

PERFUSE IT, OR LOSE IT!

OXIGENIZÁCIÓS, PERFÚZIÓS ZAVAROK SÜRGŐSSÉGI VONATKOZÁSAI

AMI A KÓRTANBÓL KIMARADT ...

Berényi Tamás



ELSŐDLEGES KÁROSODÁS



**PROGRESSZÍV
KÁROSODÁS**

**MÁSODLAGOS
KÁROSODÁS**

KIMENET

Biológiai Válasz





FONTOS!!!!



**PROGRESSZÍV
KÁROSODÁS**

**MÁSODLAGOS
KÁROSODÁS**

KIMENET



BIOLÓGIAI VÁLASZ

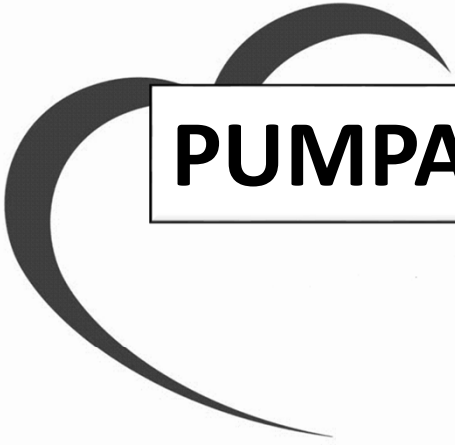


La Création du monde

PUMPA

VASCULATURA

VOLUMEN



PUMPA

VERŐTÉRFOGAT(SV)

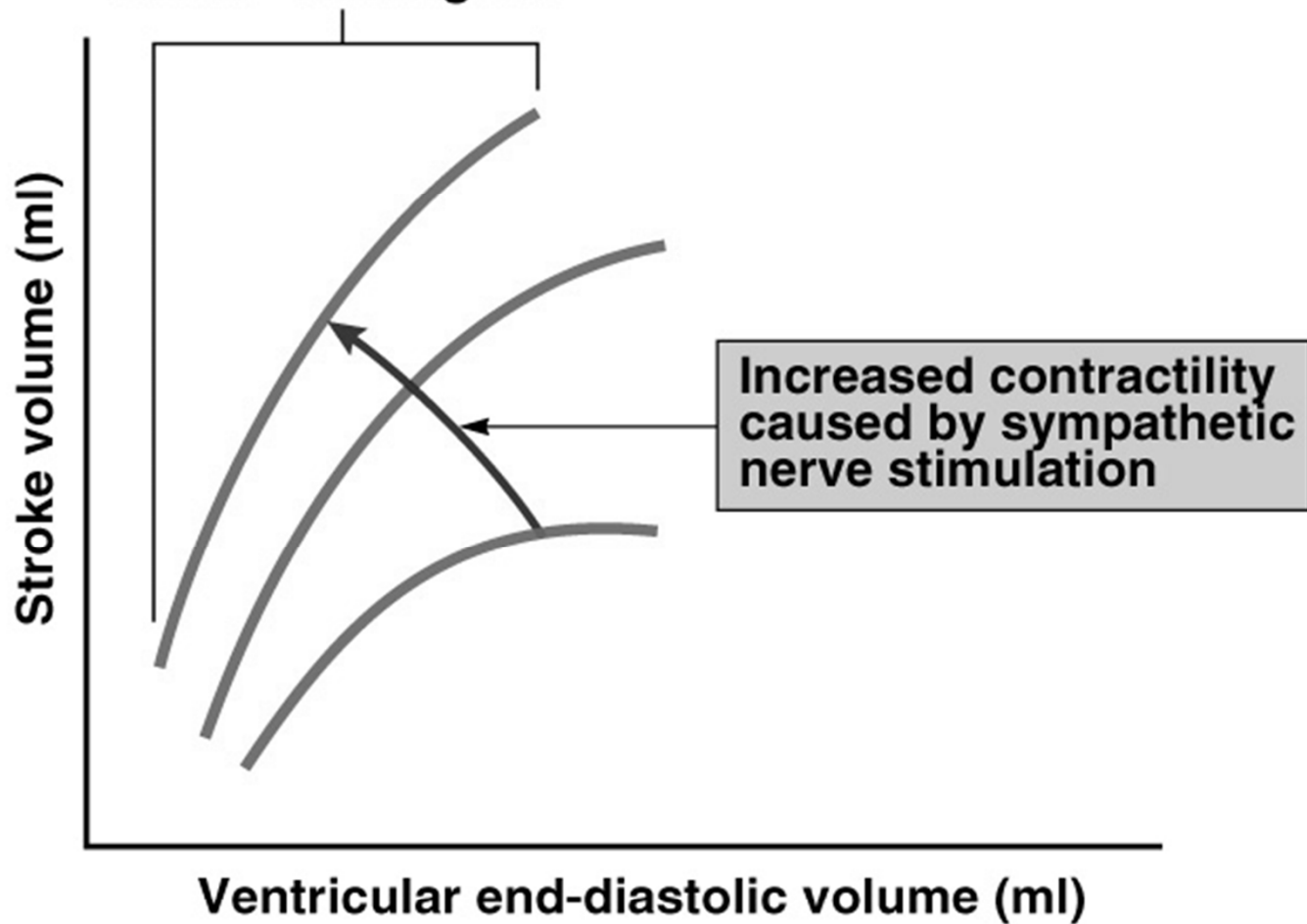
☞ EGY KONTRAKCIÓRA PUMPÁLT VÉR MENNYISÉGE

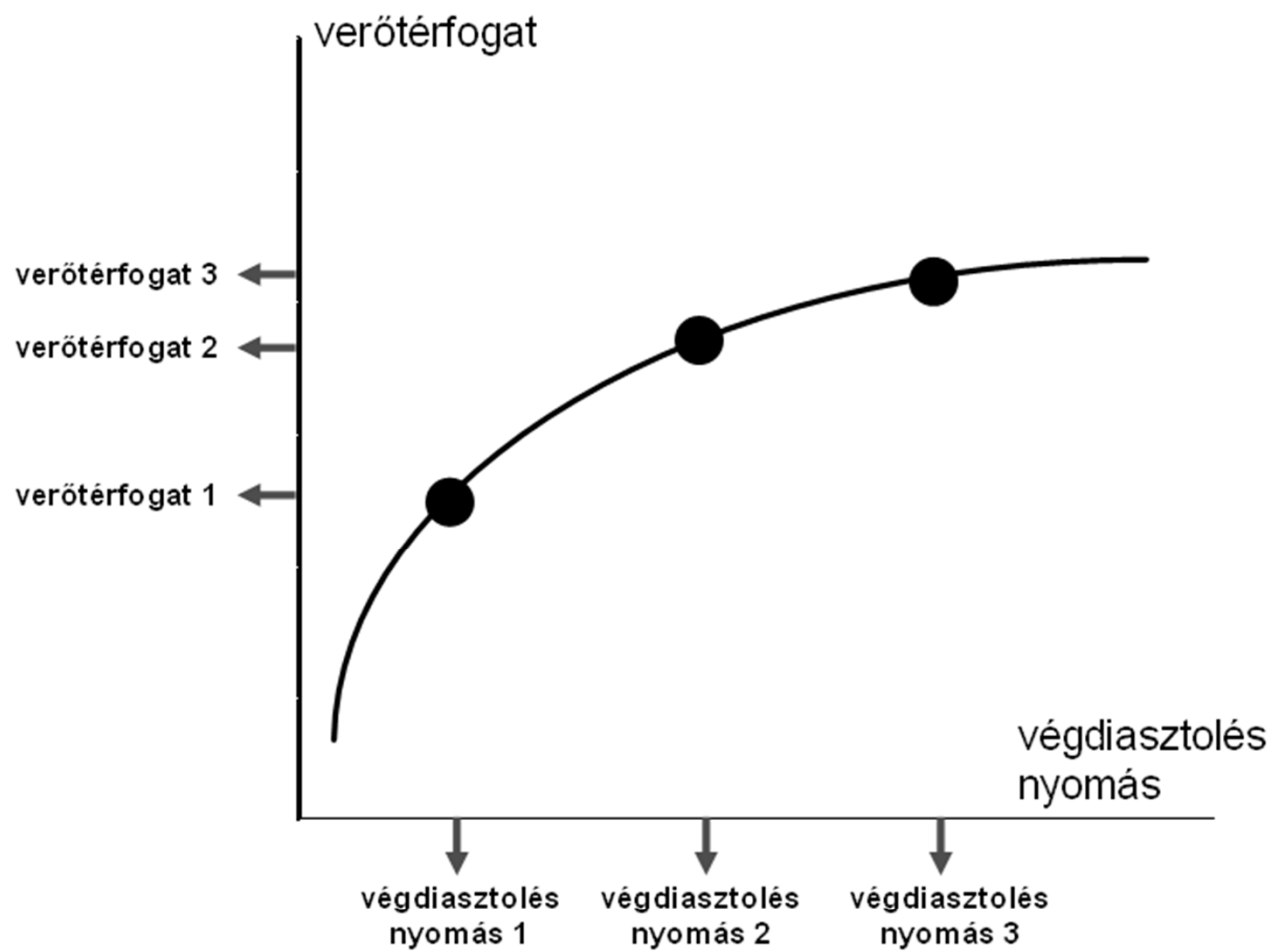
PERCTÉRFOGAT (CO) = SV x HR (VERŐTÉRFOGAT*FREKVENCIA)

SV FÜGG:

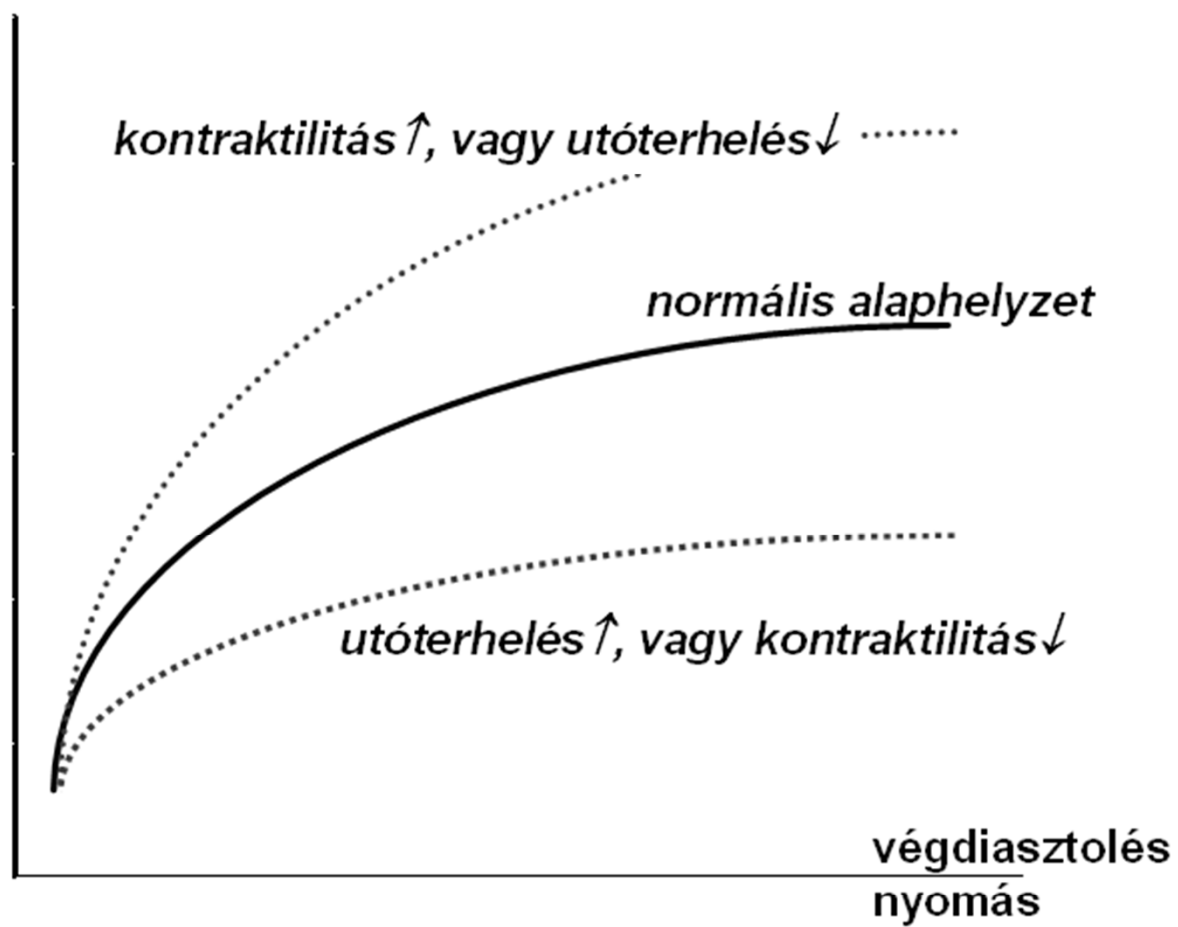
- ☞ VÉGDIASZTÓLÉS VOLUMENTÓL (EDV)
- ☞ TOTAL PERIFÉRIÁS ELLENÁLLÁSTÓL (TPR)
- ☞ KONTRAKTILITÁSTÓL

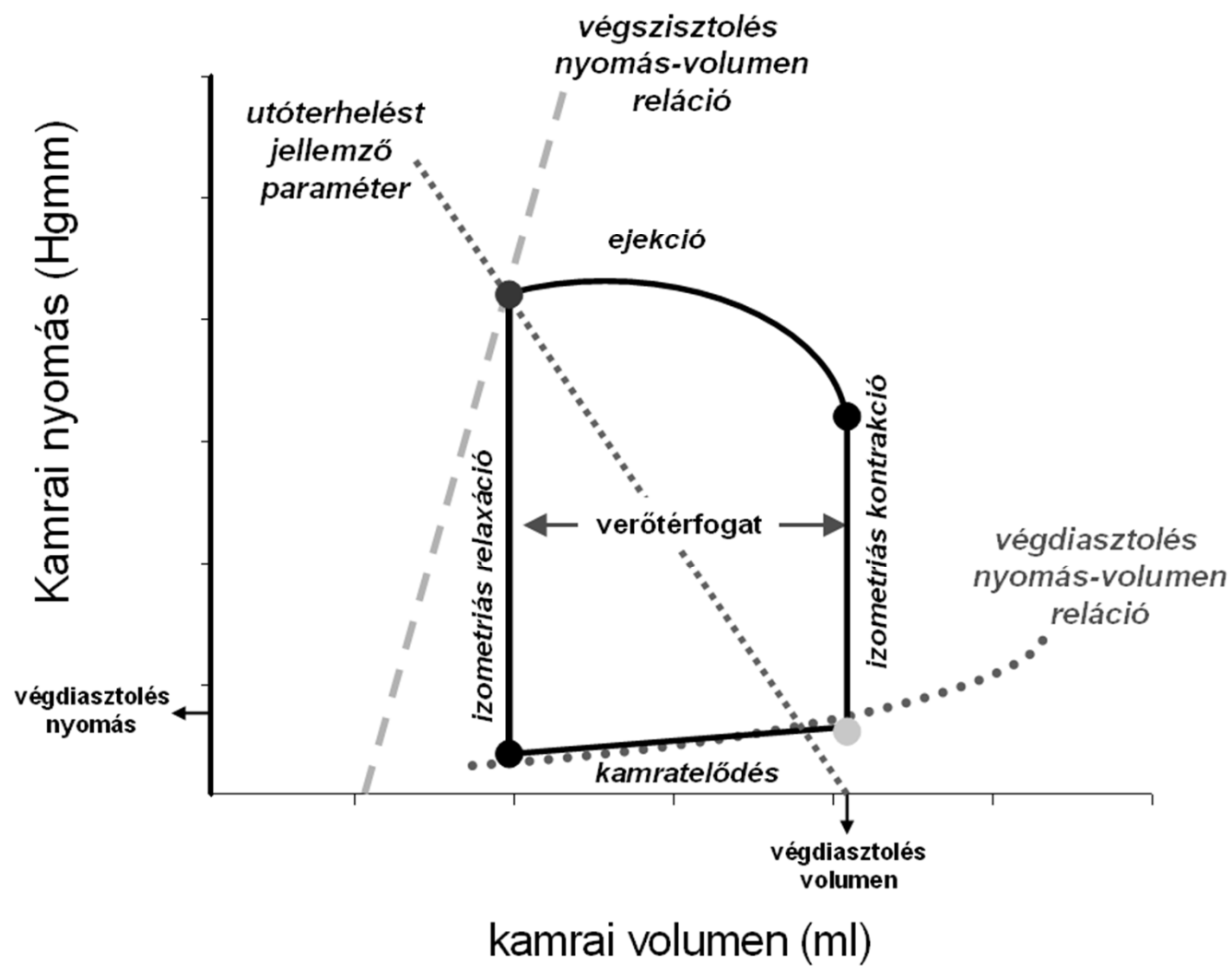
Frank-Starling law

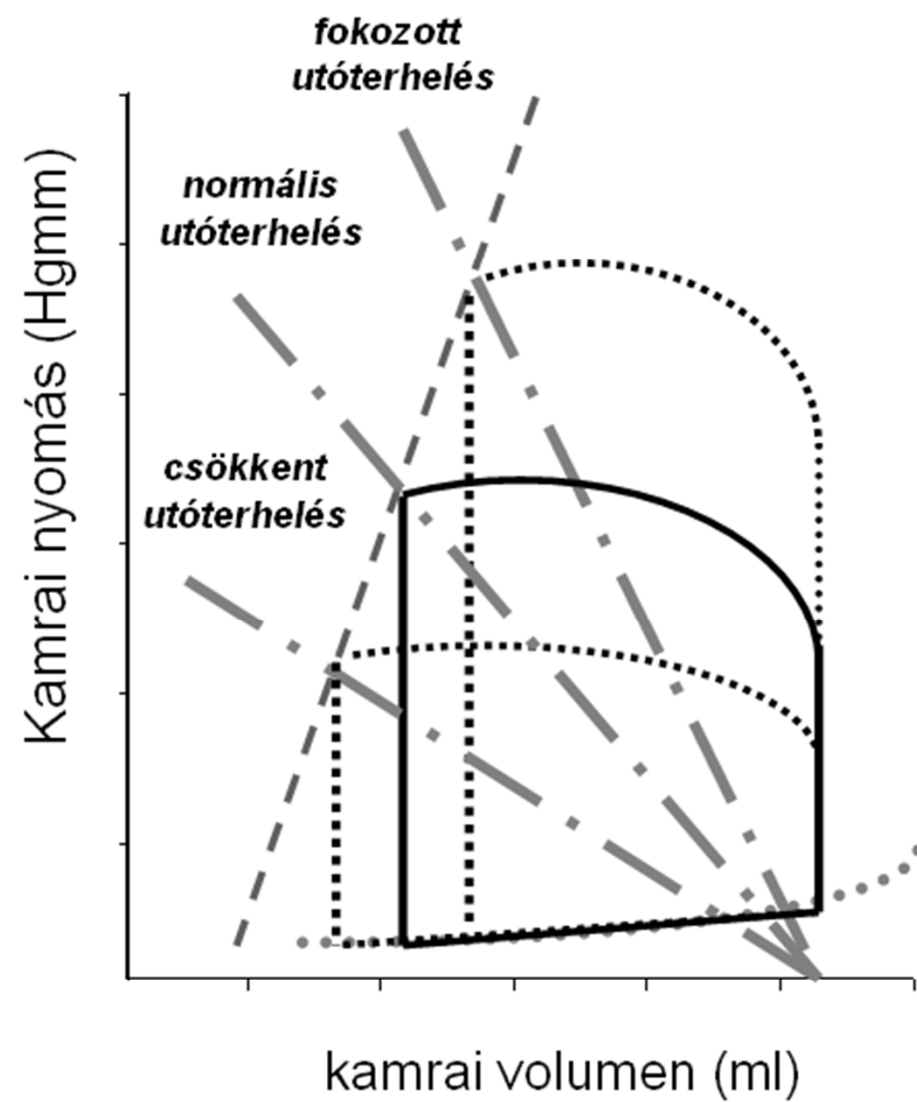


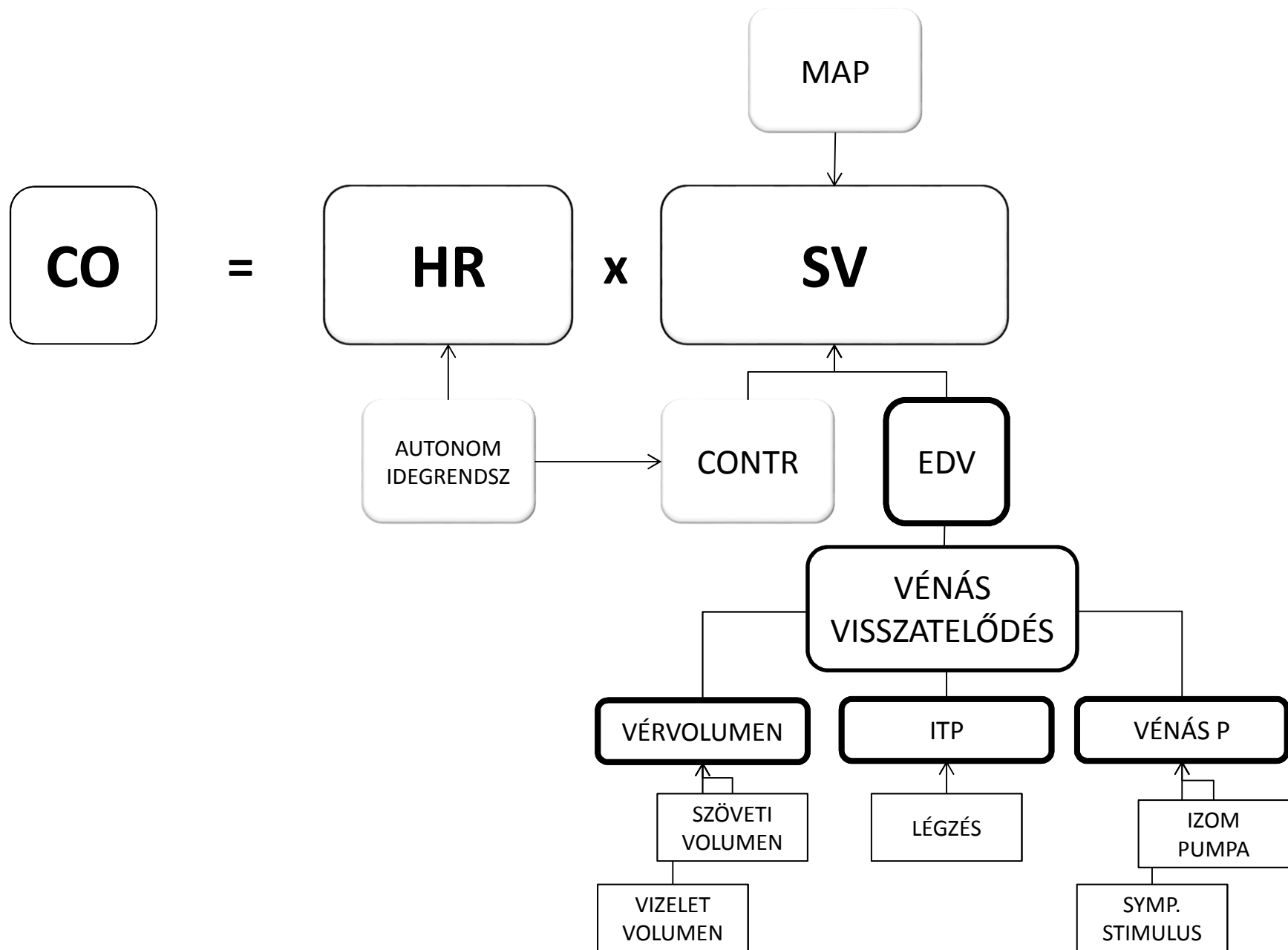


verőterfogat

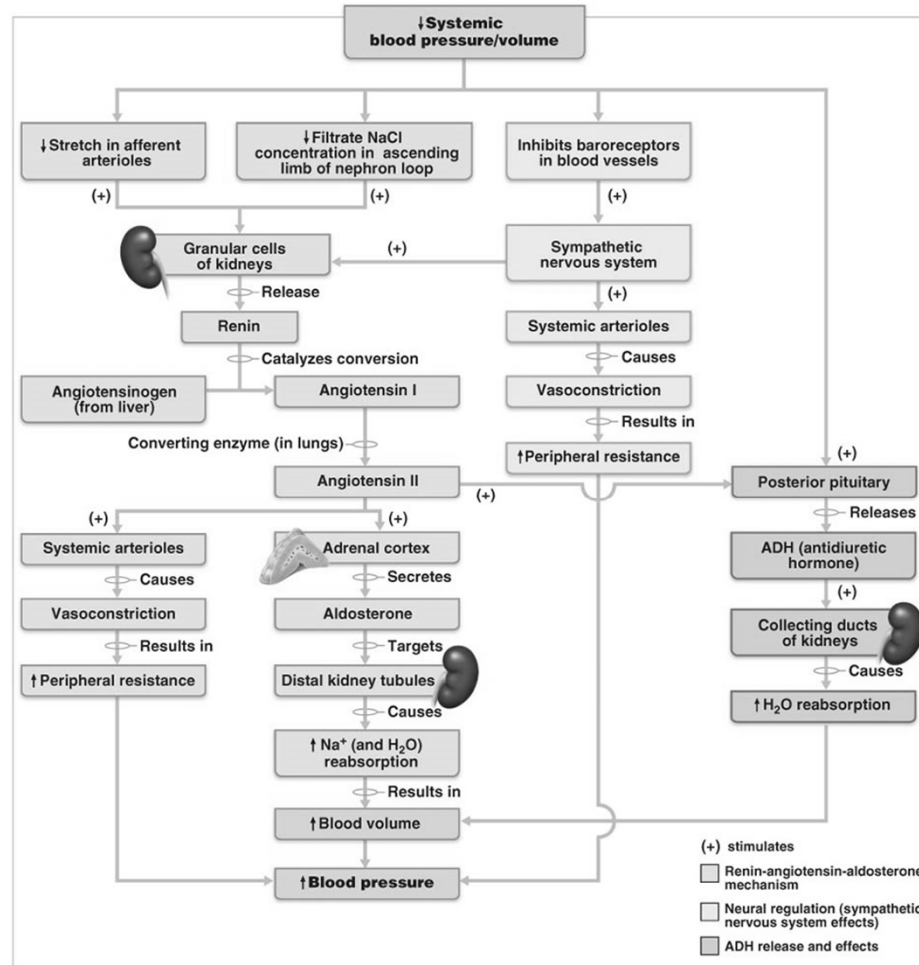


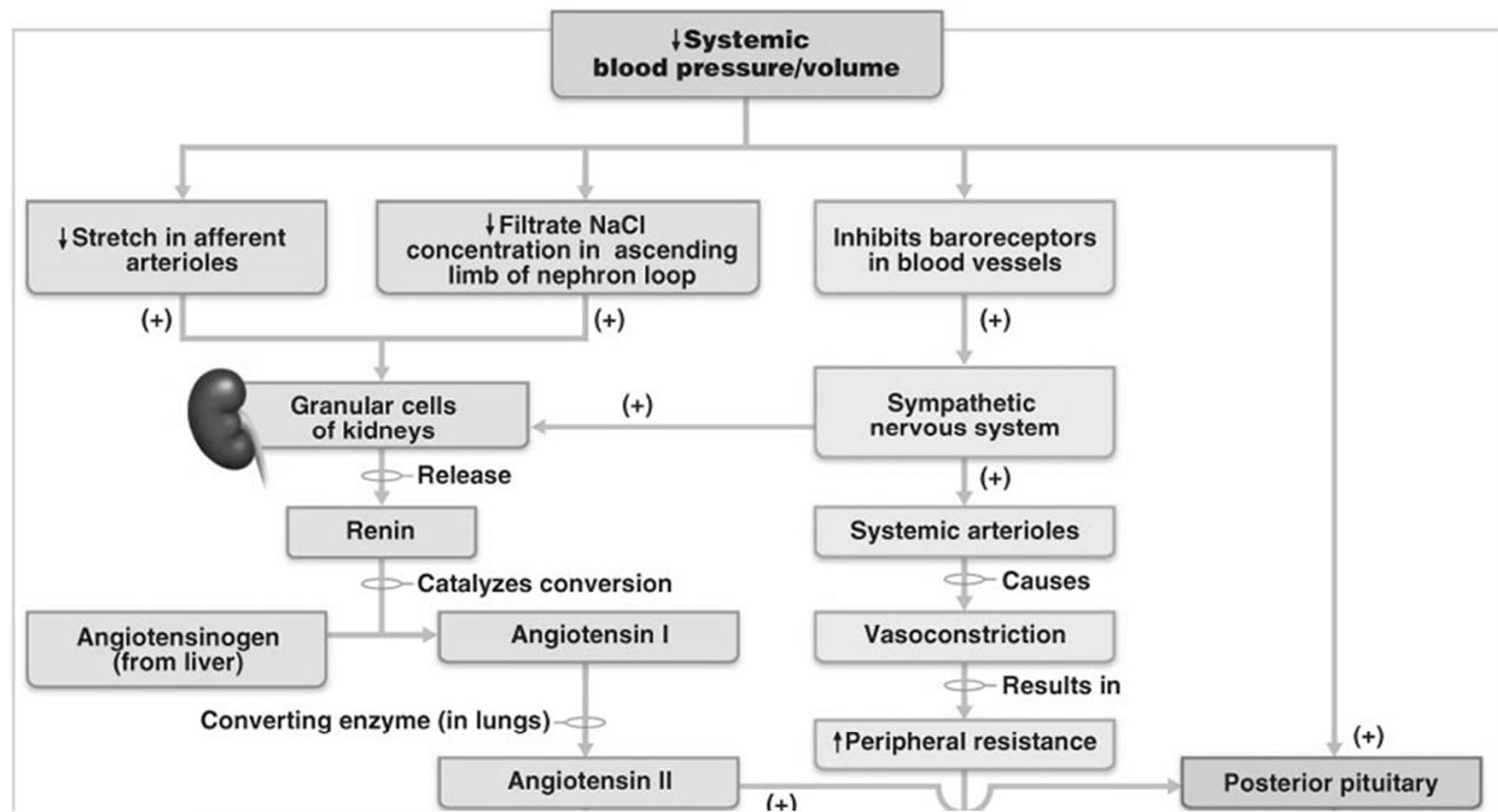


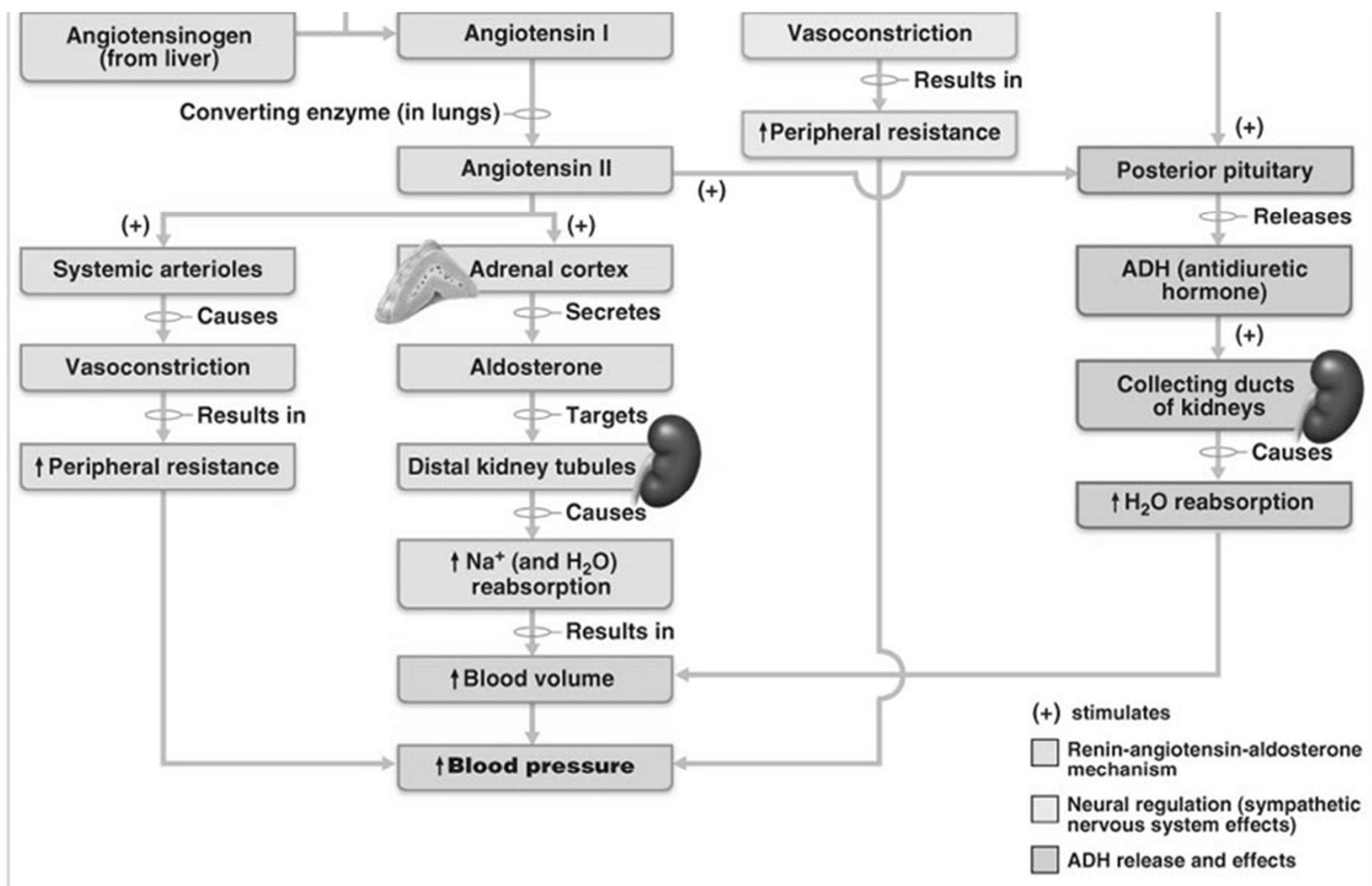


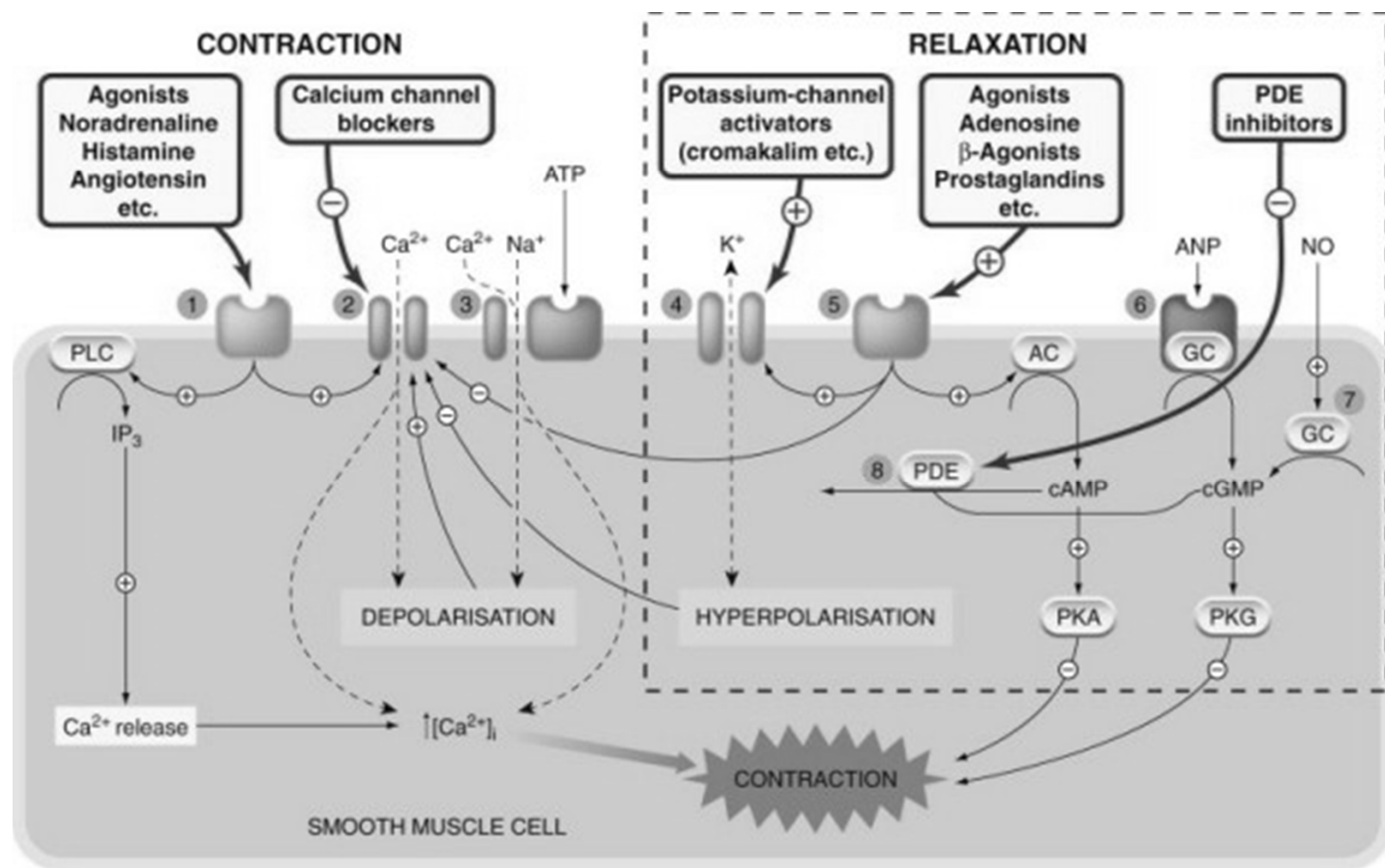


VASCULATURA

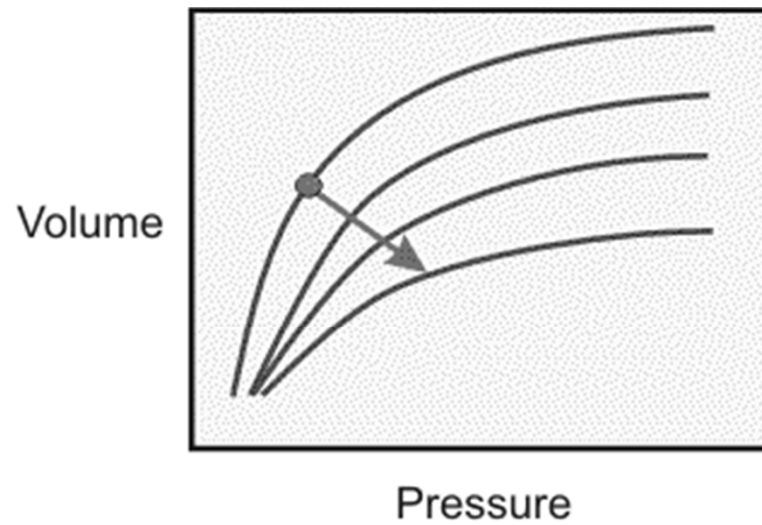
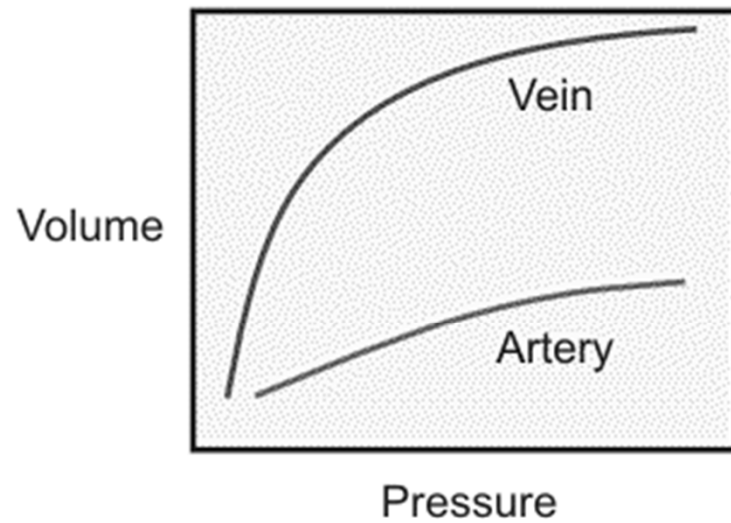




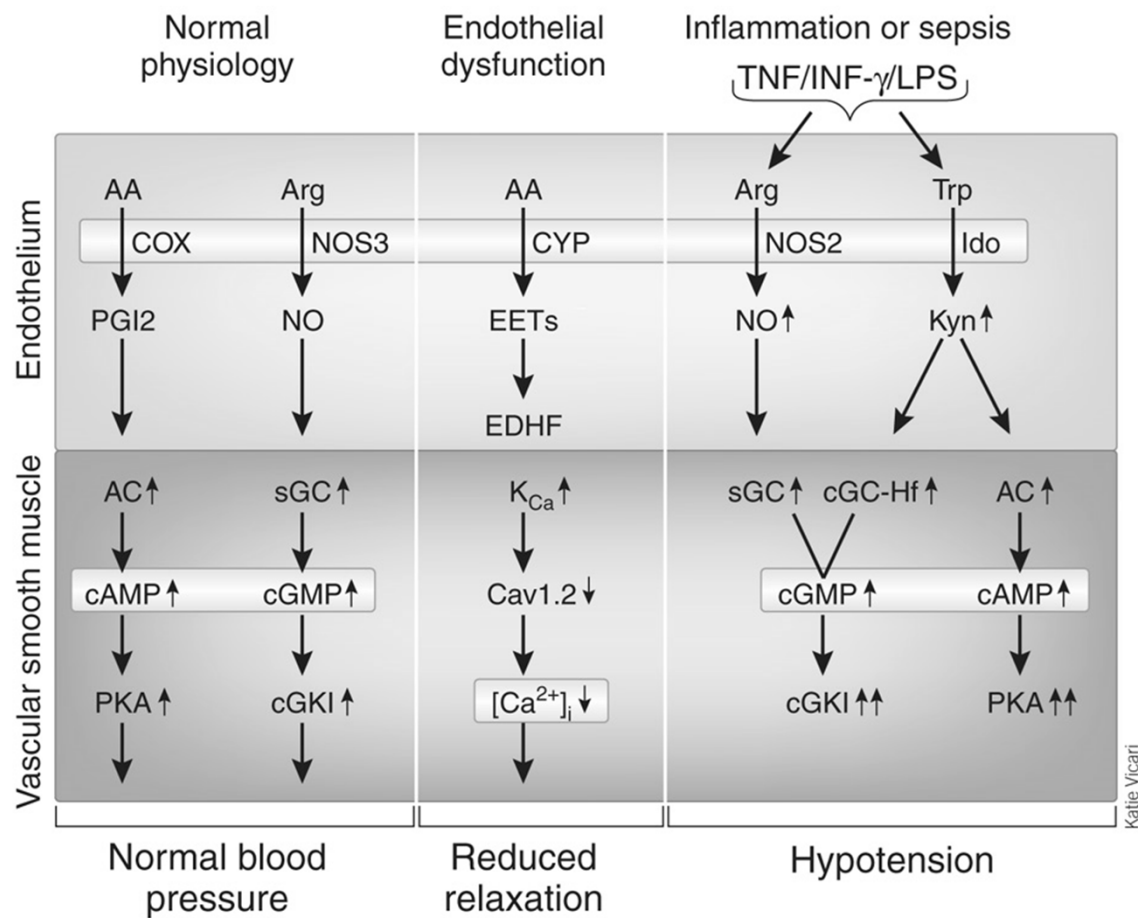




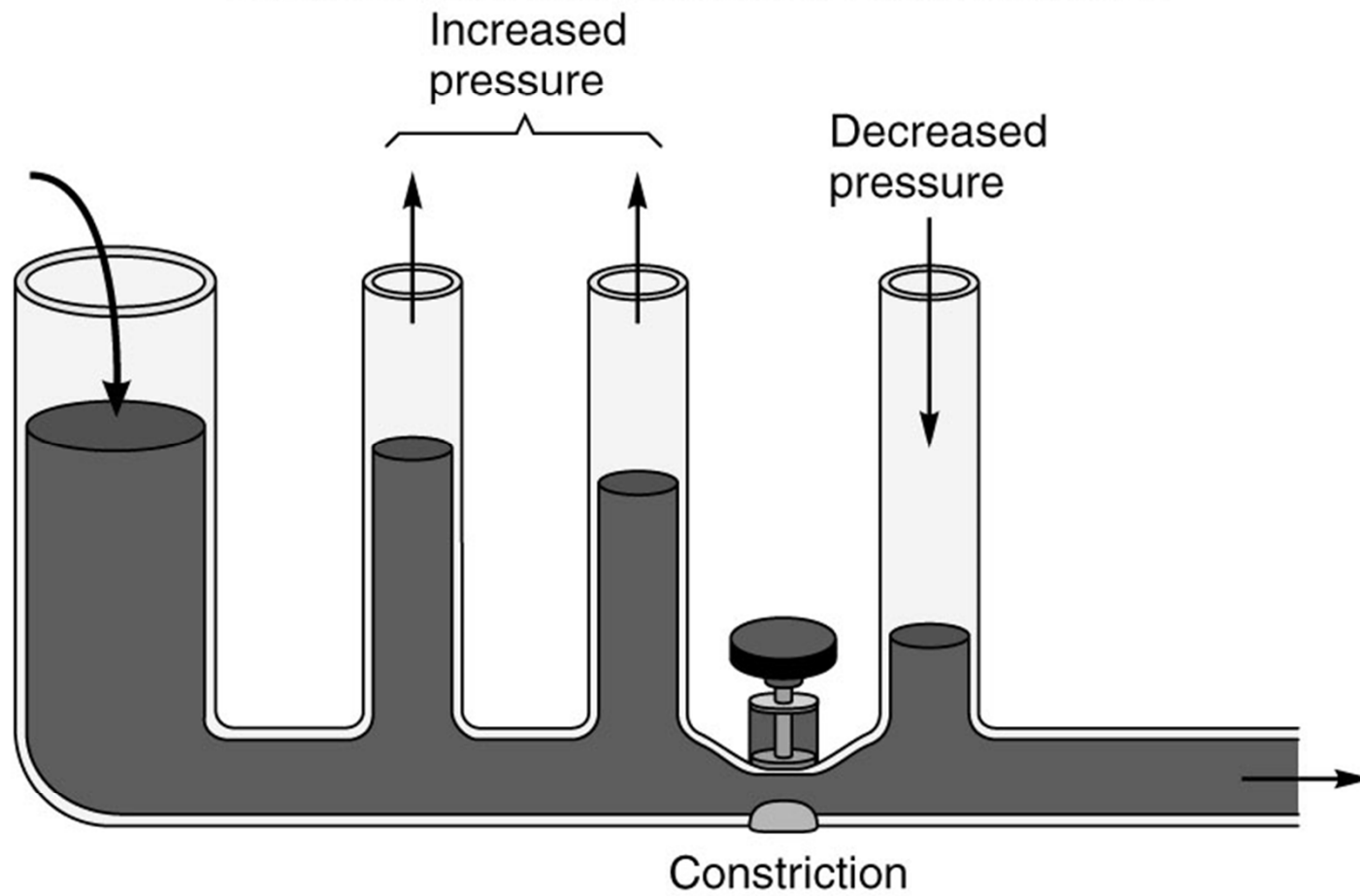
PERSZE, ITT IS JÁTSZHATUNK COMPLIANCE-GÖRBÉKKEL



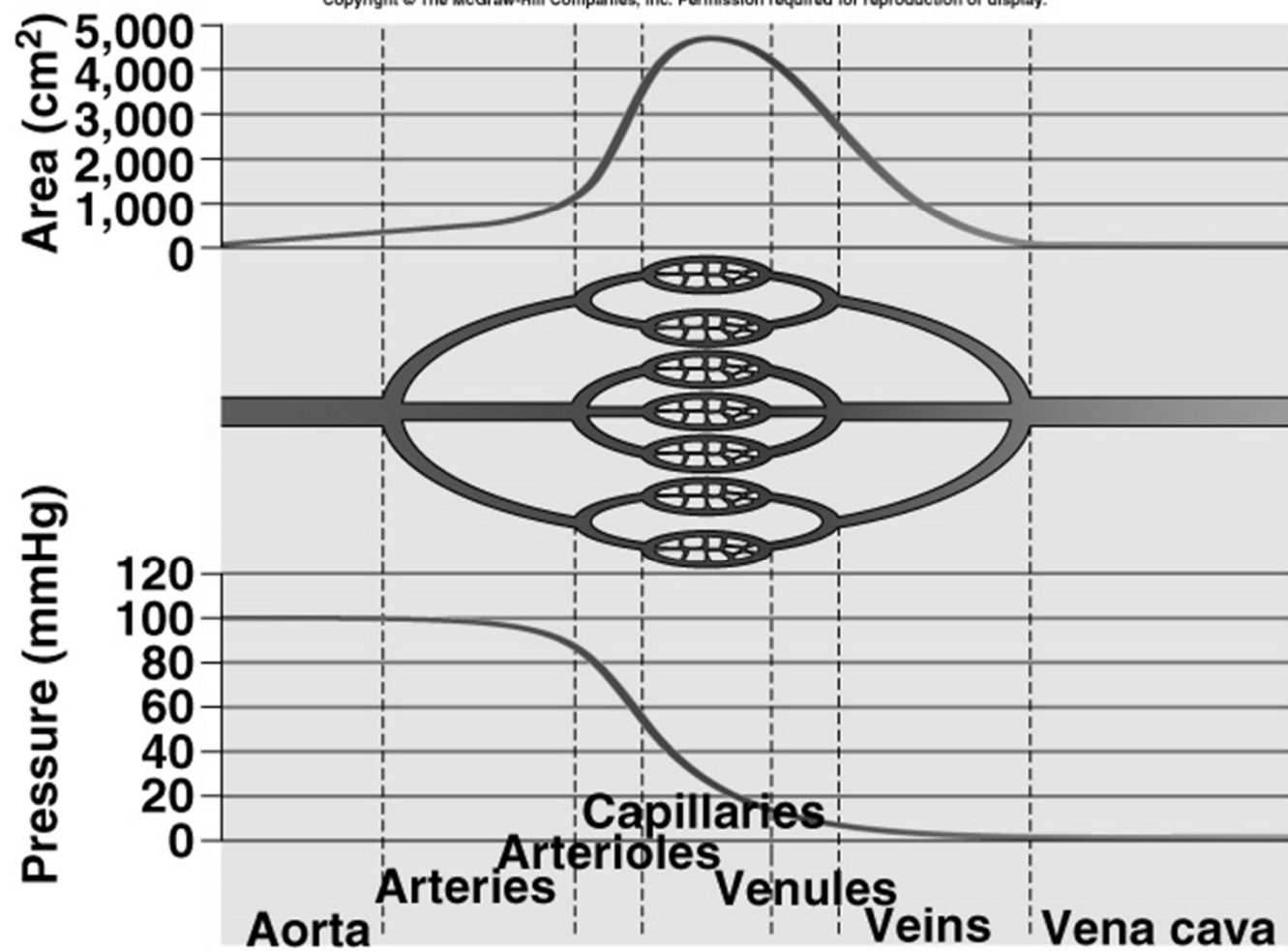
... VAGY ELMÉLYEDHETÜNK AZ ENDOTHEL BEN ☺

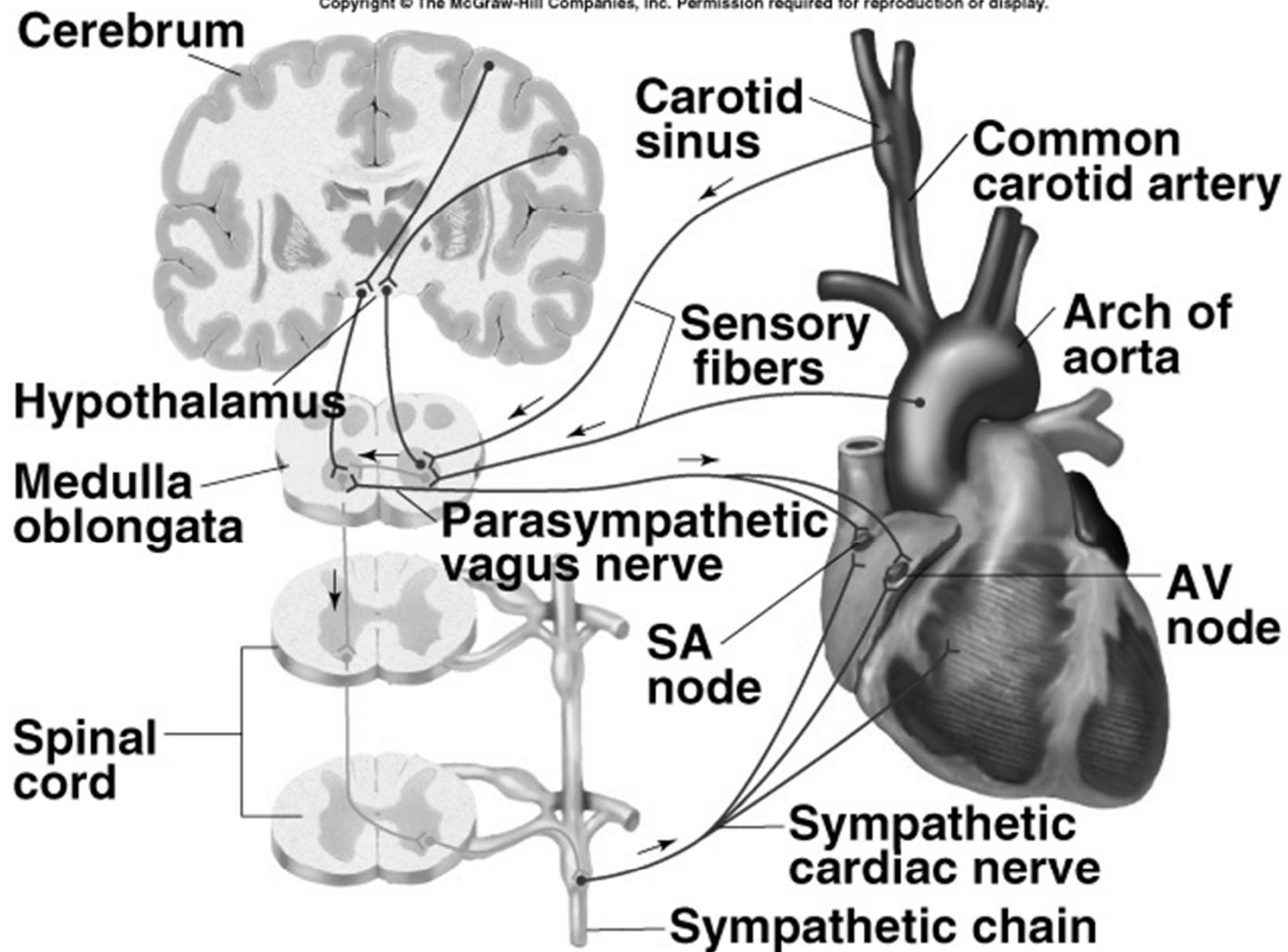


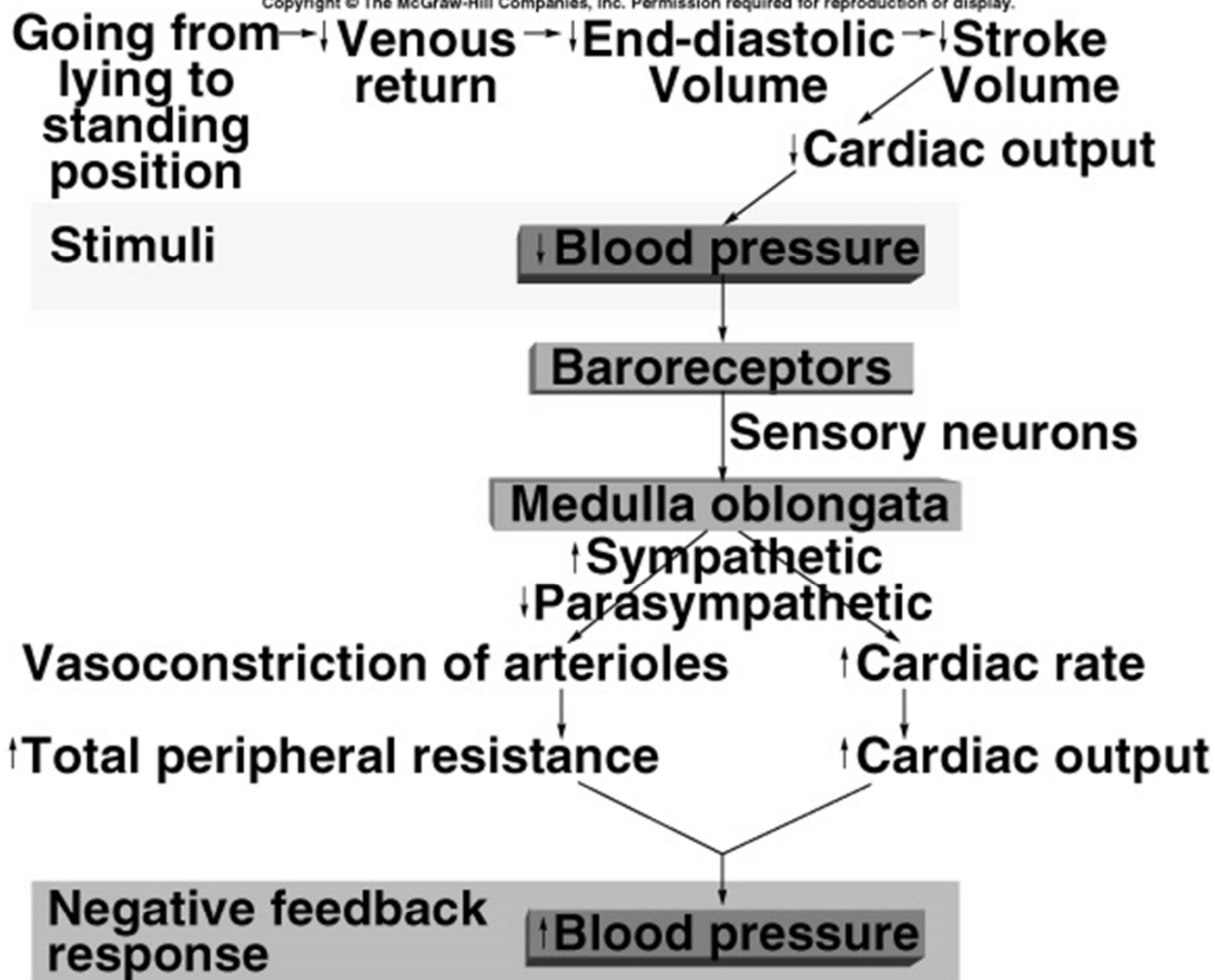
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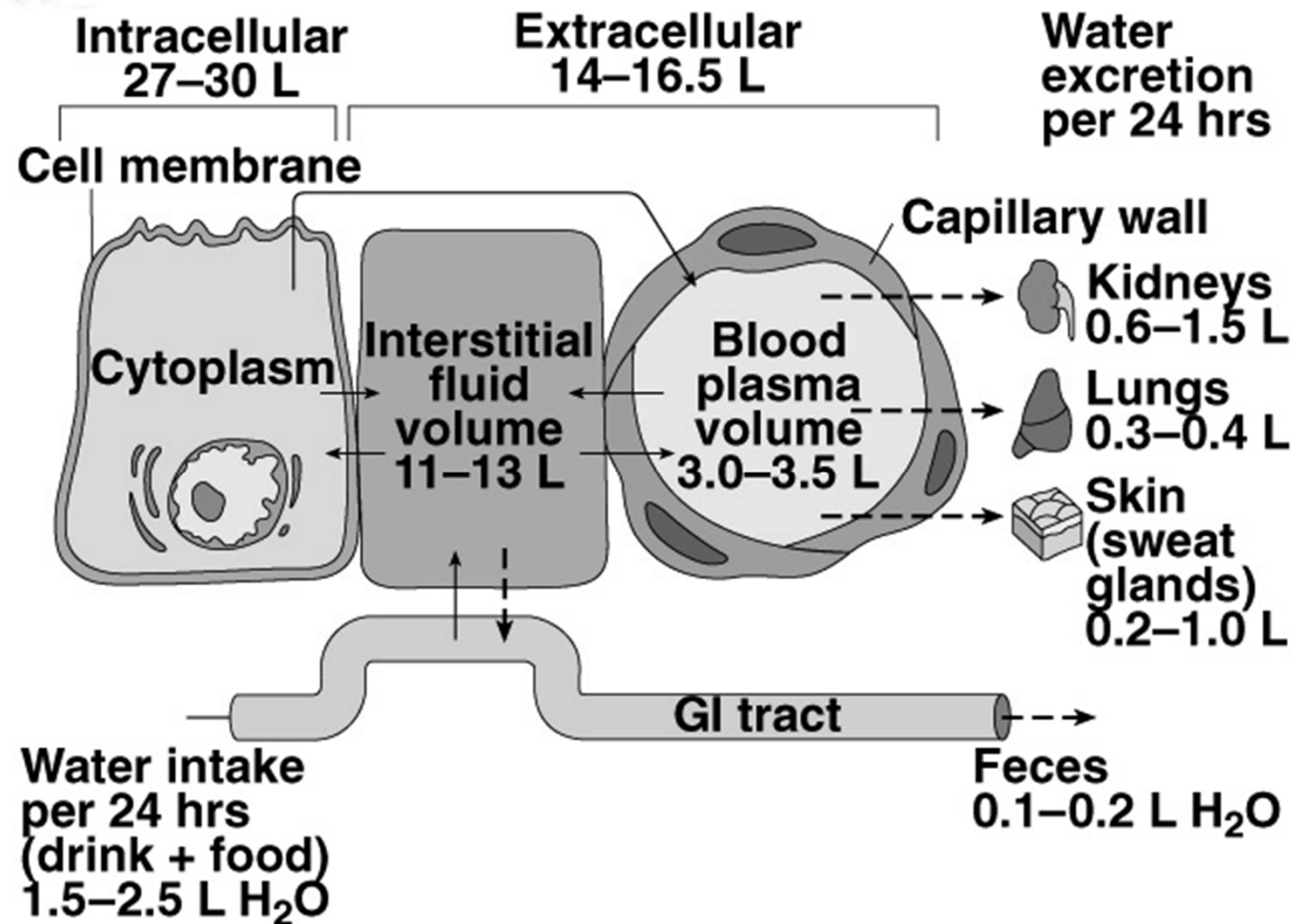
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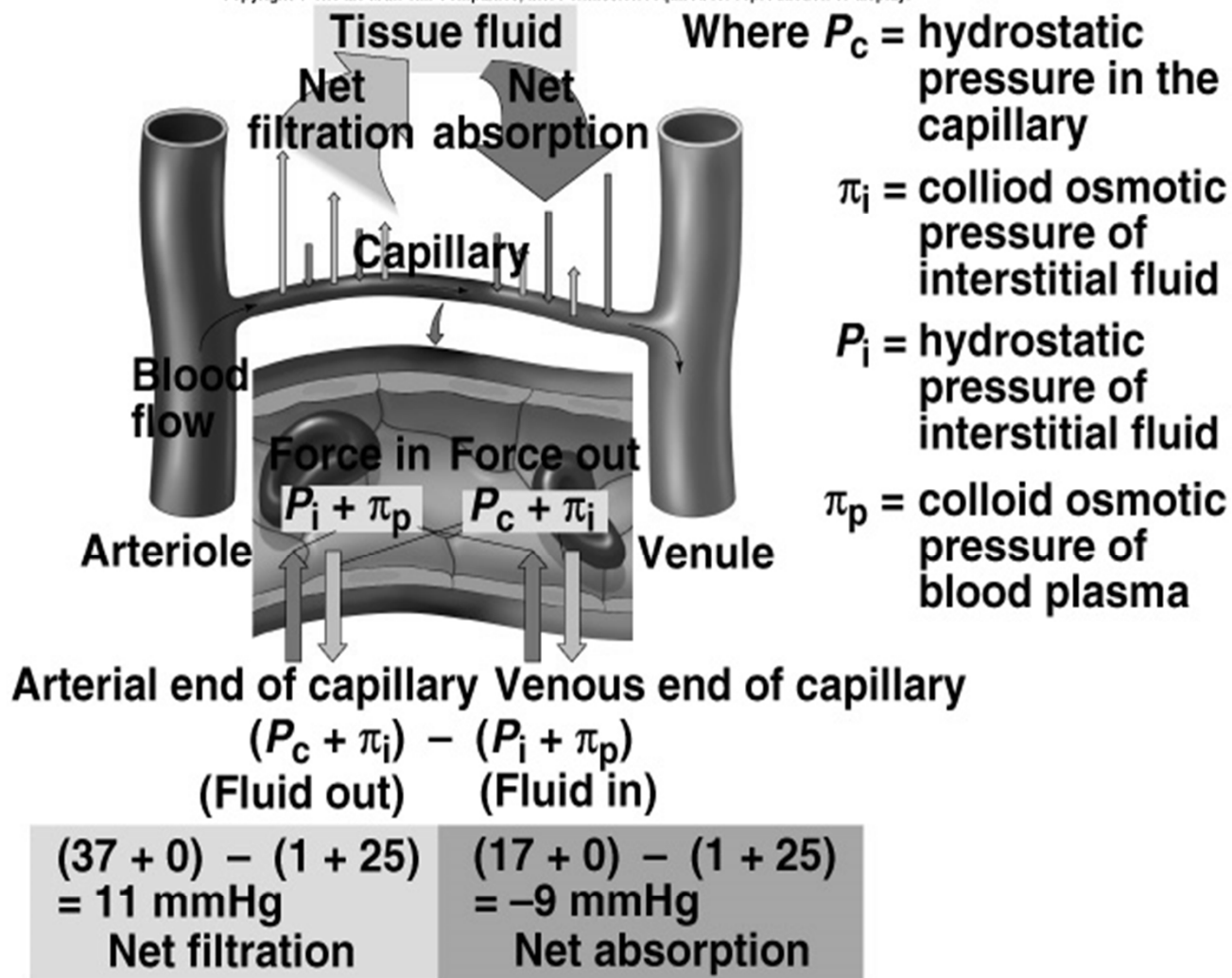


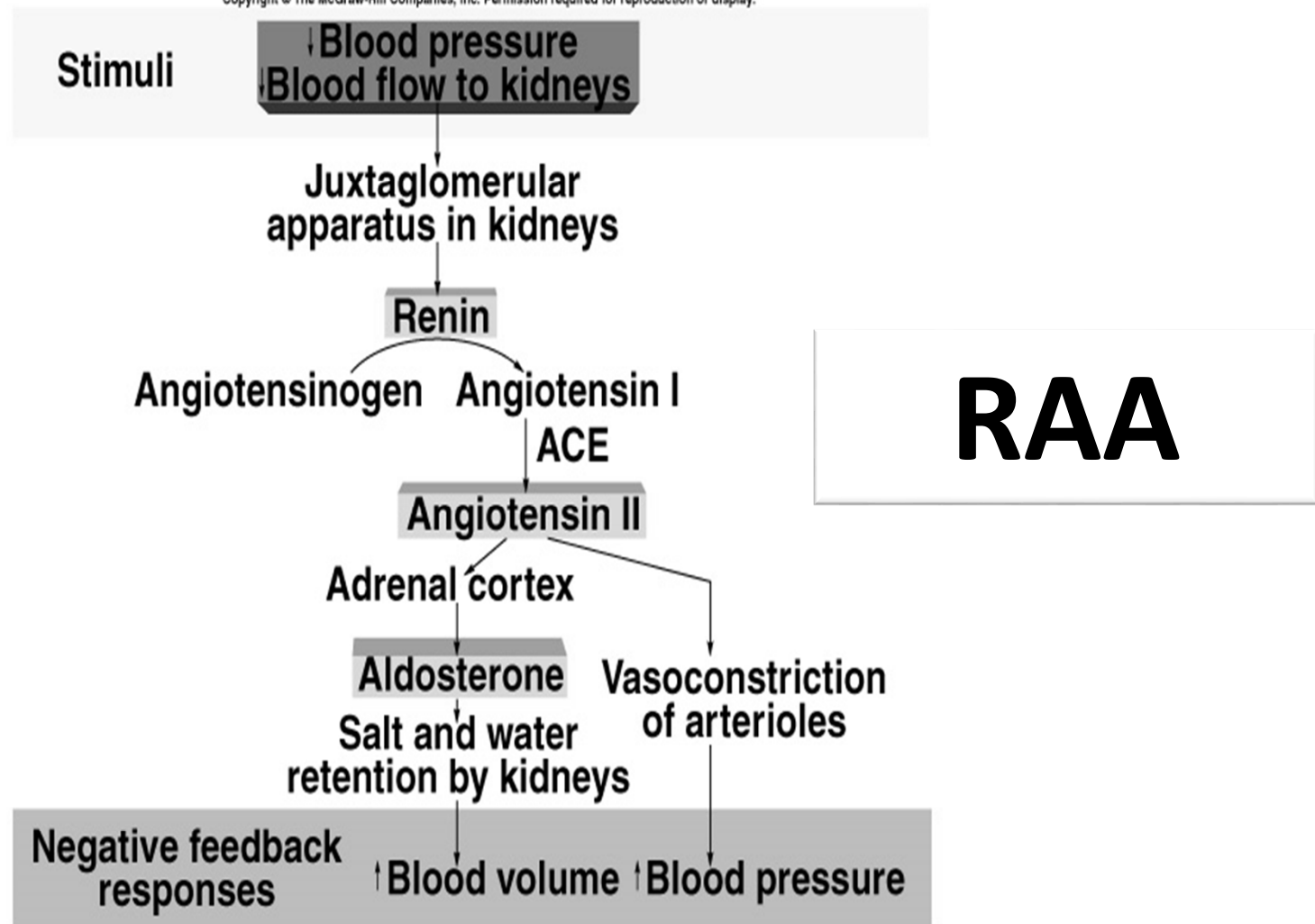


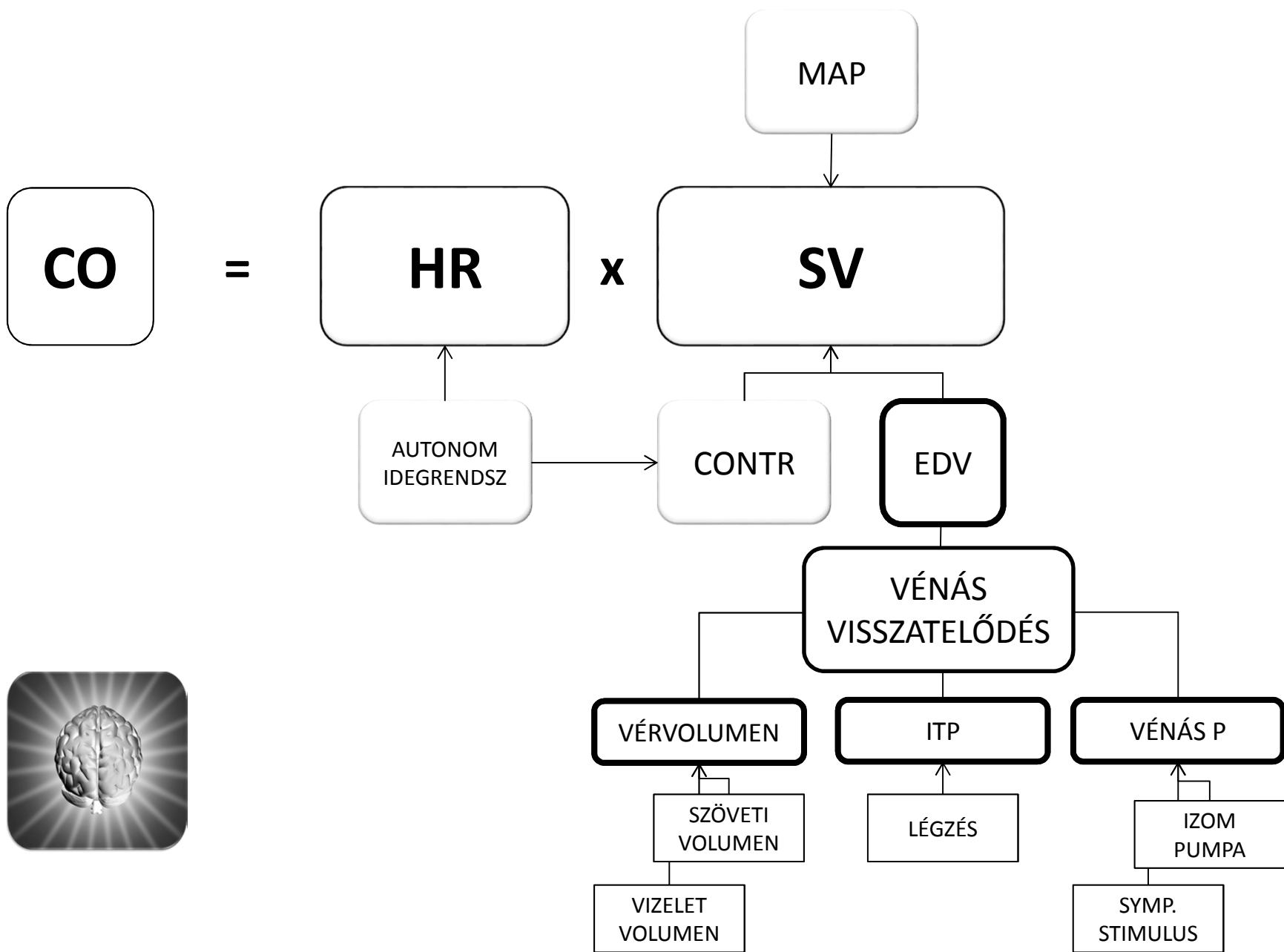


VOLUMEN

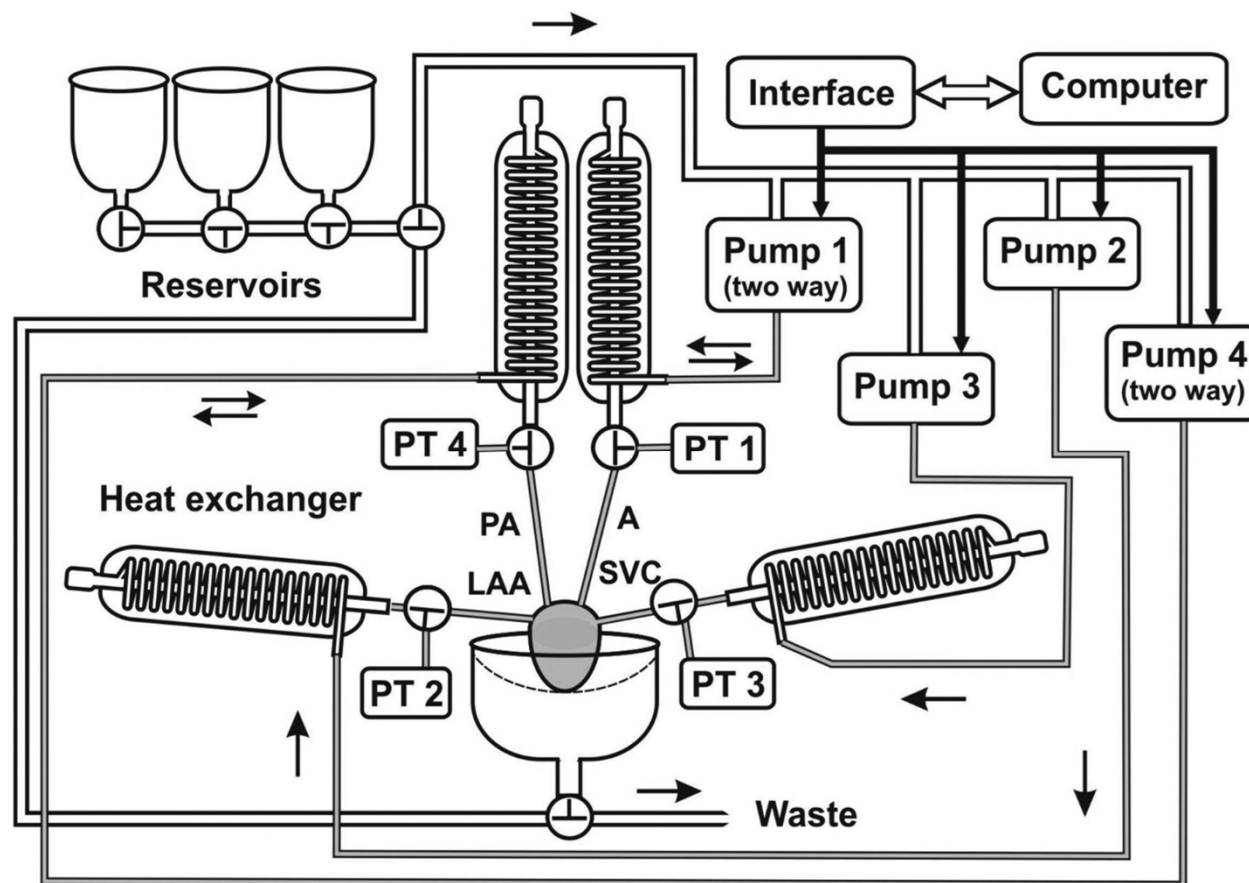




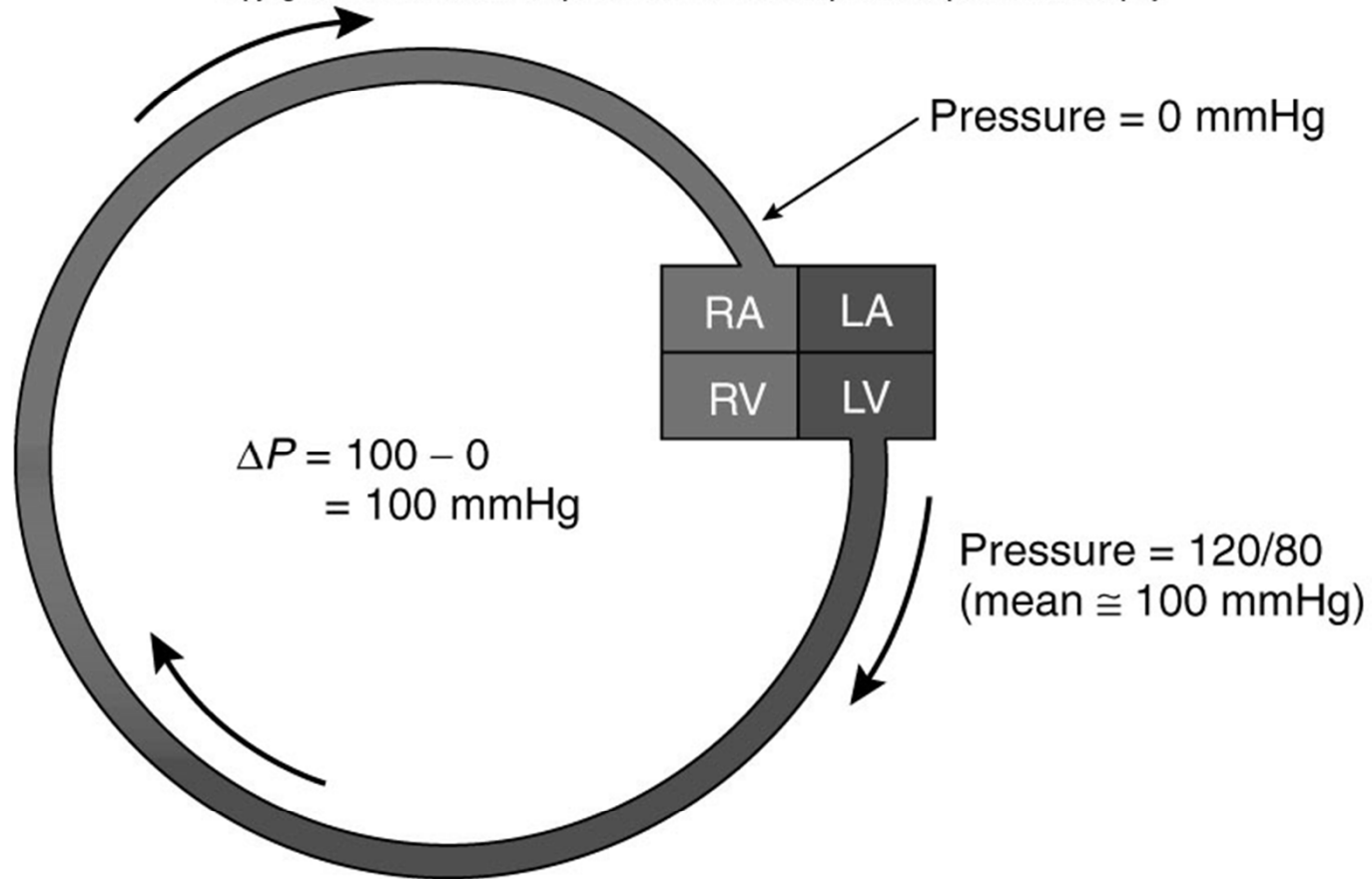


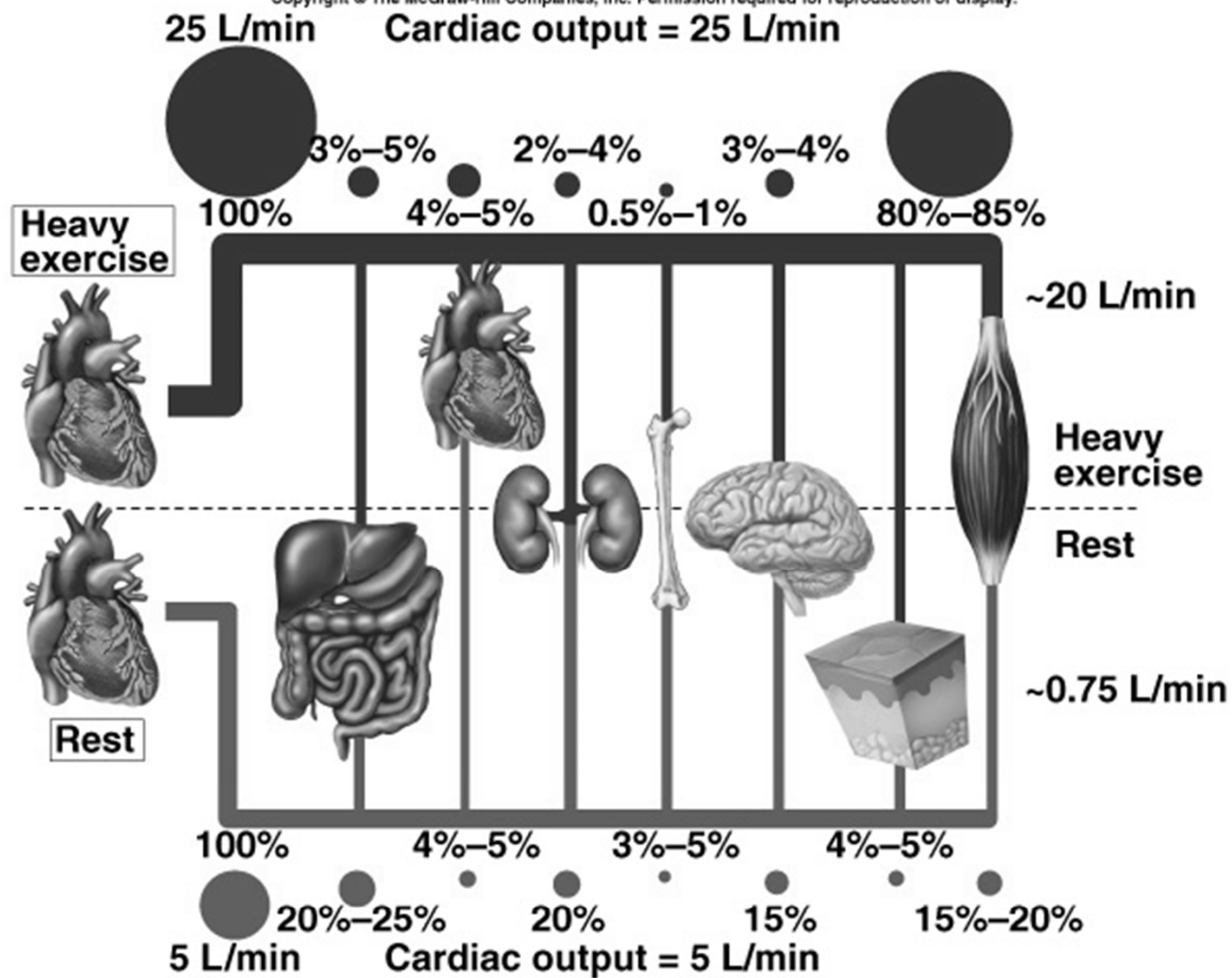


PERFUSIO



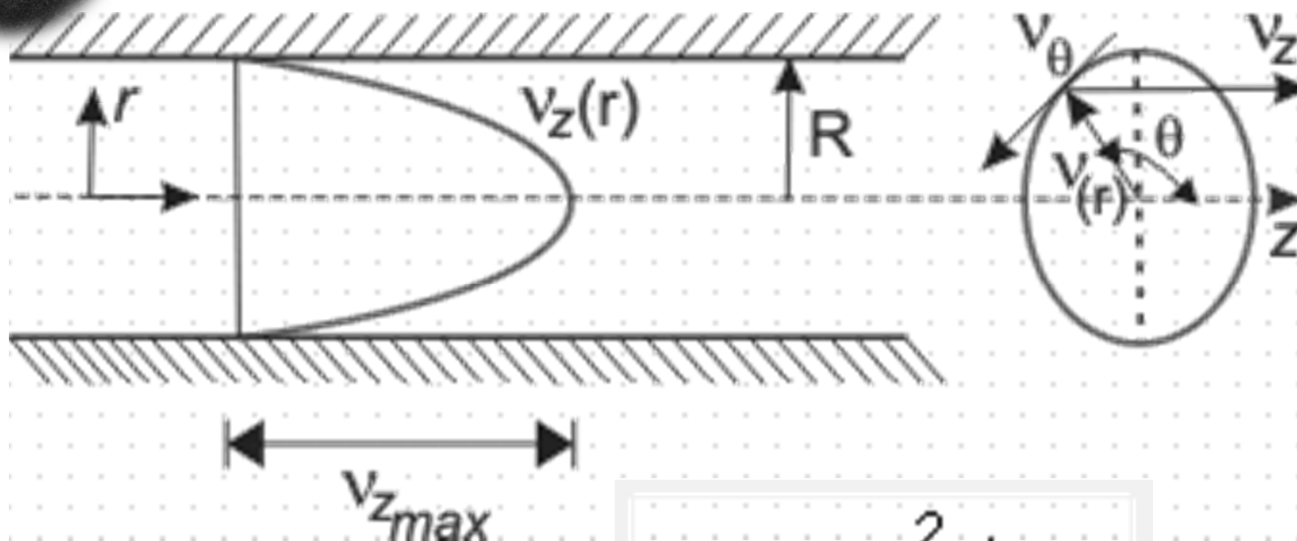
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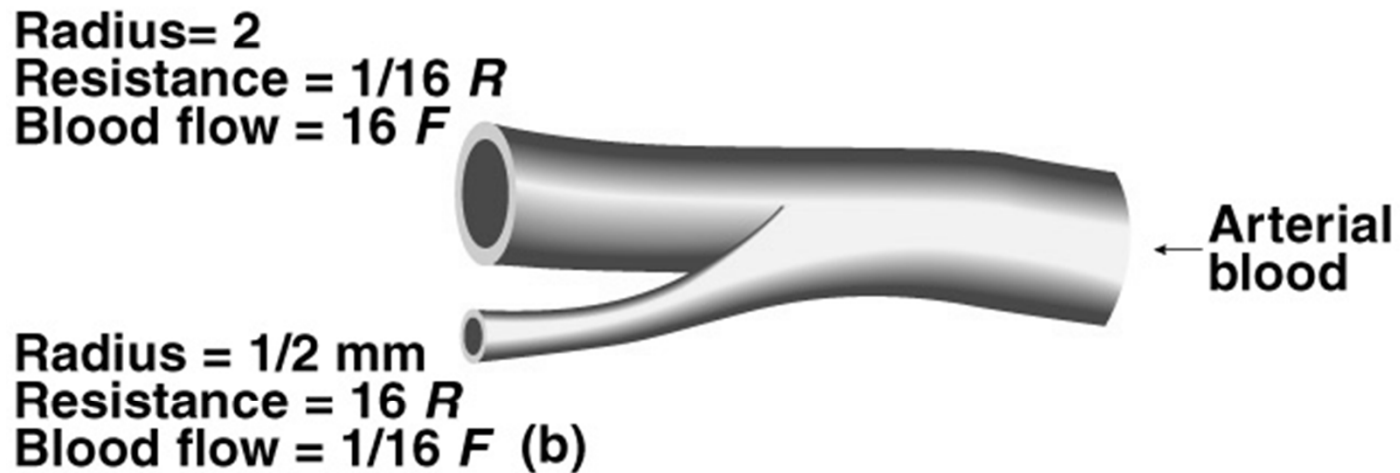
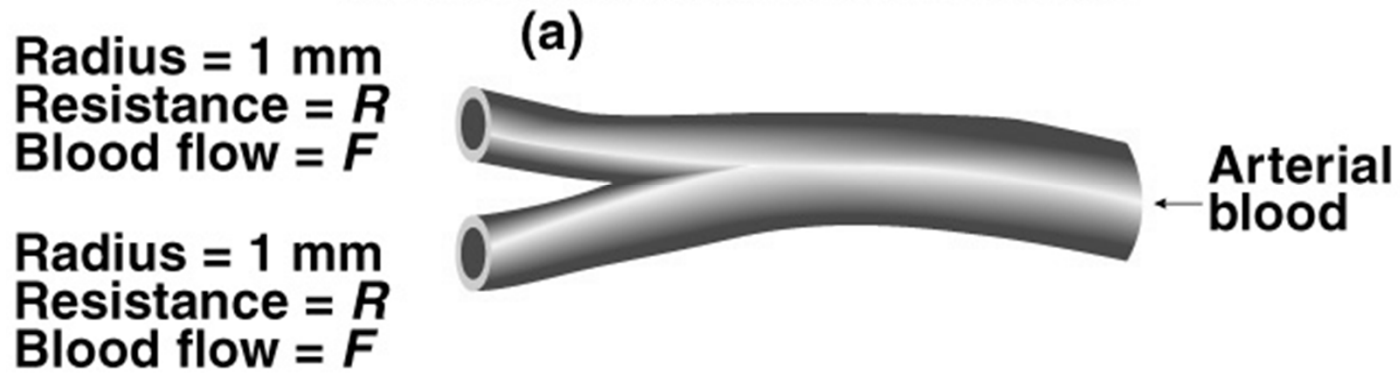


HAGEN POISEUILLE TÖRVÉNY



$\frac{\text{TÖLTŐNYOMÁS} \times \text{SUGÁR}}{\text{HOSSZ} \times \text{VISZKOZÍTÁS}}$

$$\eta = \frac{\pi r^2 \Delta p t}{8 V L}$$



... PERSZE, ENNEK IS VAN CELLULARIS ...

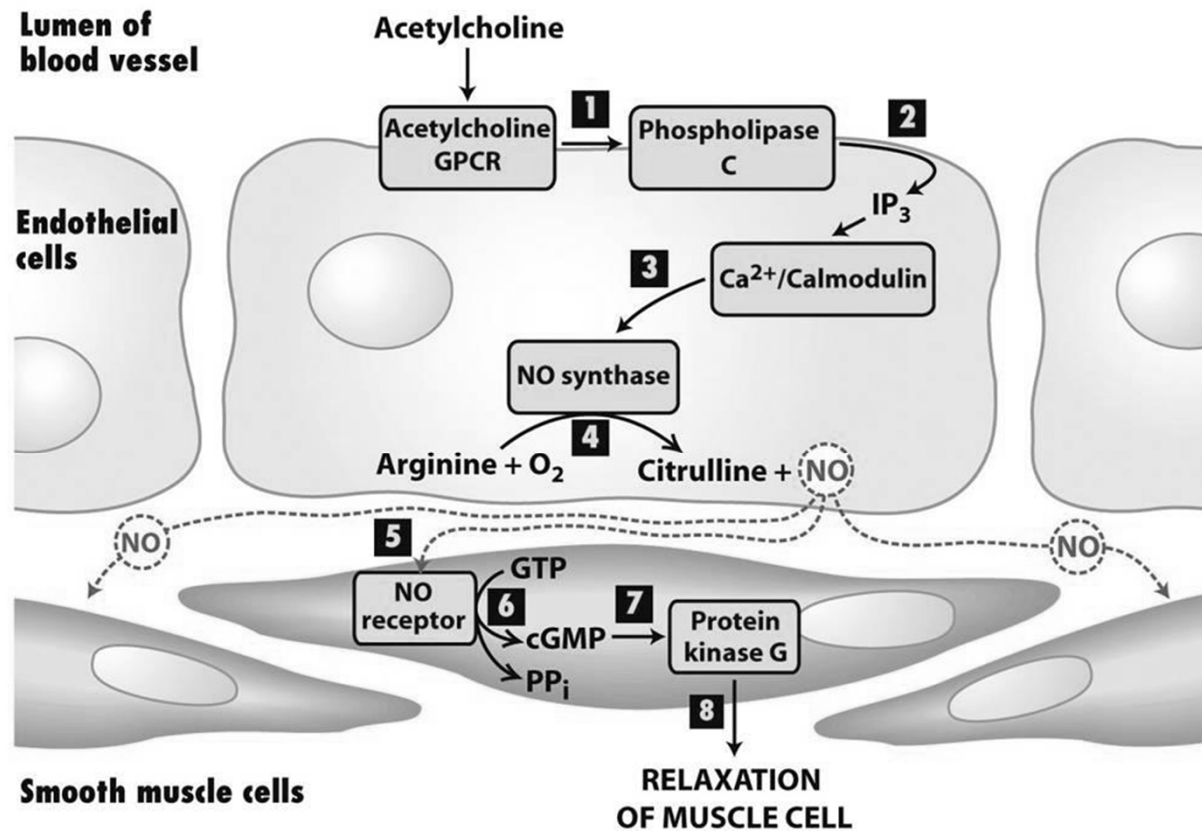
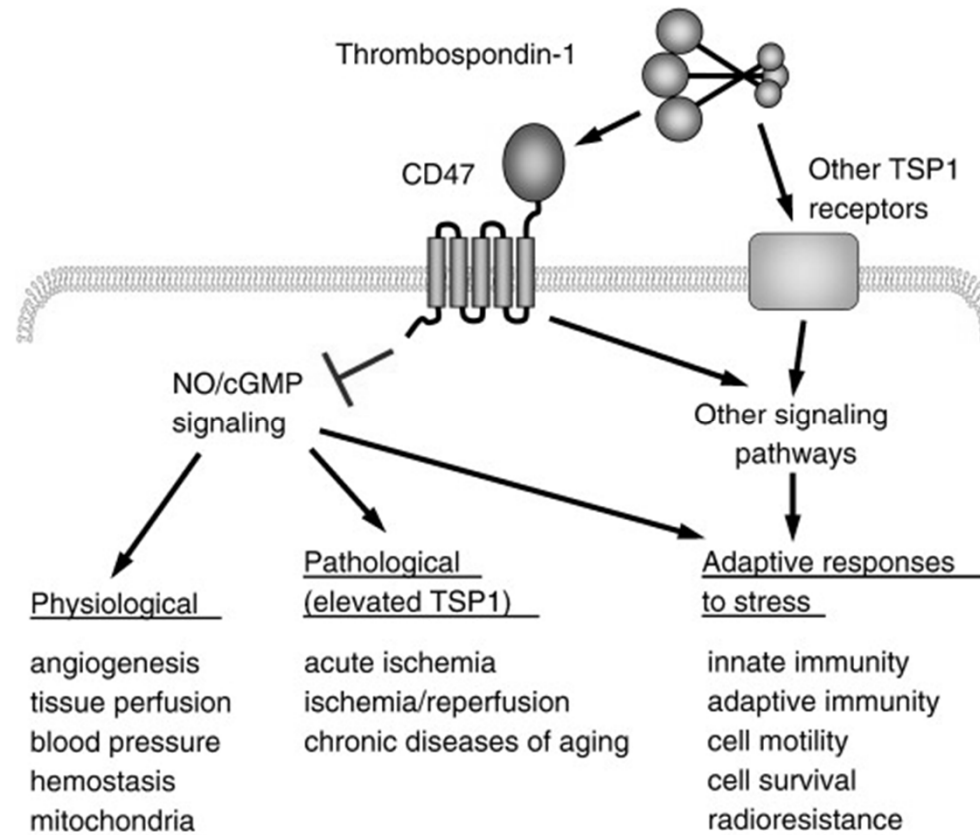
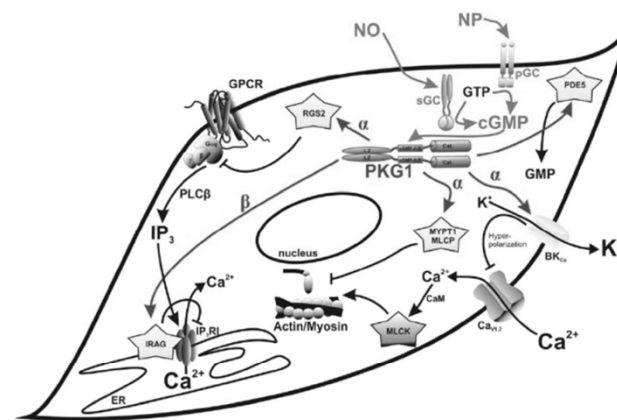
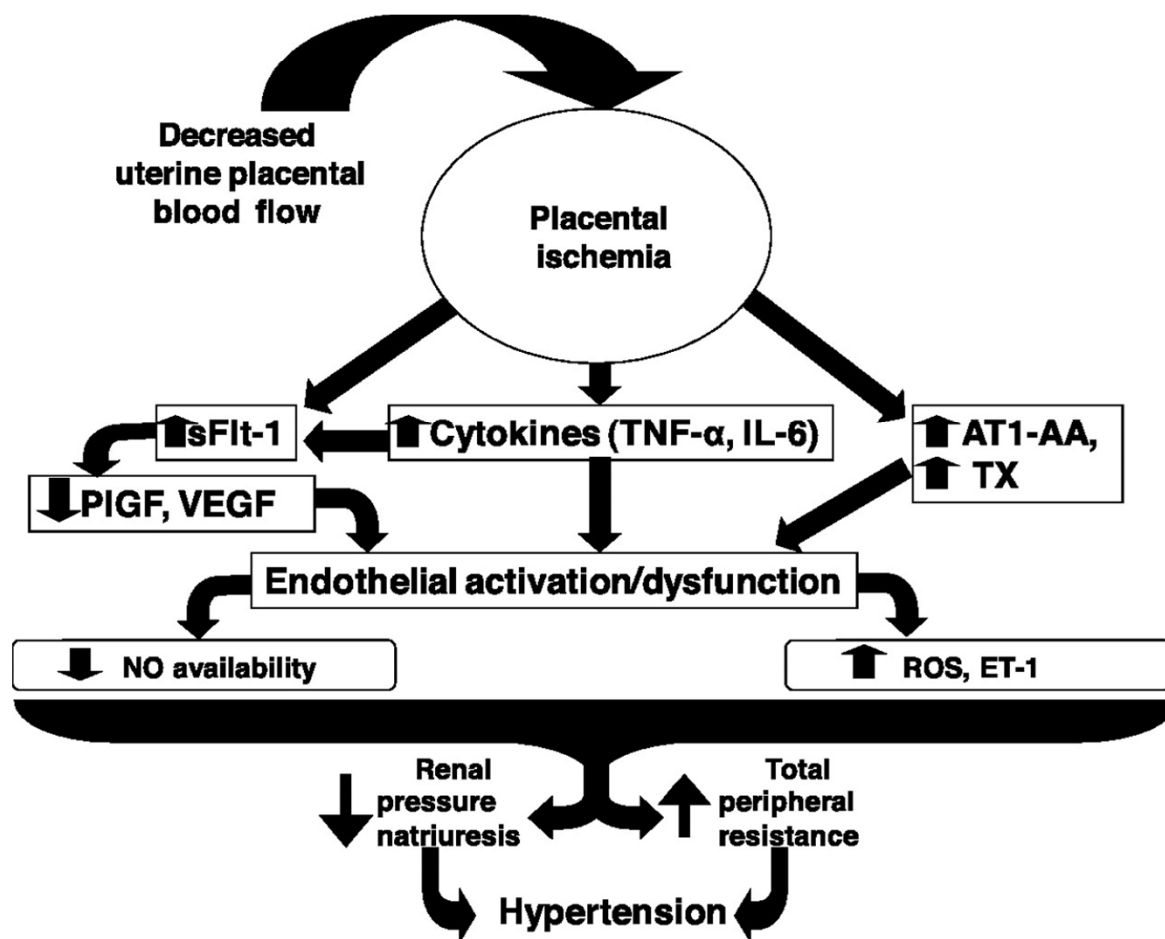


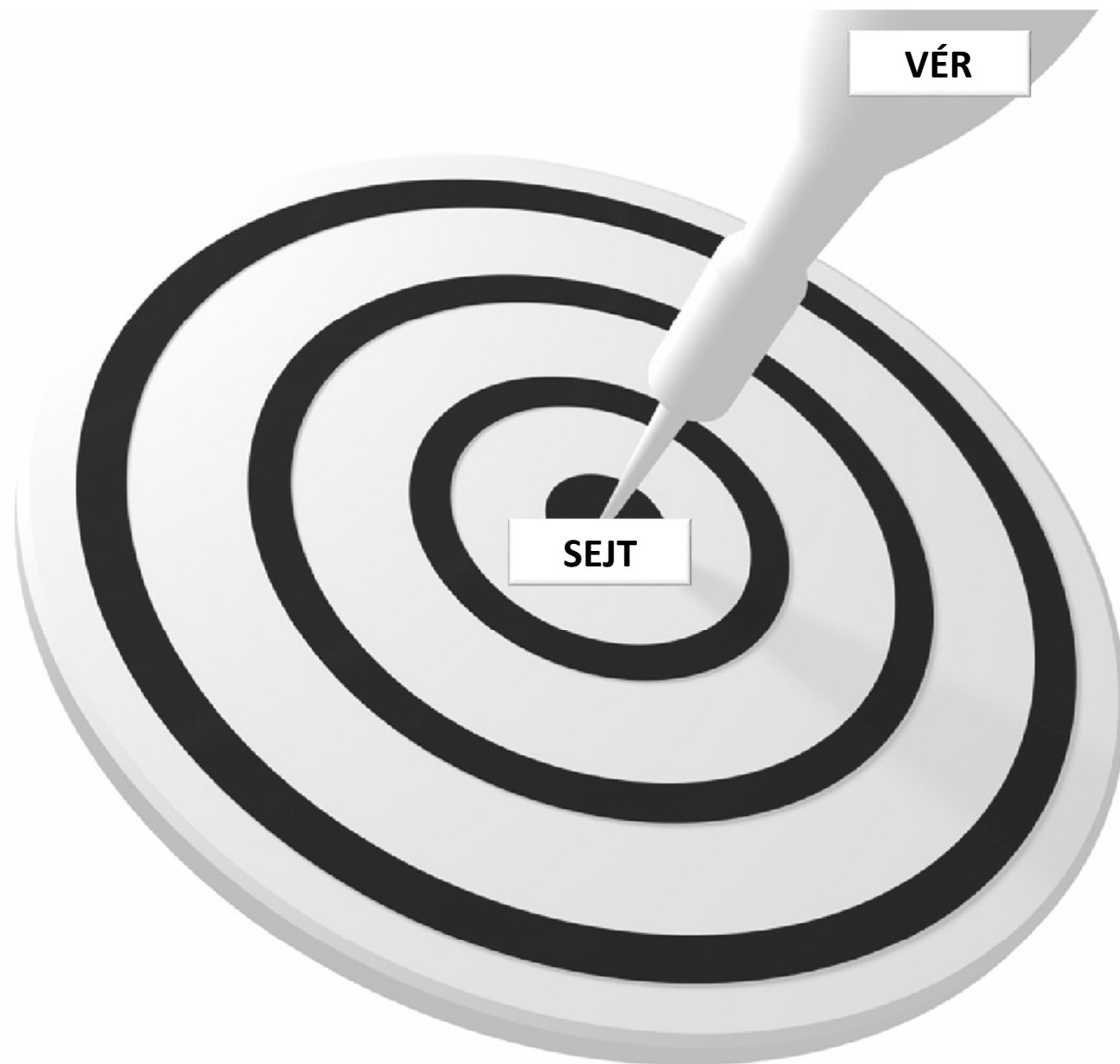
Figure 15-31
Molecular Cell Biology, Sixth Edition
© 2008 W. H. Freeman and Company

... PERSZE, ENNEK IS VAN CELLULARIS ... 2☺



... ÉS AZ EGYSZERŰSÉG KEDVÉÉRT GENETIKAI HÁTTÉR IS





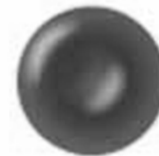
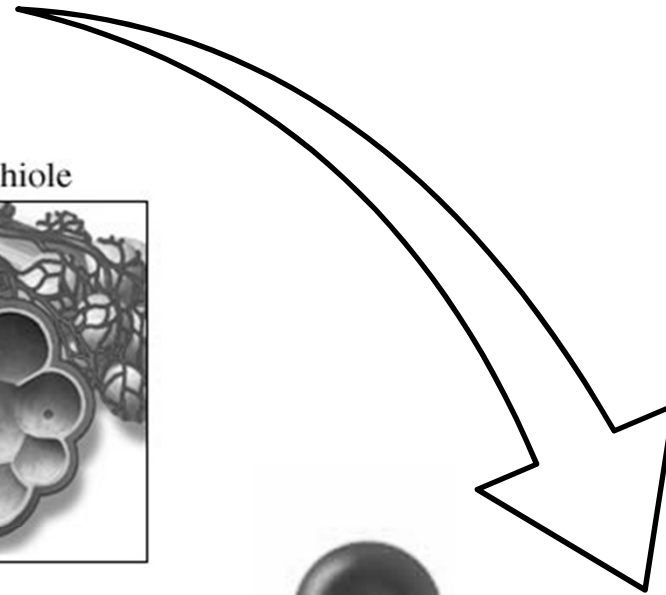
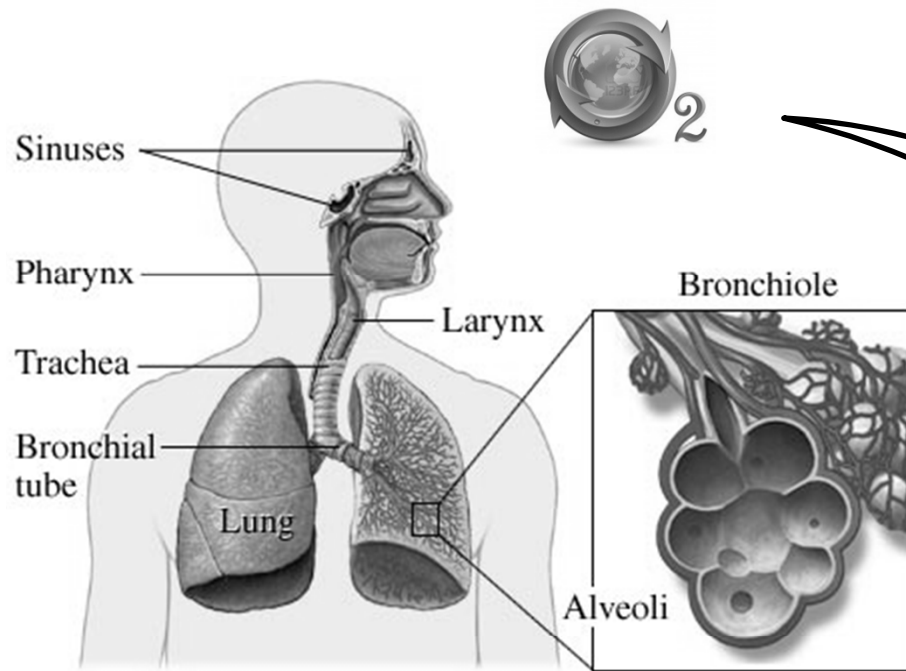
VÉR

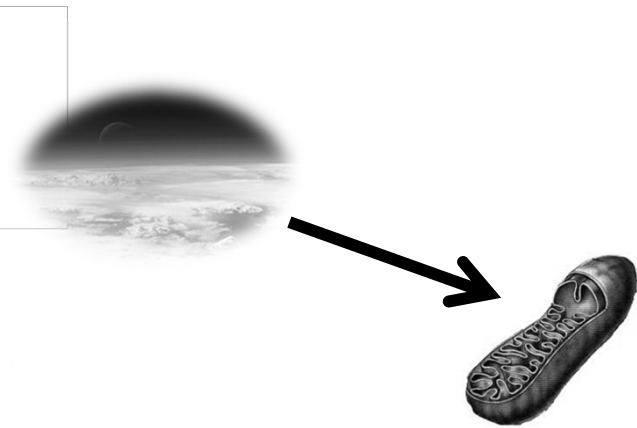
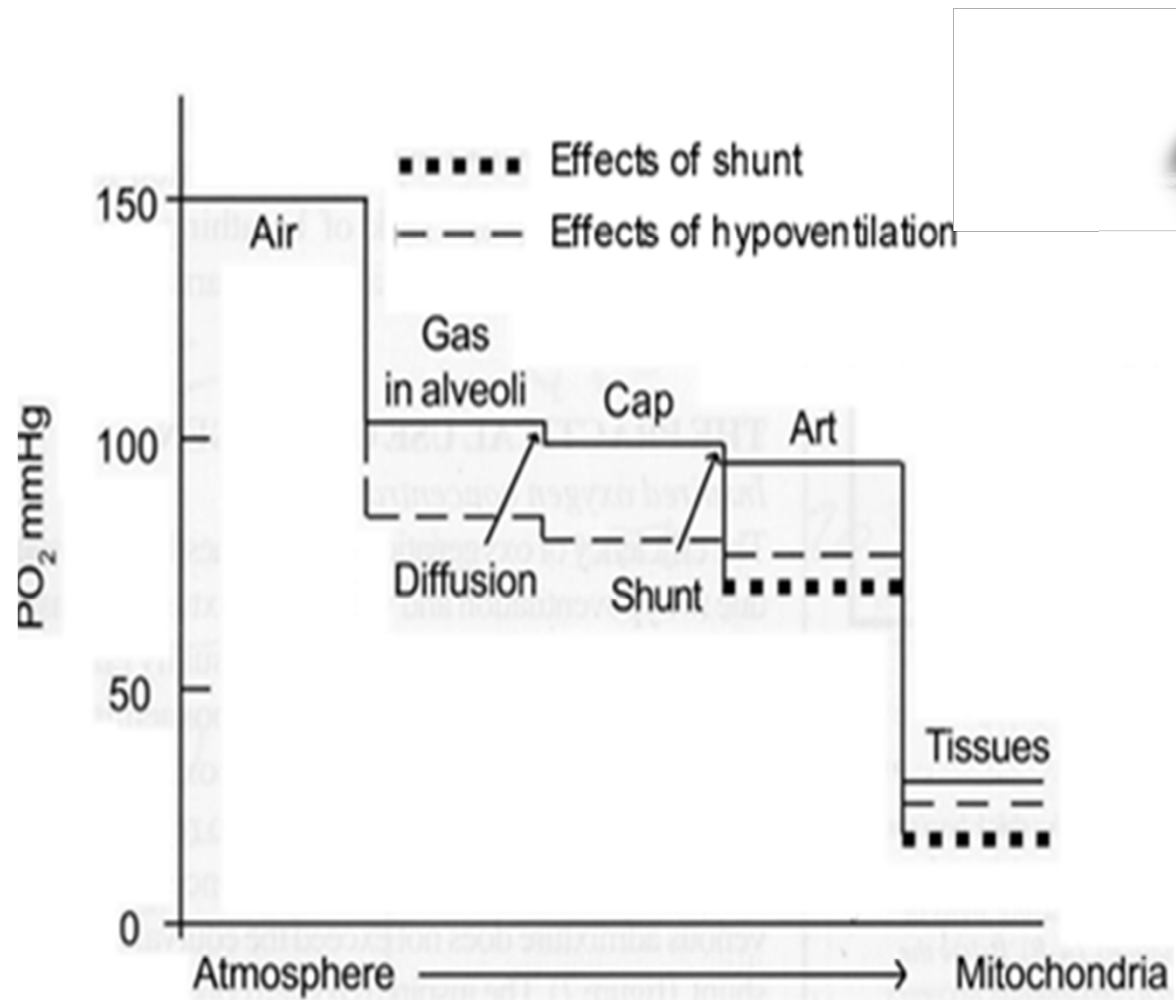
SEJT

$$\text{DO}_2 = \text{CAO}_2 \times \text{CO}$$

$$\text{CAO}_2 = \text{HGB} \times 1.34 \times \text{SAO}_2 + (\text{PO}_2 \times 0.03)$$

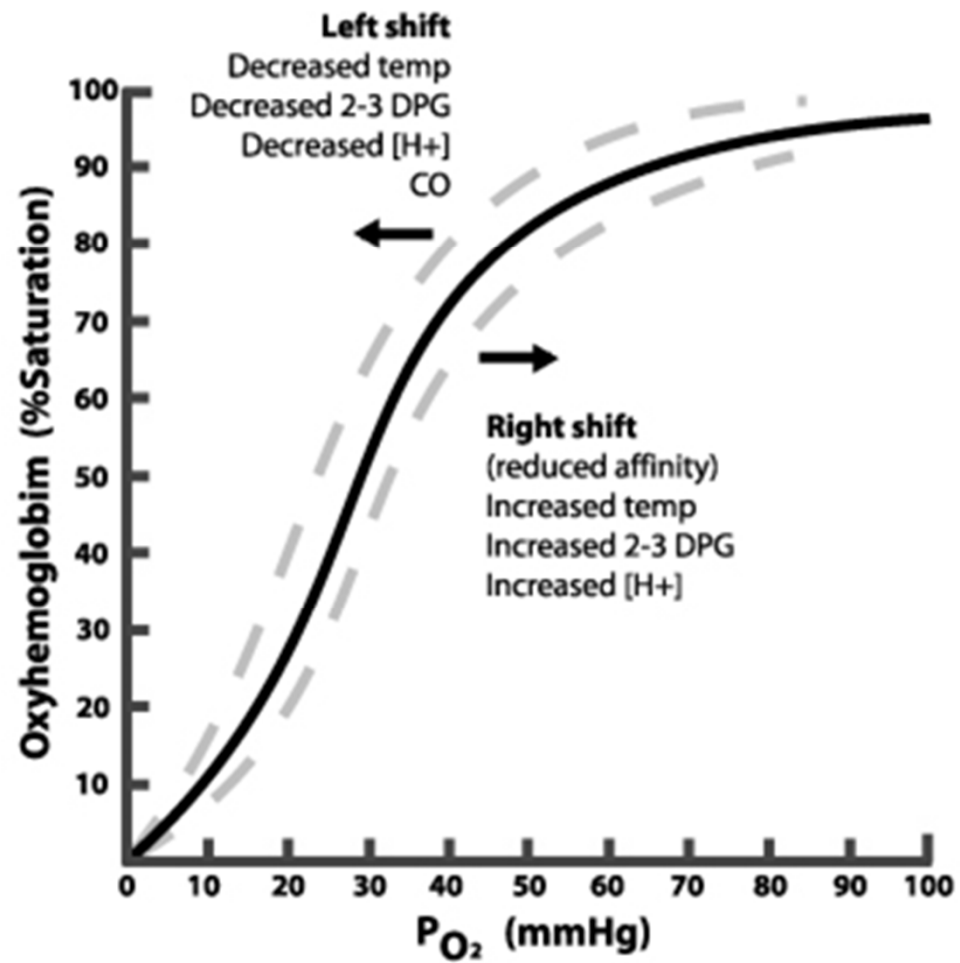
$$\text{PTF (CO)} = \text{PULZUSSZÁM} \times \text{VERŐTÉRFOGAT (SV)}$$

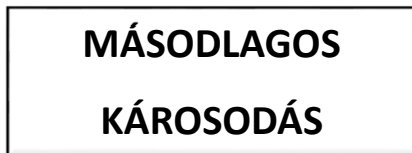




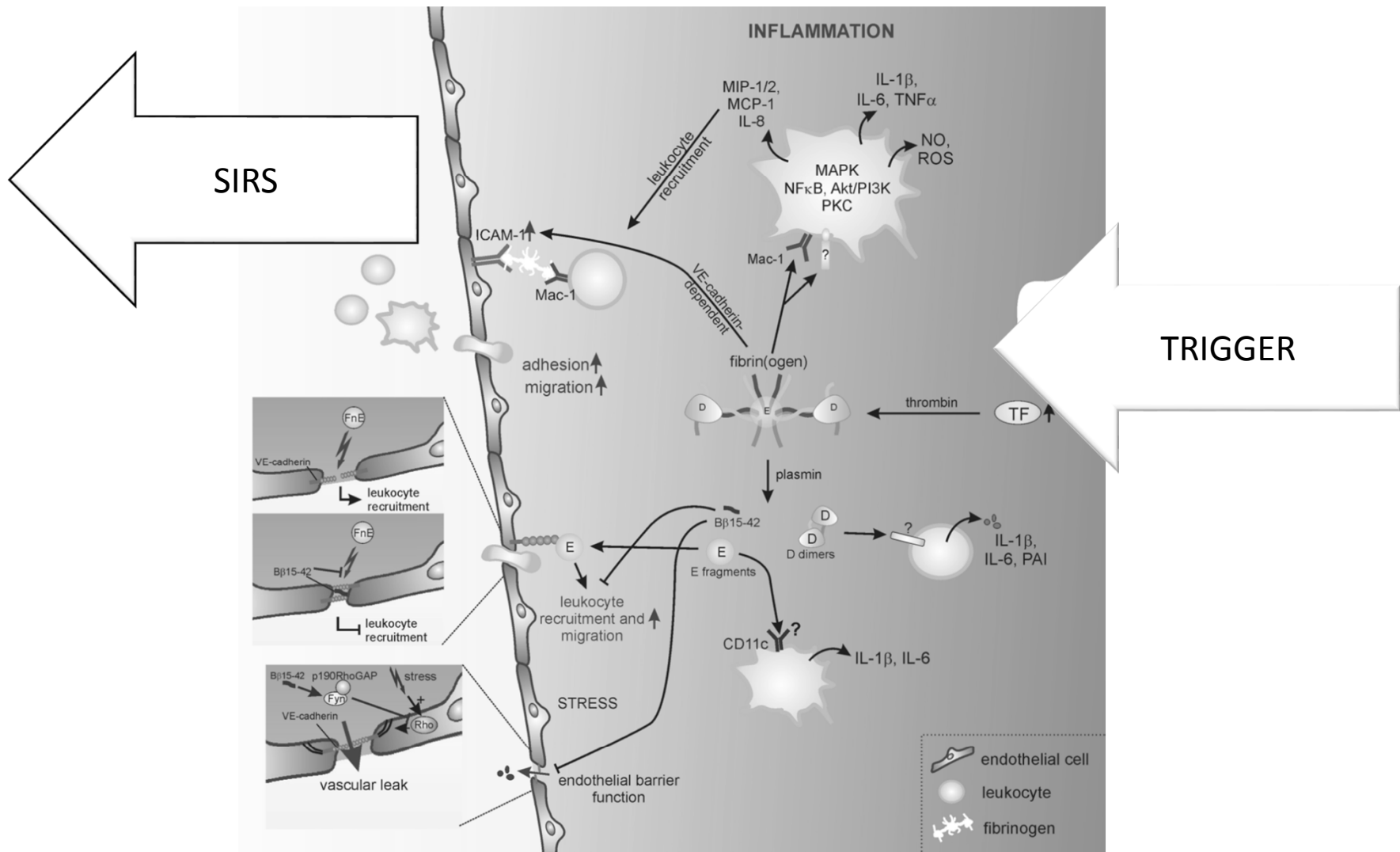
Dr Rob Law,
Bristol Royal Infirmary, Bristol, UK





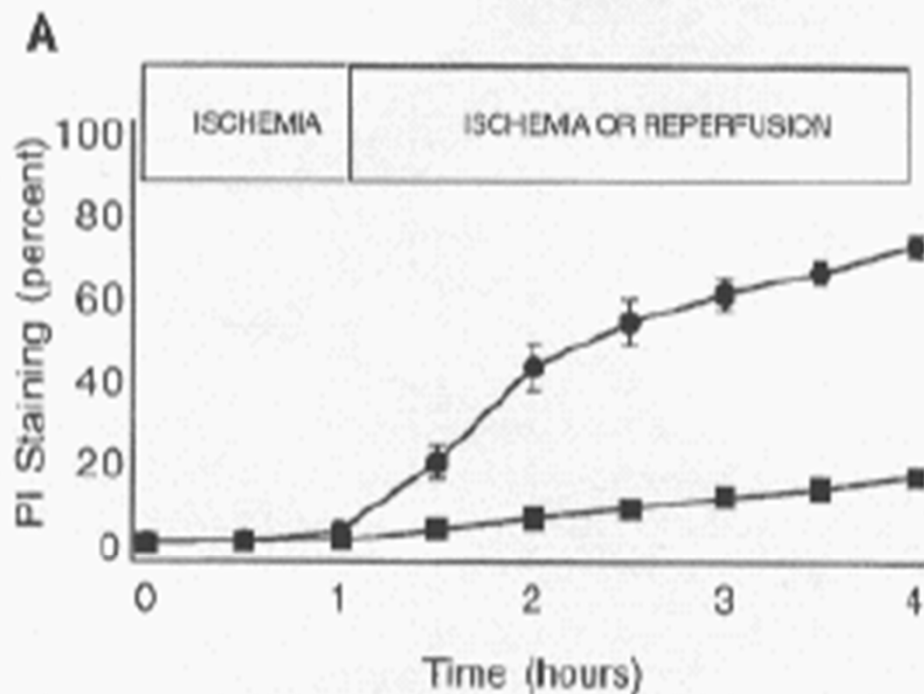


BIOLÓGIAI VÁLASZ

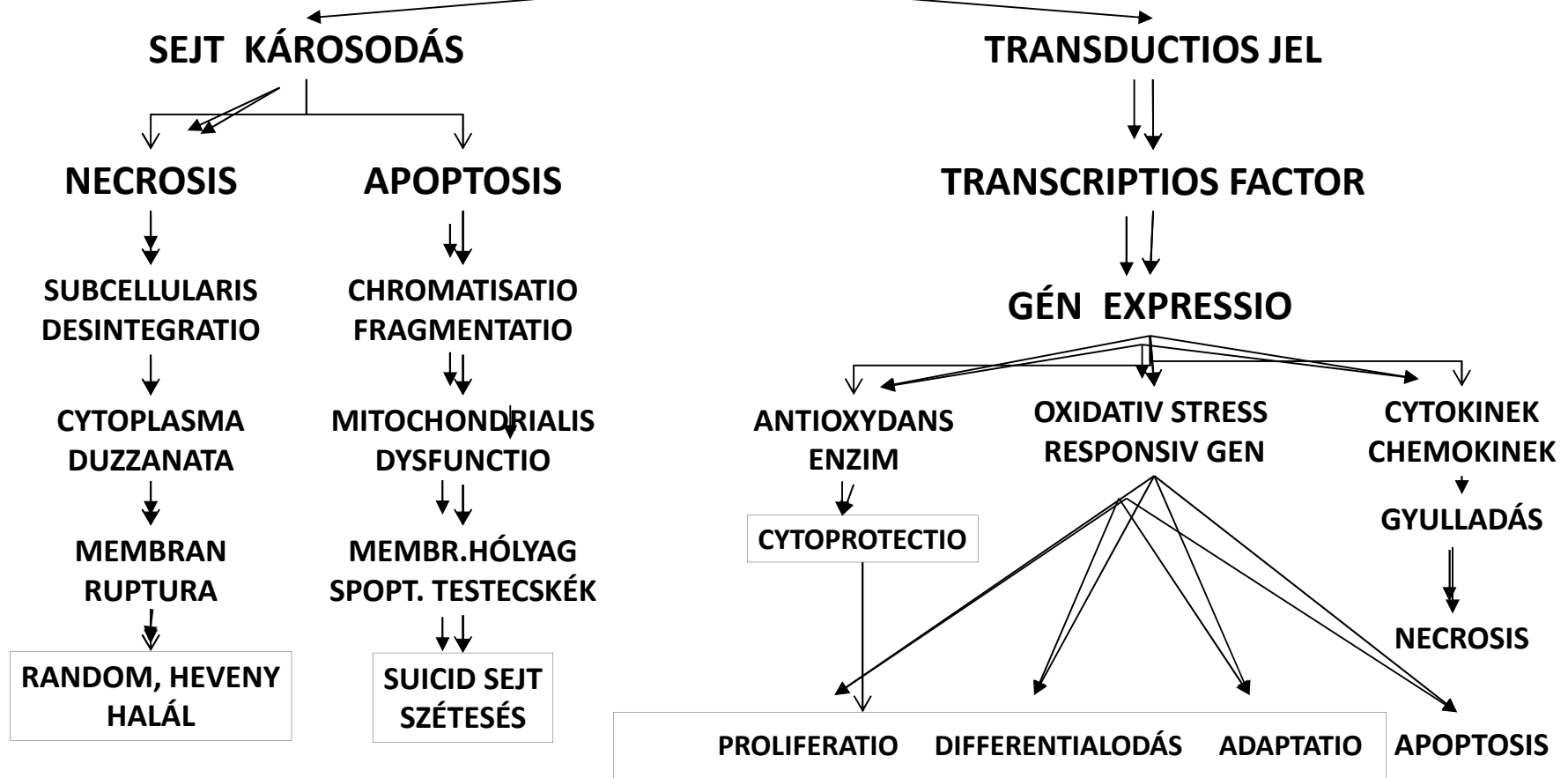


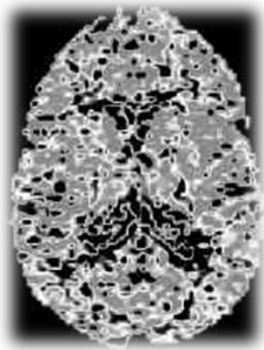


Vanden Hoek, Terry L., Zuohui Shao, Changqing Li, Radovan Zak, Paul T. Schumacker, and Lance B. Becker. Reperfusion injury in cardiac myocytes after simulated ischemia. *Am. J. Physiol.* 270 (*Heart Circ. Physiol.* 39): H1334–H1341, 1996.—The extent of cardiac injury incurred during

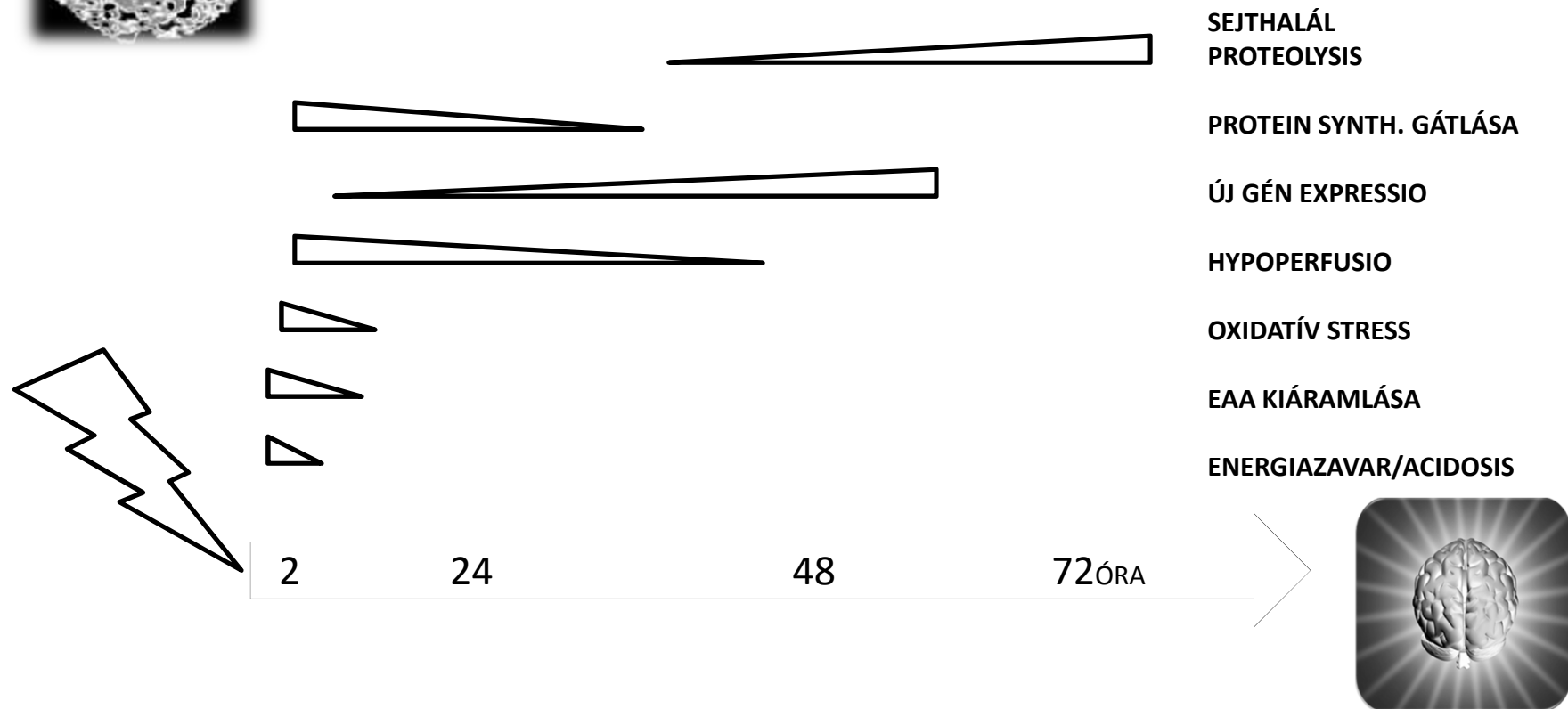


OXYDATIV STRESS



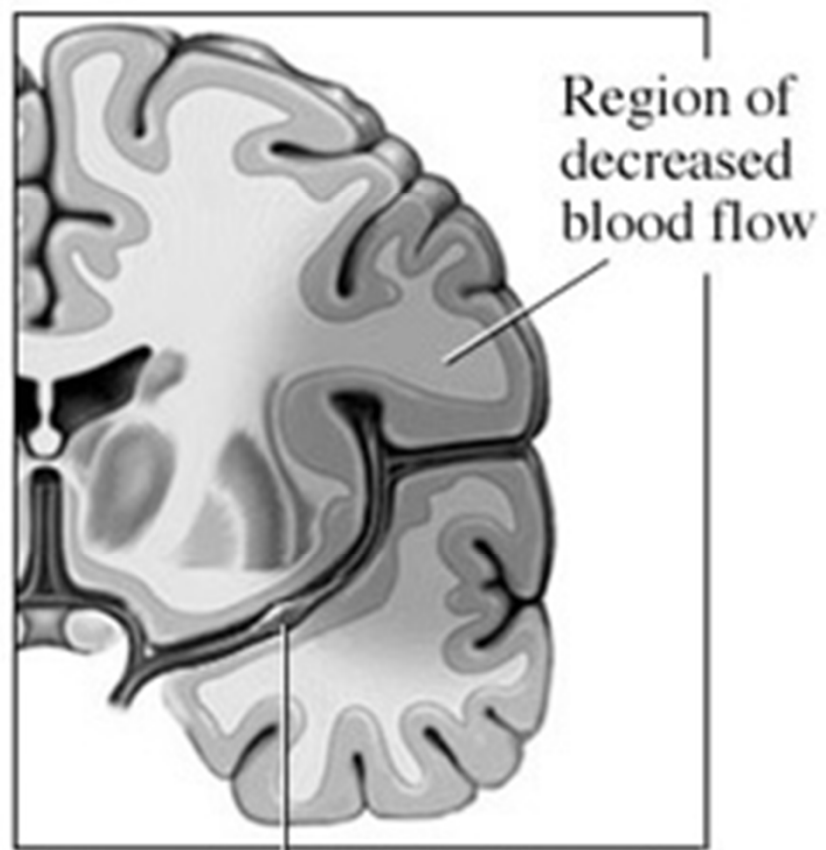


PATHOPHYSIOLOGIA - IDŐ





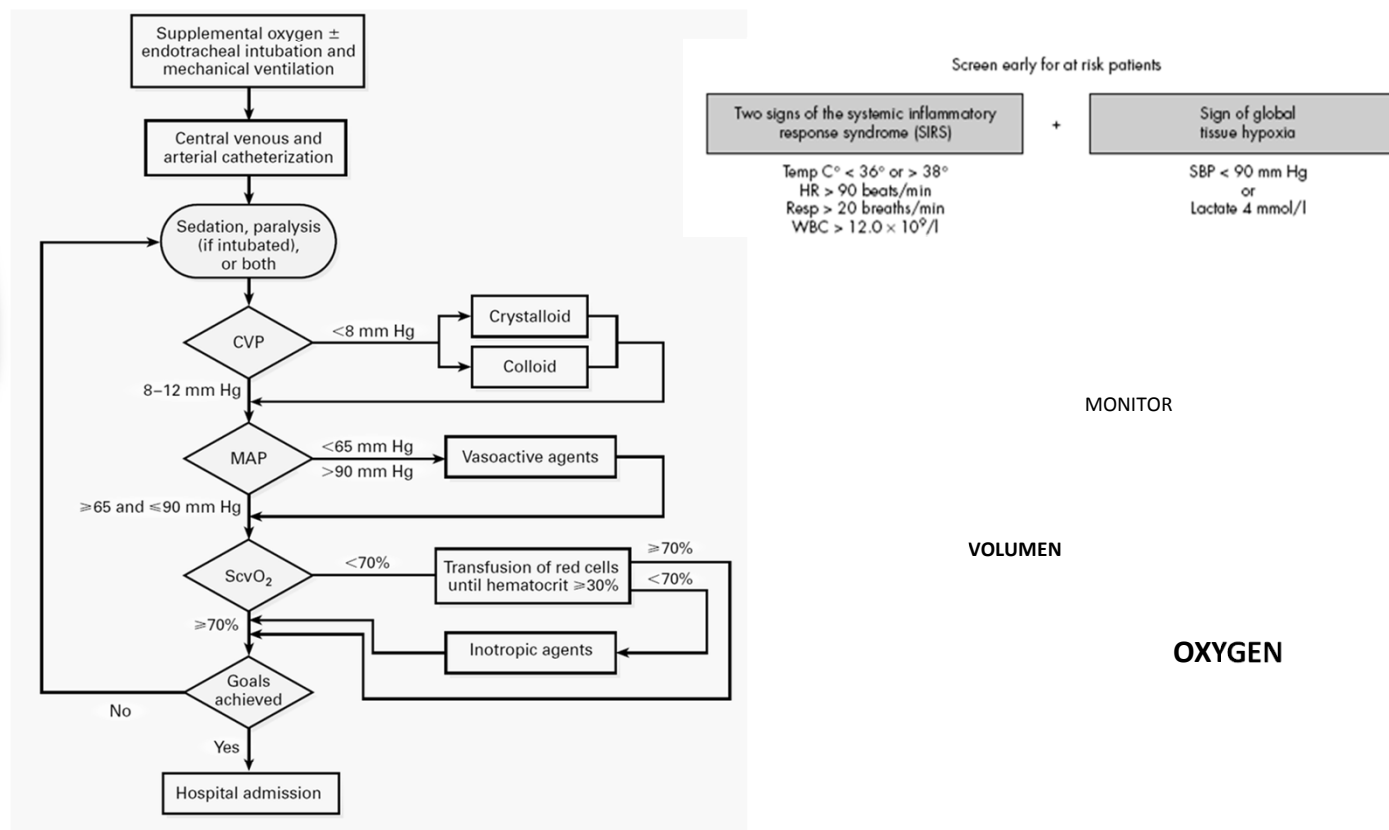
Blood supply
to the brain



Interruption of blood supply
(blood clot)

EARLY GOAL-DIRECTED THERAPY IN THE TREATMENT OF SEVERE SEPSIS AND SEPTIC SHOCK

EMANUEL RIVERS, M.D., M.P.H., BRYANT NGUYEN, M.D., SUZANNE HAVSTAD, M.A., JULIE RESSLER, B.S.,



N Engl J Med, Vol. 345, No. 19 · November 8, 2001



Emergency Medicine Australasia (2012) 24, 14–22

doi: 10.1111/j.1742-6723.2011.01516.x

REVIEW ARTICLE



Review article: Part one: Goal-directed resuscitation – Which goals? Haemodynamic targets

doi: 10.1111/j.1742-6723.2011.01515.x

Emergency Medicine Australasia (2012) 24, 127–135



REVIEW ARTICLE

Review article: Part two: Goal-directed resuscitation – Which goals? Perfusion targets



RIZIKÓ-MENEDZSMENT

RESTITUTÍV-MENEDZSMENT

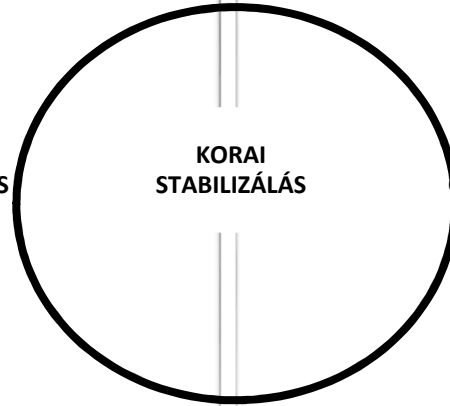
KORAI
FELSIMÉRÉS

KORAI
ÉRTÉKELÉS

KORAI
STABILIZÁLÁS

KORAI
GYÓGYÍTÁS

KORAI
REHABILITÁCIÓ



RESUSCITATÍV CSOMAG

Assessing healthy
tissue oxygenation is
an important part of

EGDT

(Early Goal-Directed Therapy)



Sepsis is one of the most common diseases¹
 Cases per 100,000 population (US / *Europe)



Sepsis



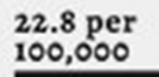
Stroke*



Cancer



Heart

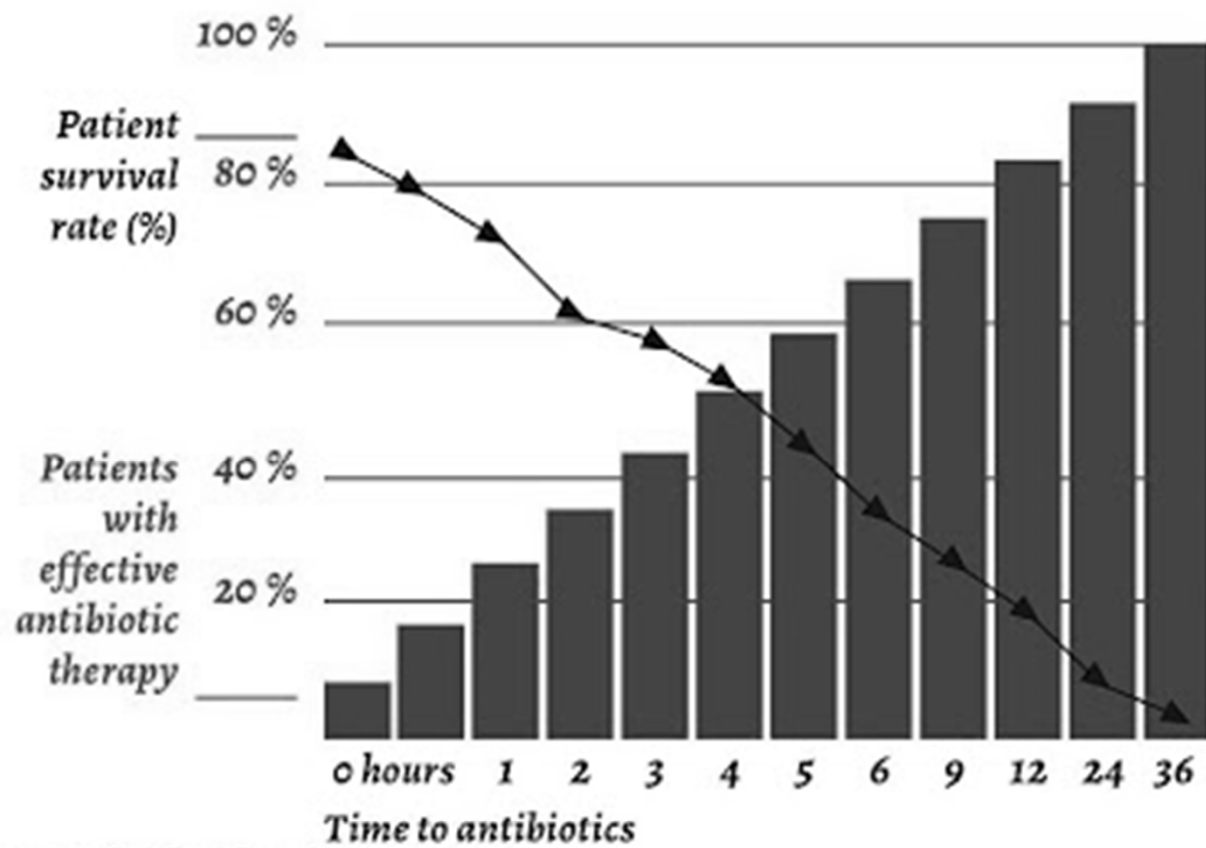


HIV

Million US-Dollars spent for state-funded research 2011
 Sepsis research receives the lowest funding²
made for World Sepsis Day
 by Indiguen-gmbh.com

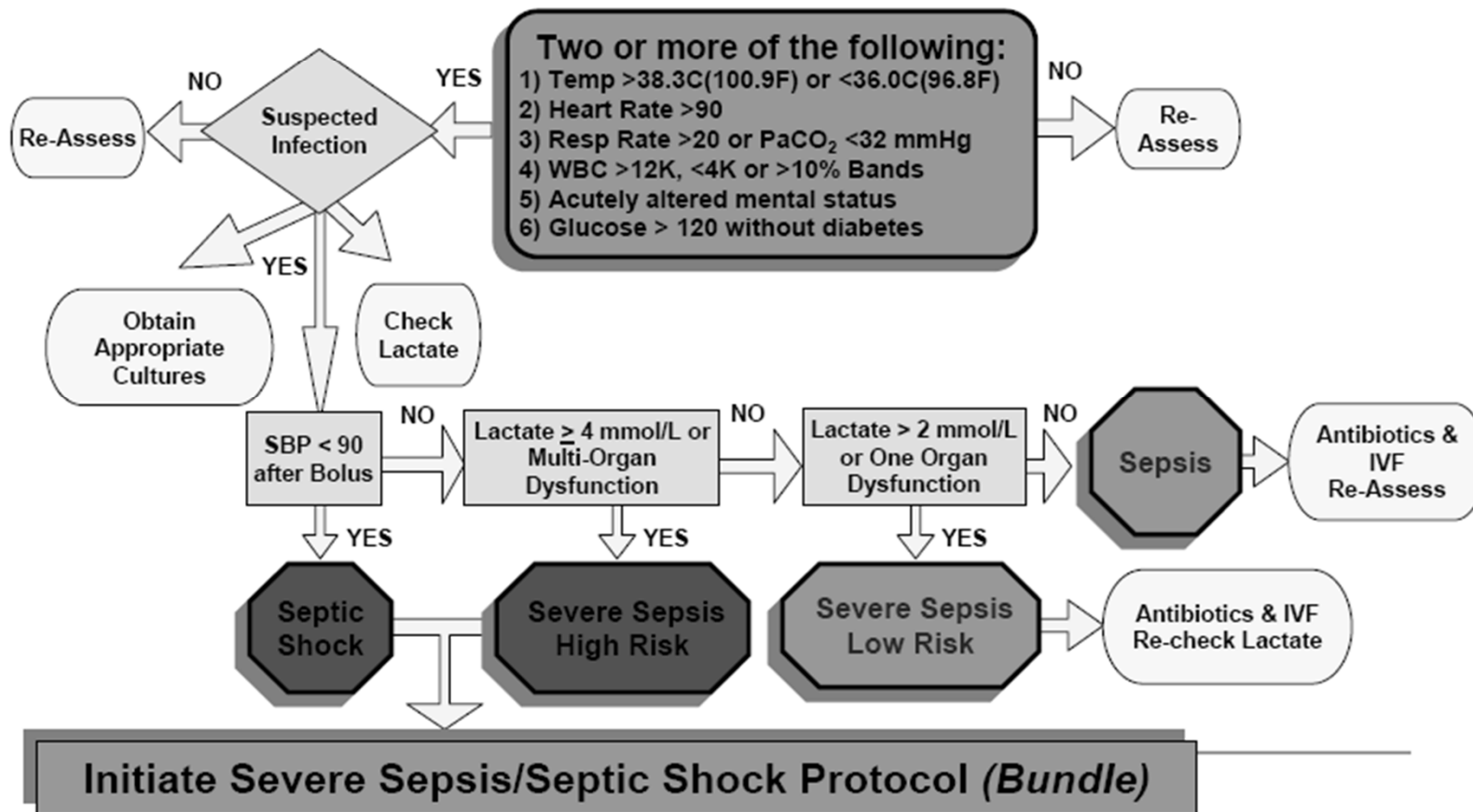


Sepsis is a medical emergency ⁸



made for World Sepsis Day by lindgruen-gmbh.com

Early Recognition of Adult Patients with Severe Sepsis/Septic Shock



2006.

STRATEGIES

TIMELY

OBVIATE the

PROGRESSION of SEPSIS



STOP SEPSIS BUNDLE

Strategies to Timely Obviate the Progression of Sepsis

< 6 ÓRÁS CÉLOK

- ☞ CVP/ScVO₂ MONITORIZÁLÁS < 2 óra
- ☞ SZÉLES SPECTRUMU ANTIBIOSIS <4 óra
- ☞ HAEMODYNAMIKAI STABILITÁS <6 óra
 - ☞ CVP ≥ 8 Hgmm
 - ☞ MAP ≥ 65 Hgmm / SBP ≥ 90 Hgmm
 - ☞ ScVO₂ ≥ 70%
- ☞ LACTAT MONITORIZÁLÁSA
- ☞ STEROID ? (catecholamin resistens v. adrenal.insuff)

SURVIVING SEPSIS CAMPAIGN BUNDLES

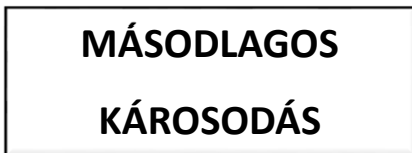
TO BE COMPLETED WITHIN 3 HOURS:

- 1) Measure lactate level
- 2) Obtain blood cultures prior to administration of antibiotics
- 3) Administer broad spectrum antibiotics
- 4) Administer 30 mL/kg crystalloid for hypotension or lactate ≥ 4 mmol/L

TO BE COMPLETED WITHIN 6 HOURS:

- 5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mm Hg
- 6) In the event of persistent arterial hypotension despite volume resuscitation (septic shock) or initial lactate ≥ 4 mmol/L (36 mg/dL):
 - Measure central venous pressure (CVP)*
 - Measure central venous oxygen saturation (ScvO₂)*
- 7) Remeasure lactate if initial lactate was elevated*

*Targets for quantitative resuscitation included in the guidelines are CVP of ≥ 8 mm Hg, ScvO₂ of $\geq 70\%$, and normalization of lactate.



BIOLÓGIAI VÁLASZ



**A SÜRGŐSSÉGI ELLÁTÁS FELADATA A KORAI
ÉSZLELÉS ÉS A KORAI RIZIKÓ ALLOKÁCIÓT KÖVETŐ
ÁLLAPOTSATBILIZÁLÁS**

**ENNEK IDŐDEPENDENS ASPECIFIKUS HANGSÚLYA
A SZERVEZET OXYGENISATIO S ÉS PERFUSIO S
VISZONYAINAK OPTIMALIZÁLÁSA**