HEART-LUNG INTERACTIONS

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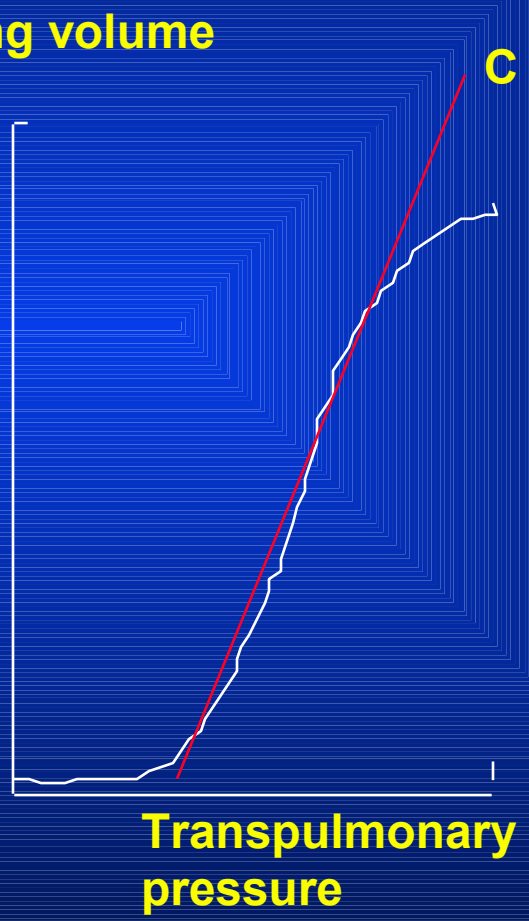
TRANSPULMONARY PRESSURE

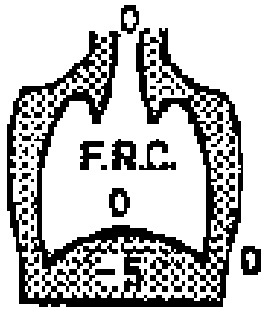
$TPP = Palv - Ppl$

$C = \Delta V / \Delta TPP$

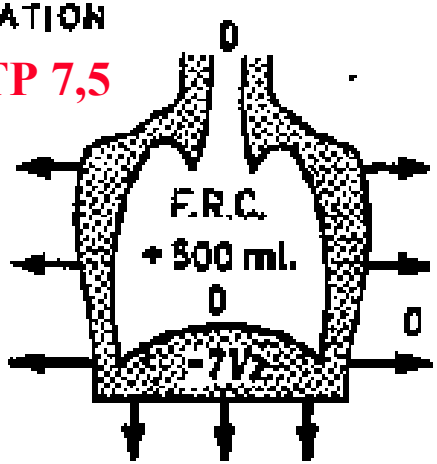


SPONTANEOUS RESPIRATION

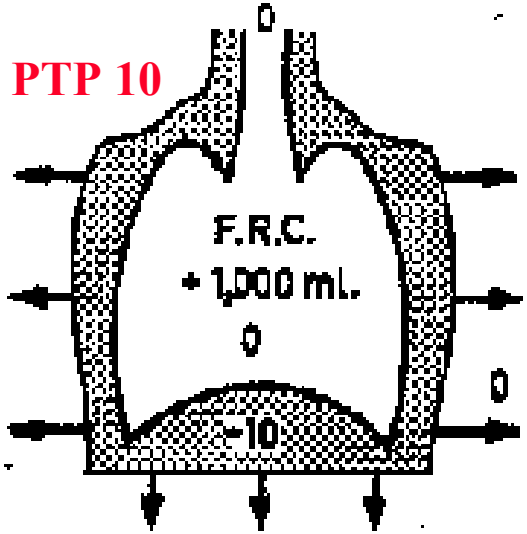
PTP 5



PTP 7,5

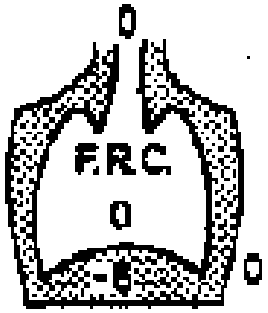


PTP 10

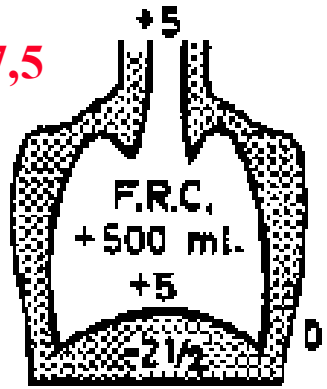


INTERMITTENT POSITIVE PRESSURE VENTILATION

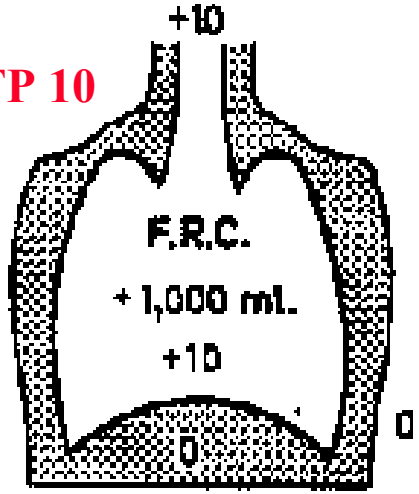
PTP 5



PTP 7,5

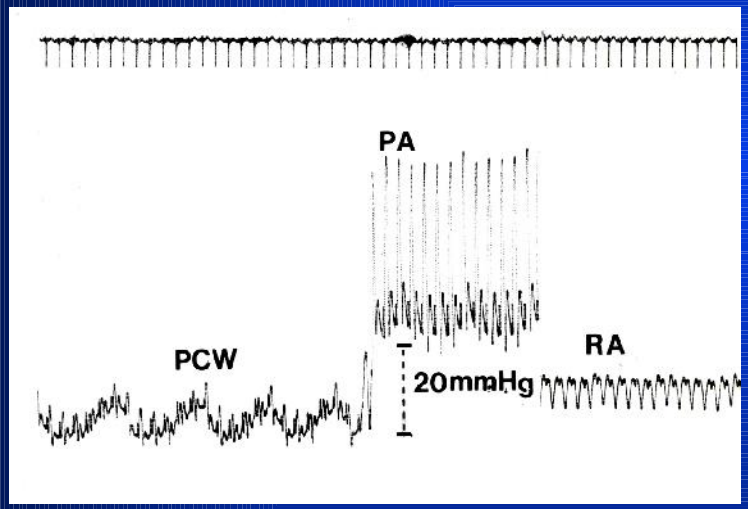


PTP 10

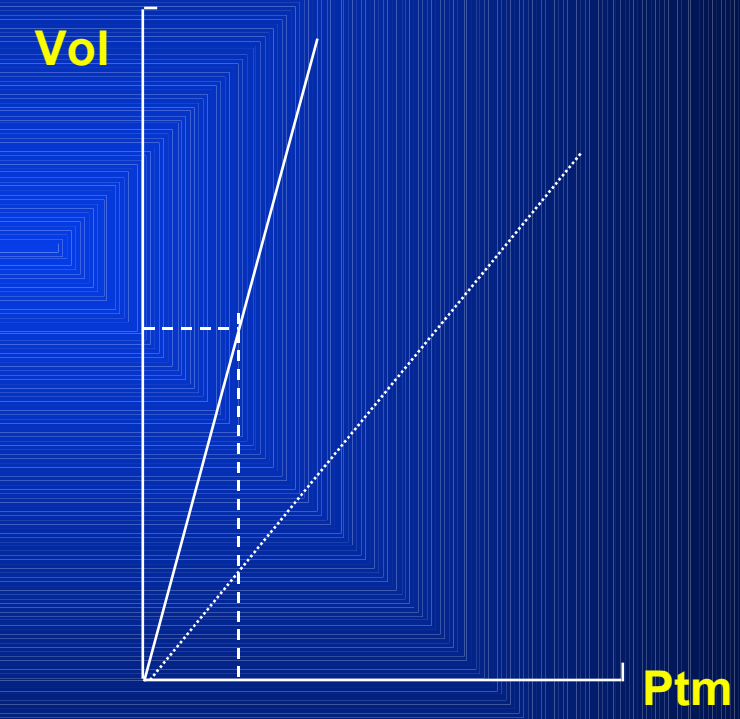


Figures denote pressure relative to atmosphere (cm H_2O)

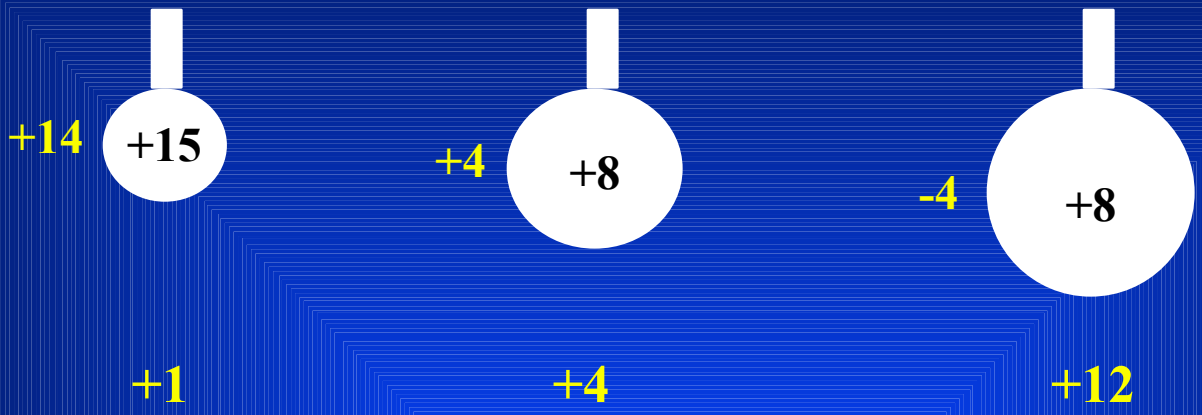
INTRAVASCULAR PRESSURE
TRANSMURAL PRESSURE



Intravascular P
=
Measured P by KT



Transmural P
=
Distending P (Pint - Pext)


+14
+15
+4
+8
-4
+8
+1
+4
+12

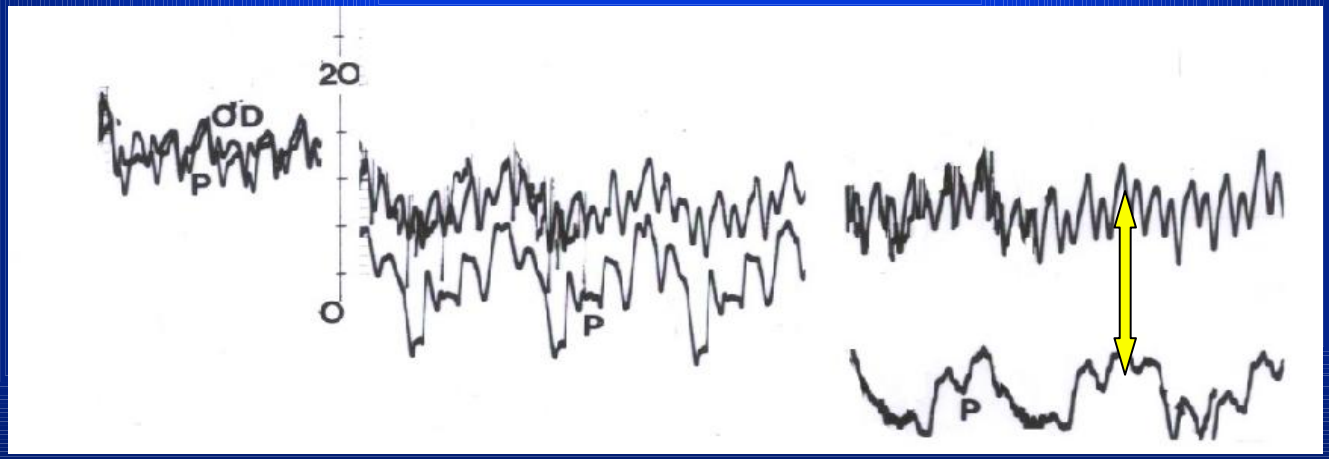
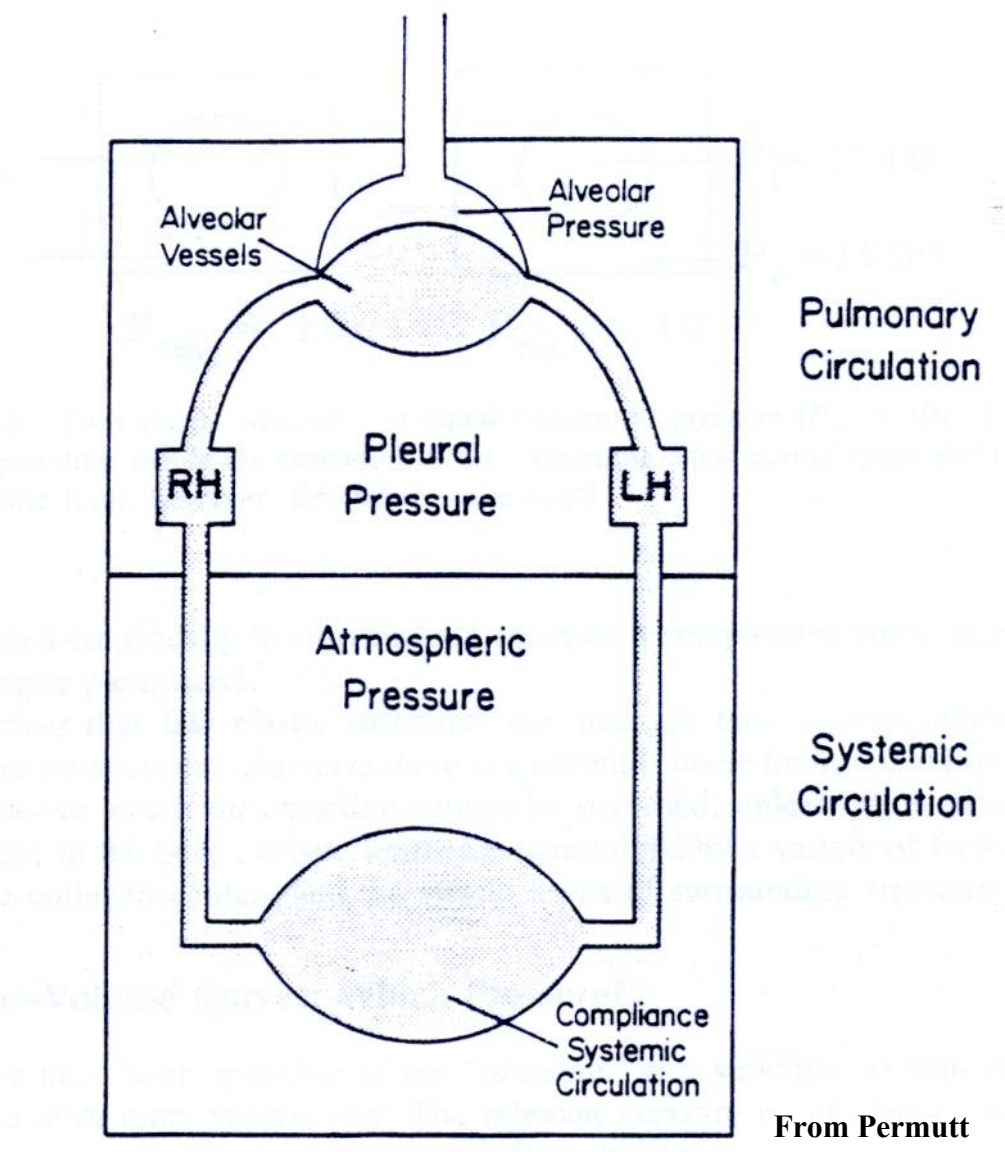
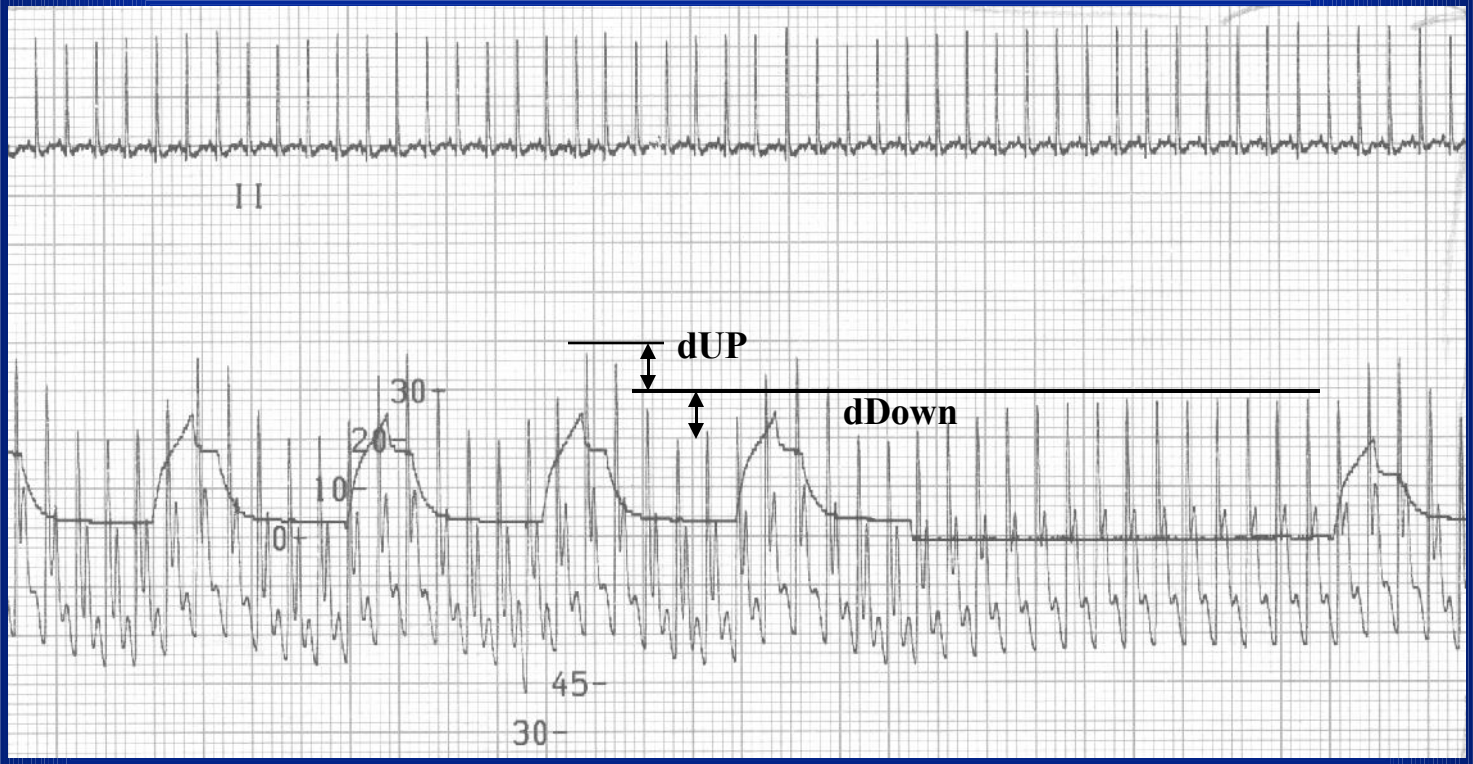

20
0
OD
P
P
P

DIAGRAM OF THE CIRCULATION



From Permutt


II
dUP
dDown
30
20
10
0
45
30

INSPIRATORY PHENOMENA

- Decrease in RV ejection
  - » By decrease in systemic venous return
  - » By increase in RV afterload

  => dDown

- **Increase in LV ejection**
  - » **By increase in LV preload**
  - » **By decrease in LV afterload?**

  => dUp

INSPIRATORY DECREASE IN RV EJECTION

dDown

Pulmonary arteries: 80 ml

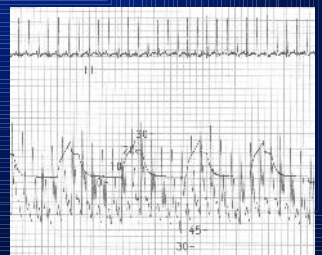
Pulmonary capillaries: 120 ml

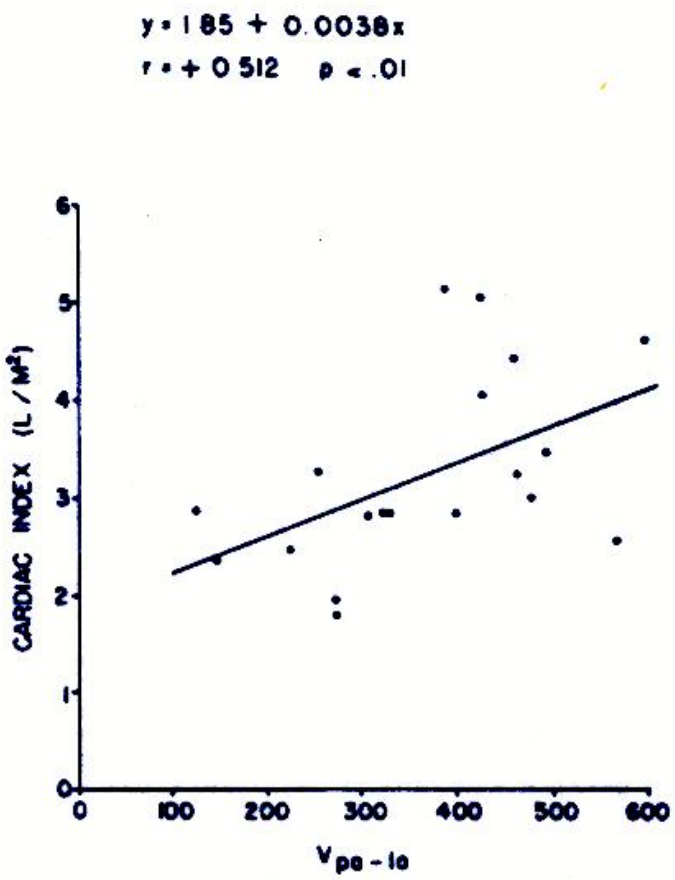
Pulmonary vena: 300ml

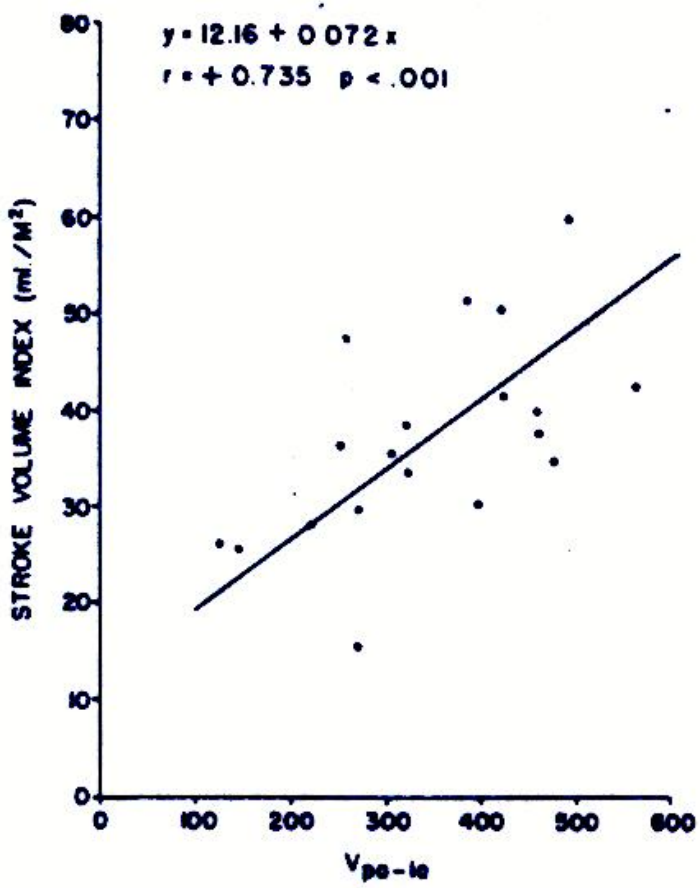
RA, RV

LA, LV

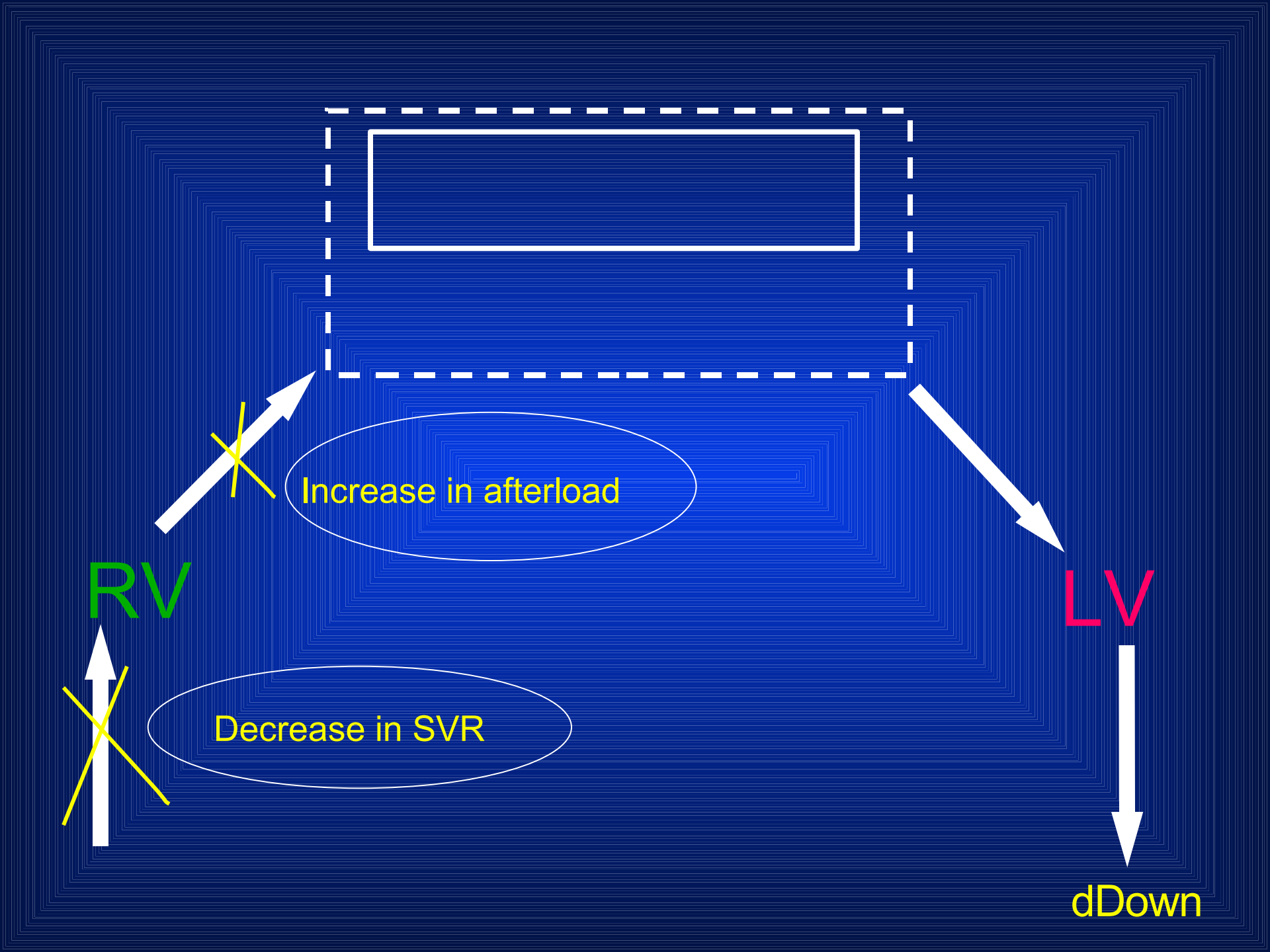
LVEDV = 70 ml/m²







Milnor Circulation 1960


Increase in afterload
RV
LV
Decrease in SVR
dDown

I

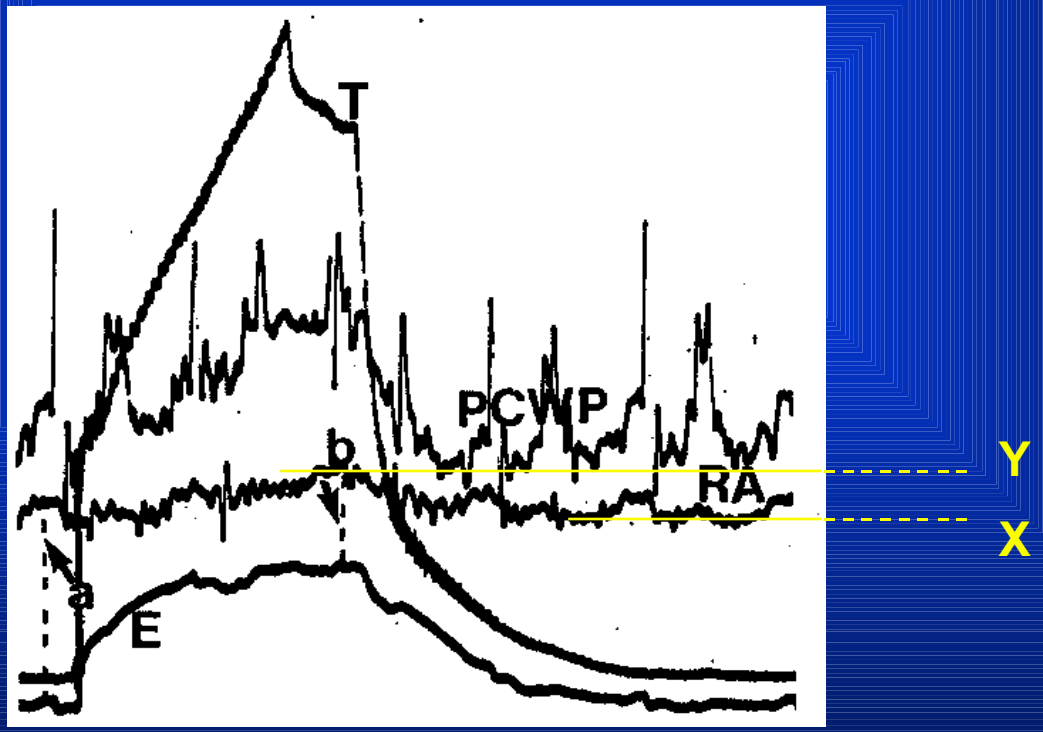
DECREASE IN SVR

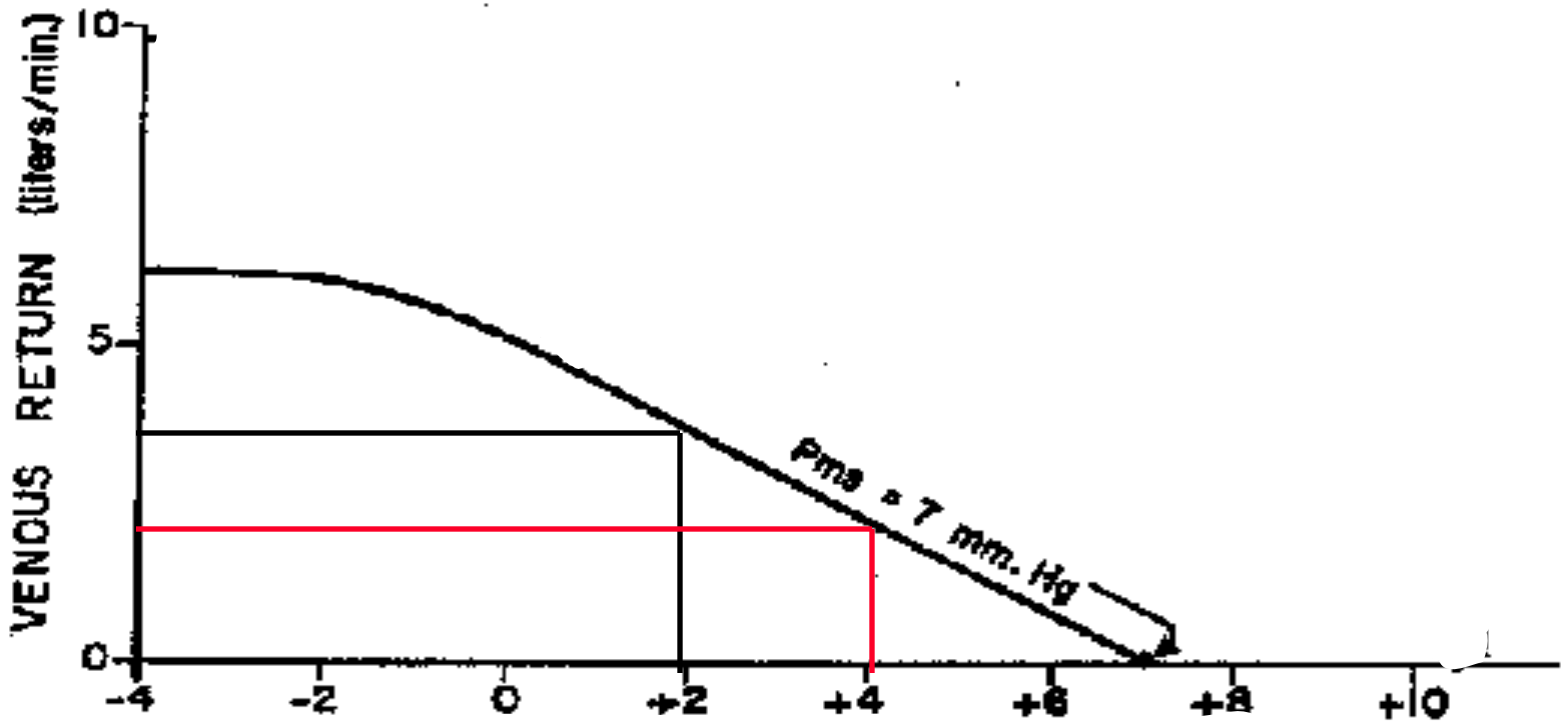
SYSTEMIC VENOUS RETURN

***Forward pressure*: mean systemic pressure (MSP) which depends on volemia vascular elastance.**

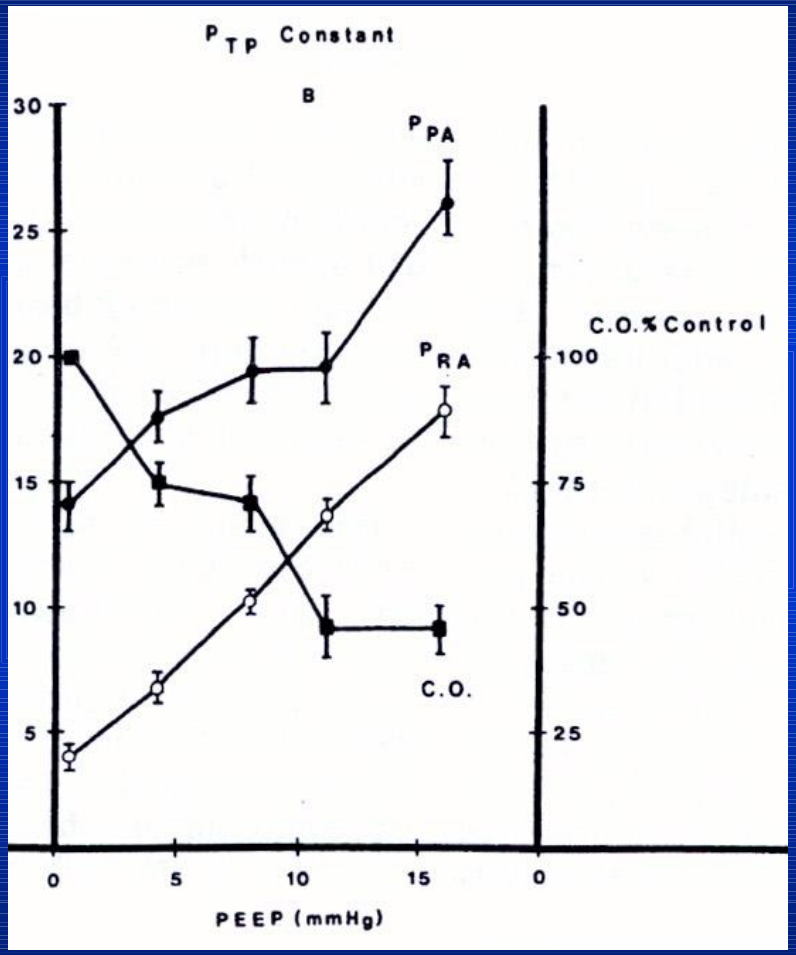
***Backward pressure* : right atrial pressure (or central venous pressure)**

The increased airway pressure is transmitted to the pleural space, leading to an increase in intravascular right atrial pressure



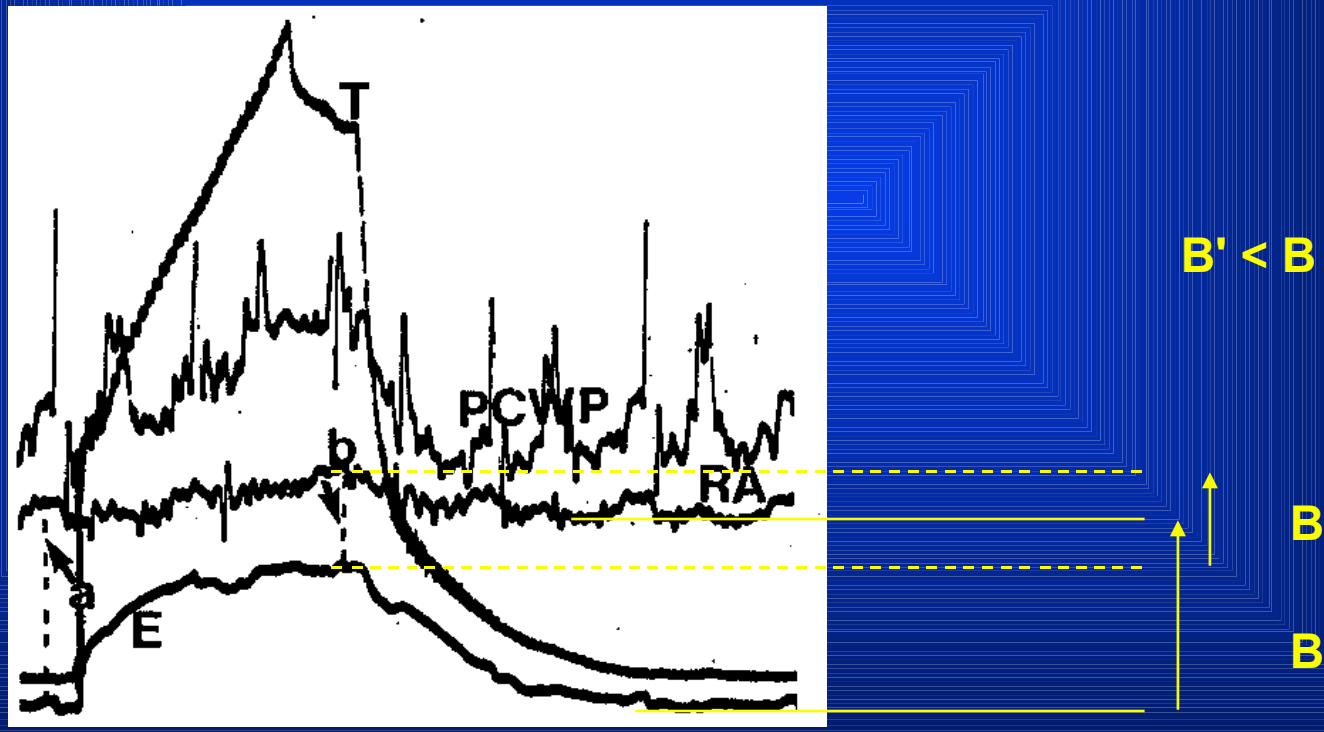


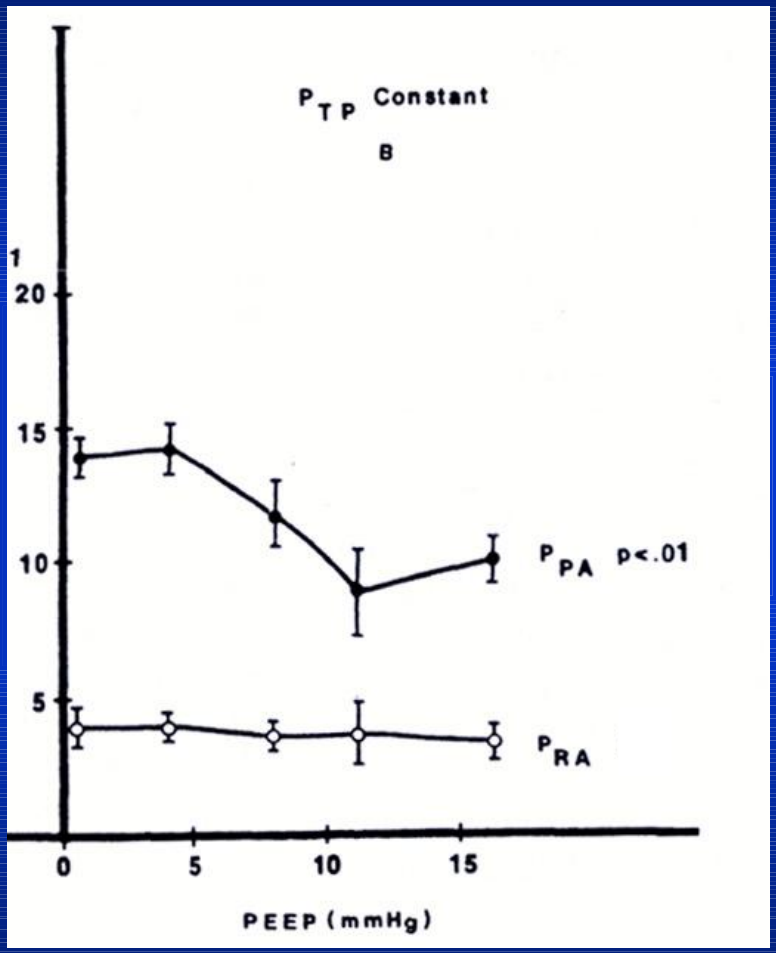
Guyton Physiol Rev 1955



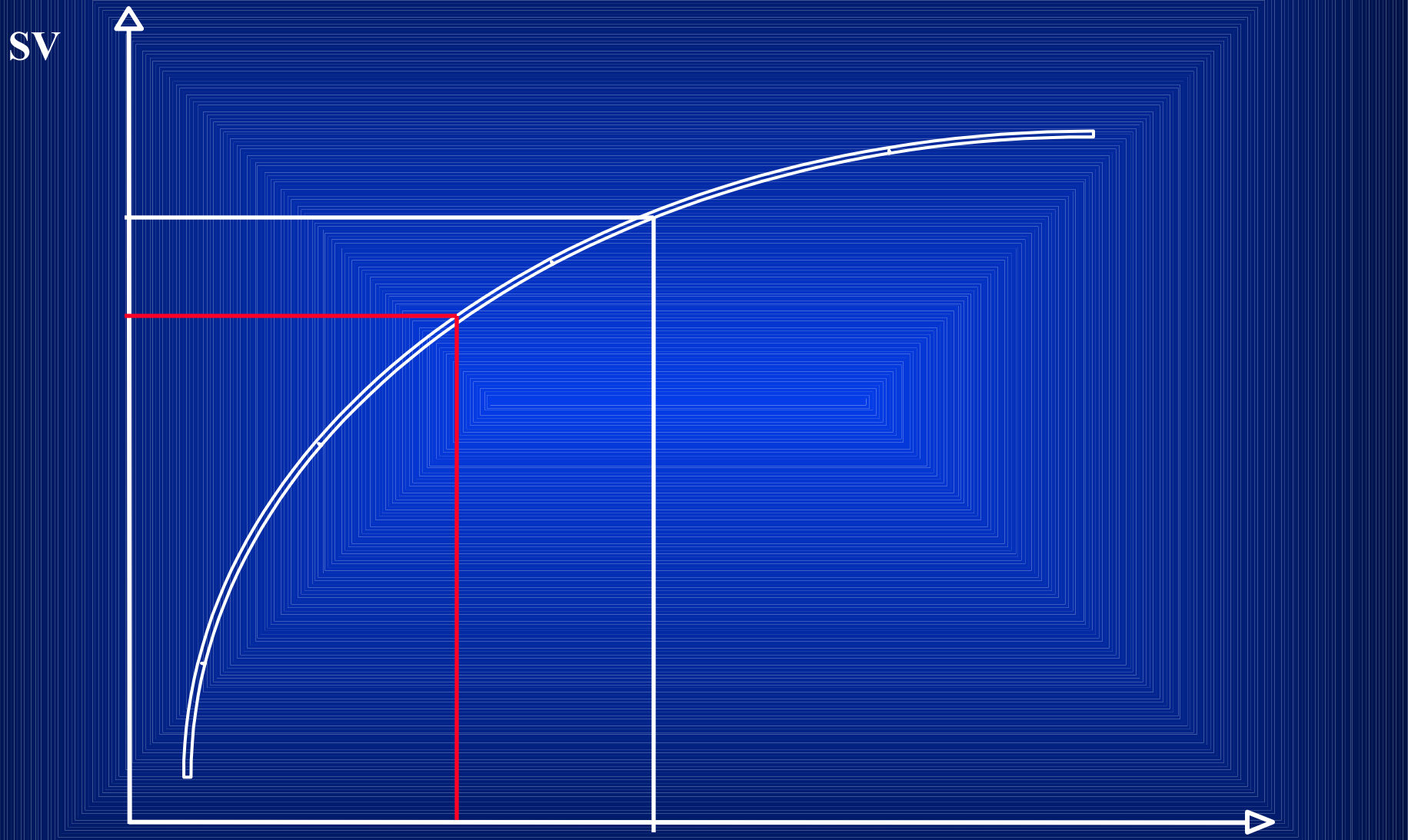
Scharf Am J Physiol 1977

The increased airway pressure is transmitted to the pleural space, leading to an increase in intravascular right atrial pressure and so a decrease in SVR and in transmural right atrial pressure.





Scharf Am J Physiol 1977


SV
TM pressure

IS GUYTON'S CONCEPT REALLY VALID?

- **Positive airway pressure does not affect the gradient for venous return**
  (MSP - RAP)
- **But decreases venous return by reducing venous conductance.**

Fessler AJRCCM 1991

➡ **Collapsible vessel?**

Inferior vena cava in spontaneous ventilation

- "Abdominal vascular zone condition"
  - Takata J Appl Physiol 1990
- Acute asthma
  - Jardin Chest 1987

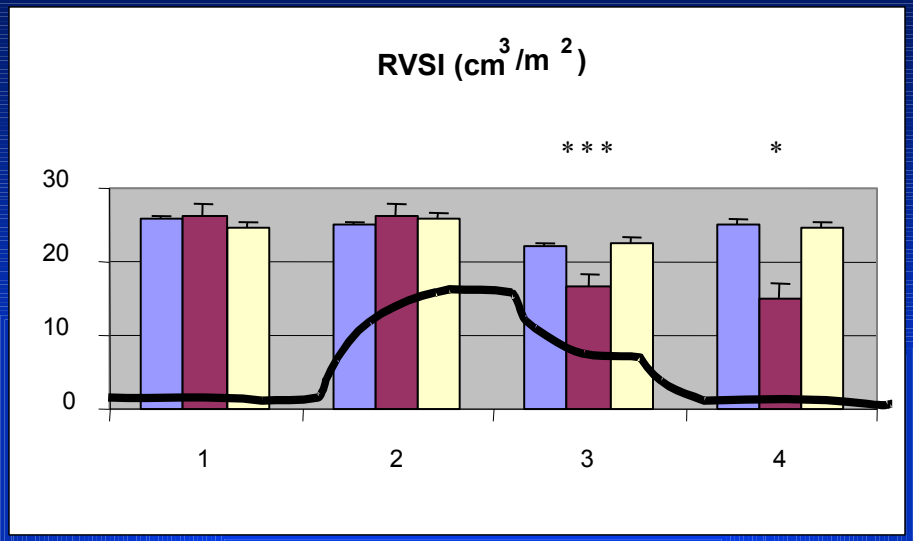
$$P_{IVC} - P_{abd} < P_{CP}$$

Baseline
SAP 120 mmHg

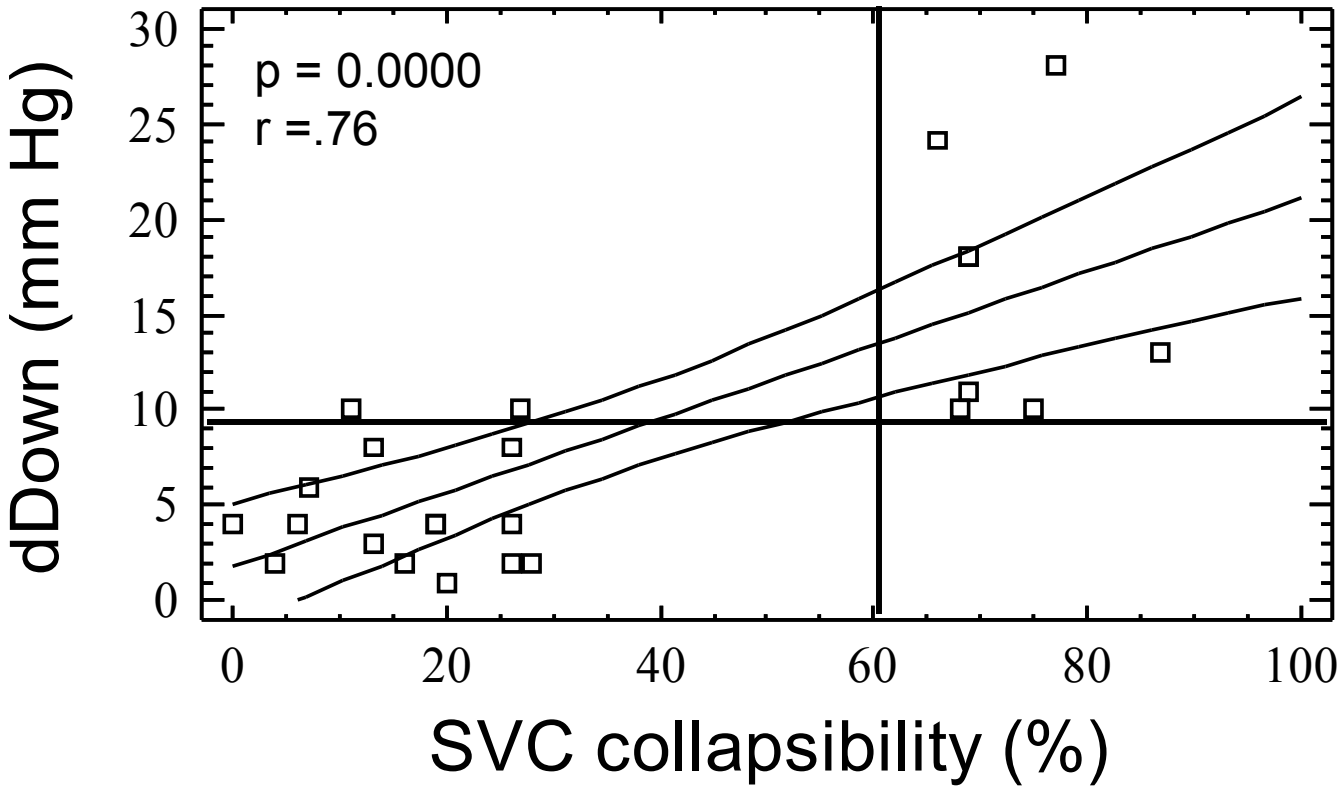
IVC cross-claming
SAP 60 mmHg

Vieillard-Baron AJRCCM 2003

N = 22 patients

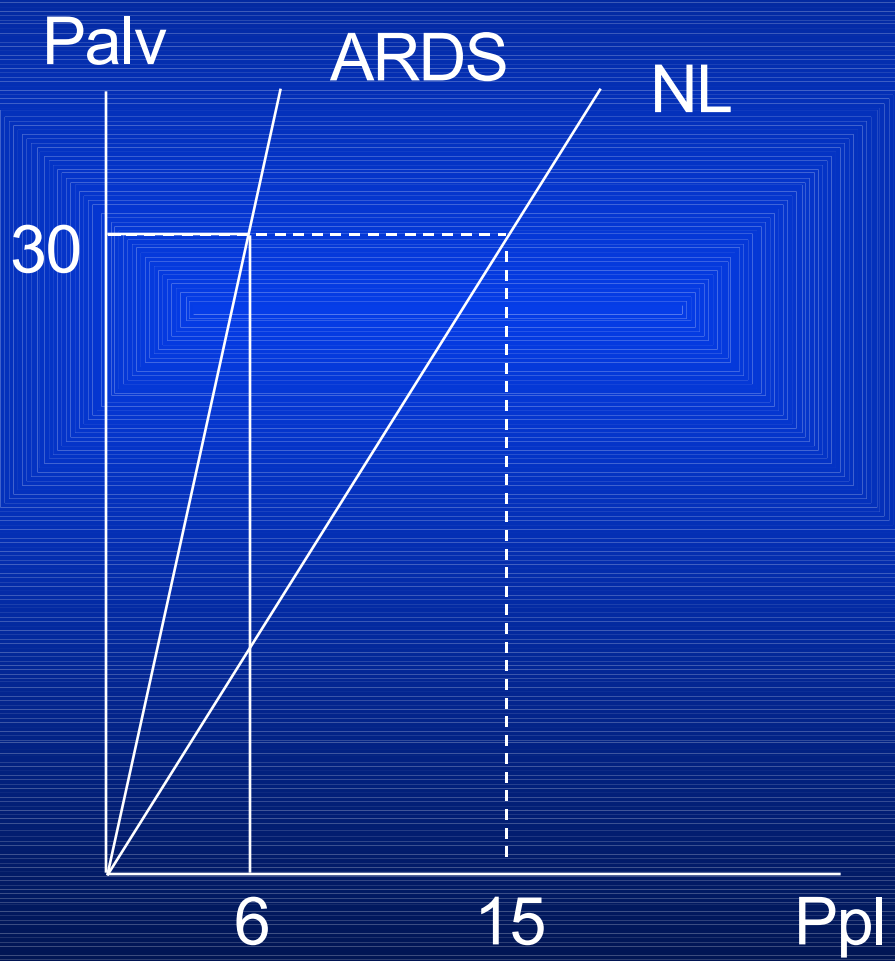


Vieillard-Baron Anesthesiology 2001

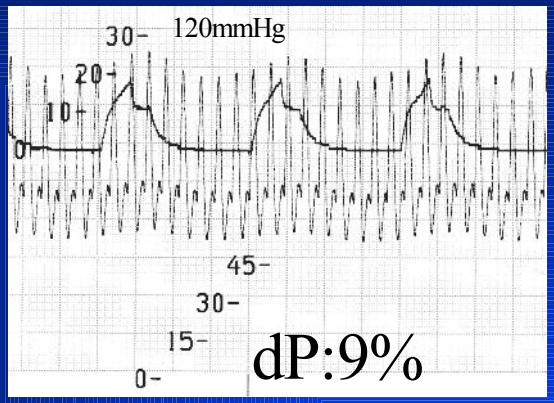


Vieillard-Baron AJRCCM 2003

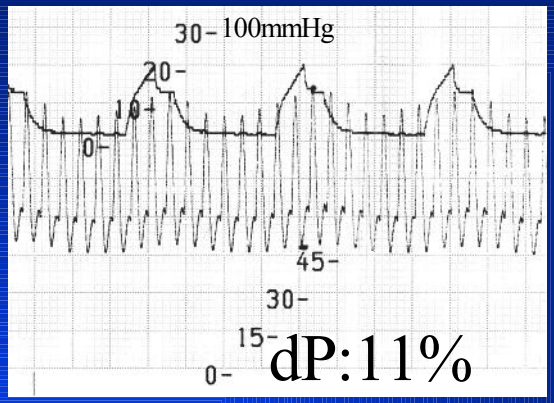
INFLUENCE OF RESPIRATORY MECHANICS



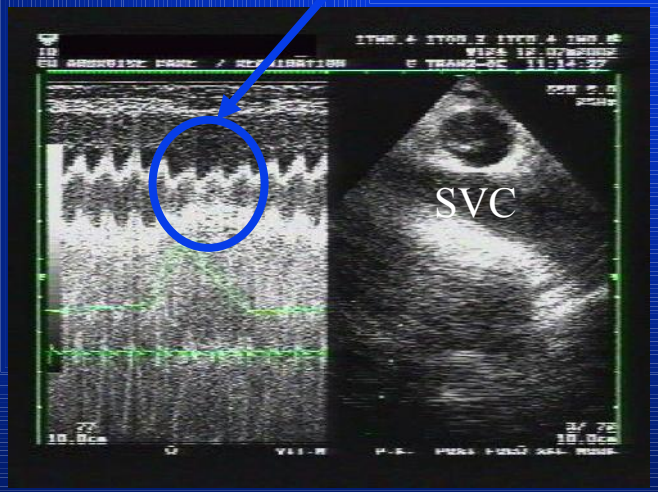
ZEEP



PEEP 5 cmH_2O



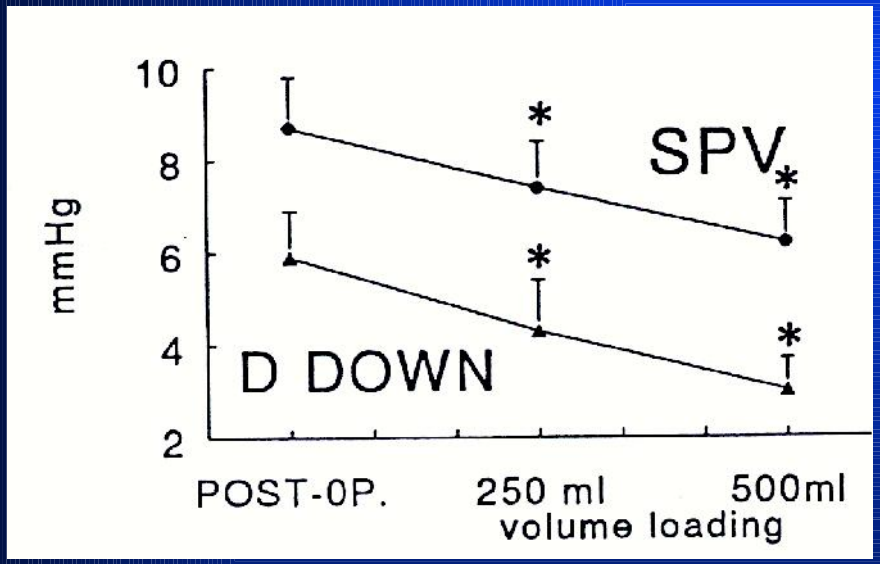
Partial collapse



Complete collapse

INFLUENCE OF HEMODYNAMIC STATUS

CI 2.5 L/min/m²



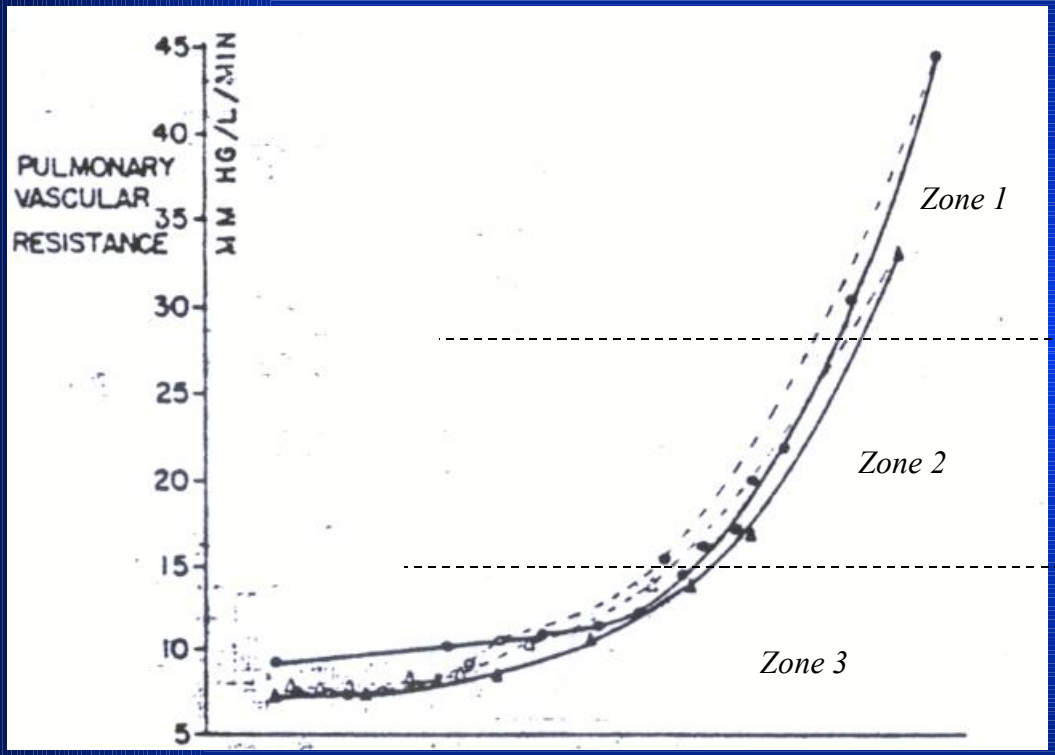
Coriat Anesth Analg 1994

CI 4.5 L/min/m²

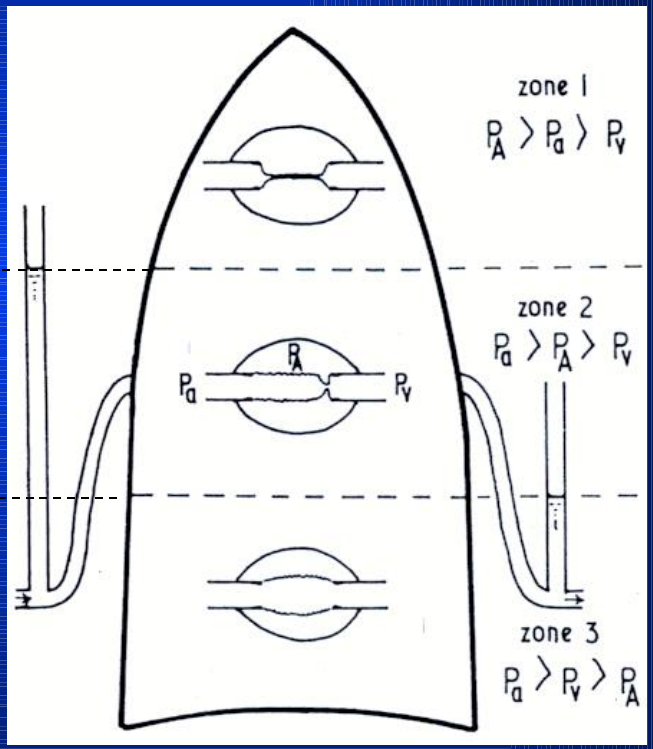
II

INCREASE IN RV AFTERLOAD

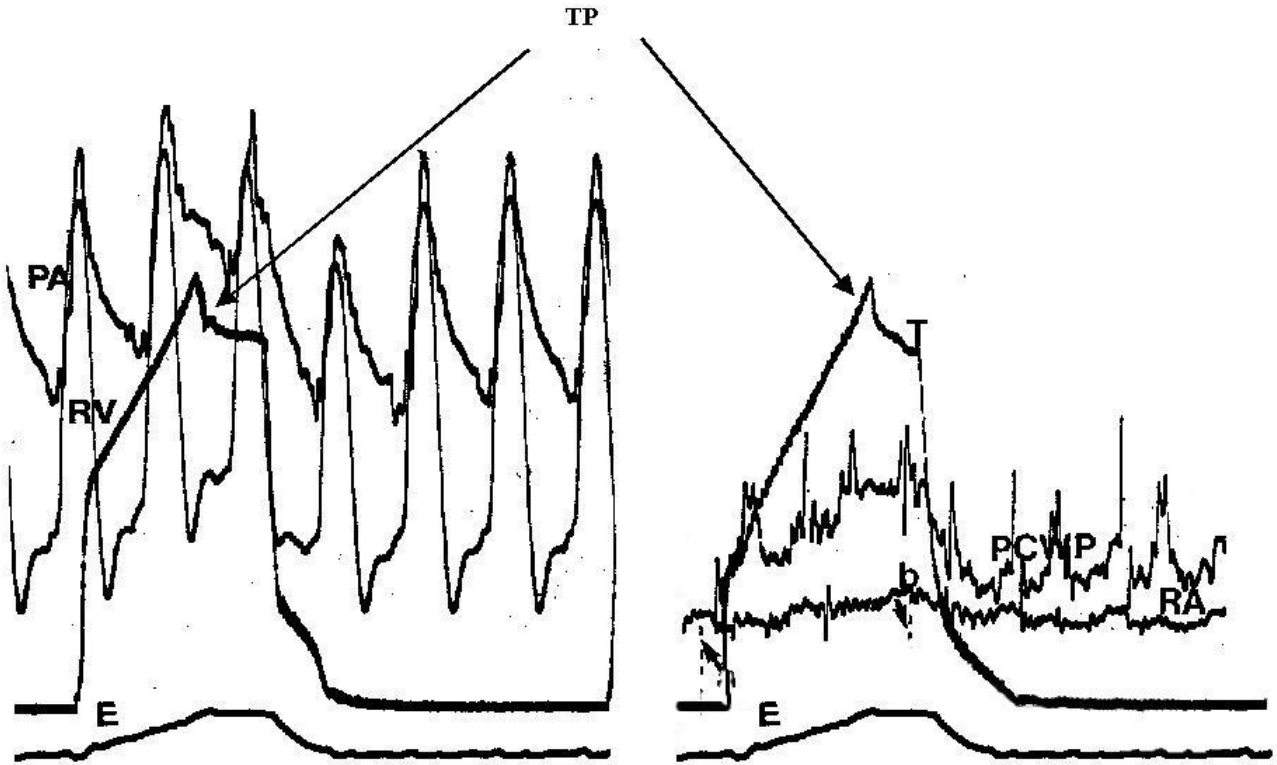
Whittenberger JAP 1960

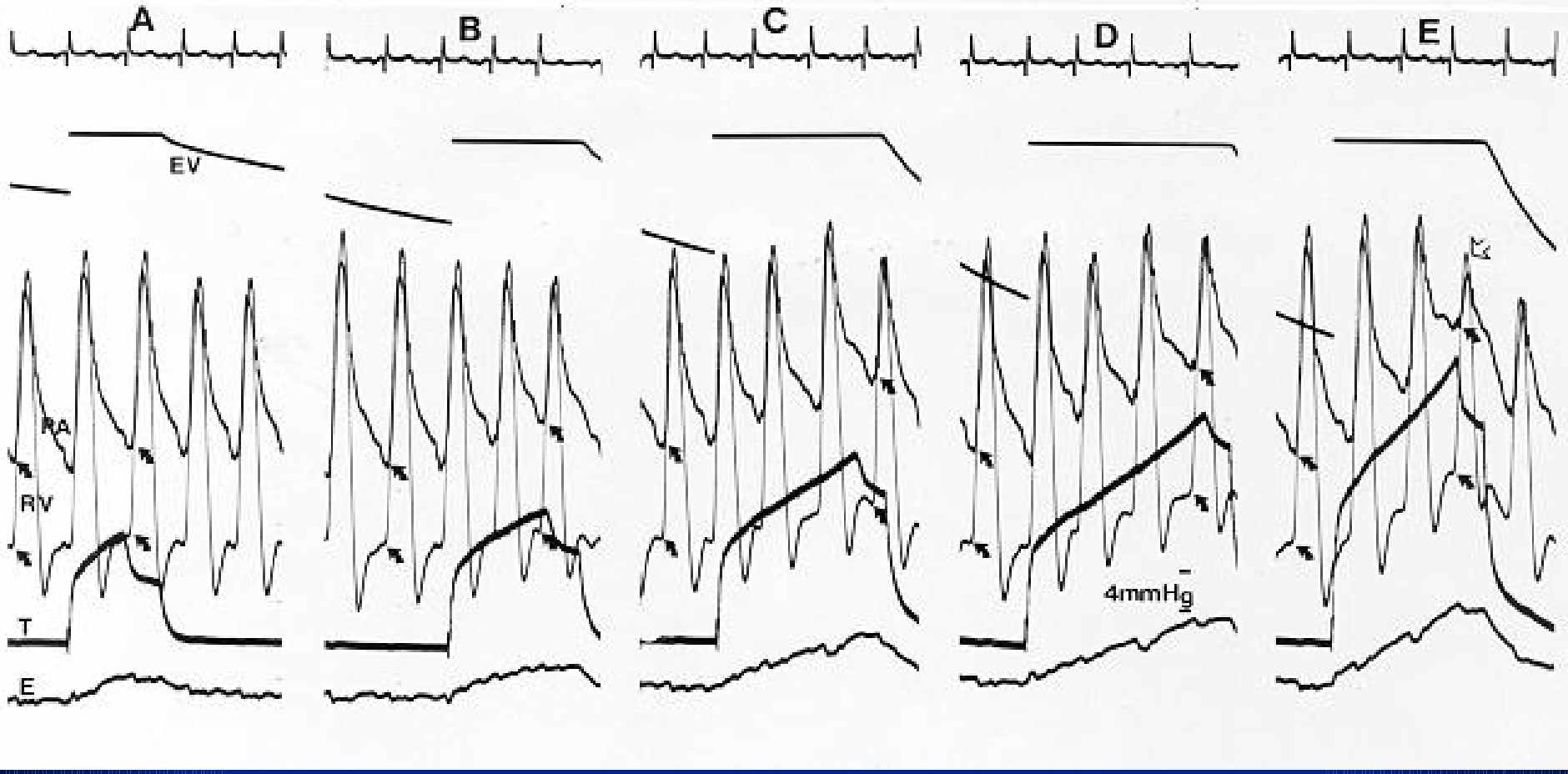


West JAP 1964



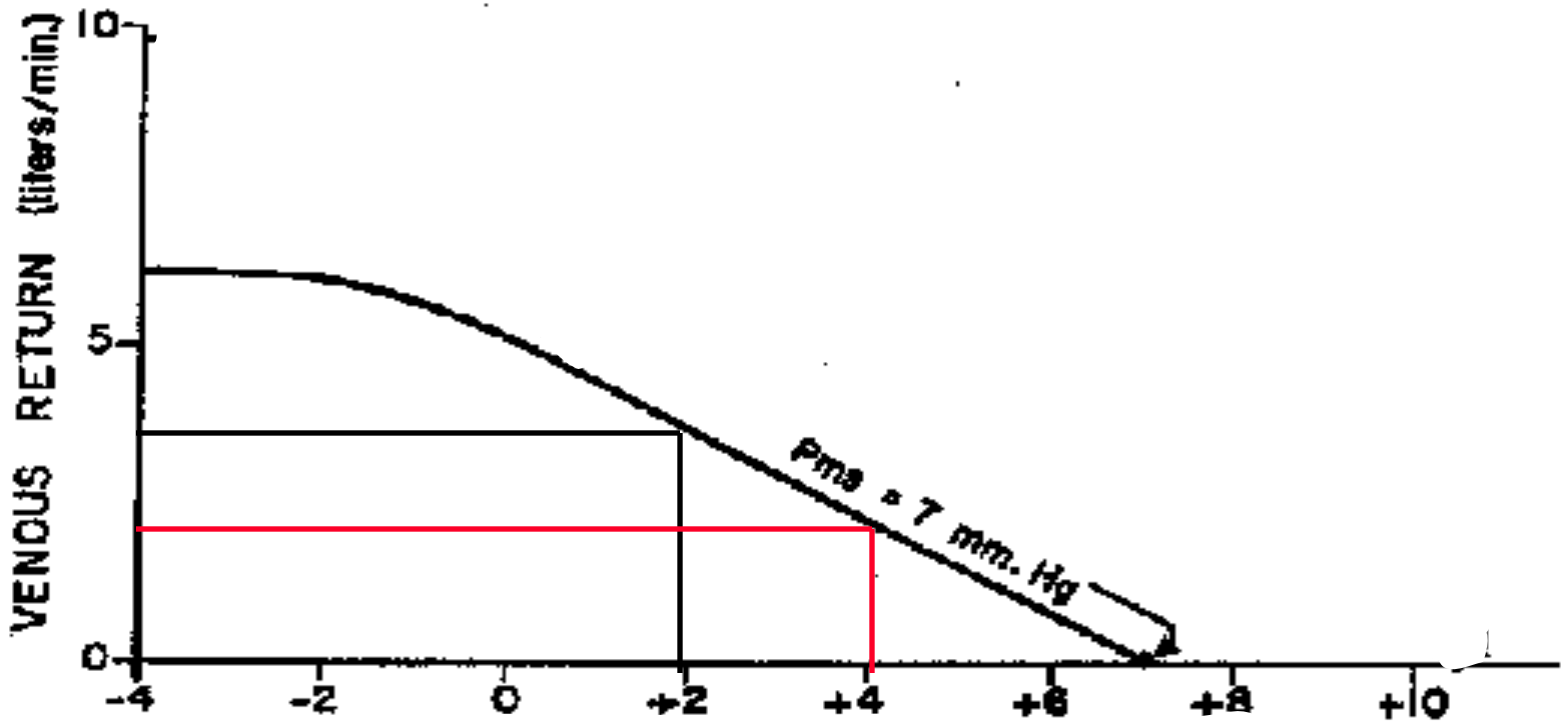
INCREASE IN ZONE II





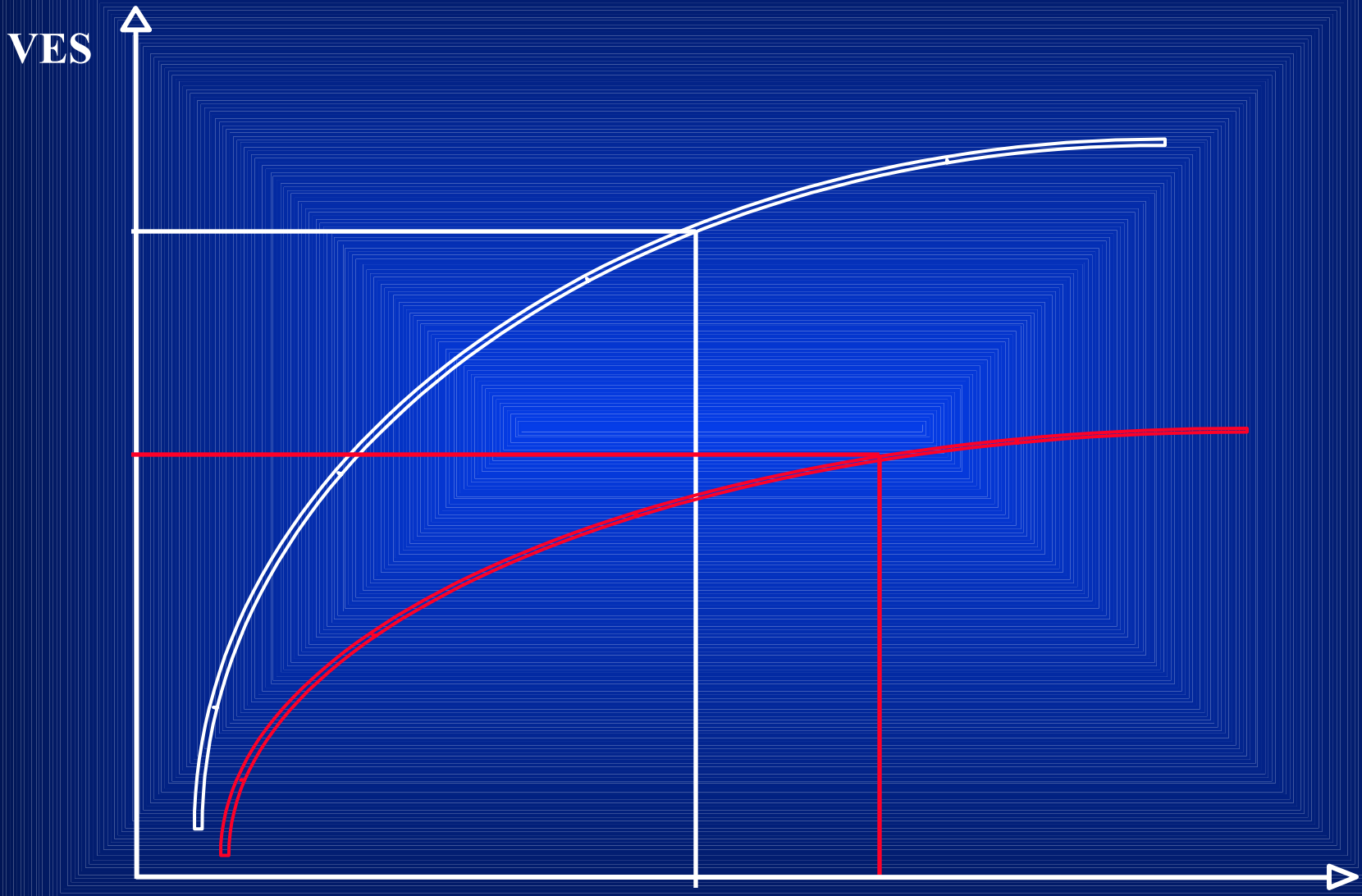
9/11 9/13 9/14 9/16 9/17

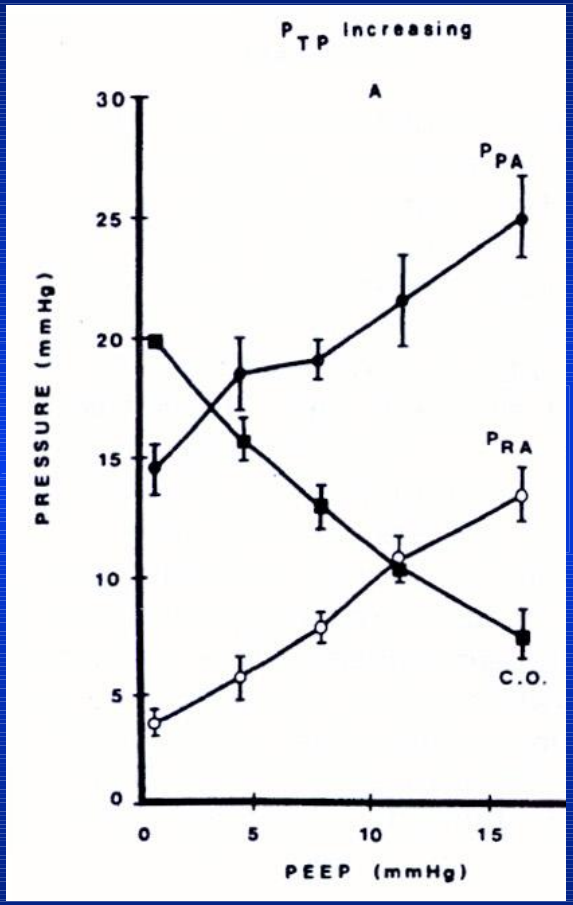
Jardin Catheterization and Cardiovascular Diagnosis 1989



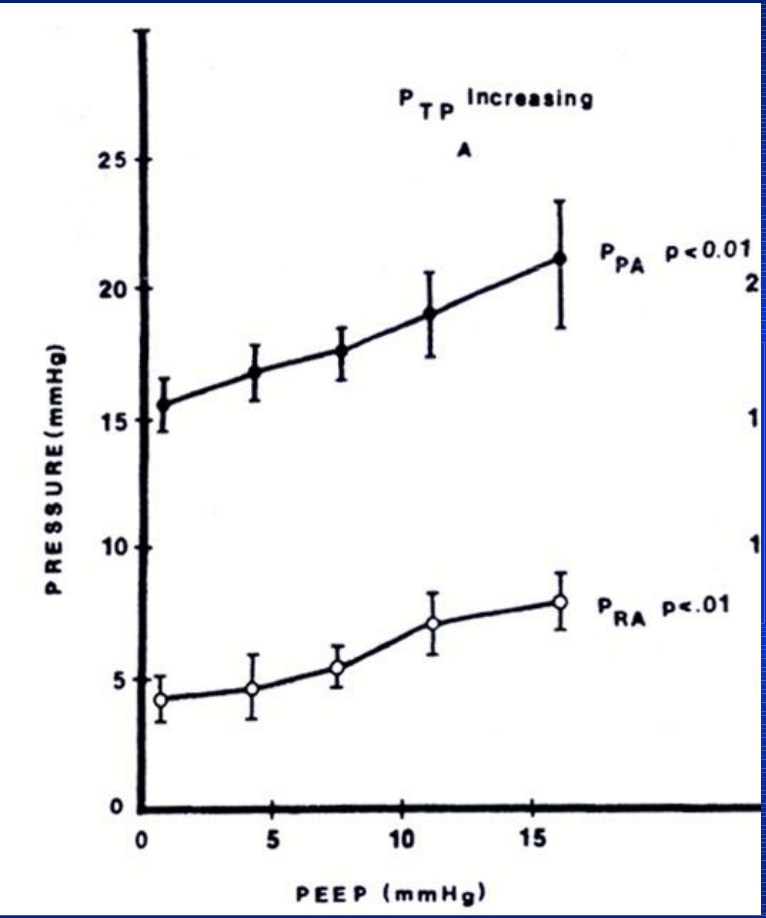
Intravascular pressure

Guyton Physiol Rev 1955

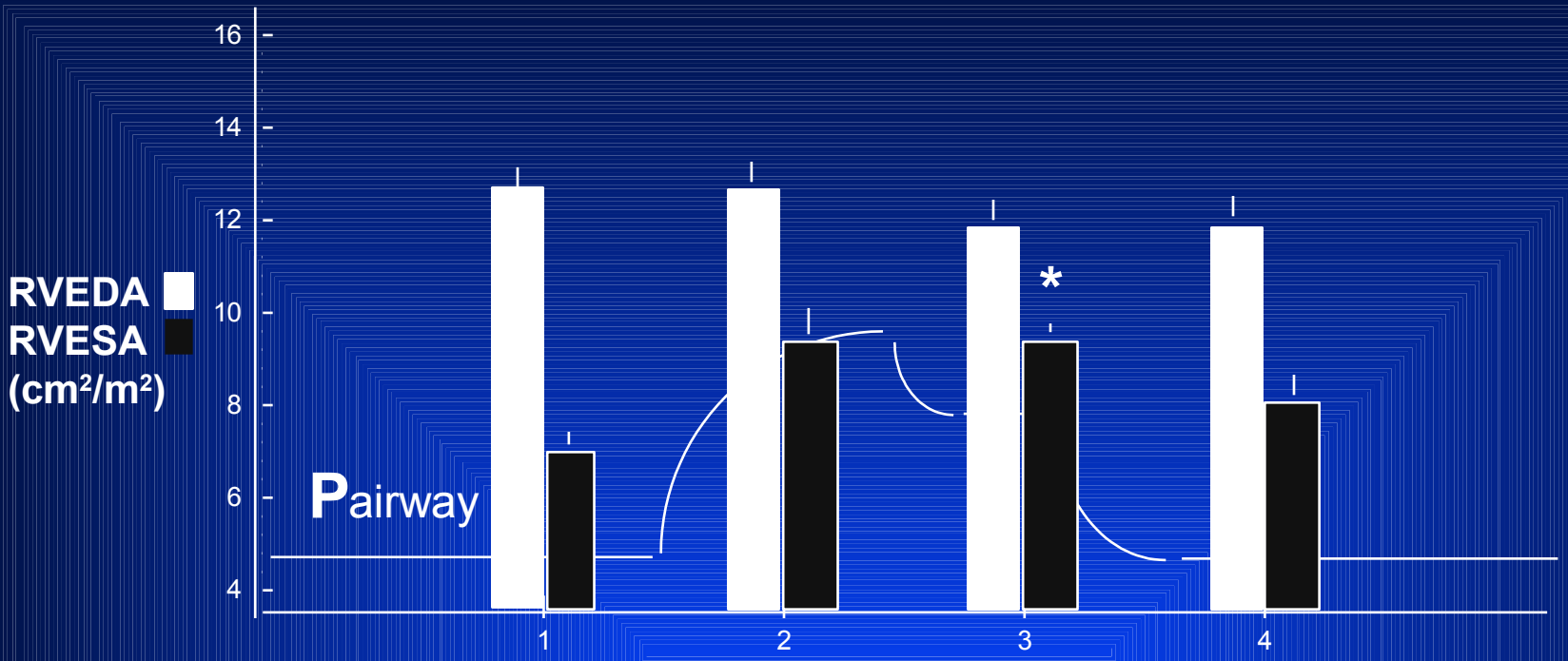

VES
Pression TM



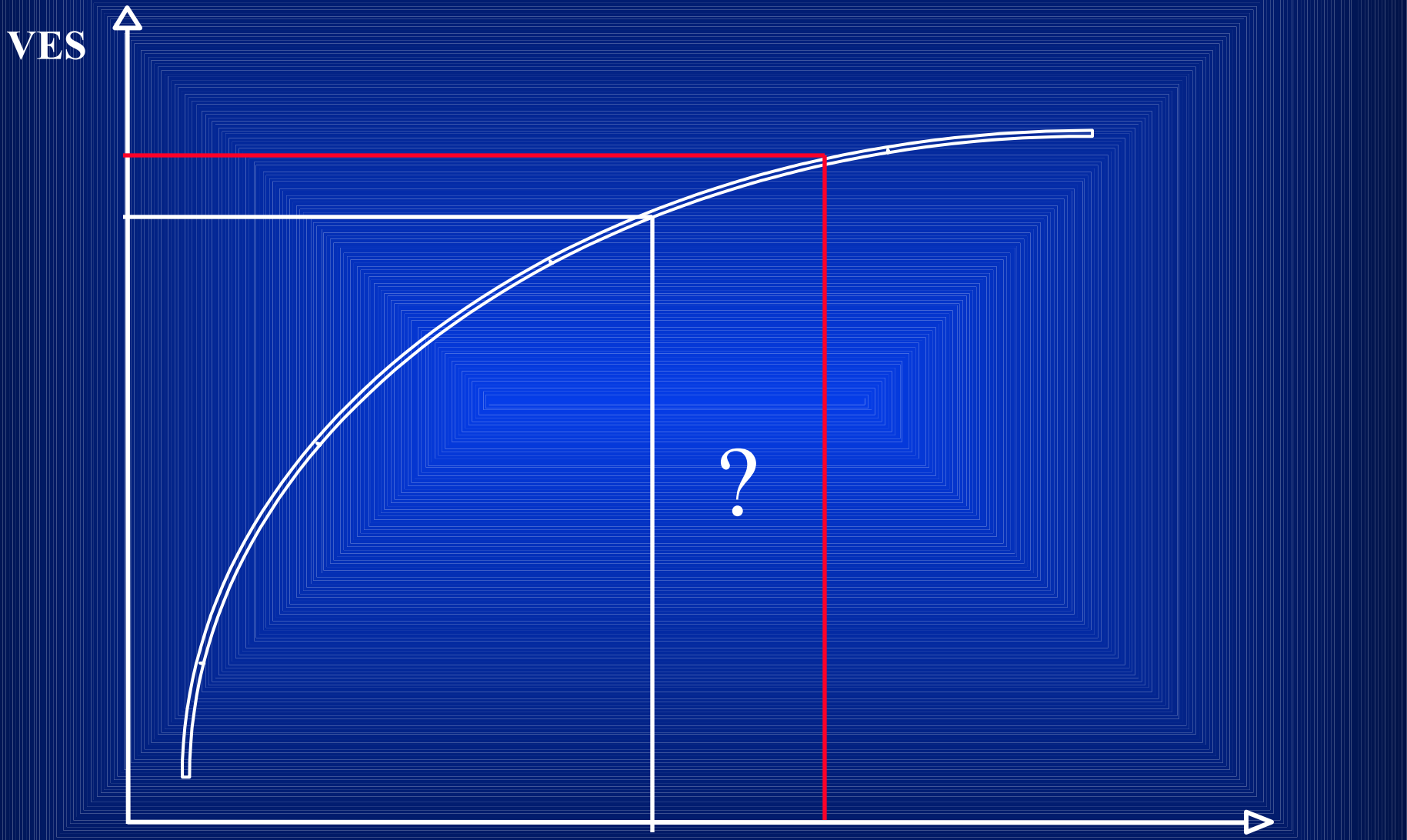
Scharf Am J Physiol 1977

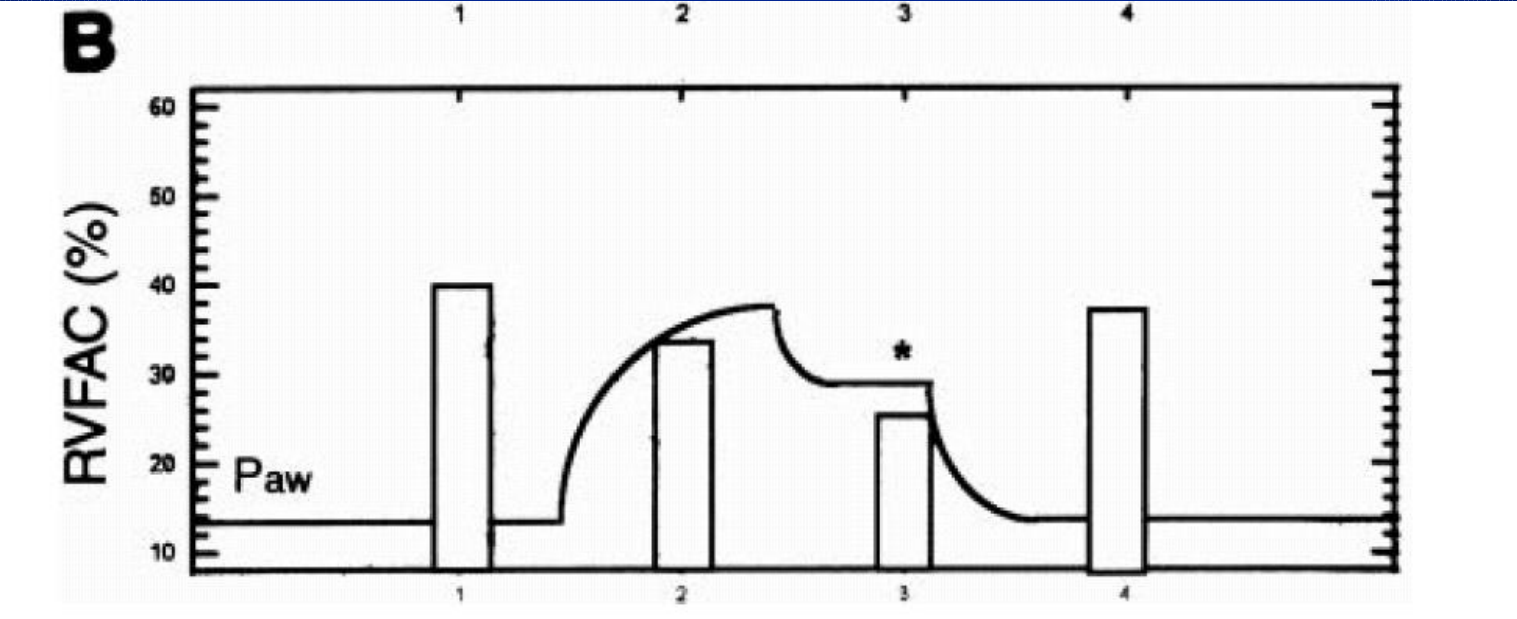


Scharf Am J Physiol 1977



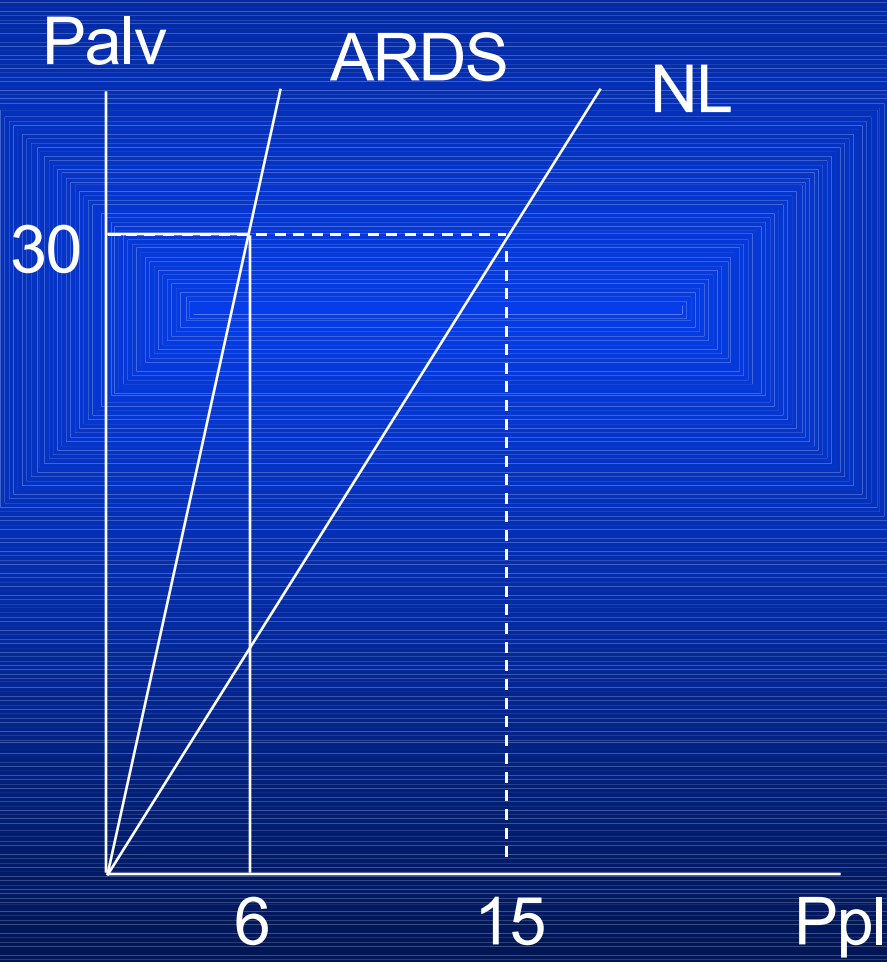
Vieillard-Baron J Appl Physiol 1999


VES
?
Pression TM



Vieillard-Baron J Appl Physiol 1999

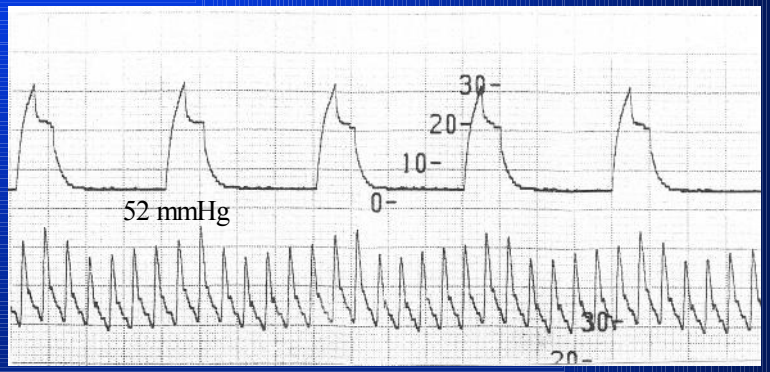
INFLUENCE OF RESPIRATORY MECHANICS



1 TPP = 24
2 TPP = 15

INFLUENCE OF HEMODYNAMIC STATUS

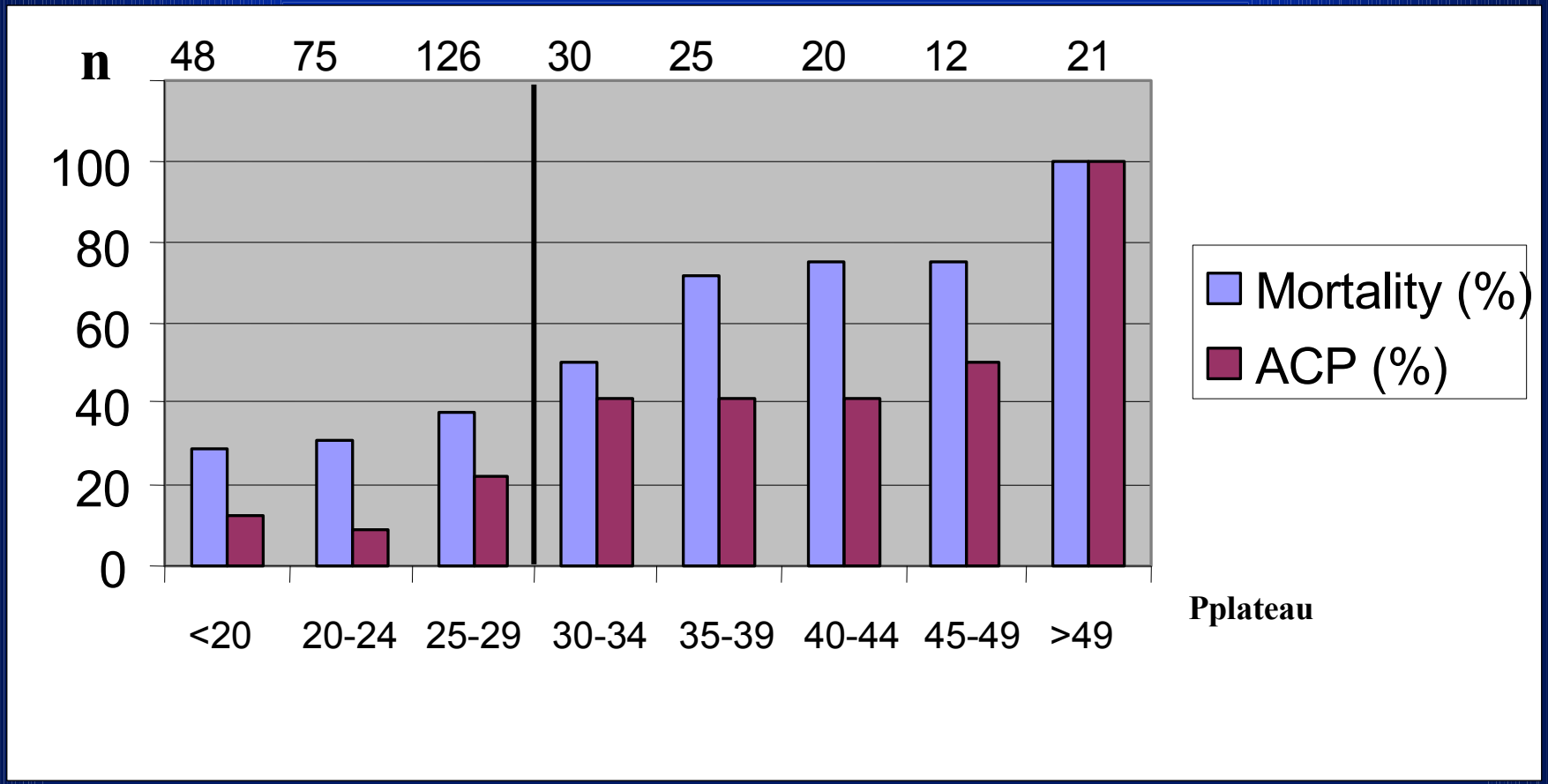
H, 69 years old
Extensive pneumonia
ARDS



ΔPP: 21%

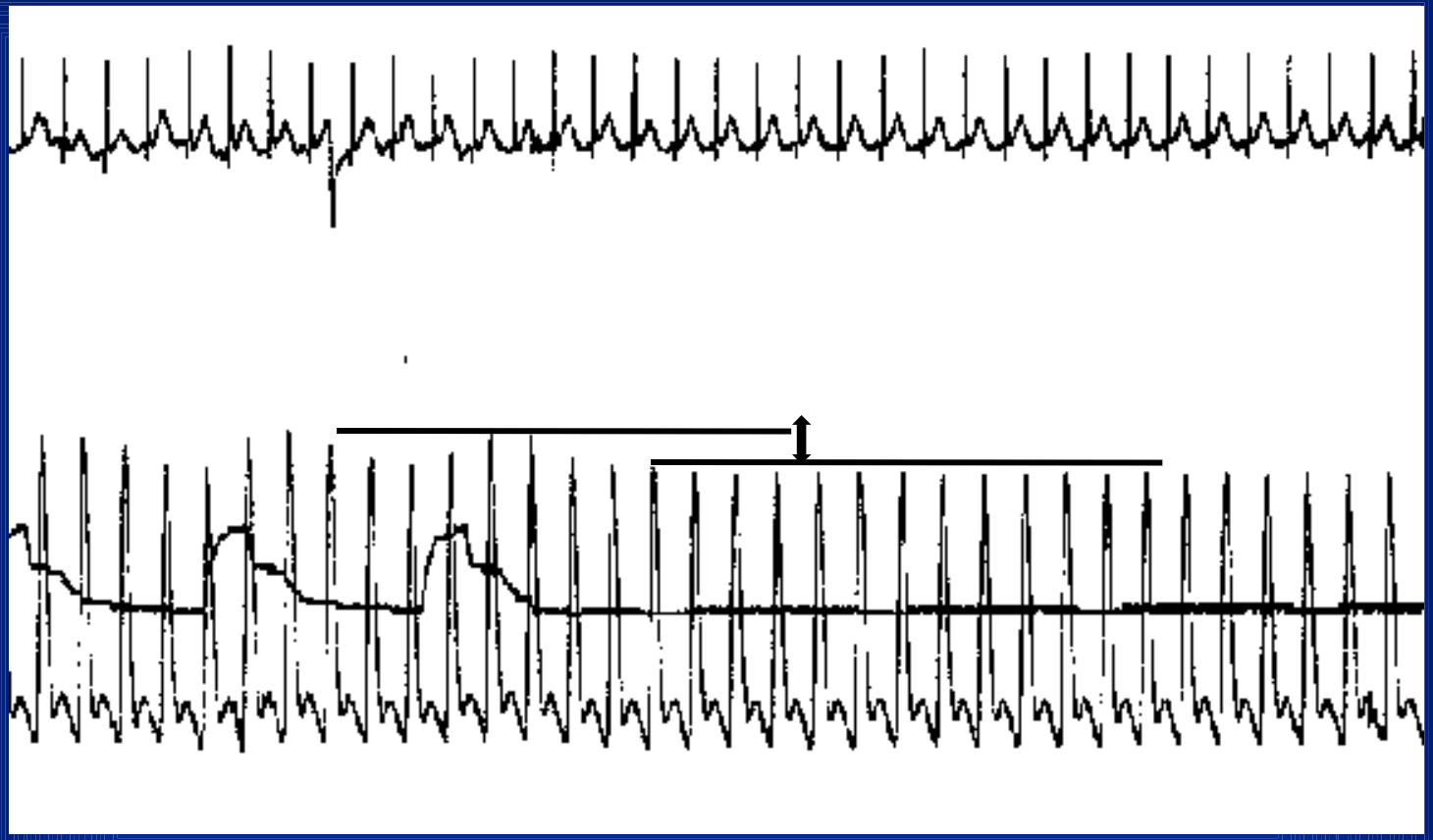
IC: 1.3 L/mn/m²

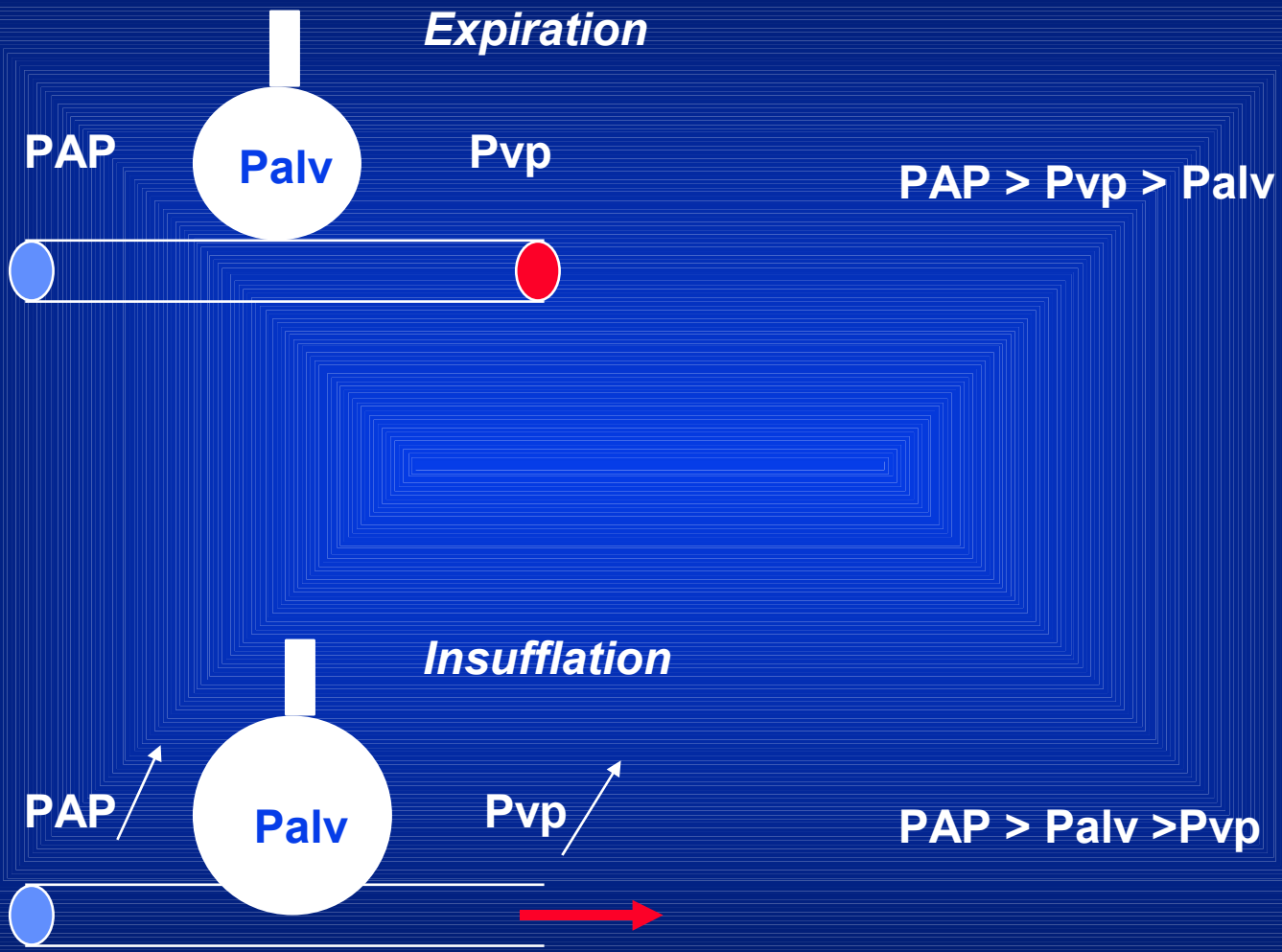
357 ARDS patients investigated by echocardiography between 1980 and 2005



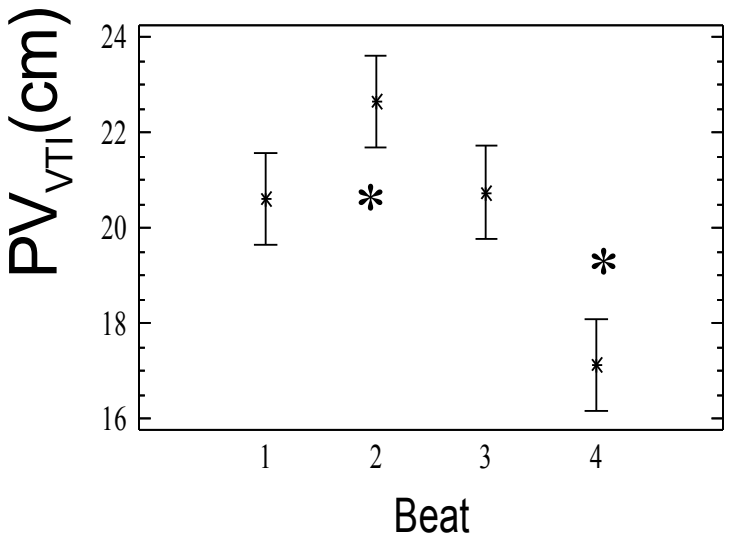
INSPIRATORY INCREASE IN LV EJECTION

DUP

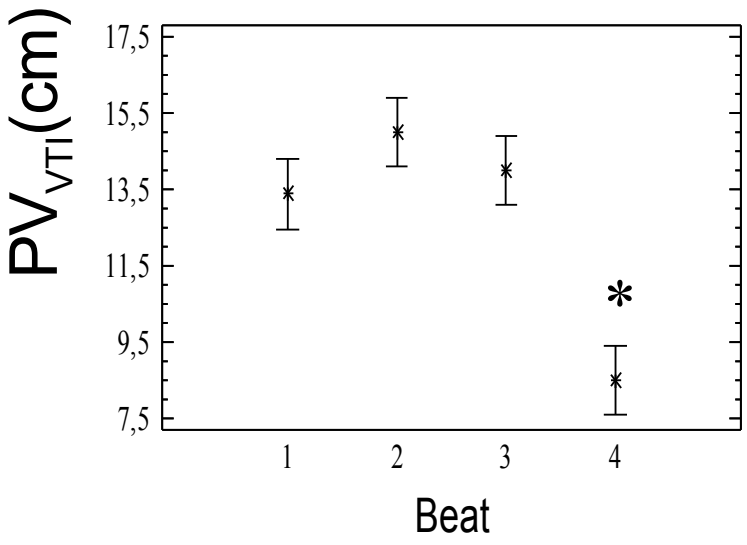


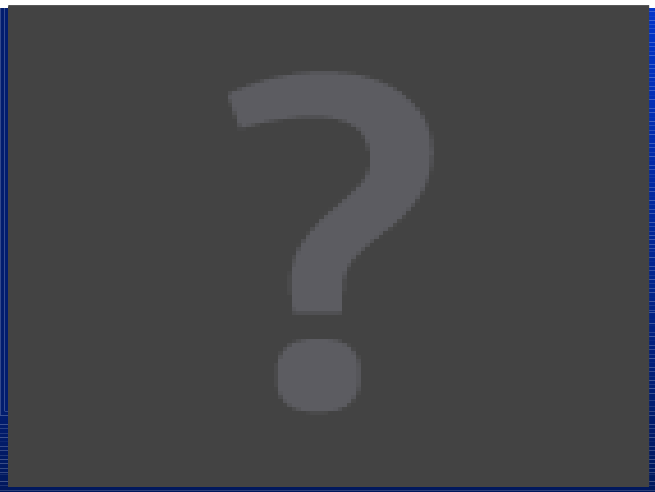

Expiration
PAP
Palv
Pvp
PAP > Pvp > Palv
Insufflation
PAP
Palv
Pvp
PAP > Palv >Pvp

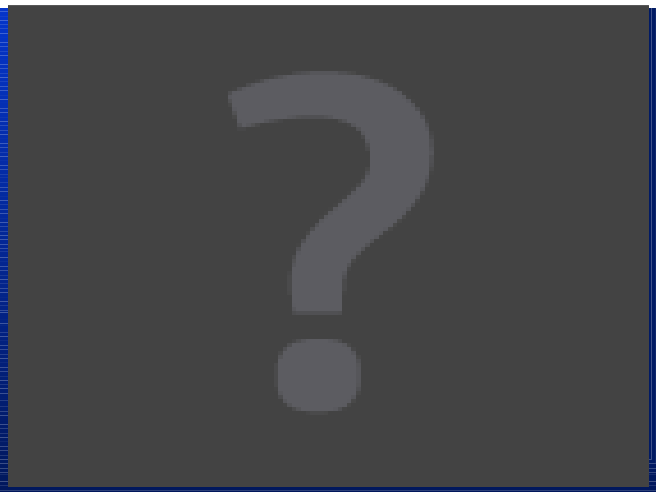
dUp + dDown



dDown





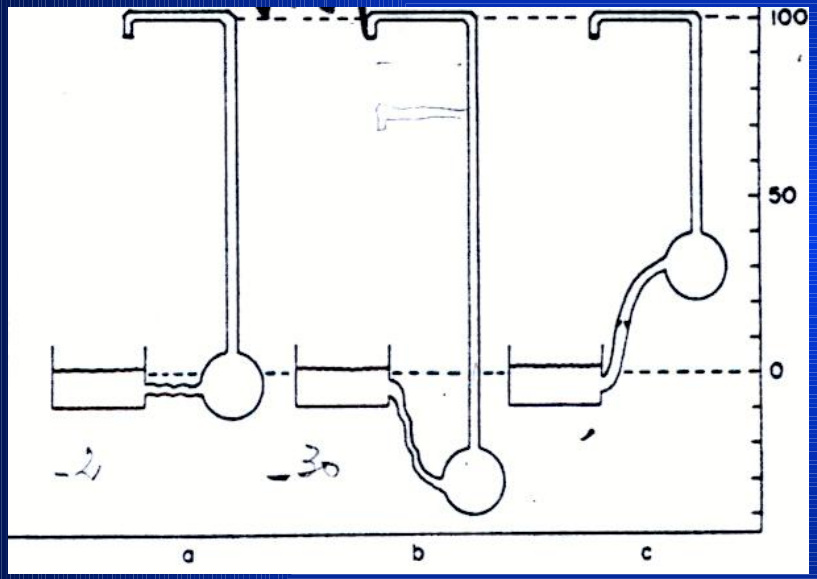


Vieillard-Baron AJRCCM 2003

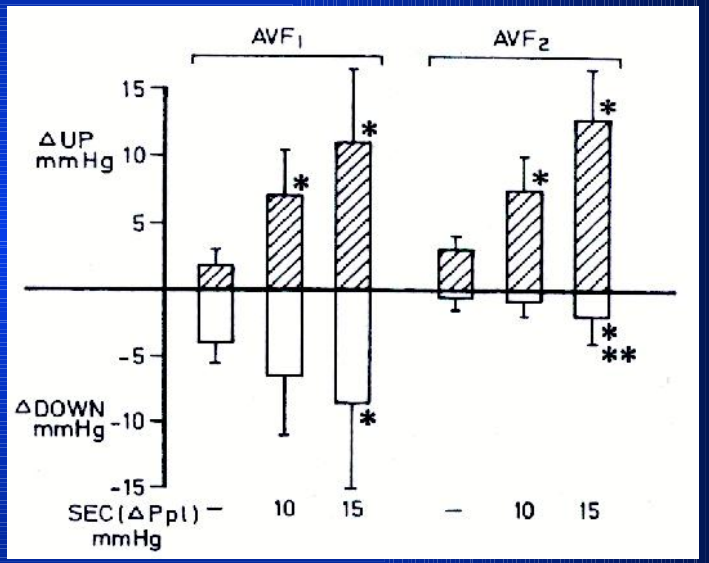
	Period 1 (Baseline)	*Period 2* (Chest Strapping)
LAD, cm		
Exp	24.6 ± 9.4	26.8 ± 11
Insp	30.6 ± 8.6* (+24%)	30.1 ± 9.9* (+12%†)

Vieillard-Baron JAP 1999

LV AFTERLOAD EFFECT?



McGregor N Engl J Med 1979



Pizov Anesth Analg 1989

L'échocardiographie en réanimation - Echocardiography in intensive care - Microsoft Internet Explorer
Fichier Edition Affichage Favoris Outils ?
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L'échocardiographie en réanimation

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Introduction

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Depuis la fin des années 1980, le service de Réanimation Médicale de l'hôpital Ambroise Paré a abandonné le cathétérisme cardiaque droit comme outil de diagnostic et de monitoring des insuffisances circulatoires et respiratoires aigües en réanimation.

Cet outil a été remplacé par la réalisation systématique d'échocardiographies transthoraciques et transoesophagiennes. Le service a acquis une expertise et une expérience importante dans ce domaine permettant, à partir de l'échocardiographie, de gérer la prise en charge diagnostique et thérapeutique des malades présentant un sepsis grave, une embolie pulmonaire massive, un syndrome de détresse respiratoire aigu.

Ce site, réalisé par le Pr A. Vieillard-Baron et le Dr A. Beauchet, en collaboration avec le Pr F. Jardin, **est destiné aux réanimateurs et anesthésistes réanimateurs qui souhaitent se perfectionner ou débuter dans l'utilisation de l'échocardiographie en réanimation**.

Par la présentation de cas cliniques concrets et de clips vidéo, tous réalisés dans le service, il peut être un véritable outil de formation médicale continue. Seront discutés et présentés les indices échocardiographiques les plus fréquemment utilisés dans chaque pathologie et qui ont été développés dans le service au fil du temps.

Plutôt que de présenter les modalités techniques de la réalisation d'une échocardiographie, certes particulièrement importantes mais qui ne peuvent s'acquérir qu'au lit du malade, **l'objectif de ce site est de faire comprendre dans quel esprit utiliser l'échocardiographie en réanimation.**

Les visiteurs pourront se rendre compte qu'il est bien différent de celui d'une échocardiographie réalisée par un cardiologue non réanimateur.

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