenal hyperplasia


GnRH
Hypothalamus
LH FSH
Anterior pituitary
Testosterone
Inhibin B
Androgenic and anabolic effects
Leydig cells
Sertoli cells
Testis

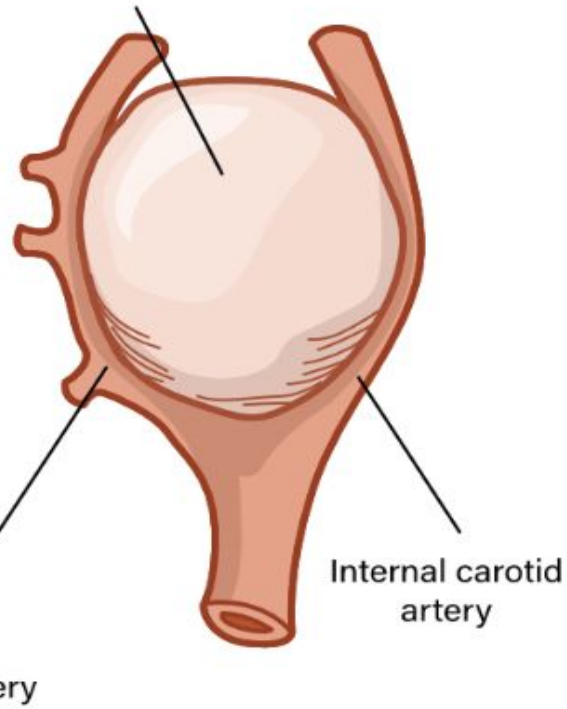

GnRH Pulse Generator
(arcuate nucleus)
NEUROENDOCRINE THEORY
Monotropic FSH Rise:
— Primary change in GnRH secretion
— Promotes follicular depletion
anterior pituitary
LH
FSH
E_2
Inhibin
Activin
foll.
ovary
OVARIAN THEORY
— Primary deficiency in ovarian hormonal feedback (e.g., inhibin or E_2 deficiency)
— Follicle depletion

Q2. Which is not correct about the carotid body?

a. Peripheral chemoreceptor
b. Innervated by Vagus nerve
c. Lined by Glomus cells
d. Not stimulated in Carbon monoxide poisoning



Carotid body tumour
(carotid body paraganglioma)

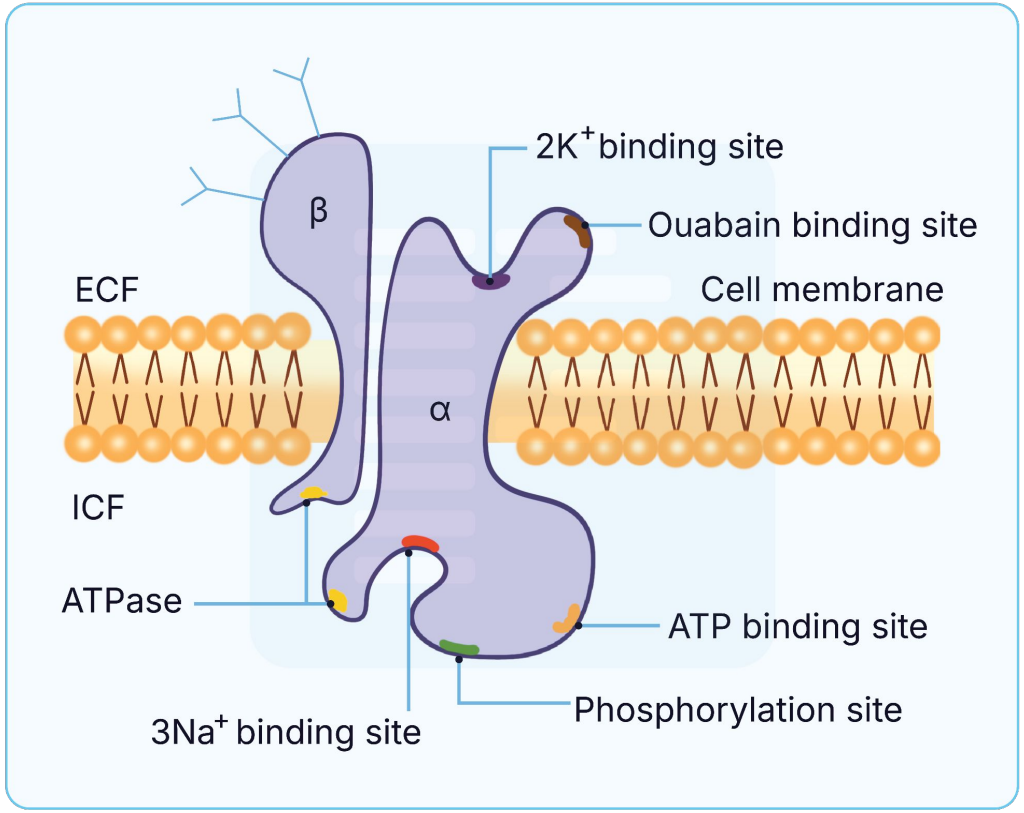


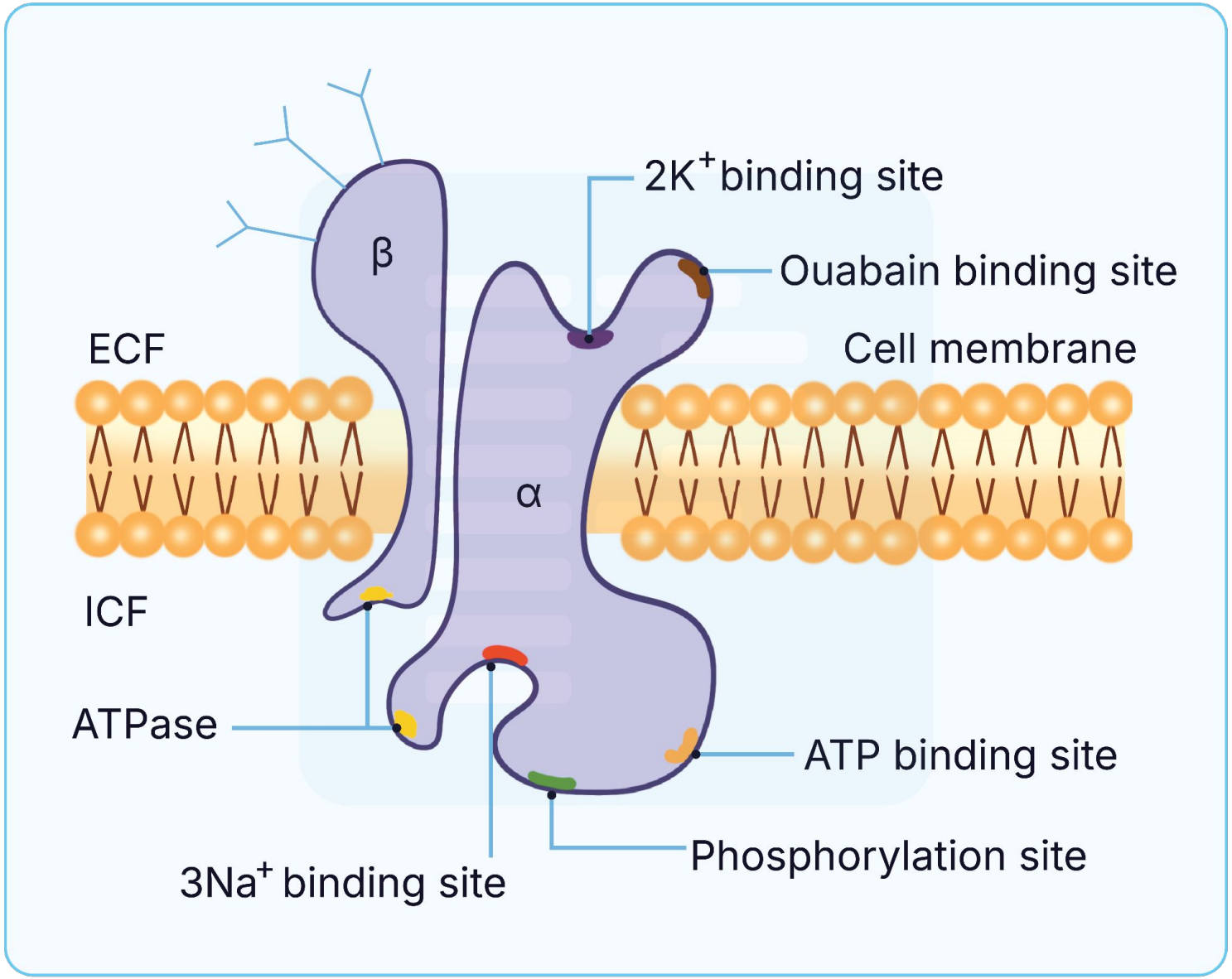
Q3. Which of the following is correct about Na-K ATPase pump?

a. Alpha subunit has 5 binding sites and beta subunit has 3 extracellular glycosylation sites
b. Alpha subunit has 2 binding sites and beta subunit has 3 binding sites
c. Alpha subunit has 3 binding sites and alpha subunit has 2 binding sites
d. Alpha subunit has 3 extra cellular glycosylation sites and beta subunit has 5 binding sites

Alpha subunit (catalytic unit has 5 binding sites: 3 Na^+ sites (intracellular side) and 2 K^+ sites (extracellular side). It also binds ATP and cardiac glycosides (e.g., digoxin).

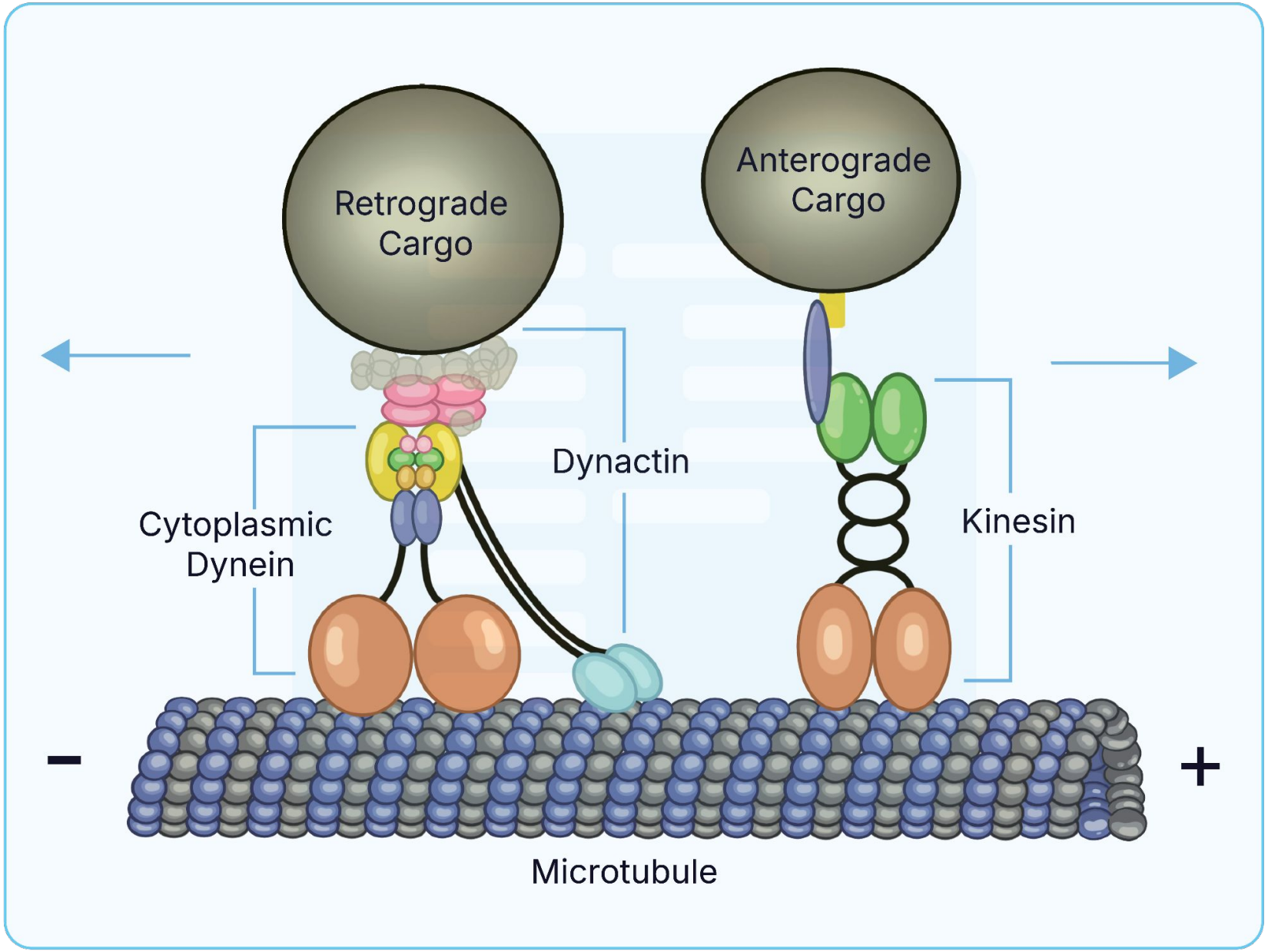
Beta subunit (glycoprotein unit) has 3 extracellular glycosylation sites. It is Important for structural stability and membrane localization, but not catalysis.




β
2K+ binding site
Ouabain binding site
ECF
Cell membrane
α
ICF
ATPase
ATP binding site
Phosphorylation site
3Na+ binding site

Q4. A child from slums went for open air defecation and was attacked by a pack of stray dogs. He subsequently developed rabies. The rabies will attack the nervous system using _____ in the axonal transport system?

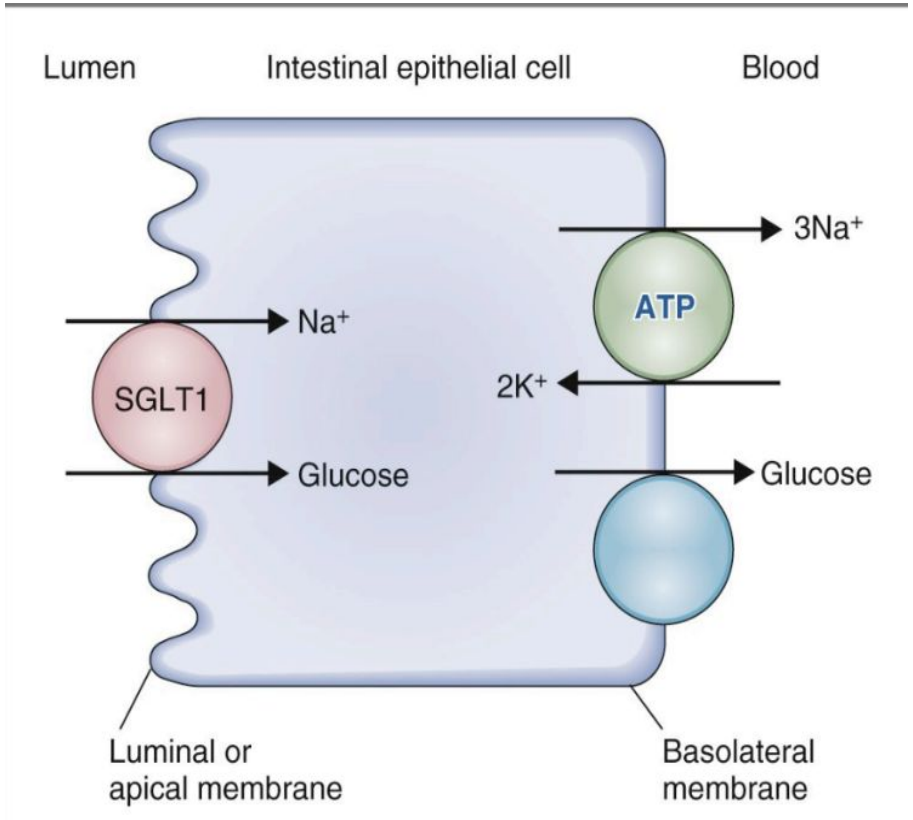
a. Kinesin
b. Dynein
c. Actin
d. Myosin

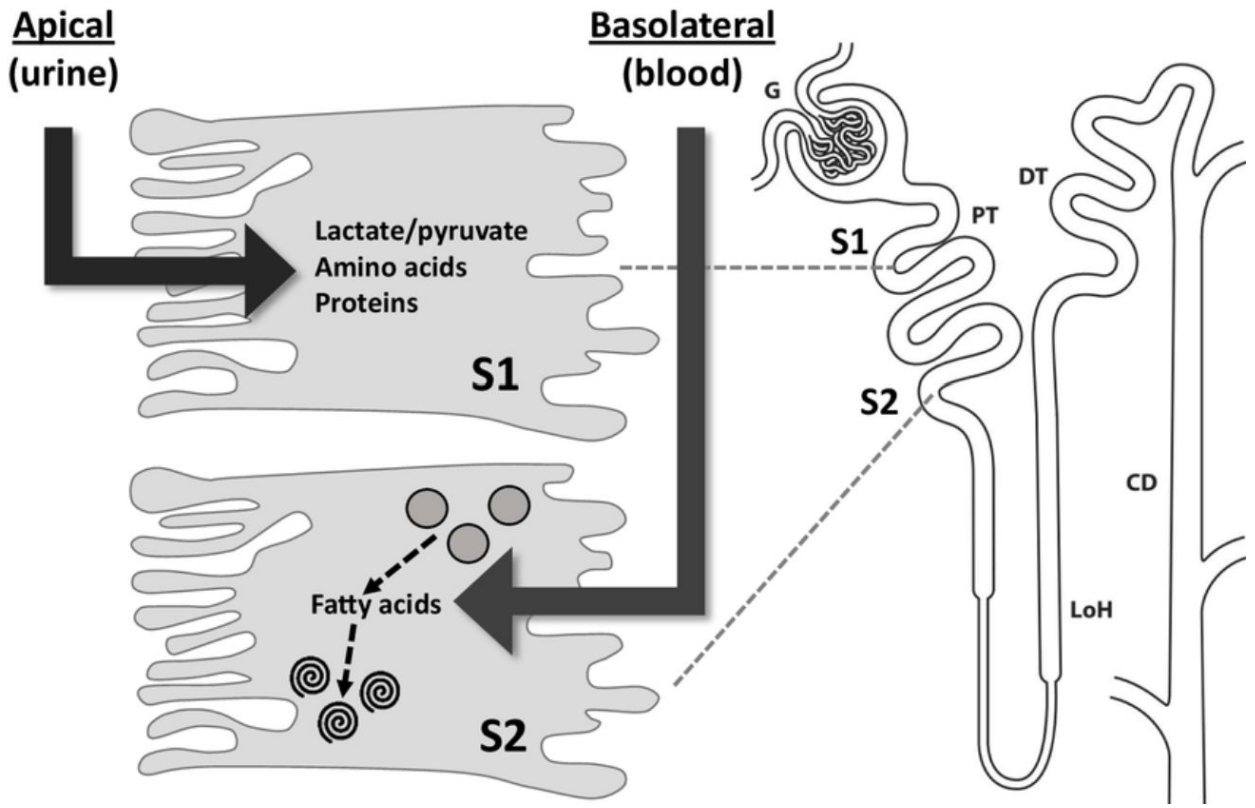

Retrograde Cargo
Anterograde Cargo
Dynactin
Cytoplasmic Dynein
Kinesin
−
+
Microtubule

Q5. Which of the following will inhibit SGLT1?

a. Empagliflozin
b. Phlorizin
c. Dapagliflozin
d. Moxifloxacin

Phlorizin is a non-selective SGLT inhibitor (inhibits both SGLT1 and SGLT2).



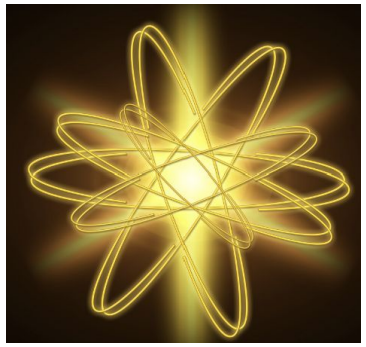


Q6. Which of the following is the excitatory cell of cerebellum?

a. Purkinje cells
b. Stellate cells
c. Golgi cells
d. Granule cells

Q7. Which of the following is an example of secondary active transport?

a. H-K-ATP ase
b. Na-K pump
c. Ca ATP ase
d. Na- Ca exchanger

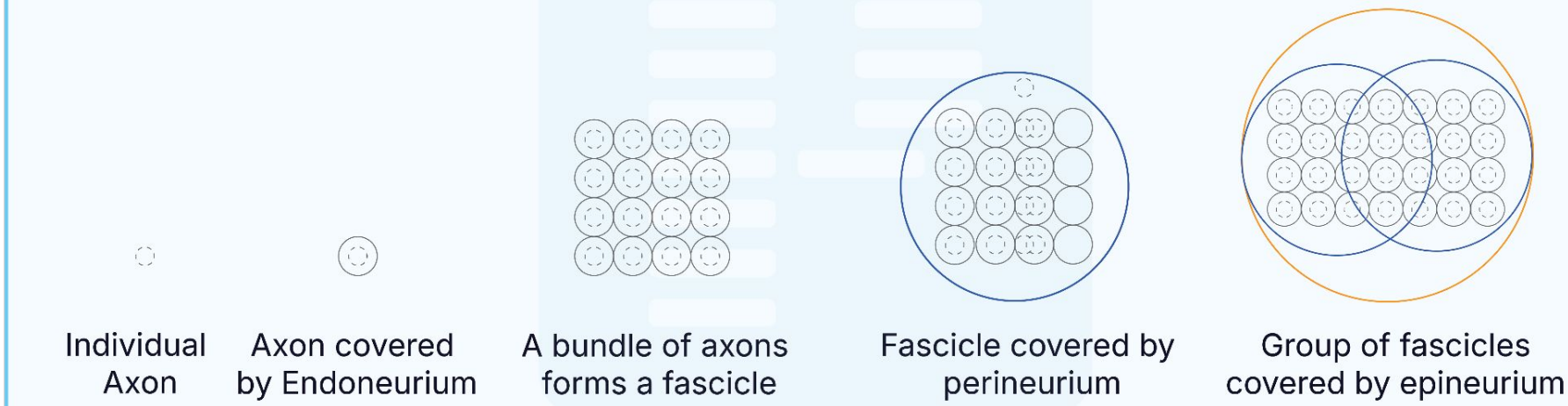
Type	Definition	Direction of transport	Energy source	Examples
Primary Active Transport 	Directly uses **ATP hydrolysis** to pump ions/ molecules against gradient	Solute moves against gradient	ATP (Direct) 	• Na^+-K^+ ATPase ($3Na^+$ out, $2K^+$ in) • Ca^{2+} ATPase (SERCA in SR) • H^+-K^+ ATPase (Parietal cells, renal tubules)
Secondary Active transport 	Uses ion gradient created by primary pumps to move other solutes	One solute moves down gradient, another moves against	Ion gradient (usually Na^+ or H^+) maintained by ATP pumps	Cotransport (Symport): • Na^+-Glucose cotransporter (SGLT1,SGLT2) • Na^+-Amino acid cotransporters • Exchange (antiport): • Na^+-Ca^{2+} exchanger (NCX) • Cl^- - HCO_3^- exchanger (AE1 in RBCs)

Q8. A 30-year-old man falls asleep after heavy alcohol intake with his arm draped over a chair. The next morning, he develops weakness of wrist extension with wrist drop. Examination reveals intact triceps strength but weakness of extensors of the wrist and fingers. Nerve conduction studies show a transient conduction block at the spiral groove of the humerus. Which of the following best describes the structural status of the nerve in this condition?

a. Both axon and endoneurium are disrupted
b. Axon is disrupted but endoneurium is intact
c. Axon and endoneurium are intact
d. Complete disruption of nerve including endoneurium and perineurium

Nerve Injury Comparison			
Feature	**Neuropraxia**	**Axonotmesis**	**Neurotmesis**
Pathology	Conduction block only (myelin injury)	Axon disrupted, endoneurium intact	Complete disruption of axon + supporting structures
Continuity of Axon	Intact/ normal		
Endoneurium / perineurium / epineurium	Preserved	Preserved (endoneurium), higher layers intact	
Wallerian Degeneration	No	Yes	Yes
Recovery	Complete, spontaneous (days-weeks)	Possible, by axonal regeneration (mm/day)	Poor needs surgery
Examples	Saturday night palsy/ pressure palsy	Crush injury Tight plaster cast Fracture compression, Road traffic accident	Laceration, penetrating trauma

Anatomy of the Peripheral Nerve



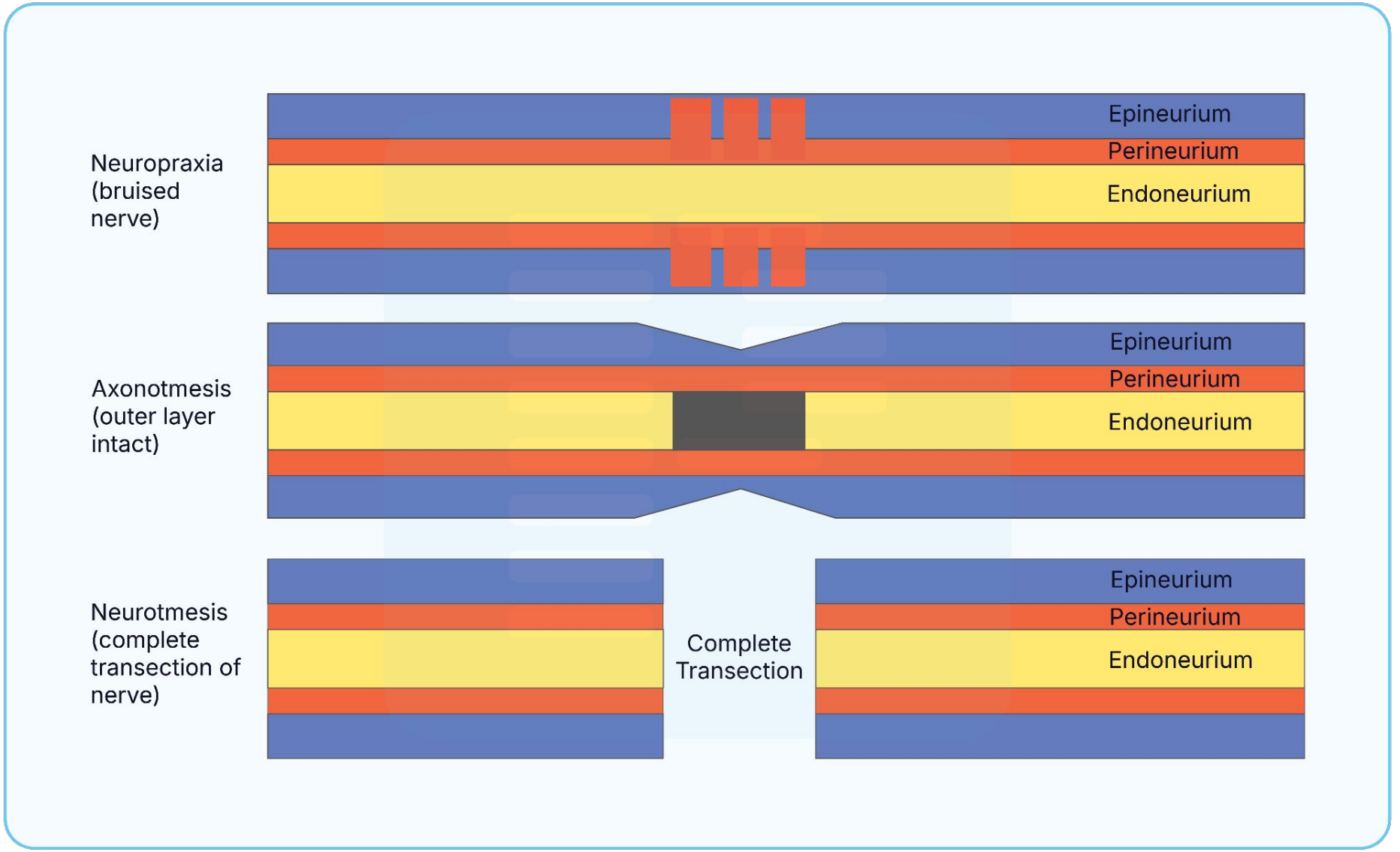
Individual Axon

Axon covered by Endoneurium

A bundle of axons forms a fascicle

Fascicle covered by perineurium

Group of fascicles covered by epineurium


Neuropraxia (bruised nerve)
Epineurium
Perineurium
Endoneurium
Axonotmesis (outer layer intact)
Epineurium
Perineurium
Endoneurium
Neurotmesis (complete transection of nerve)
Complete Transection
Epineurium
Perineurium
Endoneurium

Q9. All of the following increase the activity of Na-K pump except?

a. Thyroxine
b. Aldosterone
c. Insulin
d. Oligomycin

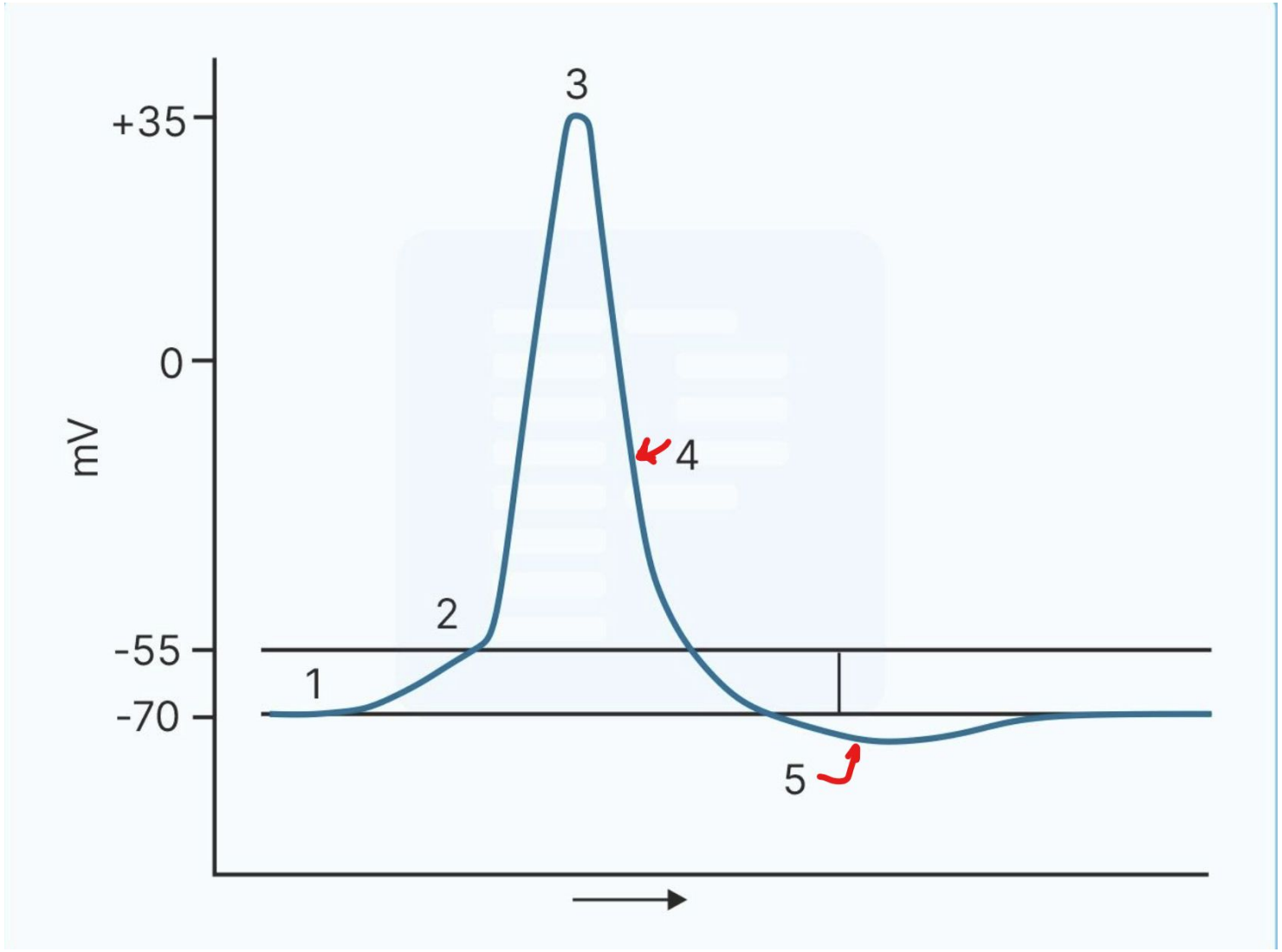
Q10. Which of the following markings is correct about the absolute refractory period of a nerve?

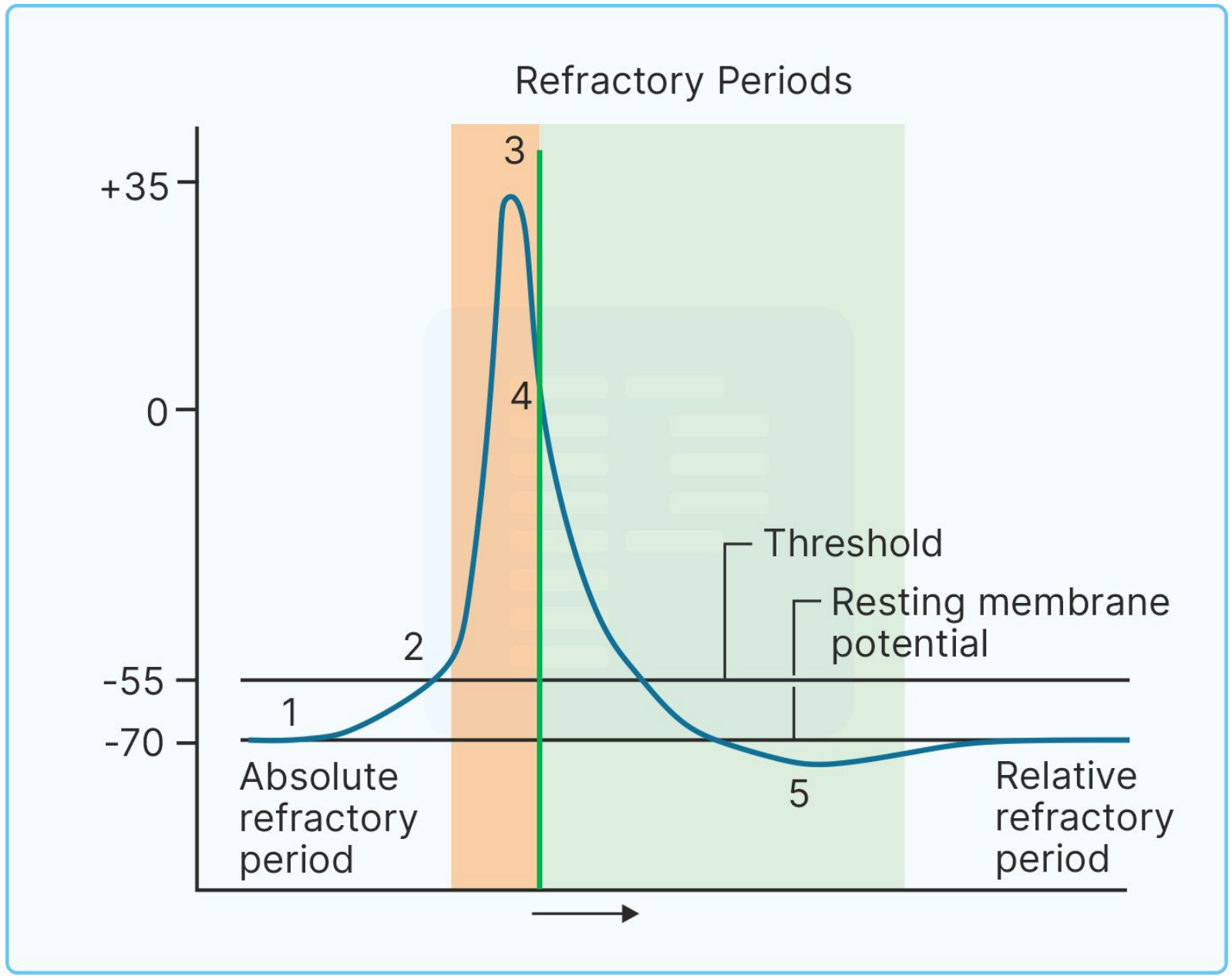
a. 1 to 2

b. 1 to 4

c. 2 to 5

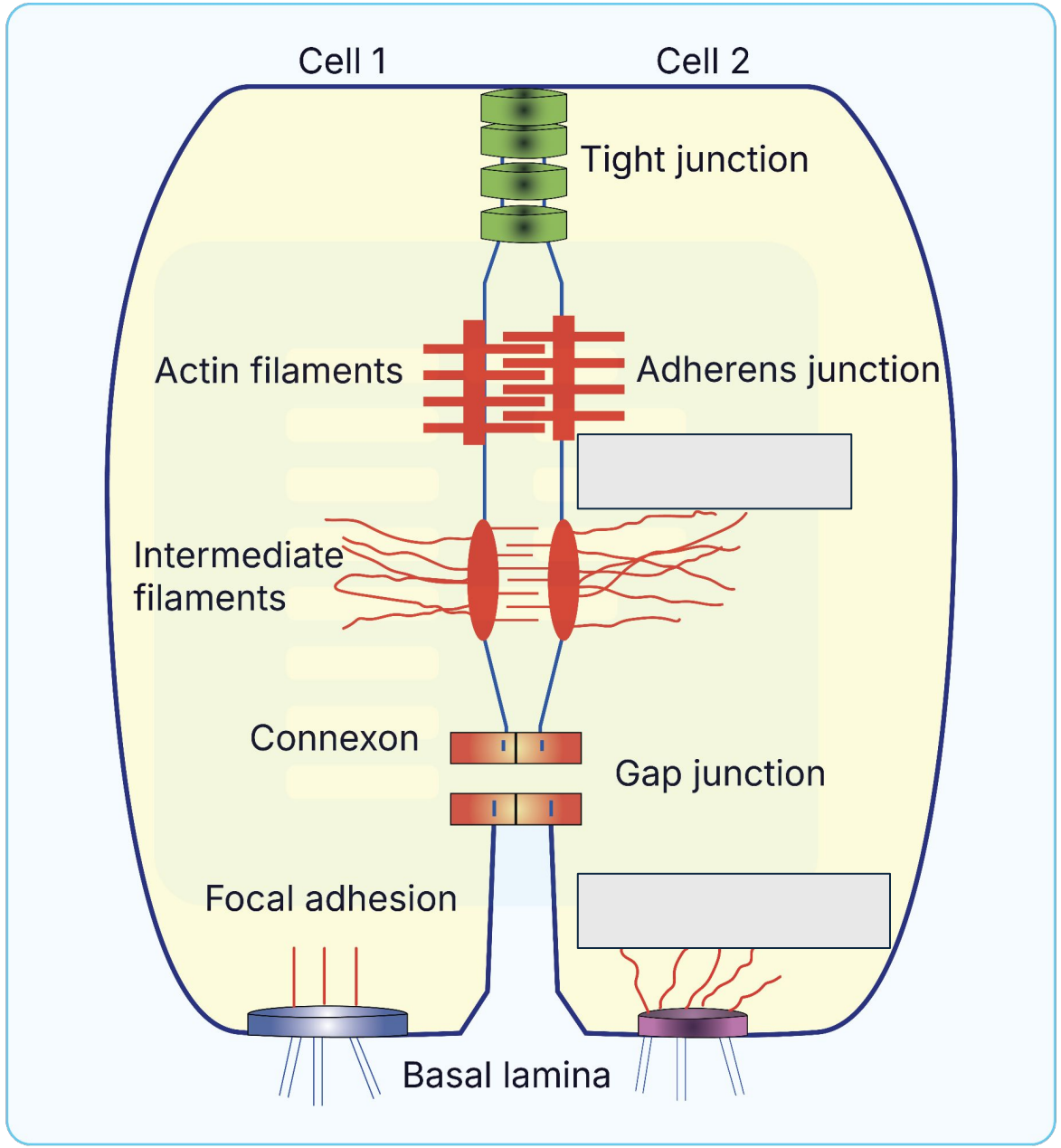
d. 2 to 4




Refractory Periods
+35
0
-55
-70
1
2
3
4
5
Threshold
Resting membrane potential
Absolute refractory period
Relative refractory period

Q11. Cell to basal lamina junction is by which of the following?

a. Desmosomes
b. Hemidesmosomes
c. Tight junctions
d. Gap junctions


Cell 1
Cell 2
Tight junction
Actin filaments
Adherens junction
Intermediate filaments
Connexon
Gap junction
Focal adhesion
Basal lamina

Q12. A 24-year-old male presents with rapidly progressive flaccid paralysis, areflexia, and impaired vibration and position sense. LP report shows cyto-albuminological dissociation. He is diagnosed with acute Inflammatory demyelinating polyradiculoneuropathy. Which of the following nerve fiber types are predominantly affected in this condition?

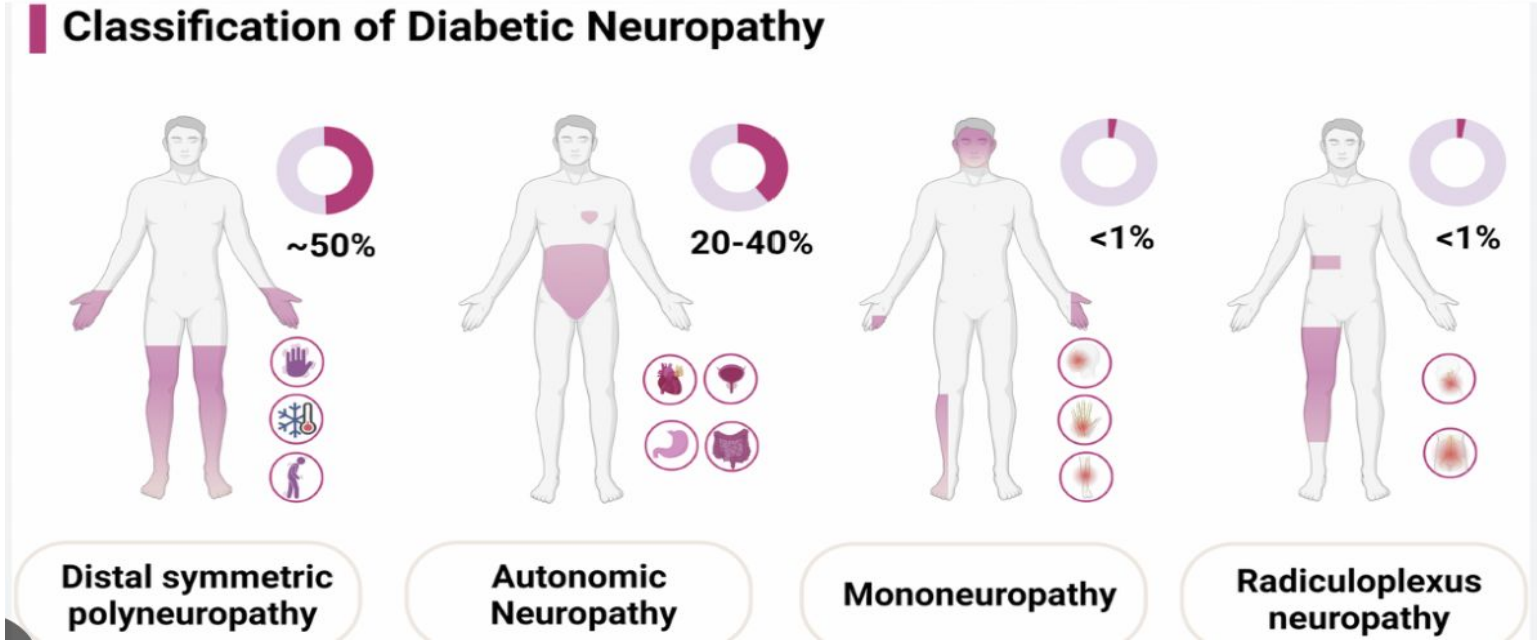
a. Aα and Aβ fiber
b. Aδ and B fibers
c. Aδ and C fibers
d. B and C fibers

- Aα fibers (large myelinated motor): responsible for paralysis and areflexia.
- Aβ fibers (large myelinated sensory): carry vibration and proprioception → sensory ataxia.
- Aδ fibers (small myelinated): pain, temperature → not the main fibers in AIDP.
- C fibers (unmyelinated): autonomic, slow pain → involvement is secondary, not primary.
- B fibers: preganglionic autonomic → usually spared.

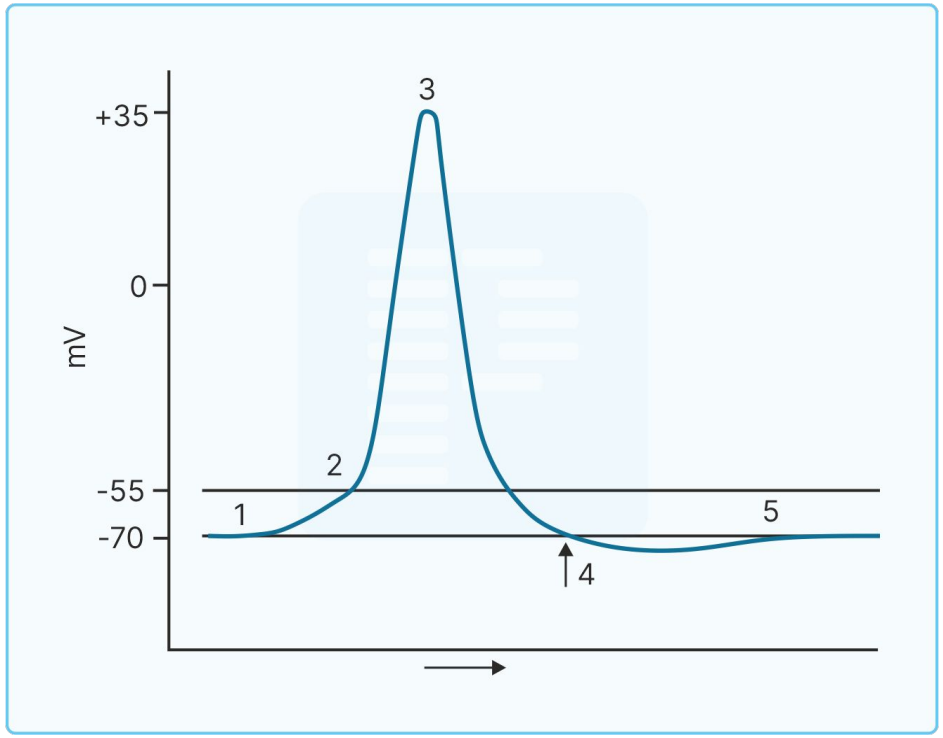
Fiber category	Size (microns)	Speed (meters/second)	Function
Aα Group IA and IB afferents	15	60-100	Large motor axons Muscle stretch and tension sensory axons
Aβ Group II afferents	12-14	30-60	Touch, pressure, vibration and joint position sensory axons
Aγ	8-10	15-30	Gamma efferent motor axons
Aδ Group III afferents	6-8	10-15	Sharp pain, very light touch & temperature sensation
B	2-5	3-10	Sympathetic preganglionic motor axons
C Group IV afferents	<1	<1.5	Dull, aching, burning pain and temperature sensation

Q13. A 55-year-old man with a 10-year history of type 2 diabetes mellitus presents with burning sensation in both feet and occasional dizziness on standing. On examination he has features of autonomic dysfunction like postural hypotension and lack of sweating in feet. Which of the following nerve fibers are predominantly affected in this patient's condition?

a. Aα and Aβ fibers
b. Aδ and C fibers
c. B fibers and Aγ fibers
d. Aα and Aδ fibers



Q14. Which of the following markings is correct about the Hodgkin cycle seen during nerve AP?



a. 1 to 2

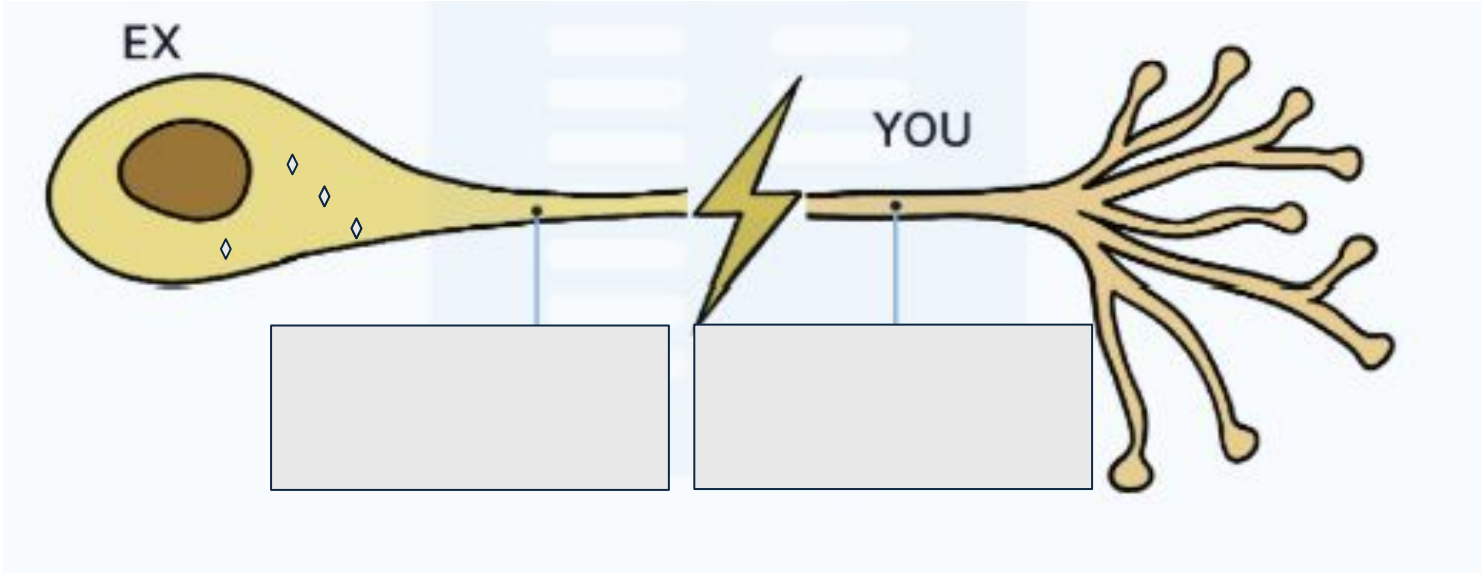
b. 1 to 4

c. 2 to 3

d. 2 to 4

Q15. A 22-year-old man sustains a clean-cut injury to the ulnar nerve at the wrist. After the injury, the part of the axon separated from the cell body undergoes fragmentation of axons and myelin within a few days, accompanied by infiltration of macrophages and proliferation of Schwann cells. Which of the following best describes this process?

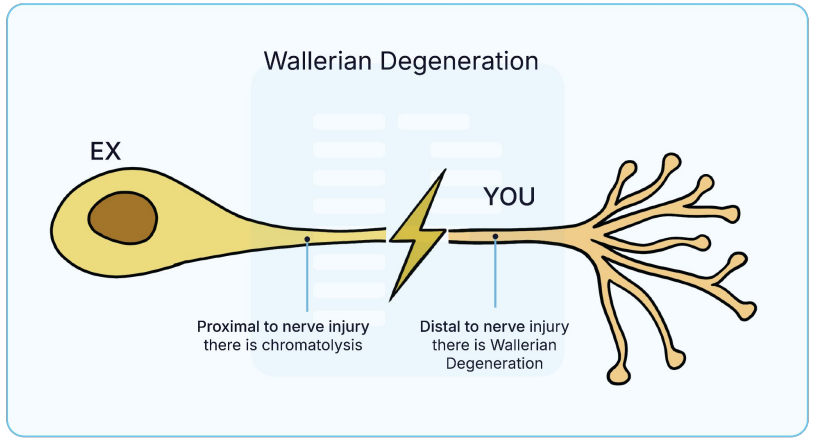
a. Retrograde degeneration
b. Chromatolysis
c. Anterograde degeneration
d. Nissl body degeneration



BREAK UP STORY

1. You create a **wall** from the Ex
2. **The distal part** ie YOU moves forward anterograde
3. This move on is called Wallerian degeneration

WAD= Wallerian anterograde degeneration



4. What happens to EX ie the Proximal part due to lack of attention will suffer chromatolysis

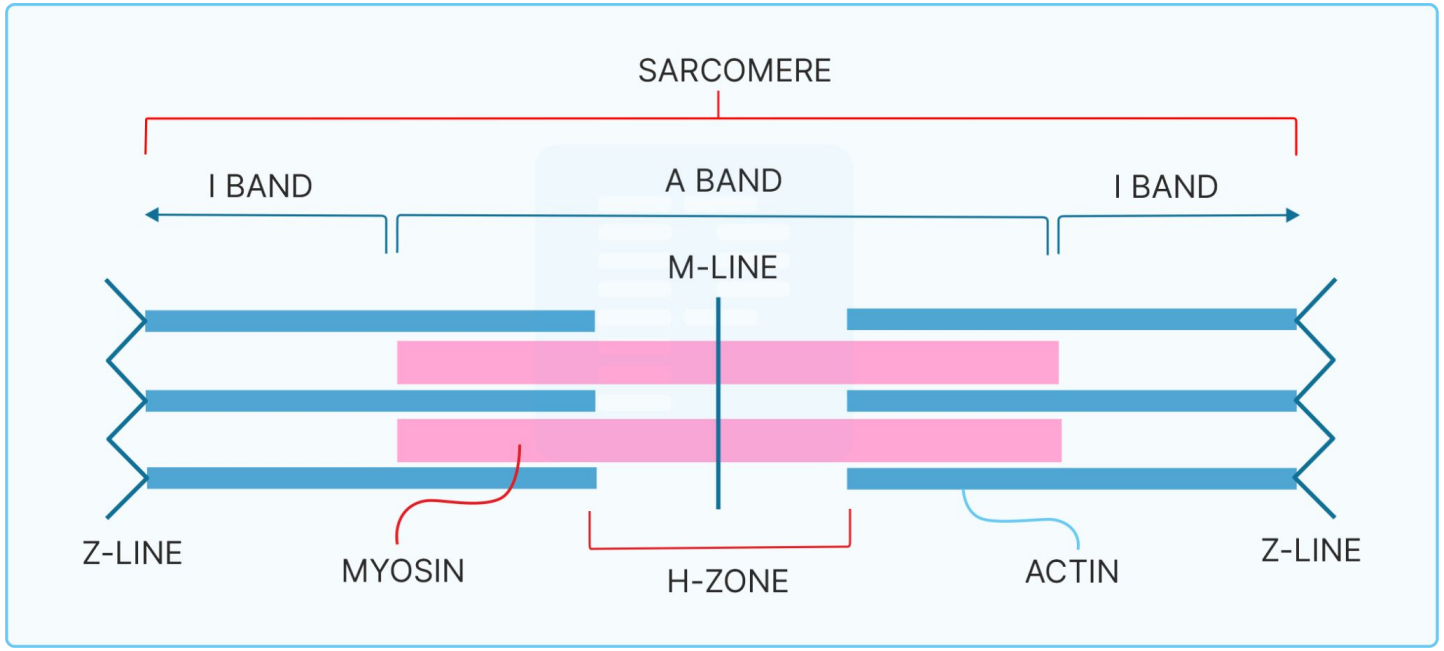
Q16. A 10-year-old child is having Gower sign and Pseudohypertrophy of calf muscles. He is diagnosed as having a deficiency of dystrophin protein in skeletal muscles. Which of the following best describes dystrophin?

a. Structural proteins
b. Regulatory protein
c. Contractile protein
d. Relaxation protein

Troponin I	
Troponin T	
Troponin C	binds to calcium and causes conformational change by moving tropomyosin away and exposing active sites on actin for cross bridge formation

Q17. Which of the following is not correct about sarcomere contraction?

a. Z lines comes closer
b. Length I band decreases
c. A band increases
d. H zone decreases

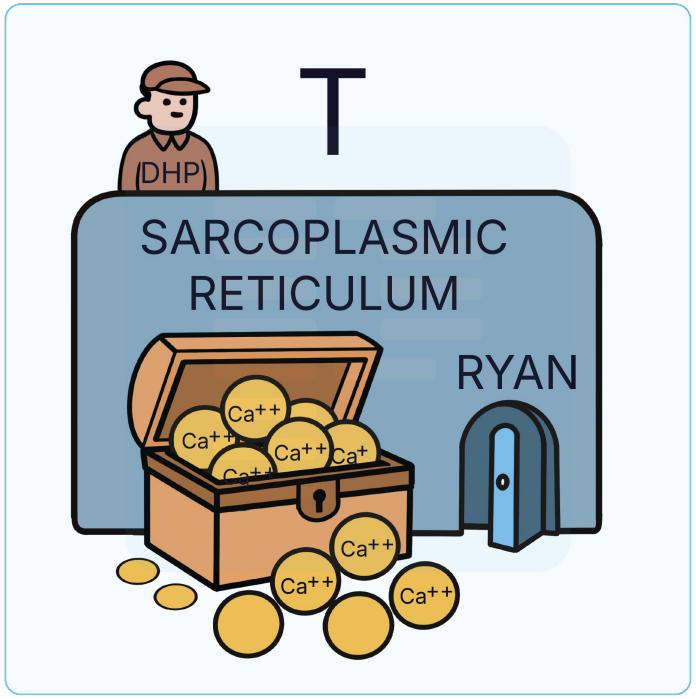


Band/ Line	Memory Hack
Z line	Zips in
I band	I = it shrinks
H zone	H= Hides away
A band	A = Always same

Q18. What is correct about T tubules that play a role in excitation-contraction coupling?

a. Present in sarcoplasmic reticulum
b. Present in sarcolemma
c. Regulate functioning of SERCA
d. Regulate functioning of Ryanodine receptor

- T tubules are present in sarcolemma of skeletal muscle. They have Dihydropyridine receptors on which drugs like amlodipine act
- They connect with L tubules in the sarcoplasmic reticulum, which is a smooth endoplasmic reticulum of skeletal muscles. These L tubules have ryanodine receptors



Q19. A 25-year-old man develops generalized muscle rigidity, hyperthermia, tachycardia, and metabolic acidosis shortly after administration of halothane and succinylcholine during surgery. Malignant hyperthermia is suspected. Which of the following gene–chromosome combinations is most commonly implicated in this condition?

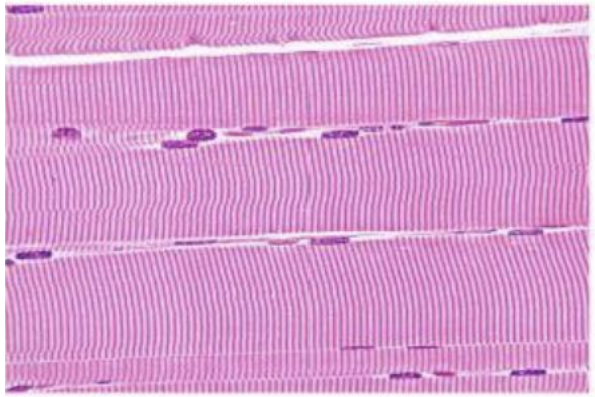
a. RYR1 gene on chromosome 19
b. CACNA1S gene on chromosome 1
c. DMD gene on chromosome Xp21
d. CFTR gene on chromosome 7

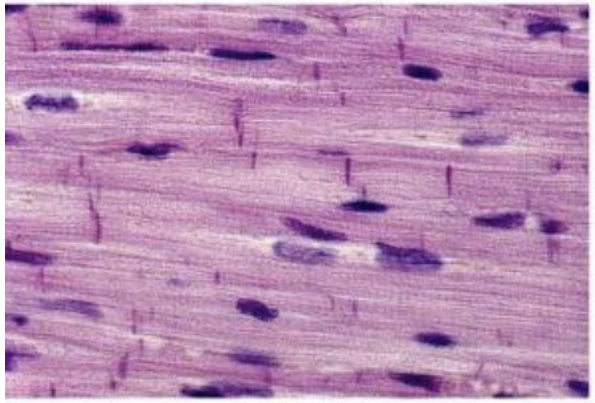
Q20. Which of the following is correct about sarco-endoplasmic reticulum Ca- ATP-ase?

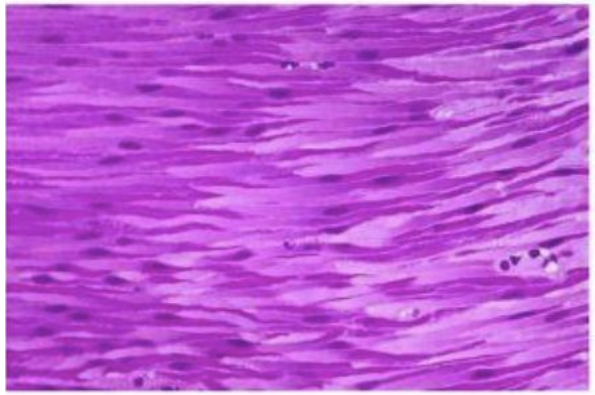
a. Skeletal muscle contraction
b. Skeletal muscle relaxation
c. Smooth muscle contraction
d. Smooth muscle Tetanization

Q21. Which is not correct about cardiac muscle?

a. Intercalated disc
b. Dense bodies
c. High myoglobin content
d. Alpha MHC isoform predominates in atria and beta MHC isoform predominates in ventricles

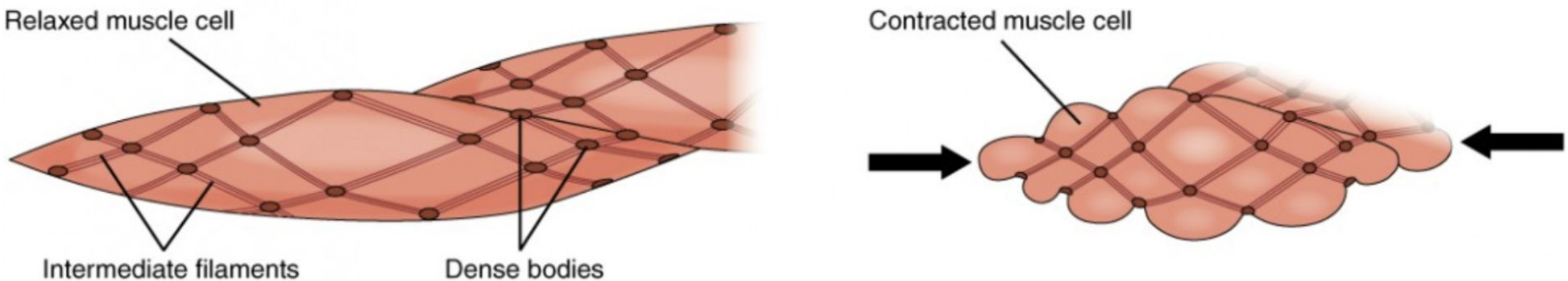






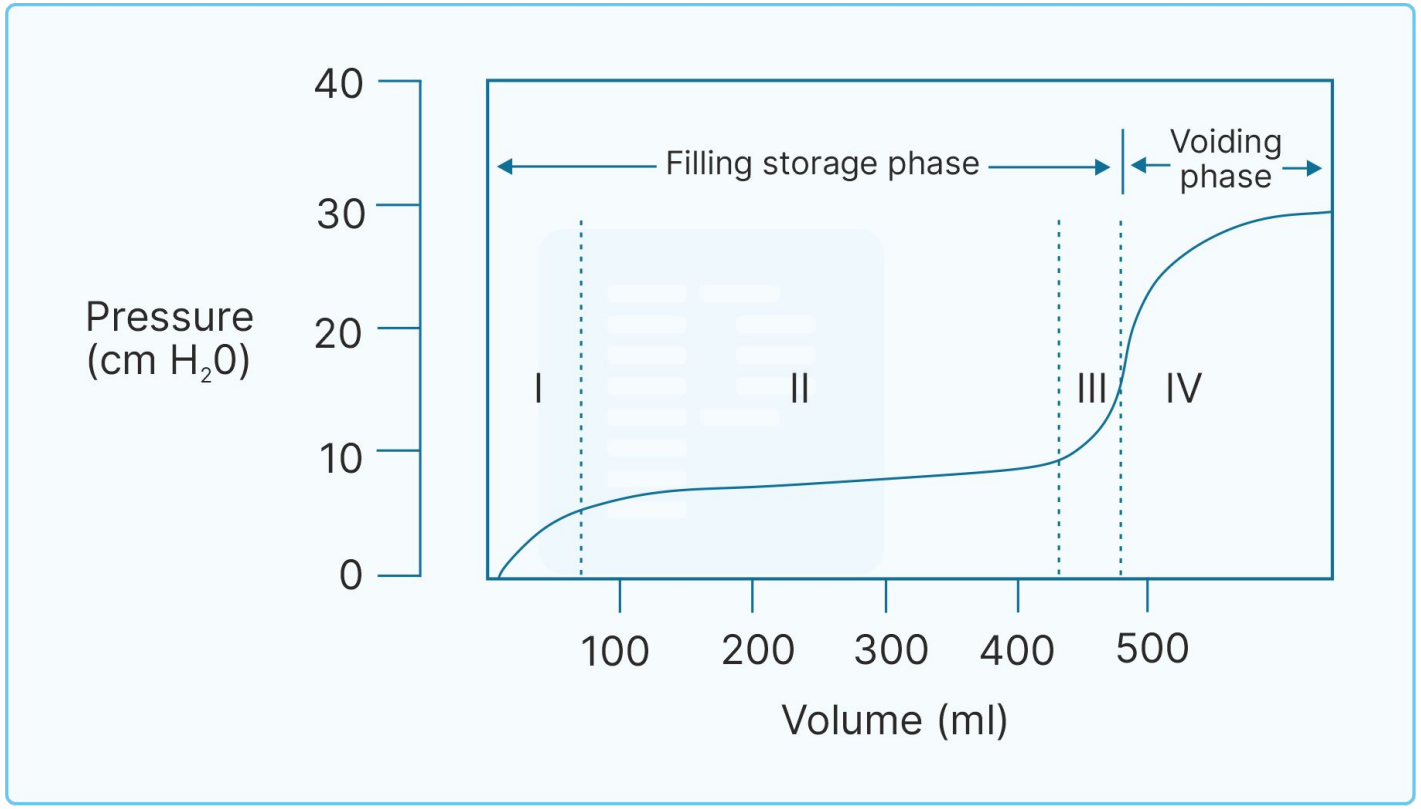
Because smooth muscle cells do not contain troponin, cross-bridge formation is not regulated by the troponin-tropomyosin complex but instead by the regulatory protein **calmodulin**. In a smooth muscle fiber, external Ca^{++} ions passing through opened calcium channels in the sarcolemma, and additional Ca^{++} released from SR, bind to calmodulin. The Ca^{++}-calmodulin complex then activates an enzyme called myosin (light chain) kinase, which, in turn, activates the myosin heads by phosphorylating them (converting ATP to ADP and P_i, with the P_i attaching to the head). The heads can then attach to actin-binding sites and pull on the thin filaments. The thin filaments also are anchored to the dense bodies; the structures invested in the inner membrane of the sarcolemma (at adherens junctions) that also have cord-like intermediate filaments attached to them.

When the thin filaments slide past the thick filaments, they pull on the dense bodies, structures tethered to the sarcolemma, which then pull on the intermediate filaments networks throughout the sarcoplasm. This arrangement causes the entire muscle fiber to contract in a manner whereby the ends are pulled toward the center, causing the midsection to bulge in a corkscrew motion (Figure 2).



Q22. Shown below is a cystometrogram that shows which of the following?

a. Latch bridge mechanism
b. Elasticity
c. Plasticity
d. Tetanic potentiation



- As the bladder fills (Phase I → II → III), volume increases but pressure rises very little. This is possible because detrusor smooth muscle adapts to stretch (reorganizing cross-bridges), allowing it to maintain low pressure despite increased volume. Only when capacity is near-max (≈ 400–500 mL), pressure suddenly rises (Phase IV = voiding reflex).

Q23. The active site of Actin is covered by?

a. Troponin T
b. Tropomyosin
c. Troponin I
d. Troponin C

- The active site on actin where myosin would bind is covered by tropomyosin.
- Troponin complex regulates this:
  - Troponin T attaches the complex to tropomyosin.
  - Troponin I inhibits actin–myosin interaction.
  - Troponin C binds Ca^{2+}, causing a conformational change that moves tropomyosin away, exposing actin active sites for cross-bridge formation

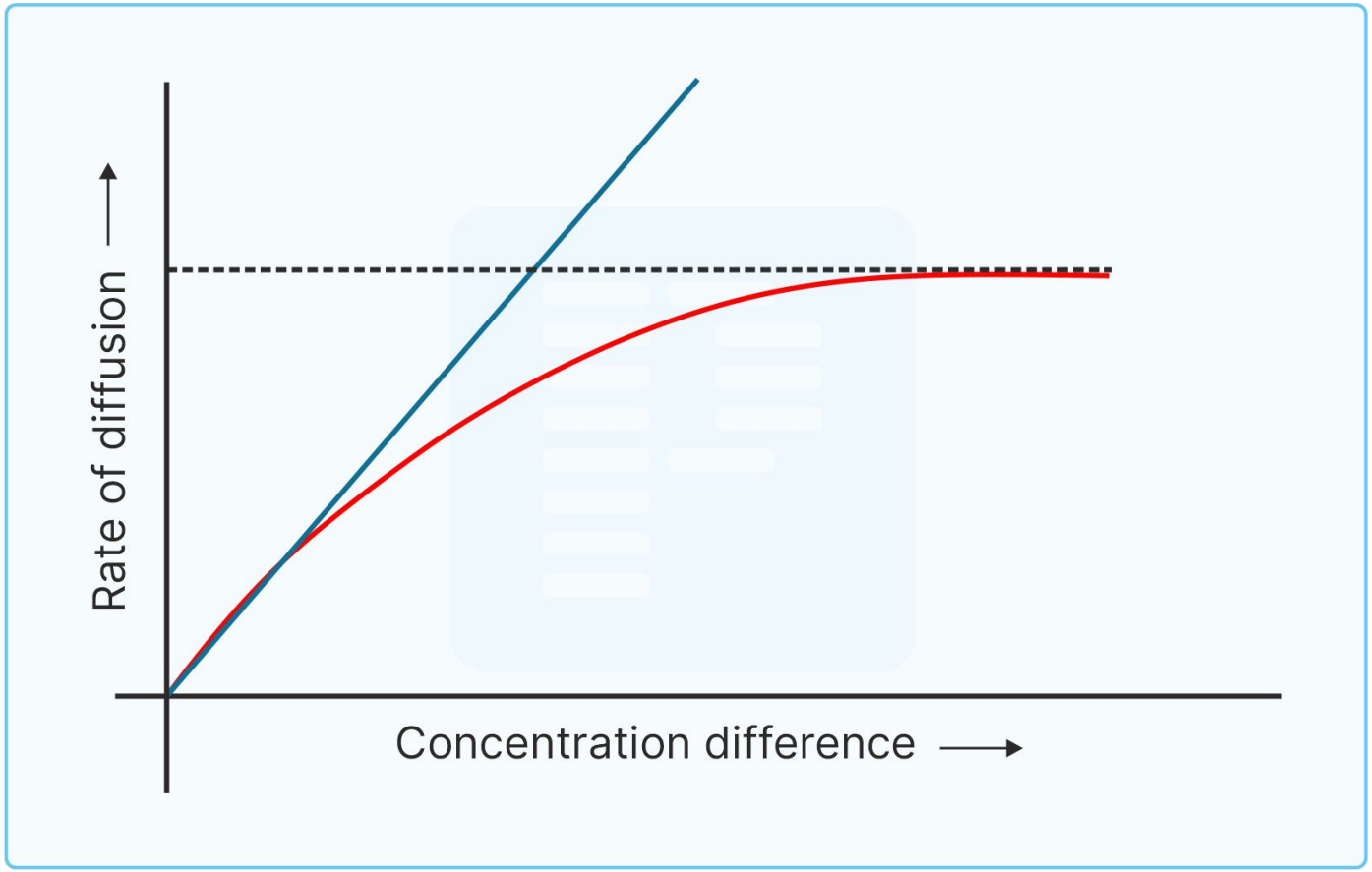
Q24. Which of the following is absent in smooth muscle?

a. Actin
b. Myosin
c. Troponin
d. Tropomyosin

- Smooth muscle is Calm and uses Calmodulin and not the tough guy Troponin

Q25. The red graph shown below is a representation of which of the following?

a. Simple Diffusion
b. Facilitated diffusion
c. Non-ionic diffusion
d. Osmosis



- Since a plateau is being obtained, it implies that carrier protein is being used and can hit a limit due to carrier proteins being limited in number.

Q26. Adipose tissue contains_____?

a. GLUT 1
b. GLUT 2
c. GLUT 3
d. GLUT 4

Q27. Which of the following is correct about Fick's Law?

a. Directly proportional to membrane surface area and inverse relation to thickness of membrane
b. Directly proportional to thickness of membrane and inverse relation to membrane surface area
c. Directly proportional to both thickness of membrane and membrane surface area
d. Inversely proportional to both thickness of membrane and membrane surface area

$$\text{Rate of diffusion} \propto \frac{(\boldsymbol{Surface\ Area})\ \boldsymbol{X}\ (\boldsymbol{Concentration\ Gradient})\ \boldsymbol{X}\ (\boldsymbol{Diffusion\ coefficient})}{\boldsymbol{Membrane\ Thickness}}$$

Q28. Na Cl cotransporter is present in distal convoluted tubule. Gain of function of this transporter leads to

a. Gitelman syndrome
b. Bartter syndrome
c. Gordon syndrome
d. Liddle syndrome

Q29. Band 3 protein is located in?

a. RBC
b. WBC
c. Platelets
d. All of the above

Q30. Correct about Botulinum toxin?

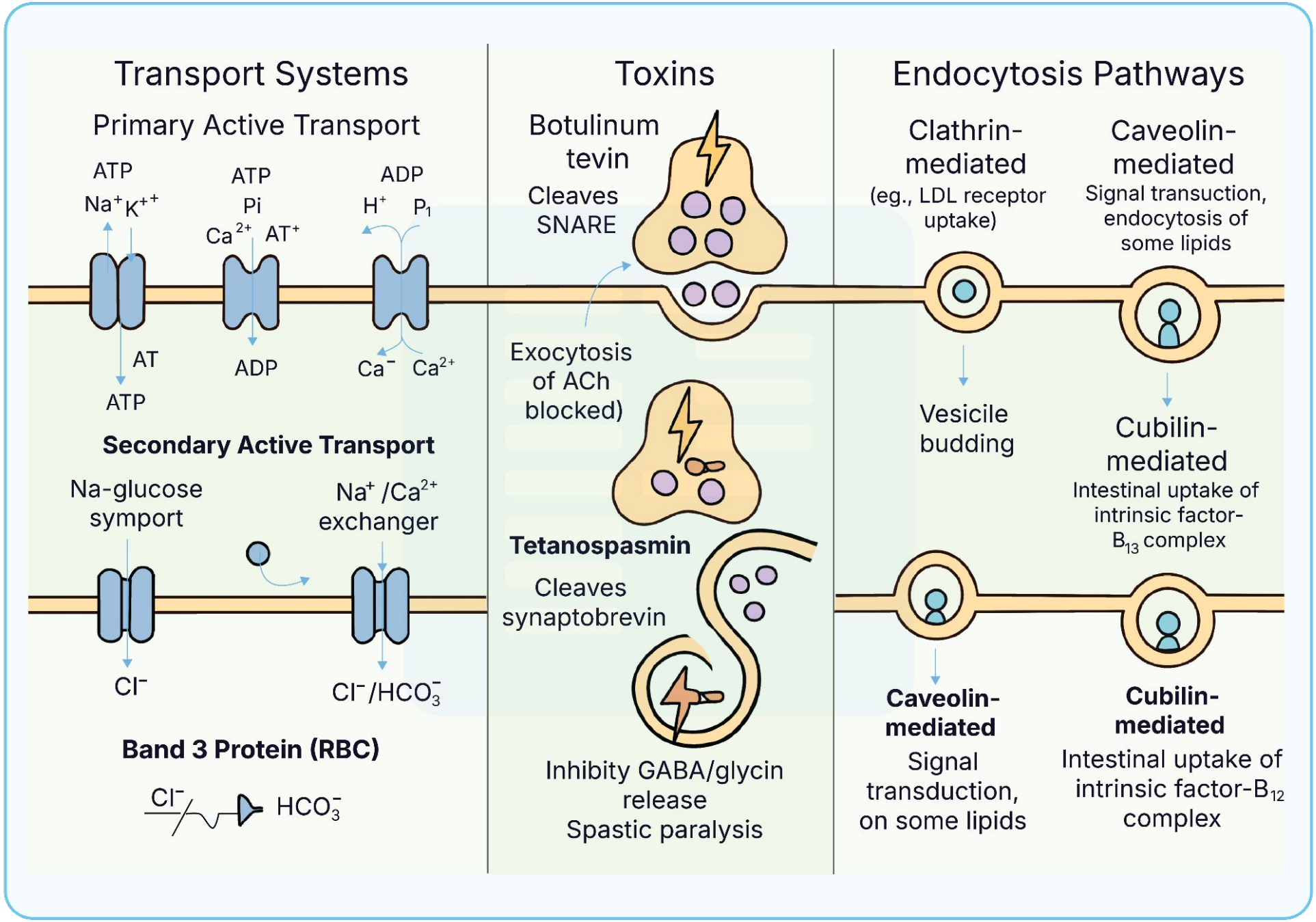
a. Cleave SNARE proteins involved in endocytosis
b. Activate SNARE proteins involved in exocytosis
c. Activate SNARE proteins involved in endocytosis
d. Cleave SNARE proteins involved in exocytosis

Q31. Tetanospasmin acts by which of the following mechanisms?

a. Cleaving synaptobrevin that inhibits release of GABA and glycine
b. Cleaving synaptobrevin that stimulates the release of GABA and glycine
c. Activating synaptobrevin that inhibits release of GABA and glycine
d. Activating synaptobrevin that stimulates the release of GABA and glycine

Q32. Endocytosis is mediated all of the following except?

a. Clathrin
b. Cubilin
c. Caveolin
d. SNAP 25


Transport Systems
Primary Active Transport
ATP
Na^+ K^{++}
ATP
Pi
Ca^{2+} AT^+
ADP
H^+ P_1
AT
ATP
ADP
Ca^- Ca^{2+}
Secondary Active Transport
Na-glucose symport
Na^+ /Ca^{2+} exchanger
Cl^-
Cl^-/HCO_3^-
Band 3 Protein (RBC)
Cl^-
HCO_3^-
Toxins
Botulinum tevin
Cleaves SNARE
Exocytosis of ACh blocked)
Tetanospasmin
Cleaves synaptobrevin
Inhibity GABA/glycin release
Spastic paralysis
Endocytosis Pathways
Clathrin-mediated
(eg., LDL receptor uptake)
Caveolin-mediated
Signal transuction, endocytosis of some lipids
Vesicile budding
Cubilin-mediated
Intestinal uptake of intrinsic factor-B_{13} complex
Caveolin-mediated
Signal transduction, on some lipids
Cubilin-mediated
Intestinal uptake of intrinsic factor-B_{12} complex

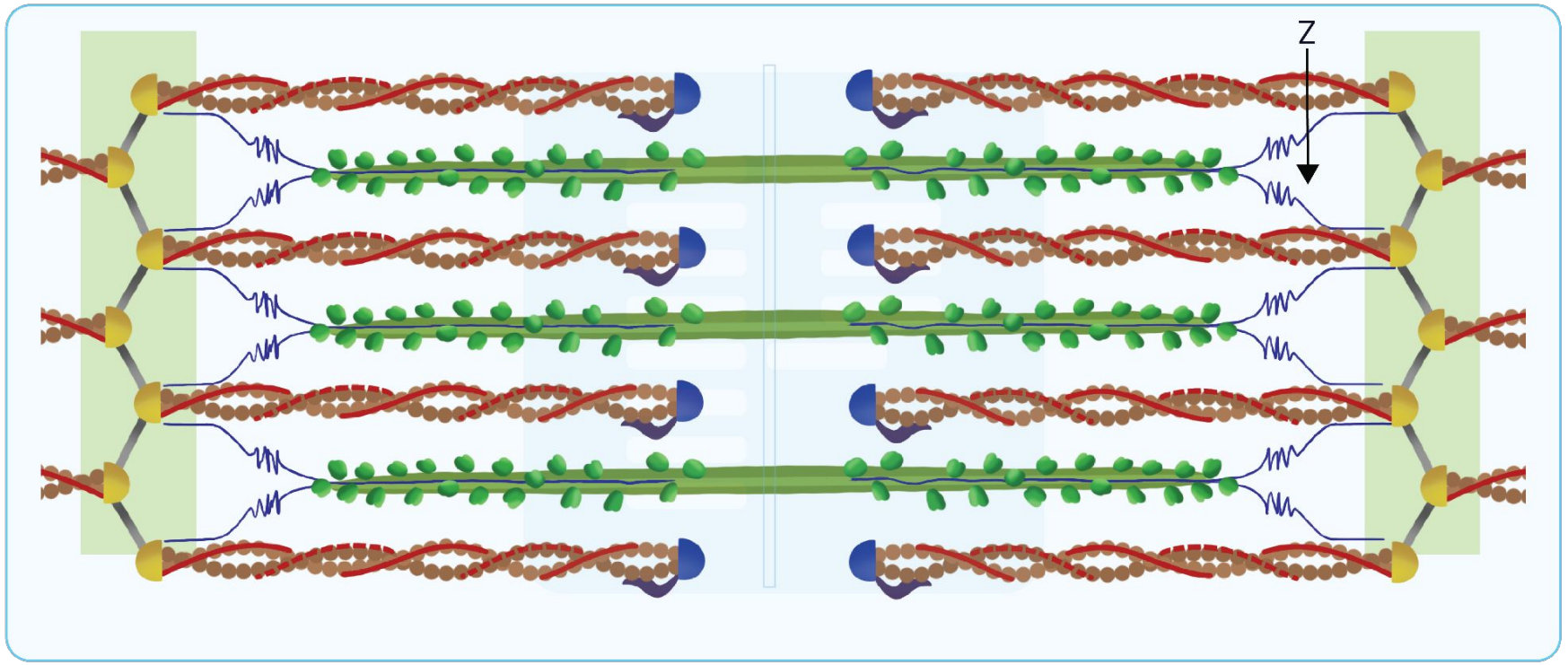
Q33. Most reactive oxygen derived free radical?

a. Superoxide
b. Hydroxyl
c. Hydrogen peroxide
d. Peroxynitrite

Q34. A child comes with difficulty in walking. Stork leg appearance of legs with contractures is noted. Gene sequencing shows CMT1 defect. This disease occurs due to defect of

a. Gap junction
b. Tight junctions
c. Desmosomes
d. Hemidesmosomes

Q35. Identify the Z marked structure in the sarcomere

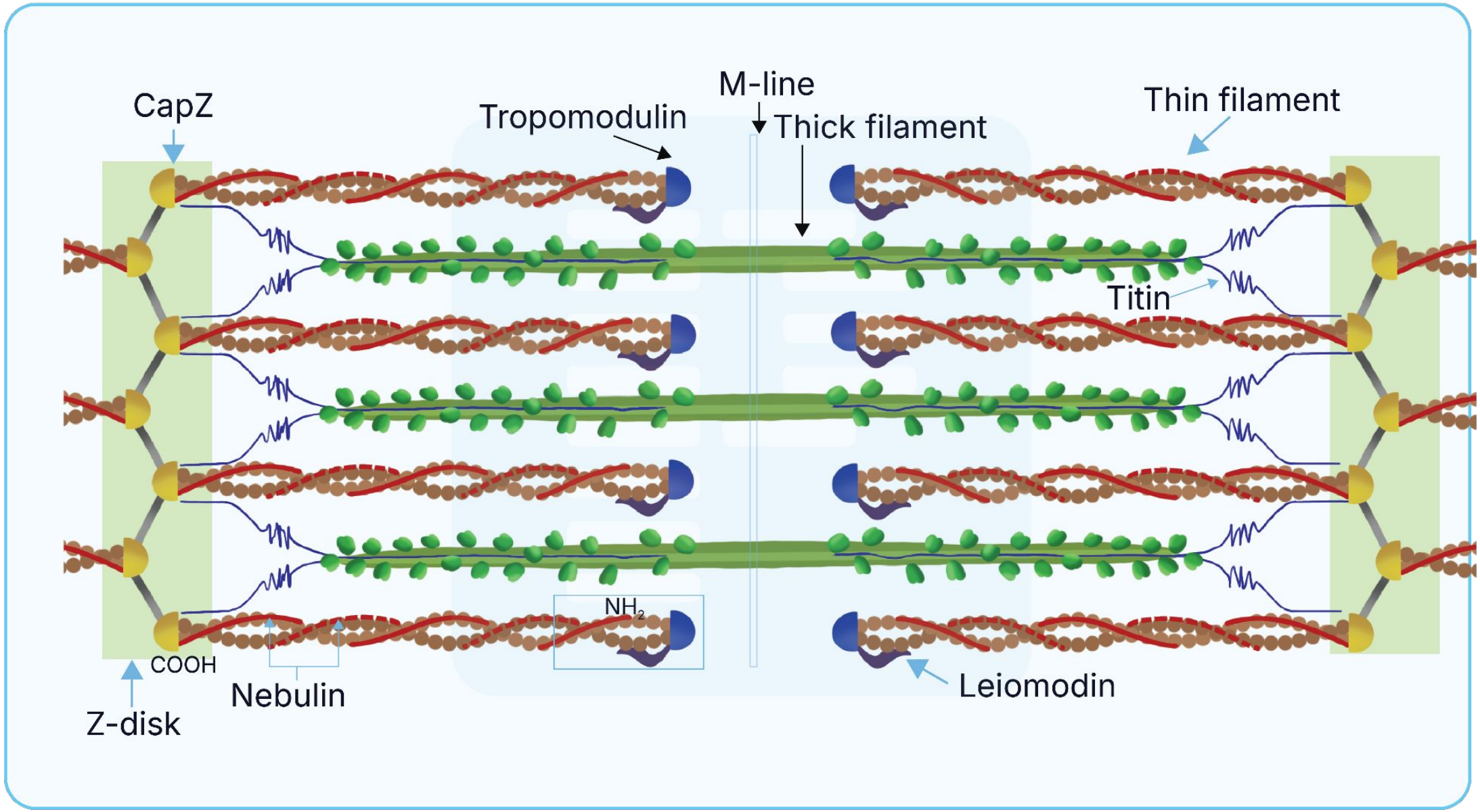


a. Nebulin

b. Tropomyosin

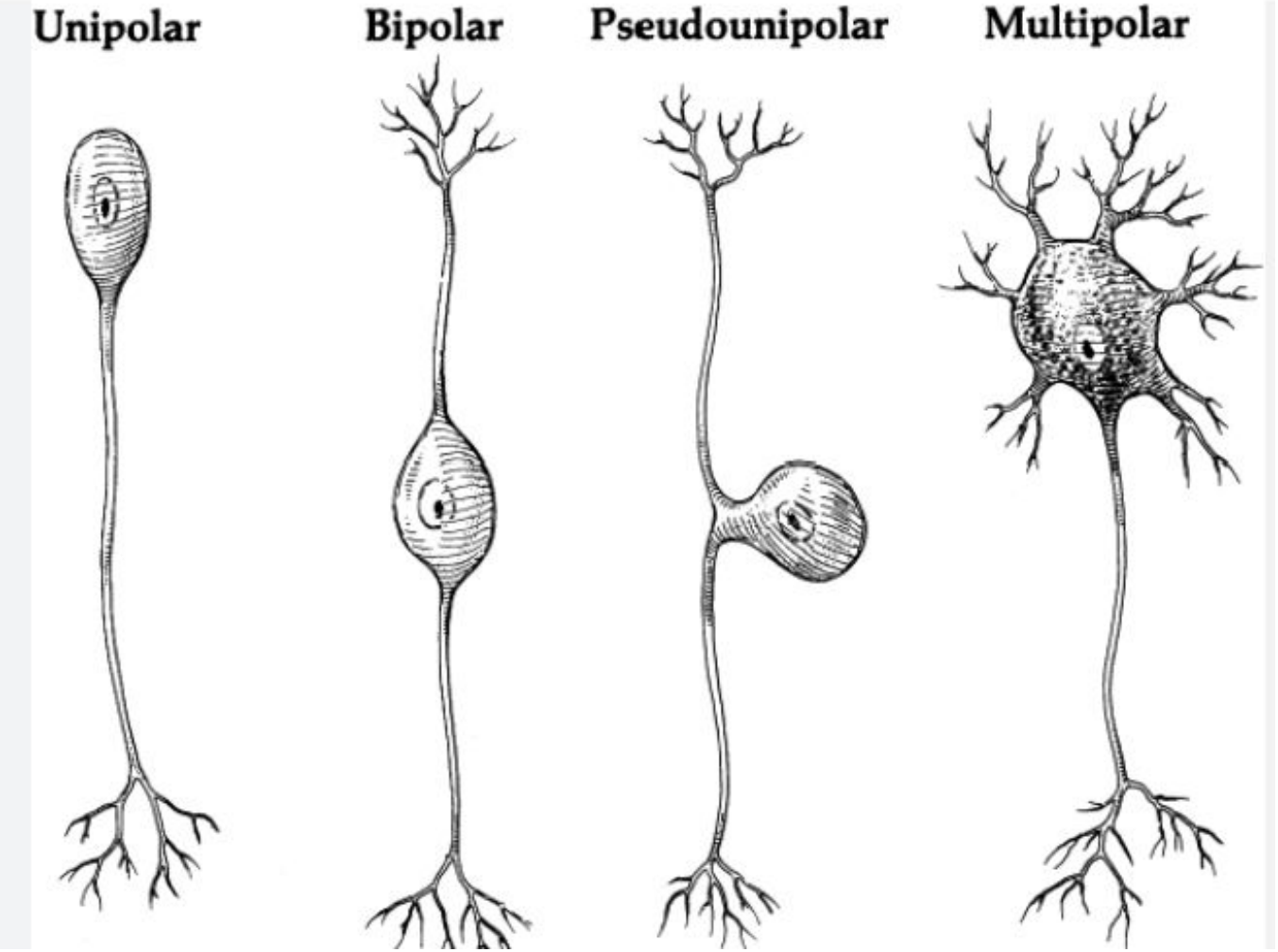
c. Titin

d. Actinin


CapZ
Tropomodulin
M-line
Thick filament
Thin filament
Titin
NH2
COOH
Nebulin
Z-disk
Leiomodin

Q36. Purkinje cells of cerebellum are?

a. Unipolar neurons
b. Bipolar neurons
c. Pseudo-unipolar neurons
d. Multipolar neurons



Q37. Which of the following is correct about astrocytes

a. Fibrous astrocytes are seen in gray matter
b. Protoplasmic astrocytes are seen in white matter
c. Perform myelination of axons
d. Target cells affected in neuromyelitis optica

Q38. Renshaw cells are located in?

a. Heart
b. Gray matter of brain
c. White matter of brain
d. Spinal cord

Q39. Which of the following areas in brain acts as osmoreceptor

a. Anterior pituitary
b. Posterior pituitary
c. Organ vasculosum lamina terminalis
d. Area postrema

Circumventricular Organs

- **Sensory** CVOs(detect blood -borne signals):
  - Area postrema - in medulla, chemoreceptor trigger zone for vomiting
  - Subfornical organ (SFO) - involved in fluid balance, thirst regulation
  - Vascular organ of the lamina terminalis (OVLT) - detects osmolarity, involved in thirst and fever regulation.
- **Secretory** CVOs (release hormones into blood /CSF):
  - Median eminence - releases hypothalamic hormones to pituitary
  - Posterior pituitary (neurohypophysis) - releases oxytocin, vasopressin
  - Pineal gland - secretes melatonin

Q40. Loss of pain and temperature and sparing of touch and vibration affecting arms, shoulders, neck is seen in

a. Brown Sequard syndrome
b. Syringomelia
c. Subacute combined demyelination of spinal cord
d. Tabes dorsalis

Q41. A 35-year-old man develops Brown-Séquard syndrome after a penetrating spinal injury. Which of the following will not be seen in this condition

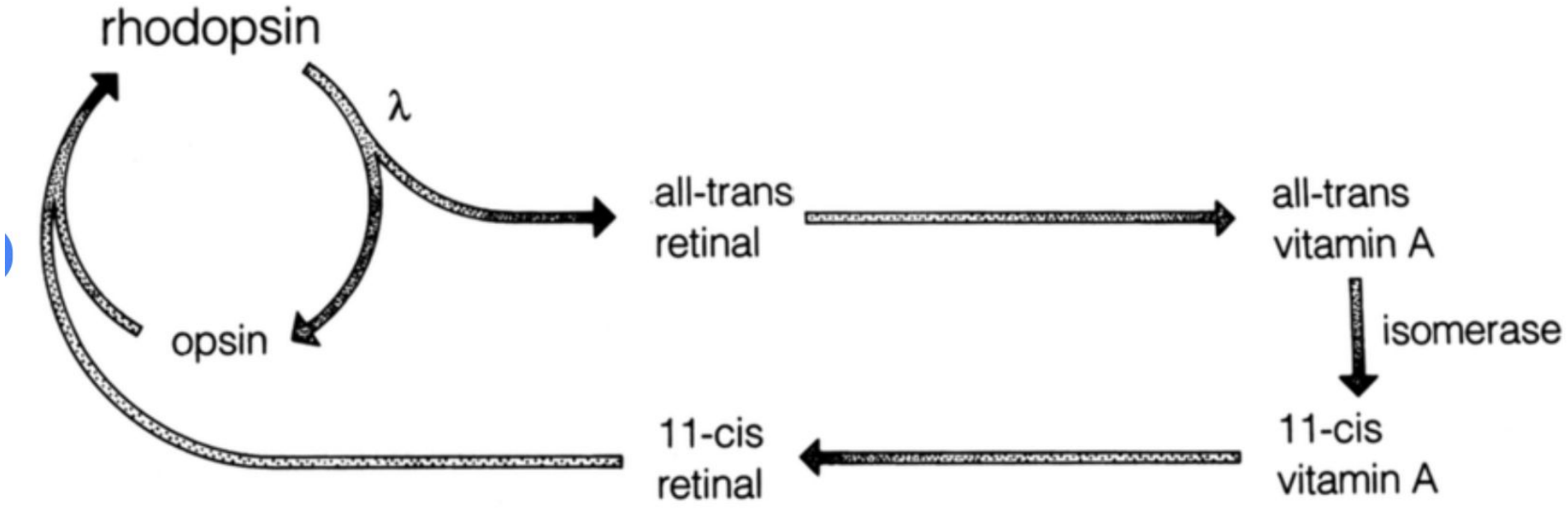
a. Ipsilateral loss of proprioception and vibration sensation
b. Ipsilateral upper motor neuron signs
c. Ipsilateral Band of hyperesthesia and LMN findings
d. Ipsilateral loss of crude touch

Side of lesion	Findings	Tracts / structures involved
Ipsilateral (below lesion)	• UMN signs – weakness, spasticity, hyperreflexia • Loss of proprioception, vibration, fine touch, 2-point discrimination	• Corticospinal tract • Dorsal column
Ipsilateral (at level of lesion)	• LMN signs – flaccid paralysis, fasciculations, atrophy • Band of segmental anesthesia / hyperesthesia	• Anterior horn cells • Doral root
Contralateral (below lesion)	• Loss of pain and temperature	• Spinothalamic tract (crosses 1-2 levels above)
Preserved	Crude touch & pressure	Anterior spinothalamic tract (bilateral representation)

I can’t feel properly: ipsilateral corticospinal, flaccidity and proprioception loss

Q42. Which of the following is a component of visual pigment rhodopsin?

a. Retinal
b. Retinol
c. Retinoic acid
d. Al-trans- retinoic acid



- Rhodopsin = opsin + 11-cis-retina
- Light converts 11-cis-retinal → all-trans-retinal

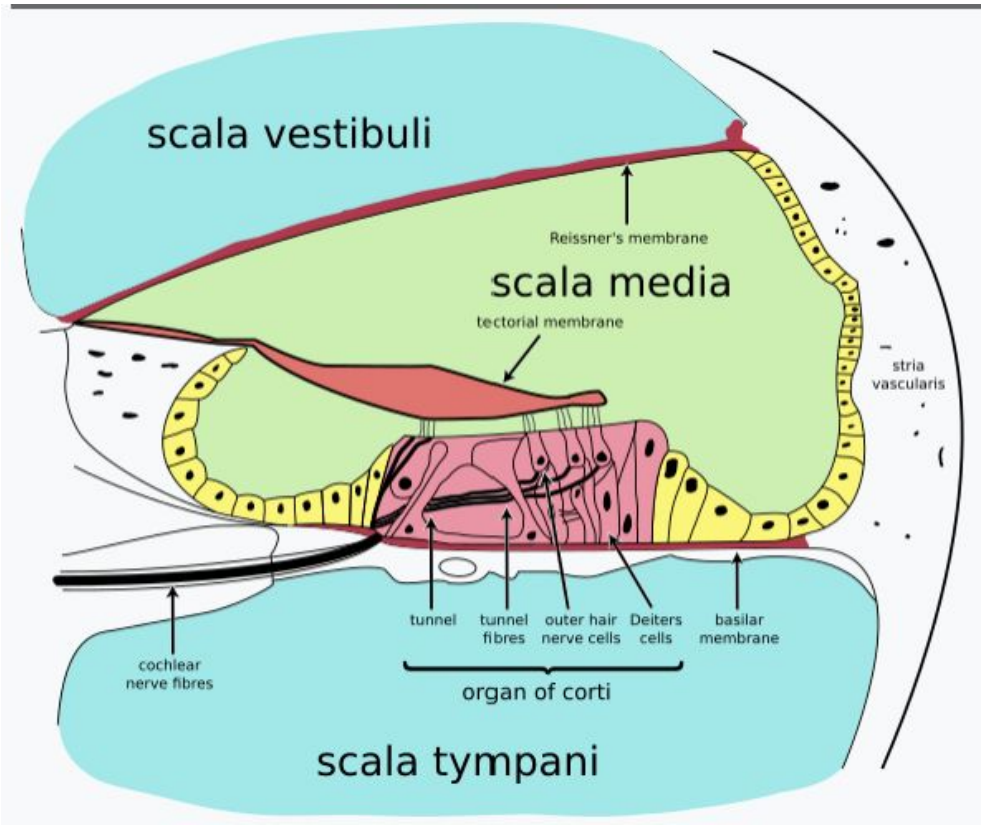
Q43. Color vision and texture of an object is carried by which of the following

a. Parvocellular pathway
b. Magnocellular pathway
c. Medial geniculate body
d. Bipolar cells

- Remember P for Parvocellular: paint color , pixels, pattern and fine details
- M for Magnocellular: Movement, depth and flicker

Q44. Which of the following is not correct about scala media in cochlea?

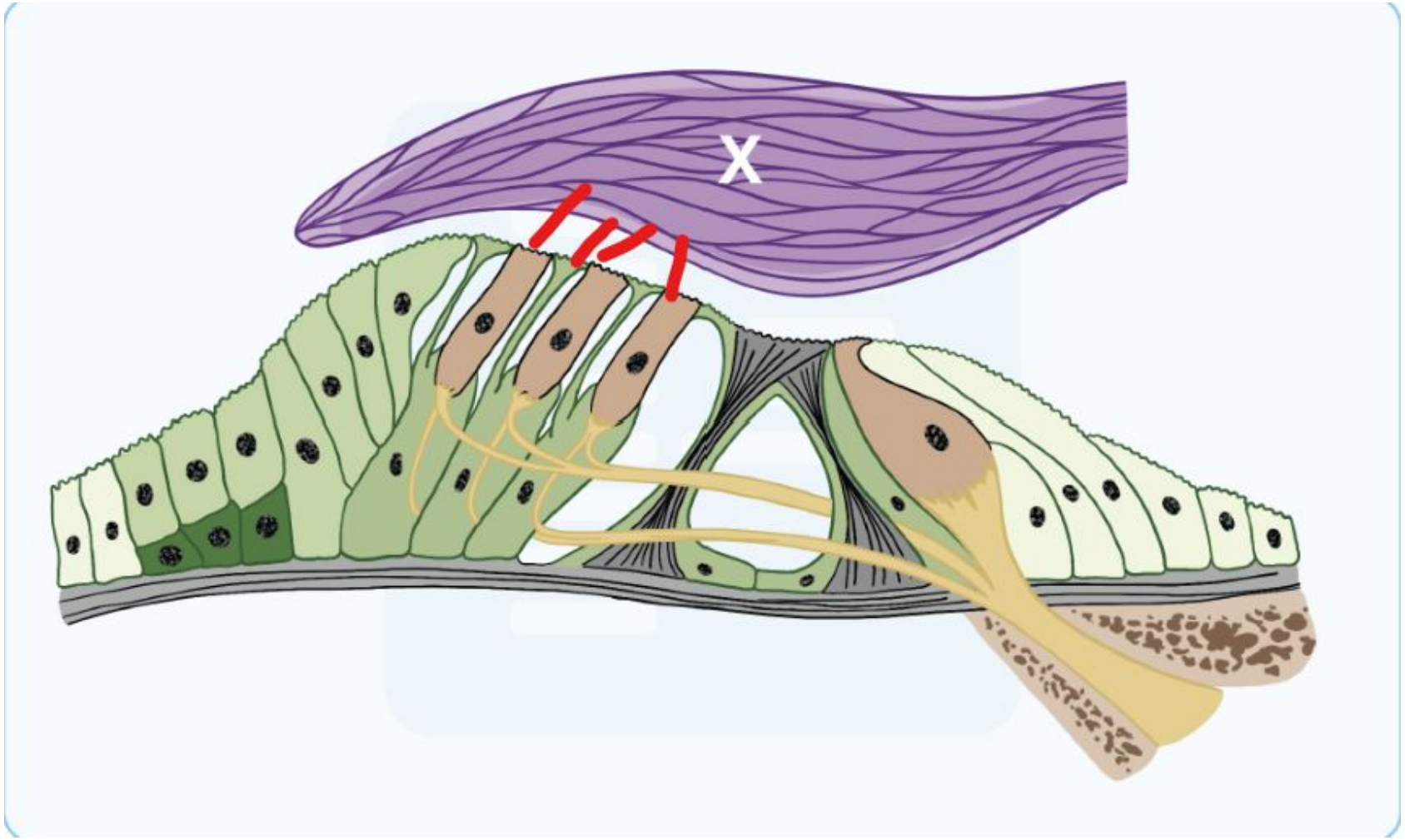
a. Contains stria vascularis that produces perilymph
b. Middle cochlear chamber
c. Contains organ of corti
d. Contains potassium rich fluid

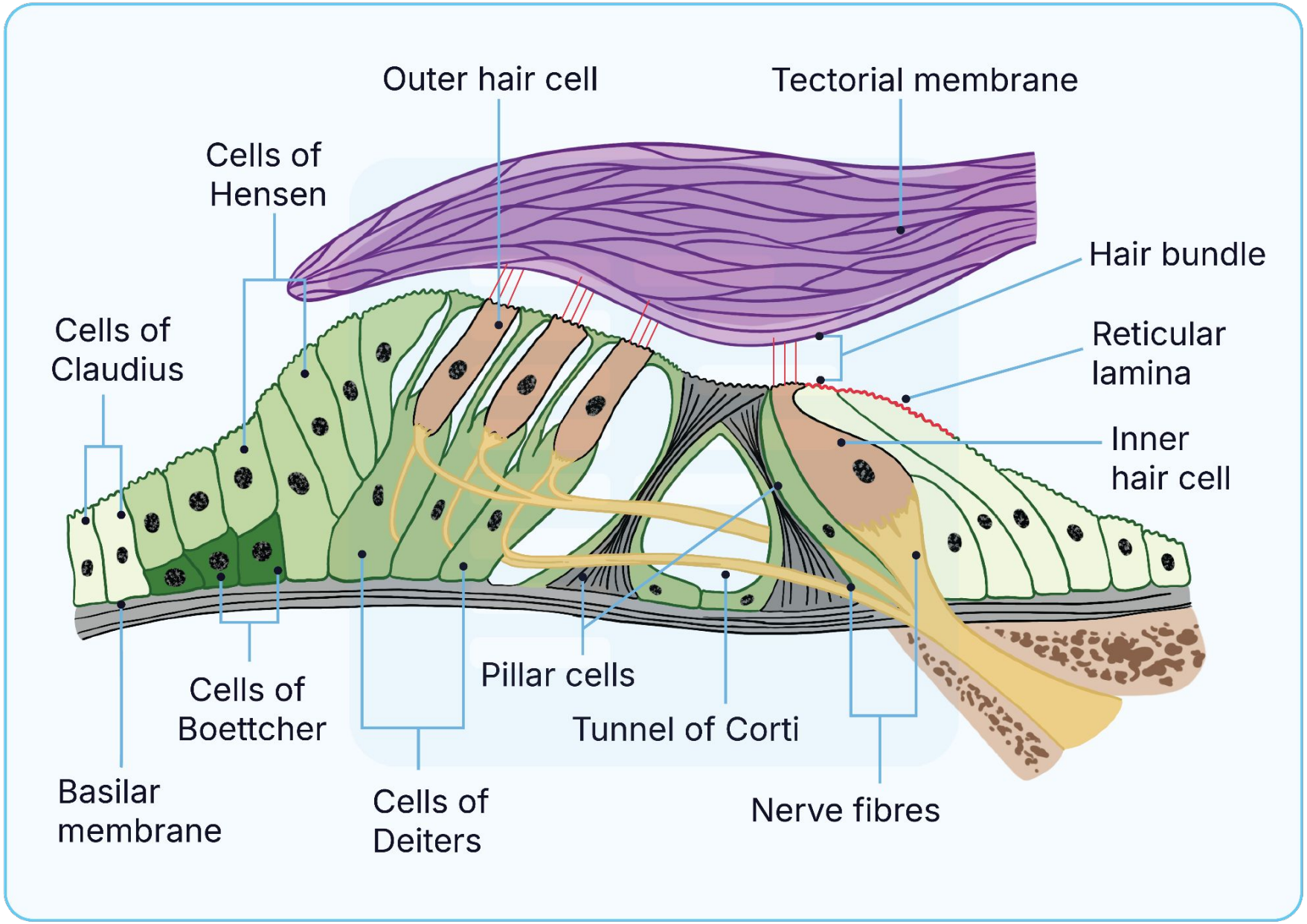


- The stria vascularis (in the lateral wall of scala media) produces endolymph (K^+-rich), not perilymph.
- True statements: scala media is the middle chamber, contains the Organ of Corti, and has potassium-rich fluid (endolymph)

Q45. Which is correct about the structure marked as X?

a. Tectorial membrane
b. Basilar membrane
c. Pillar cell
d. Striae vascularis



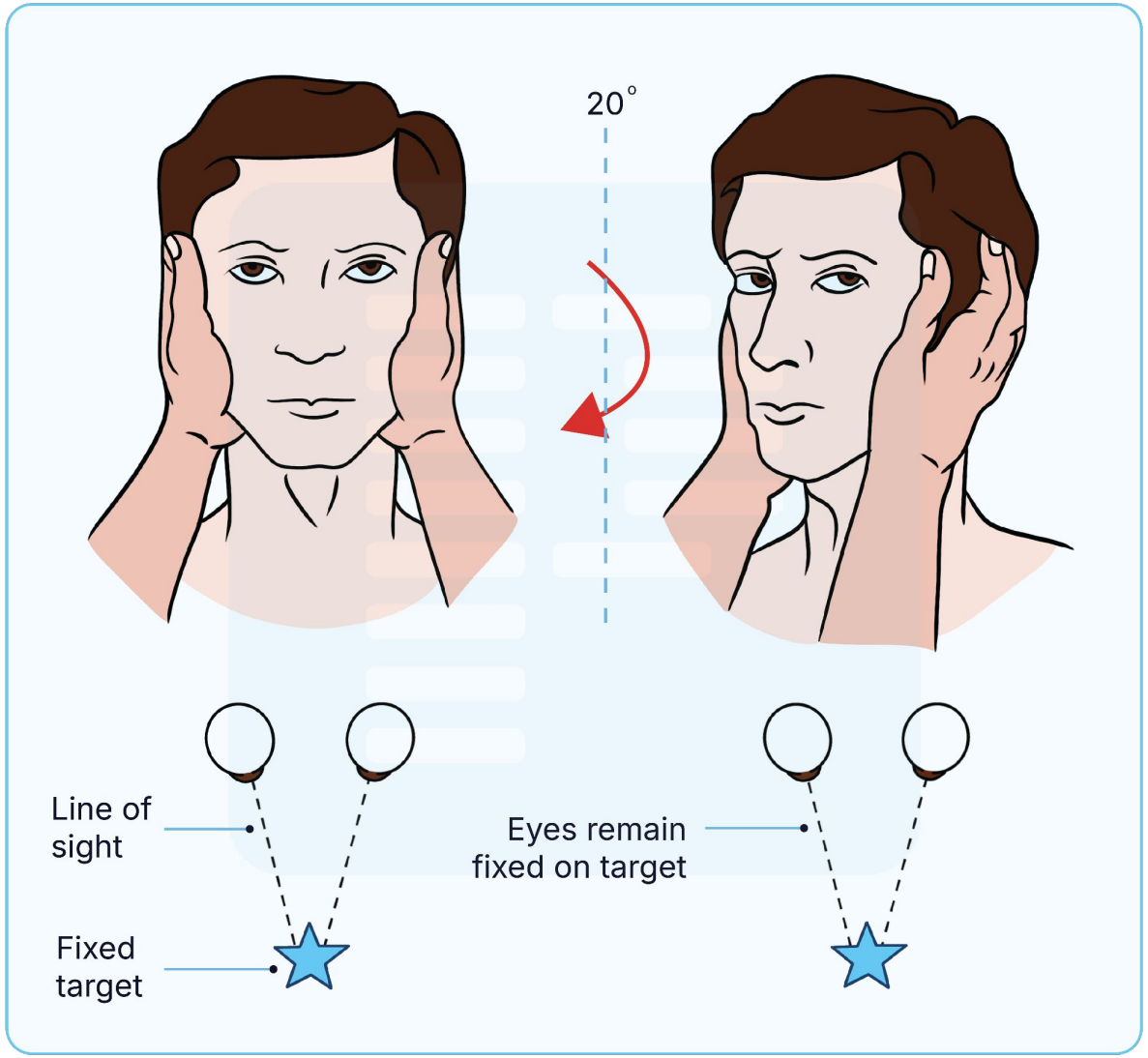

Outer hair cell
Tectorial membrane
Cells of Hensen
Hair bundle
Cells of Claudius
Reticular lamina
Inner hair cell
Cells of Boettcher
Pillar cells
Tunnel of Corti
Basilar membrane
Cells of Deiters
Nerve fibres

Q46. Kanamycin is a nephrotoxic aminoglycoside. What is correct about its ototoxicity ?

a. Damage to inner hair cells
b. Damage to outer hair cells
c. Damage to auditory cortex
d. Damage to medial geniculate body

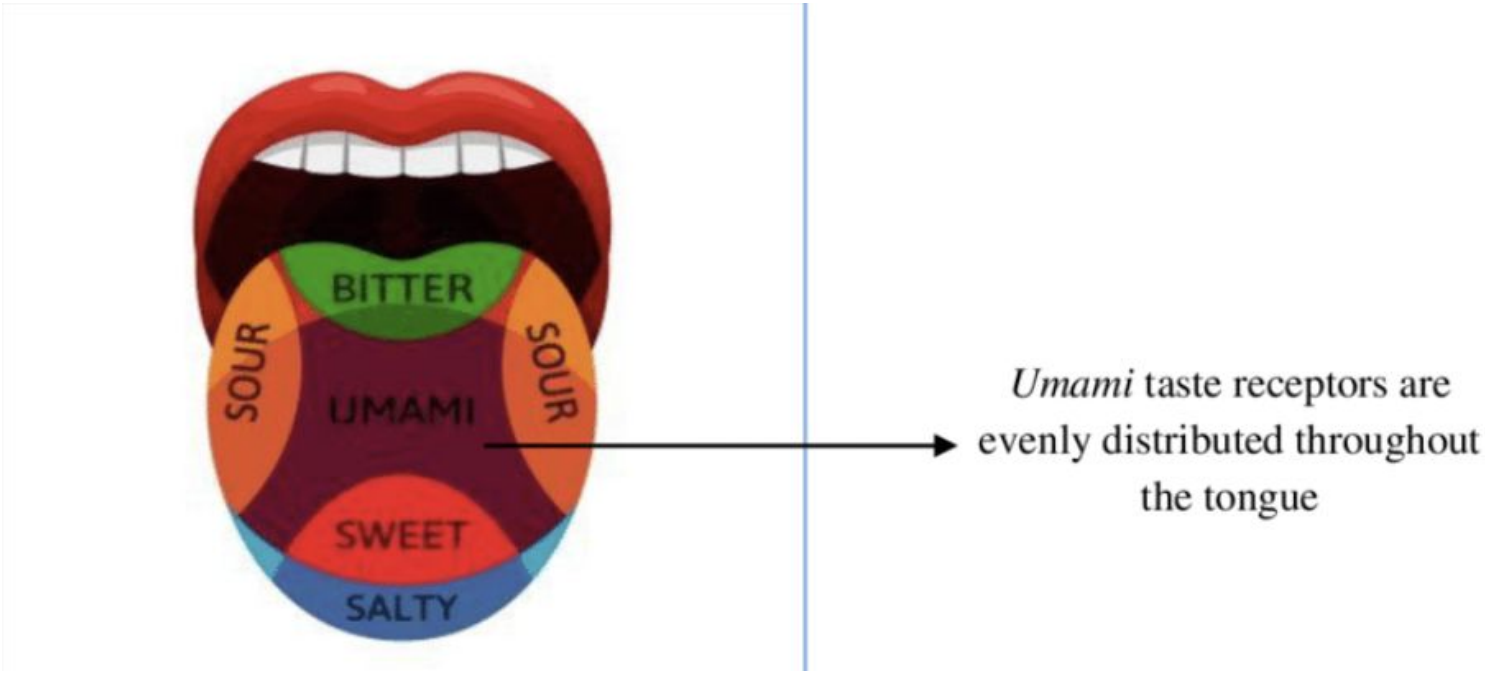
Q47. Which is correct about vestibulo-ocular reflex

a. Eyes move left in response to turning head to right side and vice versa
b. Eyes move right in response to turning head to right side and same for other eye
c. Cold water causes eyes to move to opposite and hot water to same side
d. Cold water causes eyes to move to same side and hot water to opposite side


20°
Line of sight
Fixed target
Eyes remain fixed on target

Q48. Receptor for Umami sensation on tongue?

a. Epithelial sodium channel
b. GPCR T1R2
c. GPRCR 2
d. GPCR mGluR4



- Option A for salt and sour. Option B for sweet. Option C for bitter

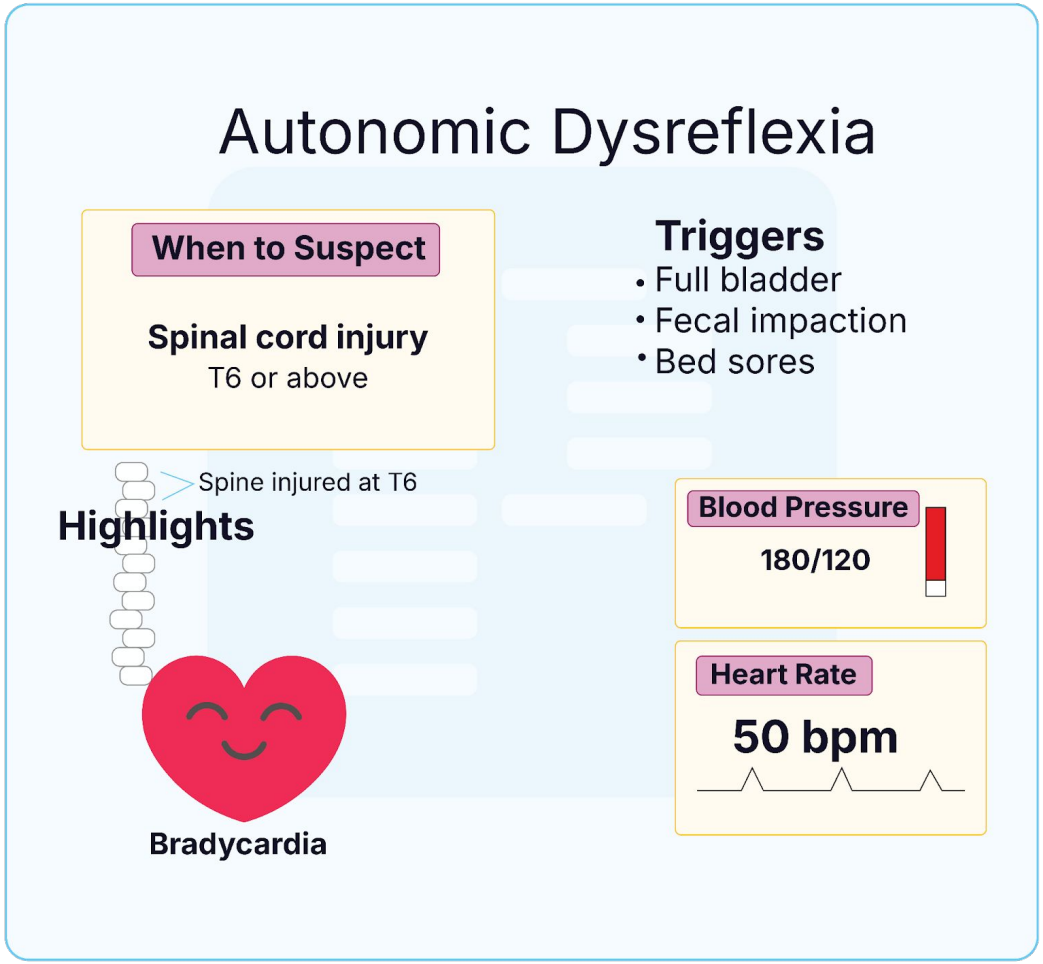
Q49. Which of the following is bi-synaptic reflex

a. Golgi tendon reflex
b. withdrawal reflex
c. Crossed extensor reflex
d. Myotatic reflex

Q50. Which is seen in autonomic dysreflexia?

a. Bradycardia with hypotension
b. Bradycardia with hypertension
c. Bradycardia with Bradypnea
d. Bradycardia with Tachypnea

Bainbridge	
Cushing	
Bezold Jarisch (Coronary chemoreflex	
Pulmonary chemoreflex	
Autonomic dysreflexia	



- Seen in chronic spinal cord injury above T6. Now the fibers from T6 to L2 have unopposed sympathetic discharge. This causes vasoconstriction and reflex bradycardia.

Q51. Which of the following is called peripheral heart?

a. Soleus
b. Gastrocnemius
c. Peroneus longus
d. Plantaris

Q52. A wave in JVP occurs due to

a. Atrial contraction
b. Atrial relaxation
c. Ventricular contraction
d. Ventricular relaxation

Q53. Which of following is correct site of lesion in kluver Lucy syndrome

a. Caudate nucleus
b. Lenticular nucleus
c. Amygdala
d. Ventromedial thalamus

- **M** - More **Eating** (Hyperphagia)
- **O** - More **Orality** (Hyperorality)
- **R** - More **Reproduction** (Hypersexuality)
- **E** - More **Exploration** (Hypermetamorphosis)
- **A** - **Agnosia**
- **P** - **Placidity**

Q54. Which of the following is responsible for planning and programming of movements

a. Cerebellum
b. Basal ganglia
c. corticospinal pathway
d. Reticulospinal pathway

- Basal ganglia - responsible for planning, programming, and initiation of movements (especially complex, learned motor activity).
- Cerebellum - coordinates movements, maintains balance, posture, and ensures precision by comparing intended vs actual performance.
- Corticospinal pathway - executes voluntary movement by sending final motor commands from the cortex to the spinal cord.
- Reticulospinal pathway - controls posture and locomotion, modulates reflexes.

Q55. Normal duration of QT interval is

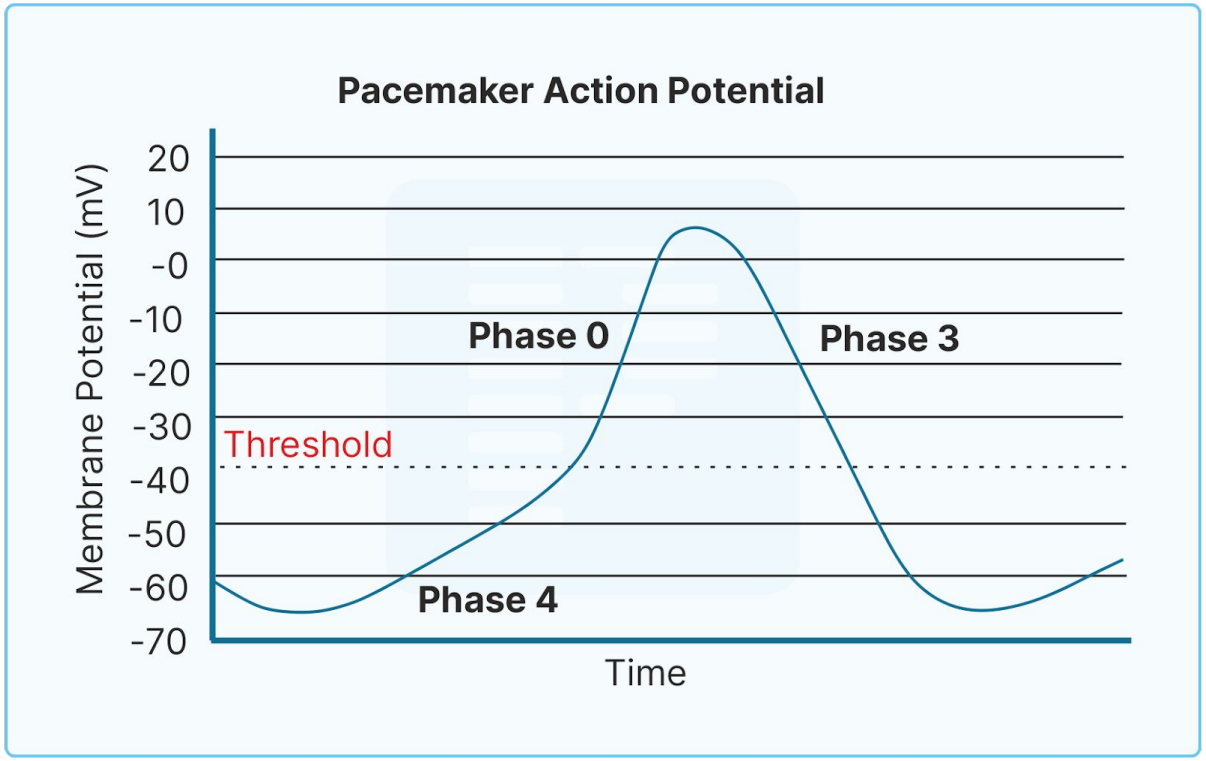
a. 0.04- 0.08 sec
b. 0.08 -0.12 sec
c. 0.12-0.20 sec
d. 0.36 -0.44 sec

Q56. Which of the following is called the gatekeeper of heart?

a. SA node
b. AV node
c. Bundle of his
d. Pukinje fiber

Q57. Schematic is shown for SA node pacemaker action potential. Which of the following ions play a role in phase 0 depolarization

a. Sodium
b. Calcium
c. Potassium
d. Chloride



- Unlike ventricular myocytes, where Na^+ influx via fast Na^+ channels causes Phase 0 in SAN, it is calcium

Phases in SA Node

- Phase 4 - Slow diastolic depolarization
  - Funny Na^+ current (if, HCN channels)
  - T-type Ca^{2+} influx contributes near threshold
- Phase 0 - Depolarization
  - Due to L-type Ca^{2+} influx (NOT fast Na^+)
- Phase 3 - Repolarization
  - Due to K^+ efflux

Absent

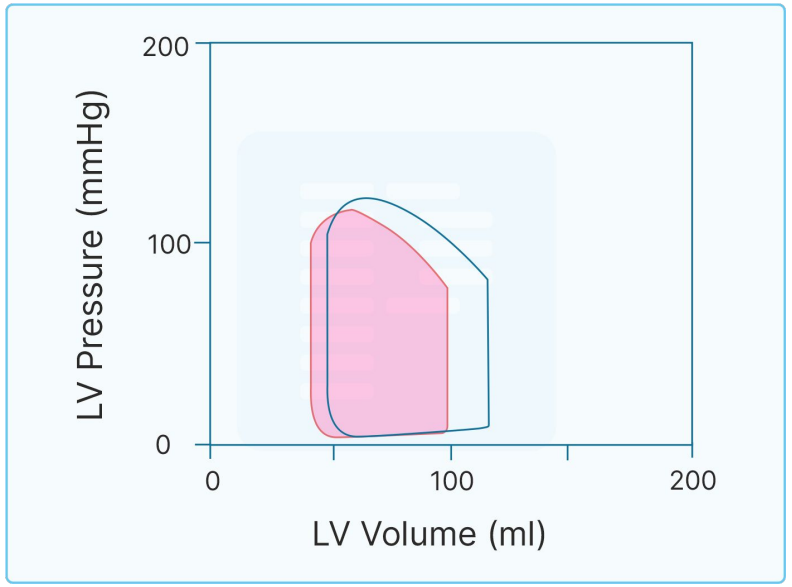
- Phase 1 (initial rapid repolarization) - Absent in pacemaker cells
- Phase 2 (Plateau phase) - Absent in pacemaker cells

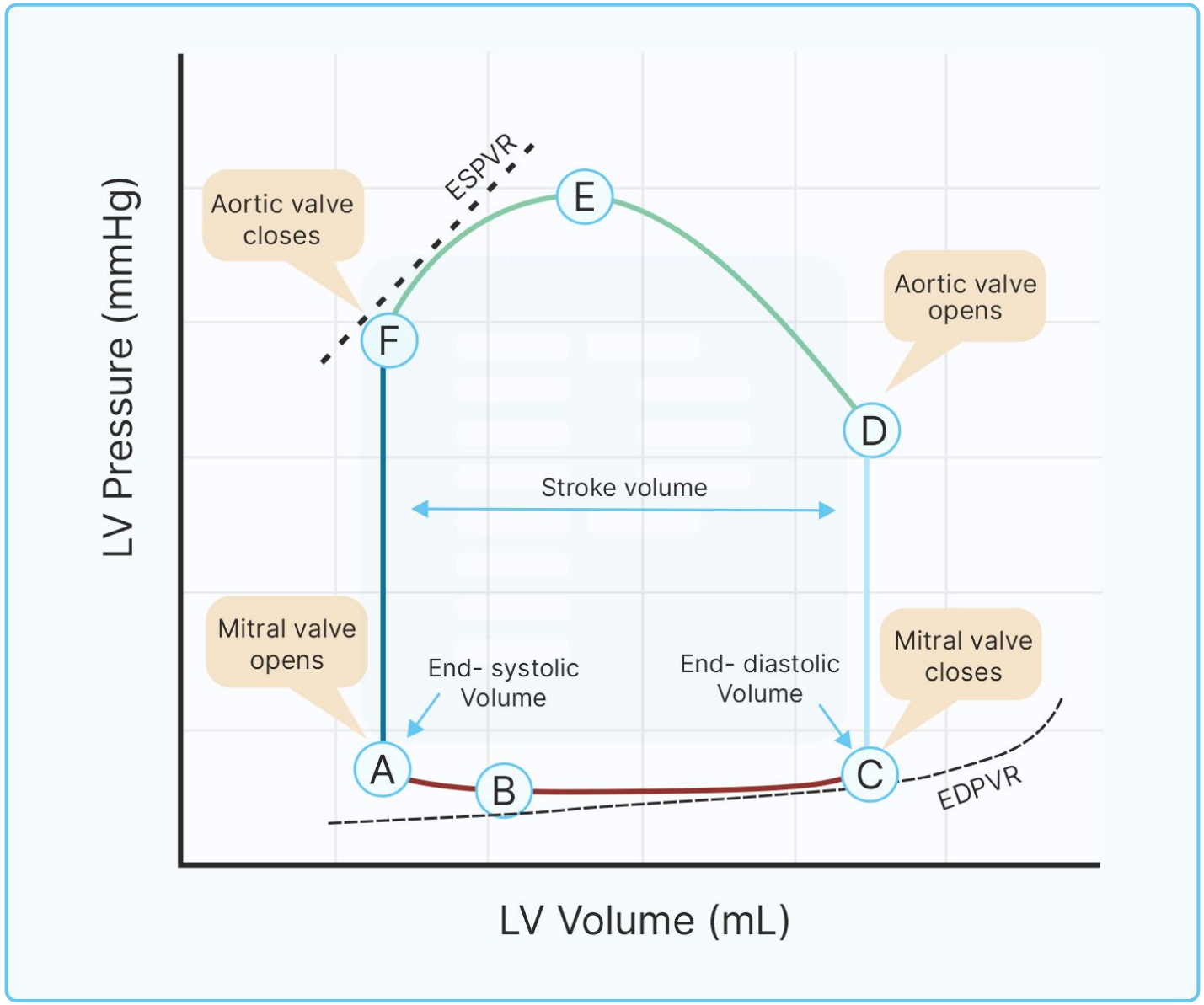
Q58. In which phase of Pacemaker action potential is “Funny Current” seen?

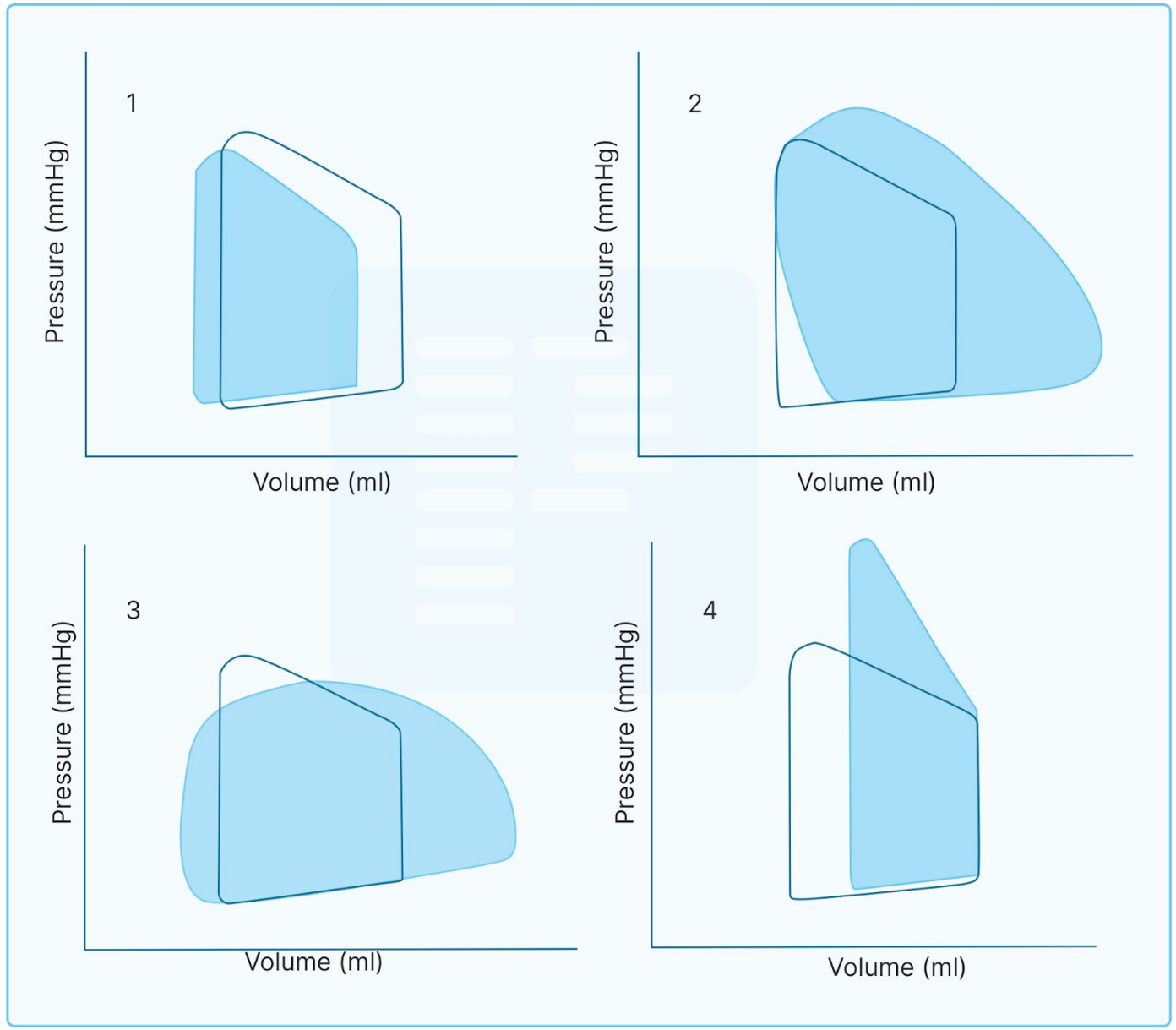
a. Depolarization
b. Plateau
c. Repolarization
d. Hyperpolarization

Q59. Identify the heart lesion from the Ventricular pressure volume curve shown below?

a. MS
b. MR
c. AS
d. AR




LV Pressure (mmHg)
LV Volume (mL)
ESPVR
EDPVR
Aortic valve closes
Aortic valve opens
Mitral valve opens
Mitral valve closes
Stroke volume
End- systolic Volume
End- diastolic Volume
A
B
C
D
E
F


1
Pressure (mmHg)
Volume (ml)
2
Pressure (mmHg)
Volume (ml)
3
Pressure (mmHg)
Volume (ml)
4
Pressure (mmHg)
Volume (ml)

Q60. Hemoglobin begins to appear at which stage of erythropoiesis?

a. Early normoblast
b. Intermediate normoblast
c. Late normoblast
d. Reticulocyte

Q61. First hemoglobin to appear in embryonic development is

a. Gower
b. Portland
c. HbF
d. HbA

Q62. Which of the following is the scantiest cell in peripheral blood

a. Neutrophil
b. Basophil
c. Monocyte
d. Eosinophil

Q63. Clotting factor with longest half life is

a. Factor II
b. Factor VII
c. Factor X
d. Factor XIII

Q64. Which is correct about electromechanical systole?

a. Onset of qRS complex to closure of aortic valve
b. Onset of qRS to end of T wave
c. Onset of qRS to closure of mitral valve
d. Onset of qRS to start of T wave

Q65. Which of the following is responsible for clearance of surfactant in the lungs?

a. Lecithin
b. GM_CSF
c. Epidermal growth factor
d. Phosphatidylglycerol

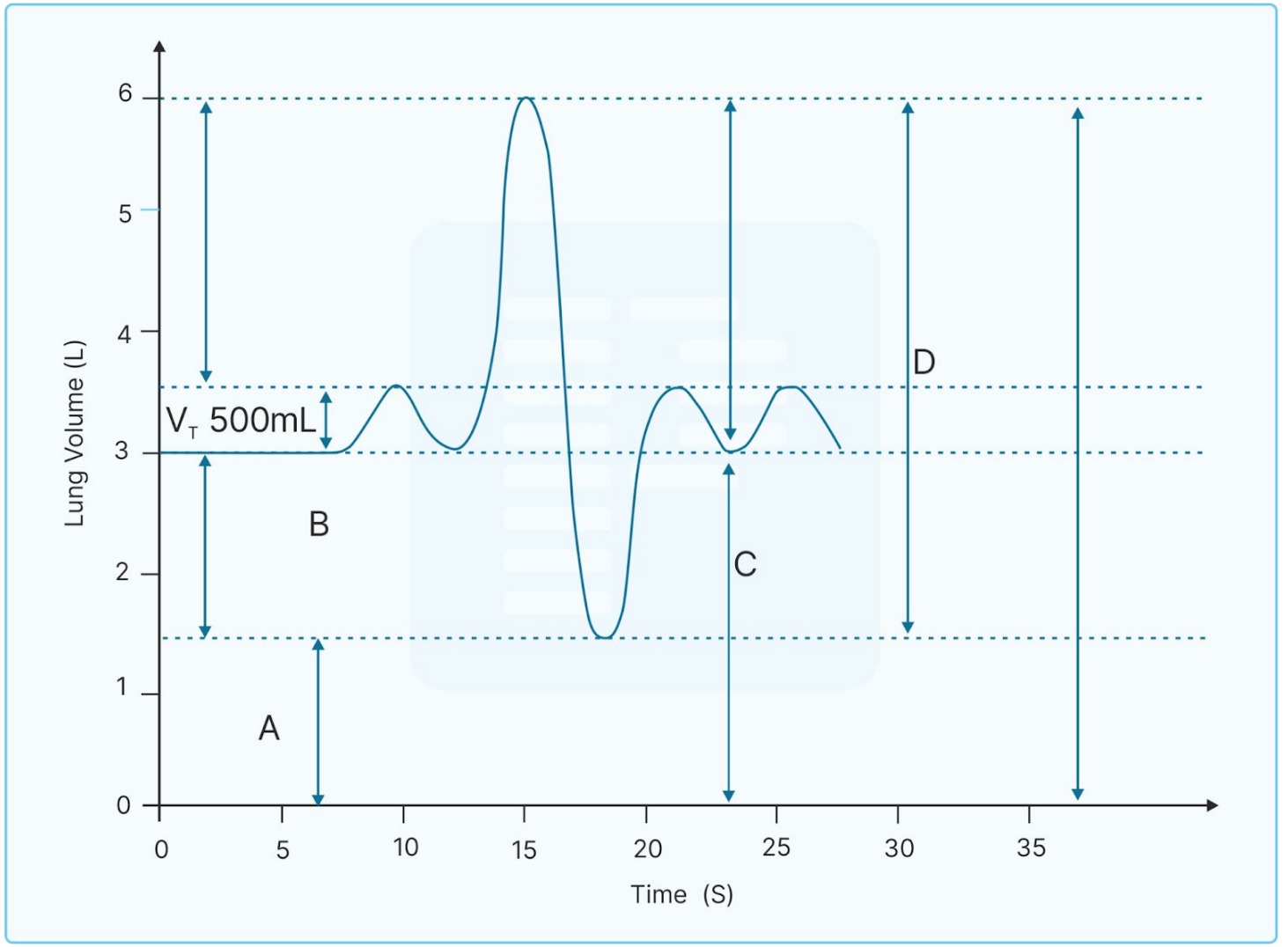
Q66. Mark the Functional residual capacity?

a. A

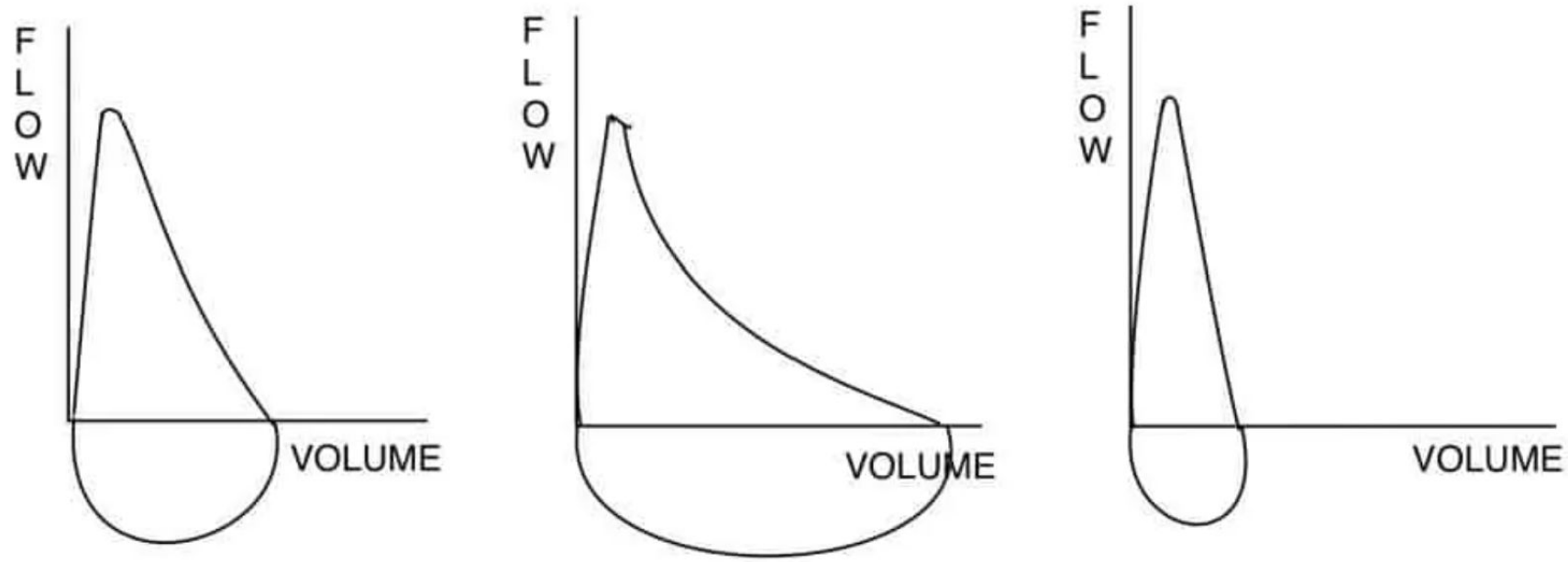
b. B

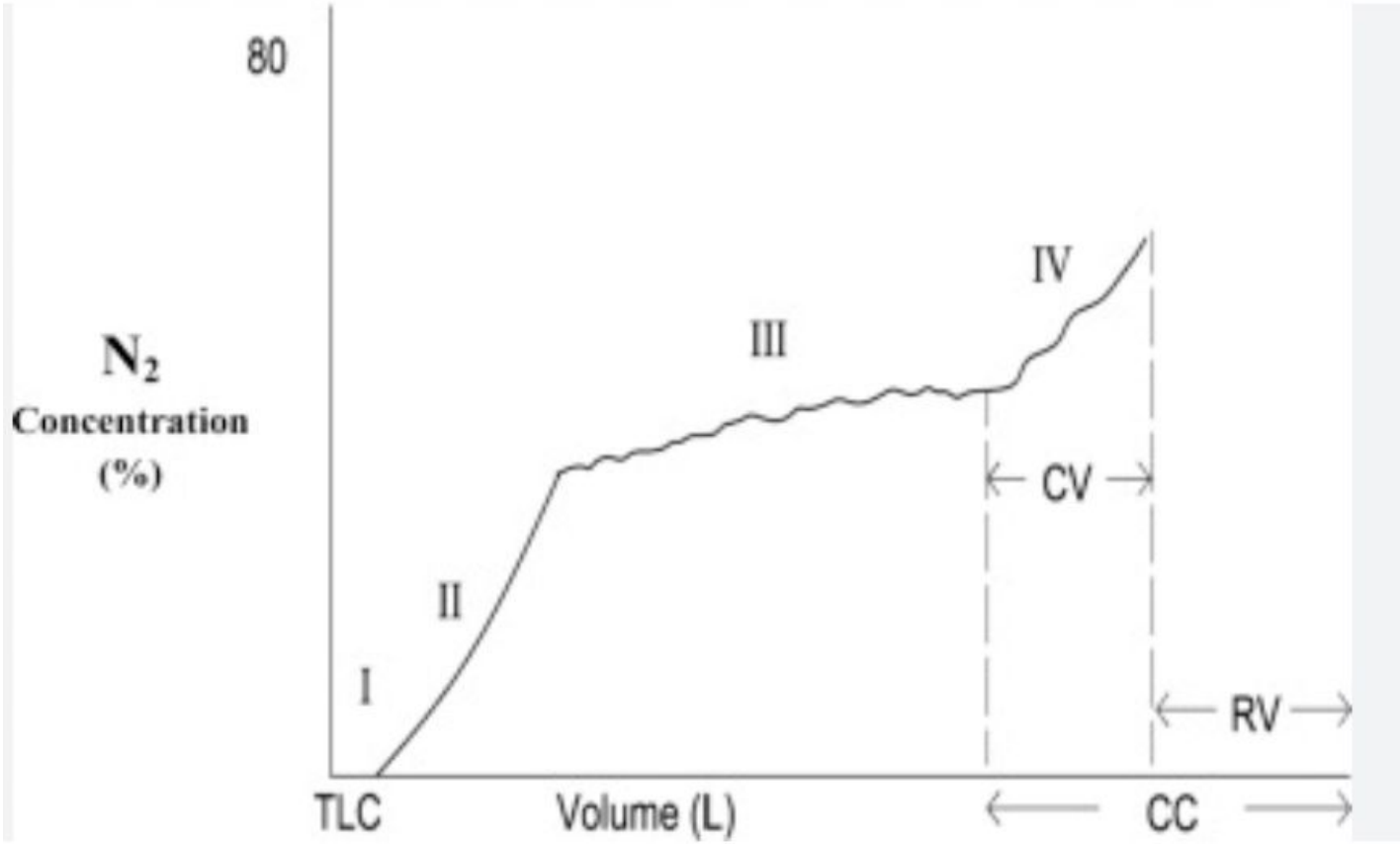
c. C

d. D



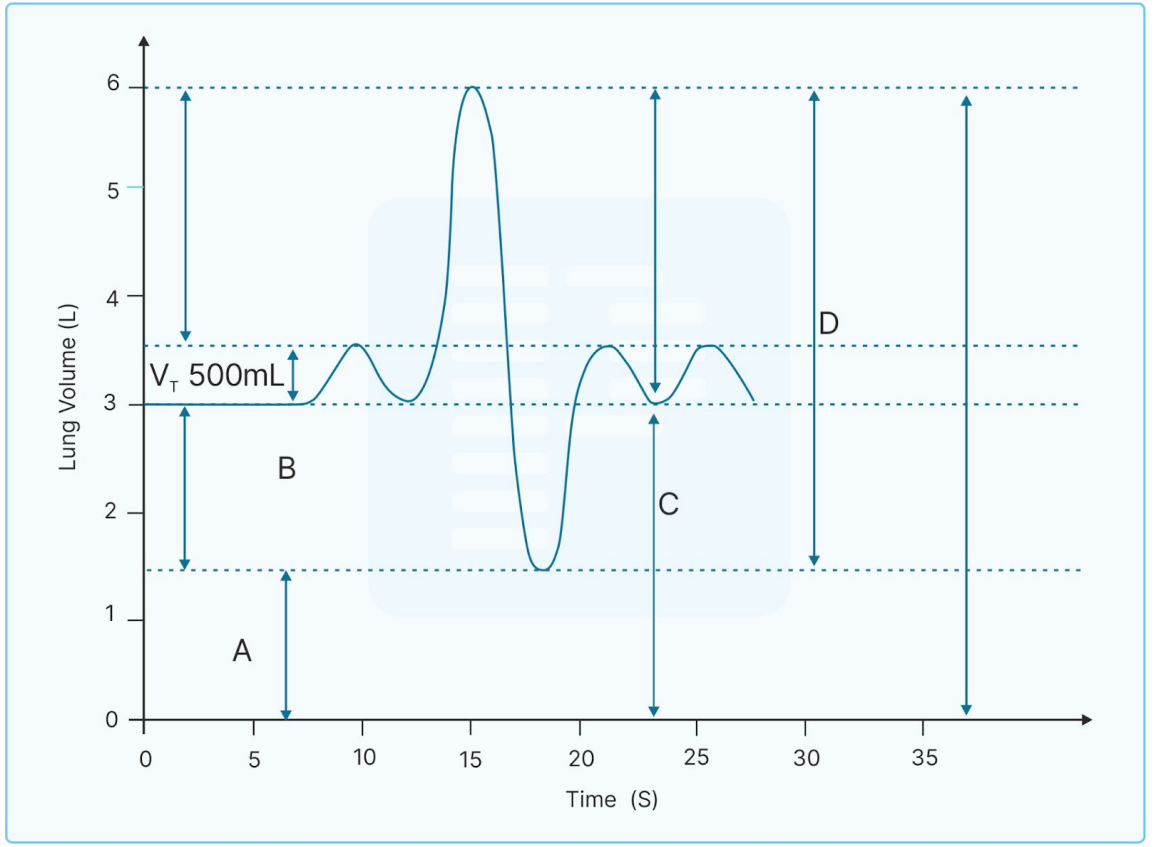
- FRC is also called equilibrium volume as the inward elastic recoil of the lung balances with outwards movement of the chest.




80
N_2
Concentration
(%)
I
II
III
IV
CV
RV
TLC
Volume (L)
CC

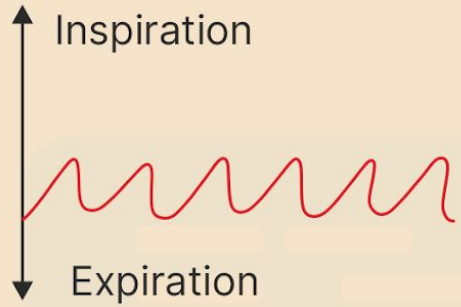
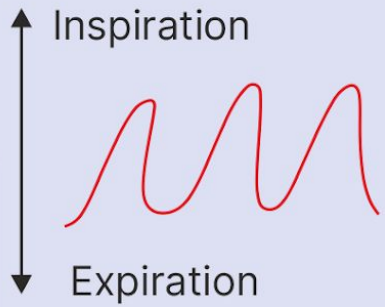
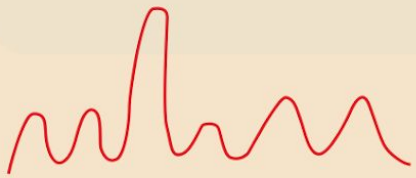
Q67. DLCO is increased in which of the following conditions

a. Bronchial asthma
b. ILD
c. P.Jiroveci
d. ARDS



Q68. Breathing pattern showing prolonged inspiratory spasm is seen in

a. Allergic airway disease
b. Head injury
c. Opioid overdose
d. Diabetic ketoacidosis

Section levels		Vagi intact	Vagi cut
	1 High pons		
	2 Middle pons		
	3 High medulla		
	4 Low medulla	(Apnea)	(Apnea)

Q69. Correct about features of diving reflex?

a. Bradycardia , apnea and increased vascular resistance
b. Tachycardia, apnea and increased vascular resistance
c. Bradycardia , apnea and decreased vascular resistance
d. Tachycardia, apnea and decreased vascular resistance

Reflex	Stimulus	Response
Bezold-Jarisch Reflex	Pulmonary edema, ischemia, chemicals (serotonin, veratrum alkaloids)	Apnea - rapid shallow breathing, Bradycardia, Hypotension
Cushing Reflex	Raised intracranial pressure	Hypertension, Bradycardia, Irregular respiration
Bainbridge Reflex	↑ Venous return/Atrial stretch	Tachycardia
Diving Reflex	Cold water on face	Bradycardia, Peripheral vasoconstriction, Apnea
Oculocardiac Reflex	Pressure on eyeball/Ocular manipulation	Bradycardia
Hering-Breuer Reflex	Lung inflation (Stretch receptors)	Stops inspiration (prevents overinflation)
Valsalva Maneuver Reflex	Forced expiration against closed glottis	Initial bradycardia - Later tachycardia

Q70. AV oxygen difference is decreased in which type of hypoxia?

a. Stagnant
b. Histotoxic
c. Anemic
d. Hypoxic

- Since tissues cannot use oxygen, the oxygen content of venous blood rises leading to reduced gradient.

Q71. A 40-year-old man goes to Leh for a holiday and develops a headache followed by severe breathing difficulty. Which is the correct pathophysiology behind this presentation?

a. Cerebral vasodilation with pulmonary vasoconstriction
b. Cerebral Vasodilation with pulmonary vasodilatation
c. Cerebral Vasoconstriction with pulmonary vasoconstriction
d. Cerebral Vasodilatation with pulmonary vasodilatation

- High altitude hypoxia → cerebral vasodilation → headache (acute mountain sickness)
- In lungs, hypoxia causes pulmonary vasoconstriction → ↑PAP → HAPE → severe dyspnea

Q72. Which of the following does not cause a rightward shift of the oxyhemoglobin dissociation curve?

a. Increased temperature
b. Increased 2,3-BPG
c. Increased PCO_2
d. Methemoglobinemia

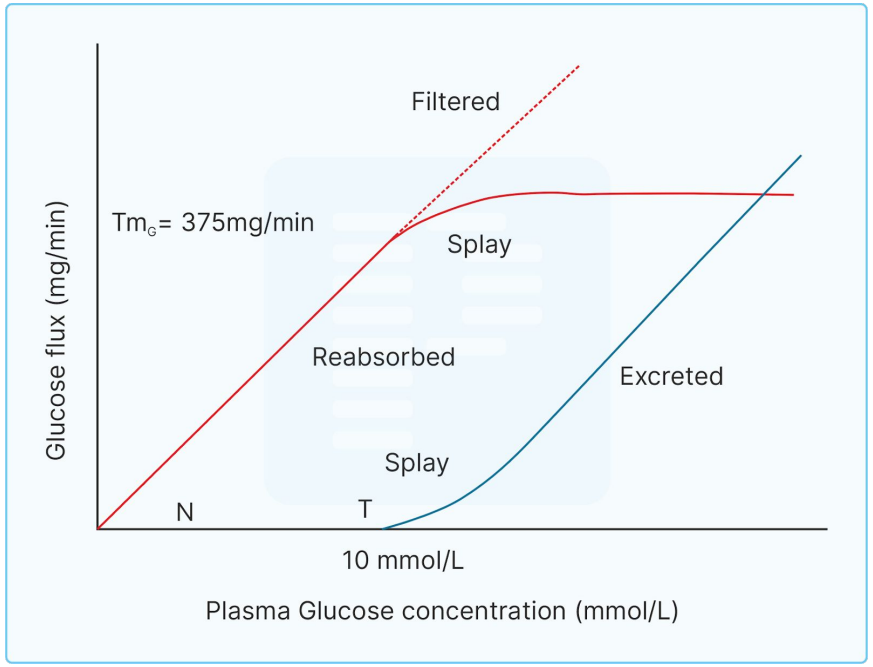
Mnemonic for Right shift - “Right Turn = CADET”

- CO_2 ↑
- Acidity ↑ (↓ pH)
- DPG ↑ (2,3 - BPG)
- Exercise
- Temperature ↑

Q73. The Hamburger phenomenon refers to?

a. Exchange of HCO_3^- into RBCs for Cl^- out of RBCs in venous blood
b. Exchange of Cl^- into RBCs for HCO_3^- out of RBCs in venous blood
c. Exchange of HCO_3^- into RBCs for Cl^- out of RBCs in arterial blood
d. Exchange of Cl^- into RBCs for HCO_3^- out of RBCs in arterial blood

Q74. Which is correct if plasma glucose rises beyond TMG value mentioned in graph for glucose excretion



a. Increase reabsorption in parallel with filtered load
b. Increase excreted rate in parallel with filtered load
c. Decrease reabsorption in parallel with filtered load
d. Decrease excreted rate in parallel with filtered load

- Once TmG is reached, tubular reabsorption is maxed out (plateaus). Any further rise in filtered load (GFR × plasma glucose) appears as urinary excretion, so the excretion line increases in parallel with the filtered line.

Q75. Which of the following blood vessels has the least cross sectional area

a. Capillaries
b. Aorta
c. Veins
d. Arterioles

THANK YOU