

Hypovolémie

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Amiens



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Réanimation 13 (2004) 255–263

Réanimation

www.elsevier.com/locate/reaurg

Recommandations

Recommandations d'experts de la SRLF

« Indicateurs du remplissage vasculaire
au cours de l'insuffisance circulatoire »

SRLF experts recommendations

Indicators of volume resuscitation during circulatory failure

J.-L. Teboul, et le groupe d'experts de la SRLF

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Champ 2- Bénéfices attendus du remplissage vasculaire

Ils doivent être analysés à travers les conséquences générales et régionales de **l'augmentation du volume d'éjection systolique** espérée du RV

le RV **peut ne pas à lui seul** assurer la réalisation de tous les objectifs préalablement établis, ce malgré l'élévation du volume d'éjection systolique

- ex :
- augmentation insuffisante de la PAM si vasoplégie
 - augmentation insuffisante de l'apport d'O₂ aux tissus si troubles de l'extraction périphérique de l'O₂
 - absence de correction d'une IRA par tubulopathie

Les effets hémodynamiques du RV sont influencés :

- par les volumes administrés,
- le débit d'administration du soluté,
- l'administration concomitante d'amines vaso-actives

Objectifs de l'expansion volémique

**Augmenter le volume d'éjection
et le débit cardiaque**



critical care review

Predicting Fluid Responsiveness in ICU Patients*

A Critical Analysis of the Evidence

Frédéric Michard, MD, PhD; and Jean-Louis Teboul, MD, PhD

CHEST 2002, 121:2000-8

	R / NR	R (%)
Calvin (Surgery 81)	20 / 8	71 %
Schneider (Am Heart J 88)	13 / 5	72 %
Reuse (Chest 90)	26 / 15	63 %
Magder (J Crit Care 92)	17 / 16	52 %
Diebel (Arch Surgery 92)	13 / 9	59 %
Diebel (J Trauma 94)	26 / 39	40 %
Wagner (Chest 98)	20 / 16	56 %
Tavernier (Anesthesio 98)	21 / 14	60 %
Magder (J Crit Care 99)	13 / 16	45 %
Tousignant (A Analg 00)	16 / 24	40 %
Michard (AJRCCM 00)	16 / 24	40 %
Feissel (Chest 01)	10 / 9	53 %
Mean	211 / 195	52 %

« What are your indicators for volume replacement (diagnostic tools) ? »

Boldt et al. Intensive Care Med 1998; 24:147-151

CVP	93 %
PAOP	58 %
TEE	2 %

Critères diagnostiques d'hypovolémie

- Petite taille des cavités cardiaques : précharge
- Hyperkinésie ventriculaire gauche
- Pressions droites et gauches basses
- Débit cardiaque bas

La précharge

- Taille des veines caves
- Taille des cavités droites
- Taille des cavités gauches



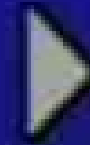
FEMME 60 ANS

R.A.C SERRE

REMPLACEMENT VALVULAIRE

AORTIQUE

ETAT DE CHOC EN SORTIE DE C.E.C



STDVG (cm²/m²)

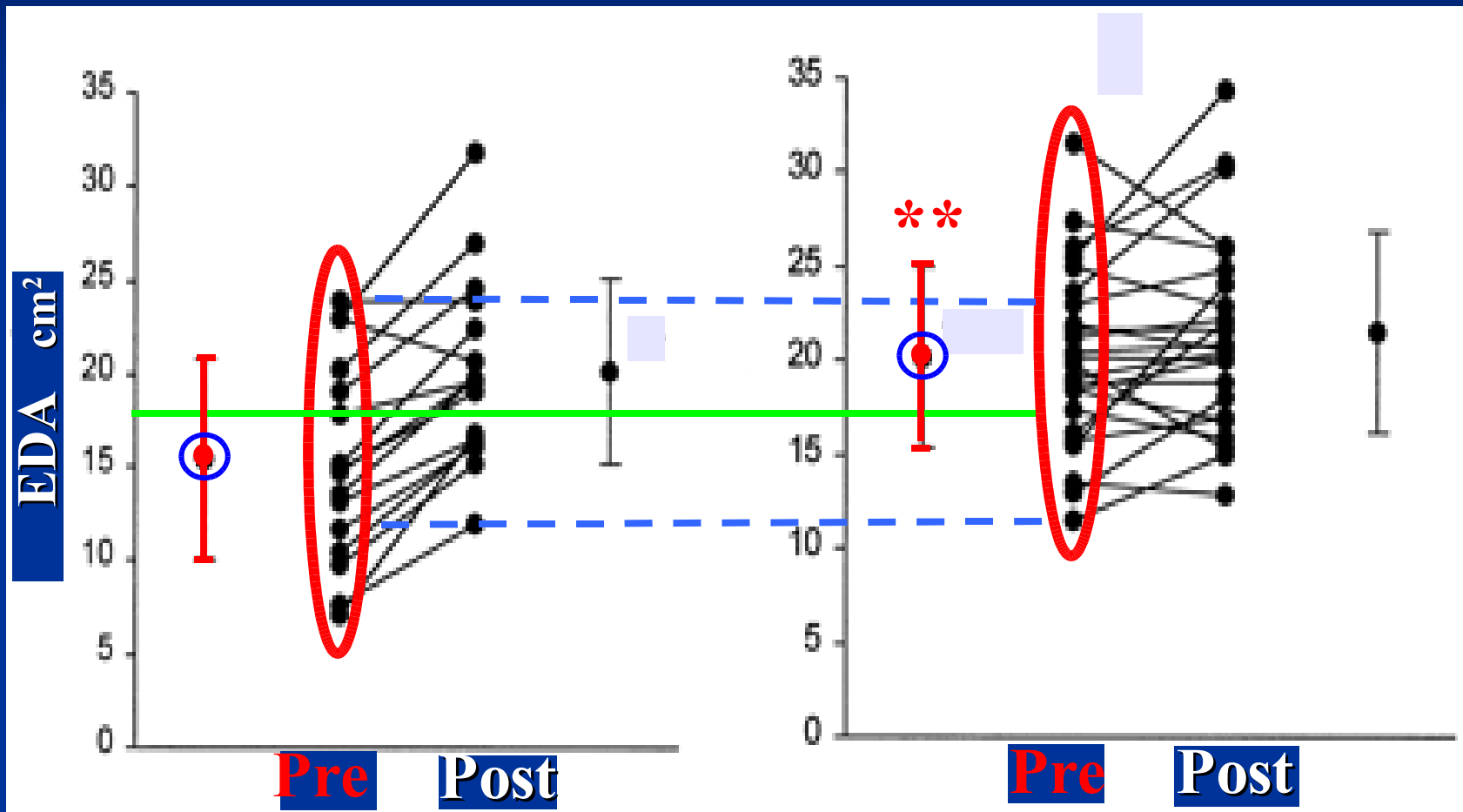
	R	NR
Tavernier (Anesthesio 98)	9 ± 3	12 ± 4 *
Tousignant (Anesth Analg 00)	15 ± 5	20 ± 5 * (cm ²)
Feissel (Chest 01)	10 ± 4	10 ± 2

* p < 0.05

The use of transesophageal echocardiography for preload assessment in critically ill patients. **Tousignant CP, Walsh F, Mazer CD. Anesth Analg 2000;90:351-355**

responders

non-responders

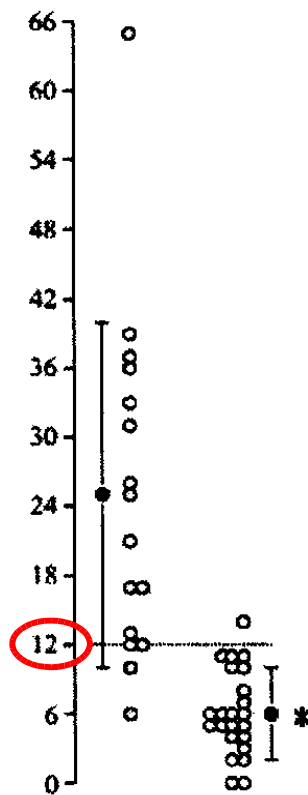


The respiratory variation of inferior vena cava diameter as a guide to fluid therapy

Feissel M, Michard F, Faller JP, Teboul JL

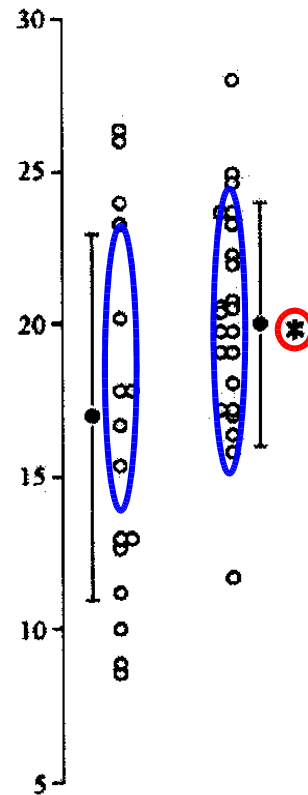
Intensive Care Med 2004, 30:1834-1837

ΔD_{IVC}



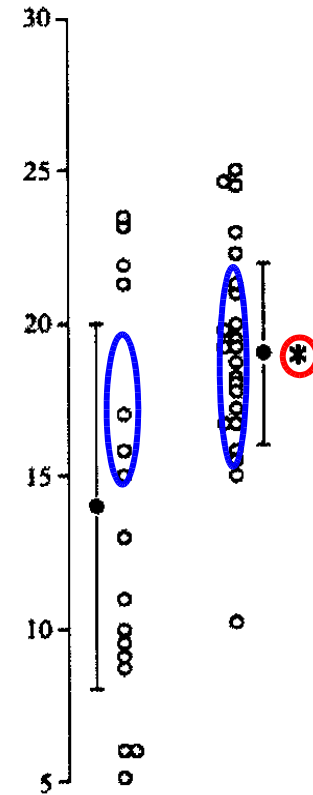
R NR

Maximum D_{IVC}



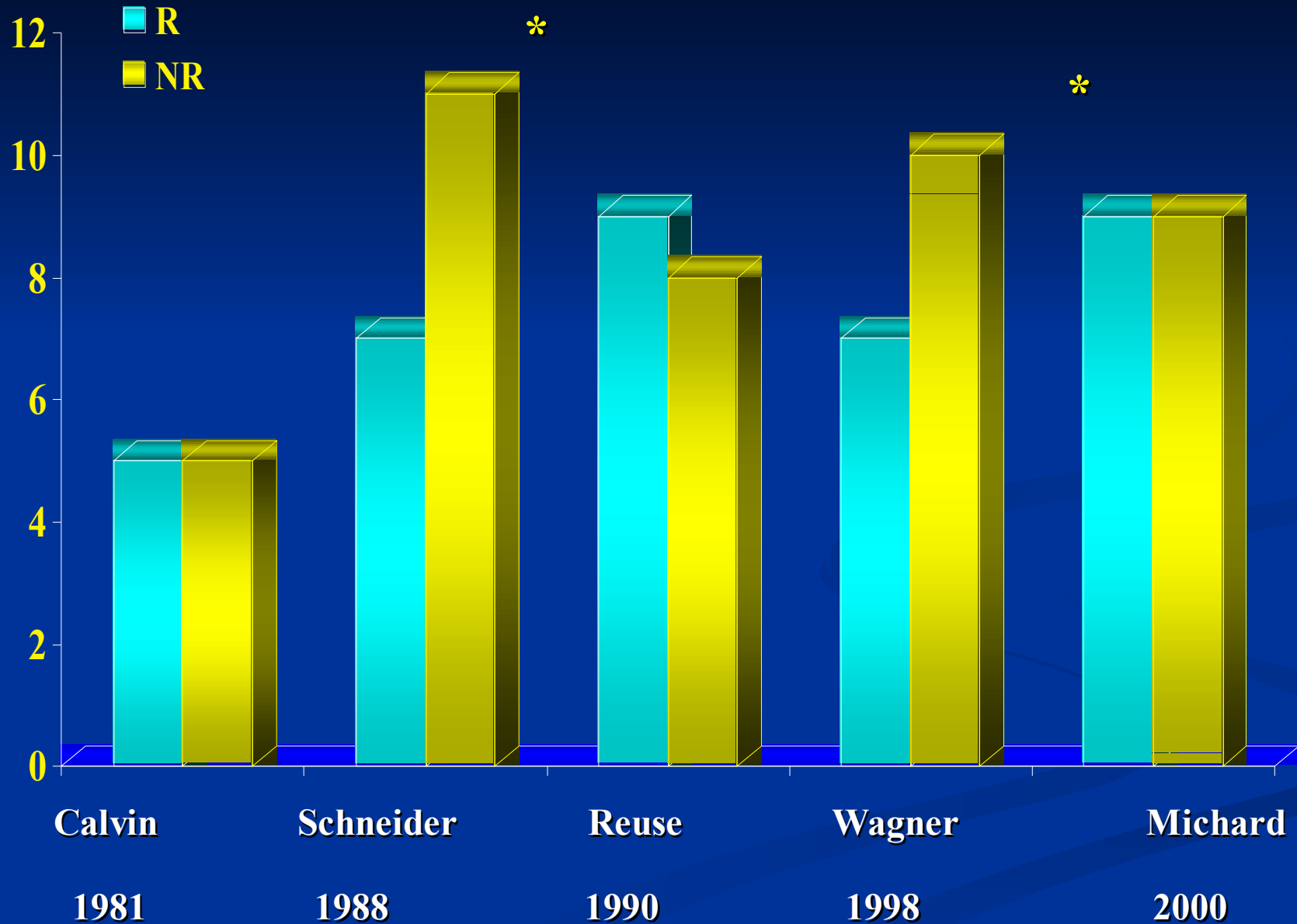
R NR

Minimum D_{IVC}

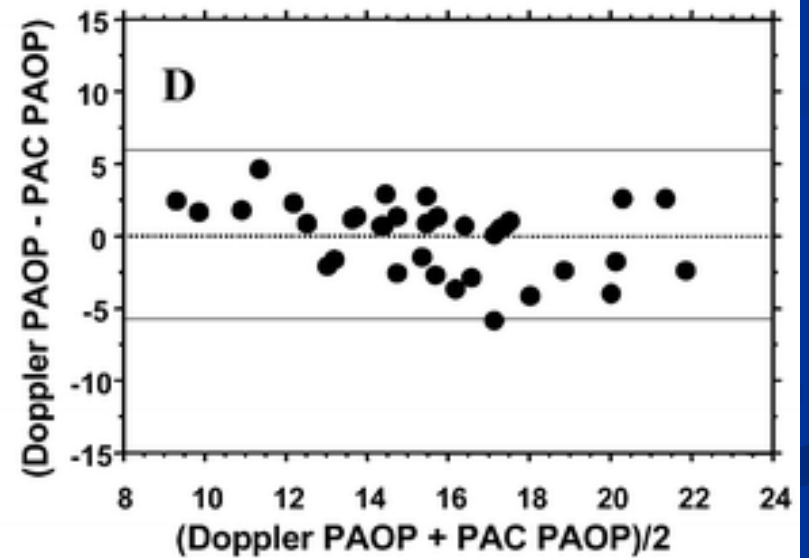
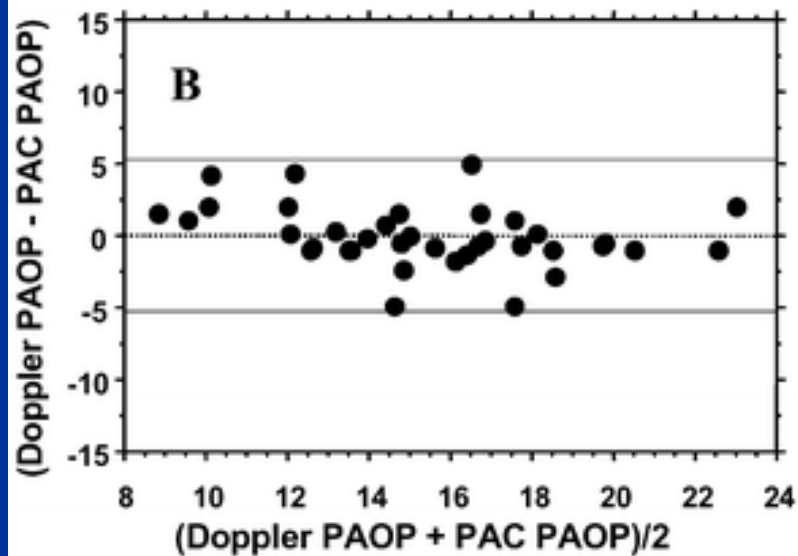
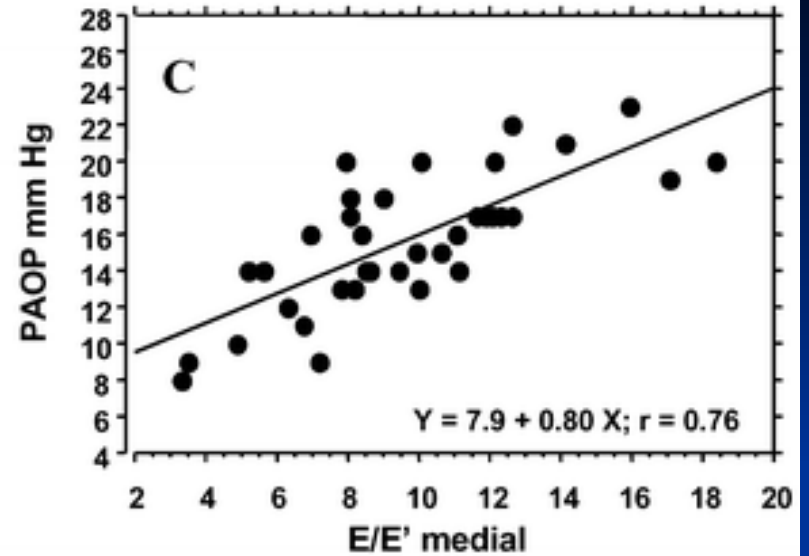
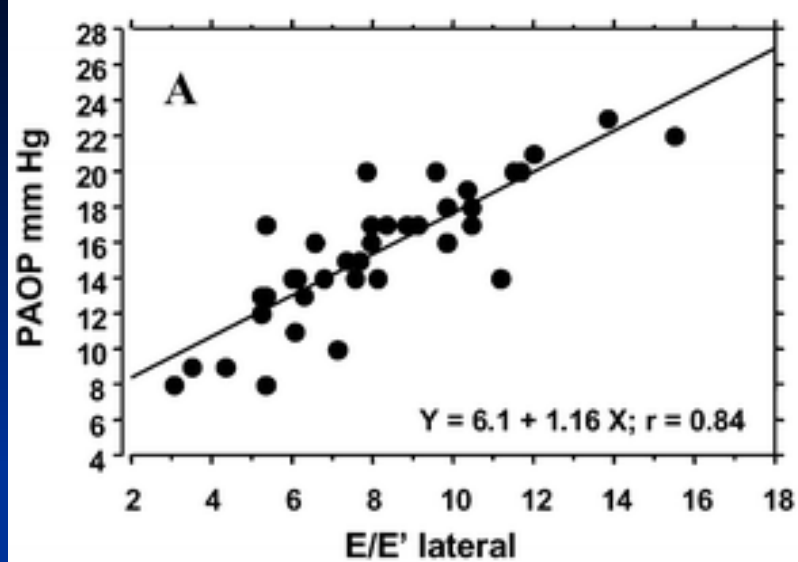


R NR

RAP before fluid challenge in responders (R) and non responders (NR)



E/Ea

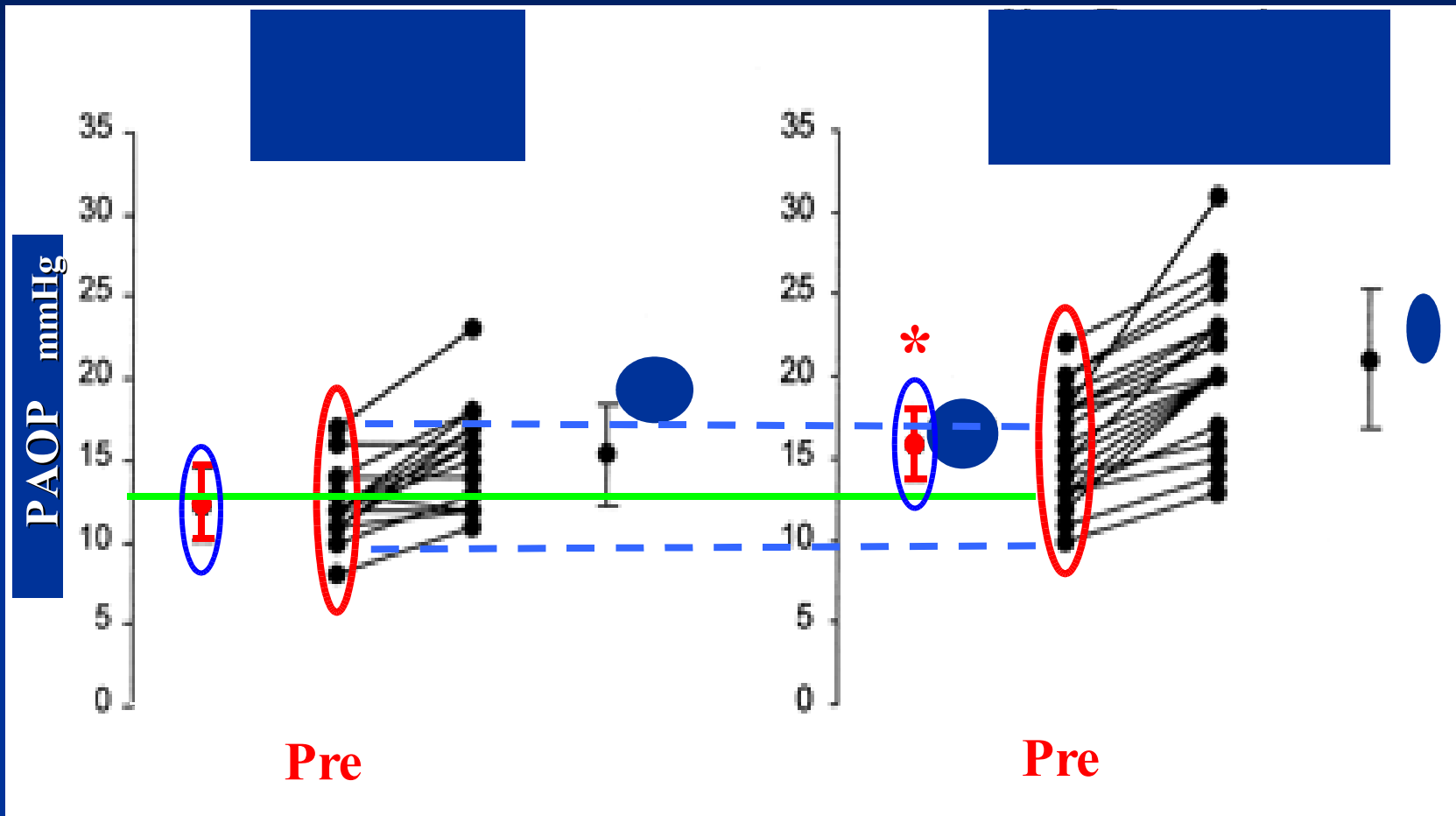


The use of transesophageal echocardiography for preload assessment in critically ill patients

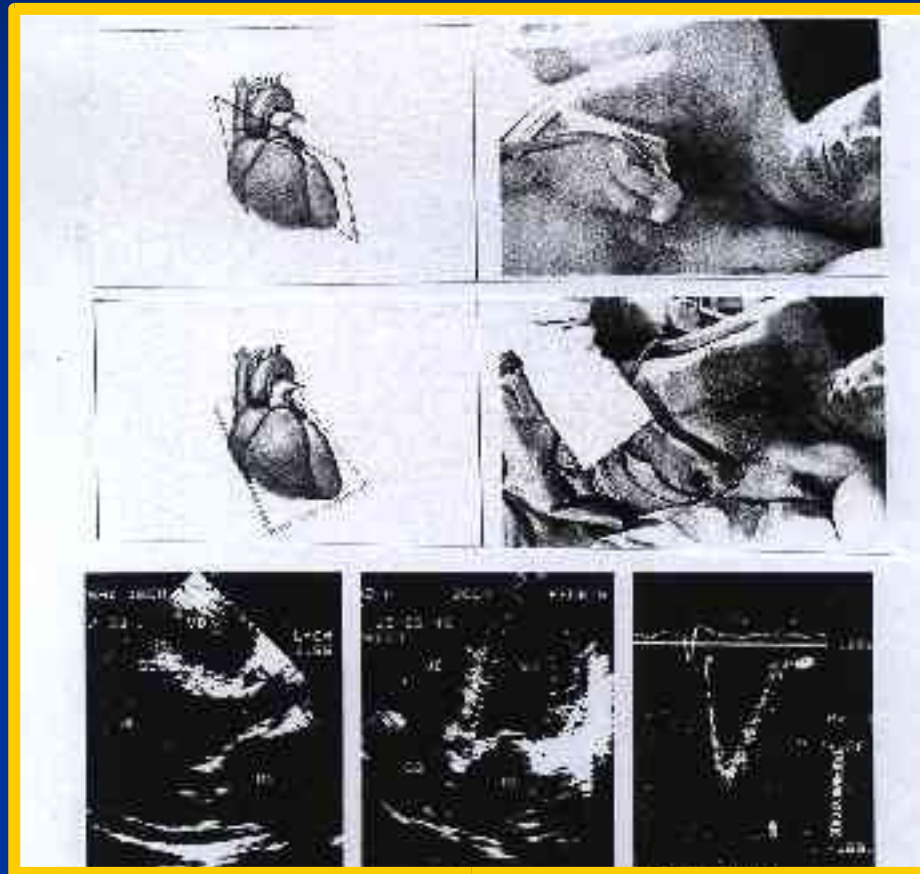
Tousignant CP, Walsh F, Mazer CD. *Anesth Analg* 2000;90:351-355

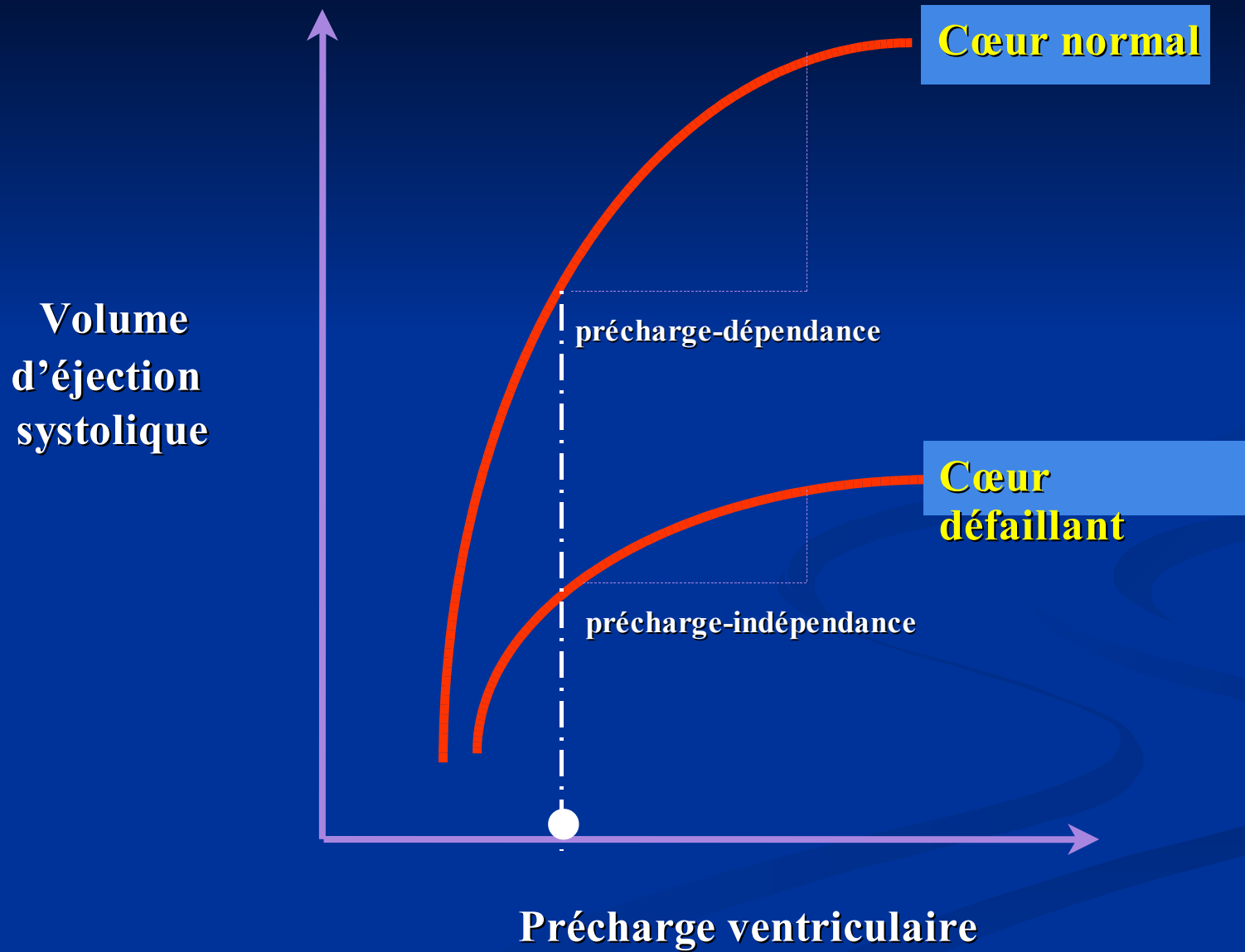
responders

non-responders



Débit par écho transthoracique





**Insufflation
mécanique**



Précharge VD



Ejection VD

à l'inspiration



Précharge VG

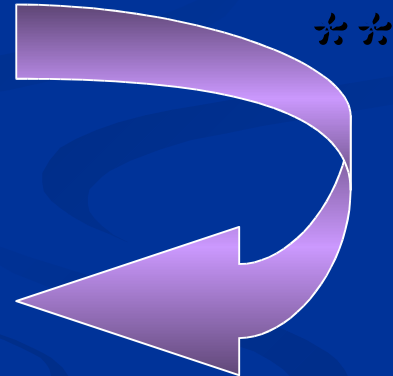
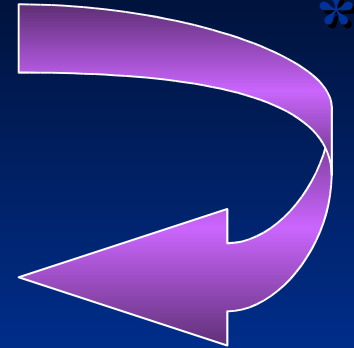
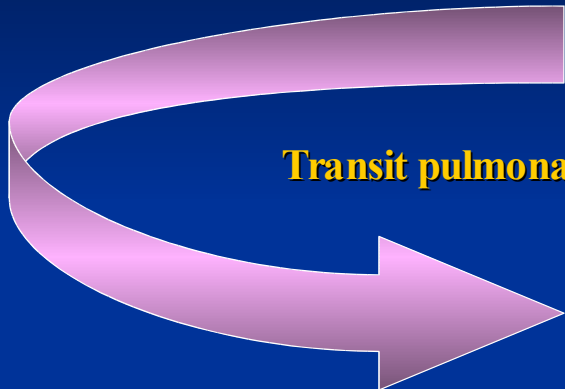
2 à 3 cycles cardiaques
plus tard



Ejection VG

à l'expiration

Transit pulmonaire



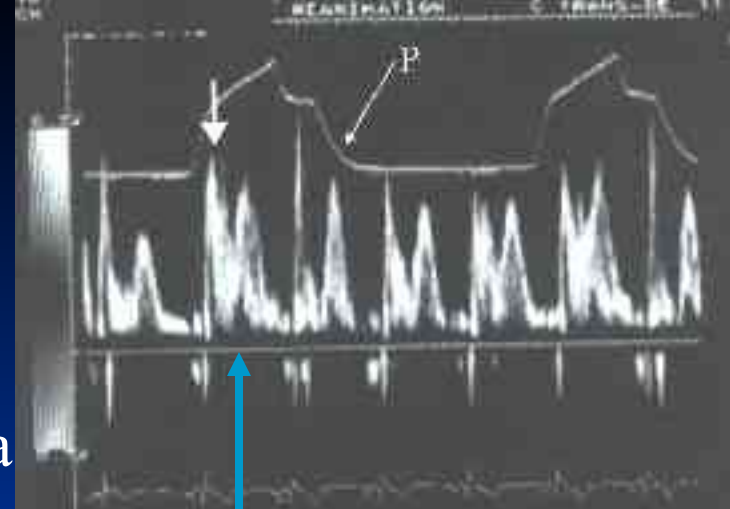
* si VD précharge-dépendant

** si VG précharge-dépendant

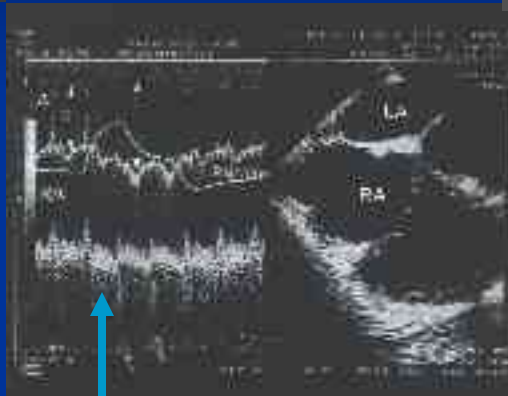


Superior vena cava

Right and left atria

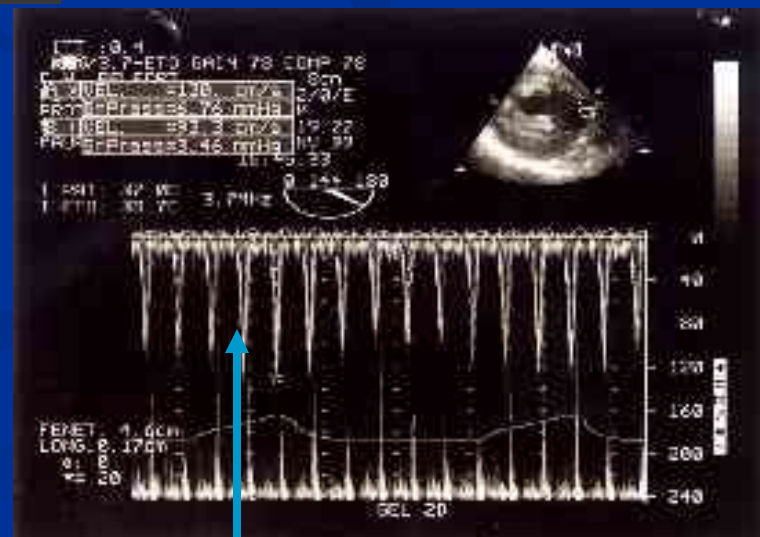


Mitral flow



Pulmonary arterial flow

Aortic flow

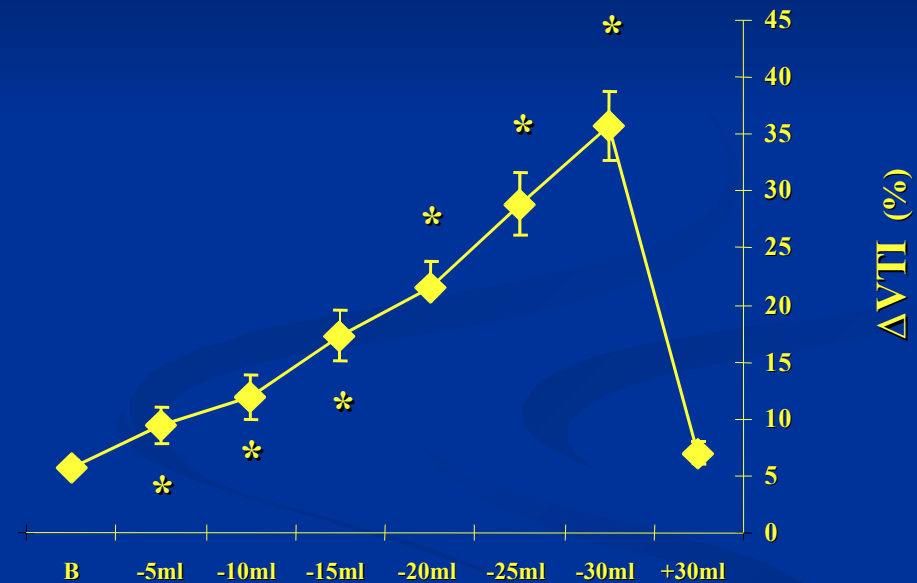
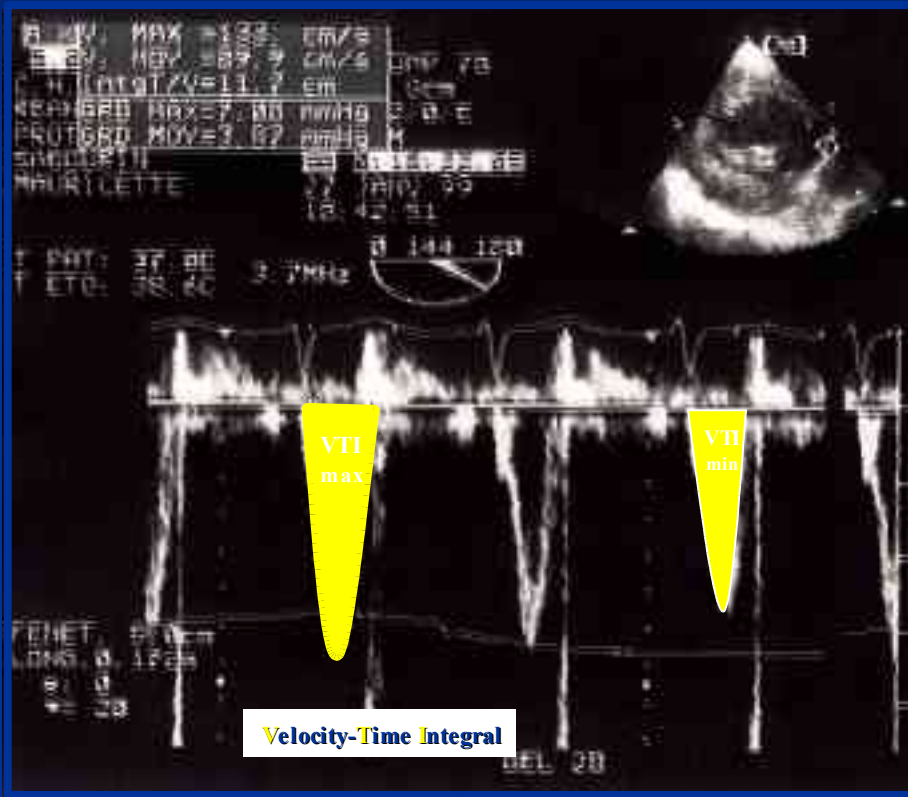


Slama M, Masson H, Teboul JL, Arnout ML, Susic D, Frohlich E, Andrejak M.

Respiratory variations of aortic VTI : A new index of hypovolemia and fluid responsiveness.

***Am J Physiol* 2002; 283: H 1729-H 1733**

VTI = Stroke volume / aortic area



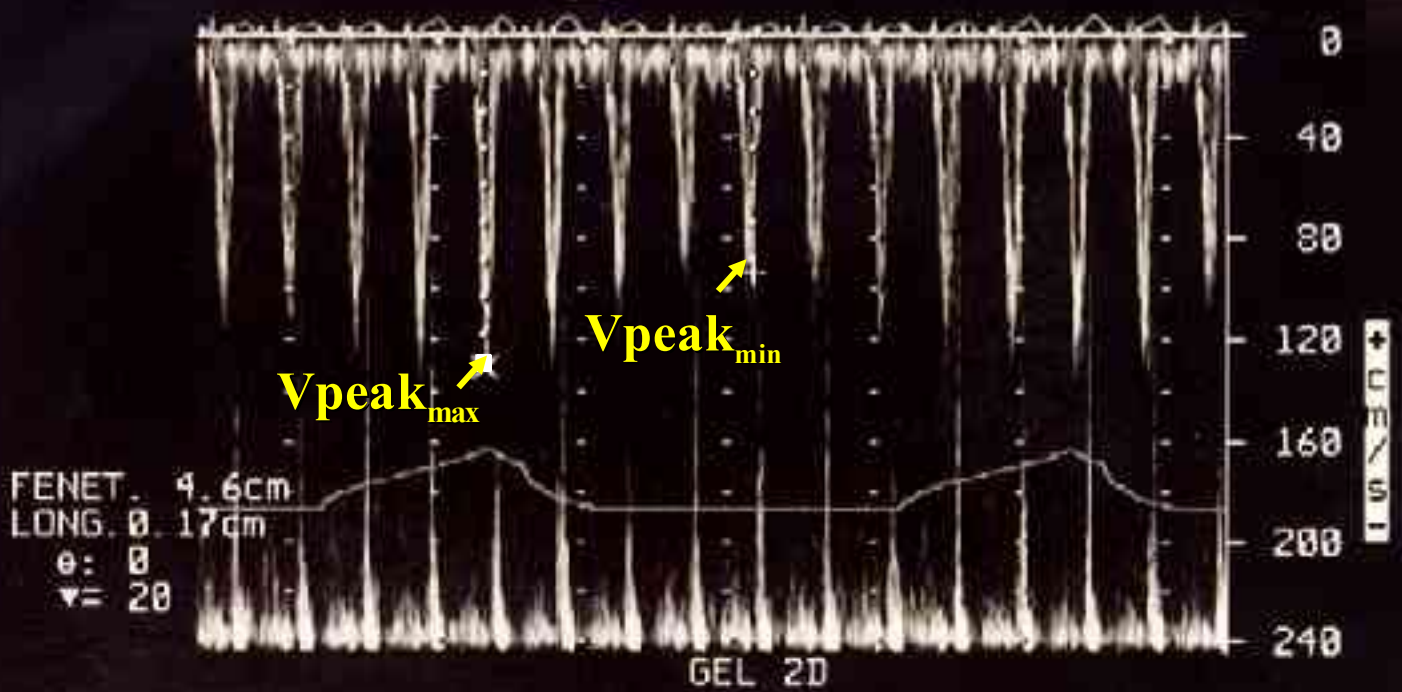
Blood withdrawal

dVpeak = 33%

**Cardiac output
will increase
by more than 40 %
after fluid infusion**

ITT 5.0
C.H. 8cm
A X VEL. =130. cm/s 2/0/E
PRD GrPress=6.76 mmHg M
B + VEL. =93.3 cm/s 19:22
MAU GrPress=3.46 mmHg NV 99
18:45:33

T PAT: 37.0C
T ETO: 38.7C 3.7MHz
0 144 180



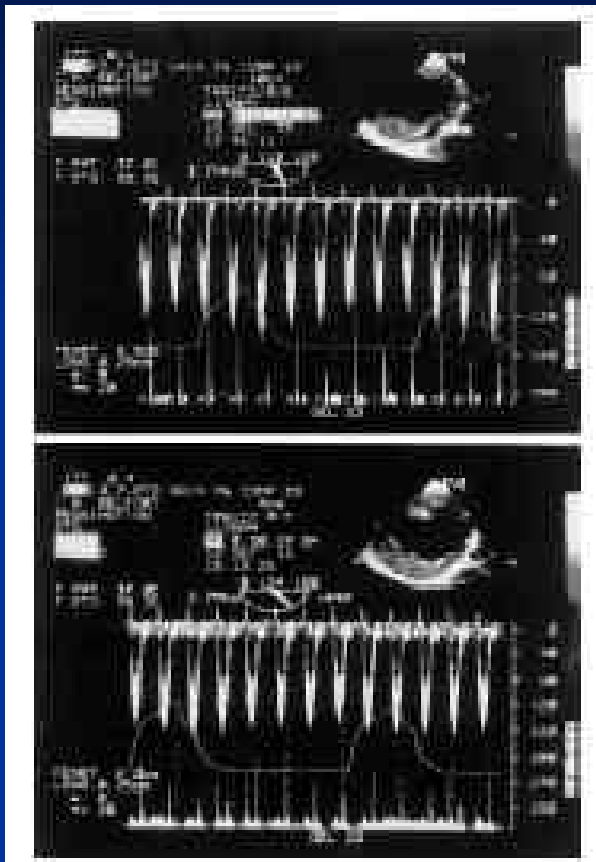


Table 1—Hemodynamic Parameters Recorded at Baseline and After Volume Expansion*

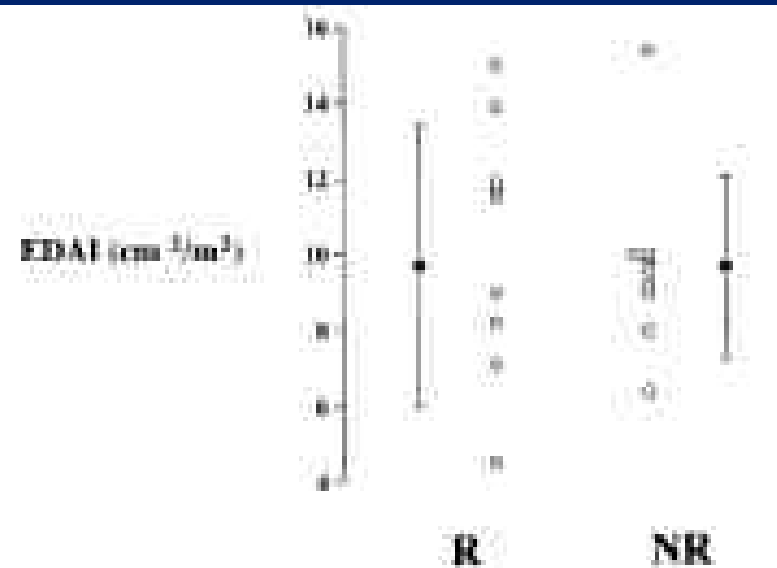
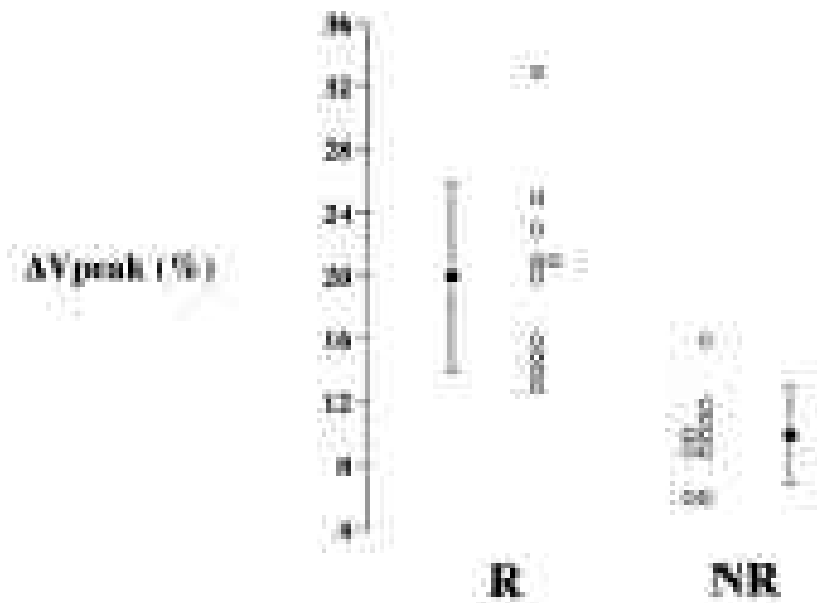
Parameters	Baseline	Volume Expansion
HR, beats/min	116 ± 24	110 ± 21
MAP, mm Hg	86 ± 12	79 ± 12†
EDAO, cm Hg ²	9.7 ± 3.1	11.8 ± 3.9†
Cardiac index, L/min/m ²	3.8 ± 1.0	4.1 ± 1.0‡
SVI, mL/m ²	38 ± 11	38 ± 11
ΔV peak, %	12 ± 2	8 ± 4‡

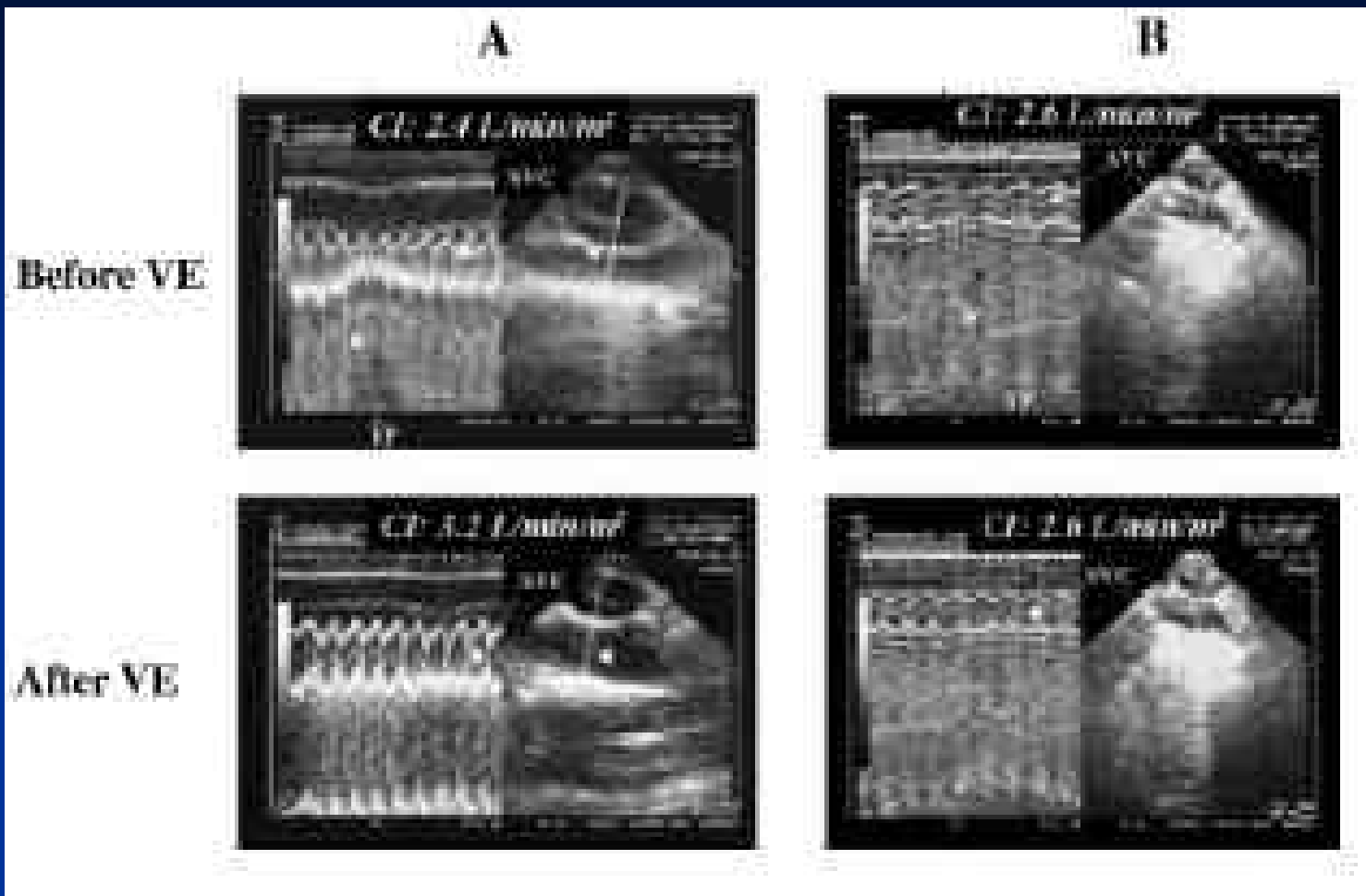
*Values are expressed as mean ± SD. HR = heart rate.

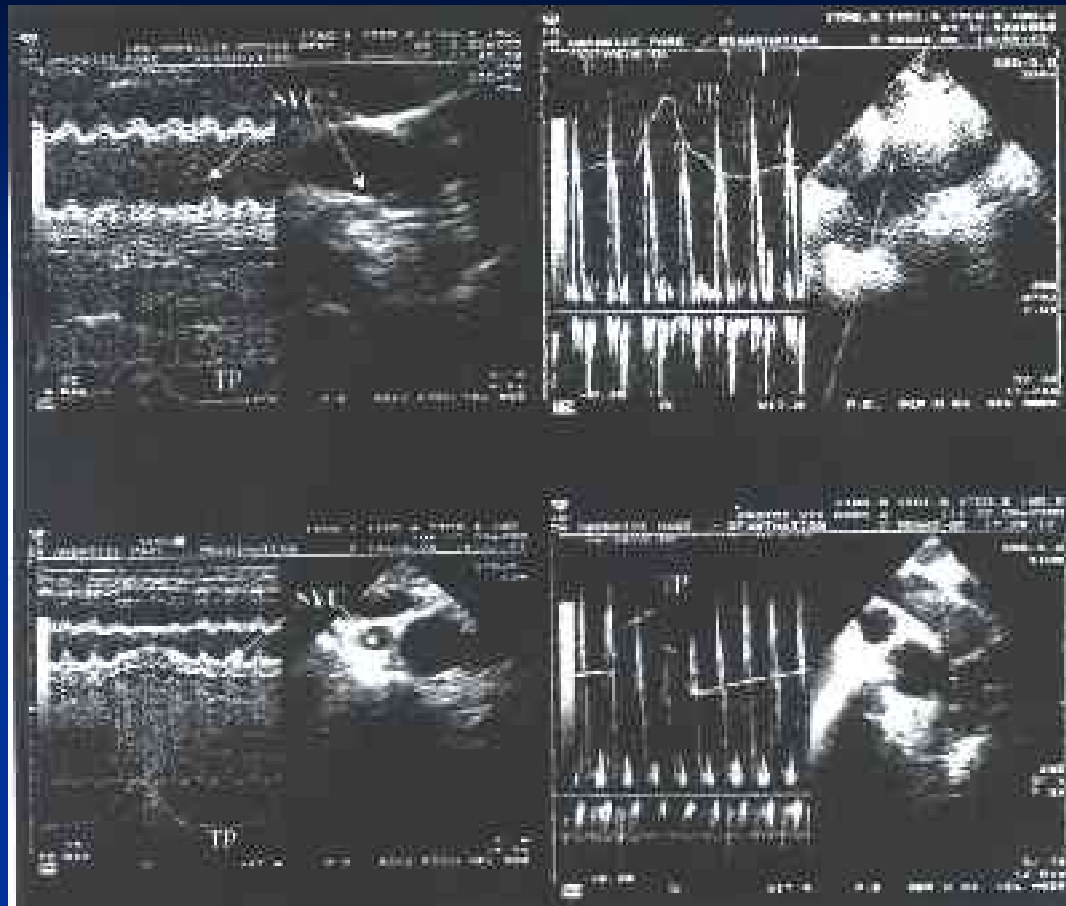
MAP = mean arterial pressure; SVI = stroke volume index.

†p < 0.01.

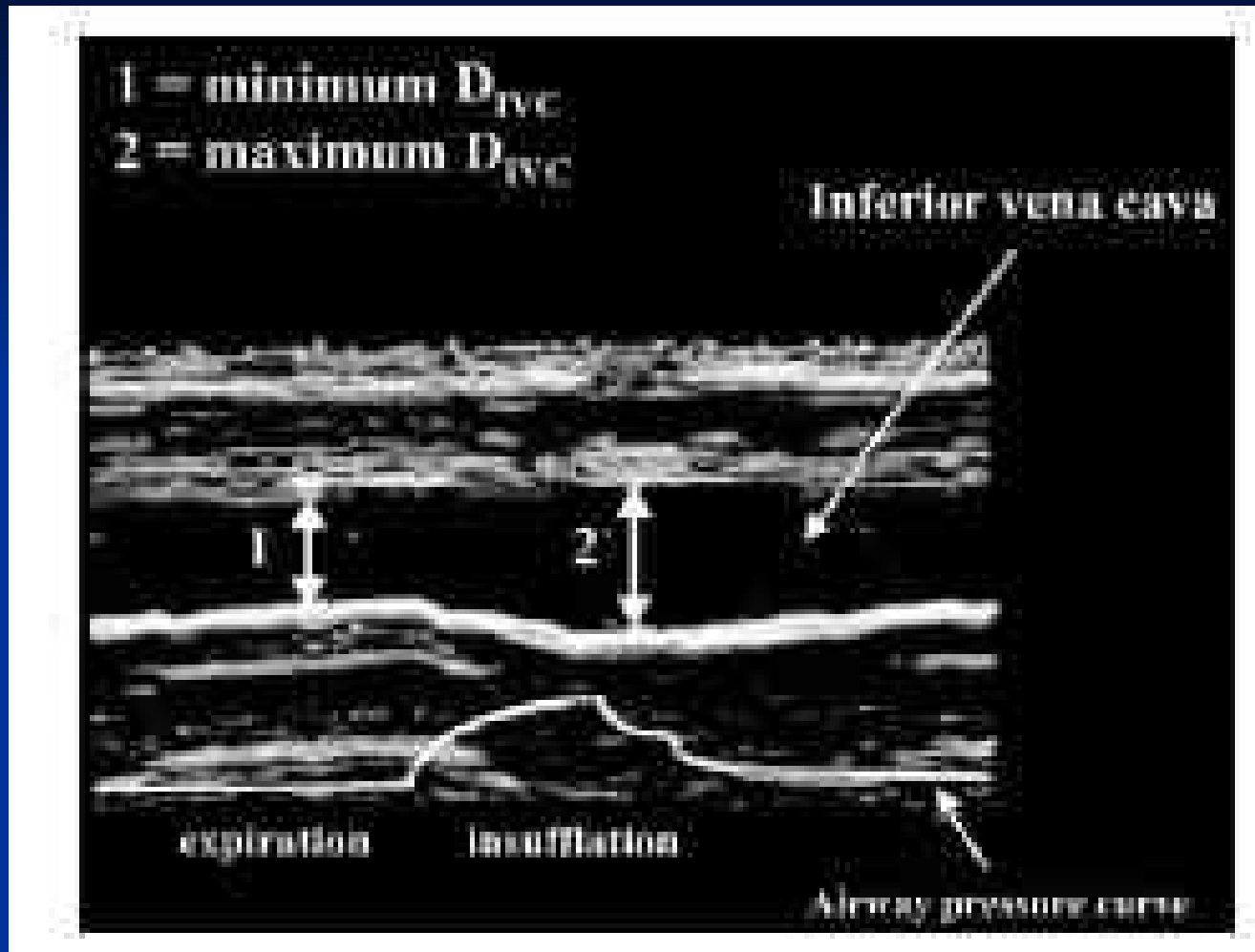
‡p < 0.001.







Vieillard-Baron A Anesthesiology 2001;95:1083-8

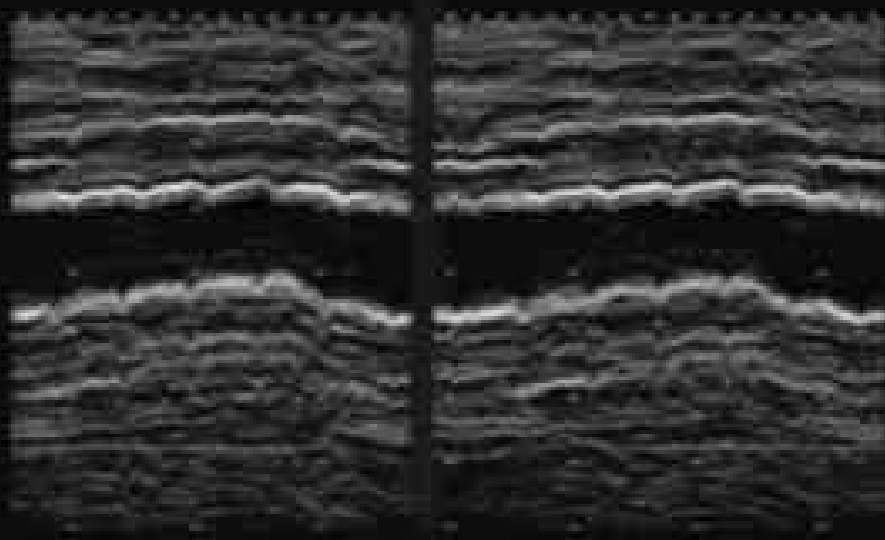


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12.2



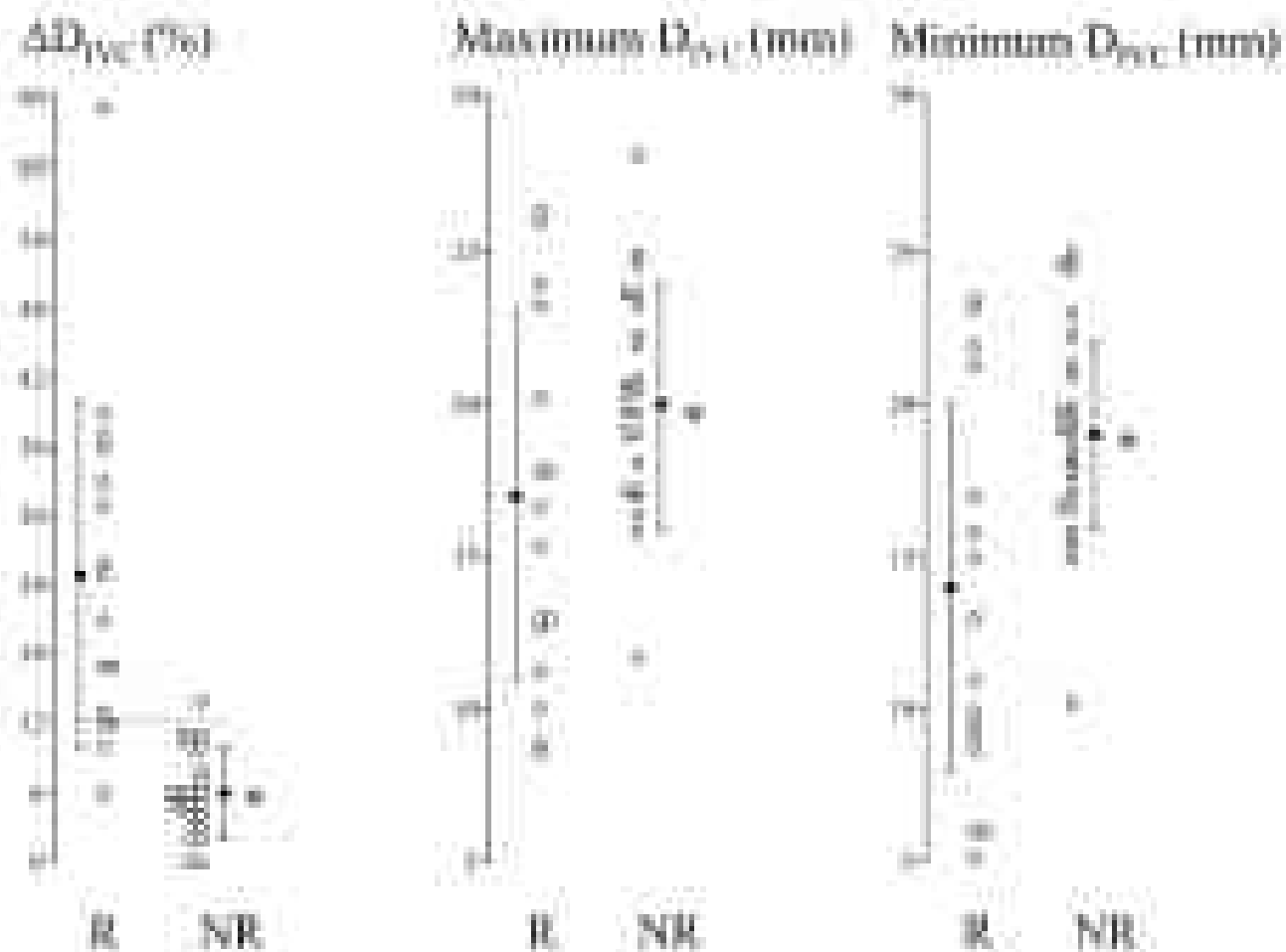
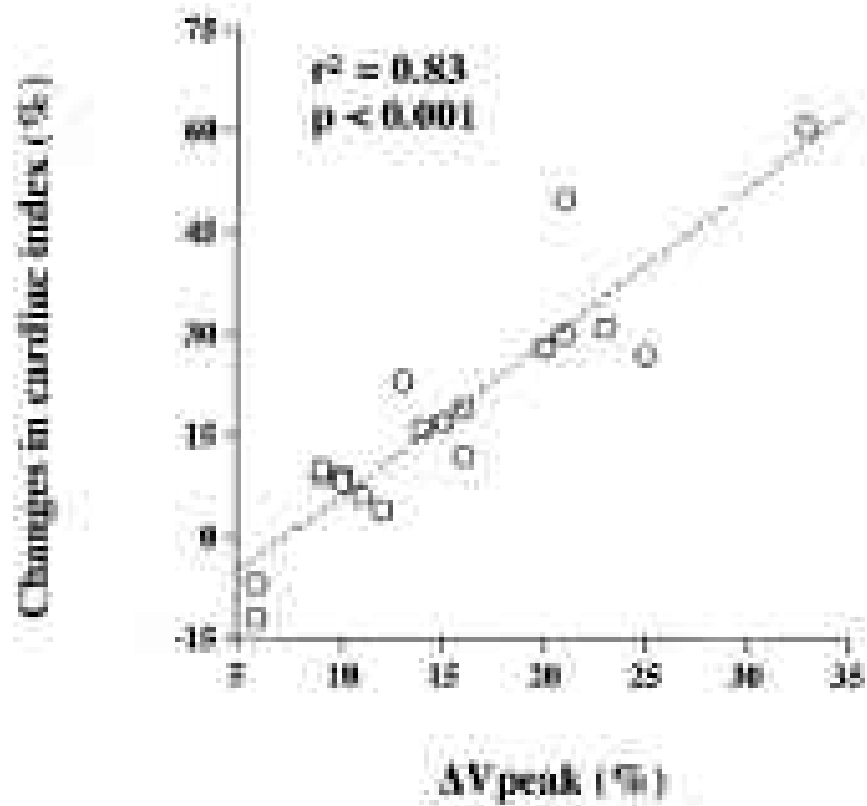
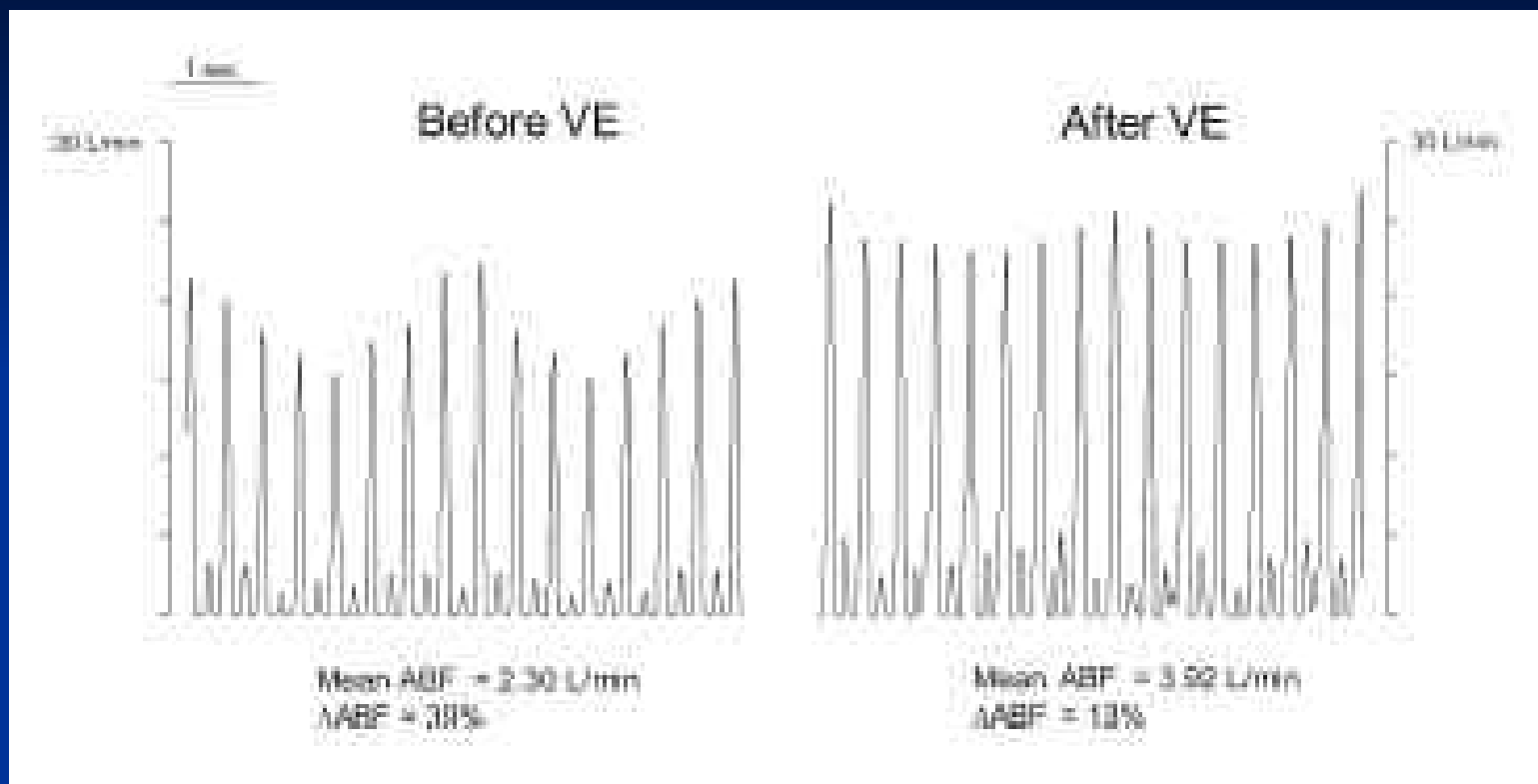


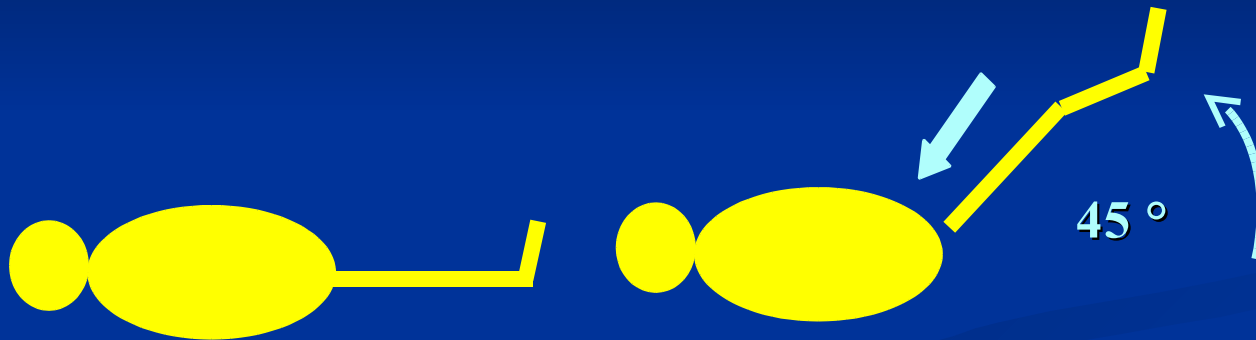
Fig. 3 Individual values (open circles) and mean $\pm$ SD (closed circles) of the maximum D_{IVC} , minimum D_{IVC} and ΔD_{IVC} before volume loading in responder (R) and non-responder (NR) patients.
* $P < 0.05$ R vs NR.





Lever de jambes passif

Venous blood shift (Rutlen et al. 1981, Reich et al. 1989)



Transient effect (Caffney 1982)

Le LJP peut être utilisé comme test plutôt que comme traitement
Augmentation du débit cardiaque est très prédictif
d'un effet favorable du remplissage