# Εξωσωματική οξυγόνωση (ECMO) και οξεία αναπνευστική ανεπάρκεια (ARDS)

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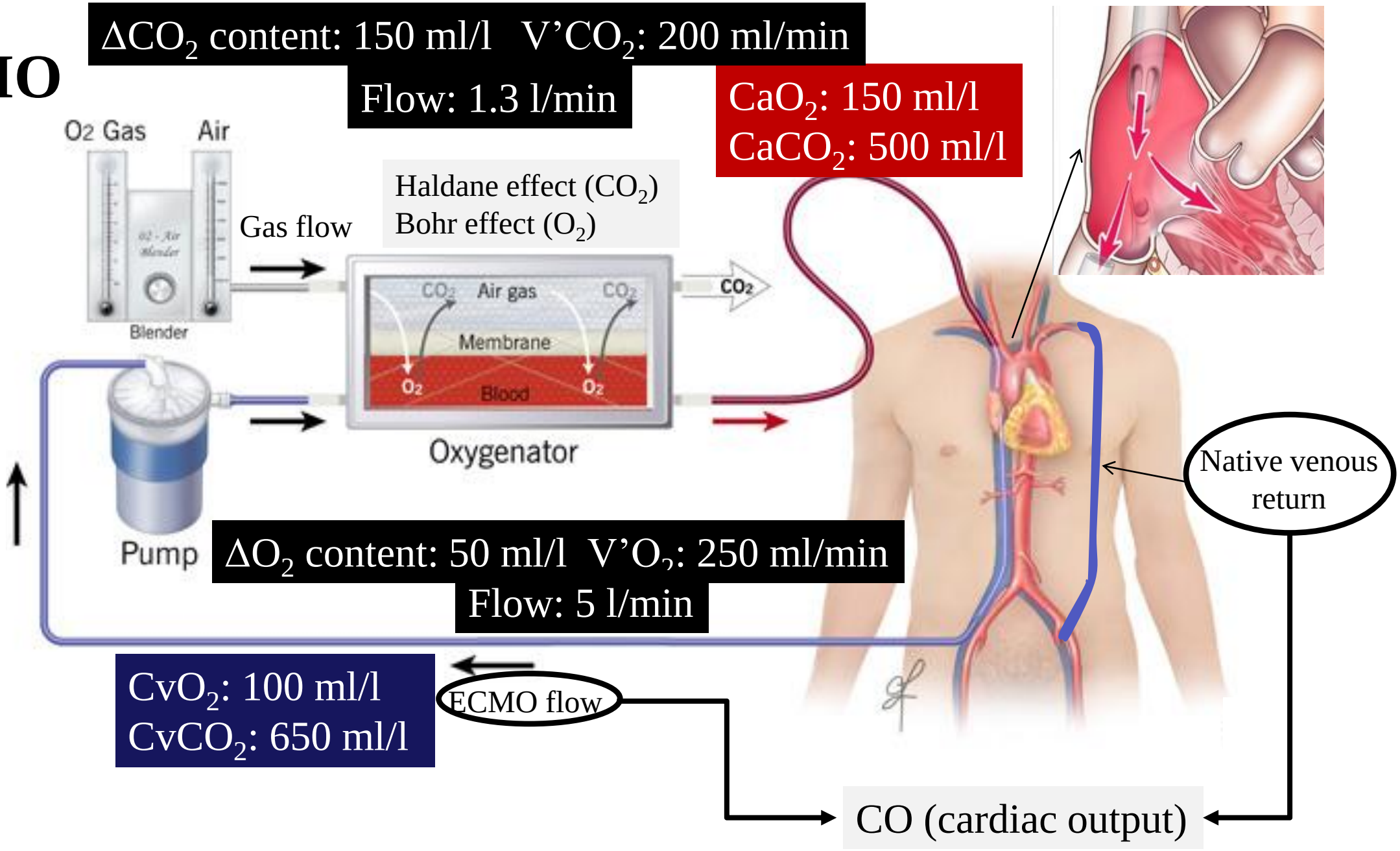
*Intensive Care Medicine Department,*
*University Hospital of Heraklion,*
*University of Crete,*
*Heraklion, Crete, Greece*

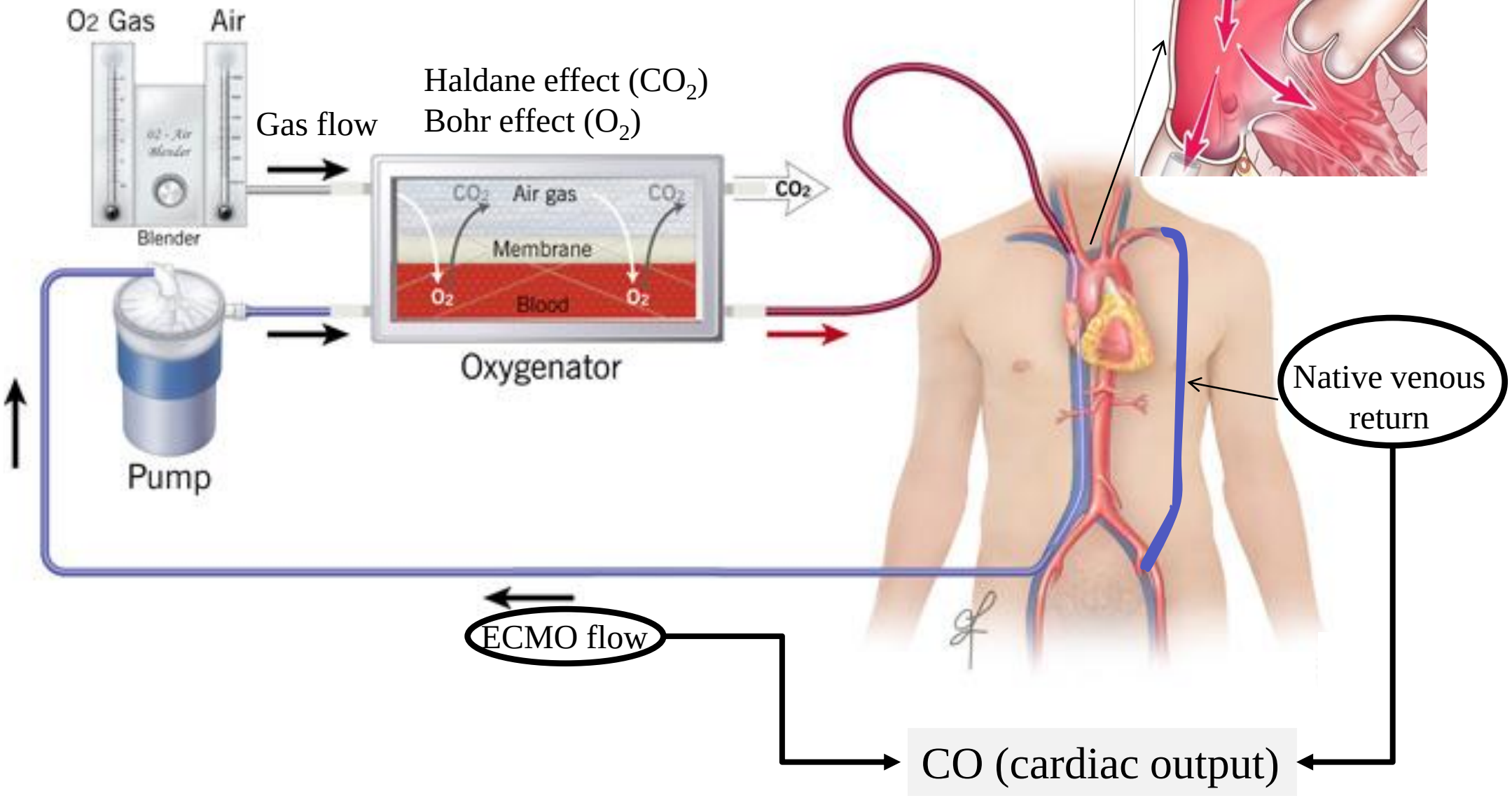
# Conflict of interest

None

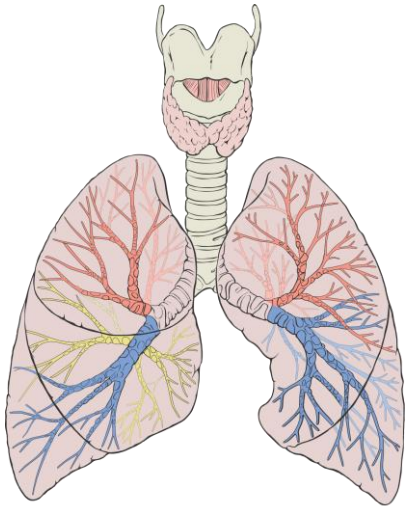
# ARDS
# vv- ECMO


ΔCO2 content: 150 ml/l V'CO2: 200 ml/min
Flow: 1.3 l/min
CaO2: 150 ml/l
CaCO2: 500 ml/l
O2 Gas
Air
Blender
Gas flow
Haldane effect (CO2)
Bohr effect (O2)
CO2
Air gas
CO2
Membrane
O2
Blood
O2
CO2
Oxygenator
Pump
Native venous return
ΔO2 content: 50 ml/l V'O2: 250 ml/min
Flow: 5 l/min
CvO2: 100 ml/l
CvCO2: 650 ml/l
ECMO flow
CO (cardiac output)

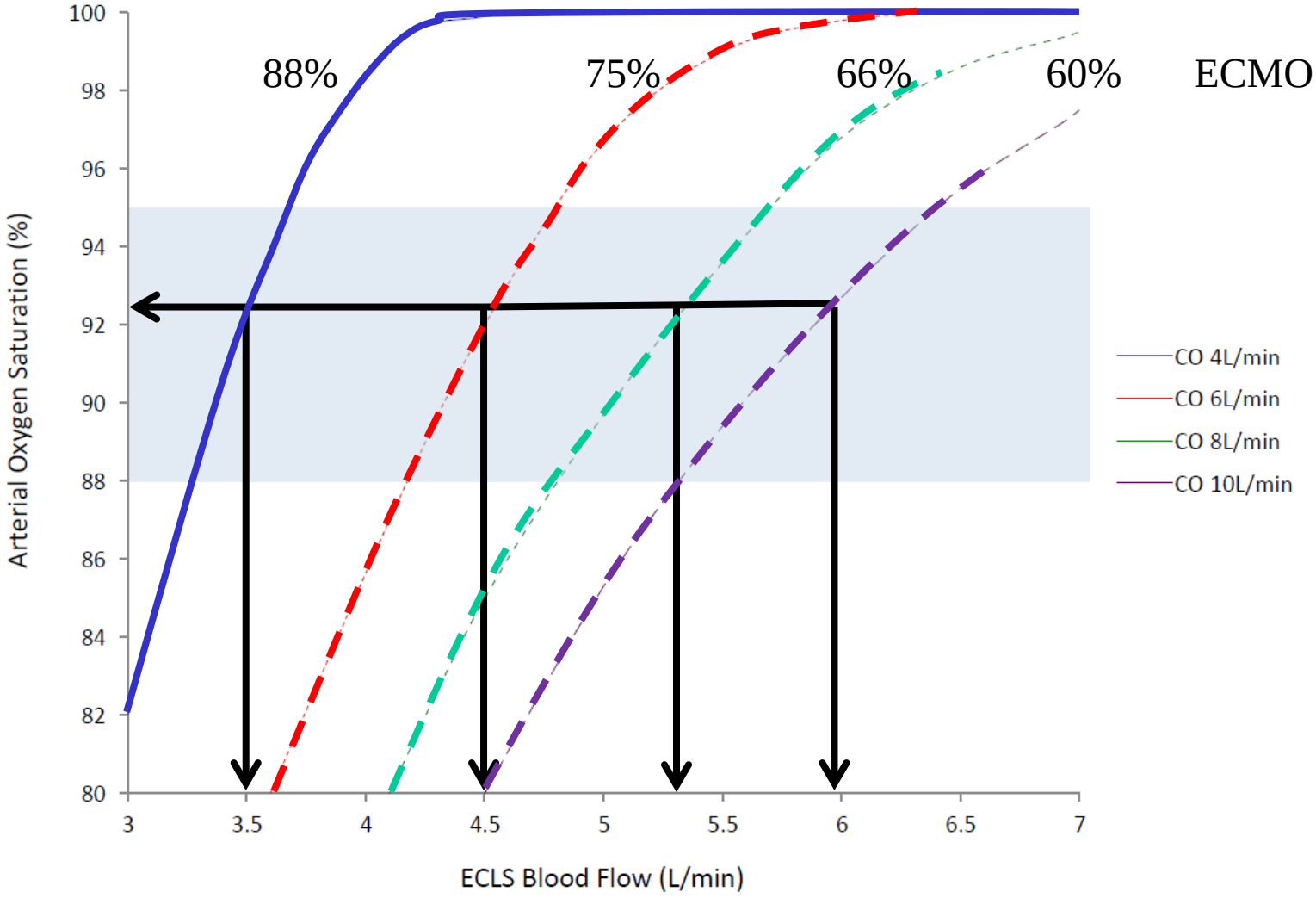
# Η αποτελεσματικότητα του συστήματος εξαρτάται κυρίως από το κλάσμα ECMO flow/Cardiac output (≥ 2/3)

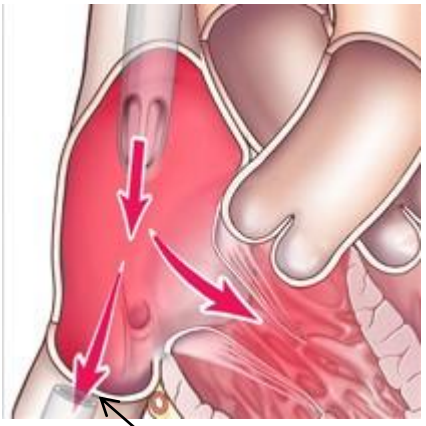


# Model analysis



**No lung function**



**15% ECMO flow**

*Abrams et al. Am J Respir Crit Care Med 2019; in press*

PINK FLOYD

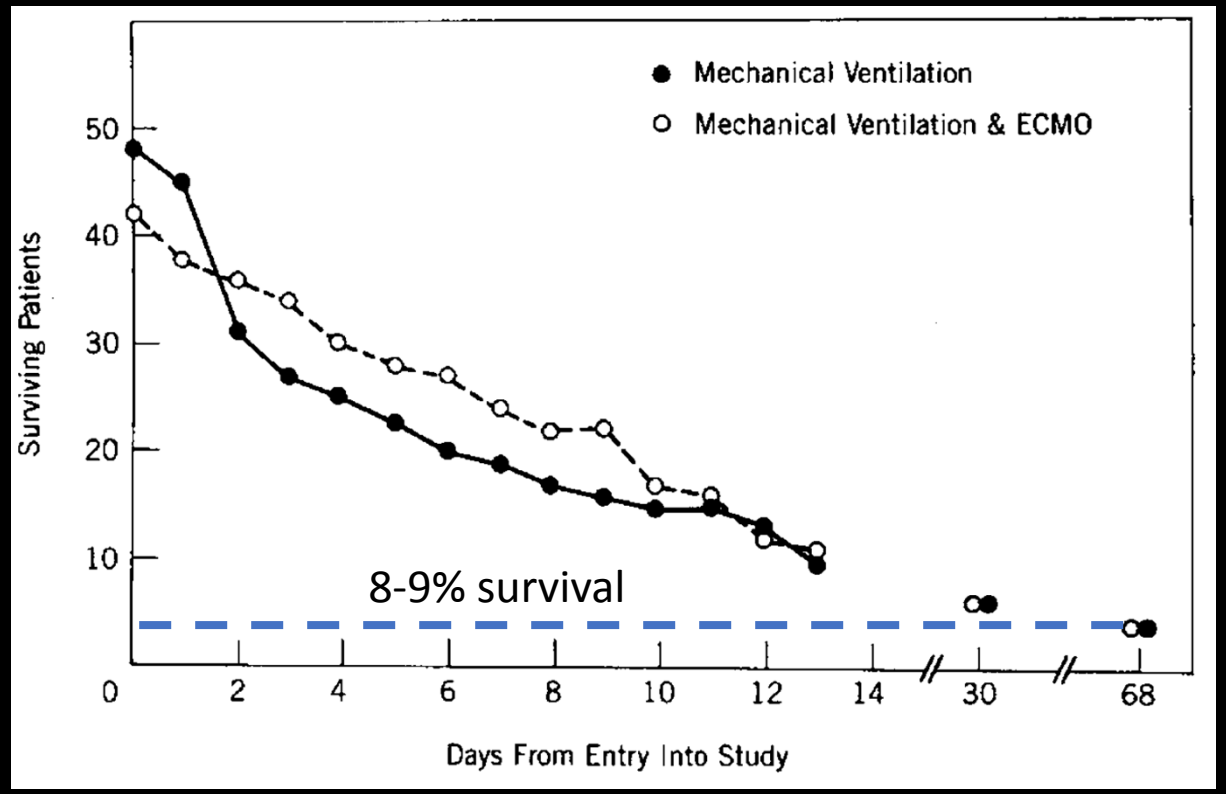
THE DARK SIDE OF THE MOON

## 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; Robert J. Fallat, MD; Robert H. Bartlett, MD; L. Henry Edmunds, MD; Alan H. Morris, MD; E. Converse Peirce II, MD; Arthur N. Thomas, MD; Herbert J. Proctor, MD; Philip A. Drinker, PhD; Philip C. Pratt, MD; Anna Bagniewski, MA; Rupert G. Miller, Jr, PhD



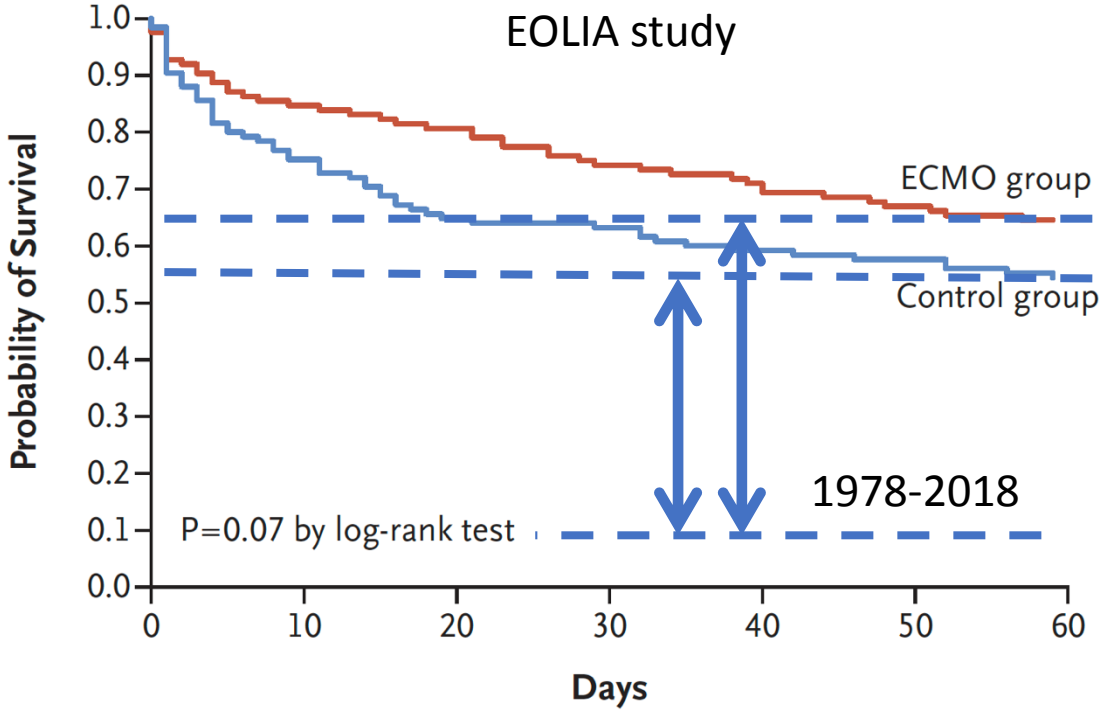

## 2018

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MAY 24, 2018 VOL. 378 NO. 21

# Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Distress Syndrome

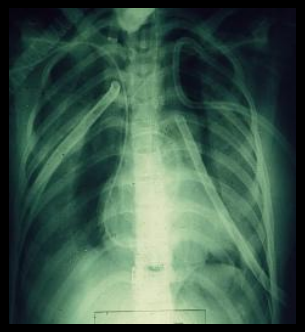
A. Combes, D. Hajage, G. Capellier, A. Demoule, S. Lavoué, C. Guervilly, D. Da Silva, L. Zafrani, P. Tirot, B. Veber, E. Maury, B. Levy, Y. Cohen, C. Richard, P. Kalfon, L. Bouadma, H. Mehdaoui, G. Beduneau, G. Lebreton, L. Brochard, N.D. Ferguson, E. Fan, A.S. Slutsky, D. Brodie, and A. Mercat, for the EOLIA Trial Group, REVA, and ECMONet*



# Goals of Management in ARDS

Modified from Tonetti et al. Ann Transl Med. 2017;5:286

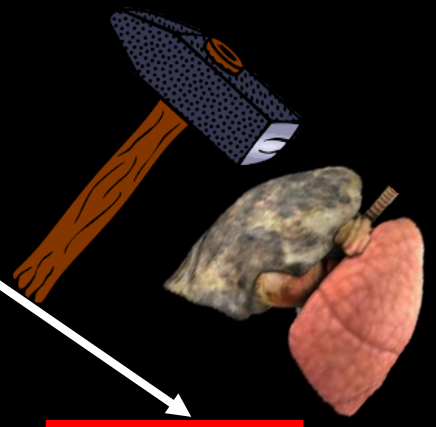
40 χρόνια



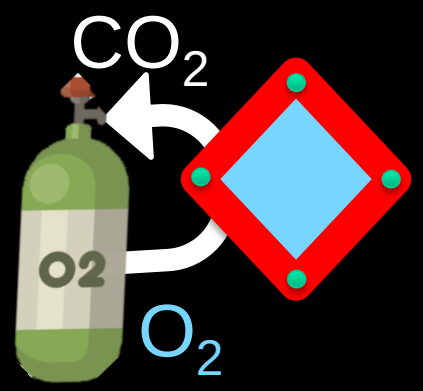
Barotrauma

Volutrauma

Atelect-biotrauma
(Homogeneity)

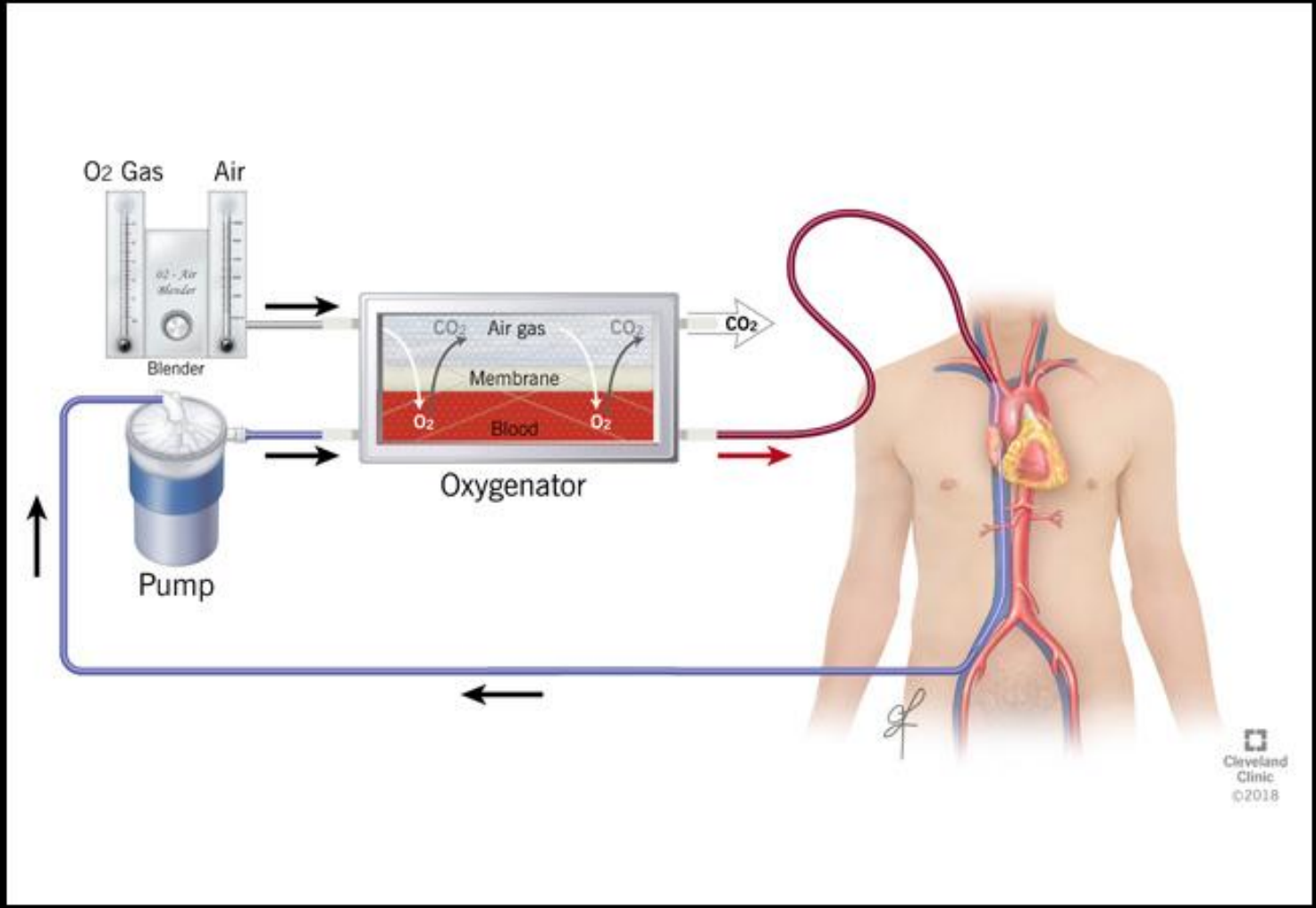


Ergotrauma




Maintain Oxygenation
At all cost

# ECMO σε ασθενείς με ARDS: Πότε πρέπει να εξετασθεί?



# Ερωτήσεις

1. Είναι η παθολογία αναστρέψιμη?
2. Έχει ο ασθενής πιθανότητες να αναρρώσει?

Επιλογή ασθενών

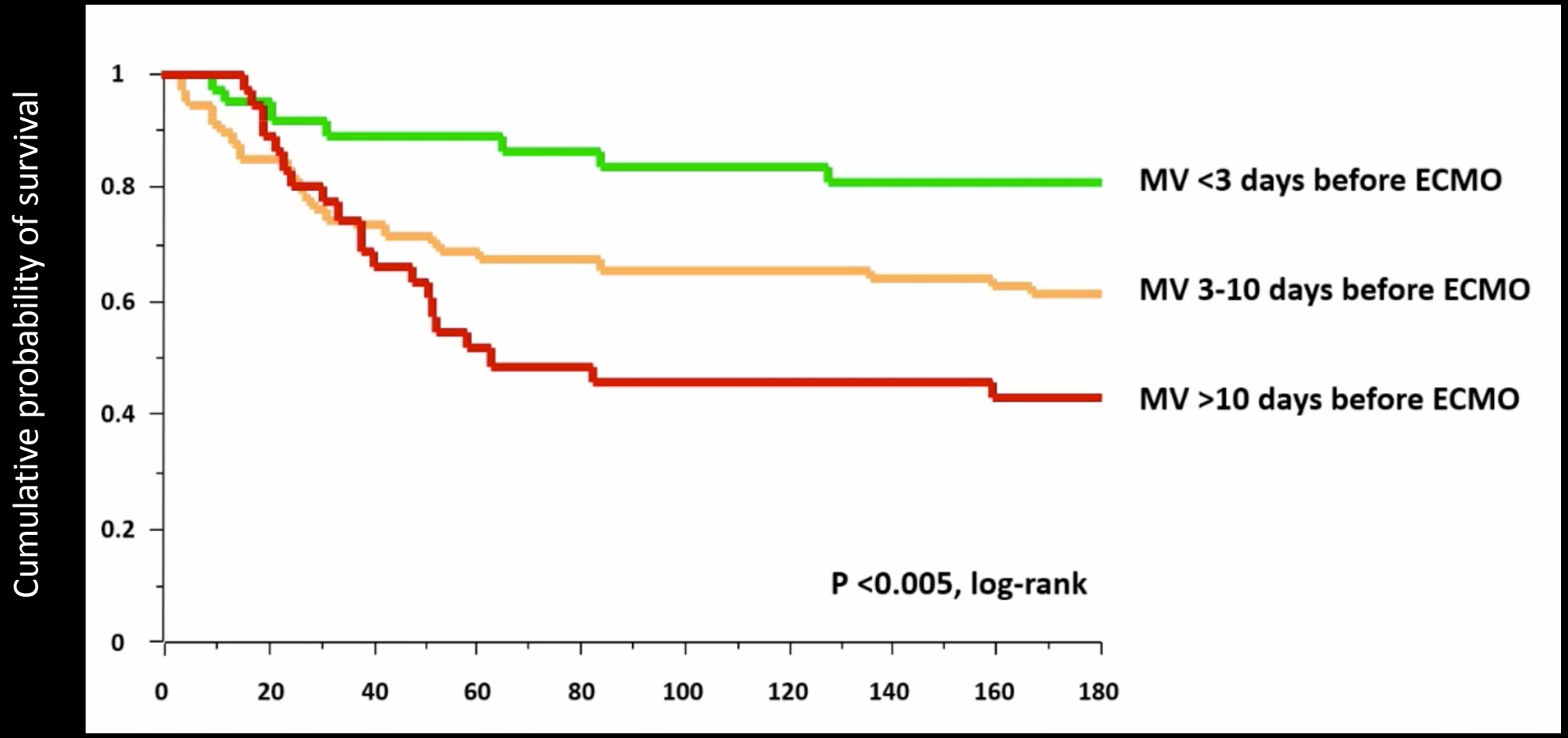
3. Είναι η ανταλλαγή των αερίων επικίνδυνη για τη ζωή?
4. Είναι ο μηχανικός αερισμός βλαπτικός?

Χρονική ένδειξη

# ECMO σε ασθενείς με ARDS: Πότε να αρχίσουμε?

ΝΩΡΙΣ

# Η πιθανότητα επιβίωσης ελαττώνεται όσο αυξάνονται οι ημέρες μηχανικού αερισμού




*Schmidt et al ; Intensive Care Med (2013) 39:1704–1713*

# ΕΝΔΕΙΞΕΙΣ VV-ECMO (EOLIA)

< 7 days of Mechanical Ventilation

One of these criteria despite $FiO_2$ > 0.8 ; Vt 6 mL/Kg IBW, PEEP > 10 $cmH_2O$:

- $PaO_2/FiO_2$ < 50 mmHg for > 3 hours

or

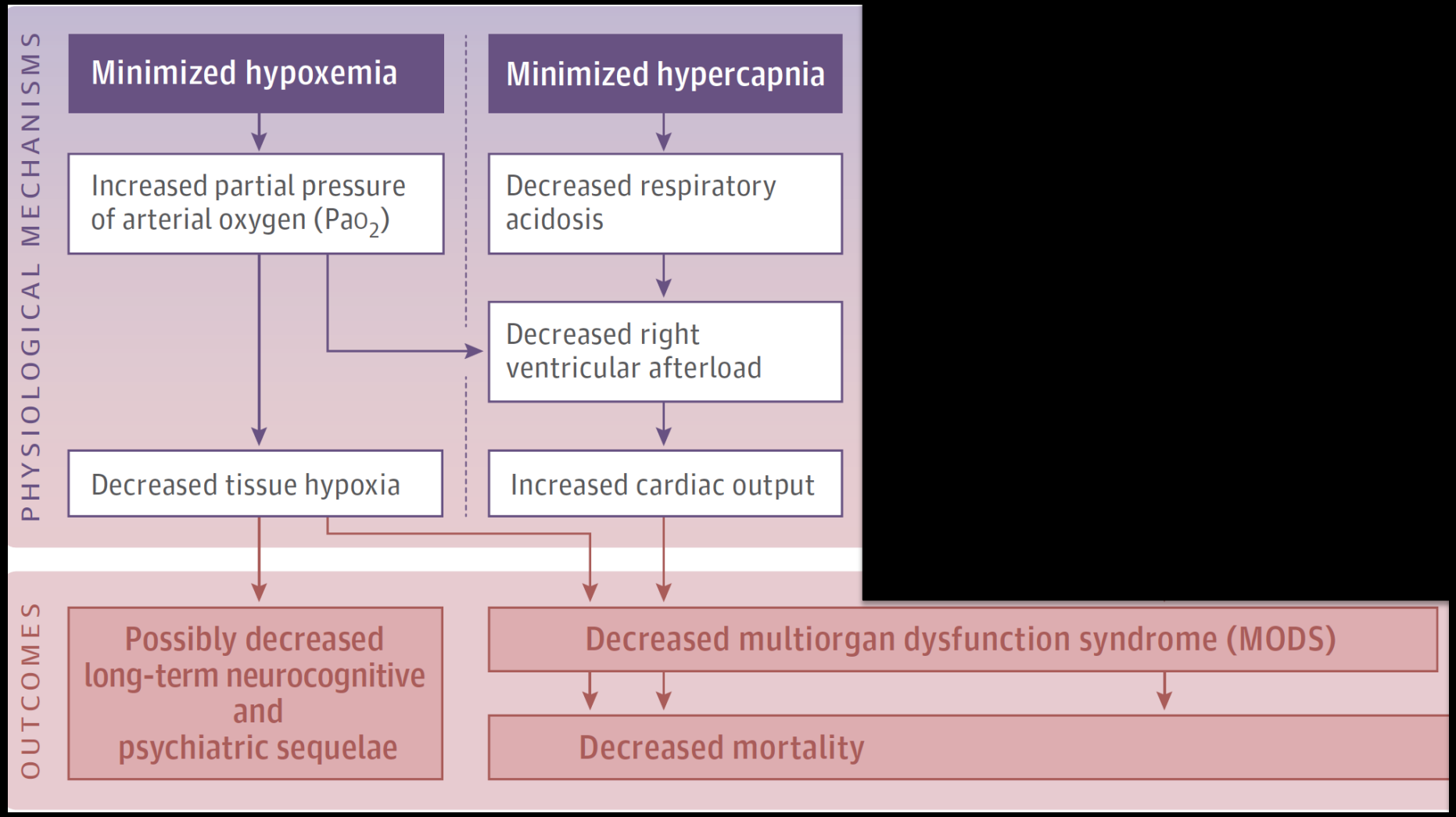
- $PaO_2/FiO_2$ < 80 mmHg for > 6 hours

or

- pH < 7.25 ($PaCO_2$ > 60 mmHg) for > 6 hours despite RR to 35/min

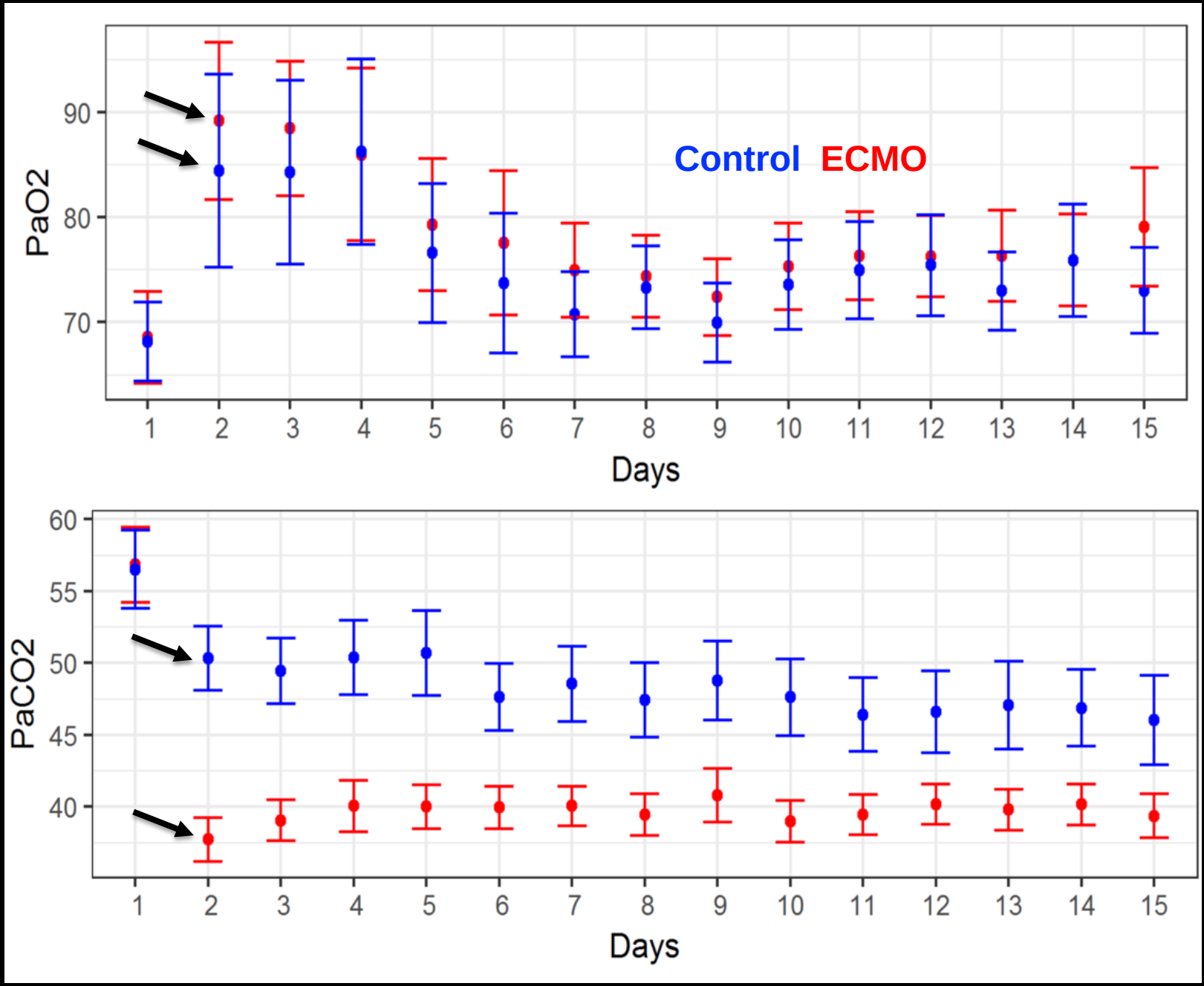
*N Engl J Med 2018*

# Πιθανοί μηχανισμοί μεσω των οποίων η ECMO βελτιώνει τους ασθενείς με σοβαρό ARDS




Brodie *et al* JAMA August 13, 2019

# Gas Exchange




EOLIA – NEJM 2018

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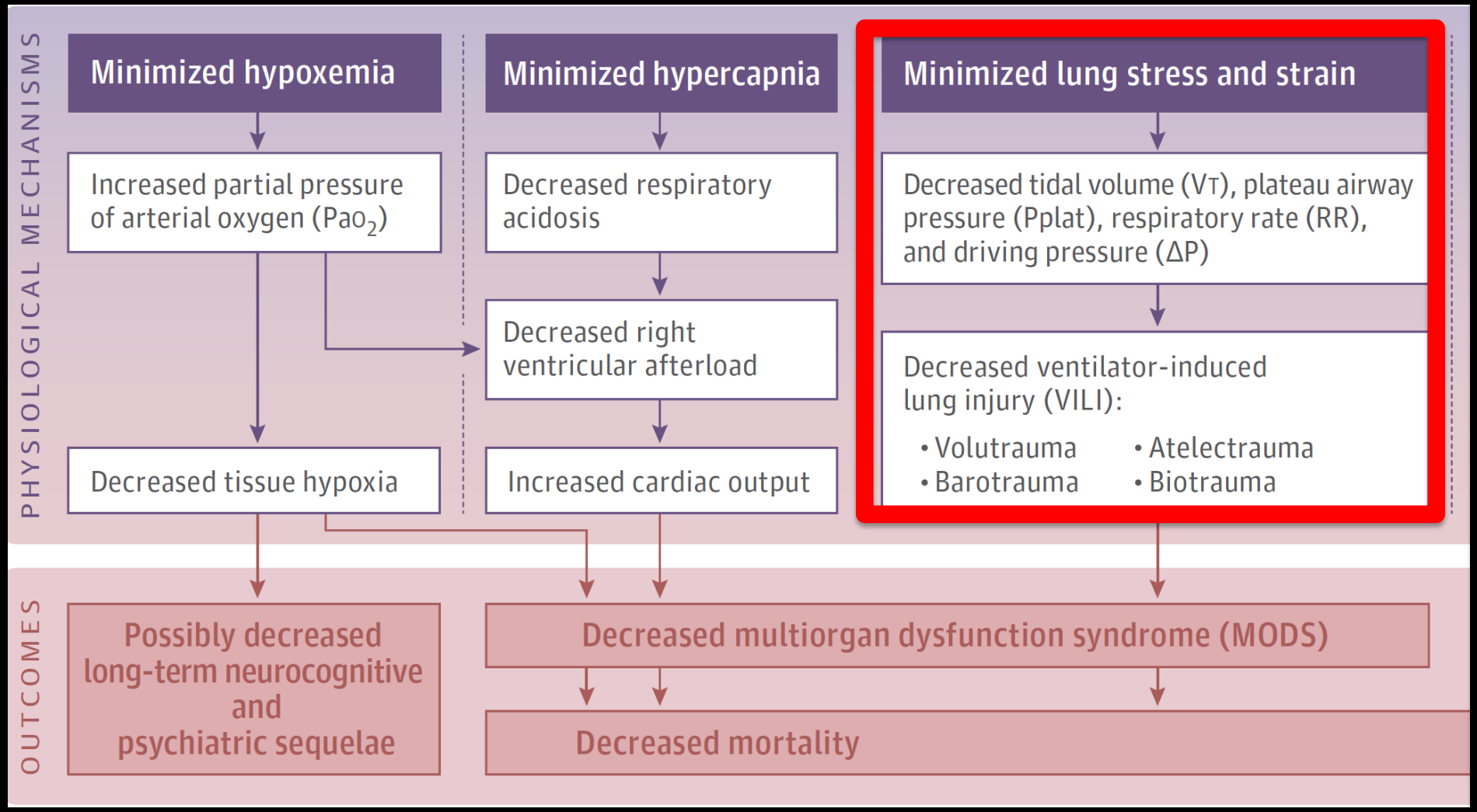
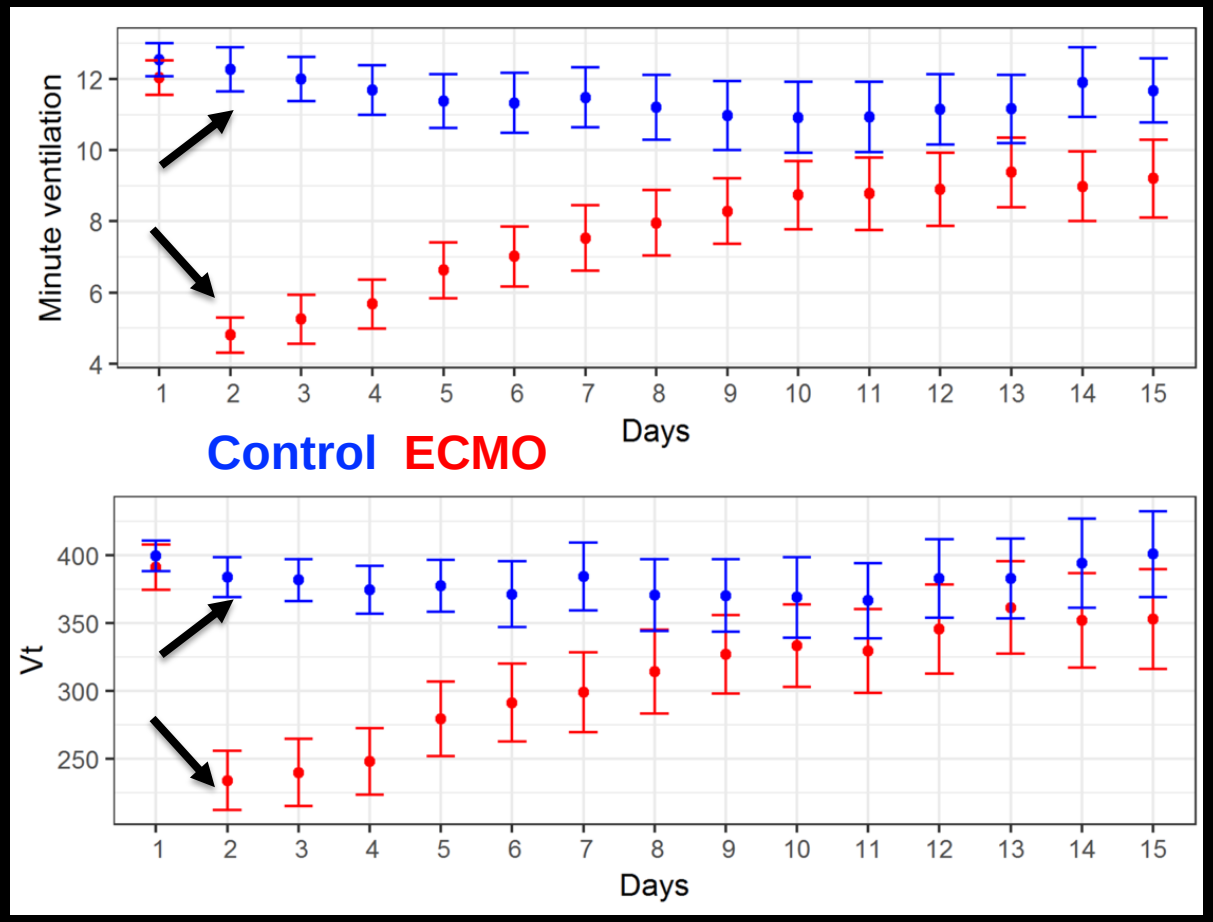
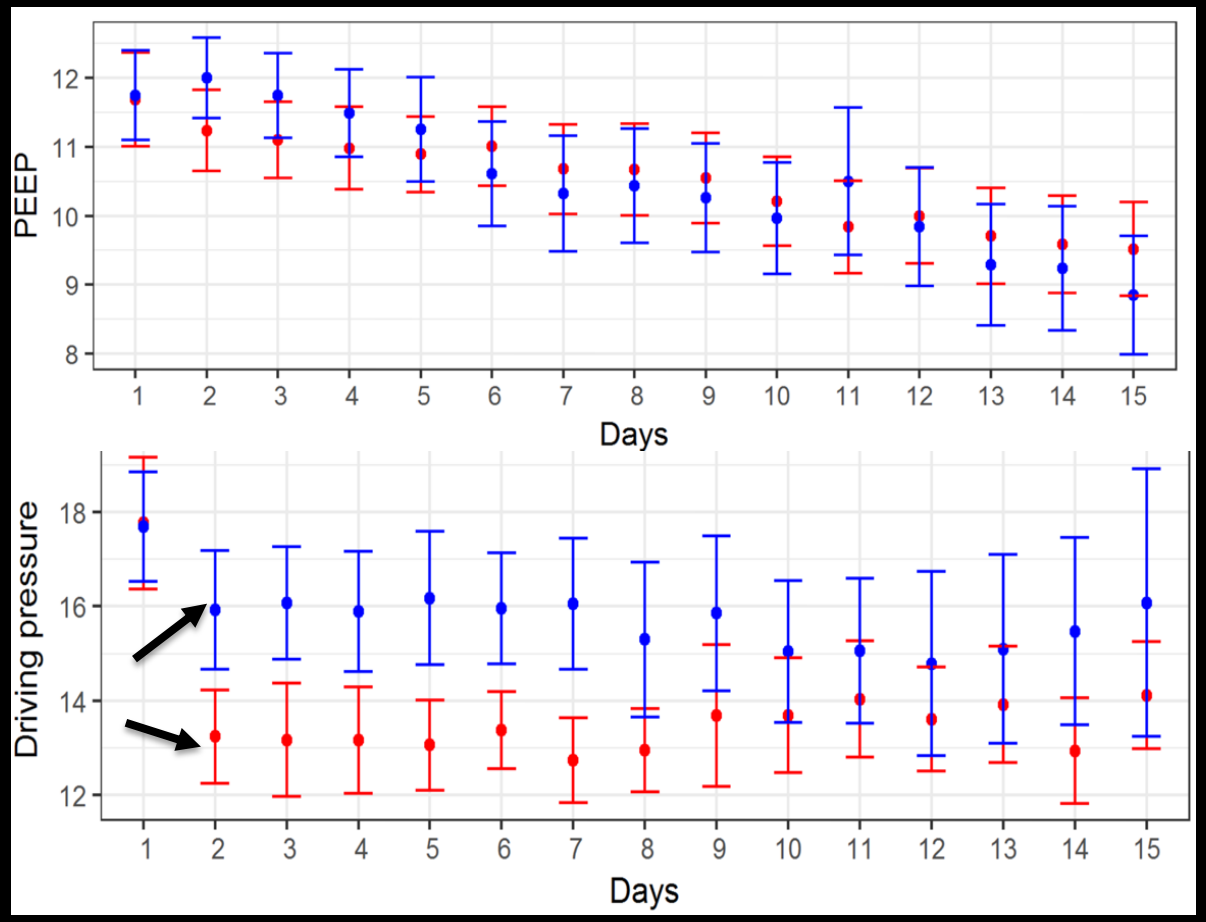



Brodie *et al* JAMA August 13, 2019

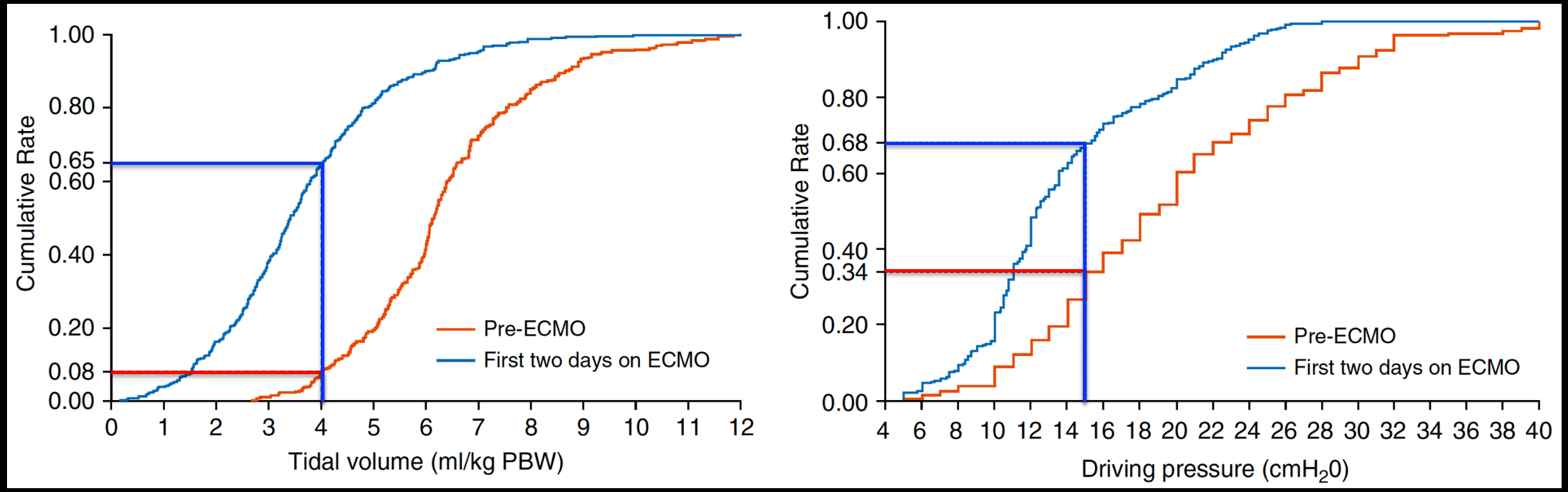
# ECMO allows reduction in MV




EOLIA – NEJM 2018

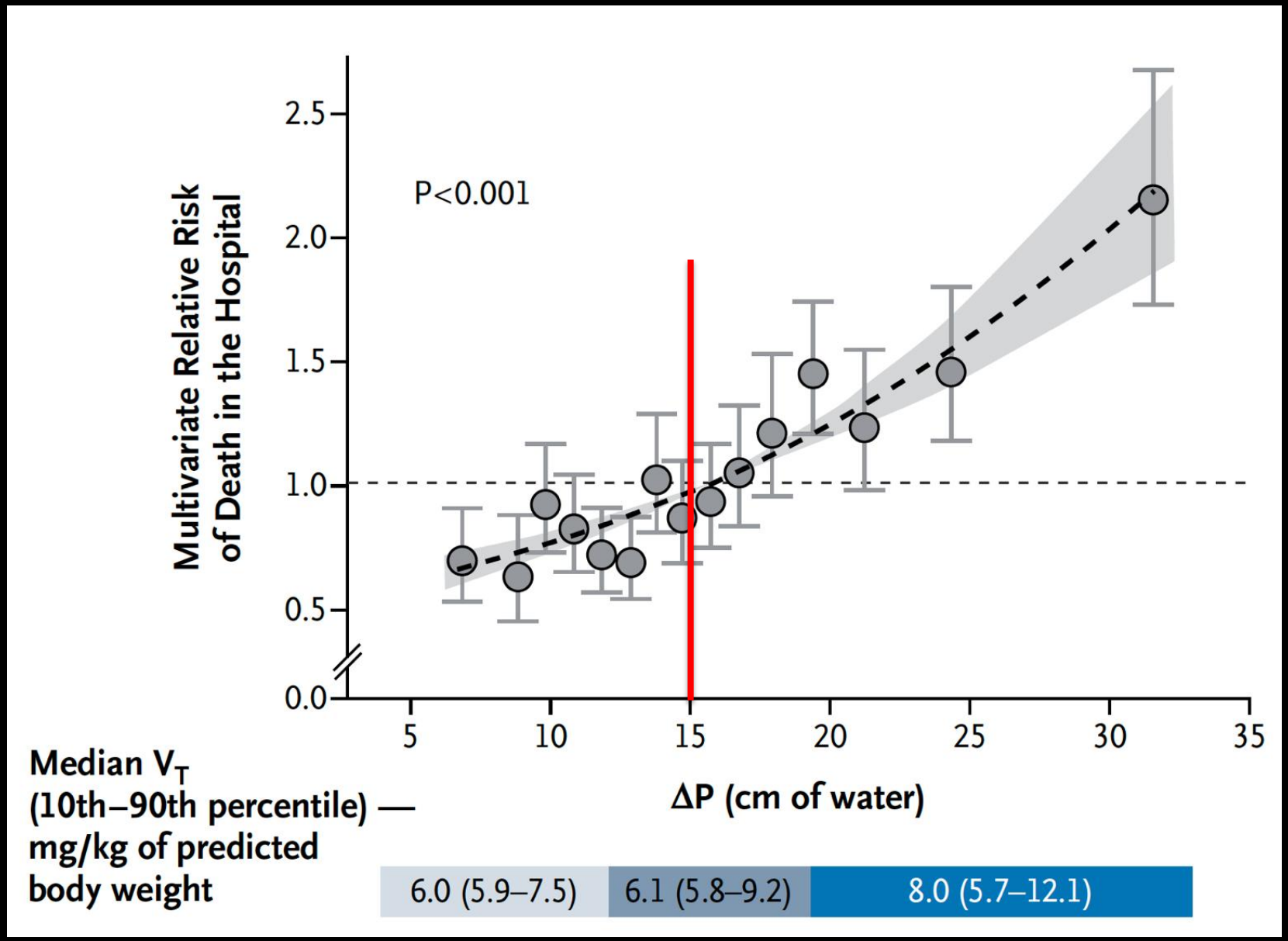
# ECMO allows ultra-low tidal volumes



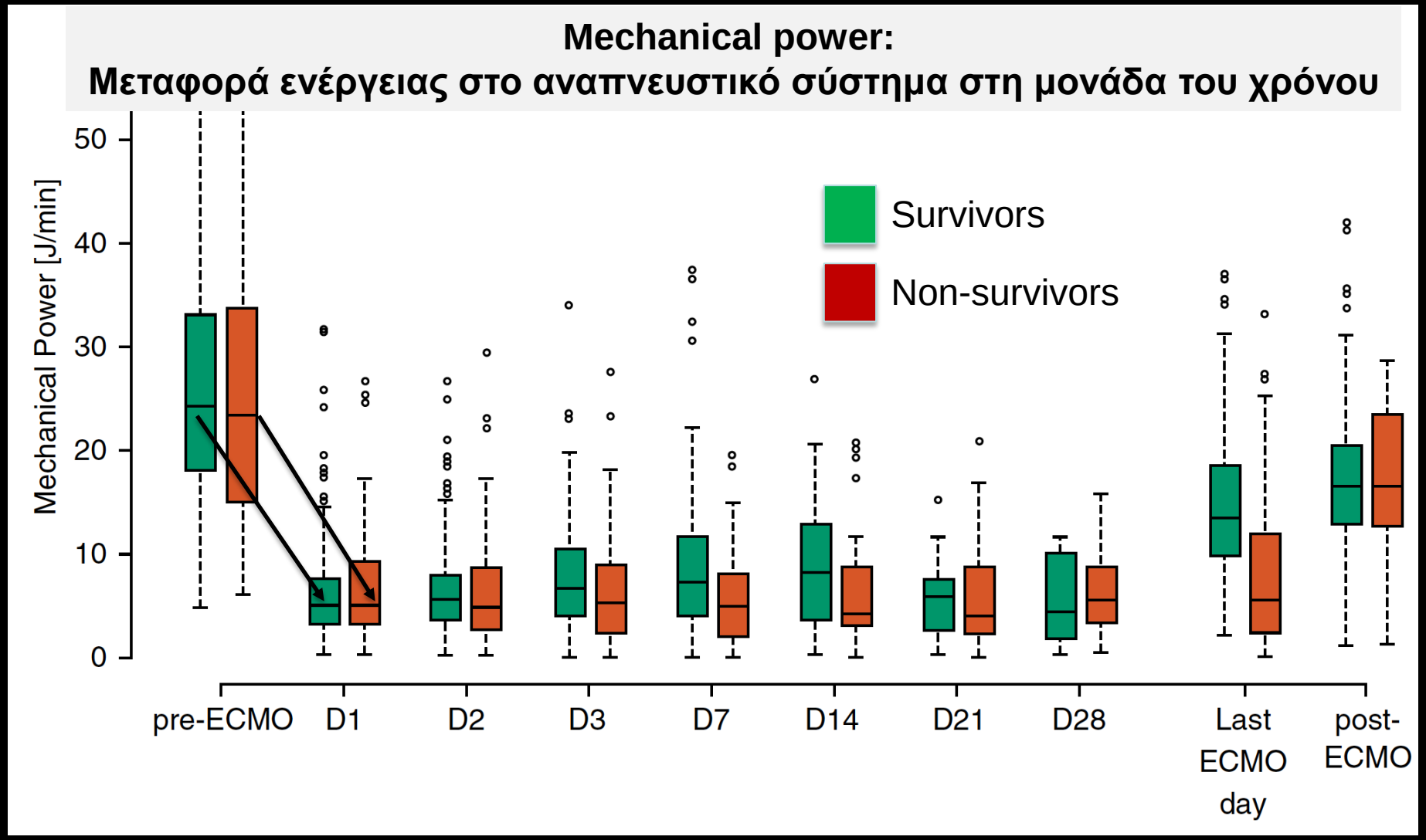

Schmidt *et al* AJRCCM. Oct 15, 2019 (LIFEGARDS)

# Scaling of Tidal volume to compliance: Driving Pressure

M. Amato; N Engl J Med 2015; 372:747-755



# Reduction in intensity of mechanical ventilation




*Schmidt et al Am J Respir Crit Care Med Oct 15, 2019 (LIFEGARDS)*

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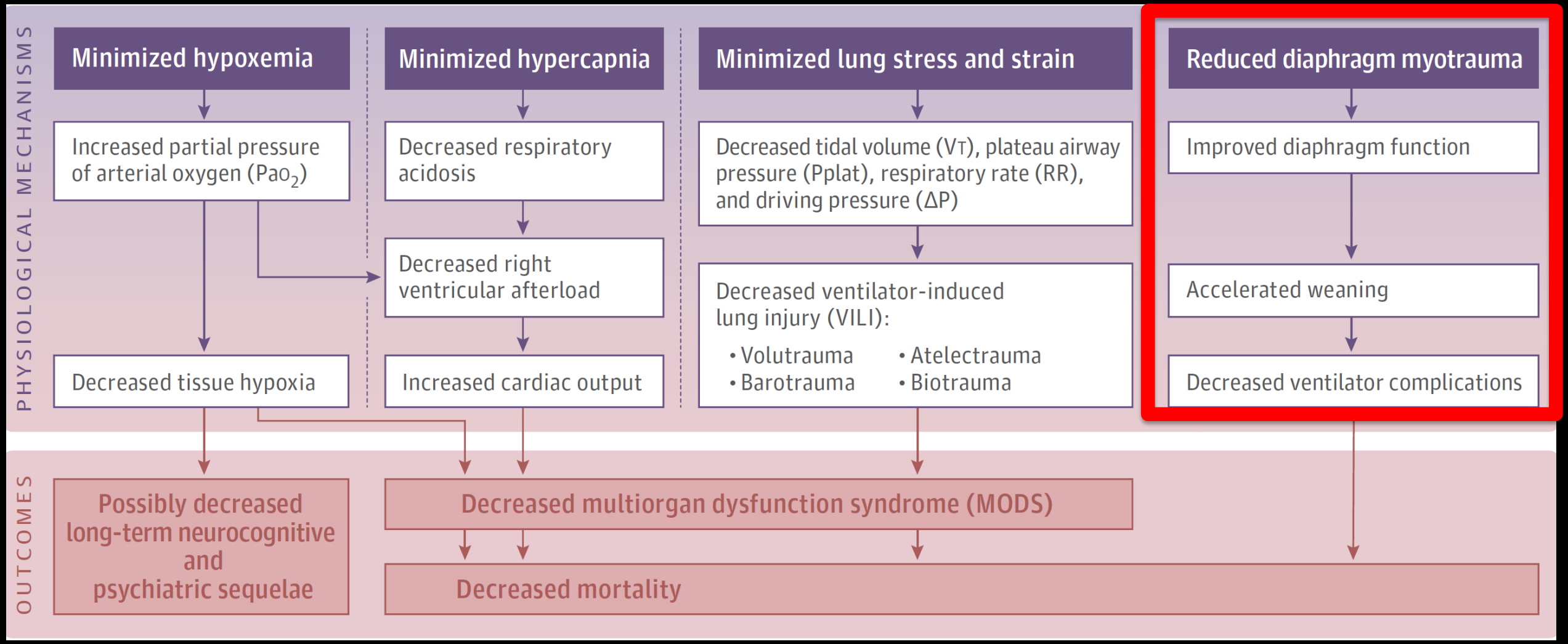



Brodie *et al* JAMA August 13, 2019

STATE OF THE ART

# Respiratory Drive in Critically Ill Patients

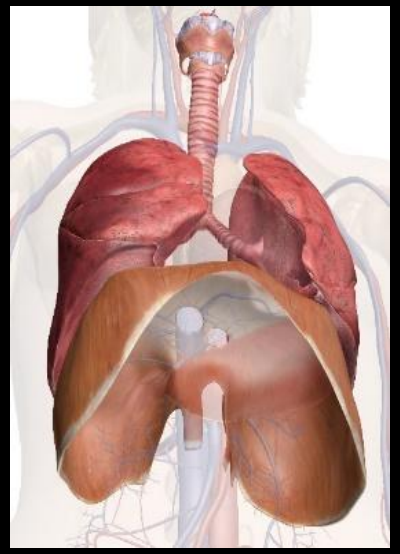
## Pathophysiology and Clinical Implications

*Am J Respir Crit Care Med Jan 1, 2020*

Katerina Vaporidi[1], Evangelia Akoumianaki[1], Irene Telias[2,3], Ewan C. Goligher[2,4,5], Laurent Brochard[2,3*‡], and Dimitris Georgopoulos[1*]

[1]Department of Intensive Care Medicine, University Hospital of Heraklion, Medical School University of Crete, Heraklion, Greece; [2]Interdepartmental Division of Critical Care Medicine, University of Toronto, Toronto, Ontario, Canada; [3]Keenan Research Center and Li Ka Shing Knowledge Institute, St. Michael's Hospital, Toronto, Ontario, Canada; [4]Department of Medicine, University Health Network, Toronto, Ontario, Canada; and [5]Toronto General Hospital Research Institute, Toronto, Ontario, Canada

Respiratory drive =
*(Αναπνευστική ώση)*



Pmus/breath

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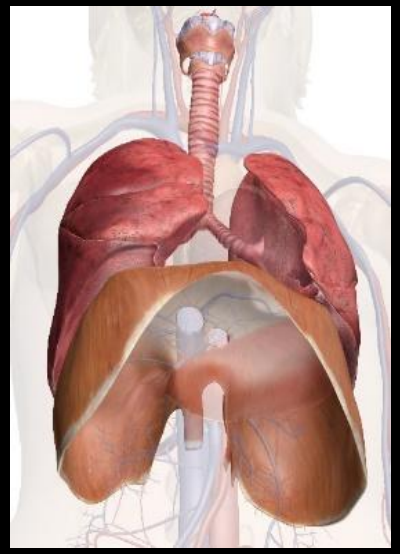
Respiratory drive= zero/low

(passive mechanical ventilation/overassist)



Pmus/breath

Diaphragmatic atrophy (myo-trauma)

*Vasilakopoulos Thorax 2016*
*Goligher et al. AJRCCM 2018*

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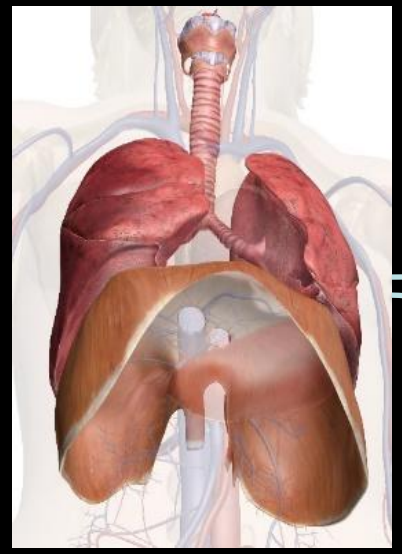
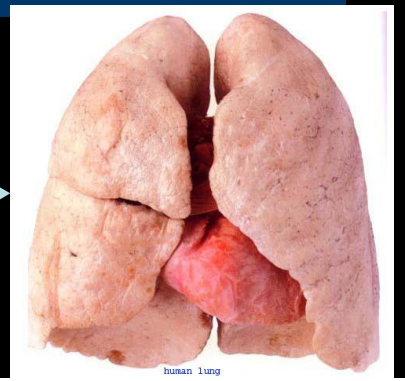
During acute phase

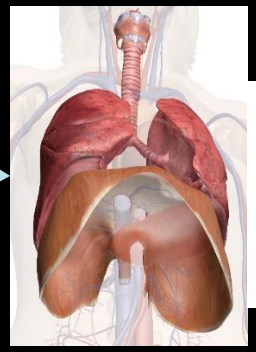
High Respiratory drive



↑↑↑Pmus/breath




Patient self inflicted lung injury (P-SILI)
(Takeshi et al. AJRCCM 2917)



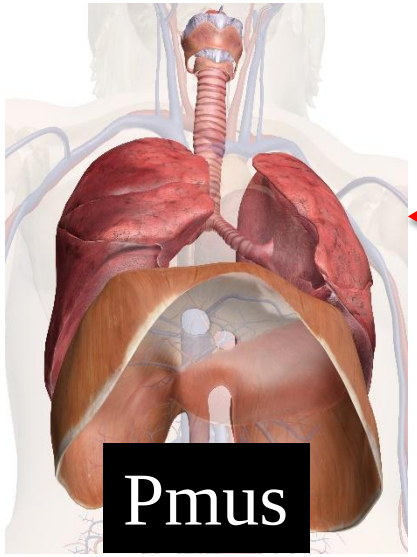
Diaphragmatic damage (hypertrophy/myo-trauma)
(Goligher et al. Lancet Respir Med 2019
Vasilakopoulos Thorax 2016)

# MESSAGE

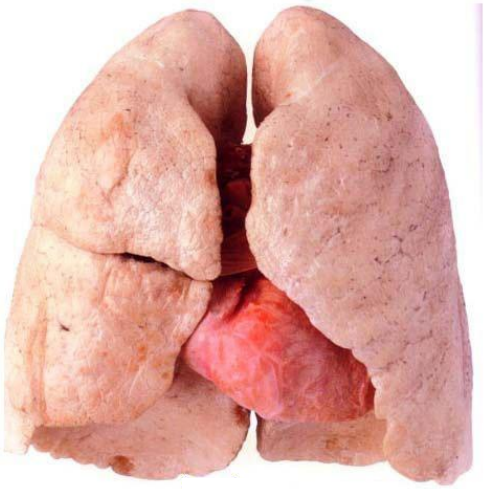
No drive
(passive ventilation)

High drive
(spontaneous breathing during acute phase of ARDS)

Myo-trauma
(Atrophy)




Myo-trauma
(Hypertrophy)



P-SILI

*For review: Vaporidi et al. Am J Respir Crit Care Med Jan 1, 2020*

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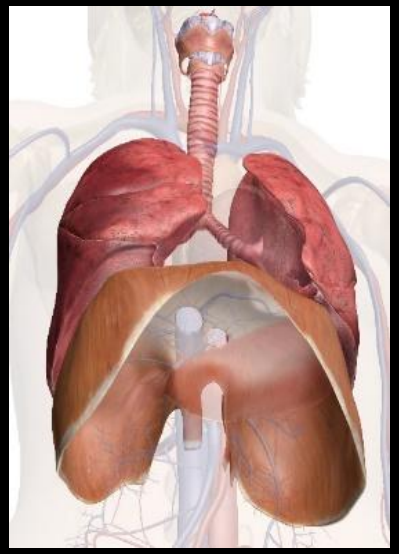
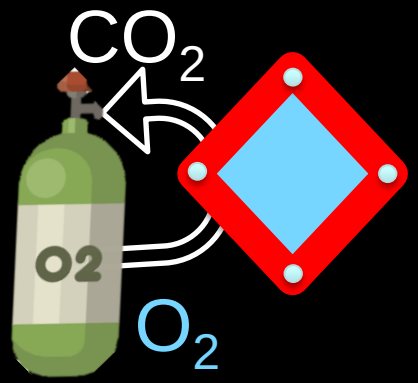
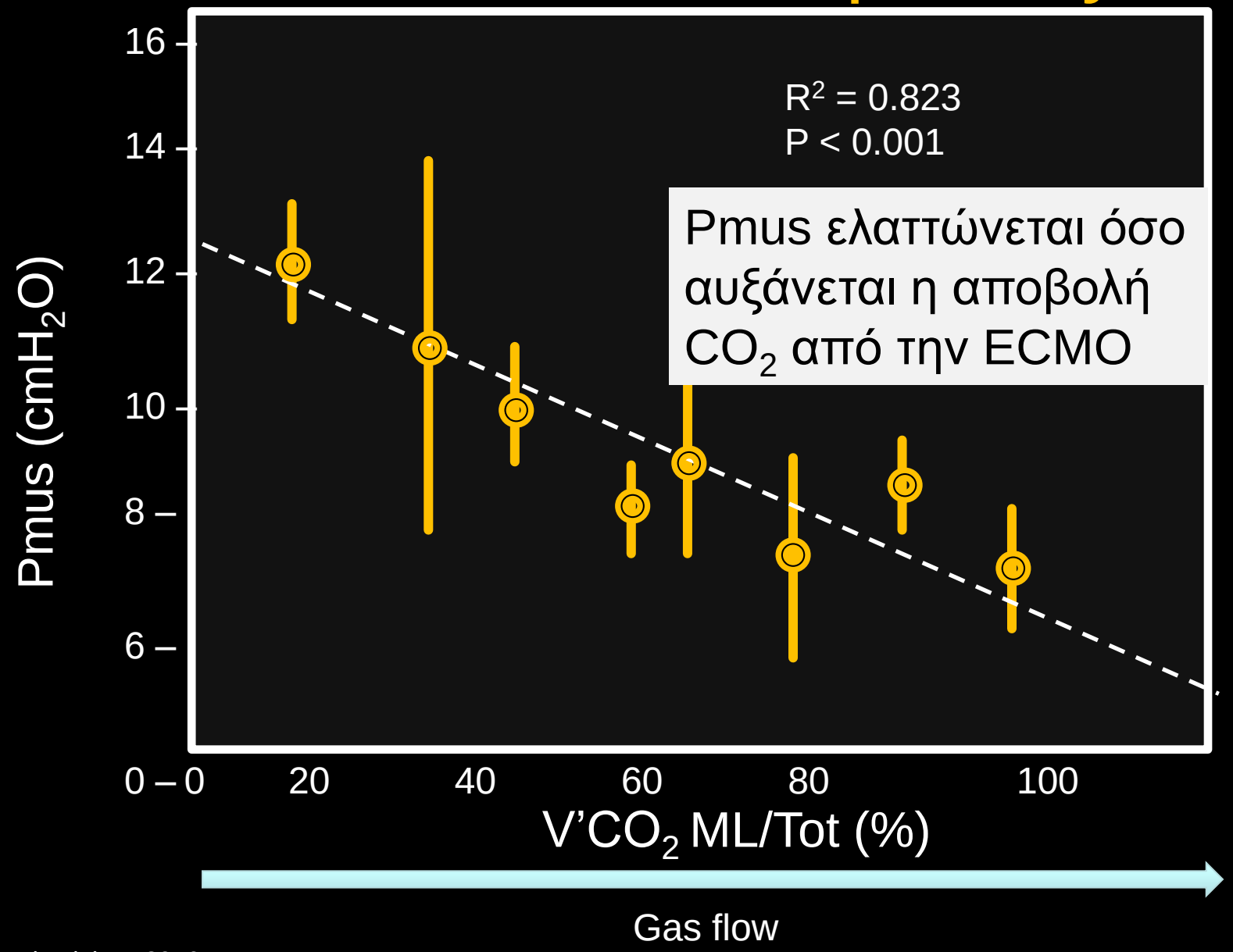
Respiratory drive =  is mainly controlled by $PaCO_2$

Pmus/breath



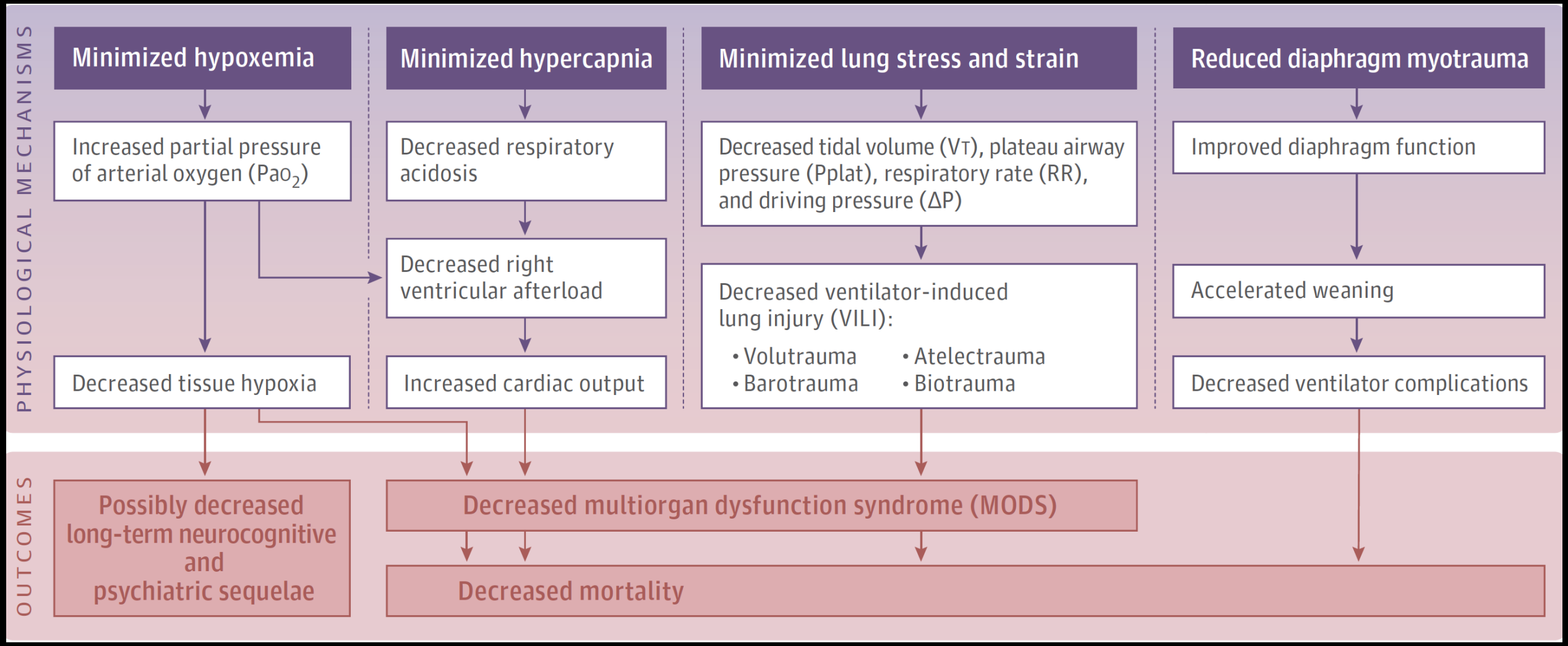

ECMO can control the respiratory drive during the acute phase of ARDS

# Effect of ECMO on Respiratory effort



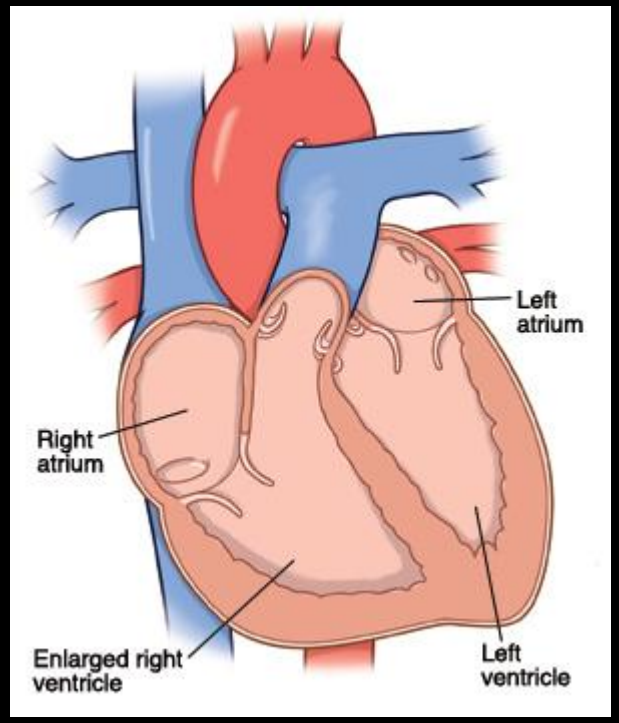

Modified from Mauri et al; Anesthesiology 2016

# Πιθανοί μηχανισμοί μέσω των οποίων η ECMO βελτιώνει τους ασθενείς με σοβαρό ARDS

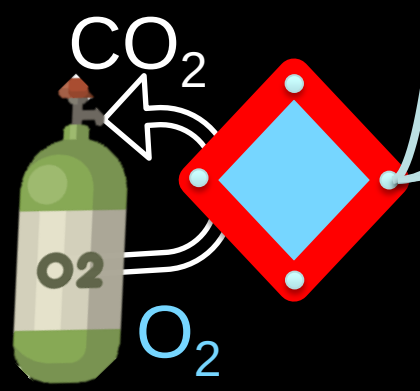



Brodie *et al* JAMA August 13, 2019

# Παράγοντες κινδύνου για δεξιά καρδιακή ανεπάρκεια




| | OR | Score |
|---|---|---|
| Pneumonia as cause of ARDS | 2.73 | 1 |
| Driving Pressure > 18 $cmH_2O$ | 2.28 | 1 |
| $PaO_2/FiO_2$ < 150 mmHg | 2.6 | 1 |
| $PaCO_2$ > 48 mmHg | 2.39 | 1 |
| Score | | 0-4 |




*Mekontso Dessap et at: Intensive Care Med (2016) 42:862–870*

# Καμιά αμφιβολία!

PINK FLOYD

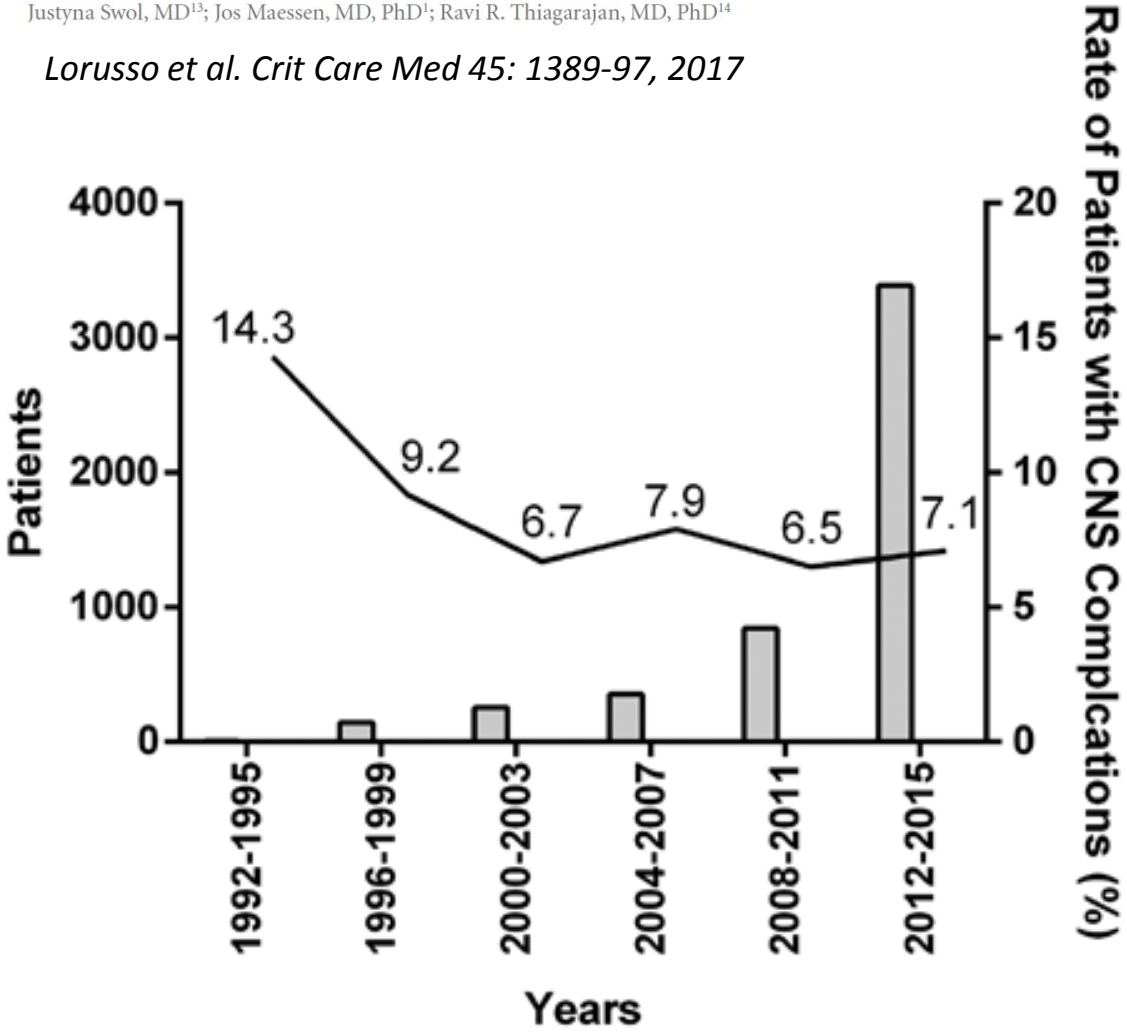
THE DARK SIDE OF THE MOON

# Νευρολογικές επιπλοκές

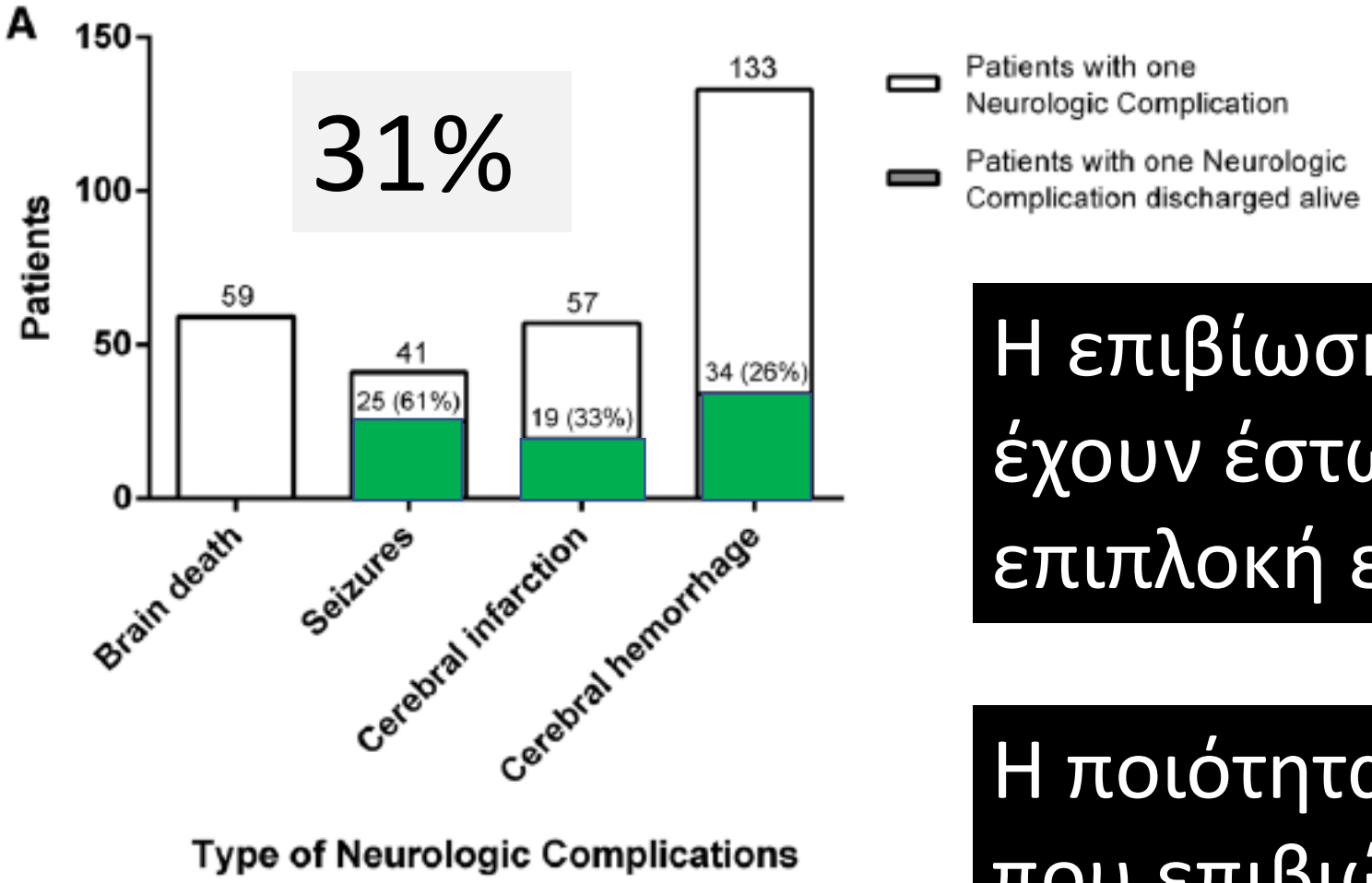
**Neurologic Injury in Adults Supported With Veno-Venous Extracorporeal Membrane Oxygenation for Respiratory Failure: Findings From the Extracorporeal Life Support Organization Database**

Roberto Lorusso, MD, PhD[1]; Sandro Gelsomino, MD, PhD[1]; Orlando Parise, MSc[1]; Michele Di Mauro, MD[2]; Fabio Barili, MD, PhD[3]; Gijs Geskes, MD[1]; Enrico Vizzardi, MD[4]; Peter T. Rycus, MPH[5]; Raf Muellenbach, MD, PhD[6]; Thomas Mueller, MD[7]; Antonio Pesenti, MD[8]; Alain Combes, MD, PhD[9]; Giles Peek, MD[10]; Bjorn Frenckner, MD, PhD[11]; Matteo Di Nardo, MD[12]; Justyna Swol, MD[13]; Jos Maessen, MD, PhD[1]; Ravi R. Thiagarajan, MD, PhD[14]

*Lorusso et al. Crit Care Med 45: 1389-97, 2017*




- **Hemorrhage (42.5%)**
- **Brain death (23.5%)**
- **Stroke (19.9%)**
- **Seizure events (14.1%)**

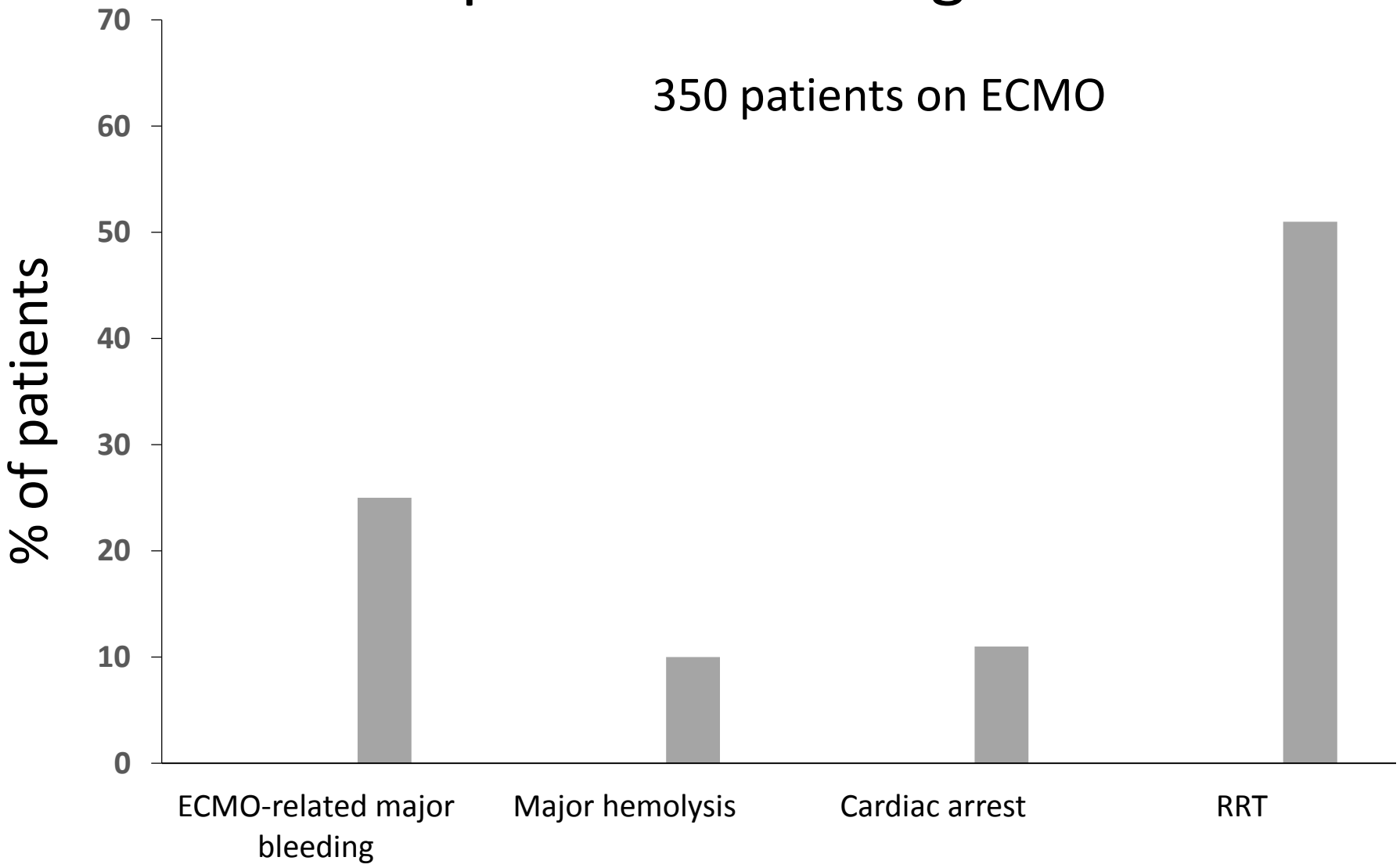



Η επιβίωση των ασθενών που έχουν έστω και μία νευρολογική επιπλοκή είναι πολύ μικρή

Η ποιότητα ζωής των ασθενών που επιβιώνουν είναι σχετικά φτωχή

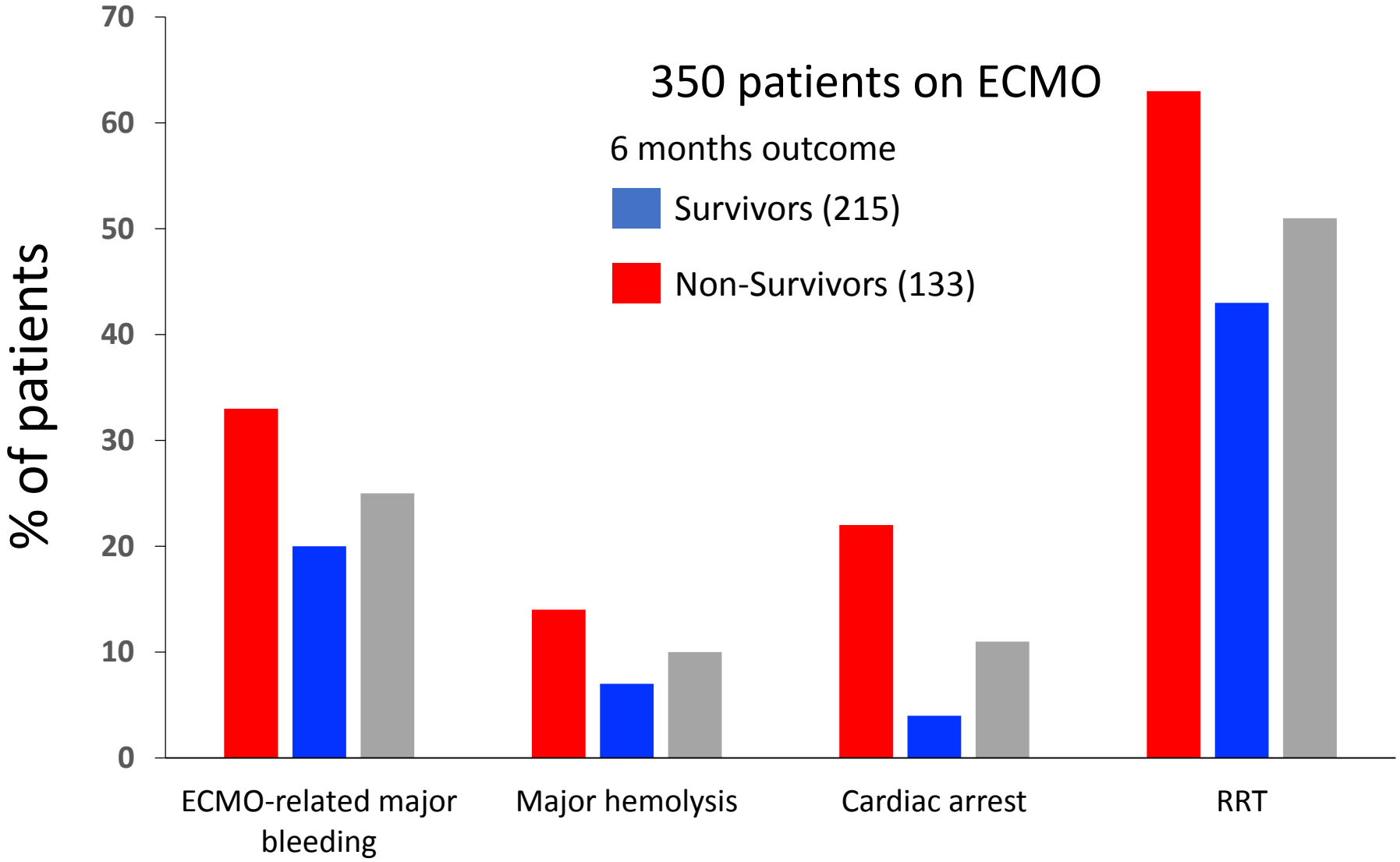
*Lorusso et al. Crit Care Med 45: 1389-97, 2017*

# Complications during ECMO



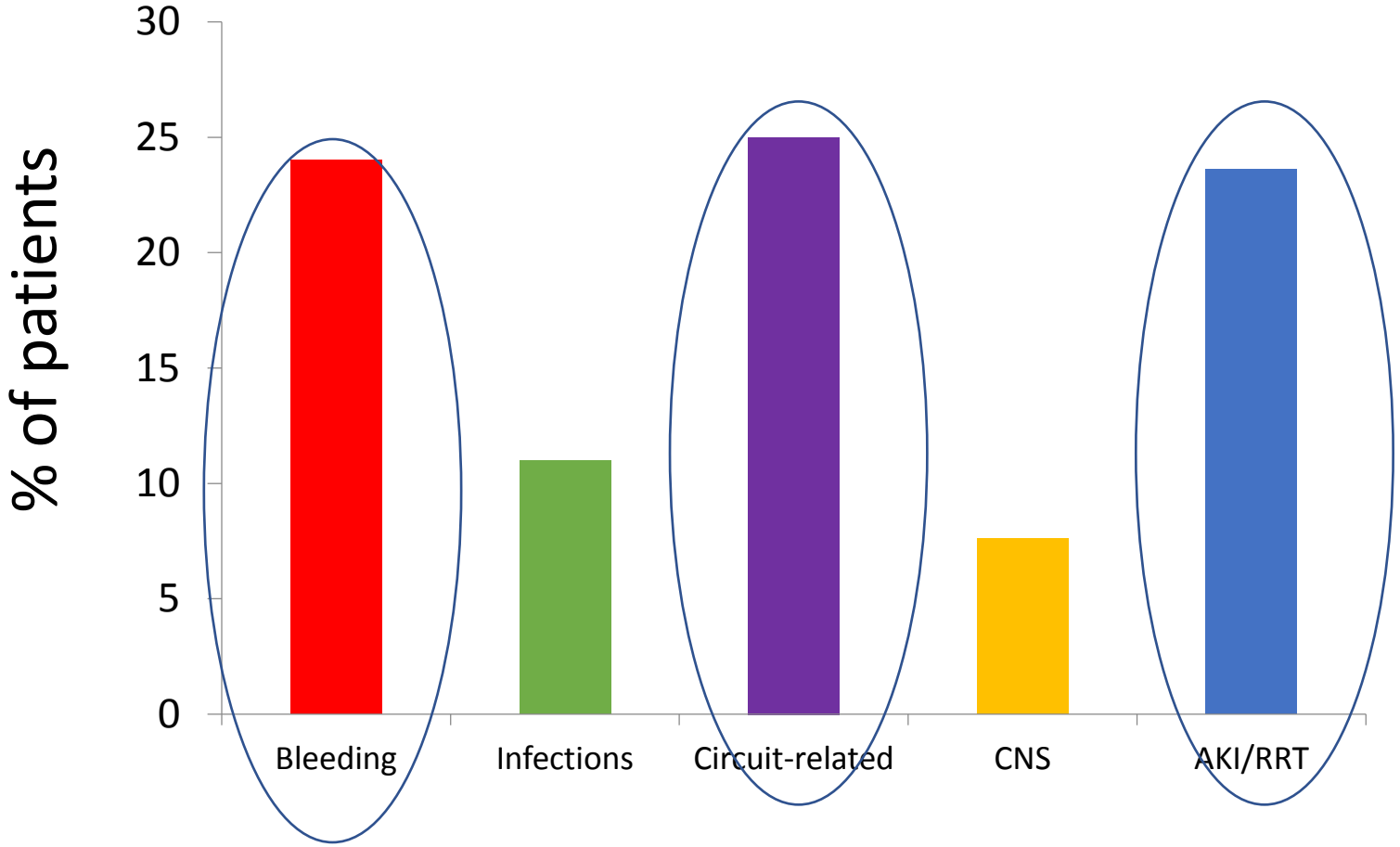

*Schmidt et al Am J Respir Crit Care Med Oct 15, 2019 (LIFEGARDS)*

# Complications during ECMO



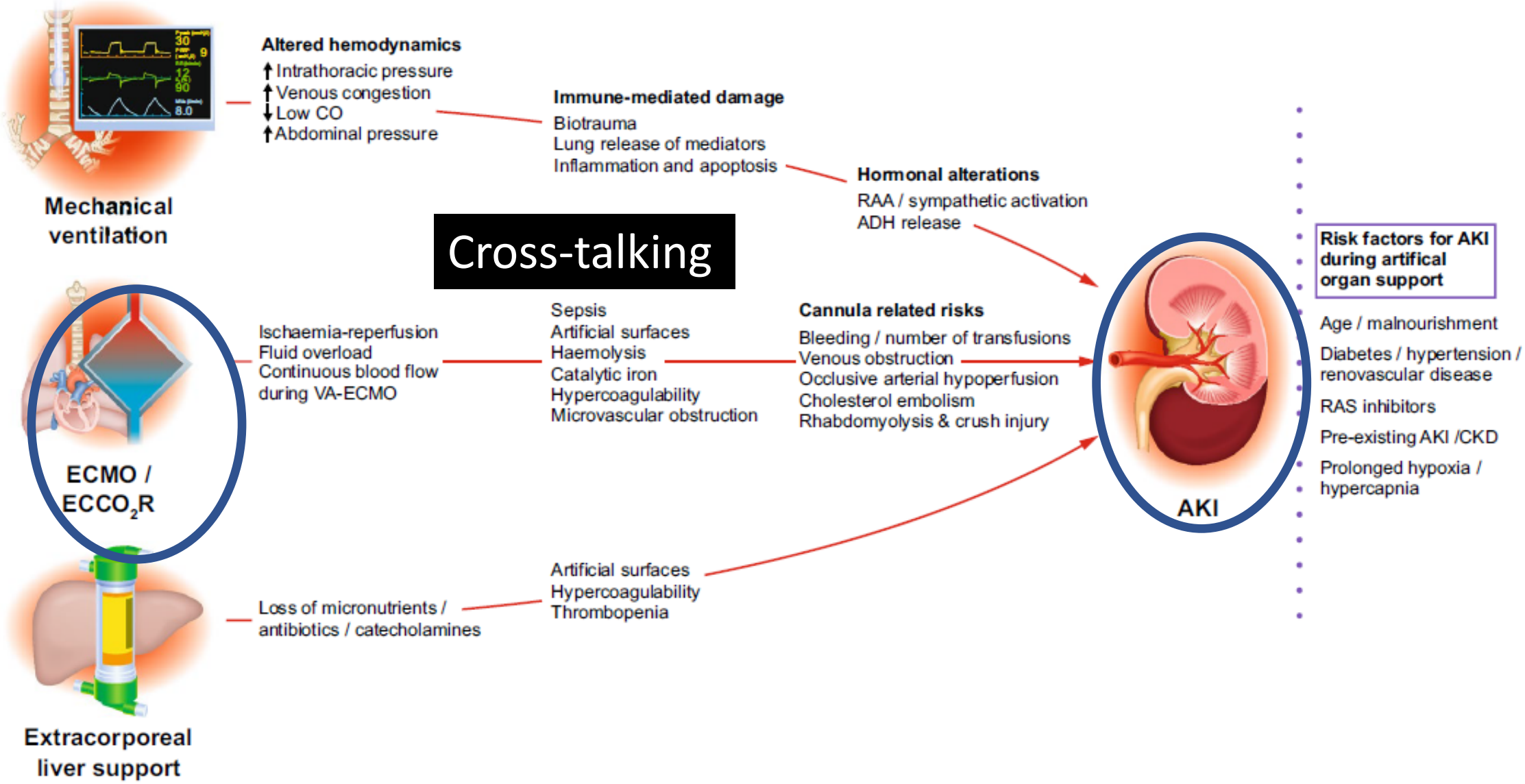

*Schmidt et al Am J Respir Crit Care Med Oct 15, 2019*

# Complications during ECMO



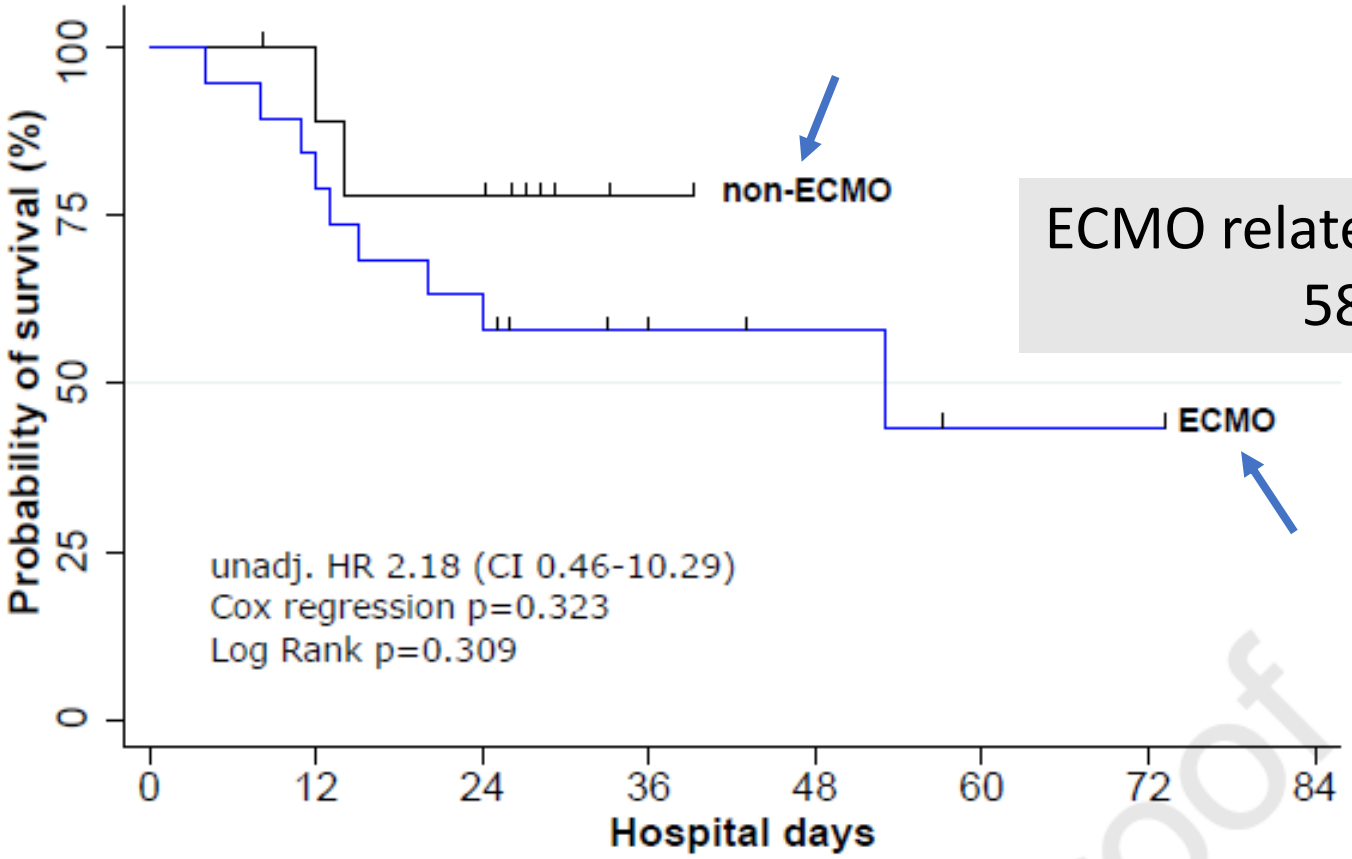

*Extracorporeal Life Support Organization (ELSO) Registry - Data from 2014 to present*

*Brodie et al JAMA August 13, 2019*




*Faeq Husain-Syed et al. Intensive Care Med (2018) 44:1447–1459*

# Patients with severe ARDS due to immune diffuse alveolar hemorrhage




**No. at risk**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| VV-ECMO | 19 | 16 | 12 | 6 | 4 | 1 | 1 | 0 |
| CONTROL | 10 | 9 | 7 | 1 | 0 | 0 | 0 | 0 |

ECMO related hemorrhagic complications:
58% (21% intracranial)

Seeliger et al. Chest 2019; In press

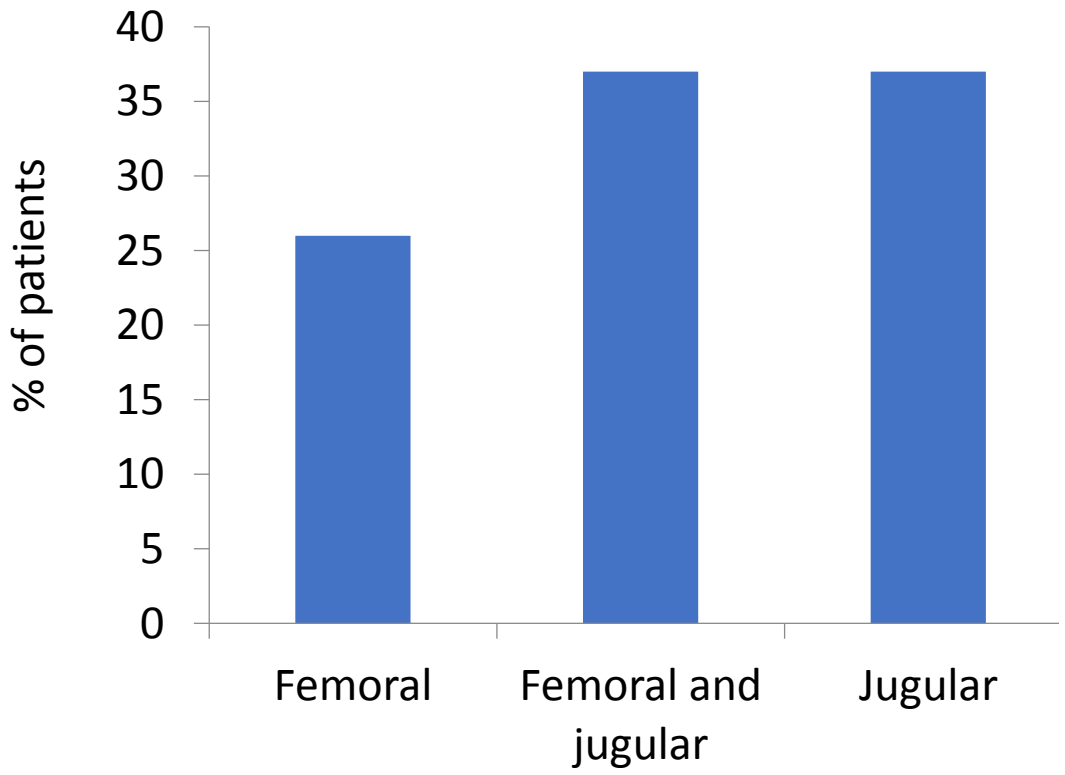
# Prevalence and Risk Factors for Thrombotic Complications Following Venovenous Extracorporeal Membrane Oxygenation: A CT Scan Study

Gabriel Parzy, MD[1,2]; Florence Daviet, MD[1,2]; Nicolas Persico, MD[1–3]; Romain Rambaud, MD[1]; Ugo Scemama, MD[4]; Mélanie Adda, MD[1,2]; Christophe Guervilly, MD[1,2]; Sami Hraiech, MD, PhD[1,2]; Kathia Chaumoitre, MD, PhD[4]; Antoine Roch, MD, PhD[1–3]; Laurent Papazian, MD, PhD[1,2]; Jean-Marie Forel, MD[1,2]

*Crit Care Med 2019; In press*

In 105 patients with ARDS and ventilated with ECMO, CT scans were performed at a median of 2 days (1–3 d) after decannulation

Cannula-associated deep vein thrombosis was found in 75 patients (71.4%)



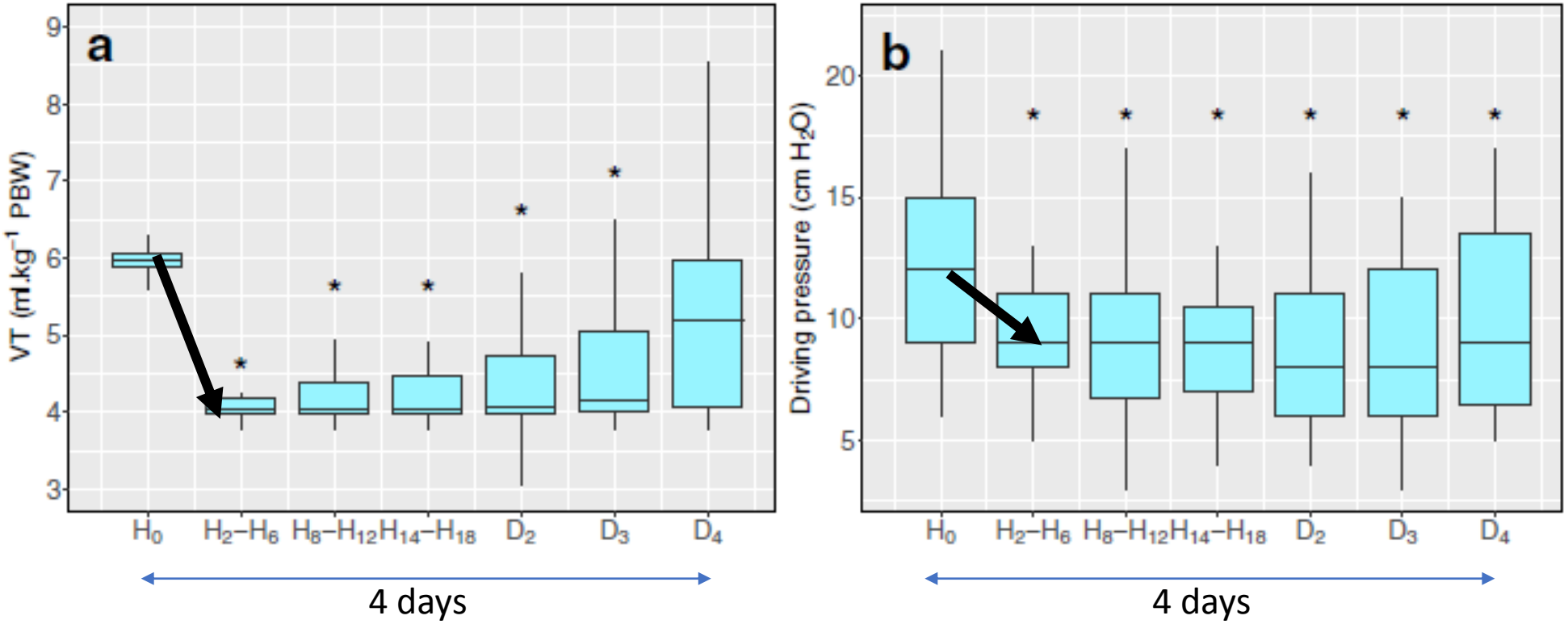
ORIGINAL

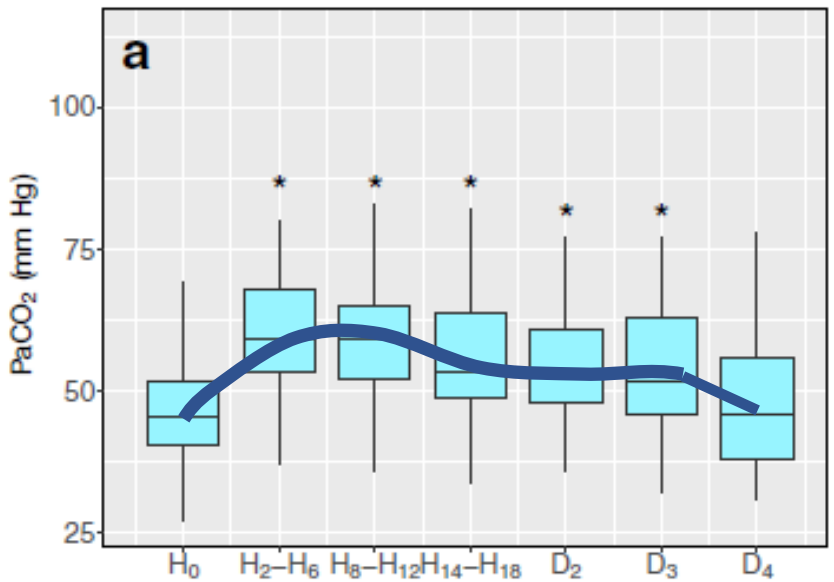
# Feasibility and safety of ultra-low tidal volume ventilation without extracorporeal circulation in moderately severe and severe ARDS patients

J. C. Richard[1,2,3*], S. Marque[4], A. Gros[5], M. Muller[6], G. Prat[7], G. Beduneau[8,9], J. P. Quenot[10], J. Dellamonica[11], R. Tapponnier[12], E. Soum[13], L. Bitker[1,2,3], J. Richecoeur[14] and the REVA research network

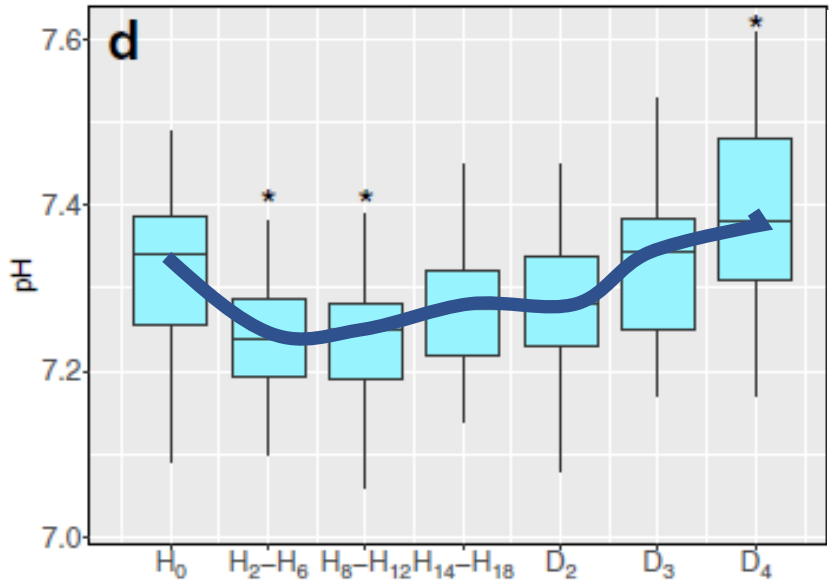
*Intensive Care Med (2019) 45:1590–1598*

## Βελτιστοποιήστε τις ρυθμίσεις του αναπνευστήρα πριν από την ECMO






VT≈4 ml/kg μπορεί να εφαρμοστεί σε περιπου 2/3 των ασθενών με ARDS (moderate/severe), με αποτέλεσμα ελάττωση της ΔΡ




Παροδική σοβαρή αναπνευστική οξέωση στο 1/3 των ασθενών

*Intensive Care Med (2019) 45:1590–1598*

PINK FLOYD

THE DARK SIDE OF THE MOON

Prone position

The NEW ENGLAND JOURNAL of MEDICINE

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

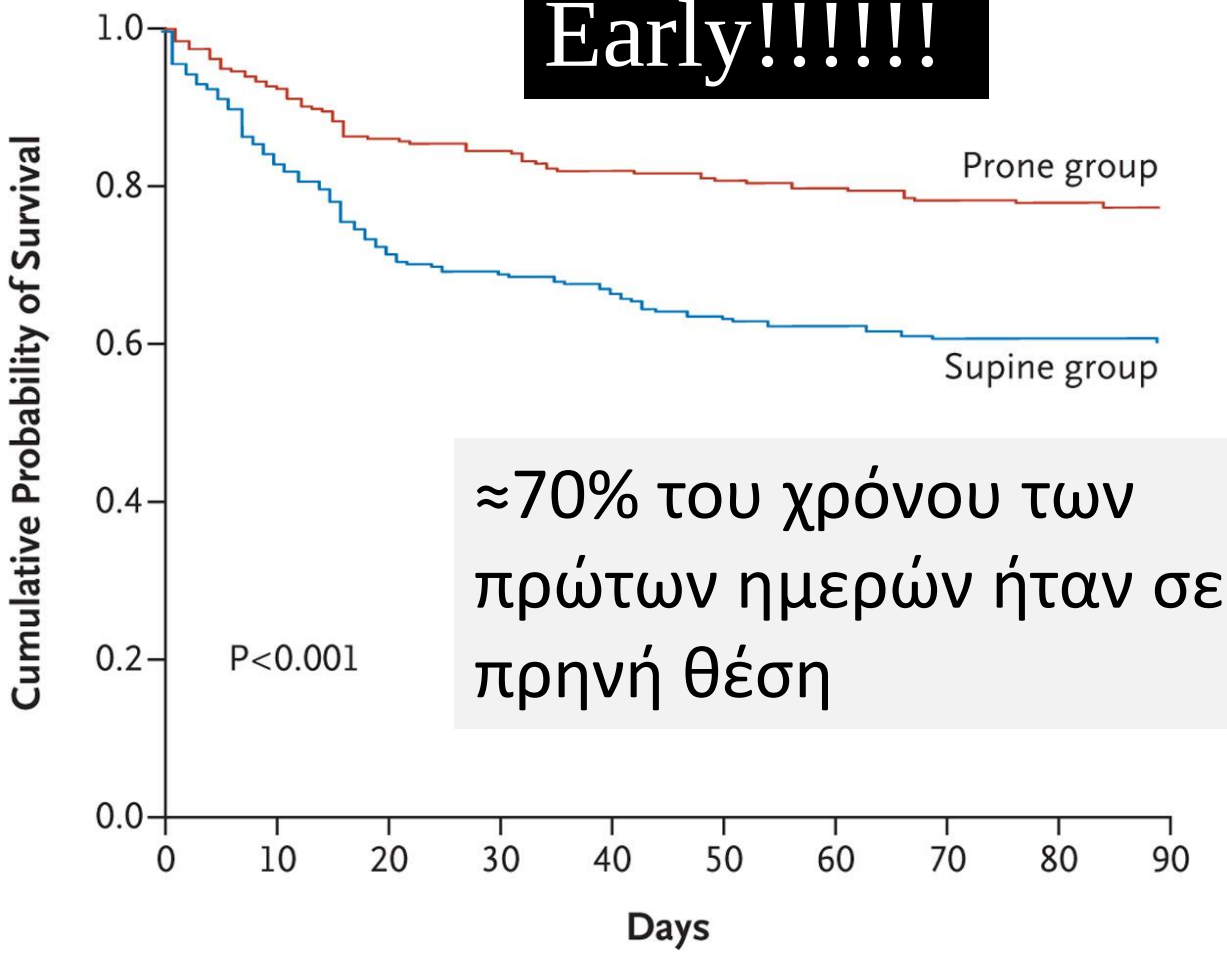
# Prone Positioning in Severe Acute Respiratory Distress Syndrome

Claude Guérin, M.D., Ph.D., Jean Reignier, M.D., Ph.D., Jean-Christophe Richard, M.D., Ph.D., Pascal Beuret, M.D., Arnaud Gacouin, M.D., Thierry Boulain, M.D., Emmanuelle Mercier, M.D., Michel Badet, M.D., Alain Mercat, M.D., Ph.D., Olivier Baudin, M.D., Marc Clavel, M.D., Delphine Chatellier, M.D., Samir Jaber, M.D., Ph.D., Sylvène Rosselli, M.D., Jordi Mancebo, M.D., Ph.D., Michel Sirodot, M.D., Gilles Hilbert, M.D., Ph.D., Christian Bengler, M.D., Jack Richecoeur, M.D., Marc Gainnier, M.D., Ph.D., Frédérique Bayle, M.D., Gael Bourdin, M.D., Véronique Leray, M.D., Raphaele Girard, M.D., Loredana Baboi, Ph.D., and Louis Ayzac, M.D., for the PROSEVA Study Group*

1) Μέσος αριθμός συνεδριών: 4/ασθενή

2) Μέση διάρκεια συνεδρίας: 17±3 ώρες

0.8% ECMO




≈70% του χρόνου των πρώτων ημερών ήταν σε πρηνή θέση

| No. at Risk | | | | | |
|---|---|---|---|---|---|
| Prone group | 237 | 202 | 191 | 186 | 182 |
| Supine group | 229 | 163 | 150 | 139 | 136 |

Early

Early

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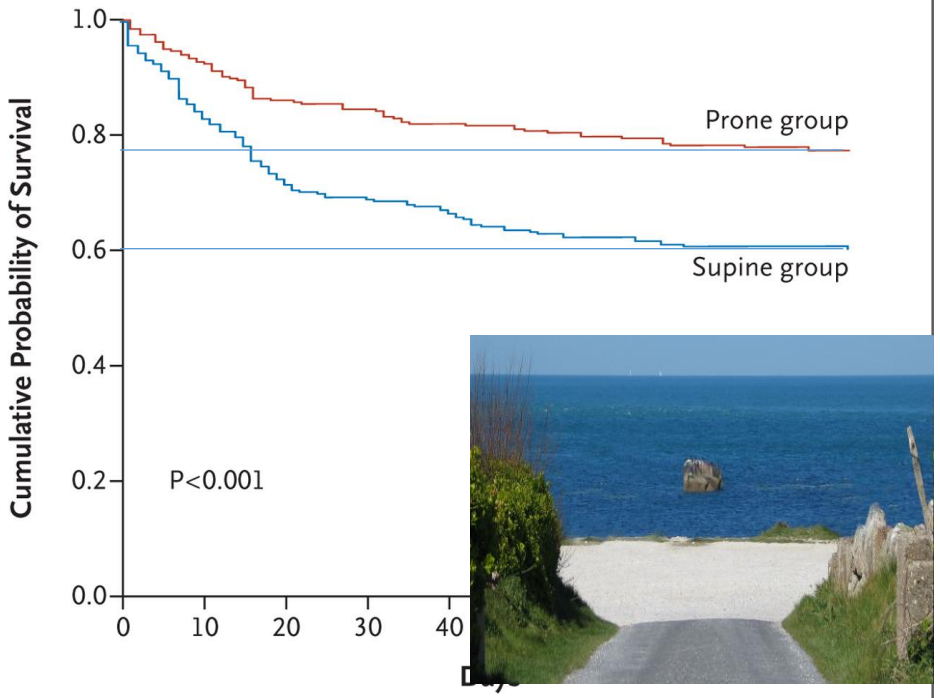


**No. at Risk**

| | | | | | |
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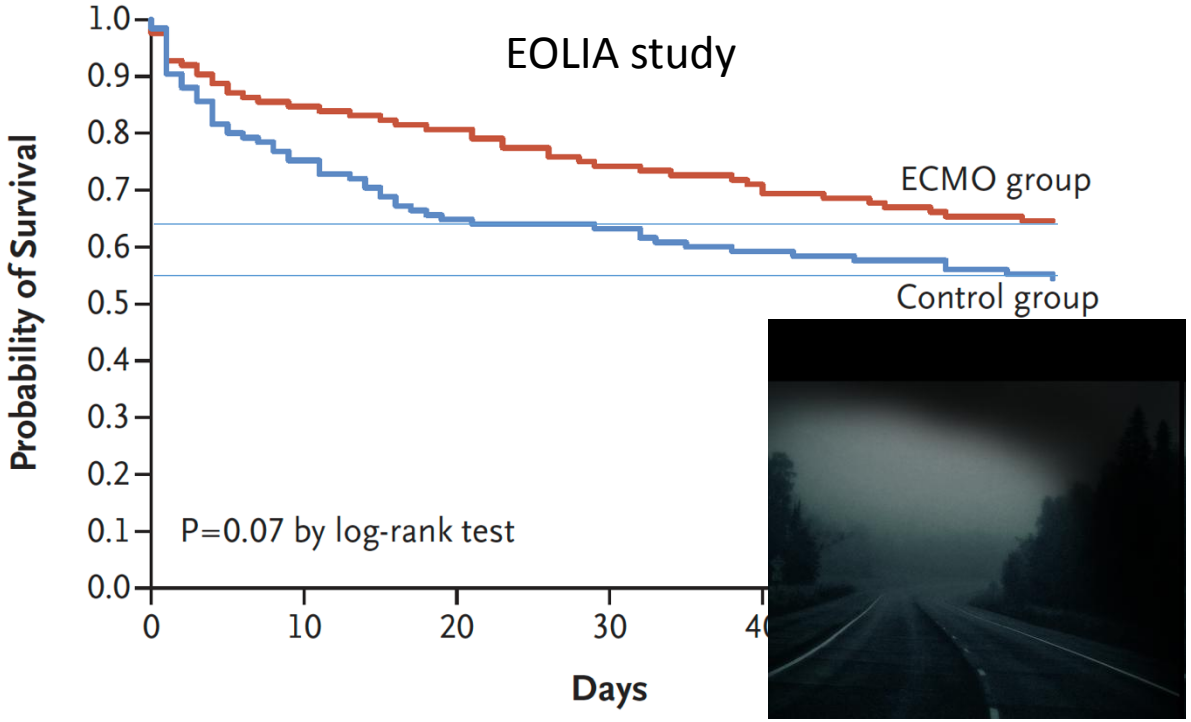
The NEW ENGLAND JOURNAL of MEDICINE
ESTABLISHED IN 1812 MAY 24, 2018 VOL. 378 NO. 21

# Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Distress Syndrome

A. Combes, D. Hajage, G. Capellier, A. Demoule, S. Lavoué, C. Guervilly, D. Da Silva, L. Zafrani, P. Tirot, B. Veber, E. Maury, B. Levy, Y. Cohen, C. Richard, P. Kalfon, L. Bouadma, H. Mehdaoui, G. Beduneau, G. Lebreton, L. Brochard, N.D. Ferguson, E. Fan, A.S. Slutsky, D. Brodie, and A. Mercat, for the EOLIA Trial Group, REVA, and ECMONet*



**Mechanical Ventilation for ARDS During Extracorporeal Life Support: Research and Practice**

Darryl Abrams, MD,[1,2] Matthieu Schmidt, MD,[3,4] Tài Pham, MD,[5,6,25] Jeremy R. Beitler, MD,[1,2] Eddy Fan, MD,[5,7] Ewan C. Goligher, MD,[5,7] James J. McNamee, FCICM,[8,9] Nicolò Patroniti, MD,[10,11] M. Elizabeth Wilcox, MD,[5,7] Alain Combes, MD,[3,4] Niall D. Ferguson, MD,[5,7] Danny F. McAuley, MD,[8,9] Antonio Pesenti, MD,[12,13] Michael Quintel, MD,[14] John Fraser, MBChB,[15,16] Carol L. Hodgson, PhD,[17,18] Catherine L. Hough, MD,[19] Alain Mercat, MD,[20] Thomas Mueller, MD,[21] Vin Pellegrino, MBBS,[22] V. Marco Ranieri, MD,[23] Kathy Rowan, PhD,[24] Kiran Shekar, MBBS,[15,16] Laurent Brochard,[5,6*+] Daniel Brodie, MD;[1,2*] International ECMO Network (ECMONet)

**Key points**

- Ventilator-induced lung injury is a major contributor to morbidity and mortality in ARDS, driven in large part by injurious mechanical forces
- ECLS can supplement or supplant native lung gas exchange in ARDS, allowing for reductions in the mechanical forces contributing to ventilator-induced lung injury
- Conventional management strategies (standard of care lung-protective ventilation, prone positioning, PEEP titration, conservative fluid balance, and perhaps neuromuscular blockade) should be optimized prior to consideration of ECLS
- The ventilation strategies employed in the EOLIA trial are a reasonable default

with improved short- and long-term outcomes

Σε ασθενείς με ARDS η πρηνής θέση θα πρέπει να εφαρμοστεί με σωστό τρόπο πριν εξεταστεί η ECMO

2019; In press

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

# Prone Positioning in Severe Acute Respiratory Distress Syndrome

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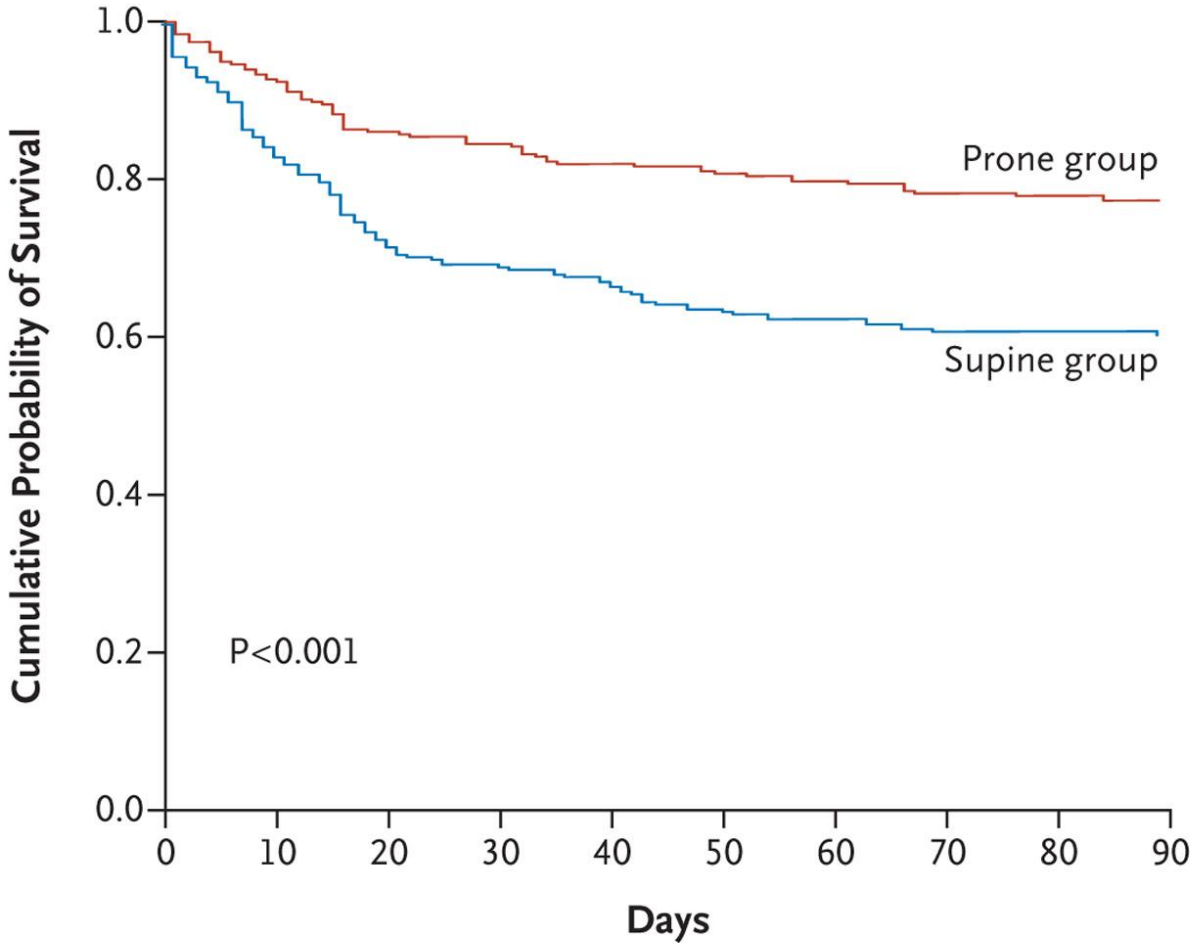
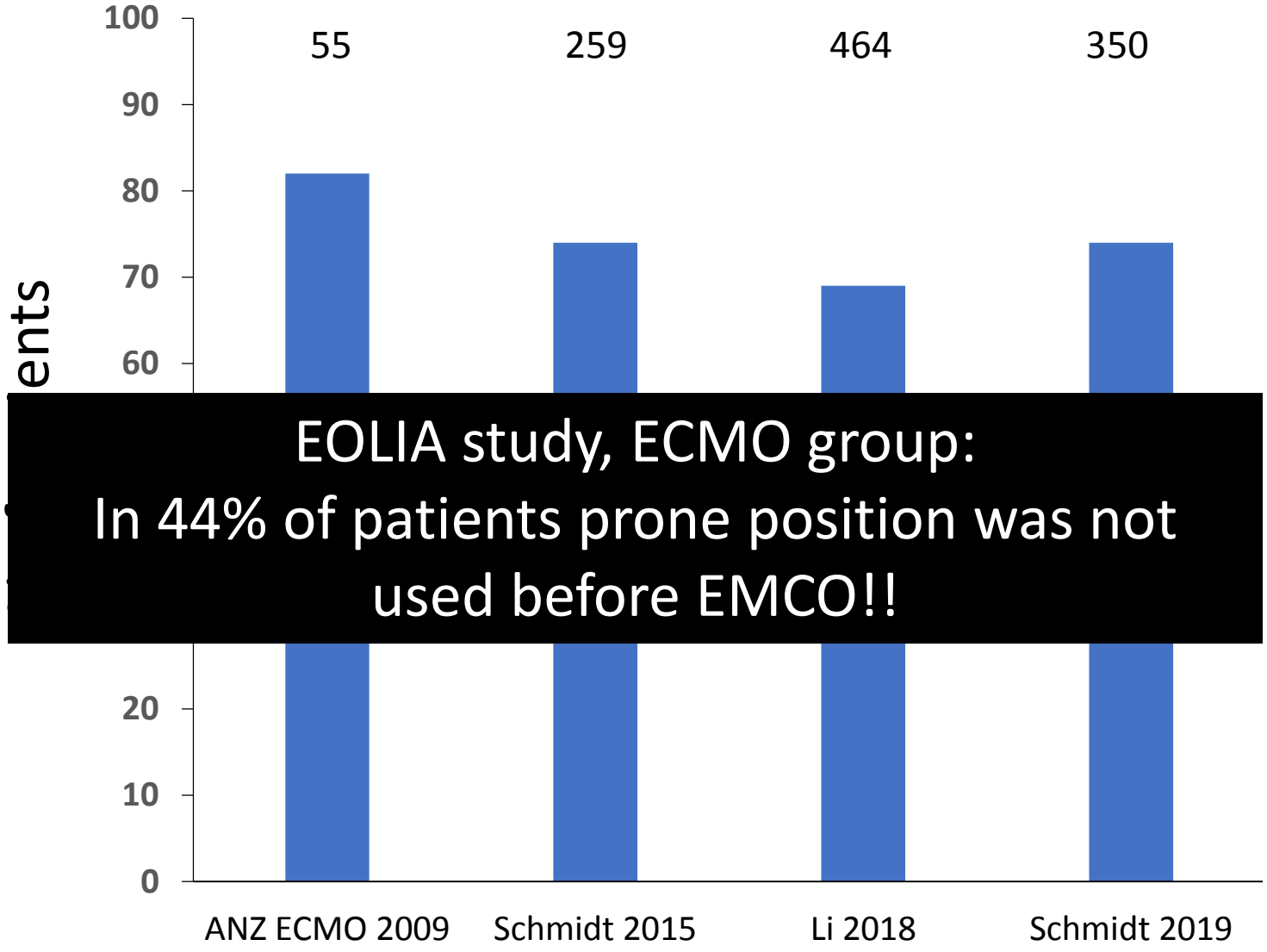
2) Μέση διάρκεια συνεδρίας: 17±3 ώρες



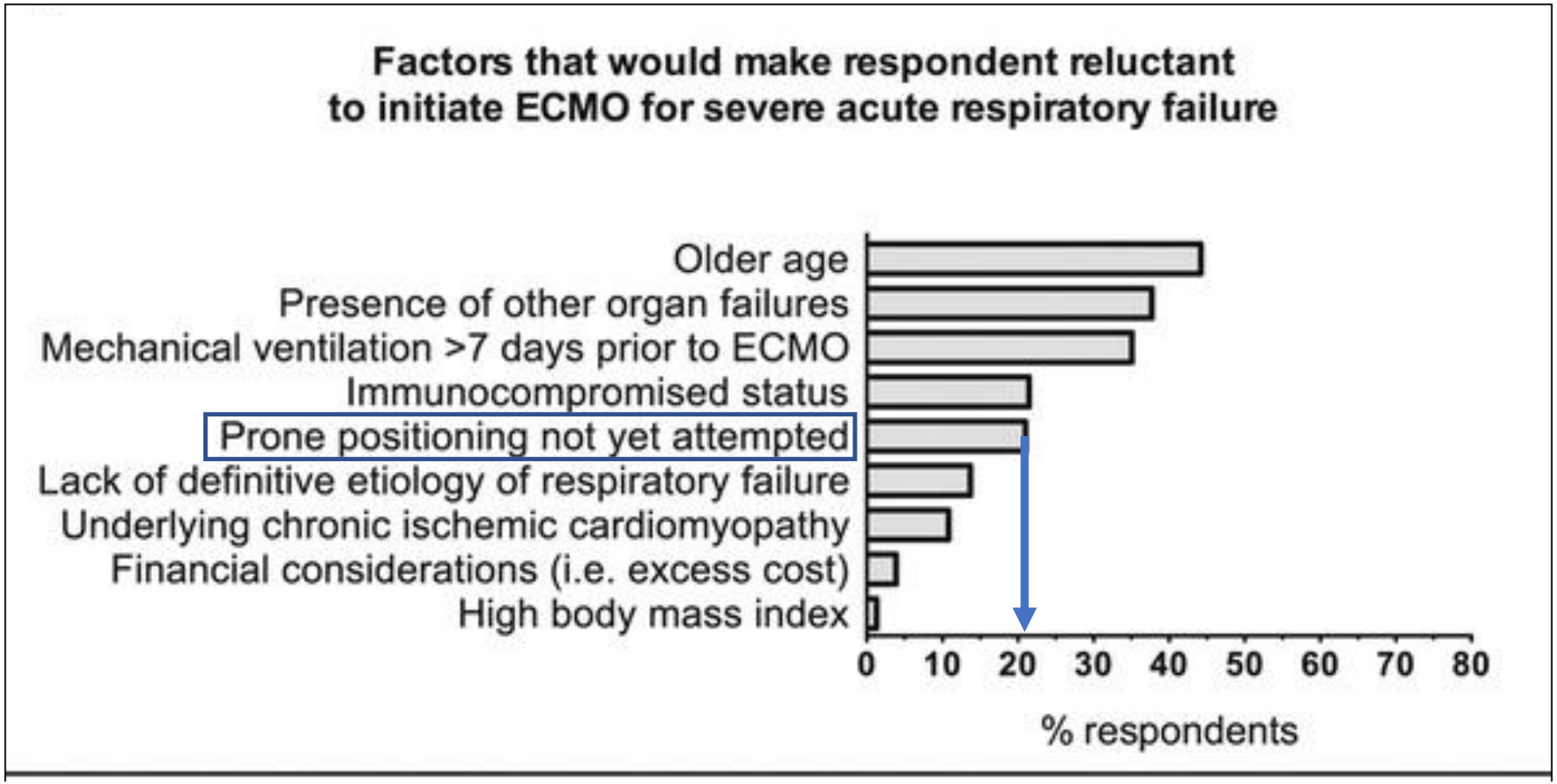

**No. at Risk**

| | | | | | |
|---|---|---|---|---|---|
| Prone group | 237 | 202 | 191 | 186 | 182 |
| Supine group | 229 | 163 | 150 | 139 | 136 |

Ποσοστό (%) των ασθενών με ARDS που δεν είχαν καμιά συνεδρία πρηνής θέσης πριν την εφαρμογή VV-ECMO



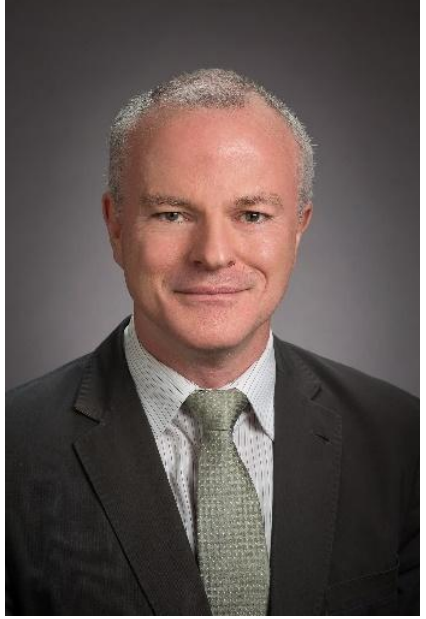

EOLIA study, ECMO group:
In 44% of patients prone position was not used before EMCO!!




Abrams et al. Critical Care Medicine. 47(10):1346-1355, October 2019

CRITICAL CARE PERSPECTIVE

Brian Kavanagh



# Unproven and Expensive before Proven and Cheap: Extracorporeal Membrane Oxygenation versus Prone Position in Acute Respiratory Distress Syndrome

Am J Respir Crit Care Med Vol 197, Iss 8, pp 991–993, Apr 15, 2018

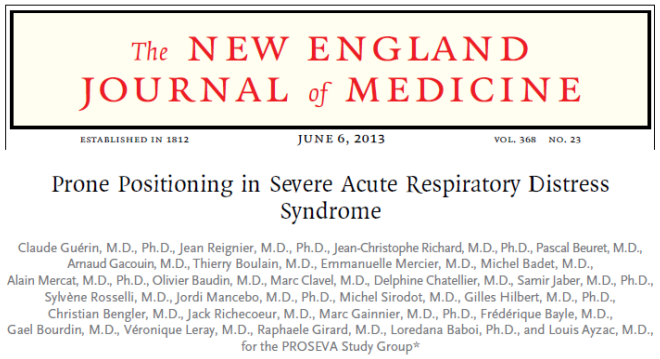
Xuehan Li[1,2,3], Damon C. Scales[3,4], and Brian P. Kavanagh[1,3]

[1]Department of Critical Care Medicine and Anesthesia, Hospital for Sick Children, University of Toronto, Toronto, Canada; [2]Department of Anesthesiology, West China Hospital of Sichuan University, Chengdu, Sichuan, China; [3]Interdepartmental Division of Critical Care Medicine, University of Toronto, Toronto, Canada; and [4]Department of Critical Care Medicine, Sunnybrook Health Sciences Centre, Toronto, Canada

Η πλειονότητα των ασθενών σε ECMO δεν είχαν ούτε μια συνεδρία πρηνής θέσης πριν την εφαρμογή ECMO

Η πρηνής θέση σε αντίθεση με ECMO είναι μια θεραπευτική παρέμβαση 1) απλή, 2) χωρίς οικονομικό κόστος, 3) με ελάχιστες επιπλοκές και 4) με αποδεδειγμένη ωφέλεια

Επομένως, συμπεράσματα σχετικά με την αποτελεσματικότητα της ECMO σε ARDS έχουν περιορισμένη χρησιμότητα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Prone Positioning in Severe Acute Respiratory Distress Syndrome

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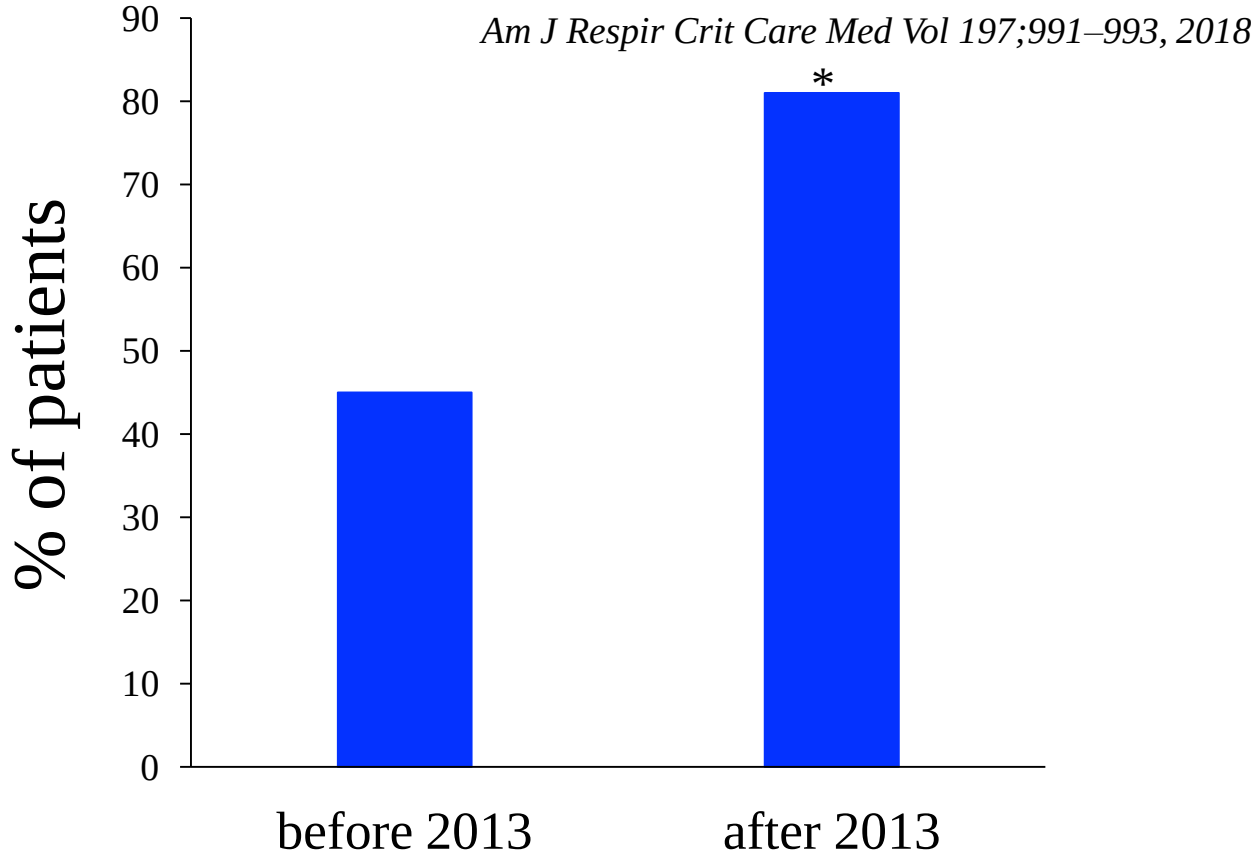
Guérin et al. *N Engl J Med* 2013;368:2159–2168

# Το ποσοστό των ασθενών που δεν είχαν καμιά συνεδρία πρηνής θέσης πριν την εφαρμογή VV-ECMO ήταν σημαντικά αυξημένο σε μελέτες μετά το 2013 (81%) σε σχέση με μελέτες πριν το 2013 (45%)



JAMA Network Open

Original Investigation | Critical Care Medicine

# Assessment of Therapeutic Interventions and Lung Protective Ventilation in Patients With Moderate to Severe Acute Respiratory Distress Syndrome

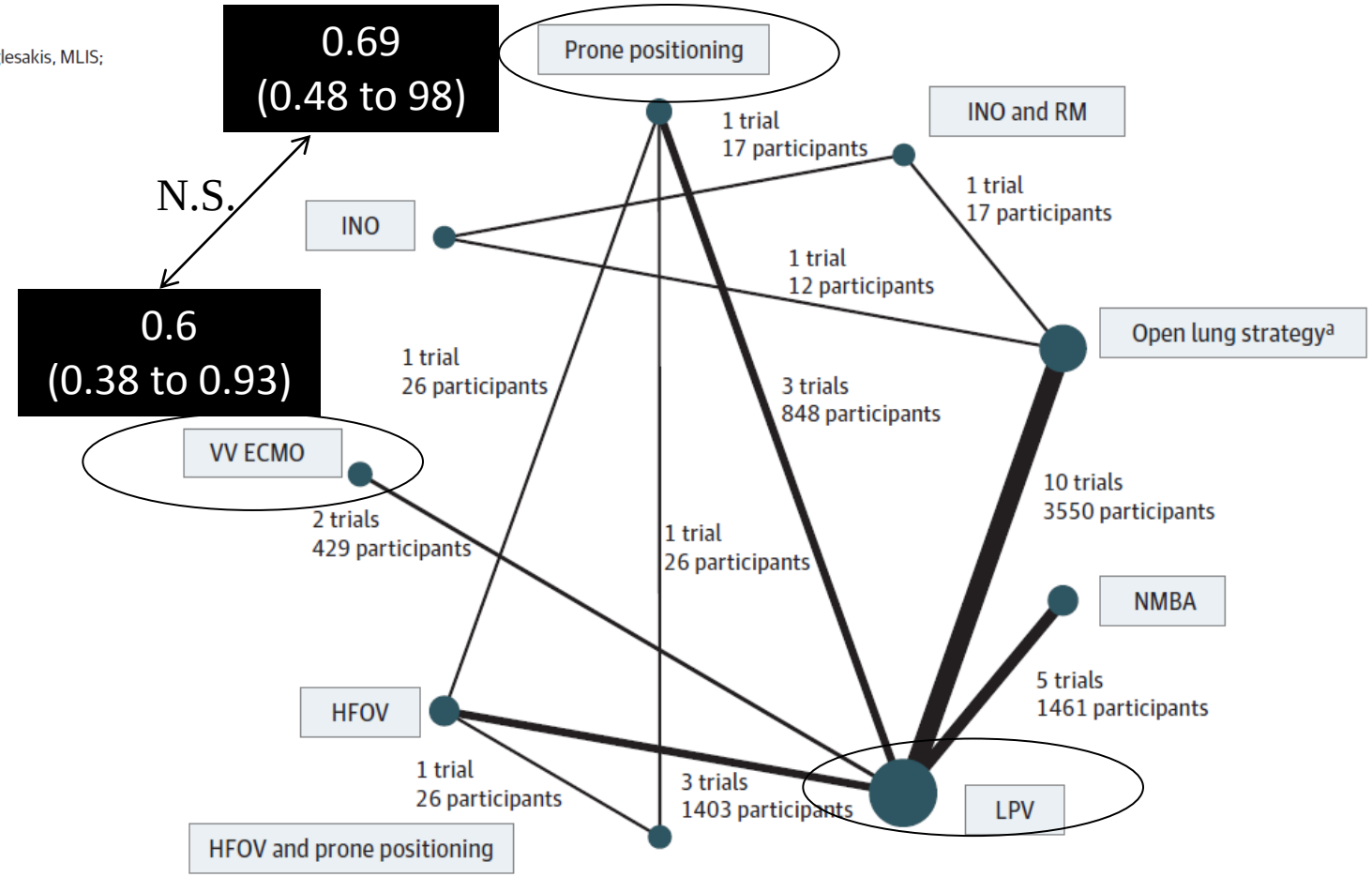
## A Systematic Review and Network Meta-analysis

Hiroko Aoyama, MD, MScCH; Kanji Uchida, MD, PhD; Kazuyoshi Aoyama, MD, PhD; Petros Pechlivanoglou, MSc, PhD; Marina Englesakis, MLIS; Yoshitsugu Yamada, MD, PhD; Eddy Fan, MD, PhD

*JAMA Network Open*. 2019;2(7):e198116. doi:10.1001/jamanetworkopen.2019.8116

Bayesian random-effects network meta-analyses

28-day mortality




Από όλες τις θεραπευτικές παρεμβάσεις μόνο η πρηνής θέση και η VV-ECMO ελάττωσαν τη θνητότητα σε ασθενείς με ARDS (moderate-severe )

# Γιατί ECMO σε ασθενείς χωρίς να έχουν υποβληθεί σε συνεδρία πρηνής θέσης?

1) Ελλειψη εξοικείωσης, ανεπαρκής κατάρτιση και ανησυχία για τις επιπλοκές της πρηνής θέσης

2) Μη αποδοχή των αποτελεσμάτων των μελετών σχετικά με την πρηνή θέση [Μετα-αλήθεια (post truth)]

# Γιατί ECMO σε ασθενείς χωρίς να έχουν υποβληθεί σε συνεδρία πρηνής θέσης?

3) Η πεποίθηση ότι μια πιο περίπλοκη θεραπεία (ECMO) είναι πάντα ανώτερη (Playing God)

4) Οικονομικοί λόγοι (ένα πρόγραμμα ECMO ωφελεί τα νοσηλευτικά ιδρύματα κατά εκατομμύρια ευρώ ετησίως - η πρηνής θέση δεν αποζημιώνεται)

# Number of patients with ARDS ≈12% ICU admissions

ICU, University Hospital of Heraklion

(Bellani et al. *JAMA. 2016;315(8):788-800)*

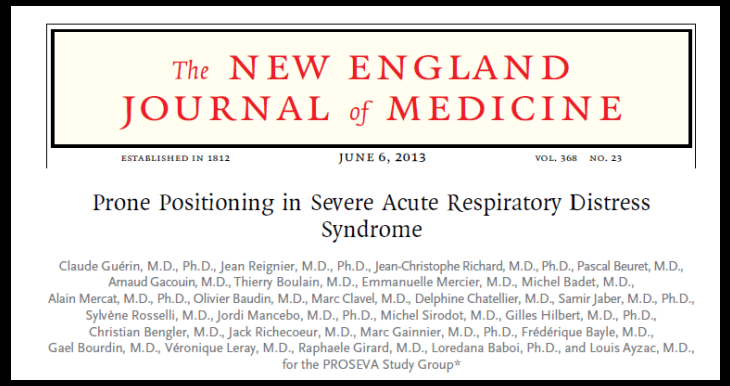
Every 10 years 1 patient may need ECMO

| | Survival |
|---|---|
| Mild ARDS: 13% → | 79% |
| Moderate ARDS: 63% → | 78% |
| Severe ARDS: 24% → | 70% |

Prone position
Moderate ARDS: 12%
Severe ARDS: 30%

No. of patients with Moderate/Severe ARDS ≈ 63/yr.
No. of patients on Prone position ≈ 12/yr.

0.1 patients per year may need ECMO



The NEW ENGLAND JOURNAL of MEDICINE

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

Prone Positioning in Severe Acute Respiratory Distress Syndrome

Claude Guérin, M.D., Ph.D., Jean Reignier, M.D., Ph.D., Jean-Christophe Richard, M.D., Ph.D., Pascal Beuret, M.D., Arnaud Gacouin, M.D., Thierry Boulain, M.D., Emmanuelle Mercier, M.D., Michel Badet, M.D., Alain Mercat, M.D., Ph.D., Olivier Baudin, M.D., Marc Clavel, M.D., Delphine Chatellier, M.D., Samir Jaber, M.D., Ph.D., Sylvène Rosselli, M.D., Jordi Mancebo, M.D., Ph.D., Michel Sirodot, M.D., Gilles Hilbert, M.D., Ph.D., Christian Bengler, M.D., Jack Richecoeur, M.D., Marc Gainnier, M.D., Ph.D., Frédérique Bayle, M.D., Gael Bourdin, M.D., Véronique Leray, M.D., Raphaele Girard, M.D., Loredana Baboi, Ph.D., and Louis Ayzac, M.D., for the PROSEVA Study Group*

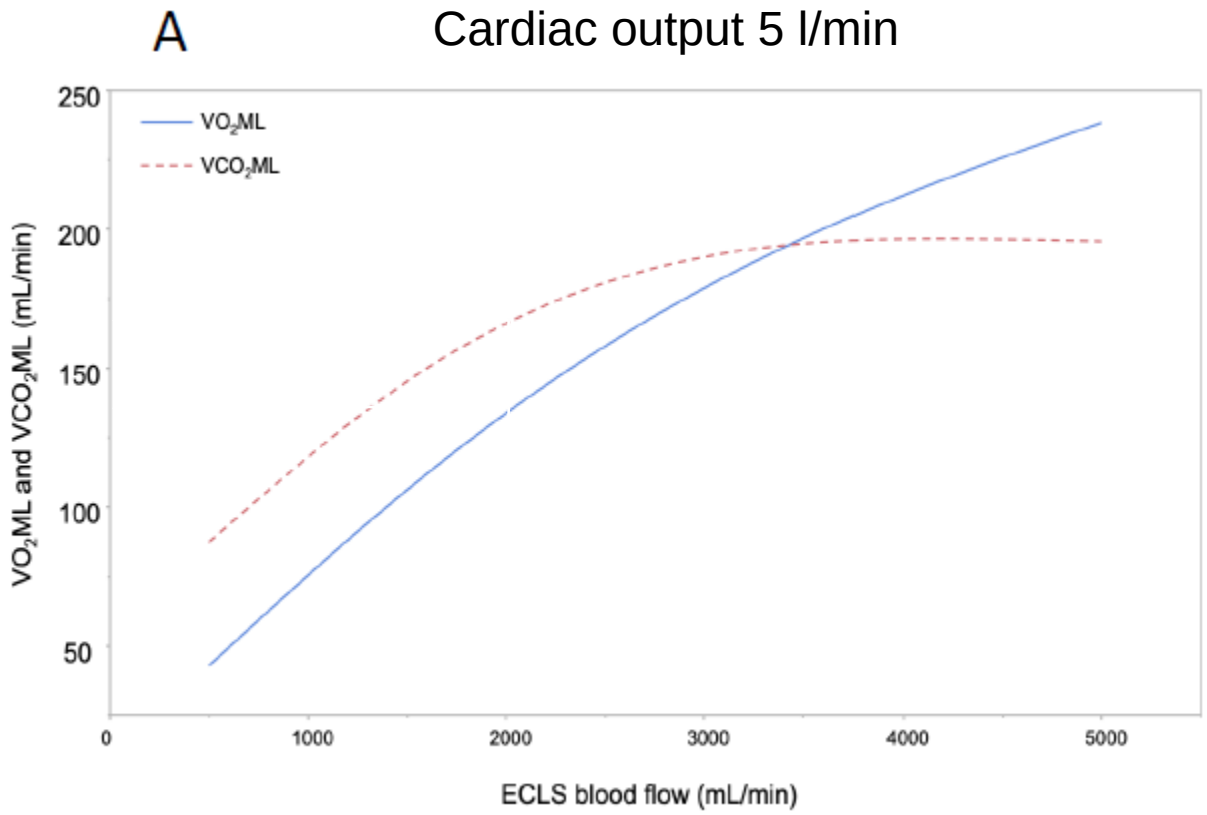
Guérin et al. *N Engl J Med* 2013;368:2159–2168

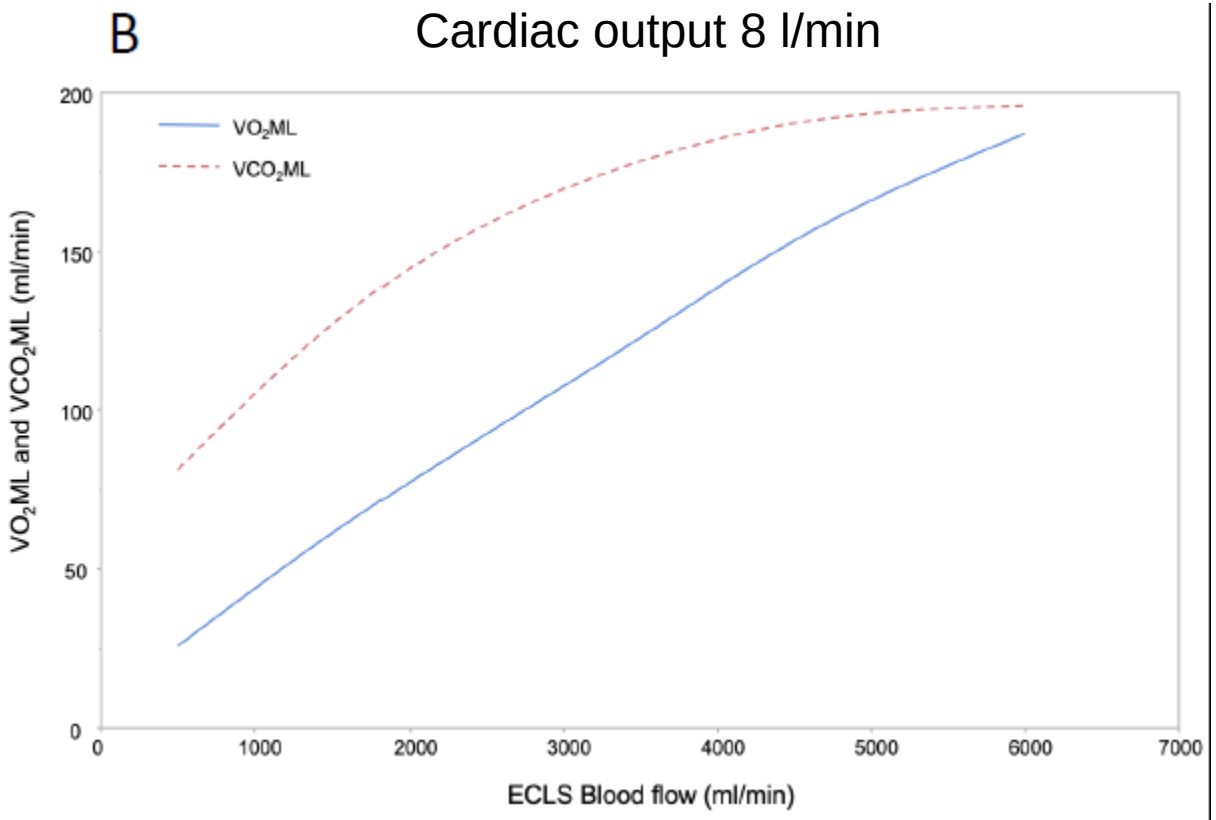
Rescue ECMO was applied in 0.8% of patients placed on prone position

Πόσες Μ.Ε.Θ. εφαρμόζουν πρηνή θέση στην Ελλάδα?

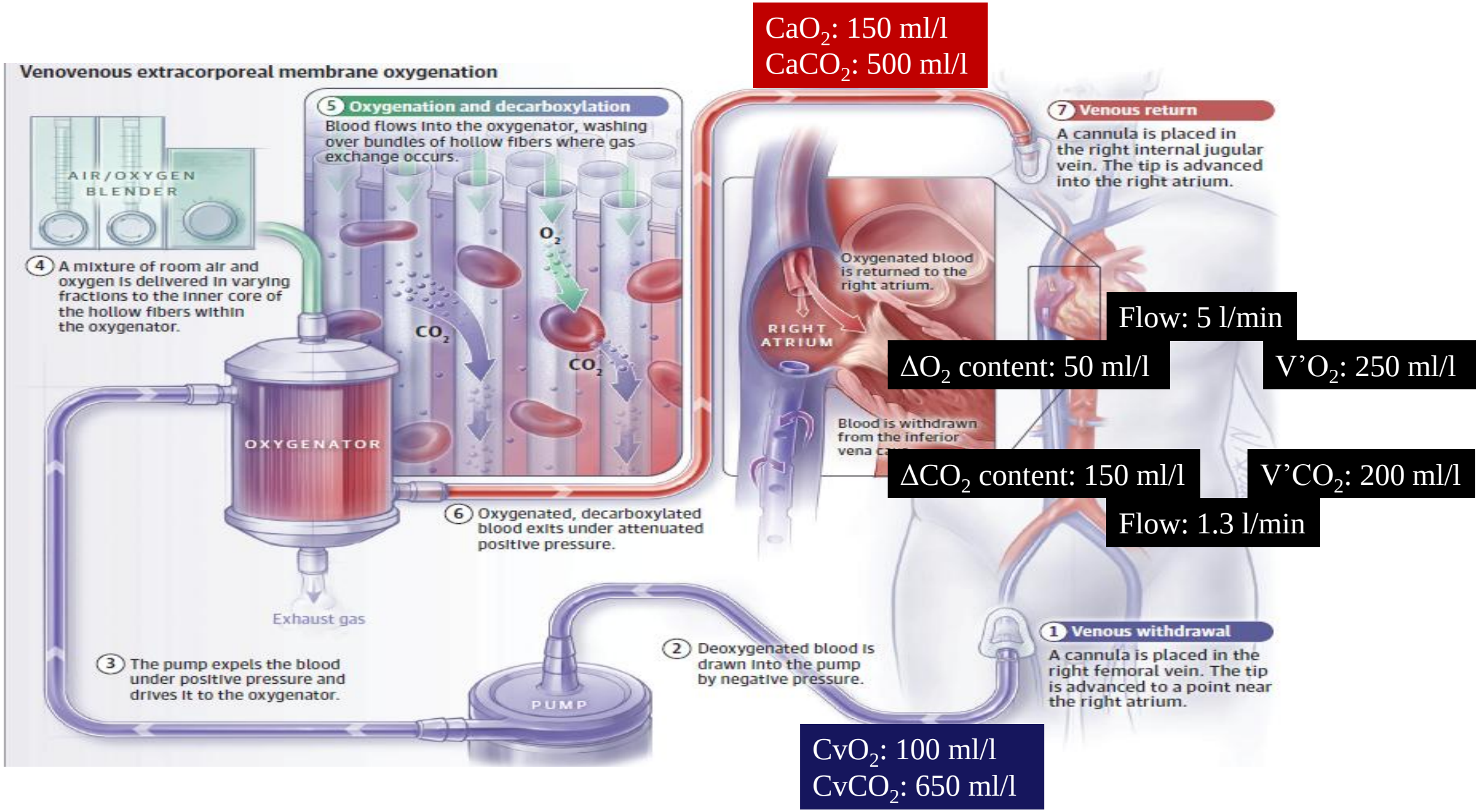
Πόσα κέντρα ν-ν ECMO πρέπει να υπάρχουν στην Ελλάδα?

Ας κρατήσουμε την ECMO
στη φωτεινή πλευρά του φεγγαριού



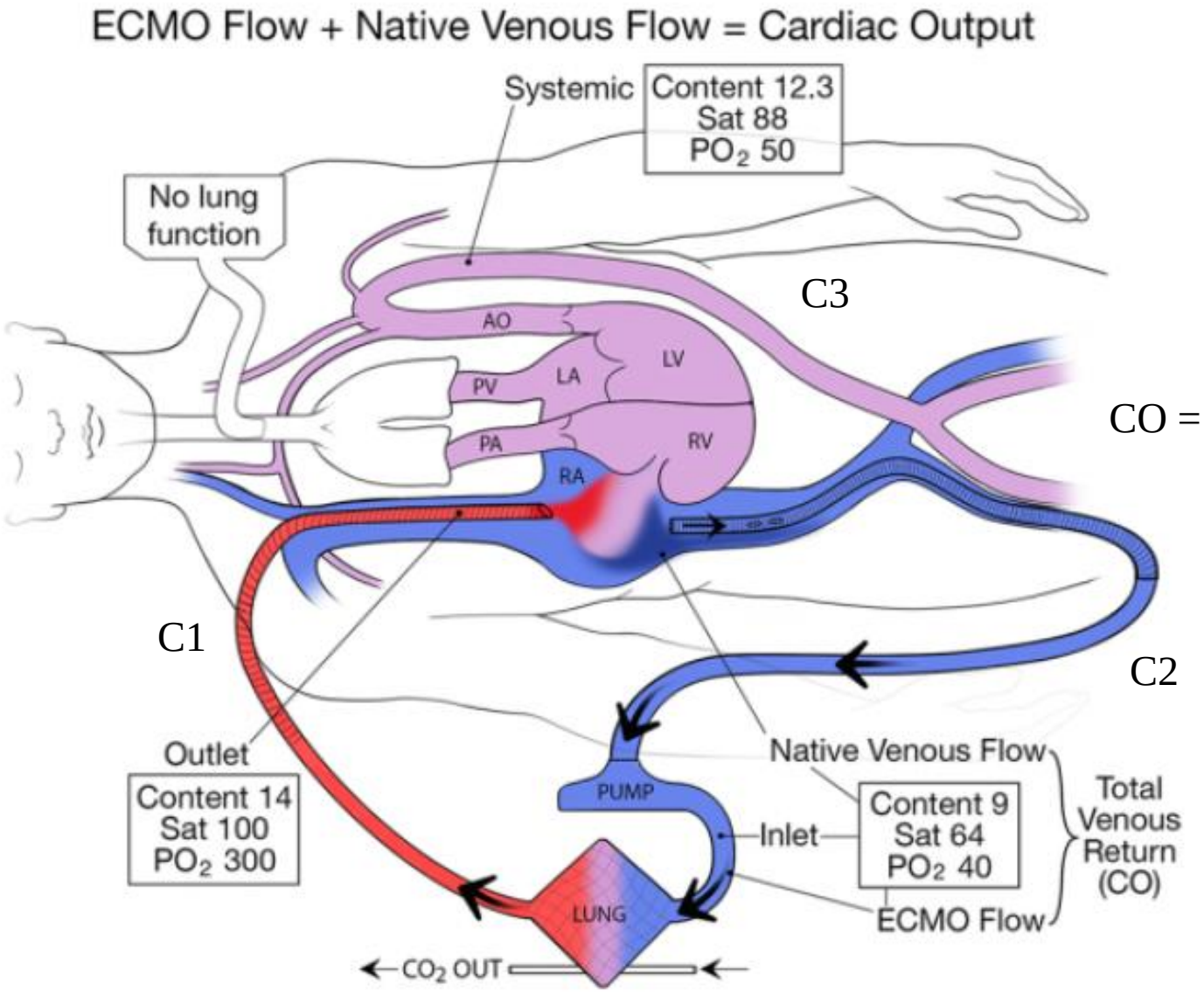




*Abrams et al. Am J Respir Crit Care Med 2019; in press*




Modified from Brodie *et al* JAMA August 13, 2019

# ECMO flow/ Cardiac output ≥ 2/3




ECMO flow=4 l/min
CO=6 l/min
EMCO flow/CO=0.67

CO = ECMO flow x(C1-C2)/(C3-C2)

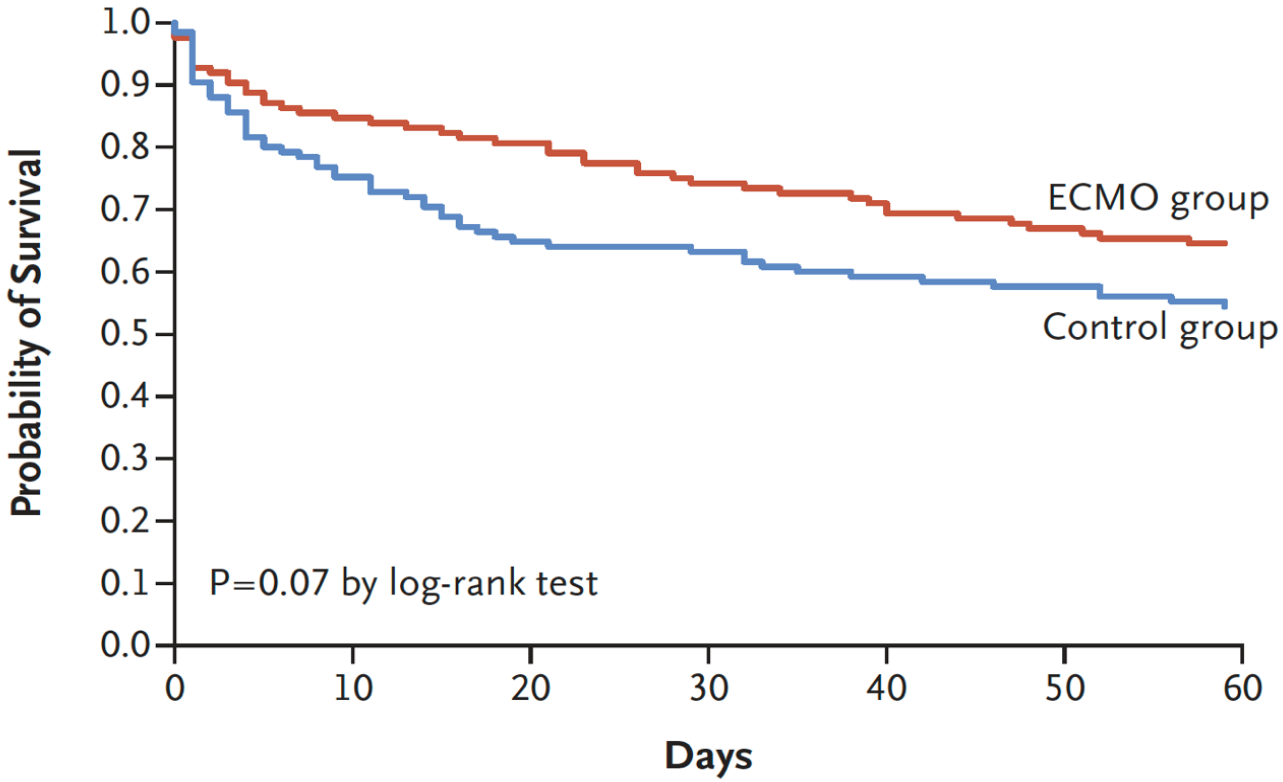
*Bartlett R. Journal of Intensive Care Medicine 2017, 32:243-248*

The NEW ENGLAND JOURNAL of MEDICINE

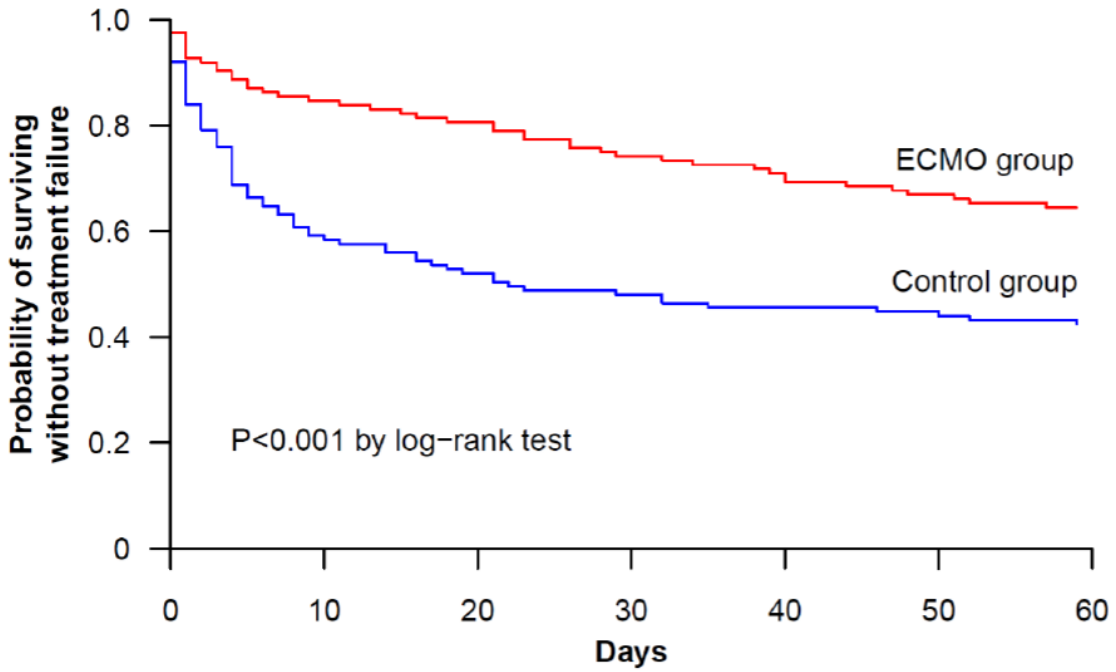
ESTABLISHED IN 1812 MAY 24, 2018 VOL. 378 NO. 21

# Extracorporeal Membrane Oxygenation for Severe Acute Respiratory Distress Syndrome

A. Combes, D. Hajage, G. Capellier, A. Demoule, S. Lavoué, C. Guervilly, D. Da Silva, L. Zafrani, P. Tirot, B. Veber, E. Maury, B. Levy, Y. Cohen, C. Richard, P. Kalfon, L. Bouadma, H. Mehdaoui, G. Beduneau, G. Lebreton, L. Brochard, N.D. Ferguson, E. Fan, A.S. Slutsky, D. Brodie, and A. Mercat, for the EOLIA Trial Group, REVA, and ECMONet*




**Kaplan–Meier Estimates of Survival Without Treatment Failure, Defined as Crossover to ECMO or Death for the Control Group and Death for the ECMO Group**



# Indications VV-ECMO (EOLIA)

< 7 days of Mechanical Ventilation

One of these criteria despite $FiO_2$ > 0.8 ; Vt 6 mL/Kg IBW, PEEP > 10 $cmH_2O$:

- $PaO_2/FiO_2$ < 50 mmHg for > 3 hours

or

- $PaO_2/FiO_2$ < 80 mmHg for > 6 hours

or

- pH < 7.25 ($PaCO_2$ > 60 mmHg) for > 6 hours despite RR to 35/min

Physicians were encouraged to use prone positioning before randomization

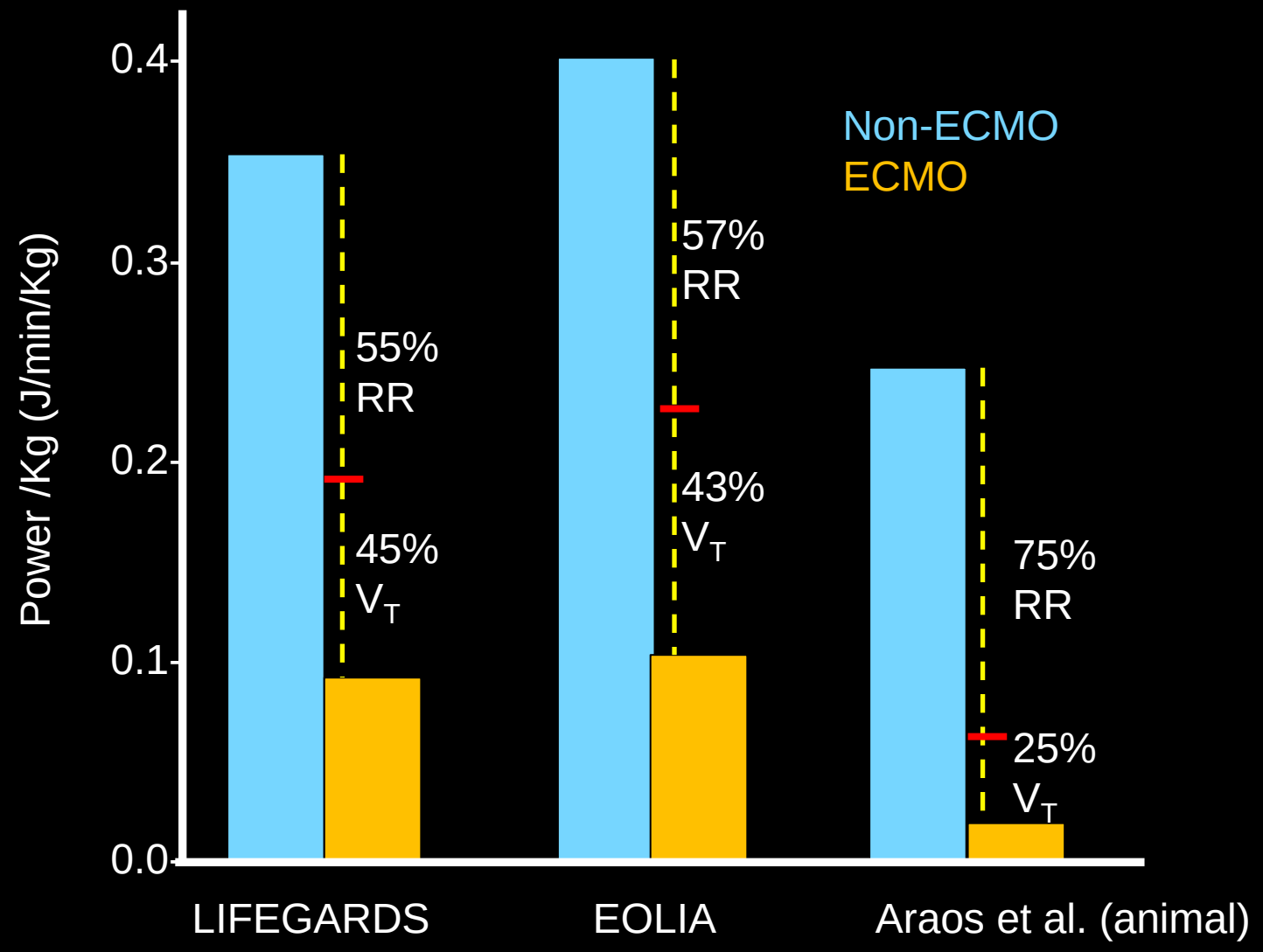
ECMO group:
In 44% of patients prone position was not used before EMCO!!

# ΝΩΡΙΣ

1. Αναστρεψιμη παθολογία
2. Ελάττωσουμε την ένταση του μηχανικού αερισμού και την επακόλουθη βλάβη του πνεύμονα
3. Πριν χειροτερεύσει η ανεπάρκεια πολλών οργάνων

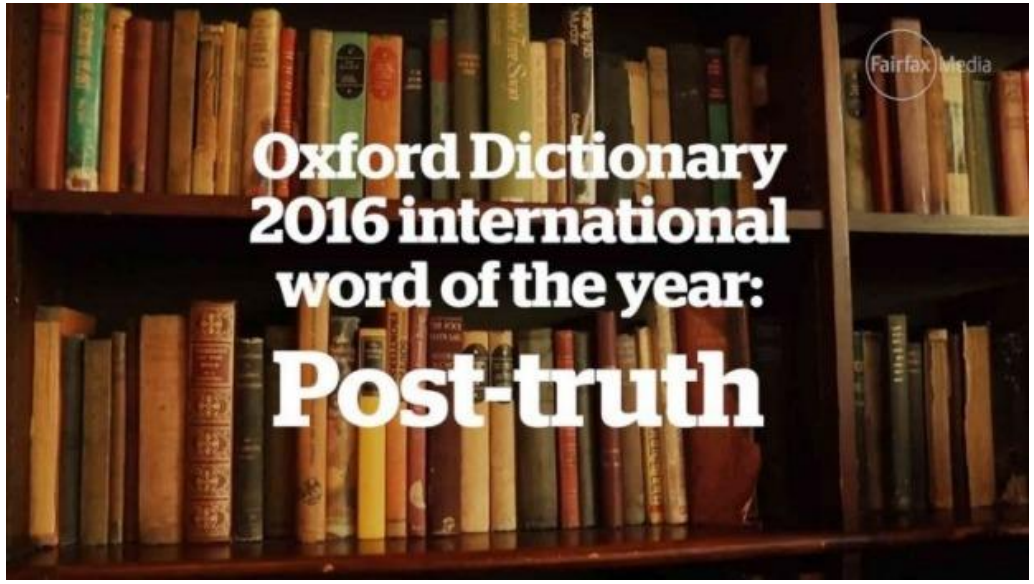
# Reduction in intensity of mechanical ventilation

*Modified from Quintel, Busana, Gattinoni AJRCCM 2019*



# Γιατί ECMO σε ασθενείς χωρίς να έχουν υποβληθεί σε συνεδρία πρηνής θέσης?

Μετα-αλήθεια’ (post-truth, word of the year 2016, Oxford Dictionary): Φιλοσοφική ένοια που σχετίζεται με μια κατάσταση στην οποία οι άνθρωποι είναι πιο πιθανό να δεχθούν ένα επιχείρημα που βασίζεται στα συναισθήματα και τις πεποιθήσεις τους, αντί να βασίζεται σε αντικειμενικά γεγονότα ή δεδομένα.



| Factor | OR | 95% CI | P |
|---|---|---|---|
| Age | 1.08 | [illegible] | [illegible]01 |
| BMI | 0.9 | [illegible] | [illegible]4 |
| Immunocompromised | 4.33 | [illegible] | [illegible]05 |
| SAPS II | 1.04 | [illegible].00 - 1.08 | 0.028 |
| Days of MV | 1.07 | 1.10 - 1.14 | 0.015 |

**7% αύξηση της θνητότητας για κάθε μέρα Μηχανικού αερισμού πριν ECMO**

*Schmidt et al ; Intensive Care Med (2013) 39:1704–1713*