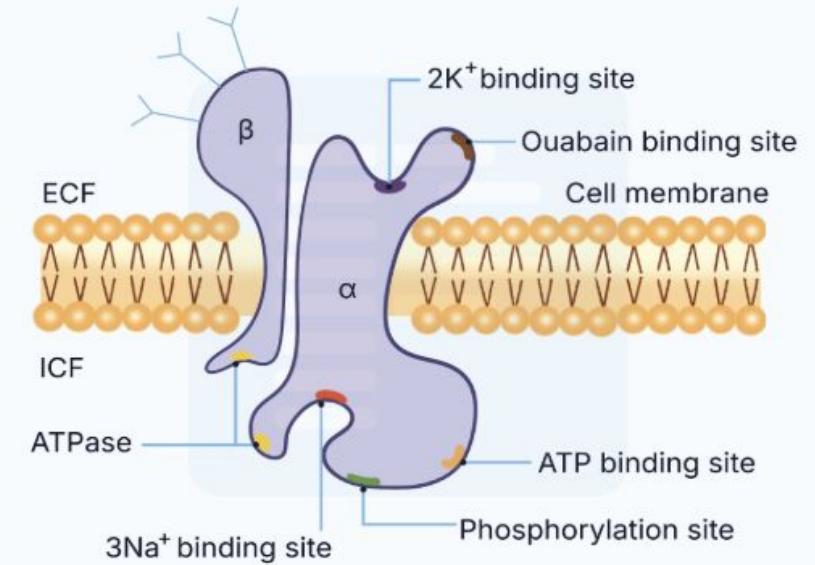
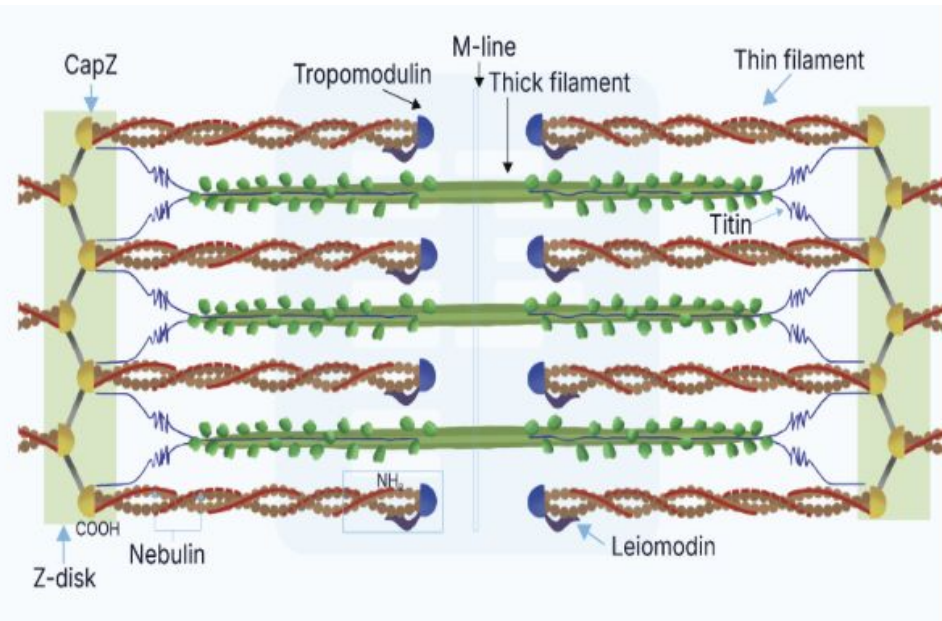
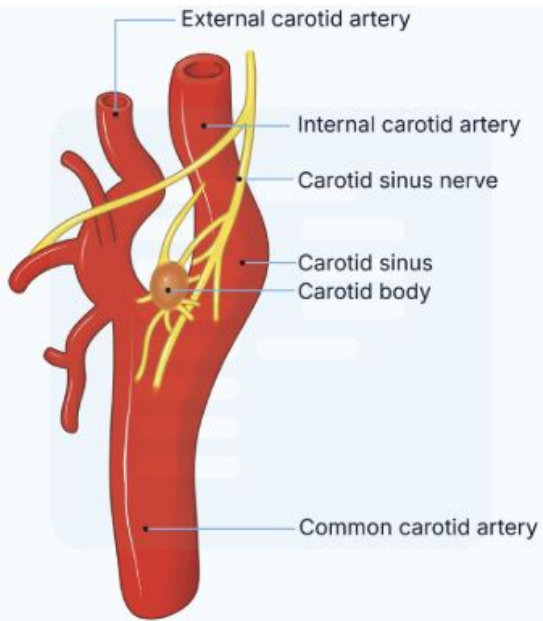


→ major circulating catecholamine  
↓  
Epi

# PHYSIOLOGY



Q1. Which hormone will <sup>\*</sup>decrease with aging in a female? post menopausal

- ~~a.~~ LH ↑
  - ~~b.~~ FSH ↑
  - c.** Testosterone ↓
  - ~~d.~~ Epinephrine
- Estradiol ↓
- ↑

Hormones that <b>decrease</b> with age GET-MD: Mnemonic	Hormones that <b><u>increase</u></b> with age
GH, Estradiol Testosterone Melatonin vit D <sub>3</sub>	✓ LH, FSH ✓ insulin ✓ PTH

## Aromatase enzyme causes

1. Testosterone ————— Aromatase Estradiol E<sub>2</sub>

2. Androstenedione ————— Aromatase Estrone E<sub>1</sub>

- Normal testosterone levels in women 20-70 ng/dL

- Site of testosterone production in women

(major) 50%  
THECA INTERNA, Peripheral  
conversion 25%

Increased testosterone in females seen in-

PCOS, ovarian tumors, Adrenal adenoma and Congenital adrenal hyperplasia





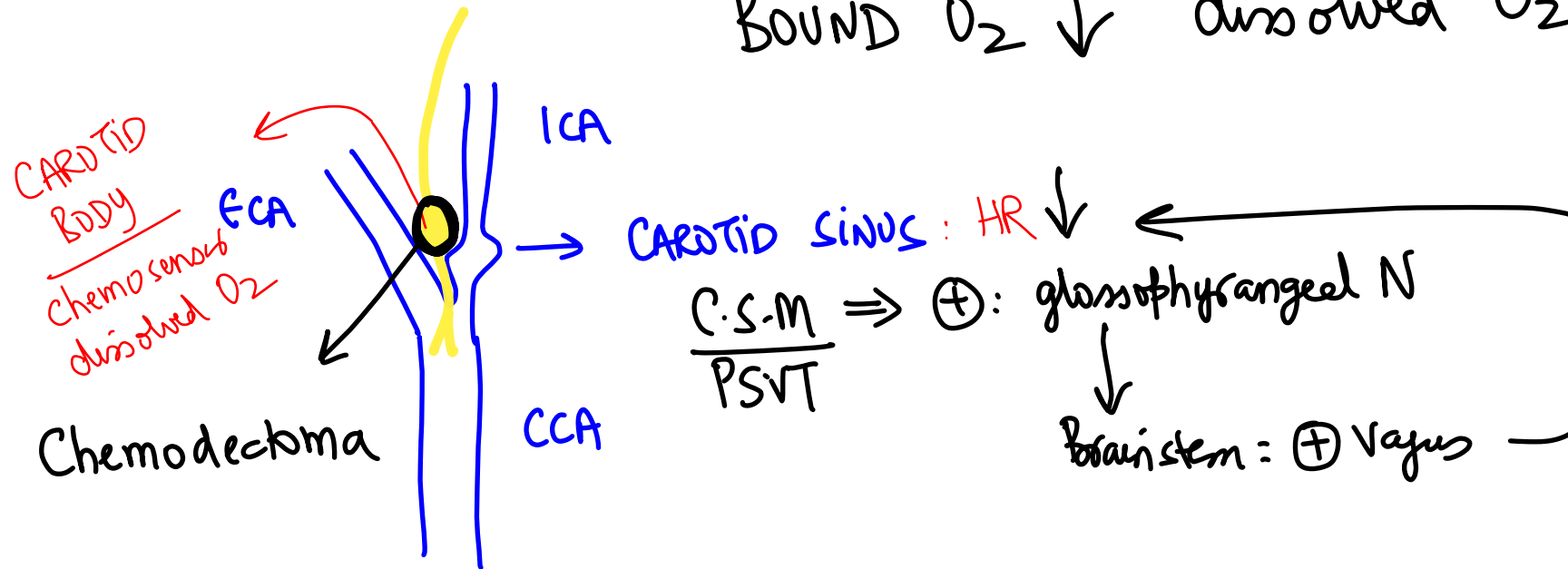
↓  
**Q2. Which is not correct about the carotid body?**

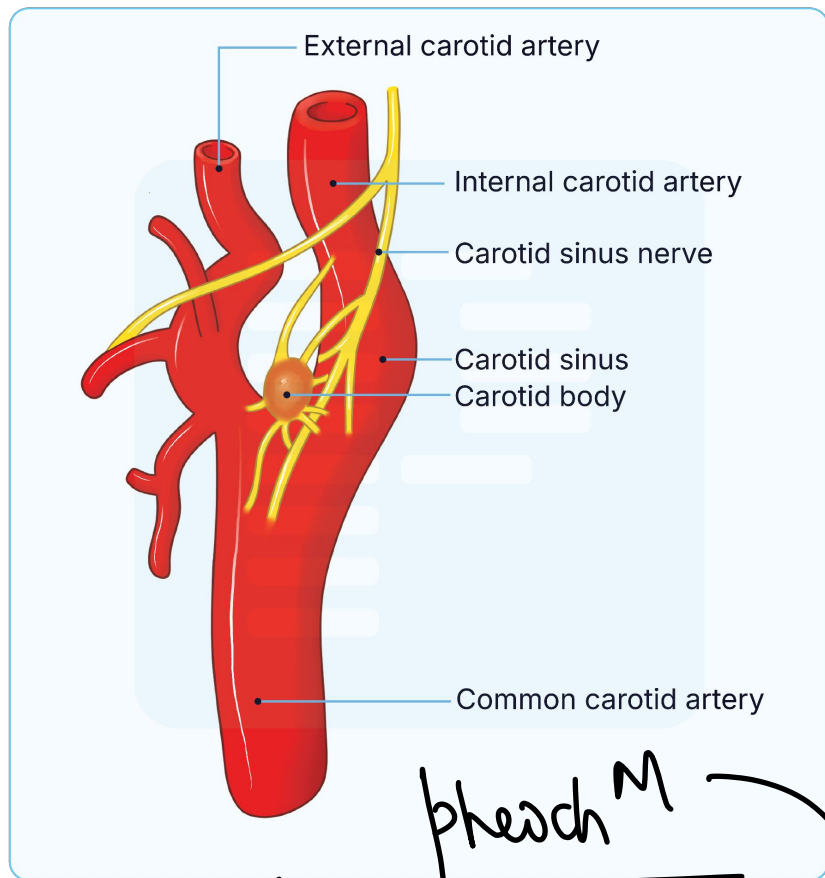
- a. Peripheral chemoreceptor ✓
- b. Innervated by Vagus nerve**
- c. Lined by Glomus cells ✓
- d. Not stimulated in Carbon monoxide poisoning ✓

CAROTID  
SINUS

↓  
BARORECEPTOR

BOUND O<sub>2</sub> ↓ dissolved O<sub>2</sub> same





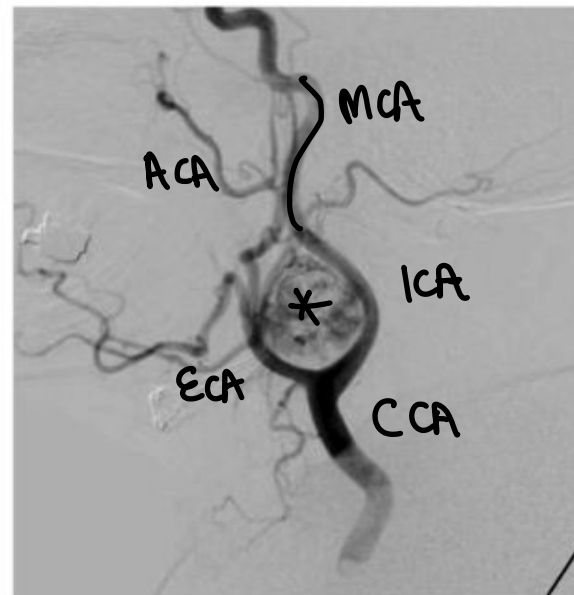
phewch<sup>M</sup>

- \* physio: Epi
- \* path: NE
- \* Med: MEN 2; Epi

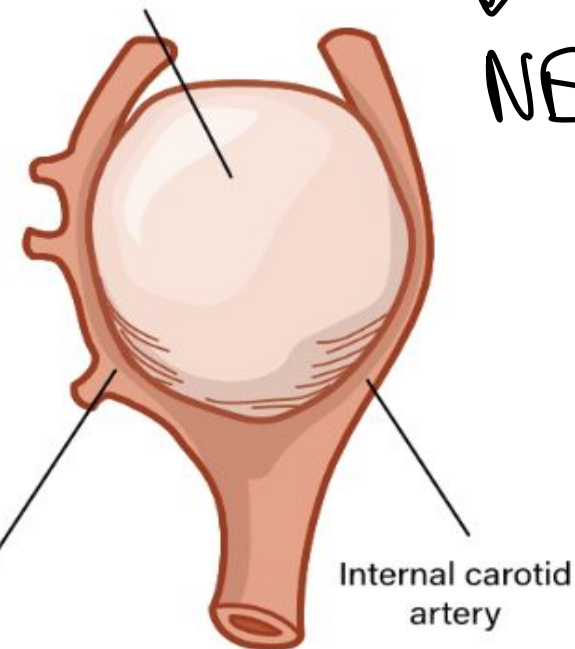
# PARAGANGLIOMA/chemodectome

Carotid body tumour  
(carotid body paraganglioma)

NE



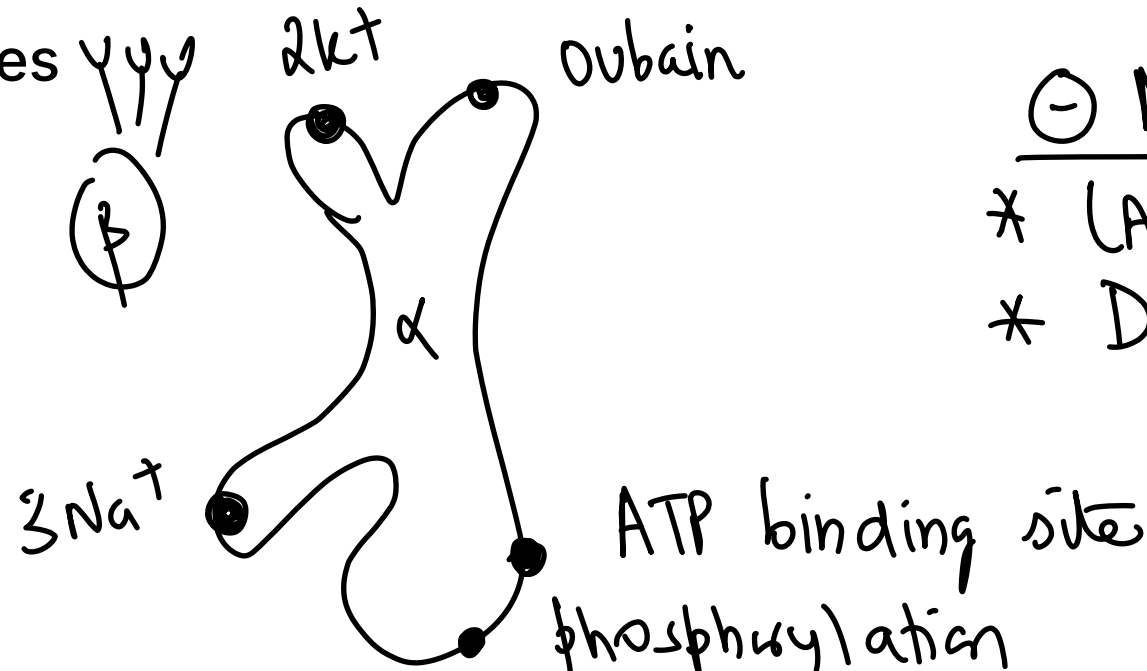
External carotid artery



LYRE SIGN

### 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



⊖ Na/K pump

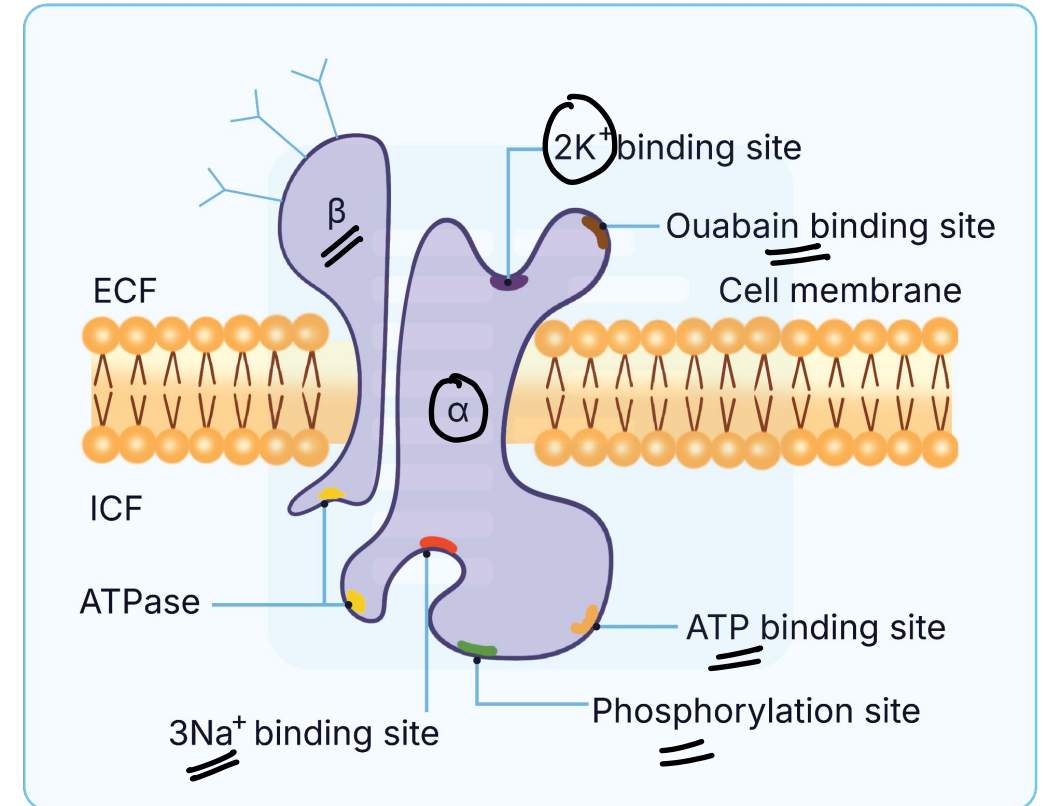
\* LANOXIN, OUABAIN : ↑ CO

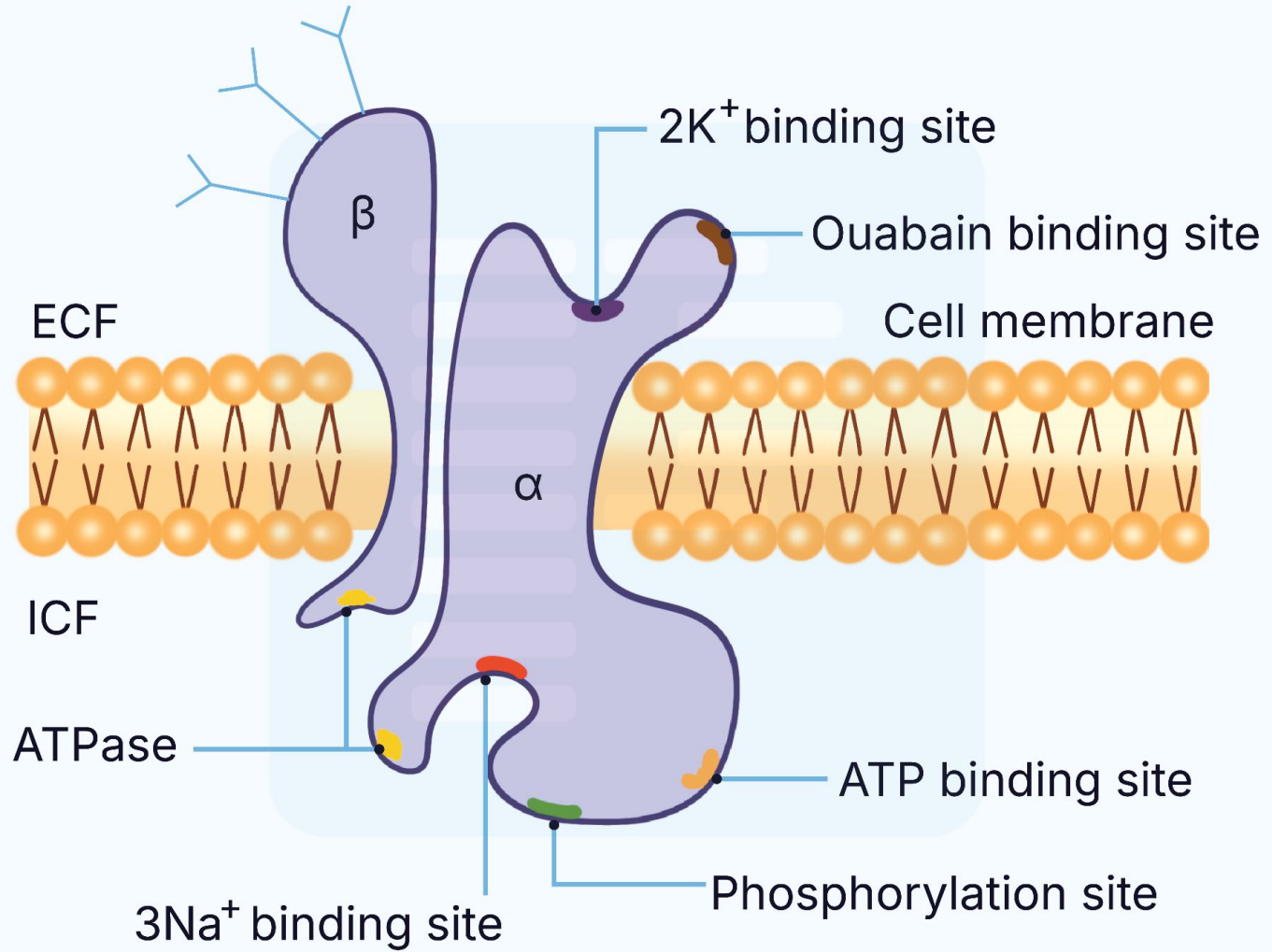
\* Dopamine : NATRIURETIC

↑ U.O

✓  
Alpha subunit (catalytic unit has 5 binding sites: 3 Na<sup>+</sup> sites (intracellular side) and 2 K<sup>+</sup> 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.





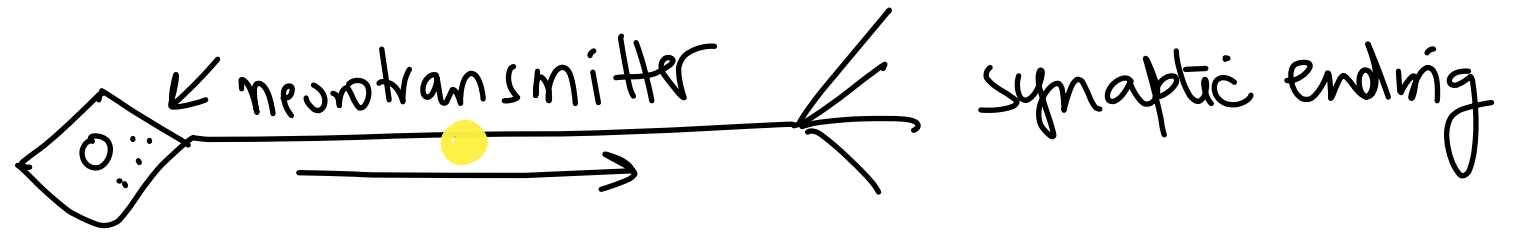


morwahmediane @ gmail. com \*

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?

Molecular motor

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



→ KINESIN

Category 3 bite

ARS : 50%

+ 50%

vaccine

im local site  
im

\*

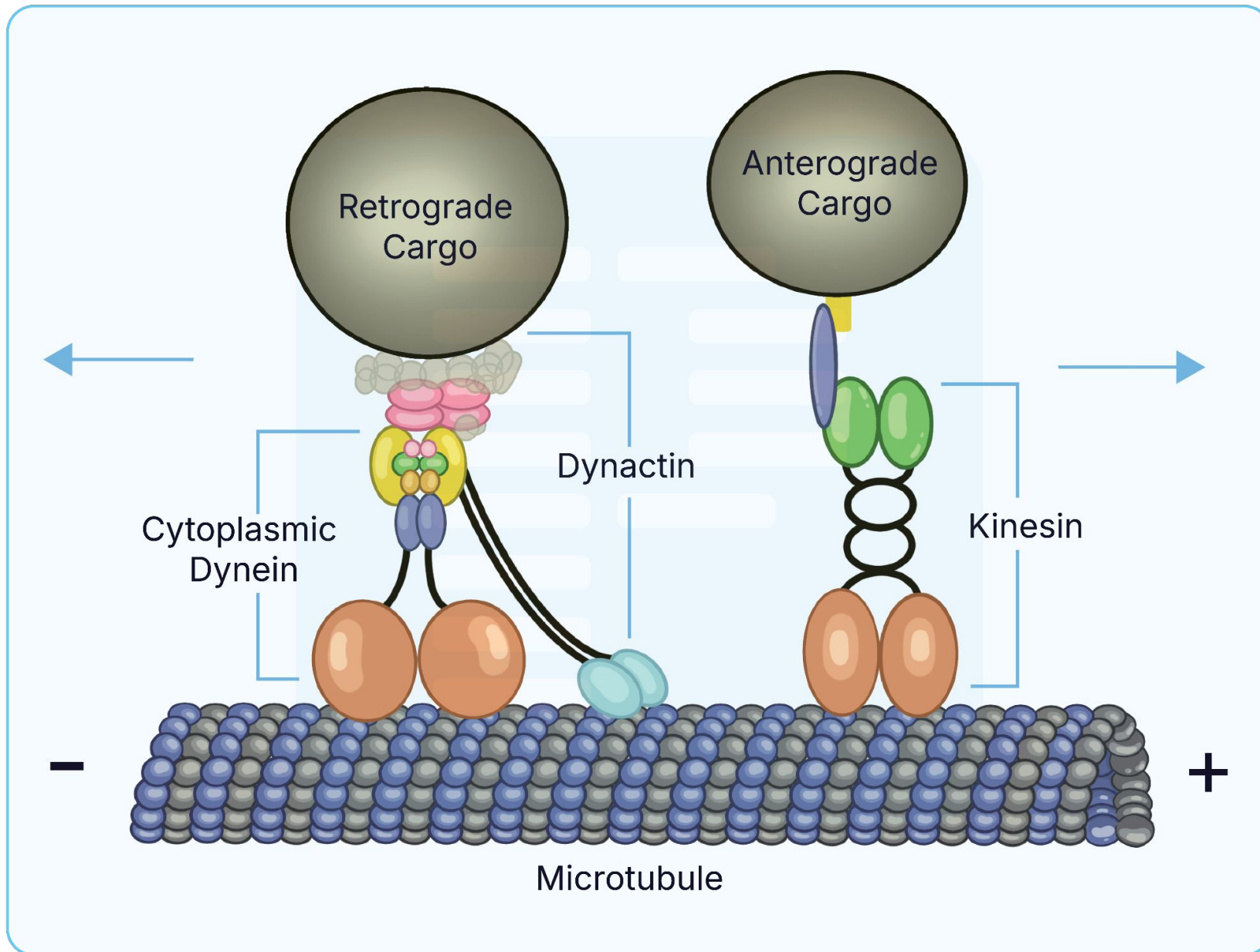
A: Age / Anterograde

D: door / Retrograde  
(far away from glory)

knowledge

dynein

RABIES, POLIO  
HERPES ZOSTER  
TETANUS

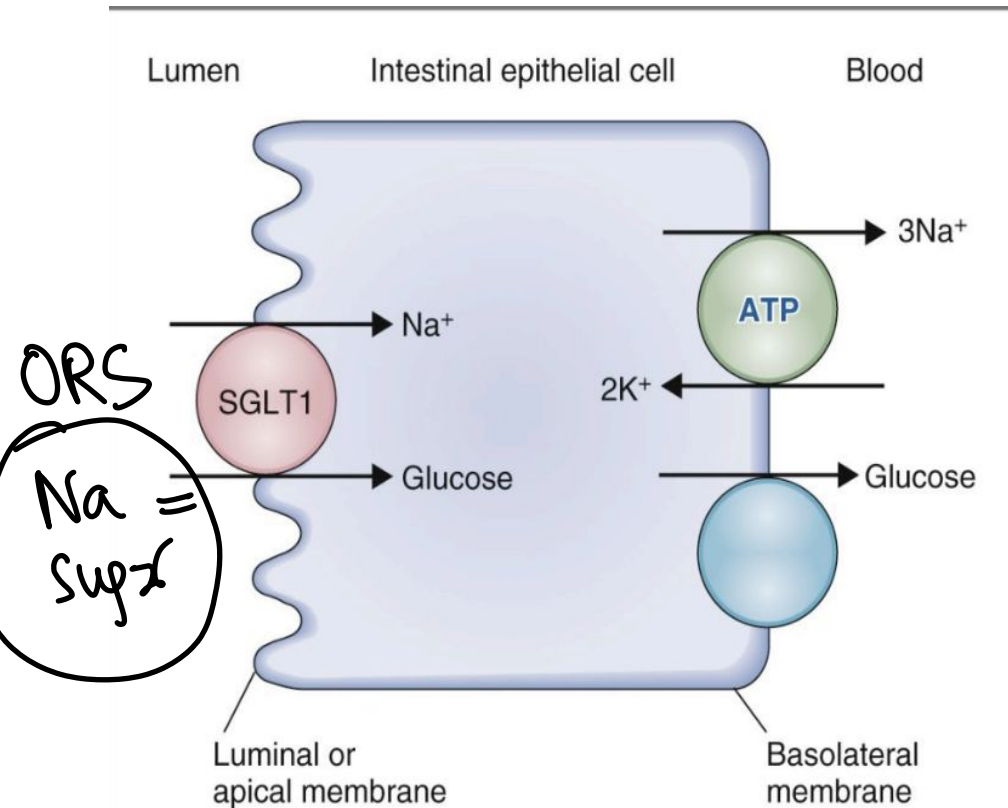


### Q5. Which of the following will inhibit SGLT1?

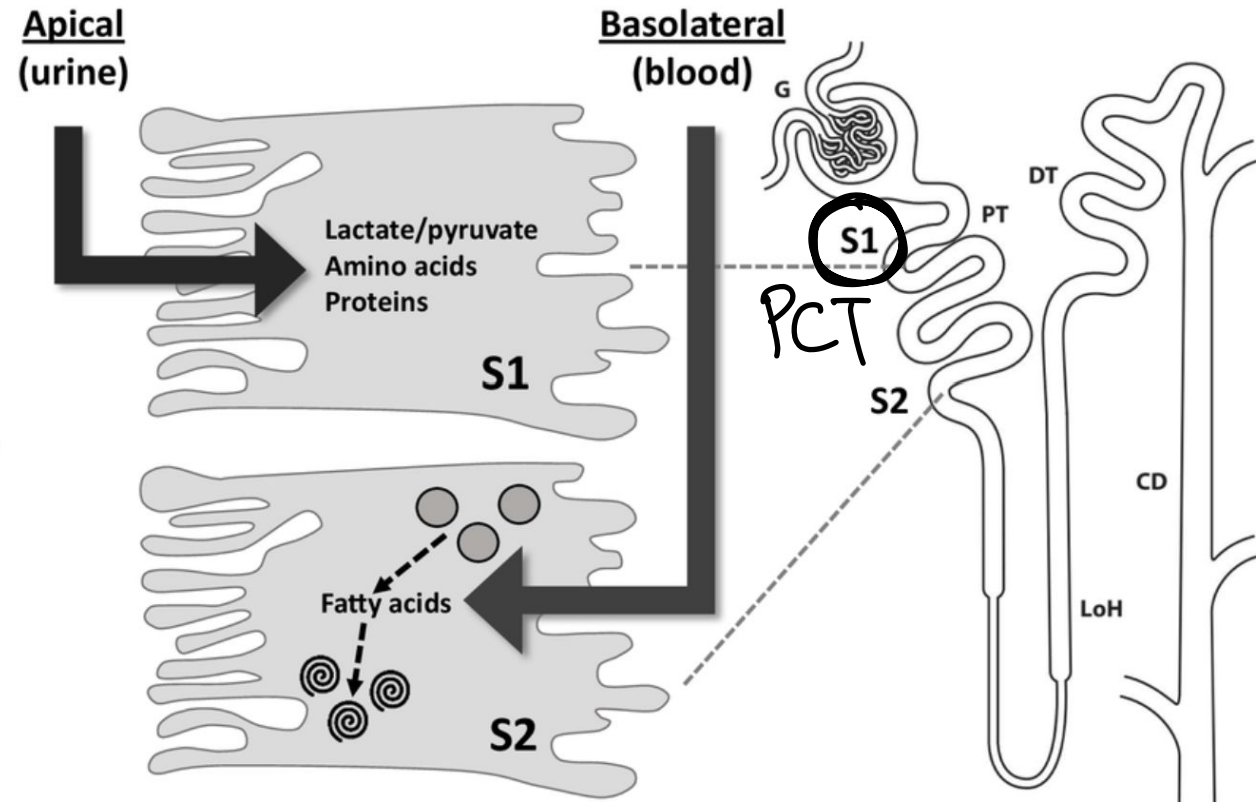
- a. Empagliflozin SGLT2i
- ☒ b. Phlorizin
- c. Dapagliflozin SGLT2i
- d. Moxifloxacin MOA: DNA GYRASE ⊖  
BPalm : MDR TB

SGLT2i  
1. HF  
2. D. Nephropathy

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



vitroline



Kidney / PCT / S<sub>1</sub> segment  
SGLT2

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

- a. Purkinje cells
- b. Stellate cells
- c. Golgi cells
- (d) Granule cells  
GLUTAMATE

↓  
⊖ output

OUTERMOST LAYER → INNERMOST

S	1.	STELLATE
B	2.	BASKET
P	3.	PURKINJE
⊕	4.	GRANULAR
	5	GOLGI

HD  
\* dopamine ↑  
GABA ↓



GLUTAMATE ↑ ⇒ ALS, Epilepsy, stroke, AD



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

~~a.~~ H-K-ATPase

~~b.~~ Na-K pump


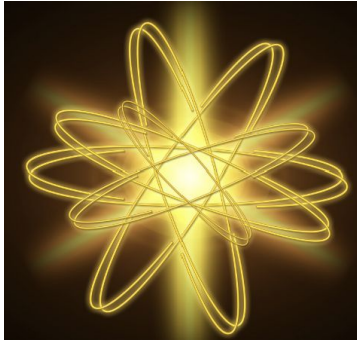

~~c.~~ Ca-ATPase

d. Na- Ca exchanger

antiport

$P_{AT} = P_{PUMP} : \text{ENERGY ATP}$

$SAT =$

Type	Definition	Direction of transport	Energy source	Examples
Primary Active Transport 	Directly uses <b>ATP hydrolysis</b> to pump ions/ molecules against gradient	Solute moves against gradient	ATP (Direct) 	<ul style="list-style-type: none"> <li>• <math>\text{Na}^+</math>-<math>\text{K}^+</math> ATPase (<math>3\text{Na}^+</math> out, <math>2\text{K}^+</math> in)</li> <li>• <math>\text{Ca}^{2+}</math> ATPase (SERCA in SR)</li> <li>• <math>\text{H}^+</math>-<math>\text{K}^+</math> ATPase (Parietal cells, renal tubules)</li> </ul>
Secondary Active transport  <p><i>Piggy back Rides!</i></p>	Uses ion gradient created by $\equiv$ primary pumps to move other solutes	One solute moves down gradient, another moves against	Ion gradient (usually $\text{Na}^+$ or $\text{H}^+$ ) maintained by ATP pumps	Cotransport (Symport): <ul style="list-style-type: none"> <li>• <math>\text{Na}^+</math>-Glucose cotransporter (SGLT1, SGLT2)</li> <li>• <math>\text{Na}^+</math>-Amino acid cotransporters</li> <li>• Exchange (antiport):</li> <li>• <math>\text{Na}^+</math>-<math>\text{Ca}^{2+}</math> exchanger (NCX)</li> <li>• <math>\text{Cl}^-</math> - <math>\text{HCO}_3^-</math> exchanger (AE1 in RBCs)</li> </ul>

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?

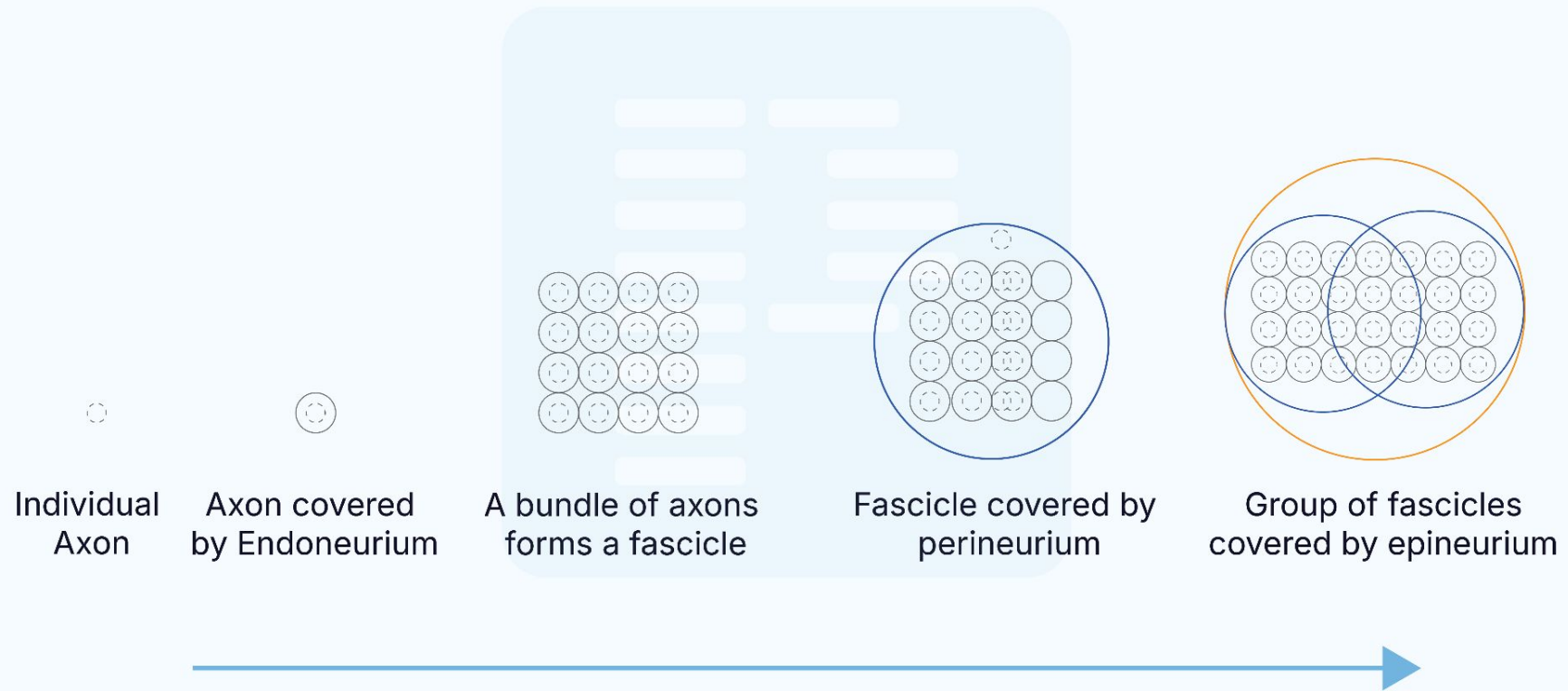
SATURDAY NIGHT Palsy

TMESIS = TORN APART!

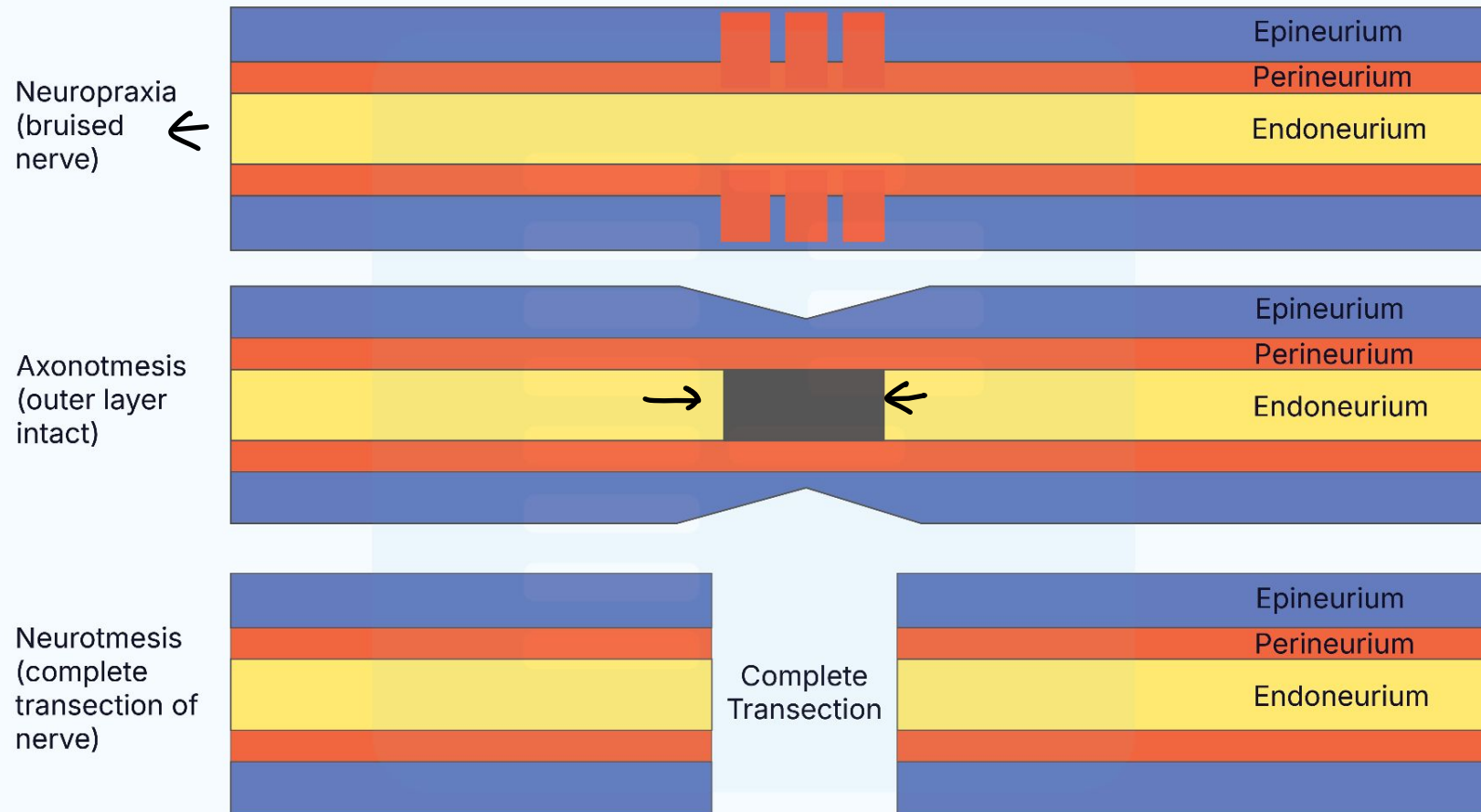
- a. Both axon and endoneurium are ~~disrupted~~
- b. Axon is ~~disrupted~~ but endoneurium is intact
- ☒ c. Axon and endoneurium are intact
- d. Complete ~~disruption~~ of nerve including endoneurium and perineurium

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 N	DISRUPTION	DISRUPTION
Endoneurium / <u>perineurium</u> / <u>epineurium</u>	Preserved N	Preserved (endoneurium), higher layers intact	DISRUPTION
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







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

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

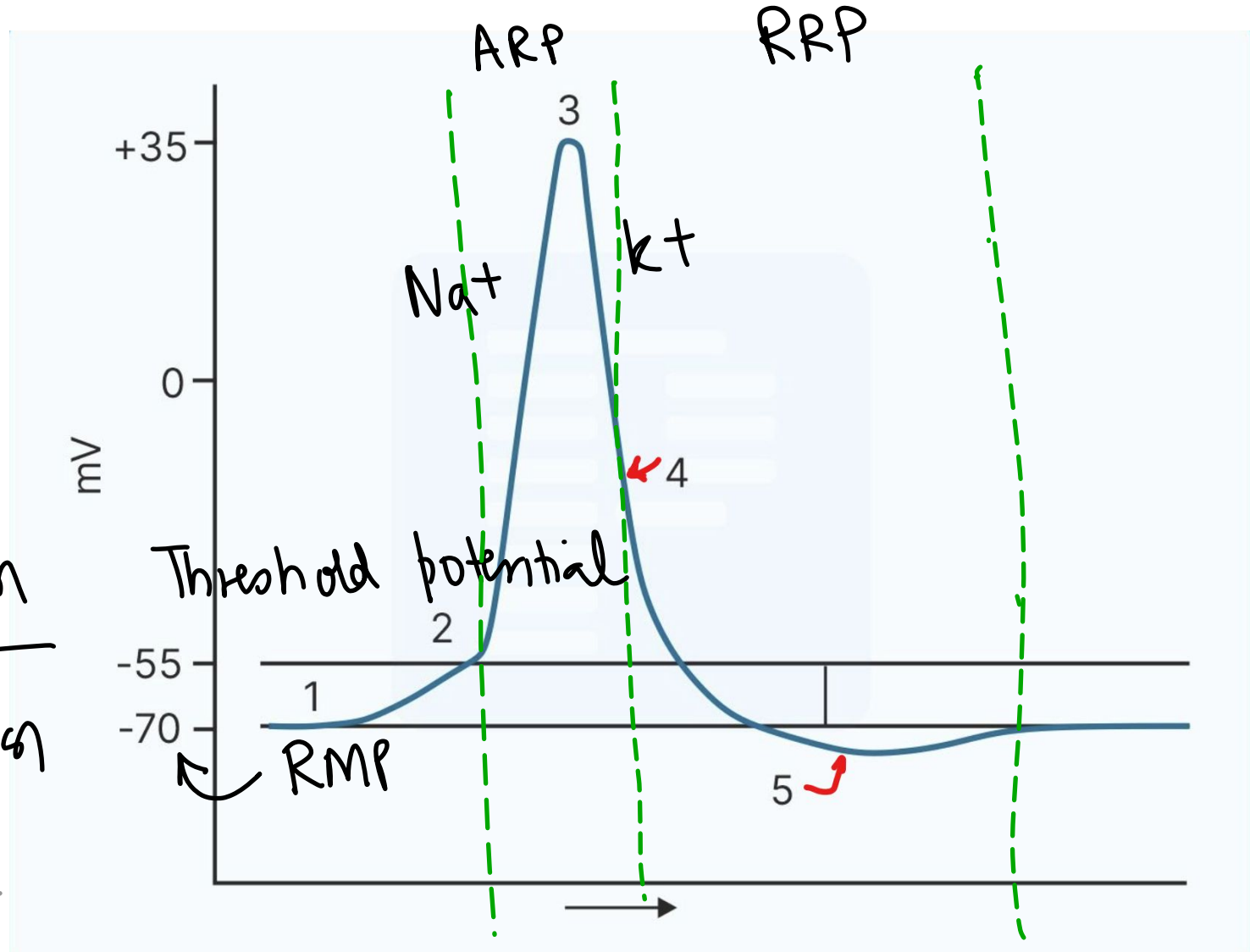
⊖ ATP synthase    ⊖ ENERGY → pump failure

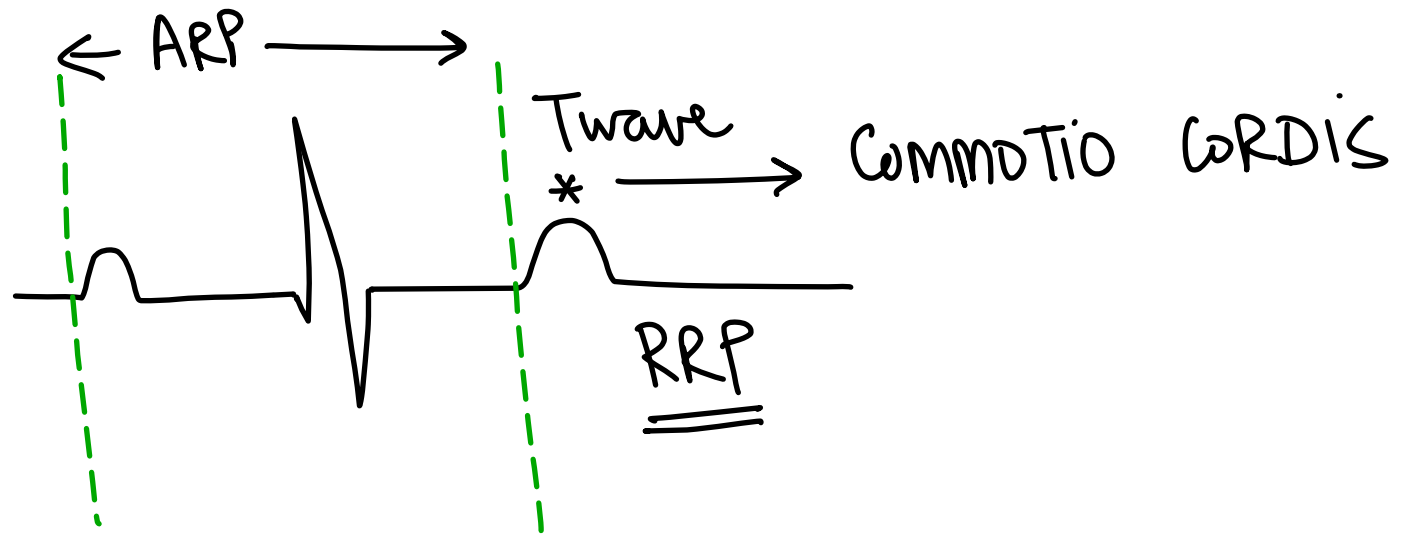
**Q10. Which of the following markings is correct about the absolute refractory period of a nerve?**

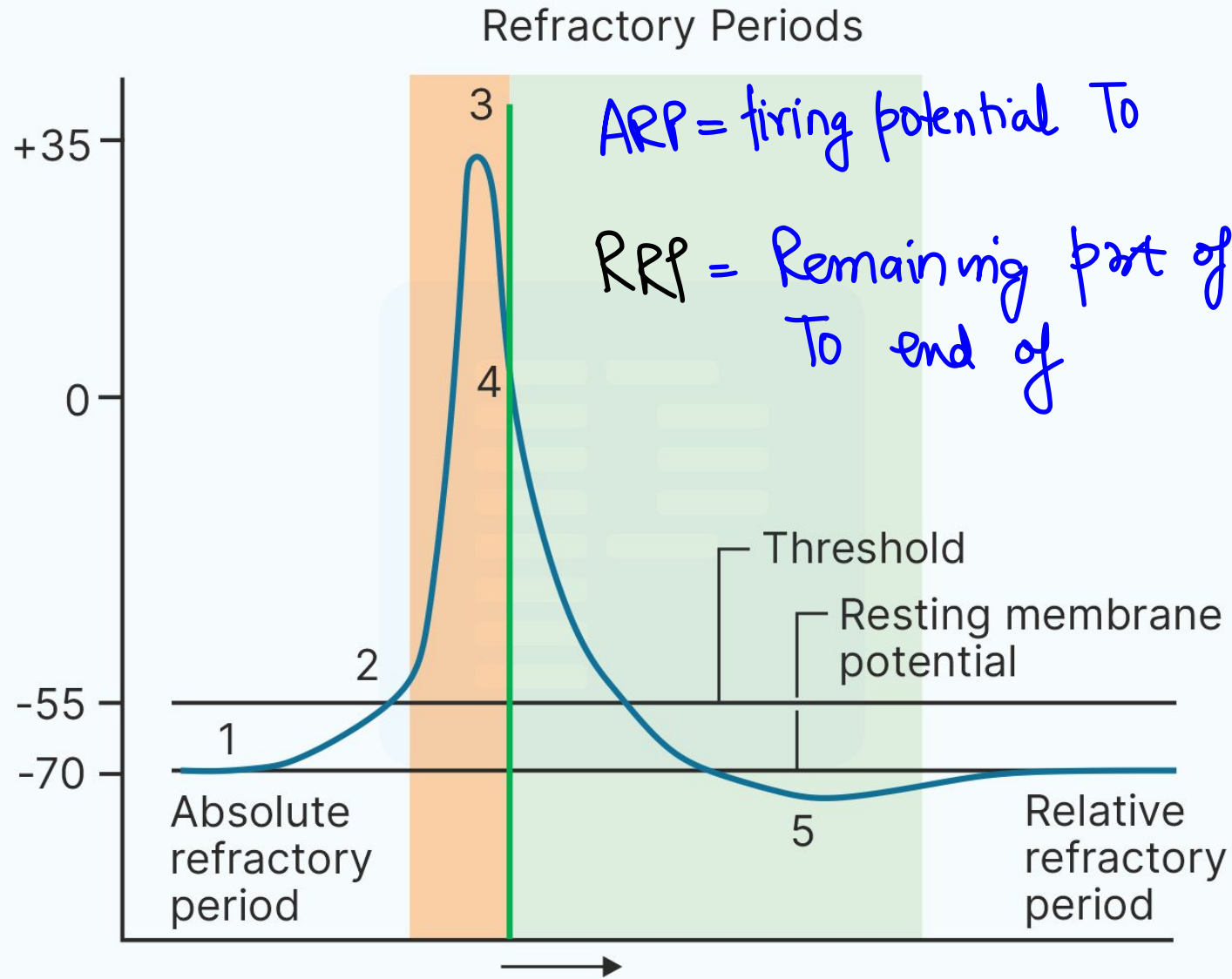
- a. 1 to 2
- b. 1 to 4
- c. 2 to 5
- d. 2 to 4**

Threshold potential To  
1/3rd of Repolarization

Remaining Repolarization  
To end AP RRP



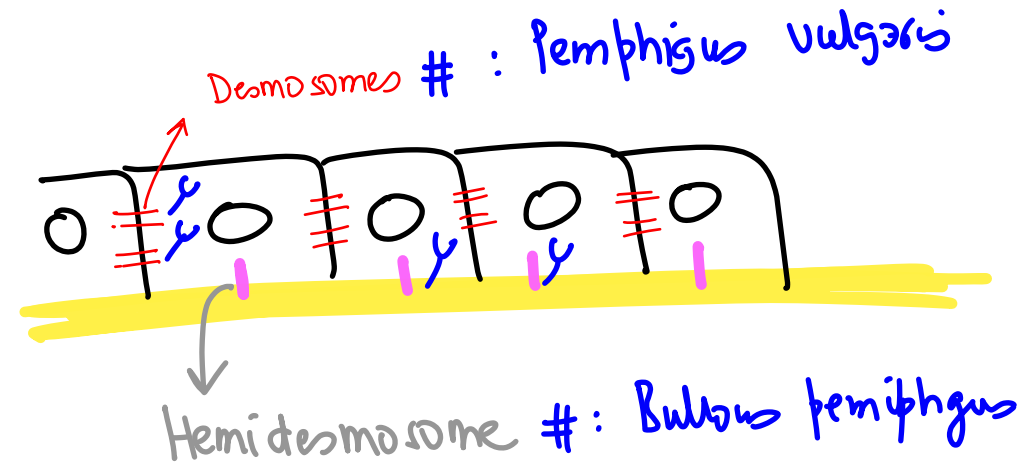


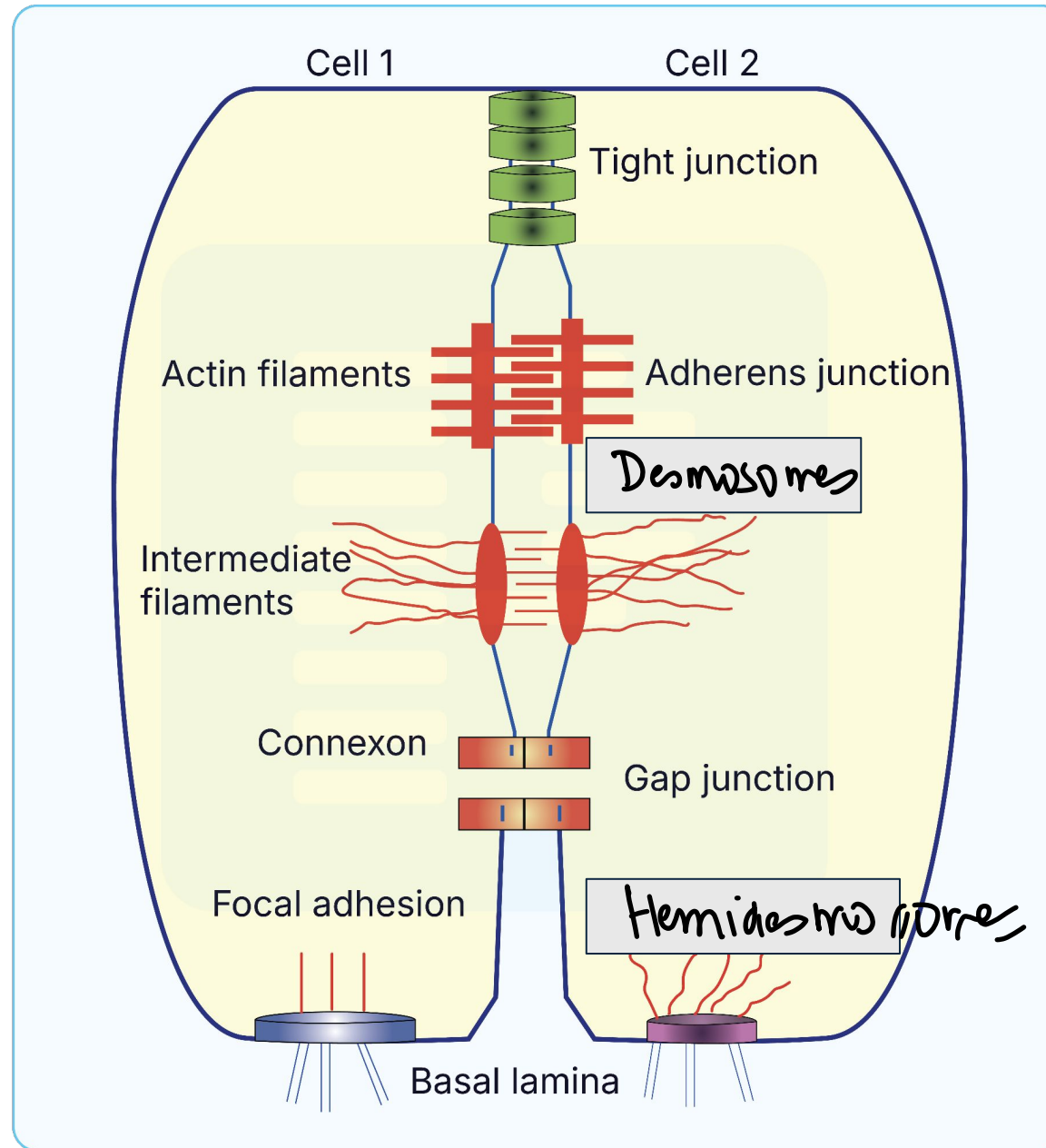




Q11. Cell to basal lamina junction is by which of the following?

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





GBS : P. NERVE, NERVE ROOTS

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.  $A\alpha$  and  $A\beta$  fiber  $\rightarrow$  myelin = paralysis =  $\alpha M$   
 $\rightarrow$  myelin = vibrations, position sense =  $\beta S$
- b.  $A\delta$  and B fibers
- c.  $A\delta$  and ~~C~~ fibers
- d. B and ~~C~~ fibers

A.I.D.P  $\Rightarrow$  demyelinating polyneuropathy

- A $\alpha$  fibers (large myelinated motor): responsible for paralysis and areflexia.
- A $\beta$  fibers (large myelinated sensory): carry vibration and proprioception → sensory ataxia.
- A $\delta$  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
<del>A<math>\alpha</math></del> Group IA and IB afferents	15	60-100 →	Large motor axons Muscle stretch and tension sensory axons
<del>A<math>\beta</math></del> Group II afferents	12-14	30-60 →	Touch, pressure, vibration and joint position sensory axons
A $\gamma$	8-10	15-30	Gamma efferent motor axons
A $\delta$ 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

GBS

↖ D-Neuropathy

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?

Sharp pain, Temp

dull pain, autonomic functions: sweating postural change of BP

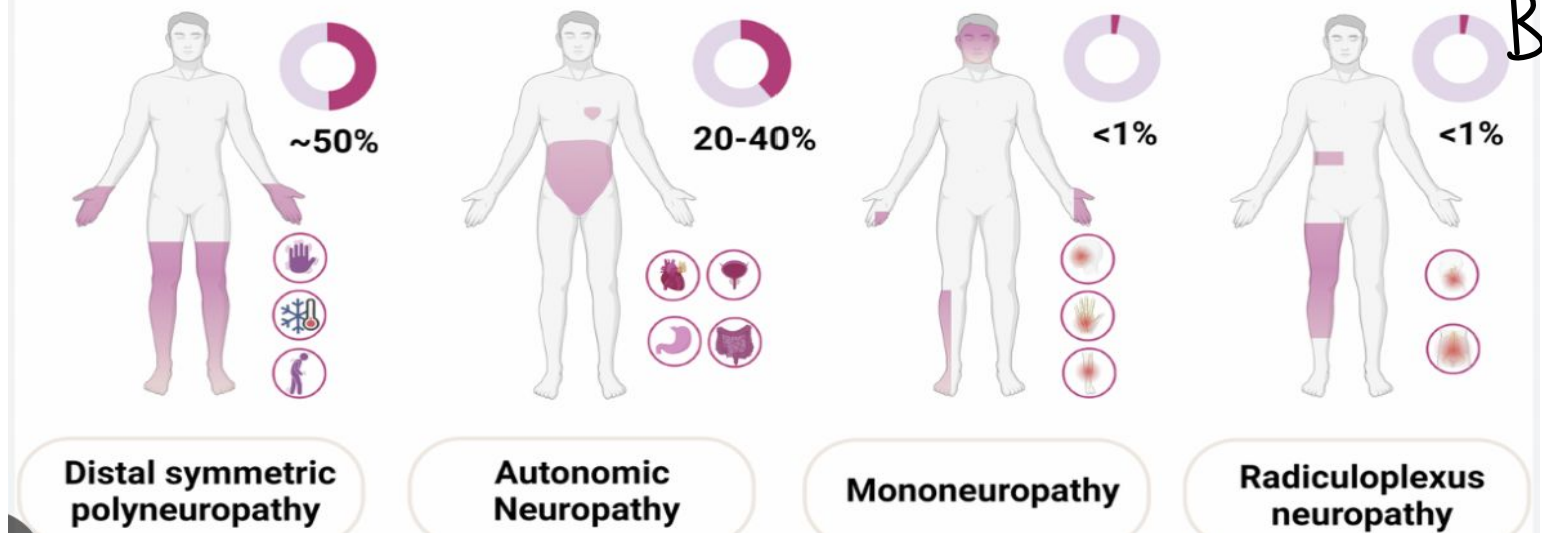
a. A $\alpha$  and A $\beta$  fibers

b. A $\delta$  and C fibers

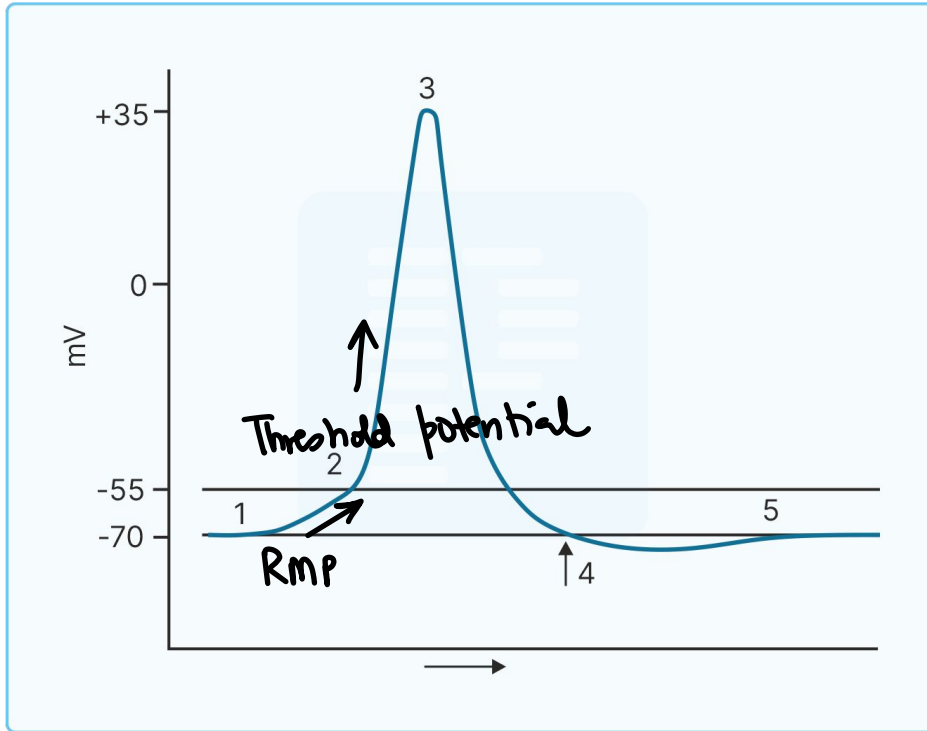
c. B fibers and A $\gamma$  fibers

d. A $\alpha$  and A $\delta$  fibers

#### Classification of Diabetic Neuropathy



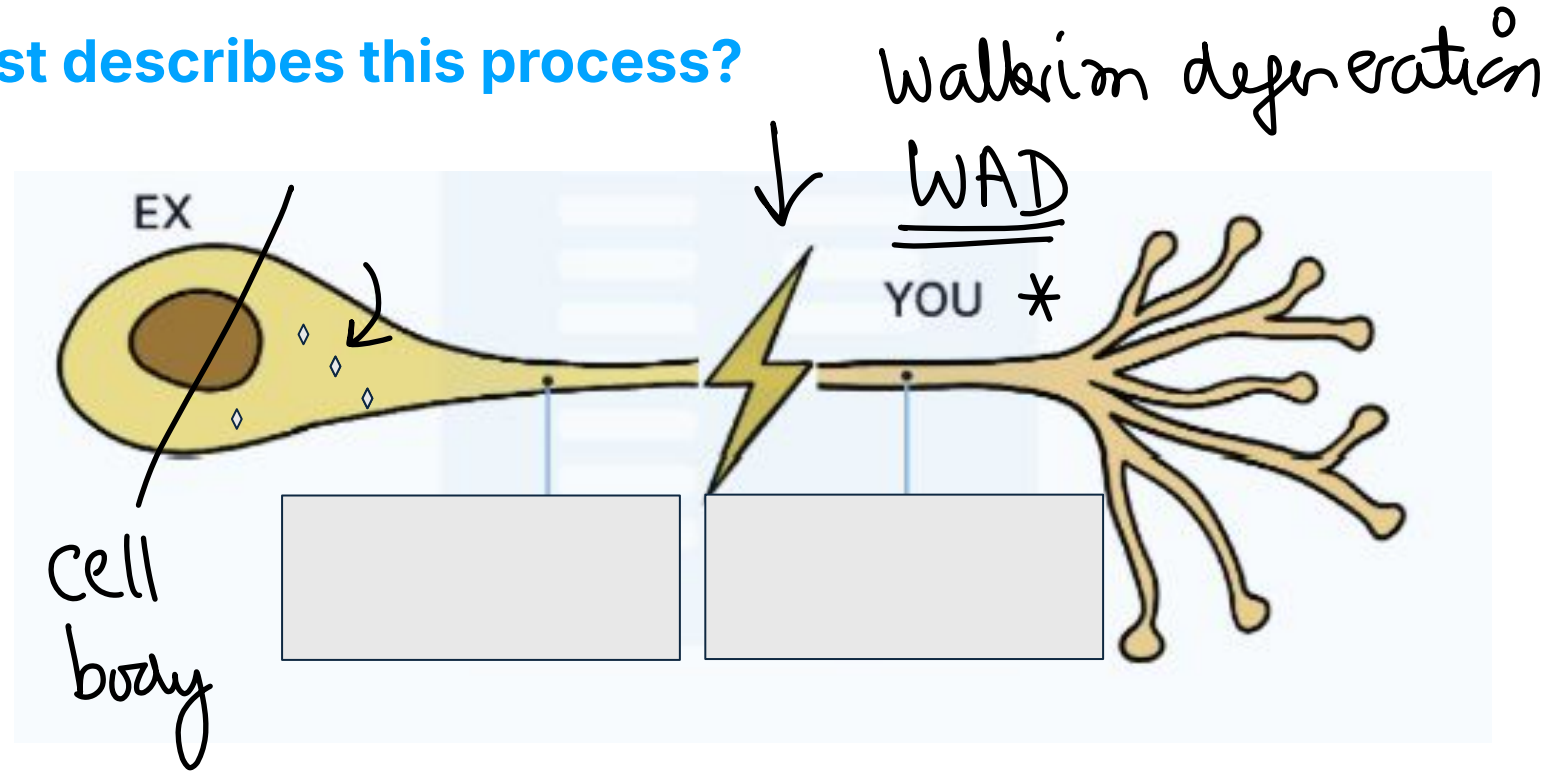
**Q14. Which of the following markings is correct about the Hodgkin cycle seen during nerve AP?**



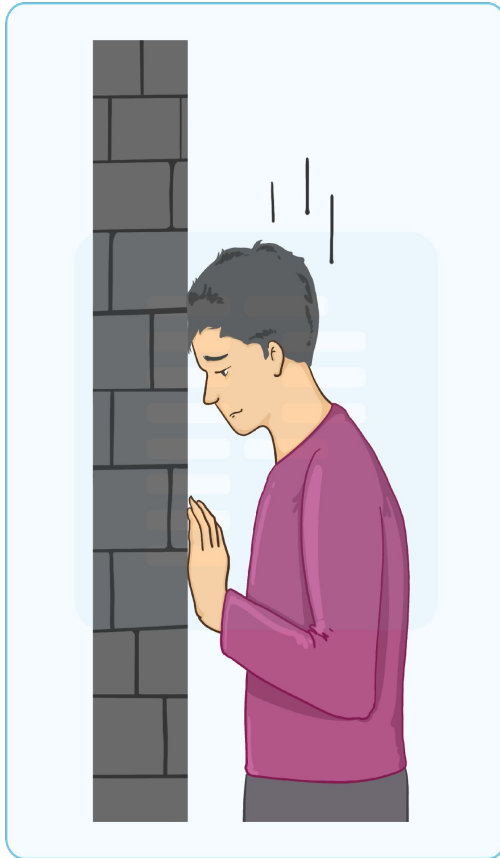
- a. 1 to 2
- b. 1 to 4
- c. 2 to 3
- d. 2 to 4

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



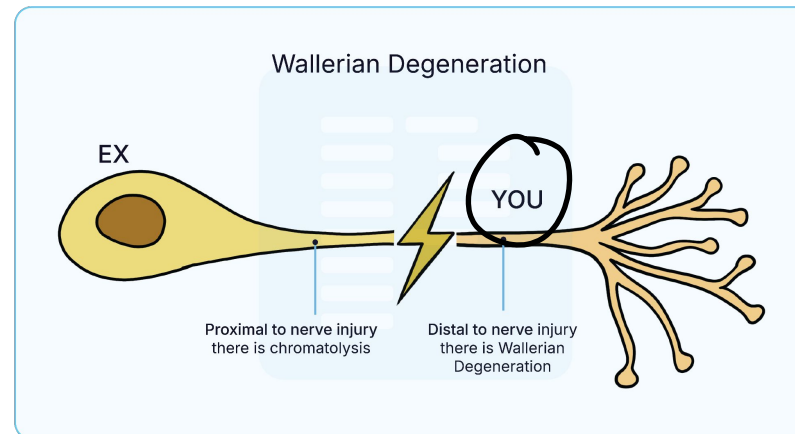




## BREAK UP STORY

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?

DMD  
XLR

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

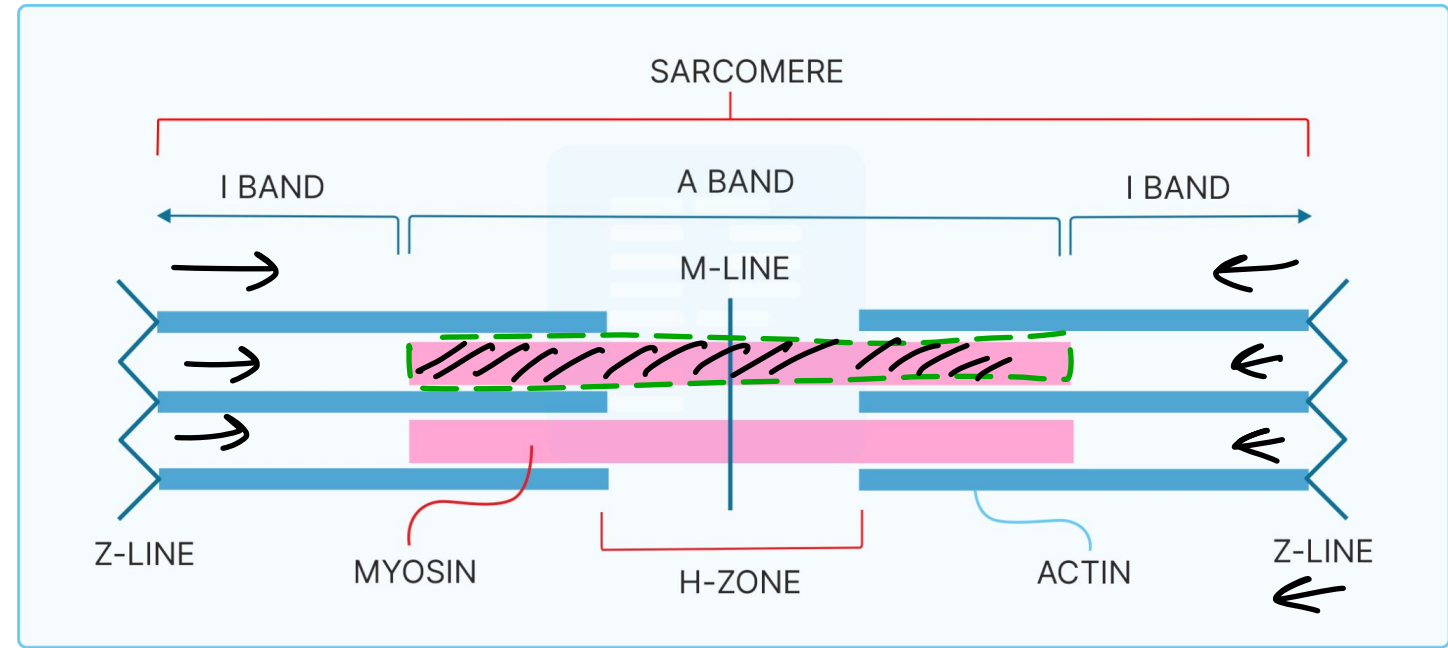
Contractile	ACTIN (THIN)	MYOSIN (THICK)	ATP
Structural	A.D.D. strength		
	Z-M		
	ACTININ, desmin, dystrophin, Titin, nebulin		
	Z-plasma memb <sup>N</sup>		
Regulatory	Troponin C: $Ca^{2+}$		
	I: $\rightarrow \ominus$ A/M interaction		
	T: Tropomyosin		
Relaxation	SERCA, CALDESSESTRIN		

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

Always = A  
same



HAM

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

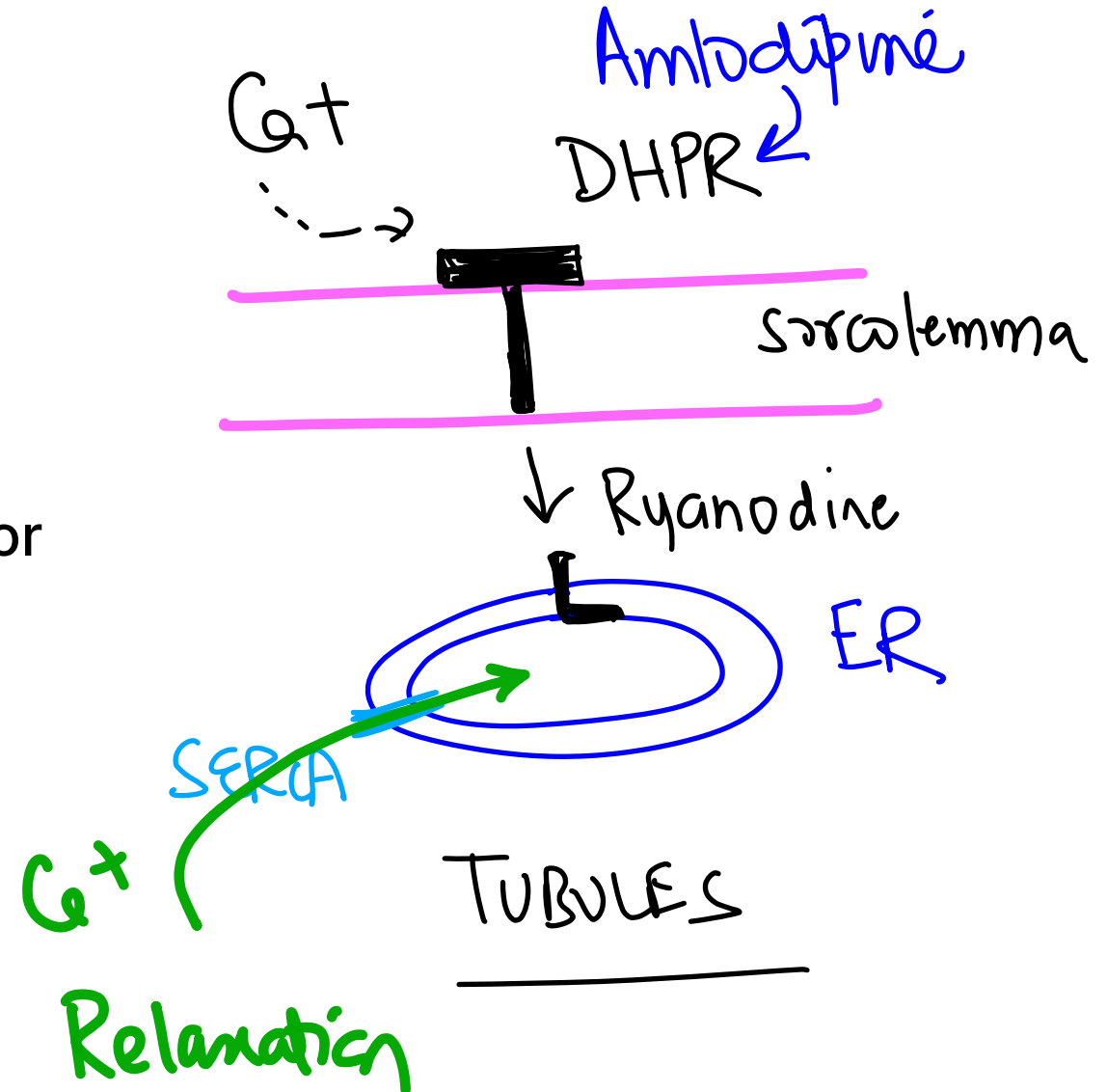
\* TDS  $\Rightarrow$  T-TUBULES, DHPR, Sarcoplasmic

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

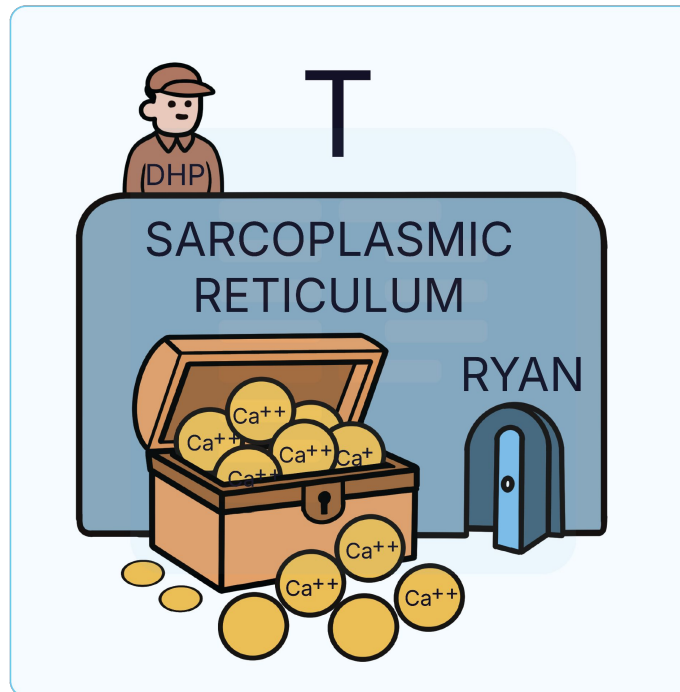
- a. Present in sarcoplasmic reticulum
- ☒ b. Present in sarcolemma
- c. Regulate functioning of SERCA
- d. Regulate functioning of Ryanodine receptor

MH: - Ryanodine # :  $\uparrow$   $Ca^{2+}$  influx  
Sch, Halothane  
Rx: DANTROLENE sodium

NMS: - Risperidone  $\uparrow$



- 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 → Hypokalemic Periodic paralysis
- c. DMD gene on chromosome Xp21
- d. CFTR gene on chromosome 7: CF



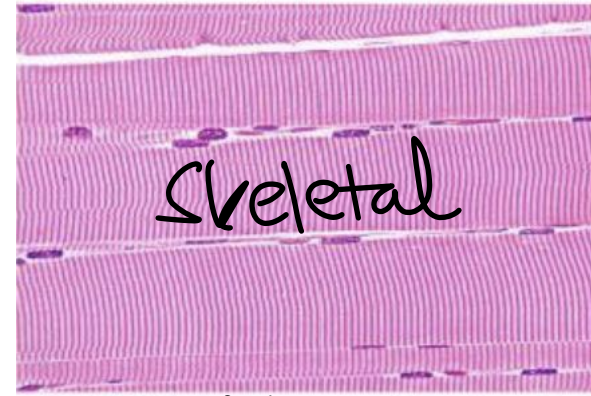
SERCA

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

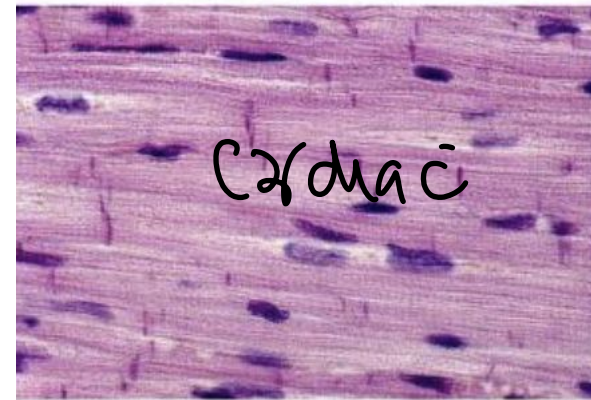
- a. Skeletal muscle contraction
- ☒ b. Skeletal muscle relaxation
- c. ~~Smooth~~ muscle contraction
- d. ~~Smooth~~ muscle Tetanization

## Q21. Which is not correct about cardiac muscle?

- a. Intercalated disc ✓
- ☒ b. Dense bodies
- c. High myoglobin content ✓  $\uparrow O_2$
- d. Alpha MHC isoform predominates in atria and beta MHC isoform predominates in ventricles ✓



STRIATION



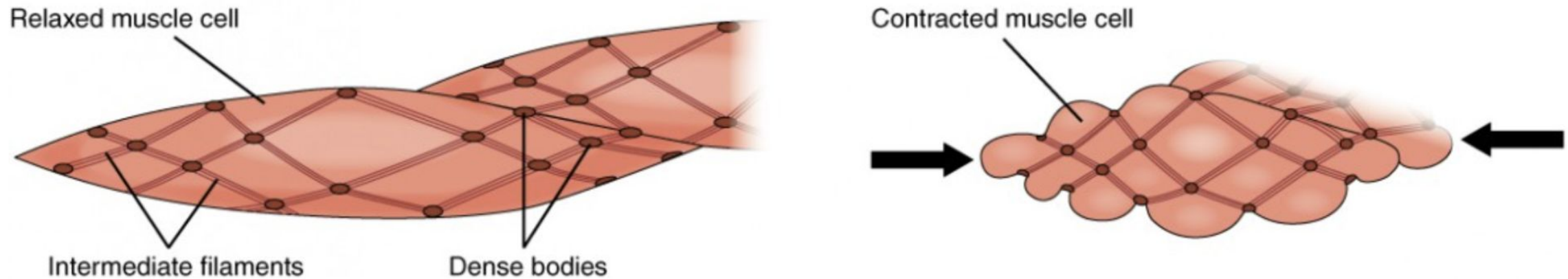
SYNCTIUM



Smooth

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  $\text{Ca}^{++}$  ions passing through opened calcium channels in the sarcolemma, and additional  $\text{Ca}^{++}$  released from SR, bind to calmodulin. The  $\text{Ca}^{++}$ -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  $\text{P}_i$ , with the  $\text{P}_i$  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

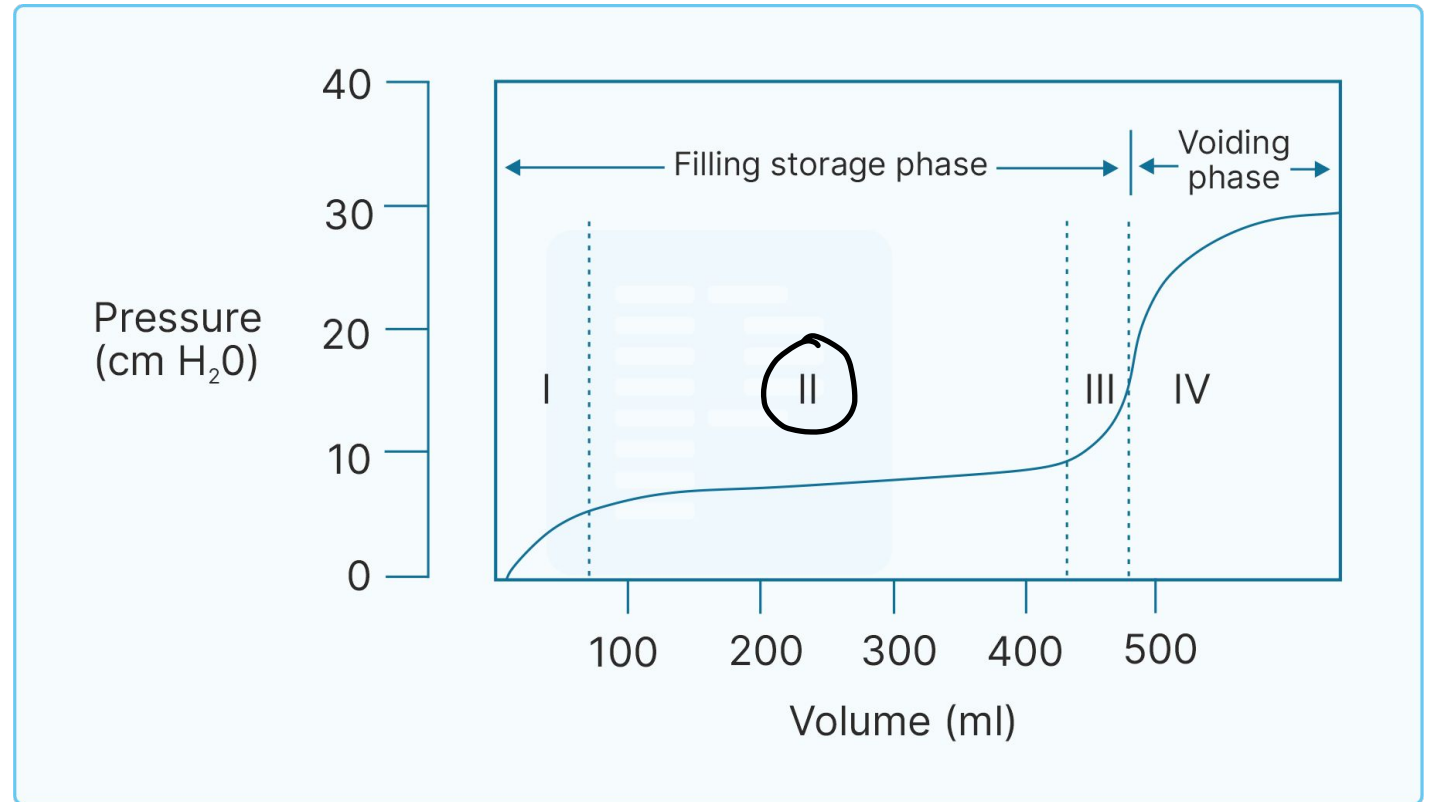
→ BV

b. Elasticity

c. Plasticity

d. Tetanic potentiation

adapt To stretch  
c minimal ↑ in  
Tension



- 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 ( $\approx 400\text{--}500$  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  $\text{Ca}^{2+}$ , 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

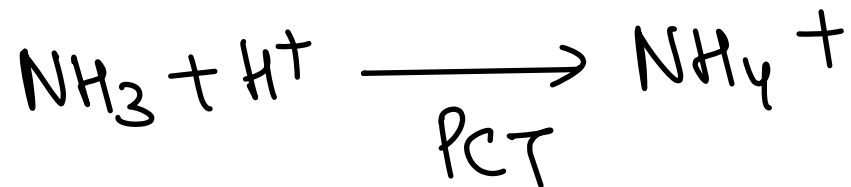
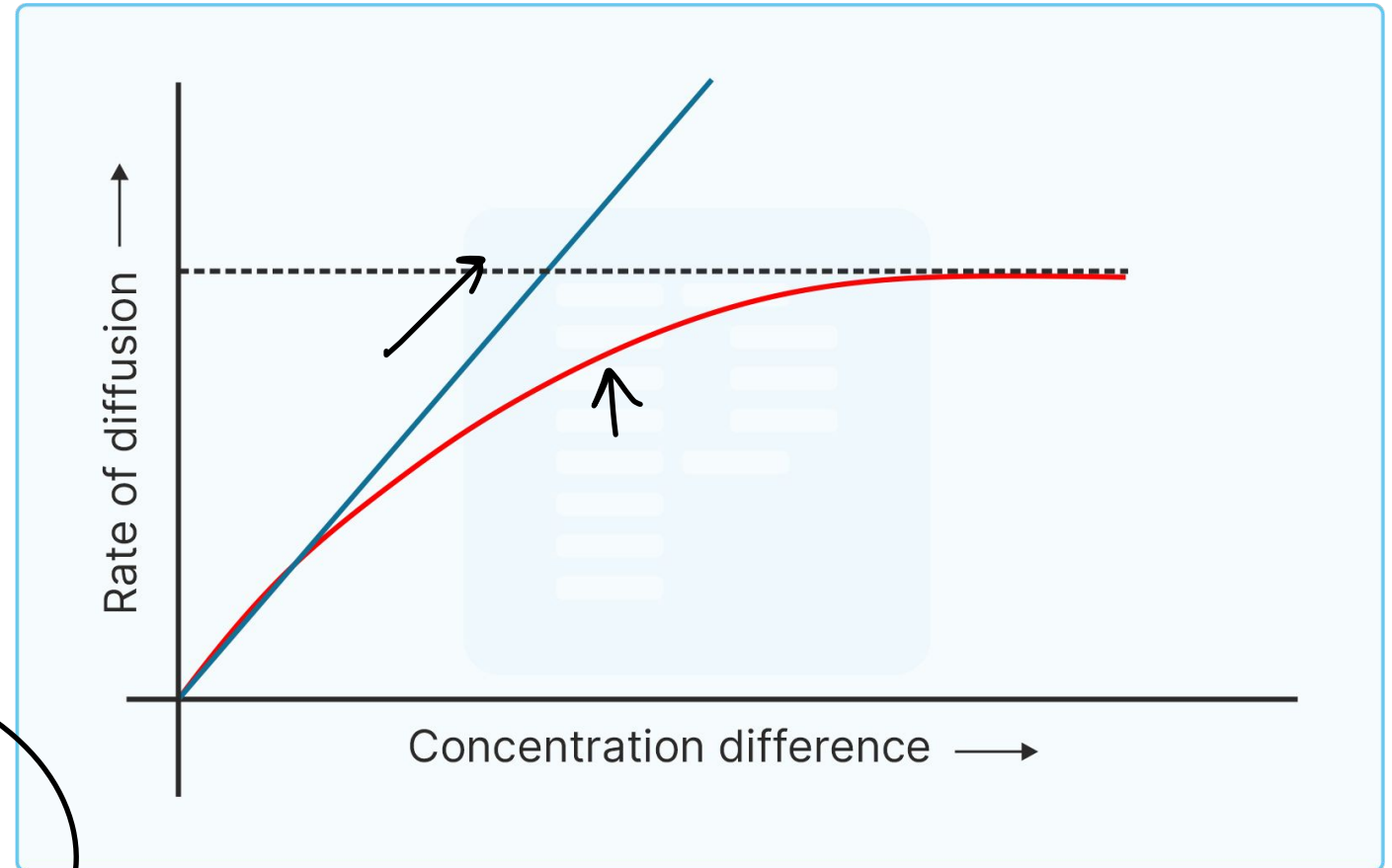
Q25. The red graph shown below is a representation of which of the following?

GASES

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

SOLVENT

NH<sub>3</sub>  
Transport  
=



- 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 RBC, placenta, Brain
- b. GLUT 2 PANCREAS:  $\beta$  cells
- c. GLUT 3 WBC
- (d) GLUT 4 MUSCLE, ADIPOSE TISSUES, LIVER

# insulin receptors  
DM

\* GLUT4 deficiency  $\Rightarrow$  FANCONI BICKEL SYN

- \* FASTING HYPOGLYCEMIA
- \* POST prandial HYPERGLYCEMIA

**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

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

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

~~a.~~ Gitelman syndrome : loss OF FUNCTION = SALT WASTING/saving  
" " "

b. Bartter syndrome

c. Gordon syndrome : GAIN OF FUNCTION = HTN  
" " "

d. Liddle syndrome

Na K Cl<sup>-</sup> cotransporter: TAL : loss of function

ENaC : gain of function

Q29. Band 3 protein is located in?

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

\* HS = ANKYRIN #  
\* HE = SPECTRIN #

ANION Exchanger  
CHLORIDE SHIFT



### 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

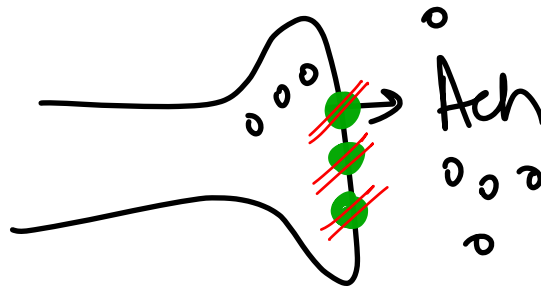
Neonate: day 0: Honey

flaccid paralysis

- Poor cry

- Poor Moro

Ach ↓



\* Rigidity / excitation

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

\* Botulinum : Cleavage of SNARE : ↓ Ach release : ⊖

\* Tetanospasmin : " " synaptobrevin : ↓ GABA → ⊕  
↓ glycine Rigidity

Q32. Endocytosis is mediated all of the following except?

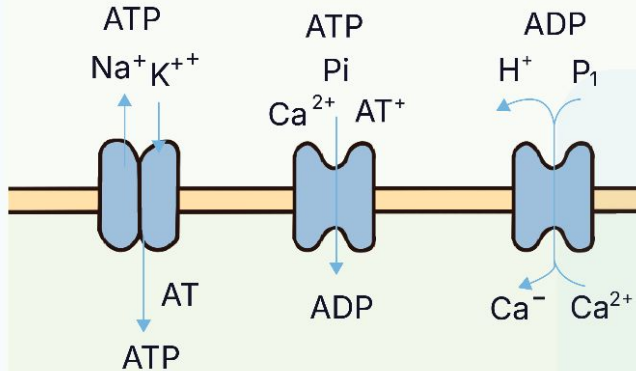
- a. Clathrin LDL uptake
- b. Cubilin IF-B<sub>12</sub> : ileum
- c. Caveolin CHOLERA TOXIN
- (d) SNAP 25 Exocytosis

↓  
ENTRY into  
ENTEROCYTES  
↑ CAMP  
H<sub>2</sub>O channels open  
SECRETORY DIARRHEA

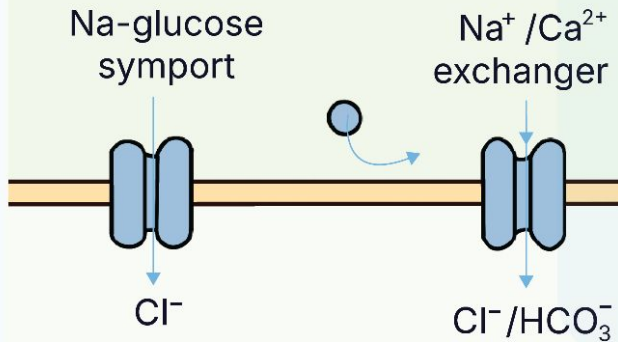
→ BAT = botulism  
→ TiG = Tetanus  
    neonate  
    ↓  
    \* intrathecally

## Transport Systems

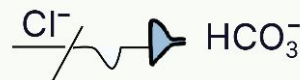
### Primary Active Transport



### Secondary Active Transport

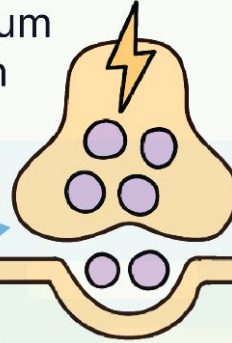


### Band 3 Protein (RBC)

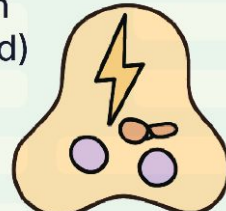


## Toxins

**Botulinum toxin**  
Cleaves SNARE



Exocytosis of ACh blocked



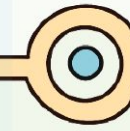
**Tetanospasmin**

Cleaves synaptobrevin

Inhibits GABA/glycine release  
Spastic paralysis

## Endocytosis Pathways

**Clathrin-mediated**  
(eg., LDL receptor uptake)



Vesicle budding

**Caveolin-mediated**  
Signal transduction, endocytosis of some lipids



**Cubilin-mediated**

Intestinal uptake of intrinsic factor-B<sub>12</sub> complex

**Caveolin-mediated**

Signal transduction, on some lipids

**Cubilin-mediated**

Intestinal uptake of intrinsic factor-B<sub>12</sub> complex

**Q33. Most reactive oxygen derived free radical?**

- a. Superoxide
- ☒ b. Hydroxyl  $\text{OH}^\cdot$
- c. Hydrogen peroxide
- d. Peroxynitrite

\* CNS = CNS, oligodendrocytes, PNS = Schwann : Myelin

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

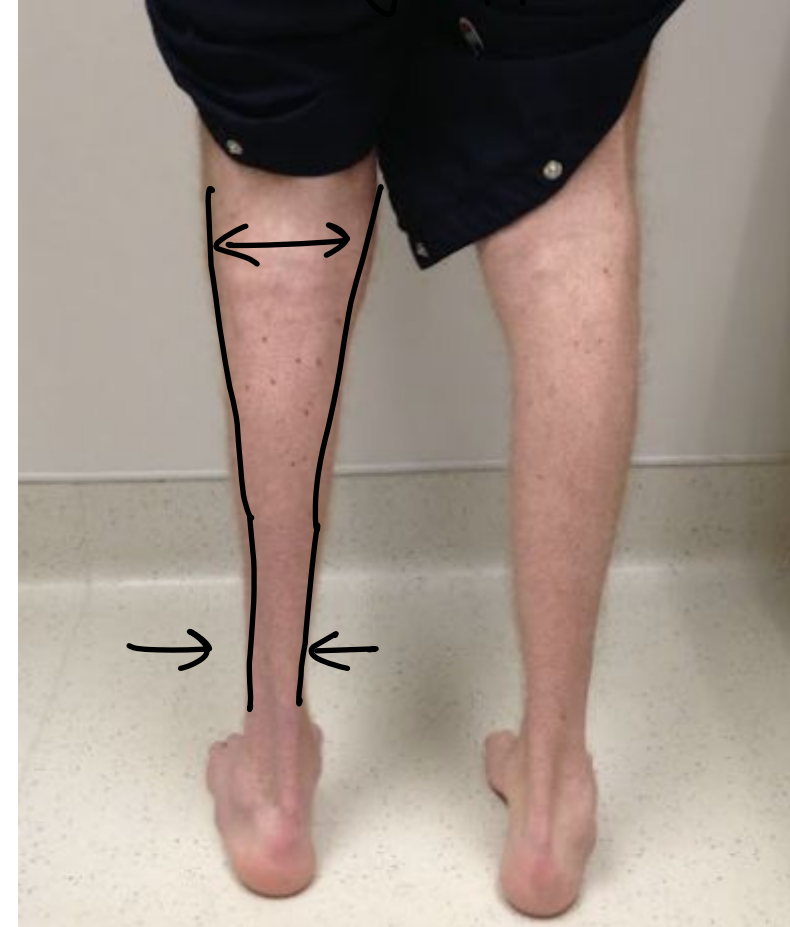
\* STORK leg appearance

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

PMP 22 gene  
ch17

HEREDITARY NEUROPATHY

myelin \*  
Schwann cells



C.M.T

# CMT (neuropathy)

child: falls

O/E: INVERTED CHAMPAGNE  
STORK leg app

\* THICKENED NERVES

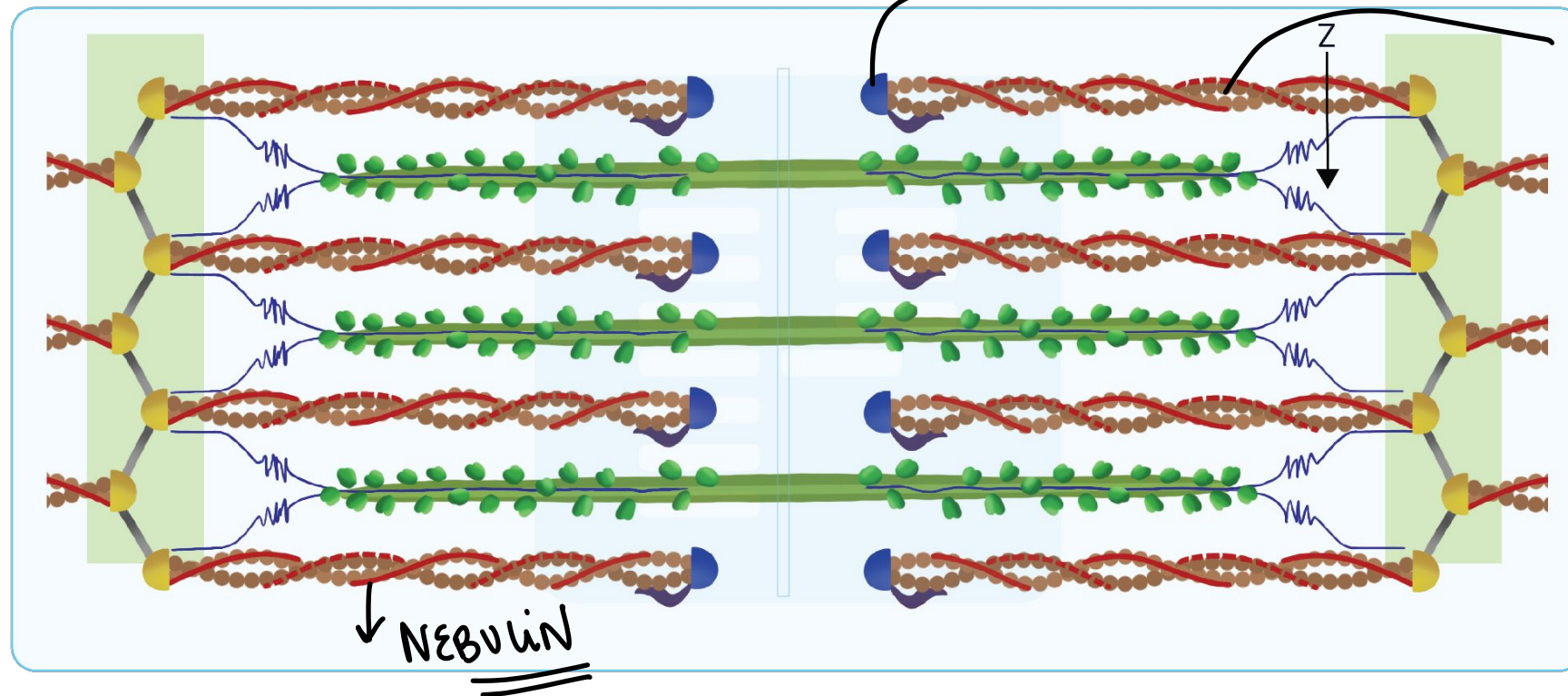
loc: gene sequencing: PMP 22 gene  
ch 17 #



CONNEXONS / GAP junction = Myelin #

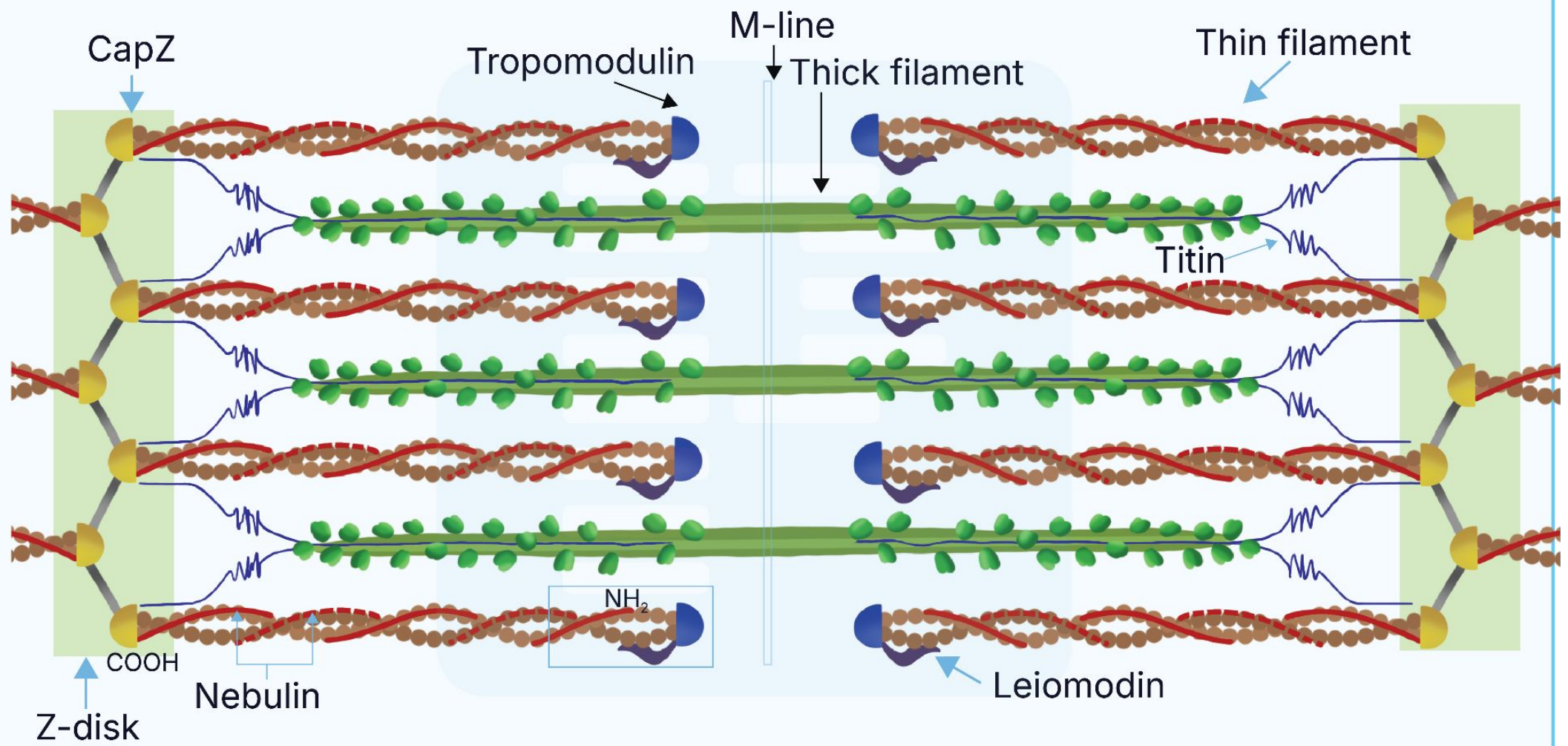


Q35. Identify the Z marked structure in the sarcomere



- a. Nebulin
- b. Tropomyosin
- ☒ c. Titin
- d. Actinin





Q36. Purkinje cells of cerebellum are?

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

INVERTEBRATE

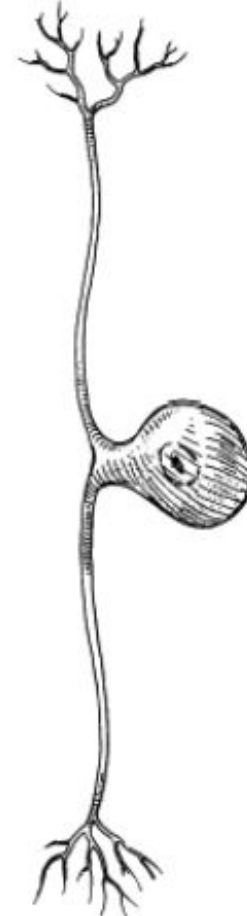
Unipolar



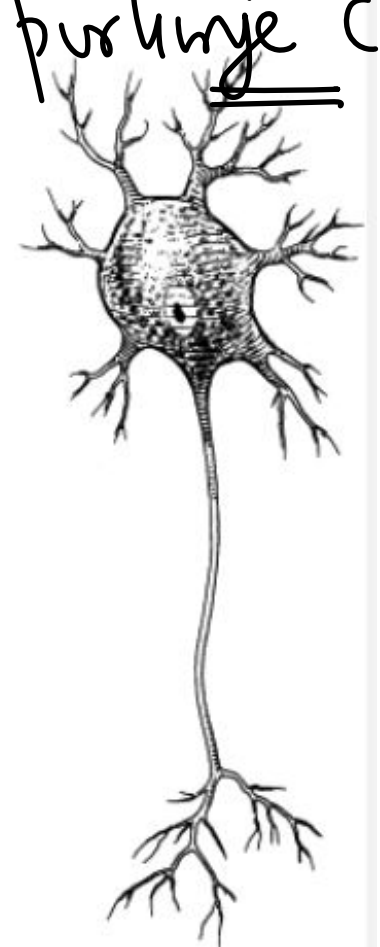
Bipolar



Pseudounipolar



Multipolar



Purkinje cells

Retina, olfactory N  
DRG (sensory to SC)

### 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 *Oligodendrocytes*
- ✓ d. Target cells affected in neuromyelitis optica

\* ASTROCYTOPATHY

✓ AD = NEURONS #

✓ NMO = ASTROCYTES #

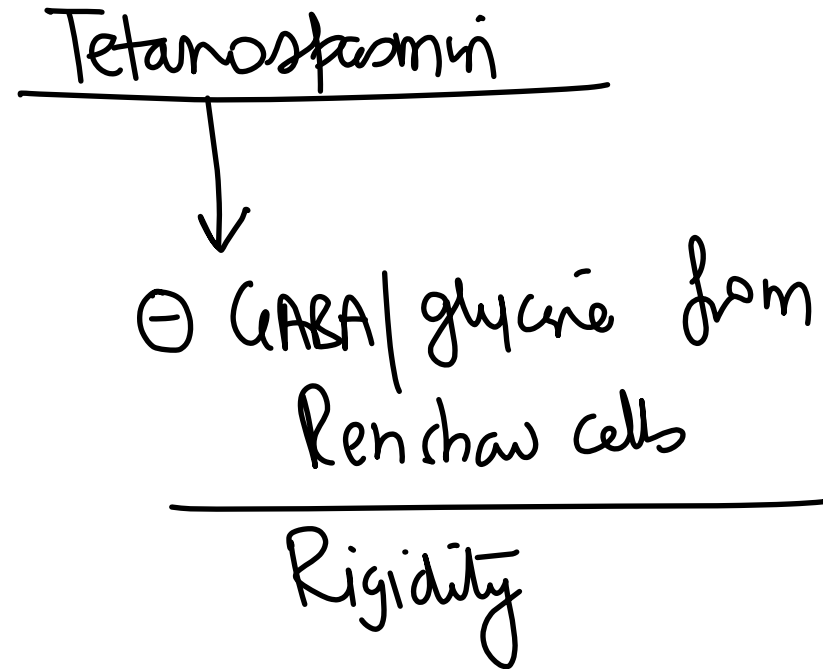
✓ ASTROCYTES — FIBROUS AN = WHITE MATTER

\* MICROGLIA

\* OLIGODENDROCYTES

### 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

O.V.L.T

~~d.~~ Area postrema Vomiting

## Circumventricular Organs

\*

AREAS OUTSIDE BBB

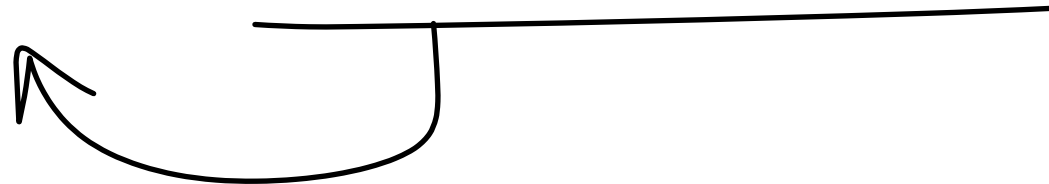
- **Sensory CVOs**(detect blood -borne signals):

1. Area postrema - in medulla, chemoreceptor trigger zone for vomiting
2. Subfornical organ (SFO) - involved in fluid balance, thirst regulation
3. 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

CIRCADIAN RHYTHM



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

~~a.~~ Brown Sequard syndrome C/L loss of pain/Temp

**b.** Syringomyelia

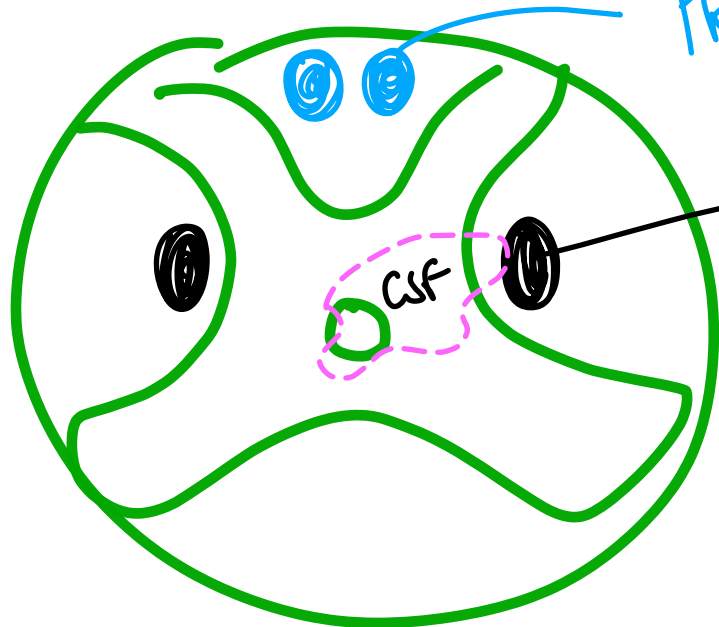
B12 ↓

~~c.~~ Subacute combined demyelination of spinal cord

DORSAL column

~~d.~~ Tabes dorsalis

PROPRIOCEPTION, VIBRATION

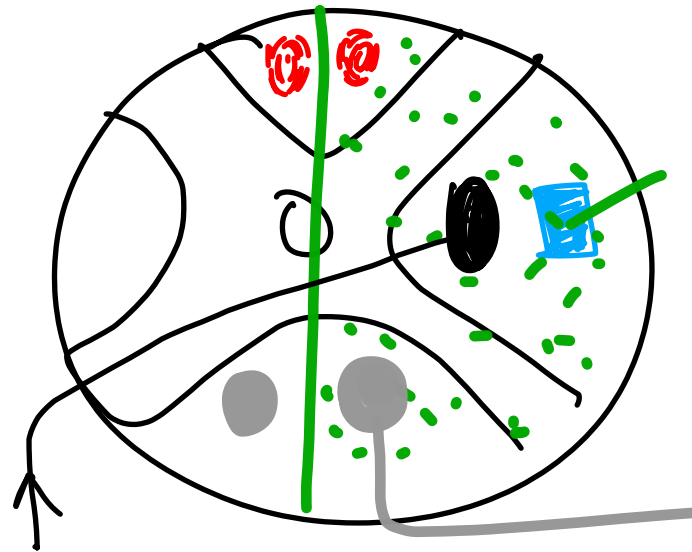


lat. spinothalamic pathway  
PAIN, TEMP

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

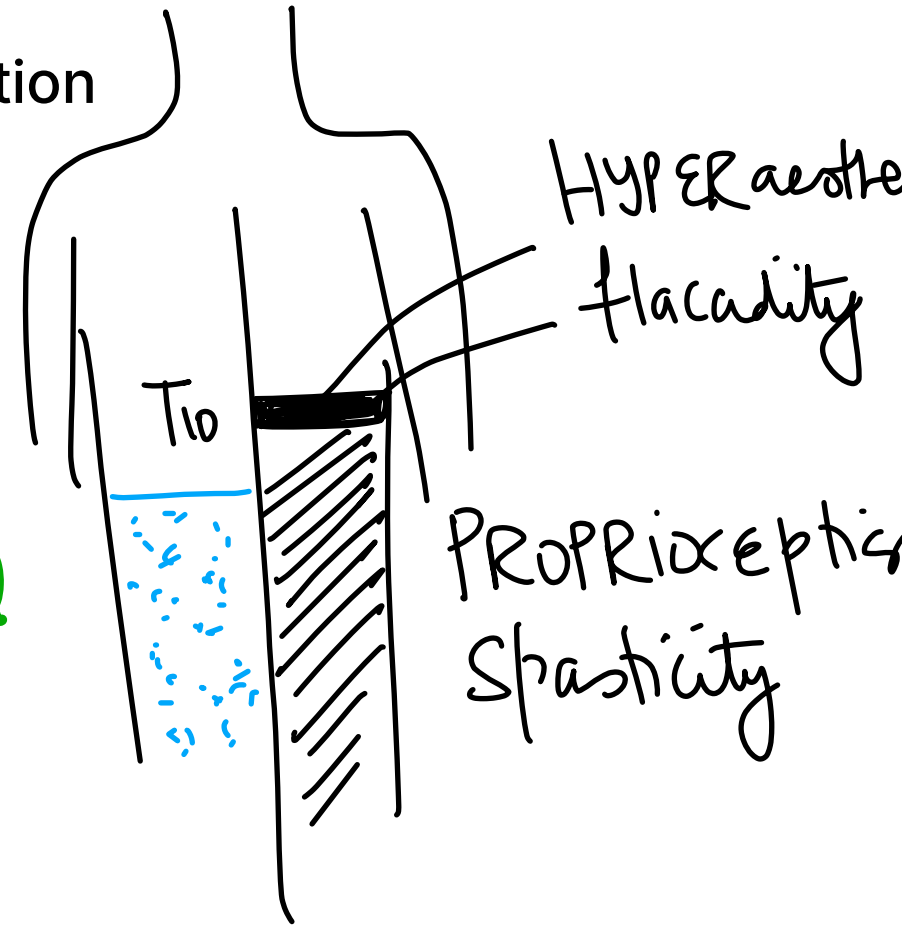
- a. Ipsilateral loss of proprioception and vibration sensation ✓
- b. Ipsilateral upper motor neuron signs ✓
- c. Ipsilateral Band of hyperesthesia and LMN findings ✓
- d. Ipsilateral loss of crude touch

OK Pain Temp  
1-2 levels  
below



Corticospinal pathway

CRUDE TOUCH





\* PAIN & TEMP ⊖

✓ SYRINGOMELIA

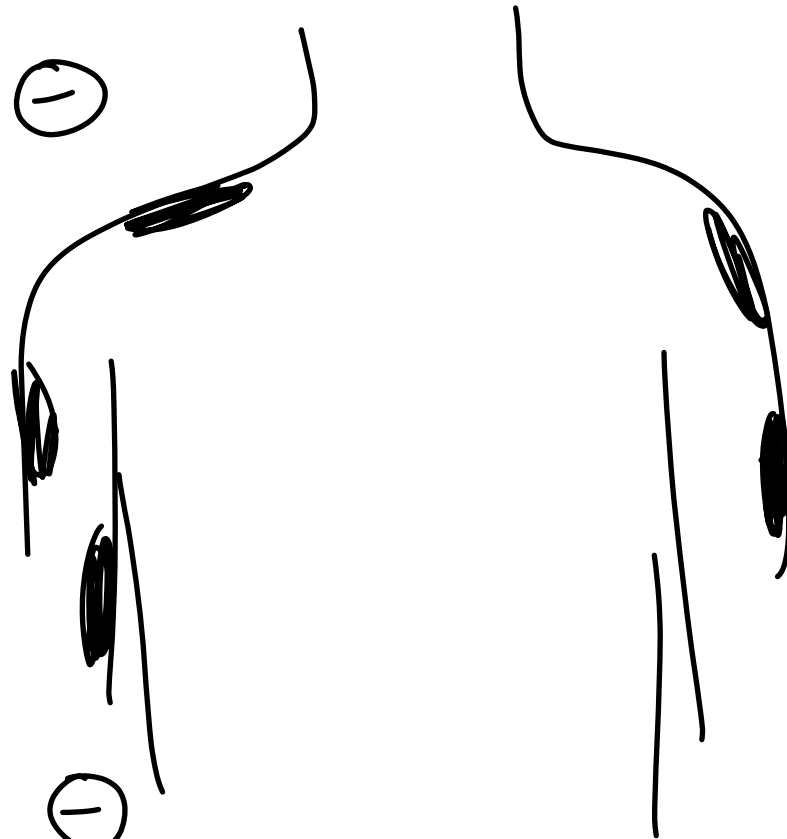
✓ BROWN SEQUARD

IL : HYPERAESTHESIA  
PROPRIOCEPTION ⊖

spasticity legs

CRUDE TOUCH Not lost

CL Pain, Temp: CL: 1 level below

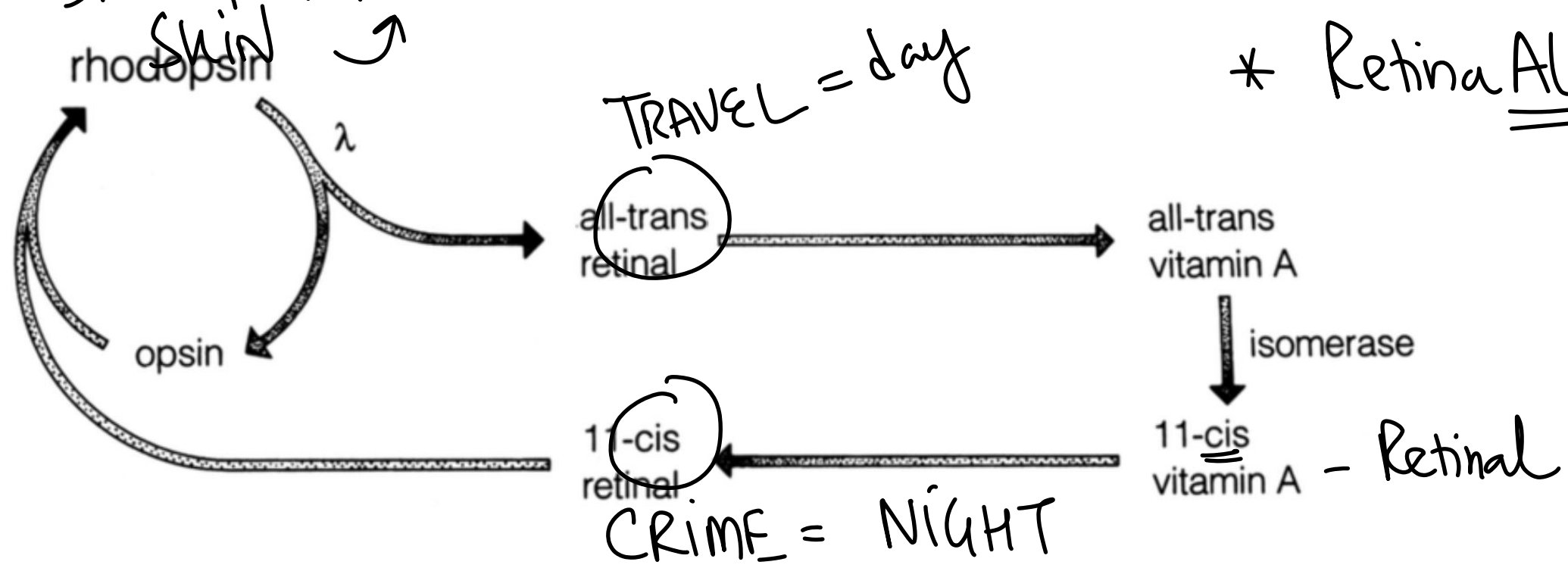


Side of lesion	Findings	Tracts / structures involved
<b>Ipsilateral (below lesion)</b>	<ul style="list-style-type: none"> <li>• UMN signs – weakness, spasticity, hyperreflexia</li> <li>• Loss of proprioception, vibration, fine touch, 2-point discrimination</li> </ul>	<ul style="list-style-type: none"> <li>• Corticospinal tract</li> <li>• Dorsal column</li> </ul>
<b>Ipsilateral (at level of lesion)</b>	<ul style="list-style-type: none"> <li>• LMN signs – flaccid paralysis, fasciculations, atrophy</li> <li>• Band of segmental anesthesia / hyperesthesia</li> </ul>	<ul style="list-style-type: none"> <li>• Anterior horn cells</li> <li>• Doral root</li> </ul>
<b>Contralateral ( below lesion)</b>	<ul style="list-style-type: none"> <li>• Loss of pain and temperature</li> </ul>	<ul style="list-style-type: none"> <li>• Spinothalamic tract (crosses 1-2 levels above)</li> </ul>
<b>Preserved</b>	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. All-trans-retinoic acid : M<sub>3</sub> AML



VISUAL PURPLE

Vit A

\* Retinol : Transport

\* Retinal

- Rhodopsin = opsin + 11-cis-retina
- Light converts 11-cis-retinal  $\rightarrow$  all-trans-retinal

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

- a. Parvocellular pathway
  - b. ~~M~~agnocellular pathway
  - ~~c.~~ Medial geniculate body
  - d. Bipolar cells
- PAINT COLOR, PIXELS, PATTERN  
→ MOVEMENT  
AUDITORY

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

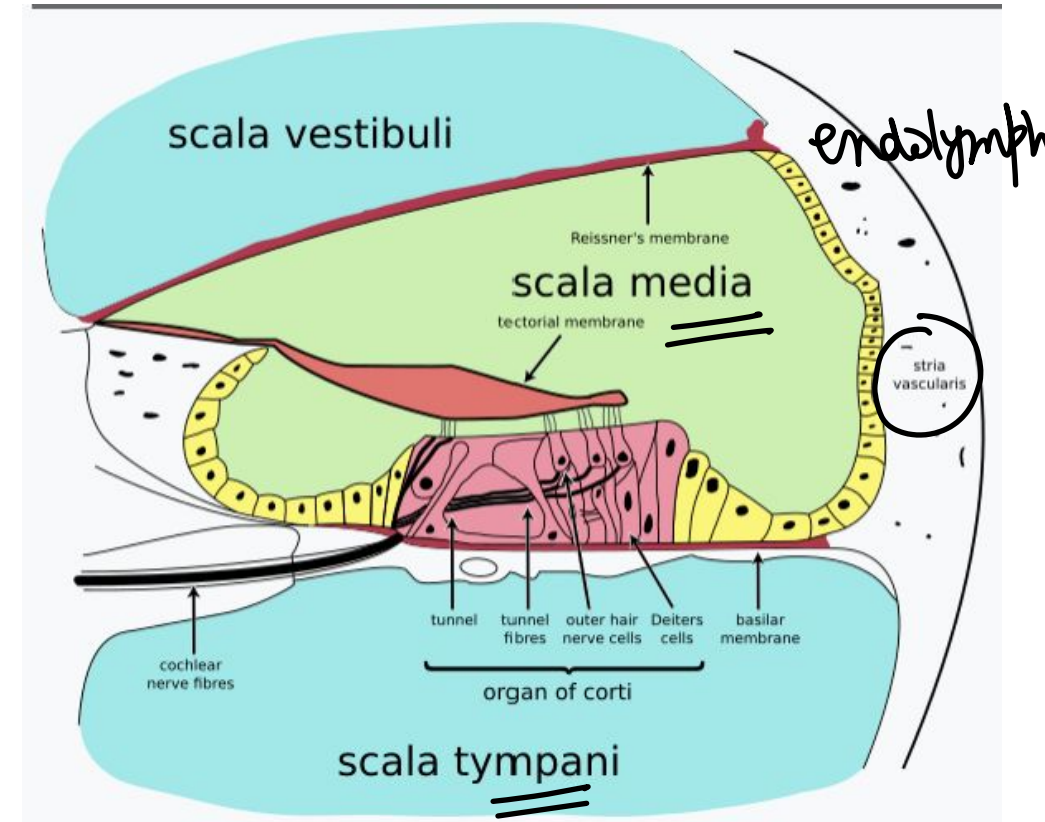
↓  
Q44. Which of the following is not correct about scala media in cochlea?

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

V

M

T



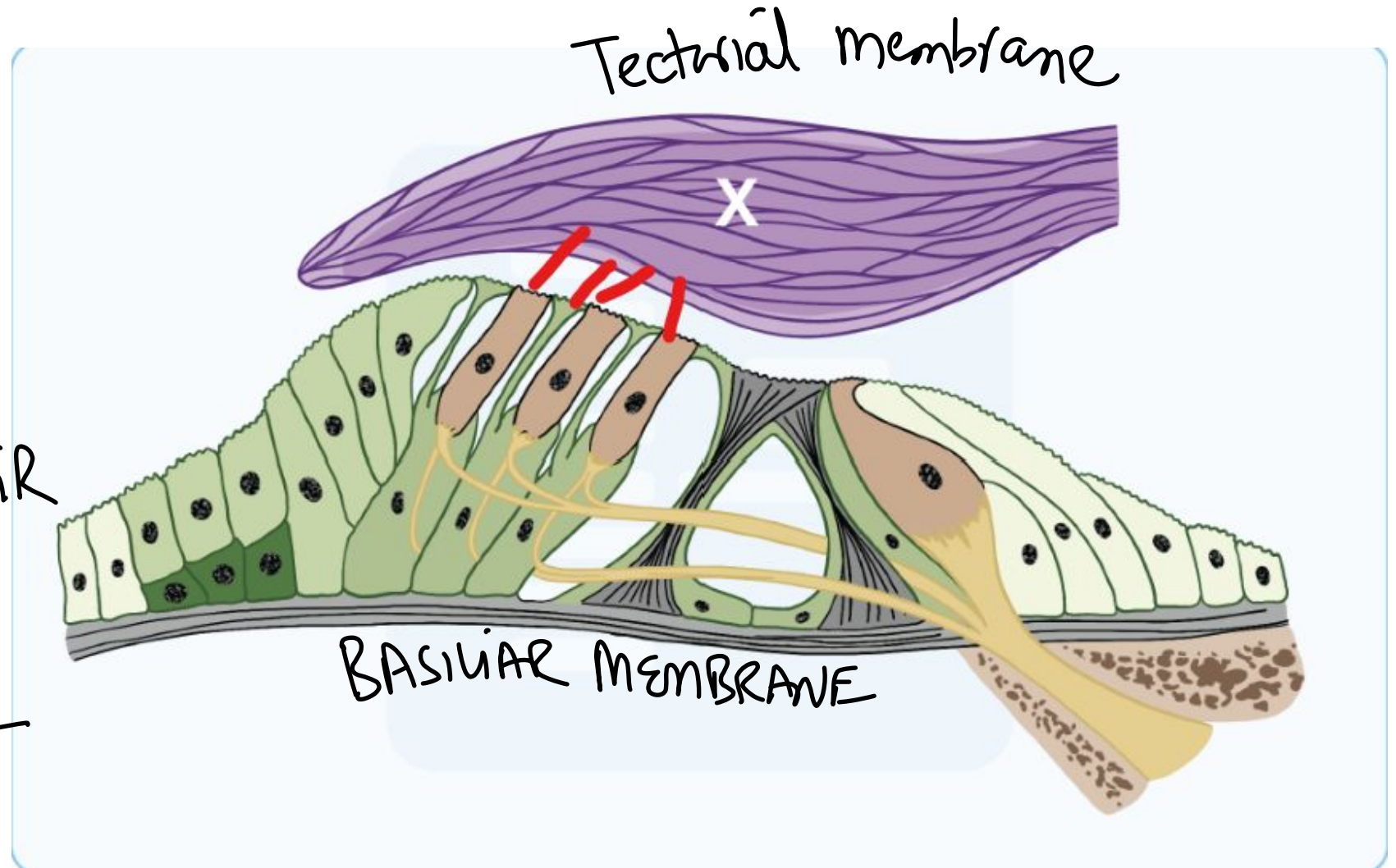
- The stria vascularis (in the lateral wall of scala media) produces endolymph ( $K^+$ -rich), not perilymph.
- True statements: scala media is the middle chamber, contains the Organ of Corti, and has potassium-rich fluid (endolymph)

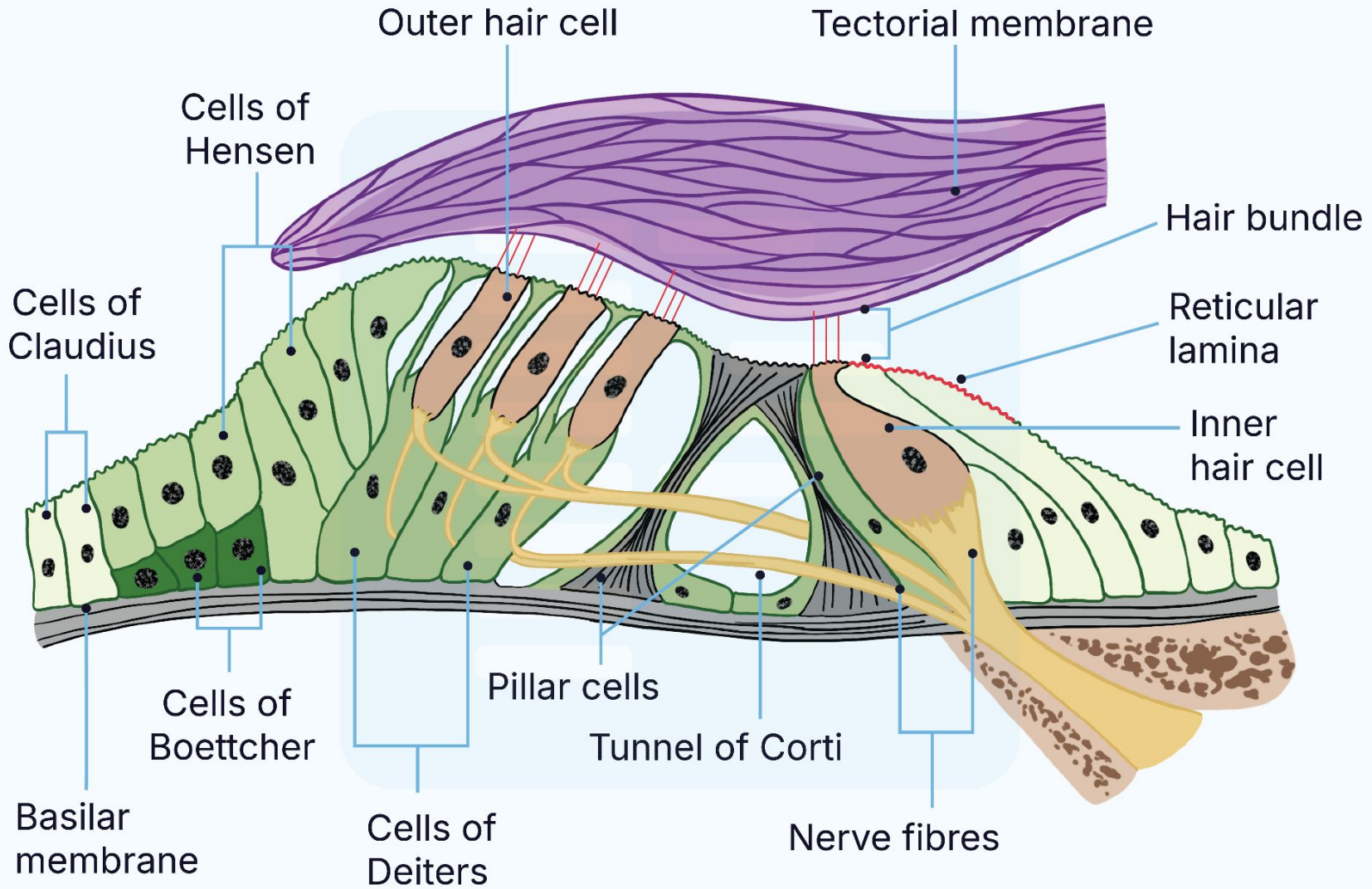


Q45. Which is correct about the structure marked as X?

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

3 rows of OUTER HAIR  
cells  
: 20k





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

↓  
\* Non oligemic AKI :  $\text{CD} : \text{V}_2$   
Polyuria ← LDSC of water ↑  $\text{H}_2\text{O reabs}$

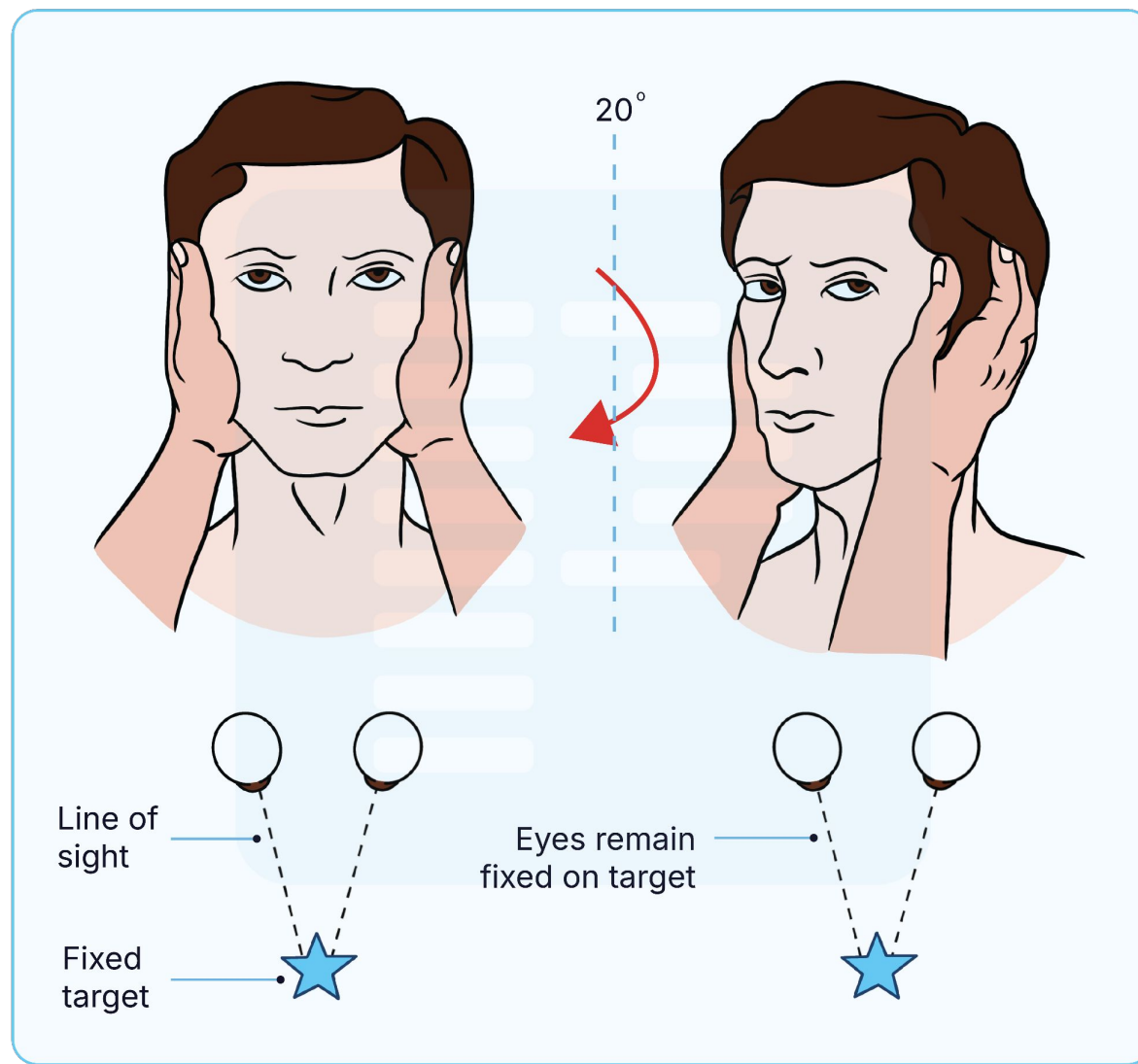
\* ototoxic : OUTER HAIR cells  
#

Q47. Which is correct about vestibulo-ocular reflex

VOR

- (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

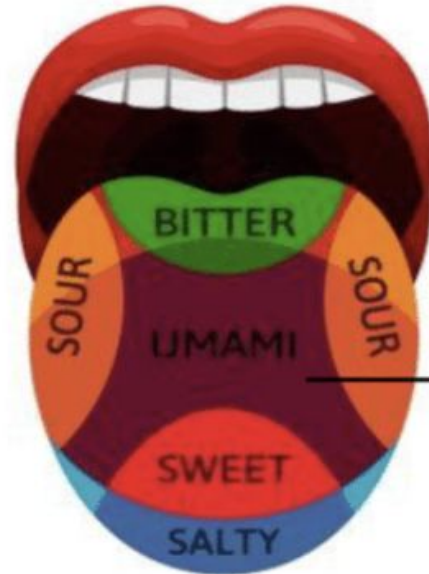
↓ COWS = Caloric ⊕ TEST



## Q48. Receptor for Umami sensation on tongue?

- a. Epithelial sodium channel
- b. GPCR T1R2
- c. GPCR 2
- (d) GPCR mGluR4

Salt / Sour



*Umami* taste receptors are evenly distributed throughout the tongue

- 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
- MUSCLE RELAXATION
- Polysynaptic Reflex
- ↖ knee JERK
- 
- The diagram consists of a large right square bracket grouping the first three options (a, b, and c). An arrow points from the middle of this bracket to the handwritten text 'Polysynaptic Reflex'. A separate curved arrow points from the text 'knee JERK' to option d, 'Myotatic reflex'.



Q50. Which is seen in autonomic dysreflexia?

Spinal cord # above T6

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

TRIGGERS

\* urine Retention  
\* fecal impaction

↓ sym ⊕

HTN

↓ ⊖ feedback  
Baroreceptors

HR ↓

HR < 60/min, BP ↑

1. Cushing Reflex

2. Autonomic dysreflexia

Bainbridge	IVF: RA $\oplus \oplus$ : HR $\uparrow$
Cushing	RAISED ICP $\leftarrow$ <div>HR <math>&lt; 60/min</math>, BP <math>\uparrow</math> Cheyne Stokes Breathing</div> Autonomic dysreflexia
Bezold Jarisch (Coronary chemoreflex MI)	HR $\downarrow$ BP $\downarrow$ apnea
Pulmonary chemoreflex (J-receptors)	pneumonia ARDS Tachypnea
Autonomic dysreflexia	Spinal cord injury

# Autonomic Dysreflexia

## When to Suspect

**Spinal cord injury**  
T6 or above

## Triggers

- Full bladder
- Fecal impaction
- Bed sores

## Highlights

Spine injured at T6



**Bradycardia**

## Blood Pressure

180/120



## Heart Rate

50 bpm



- 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

Amygdala

- 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**

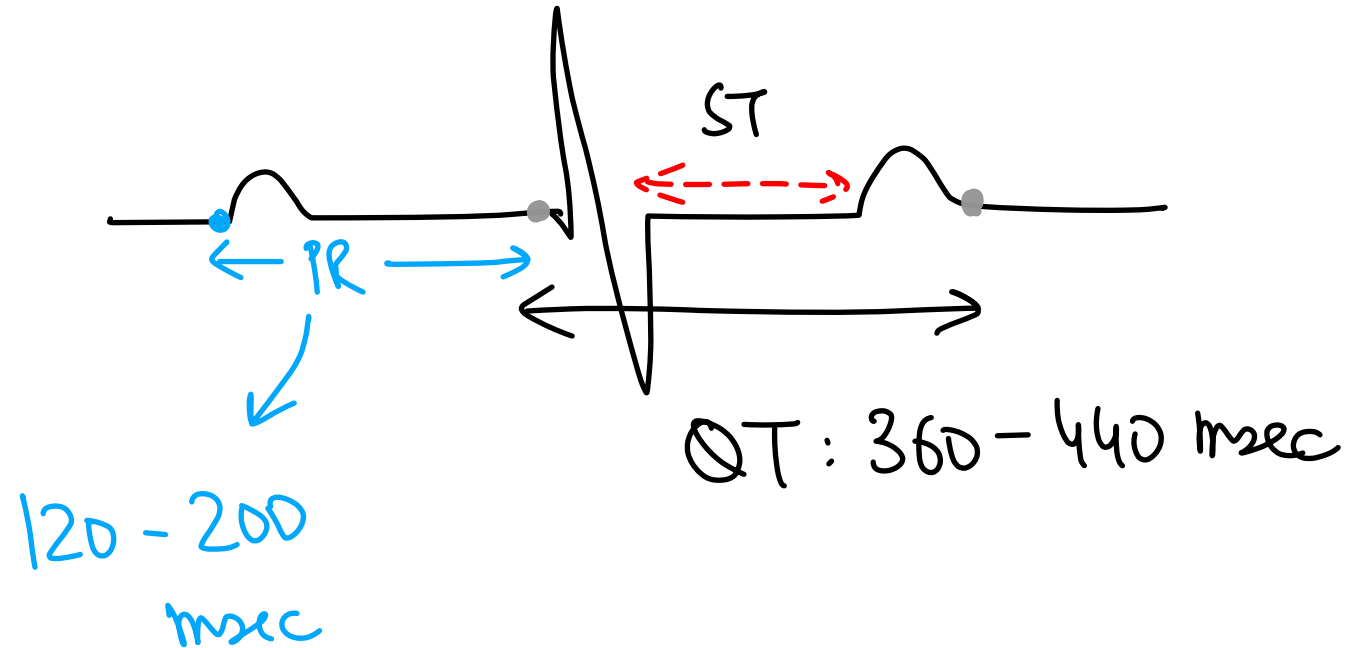
- a. Cerebellum
- ☒ b. Basal ganglia
- c. corticospinal pathway
- d. Reticulospinal pathway



- 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**



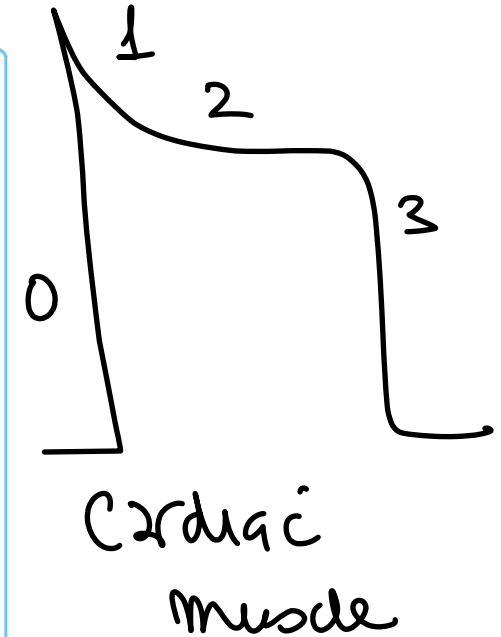
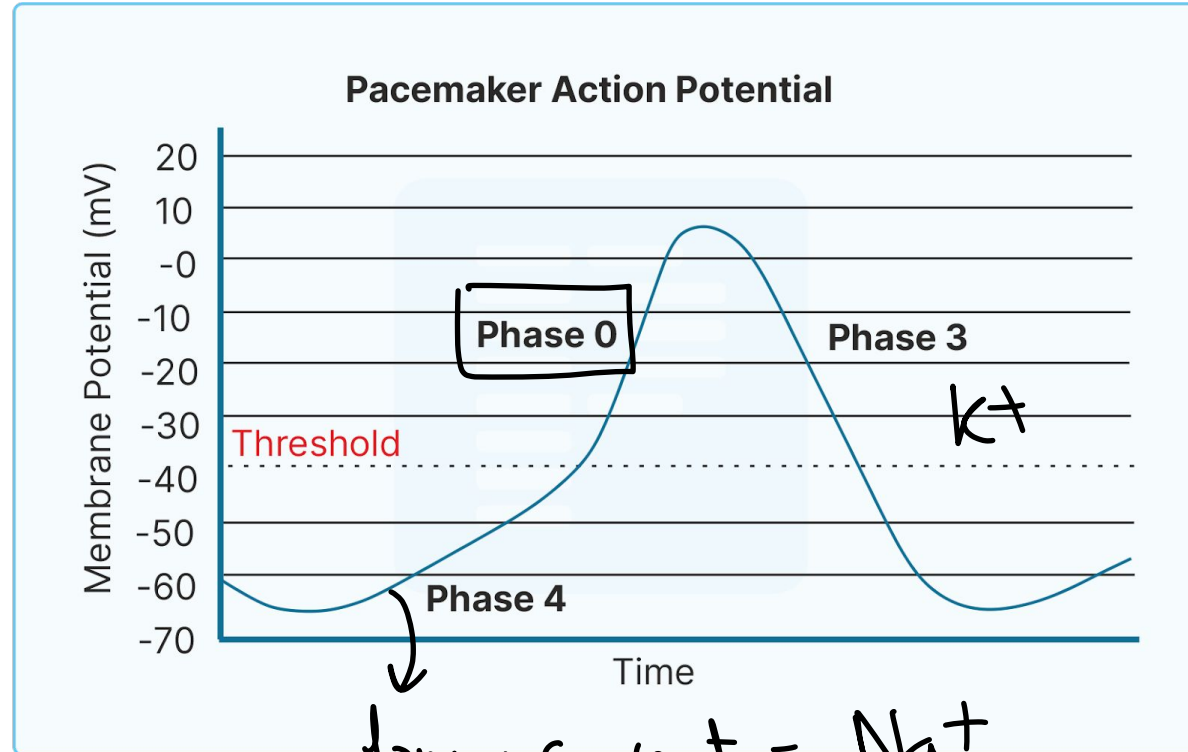
Q56. Which of the following is called the gatekeeper of heart?

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

AV node delay  $\sim 0.1 \text{ sec} \propto \frac{1}{\text{HR}}$

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  $\text{Na}^+$  influx via fast  $\text{Na}^+$  channels causes Phase 0 in SAN, it is calcium

## **Phases in SA Node**

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

## **Absent**

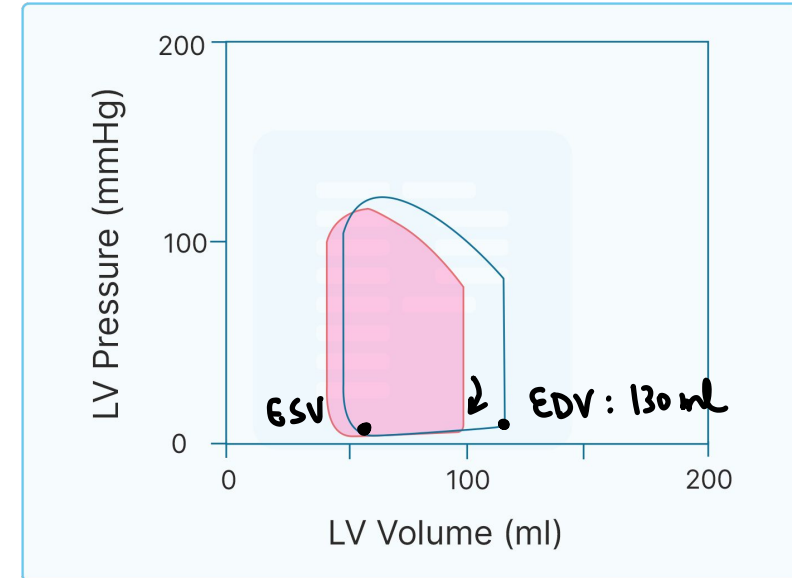
- Phase 1 (initial rapid repolarization) - Absent in pacemaker cells
- Phase 2 (Plateau phase) - Absent in pacemaker cells

**Q58. In which phase of Pacemaker action potential is "Funny Current" seen?**

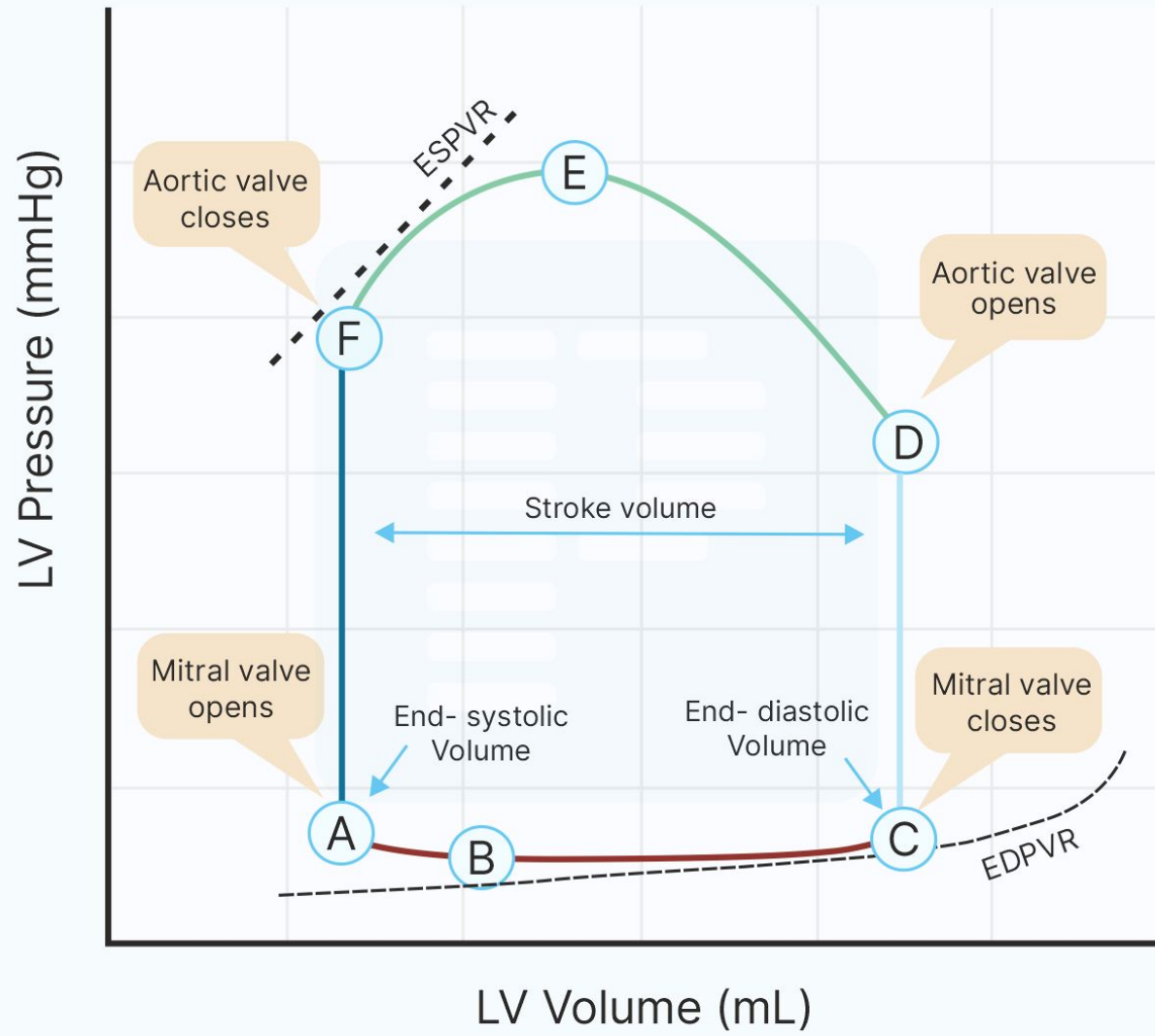
- a. Depolarization
- b. Plateau
- c. Repolarization
- ☒ d. Hyperpolarization

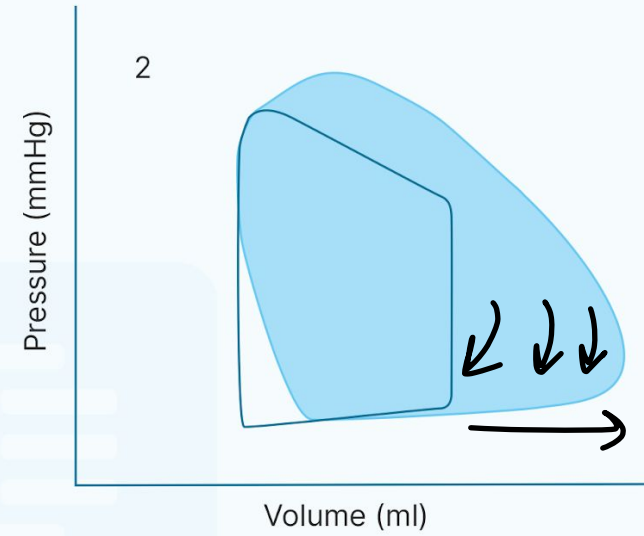
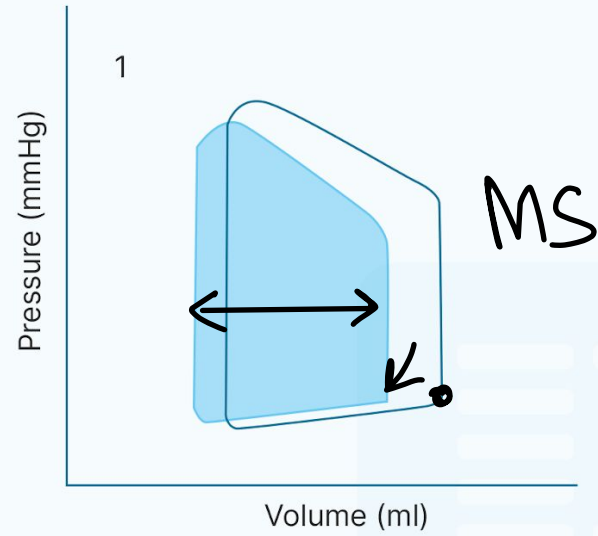
**Q59. Identify the heart lesion from the Ventricular pressure volume curve shown below?**

- ☒ a. MS
- b. MR
- c. AS
- d. AR



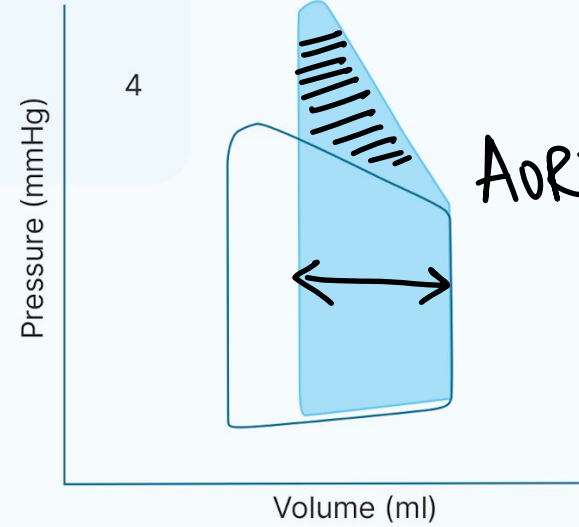
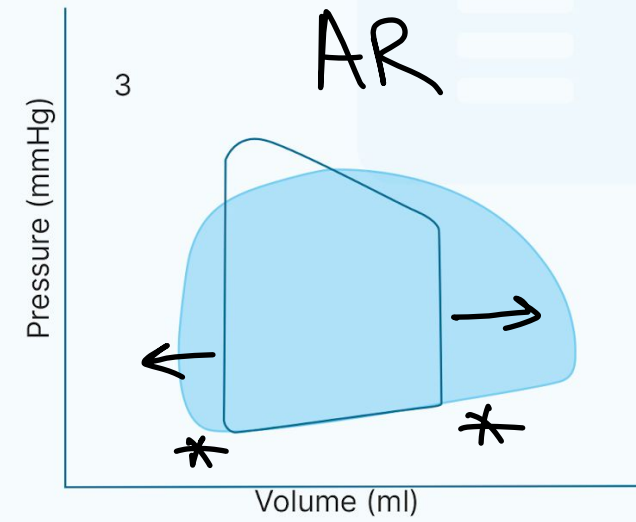






MR

EDV ↑



AORTIC VALVE opens

AS

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

- a. Early normoblast BLUE
- ☒ b. Intermediate normoblast poly chromato phulic blue, Pink  
Hb synthesis started
- c. Late normoblast
- d. Reticulocyte

Q61. First hemoglobin to appear in embryonic development is

=

- a. Gower 1
- b. Portland 2
- c. HbF 3
- d. HbA 4

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

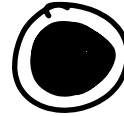
- a. Neutrophil
- ☒ b. Basophil
- c. Monocyte
- d. Eosinophil

D.L.C

PMN  
L  
B  
E  
M



= 50 - 70%



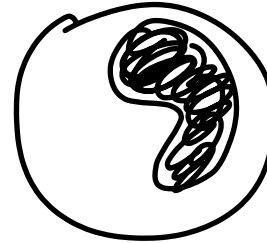
= 20 - 40%



= 0 - 1%



= 1 - 6%



= 2 - 10%

### Q63. Clotting factor with longest half life is

a. Factor II

b. Factor VII → SHORTEST

c. Factor X

(d) Factor XIII Clot stabilizing factor

Umbilical stump bleeding

day 0 = GLANZMANN THROMBOASTHENIA  
factor 13 ↓

day 5/7 ⇒ H.D.N Hemorrhagic disease  
of newborn

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

→  
qS<sub>2</sub>

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

- a. Lecithin component
- ☒ b. GM-CSF
- c. Epidermal growth factor
- d. Phosphatidylglycerol component



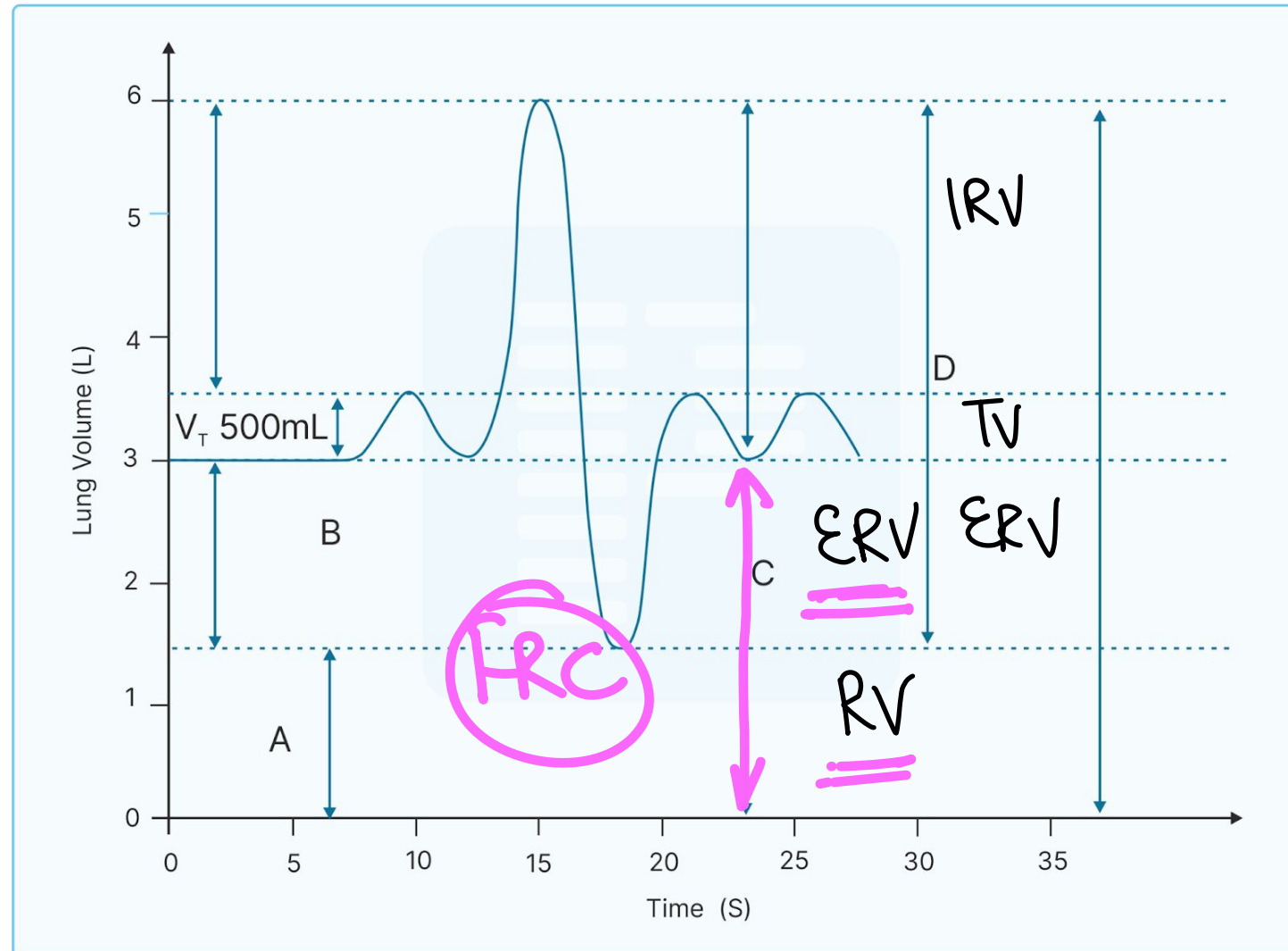
GM-CSF ↓  
↓ degradation  
-----  
P.A.P



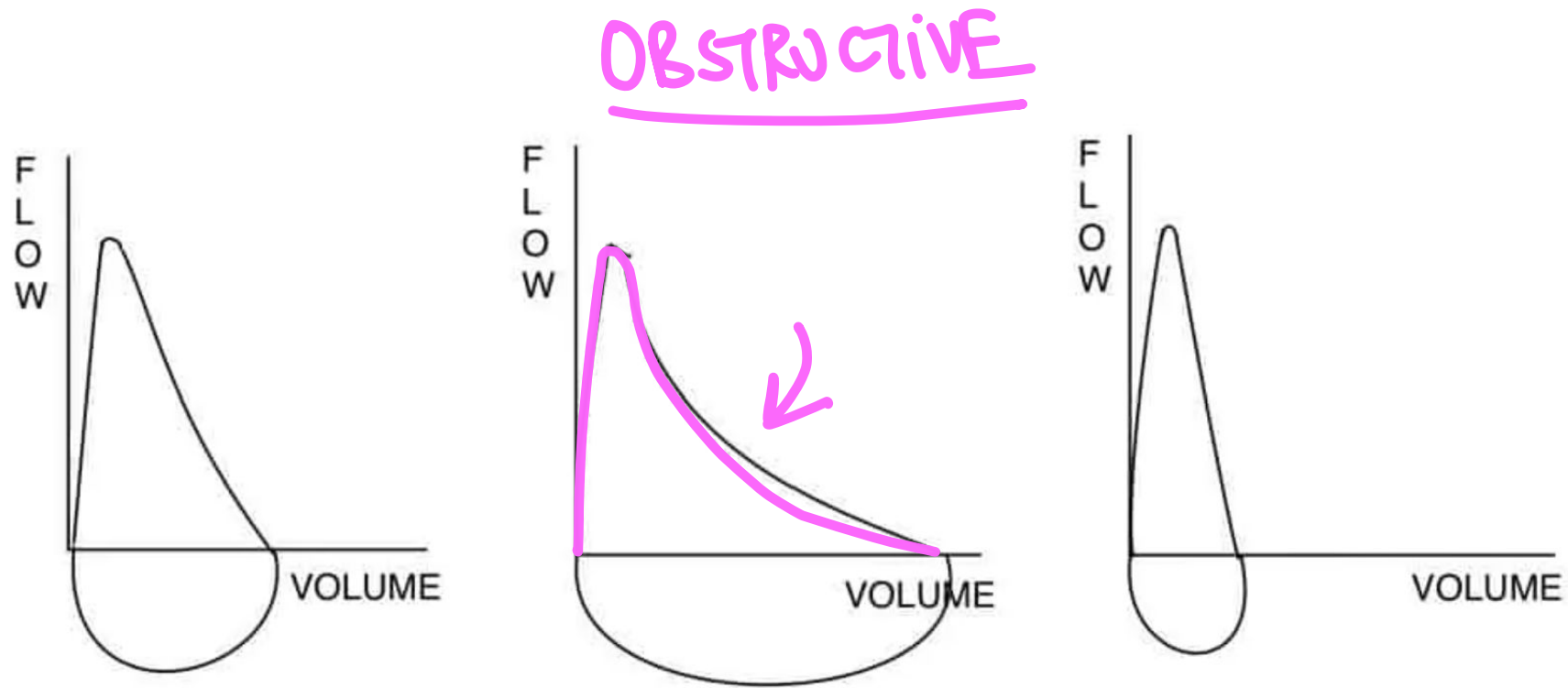
Q66. Mark the Functional residual capacity?

D = vital 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.



\_\_\_\_\_



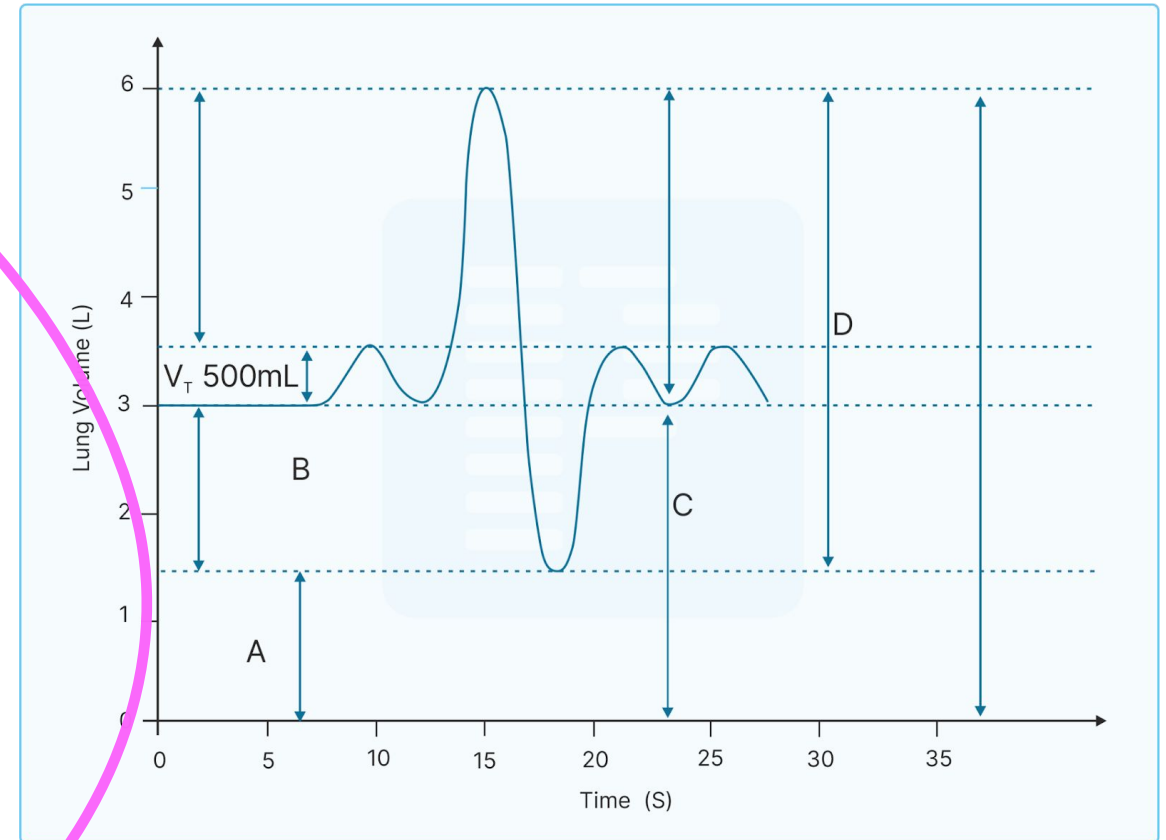
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## Q67. DLCO is increased in which of the following conditions

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

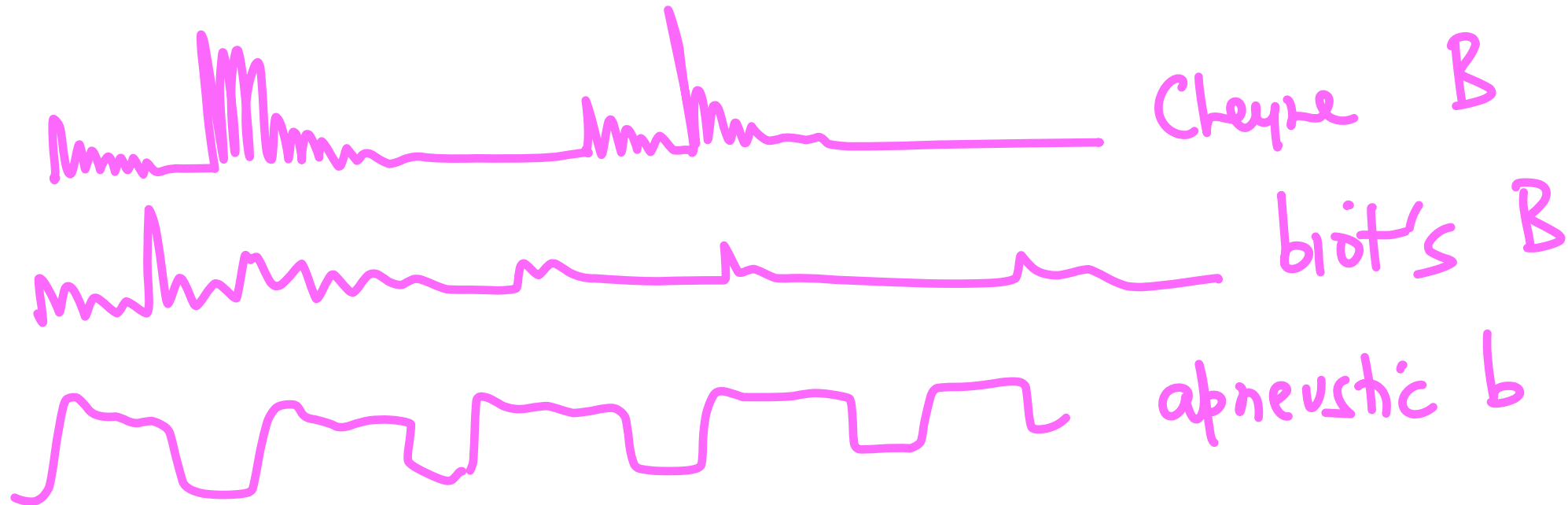
DLCO ↑

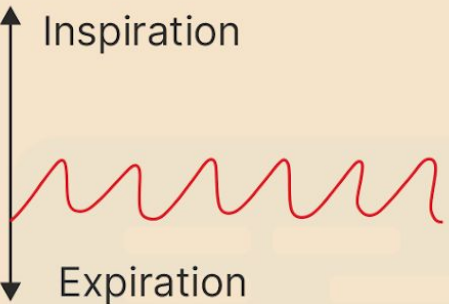
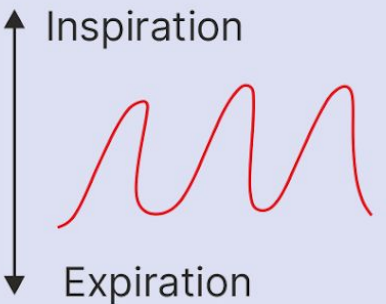

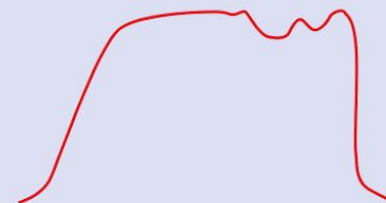
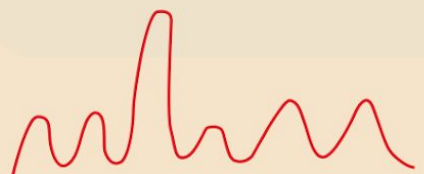



1. Asthma
2. GPS
3. CHF
4. polycyathemia



Q68. Breathing pattern showing prolonged inspiratory spasm is seen in

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



		Vagi intact	Vagi cut
Section levels	1 High pons	 <p>↑ Inspiration</p> <p>↓ Expiration</p>	 <p>↑ Inspiration</p> <p>↓ Expiration</p>
	2 Middle pons		
	3 High medulla		
	4 Low medulla	<p>(Apnea)</p> 	<p>(Apnea)</p> 

**Q69. Correct about features of diving reflex?**

- ☒ a. Bradycardia , apnea and increased vascular resistance ✓ ✓ ✓ Vc
- b. Tachycardia, apnea and increased vascular resistance
- c. Bradycardia , apnea and decreased vascular resistance
- d. Tachycardia, apnea and decreased vascular resistance

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



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

- a. Stagnant SHOCK
  - ☒ b. Histotoxic CN → TISSUE CANT TAKE UP O<sub>2</sub>
  - c. Anemic MethHb
  - d. Hypoxic COPD, ARDS
- VENOUS O<sub>2</sub> RISE ↑  
A-V diff: ↓

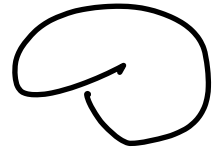
A-V  
↓ ↓ = normal

Cyanide: ⊖ cytochrome oxidase : ⊖ ATP mitochondria

HIGH ALTITUDE: HYPOBARIC

- 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?

$\downarrow pO_2$ : VD:  : DURA  $\oplus$  : headache  
 : VC: Pulm A

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

HYDROSTATIC  
SHEAR

$\leftarrow$  \* HACE  $\Rightarrow$  NIFEDIPINE  
 \* HACE  $\Rightarrow$  DEXAMETHASONE  
 \*  $1^\circ$  AMS  $\Rightarrow$  Acetazolamide

1st  
immediate  
descent

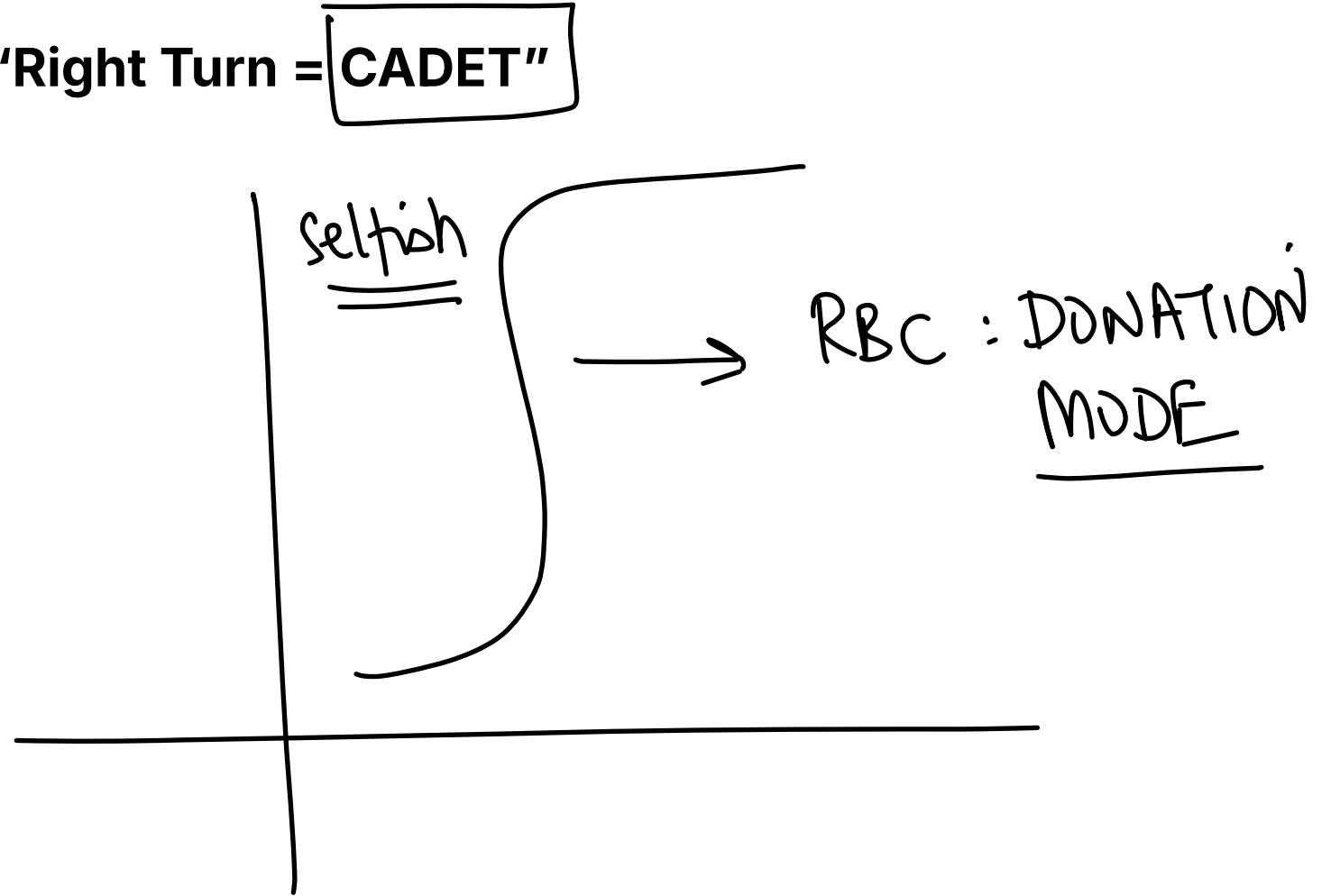
- High altitude hypoxia → cerebral vasodilation → headache (acute mountain sickness)
- In lungs, hypoxia causes pulmonary vasoconstriction → ↑PAP → HAPE → severe dyspnea

**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  $\text{PCO}_2$
- ☒ d.) Methemoglobinemia

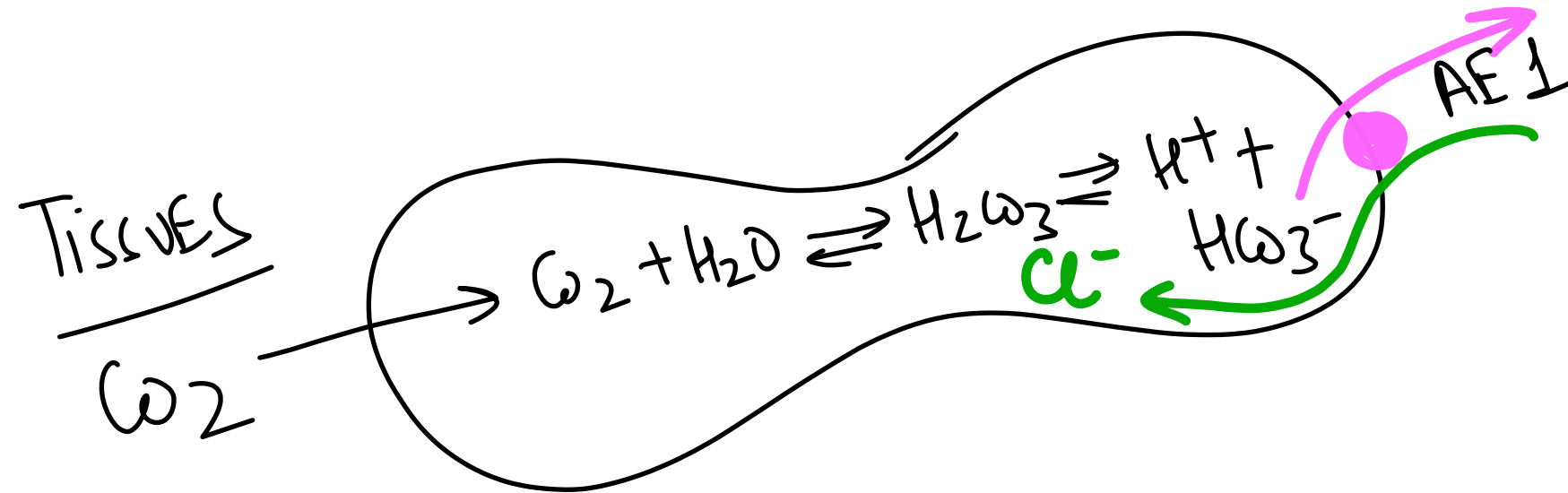
## Mnemonic for Right shift - "Right Turn = **CADET**"

- $\text{CO}_2 \uparrow$  ✓
- Acidity  $\uparrow$  ( $\downarrow$  pH) ✓
- DPG  $\uparrow$  (2,3 - BPG) ✓
- Exercise ✓
- Temperature  $\uparrow$  ✓



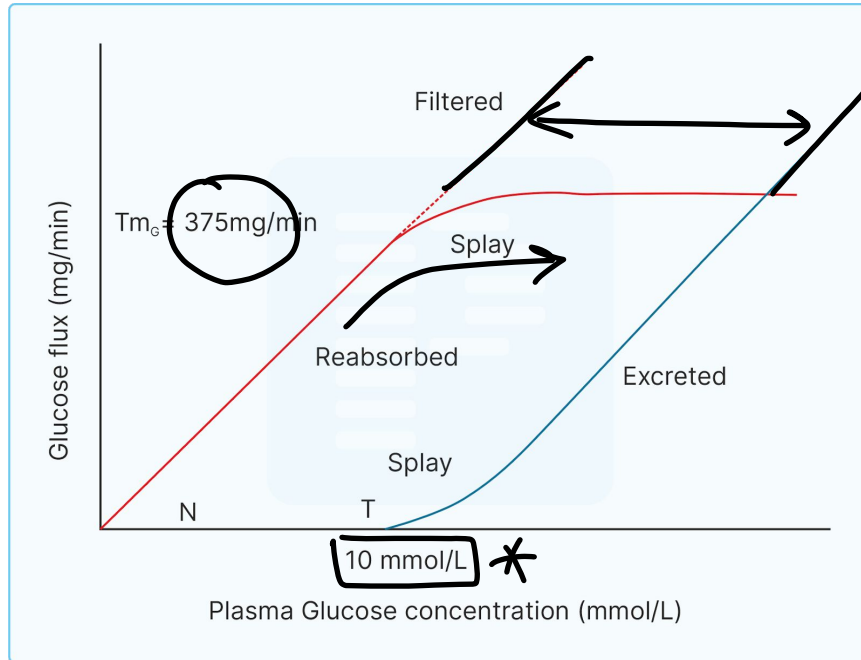
### Q73. The Hamburger phenomenon refers to?

- a. Exchange of  $\text{HCO}_3^-$  into RBCs for  $\text{Cl}^-$  out of RBCs in venous blood
- b. Exchange of  $\text{Cl}^-$  into RBCs for  $\text{HCO}_3^-$  out of RBCs in venous blood**
- c. Exchange of  $\text{HCO}_3^-$  into RBCs for  $\text{Cl}^-$  out of RBCs in arterial blood
- d. Exchange of  $\text{Cl}^-$  into RBCs for  $\text{HCO}_3^-$  out of RBCs in arterial blood



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

Transport maximum



\*  $RBS > \frac{180 \text{ mg/dL}}{10 \text{ mmol/L}}$  : Renal glucosuria

- 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  $T_mG$  is reached, tubular reabsorption is maxed out (plateaus). Any further rise in filtered load ( $GFR \times \text{plasma glucose}$ ) 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

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**THANK YOU**