HEART-LUNG INTERACTIONS

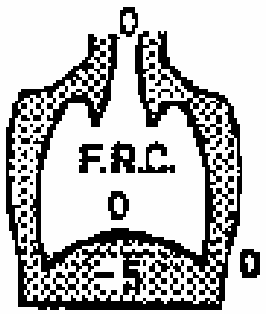
TRANSPULMONARY PRESSURE

TPP = Palv - Ppl

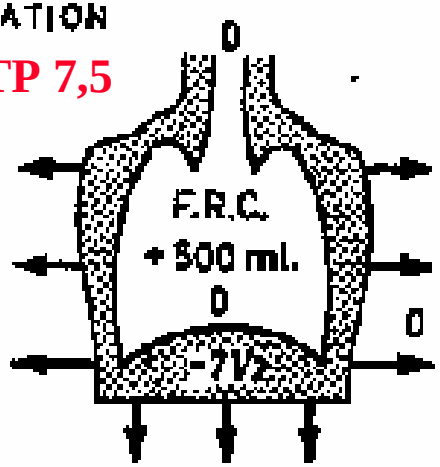
C = ΔV / ΔTPP

SPONTANEOUS RESPIRATION

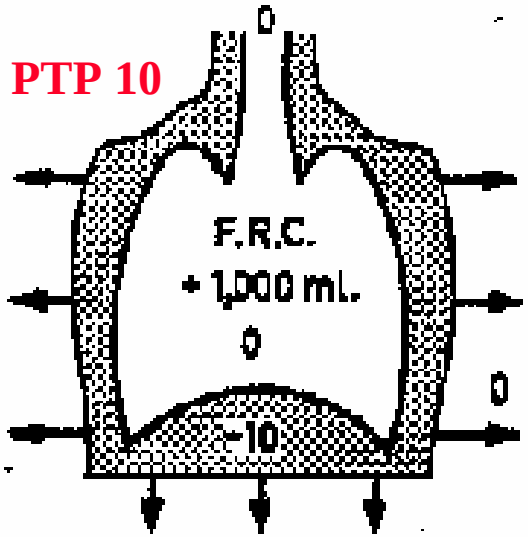
PTP 5



PTP 7,5

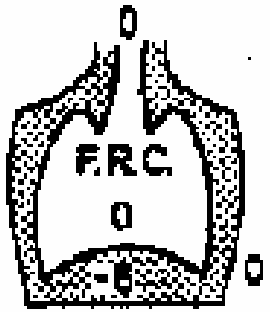


PTP 10

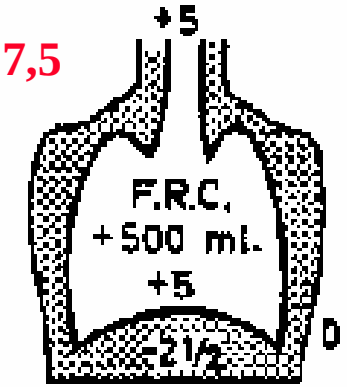


INTERMITTENT POSITIVE PRESSURE VENTILATION

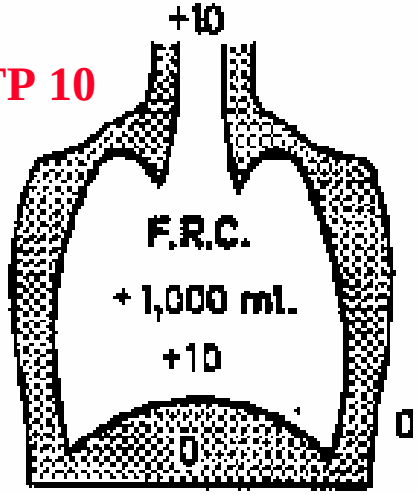
PTP 5



PTP 7,5

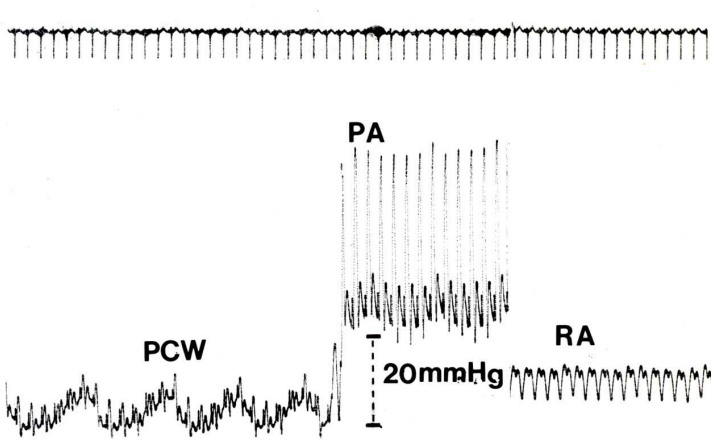


PTP 10

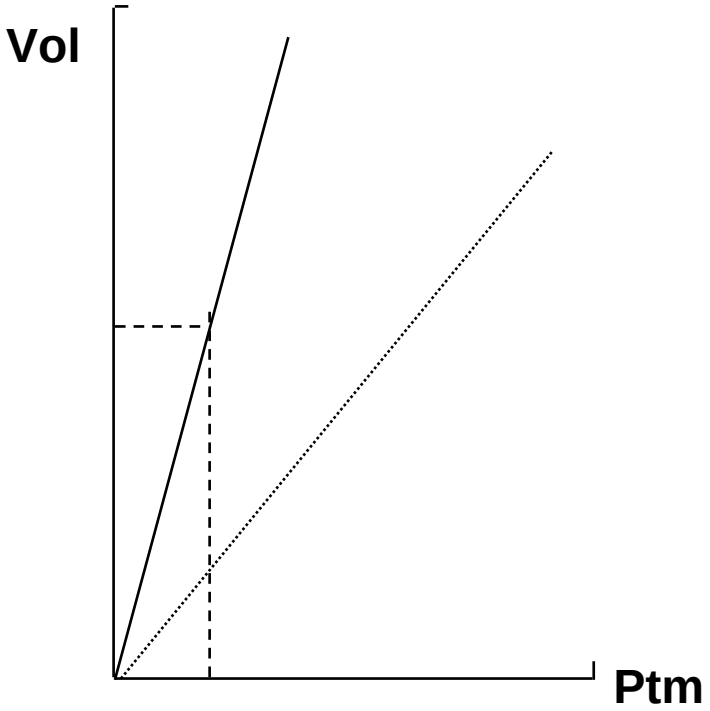


Figures denote pressure relative to atmosphere (cm H_2O)

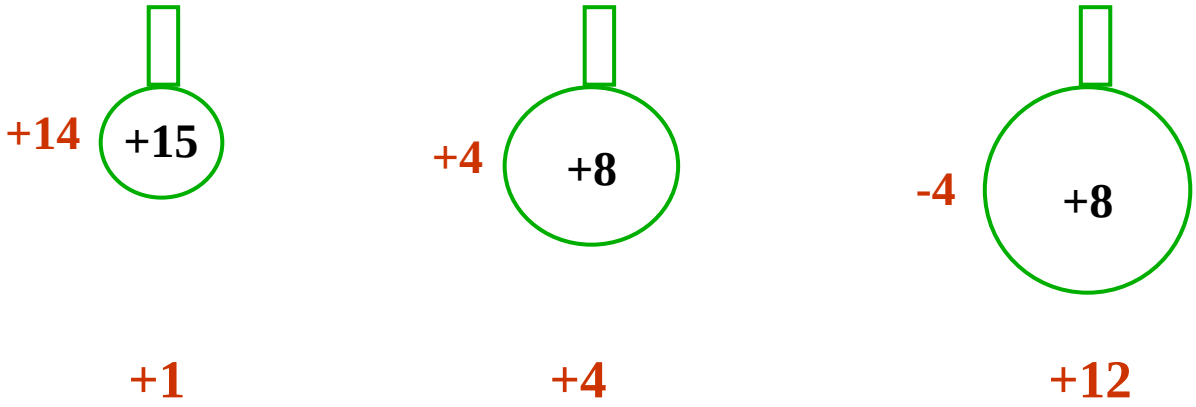
INTRAVASCULAR PRESSURE
TRANSMURAL PRESSURE

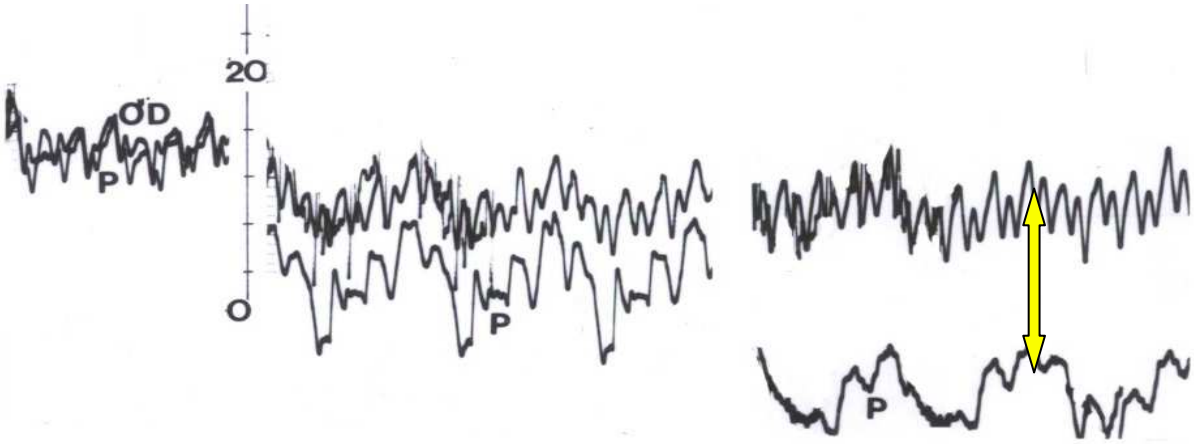


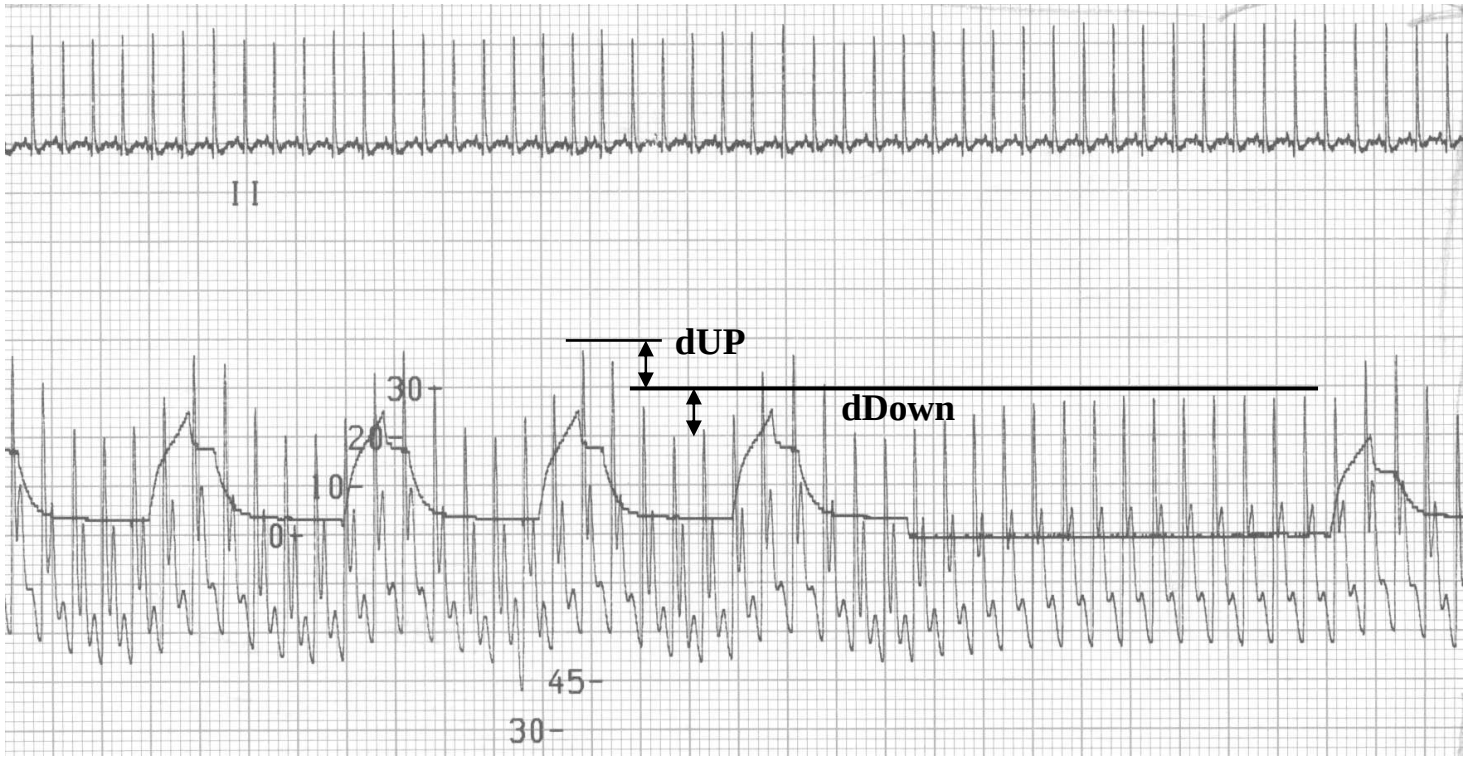
Intravascular P
=
Measured P by KT



Transmural P
=
Distending P (Pint - Pext)


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


20
OD
P
O
P
P


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

THE dDown EFFECT

Pulmonary arteries: 80 ml

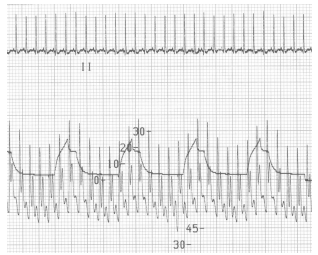
Pulmonary capillaries: 120 ml

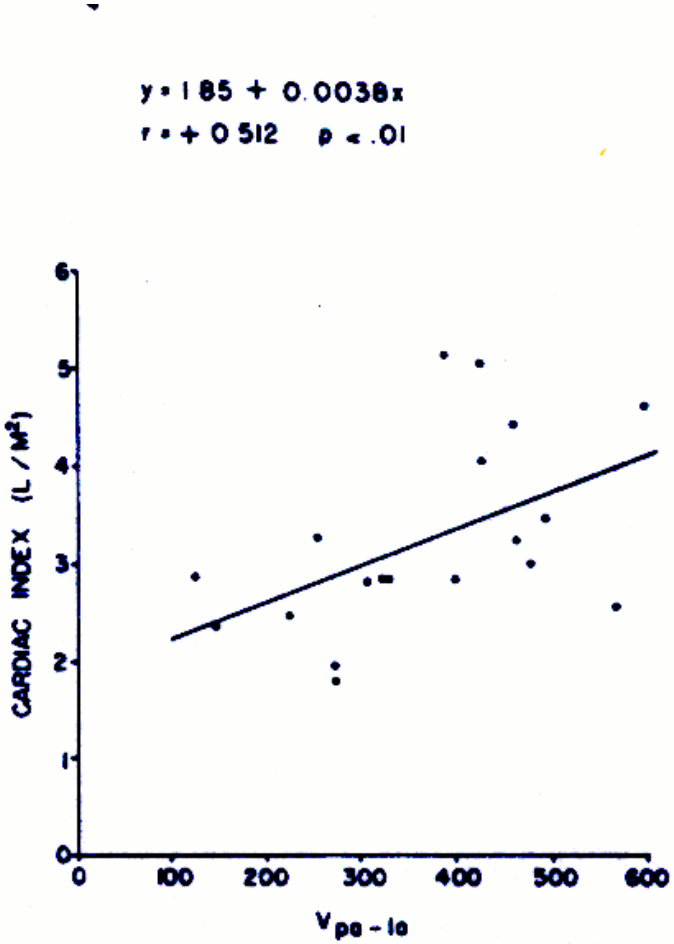
Pulmonary vena: 300ml

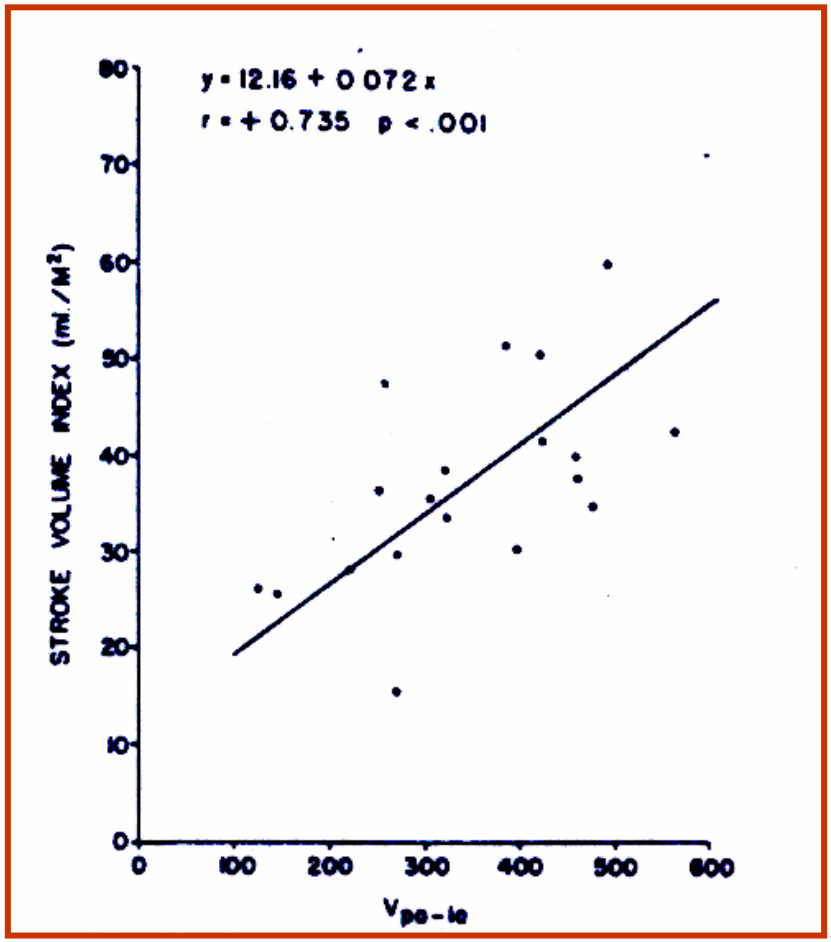
RA, RV

LA, LV

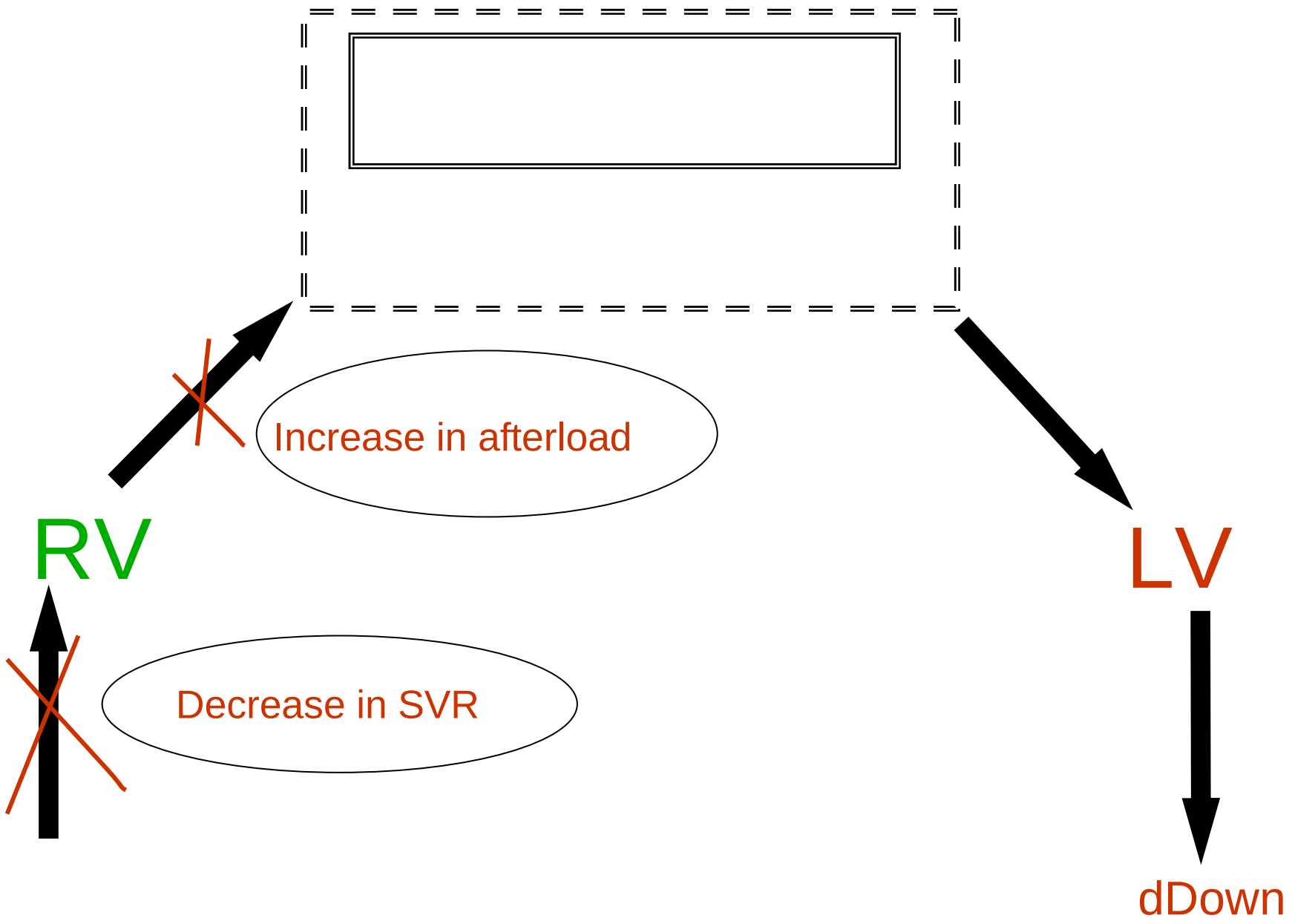
LVEDV = 70 ml/m^2

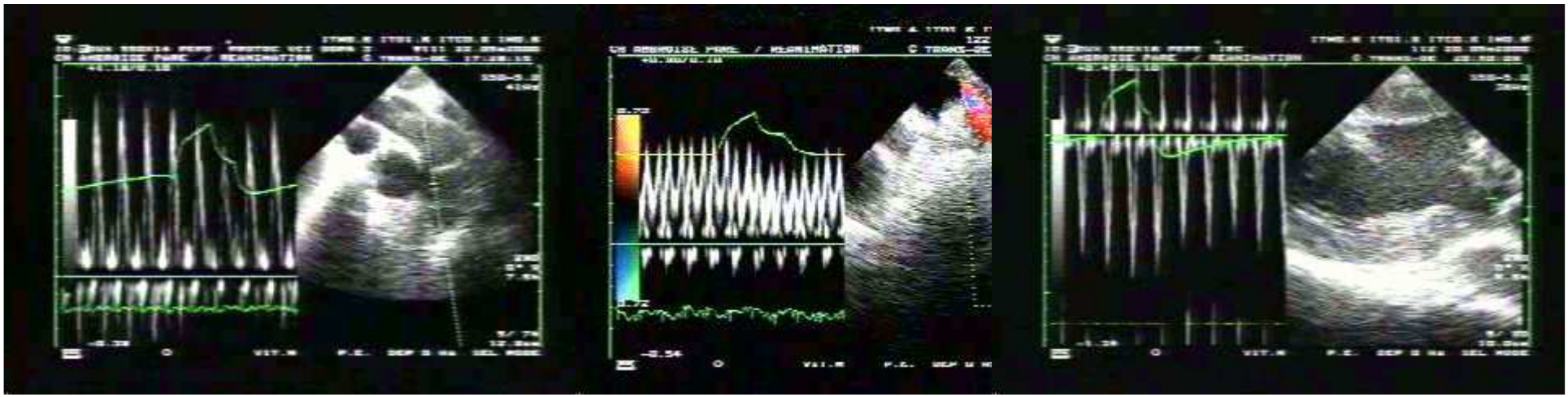






Milnor Circulation 1960


Increase in afterload
RV
LV
Decrease in SVR
dDown



I

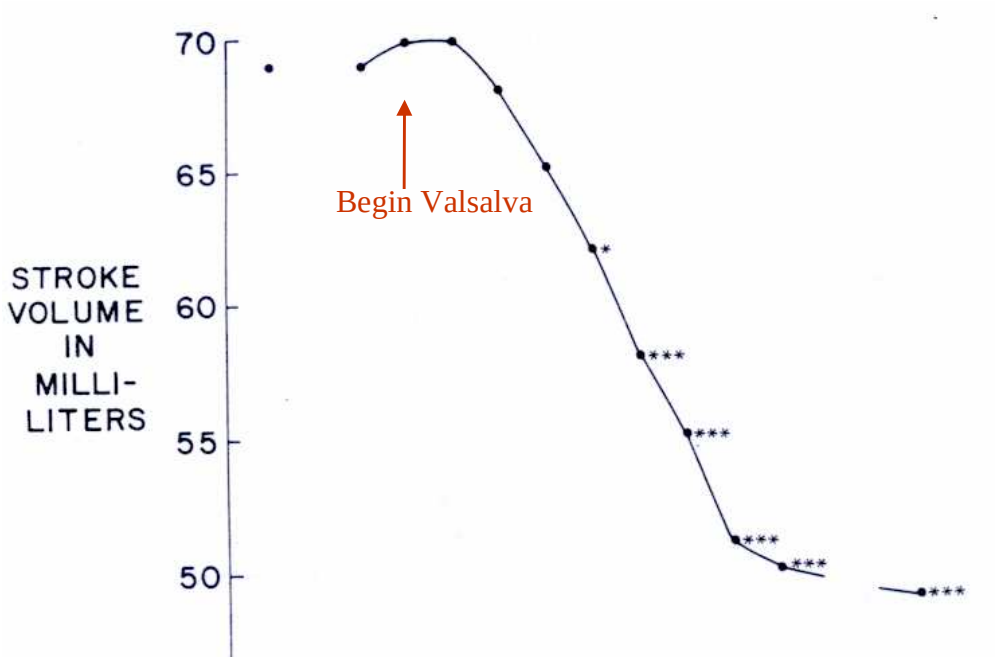
DECREASE IN SVR

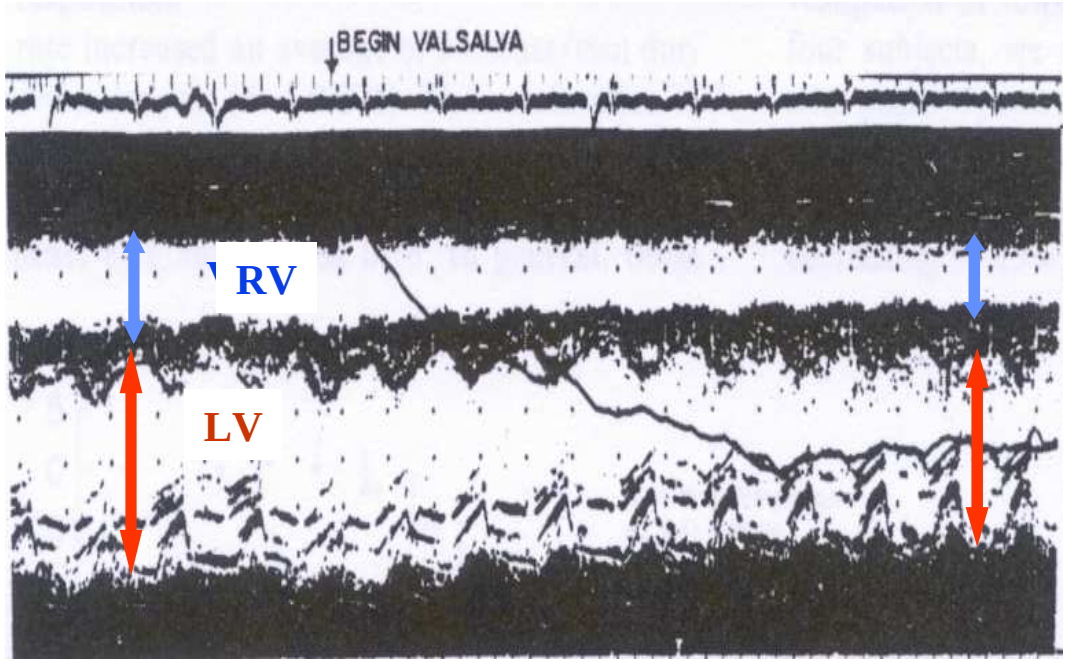
SYSTEMIC VENOUS RETURN

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

***Backward pressure* : right atrial pressure**

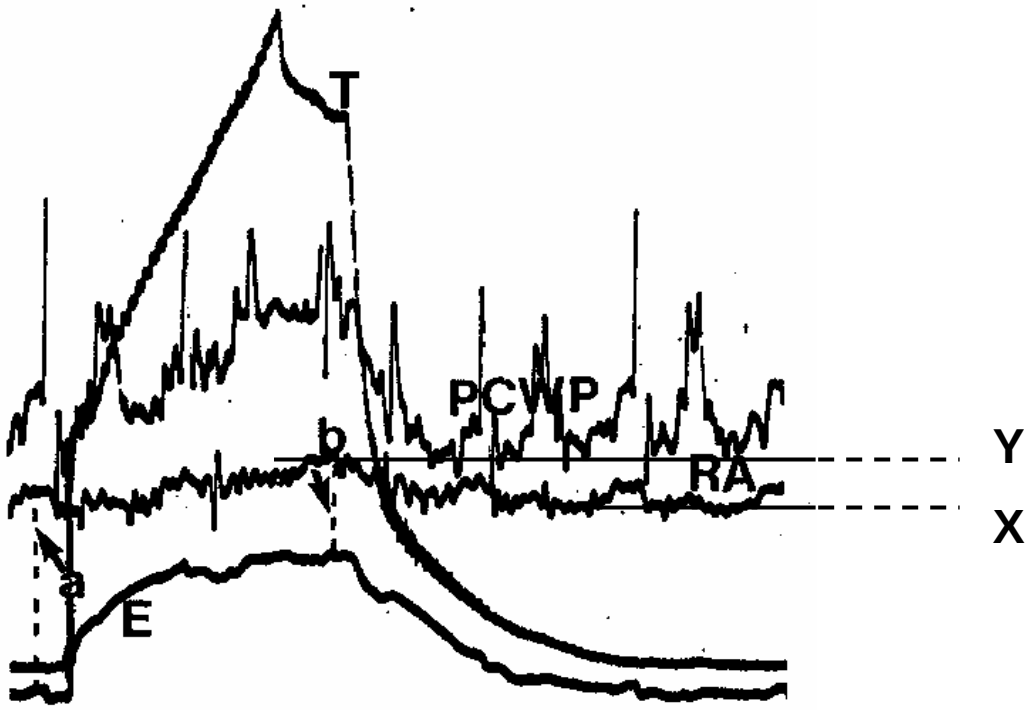
RVS = PSM - RAP/R

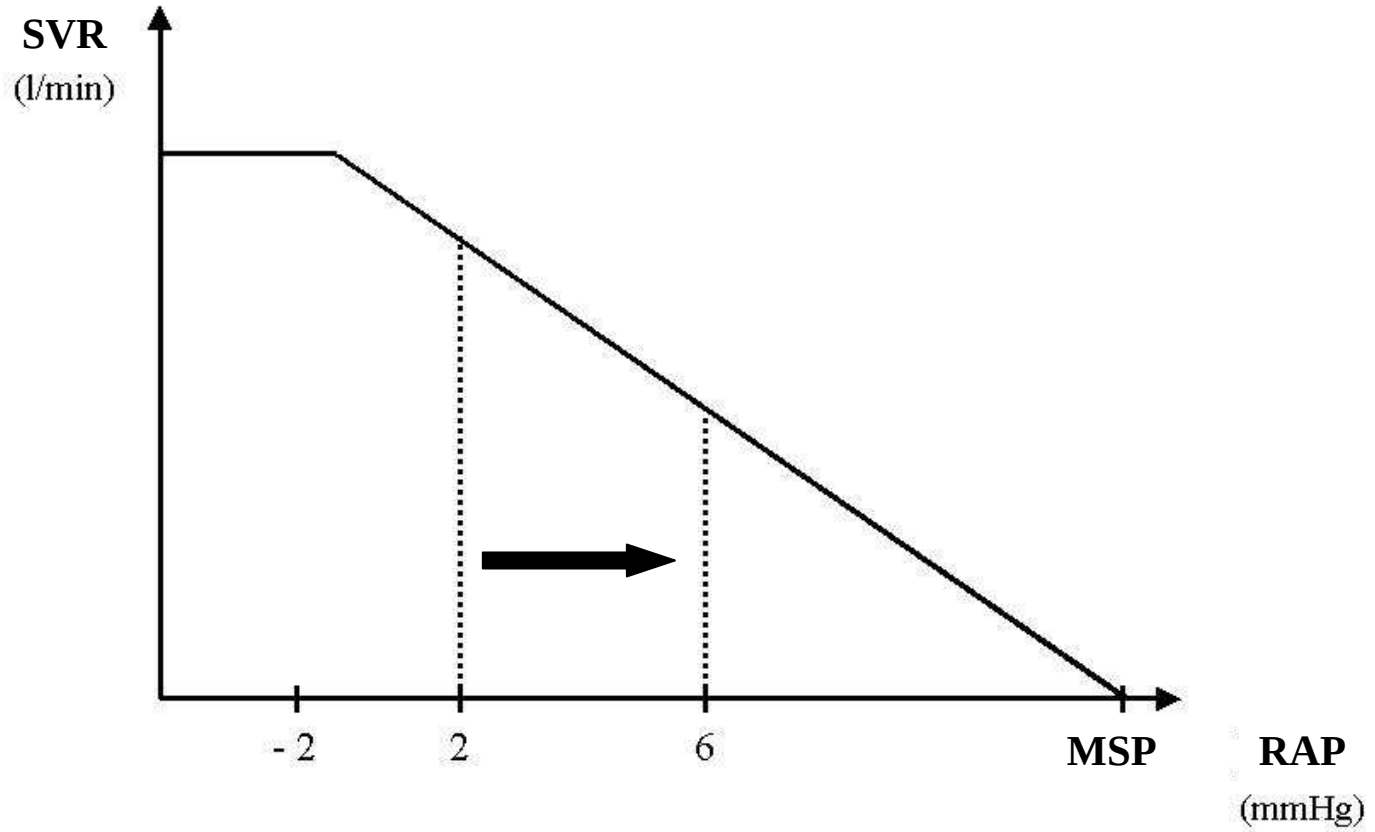

70
65
60
55
50
STROKE VOLUME IN MILLI-LITERS
Begin Valsalva



Robertson Circulation 1977

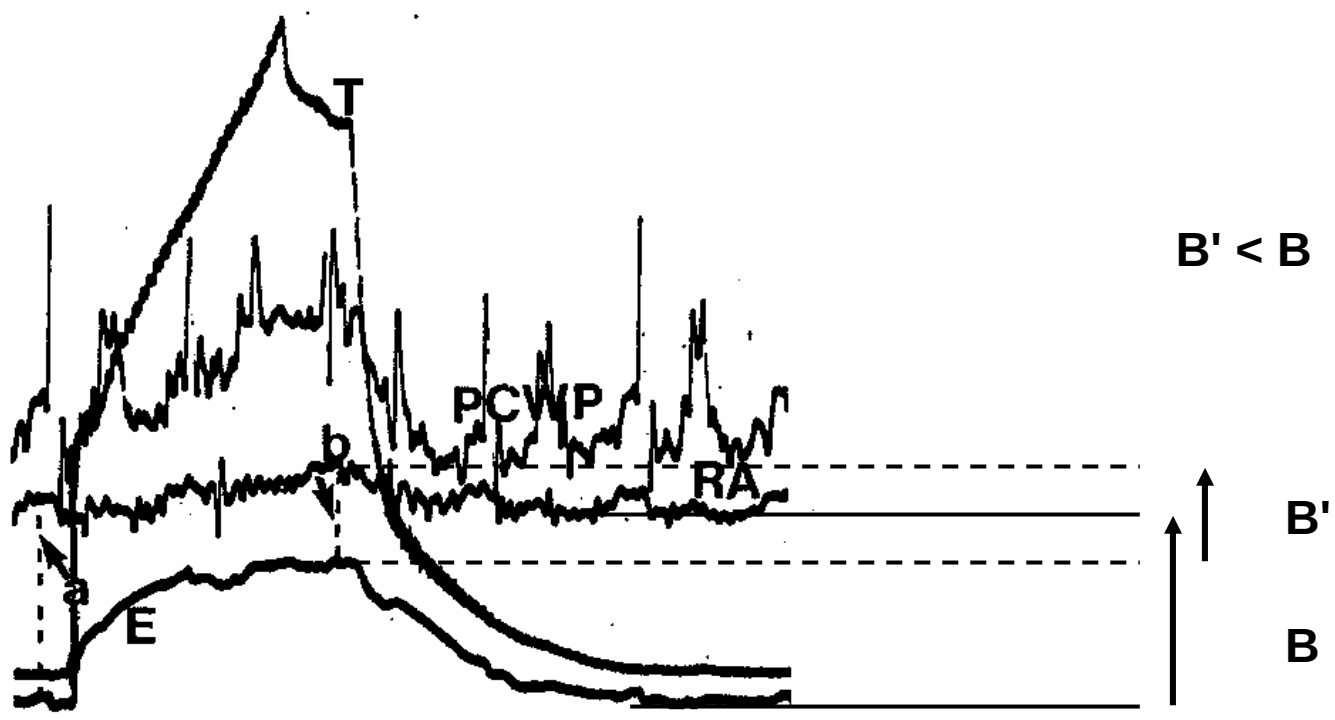
The increased airway pressure is transmitted to the pleural space, leading to an increase in intravascular right atrial pressure

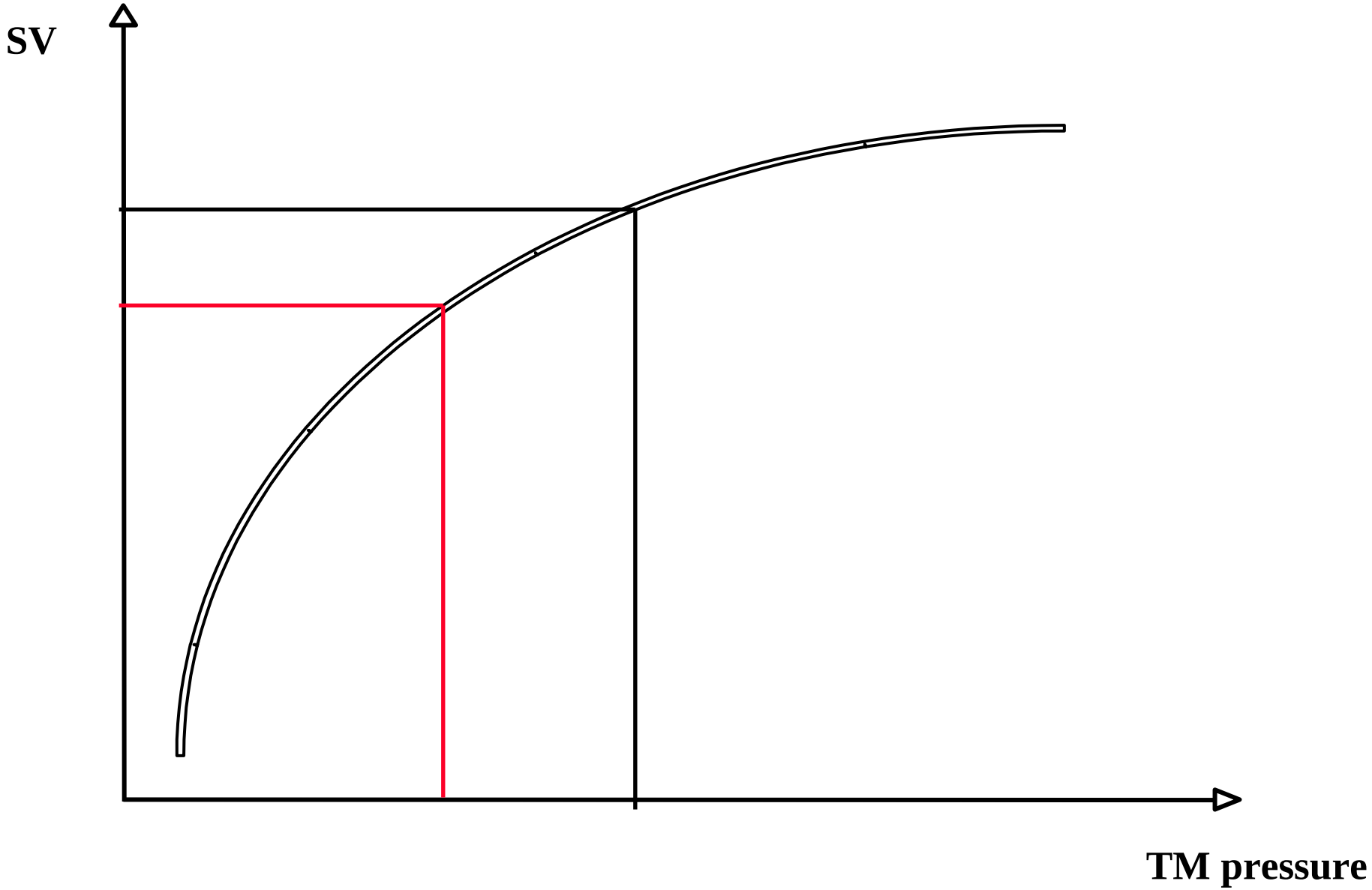




From Guyton Physiol Rev 1955

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




SV
TM pressure

IS GUYTON'S CONCEPT REALLY VALID?

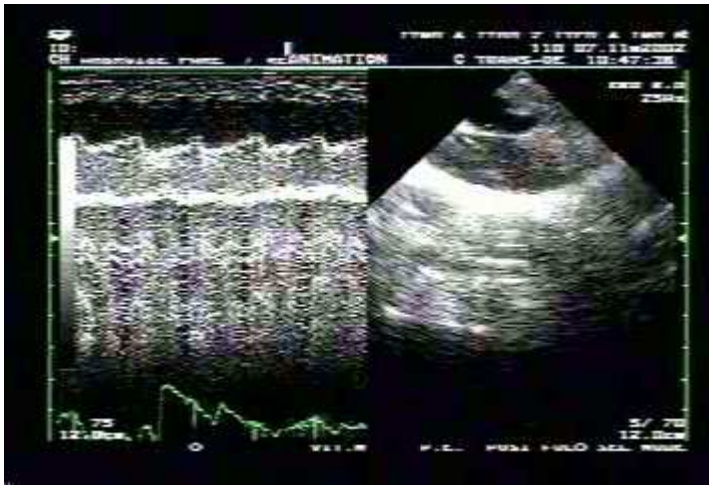
- **Positive airway pressure does not affect the gradient for venous return**

  (MSP - RAP)

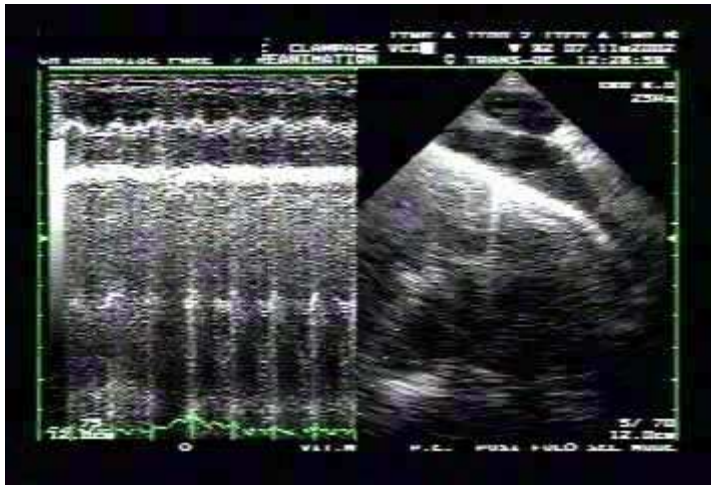
- **But decreases venous return by reducing venous conductance.**

Fessler AJRCCM 1991

Collapsible vessel?



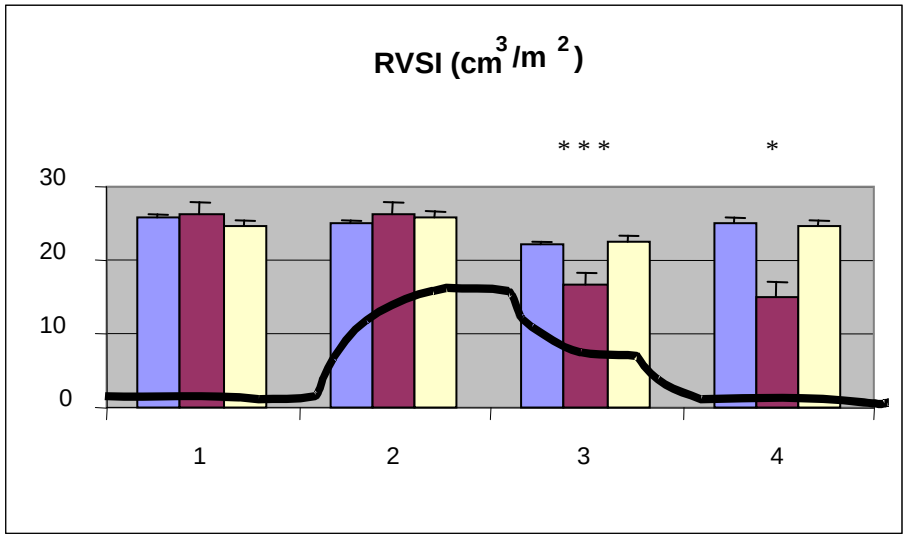
Baseline
SAP 120 mmHg

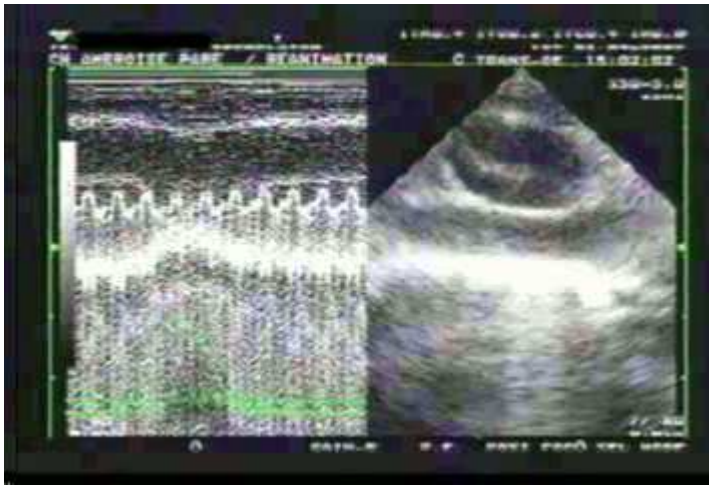


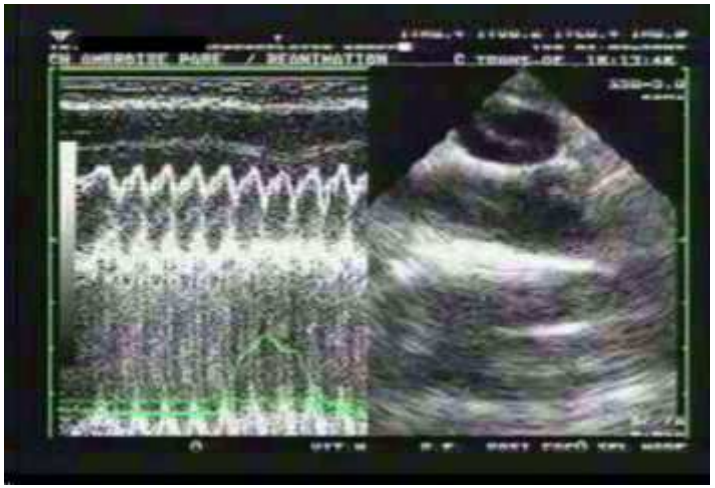
IVC cross-claming
SAP 60 mmHg

Vieillard-Baron AJRCCM 2003

N = 22 patients

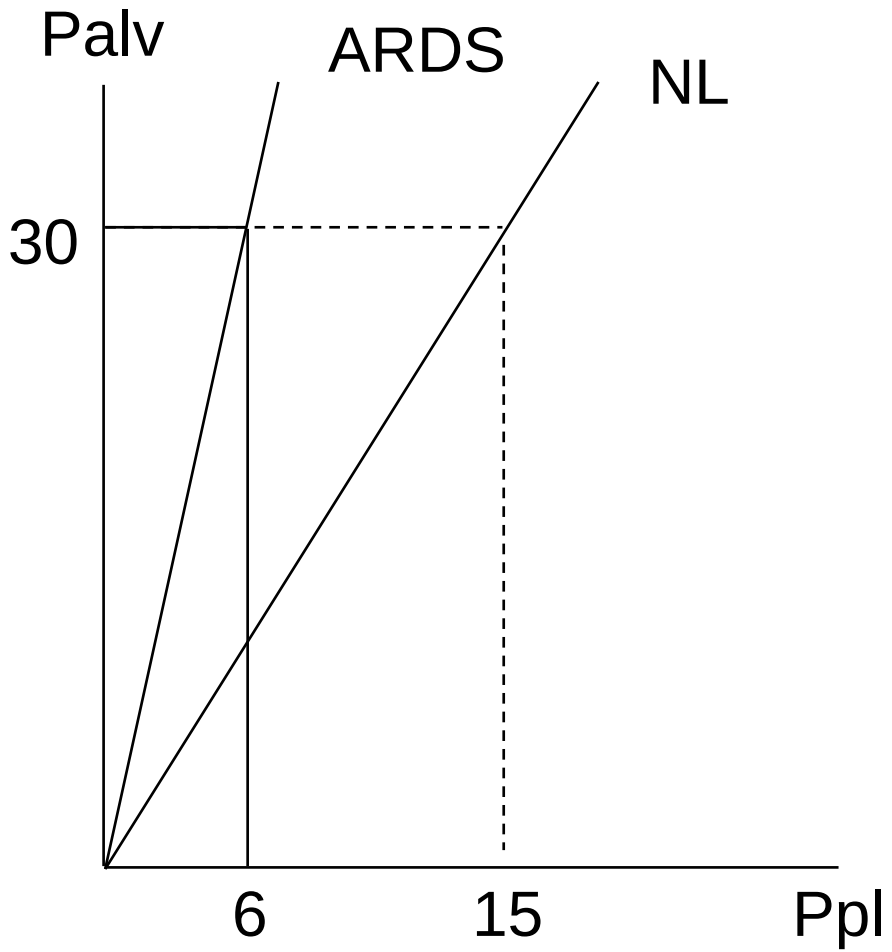




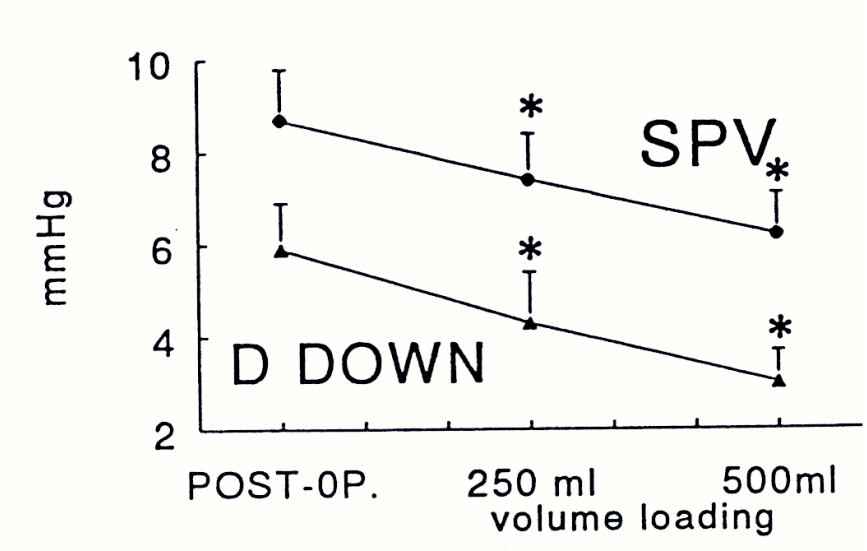


Vieillard-Baron Anesthesiology 2001

INFLUENCE OF RESPIRATORY MECHANICS

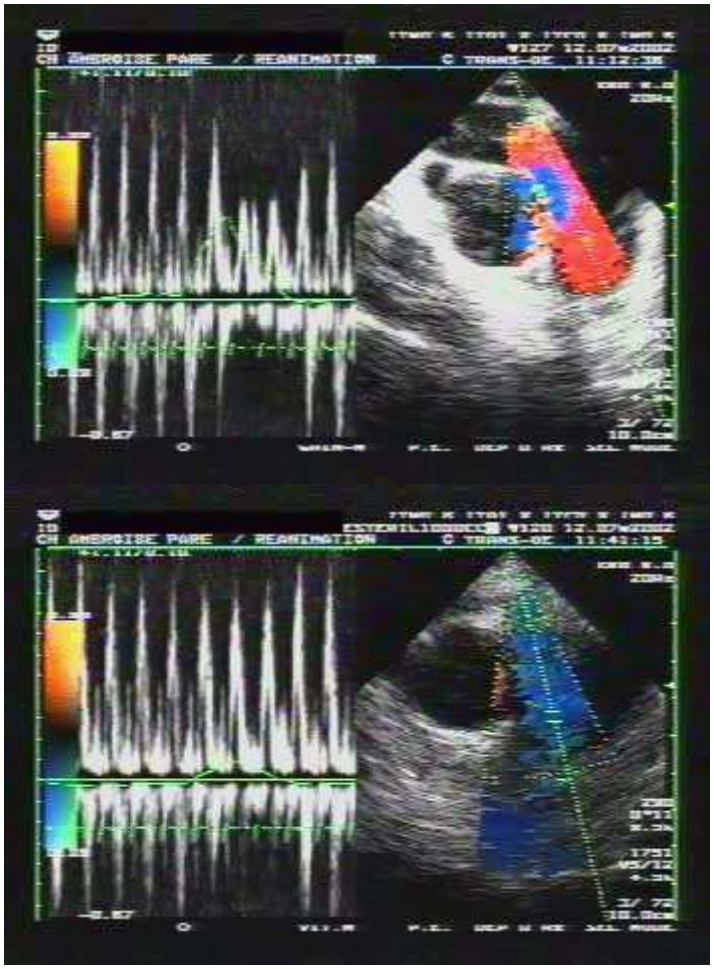


INFLUENCE OF HEMODYNAMIC STATUS



Coriat Anesth Analg 1994

CI 2.5 L/min/m^2



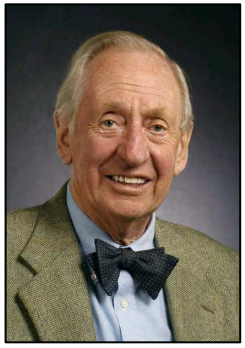
CI 4.5 L/min/m^2

II

INCREASE IN RV AFTERLOAD

WHITTENBERGER
JAP 1960

WEST
JAP 1964



RVP

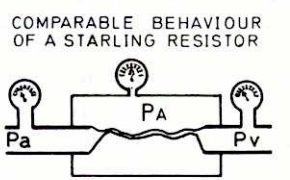
Zone 1

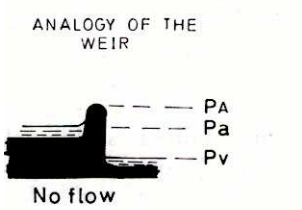
Zone 2

Zone 3

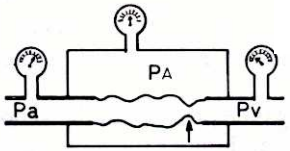
PTP
(cmH_2O)

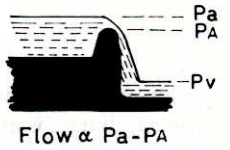
$P_{ALV} > PAP > PVP$

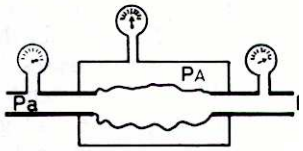


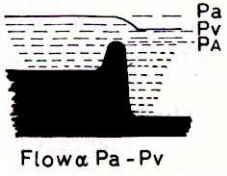


$PAP > P_{ALV} > PVP$



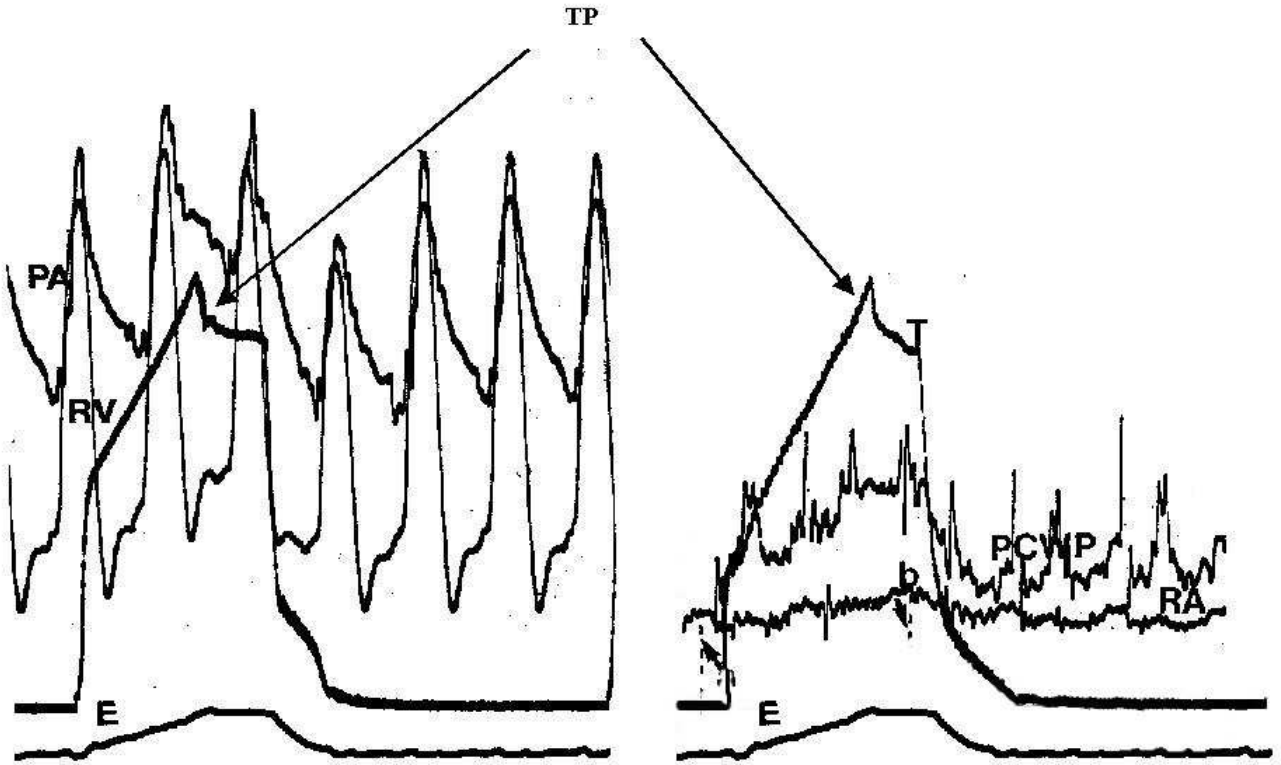


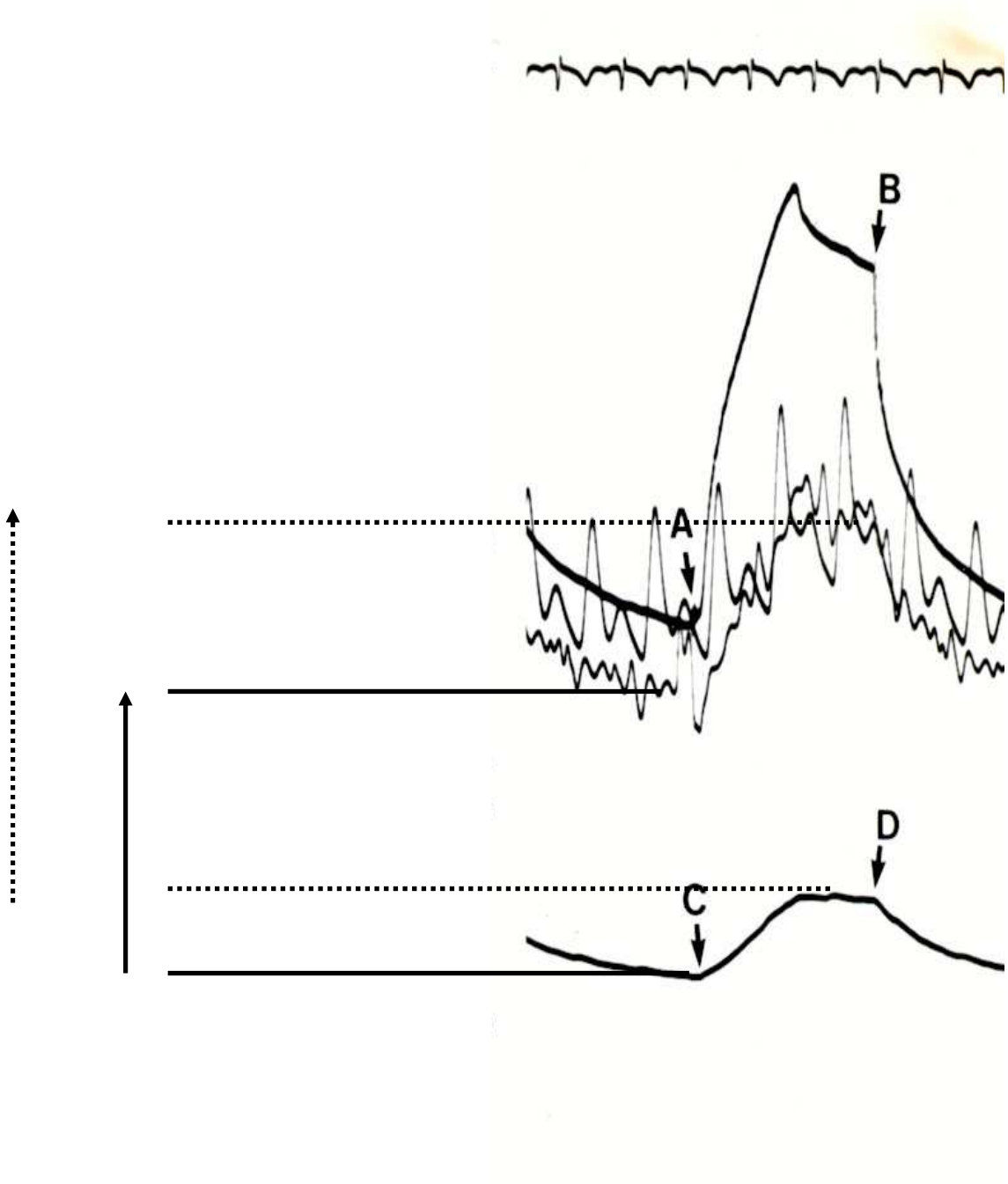


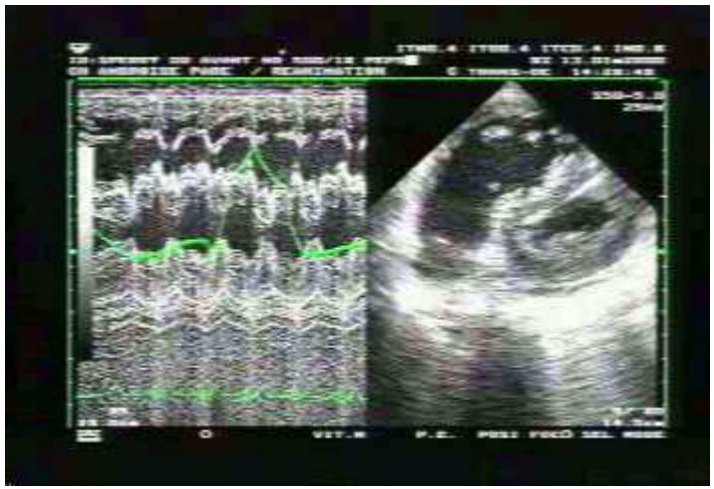


$PAP > PVP > P_{ALV}$

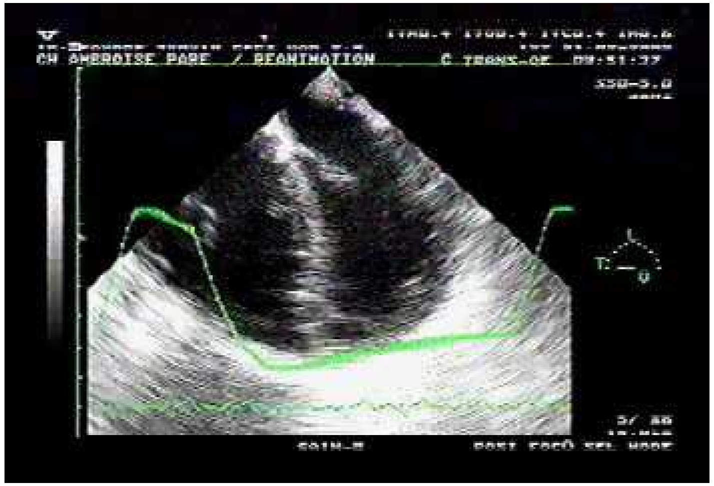
INCREASE IN ZONE II




B
A
D
C

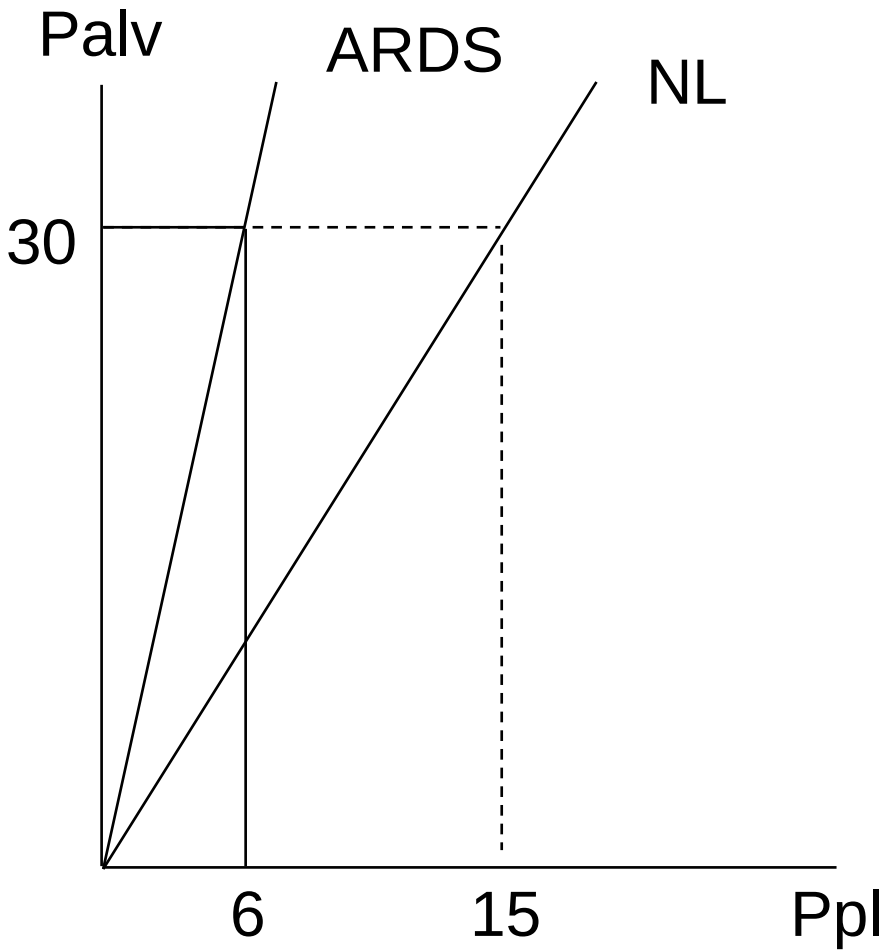


Vieillard-Baron J Appl Physiol 1999


CH AMBROISE PARE / REANIMATION
C TRANS-OE


CH AMBROISE PARE / REANIMATION
C TRANS-OE

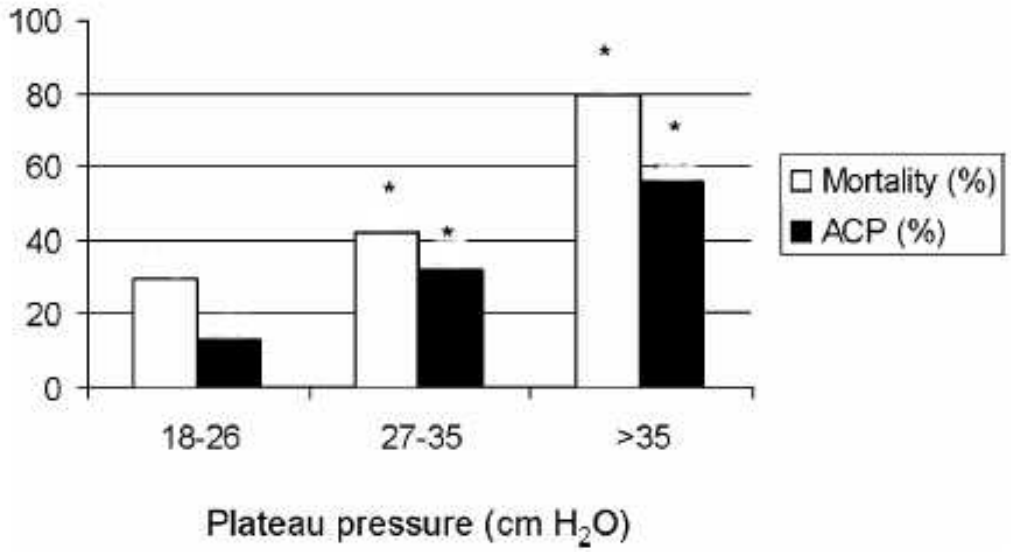
INFLUENCE OF RESPIRATORY MECHANICS

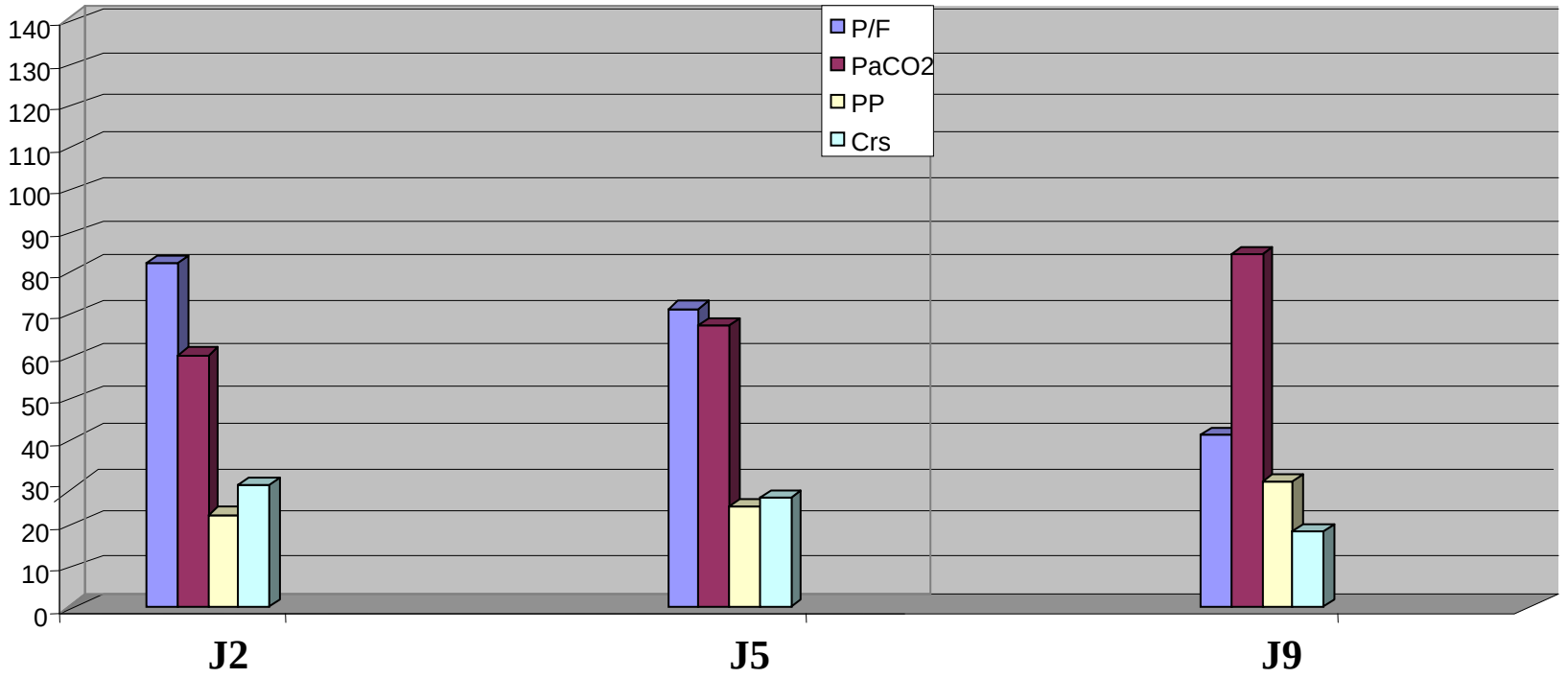


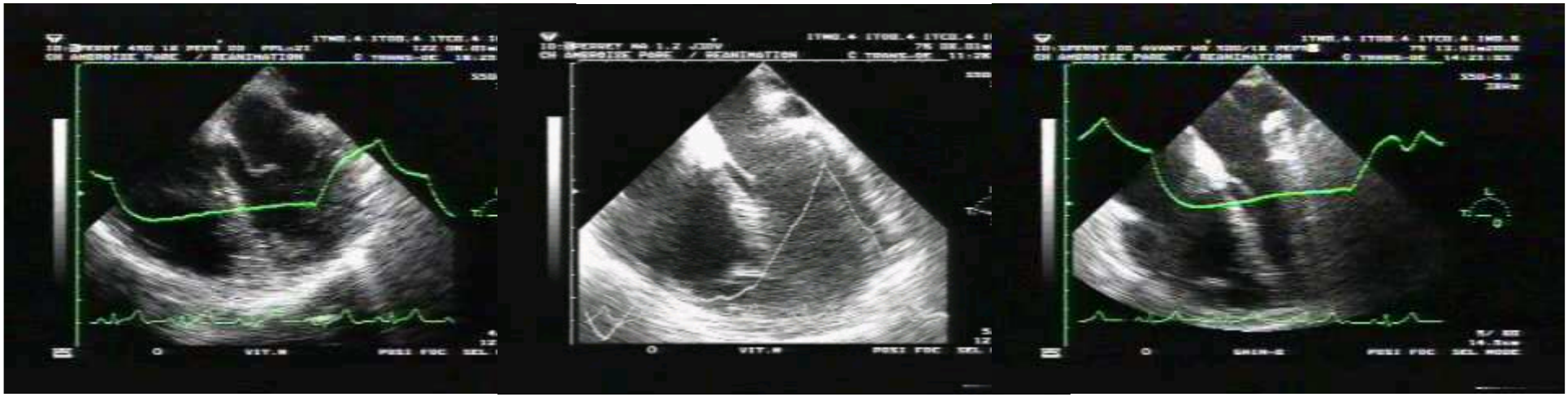
1 TPP = 24
2 TPP = 15

François Jardin
Antoine Vieillard-Baron

Is there a safe plateau pressure in ARDS? The right heart only knows



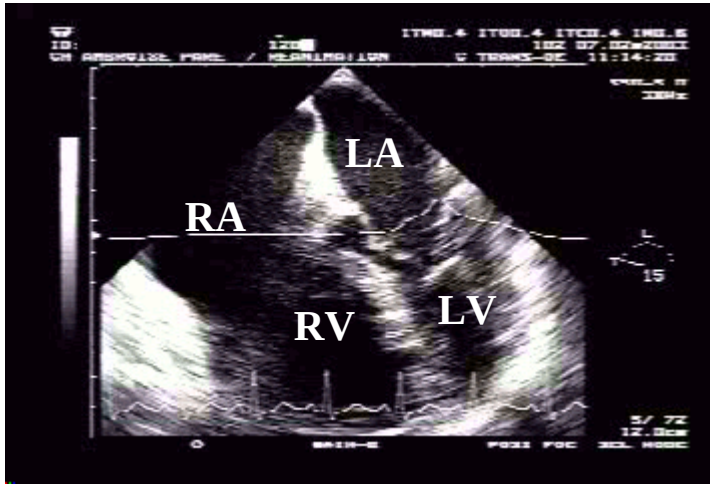




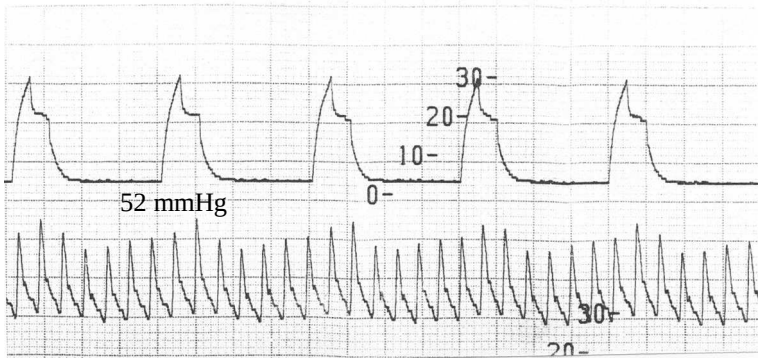
NE 0 NE 0.6 µg/kg/min NE 1.5 µg/kg/min

INFLUENCE OF HEMODYNAMIC STATUS

H, 69 years old
Extensive pneumonia
ARDS



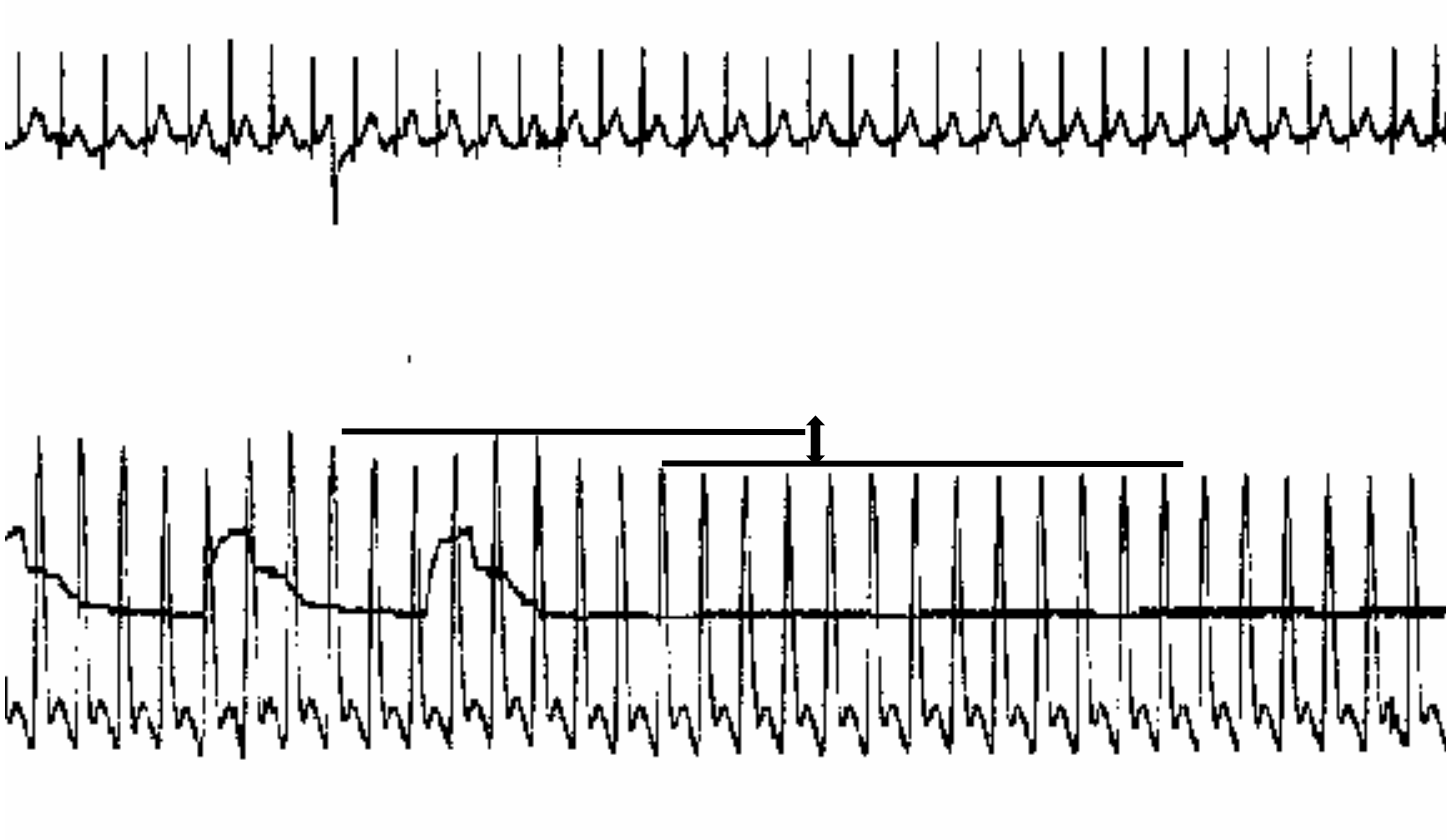
IC: 1.3 L/mn/m^2

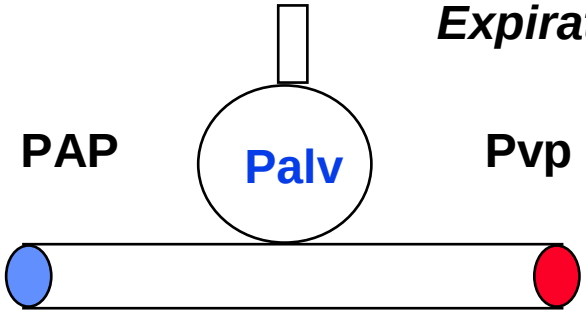


ΔPP: 21%

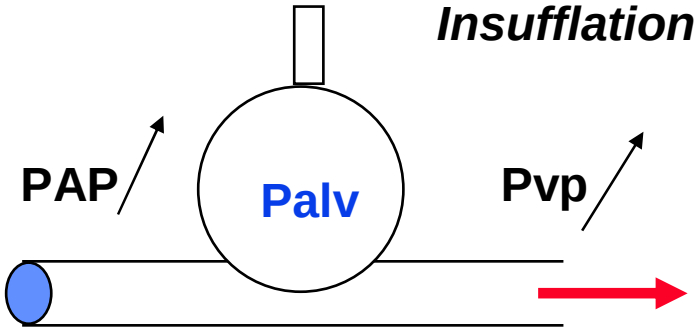
INSPIRATORY INCREASE IN LV EJECTION

THE dUp EFFECT



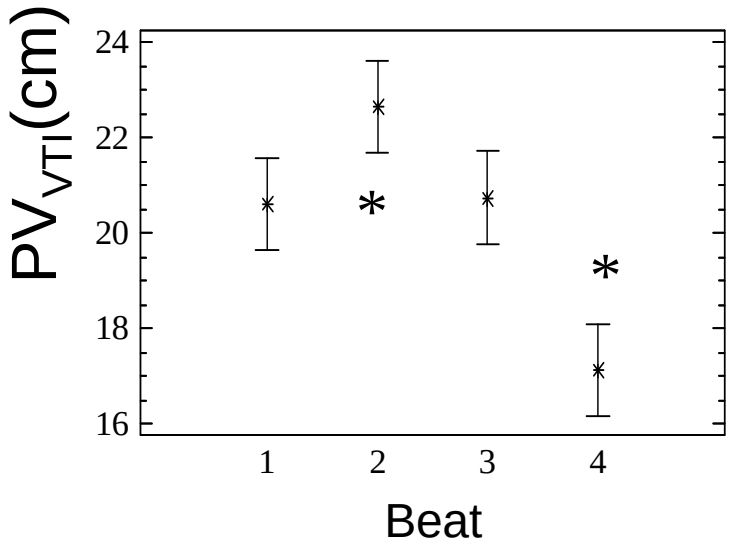


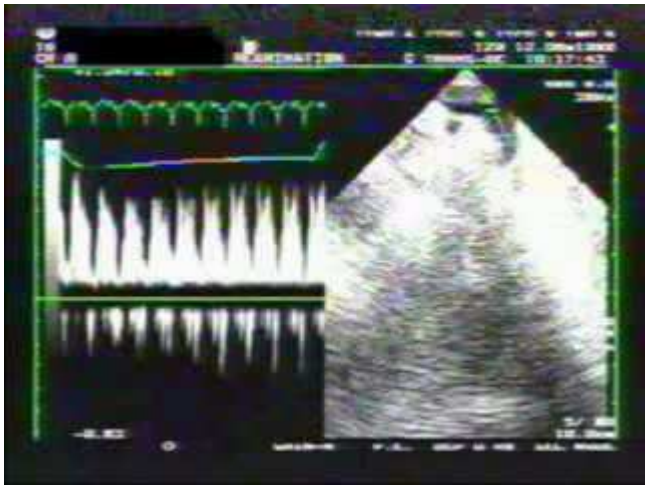
PAP > Pvp > Palv



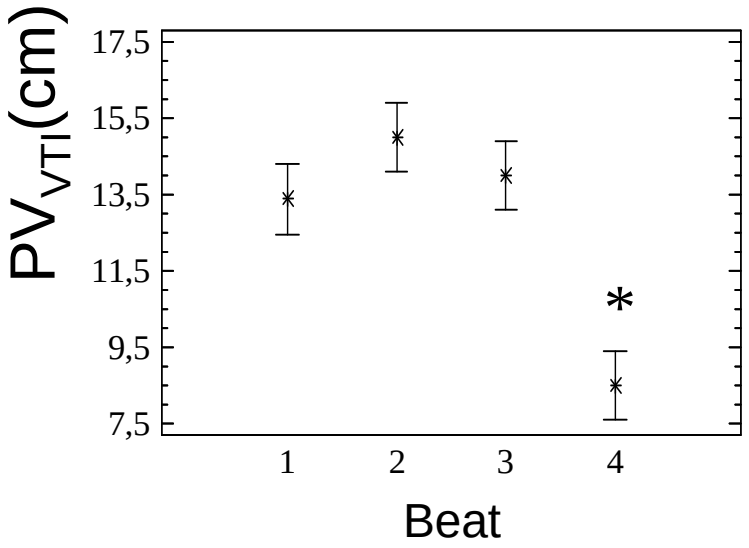
PAP > Palv >Pvp

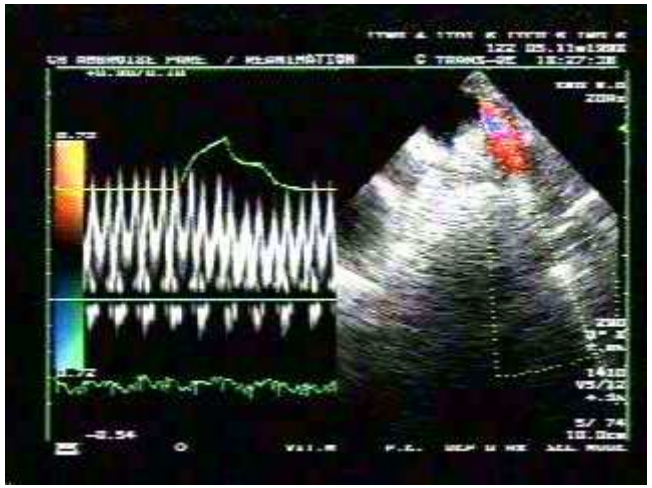
dUp + dDown





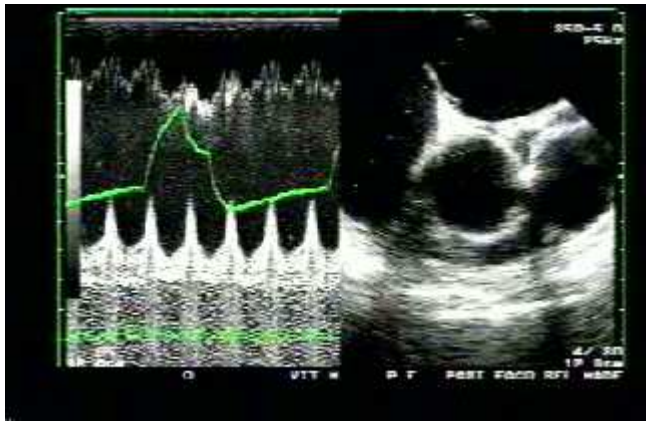
dDown





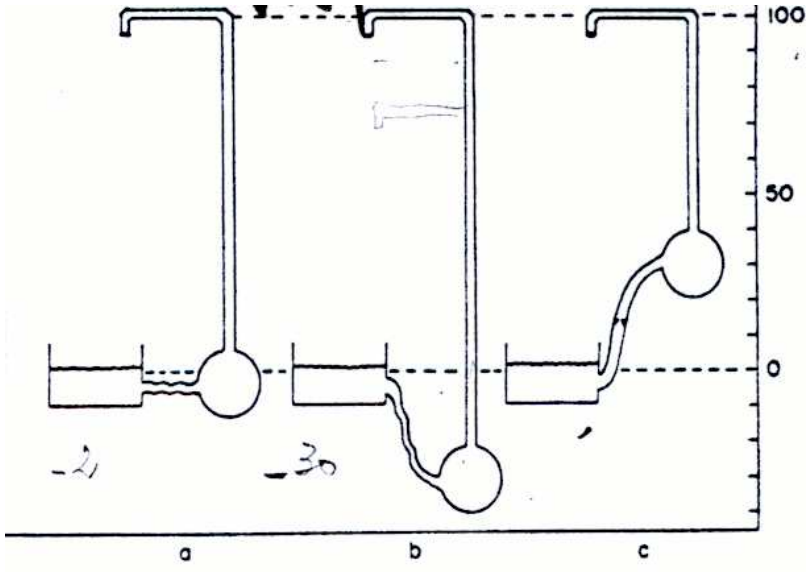
Vieillard-Baron AJRCCM 2003

	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%†)

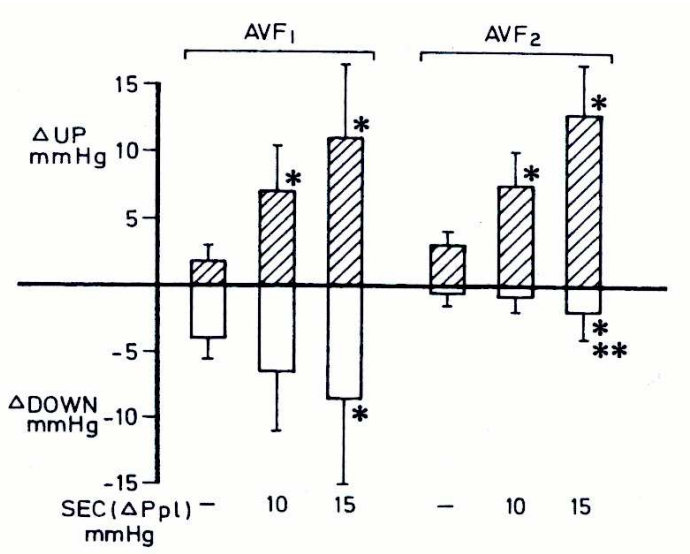


Vieillard-Baron JAP 1999

LV AFTERLOAD EFFECT?



McGregor N Engl J Med 1979



Pizov Anesth Analg 1989

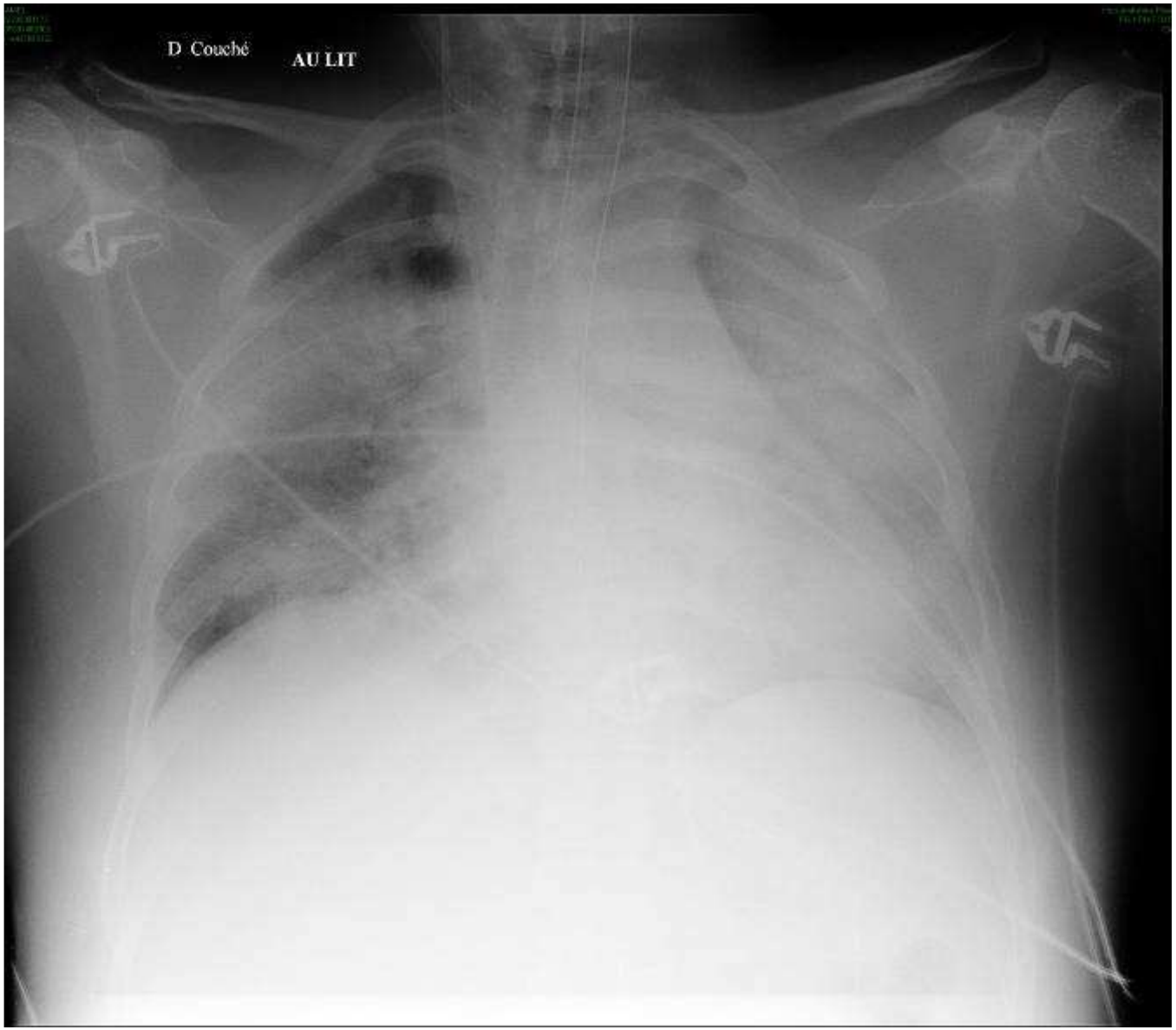
Vt: 550

Fr:15

Peep **Zeep**

5

12/01/09 14:57	12/01/09 15:21
	70.0
7.46	**7.50**
41	38
64	**101**
29	**29**
30	**30**
4.6	**5.4**
94.2	**98.2**



Vt: 500
Fr:17

Peep 5

Zeep

13/01/09 15:24	13/01/09 16:20
	TEL
7.44	7.41
41	45
108	**57**
27	**28**
28	**30**
2.6	**3.1**
98.5	**91.4**

L'échocardiographie en réanimation - Echocardiography in intensive care - Microsoft Internet Explorer

http://www.pifo.uvsq.fr/hebergement/webrea/index.php

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Echocardiography in intensive care

Pr F. Jardin - Pr A. Vieillard-Baron
Medical Intensive Care Unit - Ambroise Paré Hospital
Dr A. Beauchet
Medical Informatic - Ambroise Paré Hospital

UFR de Médecine PIFO
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INTERNATIONAL COURSE

Monday, 01 September 2008

INTERNATIONAL COURSE ON

ECHOCARDIOGRAPHY IN THE ICU

FROM THE BASICS TO HEMODYNAMIC EVALUATION

Brussels - Erasme Hospital, November 5-7, 2008

Program 139.81 Kb

Introduction

Sunday, 02 January 2005

In the late 1980s, the Medical Intensive Care Unit of the Ambroise Paré Hospital abandoned right cardiac catheterization as a diagnostic and monitoring tool for acute circulatory and respiratory failure in intensive care.

Instead we now always use transthoracic and transesophageal echocardiography in which we have acquired great expertise and experience and which we use for the diagnostic and therapeutic management of patients presenting severe sepsis, massive pulmonary embolism, or acute respiratory distress syndrome.

Professor Antoine Vieillard-Baron and Dr Alain Beauchet, in collaboration with Professor François Jardin, **have designed this website for intensivists and intensivists trained in anesthesiology who wish to start using echocardiography in intensive care or to upgrade their use of it.**

By presenting real clinical cases and video clips, all recorded in our unit, this website constitutes a genuine tool for ongoing medical training. We shall

Internet

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