

# Apport de la pression artérielle

**Pr Martin COUR**

Médecine Intensive - Réanimation

Hôpital Edouard Herriot - Hospices Civils de Lyon

23 Novembre 2024 - Lyon



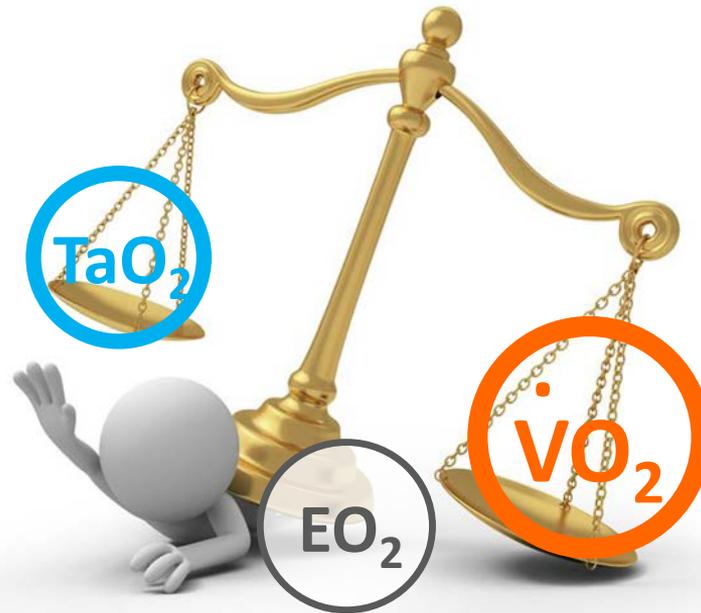
**Conflits d'intérêts**

**Aucun à déclarer**



Défaillance du système cardio-circulatoire à assurer des apports en oxygène en adéquation avec les besoins tissulaires

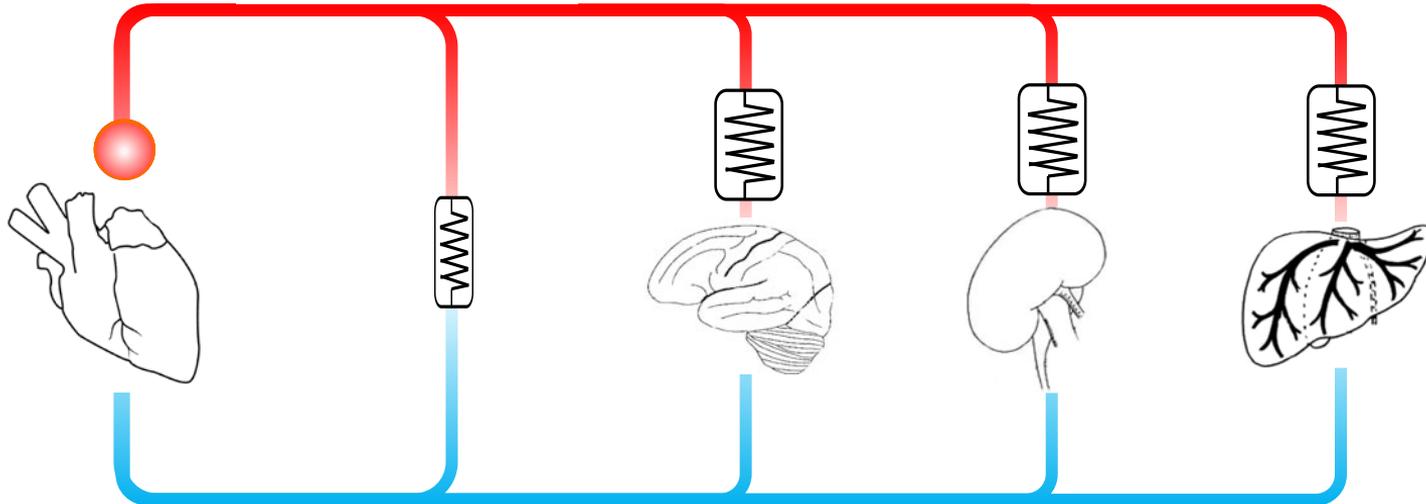
$TaO_2$  : Transport artériel en oxygène  
 $VO_2$  : Consommation en oxygène  
 $EO_2$  : Extraction périphérique en oxygène

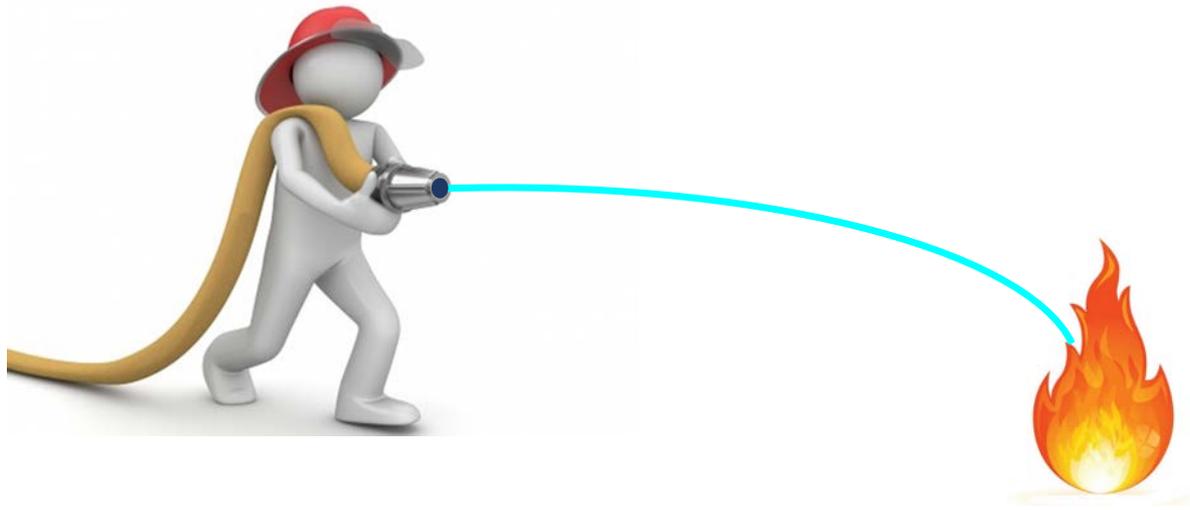


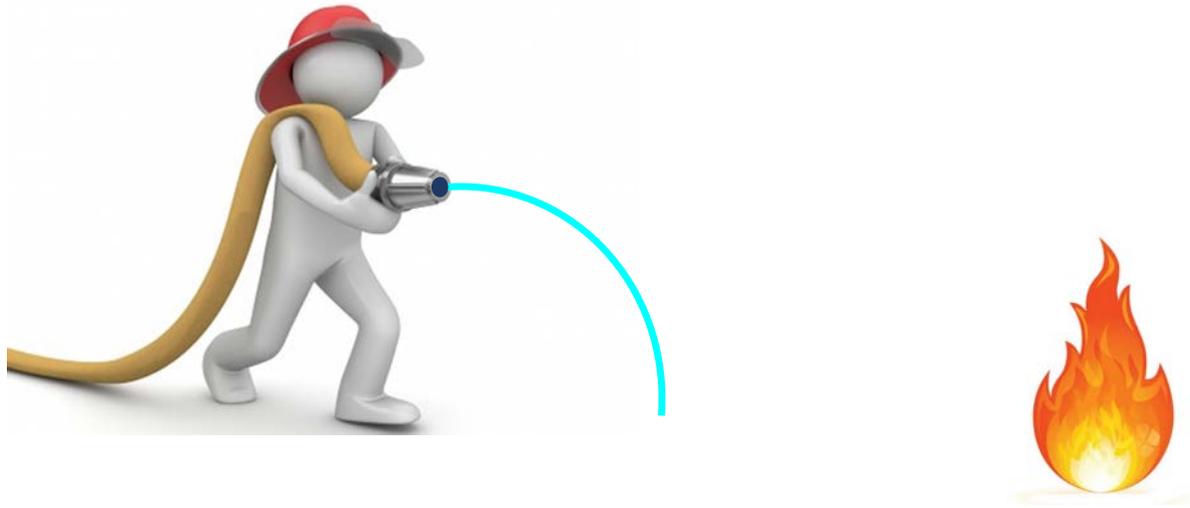
Pour perfuser les organes, il faut :

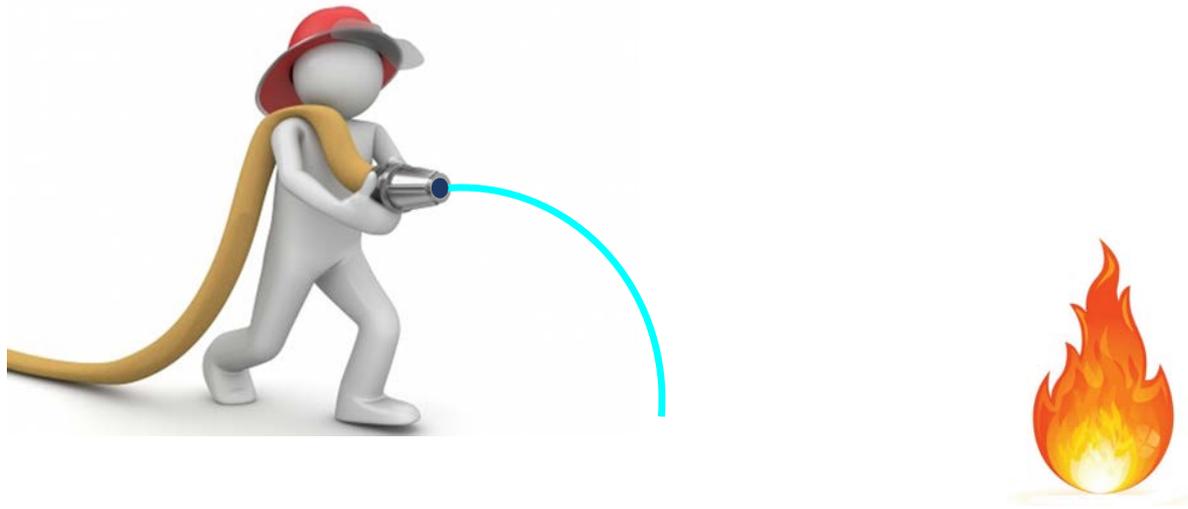
Du débit

De la pression

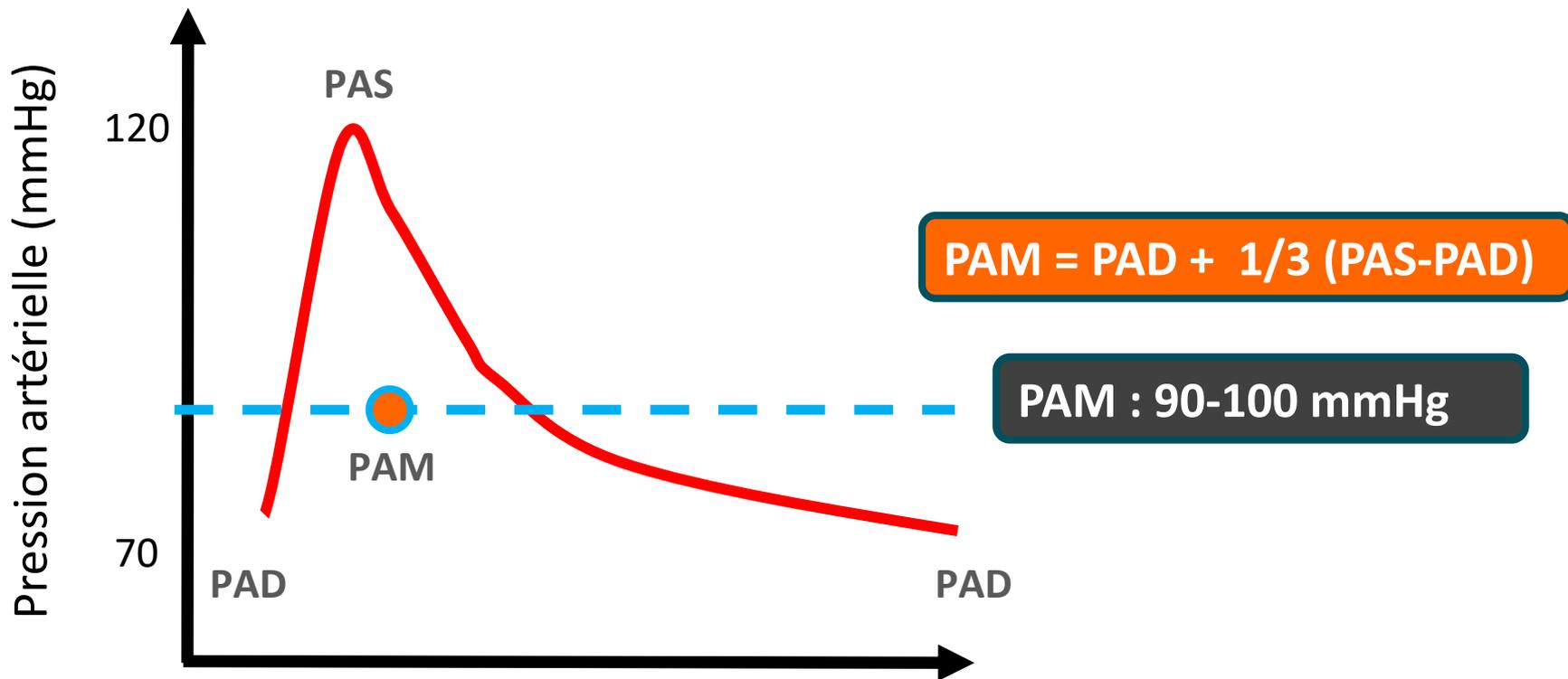




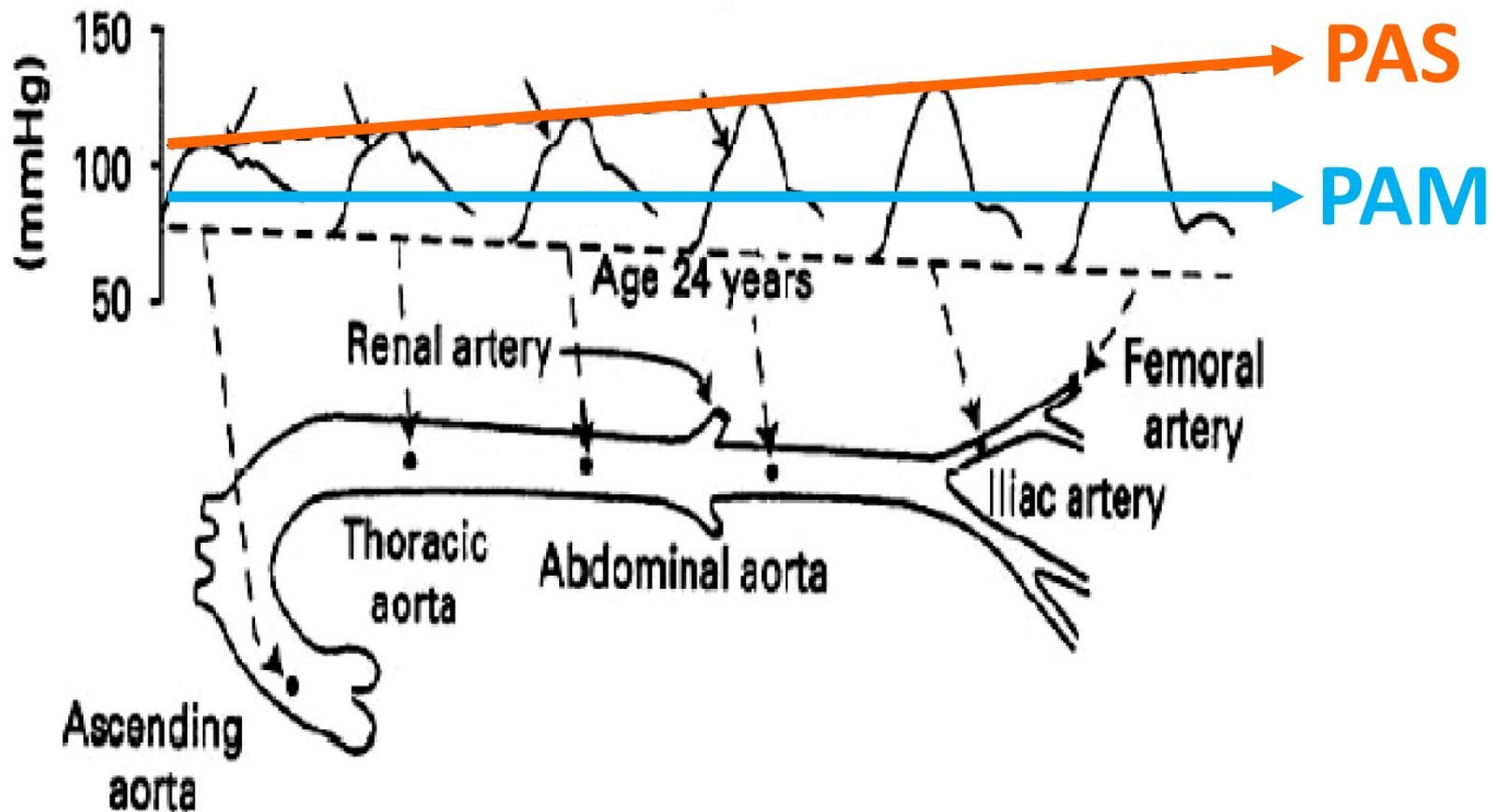


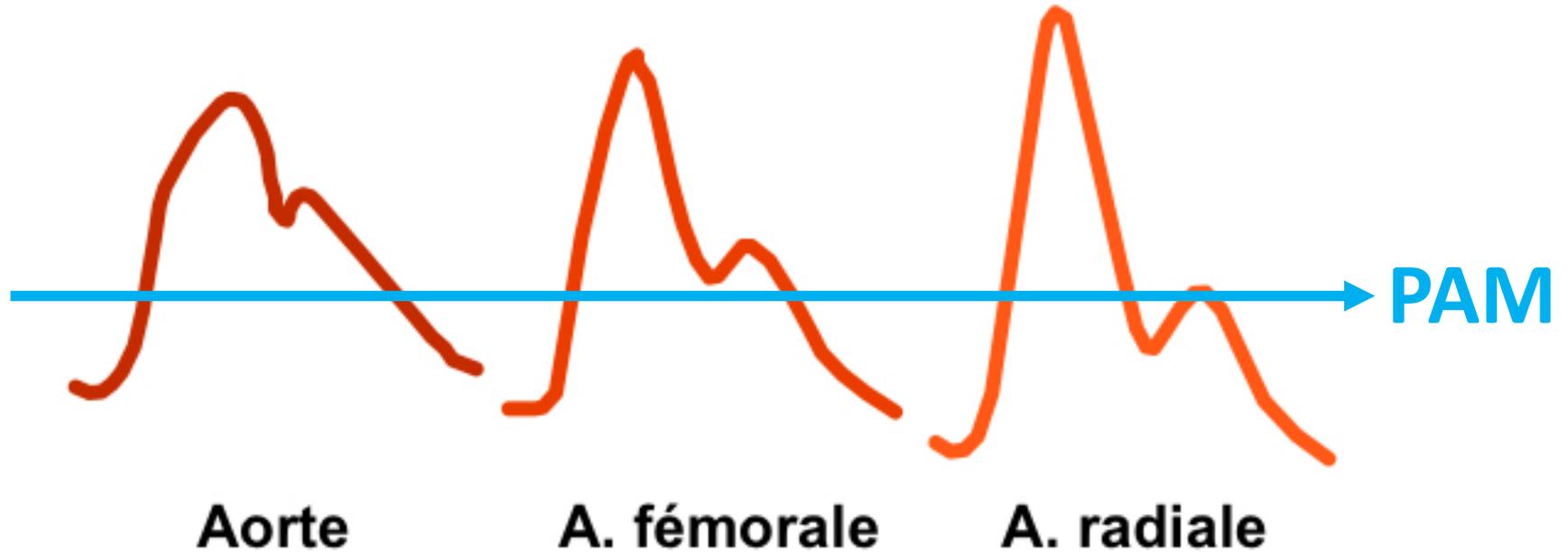


Pression de perfusion = PAM

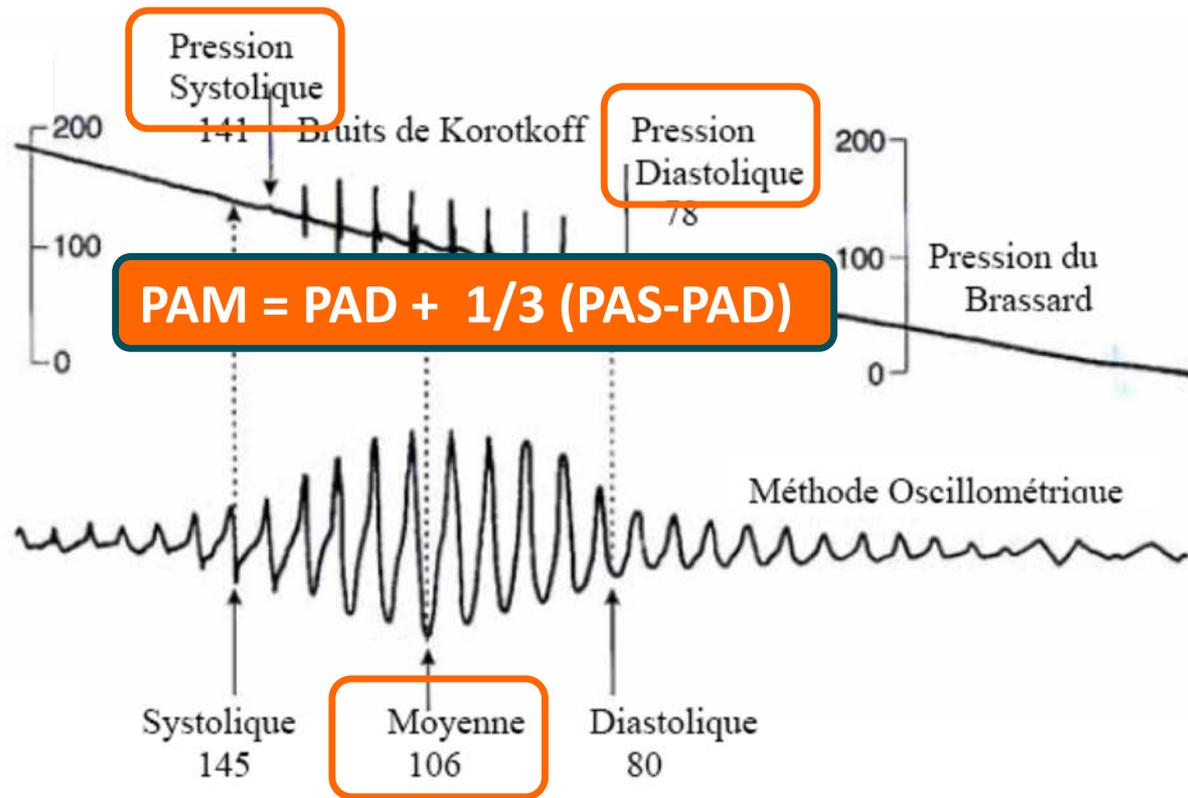


# Etats de choc : Apport de la pression artérielle





## Auscultatoire

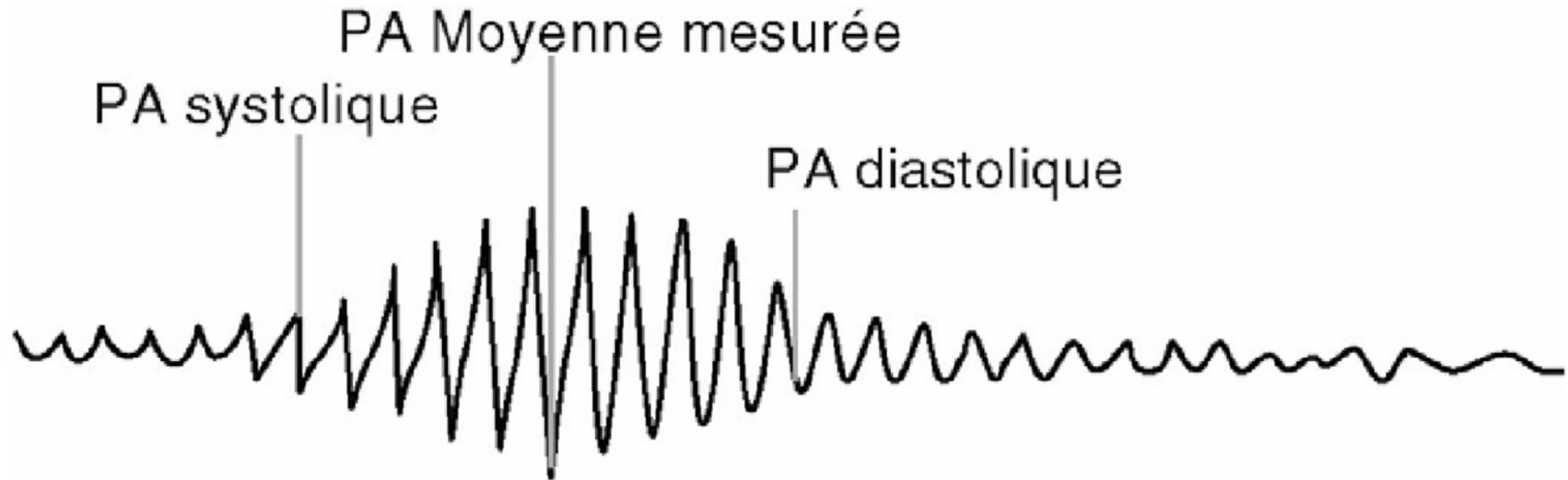


## Oscillométrie



comparaison de la méthode Korotkoff et la méthode oscillométrique.

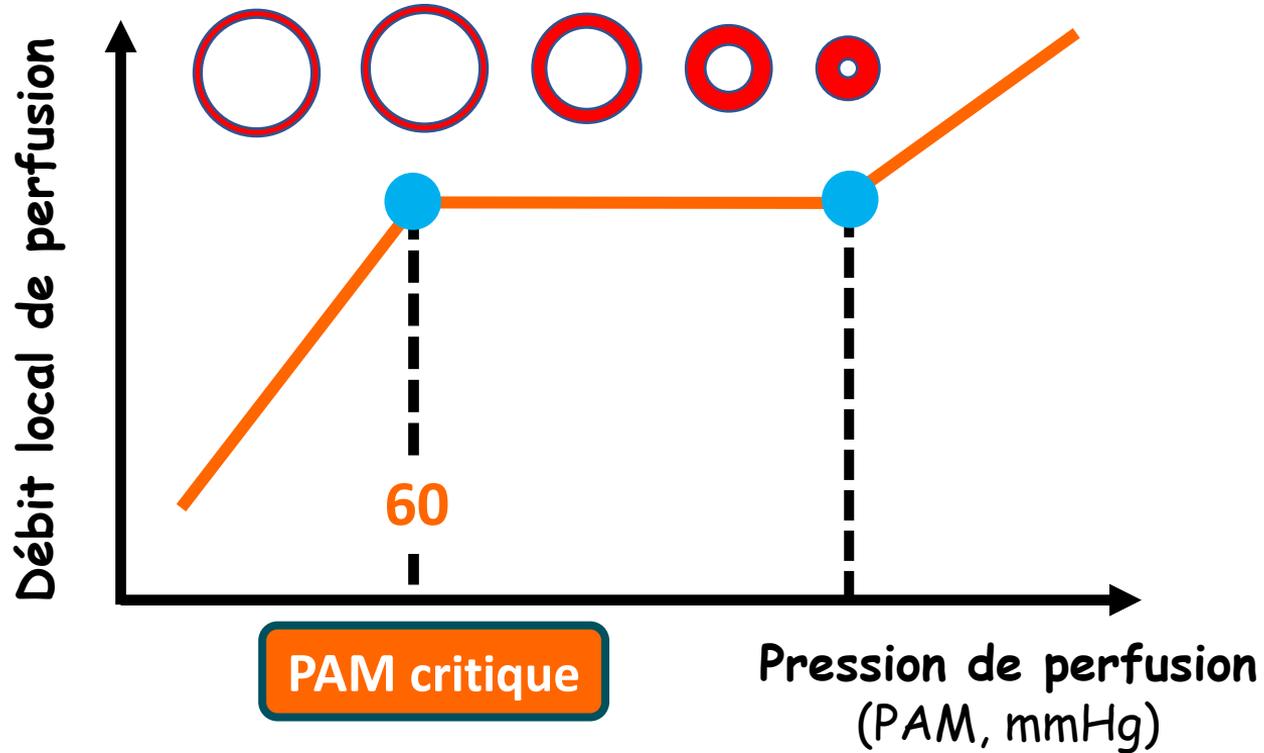
## Oscillométrie



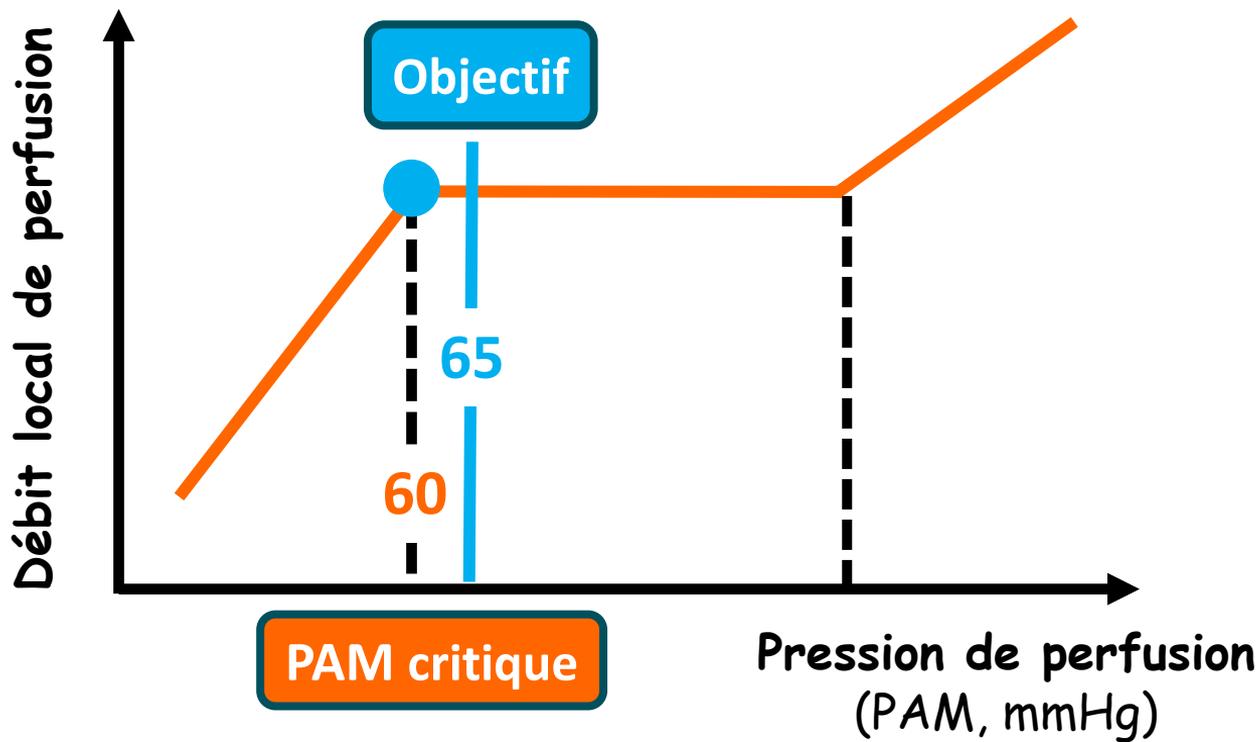
## Relation PAM - Débit local de perfusion



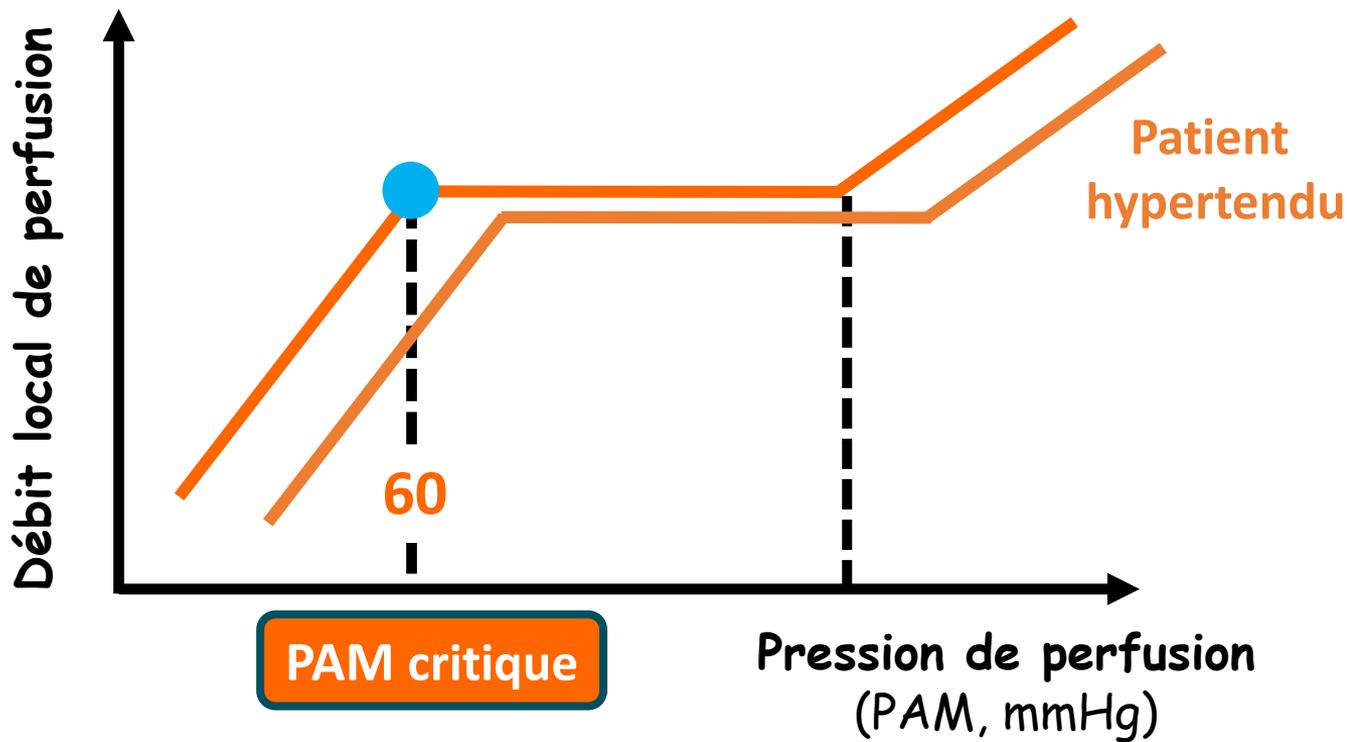
## Relation PAM - Débit local de perfusion



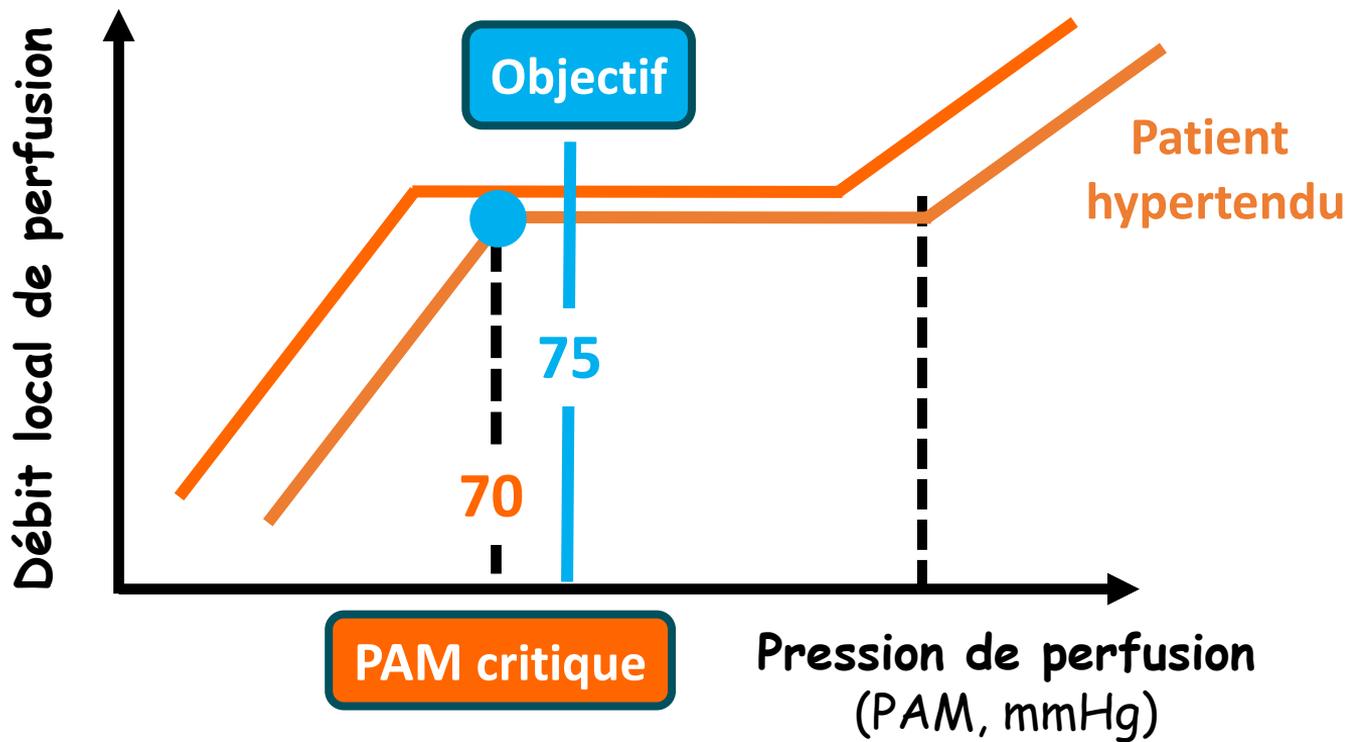
## Relation PAM - Débit local de perfusion



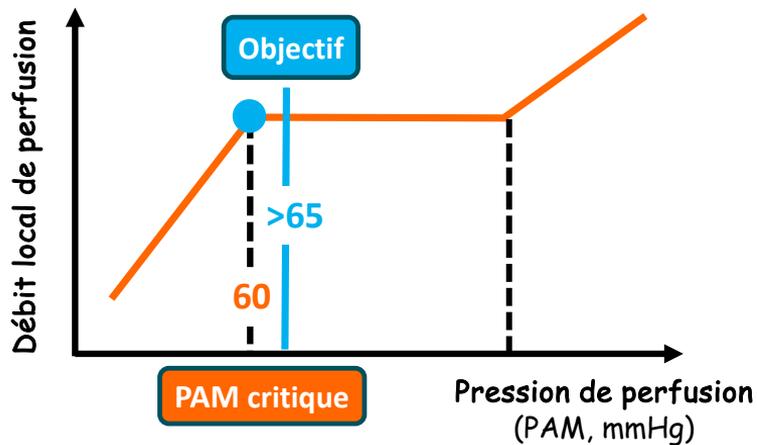
## Relation PAM - Débit local de perfusion



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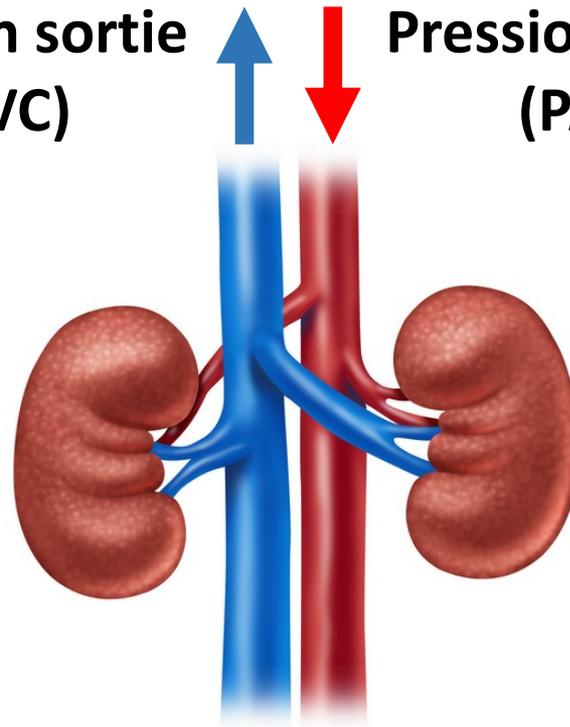


**Pression de perfusion = pression entrée – pression sortie**



Pression sortie  
(PVC)

Pression entrée  
(PAM)



Pour PAM = 65 mmHg

PVC = 5 -> P perf. = 60

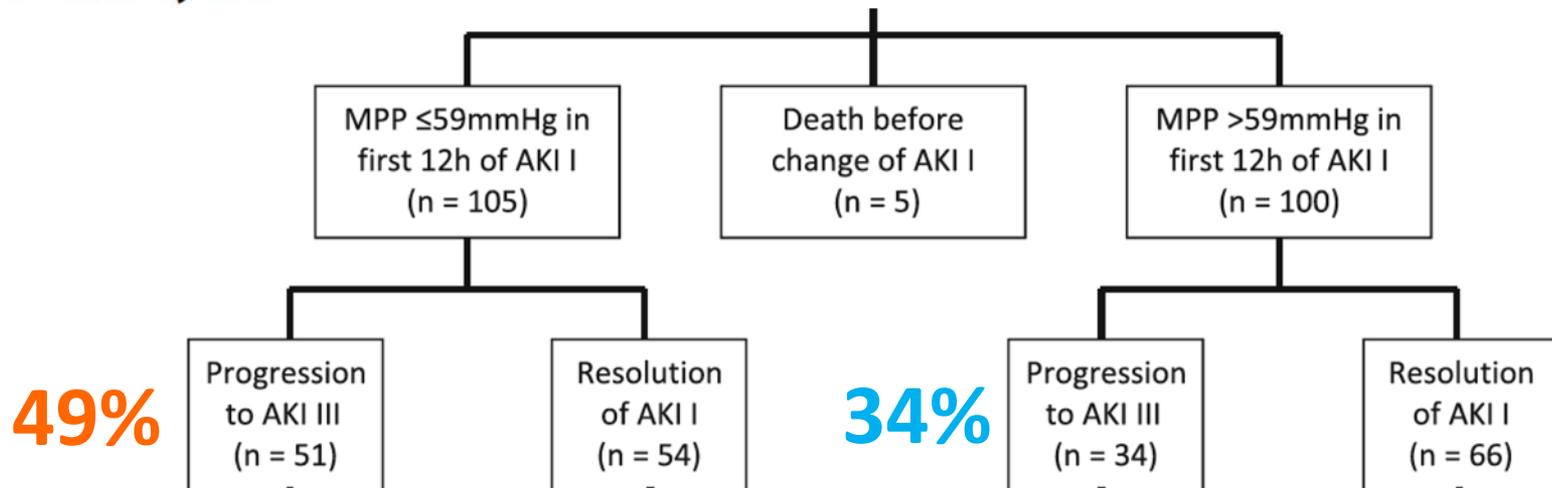
PVC = 25 -> P perf. = 40



Low mean perfusion pressure is a risk factor for progression of acute kidney injury in critically ill patients – A retrospective analysis

Pas d'association significative entre PAM et IRA

## 210 IRA stade I





**Reco.**

**PAM  $\geq$  65 mmHg**

**Si HTA**

**PAM  $\geq$  75 mmHg ?**

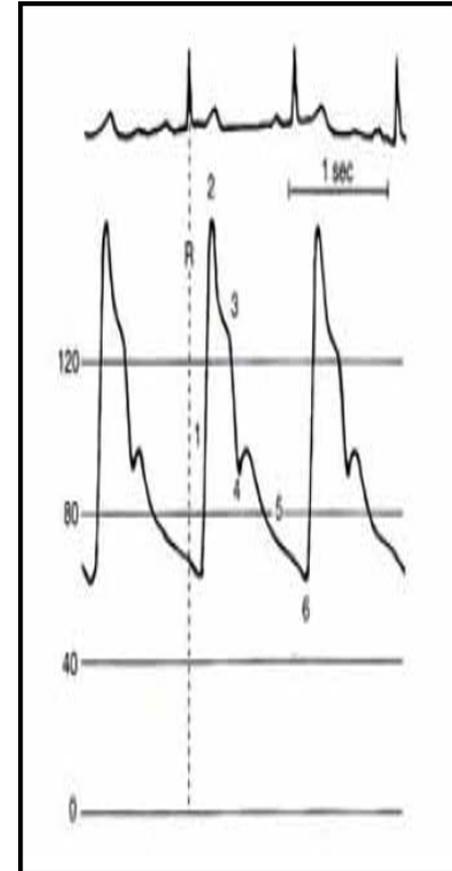
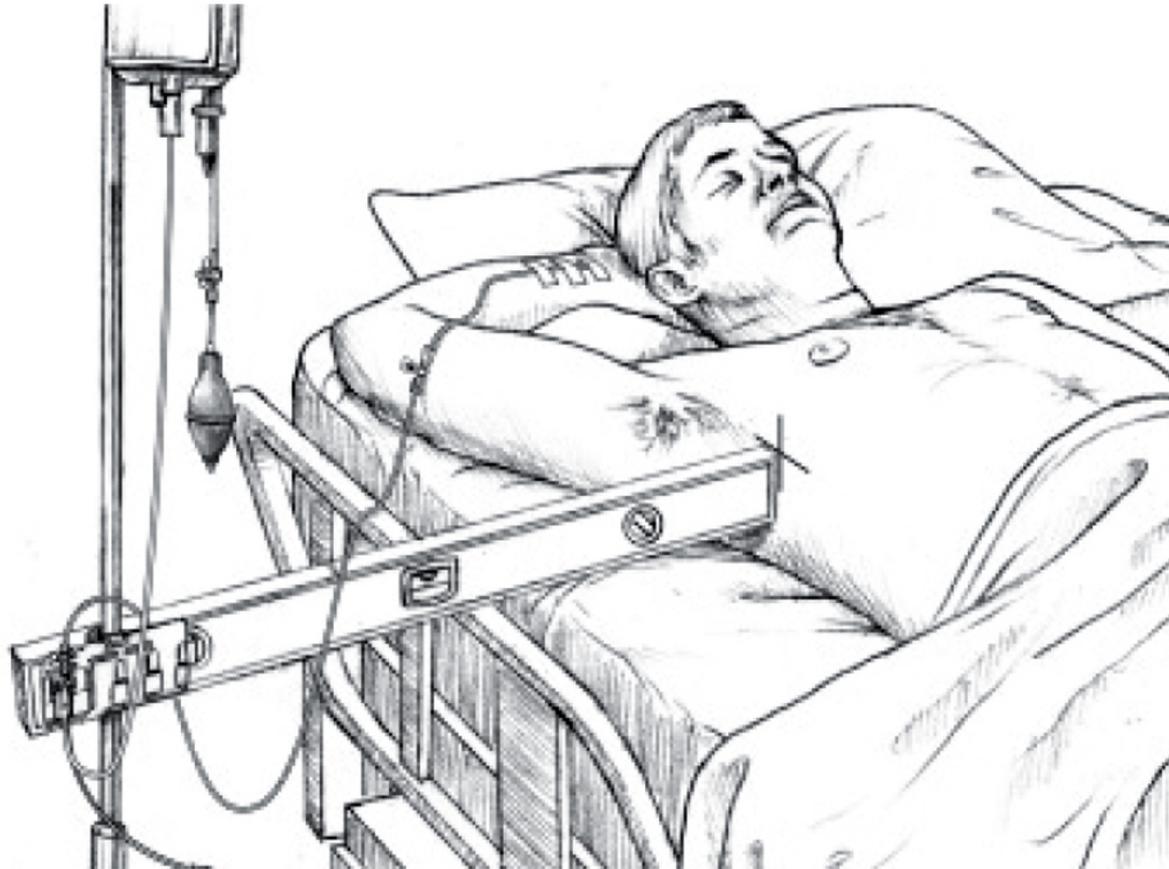
**Borne sup.**

**85 mmHg ?**

**Proposition**

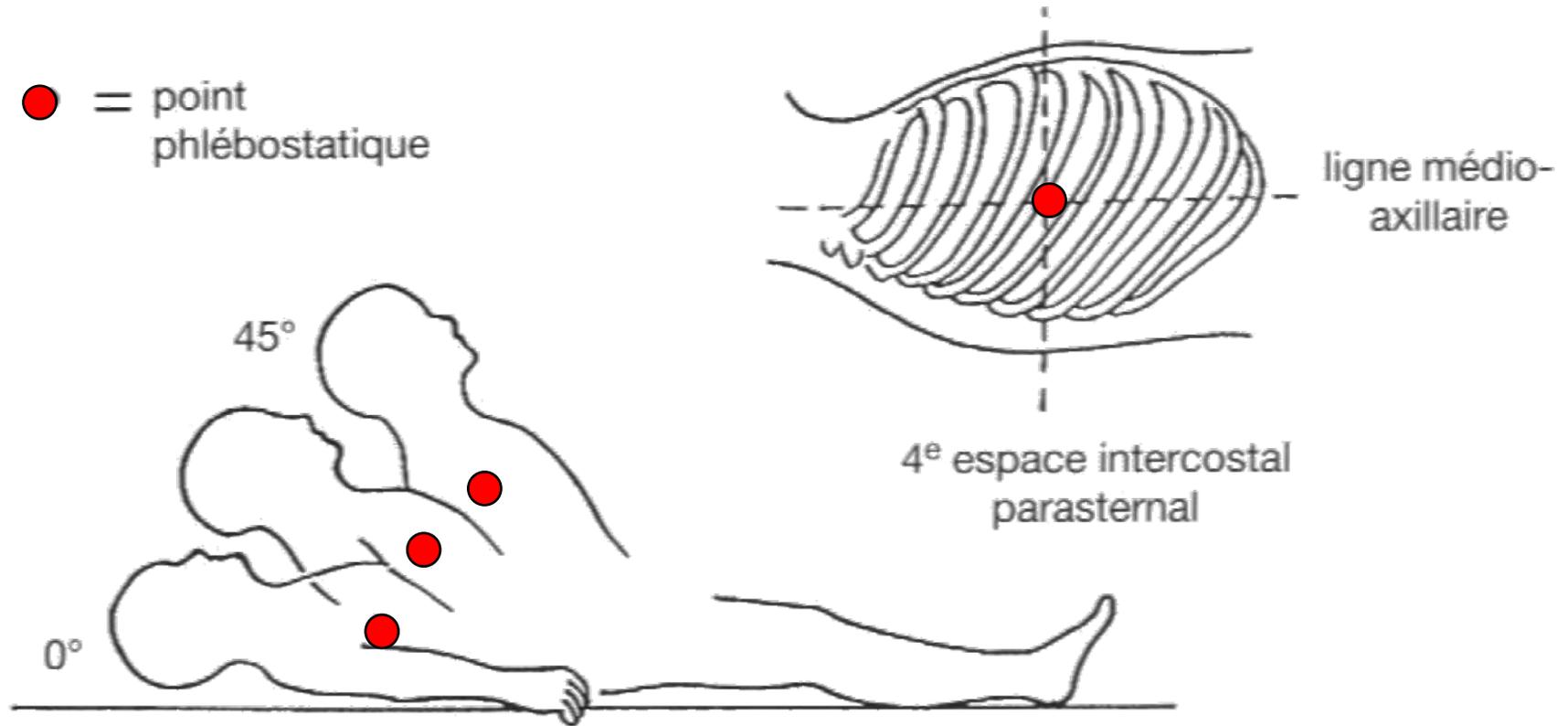
**70-80 mmHg**

# Etats de choc : Apport de la pression artérielle

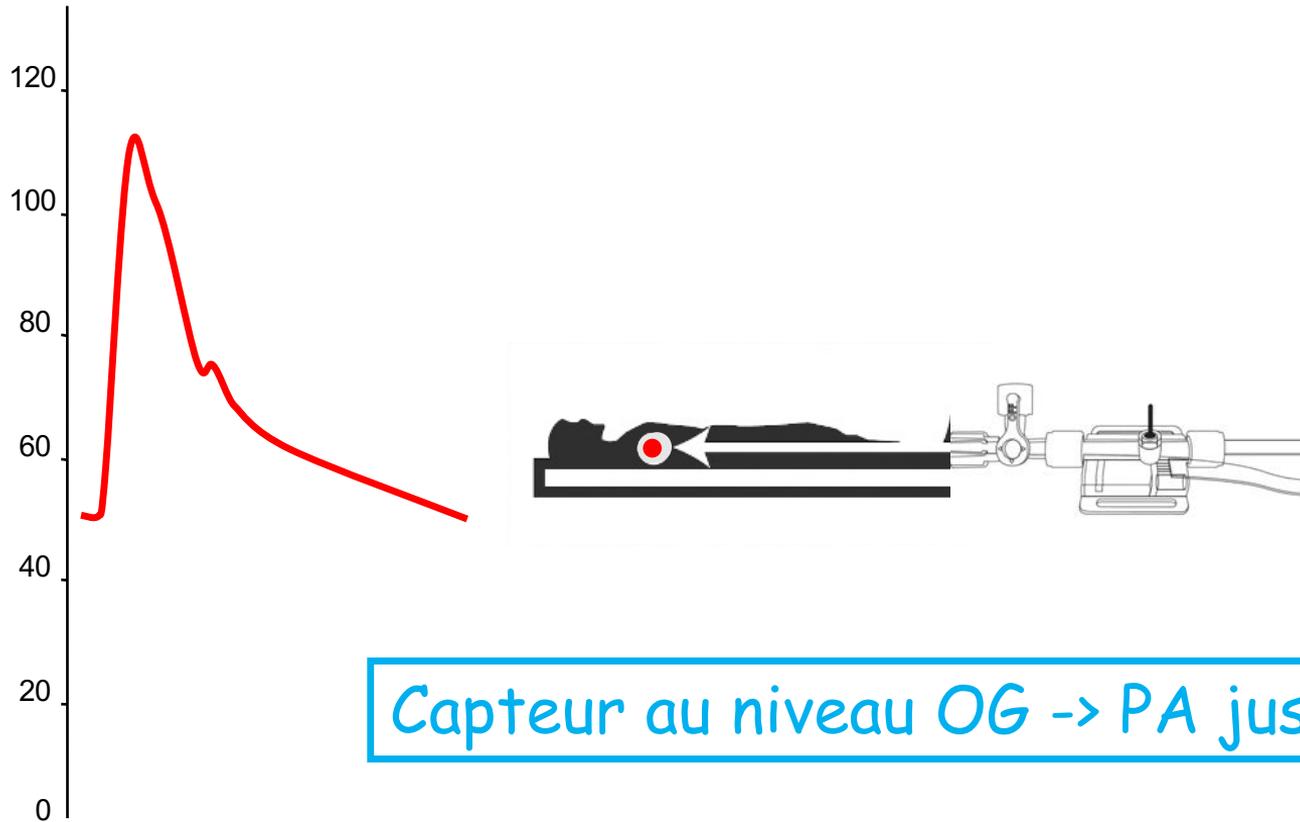


# Etats de choc : Apport de la pression artérielle

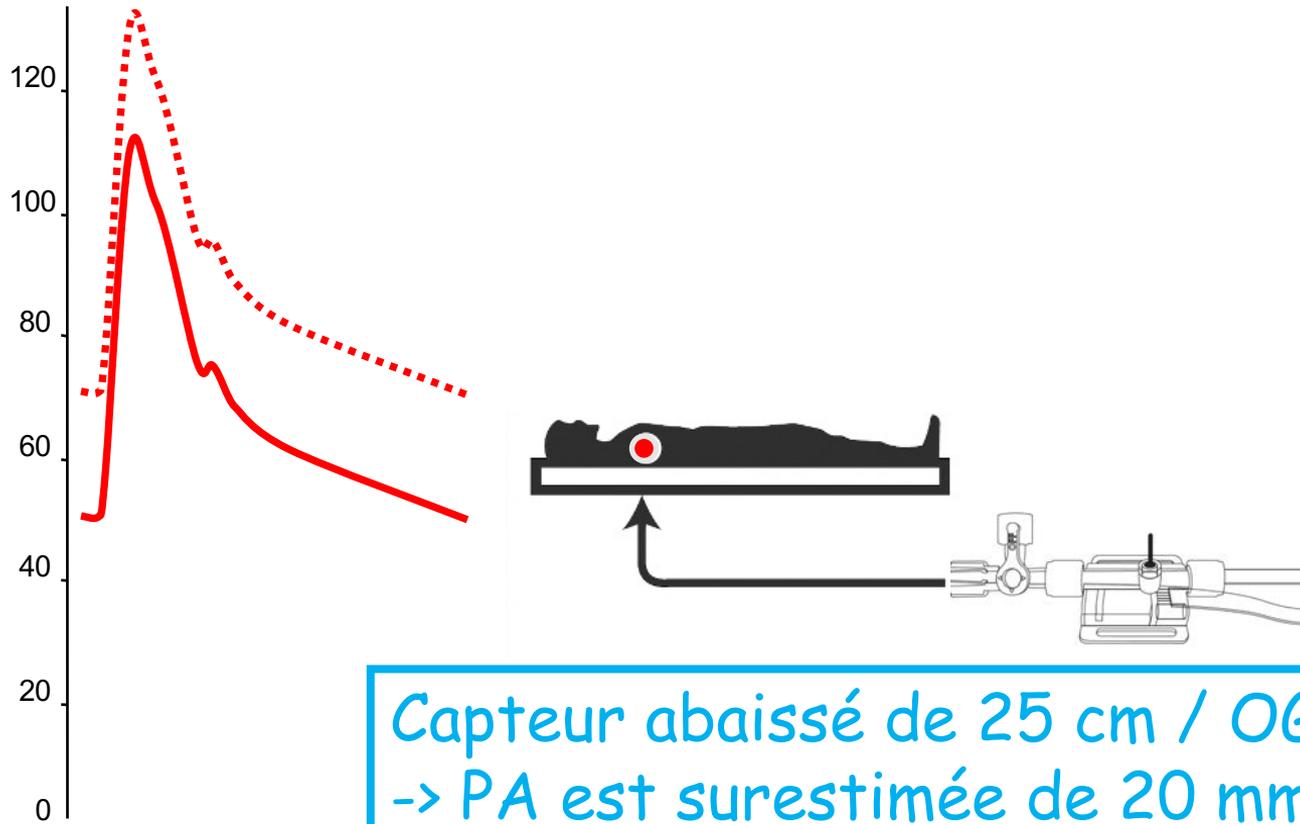
● = point  
phlébostatique



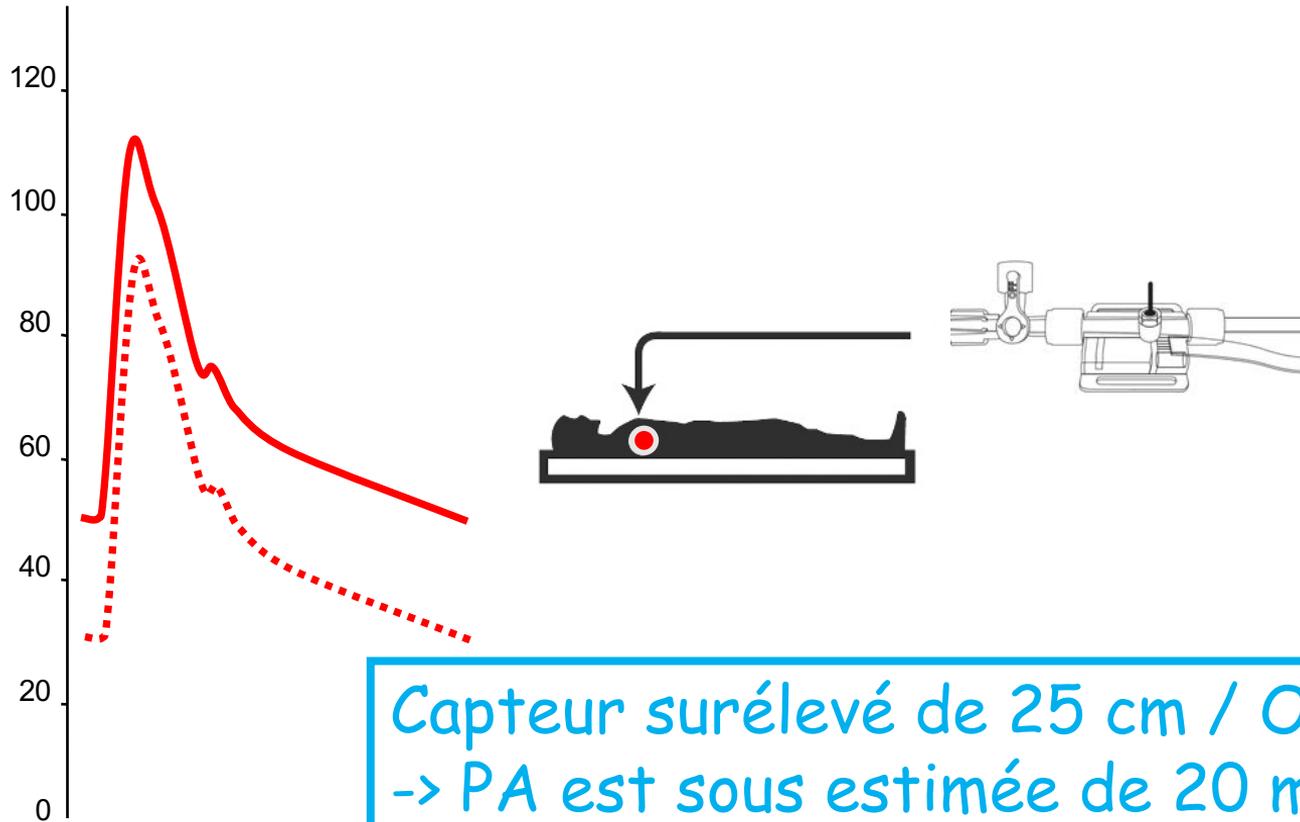
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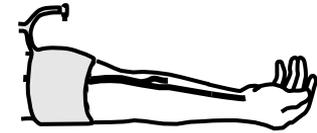
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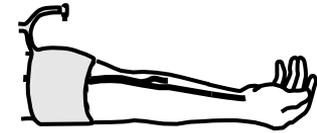
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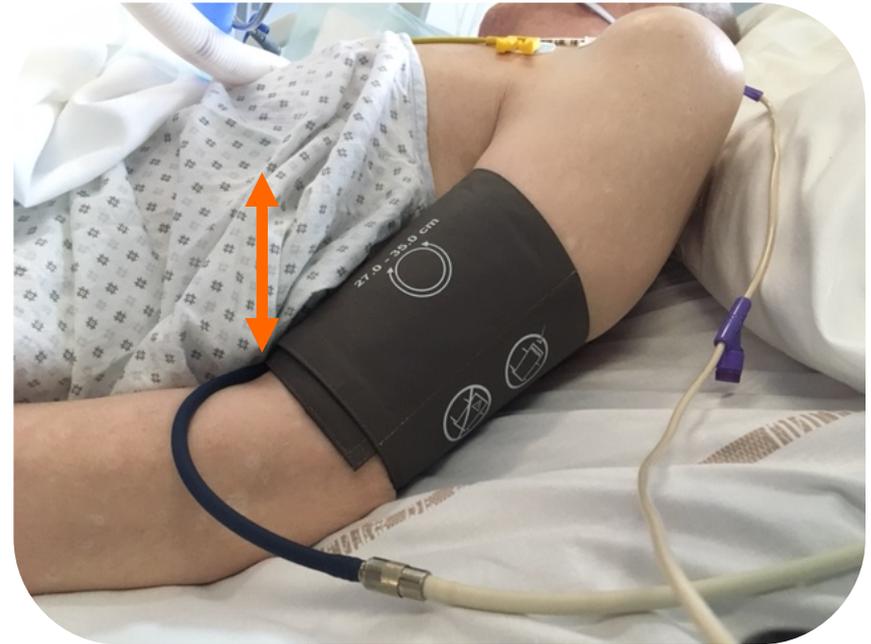
## Position bras / point phlébostatique



## Position bras / point phlébostatique



PNI	08:50	84/49(61)
mmHg	08:55	83/47(59)
	09:00	79/48(59)
	09:05	88/50(62)
	09:10	93/51(64)
	09:15	90/55(67)
	09:20	88/48(61)
	09:25	92/50(62)

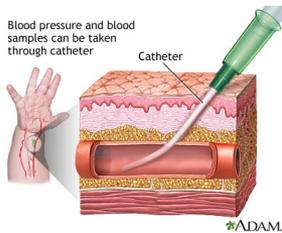


## Gradient aorto-radial

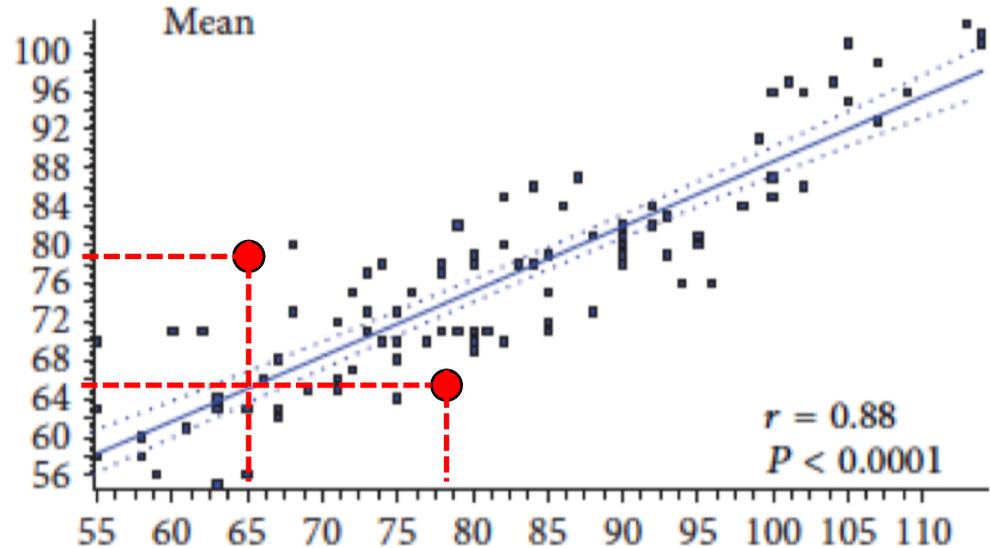
Mesure non-invasive de la pression artérielle:  
Comparabilité de la PNI.

**Noninvasive Techniques for Blood Pressure Measurement Are Not a Reliable Alternative to Direct Measurement: A Randomized Crossover Trial in ICU**

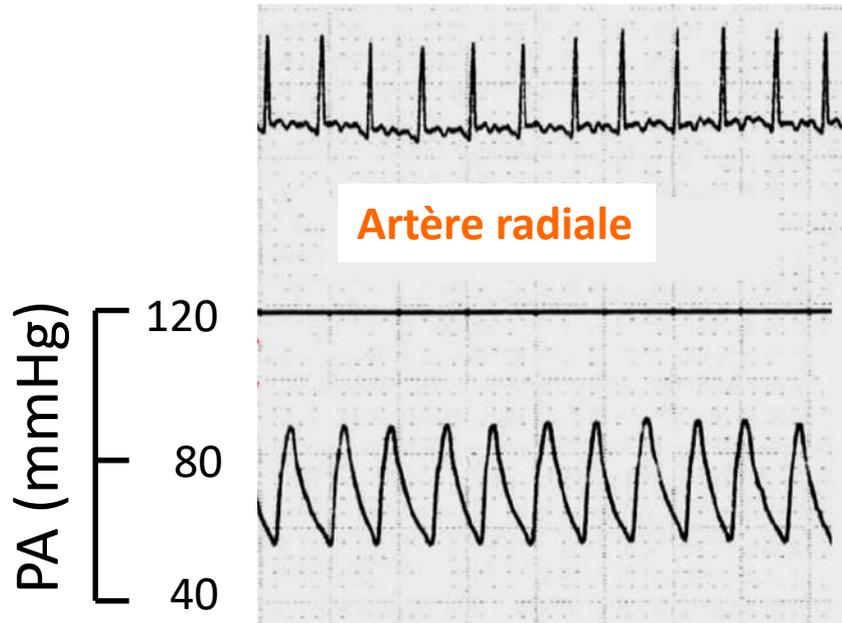
Sara Ribezzo,<sup>1</sup> Eleonora Spina,<sup>2</sup> Stefano Di Bartolomeo,<sup>3,4</sup> and Gianfranco Sanson<sup>1</sup>



IBP versus OBP



## Gradient aorto-radial



## RESEARCH

## Open Access

### Non-invasive detection of a femoral-to-radial arterial pressure gradient in intensive care patients with vasoactive agents



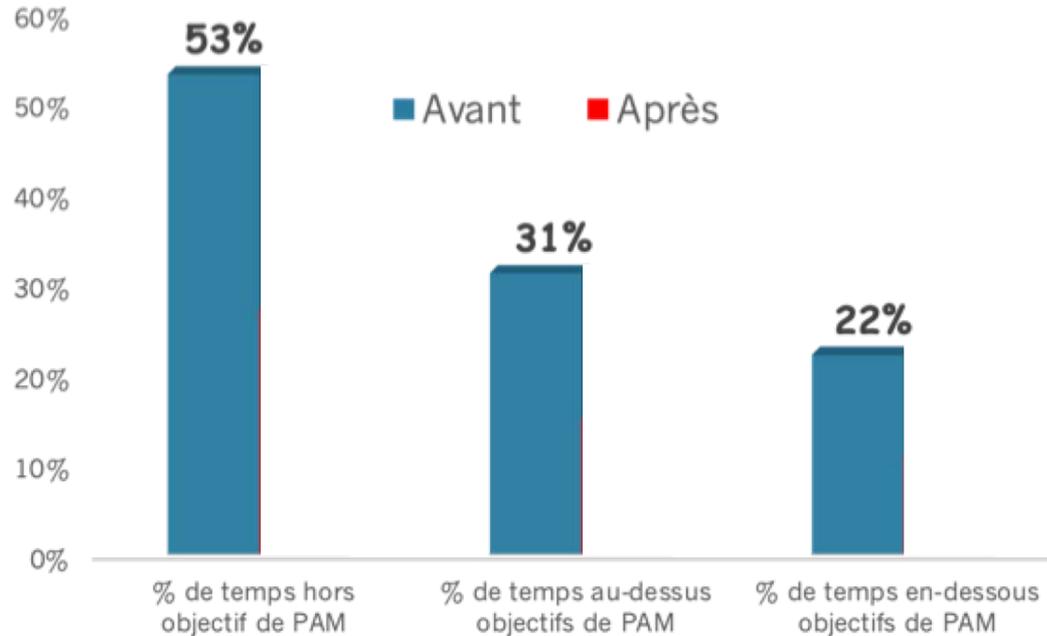
- Etude prospective
- 80 patients (post-opératoire 84%)
- Vasopresseurs
- Gradient fémoral-radial (invasif)
- Gradient PNI-P radial

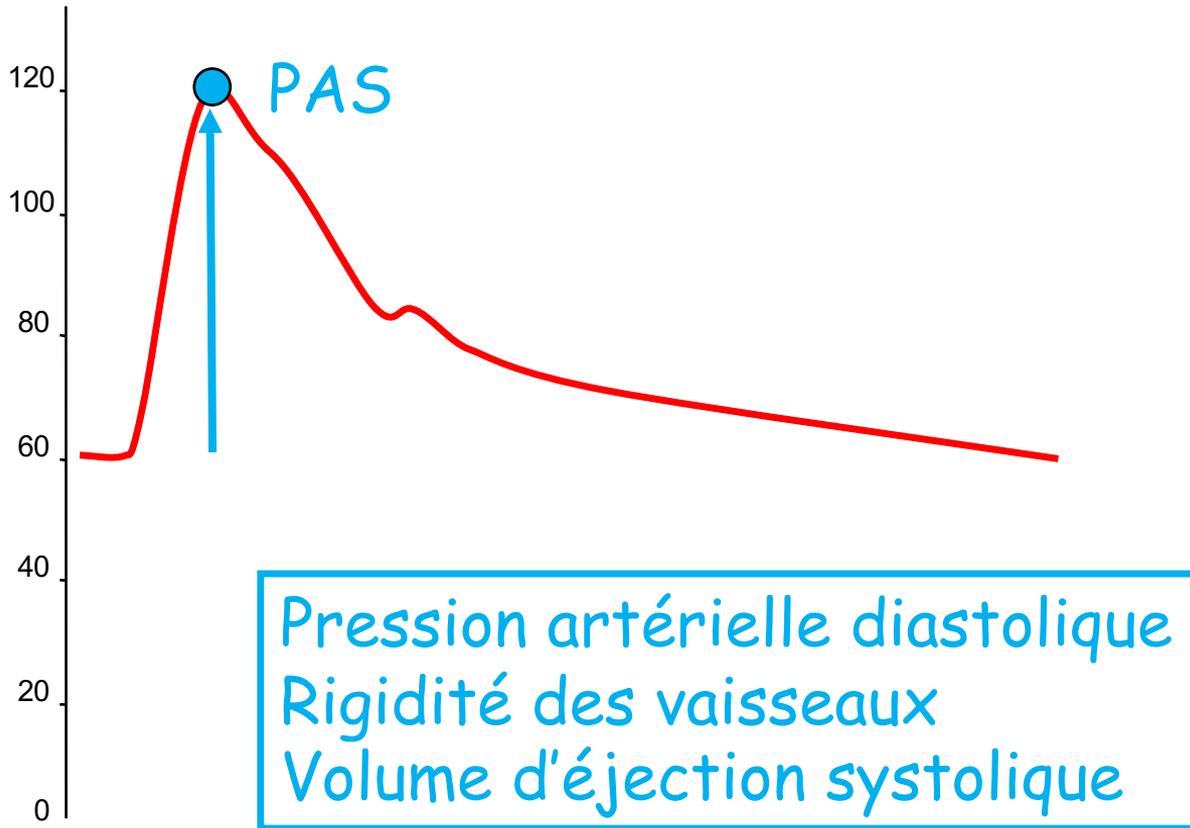
Gradient PAM > 10 mmHg  
Et/ou PAS > 25 mmHg

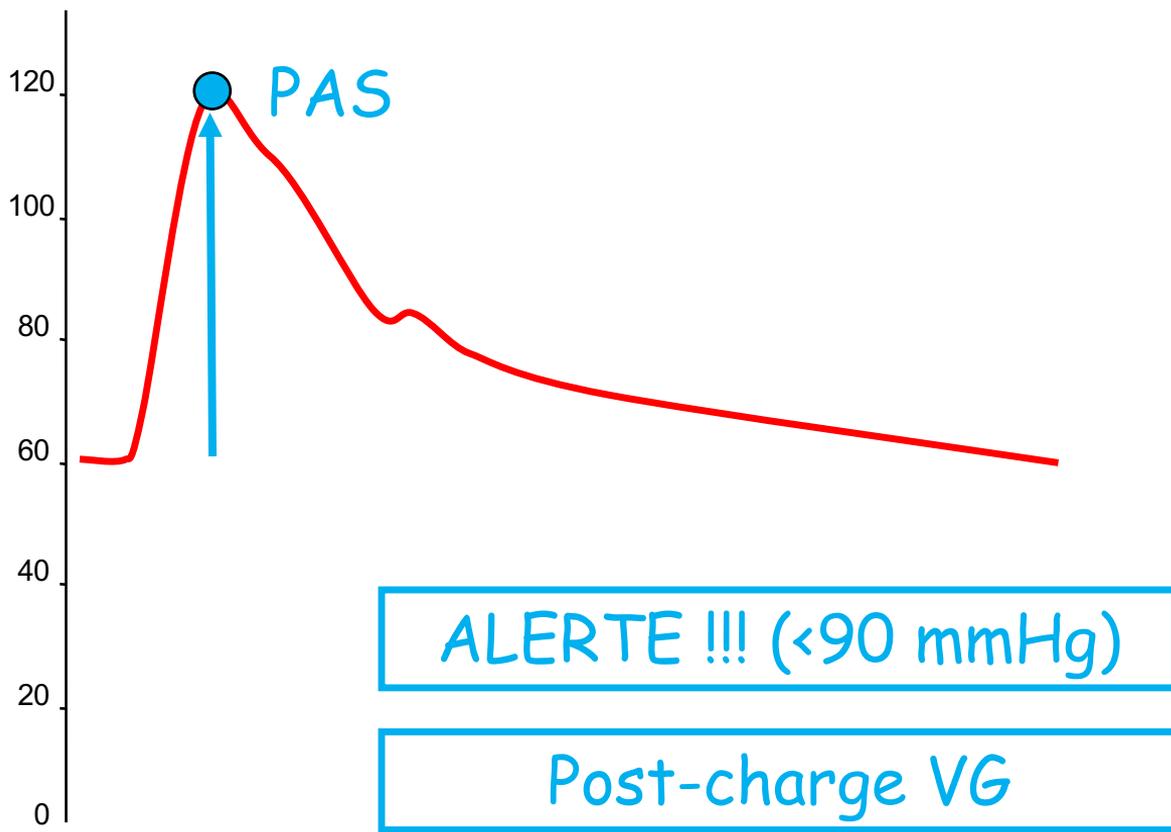
**1 sur 5 patients**

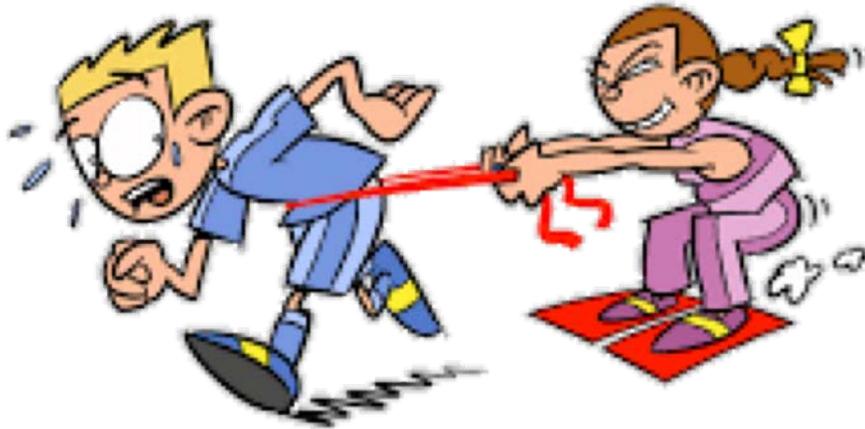
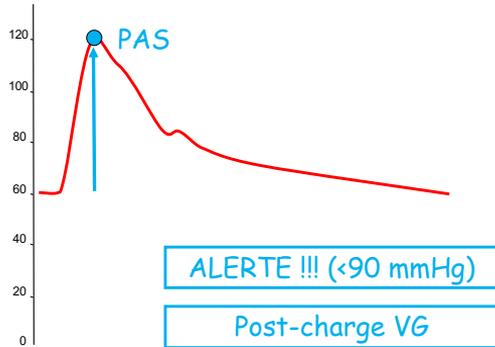
Bonne détection PNI - P radial  
Se 100%, Sp 92%

- Etude avant-après - 100 choc septiques
- Intervention : alarmes de PAM (haute et basse) sur tous les scopes
- CJP : temps passé dans les objectifs de PAM prescrits



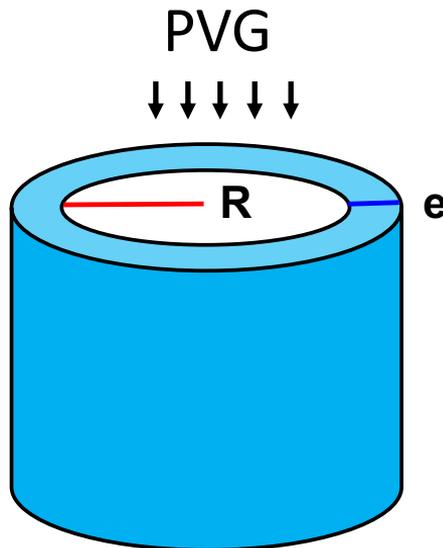
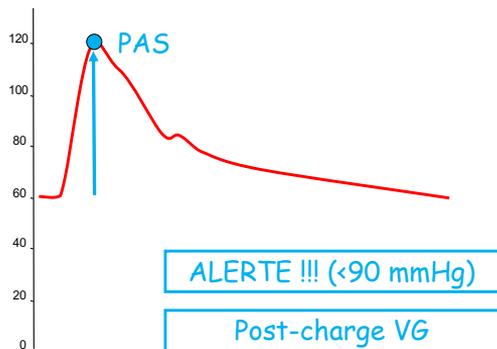






**Post-charge : ensemble des forces qui s'oppose à l'éjection du ventricule gauche**

# Etats de choc : Apport de la pression artérielle



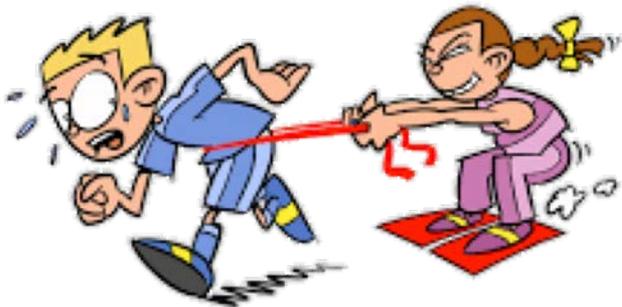
**PVG proche de la PAS**

**T** : tension pariétale

**PVG** : pression VG

**R** : rayon interne

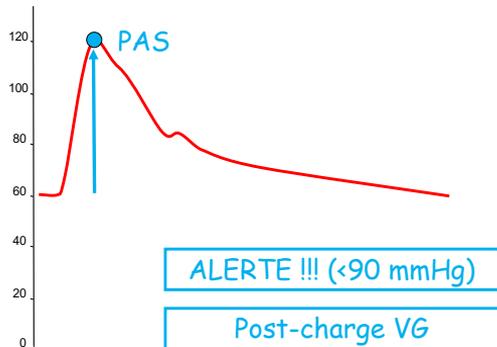
**e** : épaisseur de la paroi



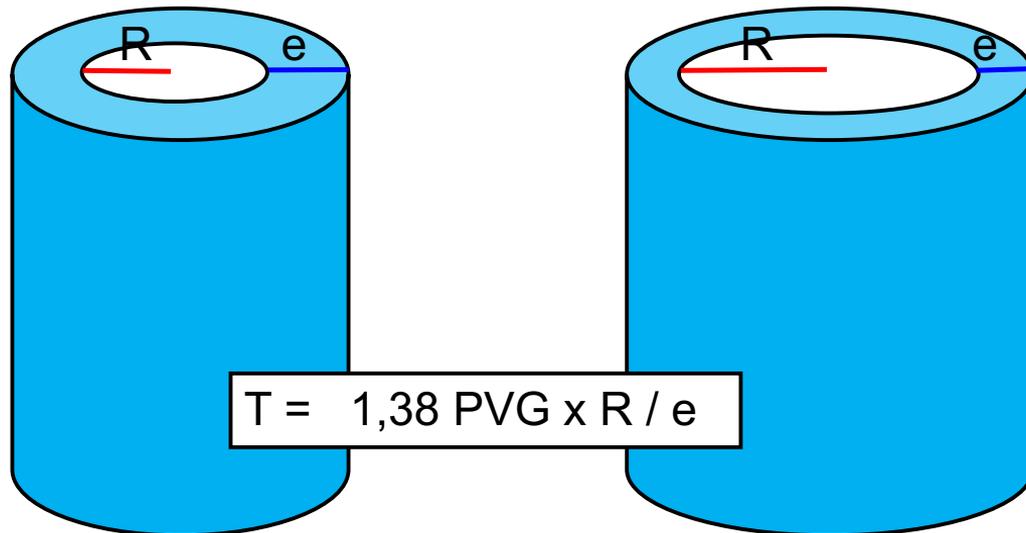
**Post-charge : contrainte pariétale**

**Loi Laplace :  $T = 1,38 \text{ PVG} \times R / e$**

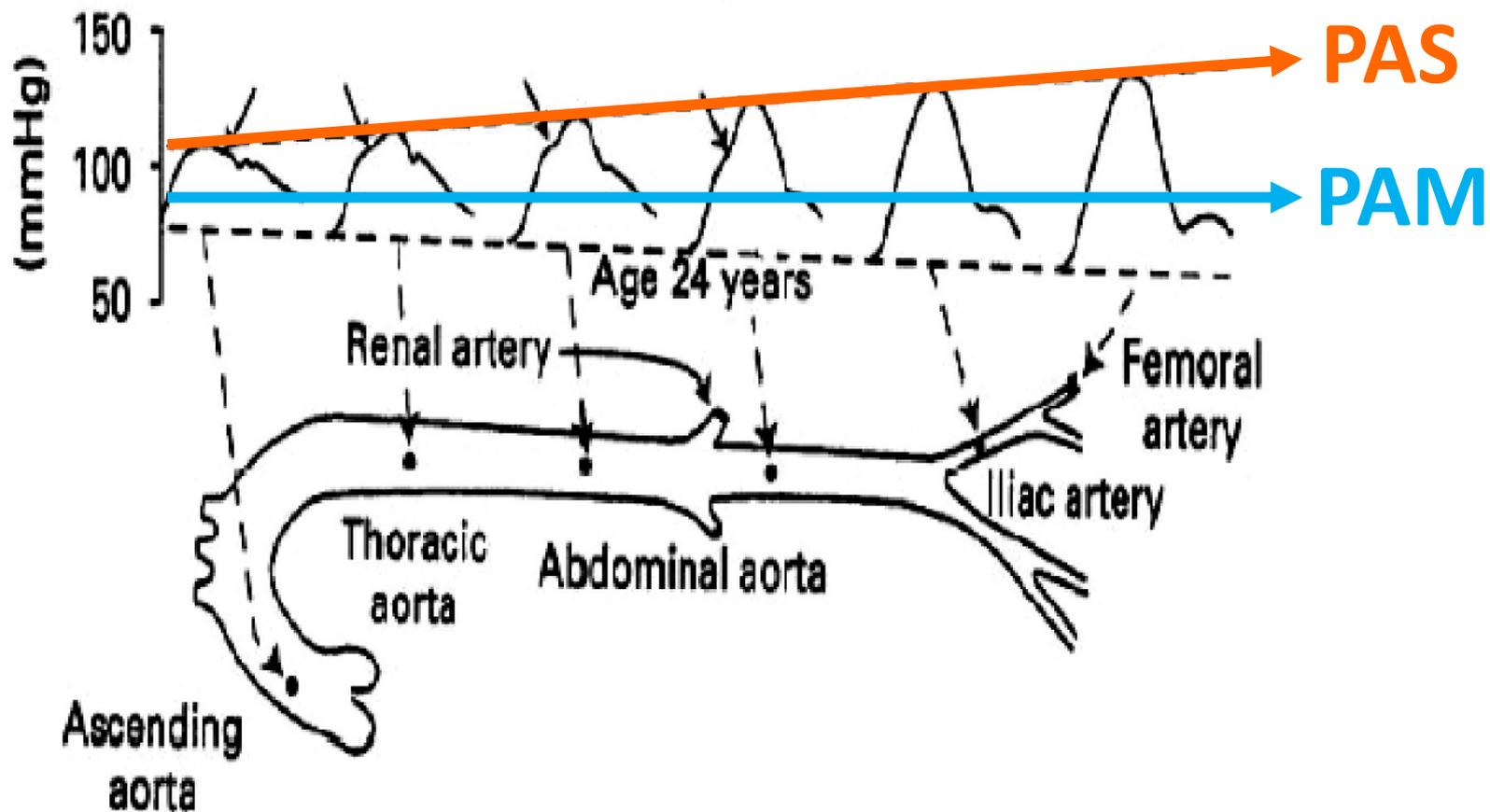
# Etats de choc : Apport de la pression artérielle



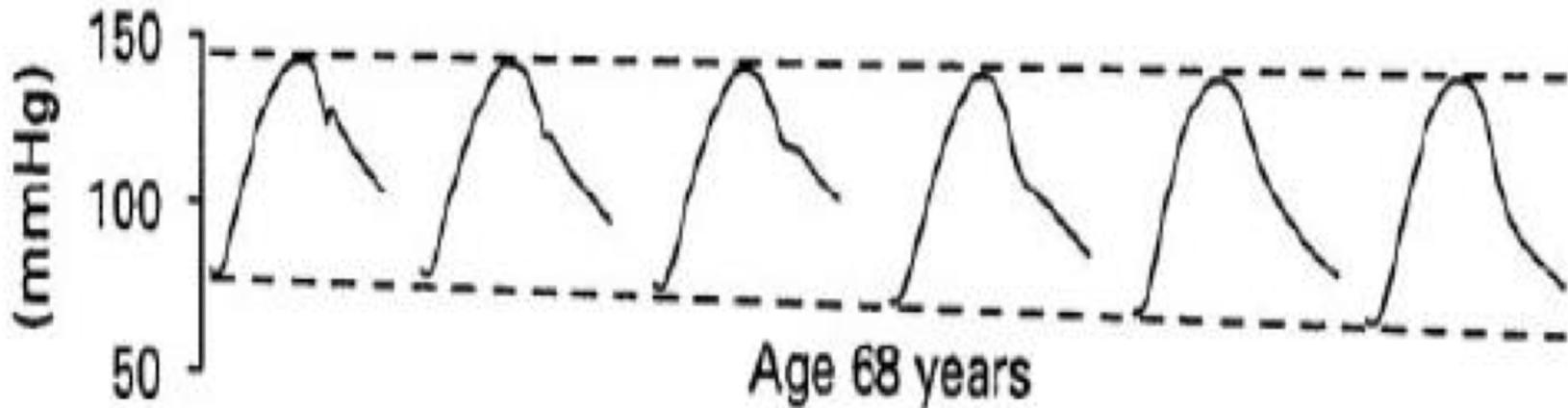
Pour une même PVG (ou PAS) la contrainte sera beaucoup plus importante pour un VG dilaté

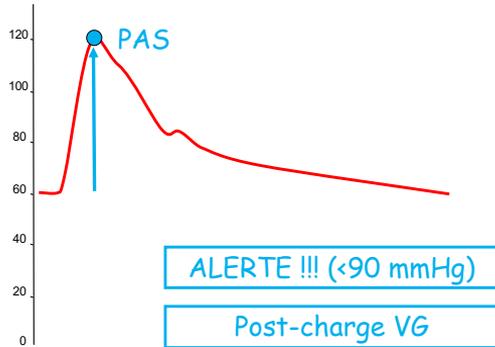


# Etats de choc : Apport de la pression artérielle



## Age and PP amplification





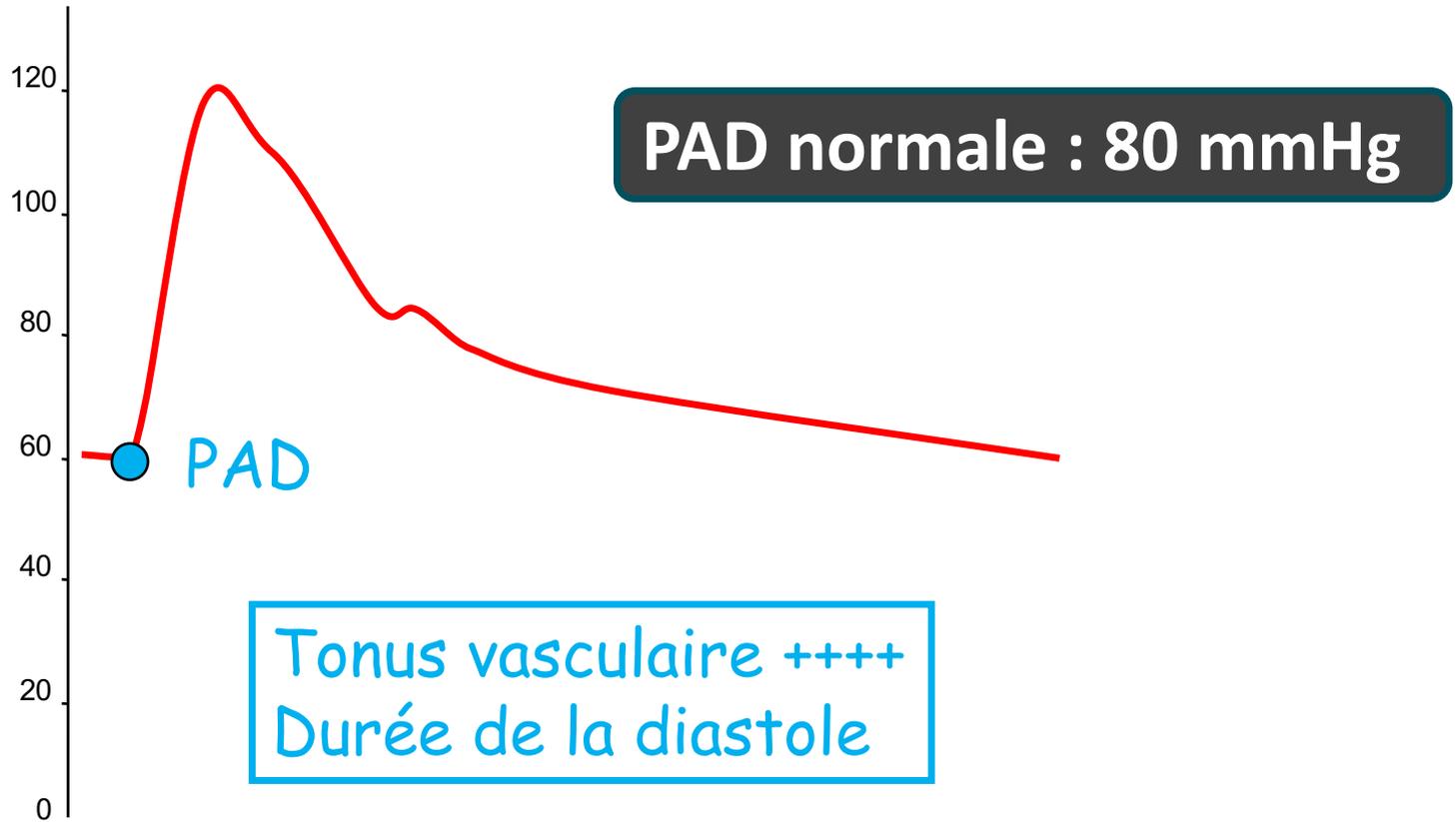
## Application ?

Choc cardiogénique

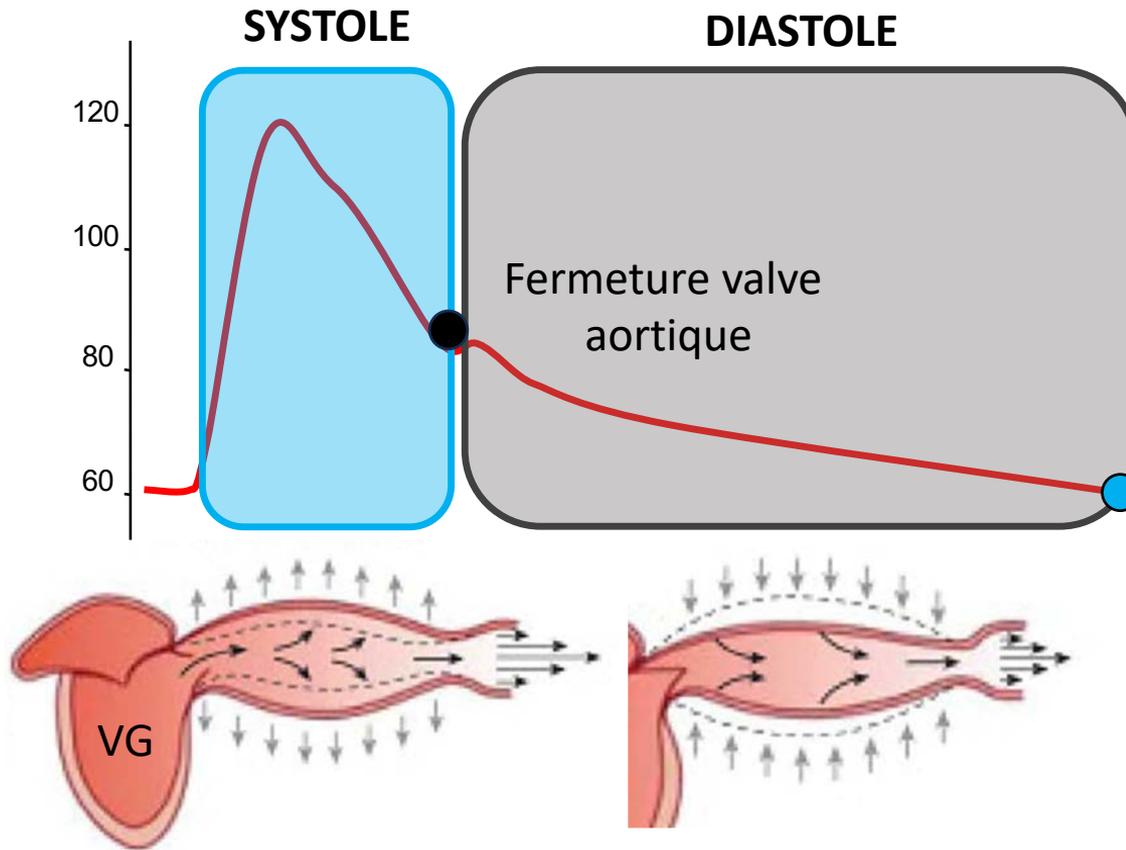
Revoir objectifs de PA



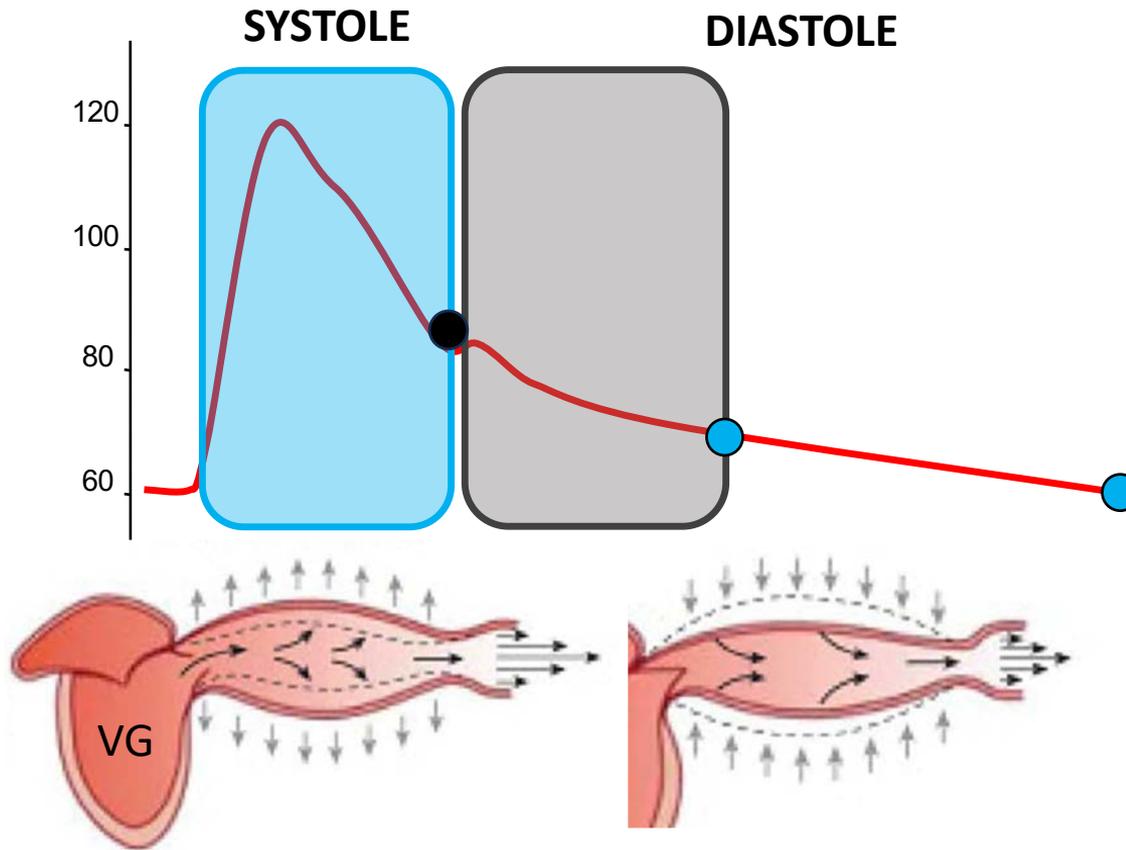
Ex : FEVG 15% + cardiopathie dilatée

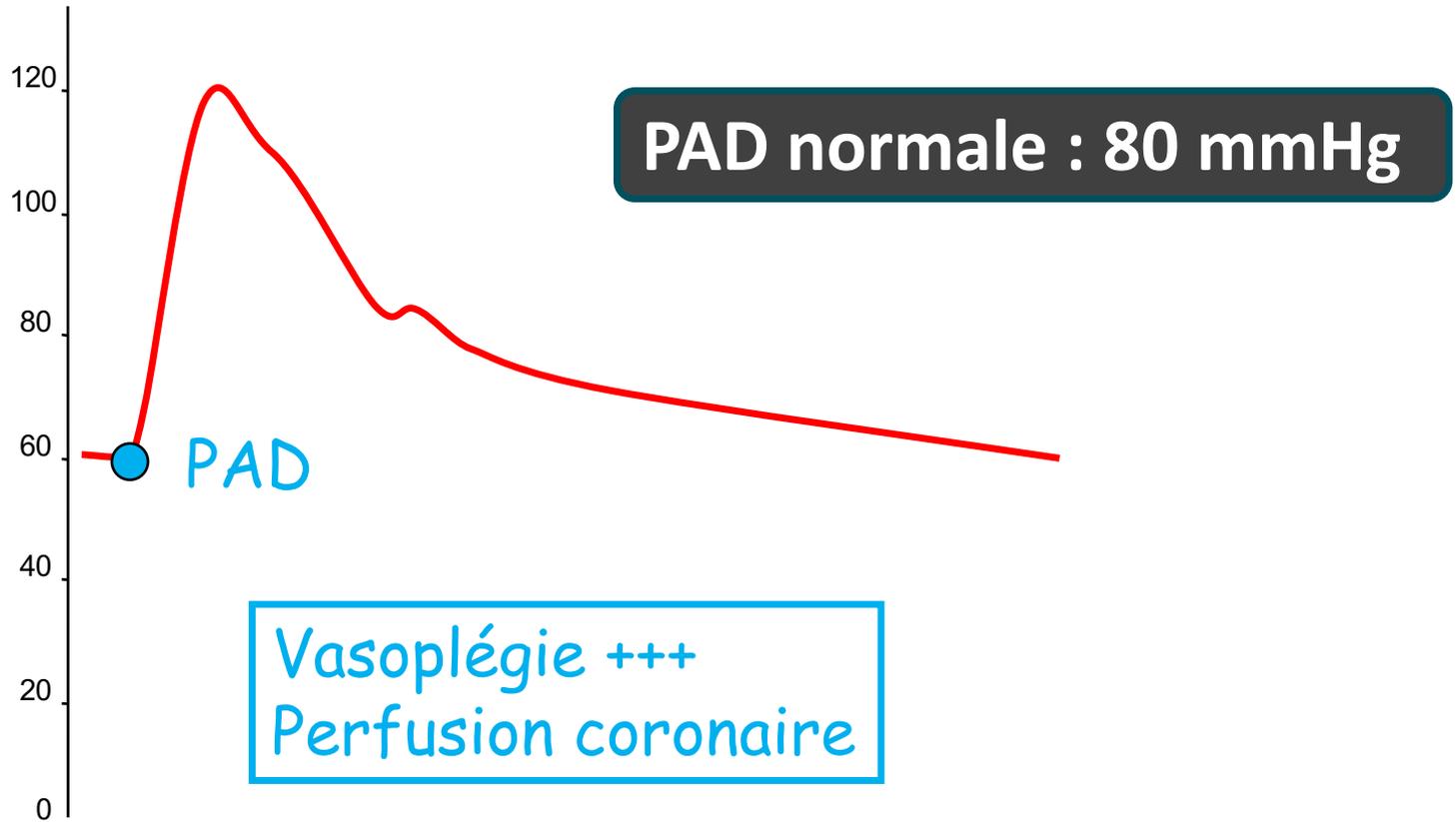


# Etats de choc : Apport de la pression artérielle

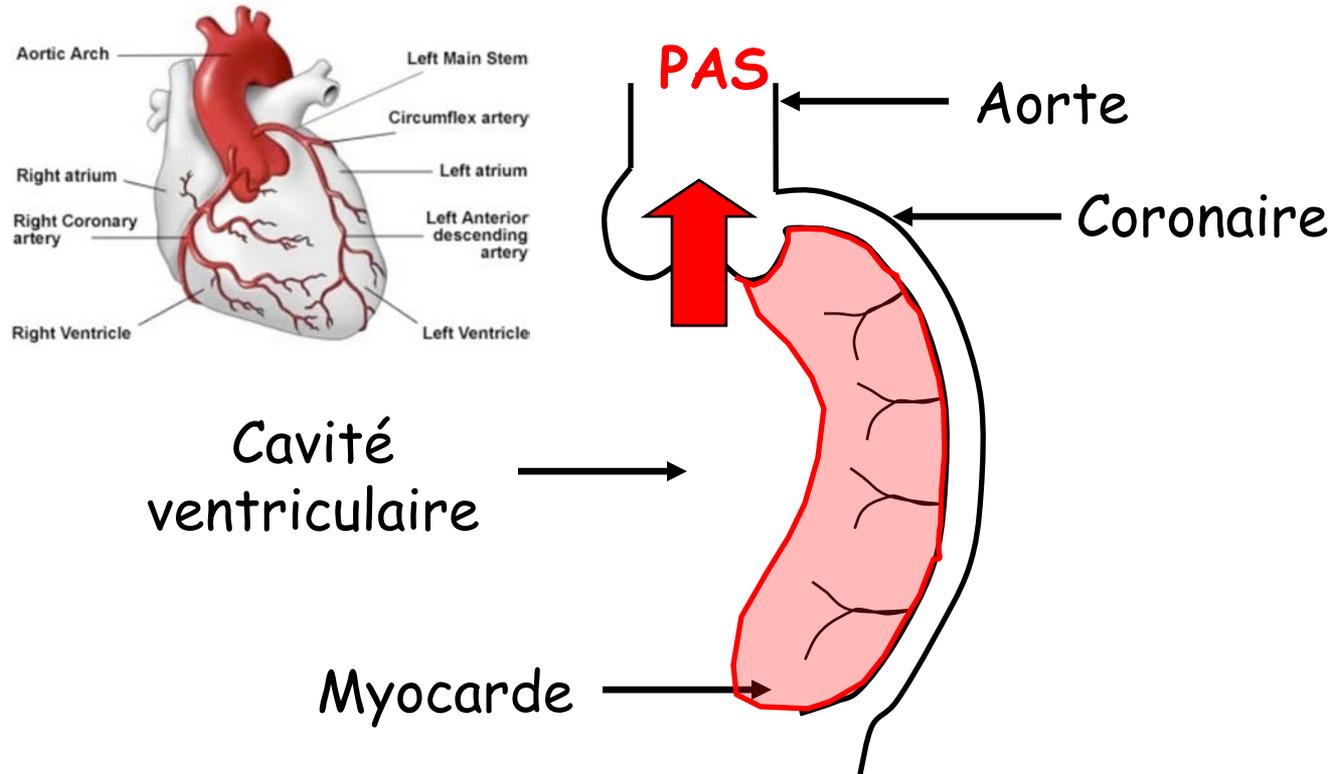


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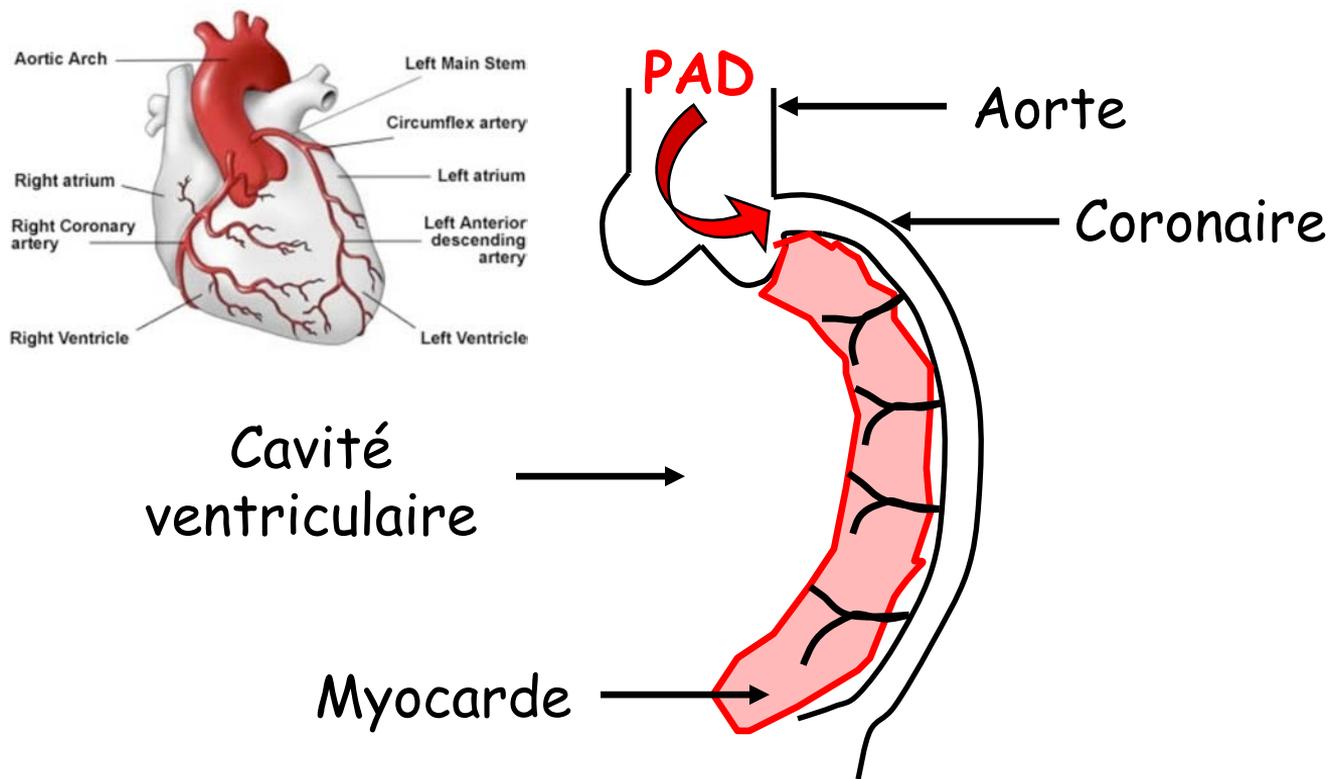




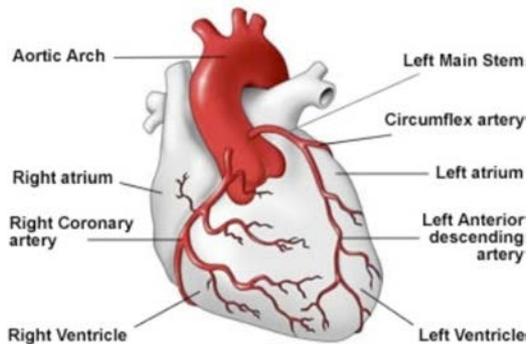
# Etats de choc : Apport de la pression artérielle



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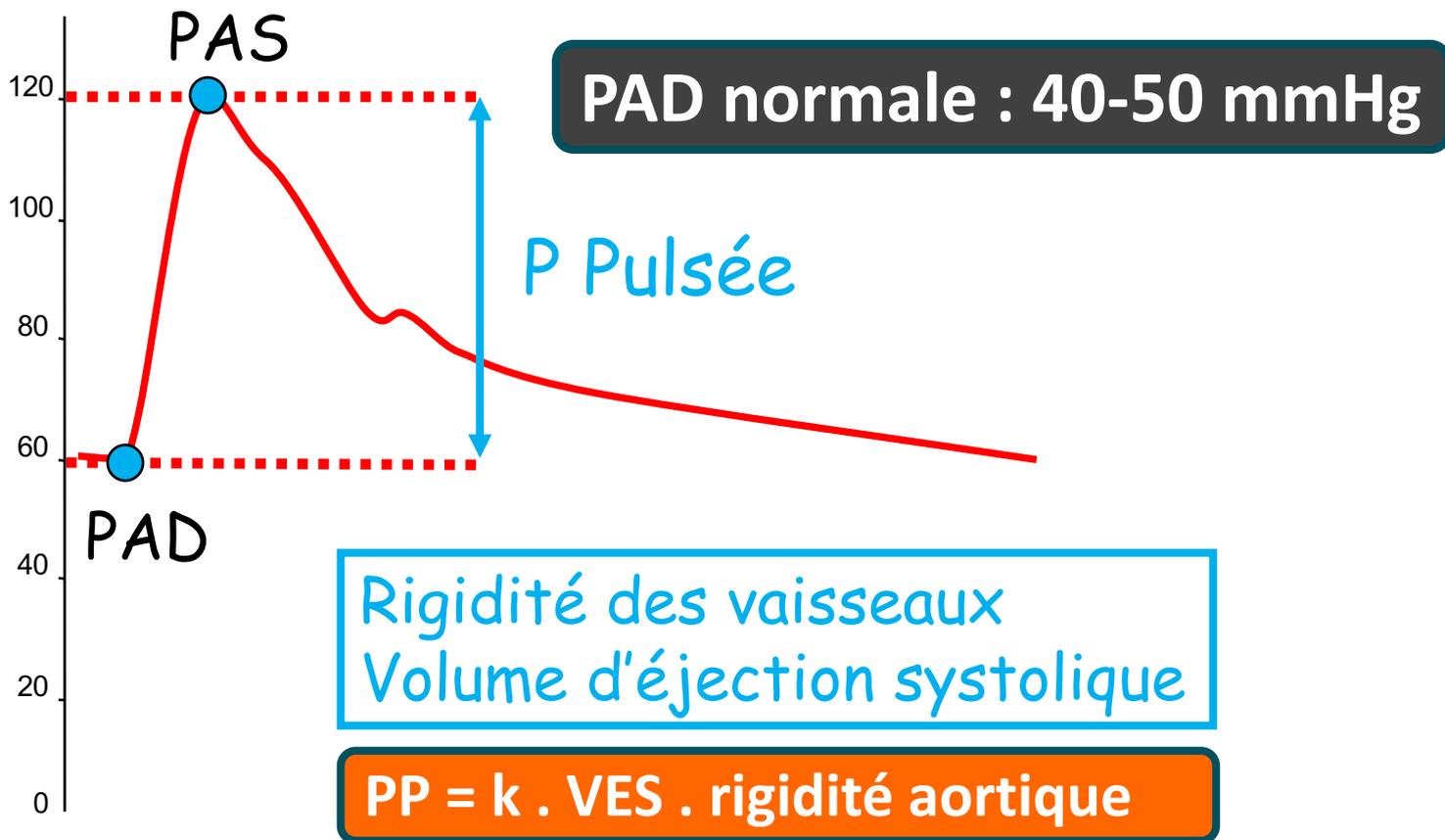


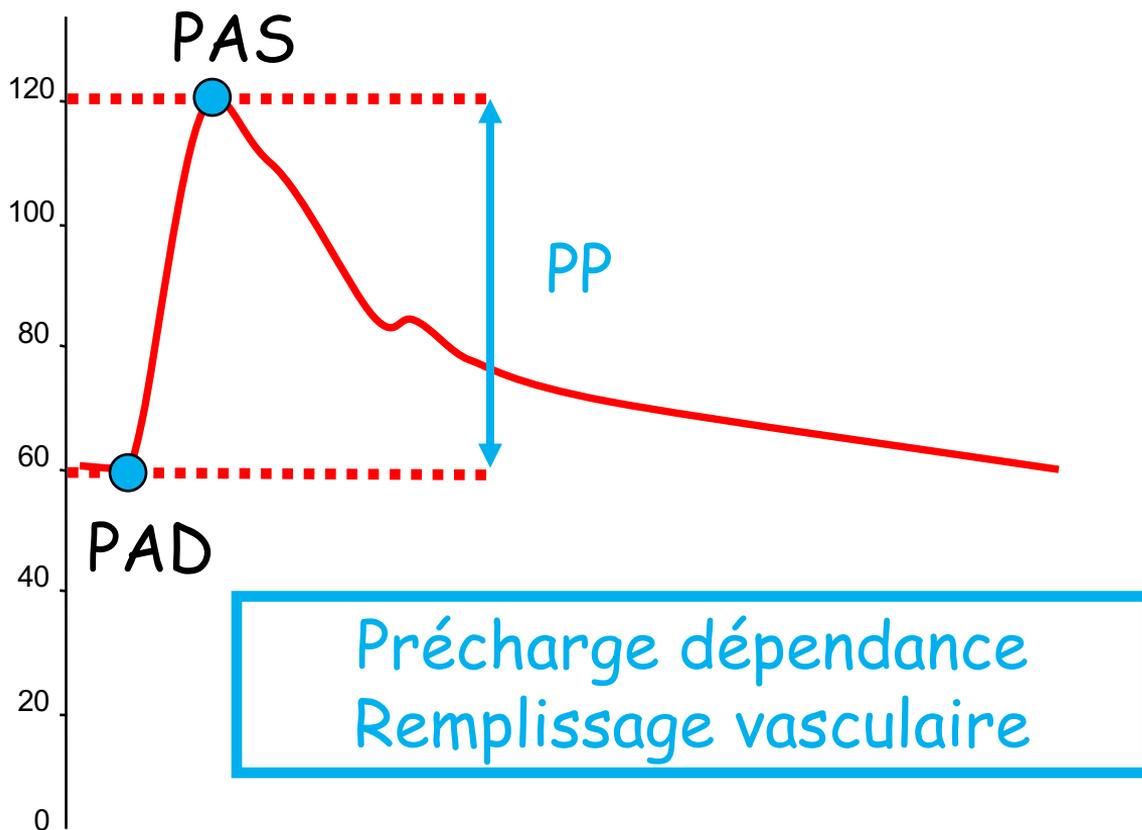
Sténose  
coronaire

Myocarde

Si PAD < 40 mmHg : indication de NORADRENALINE\*

\* Dans le choc septique



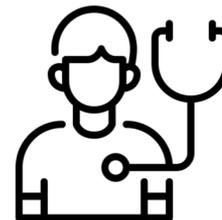




**Insuffisance circulatoire ?**

Hypotension artérielle / bas débit / hypoperfusion ?

**oui**



**Hypovolémie évidente ?**

Hémorragie active, phase initiale choc septique, etc

**oui**

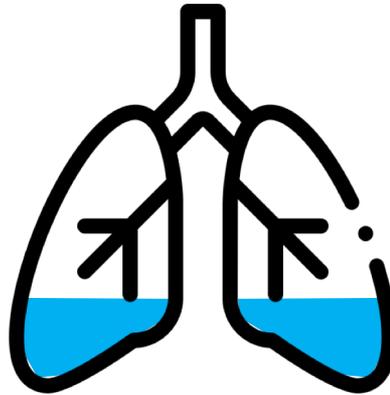
**non**

**Remplissage**

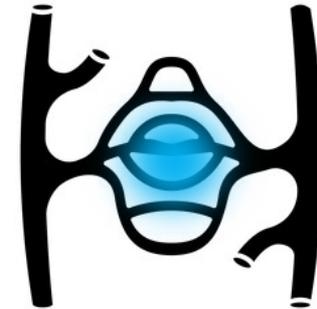
**Précharge dépendance ?**



**Oedèmes  
périphériques**

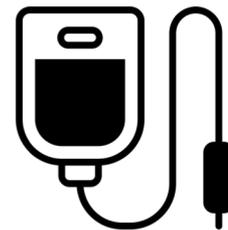
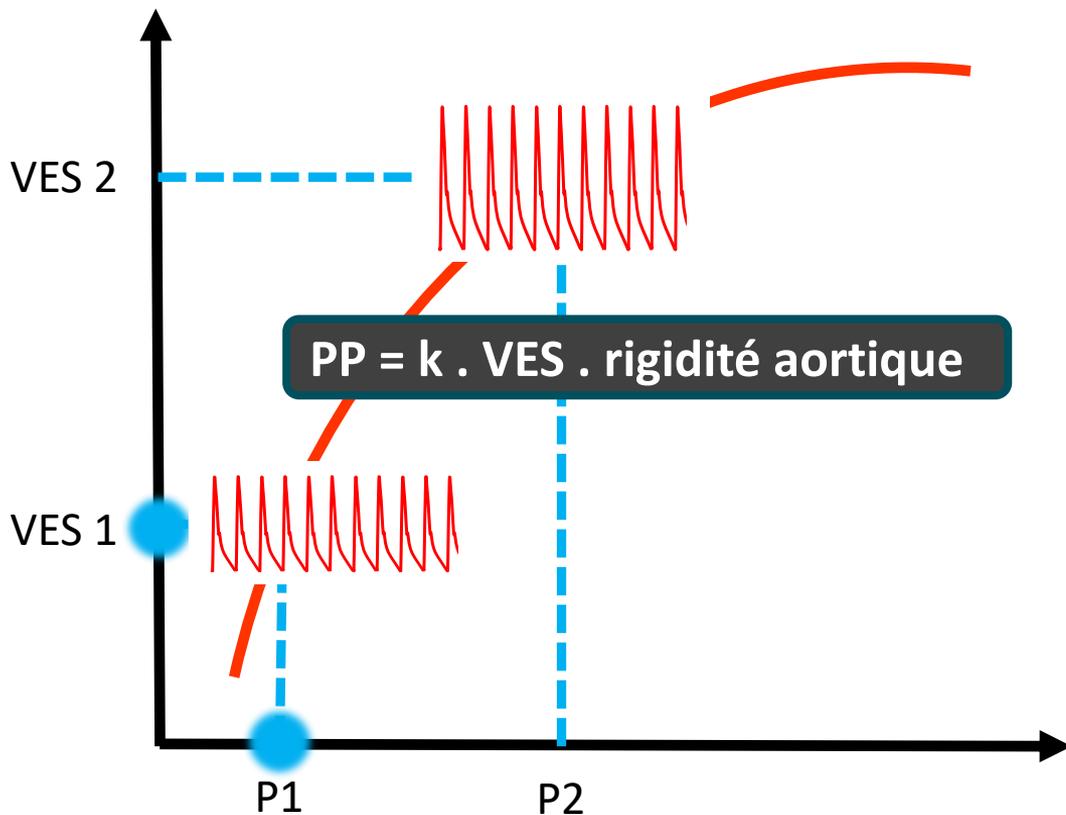


**Oedème  
pulmonaire**



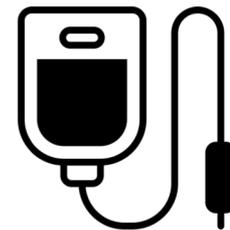
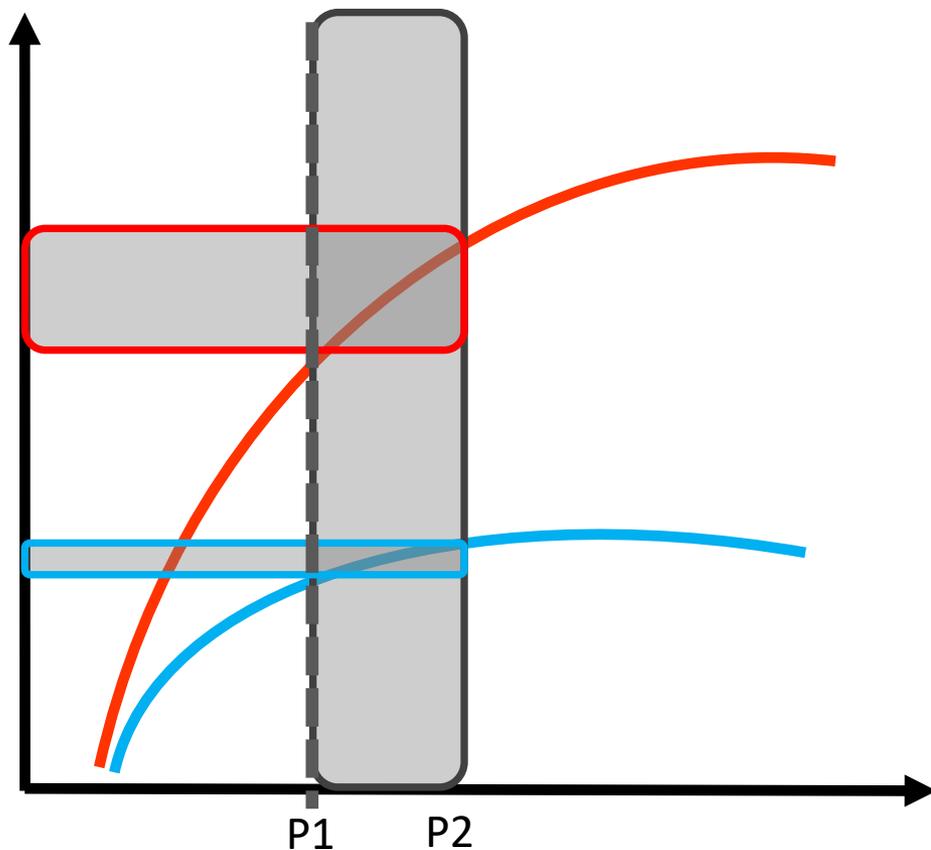
**Altération de la  
microcirculation**

Volume d'éjection  
systolique



Précharge  
cardiaque

Volume d'éjection  
systolique



Précharge  
cardiaque

# Etats de choc : Apport de la pression artérielle

Augmentation  $P_{ALV}$



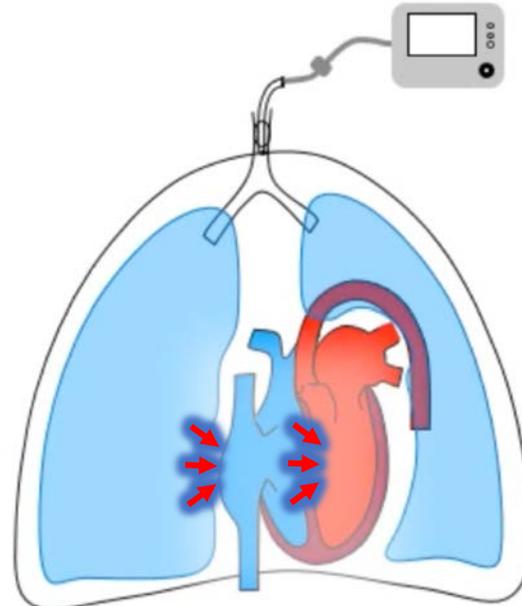
Augmentation  $P_{OD}$



Chute gradient  
retour veineux



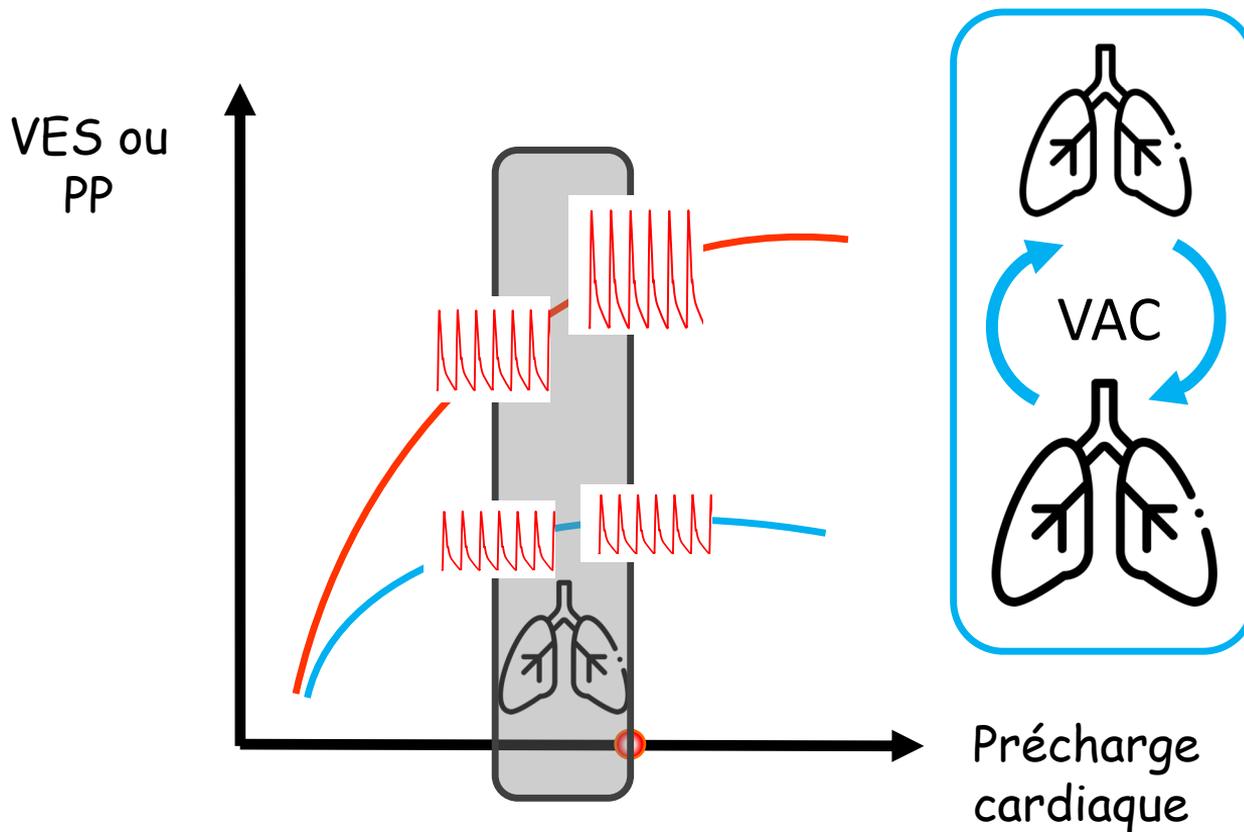
Si pré-charge  
dépendance

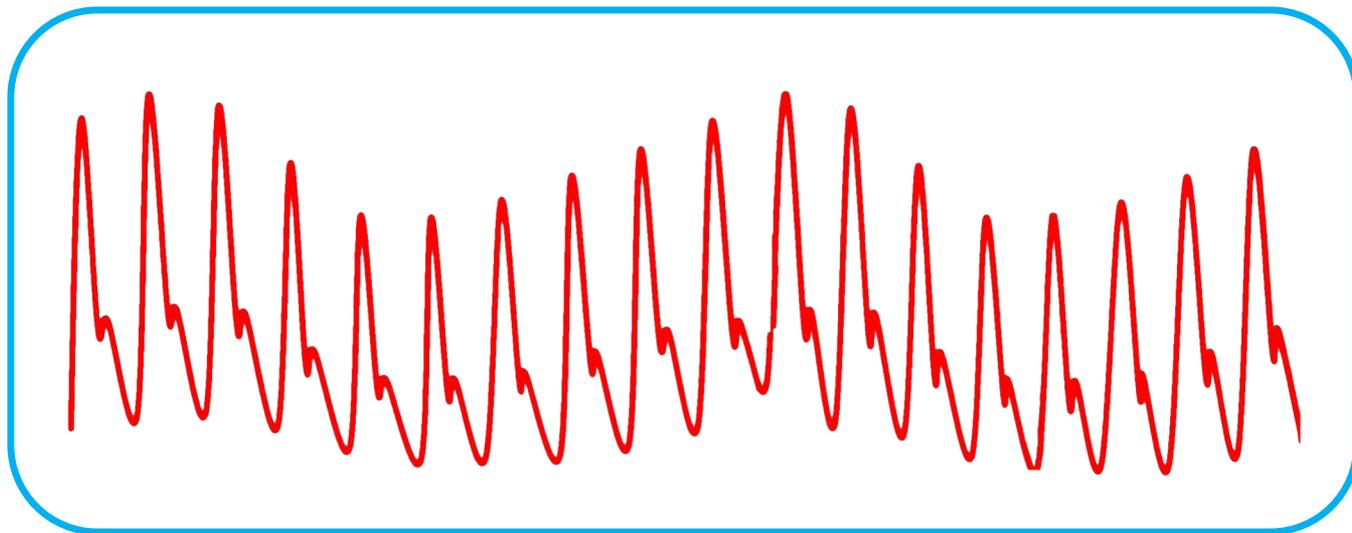


Baisse du volume d'éjection



Baisse PP

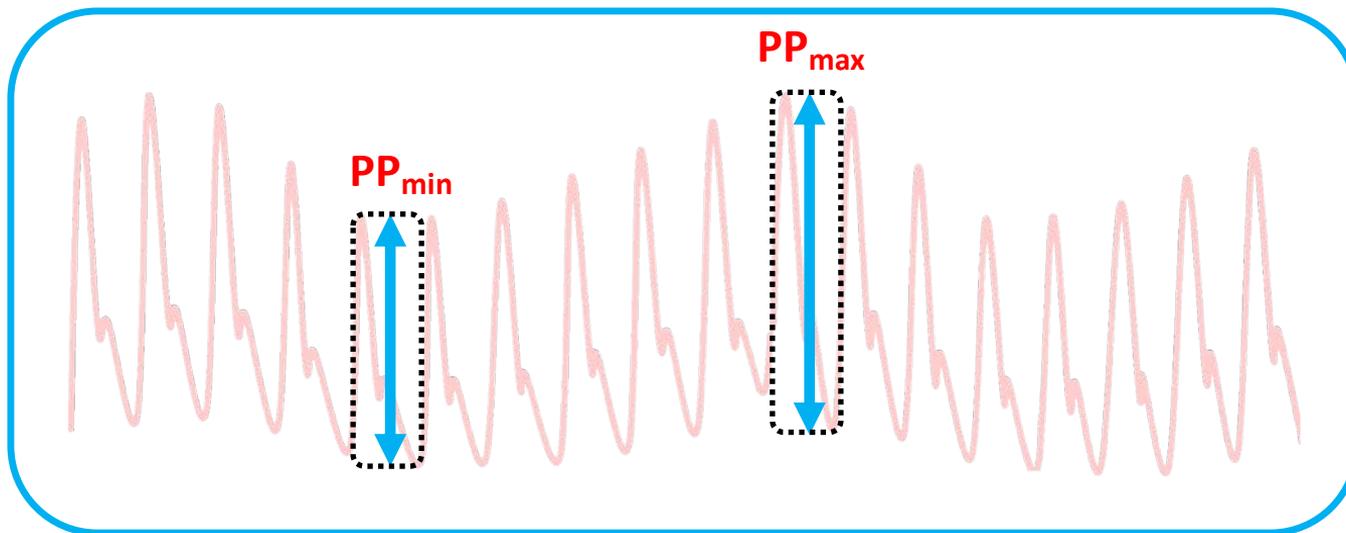


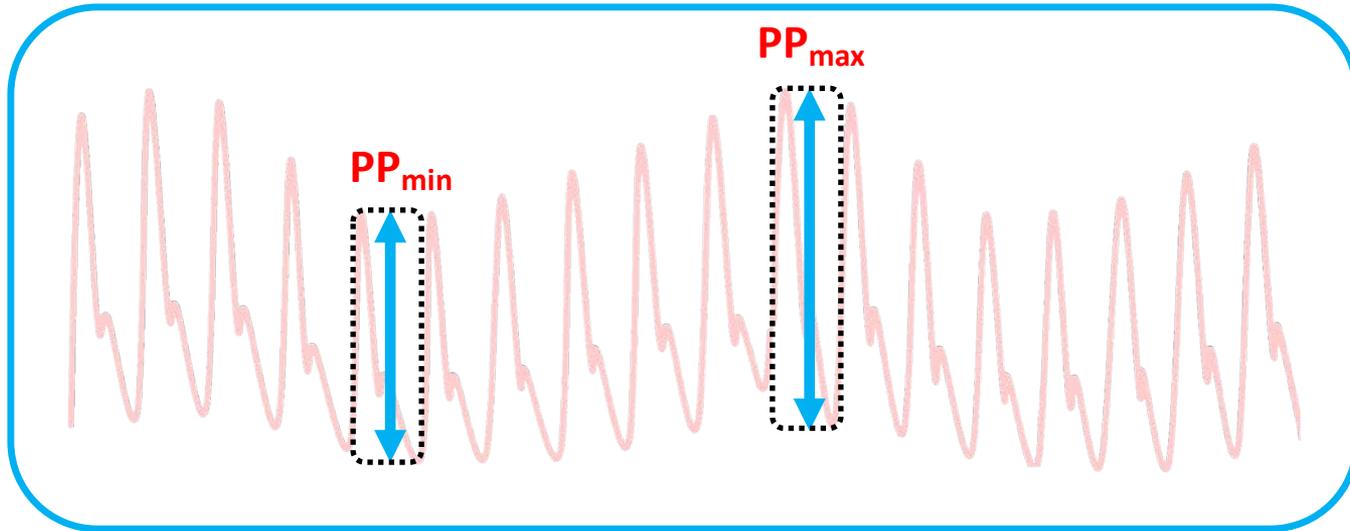


PP

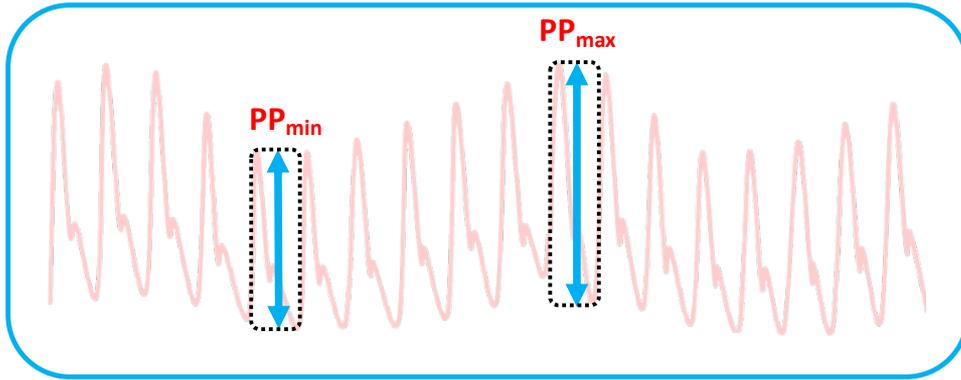
Volume d'éjection systolique

Résistances vasculaires





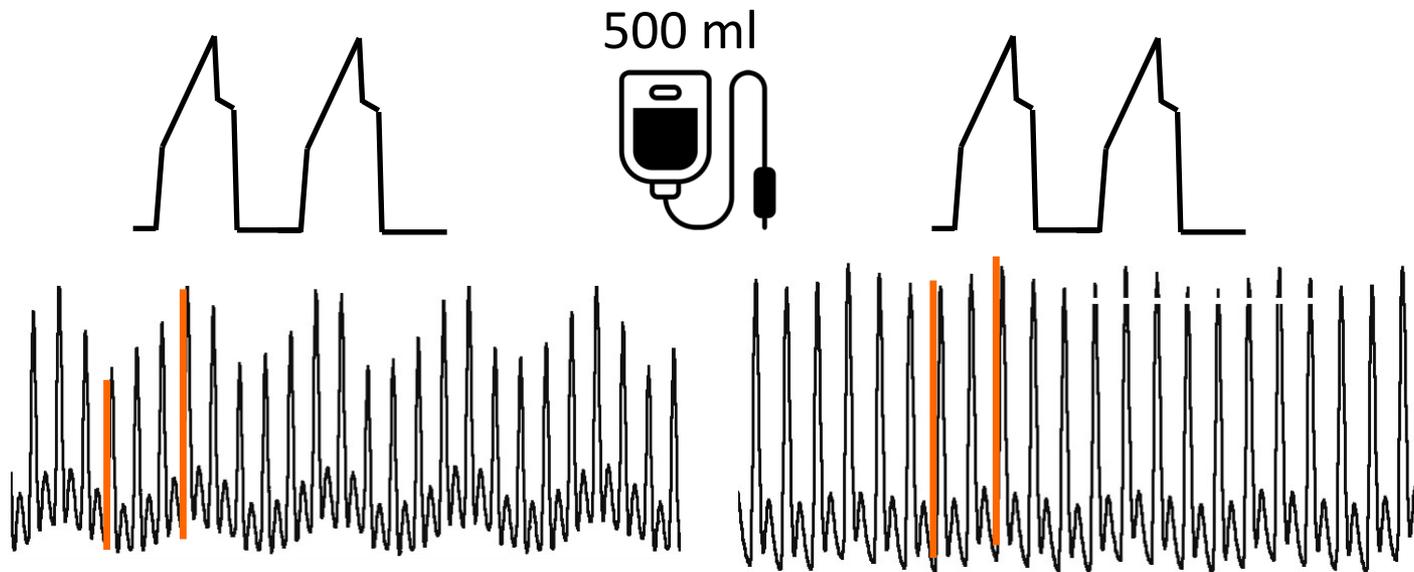
$$\Delta PP =$$



$$\Delta PP = (PP_{max} - PP_{min}) / \left( \frac{PP_{max} + PP_{min}}{2} \right)$$

**Si deltaPP > 12% : > 90% réponse au remplissage**

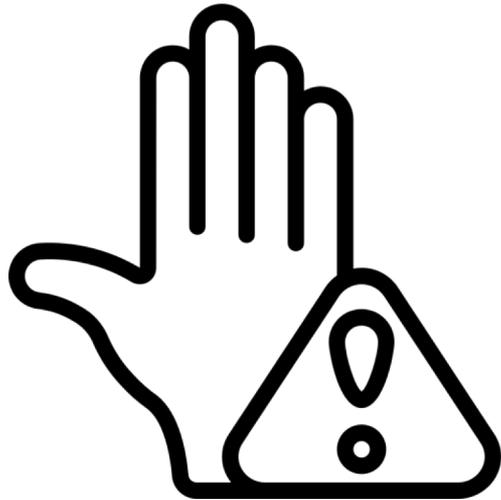
# Etats de choc : Apport de la pression artérielle



$\Delta PP = 26\%$   
 $DC = 3 \text{ L/min}$

$\Delta PP = 5\%$   
 $DC = 4 \text{ L/min}$

## Validité de la variation de PP :



**1 - Rythme sinusal**

**2 - Ventilation invasive**

**3 - Adaptation respirateur**



## Take home message

**PAM = pression perfusion**

**$\geq 65$  mmHg**

**PAD = perfusion coronaire**

**$\geq 40$  mmHg**

**DeltaPP = Remplissage ?**

**$\geq 12$  %**

**PAS = post charge VG**