PHYSIOLOGY AIIMS PYQ

Medsynapse by Dr. Nikita

In a study to detect extracellular fluid volume, 10 gm mannitol was injected by intravenous route and after waiting for adequate time for equilibration of levels, concentration was measured as 50 mg/100 ml. In this time, 10% mannitol was excreted. What is the calculated volume of ECF?

a) 10 Litres
b) 18 Litres
c) 42 Litres
d) 52 Litres

500 mg | 1L
0.5 g | L

10 gm − 1 gm = 9 gm

ECF ⟶ • sodium
• mannitol * ⟶ Vd = ECF
• inulin

Ld = Vd × Pl·conc

Vd = Ld / Pl·conc = 9 gm / 0.5 gm/L = 18 L

ICF ⇒ ICF = 36 L / 2x ECF

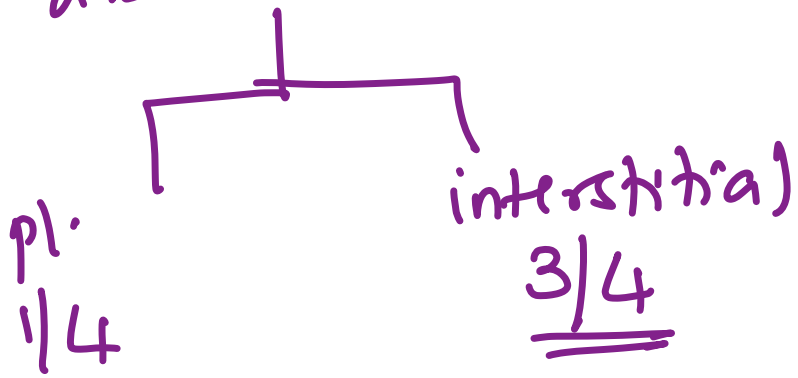
* LVP

plasma → 4·5 L (1/4 x 48 L)

Ld = (given − excreted)

10gm − 1gm = 9gm

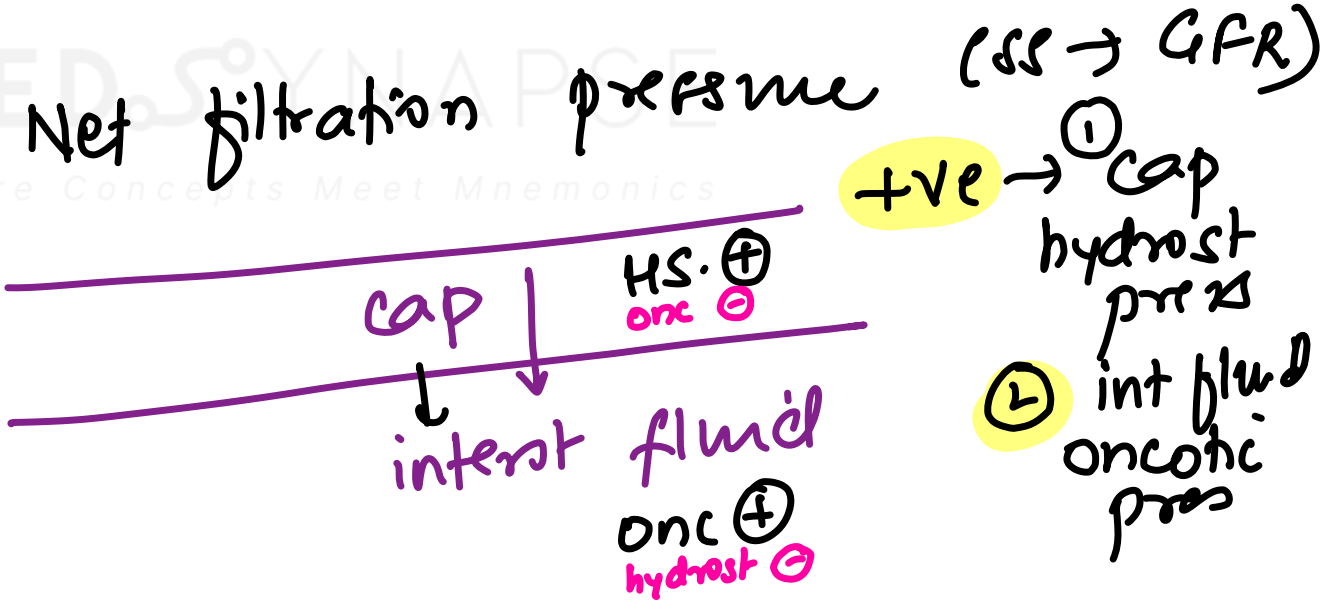
ICF = 2x ECF



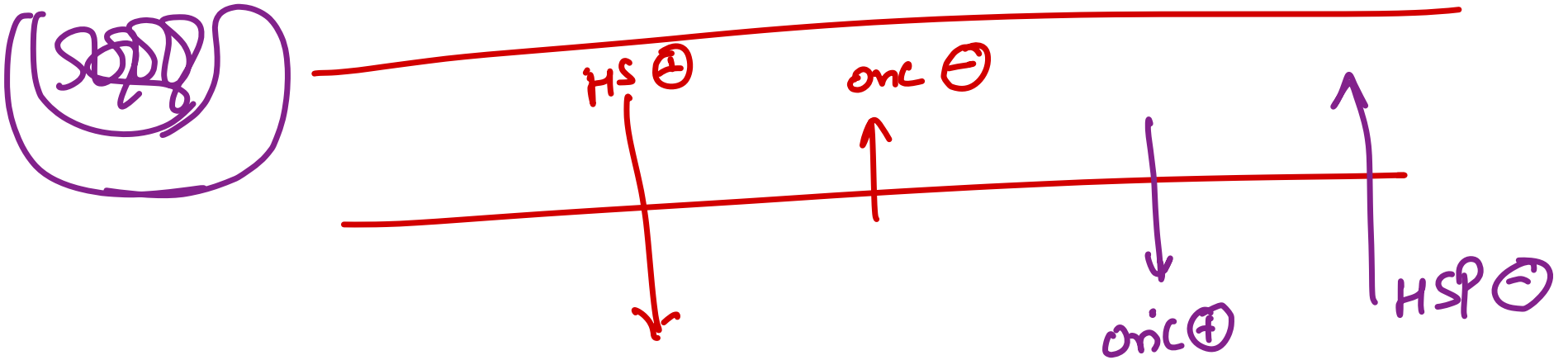
conc → gm/L

(2) If the interstitial hydrostatic pressure is 2 mm Hg, interstitial oncotic pressure is 7 mm Hg and capillary hydrostatic pressure is 25 mm Hg. What should be the capillary oncotic pressure to allow a net filtration pressure of 3 mm Hg?

a. 20
b. 21
c. 23
d. 27

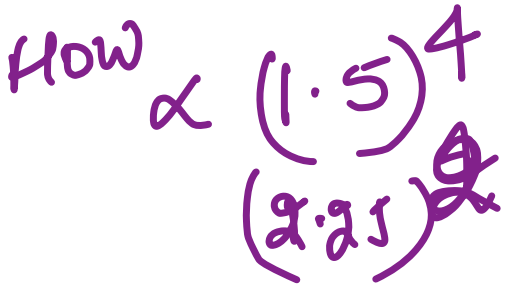


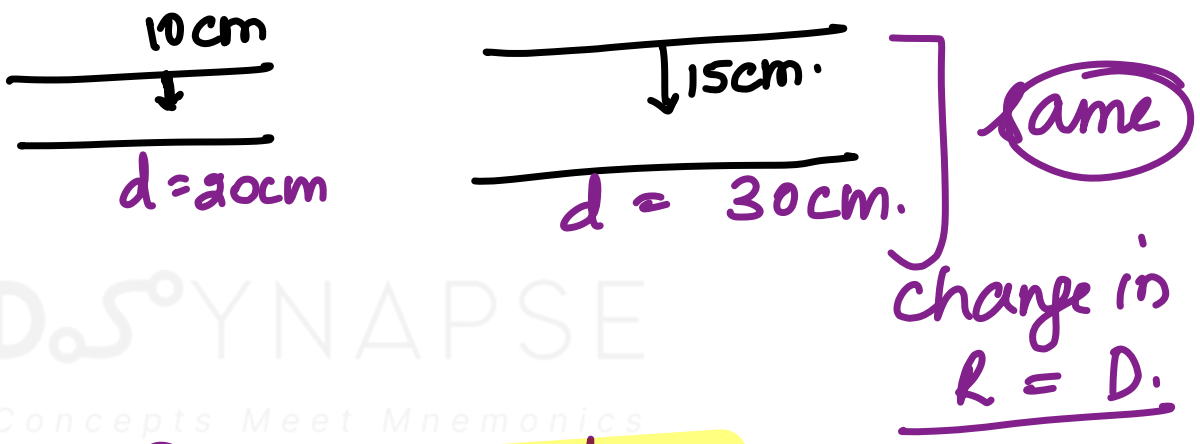
N.F.P = cap hydrost press − cap onc. press + int_int onc hyd pres



* pressure is 0 → Bowman's oncotic (0)

③ What is the rise of blood flow if the radius of blood vessel is increased by 50%?





a. ~~a.~~ 5 times
b. b. 10 times
c. c. 20 times
d. d. 100 times

Poisuielle law.

Flow then
$(2x)^4 = 16x$ (K R⁴)

if diam → doubled → $(\frac{1}{2})$ (K $\frac{1}{L}$)
if length doubled →

$$R = \frac{8\eta L}{\pi r^4}$$

$\pi \left(\frac{d}{2}\right)^4$

Resist $\propto \frac{1}{r^4/d^4}$

Flow $\propto r^4/d^4$.

Flow $\propto \frac{1}{\text{length}}$

(A)

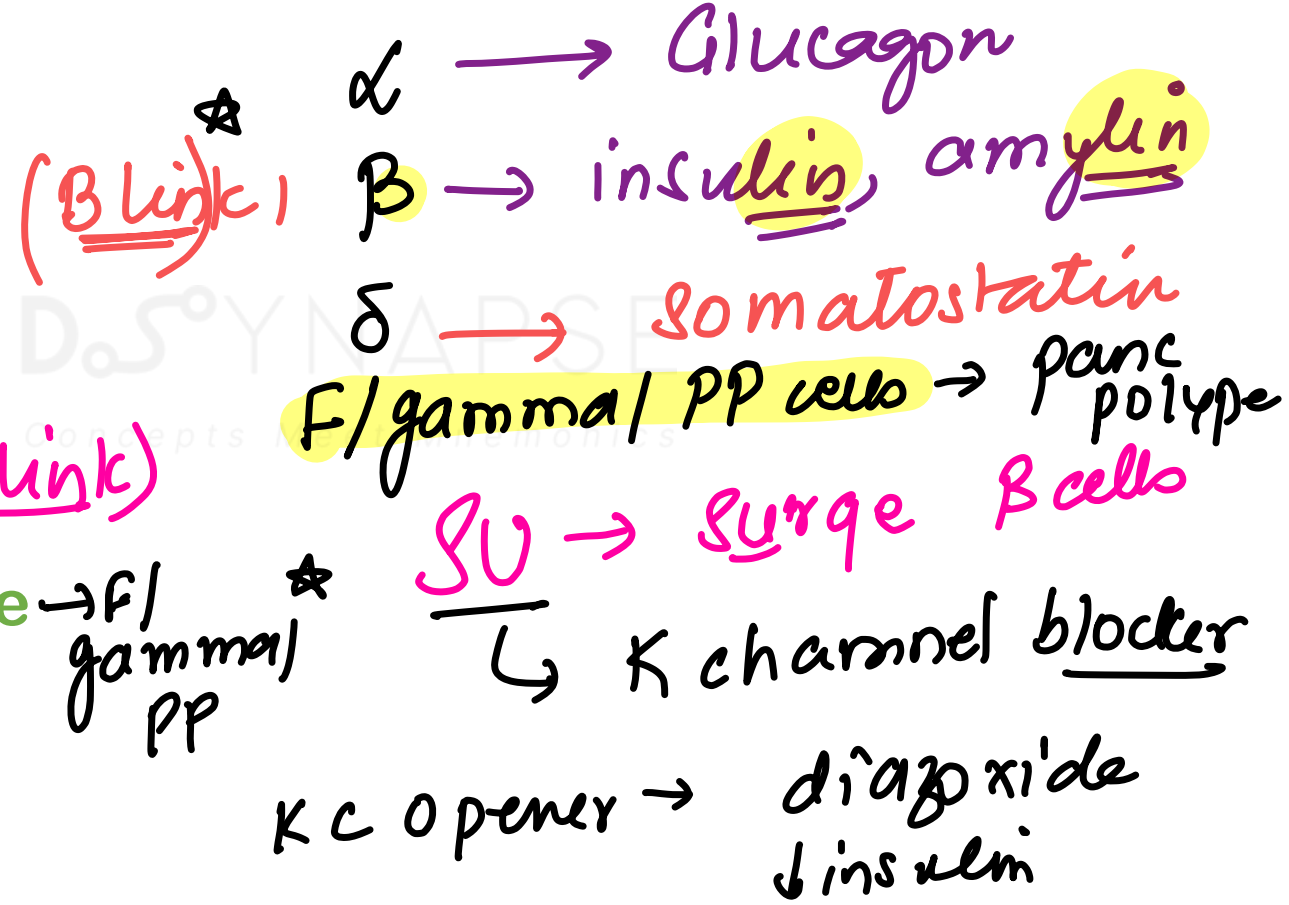
(B)

If diam doubled, ↙ flow = 16x

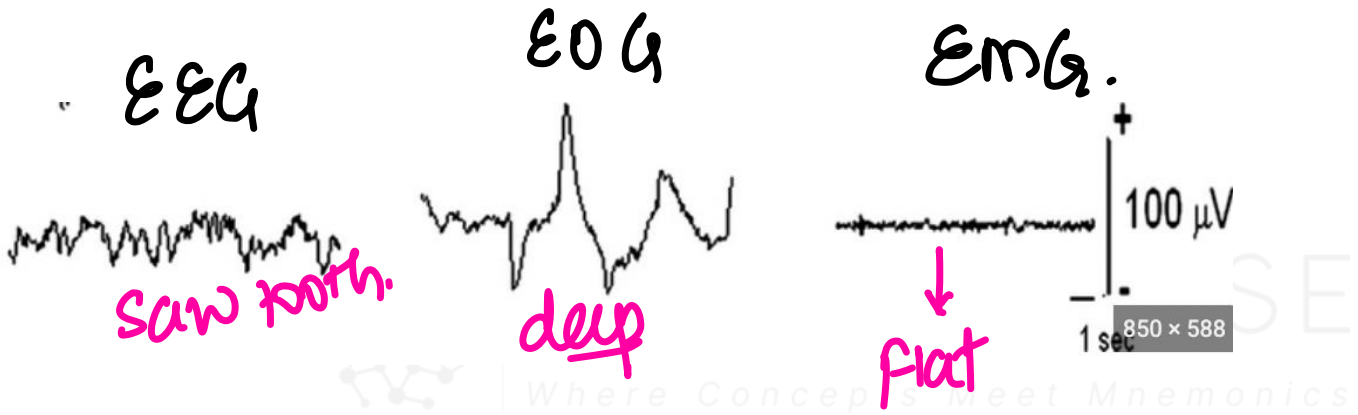
Flow $\propto \frac{1}{\text{Viscosity}}$ ↙ Resistance = $\frac{1}{16}$.

4 Which of the following is secreted by beta cells of pancreas along with insulin?

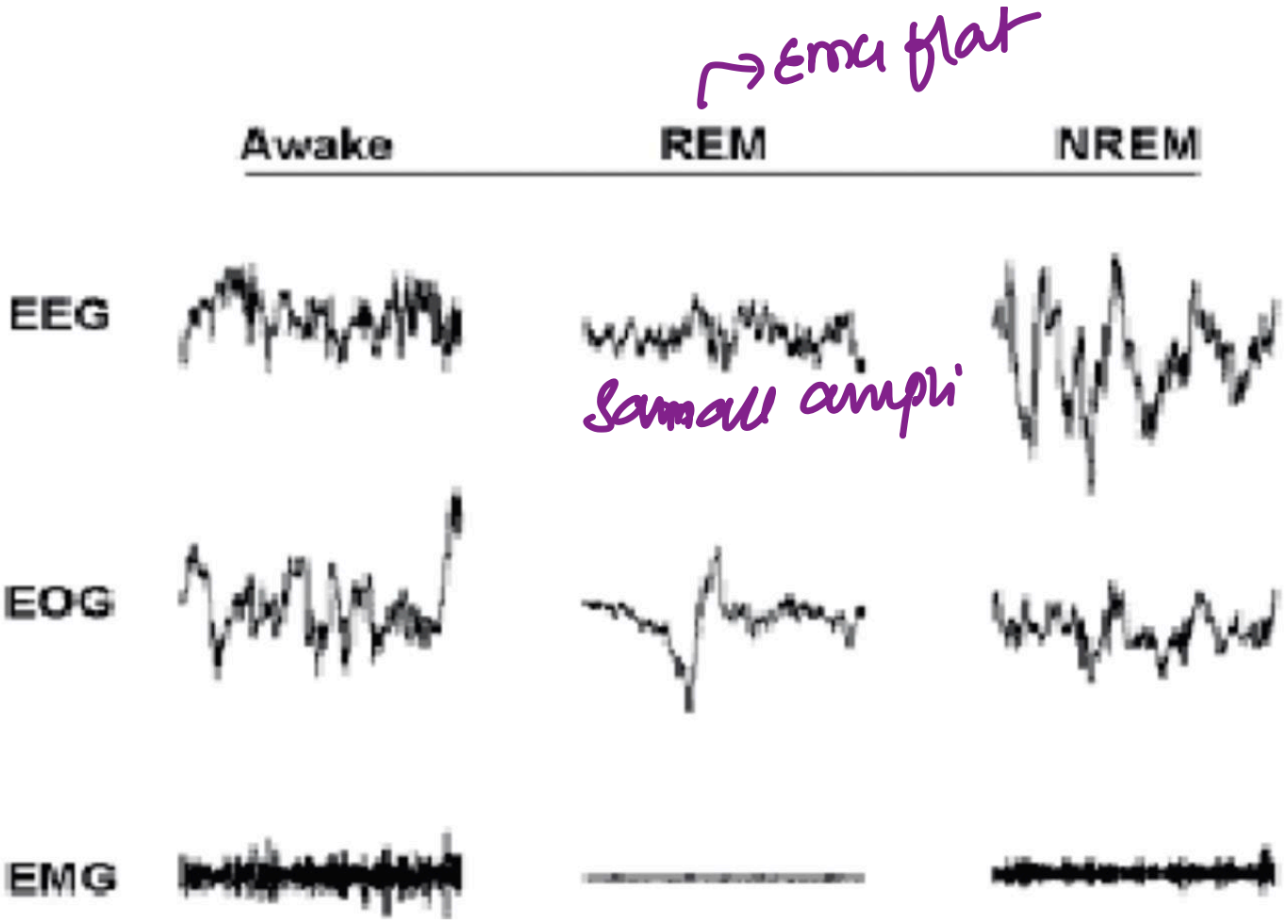
a) Somatostatin
b) Amylin, insulin (blink)
c) Pancreatic polypeptide → F/gamma/PP
d) Glucose like peptide



⑤ In the given image, stage represented is :



a) REM
b) NREM
c) Quiet wakefulness
d) Awake



EEG → BATS drink blood

B → awake, eyes open

α → awake, eyes closed

Theta → NREM 1

spindles → · second NREM 2
· spindles, IC complex.

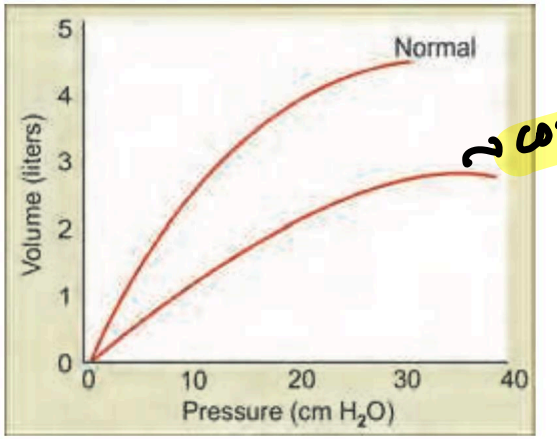
delta → deep waves, deep NREM 3.

Beta like → REM (saw tooth)

The given graph likely depicts which of the following disease?

cheat code

compliance = $\frac{\Delta V}{\Delta P}$



↝ compliance ↓.

a. Bronchial asthma → obst

b. Emphysema → obst

c. Interstitial lung disease → restrictive → fibrosis, restrictive ILD.
↳ FEV1/FVC N/↑

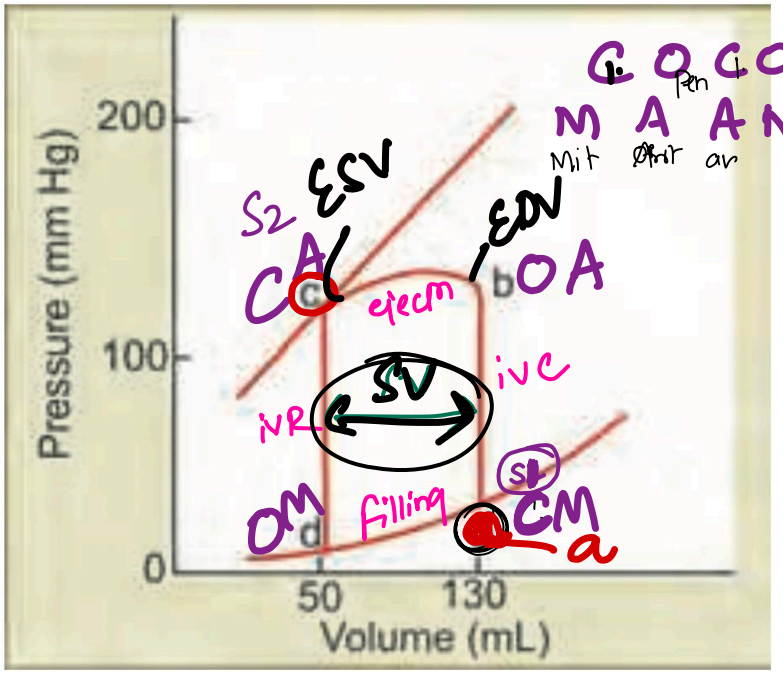
d. Normal study xx

compliance ↑ in emphysema.

FEV1/FVC ↓ in OLD

Calculate the ejection fraction from the given volume pressure curve:

a. 40%
b. 55%
c. 50%
d. 60%



start | end

Diastole (S_2) — c (S_2) | a

Systole — a (S_1) | c

EDV – 130

ESV – 50

∴ Stroke volume → 130 – 50 = 80ml

∴ $EF = \frac{SV}{EDV} = \frac{80}{130} \sim 60\%$

Interstitial fluid volume can be determined by:

ECF – plasma ↓ → ICF > ECF →

↓ sodium – albumin ↑

increased, indirect measurement

interstitial > plasma

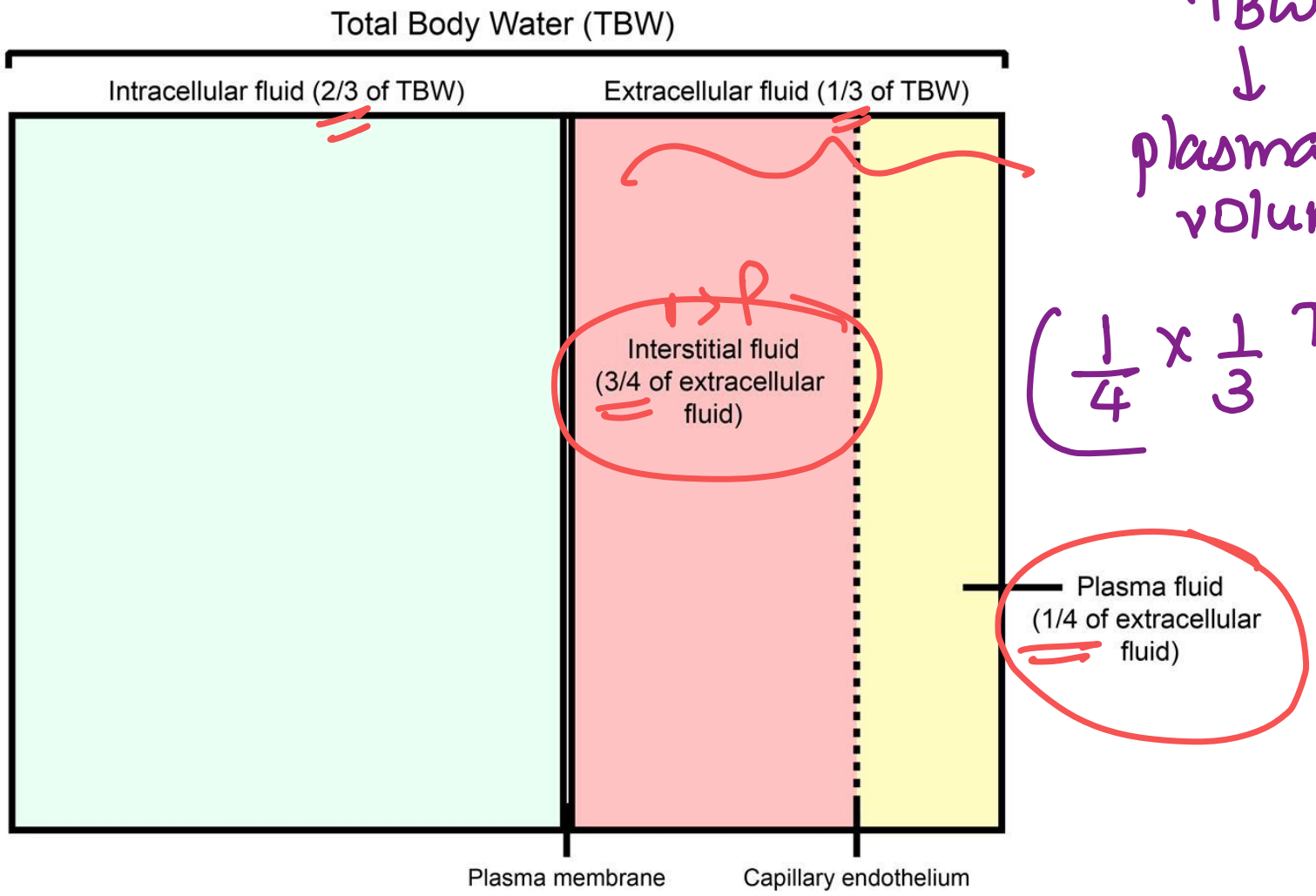
TBW – ECF

D2O – mannitol, sod, inulin

a. Radioactive iodine and radiolabelled water
b. Radioactive water and radiolabelled albumin
c. Radioactive sodium and radioactive water
d. Radioactive sodium and radioactive labelled albumin / Evans blue

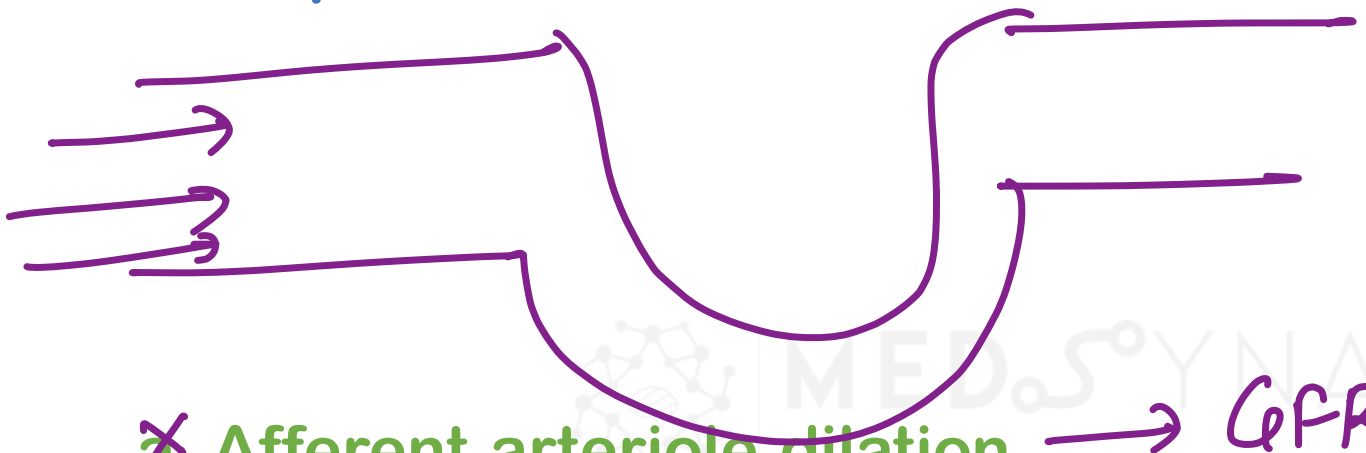
ECF – pl. volume

Body Fluid Compartments



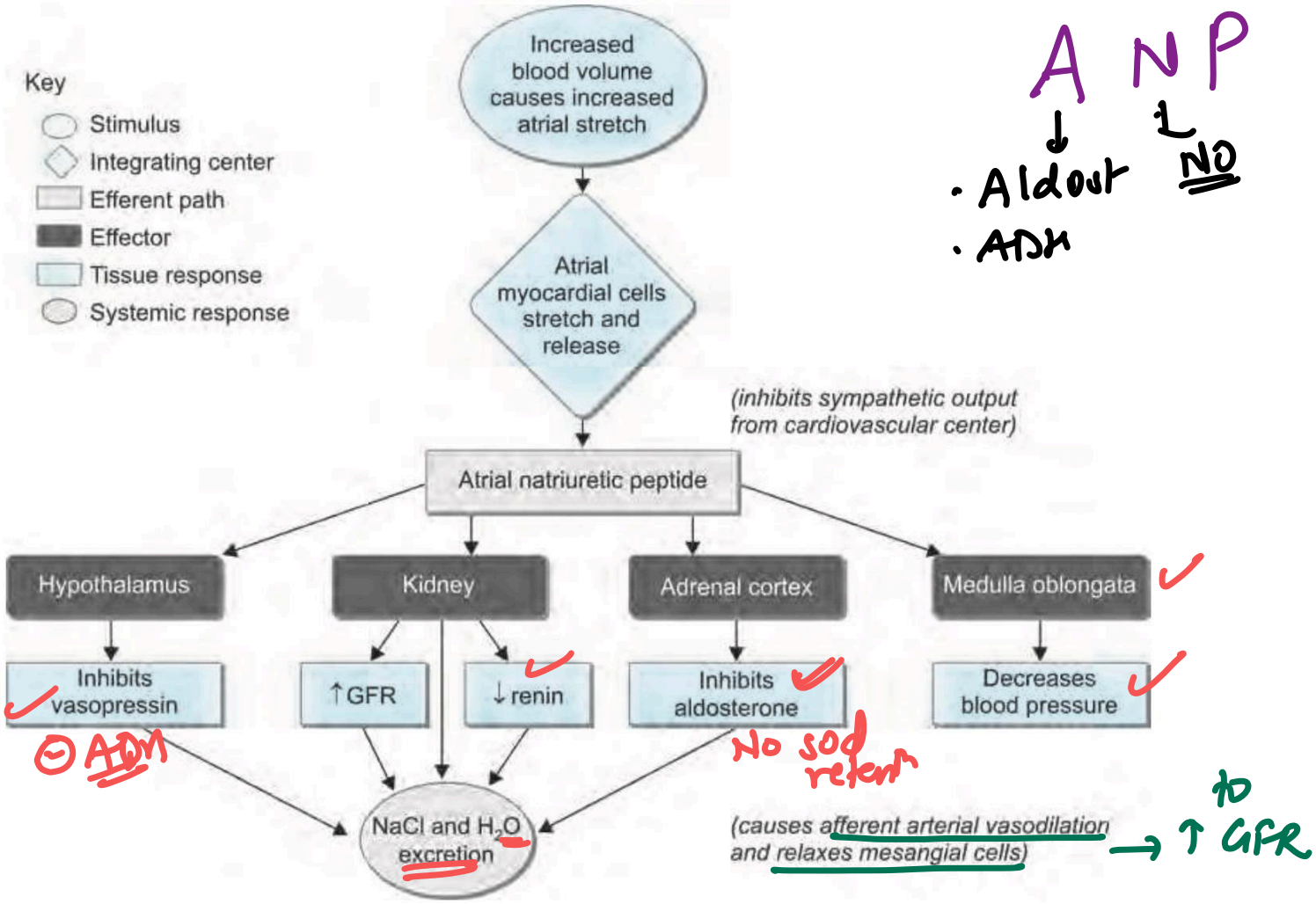
TBW = 60L
↓
plasma volume → 1/12 TBW
(1/4 x 1/3 TBW) 5L

All of these are actions of Atrial Natriuretic Peptide except:



natriuresis
↑ Na excretion
↓ Na reabsorption

a. Afferent arteriole dilation → GFR↑ (ANP does)
b. Mesangial constriction → ↓GFR
c. Decreased sodium absorption in PCT ✓
d. Inhibition of sodium reabsorption in medullary collecting duct ✓



ANP
↓ Aldost
↓ NO
· ADH

⊖ ADH

No sod retent

↑ GFR

Considering the latent period of a muscle twitch to be 10 ms, contraction time 40 ms and relaxation time 50 ms, what will be the tetanizing frequency for this muscle?

a. 25Hz
b. 50Hz
c. 100Hz
d. 75Hz

Fav

$$= \frac{1}{\text{contracn pd only}}$$

$$= \frac{1}{0.04 \text{ sec}}$$

$$= 25 \text{ Hz}$$