Mechanical ventilation : past and present

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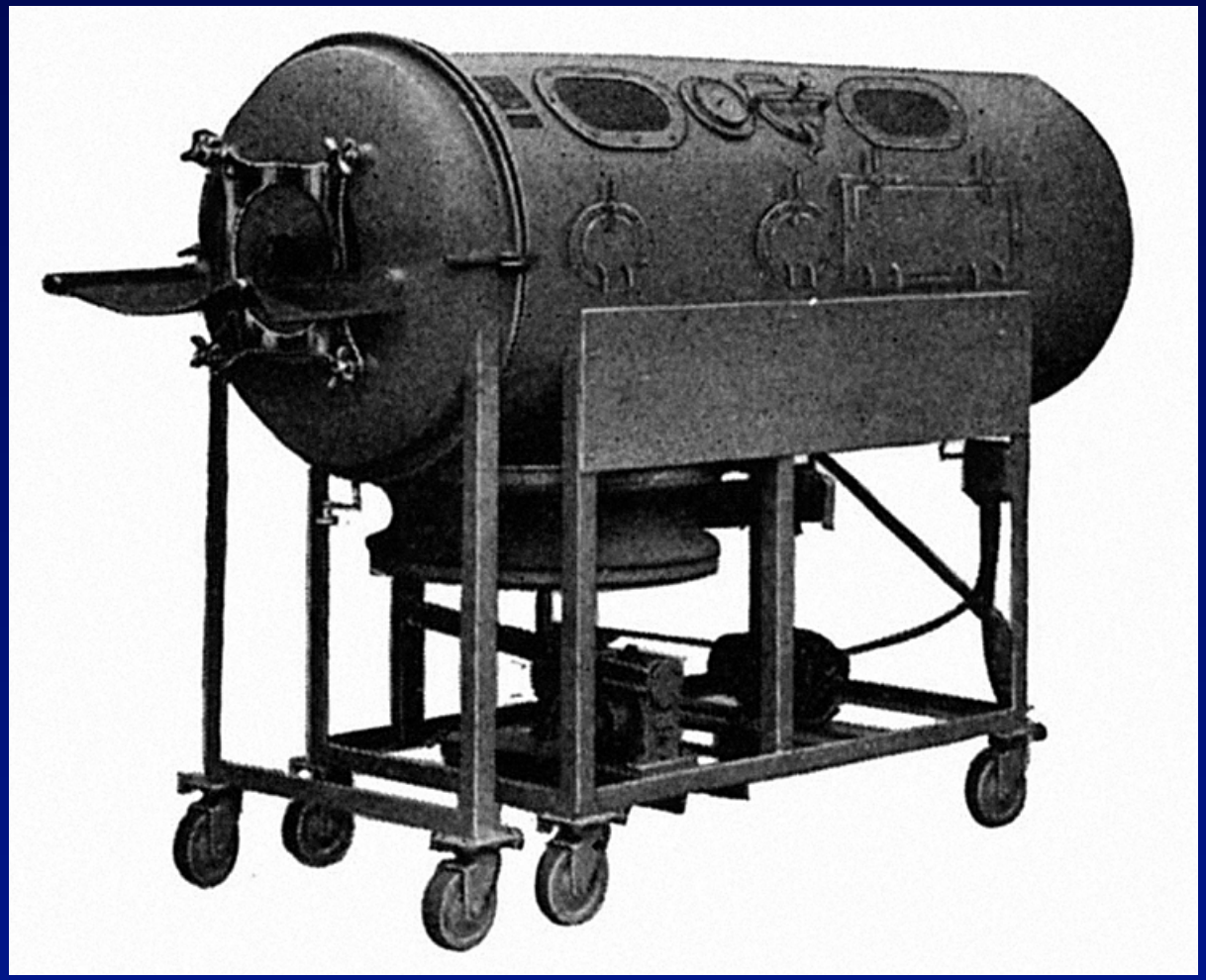
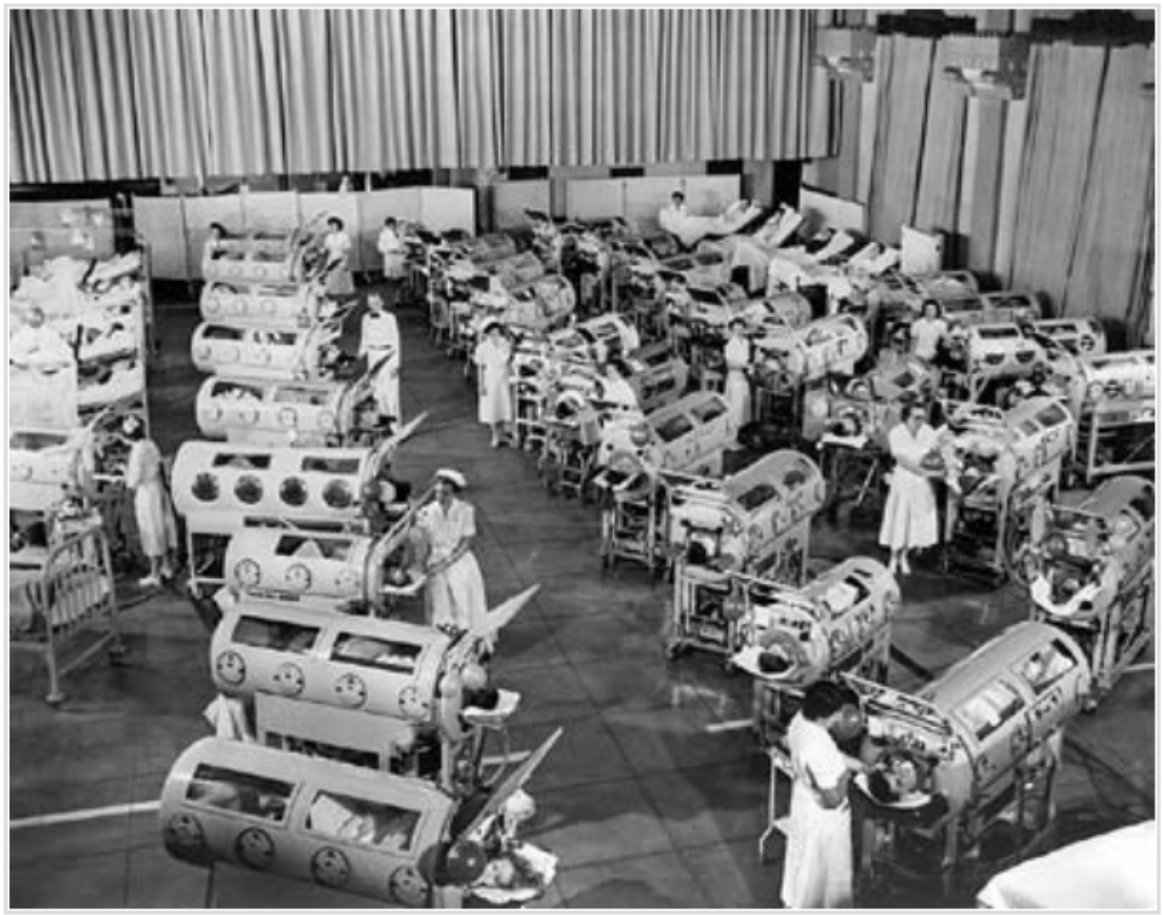
Toronto, 1930

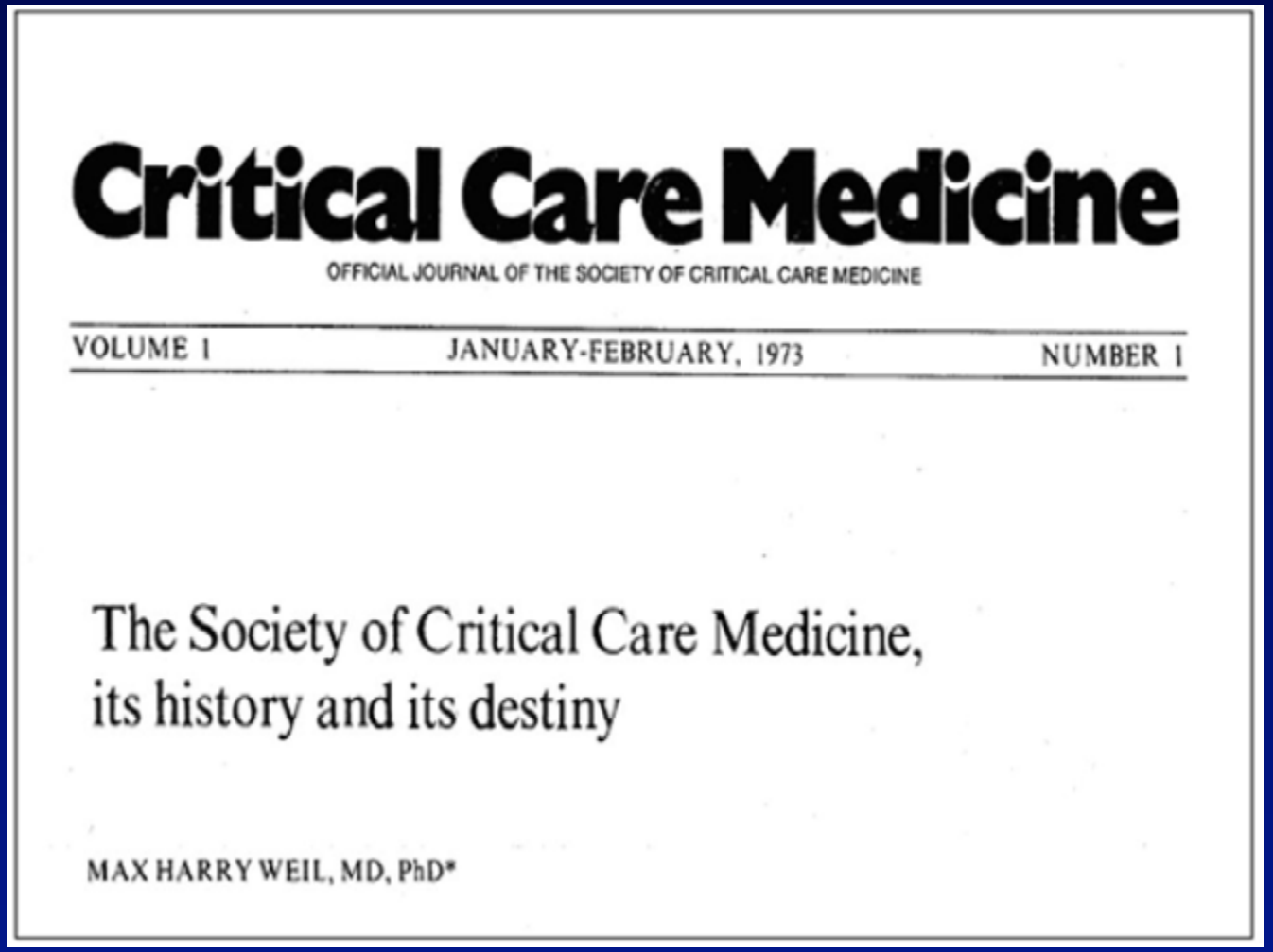


Copenhagen, 1953



Used by B. Hebert, late 1950s - 2003

SCCM - 1970



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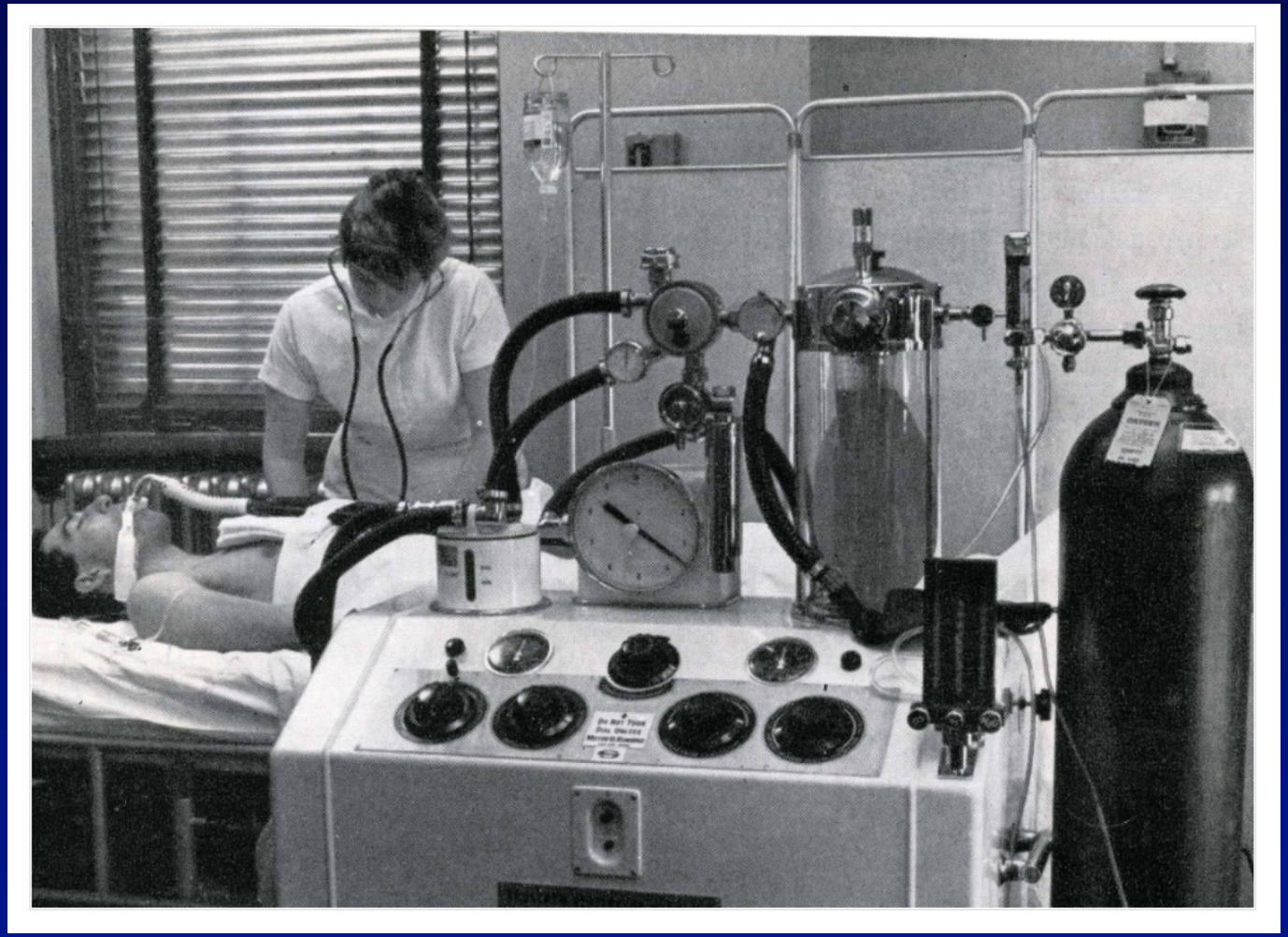
MAX HARRY WEIL, MD, PhD*

Engström - 1960s - volume ventilation



Bird - Mark 7 - 1960s - gas driven - IPPB

Bird Mark 7 Ventilator

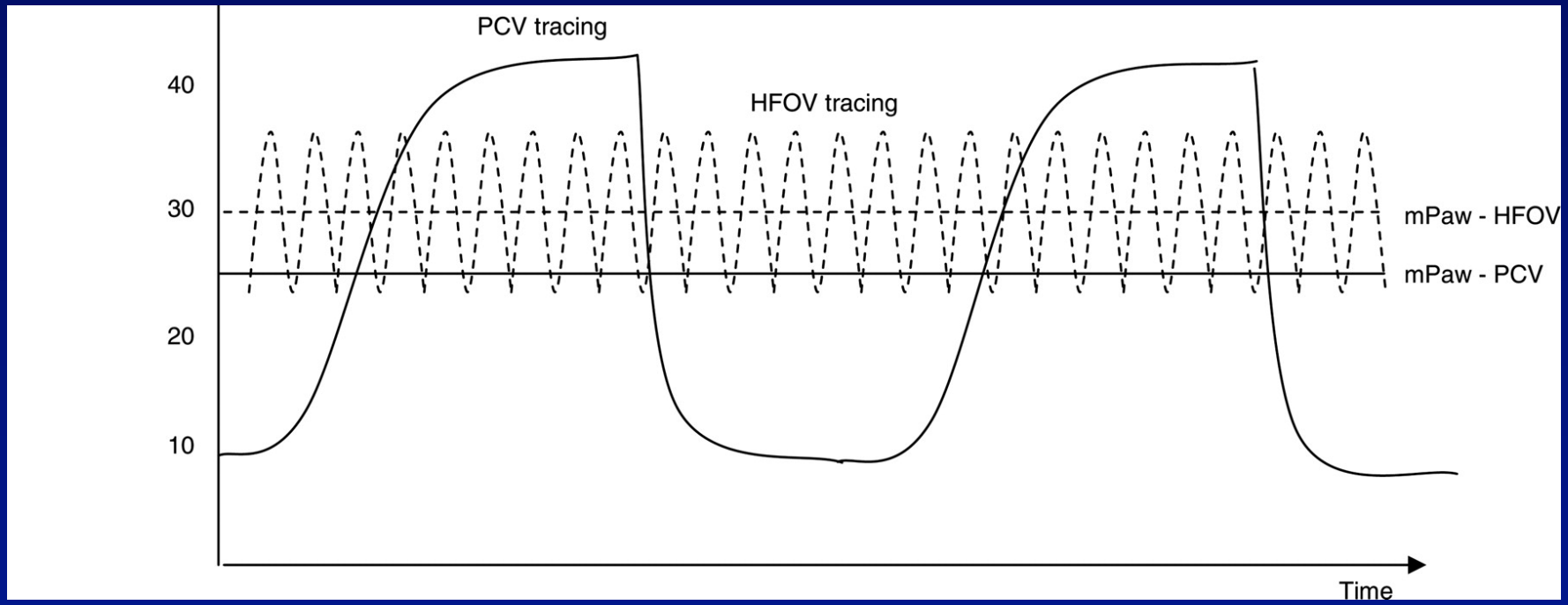
Siemens - Servo 900B - 1976 - CMV or IMV

Respiratory - ARDS

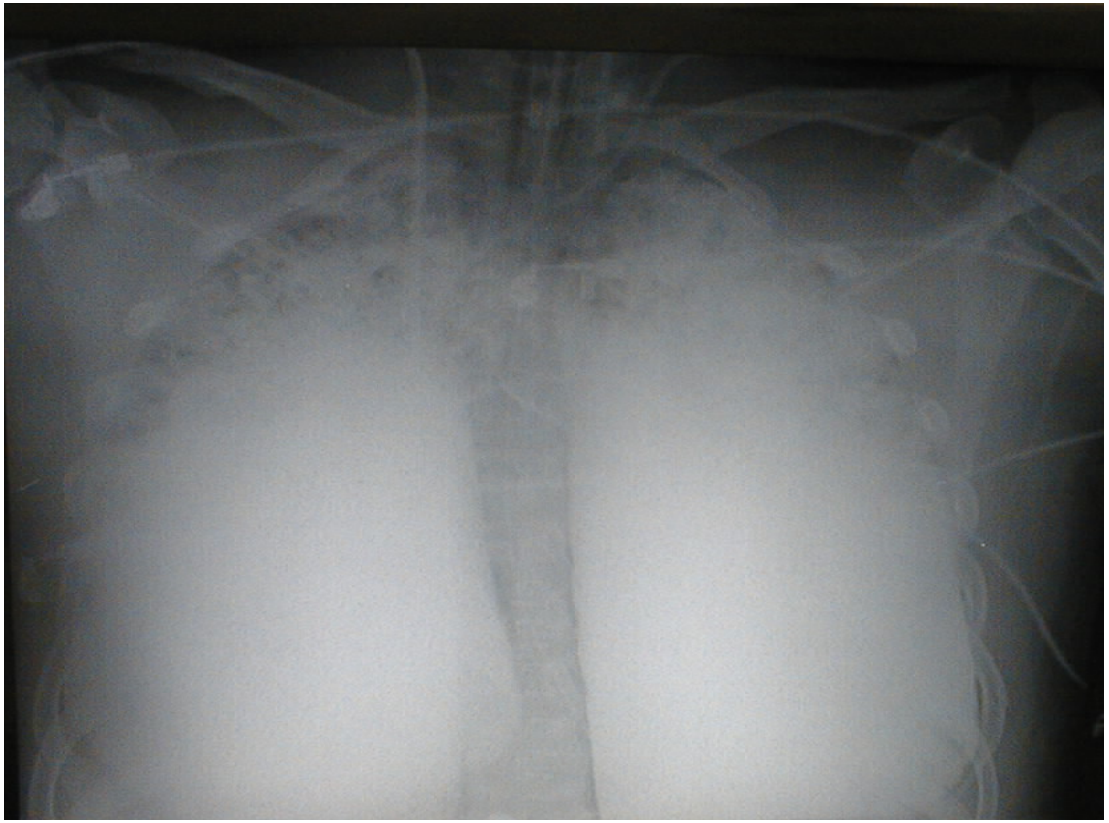
- VT 12 - 15 ml/kg, PaCO2 40 mmHg
- optimal PEEP (Suter, NEJM 1975)

- 1970s : ECMO (Zapol, JAMA 1979)
- 1995s : surfactant, NO, prone, ... NAVA
- 2000s : liquid ventil. (Kacmarek, AJRCCM 2006)
- 2000s : protective ventilation

High frequency jet ventilation



ARDS - liquid ventilation



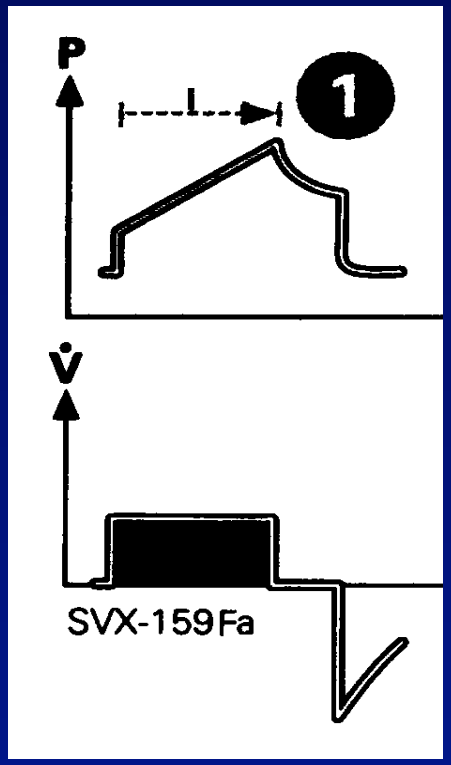

Standby

Volume control

set tidal volume

set respir. rate

check pressure

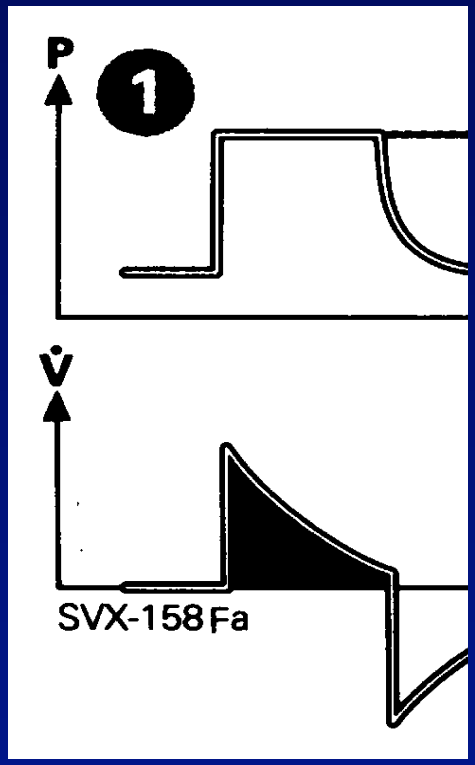


Pressure control

set pressure

set respir. rate

check volume

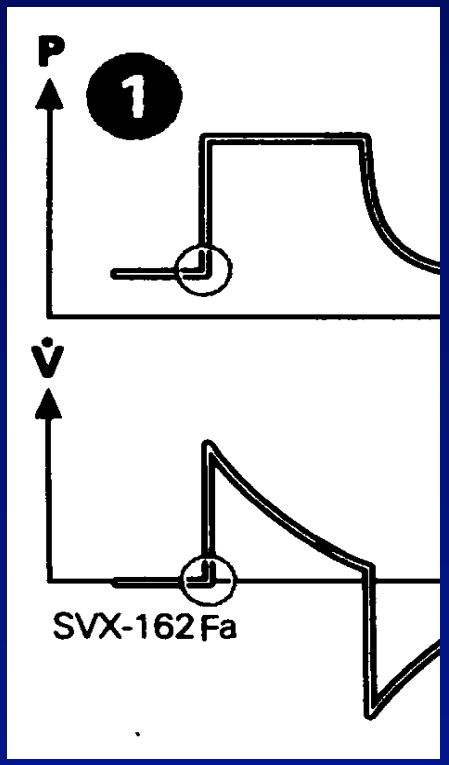


Pressure support

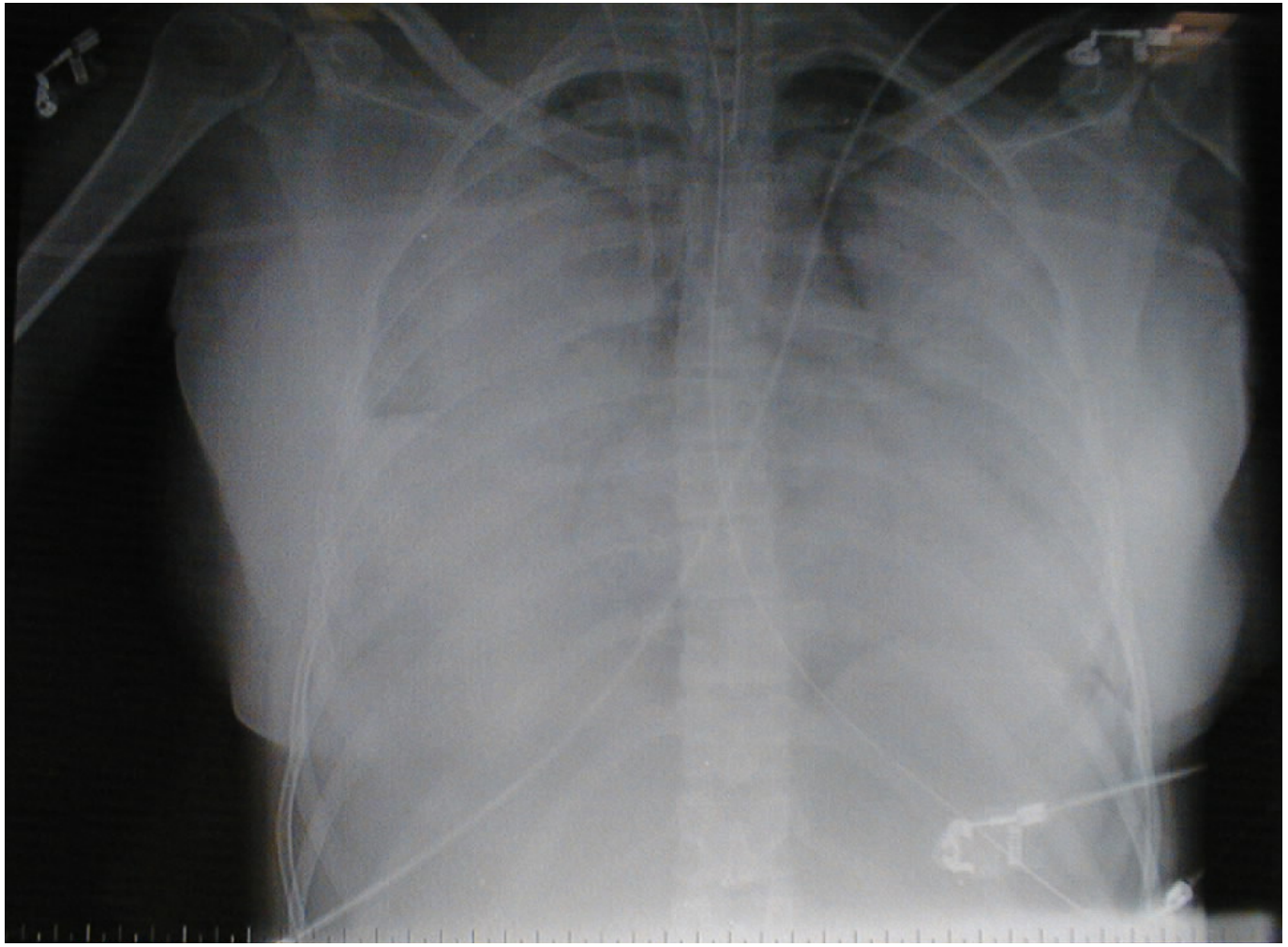
set pressure

check rate

check volume

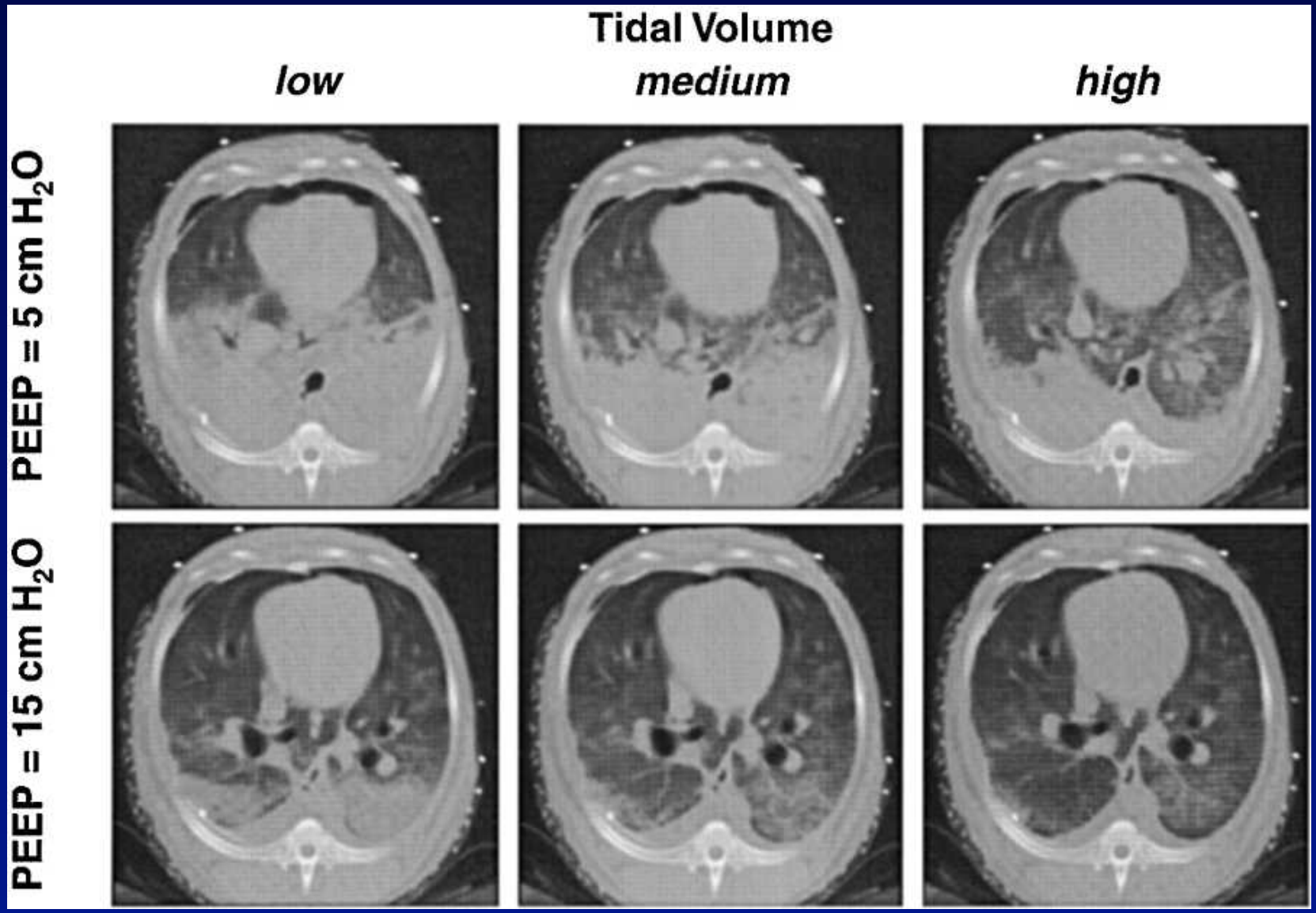


Acute respiratory distress syndrome (ARDS)



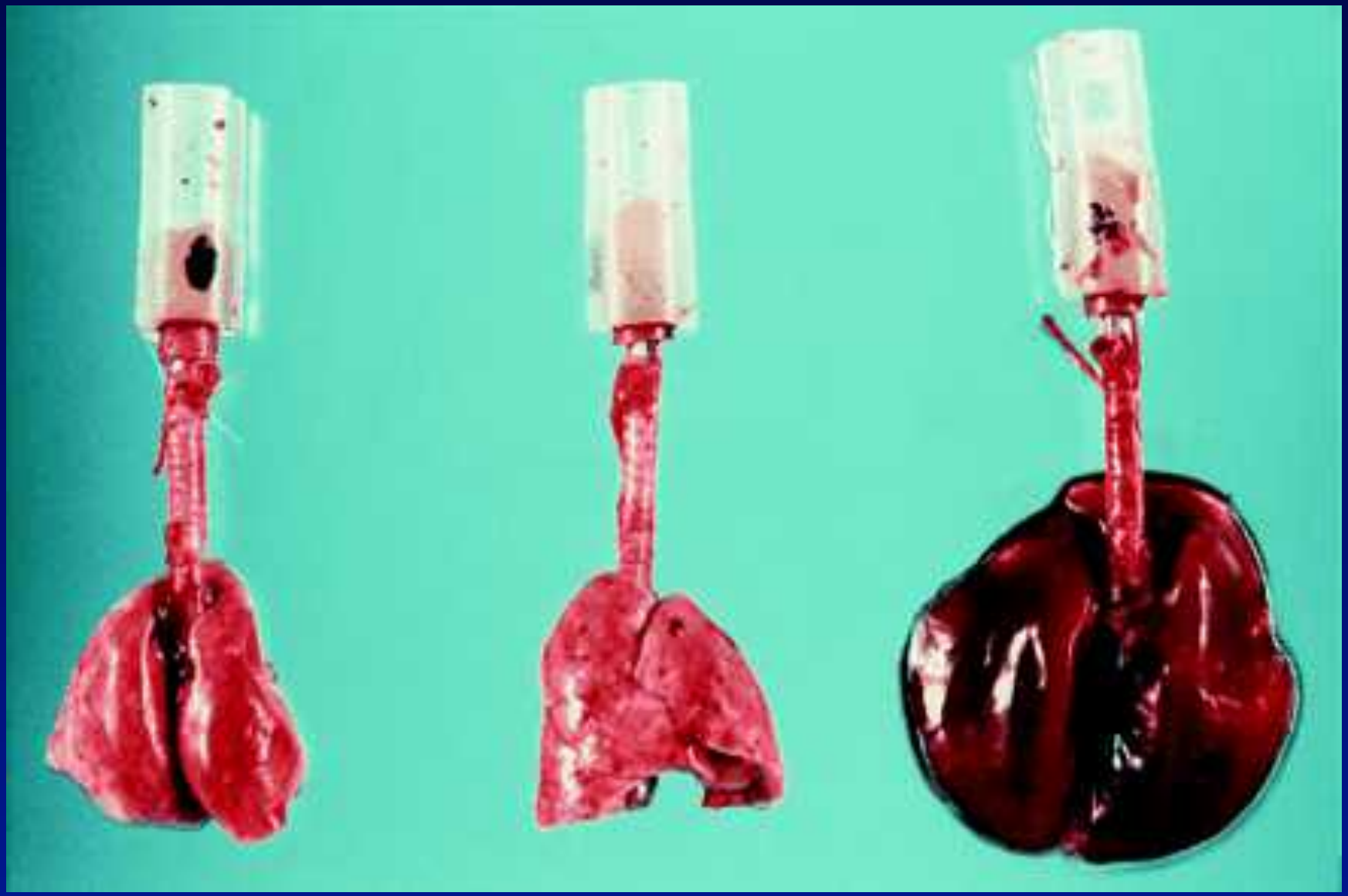
Tidal volume and/or PEEP

Pelosi, AJRCCM 2001



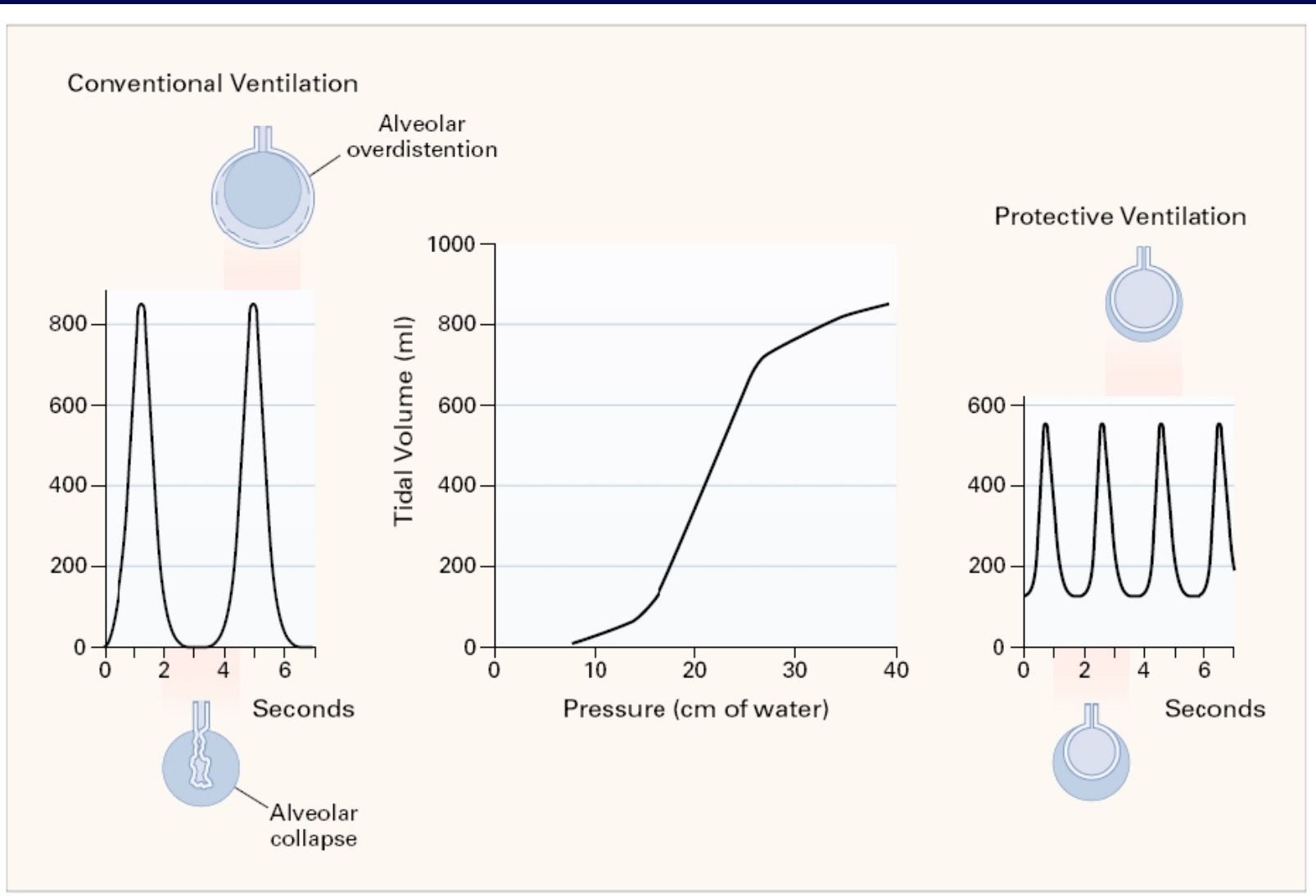
VILI : ventilator-induced lung injury

Dreyfuss, ARRD 1985



Protective ventilation

Tobin, NEJM 2001



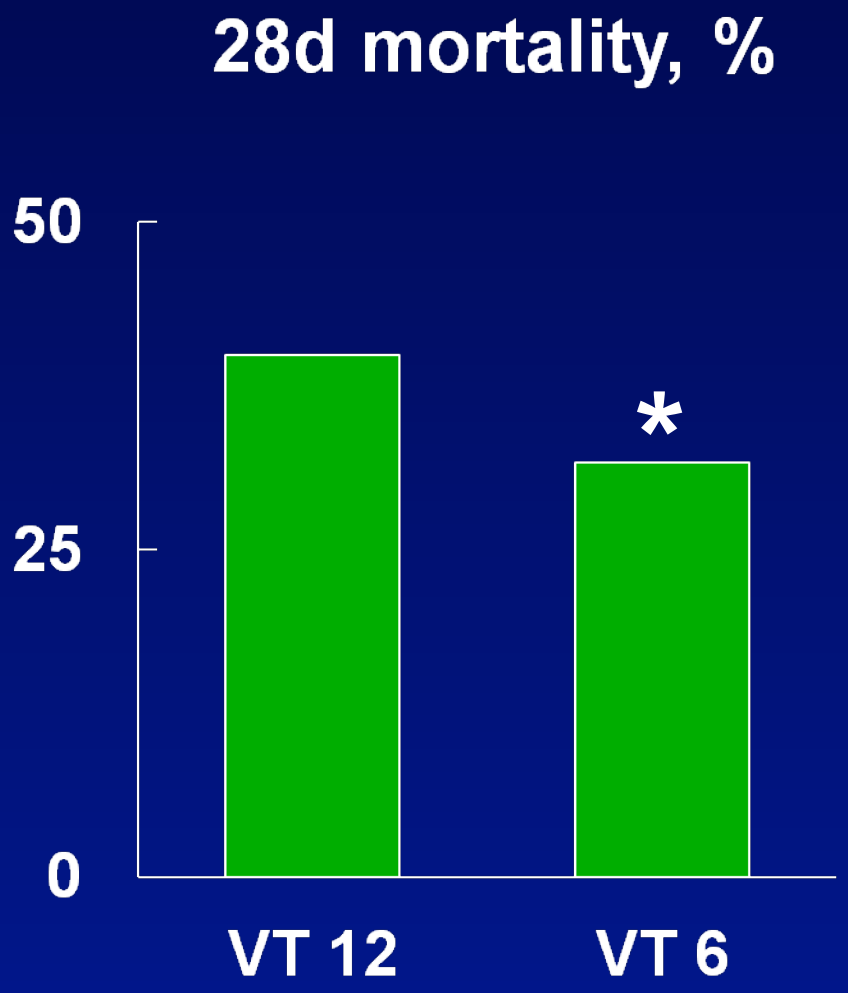
ARDS - protective ventilation

ARDSnet, NEJM 2000

- ALI or ARDS, n = 861

- conventional
  V_T 12 ml/kg
  normocapnia

- protective
  V_T 6 ml/kg, Pplat < 30
  permissive hypercapnia



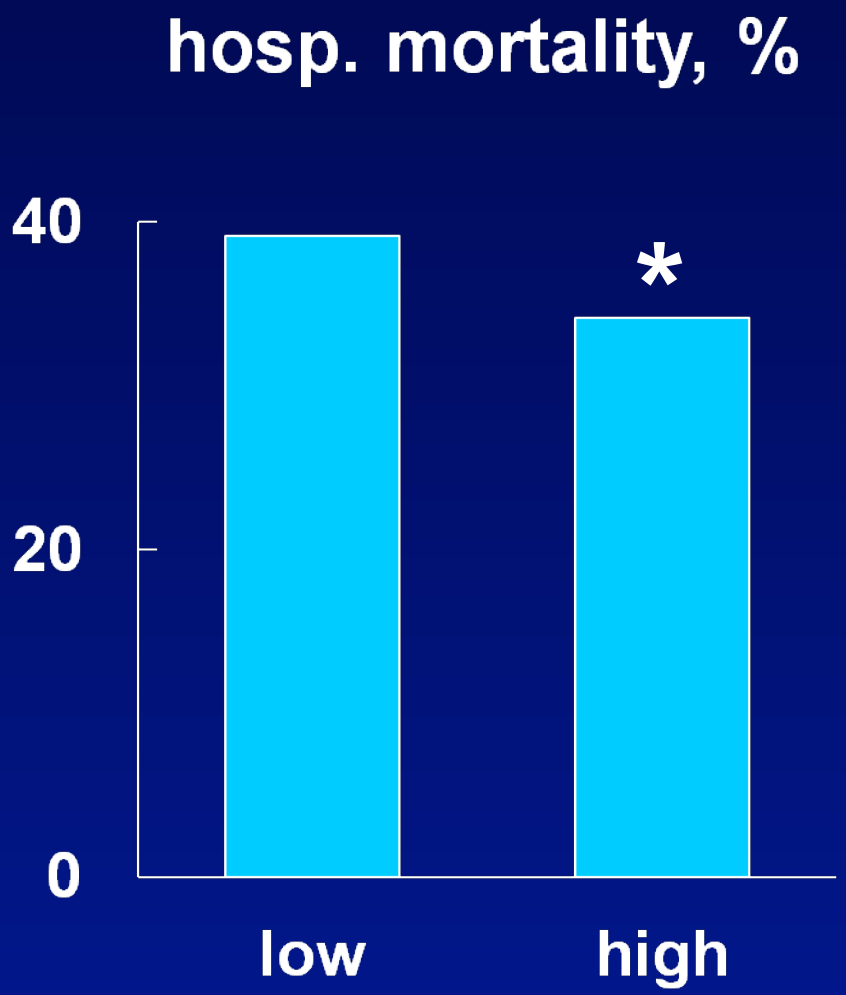
ARDS - high PEEP

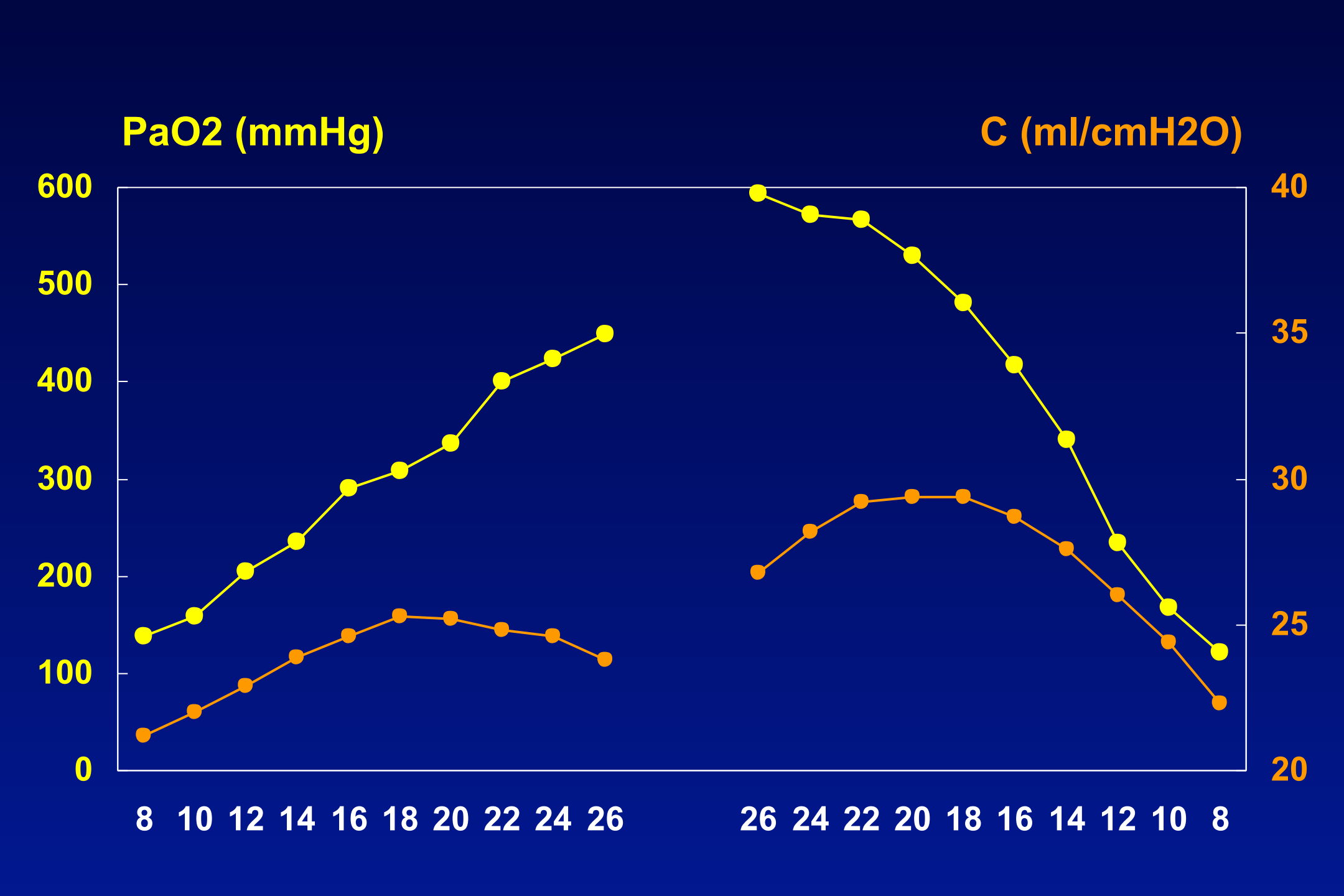
Briel, JAMA 2010

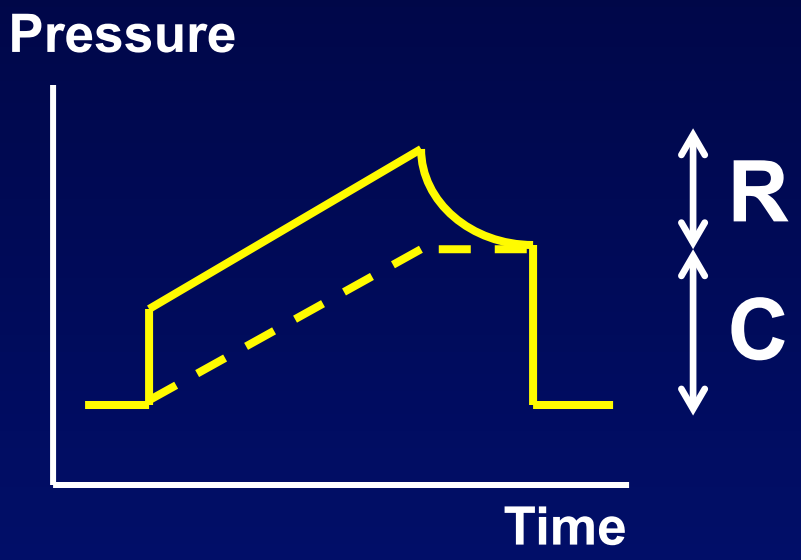
- Brower, NEJM 2004
  Meade, JAMA 2008
  Mercat, JAMA 2008

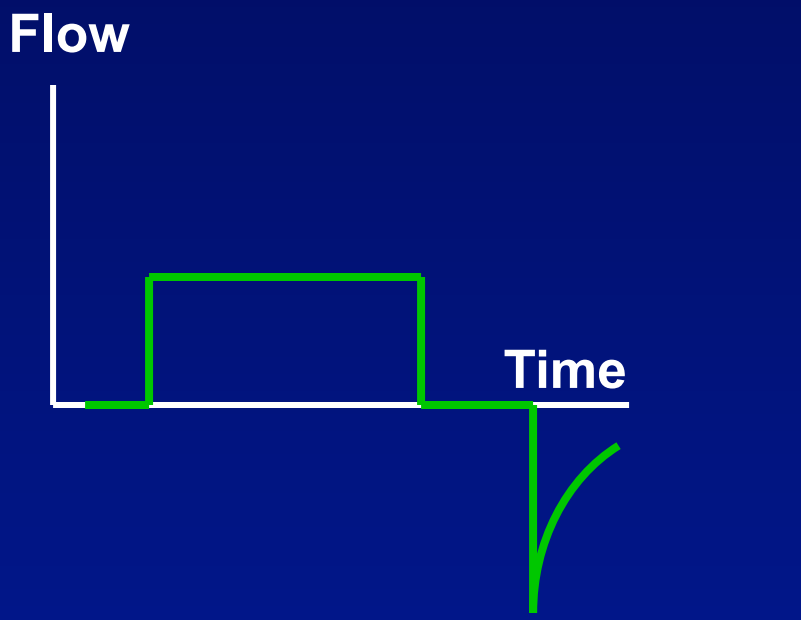
- ARDS, n = 1892

- PEEP 9 vs 15 (day 1)




PaO2 (mmHg)
C (ml/cmH2O)
600
500
400
300
200
100
0
40
35
30
25
20
8 10 12 14 16 18 20 22 24 26
26 24 22 20 18 16 14 12 10 8





Volume control

(patient passive / paralyzed)

Compliance (ml / cmH2O)

= VT / (Pplat - PEEP)

= 500 / (25 - 5) = 25

Resistance (cmH2O / LPS)

= (Ppeak - Pplat) / flow

= (35 - 25) / 0.5 = 20

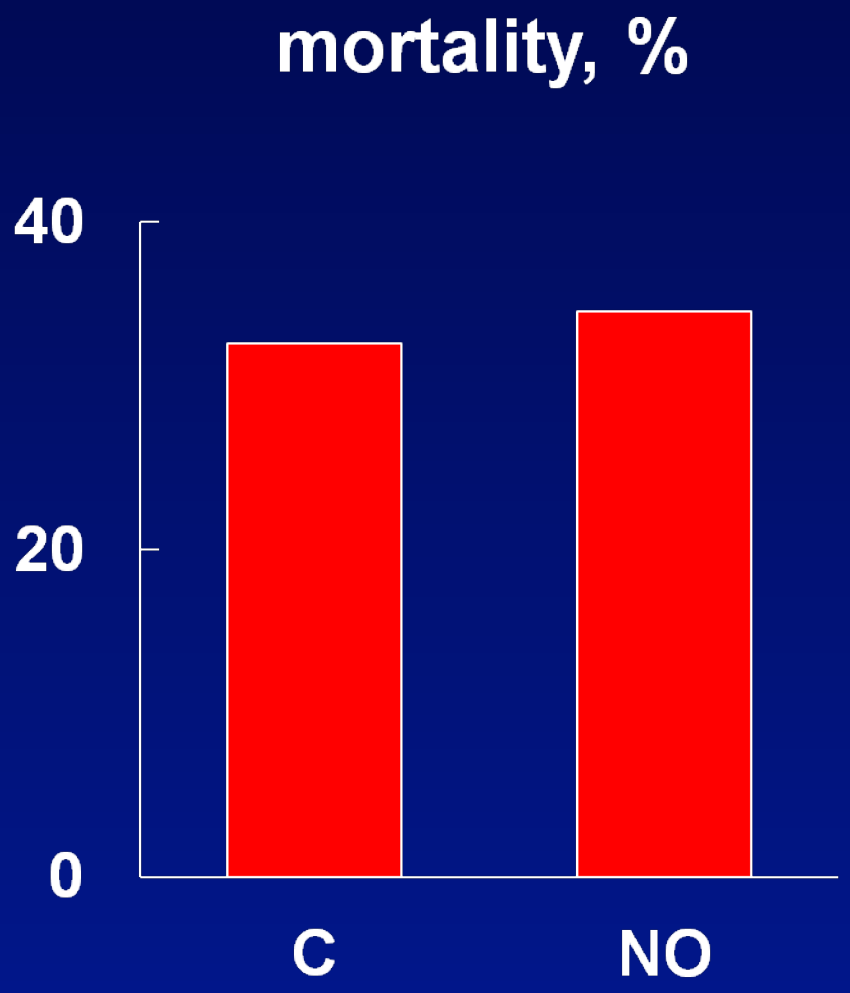
ARDS - inhaled NO

Adhikari, BMJ 2007

- Dellinger, CCM 1998
  Lundin, ICM 1999
  Payen, ICM 1999
  Taylor, JAMA 2004
  ...

- ALI or ARDS, n = 1086

- dose 5 - 80 ppm



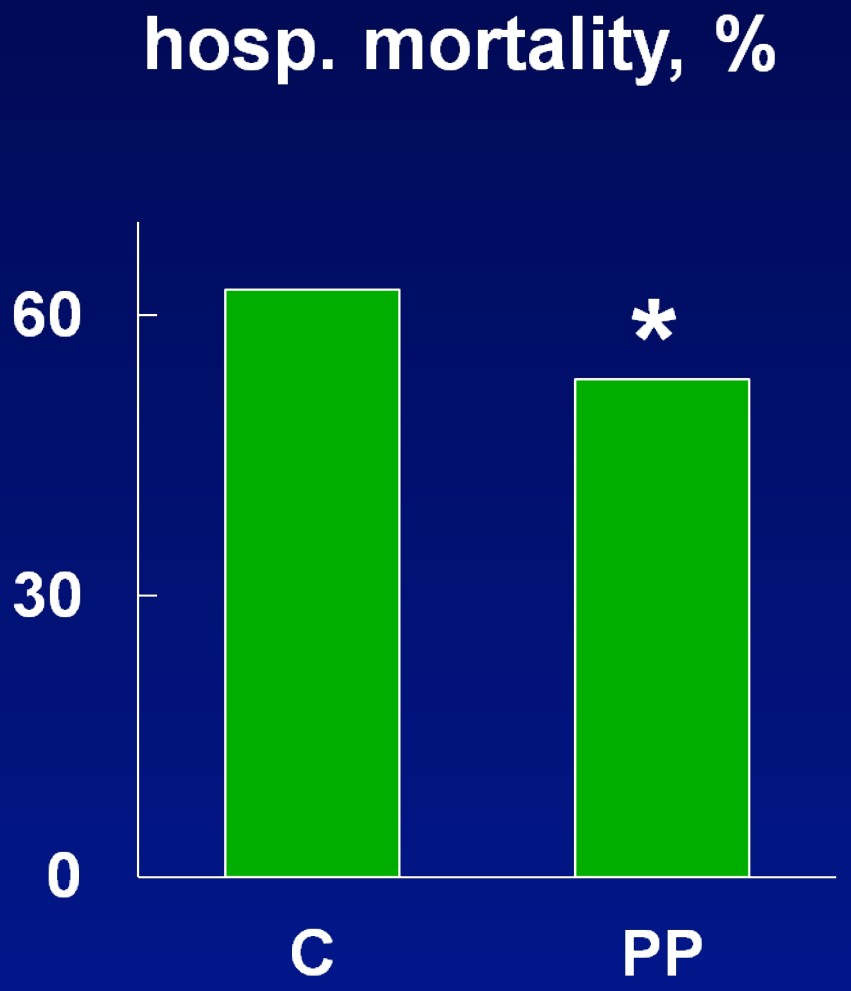
ARDS - prone position

Sud, ICM 2010

- Gattinoni, NEJM 2001
  Guérin, JAMA 2004
  Mancebo, AJRCCM 2006
  Taccone, JAMA 2009
  ...

- severe ARDS, n = 555

- duration 6-24 h / day




HEATHER
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L'INVITATION

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