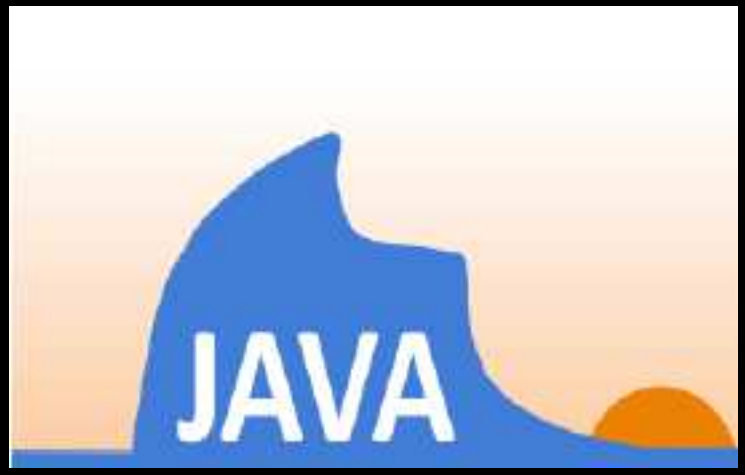


SDRA : Quelle(s) pression(s) ?

Alain Mercat

université angers

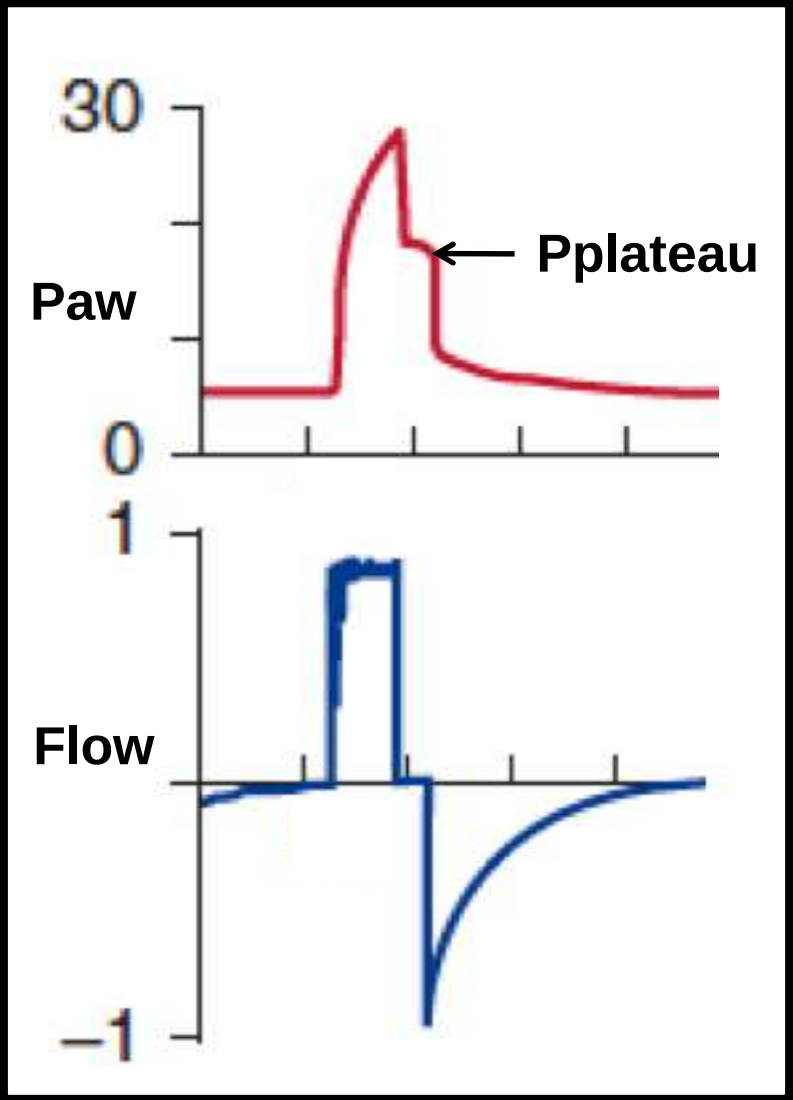
ReVa

CHU ANGERS
CENTRE HOSPITALIER UNIVERSITAIRE

Conflits d’intérêts

- Financement de travaux de recherche
  - Covidien (PAV+)
  - General Electric (CRF/SDRA)
  - Maquet (NAVA)
  - Fisher-Paykel (Optiflow)
- Brevet
  - General Electric (EELV/PEEP/recrutement)
- Exposés lors de congrès
  - Covidien
  - Alung technologies
- Activité d’expertise
  - Faron Pharmaceuticals
  - Air Liquide Medical Systems

Pression de plateau



Plat = (VT x E) + PEEPtot

Pplat = Maximal alveolar pressure

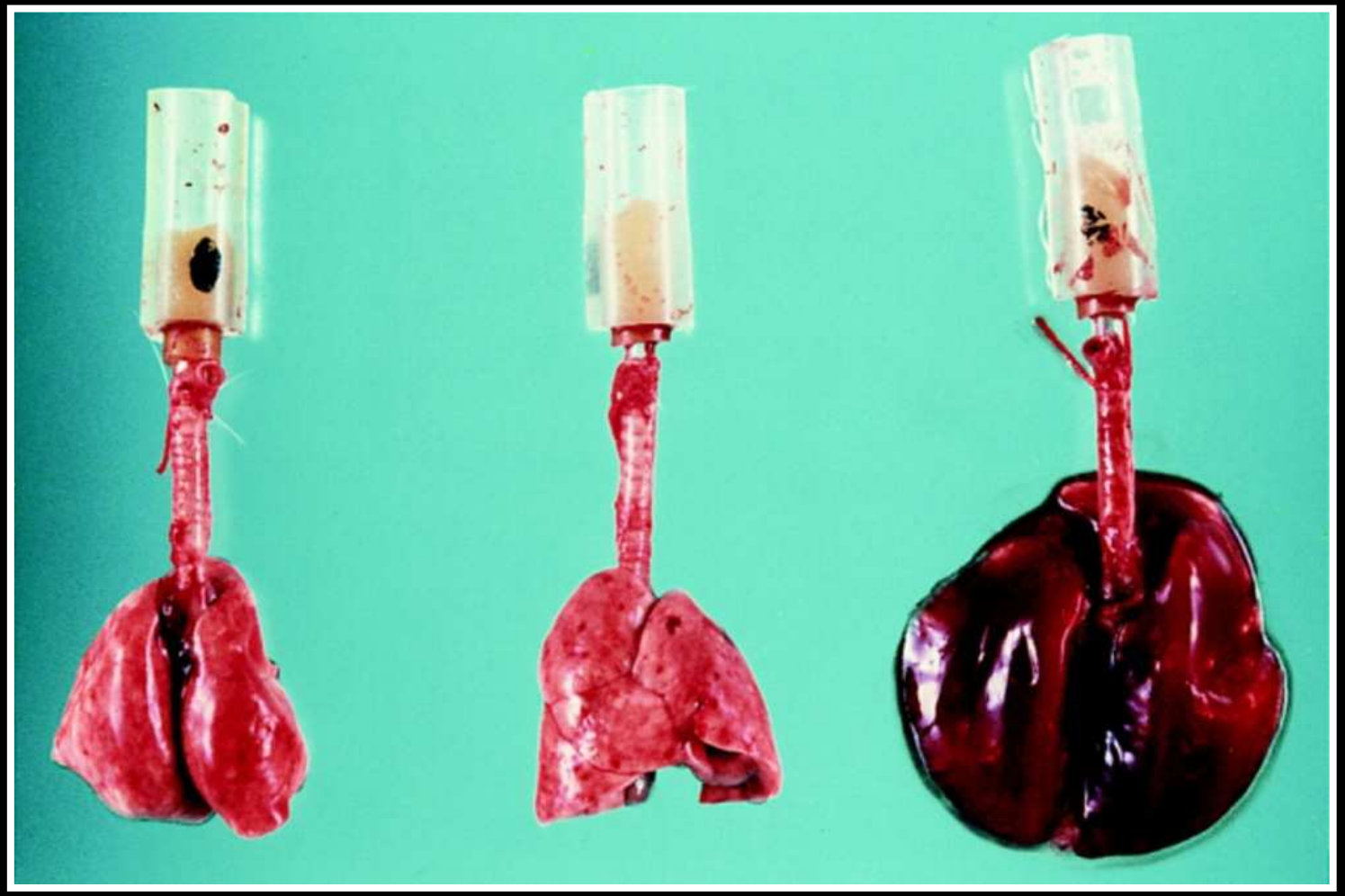
Pplat : safety limit : 30 – 32 cmH2O

Ers = (Pplat – PEEPtot) / VT

Crs = 1 / Ers

Crs = VT / (Pplat – PEEPtot)

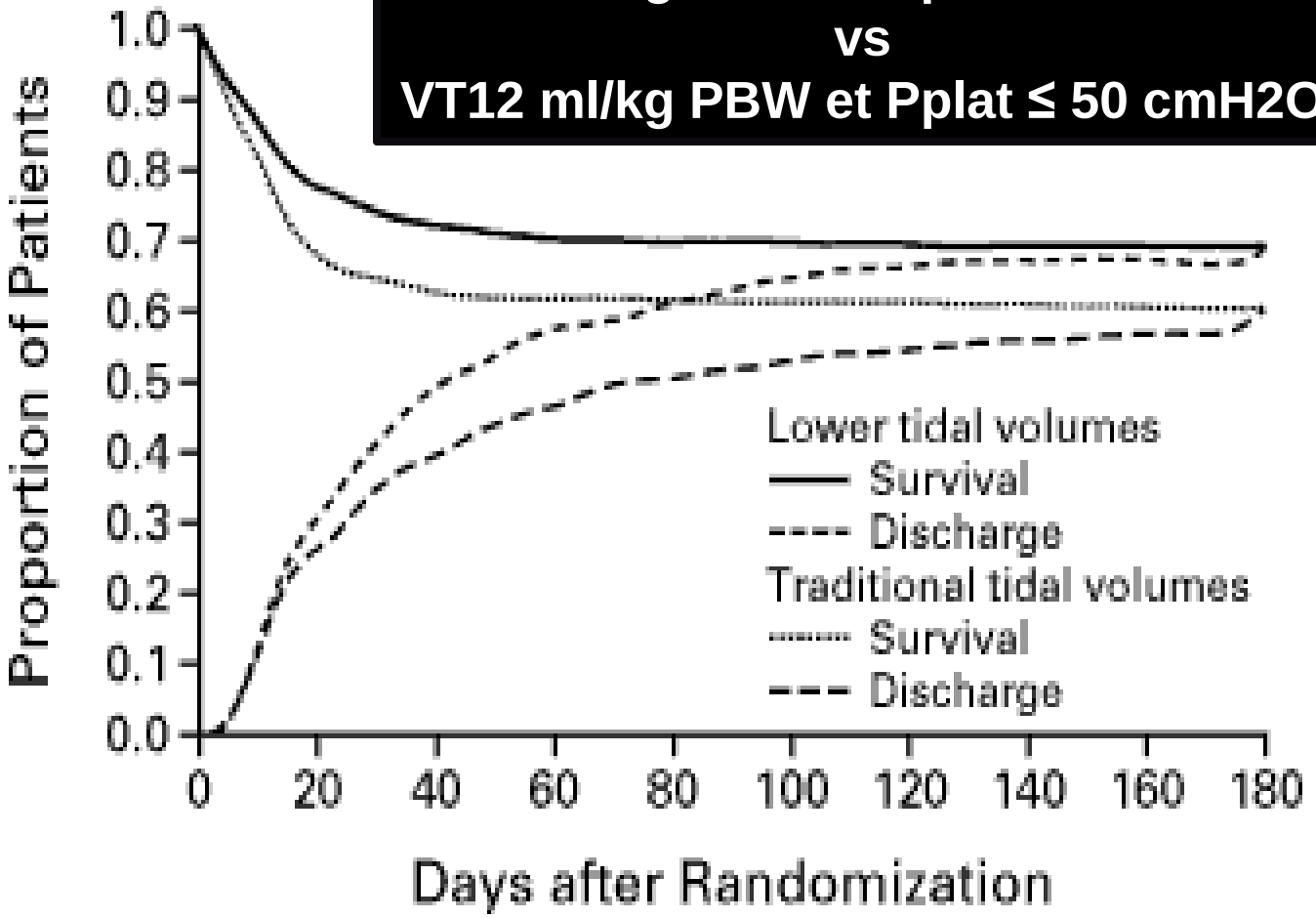
VILI : Volotrauma



Dreyfuss D, Saumon G. AJRCCM 1998

Essai « ARMA » (ARDS Network)

VT 6 ml/kg PBW et Pplat ≤ 30cmH2O
vs
VT12 ml/kg PBW et Pplat ≤ 50 cmH2O

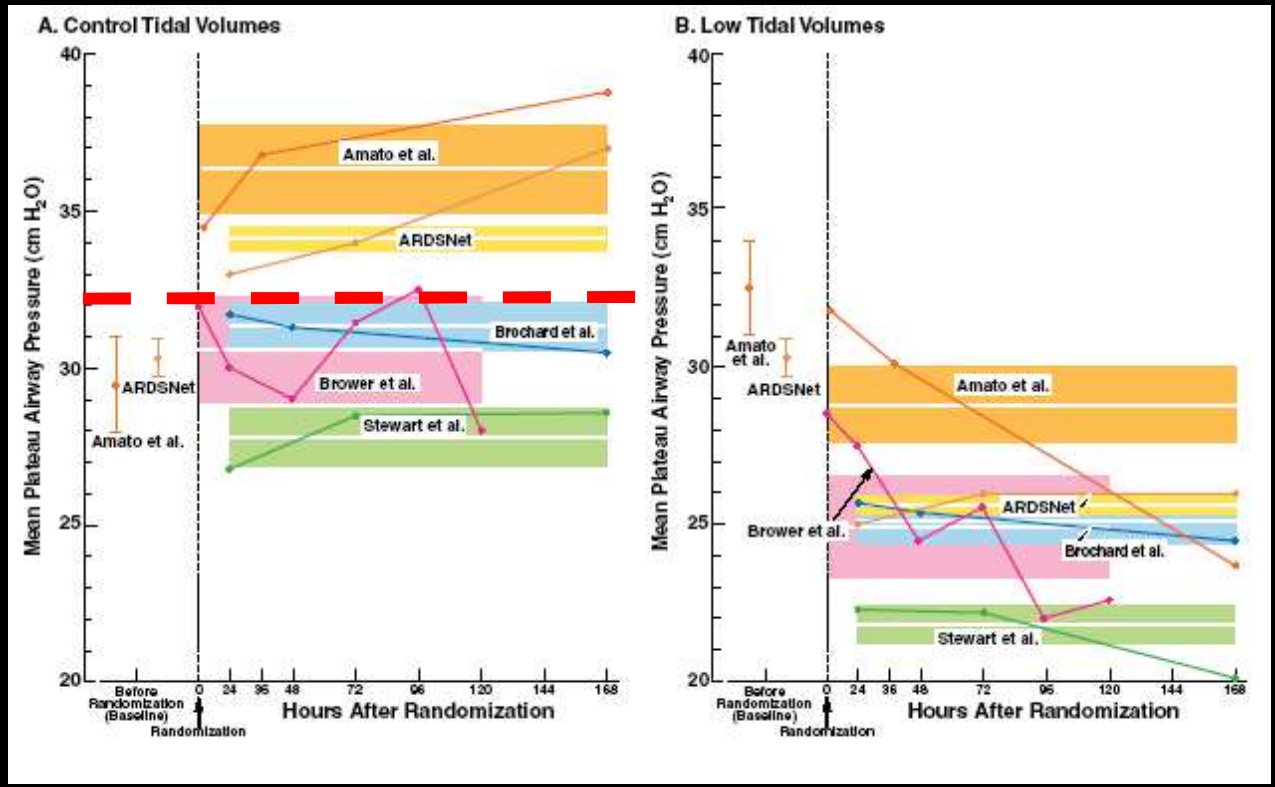


N Engl J Med 2000 ; 342:1301 - 8

ARMA : La controverse

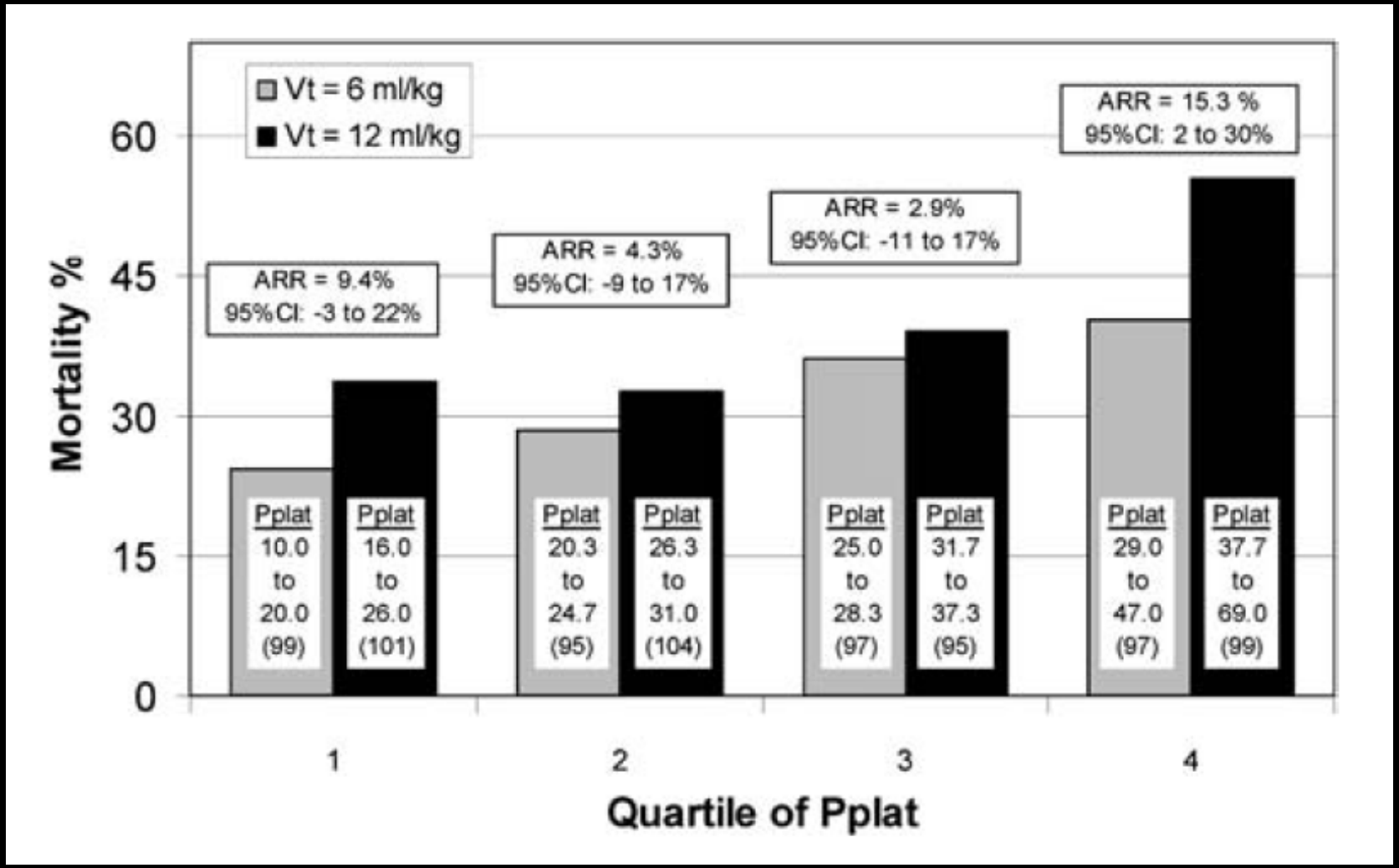
Meta-Analysis of Acute Lung Injury and Acute Respiratory Distress Syndrome Trials Testing Low Tidal Volumes

Peter Q. Eichacker, Eric P. Gerstenberger, Steven M. Banks, Xizhong Cui, and Charles Natanson



Eichacker et al AJRCCM 2002

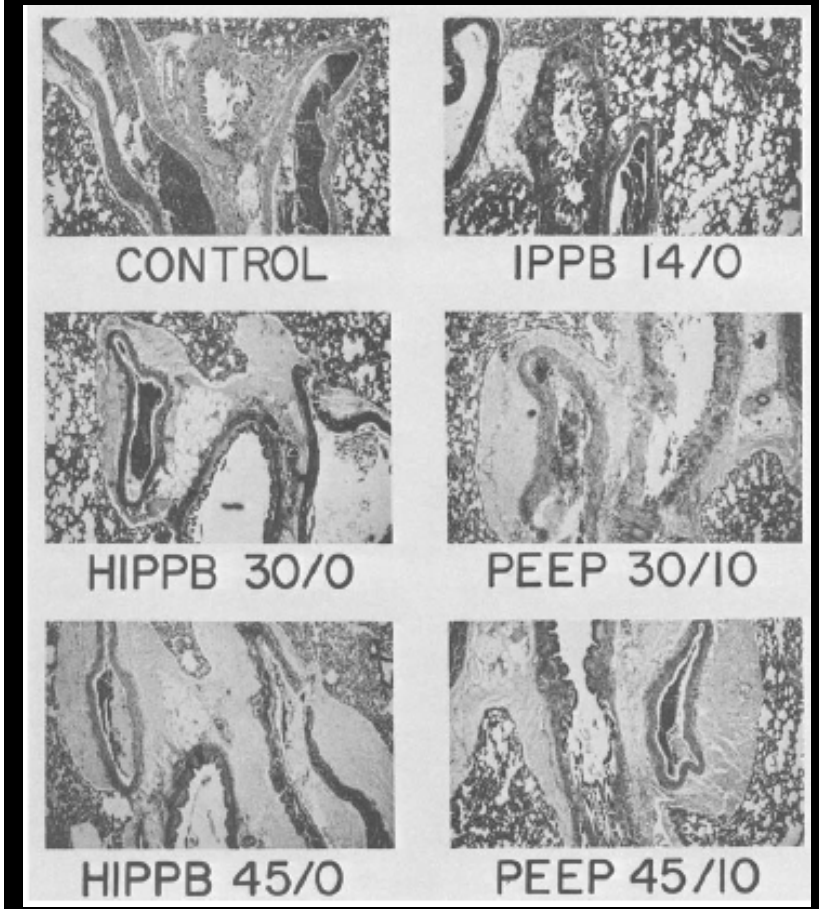
VT = 6 ml/kg for all ARDS

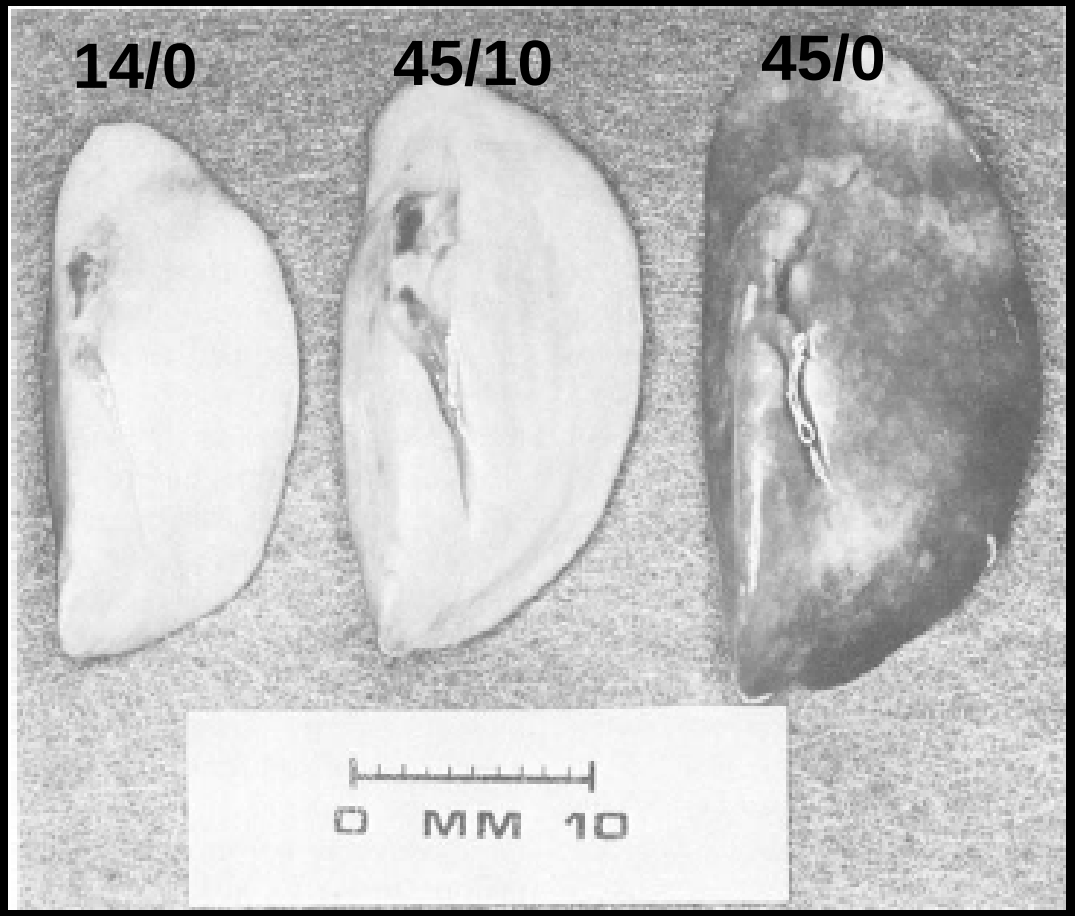


Am J Respir Crit Care Med Vol 172. pp 1241–1245, 2005

Experimental Pulmonary Edema due to Intermittent Positive Pressure Ventilation with High Inflation Pressures. Protection by Positive End-Expiratory Pressure[1-4]

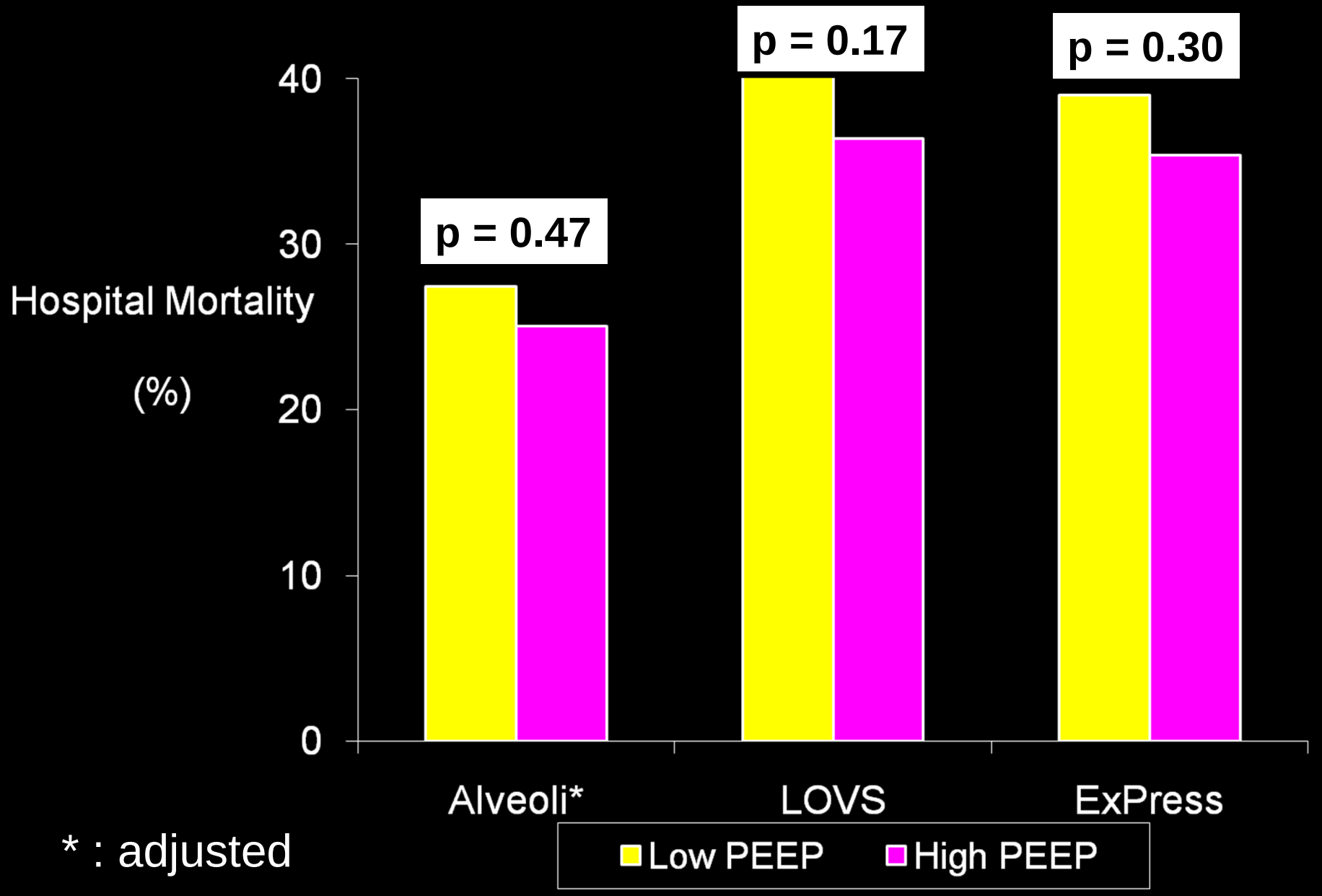
HERBERT H. WEBB and DONALD F. TIERNEY





AMERICAN REVIEW OF RESPIRATORY DISEASE, VOLUME 110, 1974

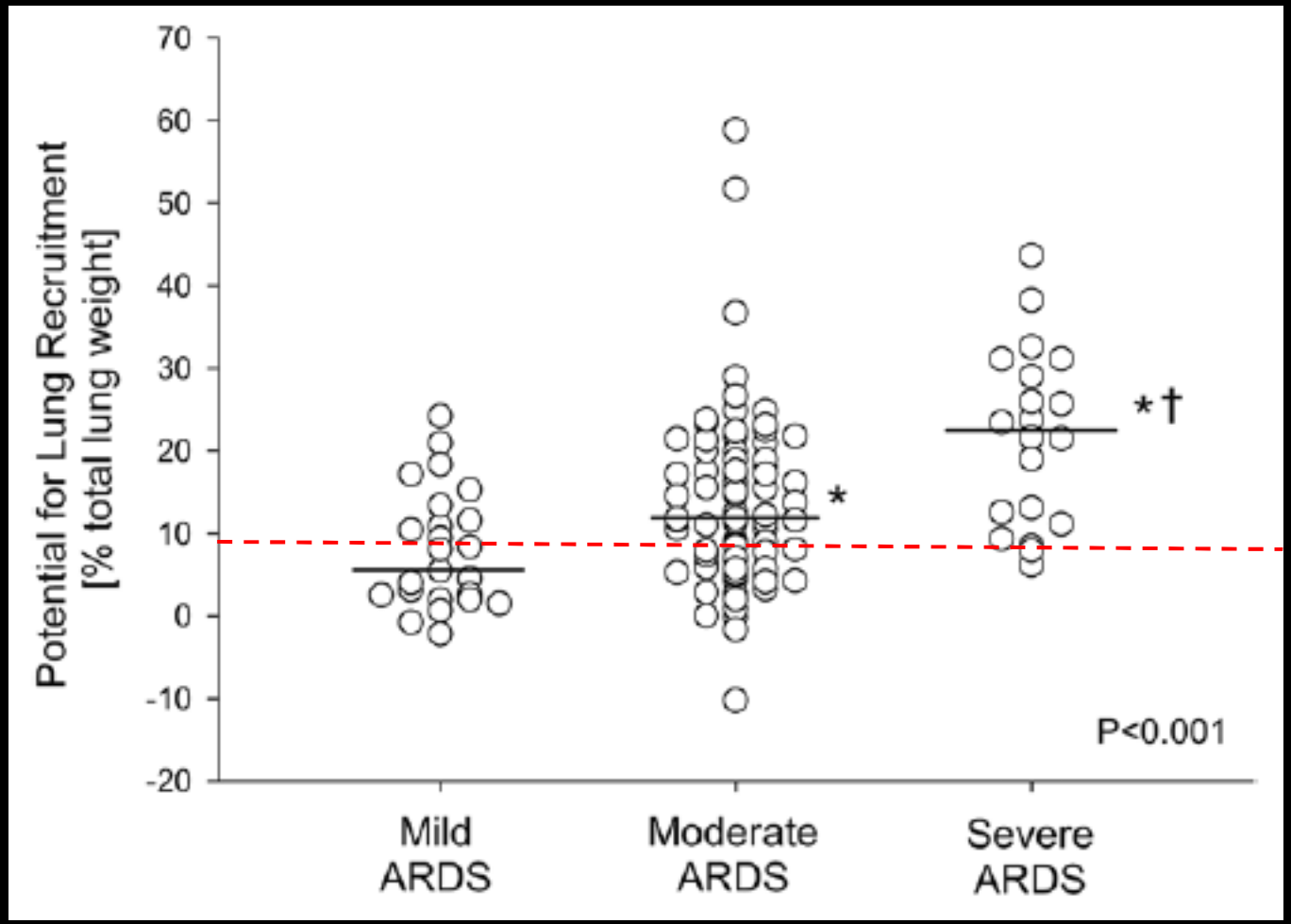
High PEEP protective ? → 3 RCT



* : adjusted

PaO2/FiO2 and recruitability

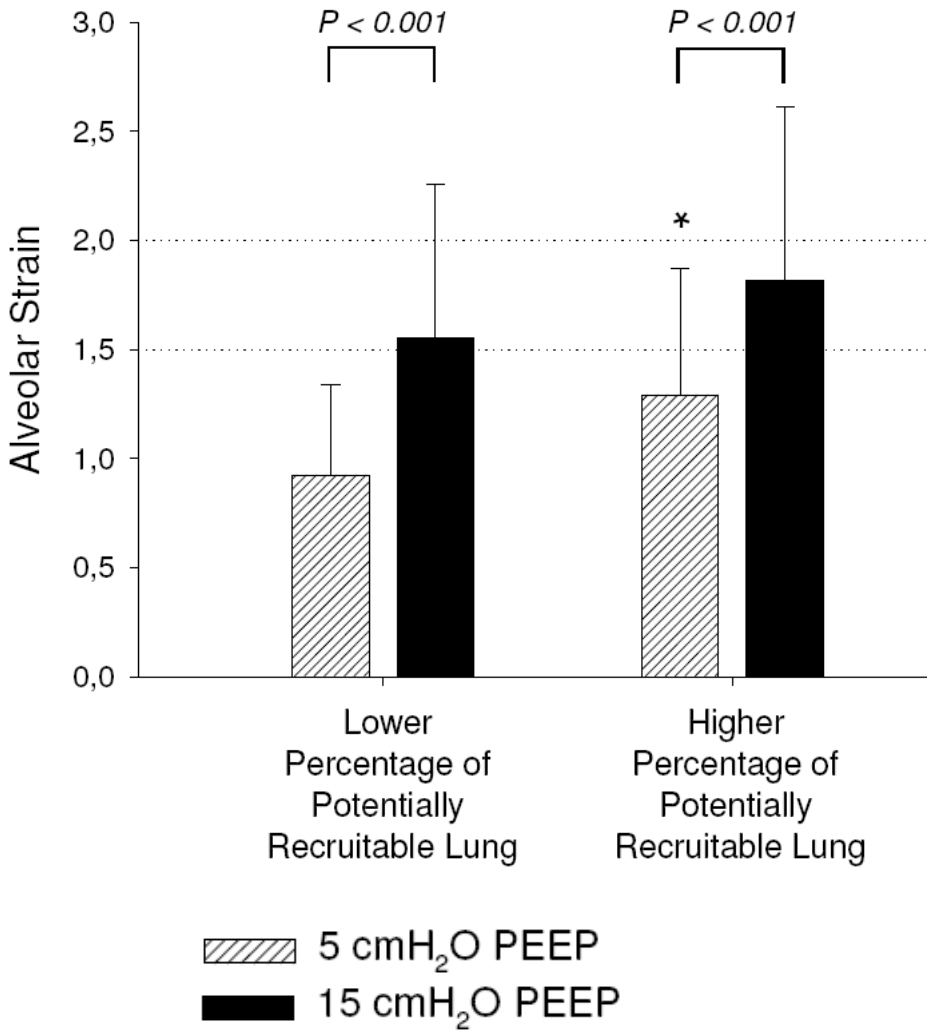
- 139 pts with mild or moderate or severe ARDS on PEEP 5



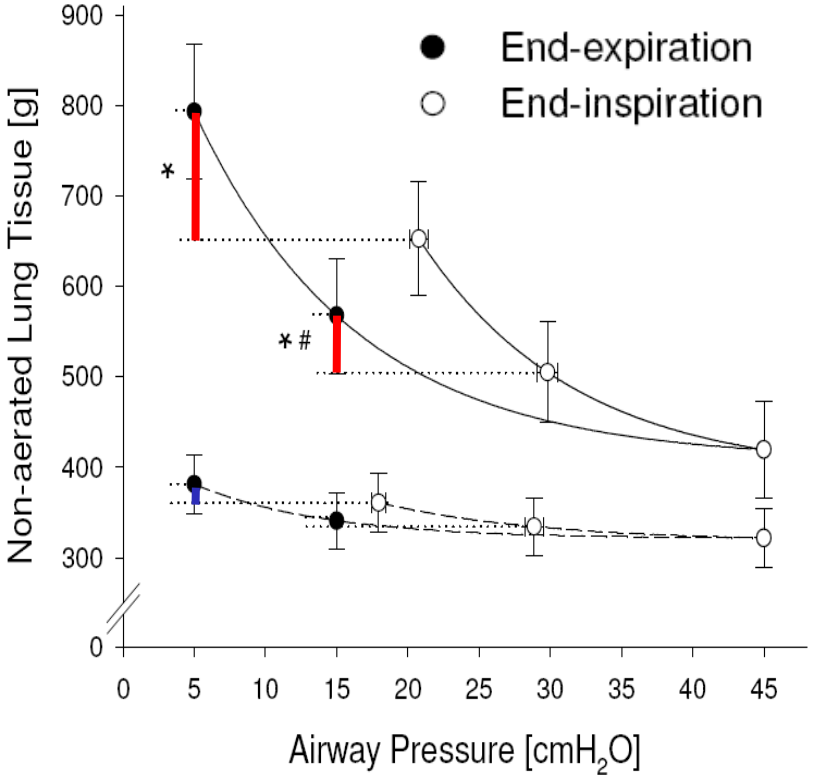
Caironi et al. Crit Care Med 2014

Lung Openning and Closing during Ventilation of ARDS

Strain



Recruitment



Caironi et al. AJRCCM 2010

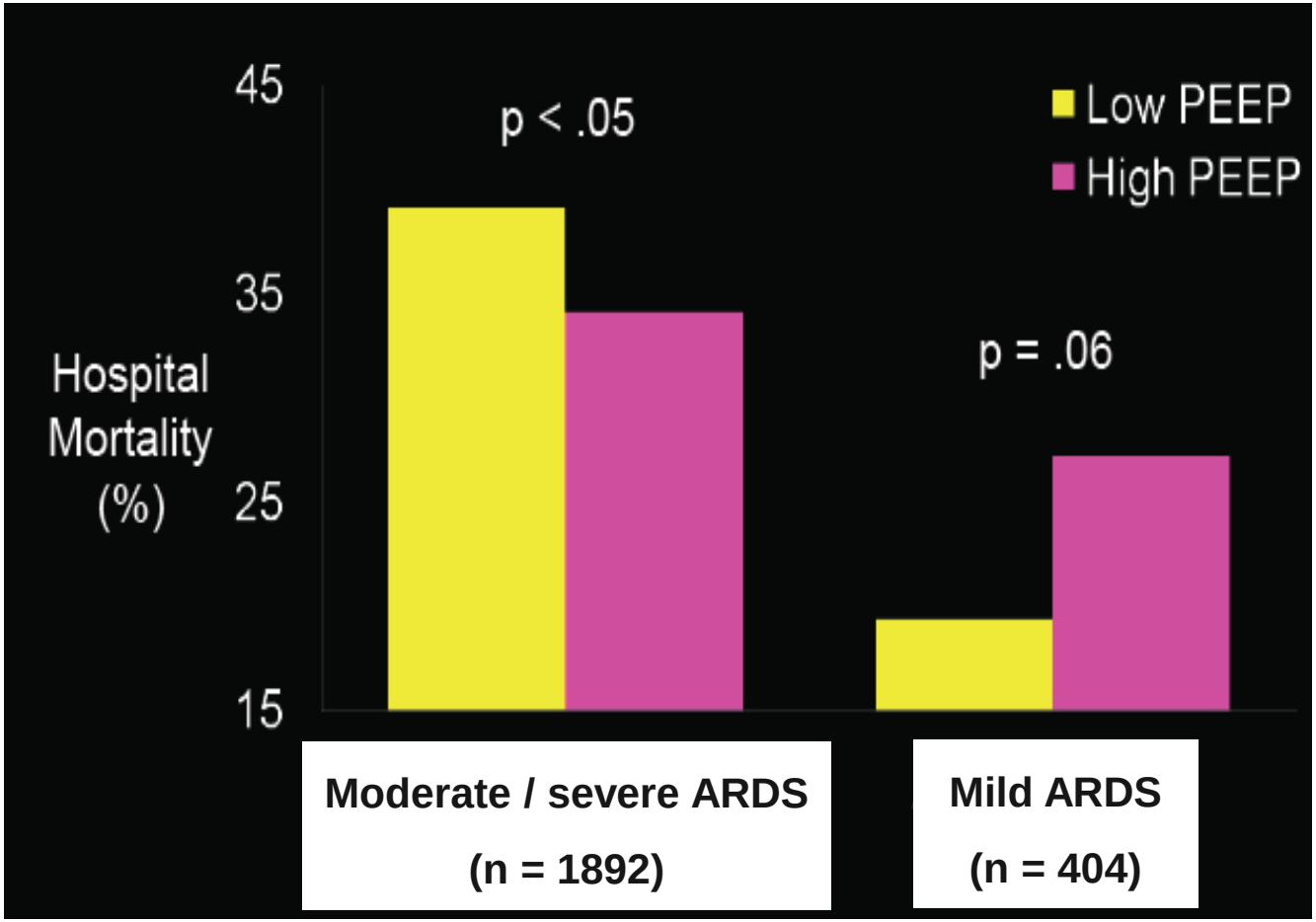
CARING FOR THE
CRITICALLY ILL PATIENT

JAMA®
Online article and related content
current as of March 3, 2010.

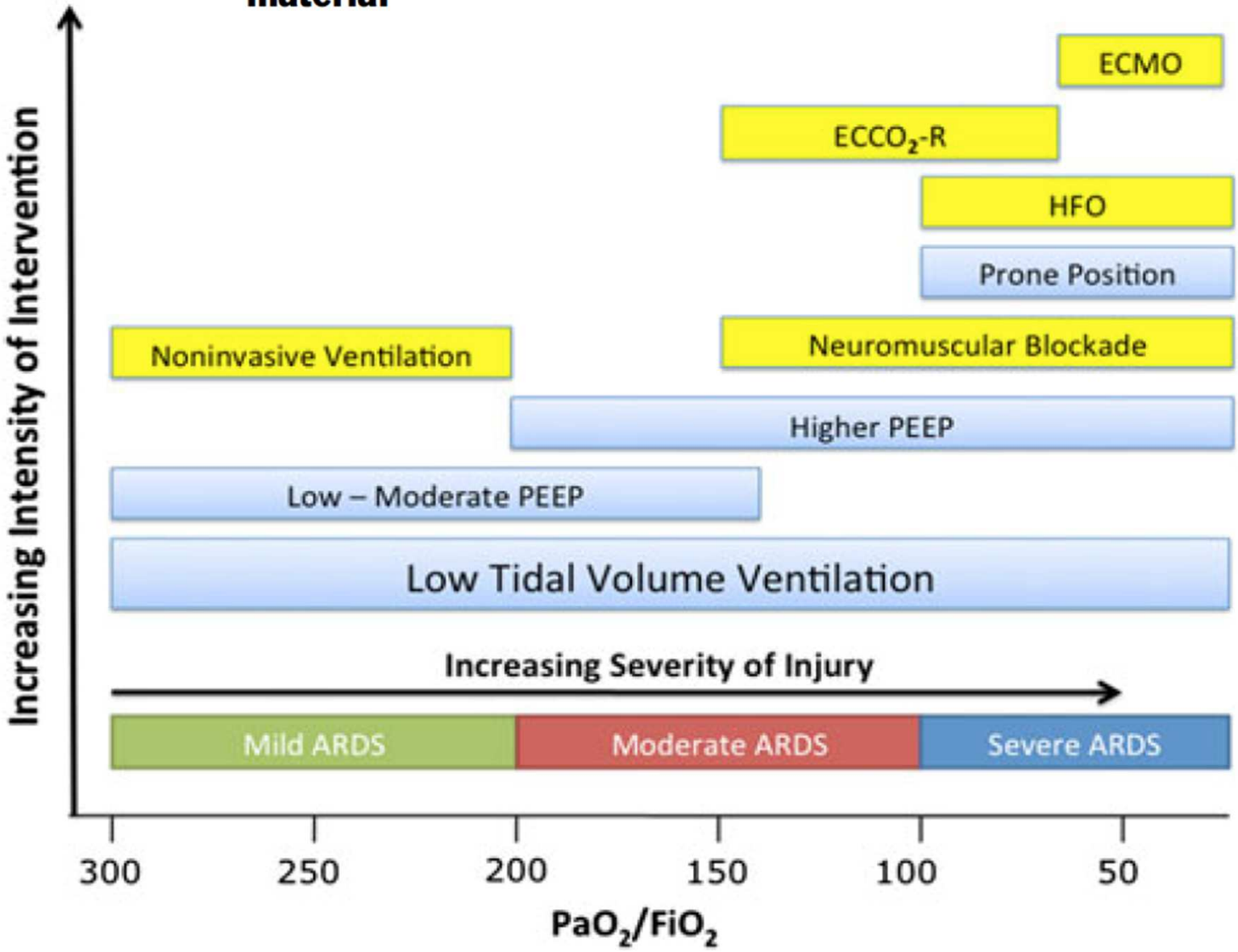
Higher vs Lower Positive End-Expiratory Pressure in Patients With Acute Lung Injury and Acute Respiratory Distress Syndrome

Systematic Review and Meta-analysis

Matthias Briel, MD, MSc
Maureen Meade, MD, MSc
Alain Mercat, MD
Roy G. Brower, MD
Daniel Talmor, MD, MPH
Stephen D. Walter, PhD
Arthur S. Slutsky, MD
Eleanor Pullenayegum, PhD
Qi Zhou, PhD
Deborah Cook, MD, MSc
Laurent Brochard, MD
Jean-Christophe M. Richard, MD
Francois Lamontagne, MD
Neera Bhatnagar, MLIS
Thomas E. Stewart, MD
Gordon Guyatt, MD, MSc



The Berlin definition of ARDS: an expanded rationale, justification, and supplementary material

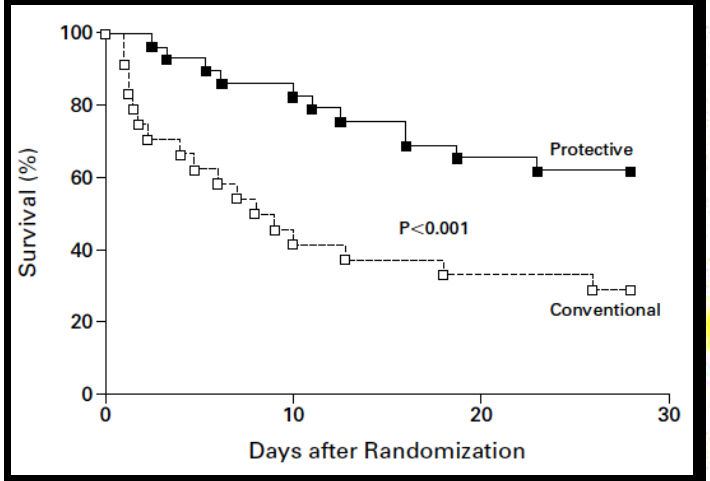


Intensive Care Med (2012) 38:1573–1582

ΔP = Pplateau - PEEP

EFFECT OF A PROTECTIVE-VENTILATION STRATEGY ON MORTALITY IN THE ACUTE RESPIRATORY DISTRESS SYNDROME

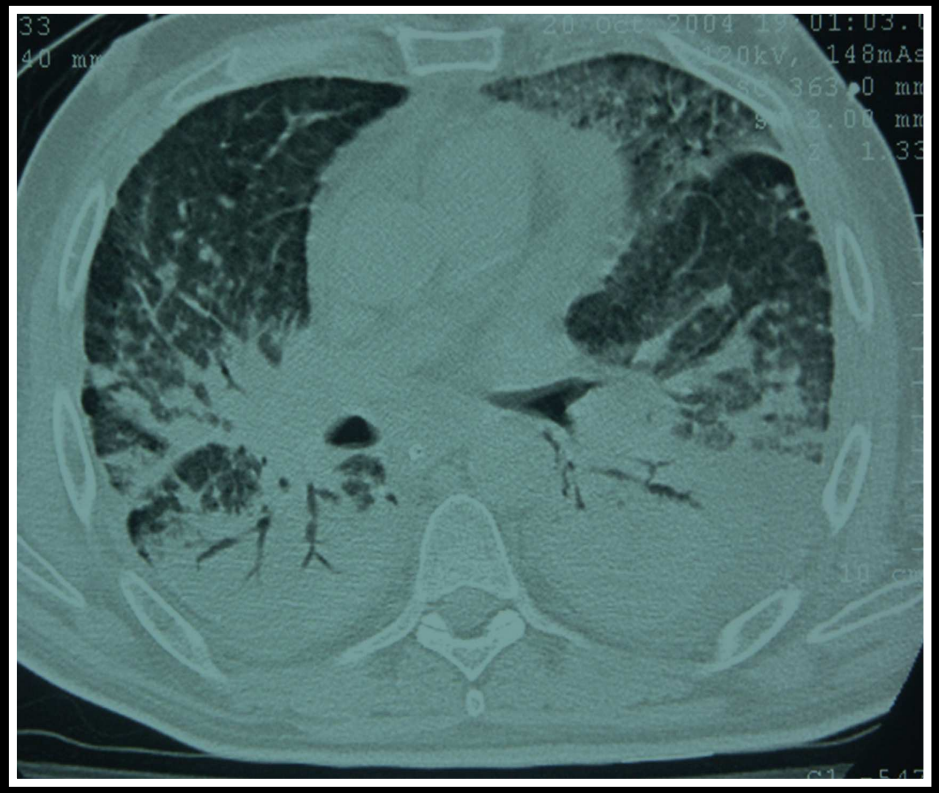
MARCELO BRITTO PASSOS AMATO, M.D., CARMEN SILVIA VALENTE BARBAS, M.D., DENISE MACHADO MEDEIROS, M.D., RICARDO BORGES MAGALDI, M.D., GUILHERME DE PAULA PINTO SCHETTINO, M.D., GERALDO LORENZI-FILHO, M.D., RONALDO ADIB KAIRALLA, M.D., DANIEL DEHEINZELIN, M.D., CARLOS MUNOZ, M.D., ROSELAINE OLIVEIRA, M.D., TERESA YAE TAKAGAKI, M.D., AND CARLOS ROBERTO RIBEIRO CARVALHO, M.D.

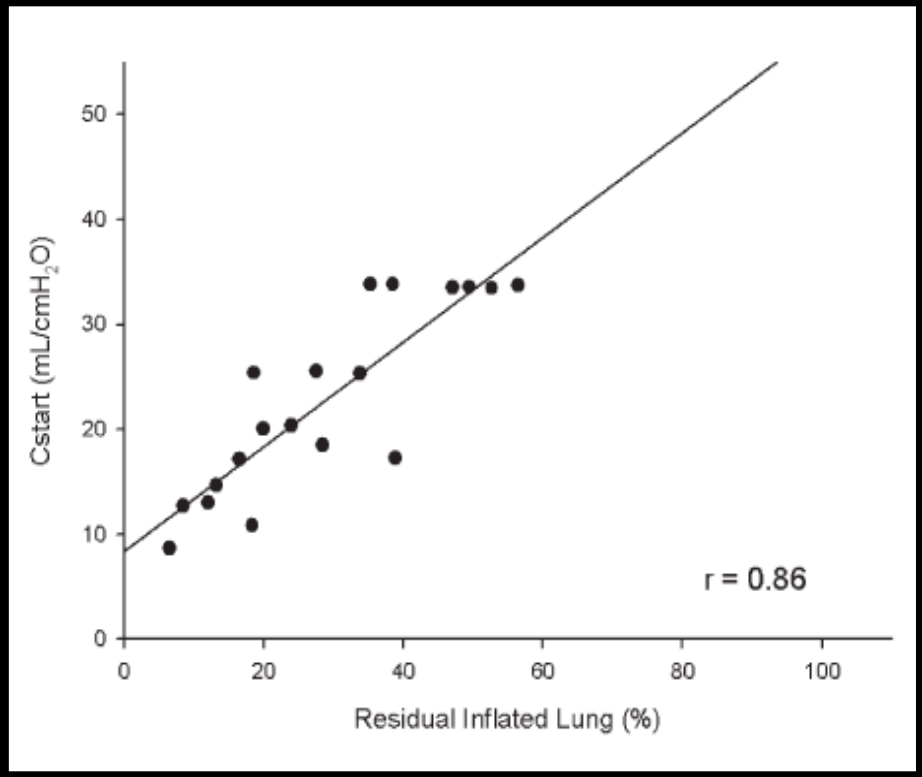


mortality at 28 days (data not shown). When the treatment assignment was removed from the Cox mortality model, there were three significant prognostic factors: the APACHE II score, the mean PEEP used during the first 36 hours (with a protective effect indicated by a coefficient of −0.15), and the driving pressures (P_{PLAT}−PEEP) during the first 36 hours (with a deleterious effect of high driving pressures indicated by a coefficient of 0.06). All other respiratory variables were of secondary importance.

N Engl J Med 1998;338:347-54.

ARDS : “baby lung”





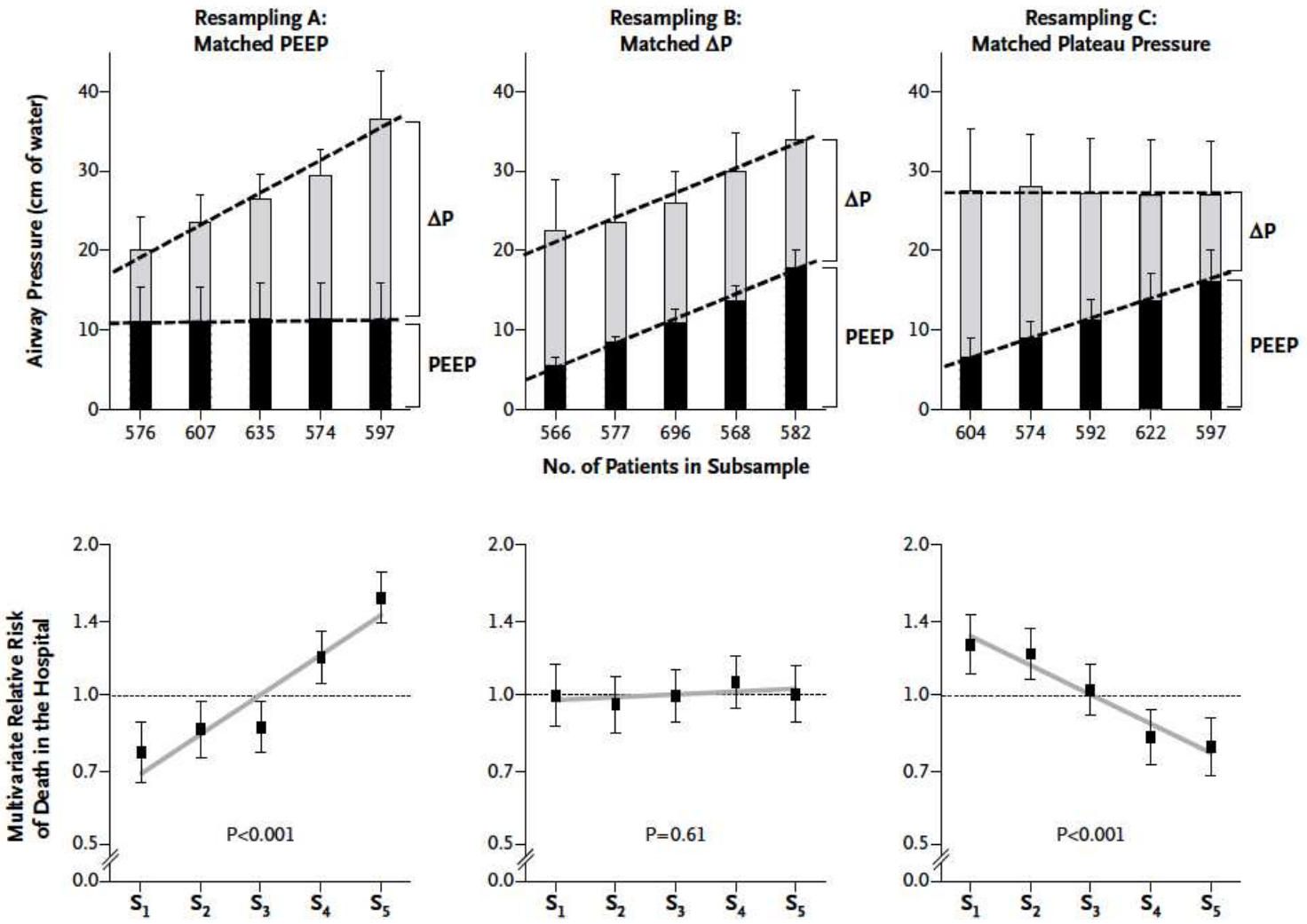
- Low compliance in ARDS : small lung not stiff lung

Gattinoni L and Pesenti A. The concept of « baby lung » ICM 2005

Pression motrice (ΔP) et Stress dynamique

- $C_{rs} = k \times CRF$
- $C_{rs} = VT / \Delta P$
- $\Delta P = VT / C_{rs}$
- $\Delta P \approx VT / k\ CRF$
- $\Delta P \approx$ Stress dynamique / k

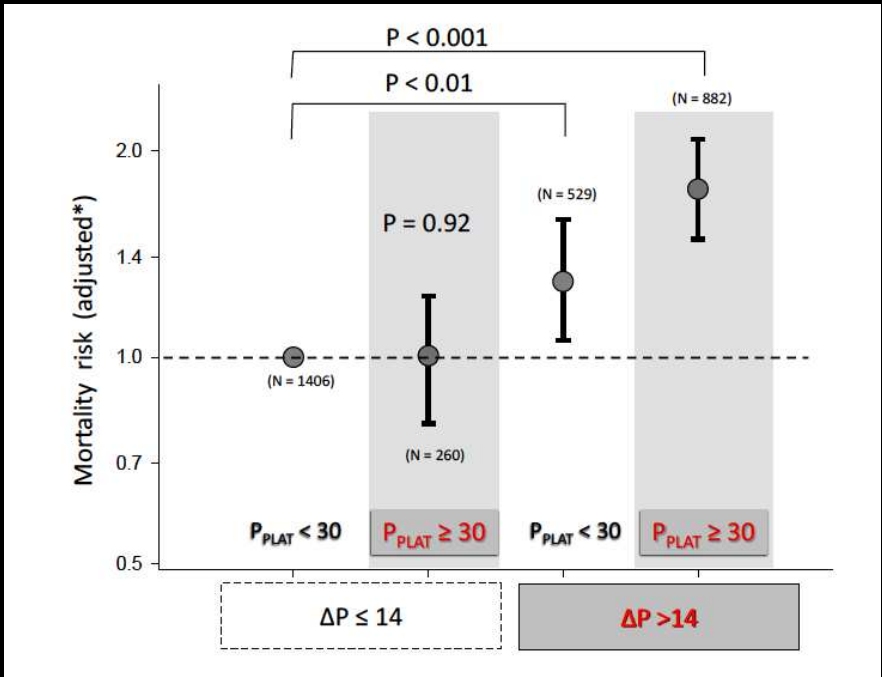
Pression motrice et stress dynamique

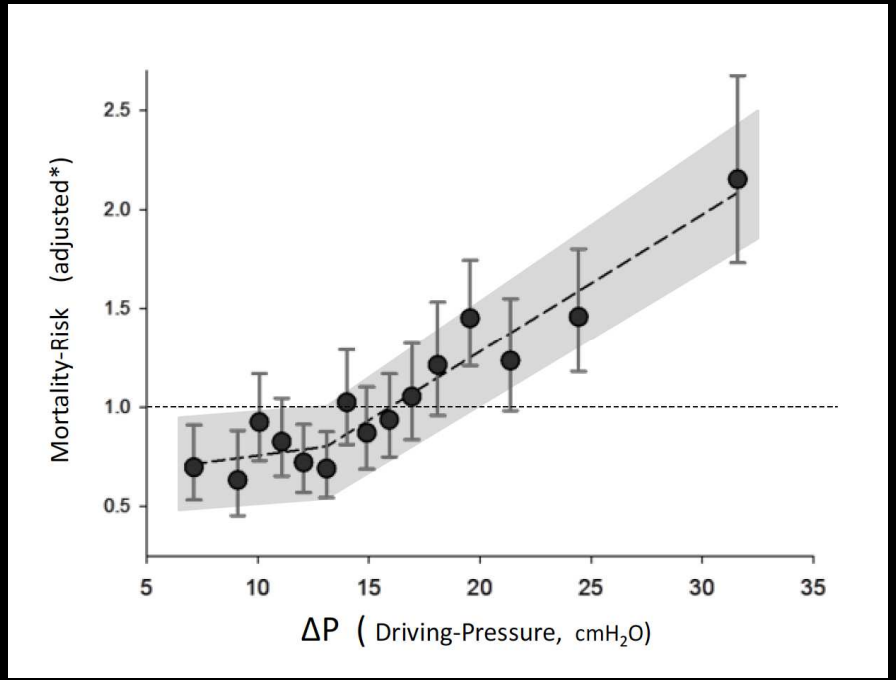


Amato et al. NEJM 2015

Driving Pressure and Survival in the Acute Respiratory Distress Syndrome

Marcelo B.P. Amato, M.D., Maureen O. Meade, M.D., Arthur S. Slutsky, M.D., Laurent Brochard, M.D., Eduardo L.V. Costa, M.D., David A. Schoenfeld, Ph.D., Thomas E. Stewart, M.D., Matthias Briel, M.D., Daniel Talmor, M.D., M.P.H., Alain Mercat, M.D., Jean-Christophe M. Richard, M.D., Carlos R.R. Carvalho, M.D., and Roy G. Brower, M.D.

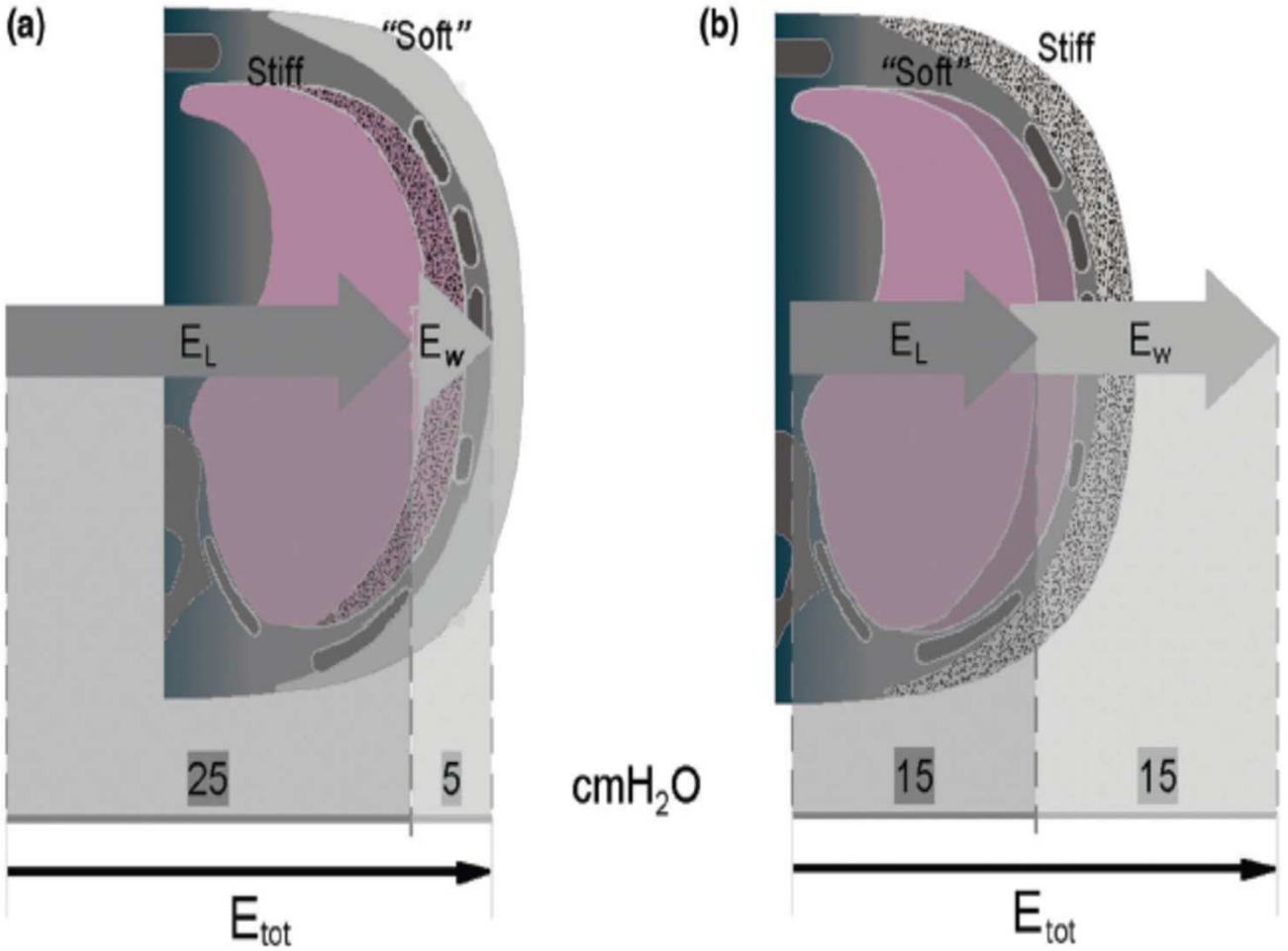




NEJM 2015

Respiratory system vs Lung

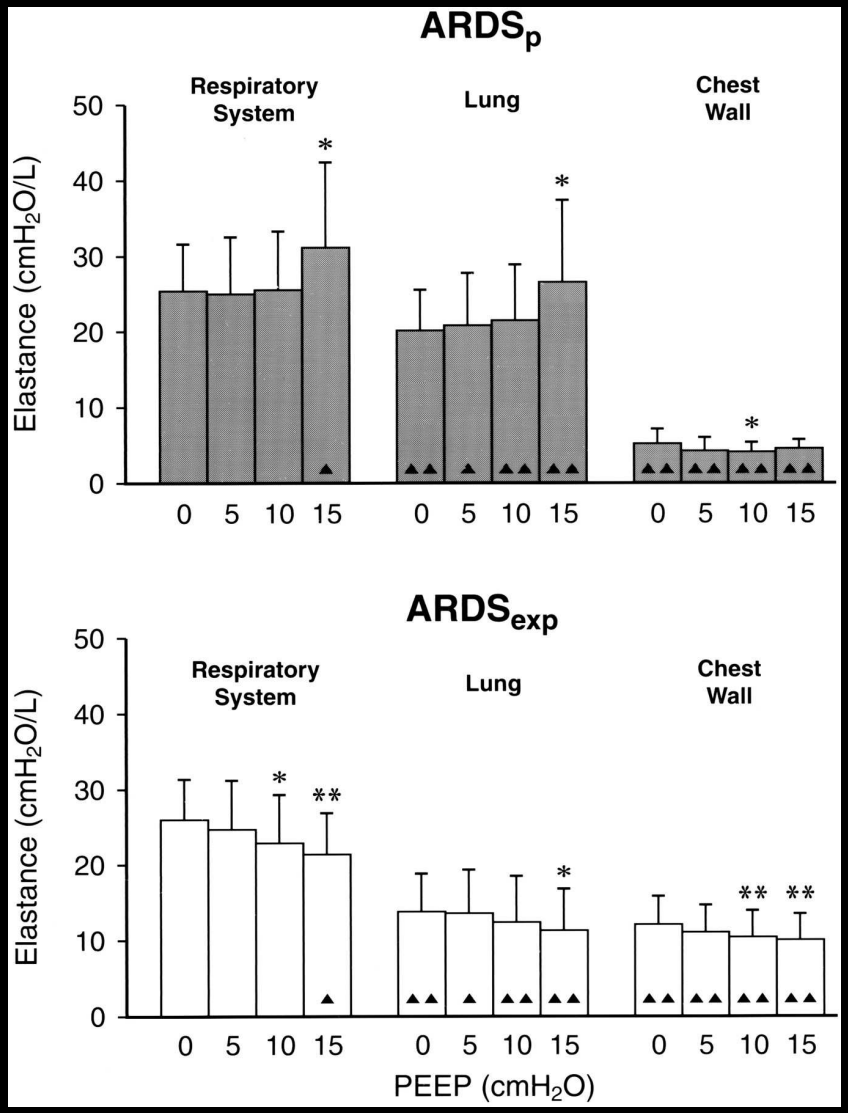
$$P_{RS} = P_L + P_{CW}$$

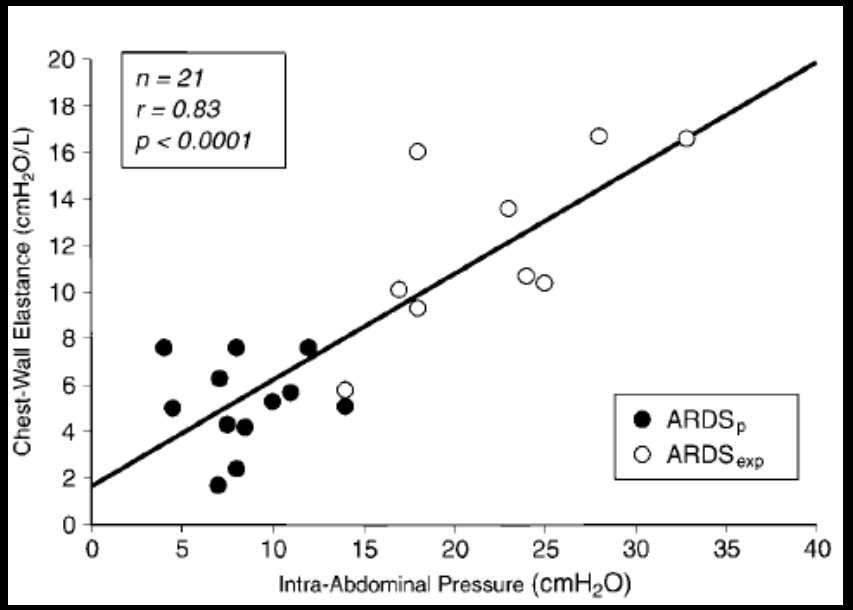


Acute Respiratory Distress Syndrome Caused by Pulmonary and Extrapulmonary Disease

Different Syndromes?

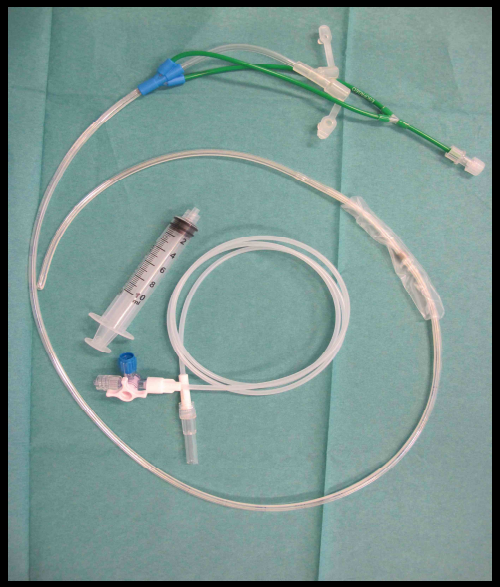
LUCIANO GATTINONI, PAOLO PELOSI, PETER M. SUTER, ALESSIA PEDOTO, PAOLA VERCESI, and ALFREDO LISSONI

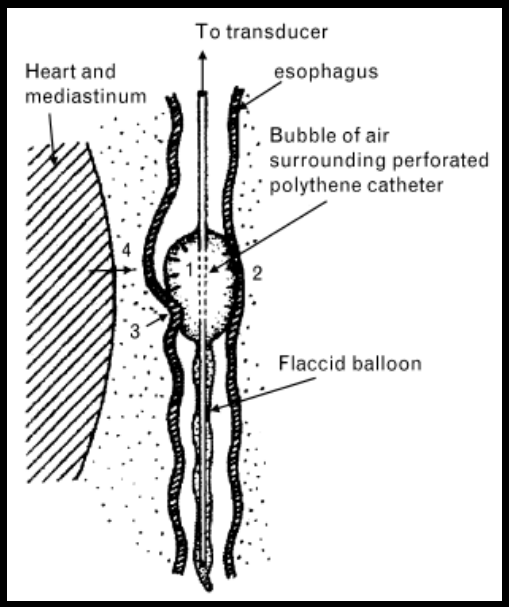


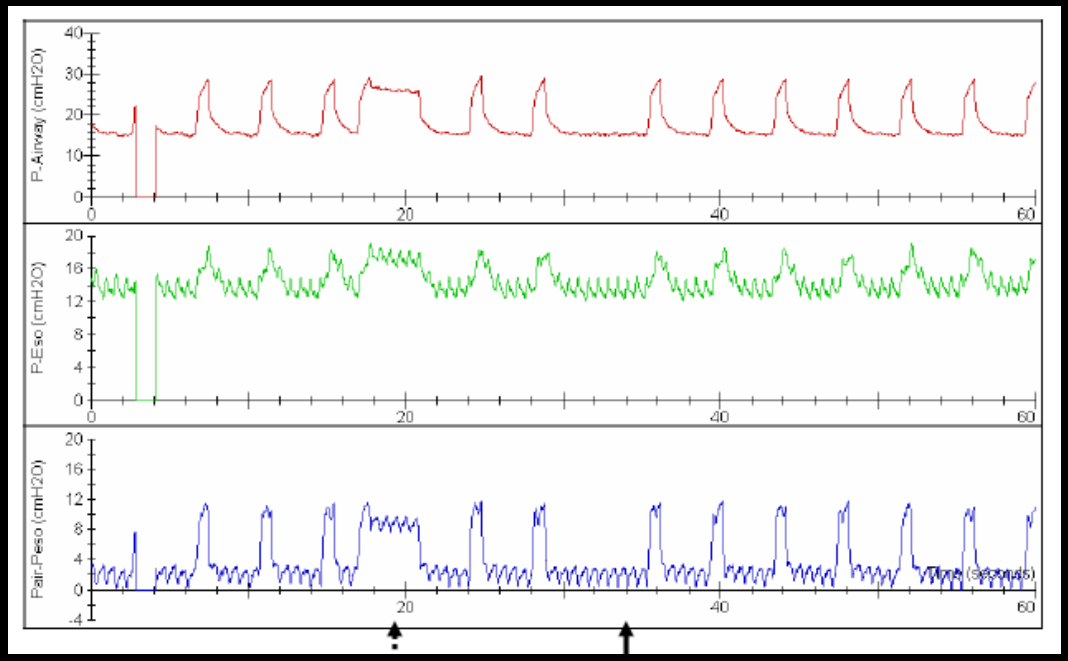


AM J RESPIR CRIT CARE MED 1998;158:3–11.

SDRA : mesure pression oesophagienne ?







Pression oesophagienne et titration de la PEEP

- Pression transpulmonaire télé-expiratoire

  A partir de la valeur absolue (corrigée) de Poeso

Mechanical Ventilation Guided by Esophageal Pressure in Acute Lung Injury

Daniel Talmor, M.D., M.P.H., Todd Sarge, M.D., Atul Malhotra, M.D., Carl R. O'Donnell, Sc.D., M.P.H., Ray Ritz, R.R.T., Alan Lisbon, M.D., Victor Novack, M.D., Ph.D., and Stephen H. Loring, M.D.

N Engl J Med 2008;359:2095-104.

- Pression transpulmonaire télé-inspiratoire

  A partir d'une P_L calculée : $P_L = P_{aw} \times (E_L/E_{RS})$

ECMO criteria for influenza A (H1N1)-associated ARDS: role of transpulmonary pressure

Intensive Care Med (2012) 38:395–403

The Application of Esophageal Pressure Measurement in Patients with Respiratory Failure

Evangelia Akoumianaki[1], Salvatore M. Maggiore[2], Franco Valenza[3], Giacomo Bellani[4], Amal Jubran[5], Stephen H. Loring[6], Paolo Pelosi[7], Daniel Talmor[6], Salvatore Grasso[8], Davide Chiumello[9], Claude Guérin[10], Nicolo Patroniti[4], V. Marco Ranieri[11], Luciano Gattinoni[12], Stefano Nava[13], Pietro-Paolo Terragni[11], Antonio Pesenti[4], Martin Tobin[5], Jordi Mancebo[14], and Laurent Brochard[15]

American Journal of Respiratory and Critical Care Medicine Volume 189 Number 5 | March 1 2014

REVIEW

Esophageal and transpulmonary pressure in the clinical setting: meaning, usefulness and perspectives

Tommaso Mauri[1], Takeshi Yoshida[2,3,4], Giacomo Bellani[5], Ewan C. Goligher[6,7,12], Guillaume Carteaux[8,9], Nuttapol Rittayamai[10,11,12], Francesco Mojoli[13], Davide Chiumello[1,14], Lise Piquilloud[15,16], Salvatore Grasso[17], Amal Jubran[18], Franco Laghi[18], Sheldon Magder[19], Antonio Pesenti[1,14], Stephen Loring[20], Luciano Gattinoni[1,14], Daniel Talmor[20], Lluis Blanch[21], Marcelo Amato[22], Lu Chen[11,12], Laurent Brochard[11,12*], Jordi Mancebo[23] and the PLeUral pressure working Group (PLUG—Acute Respiratory Failure section of the European Society of Intensive Care Medicine)

Intensive Care Med (2016) 42:1360–1373

the PLUG

Merci !

alain.mercat@univ-angers.fr