



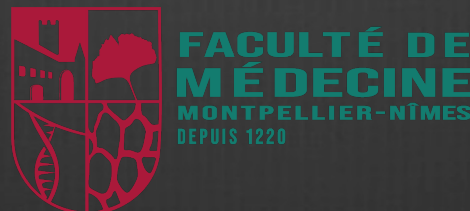
Et demain: quelle prise en charge de nos blessés ?

Monitorons nos blessés

Échographie continue

Une révolution chez le blessé dans 15 ans ?

X. Bobbia



Conflits d'intérêts



Échographie continue chez le traumatisé ?

- ⦿ Que veut-on monitorer ?
- ⦿ Que permet l'échographie – Doppler ?
- ⦿ Que peut-on imaginer ?

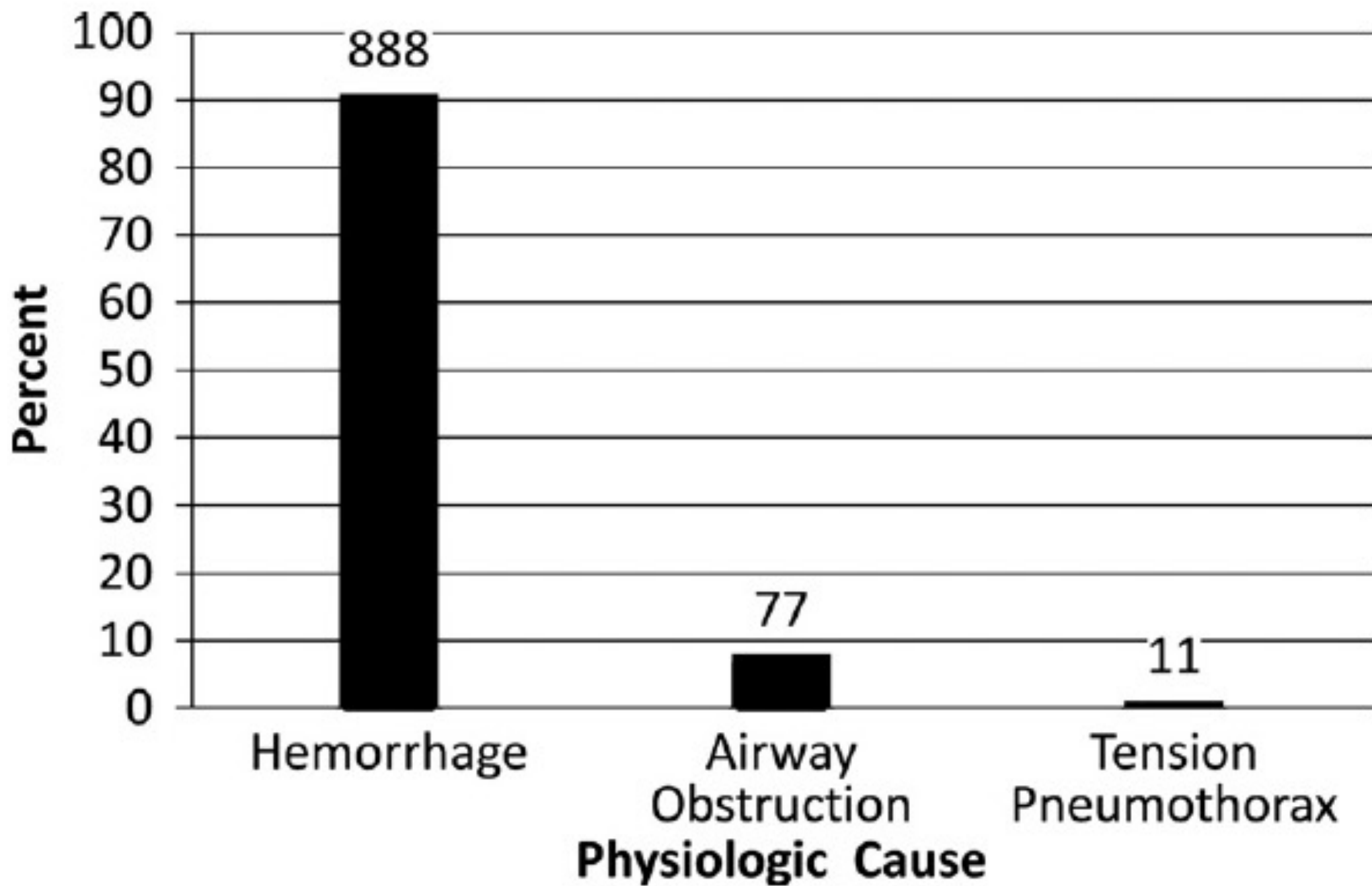
Échographie continue chez le traumatisé ?

- Que veut-on monitorer ?
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TABLE 1. Injury Focus of Patient With NS Injuries Who Died Instantaneously or Acutely Before Admission at a MTF (pre-MTF)

Cause of Death	Instantaneous (n = 1,619)	Acute (n = 1,624)
Brain injury	38.3% (620)	53.0% (753)
High spinal cord injury	—	9.2% (131)
Dismemberment	31.6% (512)	—
Heart/thoracic injury	23.6% (383)	21.8% (310)
Open pelvic injury	—	6.5% (93)
Other	6.5% (104)	9.5% (134)

Values are percentages of the total deaths and the number of deaths.



Etats de choc: 4 modèles

Bas débit

Cardiogénique

Hypovolémique

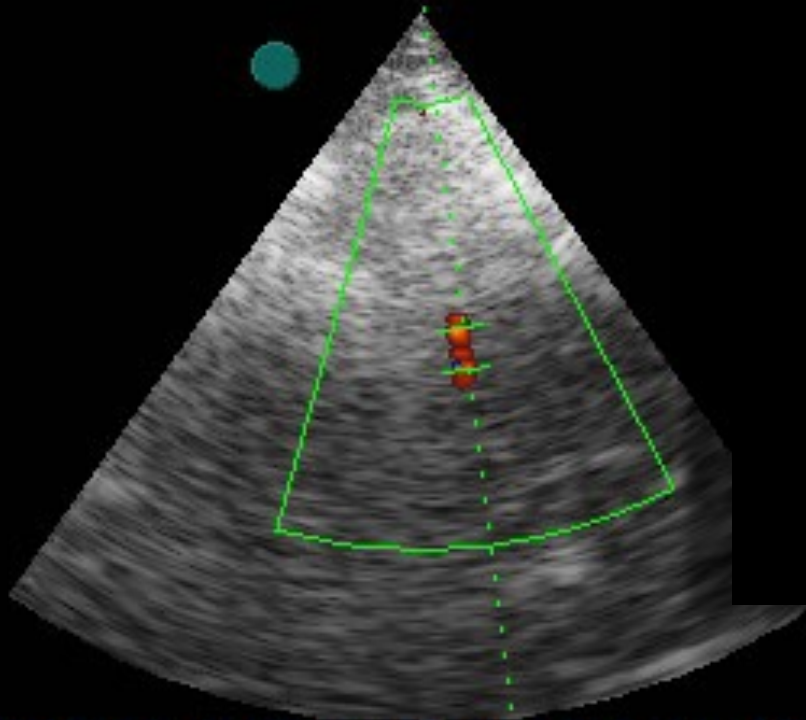
Obstrusif

Haut débit

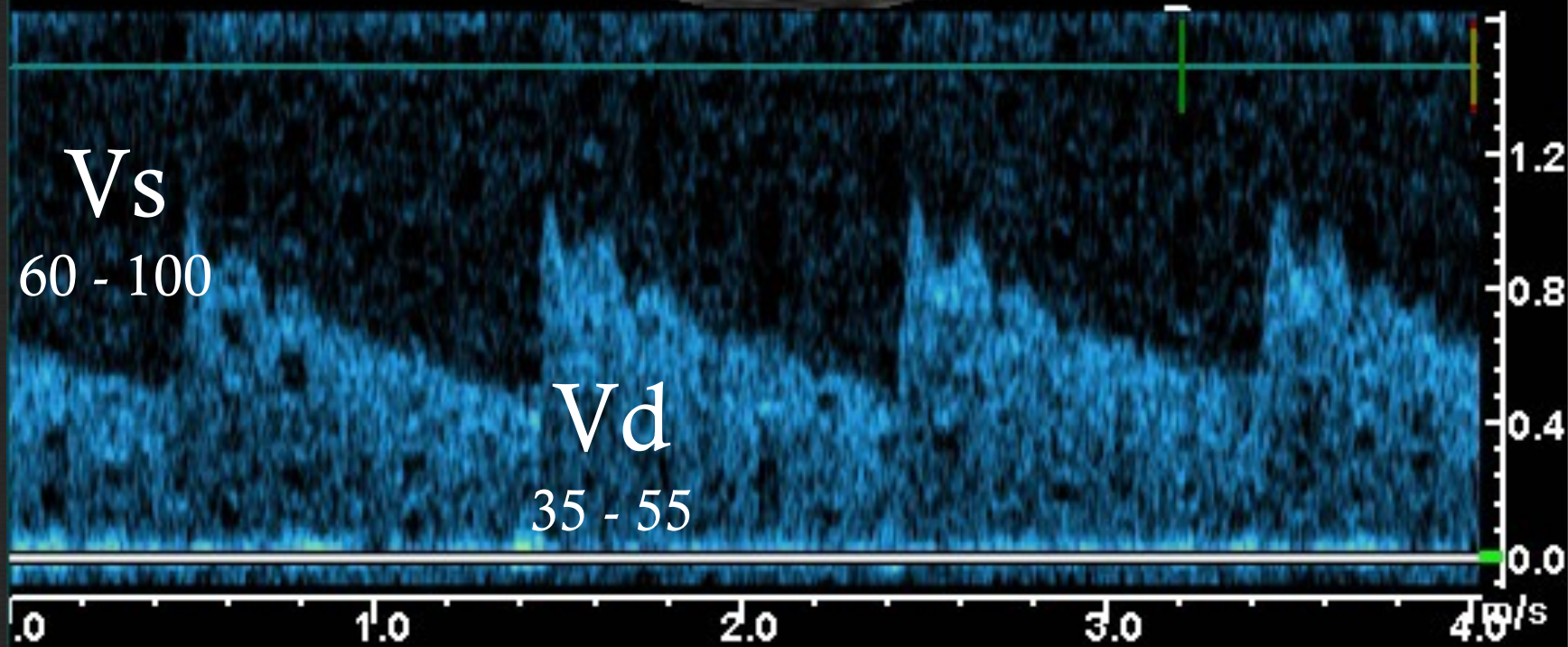
Distributif

Échographie continue chez le traumatisé ?

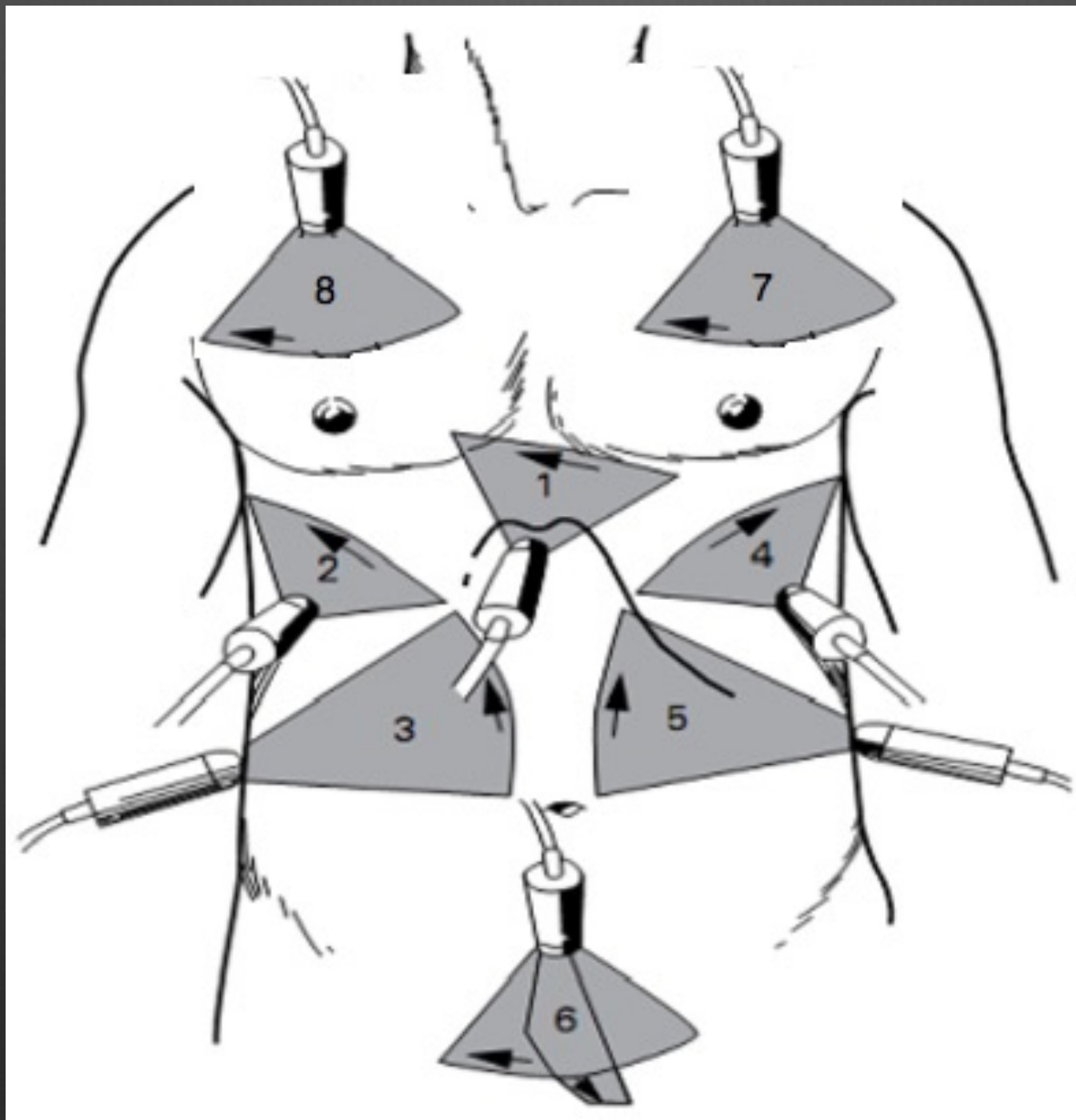
- ⦿ Que veut-on monitorer ?
- ⦿ Que permet l'échographie – Doppler ?
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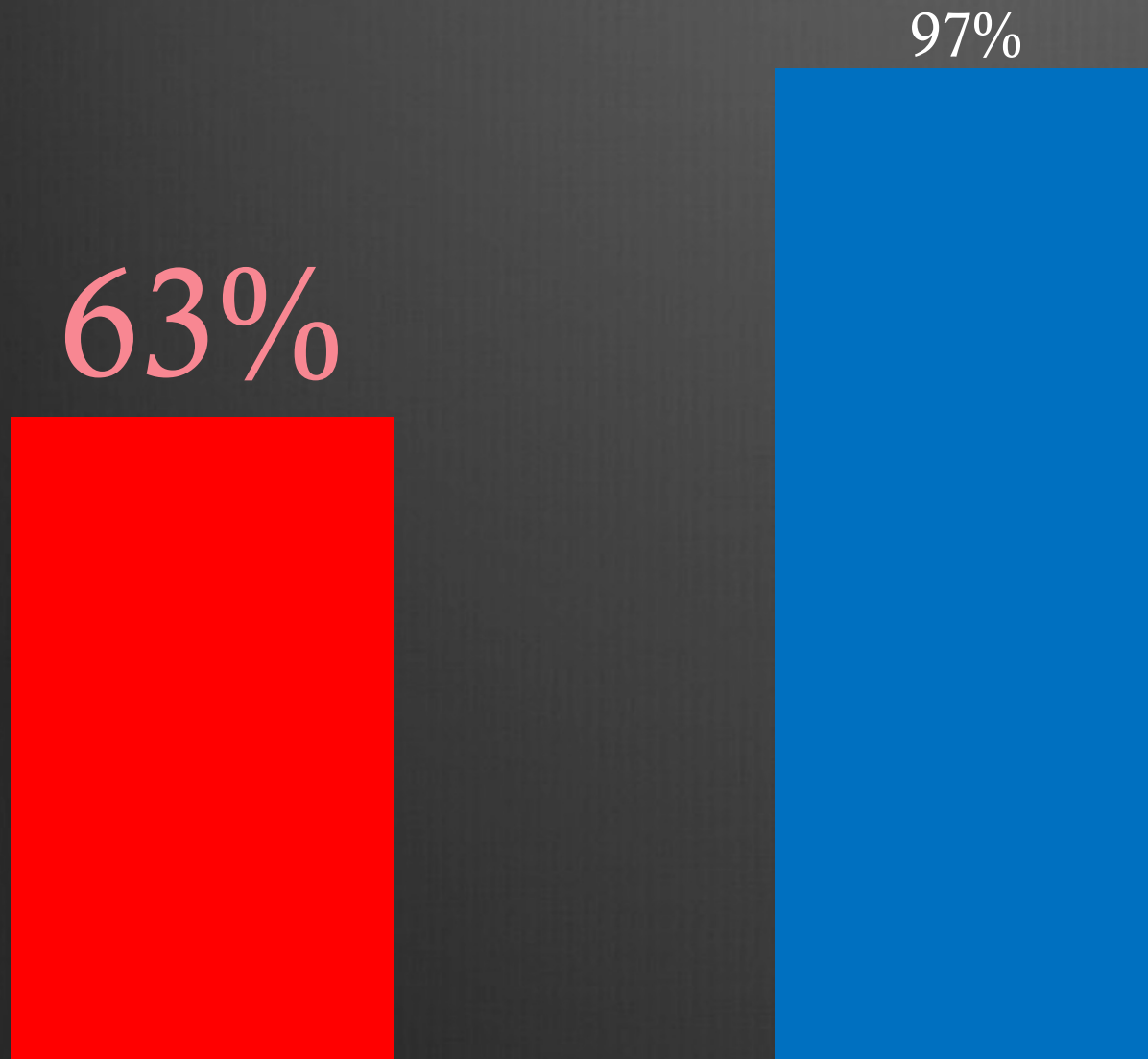
$$IP = \frac{V_s - V_d}{V_m}$$



V_m
35 - 70



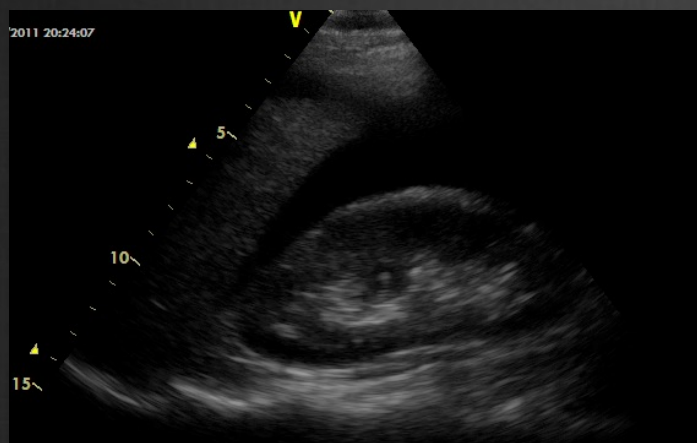
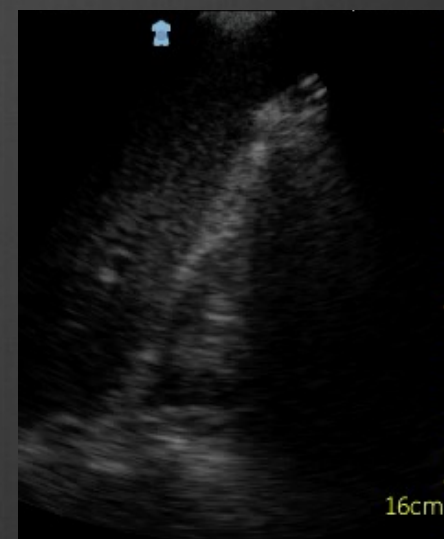
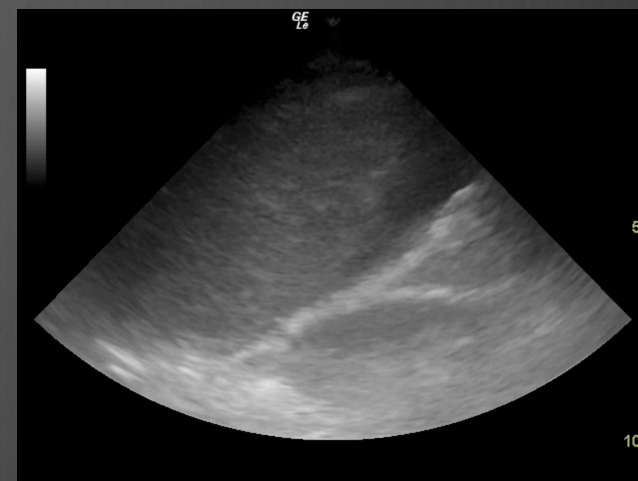
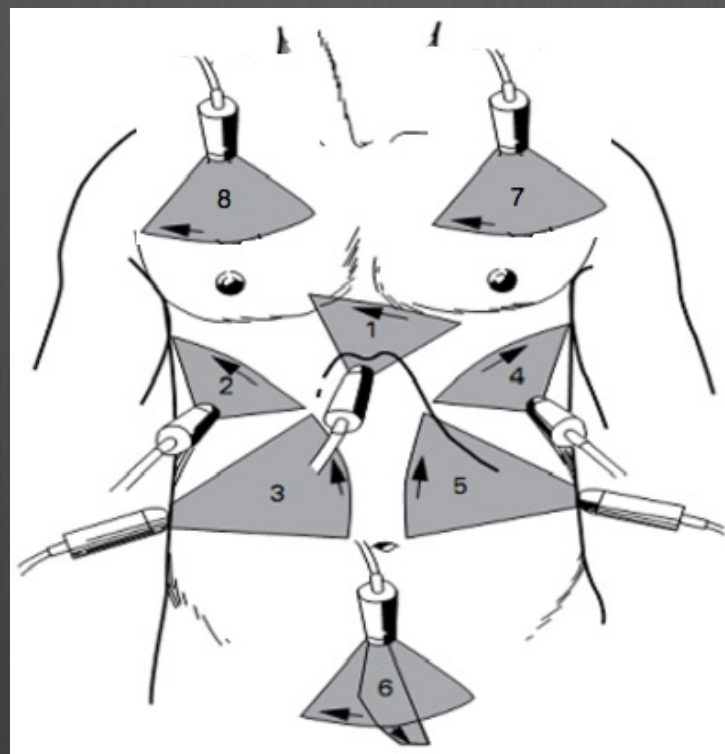
pFAST pour hémopéritoine

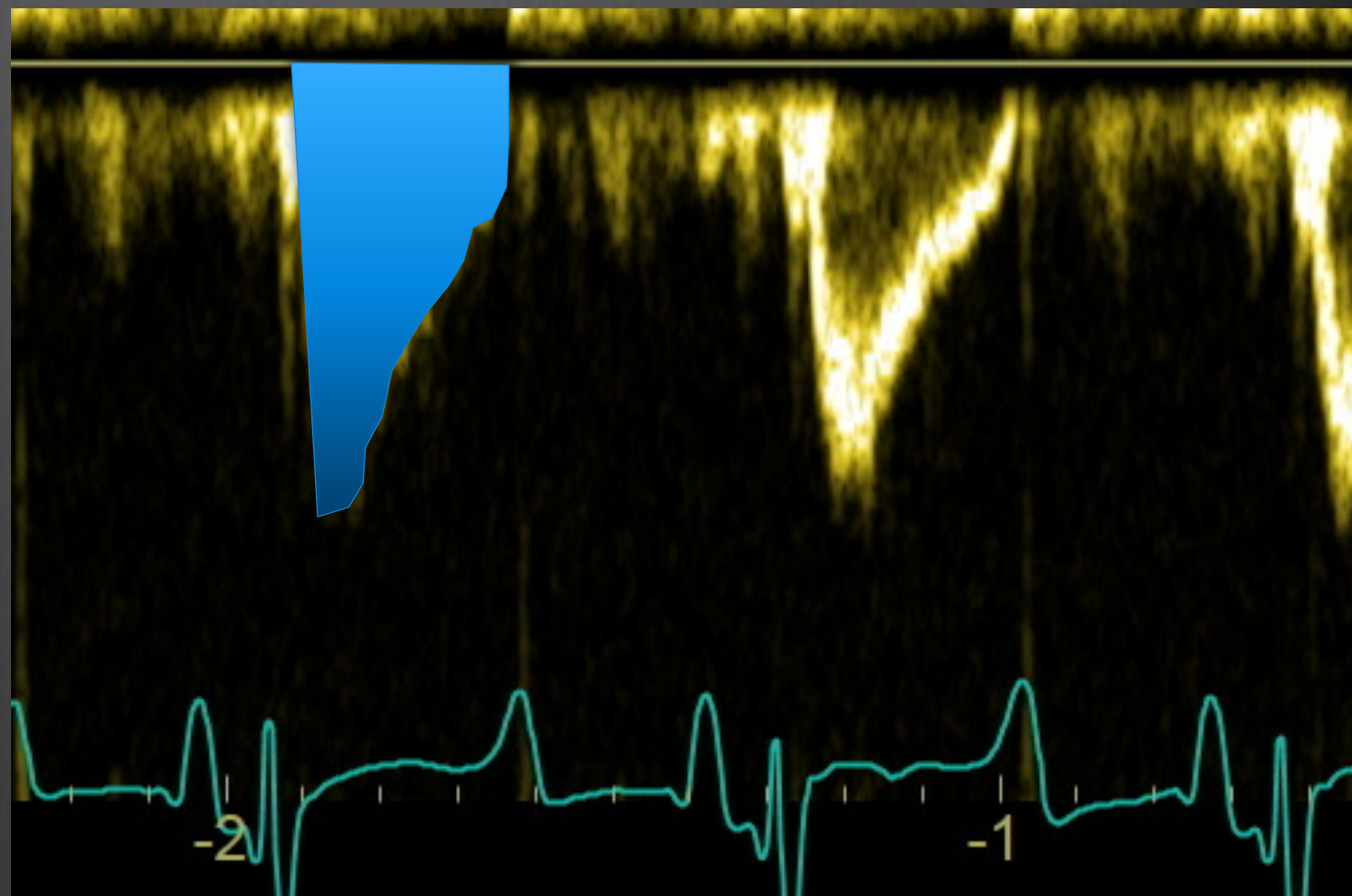
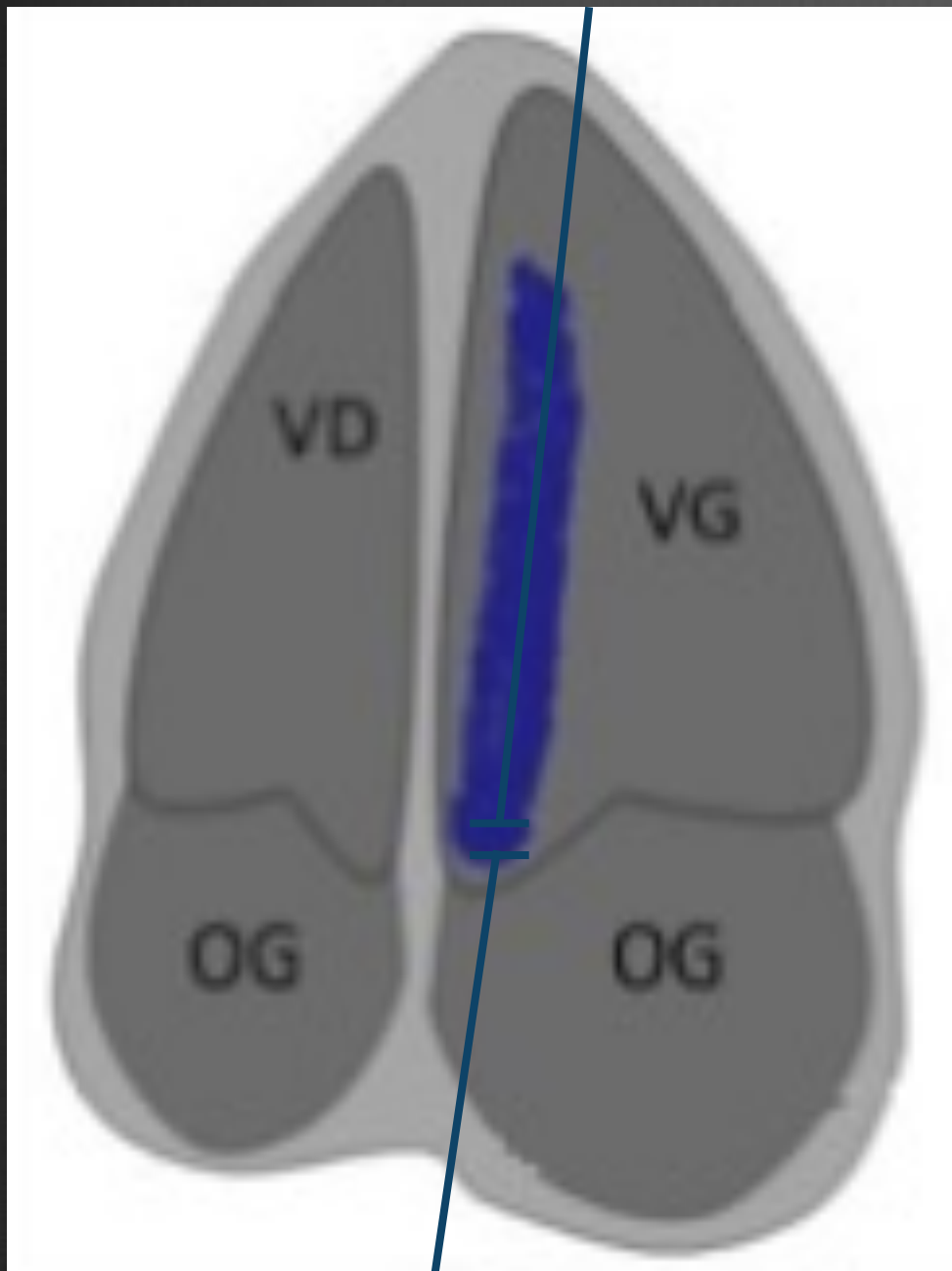


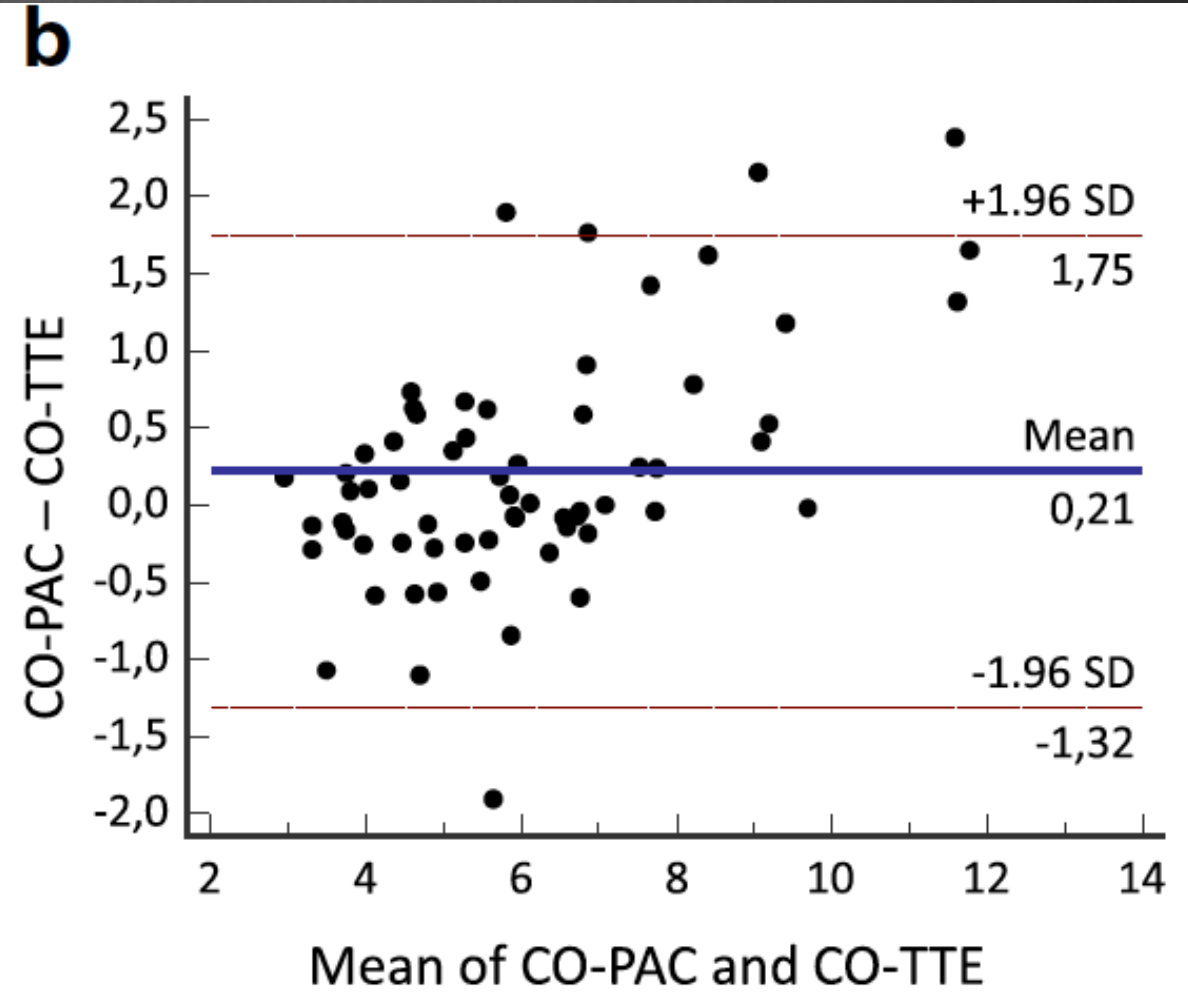
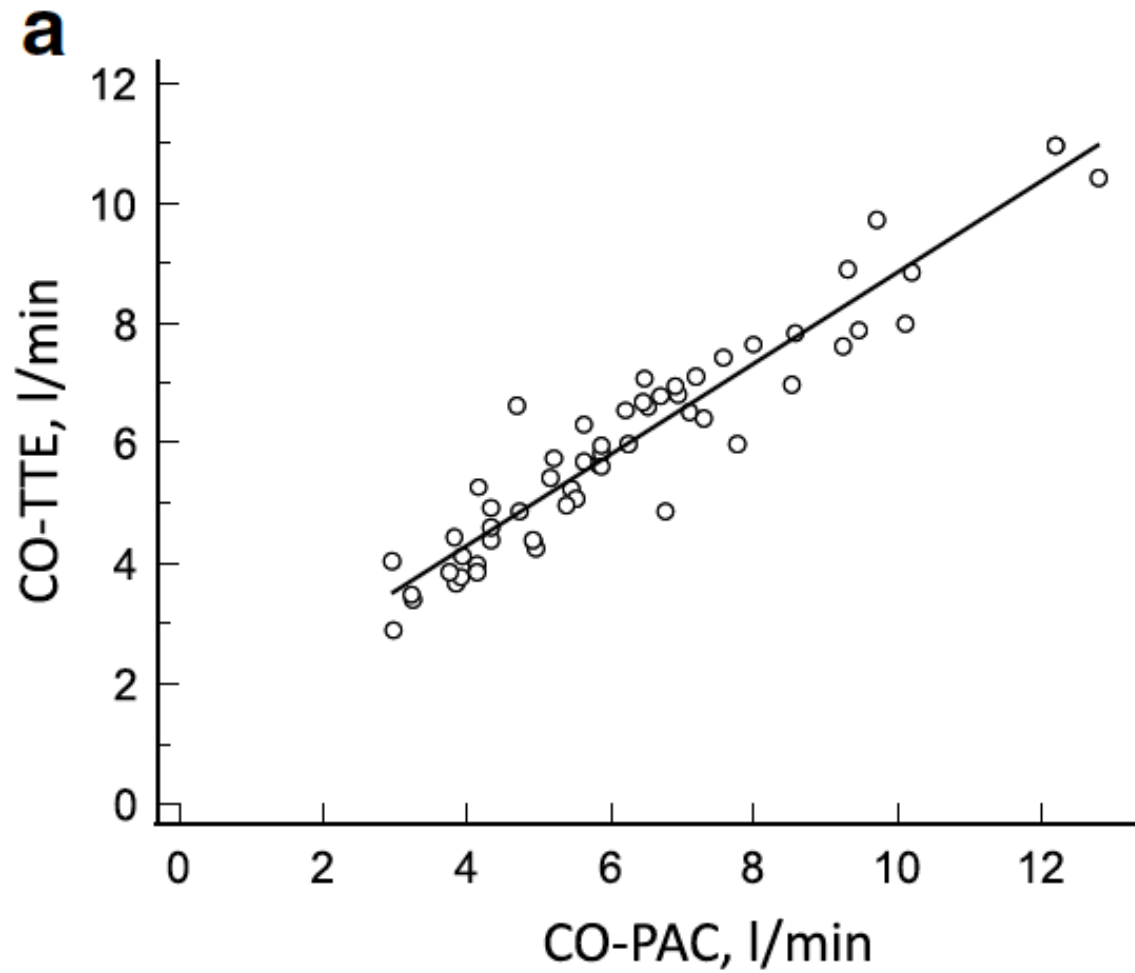
21 Études
5790 patients

Se

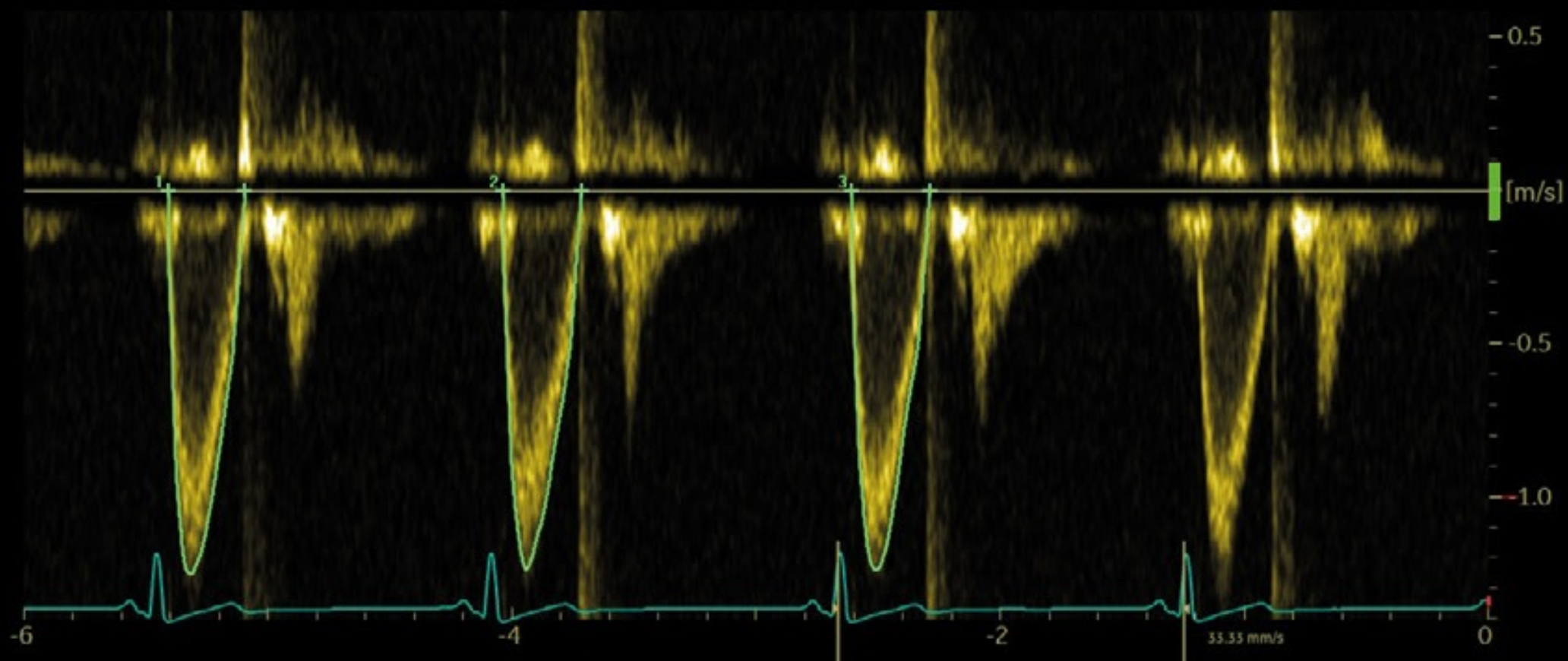
Sp







Av	LVOT Vmax	1.24 m/s
	LVOT Vmean	0.84 m/s
	LVOT maxPG	6.19 mmHg
	LVOT meanPG	3.28 mmHg
	LVOT VTI	26.6 cm
	LVOT Env.Ti	318 ms
	HR	43 BPM



FPS: 49

f: 1.7 MHz/3.4 MHz

AG(t): 0 dB

D: 16.0 cm

GE
Verat

Auto

5

10

15





Ss Ao Diam 15.0 mm

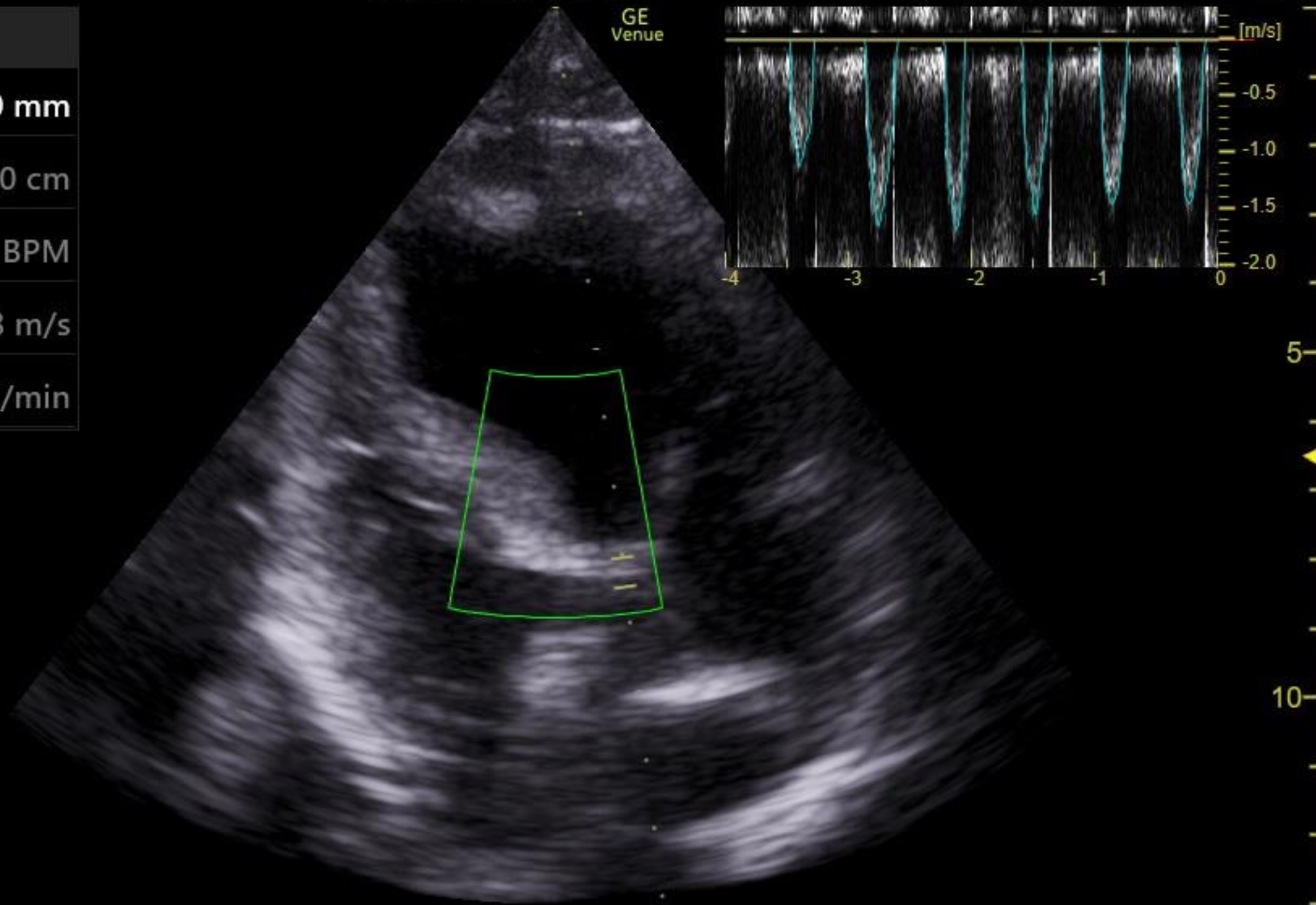
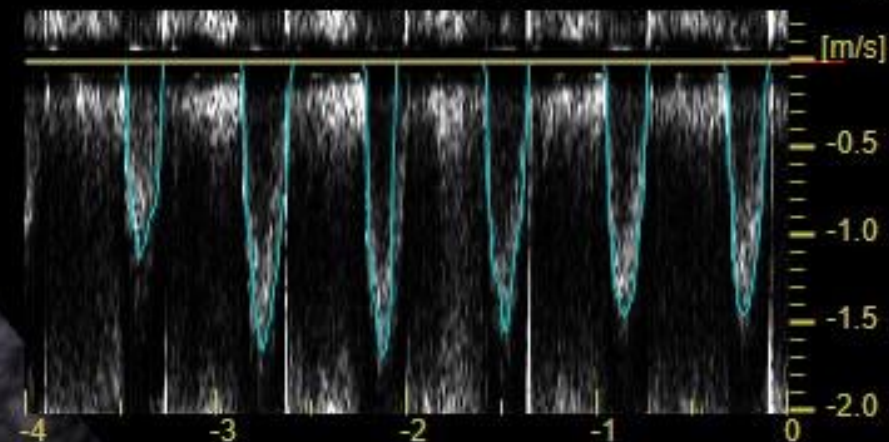
Ss Ao ITV 22.0 cm

FC 95 BPM

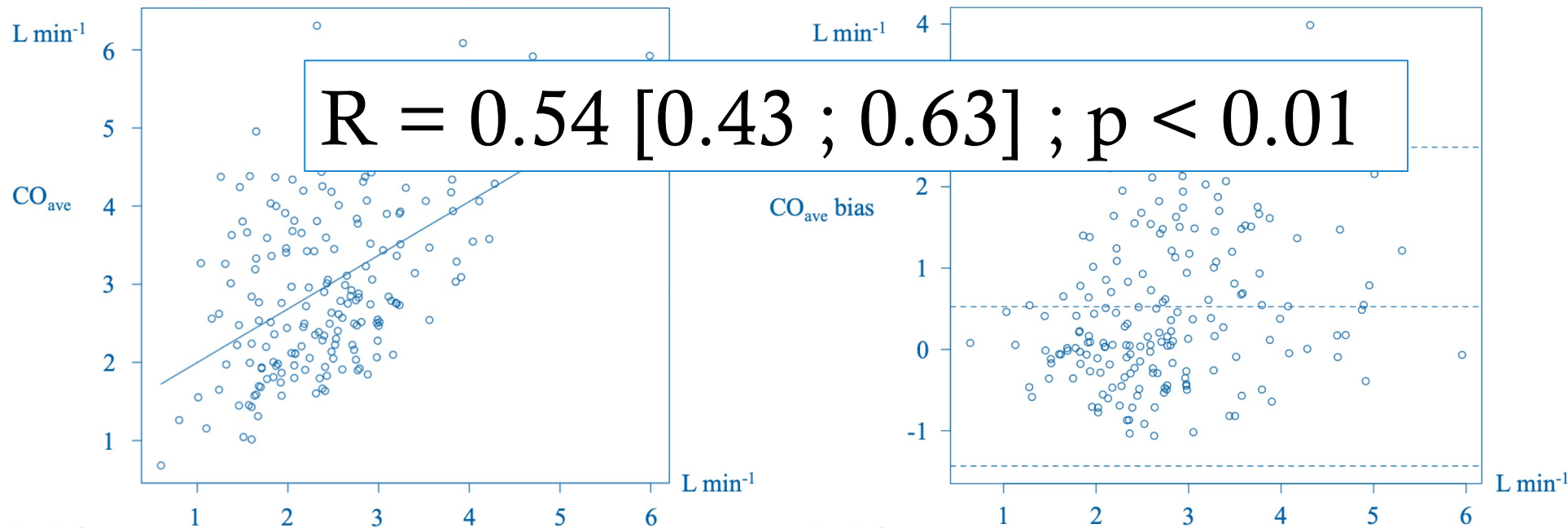
Ss Ao Vmax 1.48 m/s

Débit Syst. 3.7 l/min

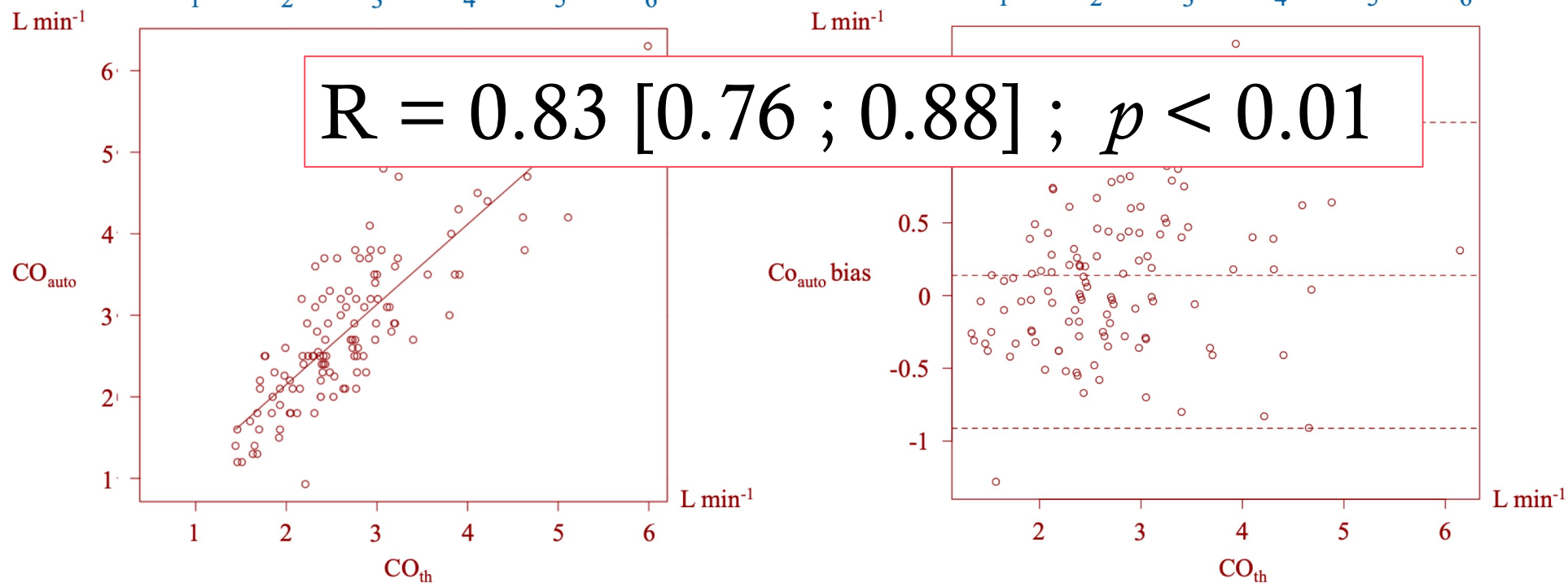
GE
Venue



Manuel
3 ITV



Automatique
4s d'ITV



Carotid / LA2-14A / 3.0cm

TIs 0.2 / Tib 0.7 / MI 0.42

[2D]

Res2

Gn 50

DR 100

FA 5

P 92%

[C]

Gen

Gn 57

PRF 3.87kHz

P 90%

[PW]

Gen

Gn 45

PRF 4.85kHz

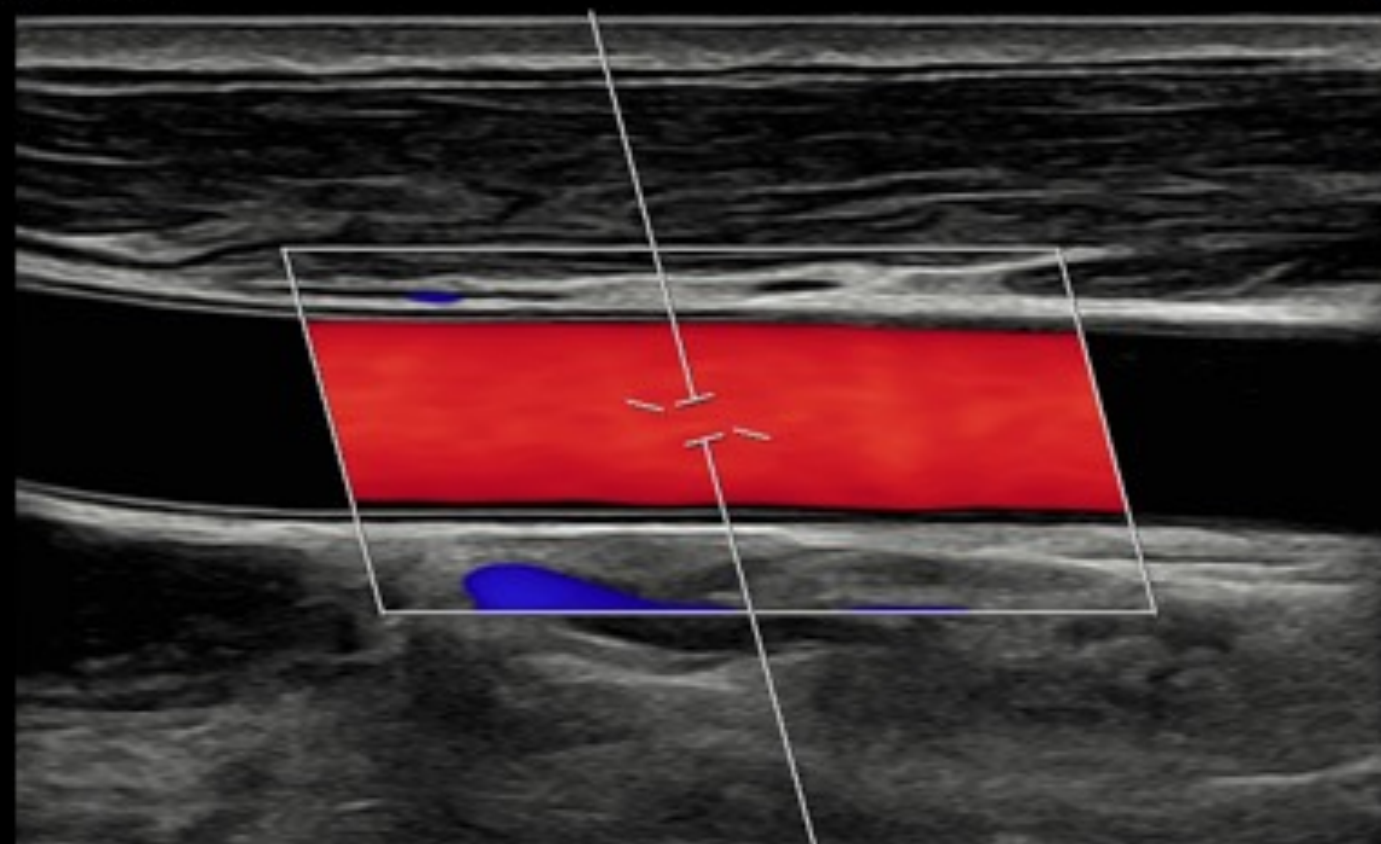
WF 104Hz

P 90%

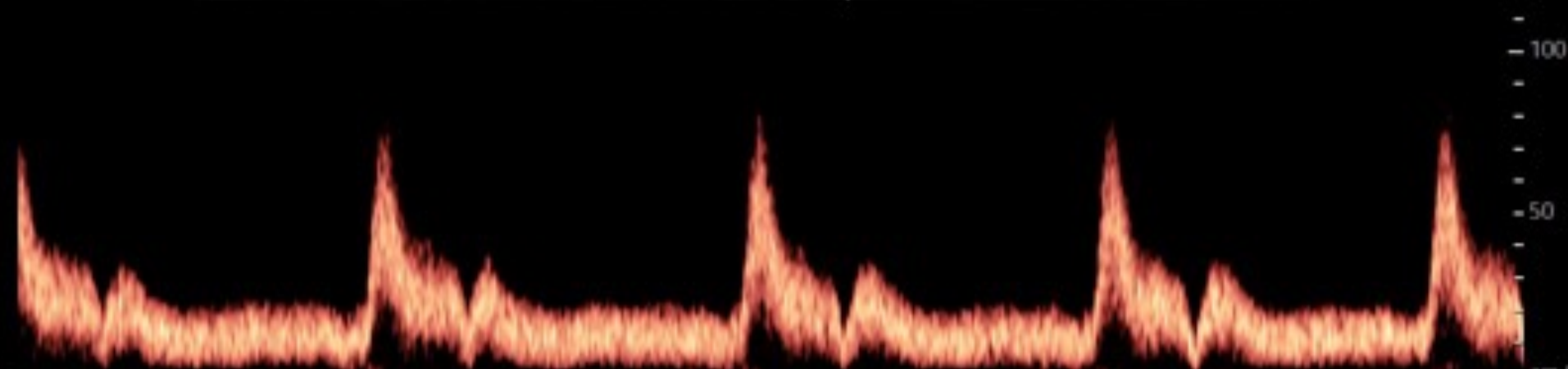
SV 1.5mm

A -60°

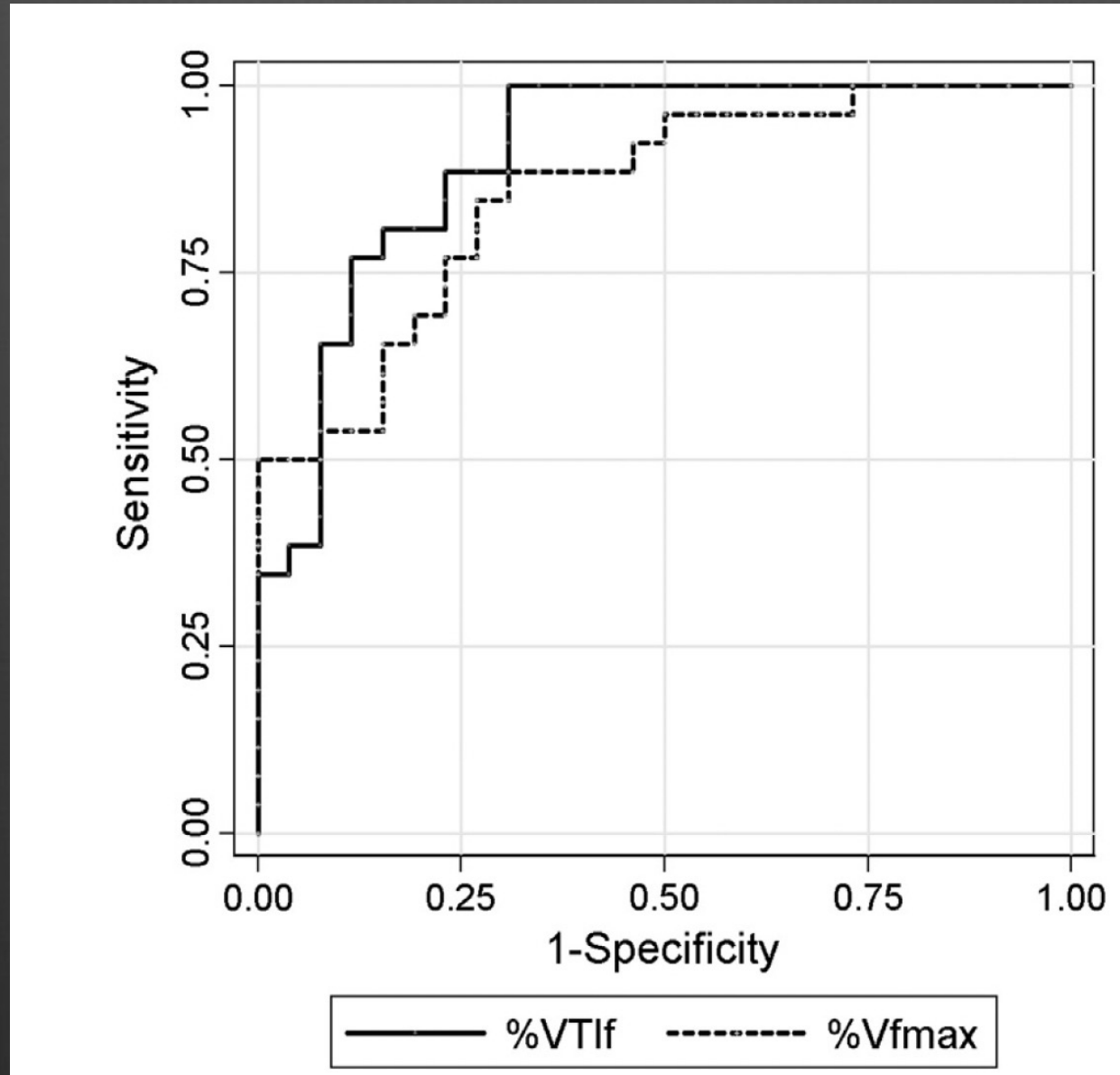
SVD 1.5cm



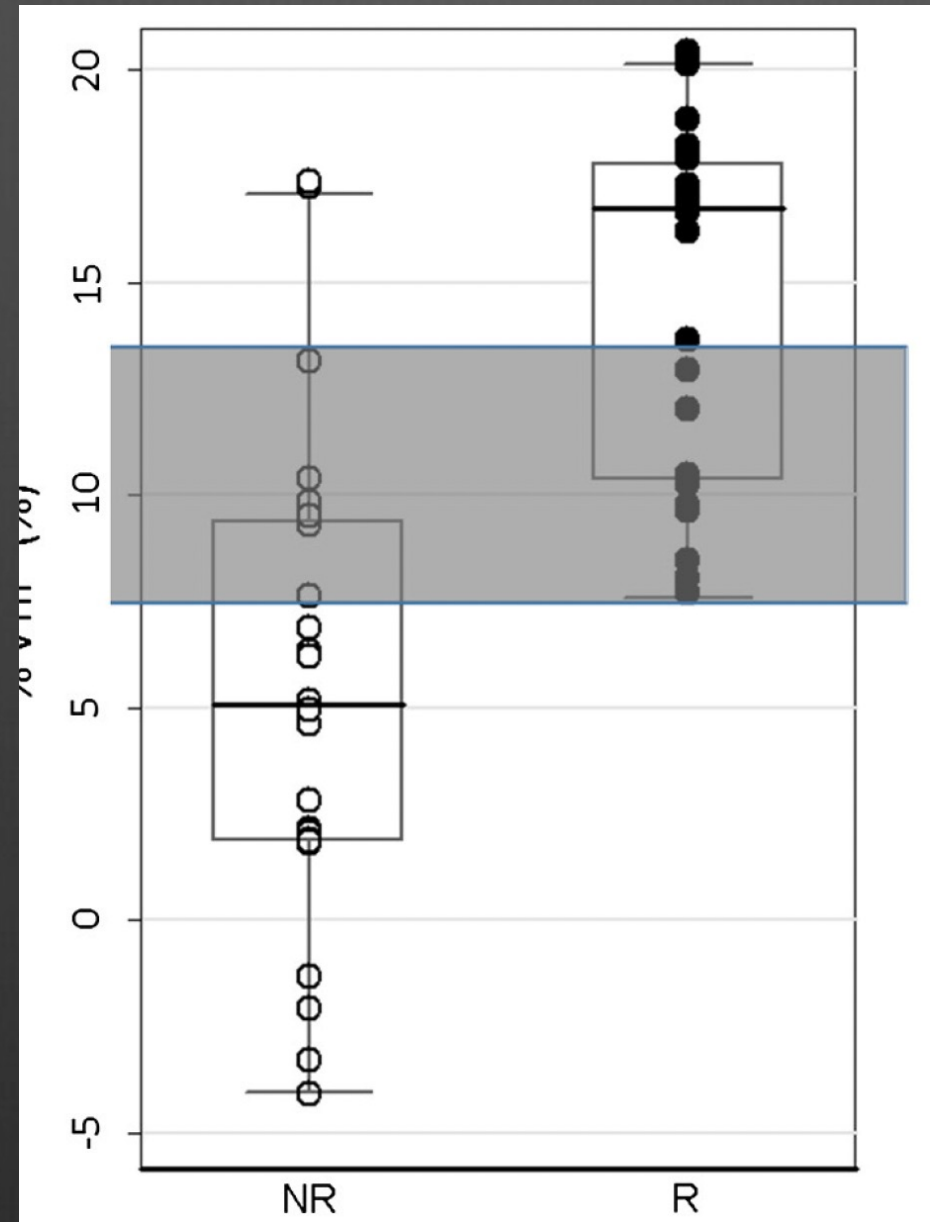
27.0

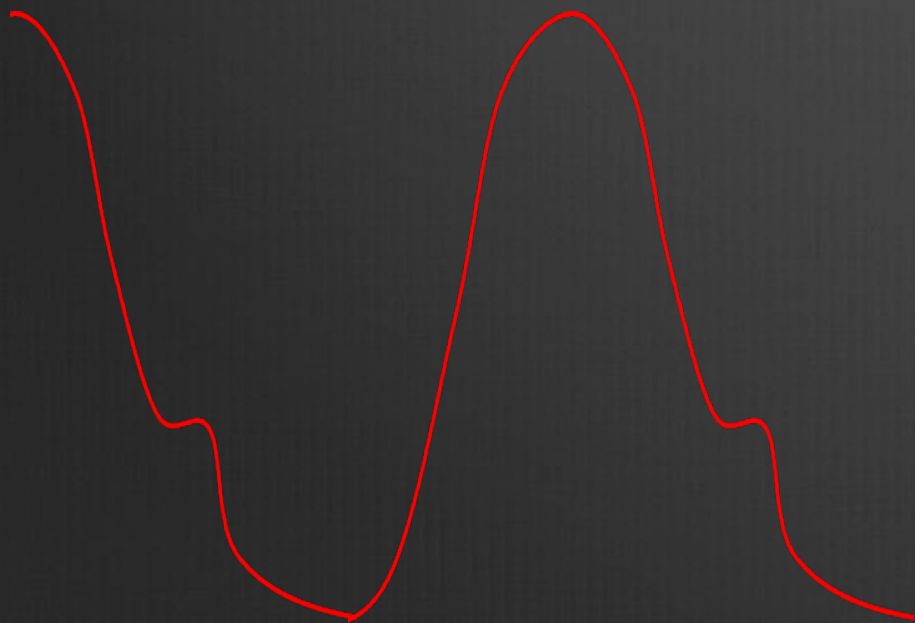
-27.0
cm/s

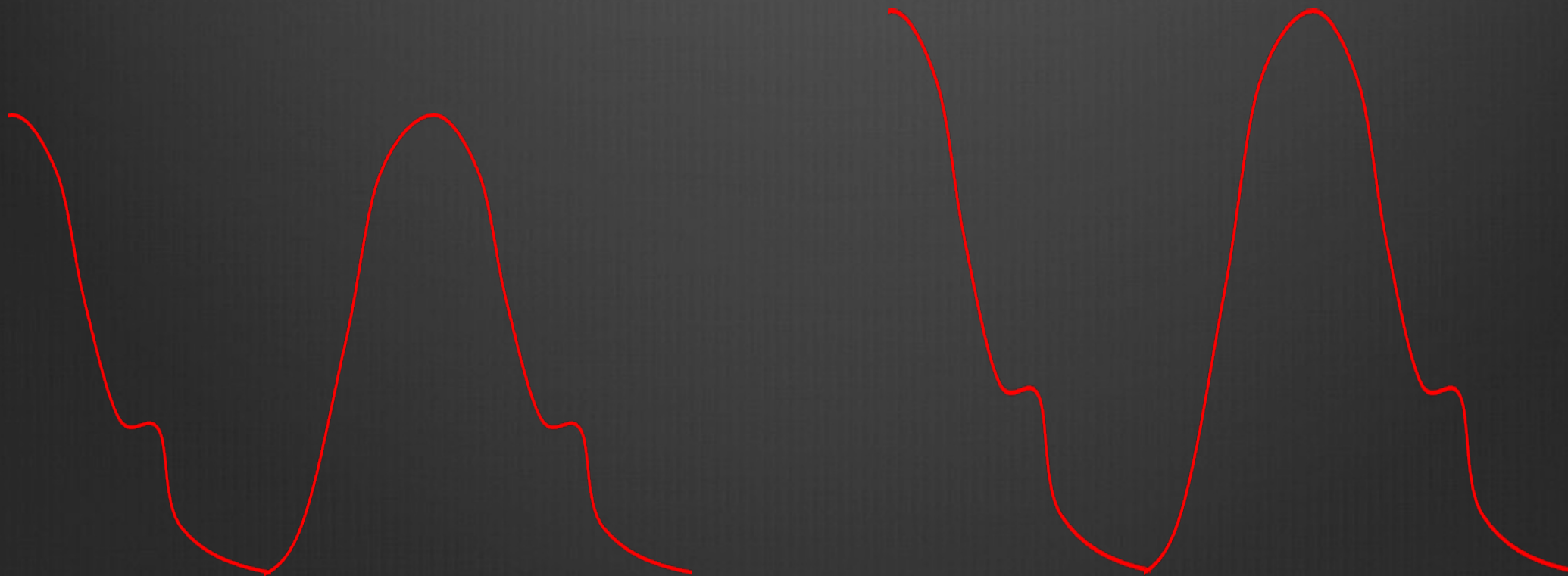
Δ ITV fémoral, Δ pic Doppler fémoral et Δ ITV sous Ao

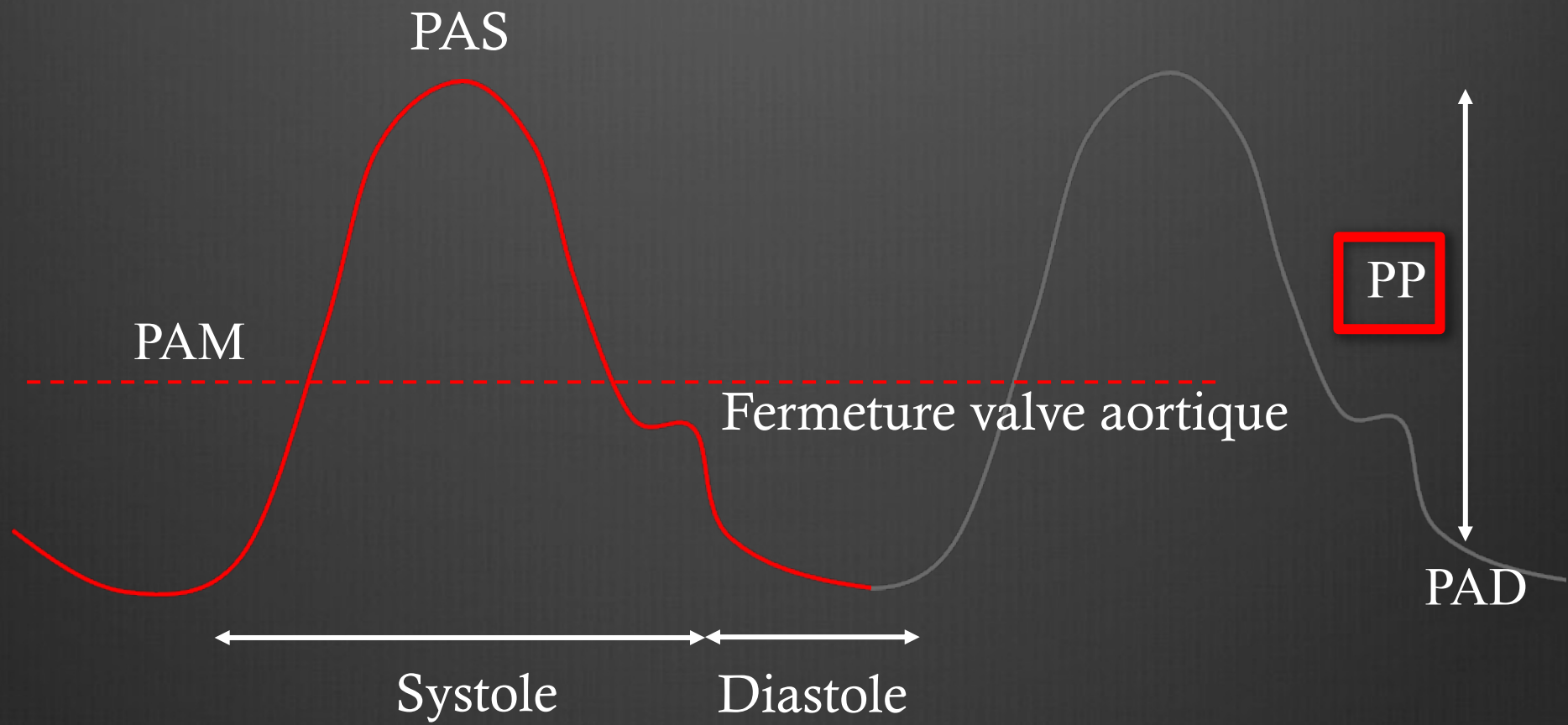


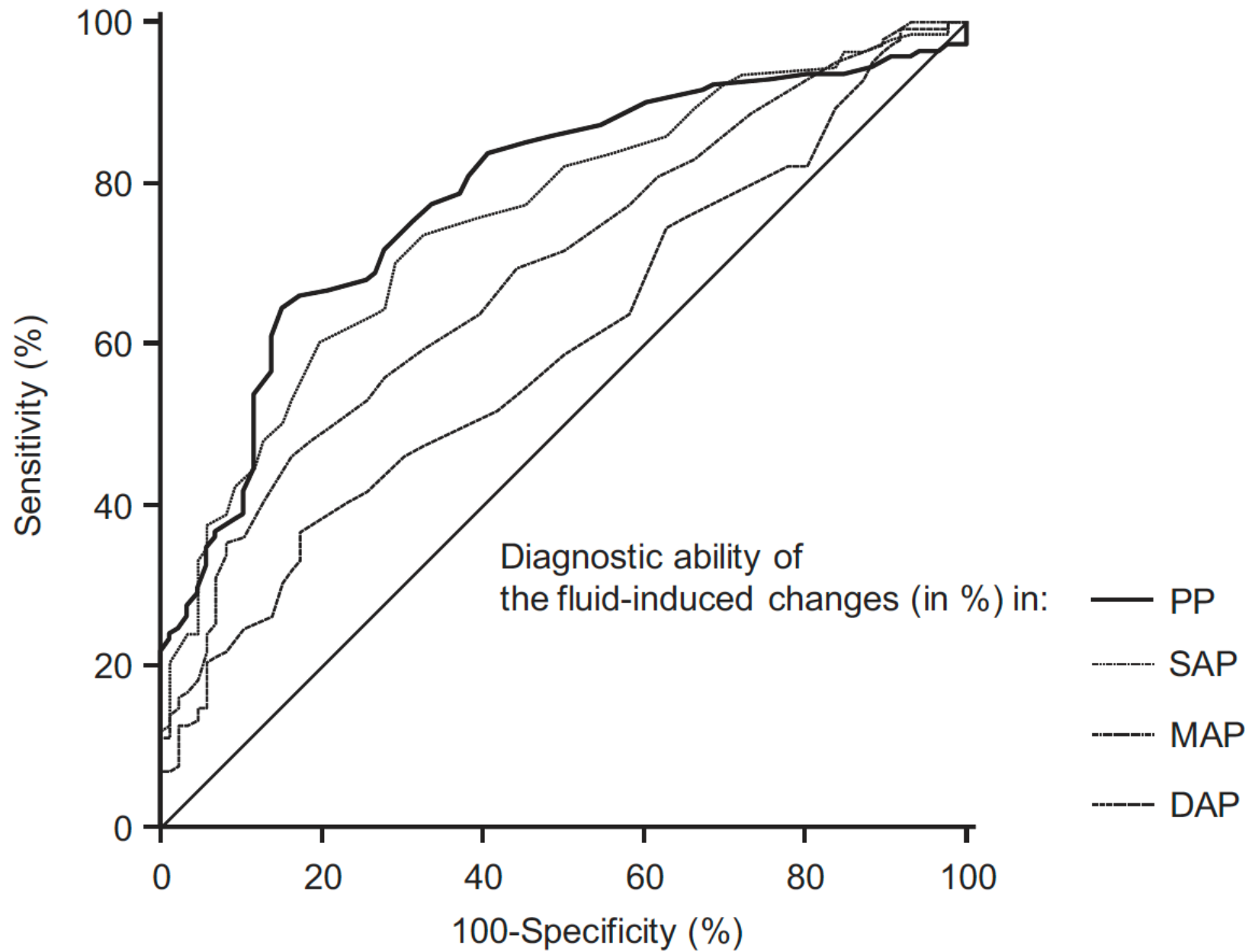
Δ ITV fémoral, Δ pic Doppler fémoral et Δ ITV sous Ao











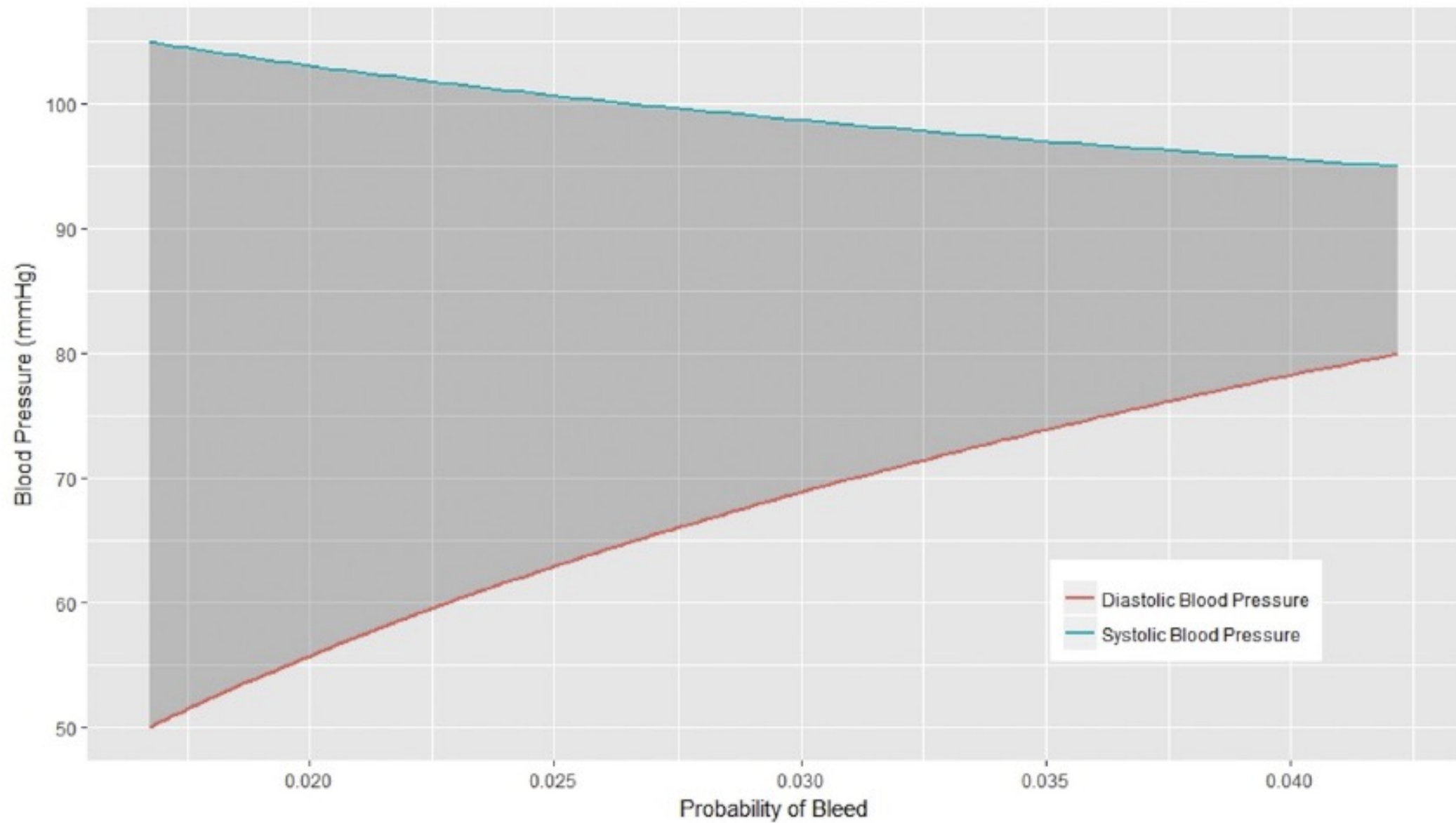
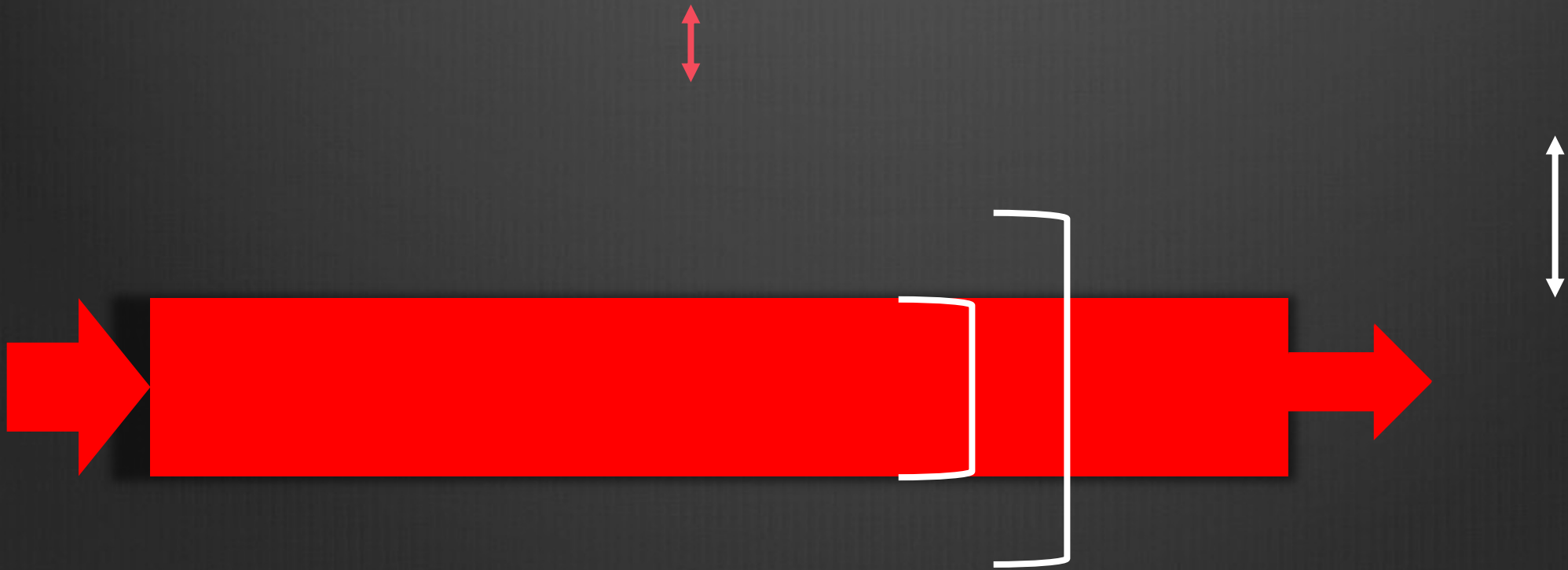
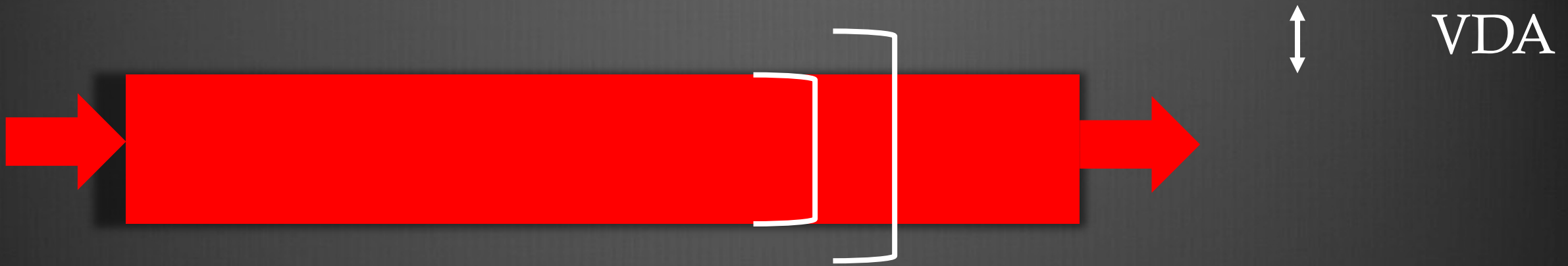


Figure 1. Predicted probability of bleeding as a function of pulse pressure in all patients.



Speckle tracking = imagerie de suivi des marqueurs acoustiques

2015/04/22-14:19:24

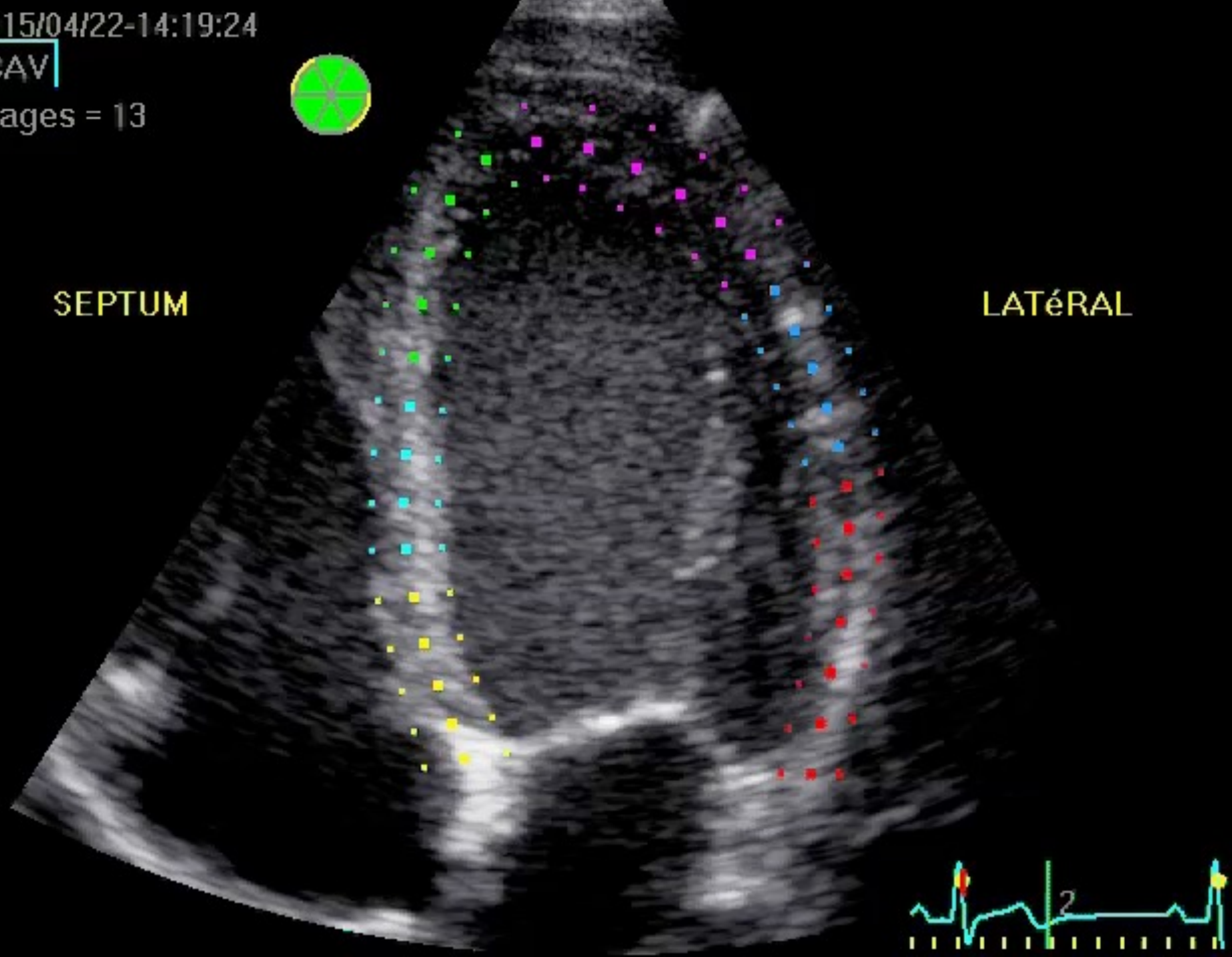
4CAV

Images = 13



SEPTUM

LATÉRAL



2015/04/22-14:19:24

4CAV

FR= 60 fps

HR= 55 bpm

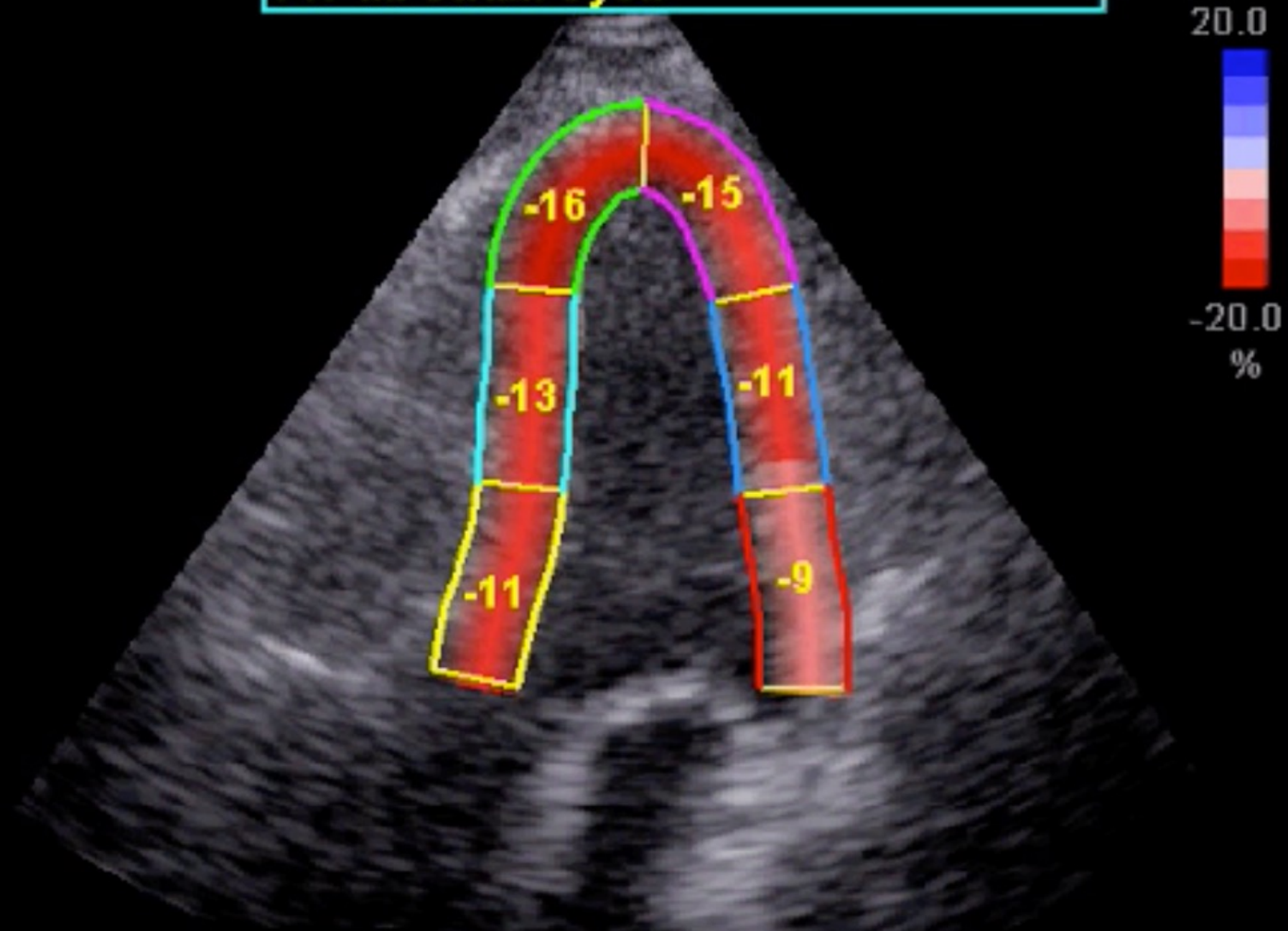


SL
20.0
-20.0
%

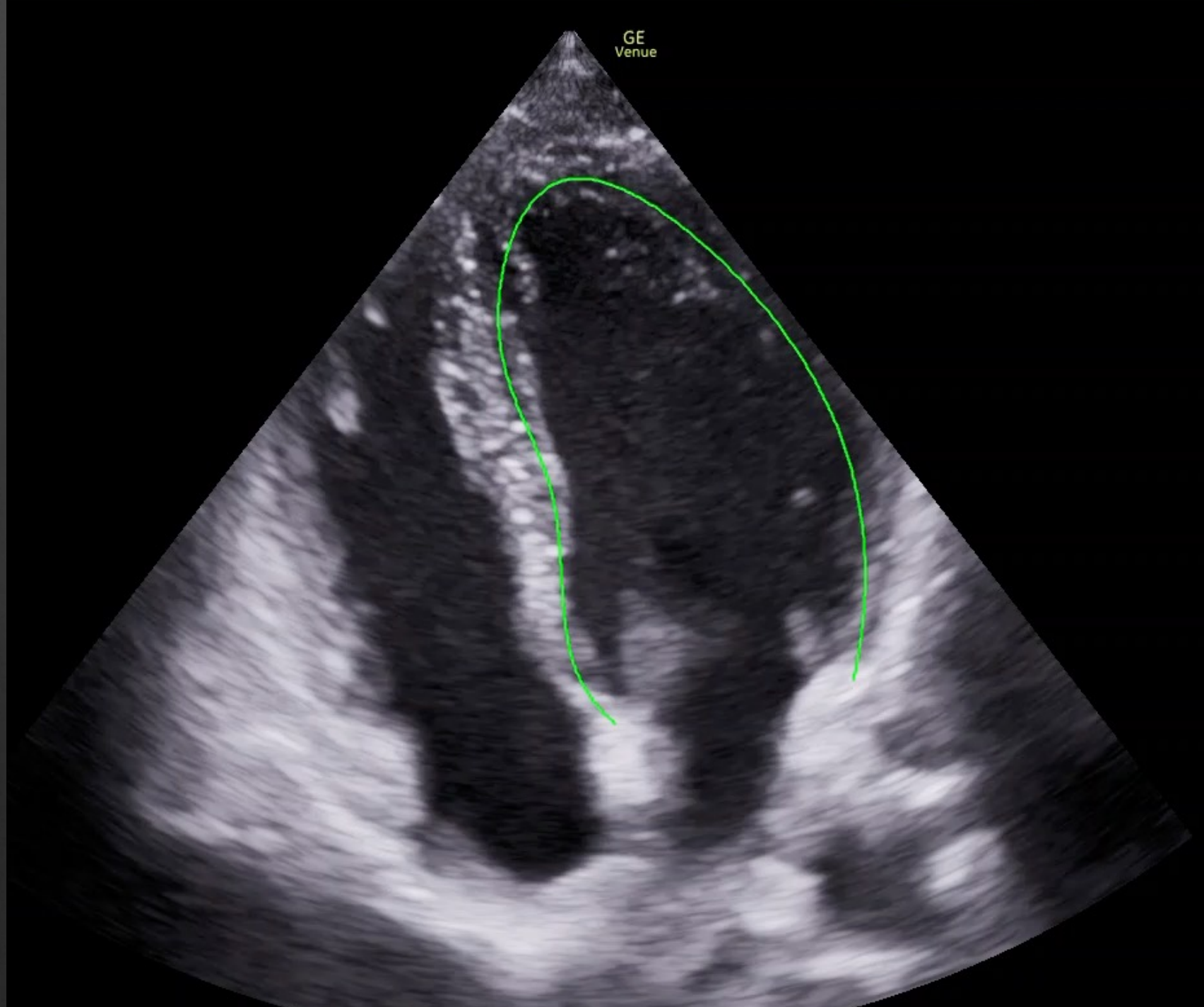
SG=-18.8%

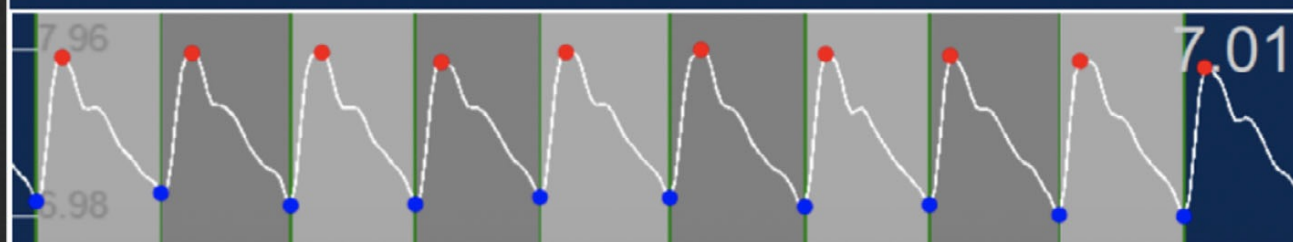
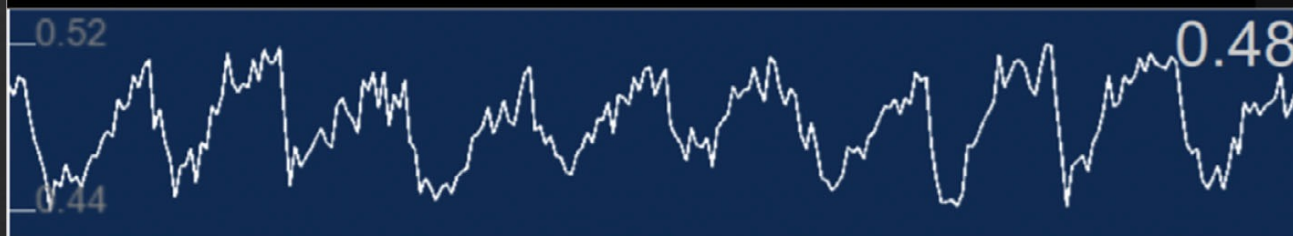
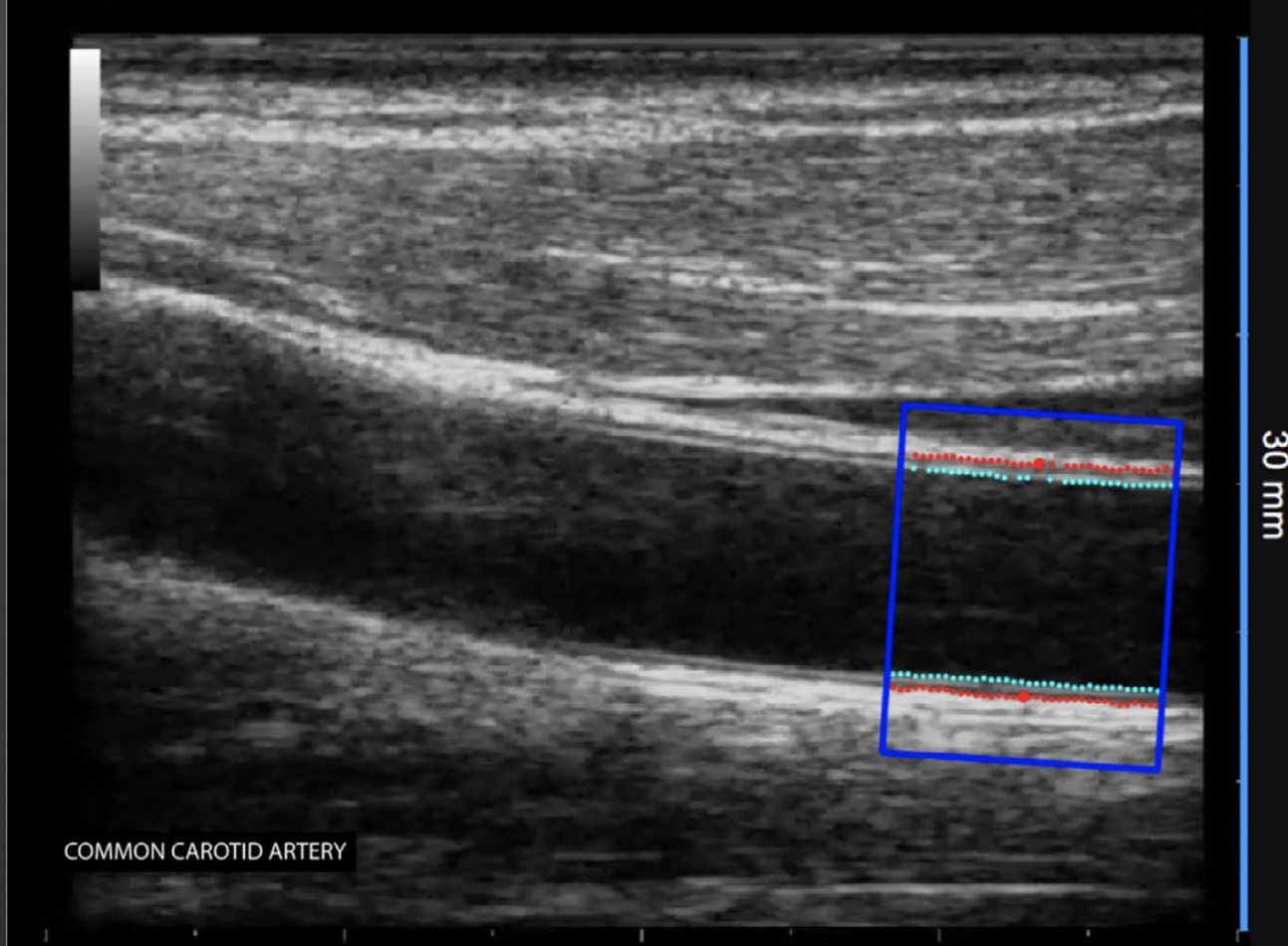


Pic du Strain Syst.



Valeurs de strain temporaires

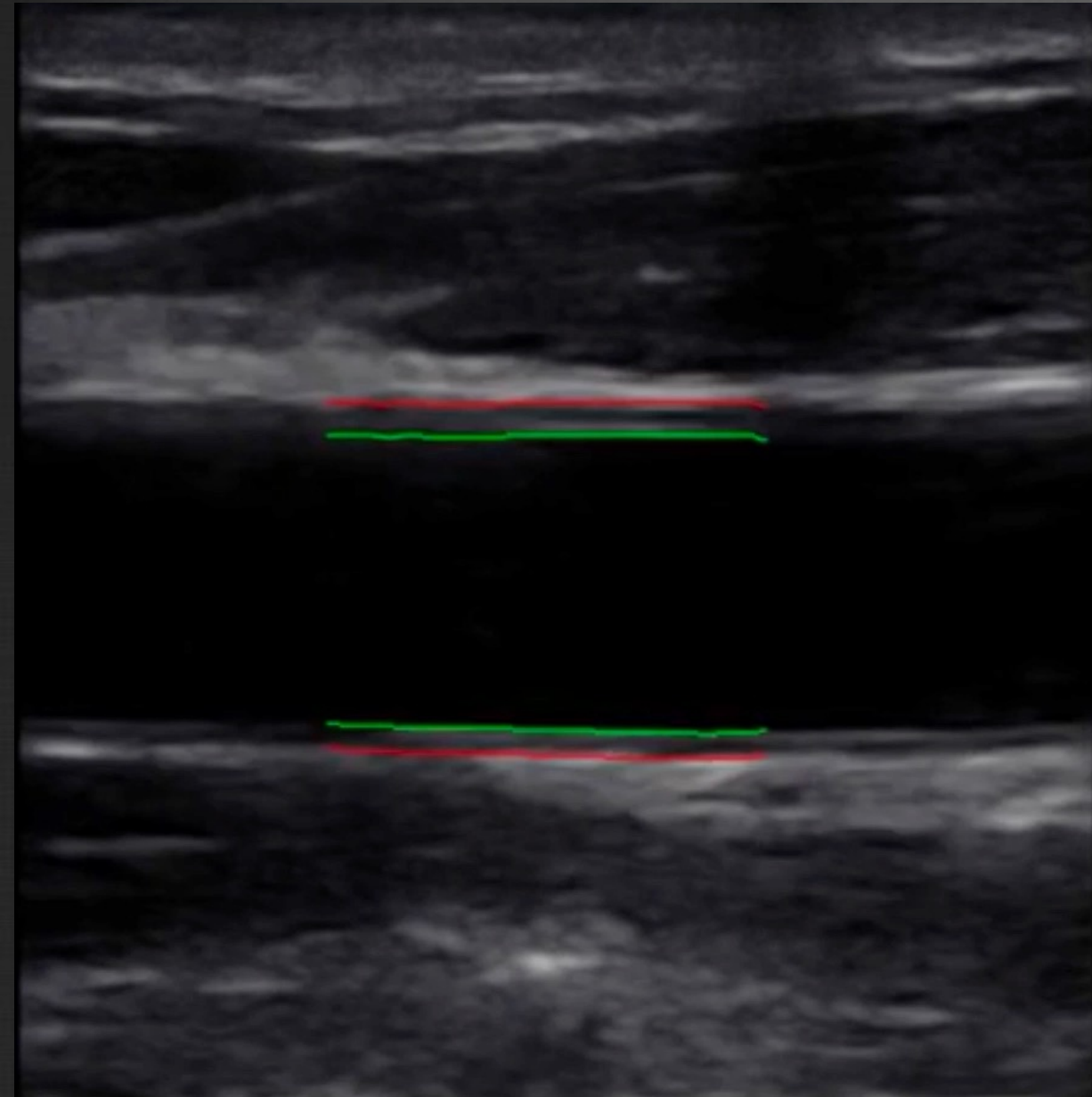




Suivi Δ calibre artériel

- ⦿ Analyse onde de pouls
- ⦿ Rigidité artérielle
- ⦿ Faible variabilité

→ Corrélation Δ calibre/VES ?



Cathéter veineux jugulaire interne :

- monitoring de la PVC
- injection des bolus froids pour thermodilution (PICCO)

Cathéter veineux auriculaire :
injection des drogues anesthésiques

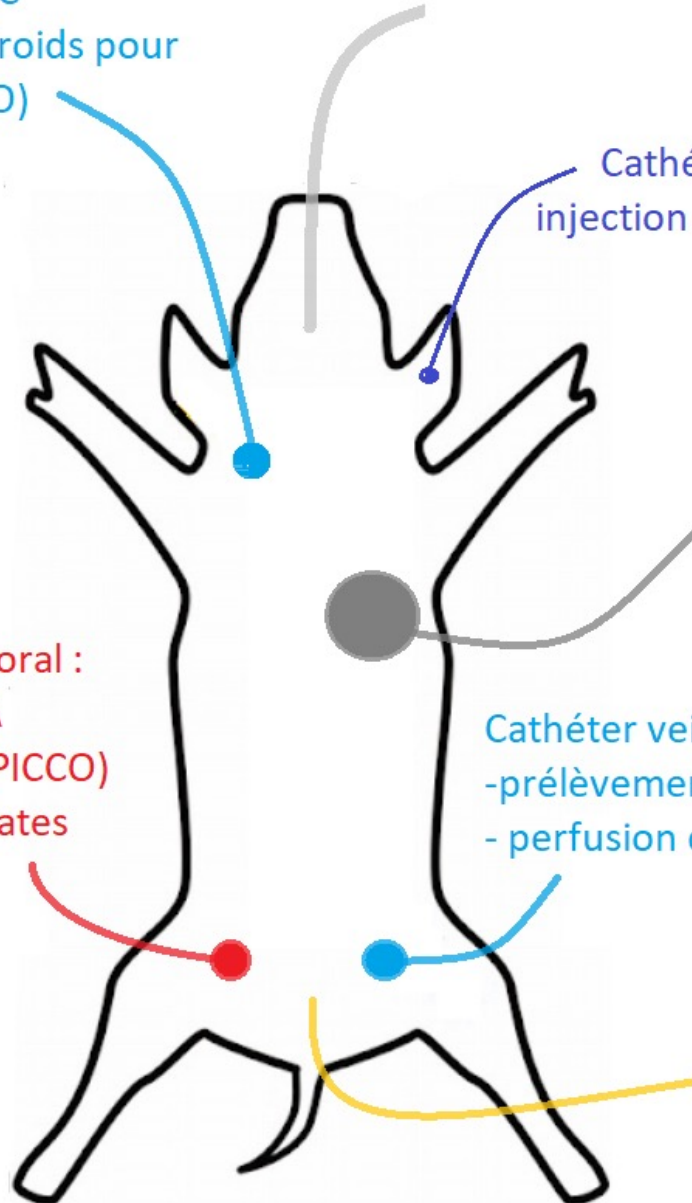
Echographie

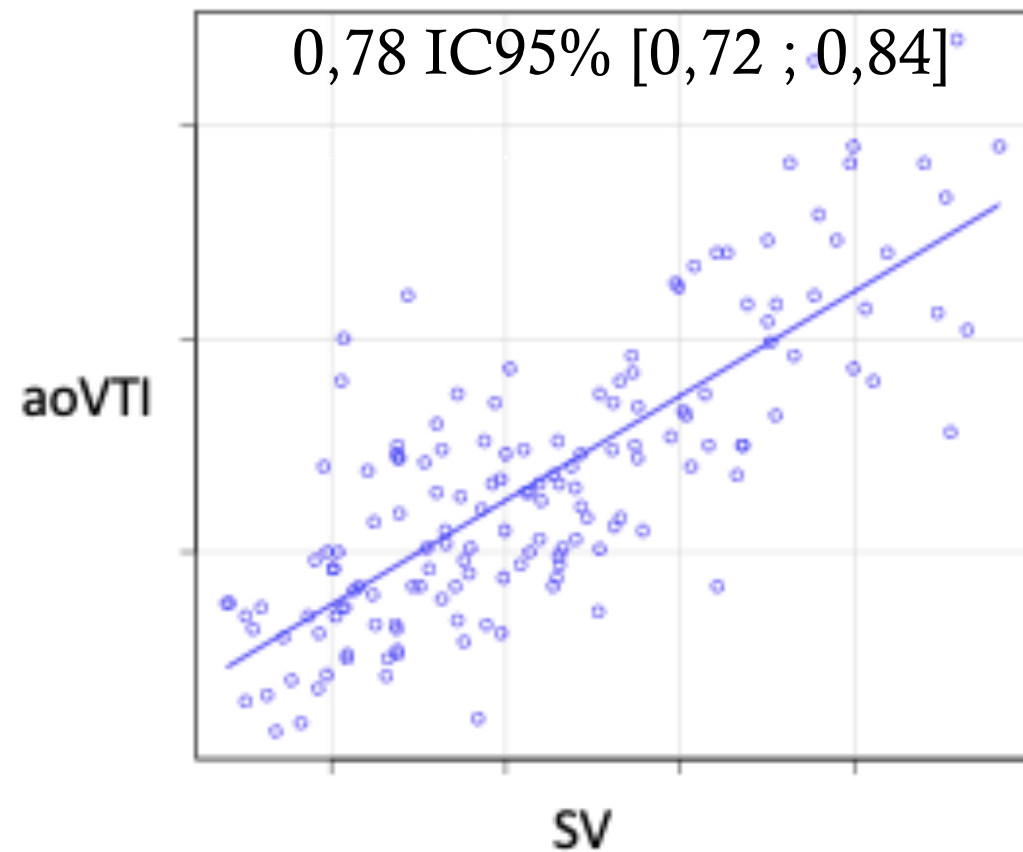
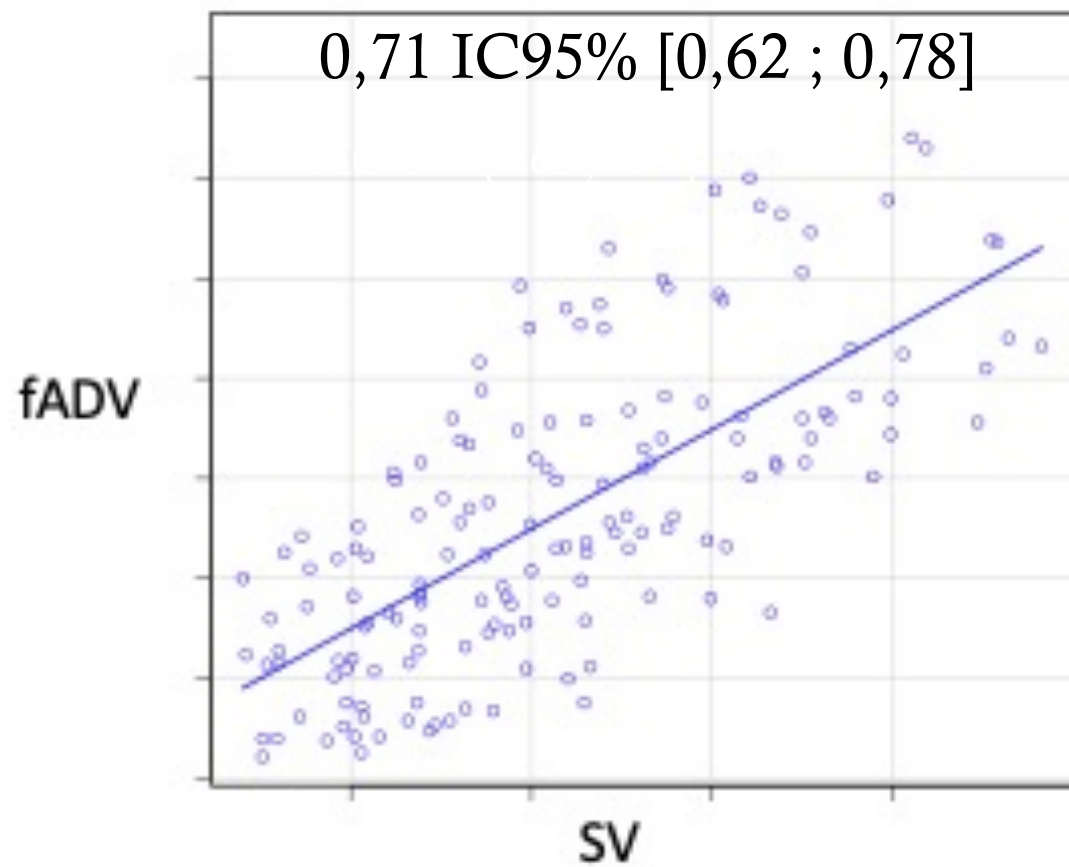
Cathéter artériel fémoral :

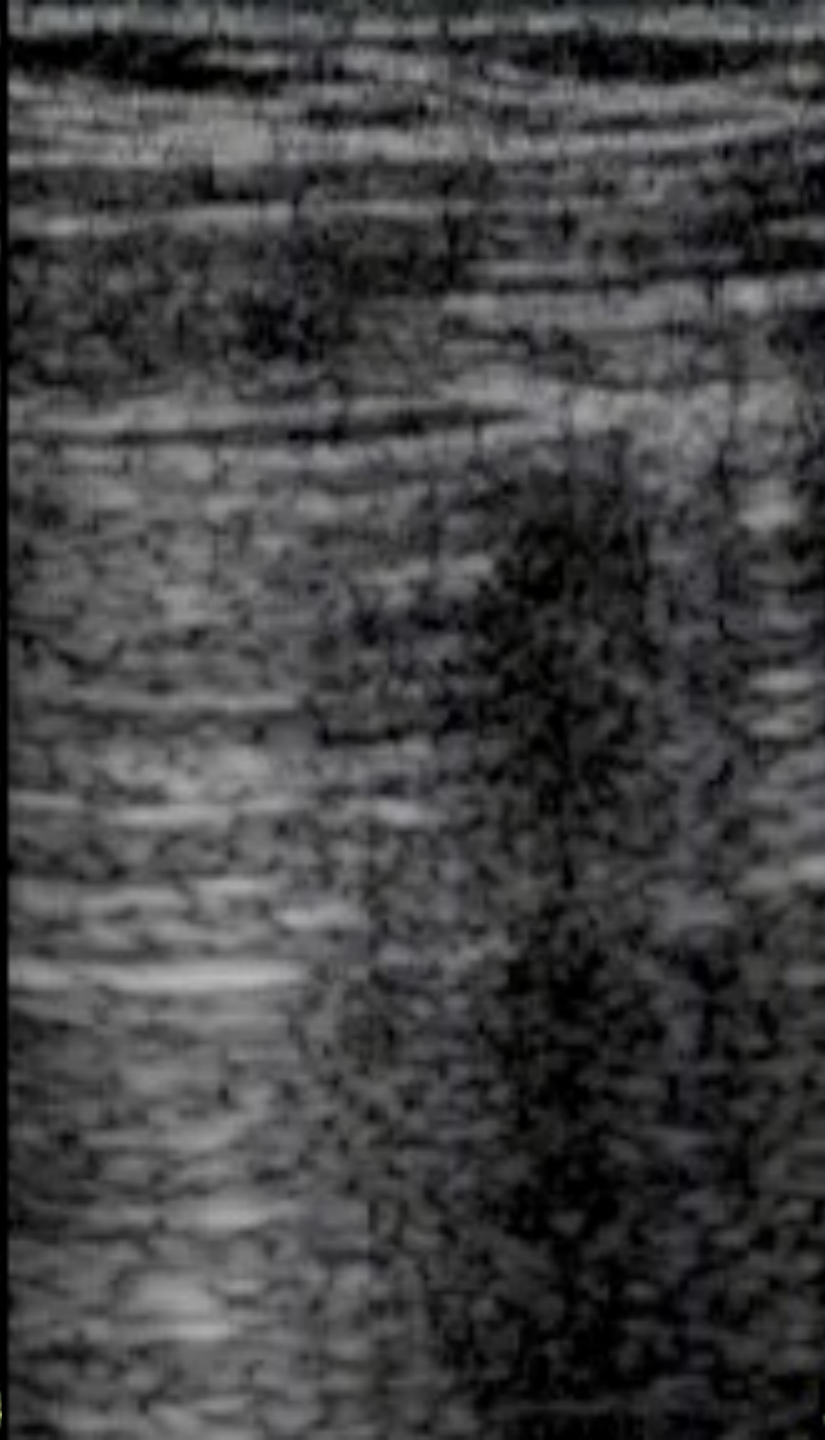
- monitoring de la PA
- monitoring du Qc (PICCO)
- monitoring des lactates

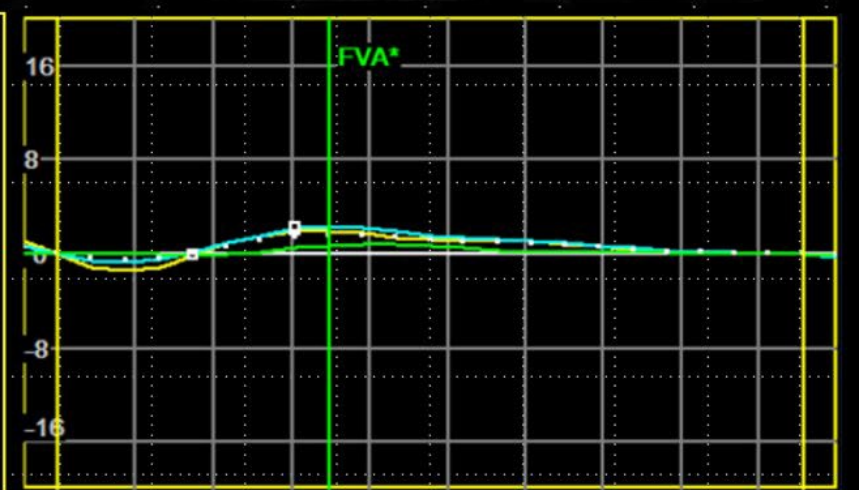
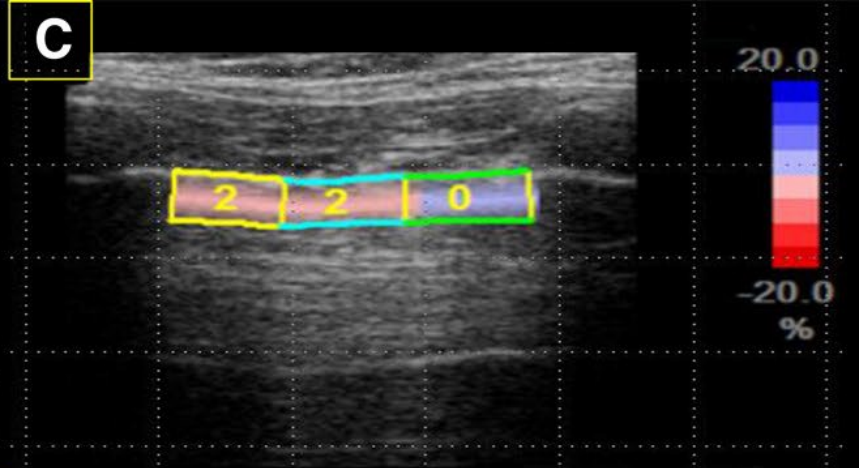
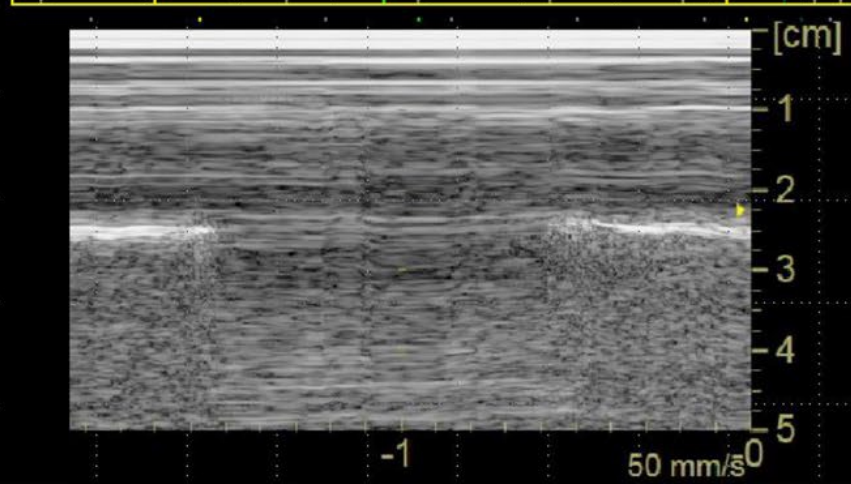
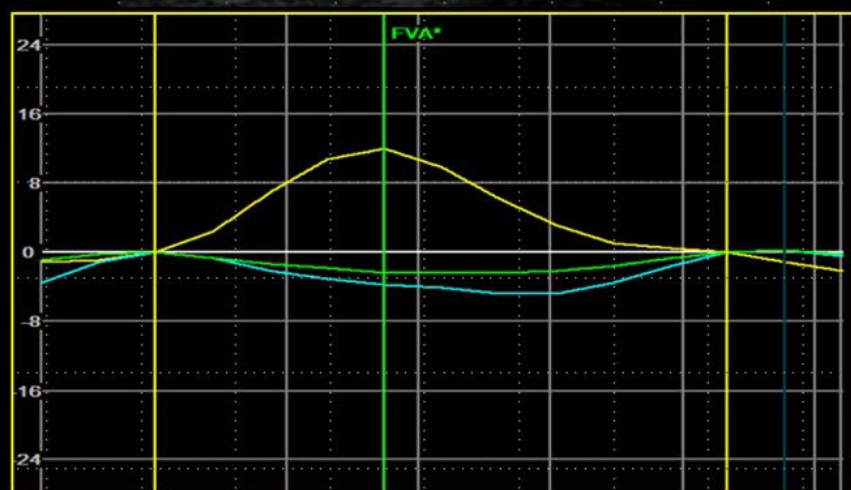
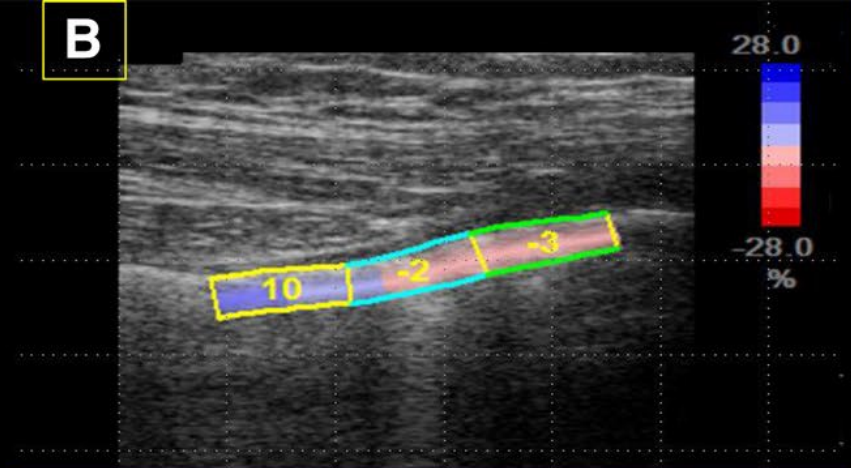
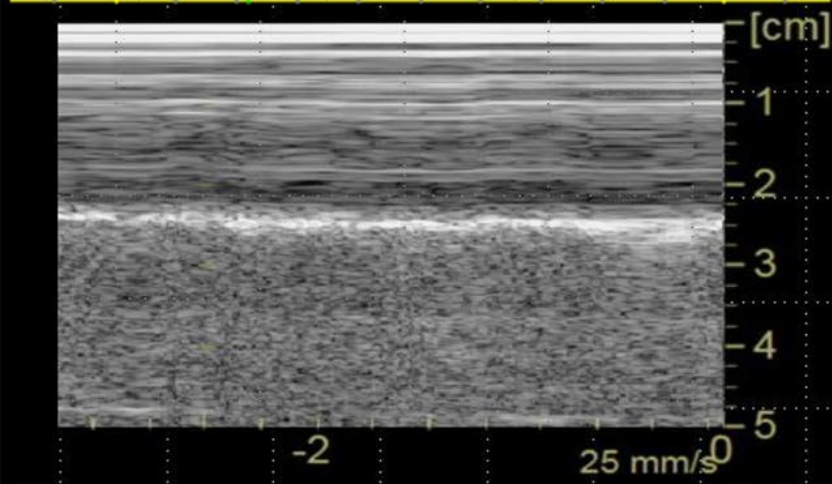
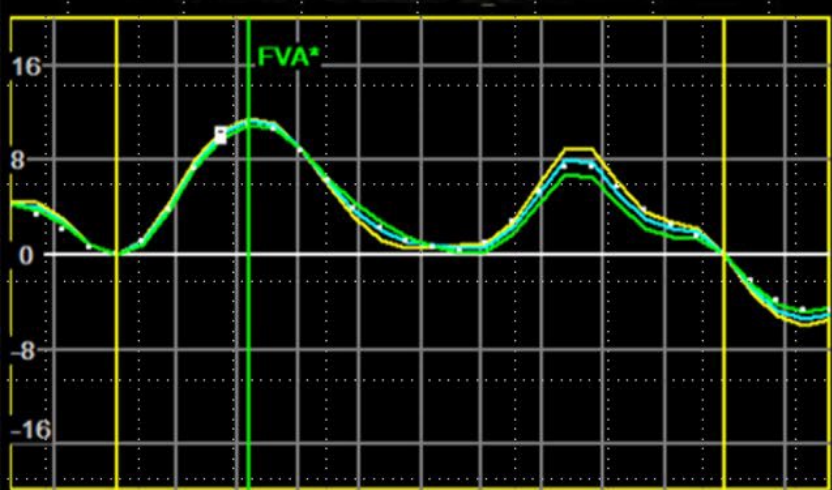
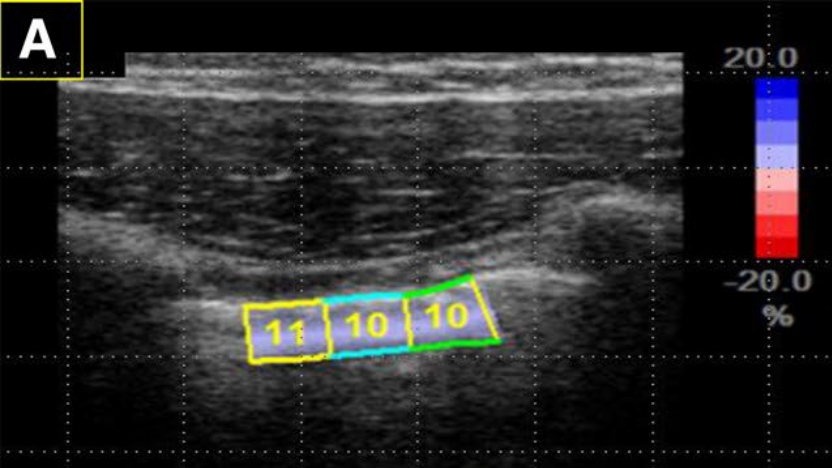
Cathéter veineux fémoral :

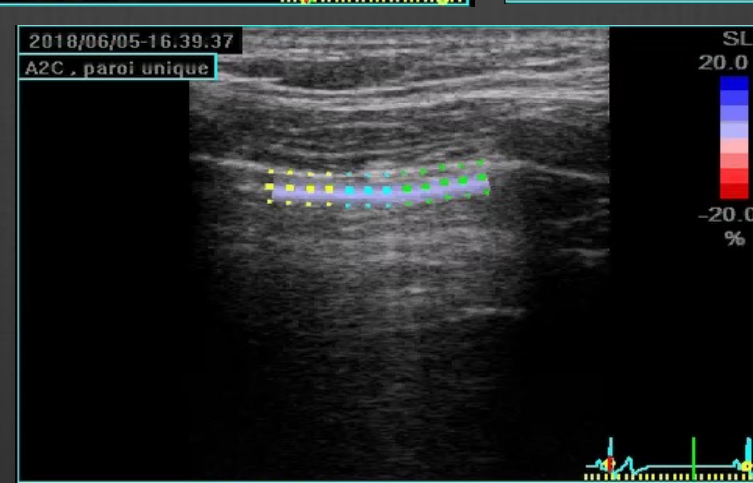
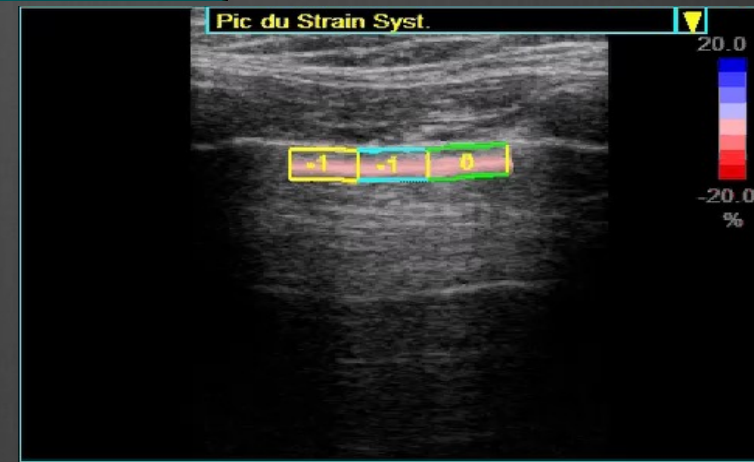
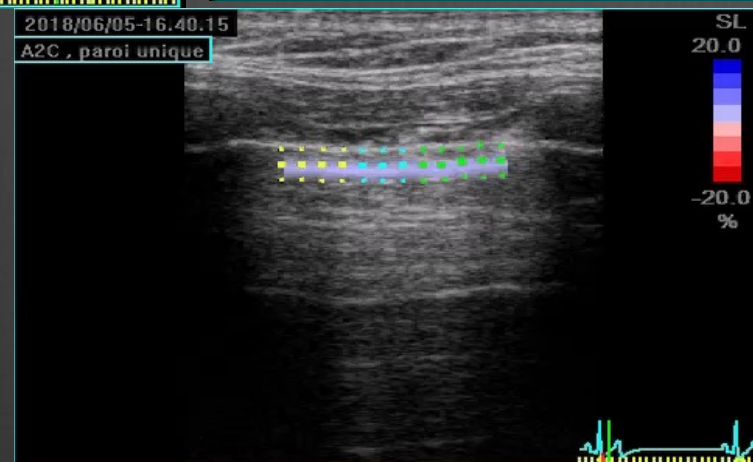
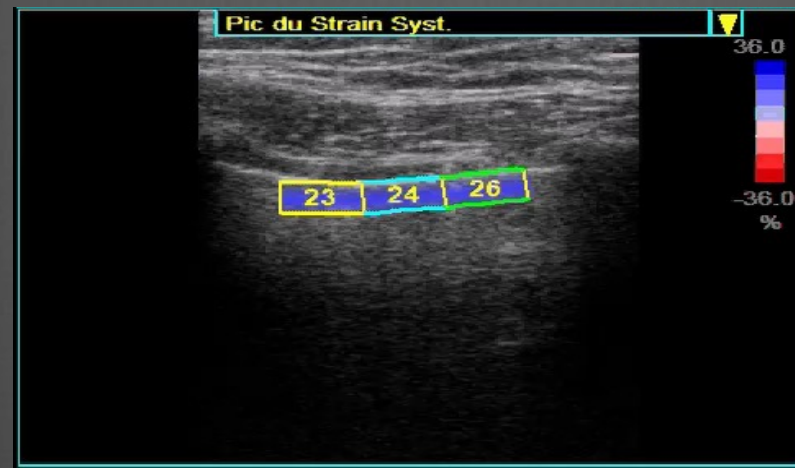
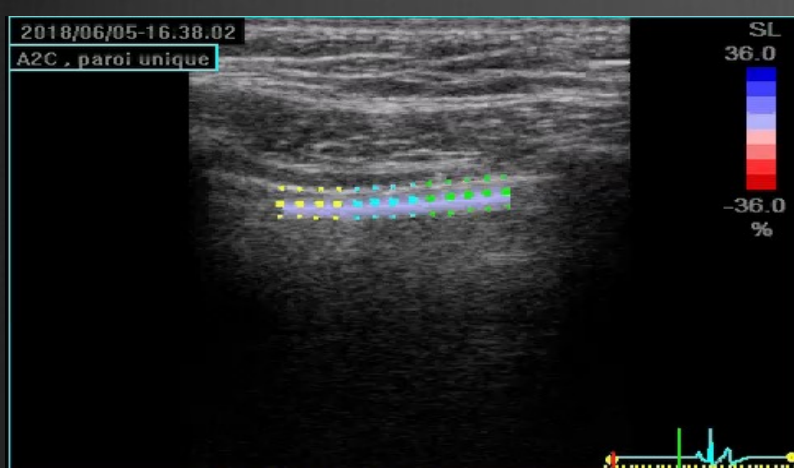
- prélèvement de sang
- perfusion de fluides de remplissage







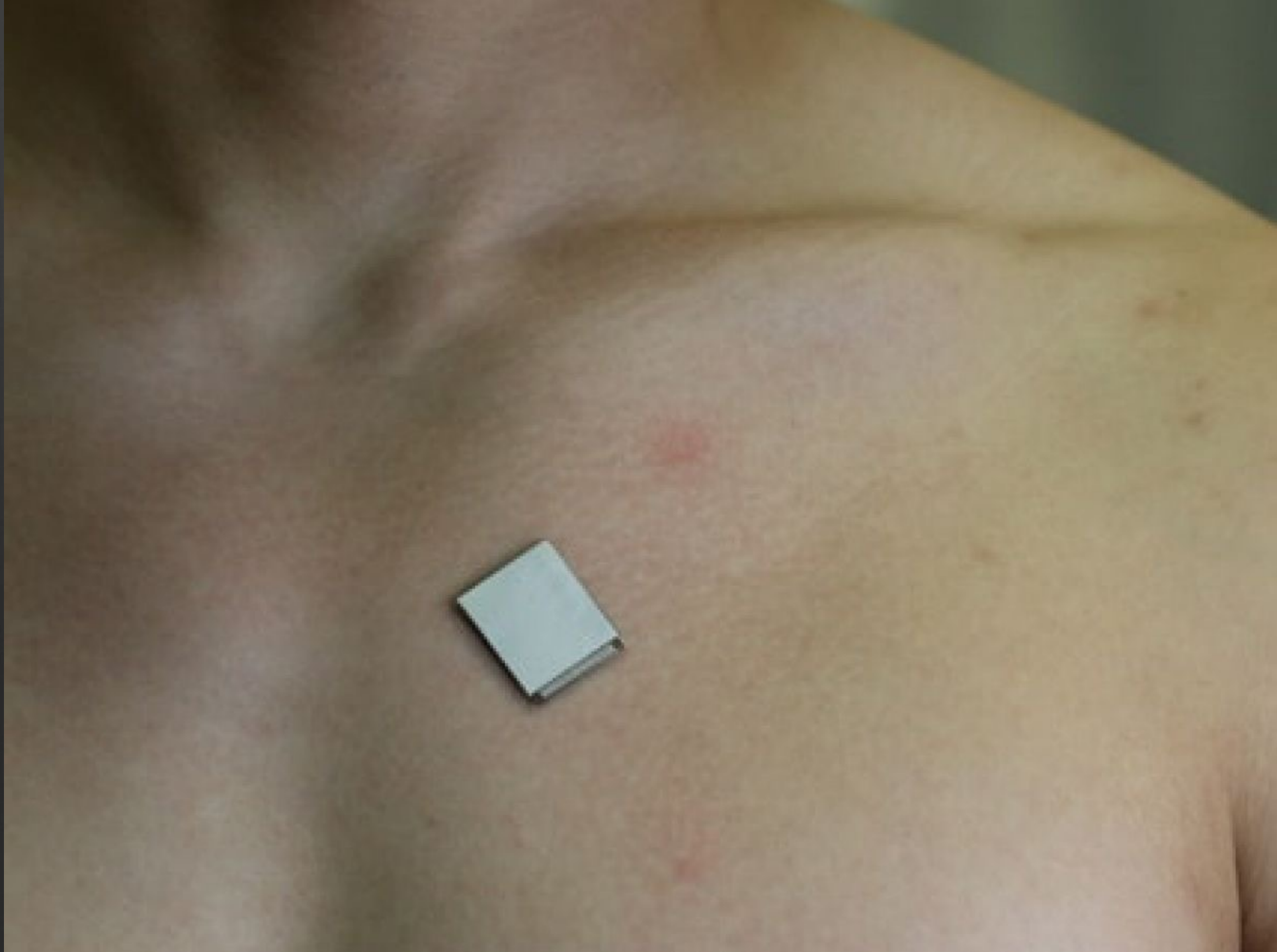


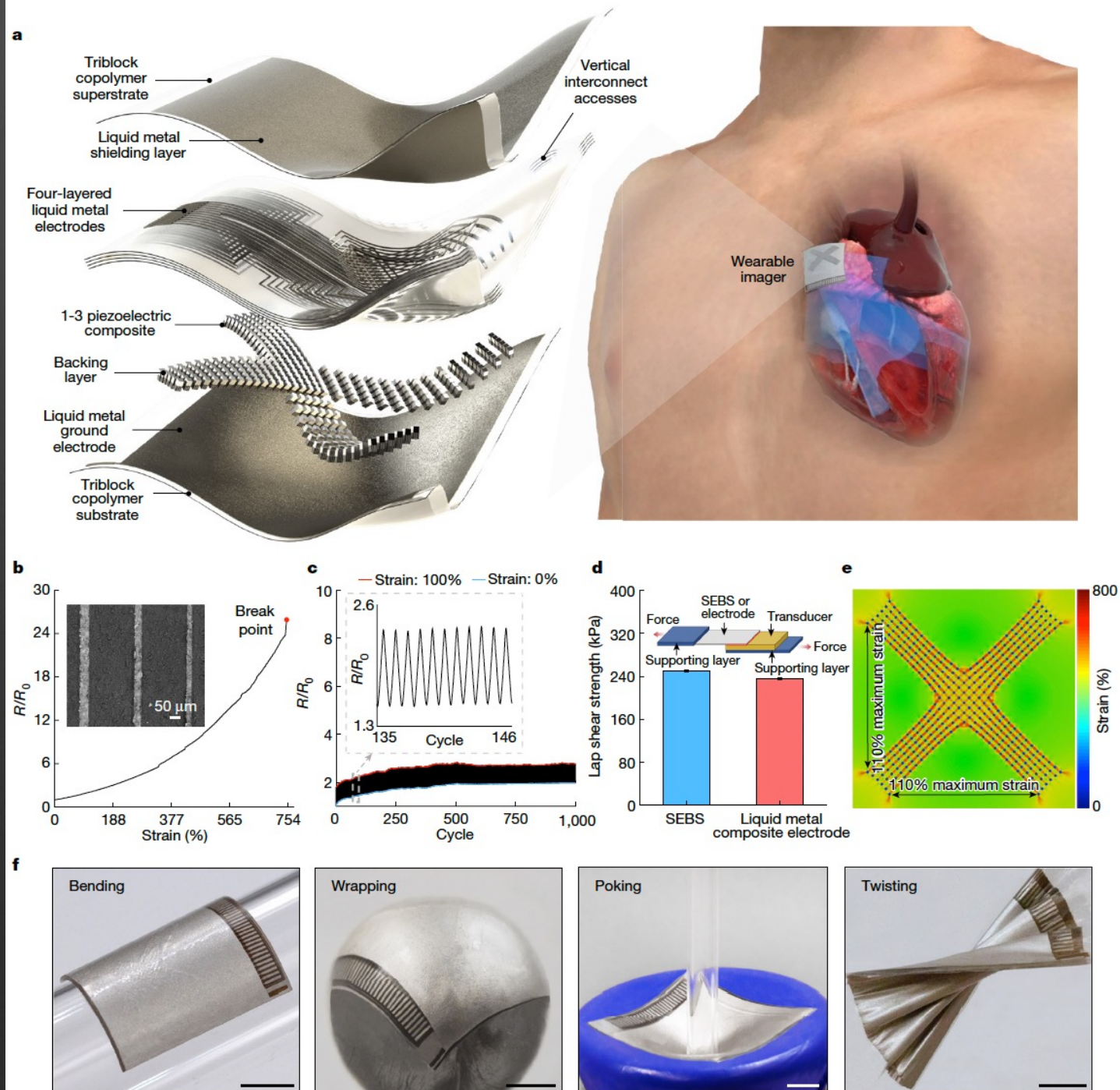


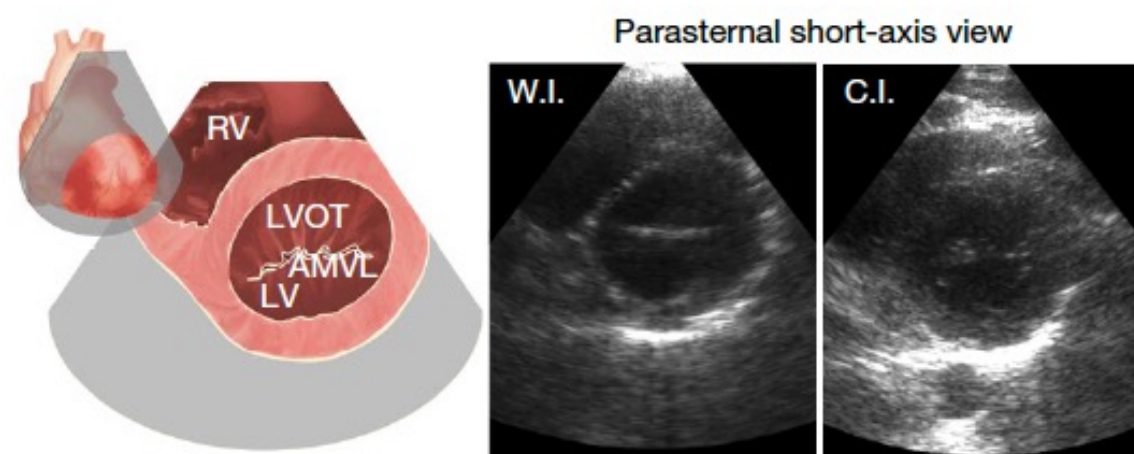
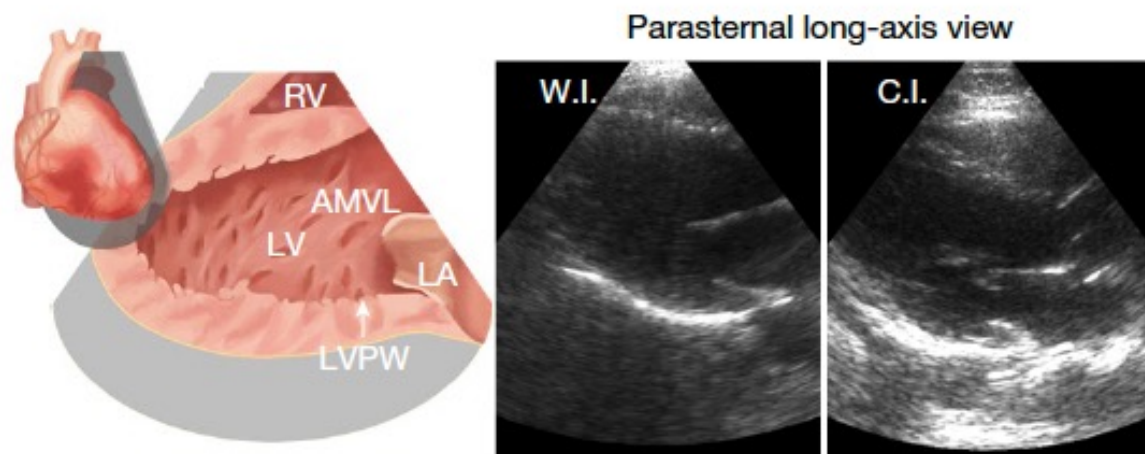
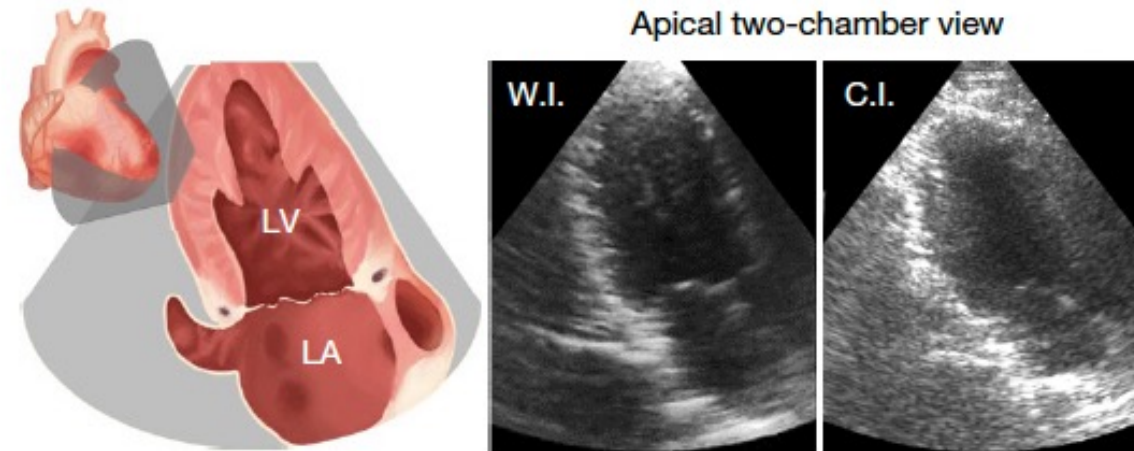
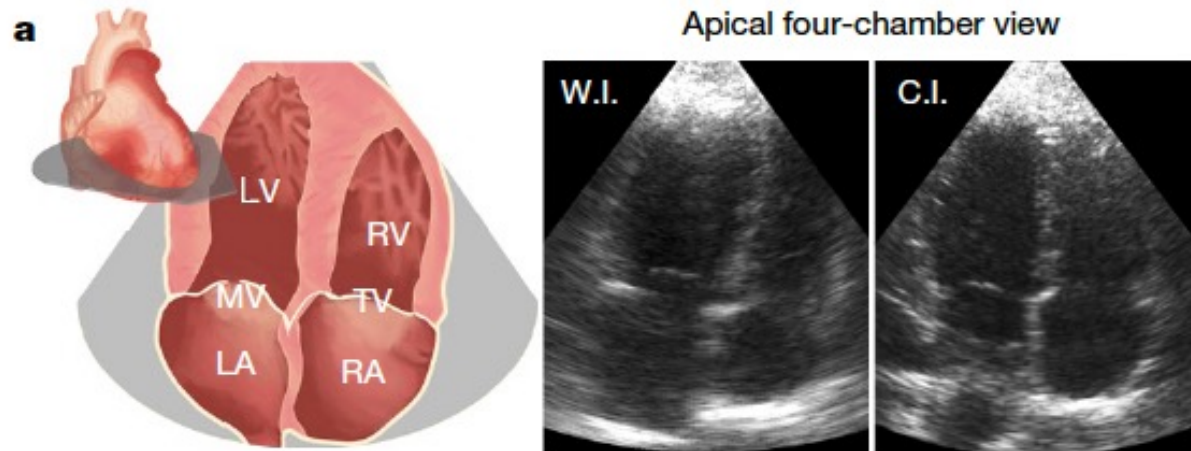


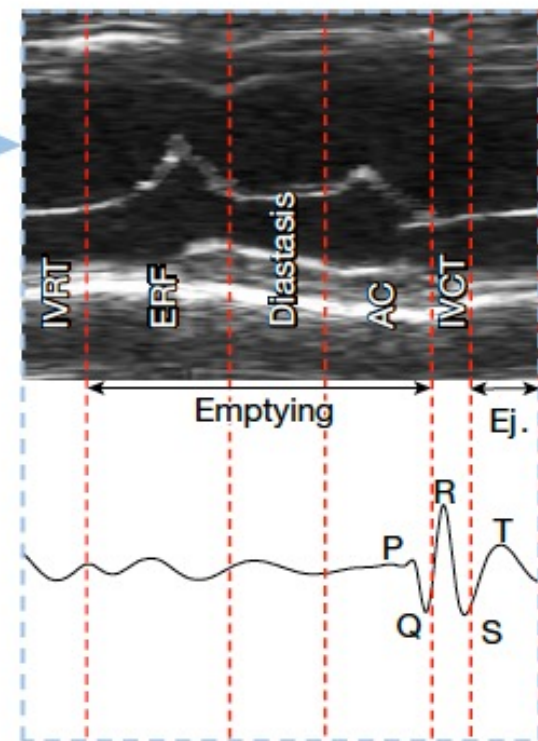
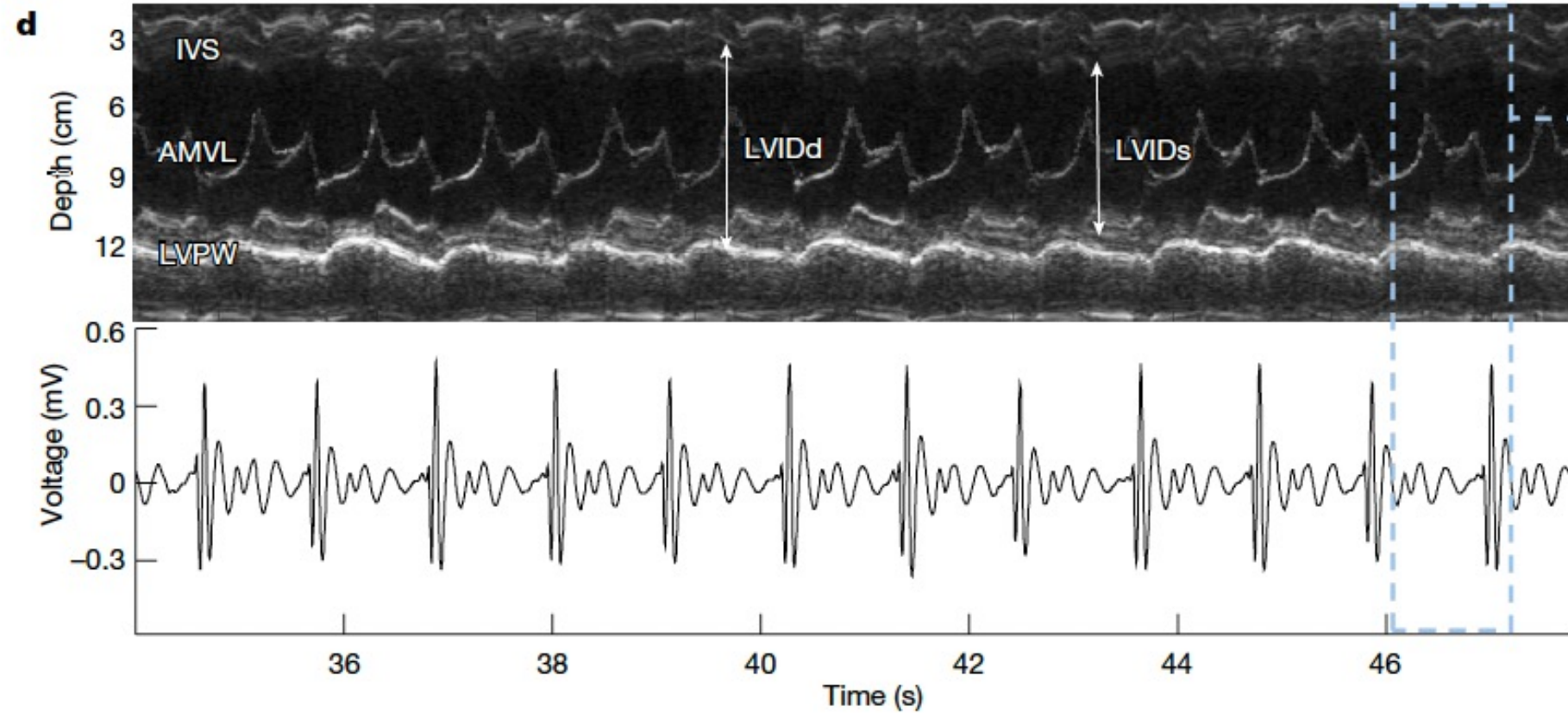


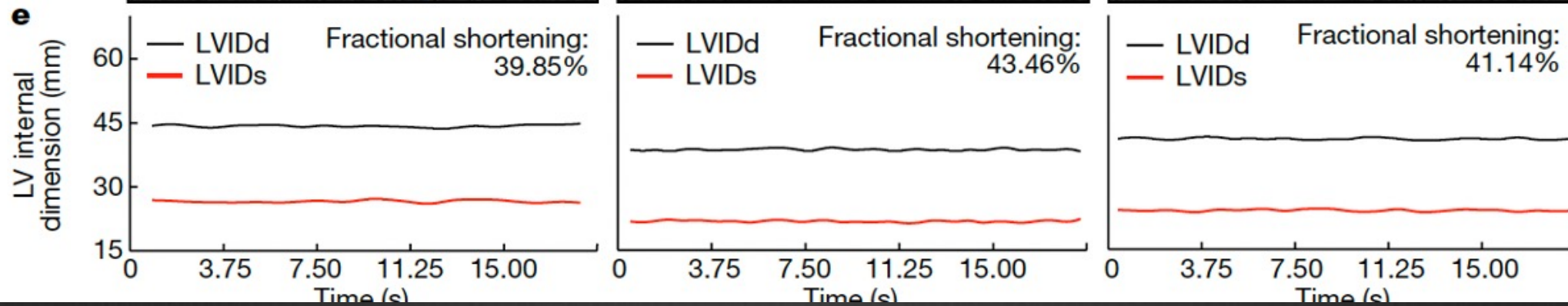
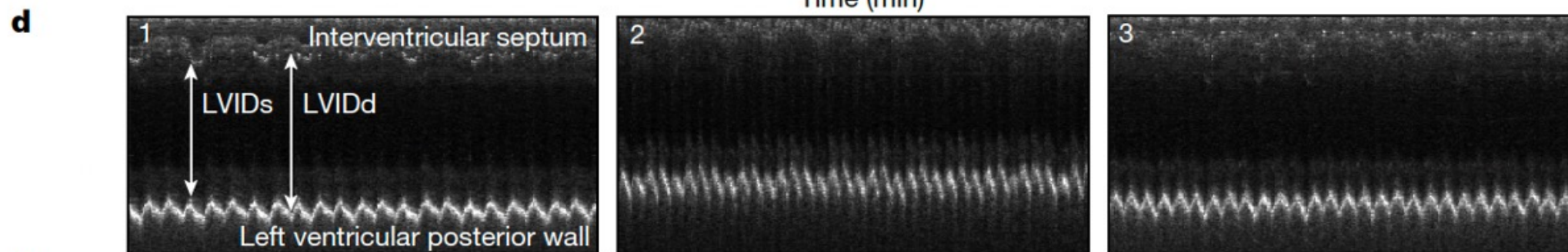
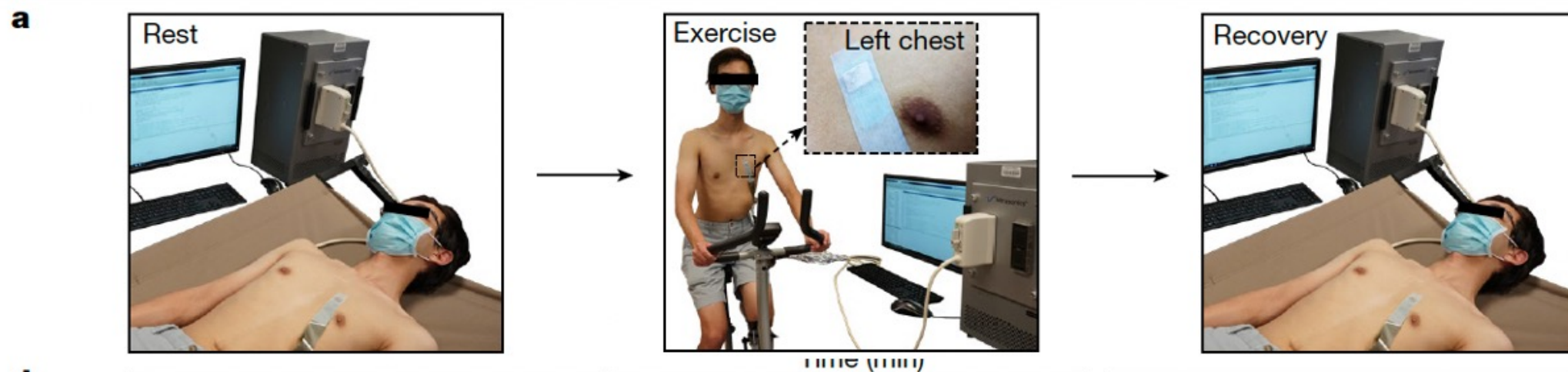






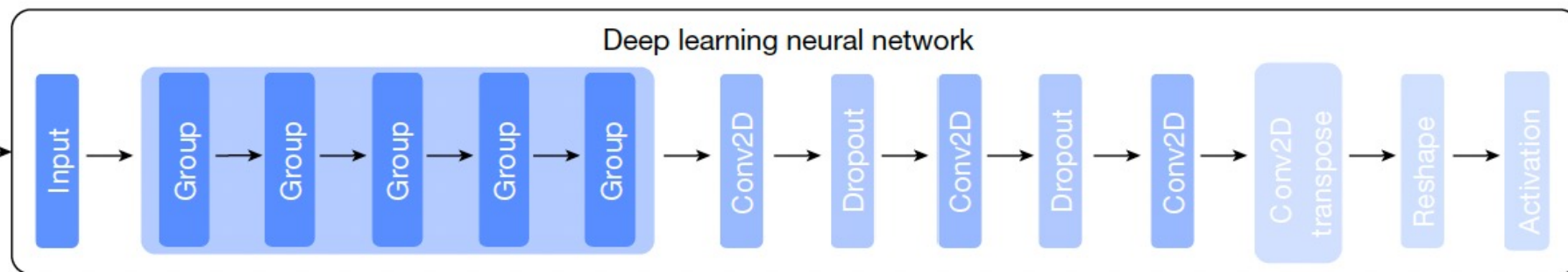
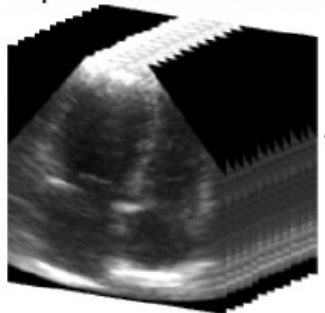






a

Apical four-chamber view

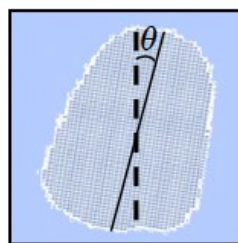


Output of neural network

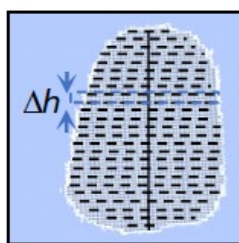


Segmentation

Principal component analysis



Rotation



Slice integration

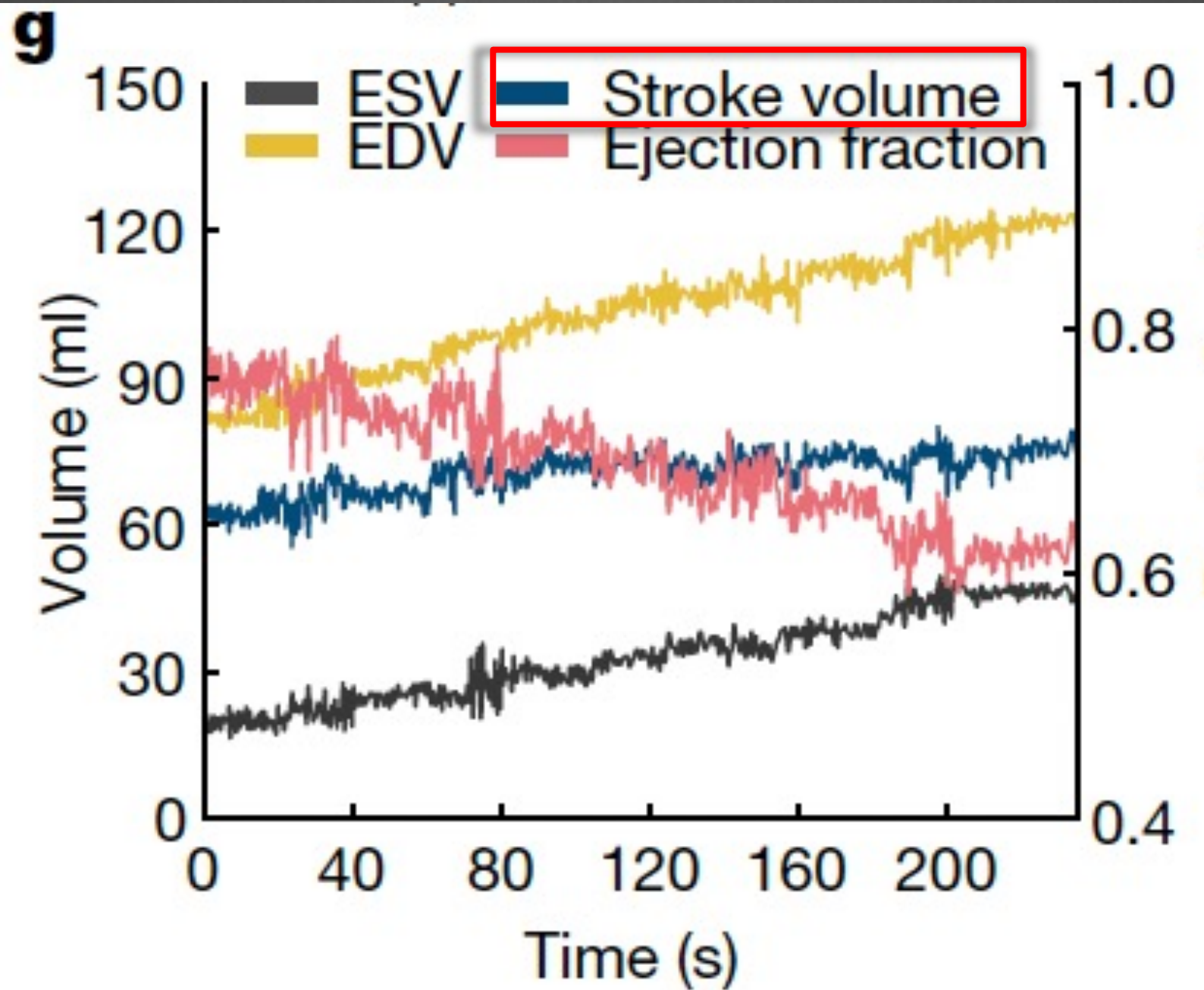
Indices calculation

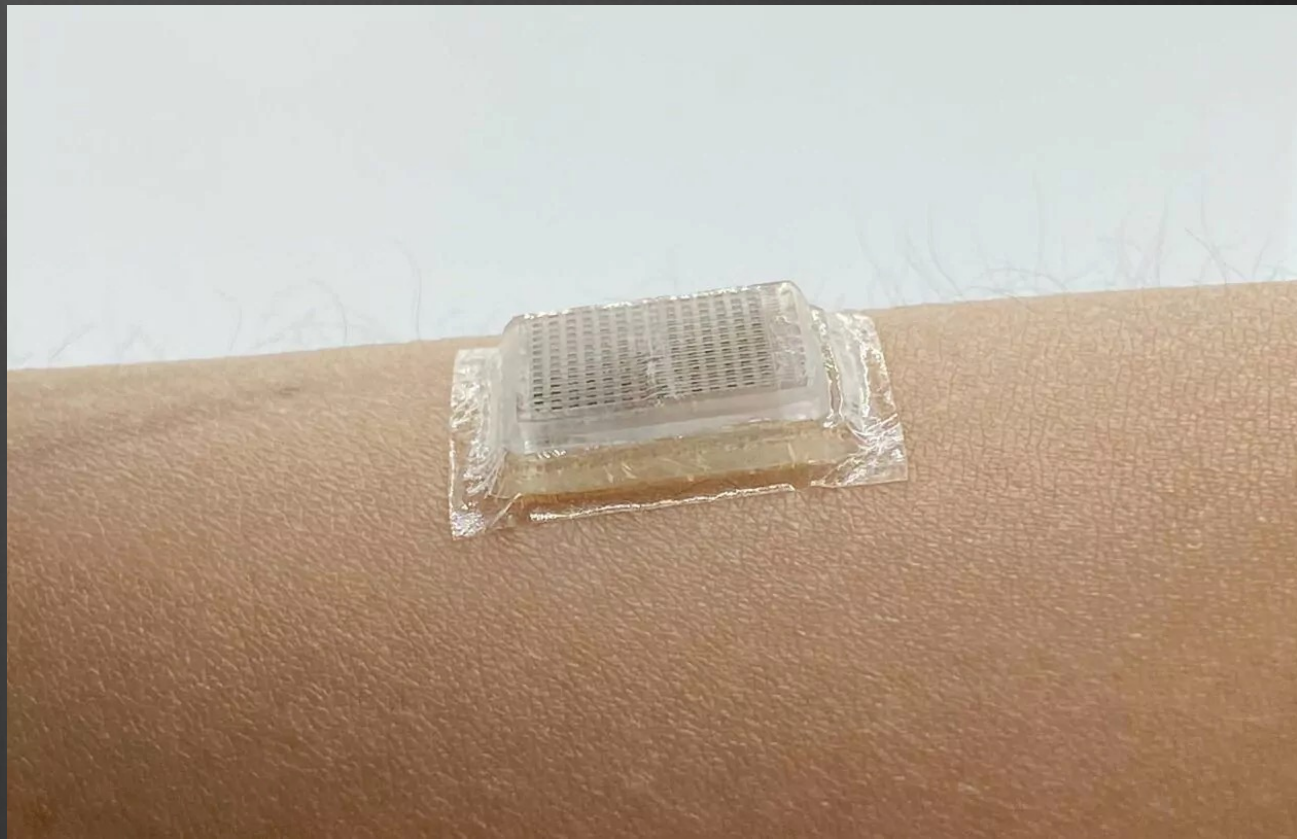
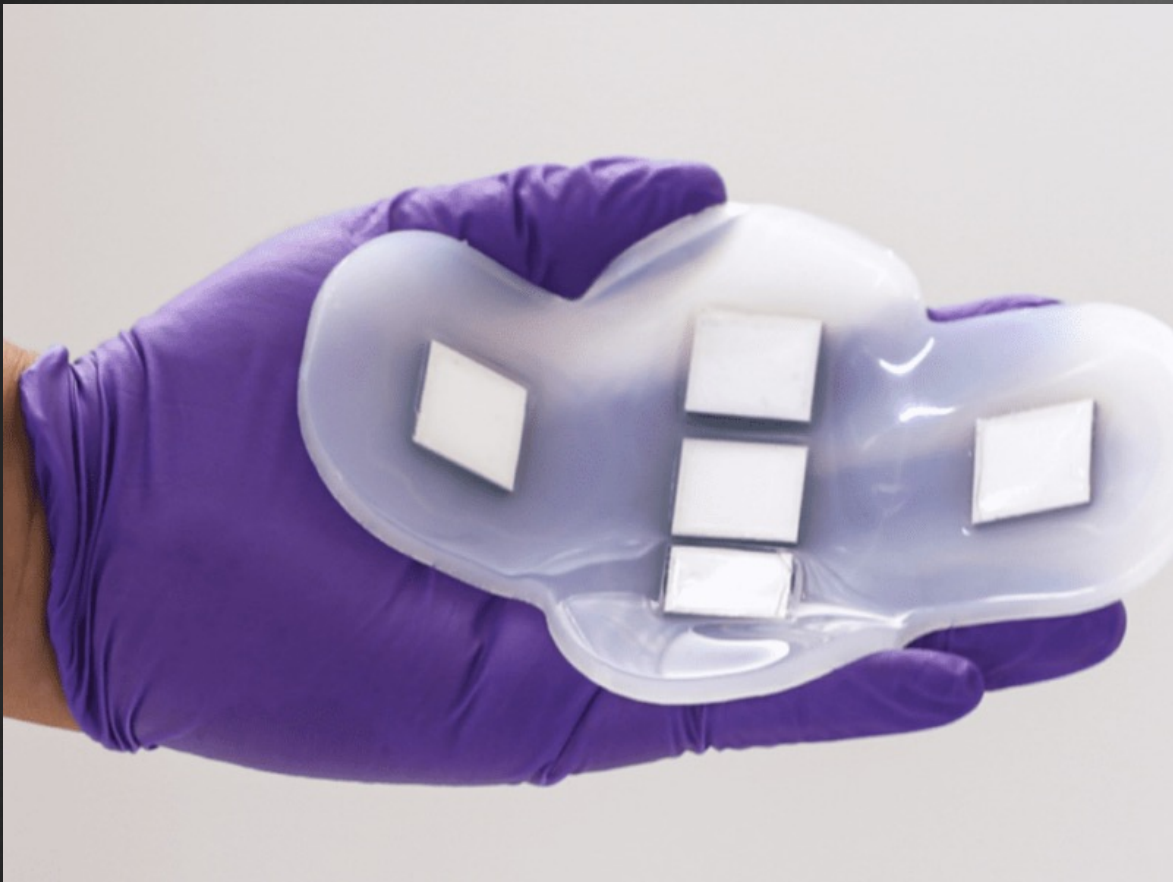
LV volume

Stroke volume

Cardiac output

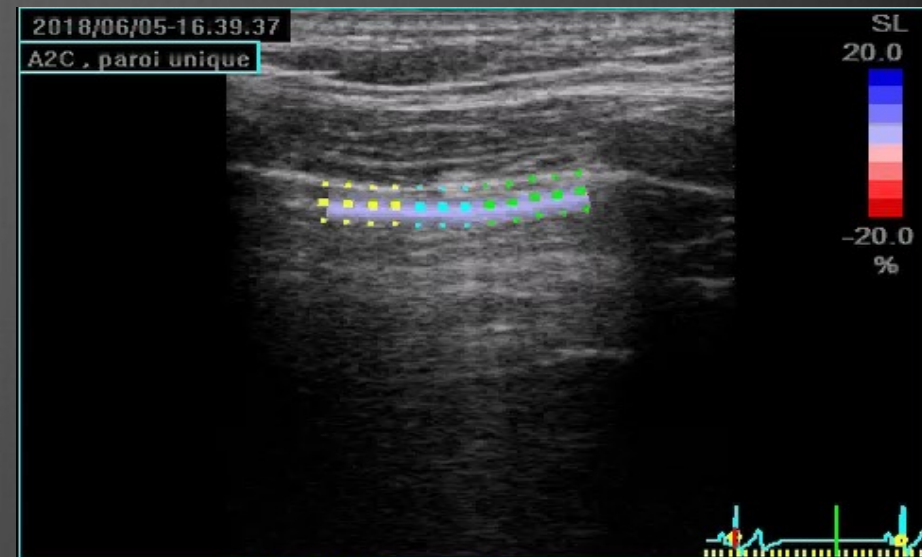
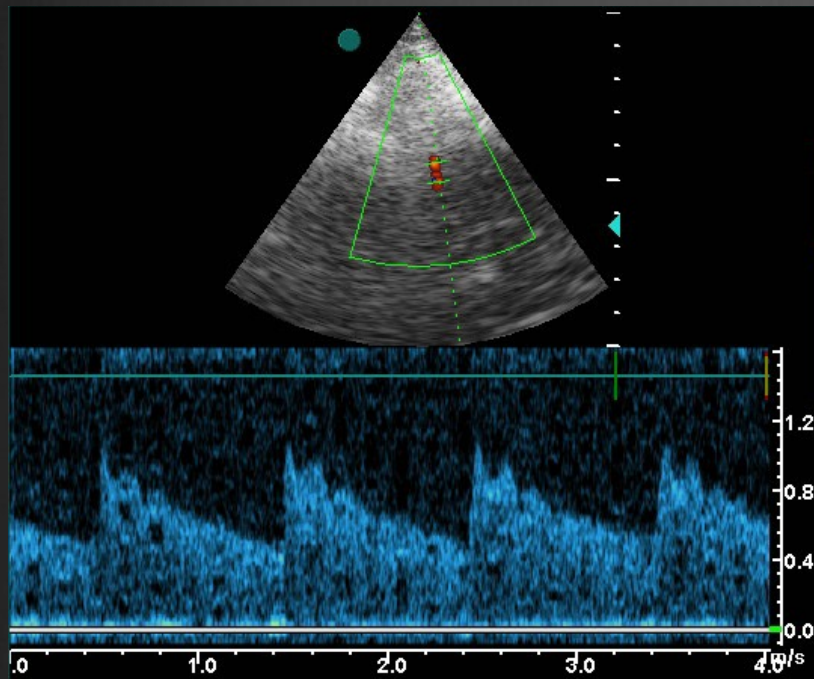
Ejection fraction

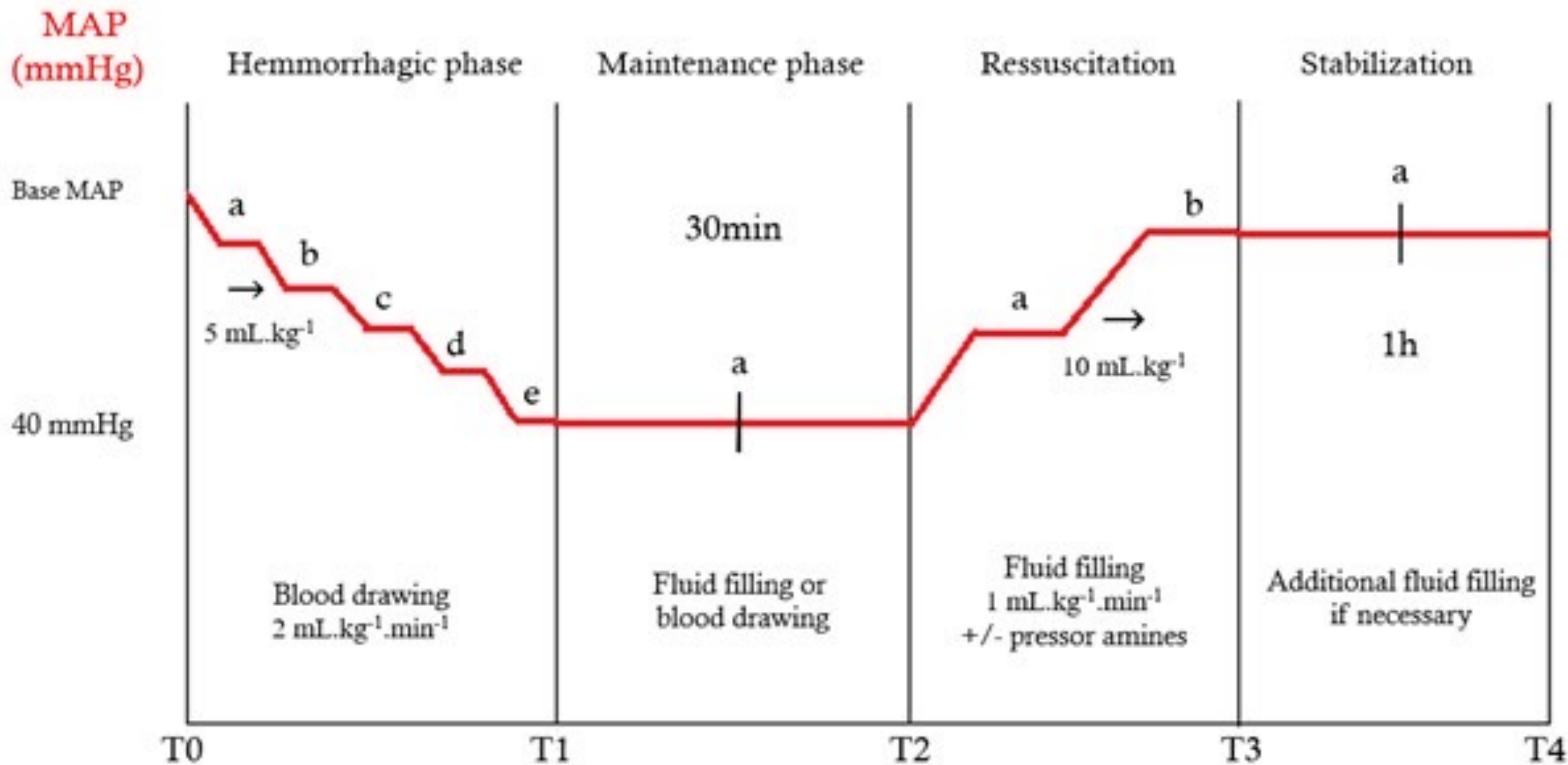


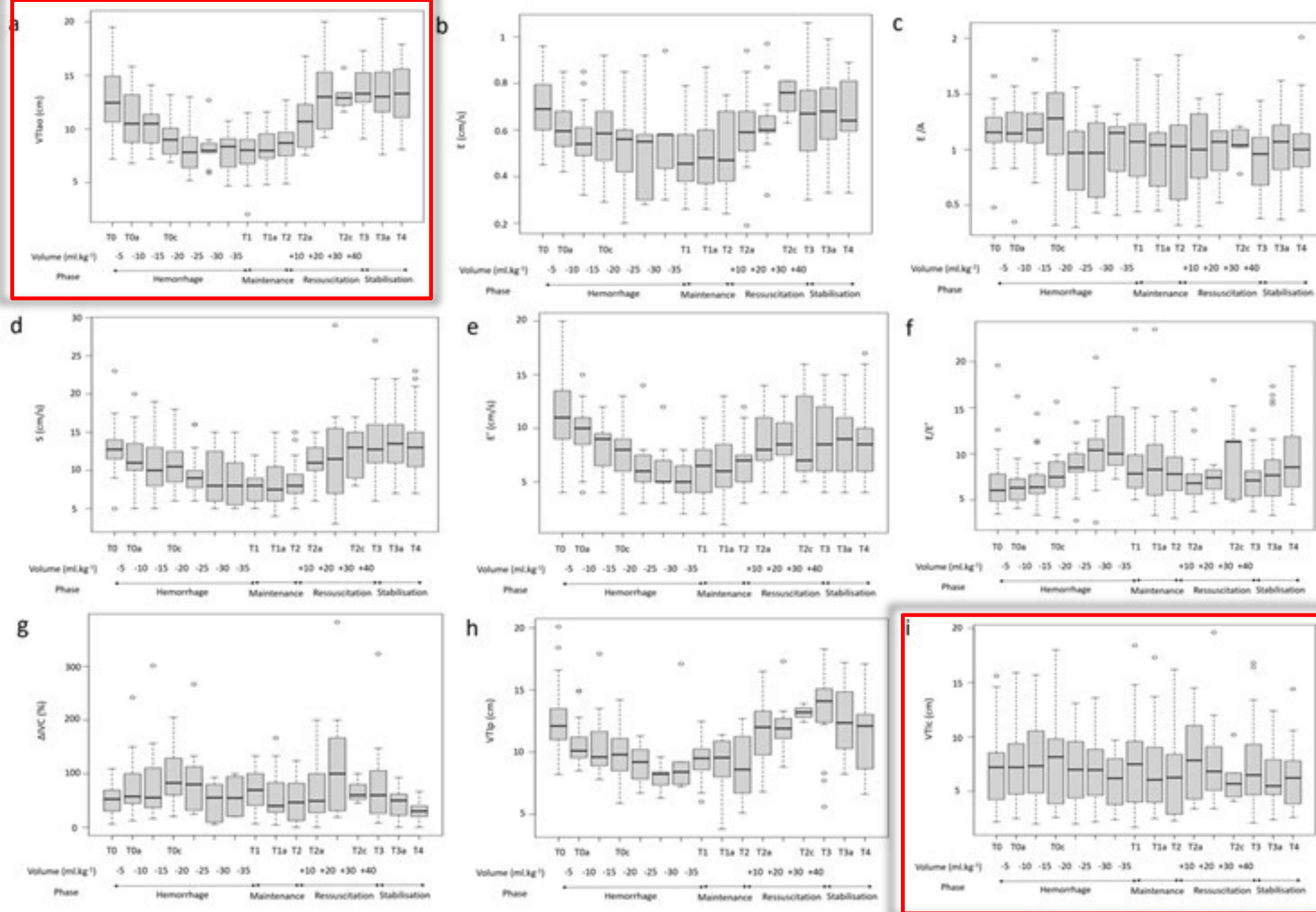


Échographie continue chez le traumatisé ?

- ⦿ Que veut-on monitorer ?
- ⦿ Que permet l'échographie – Doppler ?
- ⦿ Que peut-on imaginer ?







Méta analyse Δ ITV carotidien et Δ Dc

