

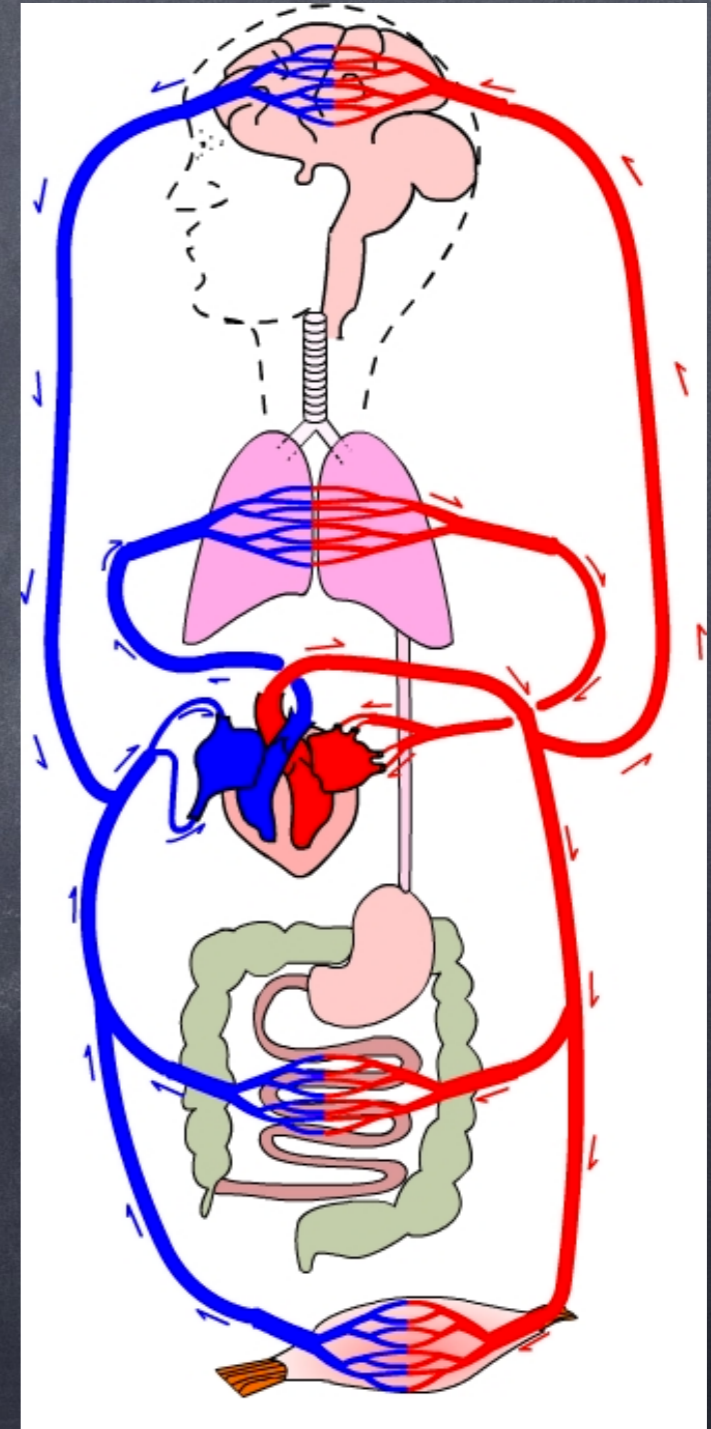
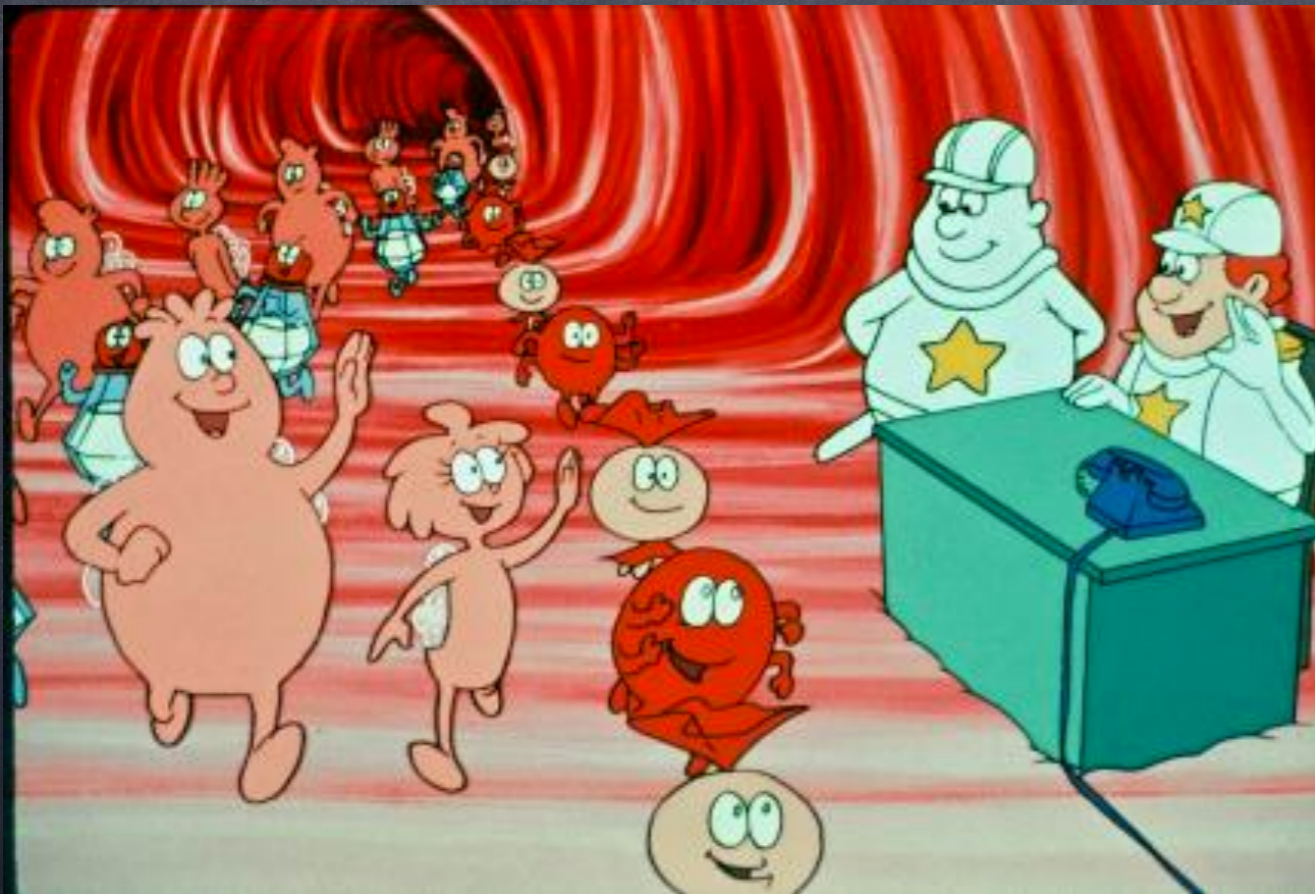
Dr Biston Patrick  
Service des Soins intensifs  
CHU Marie Curie

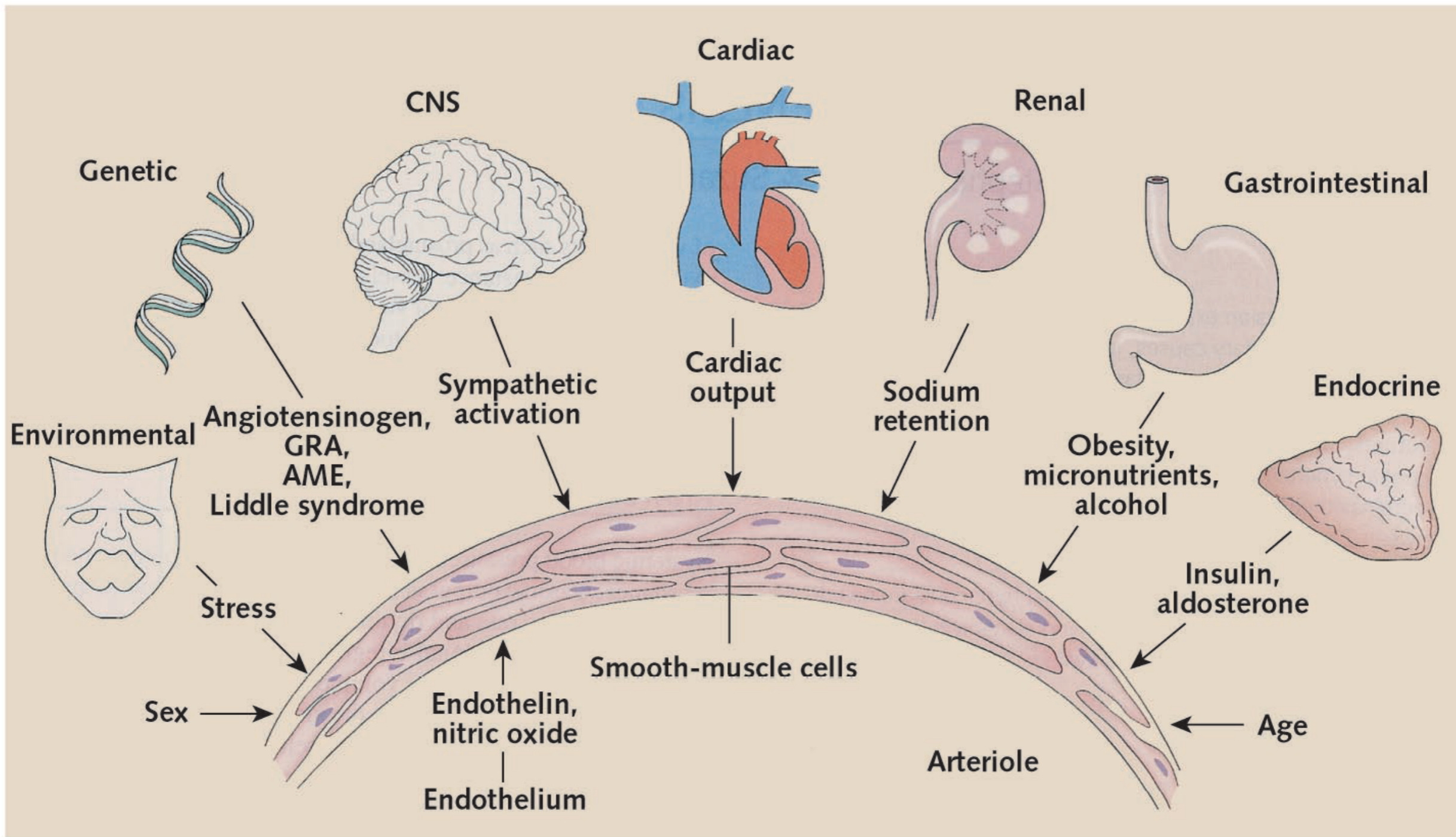


# Le choc dans tous ses états



# Circulation





$$DO_2 = CO \times Hb \times SaO_2 \times 13.9$$

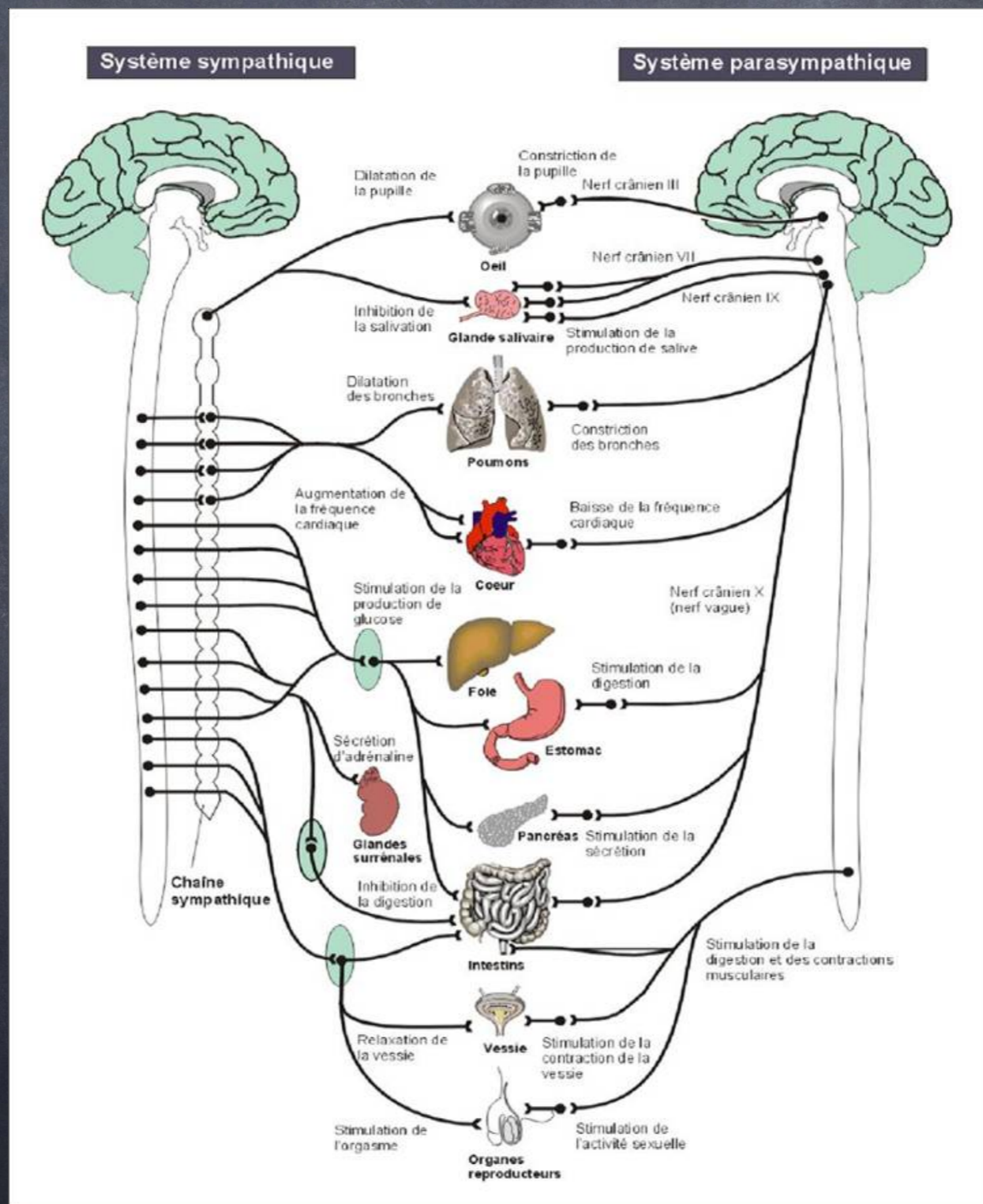
$$VO_2 = CO \times 13.9 \times hb (SaO_2 - SvO_2)$$

Transport  $O_2$

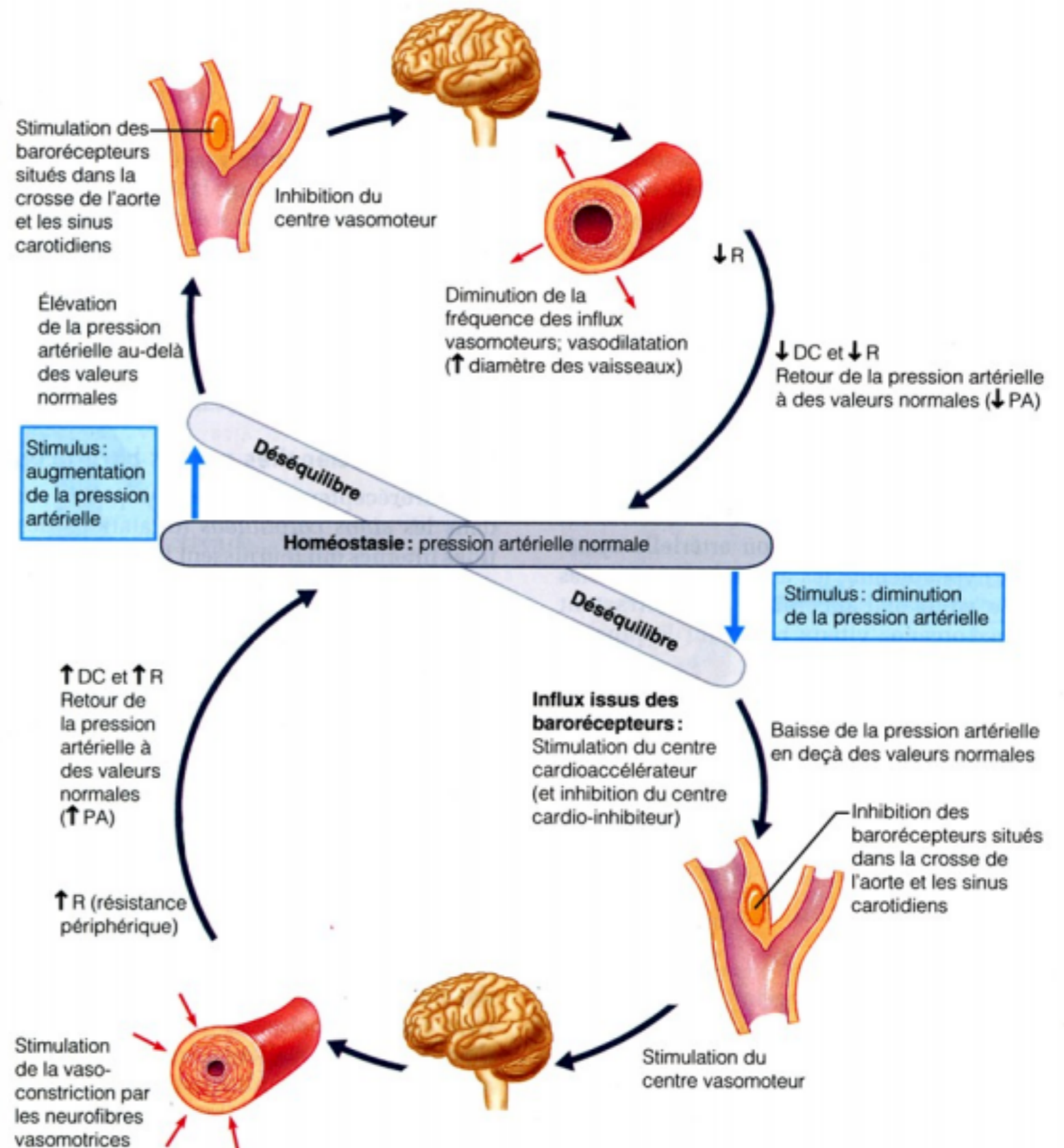
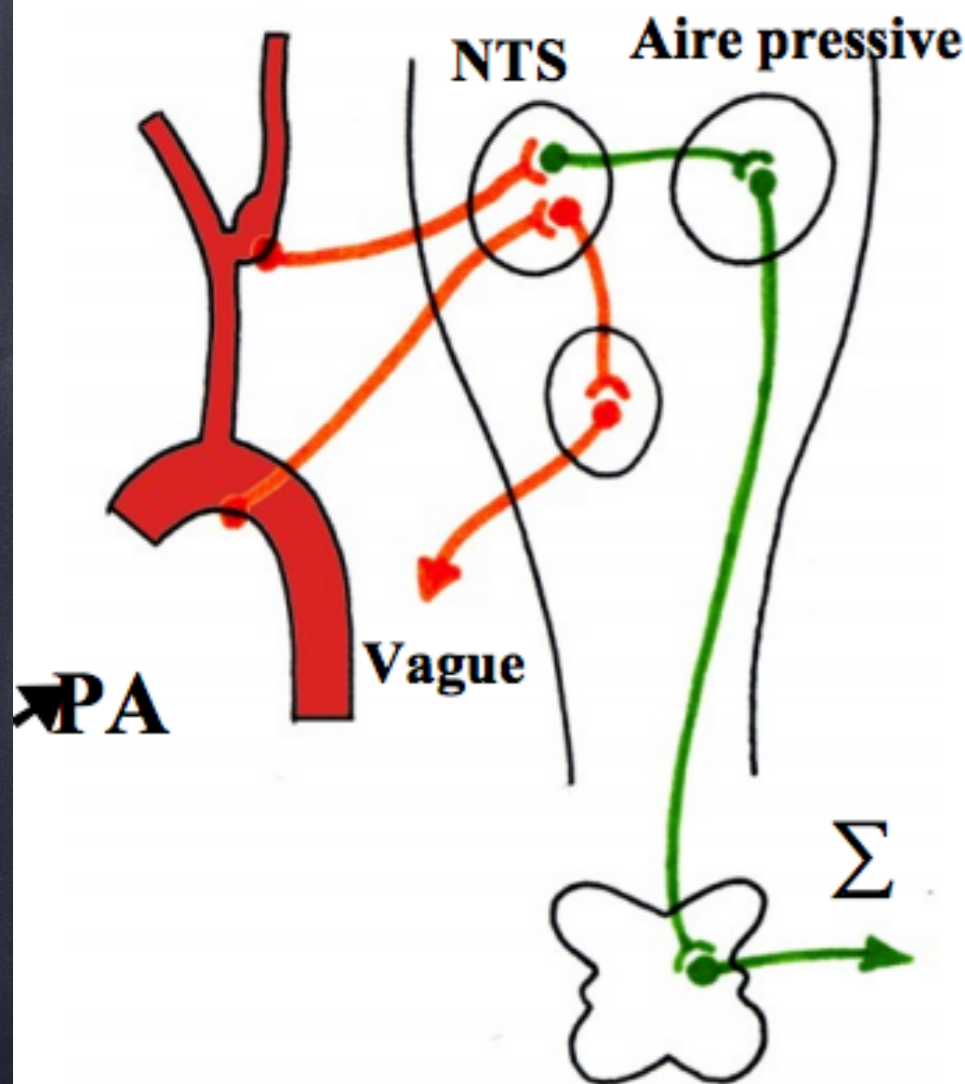
Consumption  $O_2$



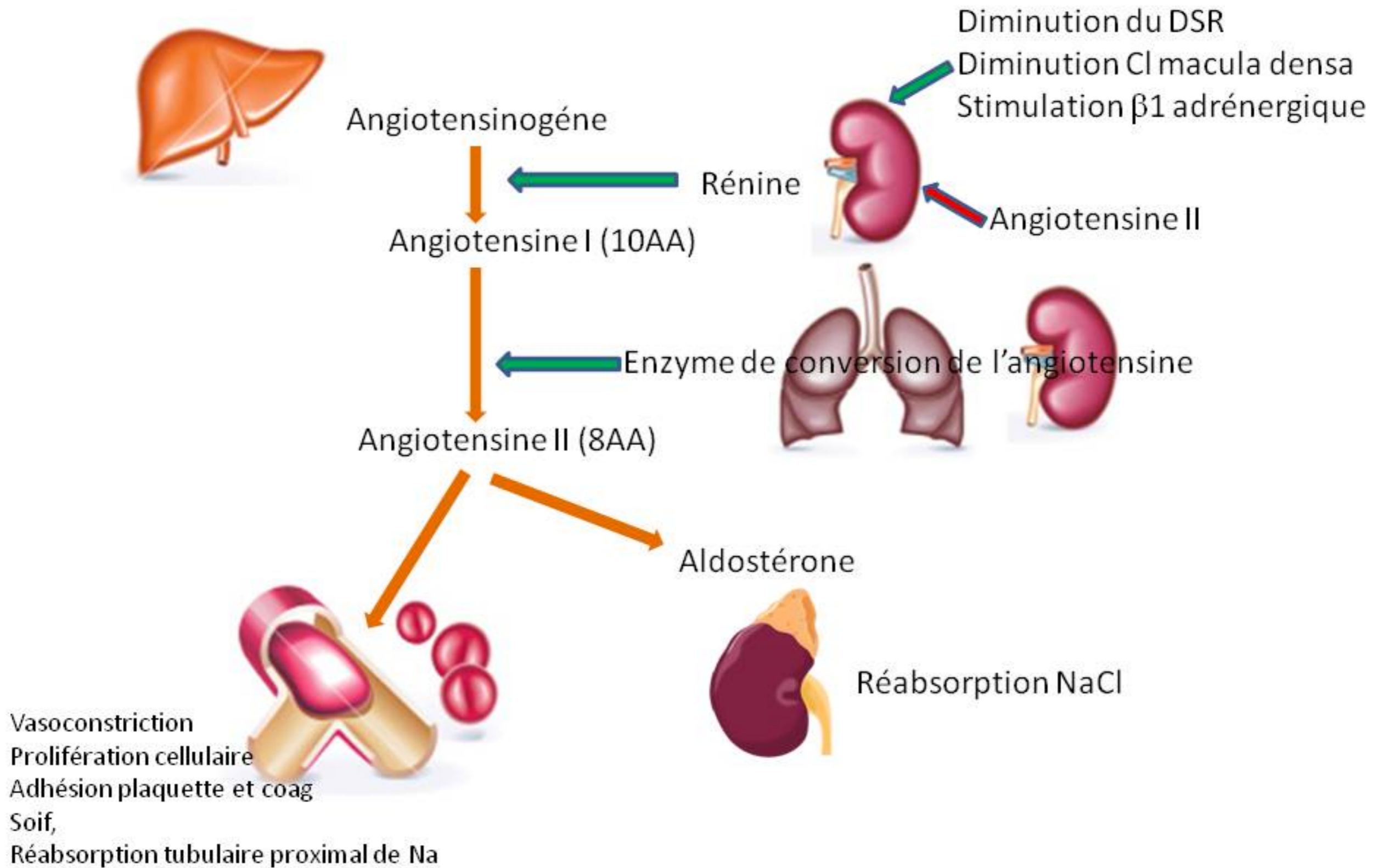
# Régulation



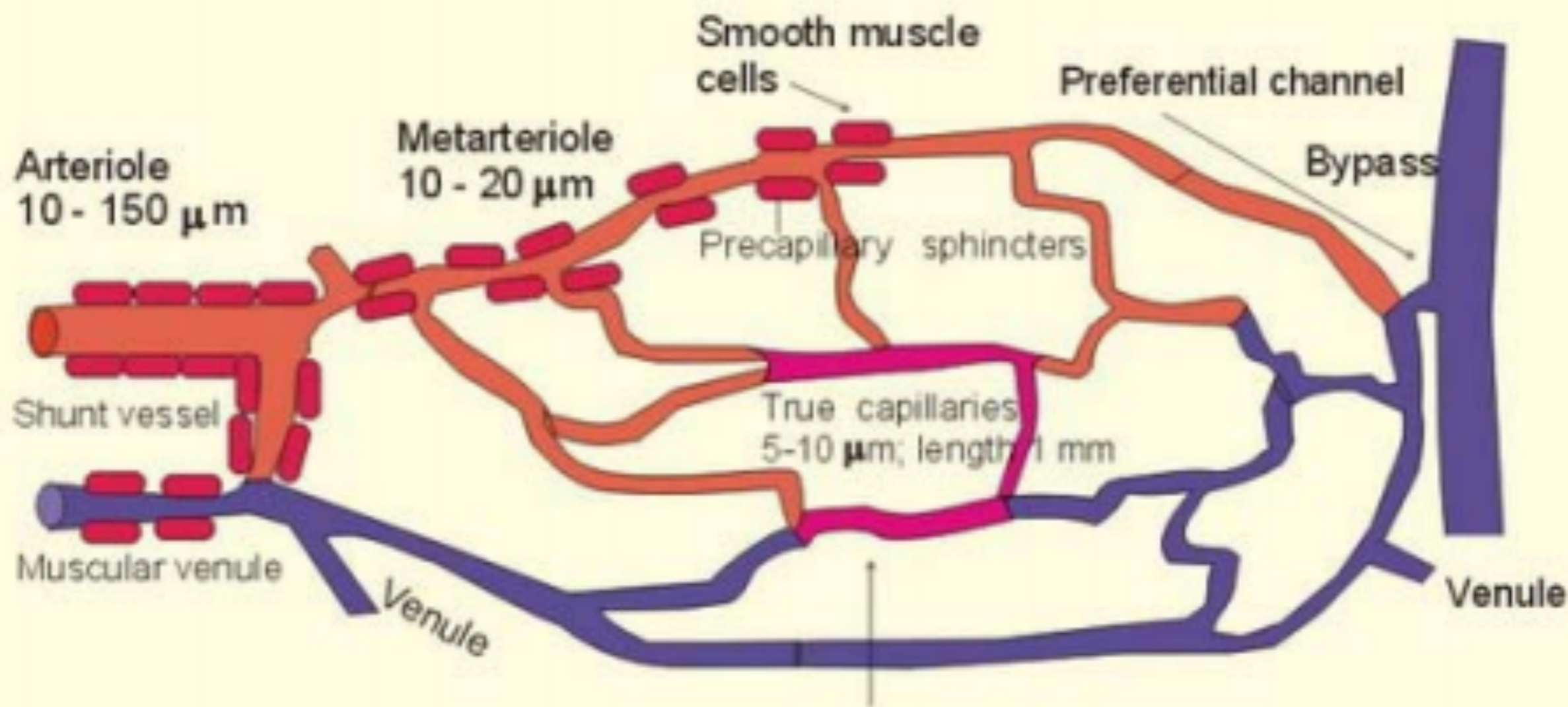
# Le baroréflexe : système de maintien de la pression artérielle à des valeurs normales.



# Le SRAA



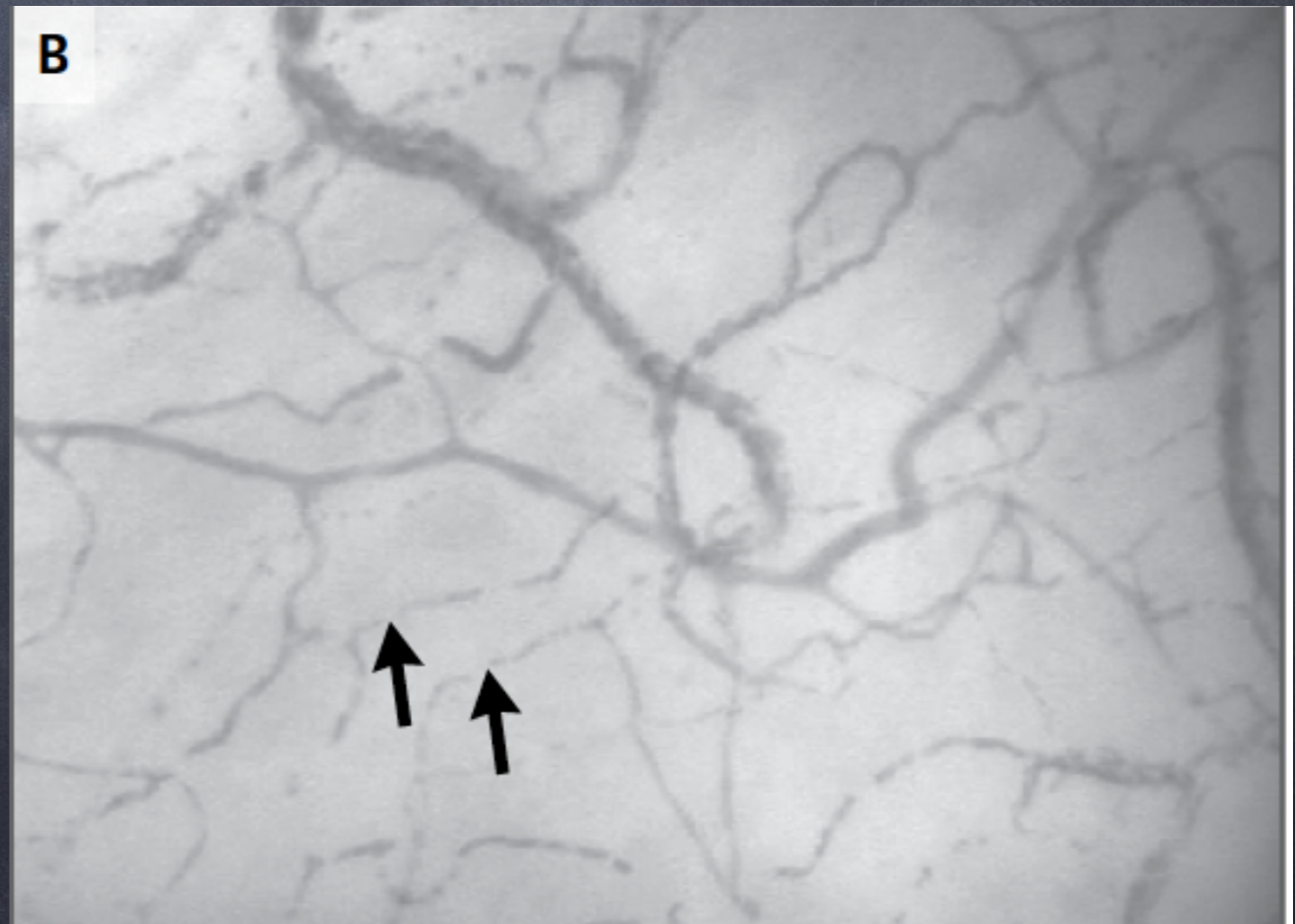
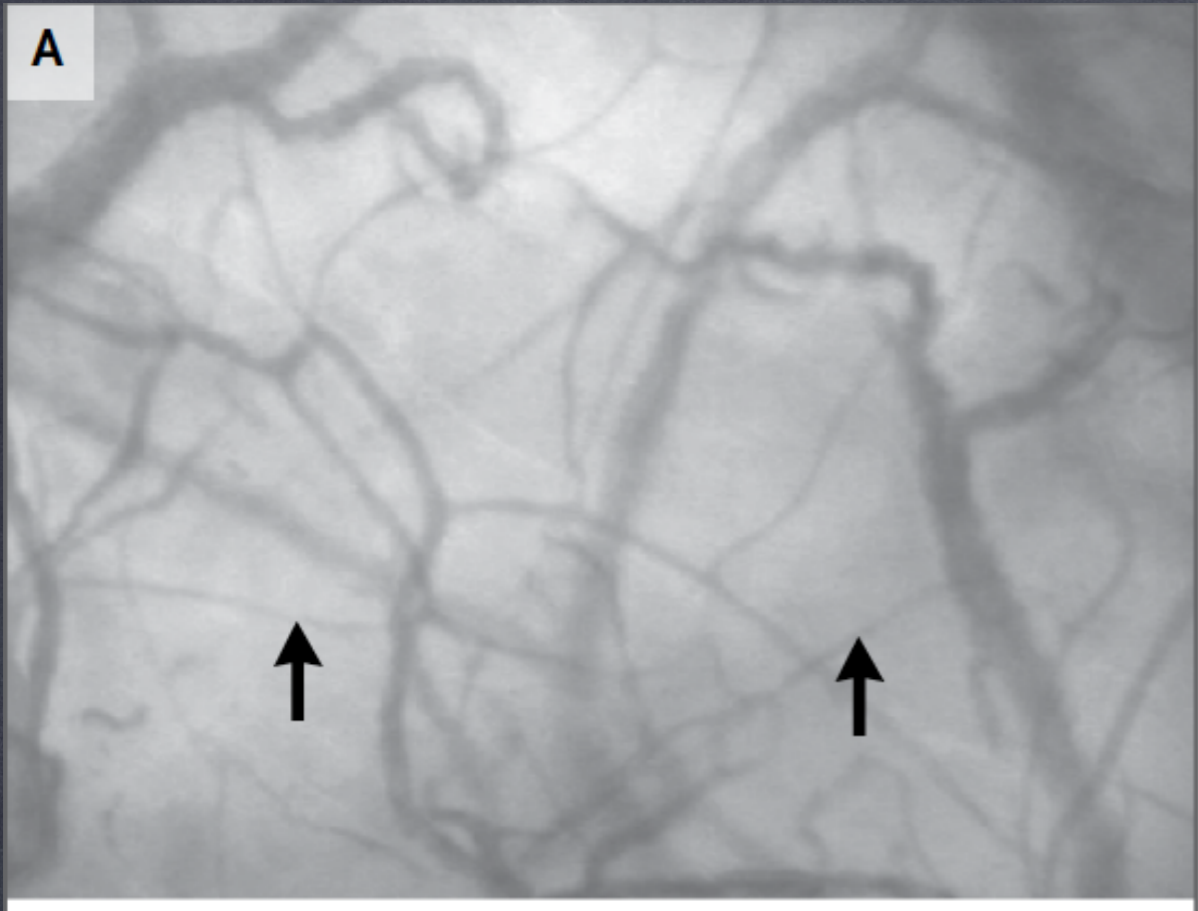
## Microcirculatory Unit

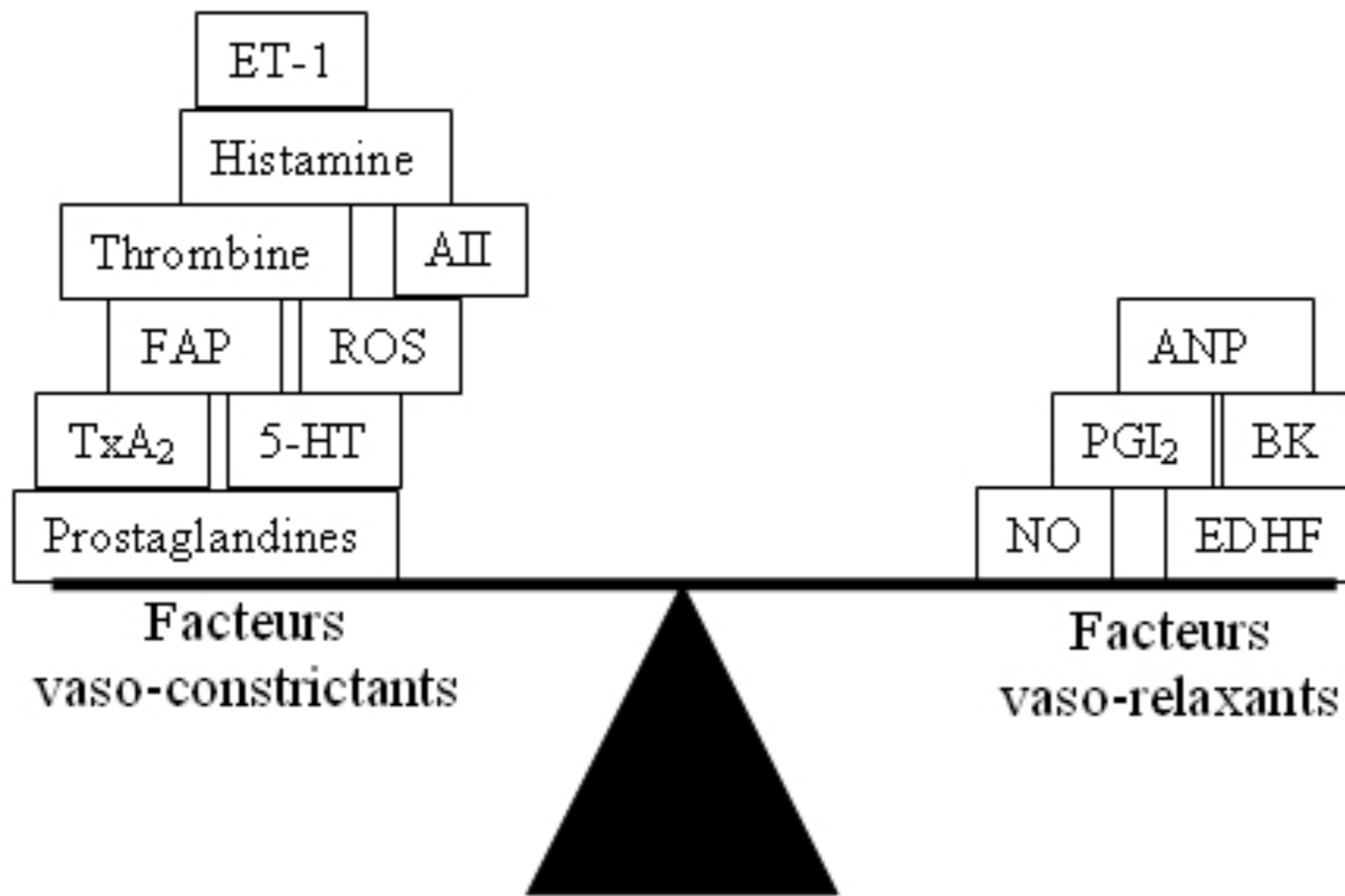


Capillaries pass substances in both directions  
Capillary velocity:  $1 \text{ mm s}^{-1}$   
Capillary intermittence  
Chaotic movement of red cells and pulsation

Fig.8-10







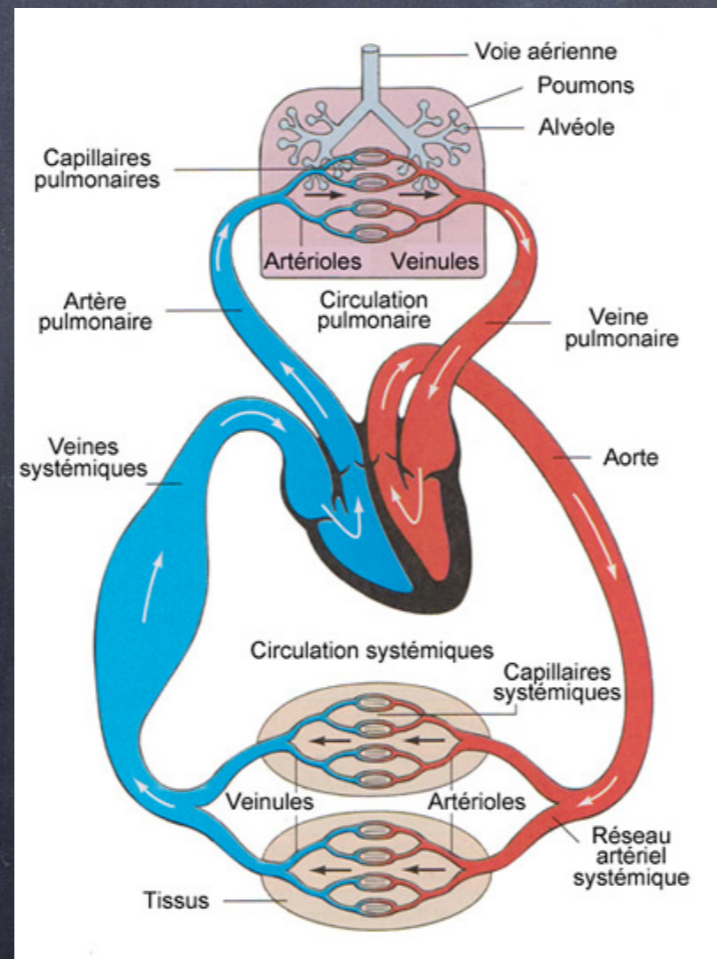
# choc

- insuffisance circulatoire conduisant à l'hypoxie cellulaire puis à la mort cellulaire
- hypotension (relative)
- hypoperfusion tissulaire
- Hyperlactacidémie

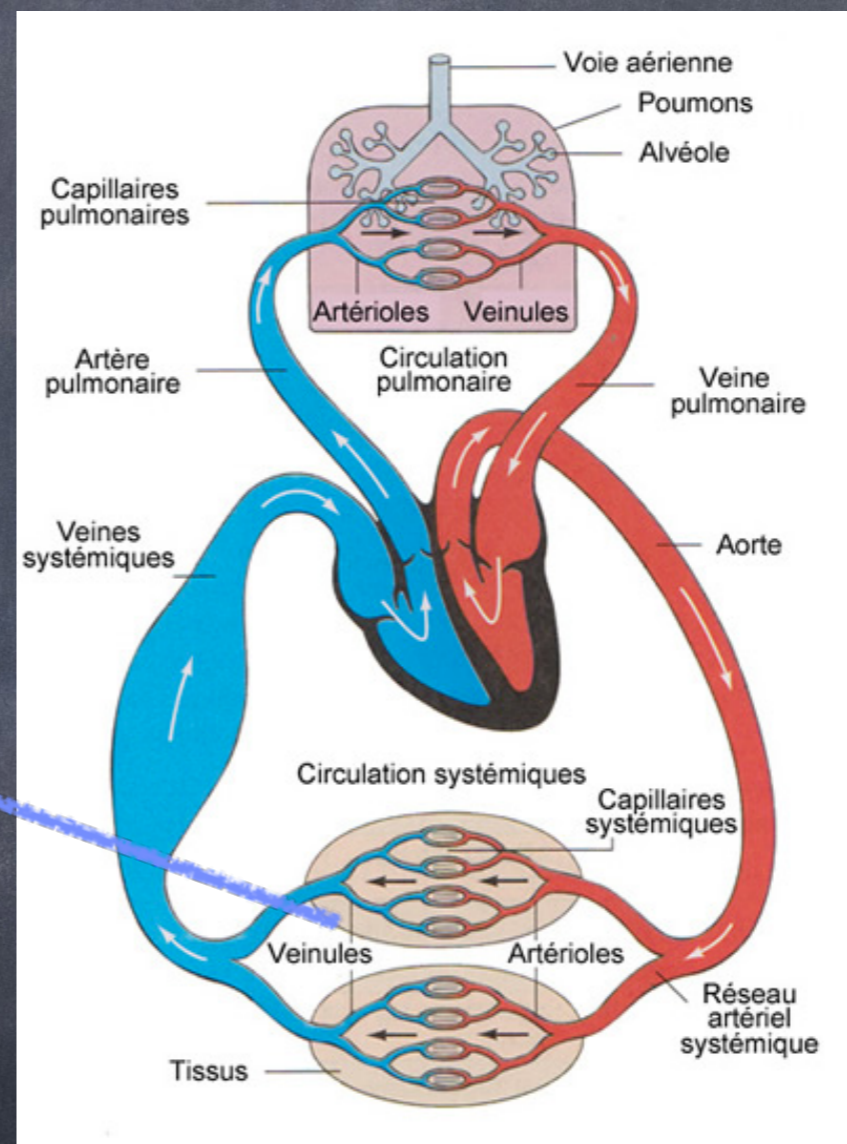
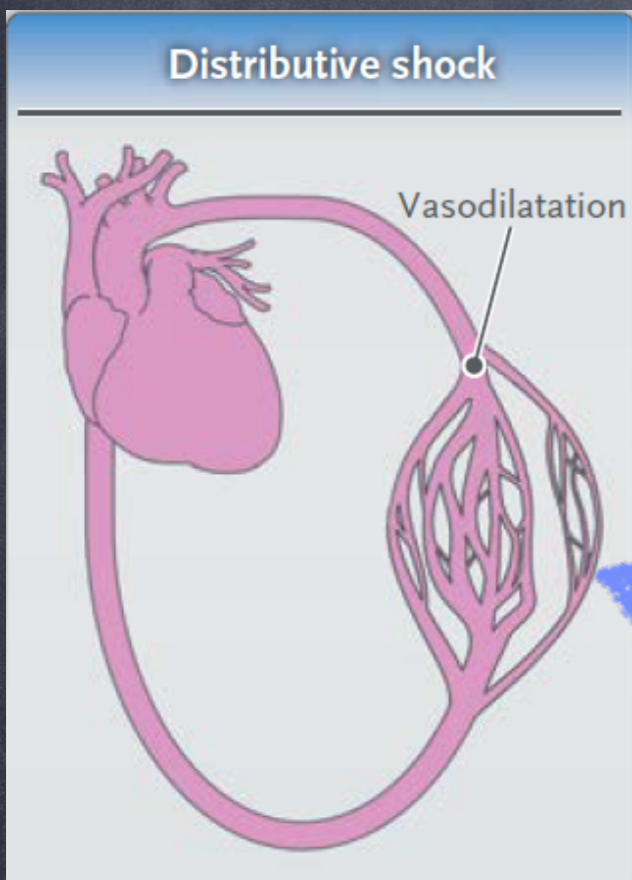


# chocs

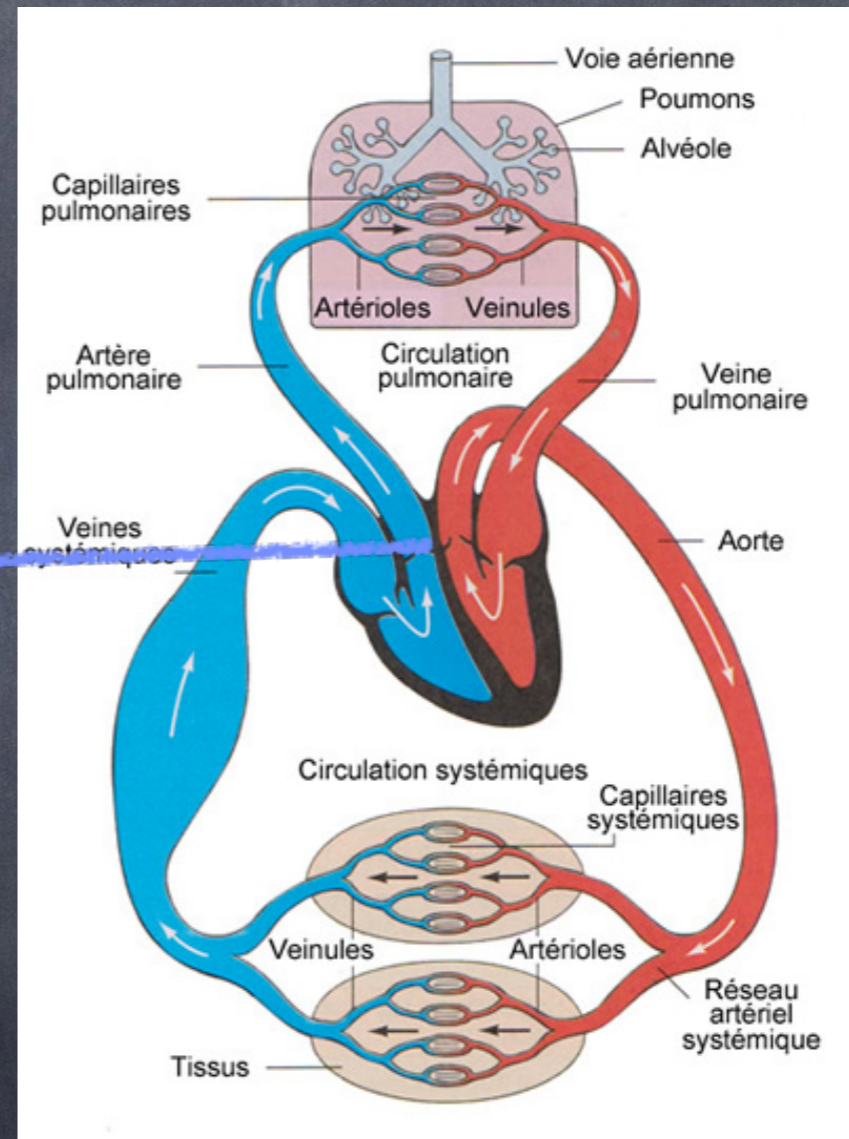
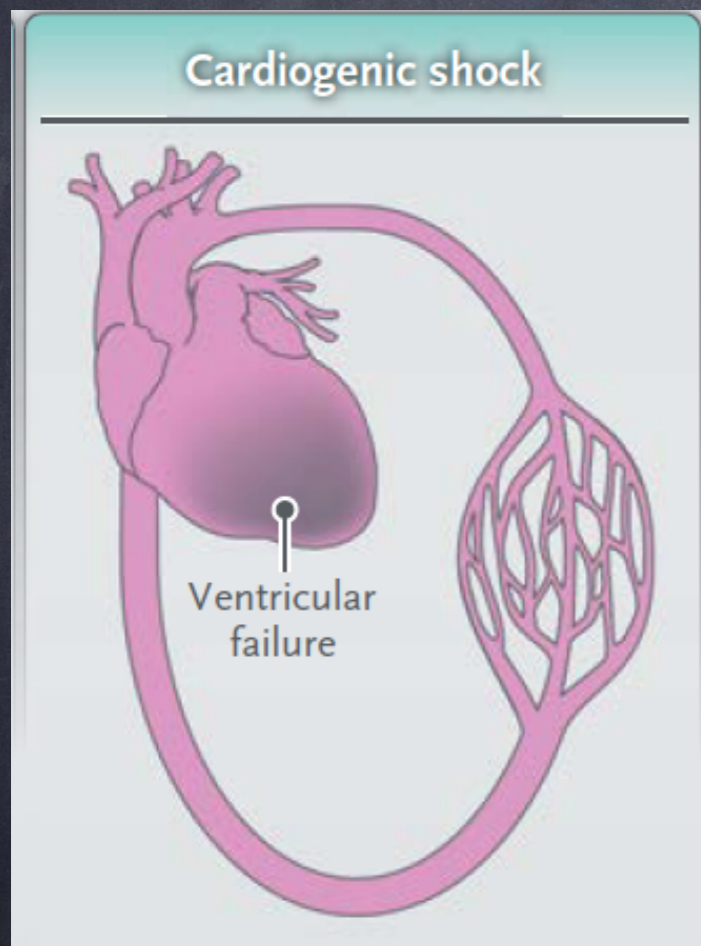
- Pathologie de soins intensifs (urgence)
- classification physiopathologique



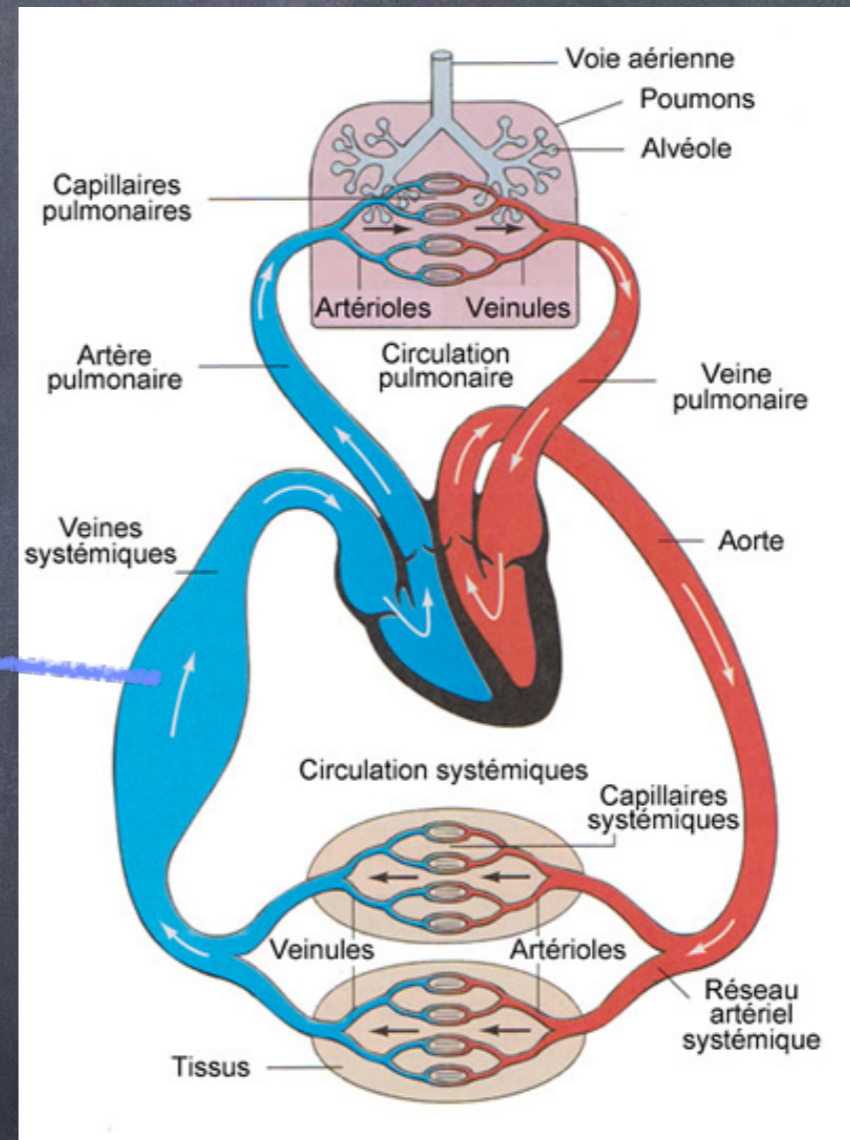
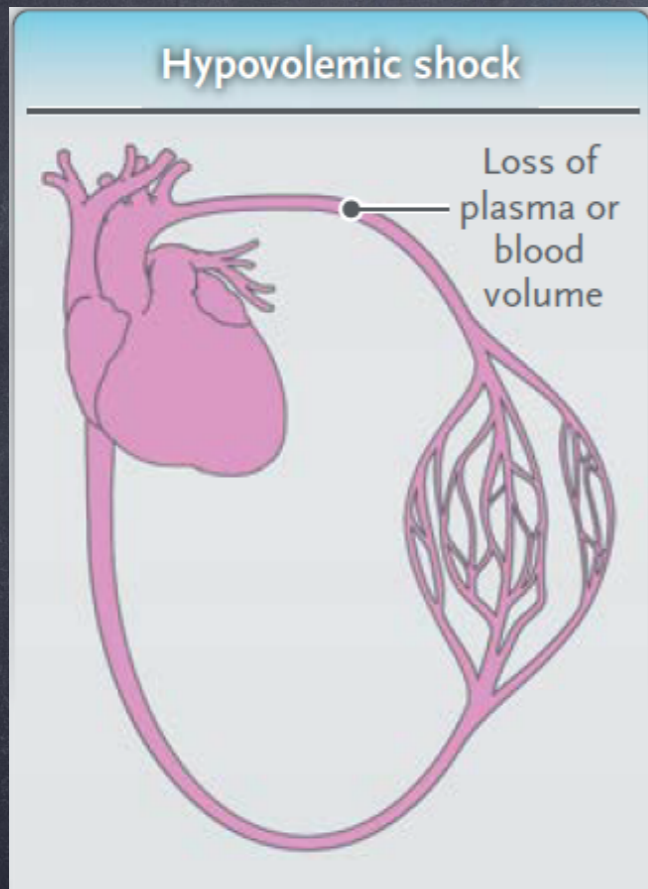
# chocs



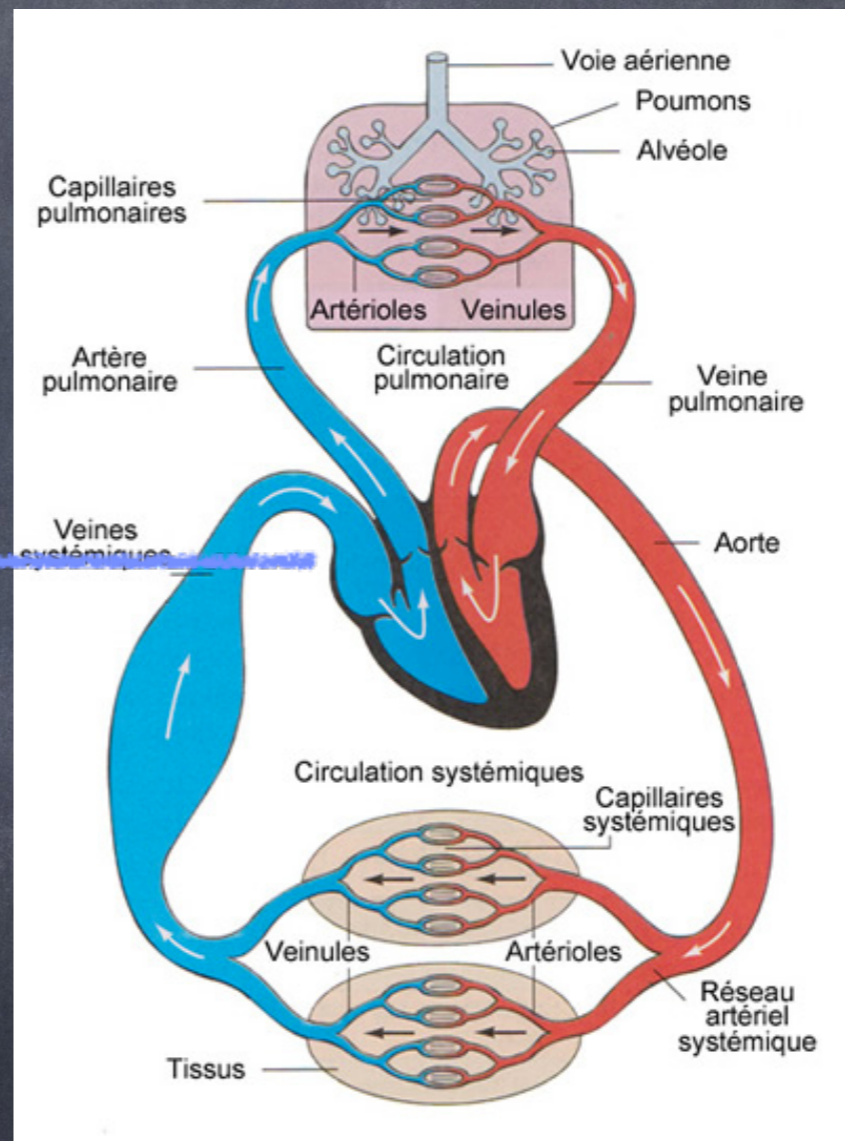
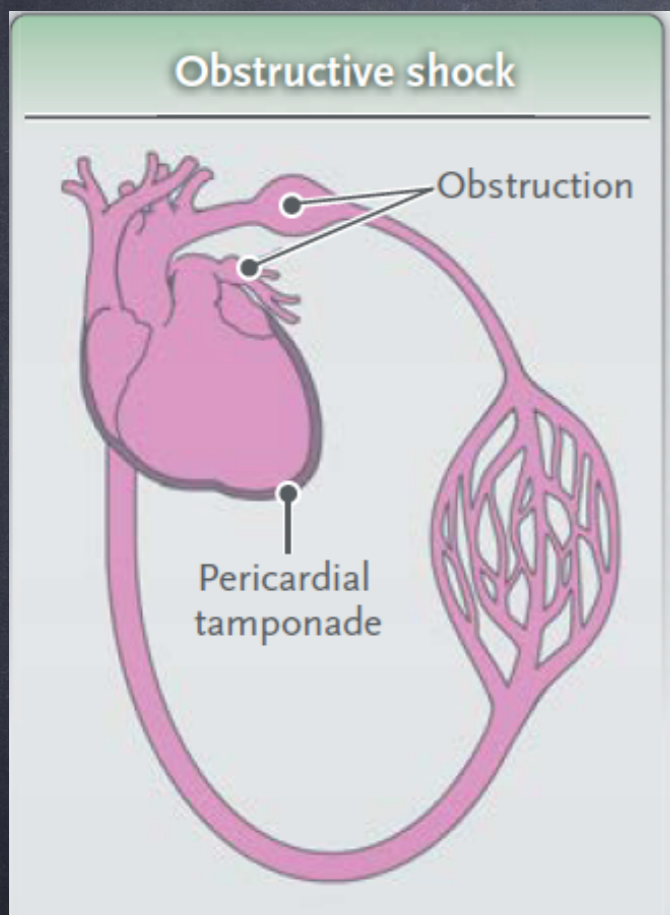
# chocs



# chocs

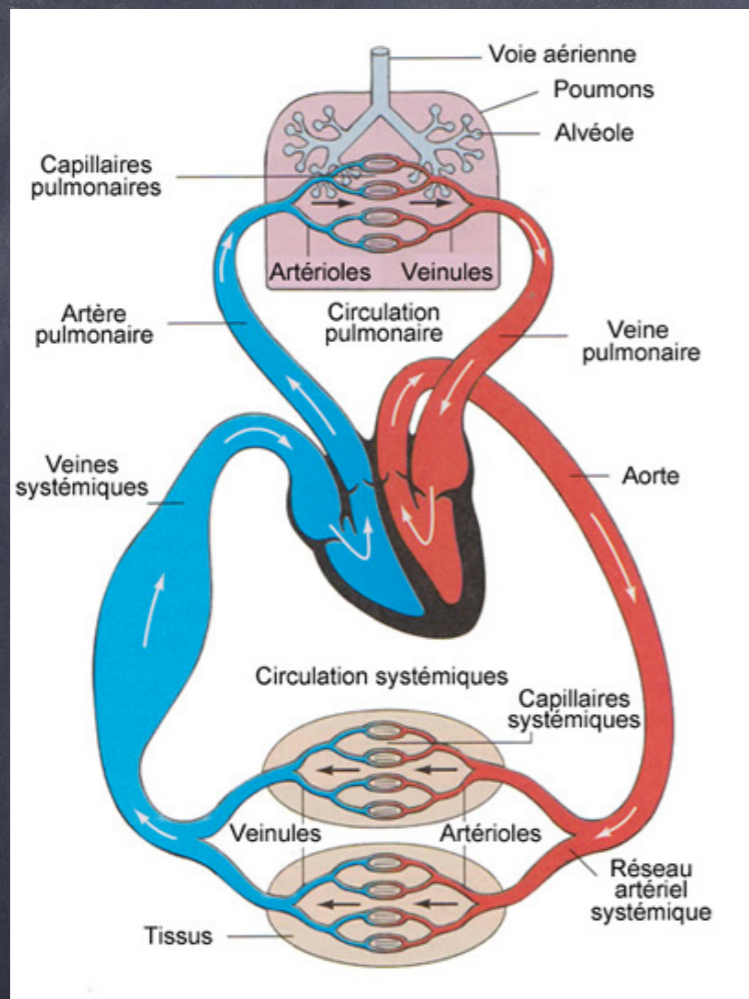


# chocs

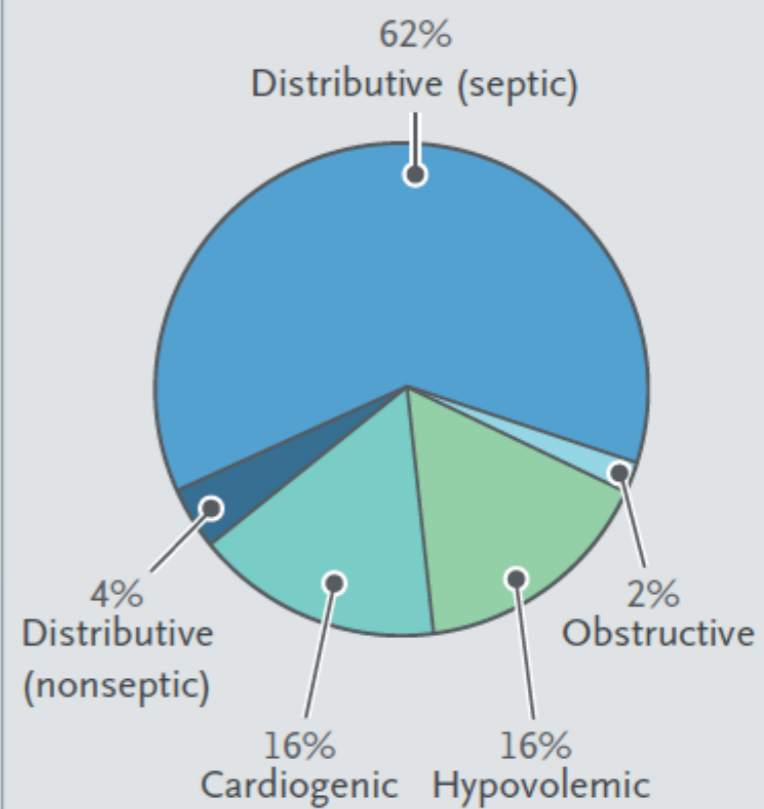




# chocs

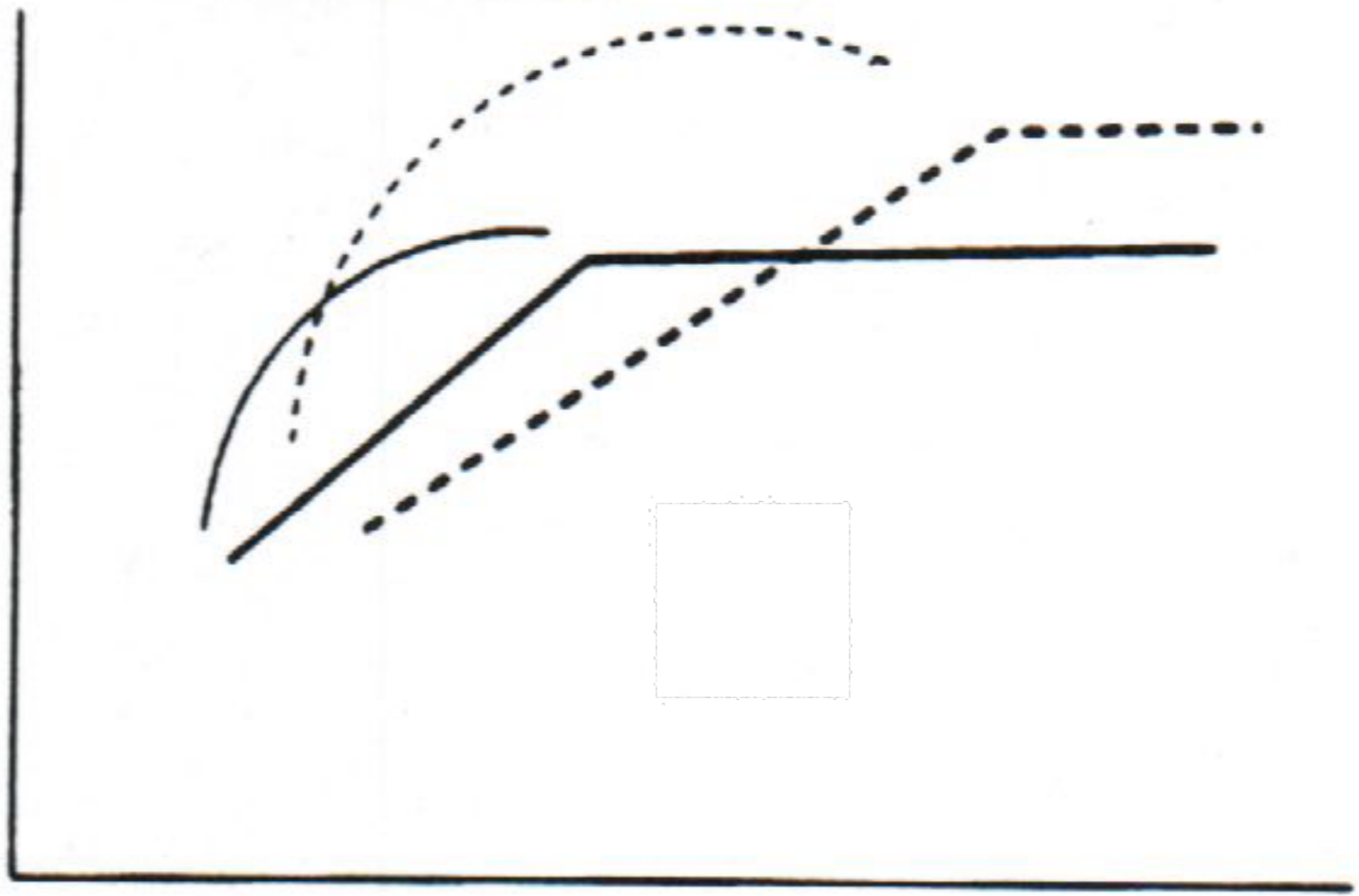


## B Types of shock



D DeBacker N Engl J Med 2010;362:779-89.

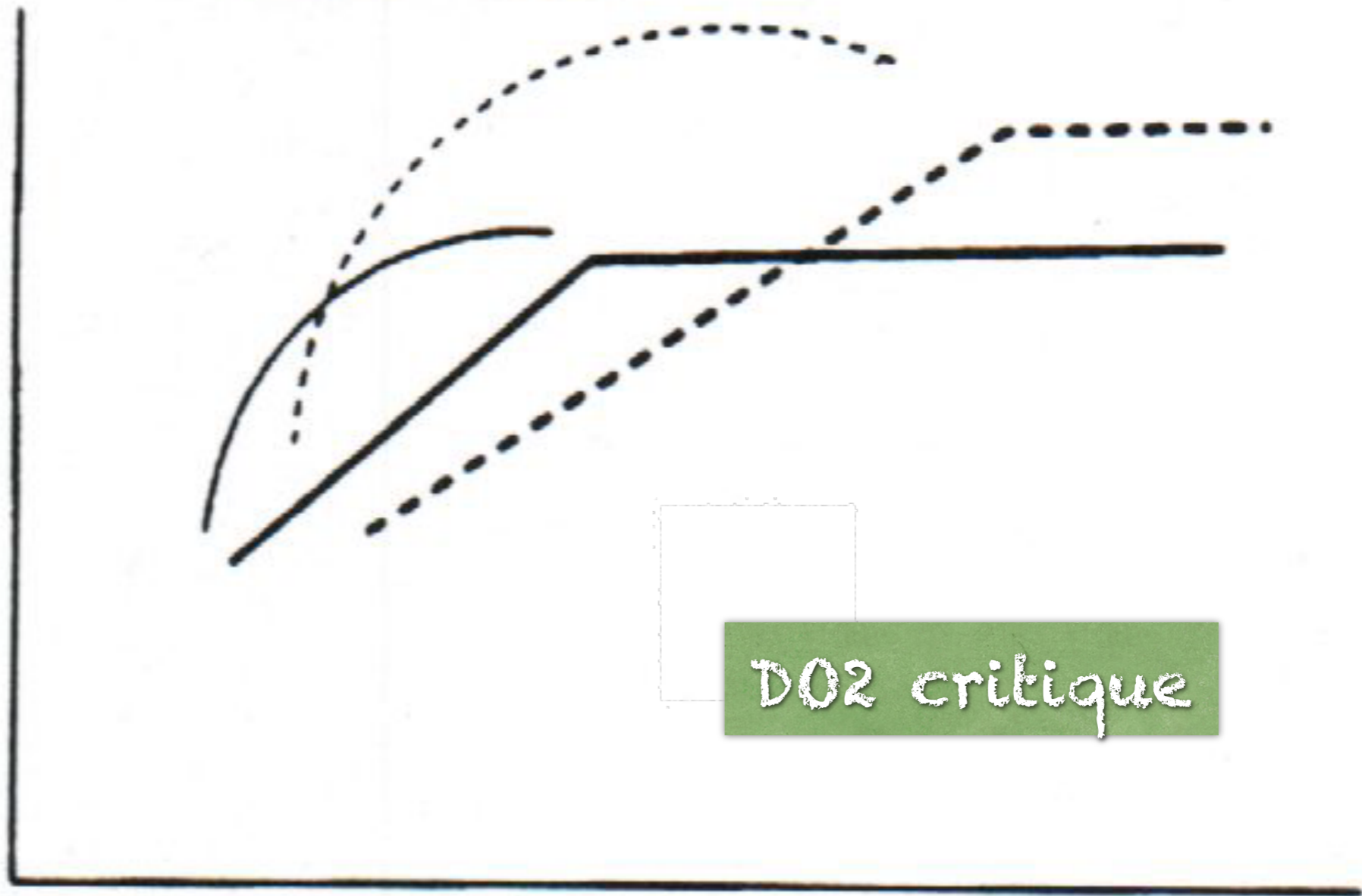
**OXYGEN UPTAKE ( $\dot{V}O_2$ )**



**OXYGEN DELIVERY ( $DO_2$ )**

HIGH BLOOD LACTATE  
LOW GASTRIC MUCOSAL pH  
HIGH VA PCO<sub>2</sub>

OXYGEN UPTAKE (VO<sub>2</sub>)

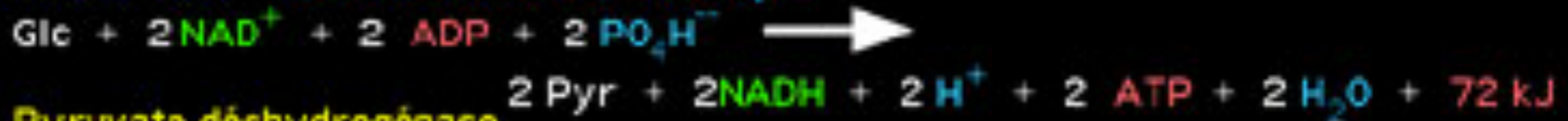


DO<sub>2</sub> critique

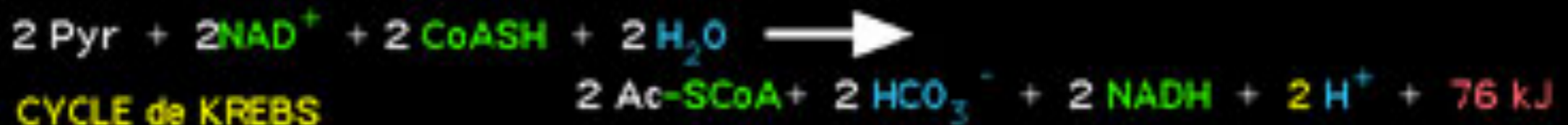
OXYGEN DELIVERY (DO<sub>2</sub>)

# Glycolyse aérobie

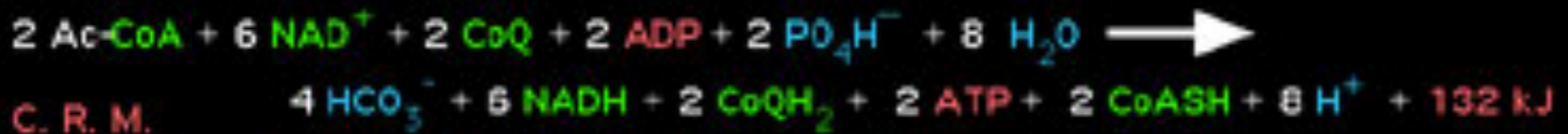
Hexokinase + GLYCOLYSE CYTOPLASMIQUE



Pyruvate déshydrogénase



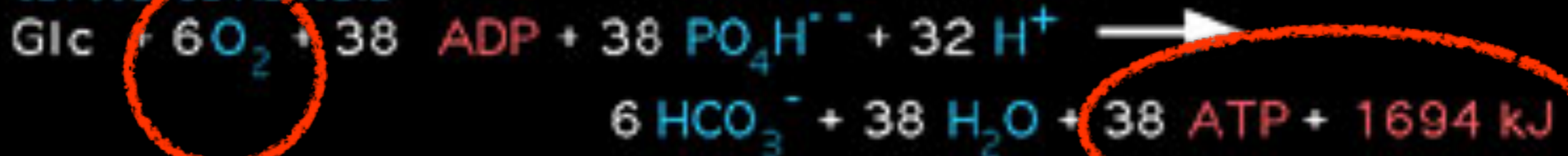
CYCLE de KREBS



C. R. M.

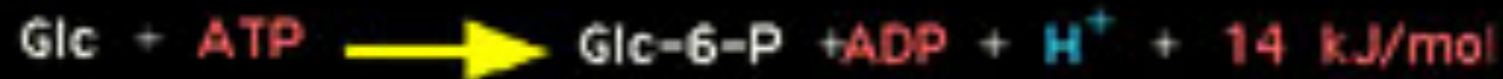


GLYCOLYSE AEROBIE

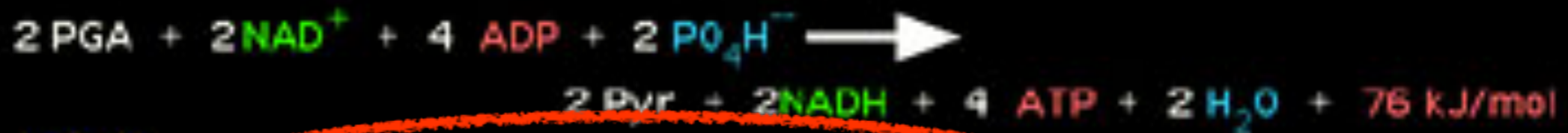
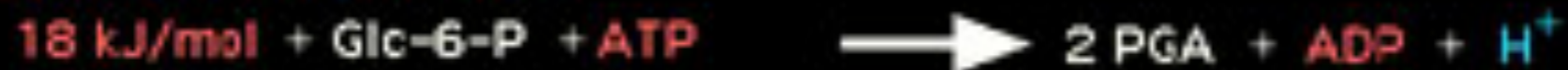


# Glycolyse anaérobie

## Hexokinase



## GLYCOLYSE CYTOPLASMIQUE



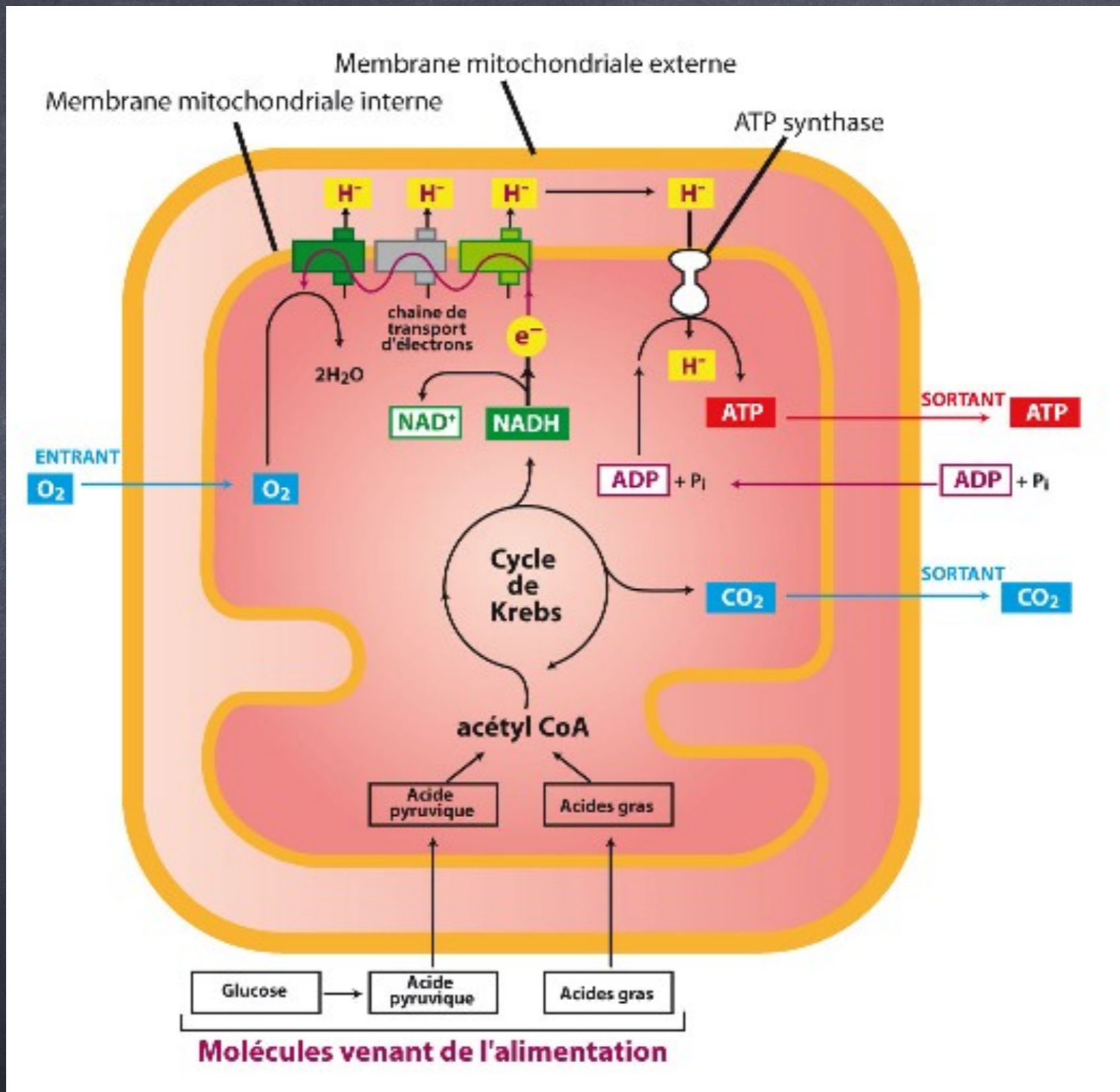
## L. D. H.



---

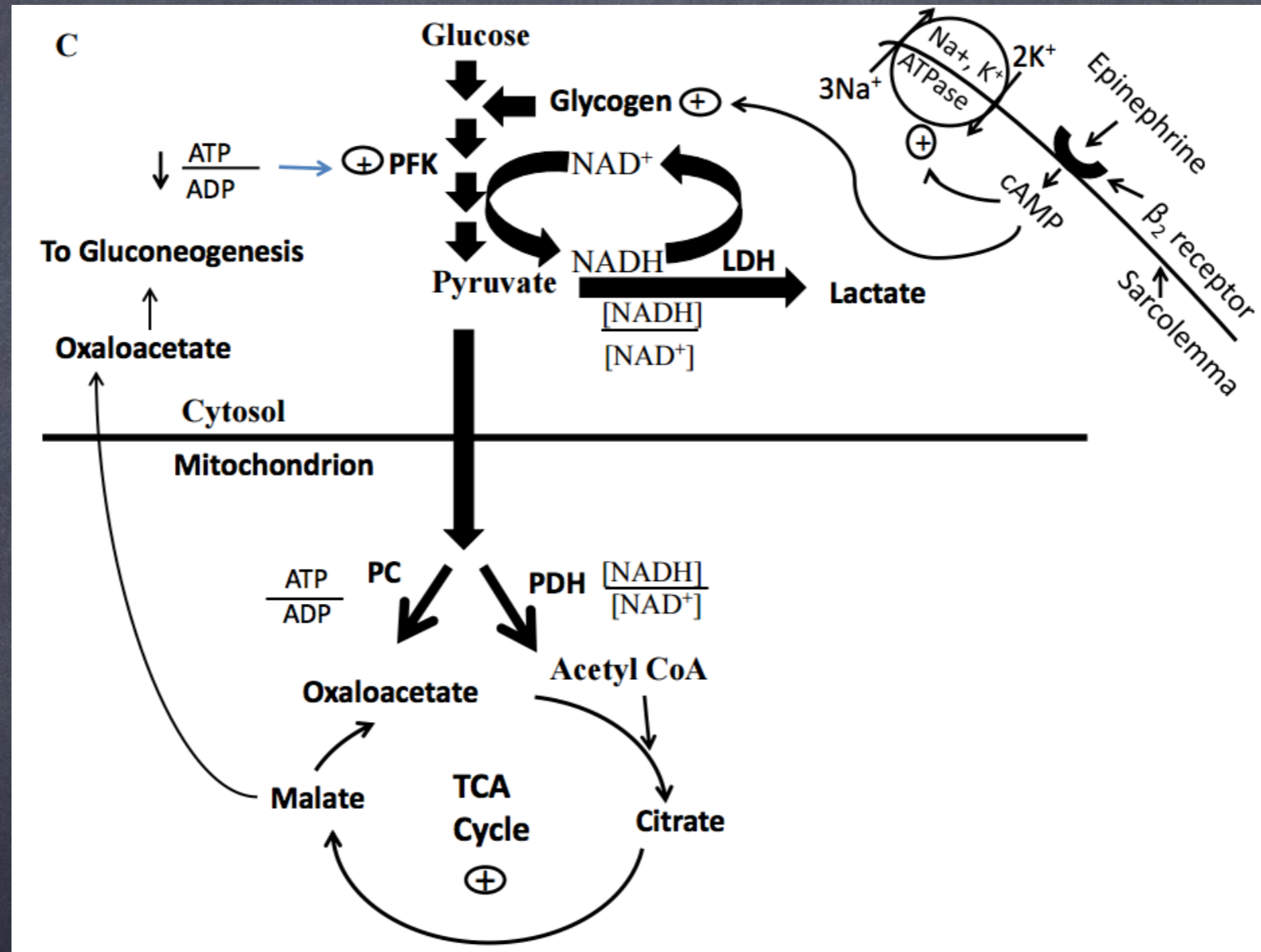
## GLYCOLYSE ANAEROBIE





N Engl J Med 2014;371:2309-19.

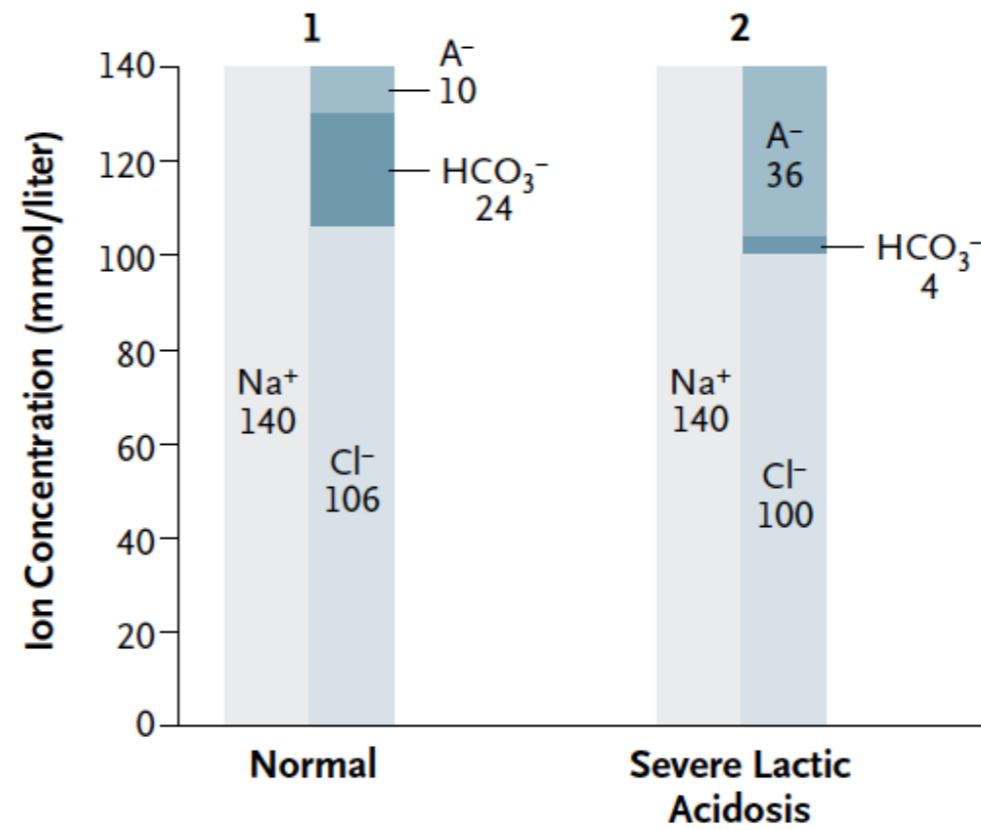
# Autres voies de production Lactate



# Autres voies de production Lactate

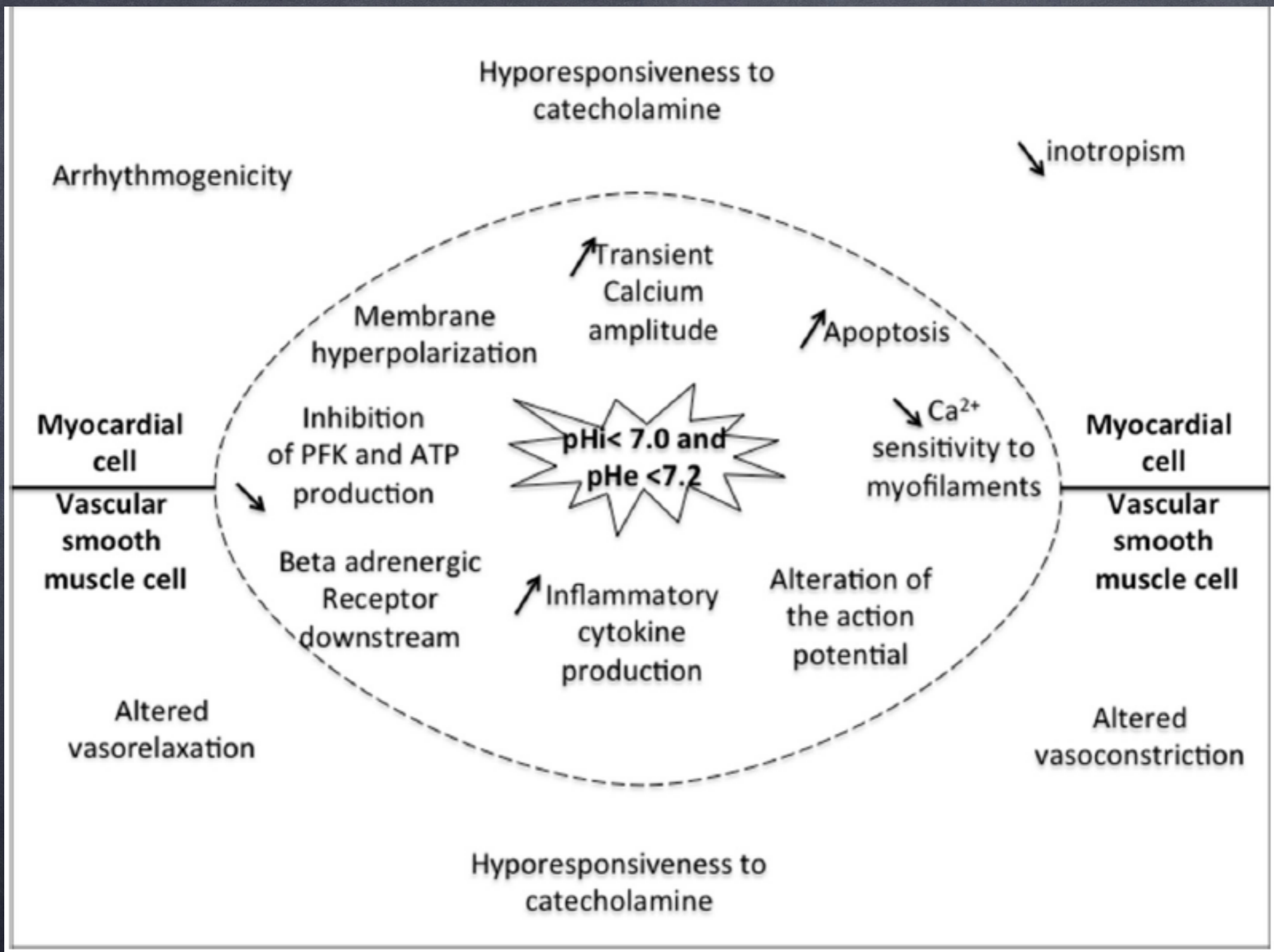
- inhibition phosphorylation oxydatives
- anti retroviral, diprivan, CN-, methanol..
- Alcalémie ( stimulation 6 phosphofrucokinase)
- cytokines
- réduction élimination ( insuffisance hépatique)





Paco <sub>2</sub> (mm Hg)	40	15
pH	7.40	7.05
Lactate (mmol/liter)	1	18

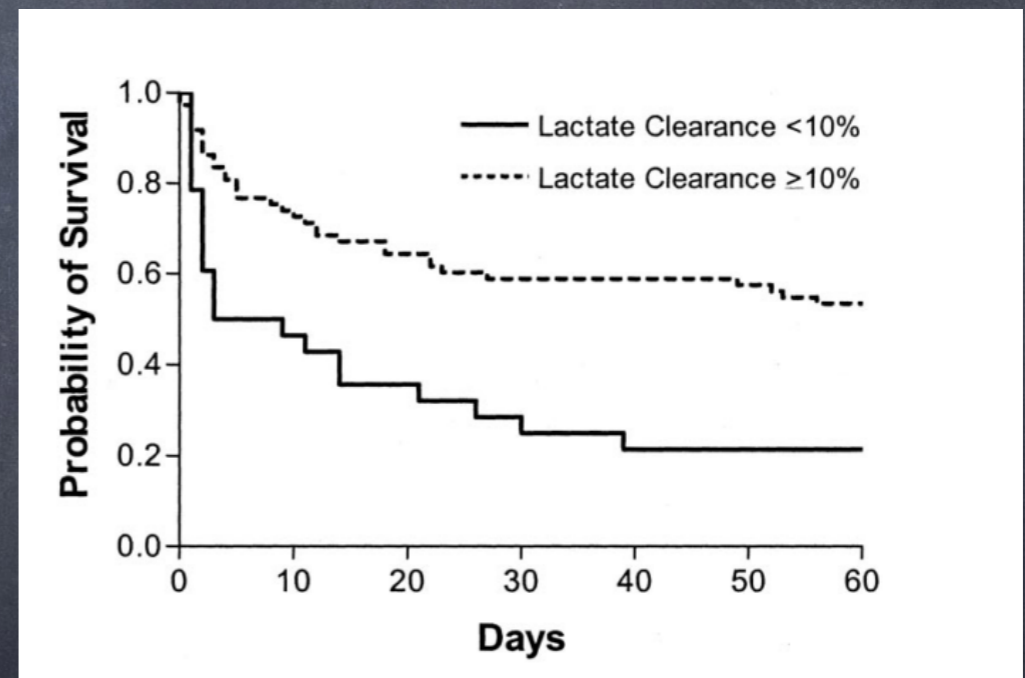
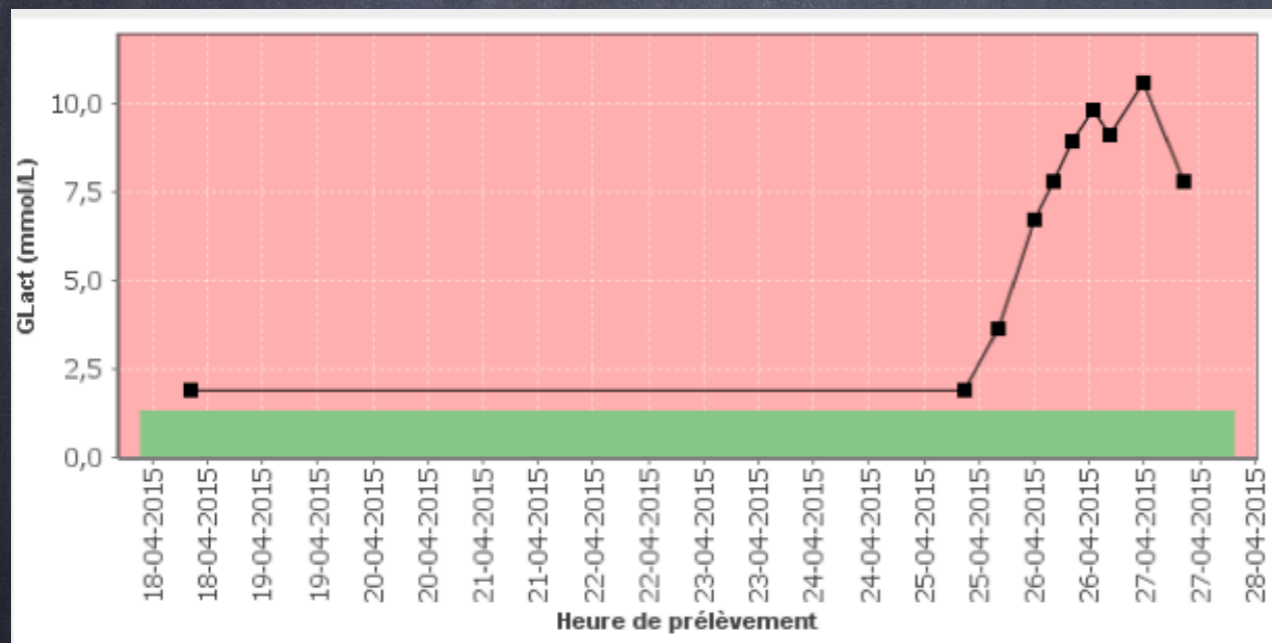
- toxicité lactate ?



As presented above, alkalization with base does  
not  
necessarily result in improved cellular or  
hemodynamic  
functions and survival rate

# Monitoring du Lactate

- suivi du patient (clearance)



Crit Care Med 2004; 32:1637-1642)

# choc: diagnostic

- hypotension (relative) → KE A
- hypoperfusion tissulaire
  - marbrure ( vasodilatation)
  - oligurie
  - troubles neurologiques
  - ....
- Hyperlactacidémie

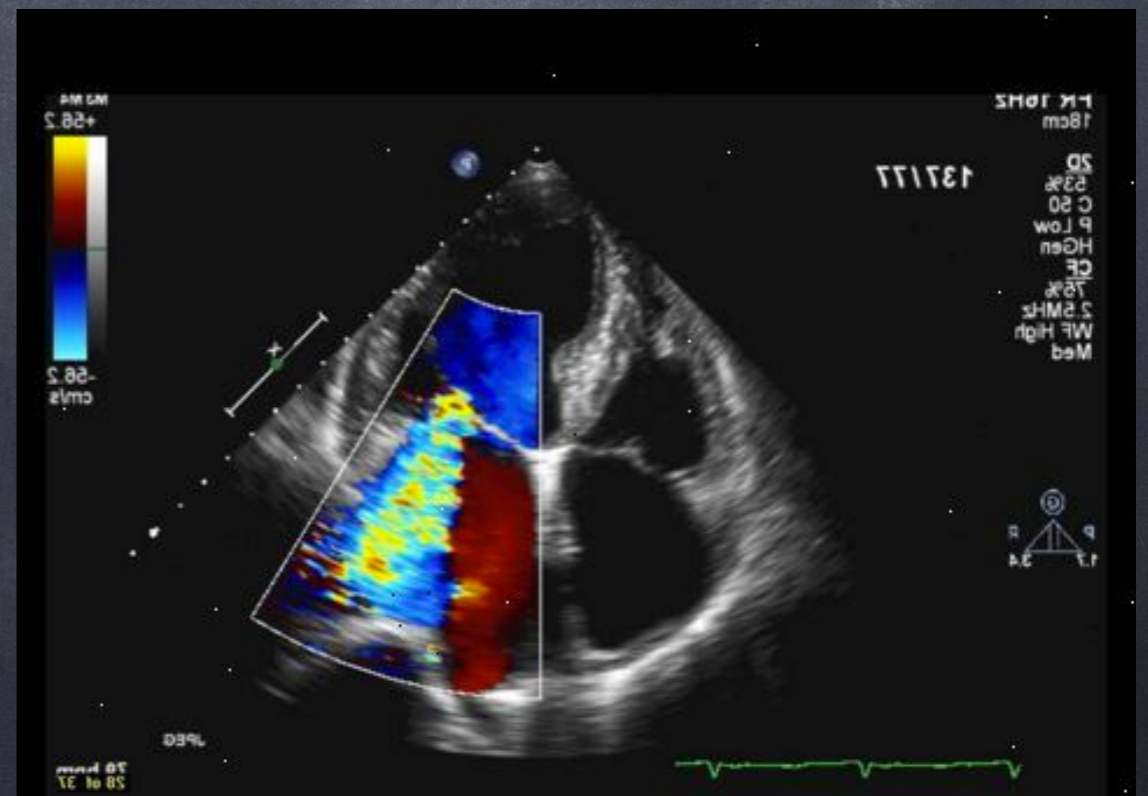
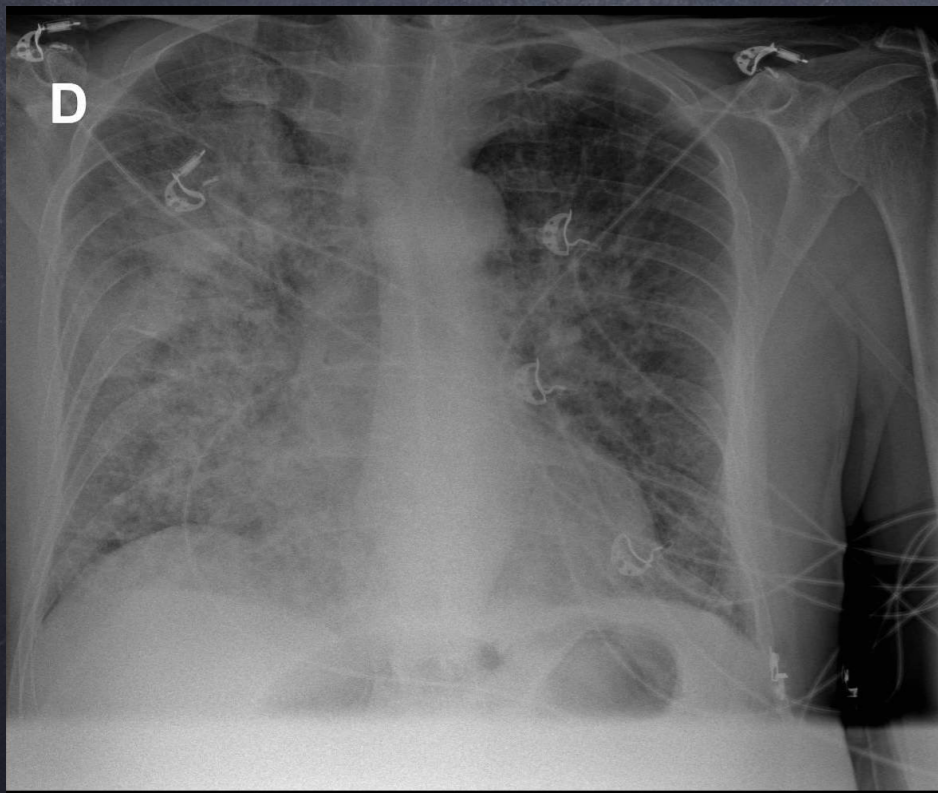


# choc: diagnostic

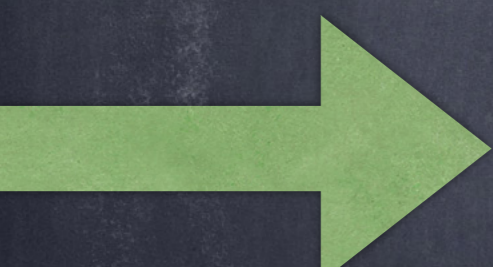
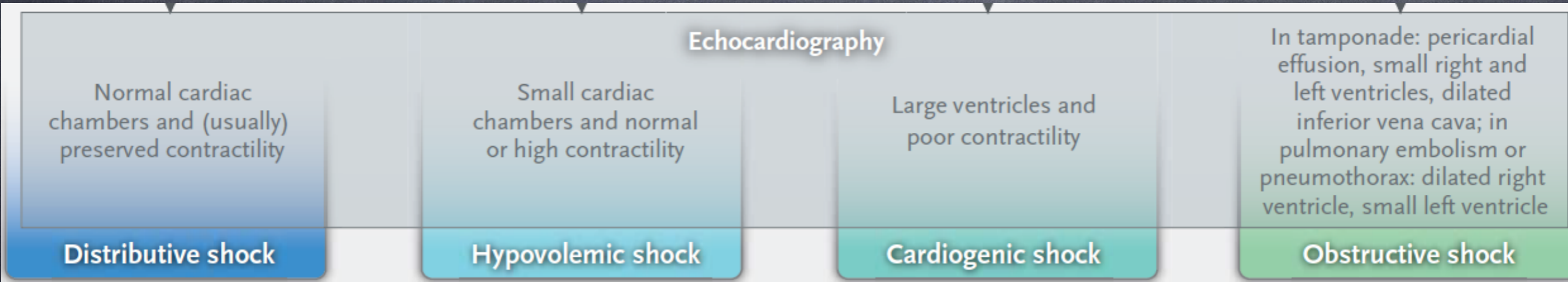


# Petite histoire

- H 70 ans
- détresse respiratoire et choc SU
- Volume, AB, ventilation Levo



# choc: diagnostic



Compétence de tout intensiviste

**CoBaTrICE**

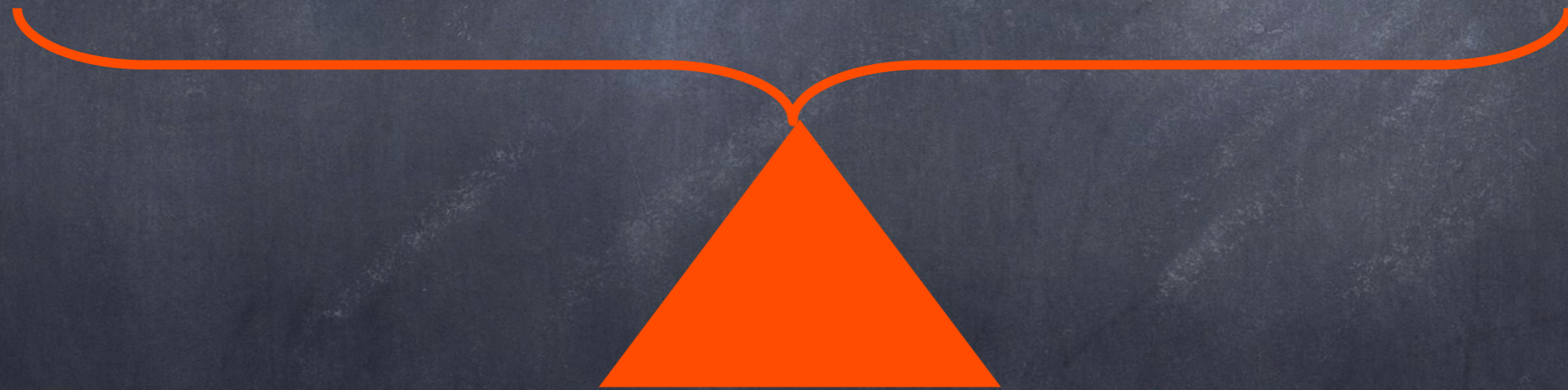
Competency Based Training in Intensive Care Medicine in Europe



# choc: approche thérapeutique

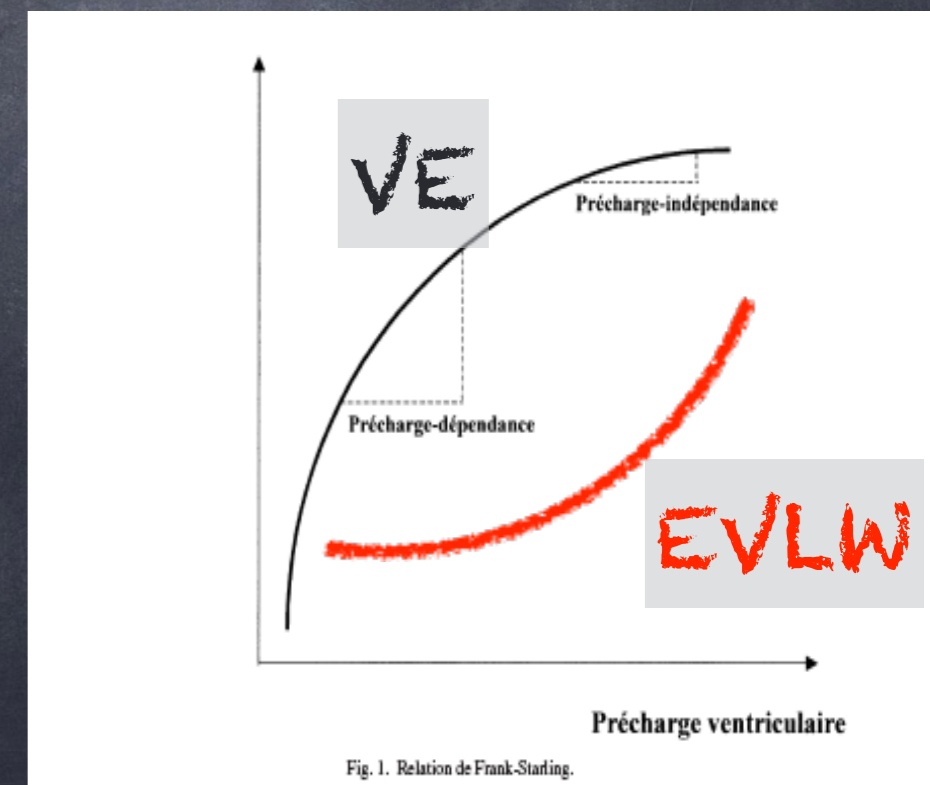
Transport  $O_2$

Consommation  $O_2$



# choc: approche thérapeutique

- Mesure précoce (peu spécifiques)
  - Ventilation
  - Remplissage vasculaire
    - fluid challenge (PLR)
    - cristalloïdes
  - objectifs: relation de Frank-Starling
- Vasopresseurs
  - noradrénaline (dérivés vasopressine ?)
- Inotropes
  - dobutamine



# choc: approche thérapeutique

- Traitement de la cause !
  - Sepsis: AB, contrôle du foyer
  - cardiogénique
    - PTCA.
    - antiarythmique
    - support extracorporel
  - Obstructif : levé obstacle
  - Hypovolémique: perfusion, transfusion, contrôle source du saignement...

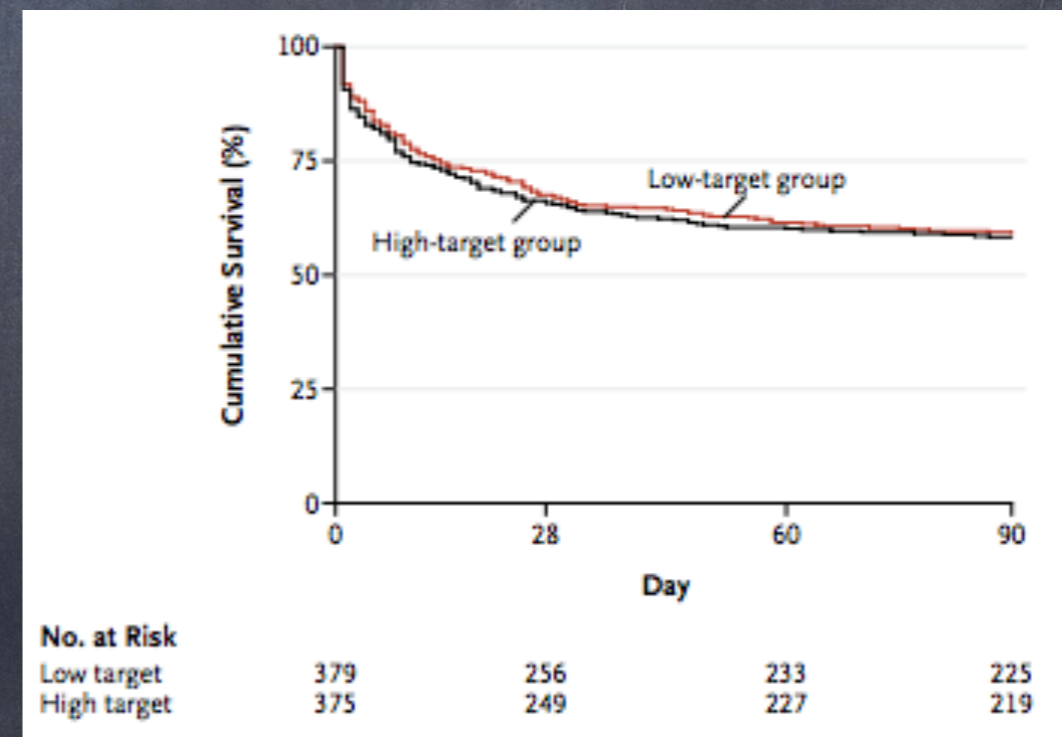


# choc: quelques controverses



# choc: quelques controverses

- Niveau de pression artérielle
  - 65-75 mmHg
  - < si saignement
  - > si HTA chronique



# choc: quelques controverses

## Interprétation débit cardiaque

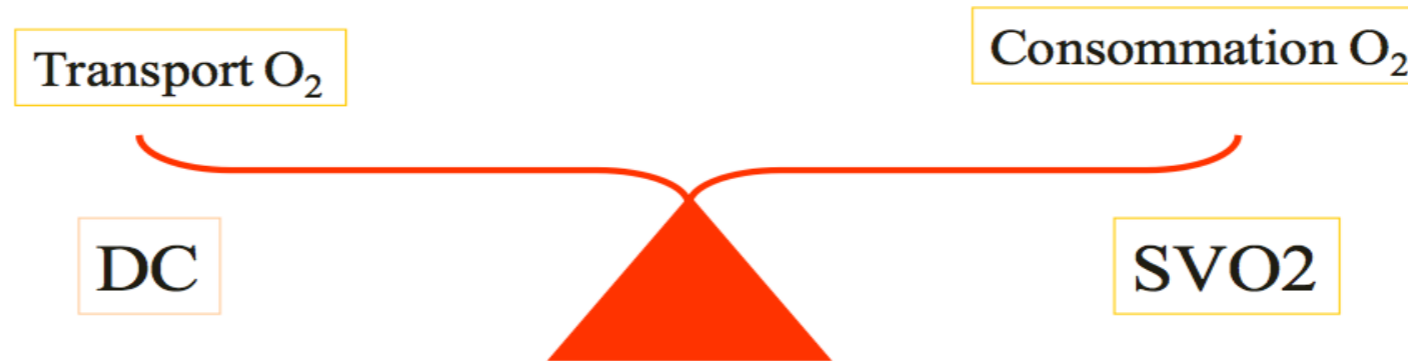
Oxygénation tissulaire

Transport  $O_2$

Consommation  $O_2$

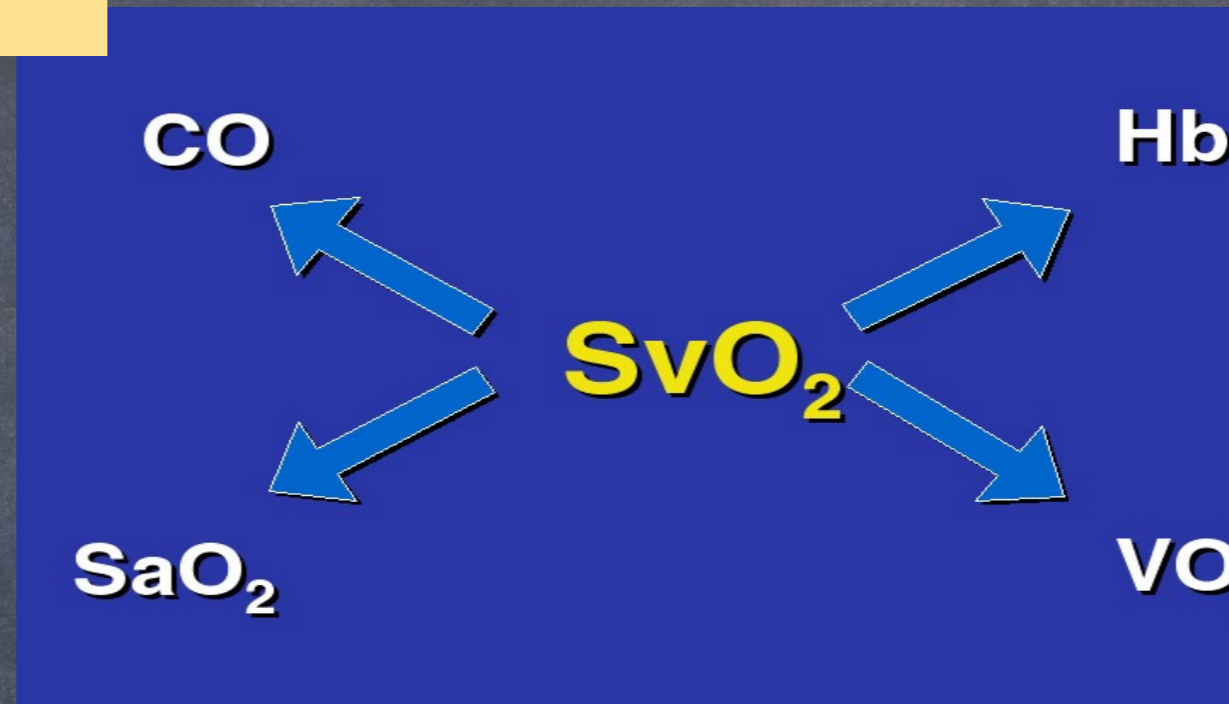
DC

SVO2



Défaillance  
cardiaque  
Hypovolémie

Anémie



hypoxémie

Augmentation  
besoin (exercice,  
fièvre,  
hyperthyroïdie.)

$$SvO_2 = \frac{SaO_2 - VO_2}{CO \times 13.9 \times Hb}$$

# choc: quelques controverses

Intensive Care Med (2014) 40:1795–1815  
DOI 10.1007/s00134-014-3525-z

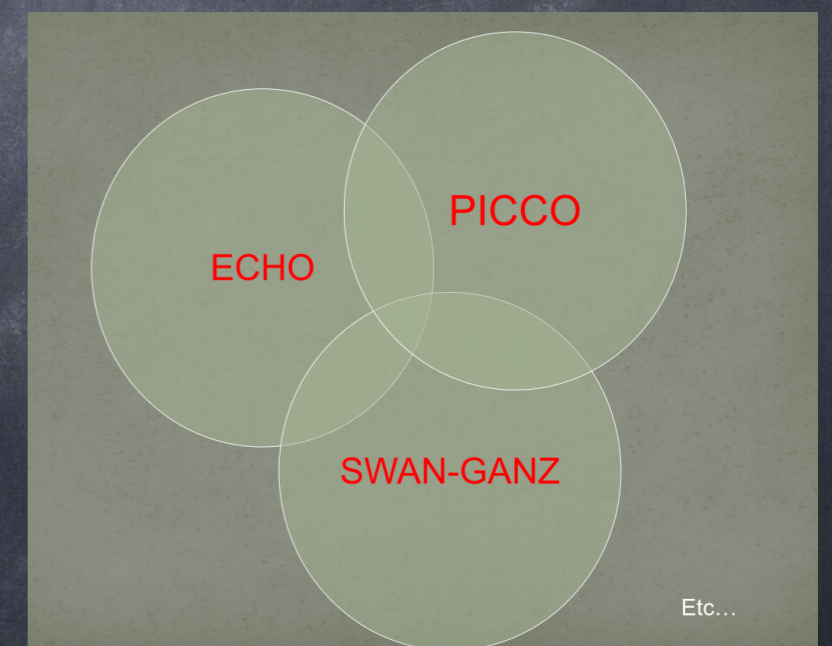
CONFERENCE REPORTS AND EXPERT PANEL

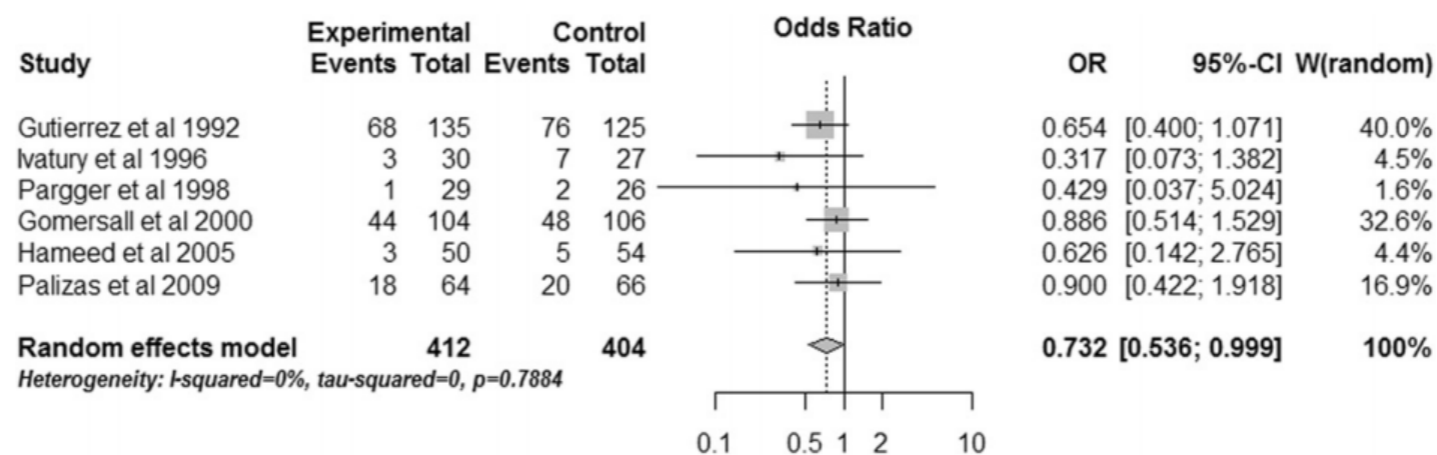
Maurizio Cecconi  
Daniel De Backer  
Massimo Antonelli  
Richard Beale  
Jan Bakker  
Christoph Hofer  
Roman Jaeschke  
Alexandre Mebazaa  
Michael R. Pinsky  
Jean Louis Teboul  
Jean Louis Vincent  
Andrew Rhodes

**Consensus on circulatory shock  
and hemodynamic monitoring. Task force  
of the European Society of Intensive Care  
Medicine**



- Nombreux outils à notre disposition dont le choix est lié à:
  - Type de pathologie
  - Expertise équipe
  - Disponibilité humaine et économique
  - Enseignement
  - Importance du traitement associé au monitoring plus que du monitoring lui-même





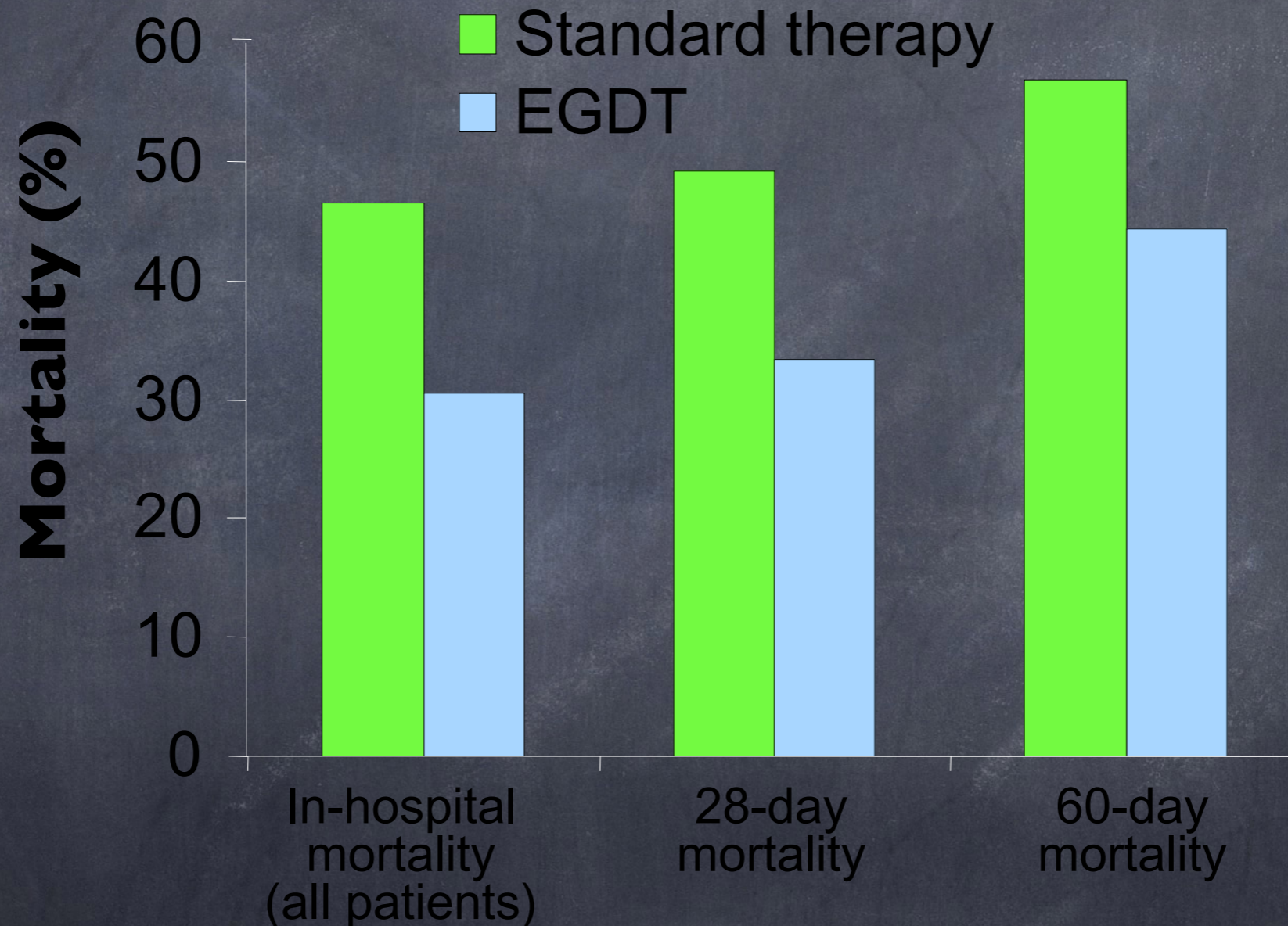
**Figure 3** Effects of gastric tonometry guided therapy versus control groups on total mortality. CI, confidence interval; OR, odds ratio; W, weight of each study.

choc: quelques controverses



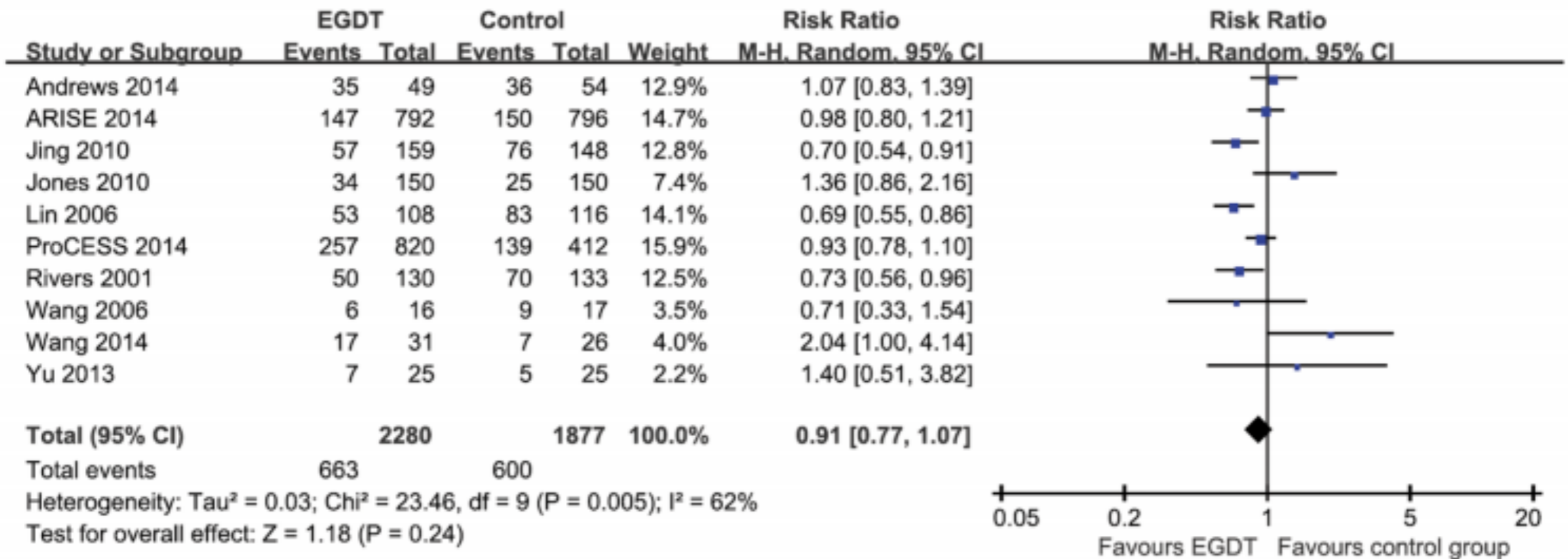
# The Importance of Early Goal-Directed Therapy for Sepsis Induced Hypo perfusion

NNT to prevent 1 event (death) = 6-8



Adapted from Table 3, page 1374, with permission from Rivers E, Nguyen B, Havstad S, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med* 2001; 345:1368-1377

## 1. EGDT vs. Control group





# Leçons des autres

- infarctus
- ACR
- AVC
- Trauma
- infections
- .....

- Next
- Tomorrow
- Later
- NOW

# Conclusions

- Le choc :
  - est syndrome gravissime associé à une altération de la circulation entraînant une hypoxie tissulaire
  - est associé à une mortalité élevée
  - nécessite une prise en charge urgente basée sur une réflexion physiopathologique



