Aneszteziológia és intenzív terápia

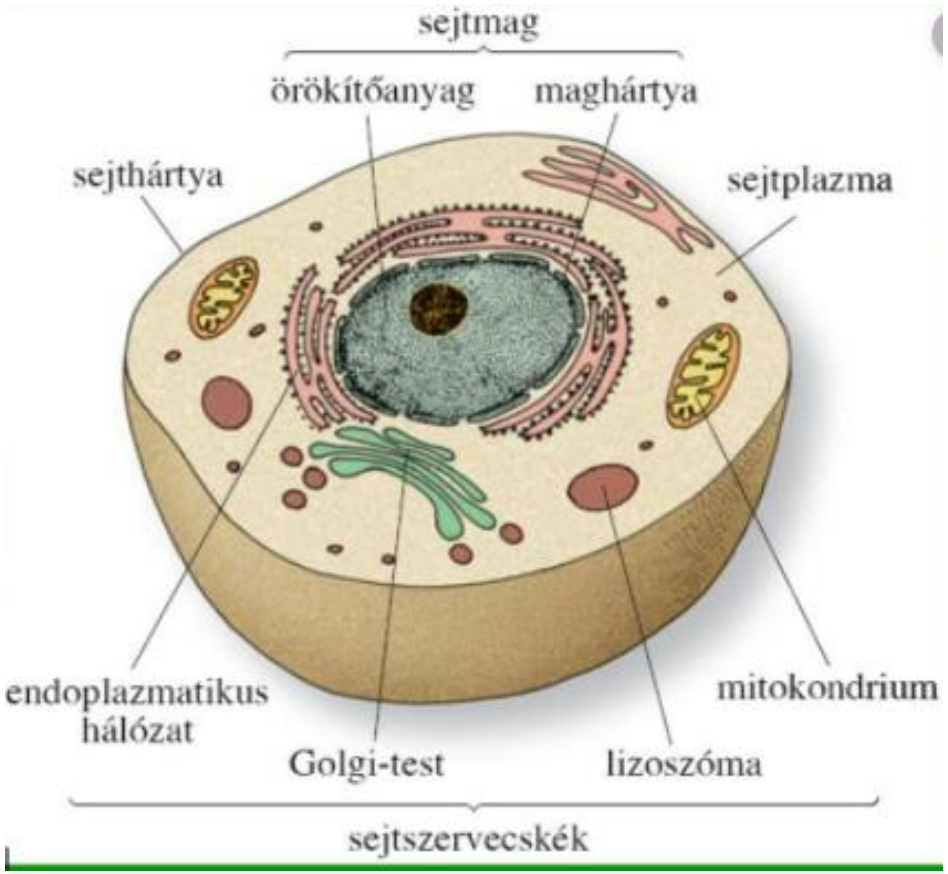
Anatómiai és élettani alapok

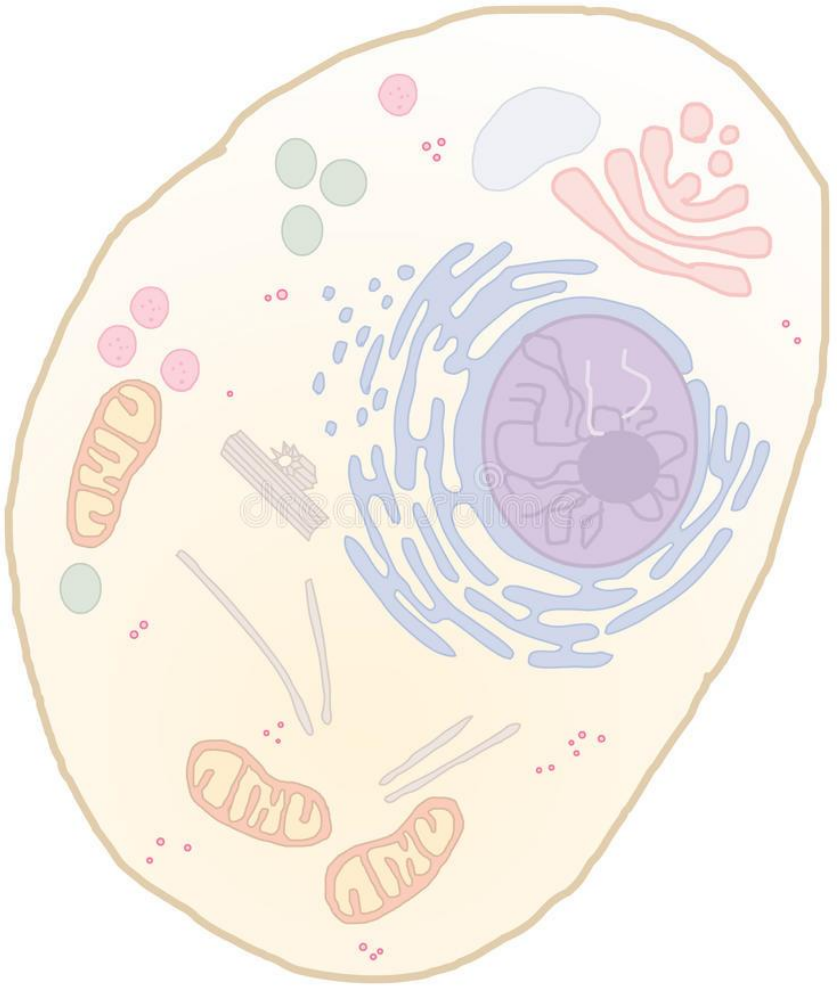
Amiről szó lesz

- …

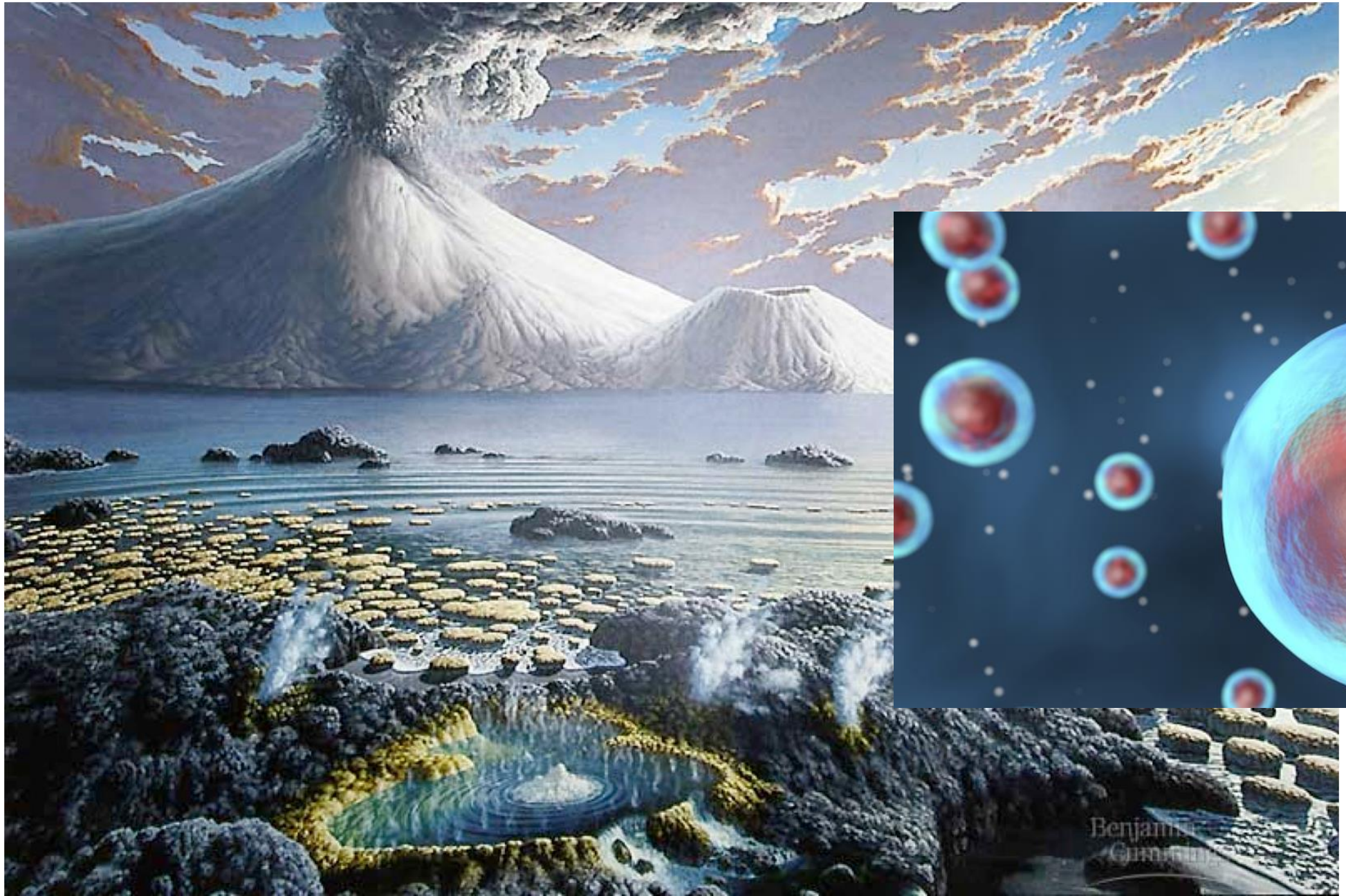
- Kicsit mindenről…

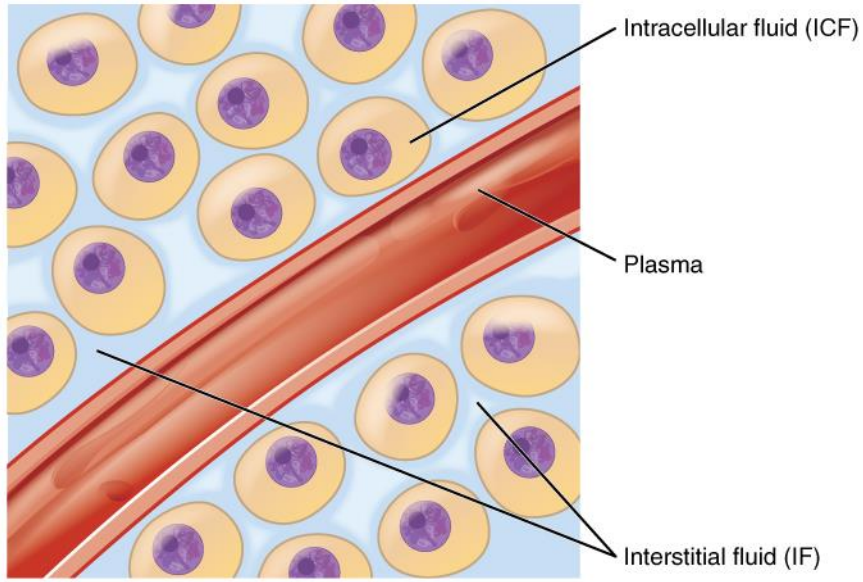
Általános bevezetés

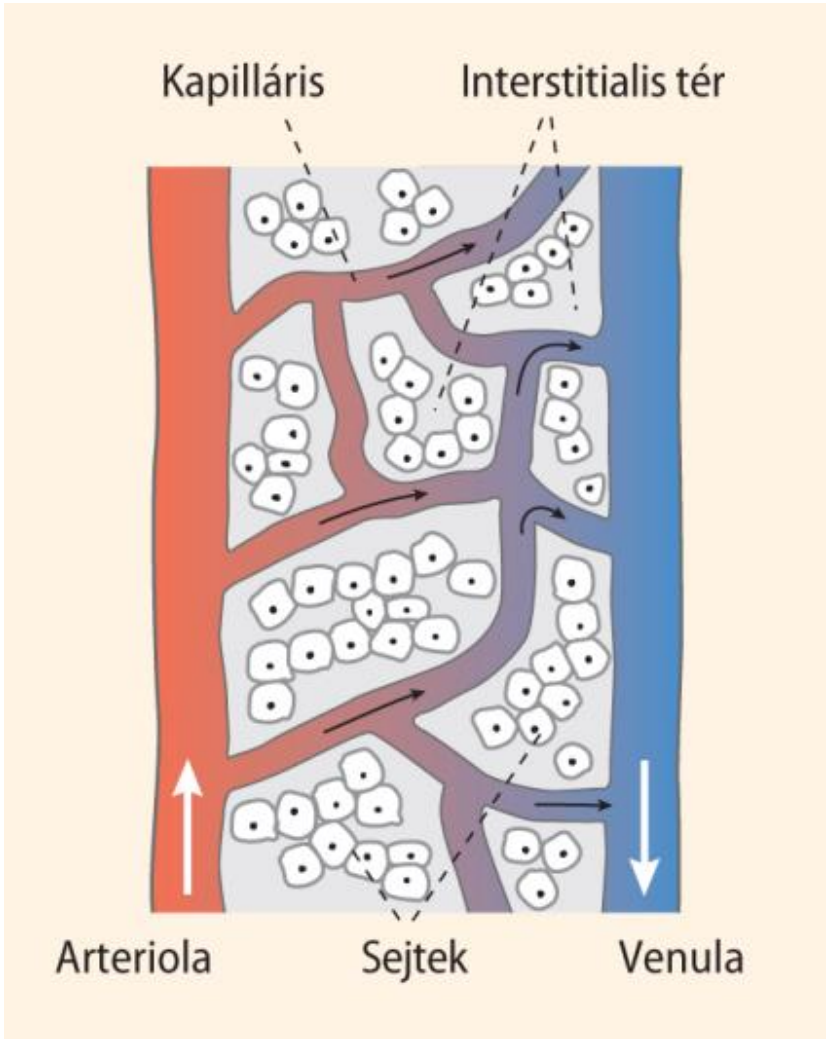




Első egysejtűek kb 3 milliárd éve, az Őstengerbe keletkeztek

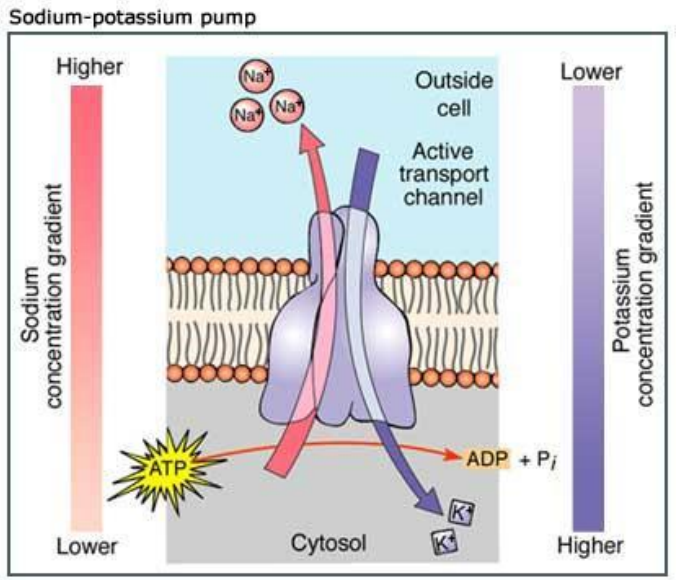


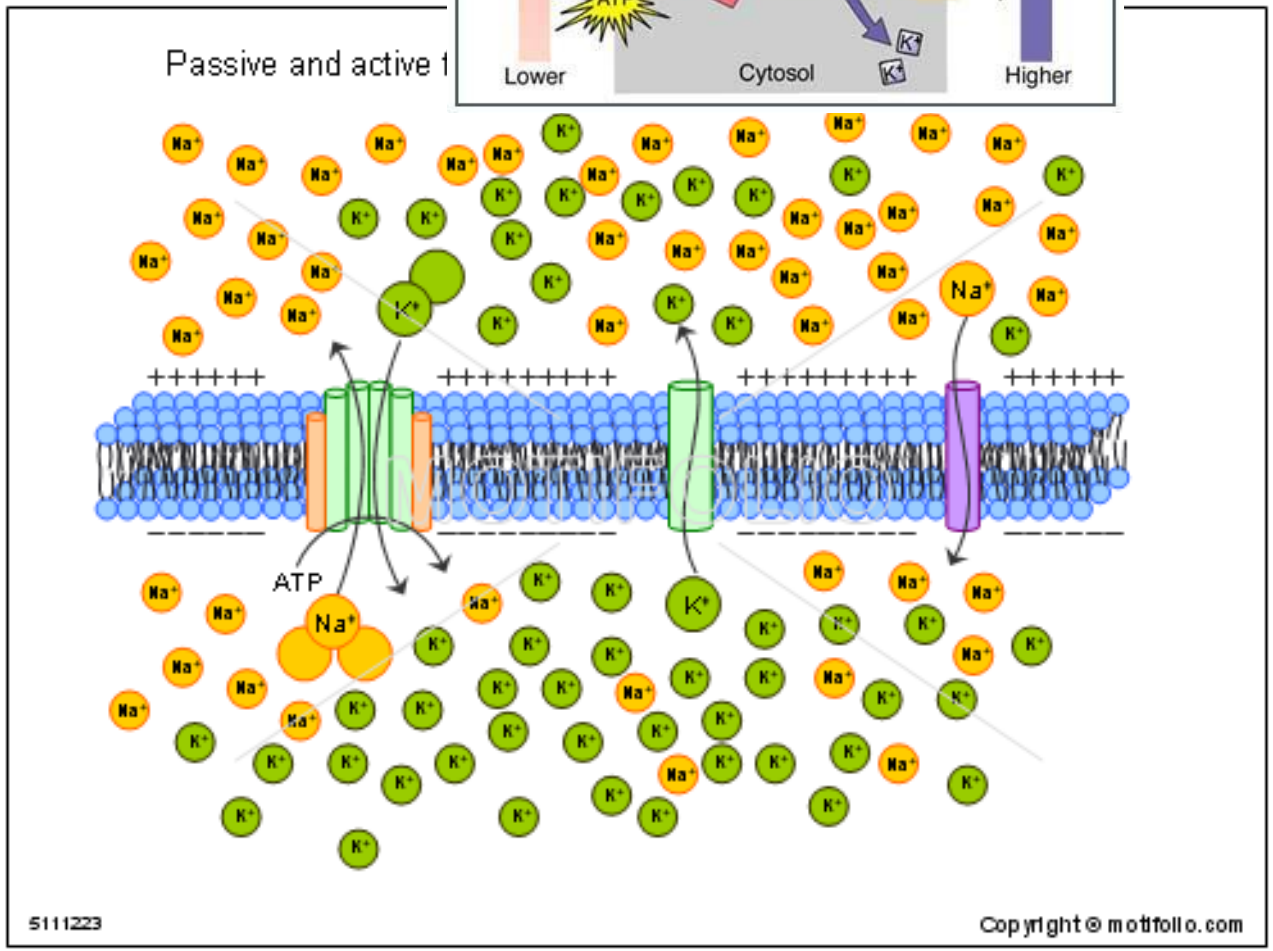

Intracellular fluid (ICF)
Plasma
Interstitial fluid (IF)


Kapilláris
Interstitialis tér
Arteriola
Sejtek
Venula

Membrán potenciál

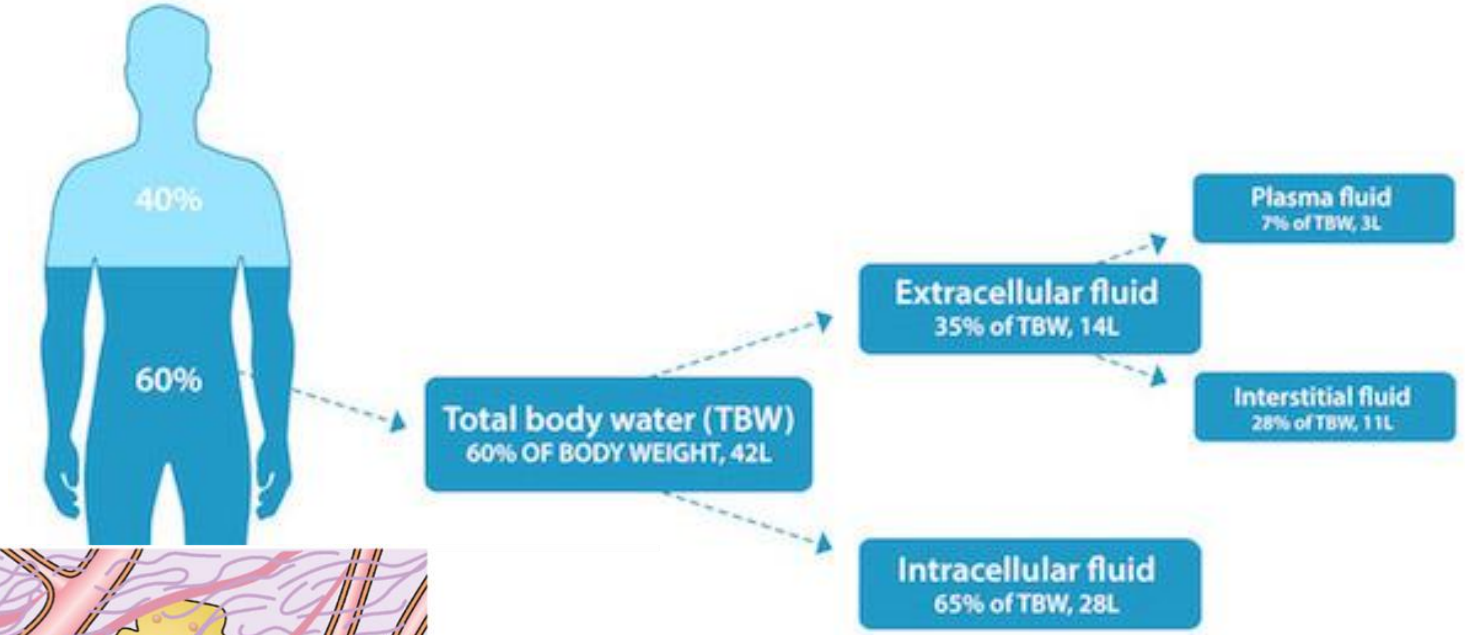
- Feszültség különbség a sejtmembrán két oldala közt
- Na/K pumpa
- Az ingerelhetőség alapja

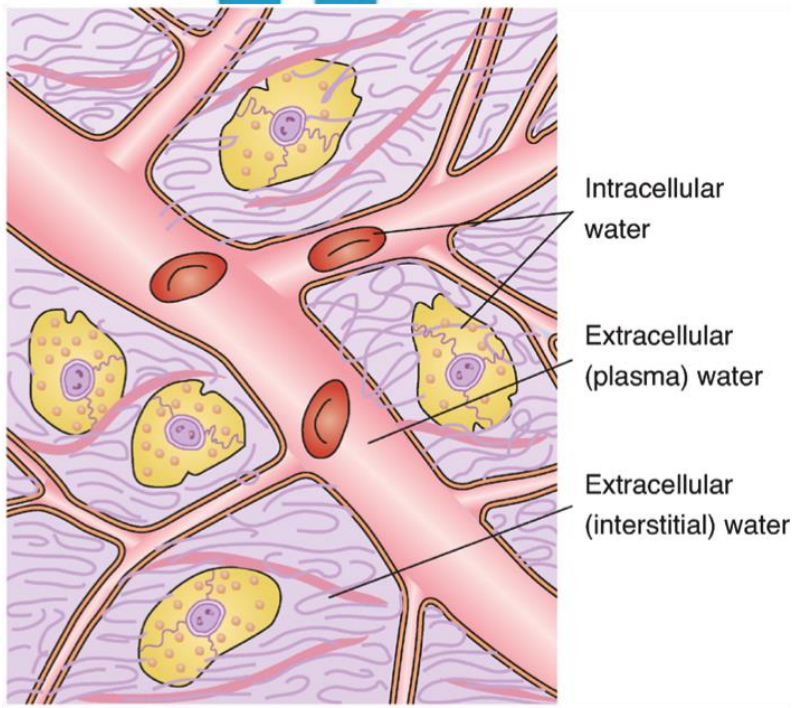




Folyadékterek

- Testtömeg 60%-a víz
- Kb. 2/3-a intracellularis (IC)
- Kb. 1/3-a extracellularisan (EC)
- Utóbbi kb. ¾-e interstitialis folyadék
- EC kb. negyede plasma



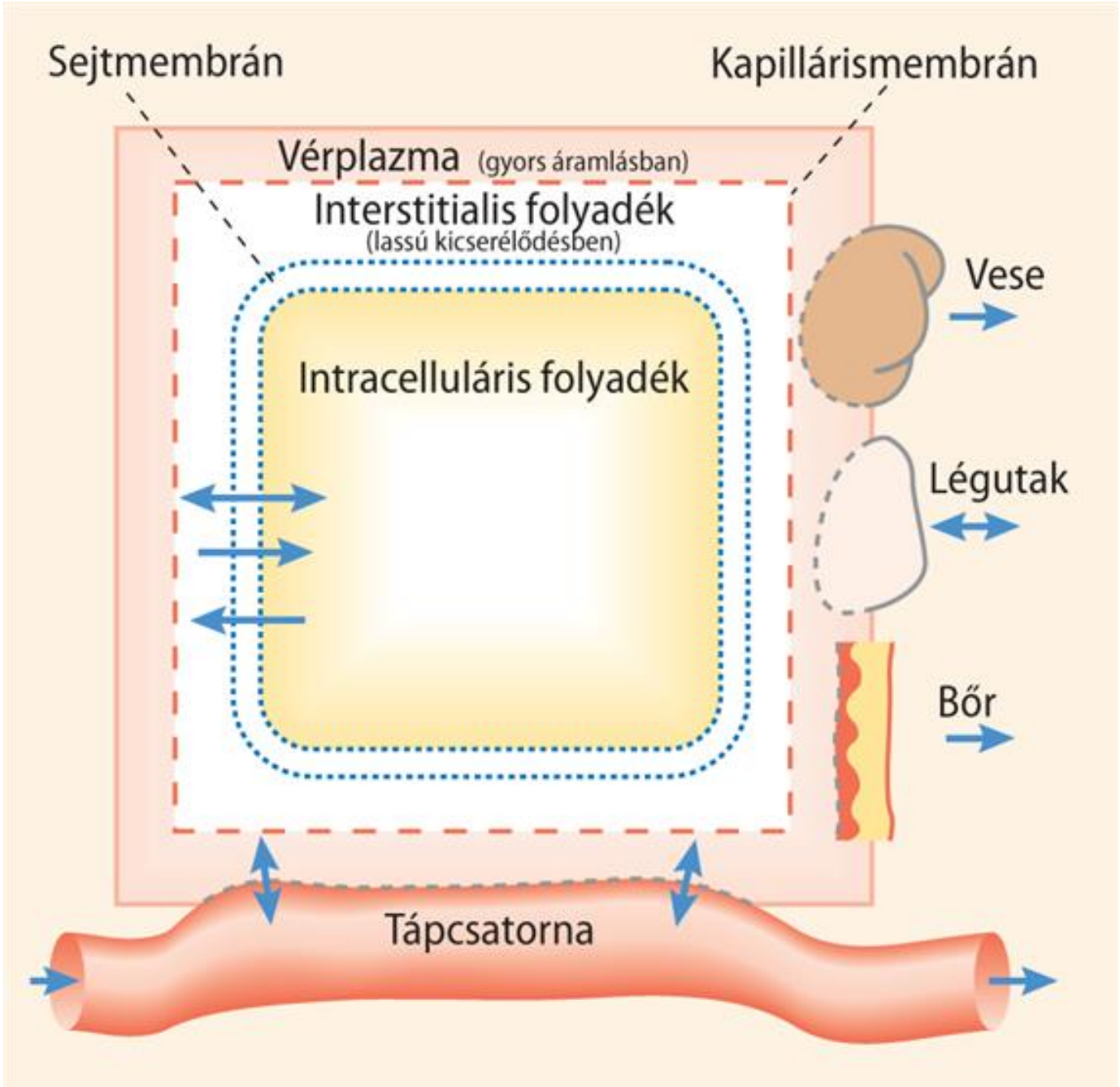


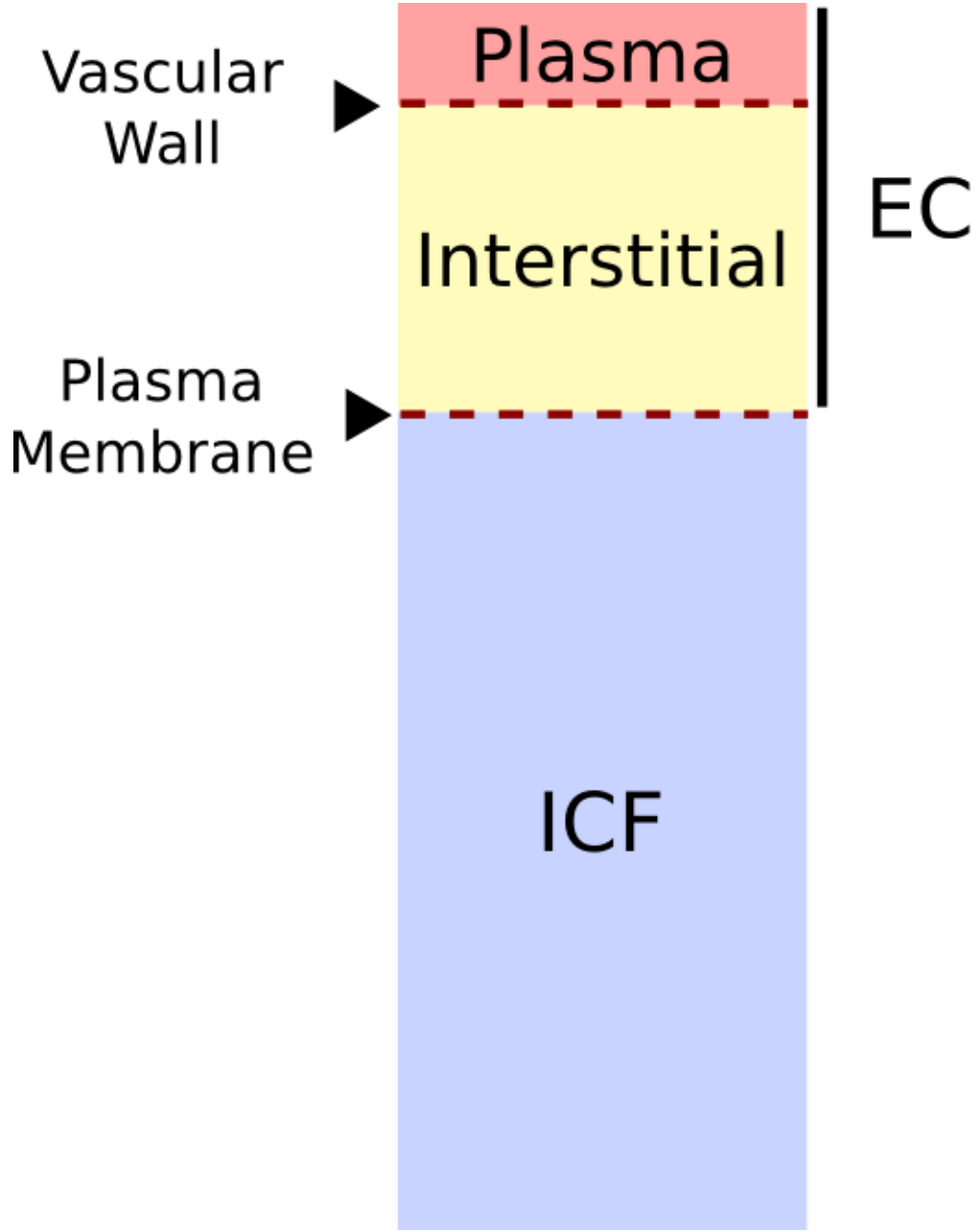
Mi választja el a tereket?

ICF - ECF: sejthártya

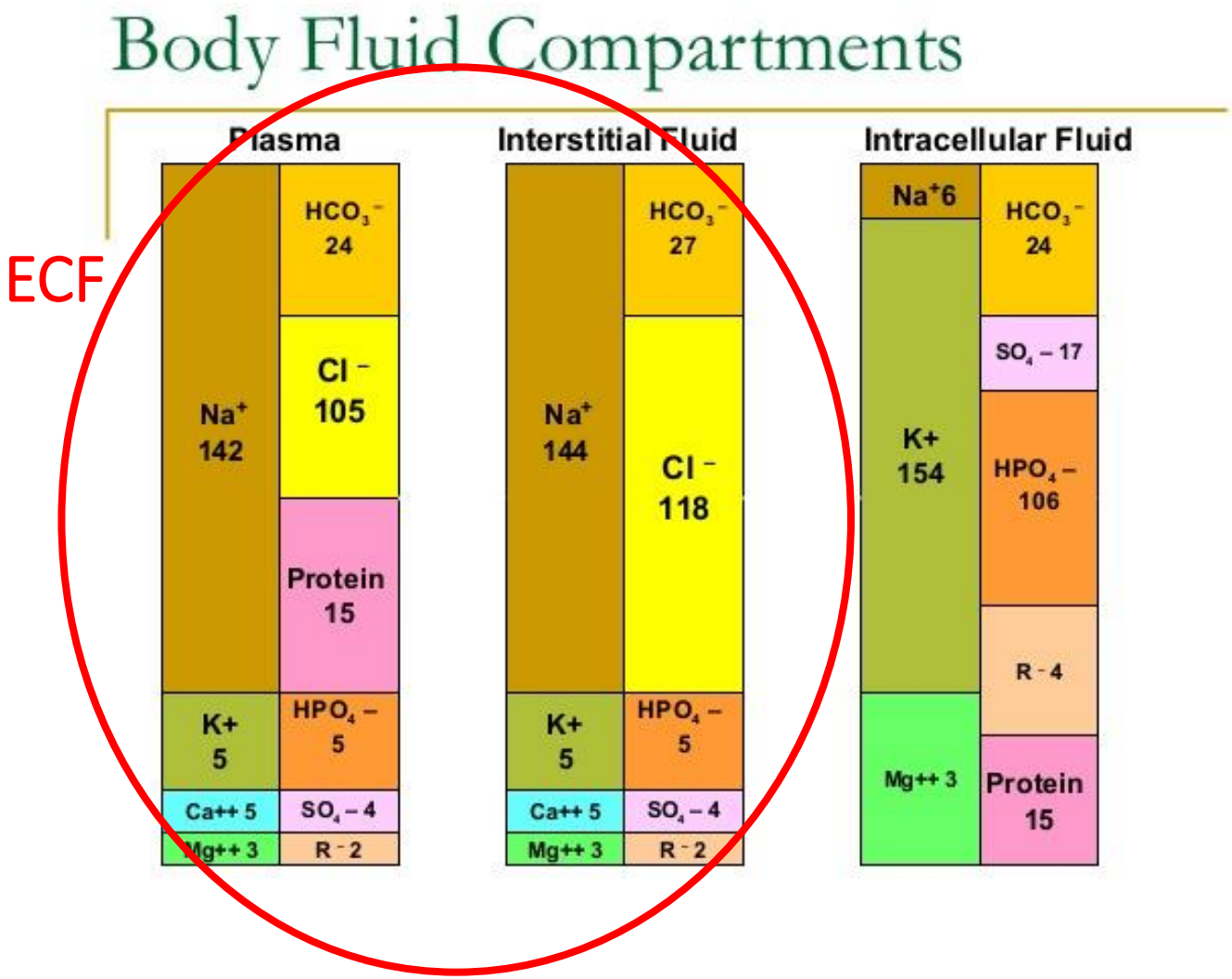
ISF – IVF: endothel

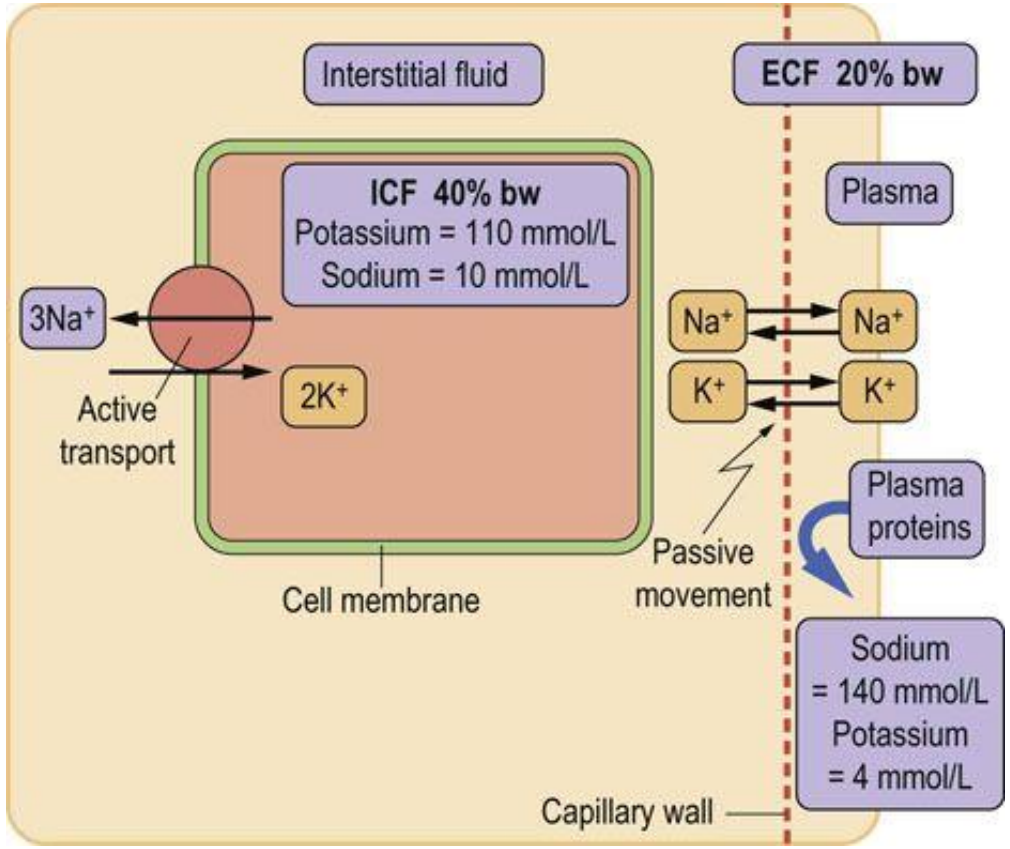
Nemcsak elválasztanak, tulajdonságaik, áteresztő képességük révén az összetételt is meghatározzák!!!


Sejtmembrán
Kapillárismembrán
Vérplazma (gyors áramlásban)
Interstitialis folyadék
(lassú kicserélődésben)
Intracelluláris folyadék
Vese
Légutak
Bőr
Tápcsatorna

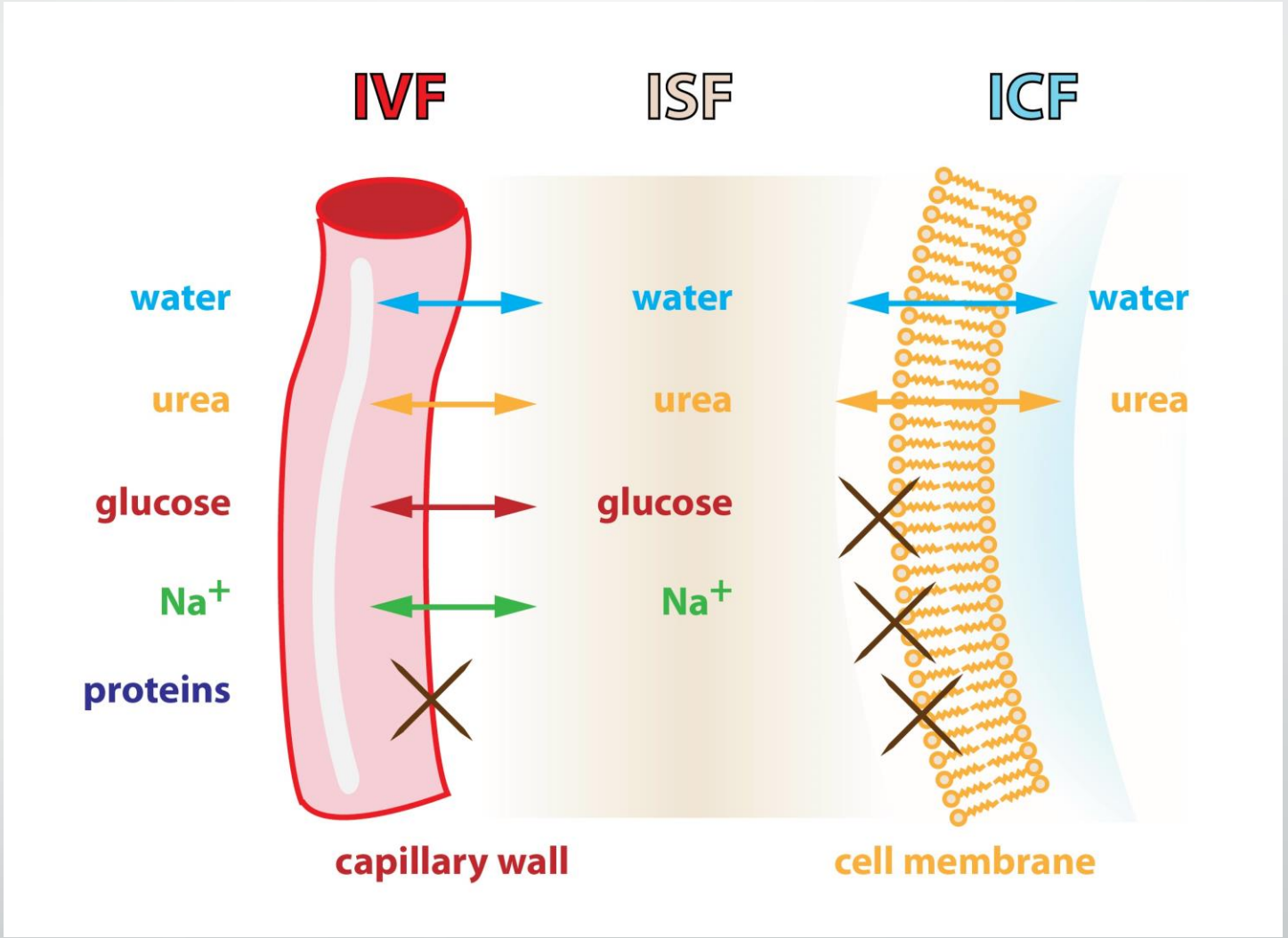

Vascular
Wall
Plasma
Interstitial
Plasma
Membrane
ICF
EC

Eltérő ionösszetétel





Különböző anyagok számára különböző módon átjárható!



Az energiaellátás….

- az élettani folyamatok, pumpa működések mind …

…ENERGIAIGÉNYESEK

MELÉS LEGELTE

Oxigén (O_2)

Szerves szénvegyület

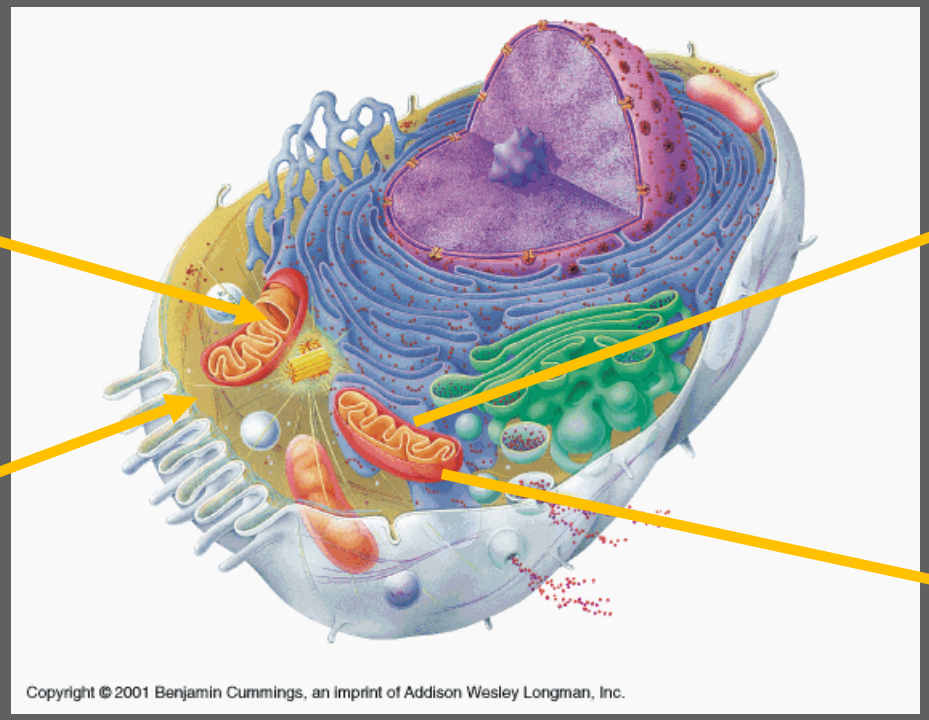
(CO_2)

+

A SEJT IS ÍGY CSINÁLJA…

Oxigén (O_2)

Szerves szénvegyület



Széndioxid (CO_2)
+
Víz (H2O)

Energia

AZ AEROB ENERGIATERMELÉS

MI HATÁROZZA MEG A SEJTEK OXIGÉN KÍNÁLATÁT?

- A sejtekhez egy perc alatt eljutó oxigén mennyiségét, azaz az oxigén szállítást (DO_2) meghatározza:
  - Hemoglobin koncentráció (Hb)
  - Annak oxigén telítettsége (SaO_2)
  - (vérben fizikailag oldott oxigén mennyisége – elhanyagolható)
  - Keringő perctérfogat (cardiac output - CO)
    - Szívfrekvencia (fr)
    - Verőtérfogat (stroke volume – SV)
      - --Előterhelés
      - --Kontraktilitás
      - --Utóterhelés

DEFINÍCIÓK

- Perctérfogat (CO):

  A szív álatal egy perc alatt kilökött vér mennyisége, a szívferkvencia és a verőtérfogat szorzata (fr x SV)

- Verőtérfogat (SV):

  A szív által egy összehúzódás során kilökött vér mennyisége

AZ OXIGÉN SZÁLLÍTÓ KAPACITÁS (DO_2)

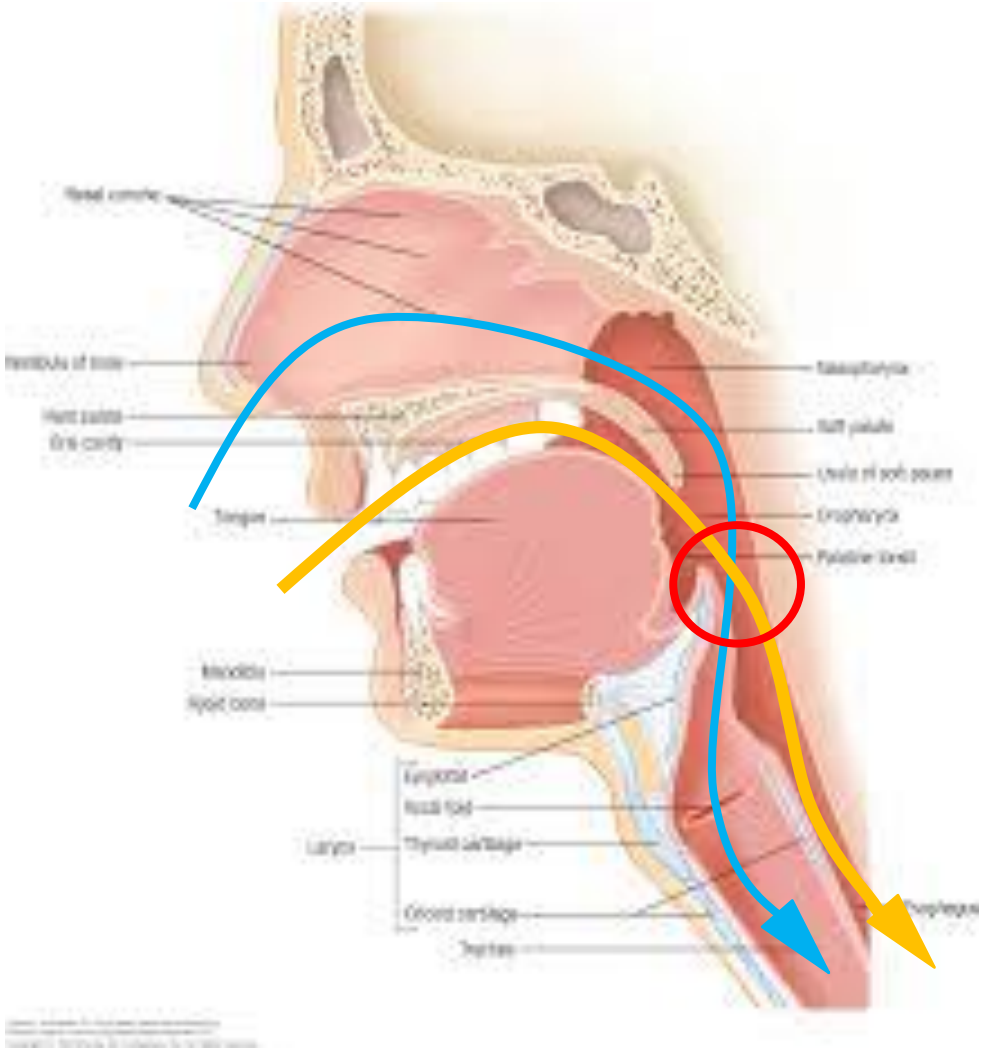
$$DO_2 \approx Hb \times SaO_2 \times CO$$

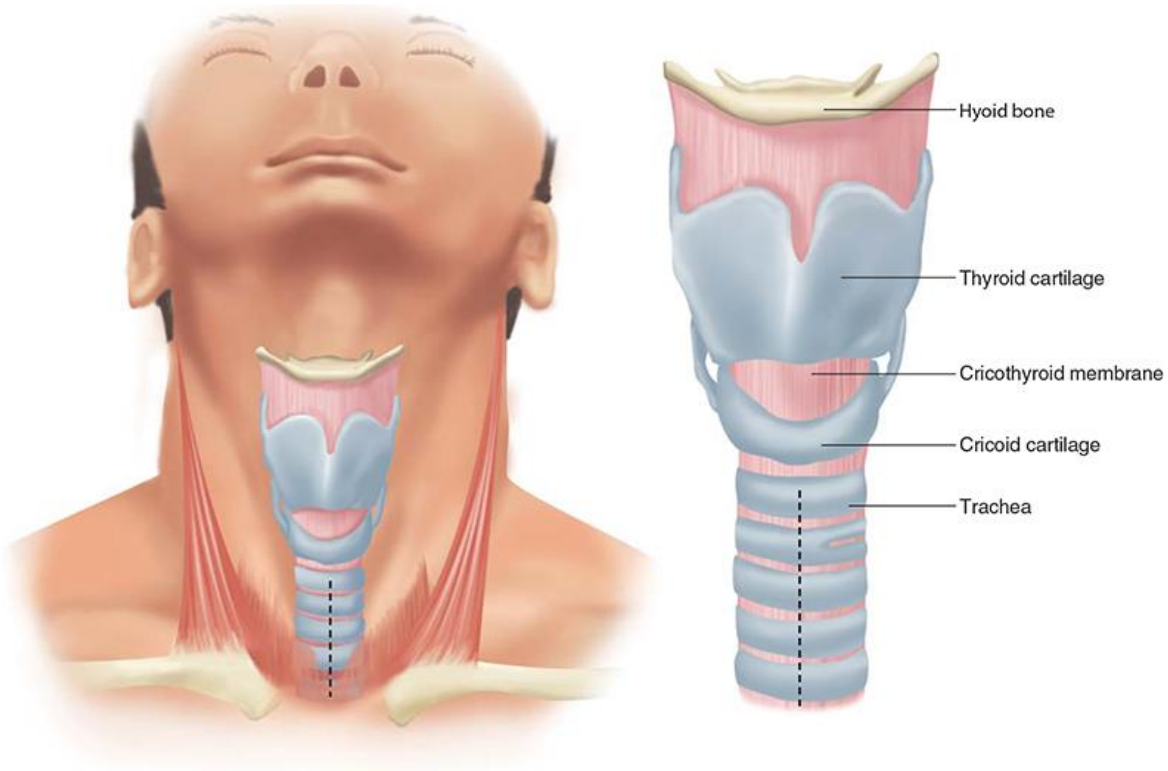
$$SV \times fr$$

előterhelés – kontraktilitás - utóterhelés

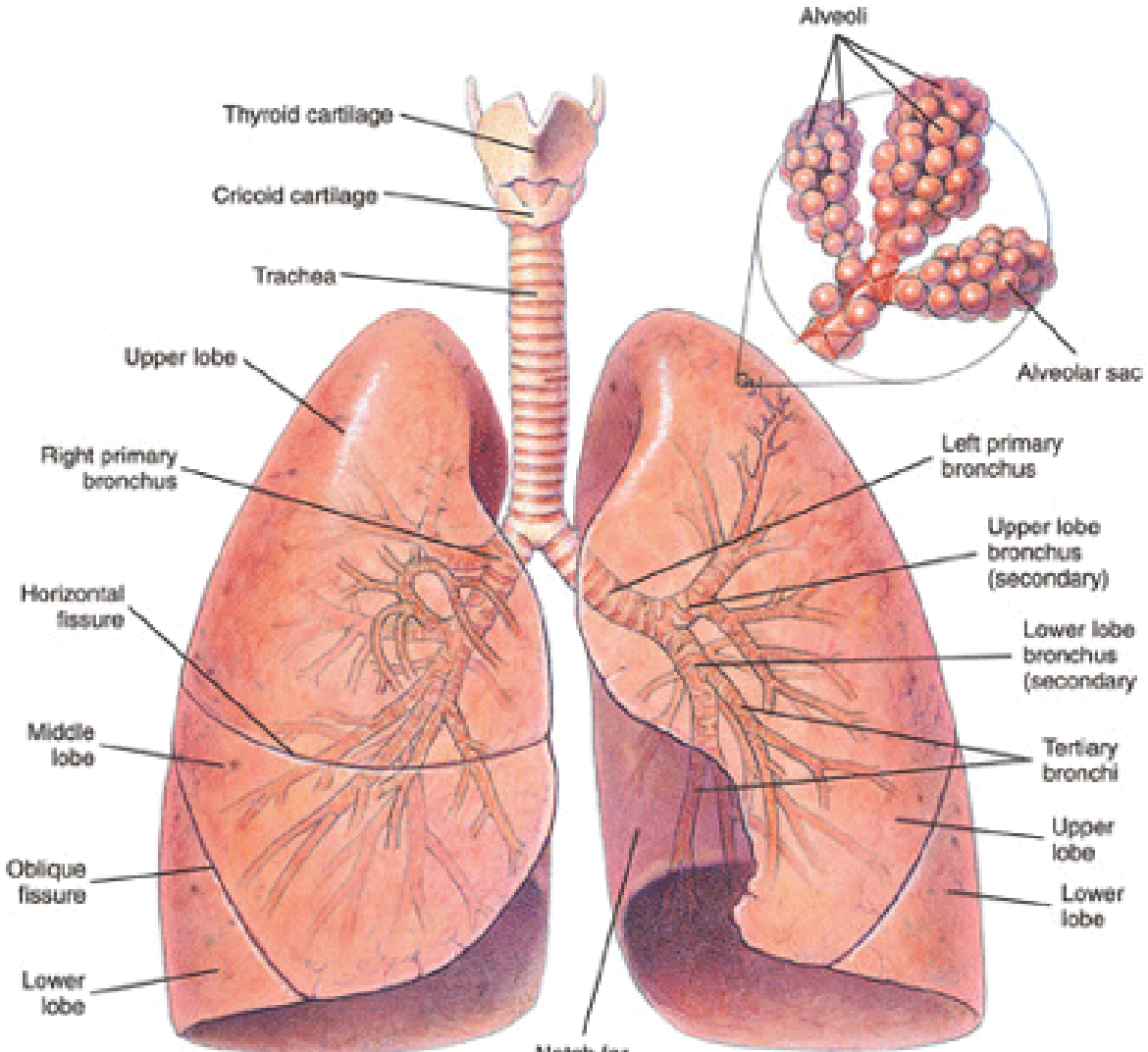
A (a légút alapjai)

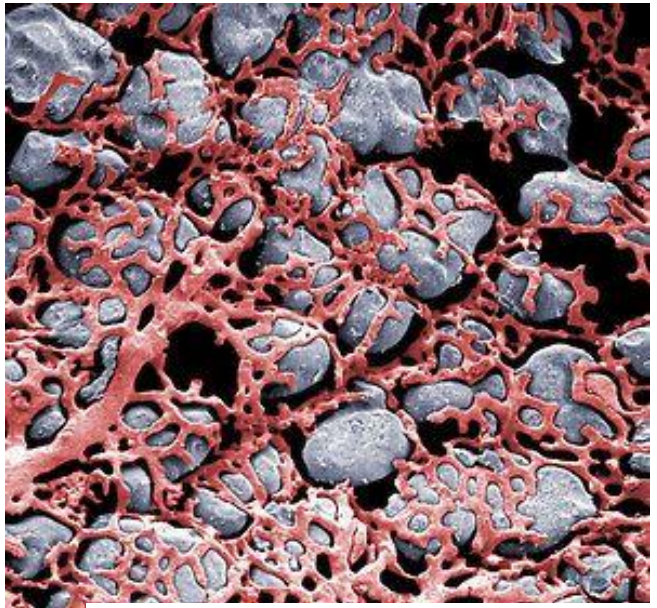
- A légút és az emésztő traktus keresztezi egymást
- Gégefedő választja el

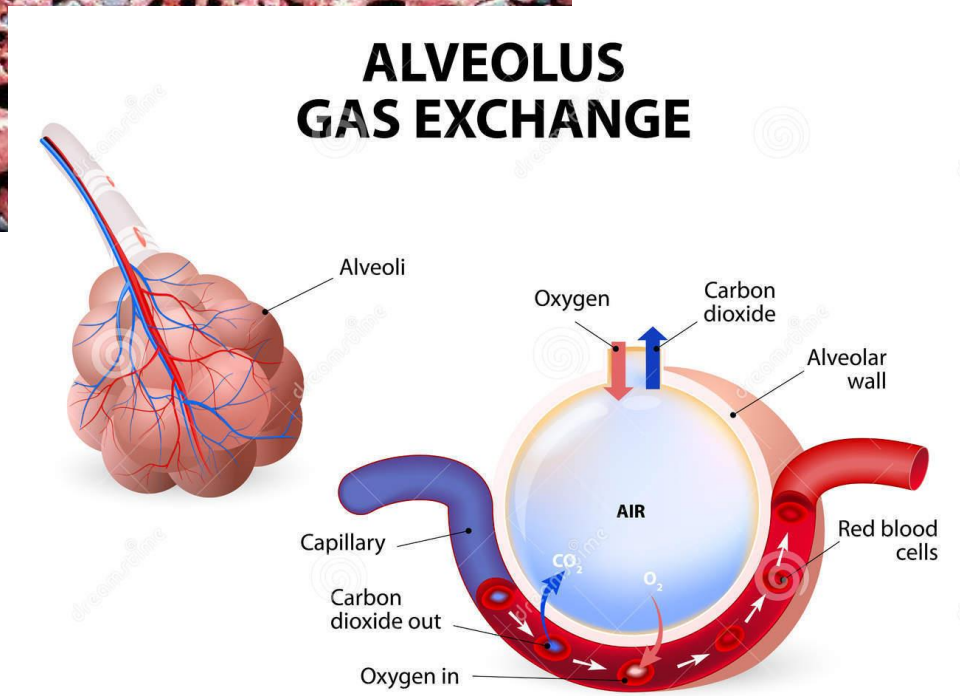




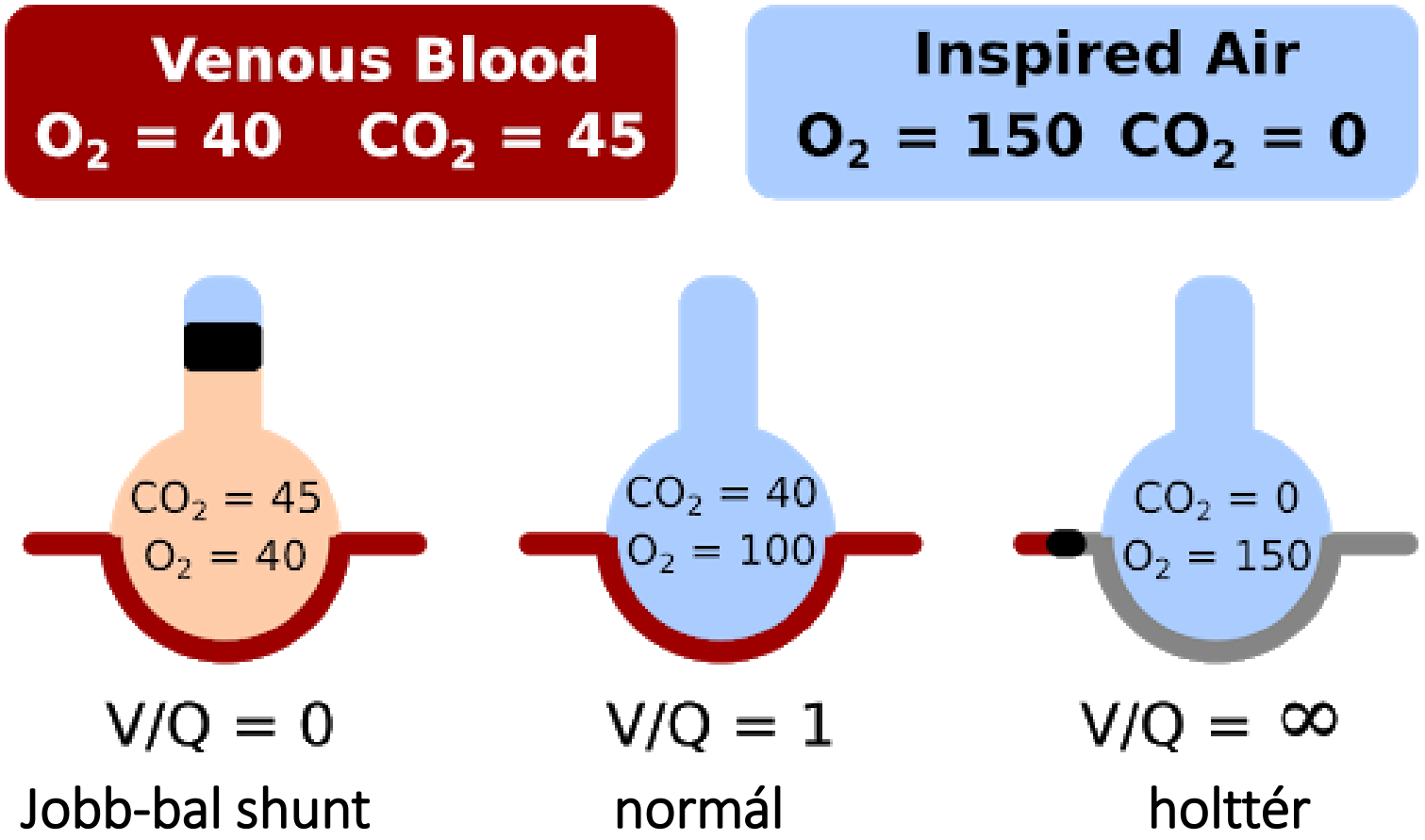
B - légzés

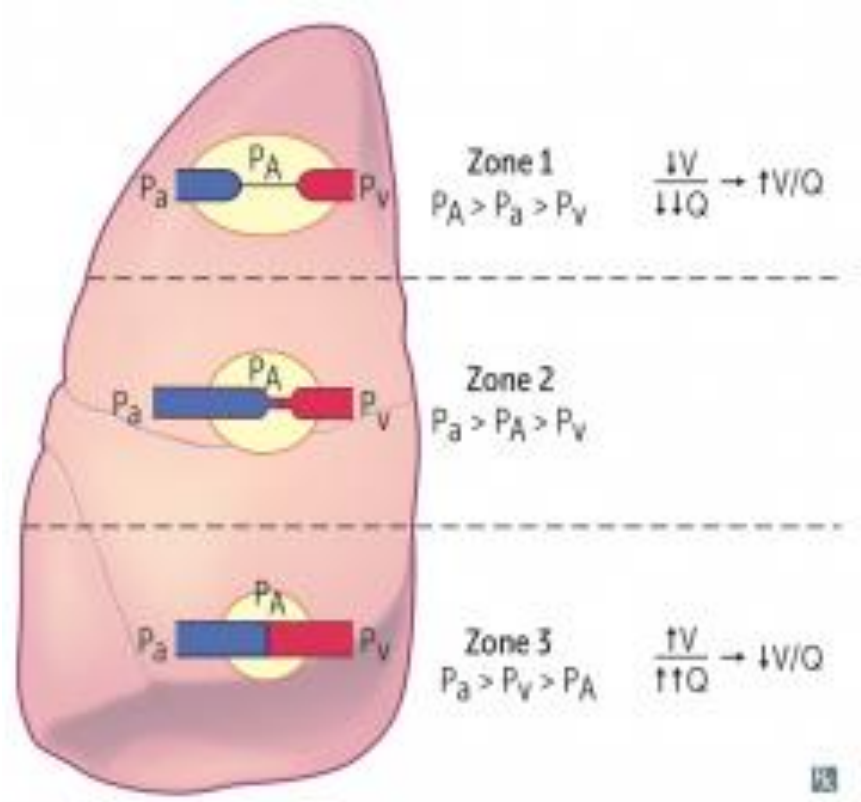


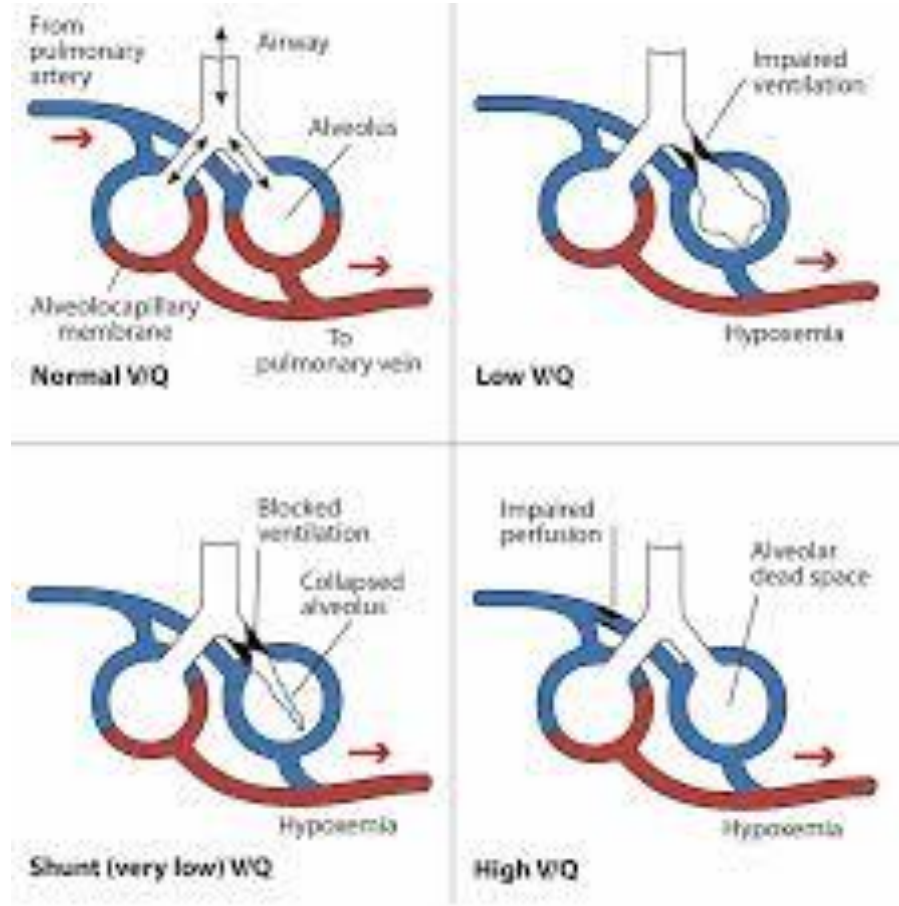


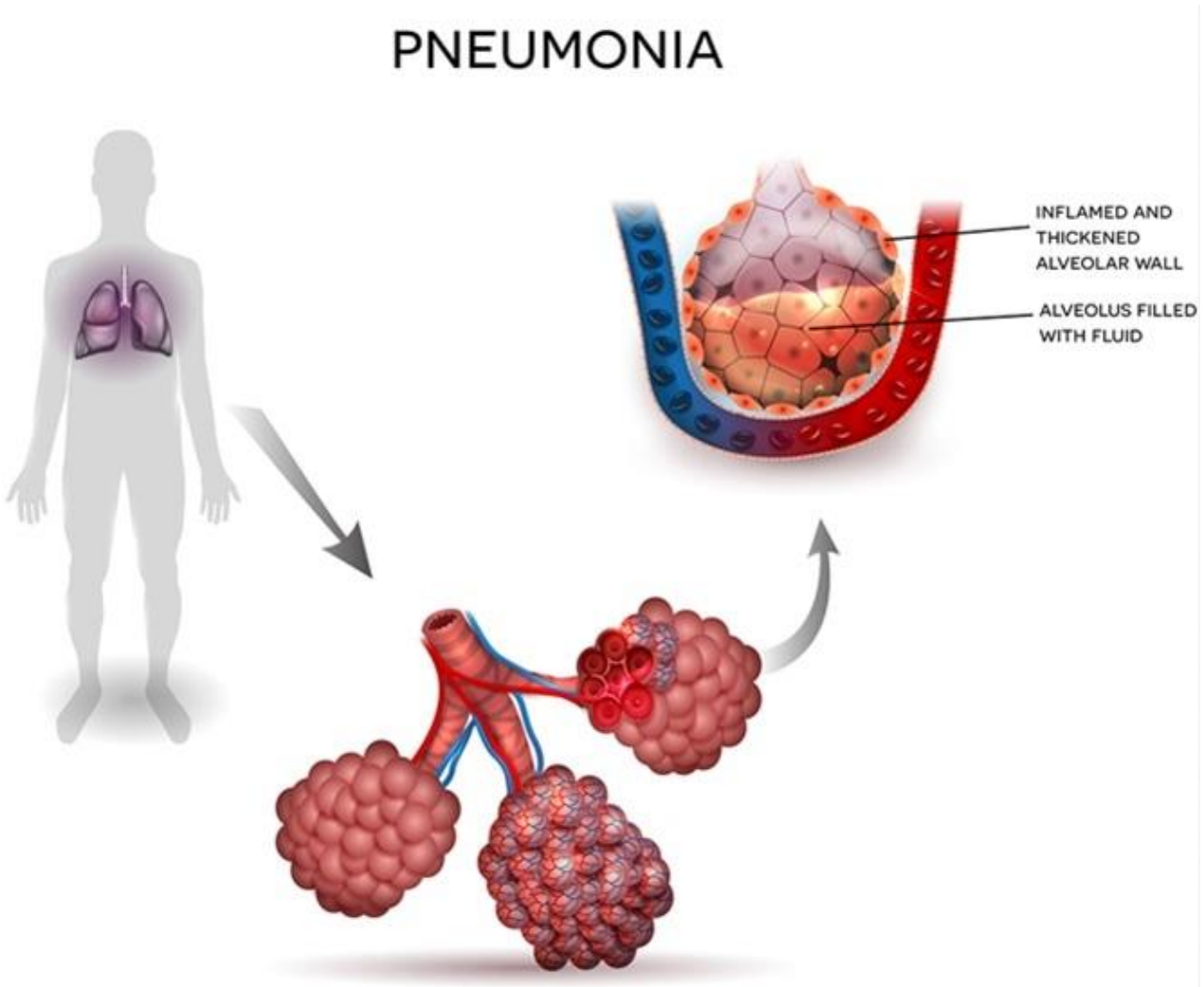


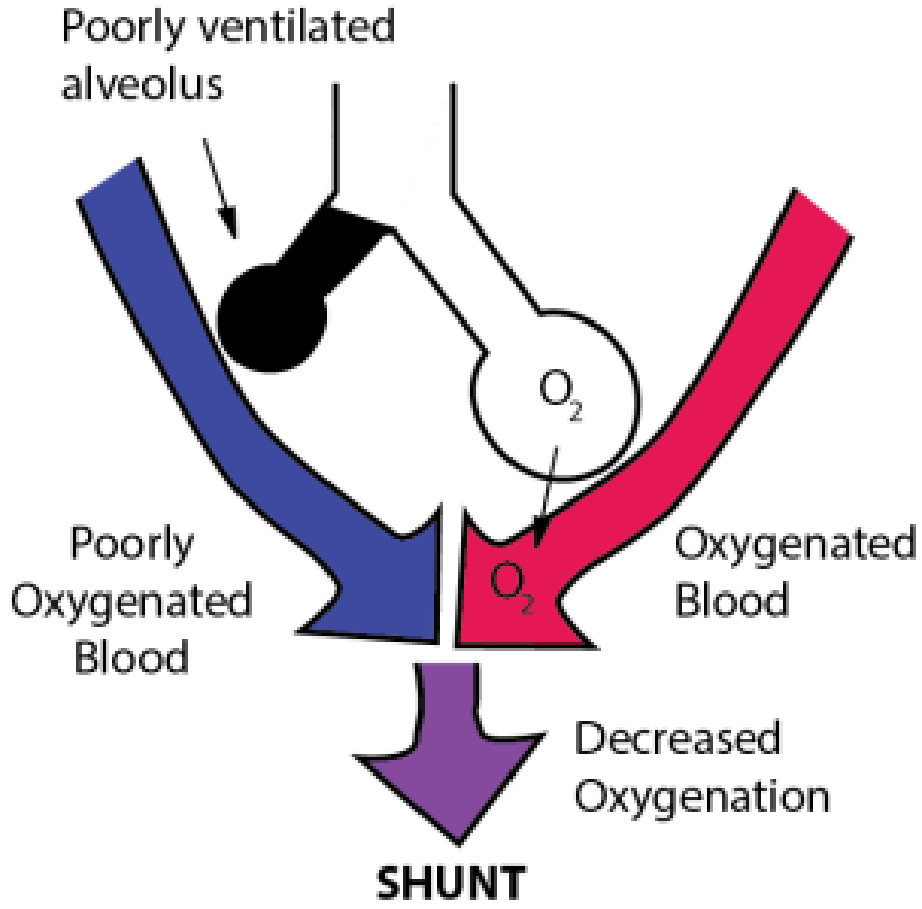
A V/Q (ventilláció/perfúzió) arány



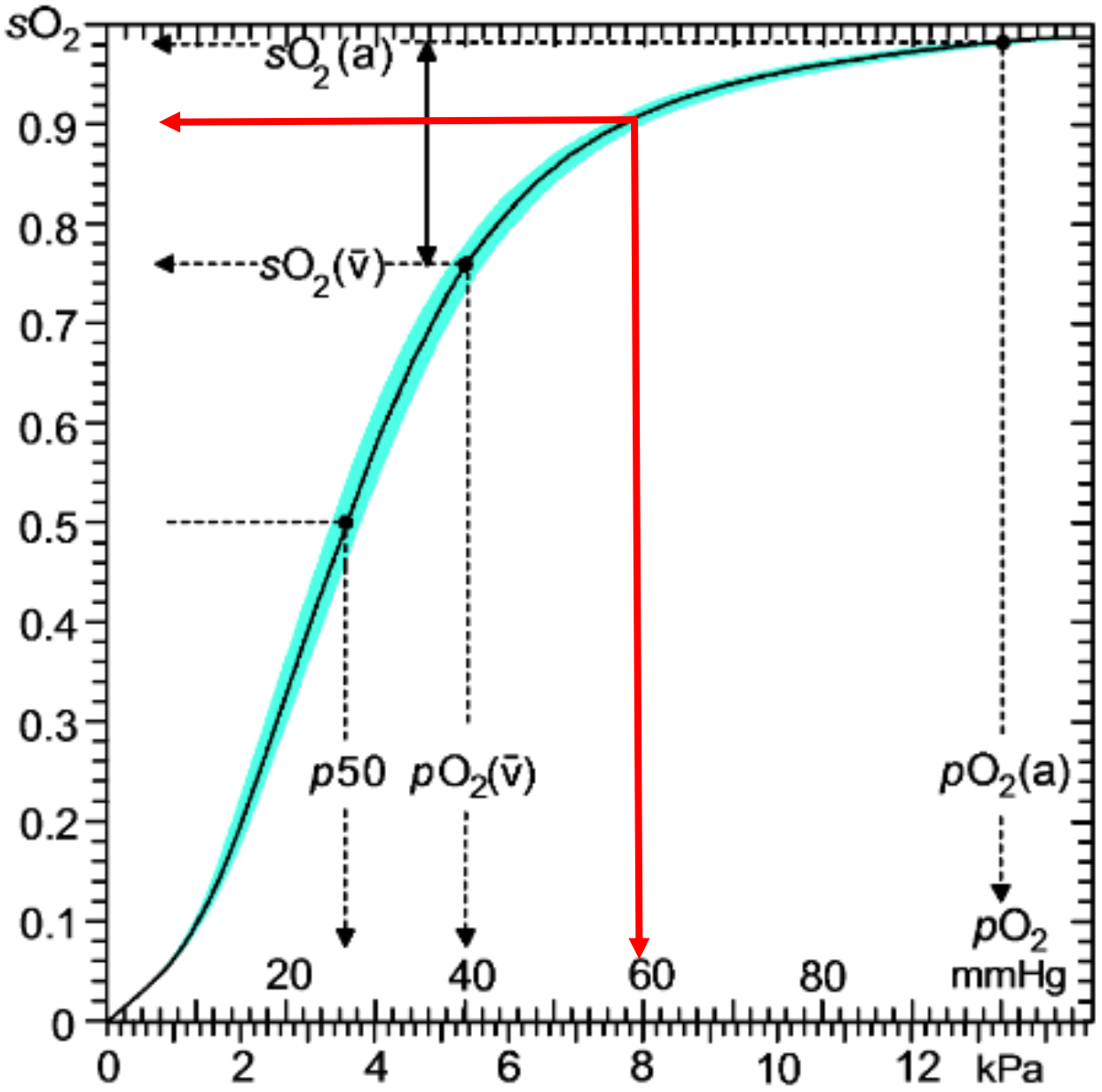

Zone 1
$P_A > P_a > P_v$
$\frac{\downarrow V}{\downarrow\downarrow Q} \rightarrow \uparrow V/Q$
Zone 2
$P_a > P_A > P_v$
Zone 3
$P_a > P_v > P_A$
$\frac{\uparrow V}{\uparrow\uparrow Q} \rightarrow \downarrow V/Q$


From pulmonary artery
Airway
Alveolus
Alveolocapillary membrane
To pulmonary vein
Normal V/Q
Impaired ventilation
Hypoxemia
Low V/Q
Blocked ventilation
Collapsed alveolus
Hypoxemia
Shunt (very low) V/Q
Impaired perfusion
Alveolar dead space
Hypoxemia
High V/Q


PNEUMONIA
INFLAMED AND THICKENED ALVEOLAR WALL
ALVEOLUS FILLED WITH FLUID

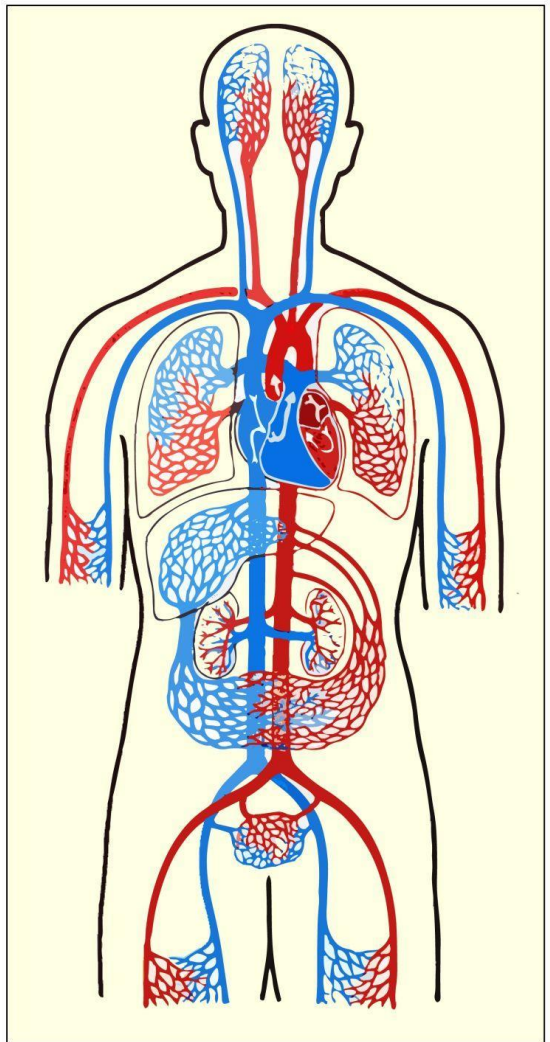

Poorly ventilated alveolus
O_2
O_2
Poorly Oxygenated Blood
Oxygenated Blood
Decreased Oxygenation
SHUNT

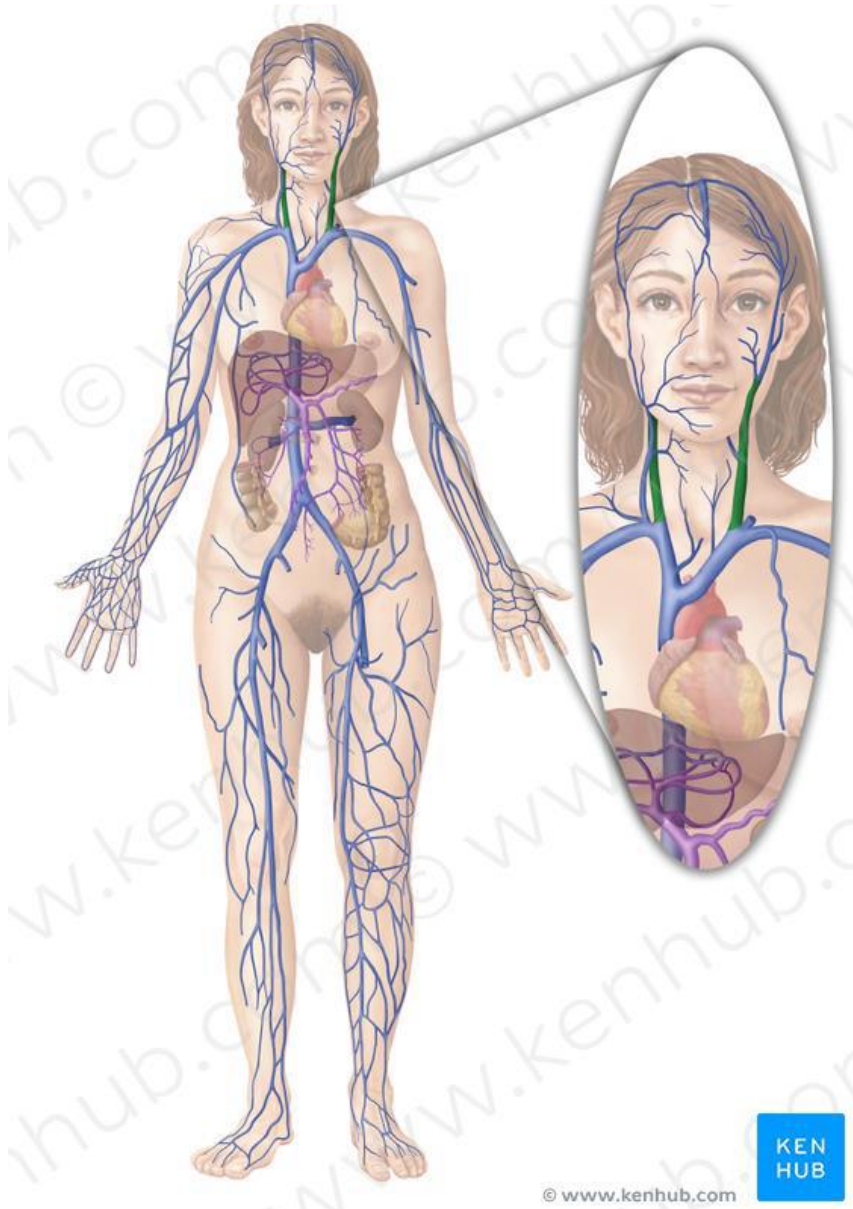
A pO2 és a SaO2 összefüggése: az oxigén disszociációs görbe (ODC)



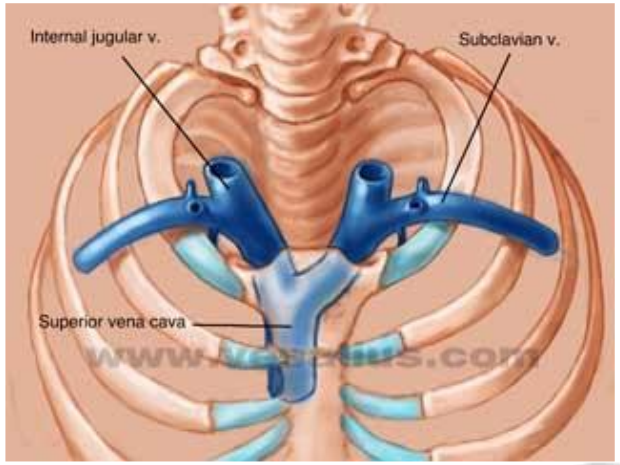
Az ODC görbét balra tolja	**Az ODC görbét jobbra tolja**
c2,3-DPG	c2,3-DPG
Temp.	Temp.
pCO2	pCO2
pH	pH
FHbF	FSHb
FCOHb	
FMetHb	

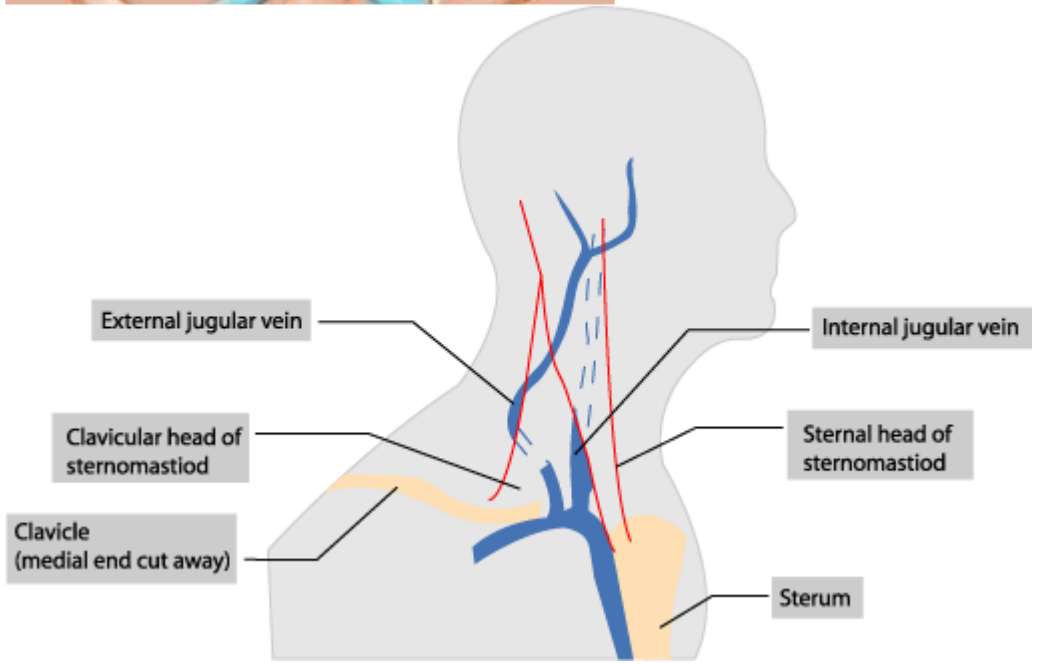
C (A keringés alapjai)

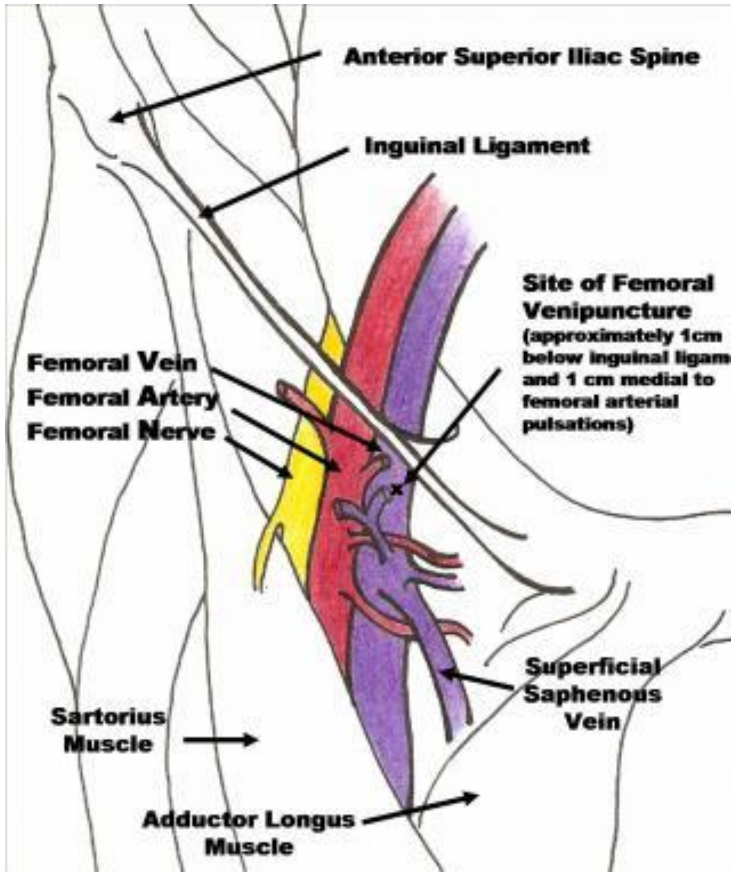




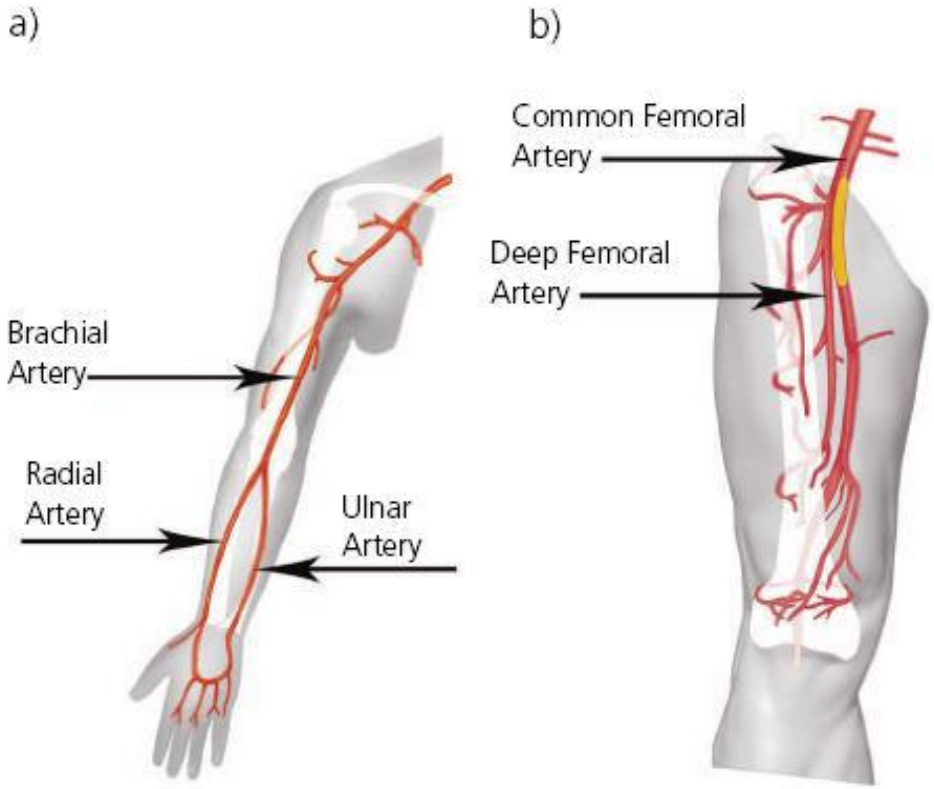
Centralsi venas behatolási pontok



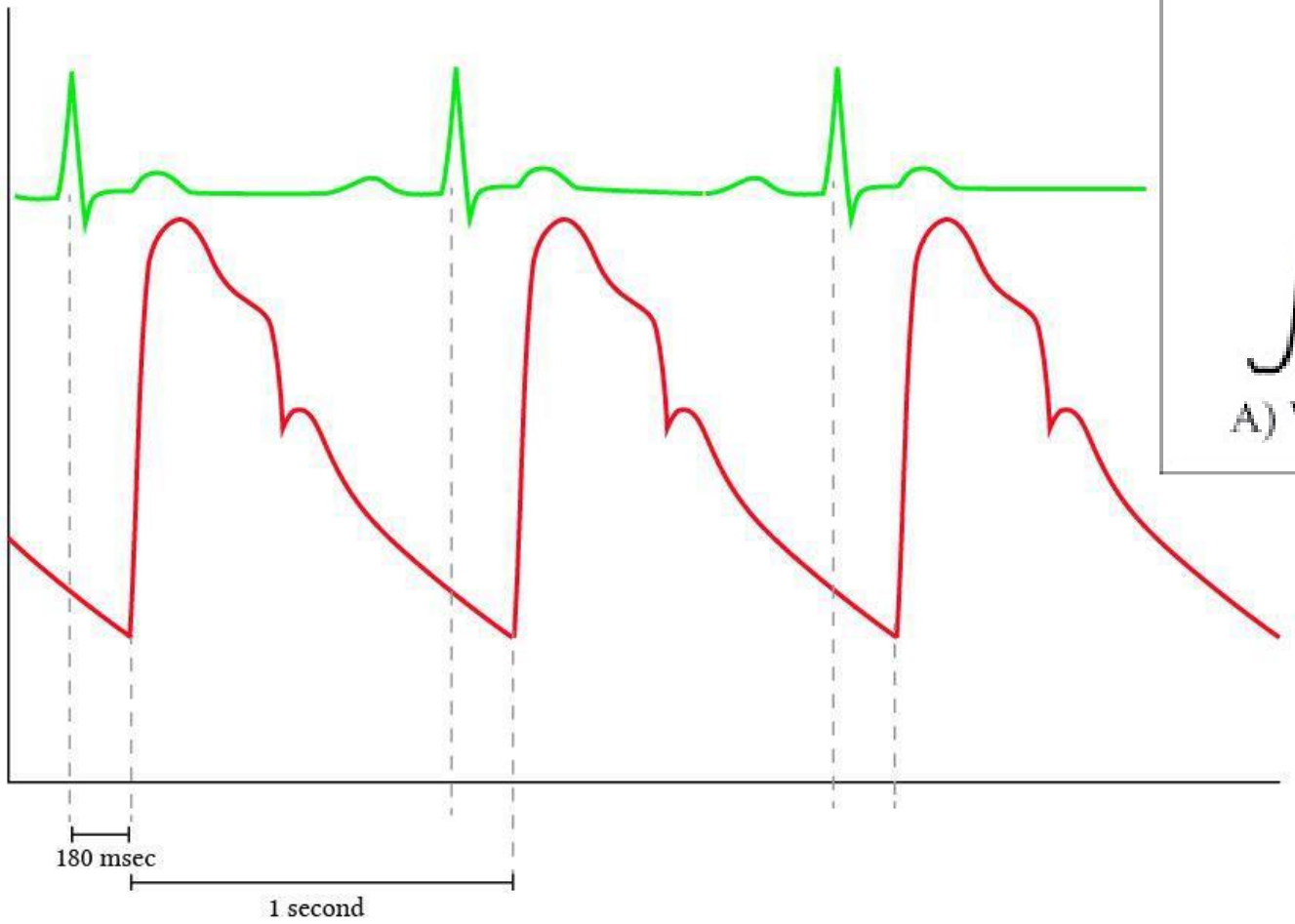


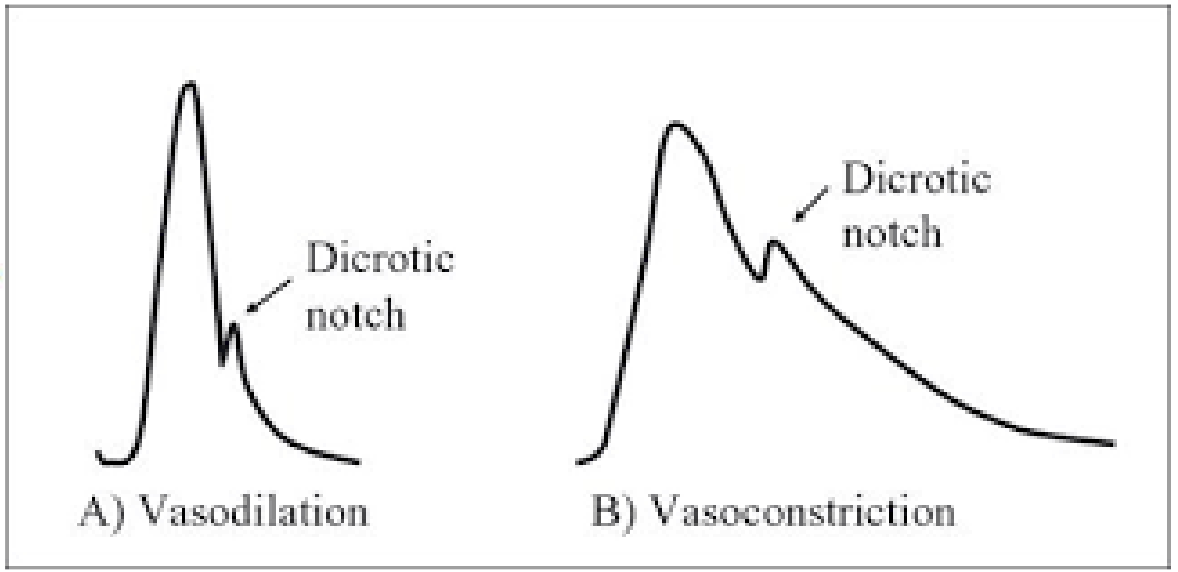


Artéris kanülálási pontok

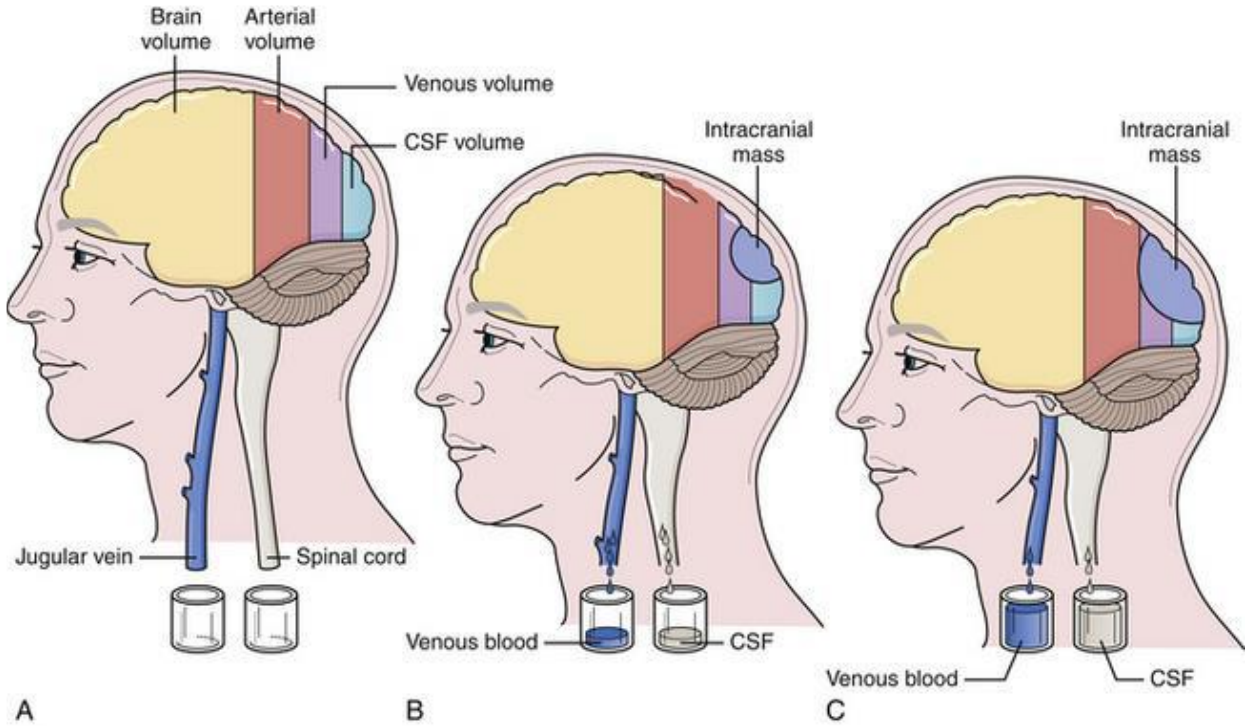


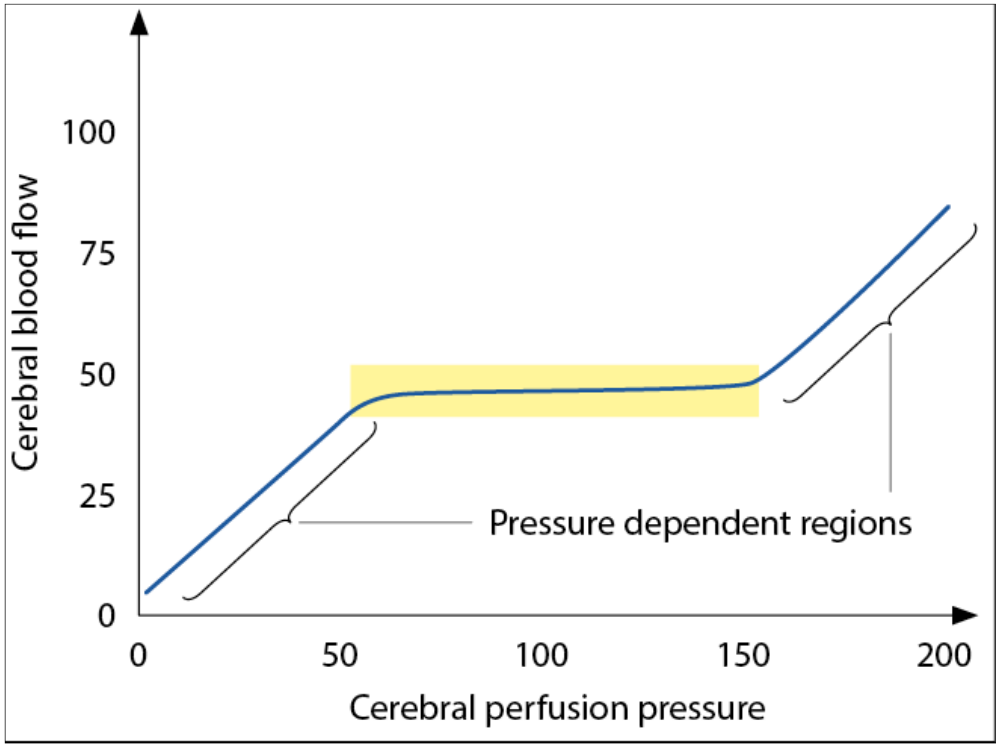
Az artériás nyomáshullám

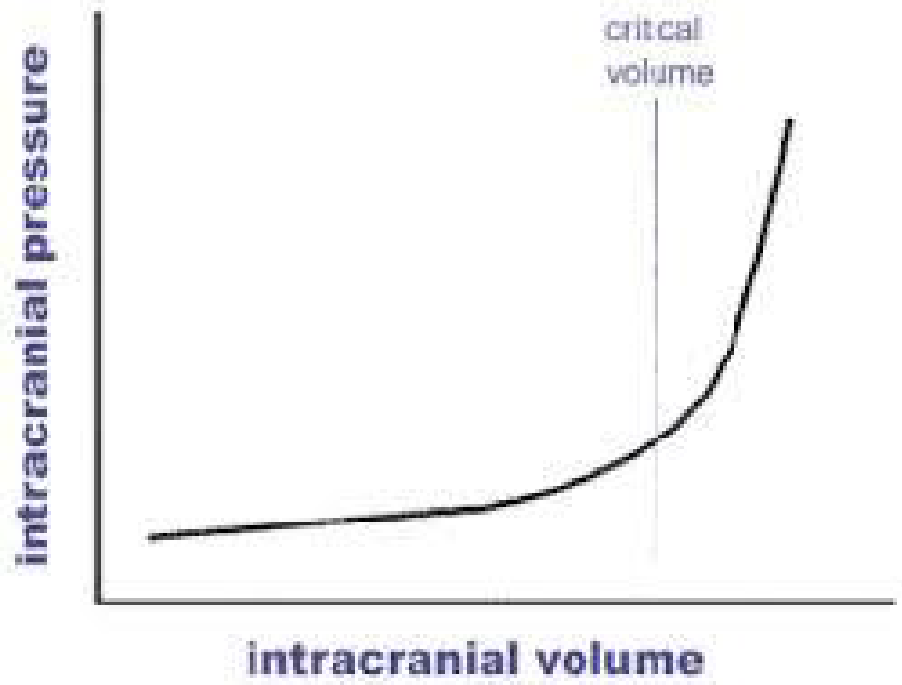


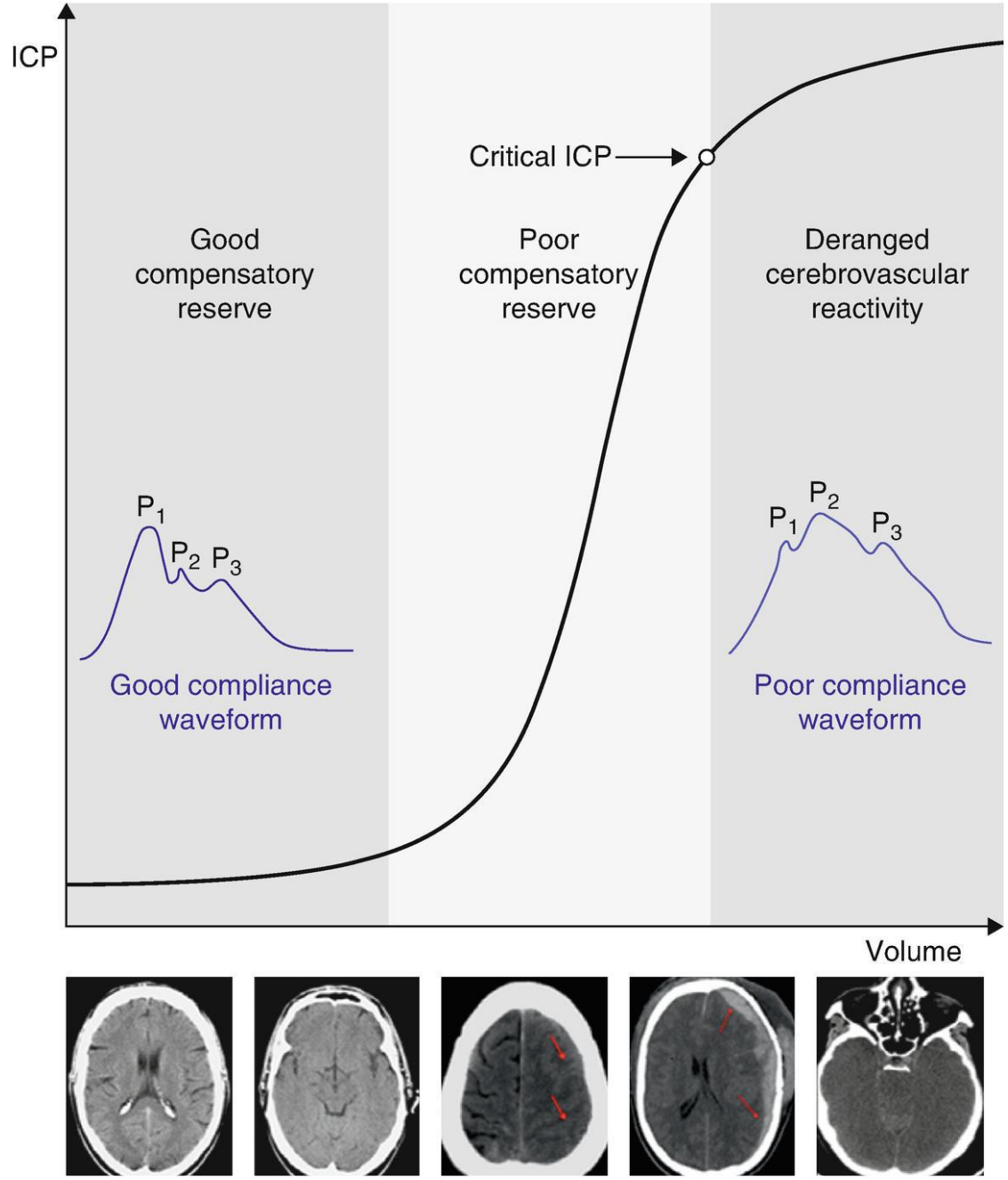


D - Életten-kórélettan

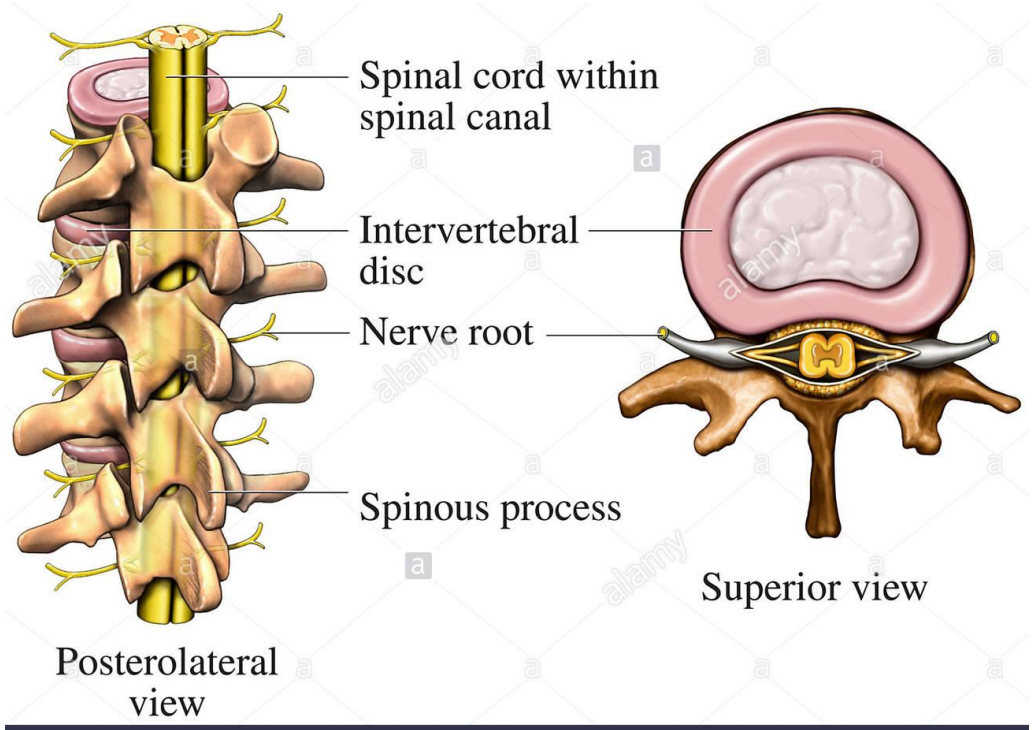


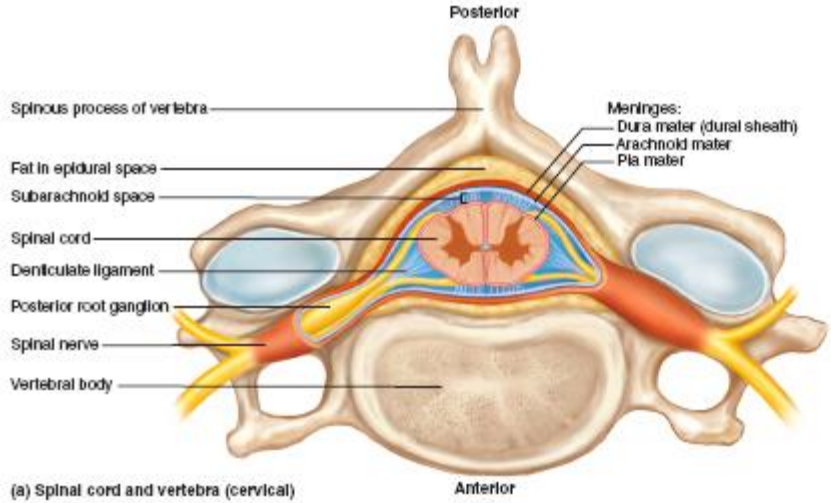


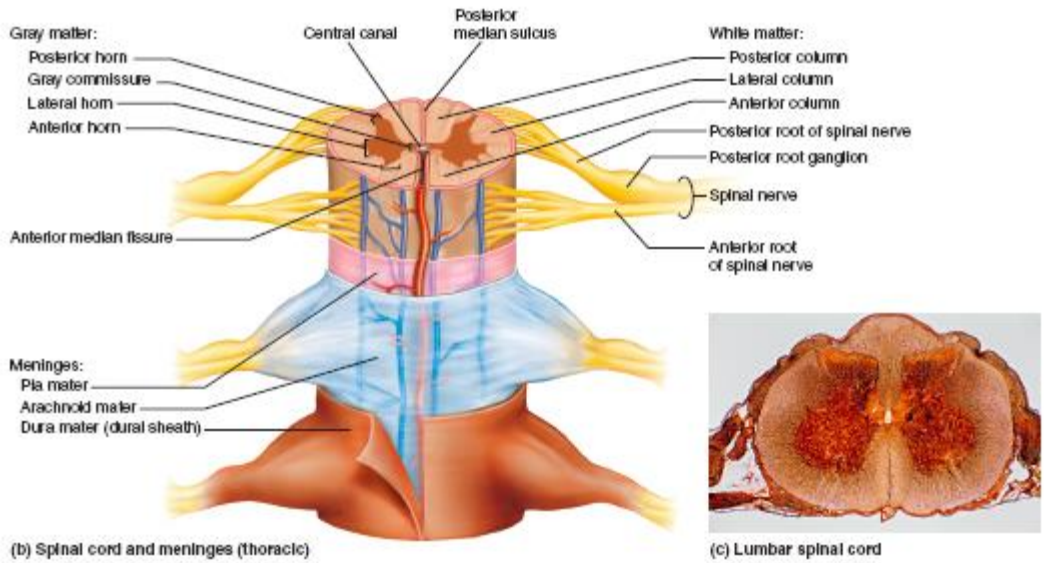

critcal
volume
intracranial pressure
intracranial volume

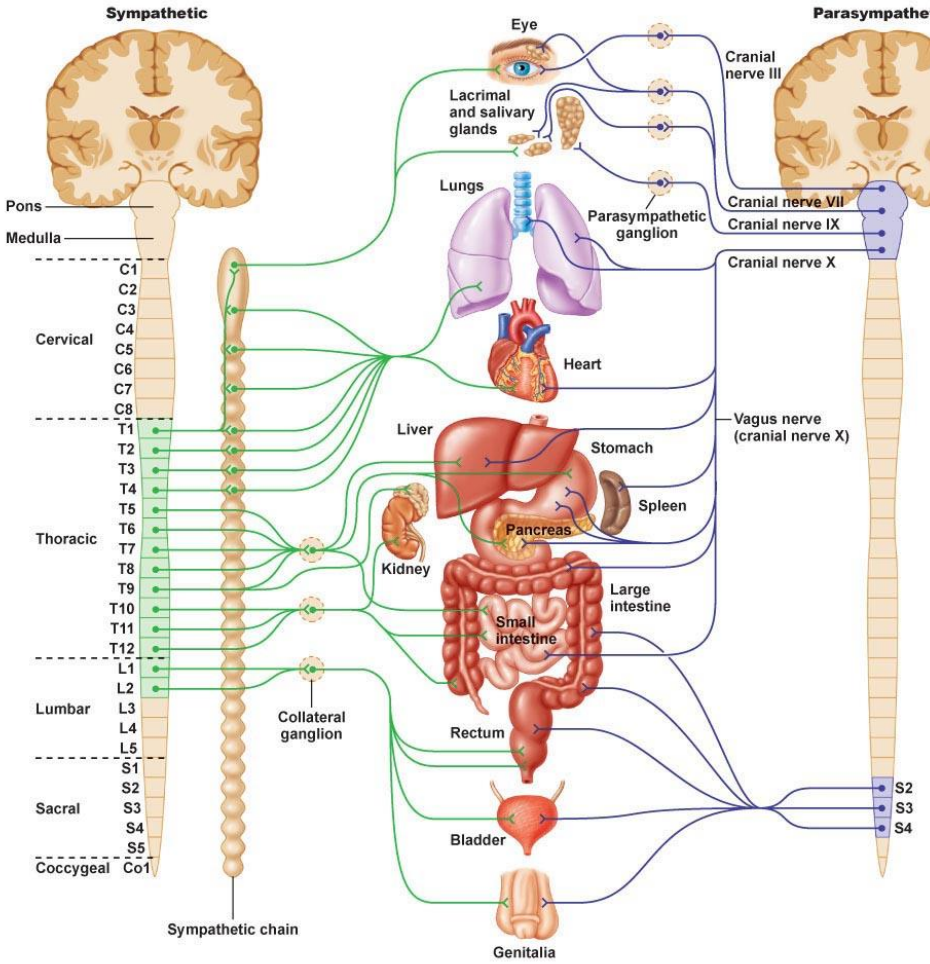

ICP
Critical ICP
Good
compensatory
reserve
Poor
compensatory
reserve
Deranged
cerebrovascular
reactivity
P1
P2 P3
Good compliance
waveform
P1
P2
P3
Poor compliance
waveform
Volume

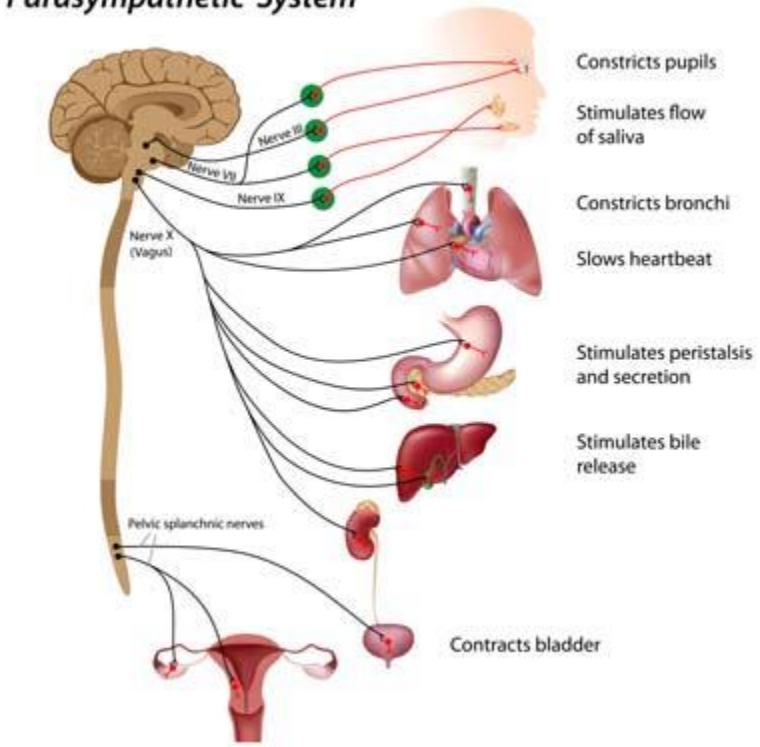
D (neurológia)

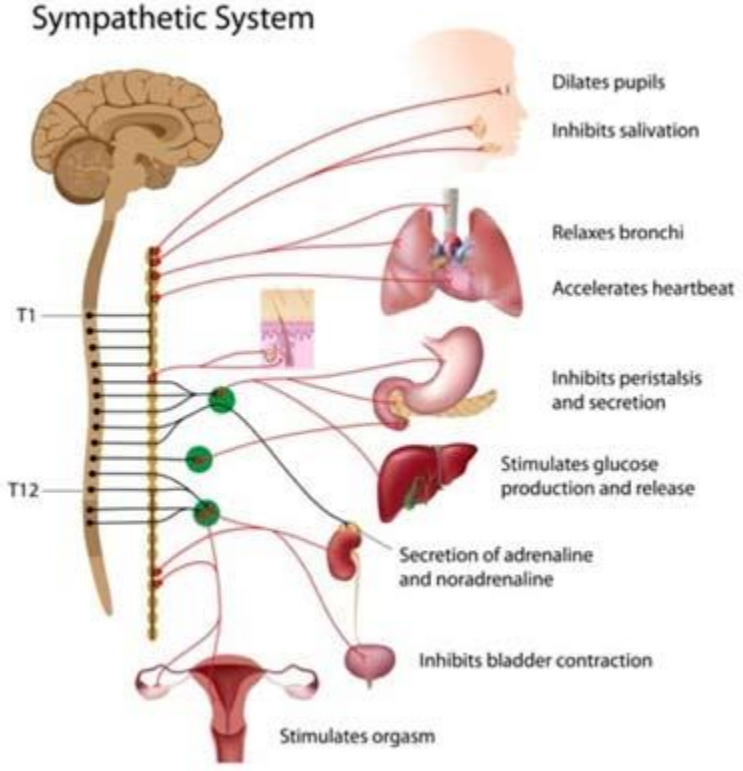


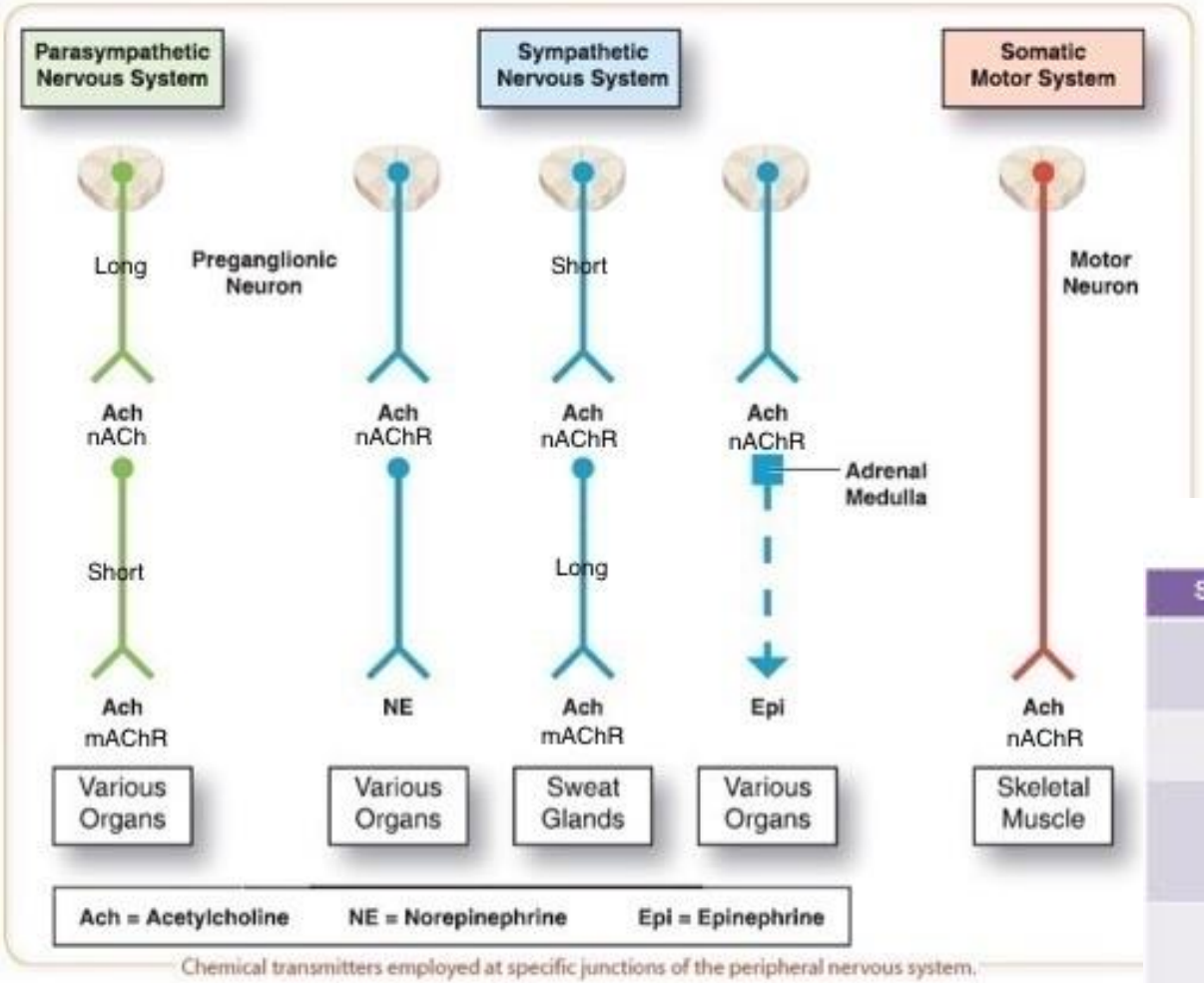












Chemical transmitters employed at specific junctions of the peripheral nervous system.

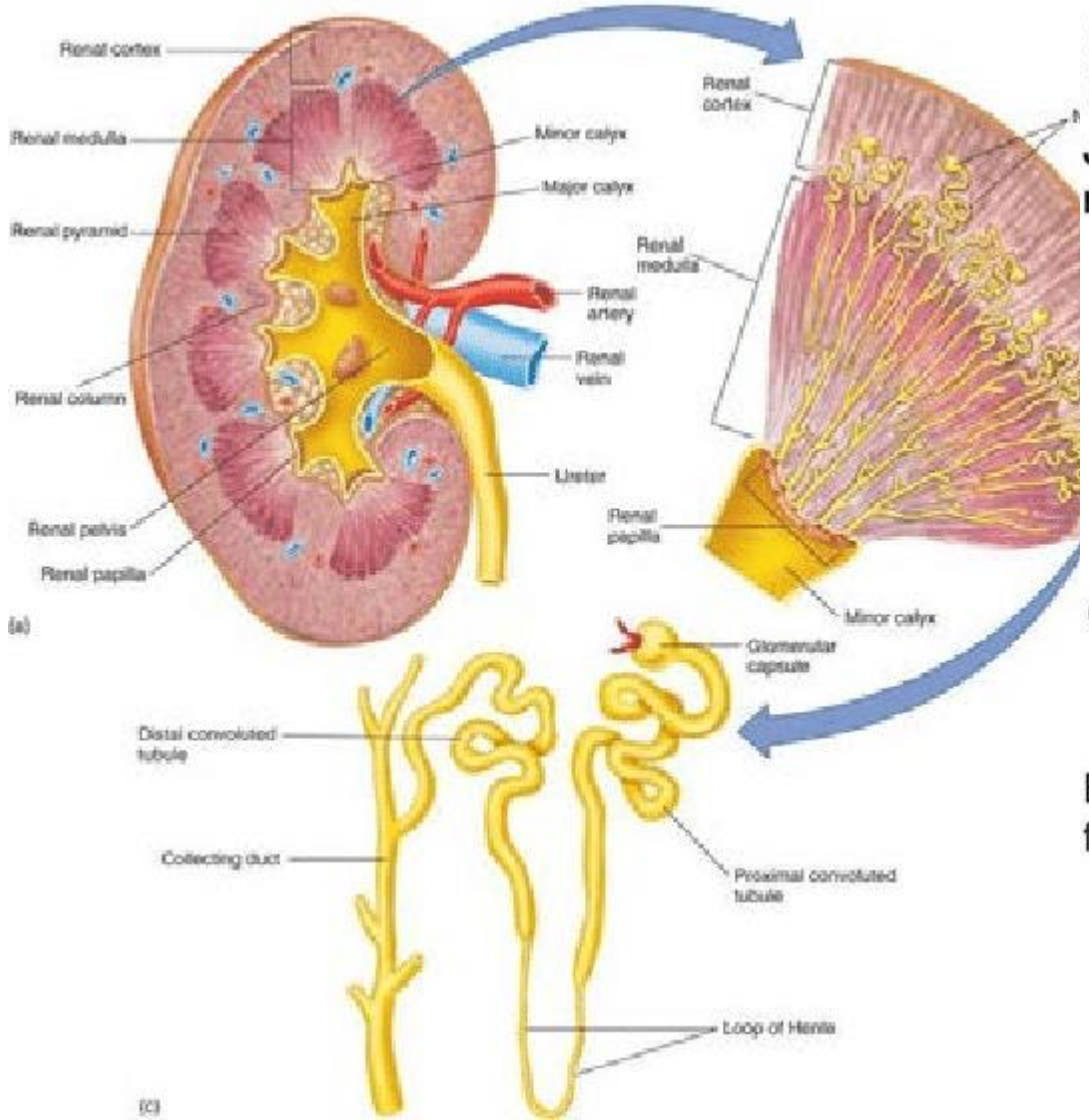
Autonomic Nervous System Review

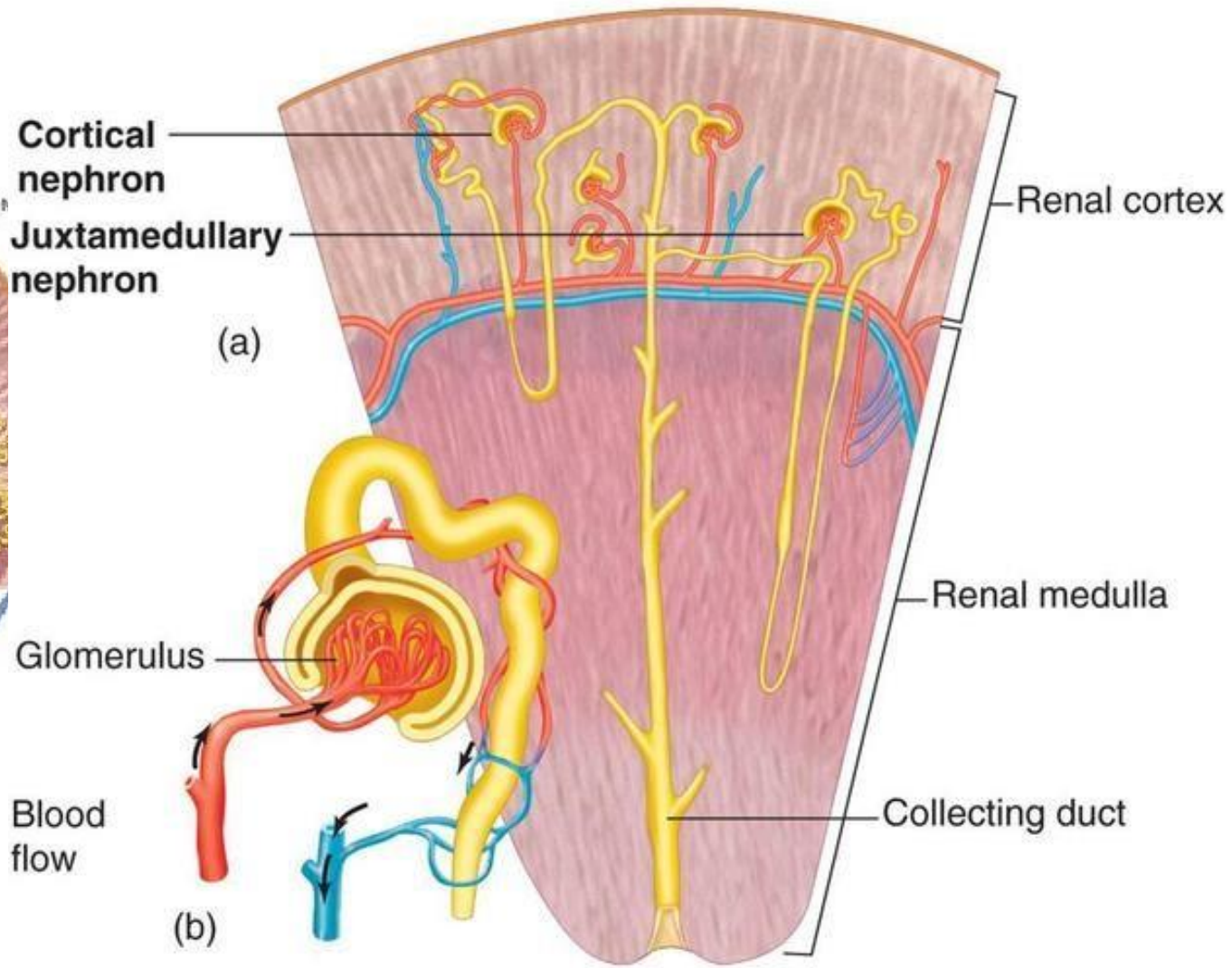
Sympathetic Receptor	Location	Action
α_1	Vascular smooth muscle	↑ vascular smooth muscle contraction
α_2	CNS	↓ sympathetic outflow
β_1	Cardiac cells	↑ heart rate, ↑ contractility, ↑ renin release
β_2	Vascular and bronchiolar smooth muscle	Vasodilation, bronchodilation
D_1	Renal, splanchnic, coronary, cerebral	Relaxes renal vasculature smooth muscle

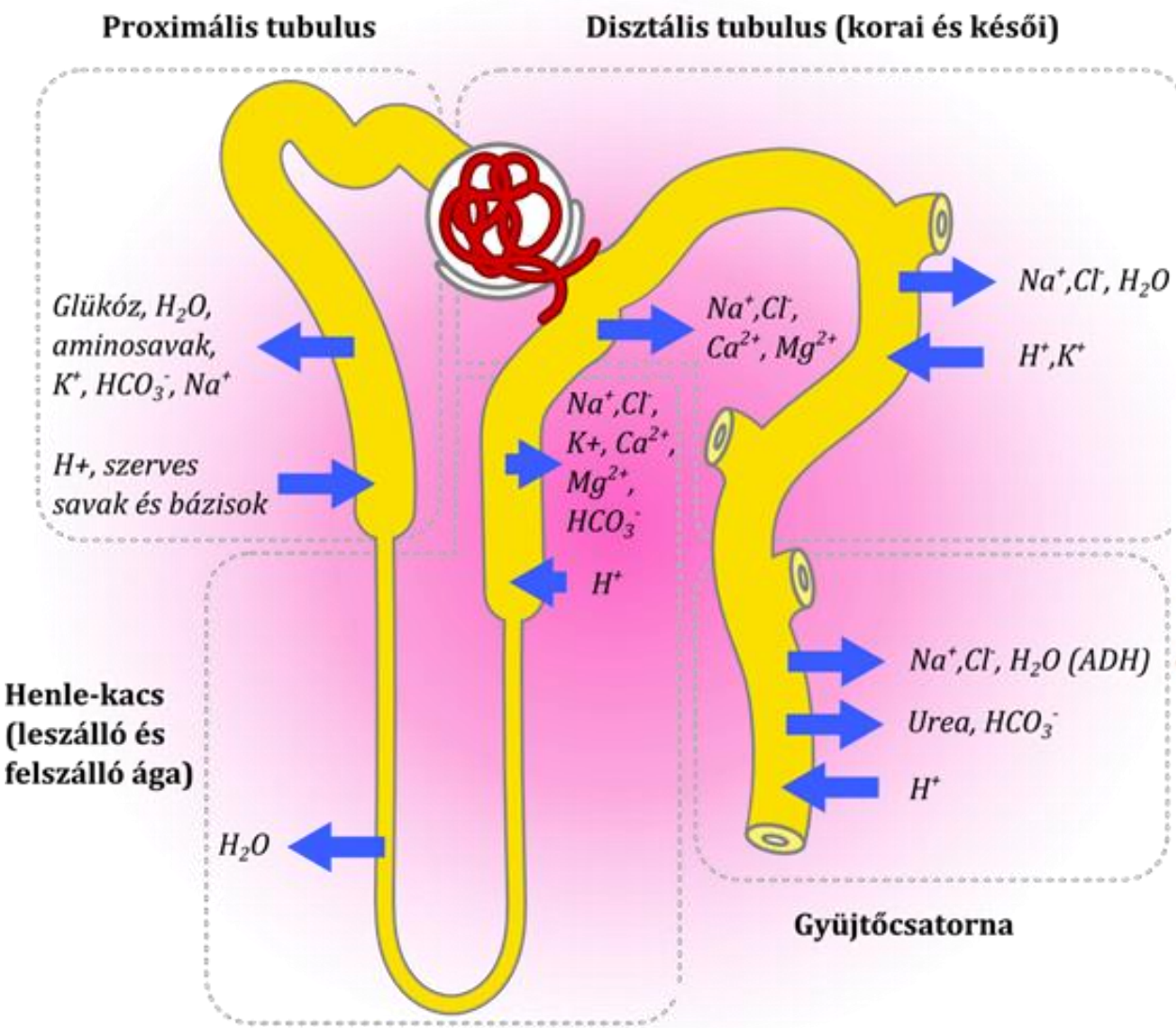
College of Osteopathic Medicine

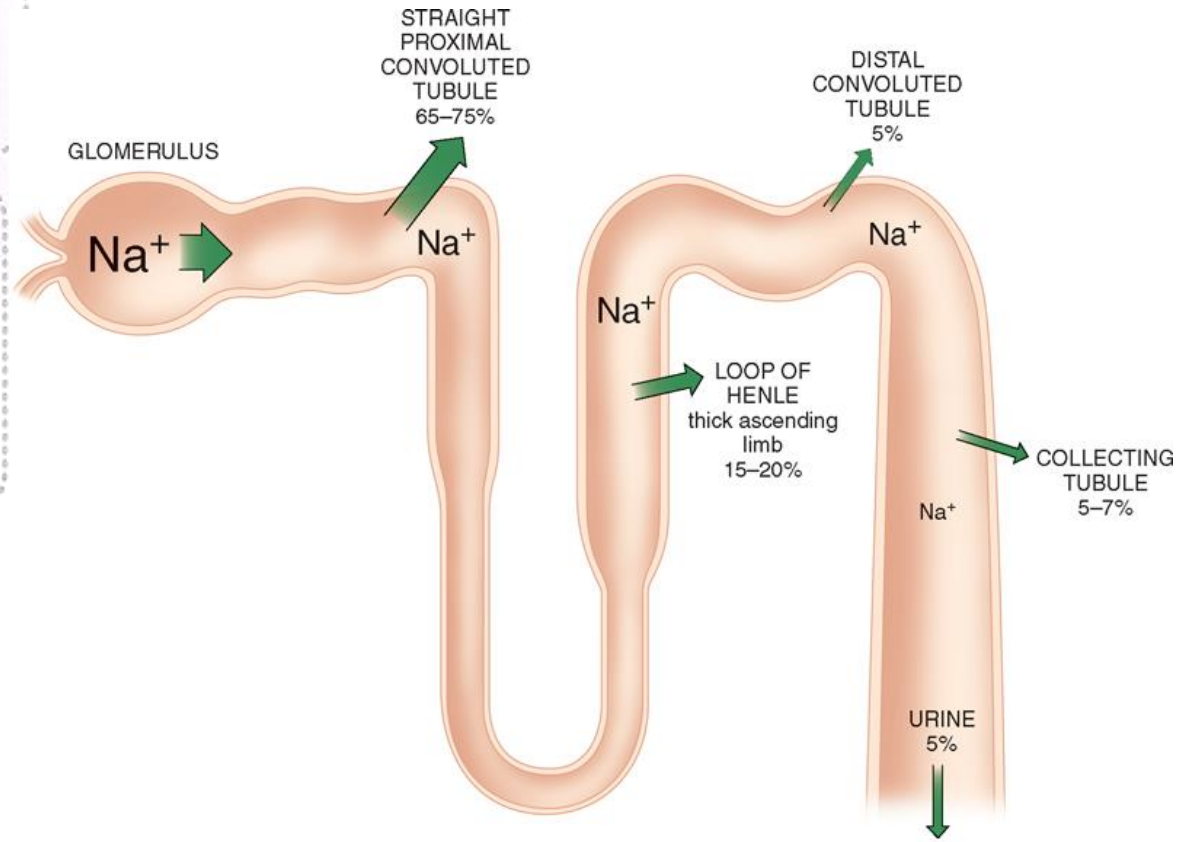
Adapted From First Aid for the USMLE Step 1 2018

E (egyéb ☺)


Renal cortex
Renal medulla
Minor calyx
Major calyx
Renal pyramid
Renal artery
Renal vein
Renal column
Ureter
Renal pelvis
Renal papilla
(a)
Glomerular capsule
Distal convoluted tubule
Collecting duct
Proximal convoluted tubule
Loop of Henle
(c)


Cortical nephron
Juxtamedullary nephron
(a)
Renal cortex
Renal medulla
Glomerulus
Collecting duct
Blood flow
(b)





Source: Butterworth JF, Mackey DC, Wasnick JD: *Morgan & Mikhail's Clinical Anesthesiology*, 5th Edition: www.accessmedicine.com

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