SDRA: 20 ans d'essais thérapeutiques: et après?.... Ou bien…. « et avant »?

Didier Dreyfuss

Université Paris-Diderot

Aucune rémunération d'aucune sorte par l'industrie

Aucune occurrence dans transparence.sante.gouv.fr

The Lancet · Saturday 12 August 1967

ACUTE RESPIRATORY DISTRESS IN ADULTS

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From the Departments of Surgery and Medicine, University of Colorado Medical Center, Denver, Colorado, U.S.A.

This Issue

Article

November 16, 1979

Extracorporeal Membrane Oxygenation in Severe Acute Respiratory Failure

A Randomized Prospective Study

Warren M. Zapol, MD; Michael T. Snider, MD, PhD; J. Donald Hill, MD; et al

Author Affiliations

JAMA. 1979;242(20):2193-2196. doi:10.1001/jama.1979.03300200023016

Abstract

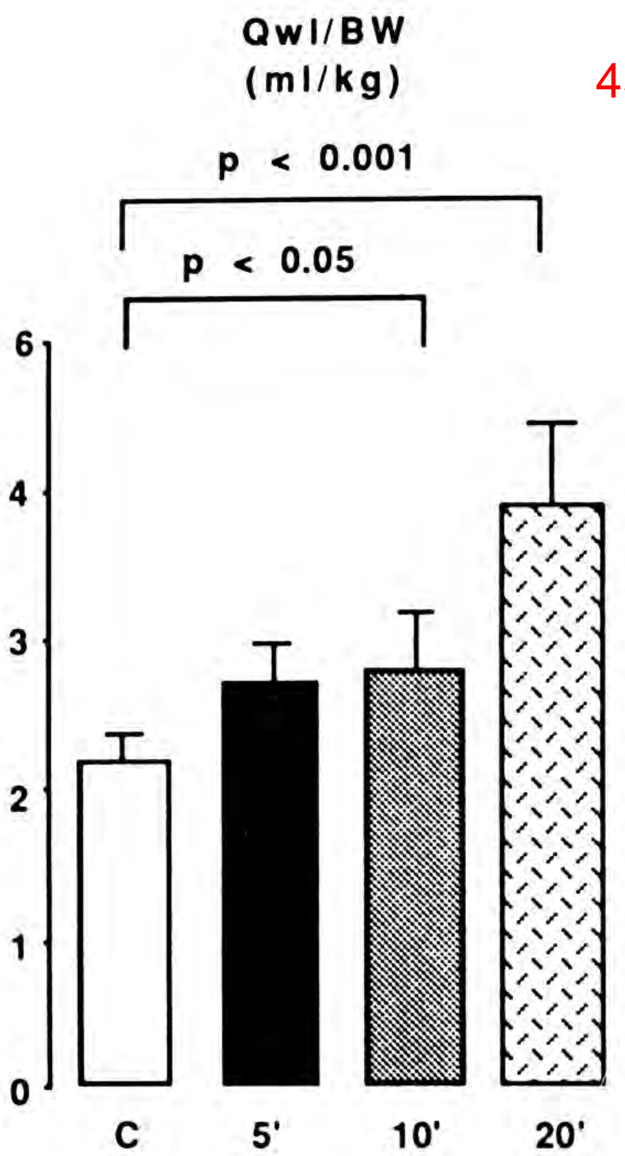
Nine medical centers collaborated in a prospective randomized study to evaluate prolonged extracorporeal membrane oxygenation (ECMO) as a therapy for severe acute respiratory failure (ARF). Ninety adult patients were selected by common criteria of arterial hypoxemia and treated with either conventional mechanical ventilation (48 patients) or mechanical ventilation supplemented with partial venoarterial bypass (42 patients). Four patients in each group survived. The majority of patients suffered acute bacterial or viral pneumonia (57%). All nine patients with pulmonary embolism and six patients with posttraumatic acute respiratory failure died. The majority of patients died of progressive reduction of transpulmonary gas exchange and decreased compliance due to diffuse pulmonary inflammation, necrosis, and fibrosis. We conclude that ECMO can support respiratory gas exchange but did not increase the probability of long-term survival in patients with severe ARF.

(*JAMA* 242:2193-2196, 1979)

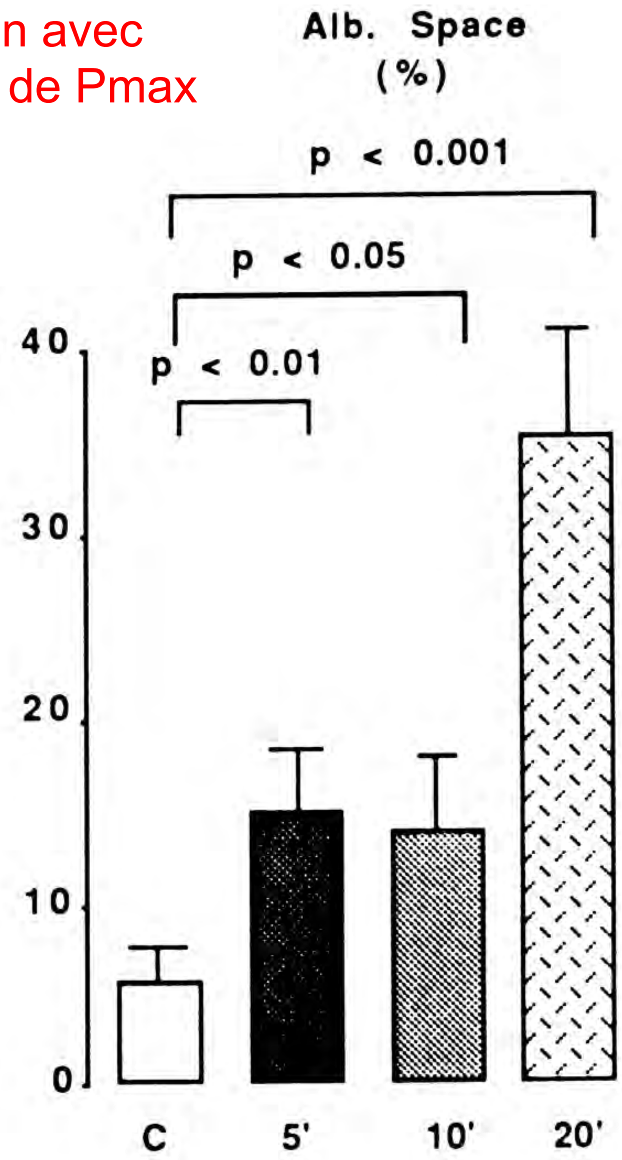
Mechanical ventilators, by applying high transpulmonary pressure to the nonuniformly expanded lungs of some patients who would otherwise die of respiratory insufficiency, may cause the hemorrhage and hyaline membranes found in such patients’ lungs at death.

Mead, JAP 1970

Ventilation avec
45 cmH2O de Pmax

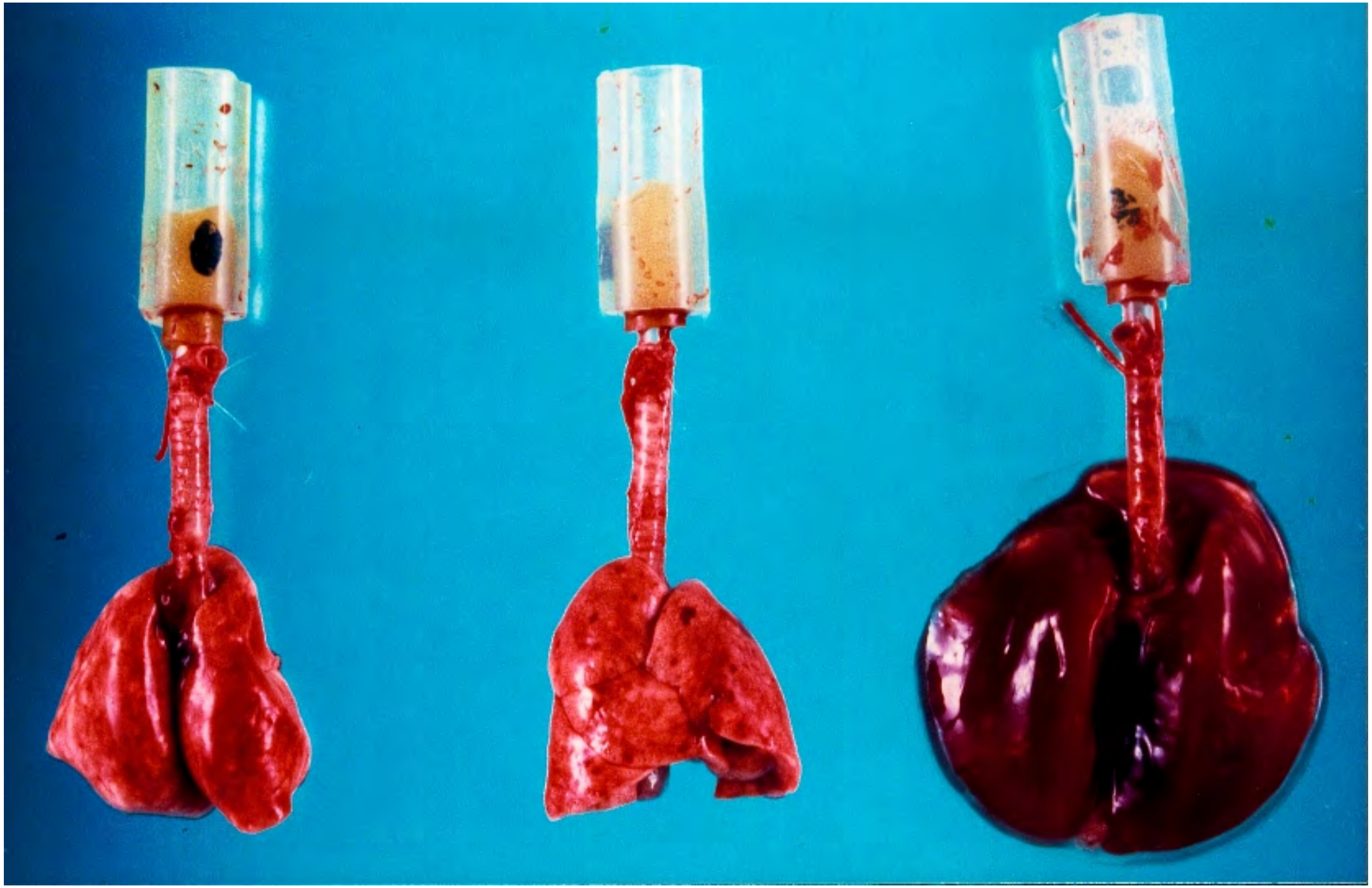


Quantification de l'œdème pulmonaire



Quantification de la perméabilité microvasculaire

Dreyfuss et al, ARRD, 1985



Ventilation avec
45 cmH2O de Pmax

Dreyfuss and Saumon AJRCCM 1998

CLINICAL REVIEW

CLINICIAN'S CORNER

Ventilatory Management of Acute Lung Injury and Acute Respiratory Distress Syndrome

Eddy Fan, MD

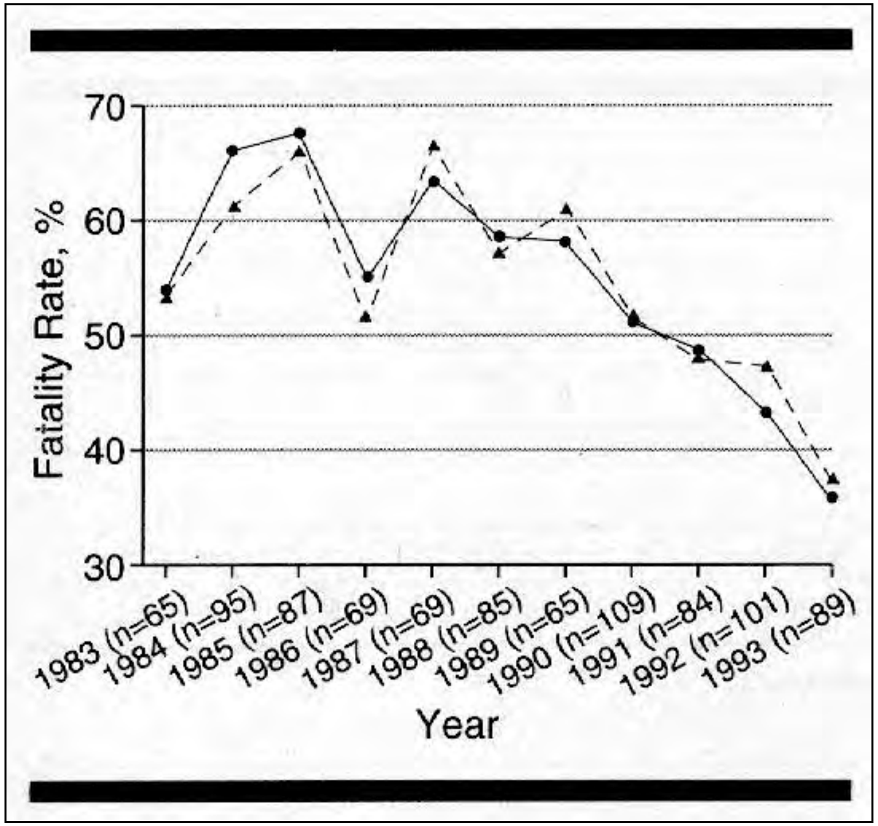
Dale M. Needham, MD, PhD

Thomas E. Stewart, MD

JAMA. 2005;294:2889-2896

« Recognition that mechanical ventilation, although life-saving, can contribute to patient morbidity and mortality has been the most important advance in the management of patients with ALI and ARDS »

Figure 1



Improved Survival of Patients With Acute Respiratory Distress Syndrome (ARDS): 1983-1993.

Milberg, John; Davis, Donna; Steinberg, Kenneth; Hudson, Leonard

JAMA. 273(4):306-309, Jan 25, 1995.

Figure 1 . Crude (solid line) and adjusted (dashed line) acute respiratory distress syndrome (ARDS) fatality rates, total population, Harborview Medical Center, 1983 through 1993. Rates are adjusted for ARDS risk group, age, and gender

Zimmerman et al. Critical Care 2013, 17:R81
http://ccforum.com/content/17/2/R81

CRITICAL CARE

RESEARCH Open Access

Changes in hospital mortality for United States intensive care unit admissions from 1988 to 2012

Jack E Zimmerman[1], Andrew A Kramer[2*] and William A Knaus[3]

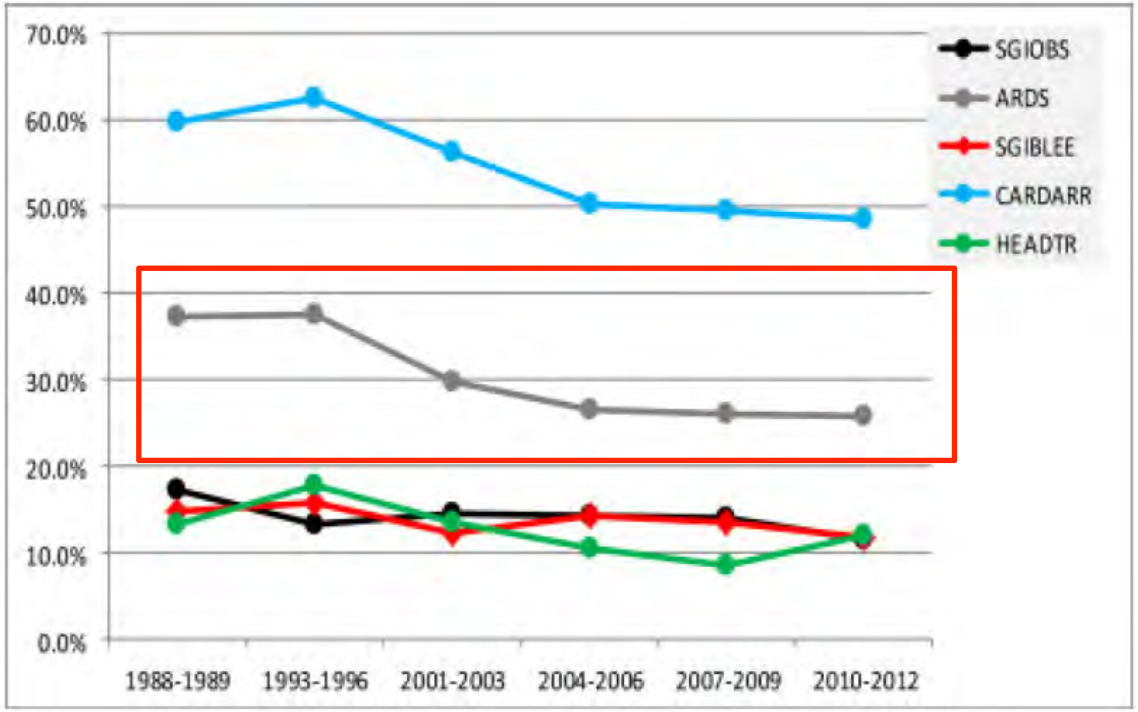


Figure 5 Diagnostic groups with a 10% to 40% reduction in mortality from 1988-1989 to 2010-2012. Definition of abbreviations: ARDS, acute respiratory distress syndrome; CARDARR, cardiac arrest; HEADTR, head trauma, with chest, abdomen, pelvis, or spine injury; SGIBLEE, surgery for gastrointestinal bleeding; SGIOBS, surgery for gastrointestinal obstruction.

		Tidal volume : ml/kg
1965	**Sykes** ***(BJA)***	**10-15**
1969	**McIntyre** ***(Can Anesth S. J.)***	**8-14**
1970	**Kumar** ***(NEJM)***	**11 and 13**
1972	**Pontoppidan** ***(NEJM)***	**10-15**
	Falke ***(JCI)***	**9-24**
	Lutch, Murray ***(Ann.Int. Med)***	**10-16**
1973	**Kumar** ***(Crit.Care Med)*** **BT: 50%**	**12-18**
1974	**Steir** ***(JTCVS)*** **PNTX**	**18 (14-21)**
1975	**Suter** ***(NEJM)***	**15**
1979	**Hemmer** ***(Anesthiol)***	**15**
1981	**Jardin** ***(NEJM)***	**12-20**
1983	**Mathru** ***(Crit.Care Med)***	**12-15**

CARING FOR THE CRITICALLY ILL PATIENT

Characteristics and Outcomes in Adult Patients Receiving Mechanical Ventilation

A 28-Day International Study

JAMA, January 16, 2002—Vol 287, No. 3

Andrés Esteban, MD, PhD
Antonio Anzueto, MD
Fernando Frutos, MD
Inmaculada Alía, MD
Laurent Brochard, MD
Thomas E. Stewart, MD
Salvador Benito, MD
Scott K. Epstein, MD
Carlos Apezteguía, MD
Peter Nightingale, MD
Alejandro C. Arroliga, MD
Martin J. Tobin, MD

- 5183 mechanically ventilated patients
- 231 ARDS
  - V_T: 8,7 ml/kg
  - Pplat: 28 cmH2O
  - PEEP = 8 cmH_2O

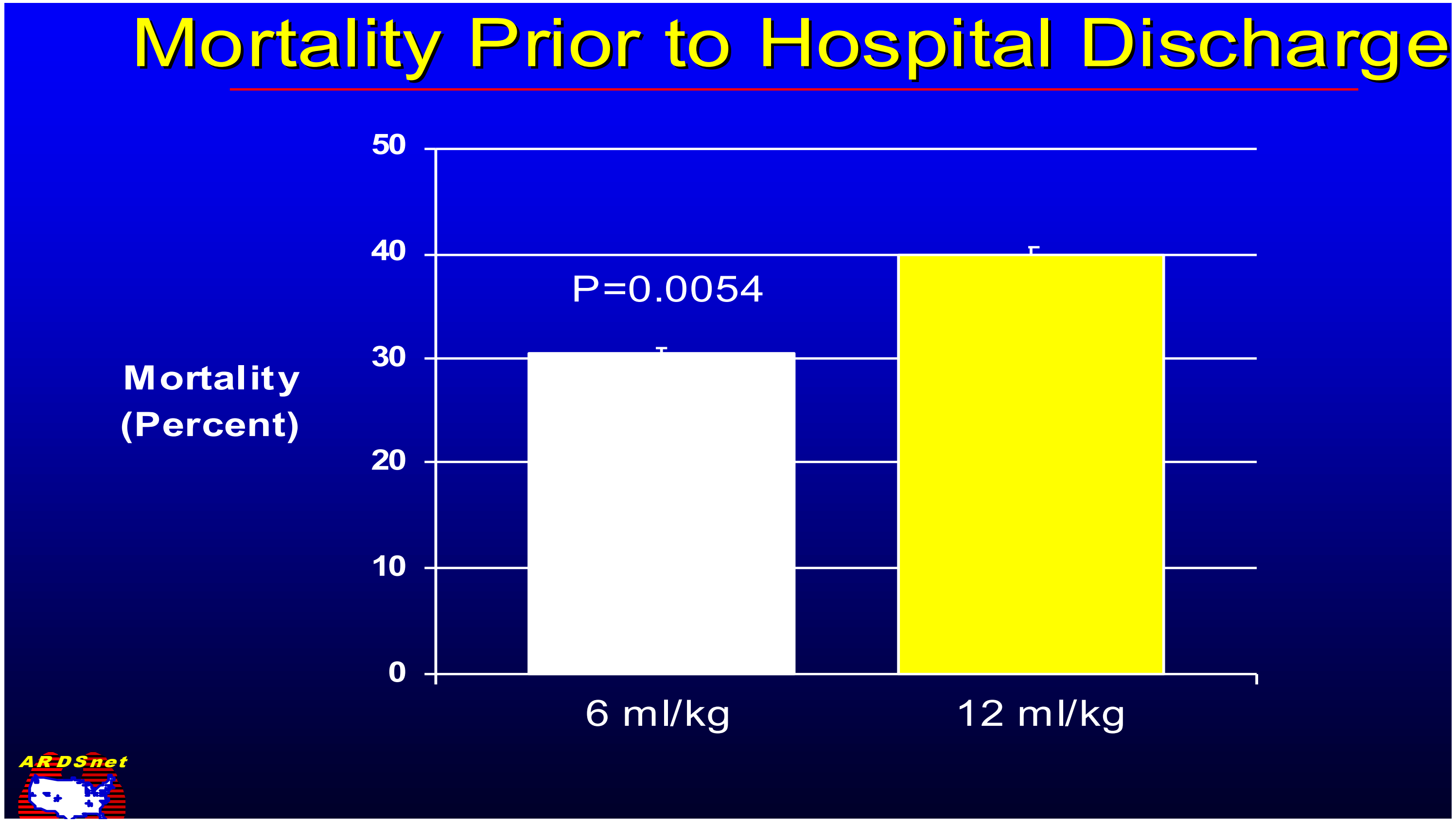
Le volotrauma

The New England
Journal of Medicine

VOLUME 342 | MAY 4, 2000 | NUMBER 18

VENTILATION WITH LOWER TIDAL VOLUMES AS COMPARED WITH TRADITIONAL TIDAL VOLUMES FOR ACUTE LUNG INJURY AND THE ACUTE RESPIRATORY DISTRESS SYNDROME

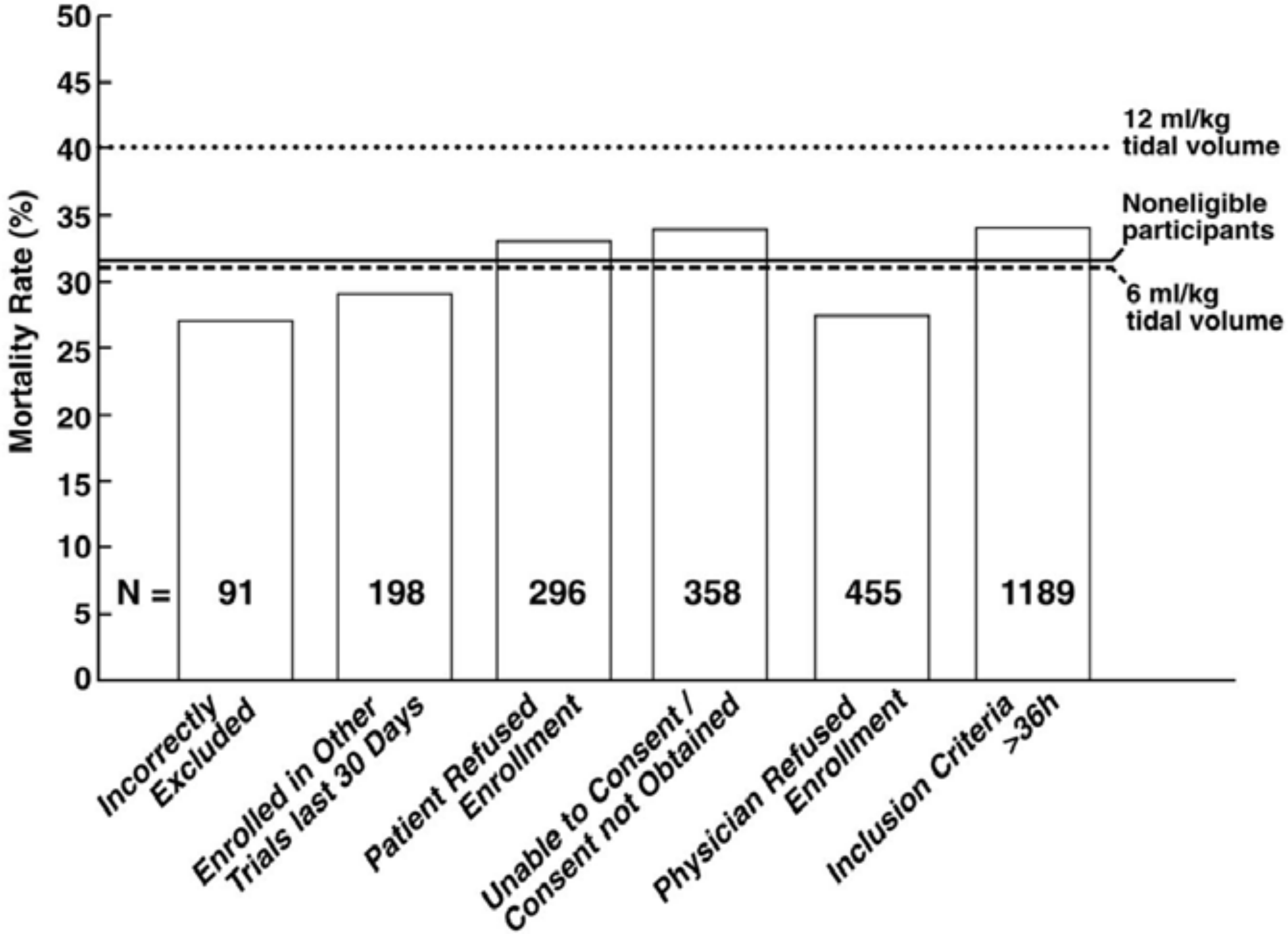
THE ACUTE RESPIRATORY DISTRESS SYNDROME NETWORK*



Mechanical ventilation in ARDS: One size does not fit all*

Katherine J. Deans, MD
Peter C. Minneci, MD

Crit Care Med 2005 Vol. 33, No. 5



Higher versus Lower Positive End-Expiratory Pressures in Patients with the Acute Respiratory Distress Syndrome

The National Heart, Lung, and Blood Institute ARDS Clinical Trials Network*

Table 2. Baseline Characteristics of the Patients.*

Characteristic	Lower-PEEP Group (N=273)	Higher-PEEP Group (N=276)
Age (yr)	49±17	54±17†
Female sex (%)	47	43
Race or ethnic group (%)‡		
White	73	77
Black	14	14
Hispanic	6	7
Other or not available	7	2
APACHE III score§	91±30	96±33
Tidal volume (ml/kg of predicted body weight)	8.2±2.0	8.0±2.0

Positive End-Expiratory Pressure Setting in Adults With Acute Lung Injury and Acute Respiratory Distress Syndrome

A Randomized Controlled Trial

for the Expiratory Pressure (Express) Study Group

JAMA, February 13, 2008—Vol 299, No. 6

Mercat et al

Table 2. Baseline Characteristics of the Patients

Characteristic	Minimal Distension (n = 382)	Increased Recruitment (n = 385)
Age, mean (SD), y	60 (15)	60 (16)
Respiratory measures, mean (SD)		
Tidal volume, mL/kg of predicted body weight	7.5 (1.5)	7.4 (1.4)
Minute ventilation, L/min	11.5 (3.1)	11.5 (2.8)
Respiratory rate, cycles/min	24.7 (5.8)	24.4 (6.0)
PEEP, cm H_2O	7.9 (3.3)	8.2 (3.7)
Plateau pressure, cm H_2O	22.9 (5.3)	23.7 (4.9)
Respiratory system compliance, mL/cm H_2O[d]	36.1 (13.8)	36.4 (14.6)
PaO_2:FIO_2, mm Hg	143 (57)	144 (58)

CARING FOR THE CRITICALLY ILL PATIENT

JAMA, February 13, 2008—Vol 299, No. 6

Ventilation Strategy Using Low Tidal Volumes, Recruitment Maneuvers, and High Positive End-Expiratory Pressure for Acute Lung Injury and Acute Respiratory Distress Syndrome

A Randomized Controlled Trial

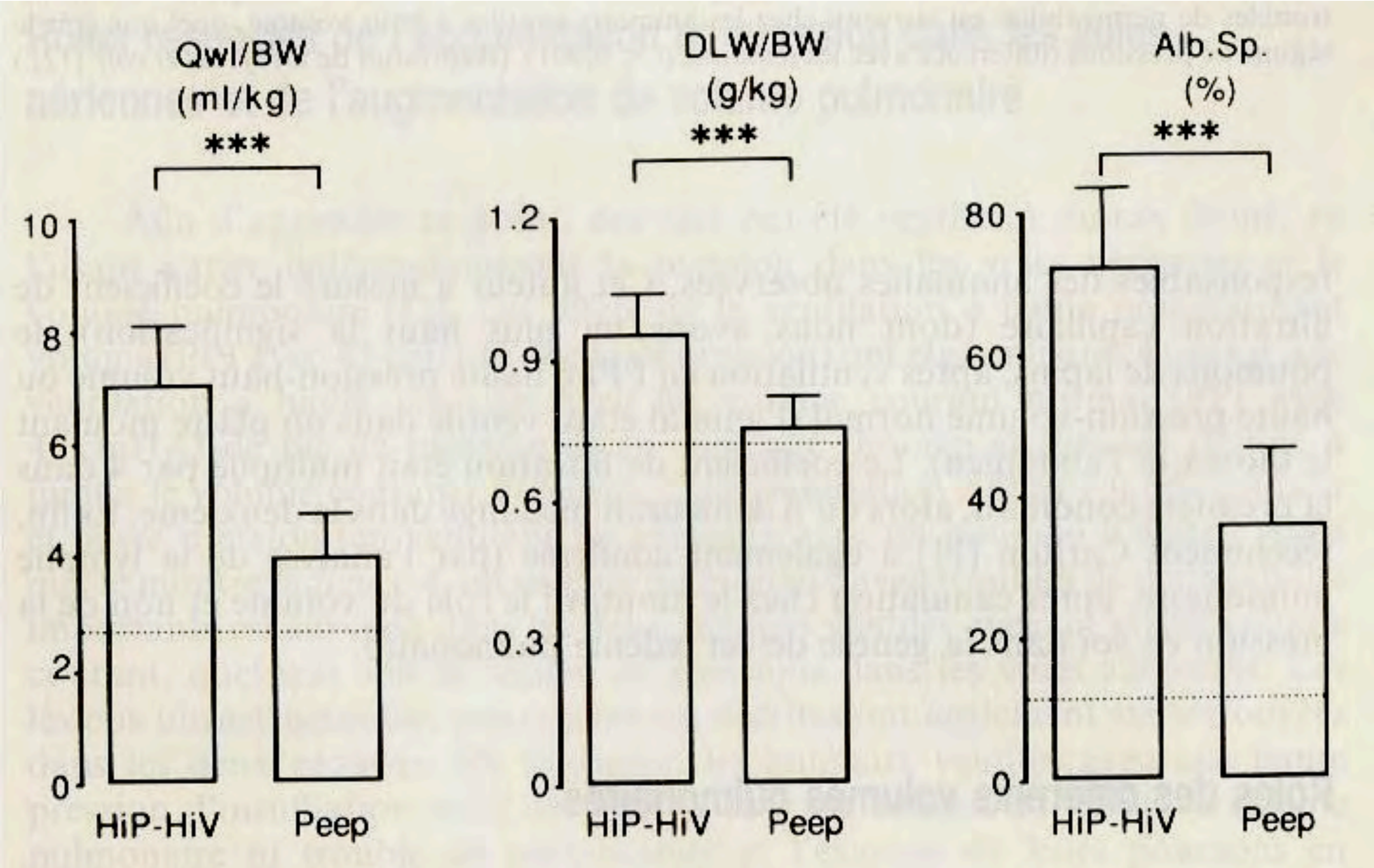
Meade et al

Characteristics	Lung Open Ventilation (n = 475)	Control Ventilation (n = 508)
Age, mean (SD), y	54.5 (16.5)	56.9 (16.5)
Female sex	193 (40.6)	201 (39.6)
Hospital stay, median (IQR), d	3 (1-6)	3 (2-6)
Mechanical ventilation, median (IQR), d	1 (0-3)	1 (0-3)
APACHE II score, mean (SD)[b]	24.8 (7.8)	25.9 (7.7)
Nonpulmonary MOD score, mean (SD)[c]	6.5 (3.4)	6.6 (3.3)
Pao_2/Fio_2, mean (SD)	144.8 (47.9)	144.6 (49.2)
Pao_2/Fio_2 <200	409 (86.1)	427 (84.1)
Oxygenation index, median (IQR)[d]	12.1 (8.7-17.2)	11.9 (8.5-18.0)
Set PEEP, mean (SD), cm H_2O	11.5 (3.5)	11.2 (3.3)
Plateau pressure, mean (SD), cm H_2O[e]	30.4 (5.5)	29.3 (6.0)
Tidal volume, mL/kg predicted body weight, mean (SD)	8.4 (2.1)	8.4 (2.2)

Effect of Peep

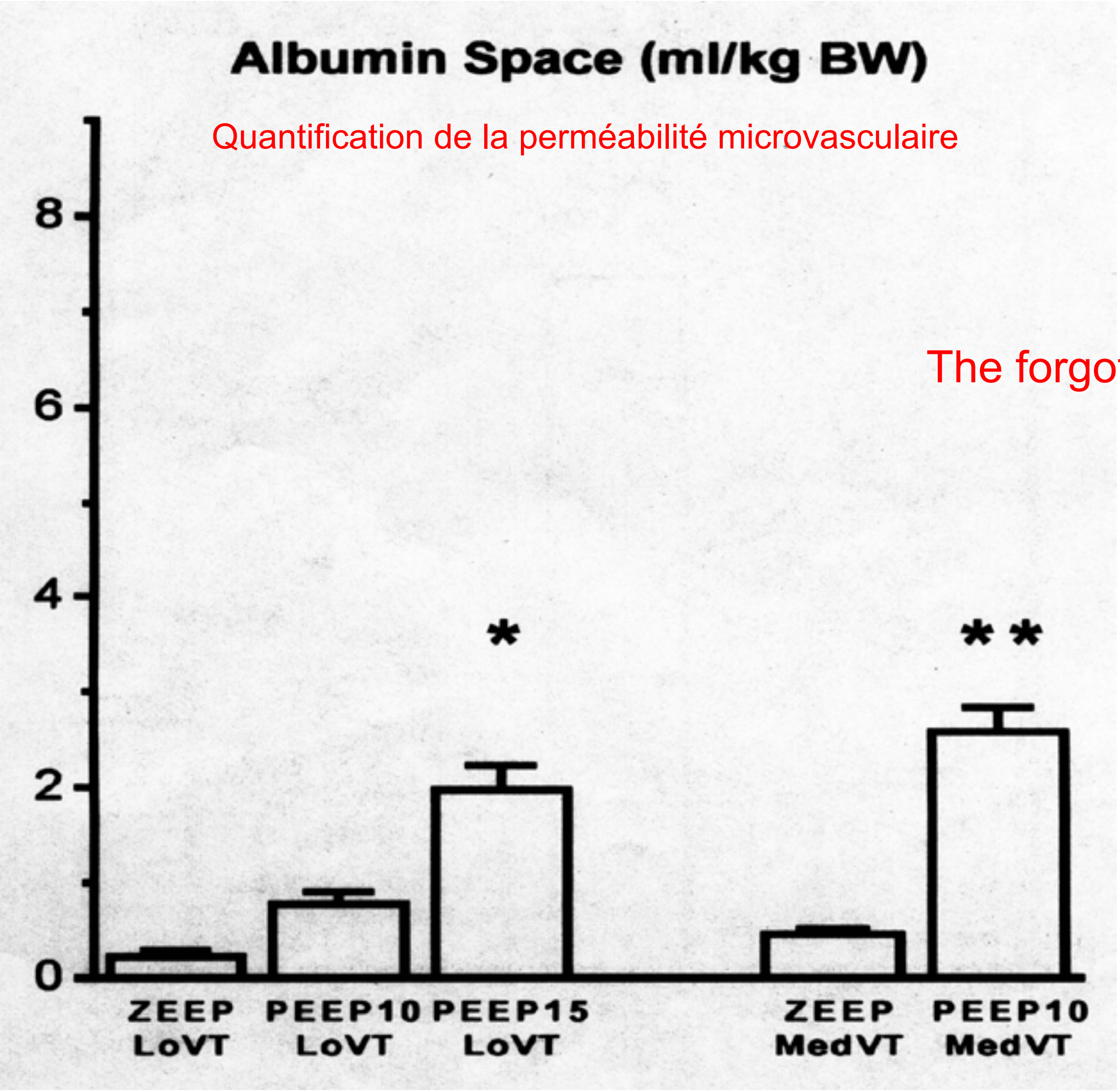
Quantification de l'œdème pulmonaire

Quantification de la perméabilité microvasculaire



Dreyfuss et al, ARRD, 1985

Peep may favor VILI



The forgotten study….

Dreyfuss ARRD 1993

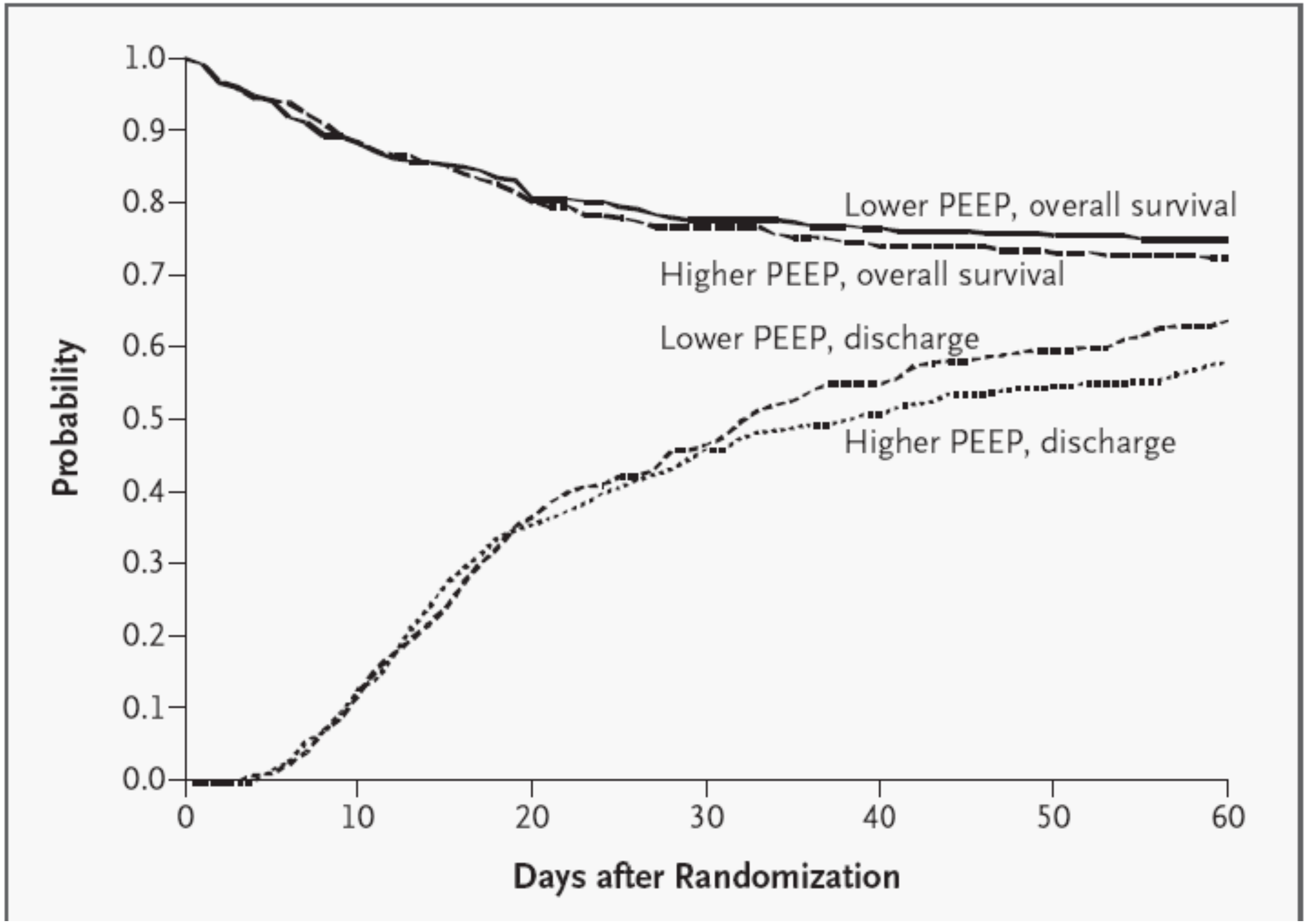
L’atélectrauma:
(ouverture-refermeture) ???

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JULY 22, 2004 VOL. 351 NO. 4

Higher versus Lower Positive End-Expiratory Pressures in Patients with the Acute Respiratory Distress Syndrome

The National Heart, Lung, and Blood Institute ARDS Clinical Trials Network*



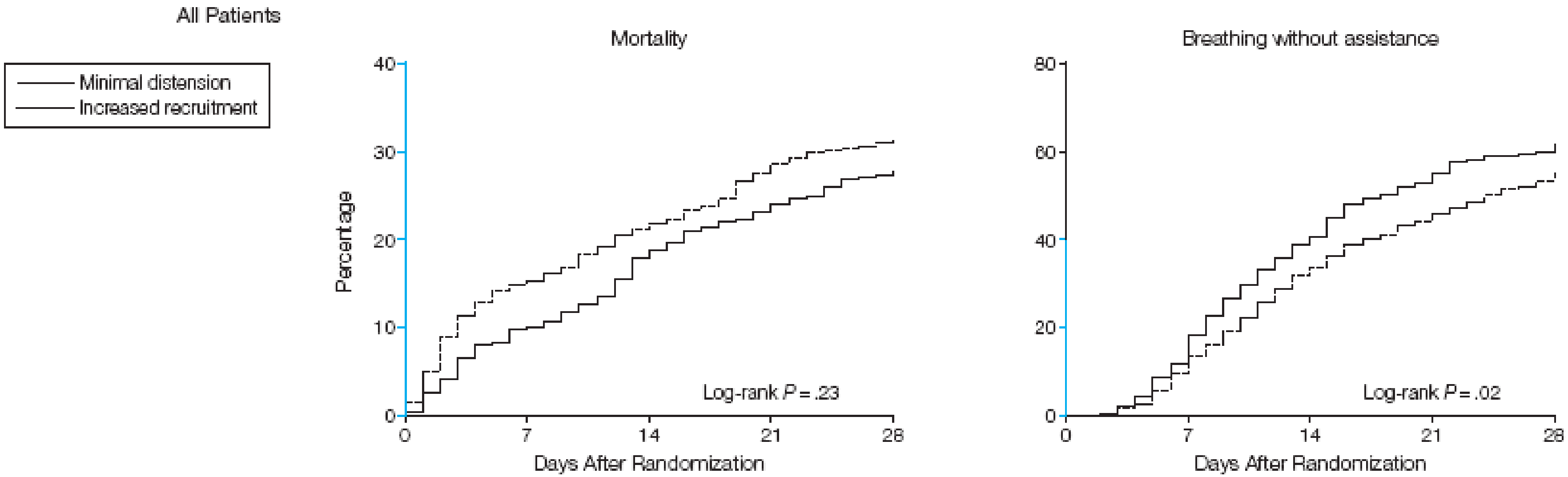
Positive End-Expiratory Pressure Setting in Adults With Acute Lung Injury and Acute Respiratory Distress Syndrome

Mercat et al.

A Randomized Controlled Trial

646 JAMA, February 13, 2008—Vol 299, No. 6 (Reprinted)

Figure 2. Probabilities of Death and Breathing Without Assistance From the Day of Randomization (Day 0) to Day 28



No. at risk

Minimal distension	382	325	301	277	264	382	345	261	213	178
Increased recruitment	385	347	316	296	280	385	339	235	182	155

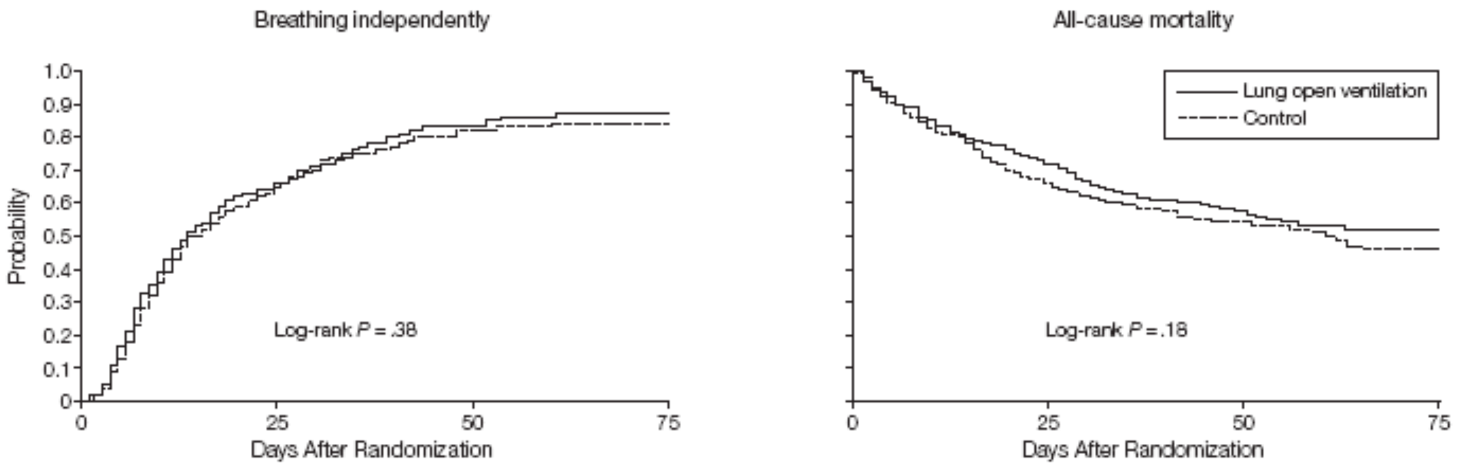
Meade et al.

Ventilation Strategy Using Low Tidal Volumes, Recruitment Maneuvers, and High Positive End-Expiratory Pressure for Acute Lung Injury and Acute Respiratory Distress Syndrome

A Randomized Controlled Trial

(Reprinted) JAMA, February 13, 2008—Vol 299, No. 6 **637**

Figure 2. Probabilities of Survival and Unassisted Breathing From Day of Randomization (Day 0) to Day 75 Among Patients in the Lung Open Ventilation and Control Groups



No. at Risk								
Lung open ventilation	475	99	23	11	475	223	91	43
Control ventilation	508	95	26	1	508	220	97	47

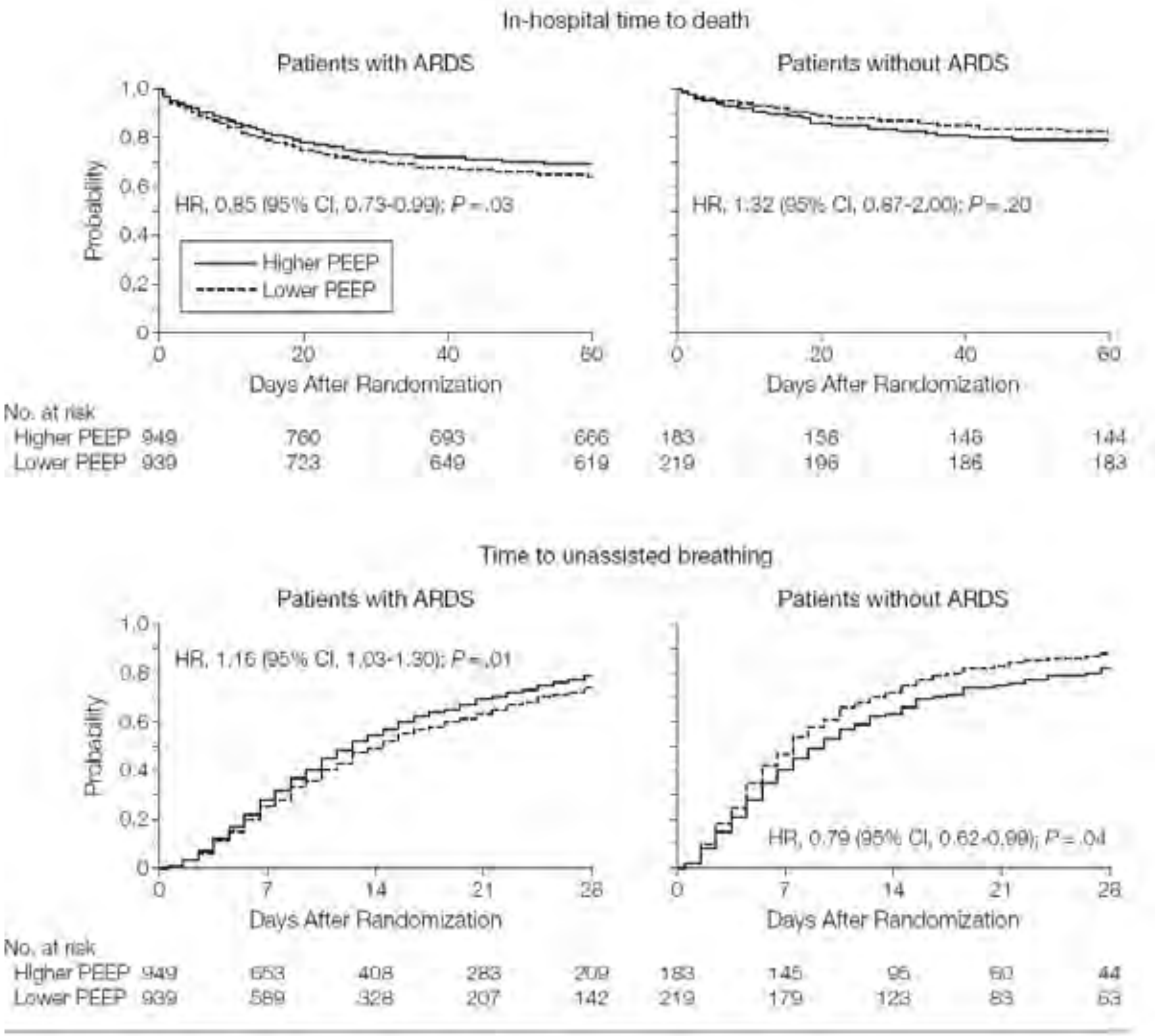
Patients were censored at hospital discharge and at death in the 2 analyses, respectively.

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

Briel et al

Systematic Review and Meta-analysis

(Reprinted) JAMA, March 3, 2010—Vol 303, No. 9 **865**

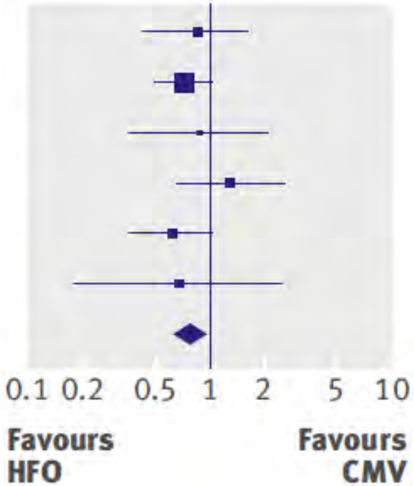


BMJ 2010 RESEARCH

High frequency oscillation in patients with acute lung injury and acute respiratory distress syndrome (ARDS): systematic review and meta-analysis

Sachin Sud, fellow,[1] Maneesh Sud, medical student,[2] Jan O Friedrich, assistant professor,[3] Maureen O Meade

	High frequency oscillation	Conventional mechanical ventilation	Risk ratio (95% CI)	Weight (%)	Risk ratio (95% CI)
Arnold 1994	10/29	12/29		13.0	0.83 (0.43 to 1.62)
Derdak 2002	28/75	38/73		42.6	0.72 (0.50 to 1.03)
Shah 2004	6/15	6/13		7.9	0.87 (0.37 to 20.4)
Bollen 2005	16/37	8/24		12.5	1.30 (0.66 to 2.55)
Mentzelopoulus 2007	11/27	18/27		20.6	0.61 (0.36 to 1.04)
Samransamruajkit 2005	2/6	5/10		3.4	0.67 (0.18 to 2.42)
Total (95% CI)	73/189	87/176		100.0	0.77 (0.61 to 0.98)



Test for heterogeneity: $\tau^2=0.00$, $\chi^2=3.36$, df=5, P=0.64, $I^2=0\%$

Test for overall effect: z=2.12, P=0.03

Fig 2 | Hospital or 30 day mortality in patients with acute lung injury/acute respiratory distress syndrome allocated to high frequency oscillation or conventional mechanical ventilation

Conclusion High frequency oscillation might improve survival and is unlikely to cause harm.

POINT: HIGH-FREQUENCY VENTILATION IS THE OPTIMAL PHYSIOLOGICAL APPROACH TO VENTILATE ARDS PATIENTS

Niall D. Ferguson and Arthur S. Slutsky *J Appl Physiol* 104: 1230–1235, 2008;

Because cyclic alveolar stretch is minimal, volutrauma can be avoided even when the mean airway pressure is set to higher levels than can be reasonably set with PEEP on conventional ventilation.

The NEW ENGLAND JOURNAL of MEDICINE

SPECIAL ARTICLE

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.

N ENGL J MED 372;8 NEJM.ORG FEBRUARY 19, 2015

Scaling V_T acording to respiratory mechanics and not to PBW

- Driving pressure (ΔP) = V_T/Crs

- Pplat = Peep + V_T/Crs

- V_T/Crs = Pplat - Peep = ΔP

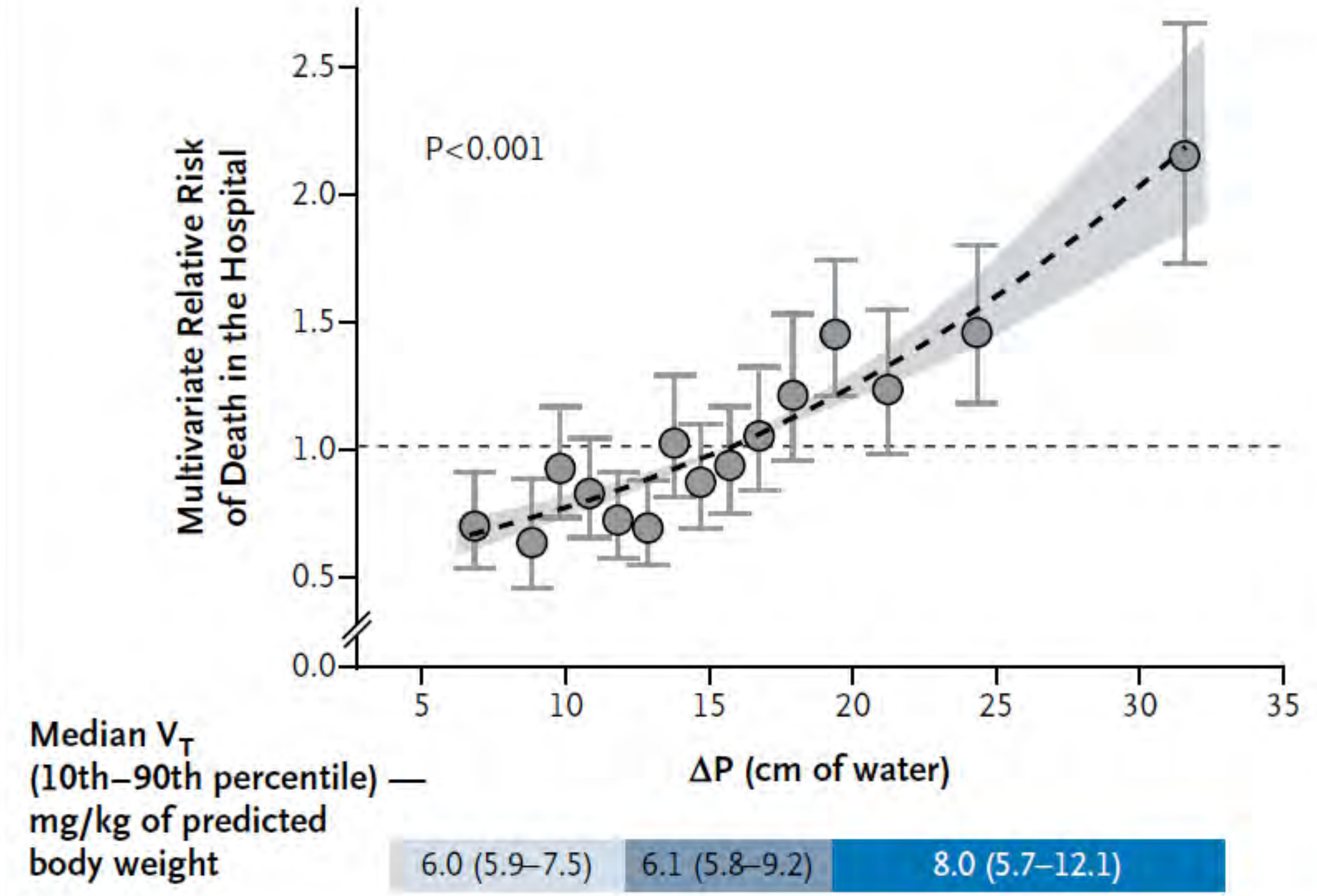


Figure 2. Relative Risk of Death in the Hospital versus ΔP in the Combined Cohort after Multivariate Adjustment.

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

High-Frequency Oscillation in Early Acute Respiratory Distress Syndrome

Niall D. Ferguson, M.D., Deborah J. Cook, M.D., Gordon H. Guyatt, M.D.,

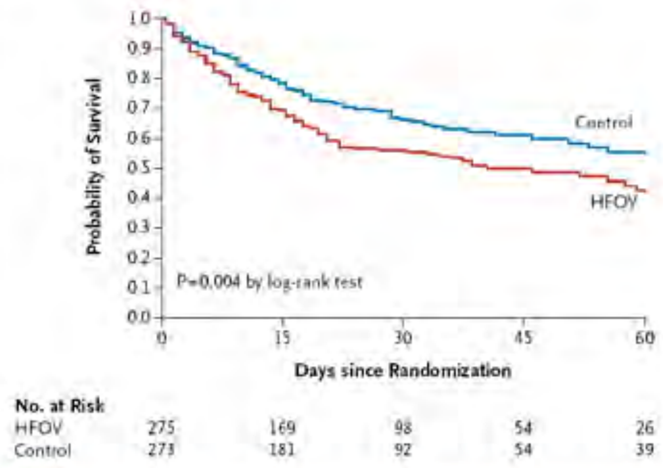


Figure 2. Probability of Survival from the Day of Randomization to Day 60 in the HFOV and Control Groups.

Can DeltaP explain these findings?

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

High-Frequency Oscillation for Acute Respiratory Distress Syndrome

Duncan Young, D.M., Sallie Lamb, D.Phil., Sanjoy Shah, M.D.,

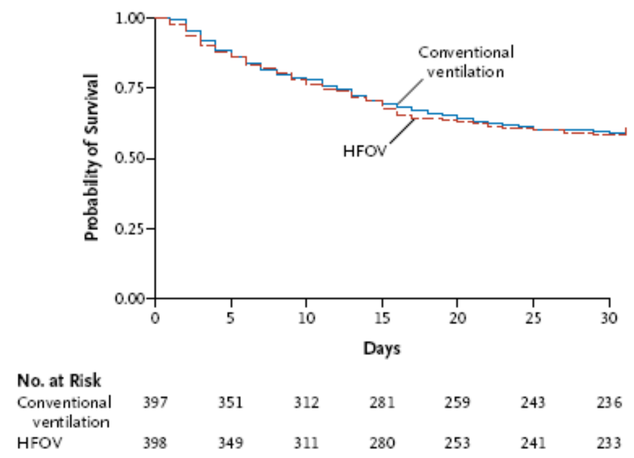


Figure 3. Kaplan–Meier Survival Estimates during the First 30 Study Days.

Attributed to

I only believe in statistics that I doctored myself

Attributed to Prime Minister Disraeli by Mark Twain:

There are three kinds of lies:

Lies
Damned lies and.....
Statistics

Intensive Care Med
DOI 10.1007/s00134-015-4062-0

REVIEW

CrossMark

Didier Dreyfuss
Jean-Damien Ricard
Stéphane Gaudry

Did studies on HFOV fail to improve ARDS survival because they did not decrease VILI? On the potential validity of a physiological concept enounced several decades ago

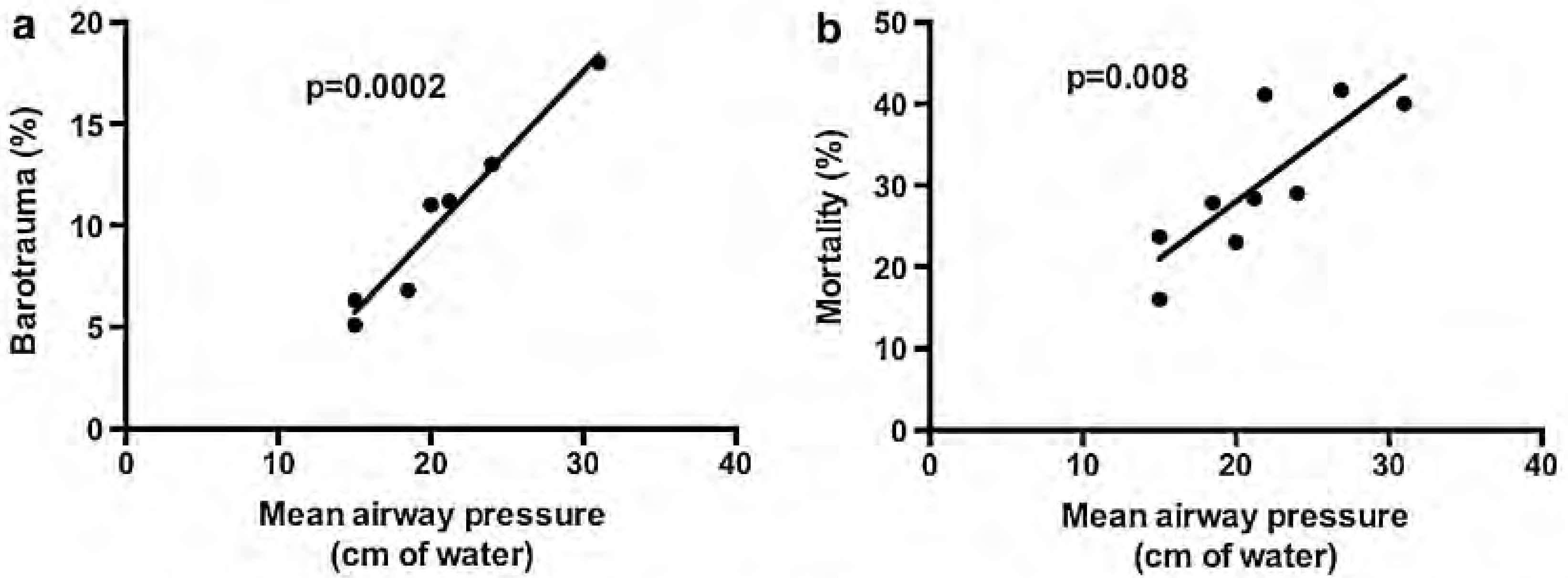


Fig. 4 Correlations between mean airway pressure and barotrauma (**a**) or mortality (**b**) in recent studies on mechanical ventilation of ARDS patients (values are extracted from Table 1). The incidence of barotrauma was not reported in one recent study on HFOV [42]. See text for details on computation of mean airway pressure

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

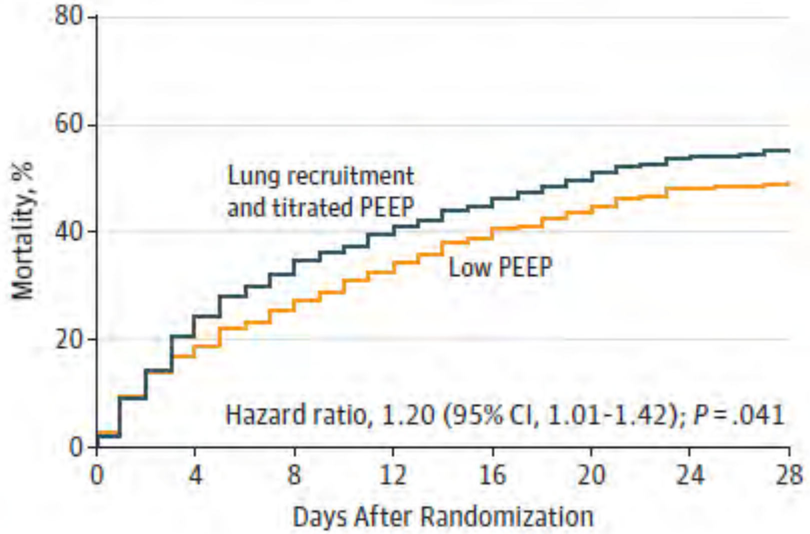
Effect of Lung Recruitment and Titrated Positive End-Expiratory Pressure (PEEP) vs Low PEEP on Mortality in Patients With Acute Respiratory Distress Syndrome

A Randomized Clinical Trial

Published online September 27, 2017

Writing Group for the Alveolar Recruitment for Acute Respiratory Distress Syndrome Trial (ART) Investigators Groupe d'Amato

Figure 2. 28-Day Mortality in the Lung Recruitment Maneuver With Titrated PEEP Group vs the Low-PEEP Group



No. at risk	0	4	8	12	16	20	24	28
Lung recruitment and titrated PEEP	501	397	340	303	276	254	233	225
Low PEEP	509	423	378	343	312	286	264	260

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Lung Recruitment and Titrated Positive End-Expiratory Pressure (PEEP) vs Low PEEP on Mortality in Patients With Acute Respiratory Distress Syndrome

A Randomized Clinical Trial

Published online September 27, 2017

Writing Group for the Alveolar Recruitment for Acute Respiratory Distress Syndrome Trial (ART) Investigators

eTable 2 - Respiratory Variables During the First Seven Days of Treatment

Variable	1hour			Day 1			Day 3			Day 7		
	Lung Recruitment Maneuver with PEEP Titration Group	Control Group	P Value	Lung Recruitment Maneuver with PEEP Titration Group	Control Group	P Value	Lung Recruitment Maneuver with PEEP Titration Group	Control Group	P Value	Lung Recruitment Maneuver with PEEP Titration Group	Control Group	P Value
PEEP, mean (95% CI), cmH_2O	16.4 (16.0 to 16.7)	13.0 (12.7 to 13.3)	<0.001	16.2 (15.9 to 16.6)	12.0 (11.7 to 12.3)	<0.001	14.2 (13.8 to 14.6)	10.5 (10.2 to 10.9)	<0.001	11.6 (11.2 to 12.1)	9.6 (9.3 to 10.0)	<0.001
No. of patients	499	507		481	490		418	432		296	326	
Plateau pressure, mean (95% CI), cmH_2O	27.9 (27.5 to 28.3)	25.9 (25.5 to 26.3)	<0.001	27.9 (27.5 to 28.3)	25.4 (25.0 to 25.9)	<0.001	26.3 (25.8 to 26.9)	24.0 (23.5 to 24.6)	<0.001	24.1 (23.4 to 24.8)	23.2 (22.5 to 23.8)	0.05
No. of patients	498	503		478	488		417	431		294	325	
Plateau pressure > 30 cmH_2O, No. of events / total No. (%)	80/498 (16.1)	45/503 (8.9)	0.001	83/478 (17.4)	52/488 (10.7)	0.004	55/417 (13.2)	37/431 (8.6)	0.04	22/294 (7.5)	25/325 (7.7)	>0.99
Driving pressure, mean (95% CI), cmH_2O	11.5 (11.1 to 11.8)	13.0 (12.6 to 13.3)	<0.001	11.7 (11.3 to 12.1)	13.5 (13.1 to 13.8)	<0.001	12.1 (11.7 to 12.5)	13.5 (13.1 to 13.9)	<0.001	12.5 (12.0 to 12.9)	13.6 (13.1 to 14.1)	0.001

+++++ Regardez la « driving pressure » et la Pplat !!!

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 SEPTEMBER 16, 2010 VOL. 363 NO. 12

Neuromuscular Blockers in Early Acute Respiratory Distress Syndrome

Laurent Papazian, M.D., Ph.D., Jean-Marie Forel, M.D., Arnaud Gacouin, M.D., Christine Penot-Ragon, Ph
Gilles Perrin, M.D., Anderson Loundou, Ph.D., Samir Jaber, M.D., Ph.D., Jean-Michel Arnal, M.D., Didier Pere
Jean-Marie Seghboyan, M.D., Jean-Michel Constantin, M.D., Ph.D., Pierre Courant, M.D., Jean-Yves Lefrant, M.I
Claude Guérin, M.D., Ph.D., Gwenaël Prat, M.D., Sophie Morange, M.D., and Antoine Roch, M.D., Ph
for the ACURASYS Study Investigators*

Table 2. Baseline Characteristics of the Patients, According to Study Group.*

Characteristic†	Cisatracurium (N=177)	Placebo N=162)	P Value
Age — yr	58±16	58±15	0.70
Tidal volume — ml/kg of predicted body weight	6.55±1.12	6.48±0.92	0.52
Minute ventilation — liters/min	10.0±2.5	10.1±2.2	0.83
PEEP applied — cm of water	9.2±3.2	9.2±3.5	0.87
Plateau pressure — cm of water	25.0±5.1	24.4±4.7	0.32

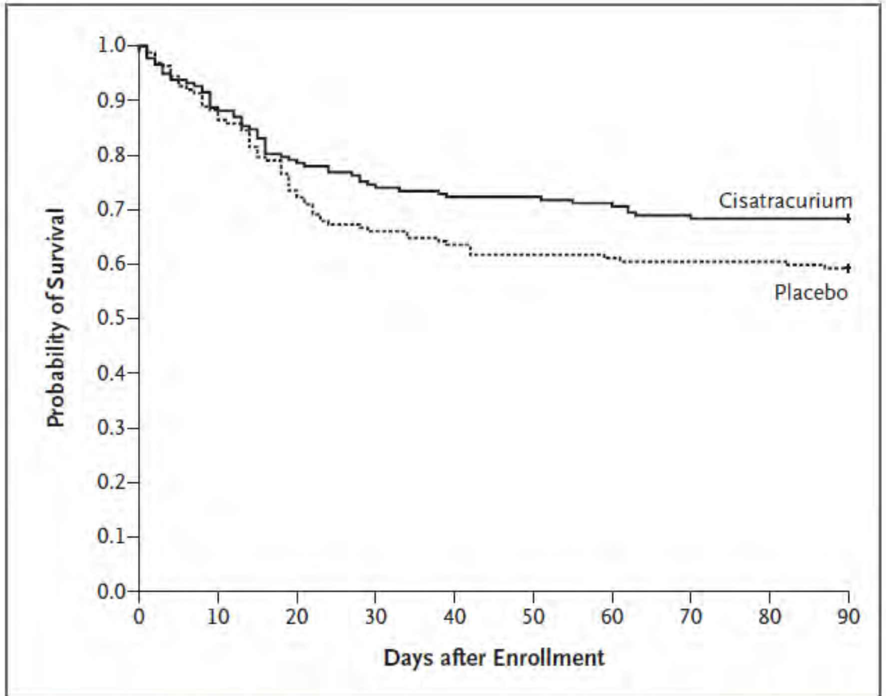
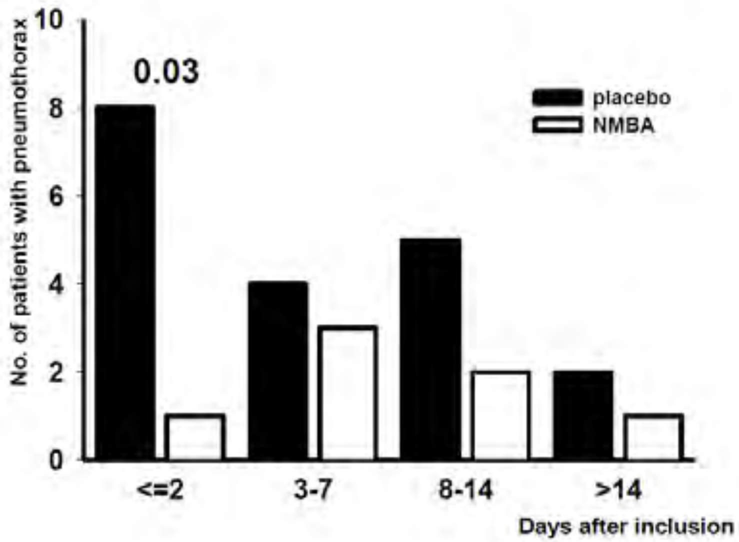
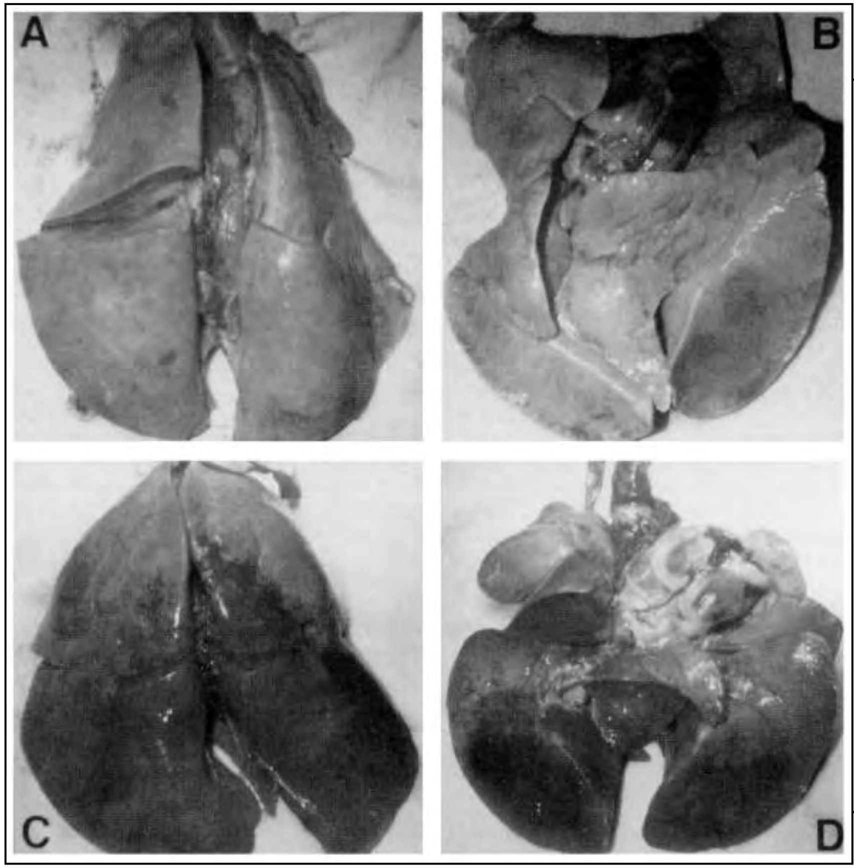
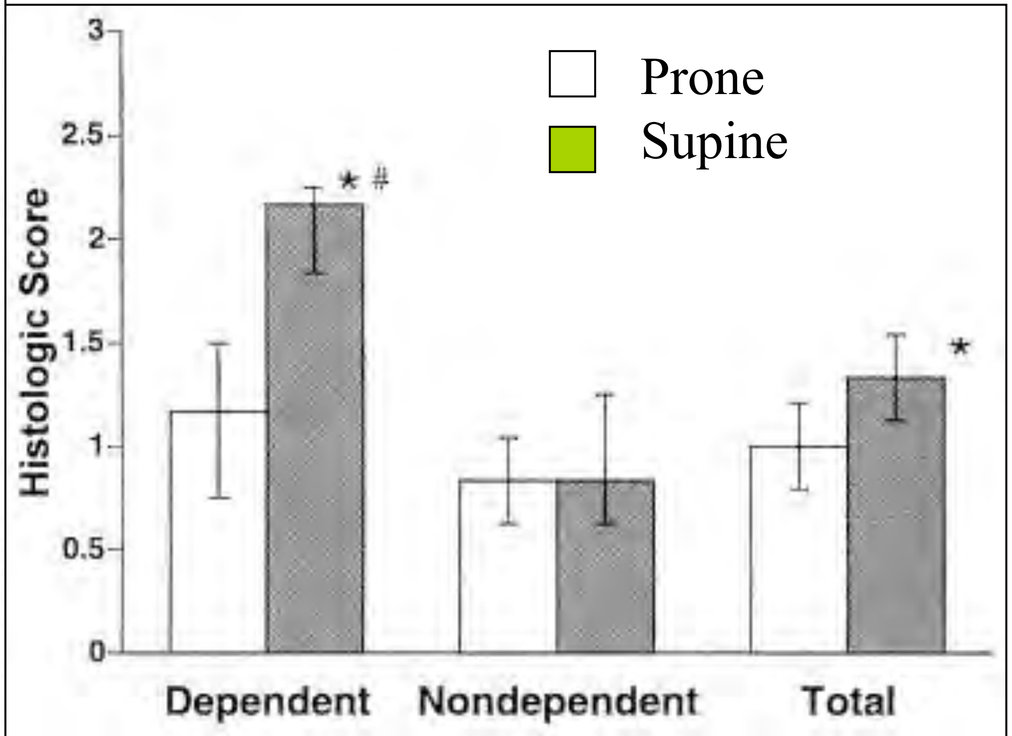


Figure 2. Probability of Survival through Day 90, According to Study Group.



Prone positioning attenuates and redistributes ventilator-induced lung injury in dogs. Broccard et al. Critical Care Medicine. 28(2):295-303, 2000.





The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 JUNE 6, 2013 VOL. 368 NO. 23

Prone Positioning in Severe Acute Respiratory Distress Syndrome

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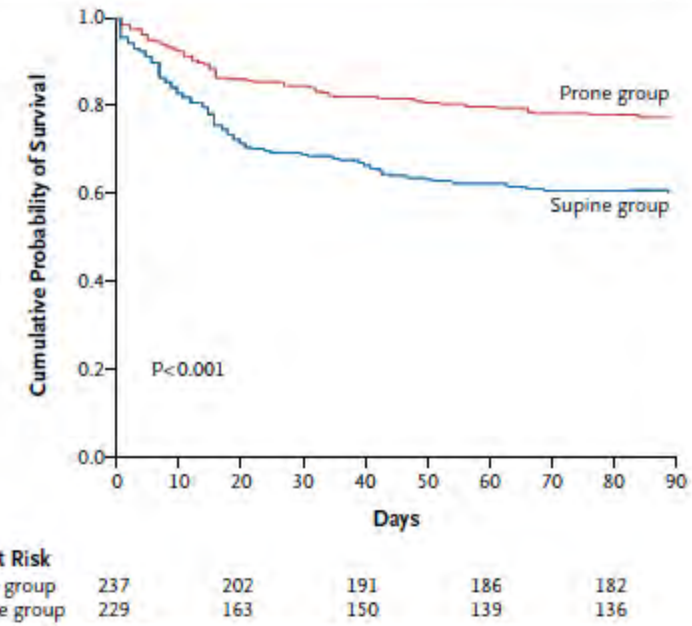

Figure 2. Kaplan–Meier Plot of the Probability of Survival from Randomization to Day 90.

Table S3. Ventilator settings, arterial blood gases and respiratory system mechanics during the first week, recorded in the supine position in the two groups

	Day 3		Day 5		Day 7	
	SG	PG	SG	PG	SG	PG
Tidal volume (ml)	415±117 (n=201)	411±95 (n=218)	425±115 (n=188)	440±124 (n=197)	440±117 (n=156)	431±102 (n=155)
Tidal volume (ml.kg^{-1}PBW)	6.6±1.6 (n=201)	6.5±1.4 (n=218)	6.9±1.8 (n=188)	6.9±1.8 (n=197)	7.0±1.9 (n=156)	6.8±1.4 (n=155)
Respiratory frequency (breaths.min^{-1})	28±6 (n=202)	27±6 (n=218)	27±6 (n=190)	27±7 (n=201)	27±7 (n=157)	27±7 (n=160)
PEEP (cm H_2O)	9.3±3.3 (n=205)	8.6±2.6* (n=222)	8.9±3.5 (n=191)	8.1±3.0* (n=205)	8.5±3.5 (n=159)	8.1±3.9 (n=165)

JAMA | Original Investigation | CARING FOR THE CRITICALLY ILL PATIENT

Epidemiology, Patterns of Care, and Mortality for Patients With Acute Respiratory Distress Syndrome in Intensive Care Units in 50 Countries

JAMA February 23, 2016 Volume 315, Number 8

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Table 4. Use of Adjunctive and Other Optimization Measures in Invasively Ventilated Patients With Acute Respiratory Distress Syndrome[a]

	Patients of No. (%) [95% CI]				
	All (n = 2377)	Mild[a] (n = 498)	Moderate[a] (n = 1150)	Severe[a] (n = 729)	P Value[b]
Neuromuscular blockade	516 (21.7) [20.1-23.4]	34 (6.8) [4.8-9.4]	208 (18.1) [15.9-20.4]	274 (37.8) [34.1-41.2]	<.001
Recruitment maneuvers	496 (20.9) [19.2-22.6]	58 (11.7) [9.0-14.8]	200 (17.4) [15.2-19.7]	238 (32.7) [29.3-36.2]	<.001
Prone positioning	187 (7.9) [6.8-9.0]	5 (1.0) [0.3-2.3]	63 (5.5) [4.2-7.0]	119 (16.3) [13.7-19.2]	<.001
ECMO	76 (3.2) [2.5-4.0]	1 (0.2) [0.05-1.2]	27 (2.4) [1.6-3.4]	48 (6.6) [4.9-8.6]	<.001
Inhaled vasodilators	182 (7.7) [6.6-8.8]	17 (3.4) [02.0-5.4]	70 (6.1) [4.8-7.6]	95 (13.0) [10.7-15.7]	<.001
HFOV	28 (1.2) [0.8-1.7]	3 (0.6) [0.1-1.7]	14 (1.2) [0.7-2.0]	11 (1.5) [0.8-2.7]	.347

Et le « biotrauma »?

Critical Care Perspective

On the Physiologic and Clinical Relevance of Lung-borne Cytokines during Ventilator-induced Lung Injury

Didier Dreyfuss, Jean-Damien Ricard, and Georges Saumon

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Am J Respir Crit Care Med Vol 167. pp 1467–1471, 2003

Otherwise, we may return to a form of medicine practiced at the time of Molière, when physicians believed that disease was the result of poor handling of "humeurs peccantes" (sinful humors) (Molière, 1666, "*Le médecin malgré lui*" [*A doctor despite himself*, Act II, Scene IV]).

Les erreurs fondamentales

- Méconnaissance du rôle majeur de la distension télé-inspiratoire (ou « statique » en HFO): « volotrauma »
- Surestimation du rôle de « l'atélectrauma » (ouverture-refermeture)
- Errements à propos du « biotrauma »

Une certitude, une proposition, une inconnue et un corollaire, une prospective

- La certitude: le volotrauma est un déterminant essentiel de la mortalité associée à la ventilation mécanique et la PEP peut y contribuer si elle est excessive
- La proposition: ne régler la PEP qu'en fonction de la PO2 souhaitée et non pour éviter « l'atélectrauma » est bénéfique
- L'inconnue: la toxicité réelle de la FiO2 élevée
- Le corollaire: si on admet que la FiO2 élevée n'est pas problématique, l'utilisation de PEP systématiquement élevée est inutile
- La prospective: place de l'ECMO et de l'ECCOR?

There must be fifty ways…

to die from mechanical ventilation

Ventilator-induced lung injury

Ventilator-induced hemodynamic alterations

Ventilation-associated infections

Paul Simon and
Didier Dreyfuss (after…or before several beers)

Ockam's (1287 – 1347) razor
and
Pplat versus ΔP

- Wikipedia:
- *pluralitas non est ponenda sine necessitate: plurality should not be posited without necessity*
- *In other words, among competing hypotheses, the one with the fewest assumptions should be selected.*
- In other words, first do simple before complex