DÉCUBITUS VENTRAL DANS LE SDRA LE TEMPS DES CERTITUDES

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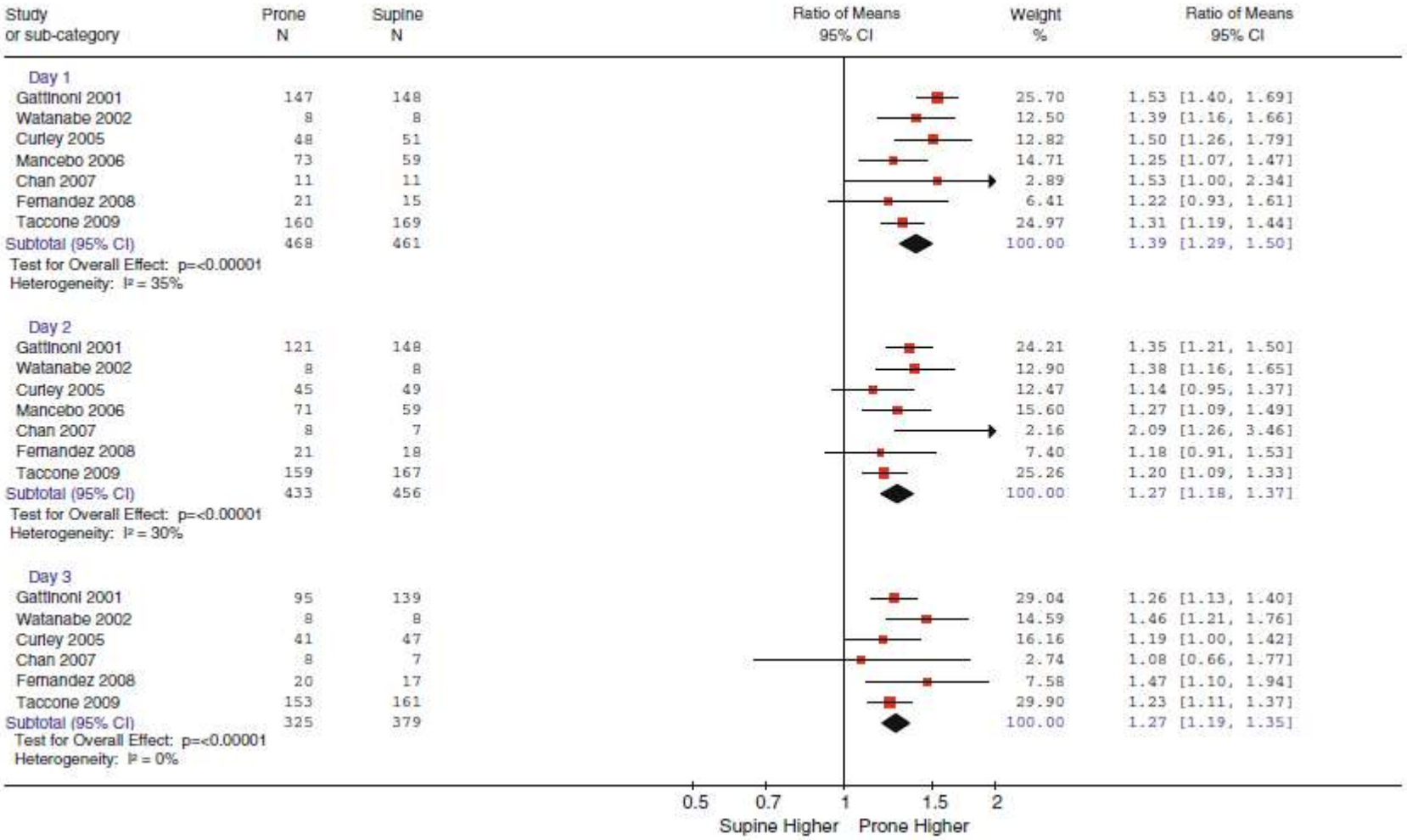
Décubitus Ventral

- Proposé pour prendre en charge l'hypoxémie sévère «réfractaire» et améliorer l'oxygénation
  - Bryan (ARRD 1974), Piehl (CCM 1976), Douglass (ARRD 1977)
  - Ph. Gaussorgues (Presse Médicale 1986)
- Objectifs de la VM au cours du SDRA
  - N°1. Protéger le poumon du VILI
  - N°1bis. Éviter une hypoxémie dangereuse

CERTITUDE SUR L'AMELIORATION DE L'OXYGENATION

Méta-analyse

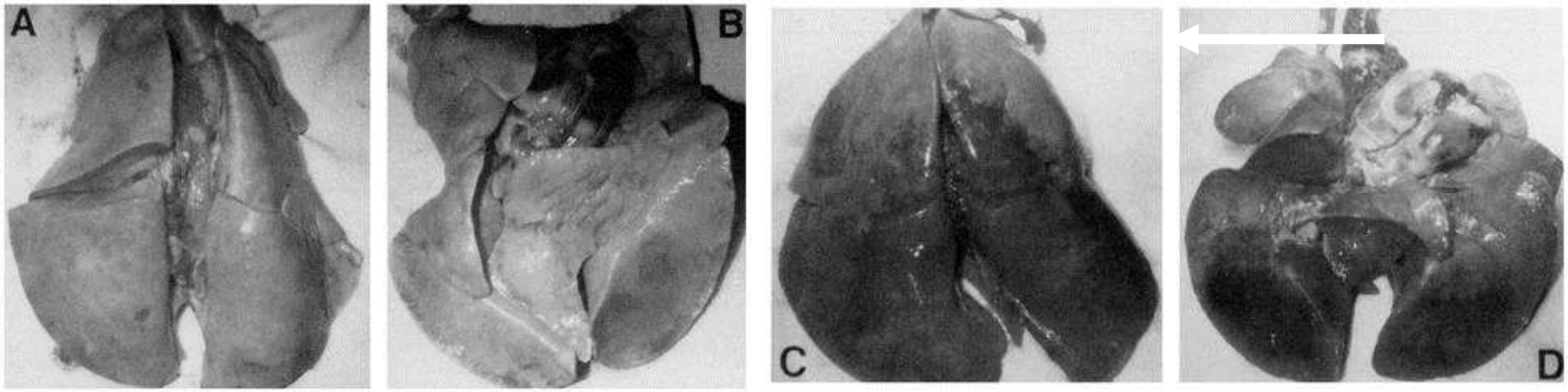


Sud ICM 2010

CERTITUDE SUR LA PREVENTION DU VILI

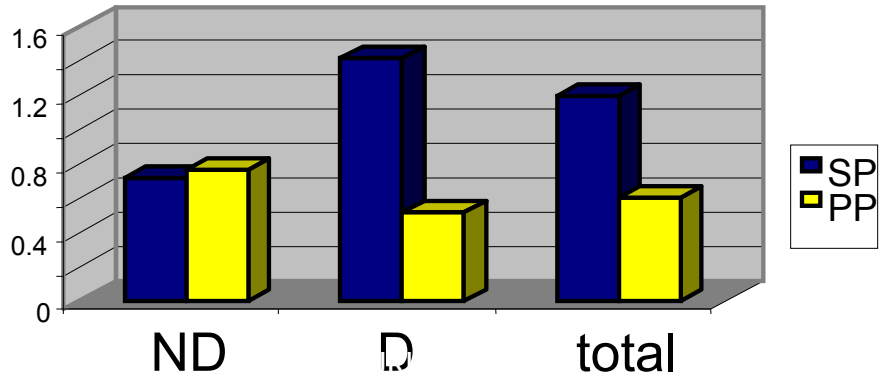
Ventilator-induced lung injury

Normal dogs, V_T = 77 ml/kg, Pplat,L = 35 cm H_2O



Prone 6 hours

Supine 6 hours

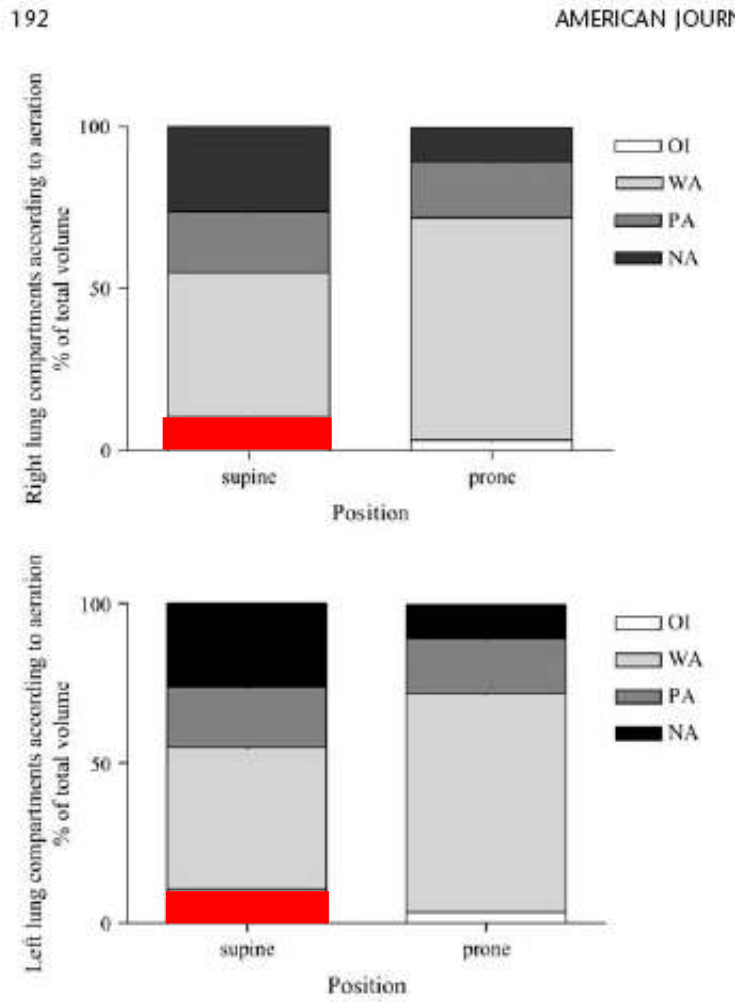


Broccard et al.
CCM 2000

Alveolar recruitment and reduction of hyperinflation

Right Lung

Left Lung



Galiastou AJRCCM 2006

CERTITUDE SUR LA REDUCTION DE MORTALITE ?

Méta-analyse sur données groupées

Intensive Care Med (2010) 36:585–599
DOI 10.1007/s00134-009-1748-1

REVIEW

Sachin Sud
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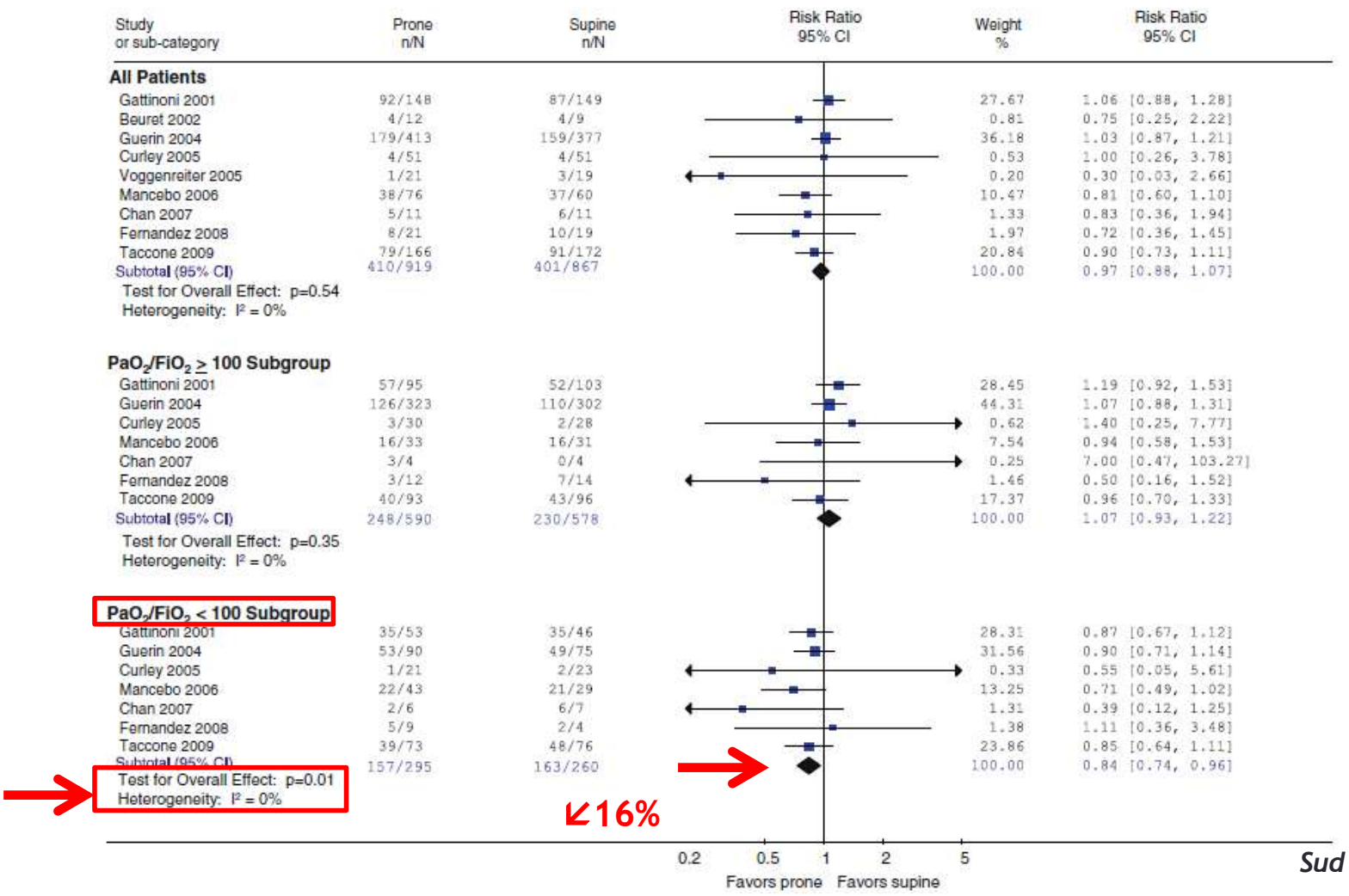
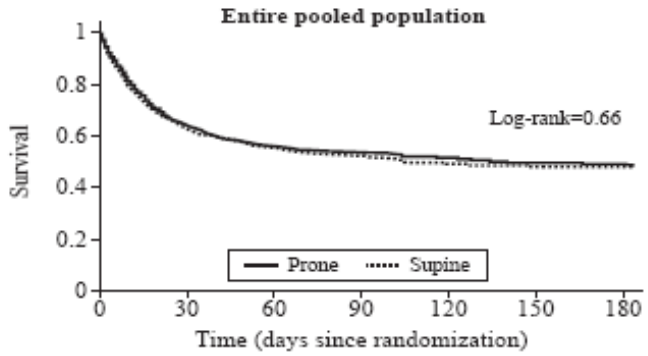
Prone ventilation reduces mortality in patients with acute respiratory failure and severe hypoxemia: systematic review and meta-analysis

Méta-analyse sur données groupées



Sud ICM 2010

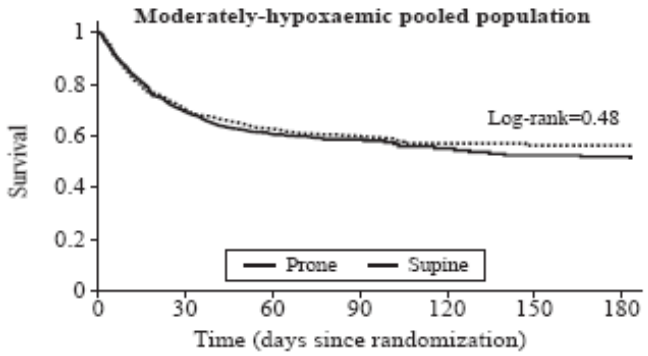
Méta-analyse sur données individuelles



No. at risk

Prone	764	467	399	368	148	143	143
Supine	809	501	421	394	155	149	148

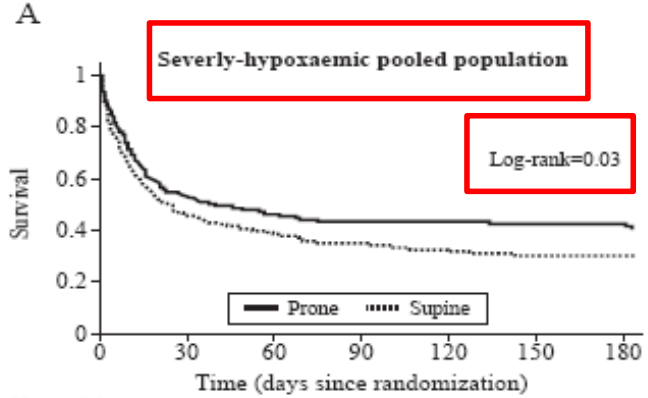
A



No. at risk

Prone	538	369	319	297	106	104	104
Supine	549	373	317	301	100	95	94

B



No. at risk

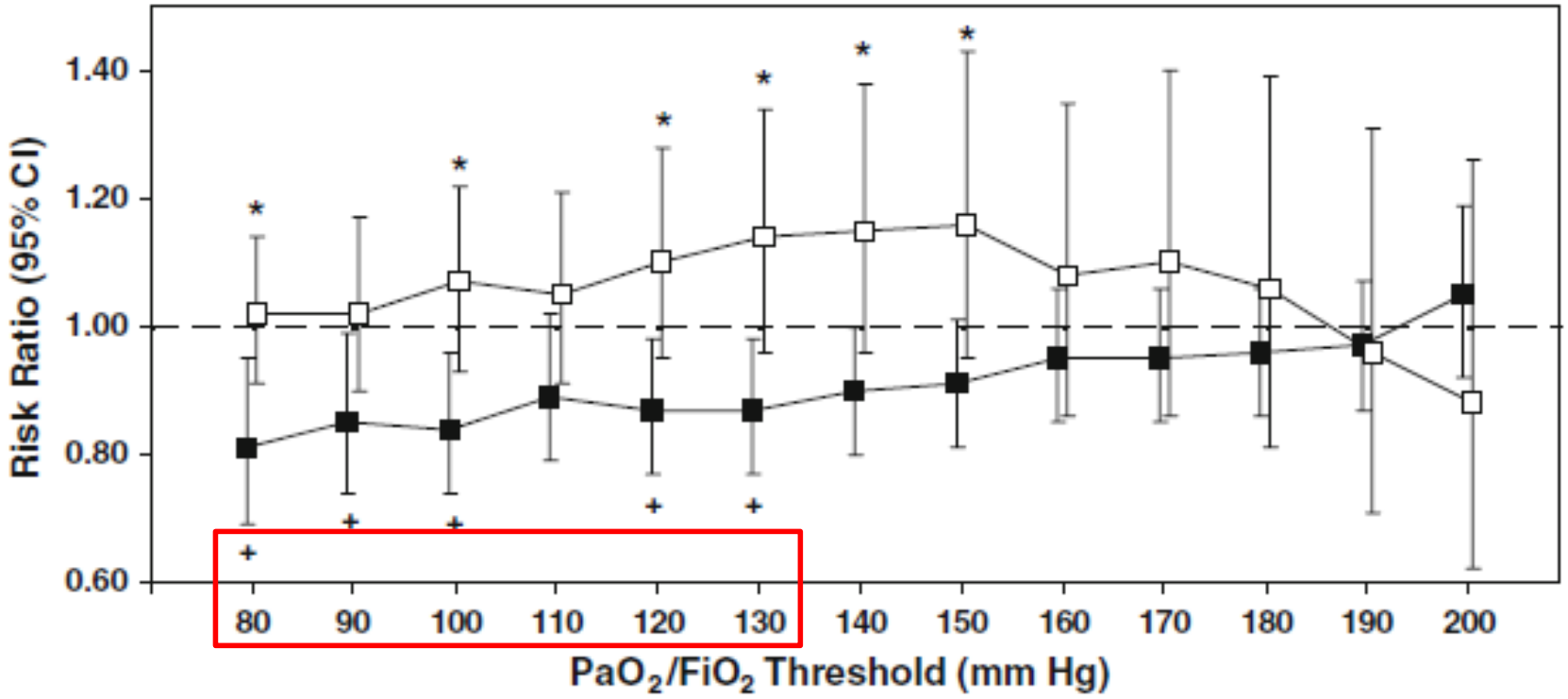
Prone	226	98	80	71	41	40	40
Supine	260	128	140	93	55	54	54

C

Gattinoni et al. Minerva Anesthesiologica 2010

Figure 3.—Kaplan-Meier estimates of survival rates at the latest follow-up of the prone (magenta line) and supine (green line) patients from the studies included in the pooled analysis of the four largest existing trials [15, 16, 18, 20] investigating the effects of prone positioning: entire pooled population (A), moderately hypoxemic patients (B) and severely hypoxemic patients (C) from the same pooled population.

Seuils critiques de PaO2/FIO2



Sud ICM 2010

PROSEVA trial

- Multicenter RCT
- Severe and Persistent ARDS
- Early intervention
- Two arms
  - Prone position for ≥ 16 hrs/day
  - Supine position 24 hrs/24hrs

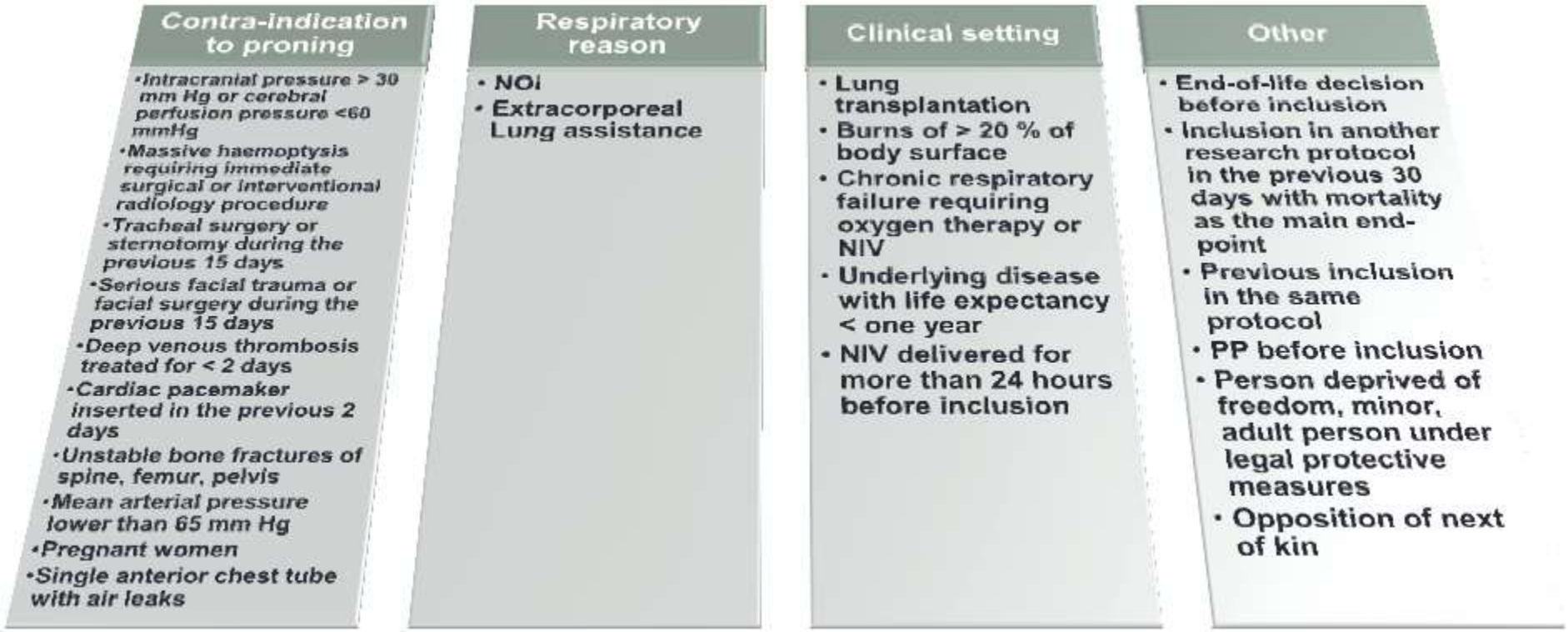
Objective

- Primary
  - To demonstrate that prone position can reduce mortality at Day 28 in patients with severe and confirmed ARDS
- Secondary
  - To demonstrate that prone position can reduce mortality at Day 90 in patients with severe and confirmed ARDS

Inclusion criteria

1. Aged 18 years or more
2. Both genders
3. Intubated for ARDS for < 36 hours
4. ARDS according to AECC criteria
5. Criteria confirmed 12-24 hours later
6. AND severity criteria at that time
   - $PaO_2/FiO_2 < 150$ with $F_IO_2 \geq 0.6$ + PEEP ≥ 5 cm H_2O + VT 6 ml/kg IBW
7. Information sheet given to next of kin

Non Inclusion criteria



Proning requirements

- First PP session should start in the 60 minutes after randomization
- Horizontal position
- PP session duration should last at least 16 consecutive hours until stopping criteria

Stopping criteria of Proning

1. Oxygenation improvement defined as:
   $PaO_2/F_IO_2 \geq 150$ mmHg
   AND PEEP ≤ 10 cm H_2O
   AND $F_IO_2 \leq 60\%$

   in SP
2. Serious complication during session
3. PaO2/FIO2 decrease by more than 20% during session for two consecutive sessions

PP in SP group

- Not allowed except as a life-saving procedure as defined as:
  - PaO_2/F_IO_2 < 55 mm Hg
  - AND F_IO_2 100%
  - AND maximal PEEP from F_IO_2-PEEP table (=24 cm H_2O)
  - AND NOi 10 ppm
  - AND recruitment manoeuvers
  - AND almitrine bismesylate

Mechanical Ventilation

Should be adjusted whatever the body position

- Targets
  - $55 \leq PaO_2 \leq 80$ mm Hg or $88\% \leq SpO_2 \leq 95\%$
  - PaO_2 over SpO_2
  - Pplat $\leq$ 30 cm H_2O (1 sec inspiratory pause)
  - $7.20 \leq pH \leq 7.45$
- Settings
  - VT = 6 ml/kg IBW
  - PEEP and F_IO_2 table (ARMA study NEJM 2000)
  - Respiratory rate adjusted to get pH between 7.20 and 7.45 (maximal rate 35 cycles per minute)

Weaning from mechanical ventilation

As soon as PaO_2/FIO_2 ≥ 150 mmHg and PEEP ≤ 10 cm H2O and F_IO_2 ≤ 60%
(<u>after 4 hours in SP</u>)

↓

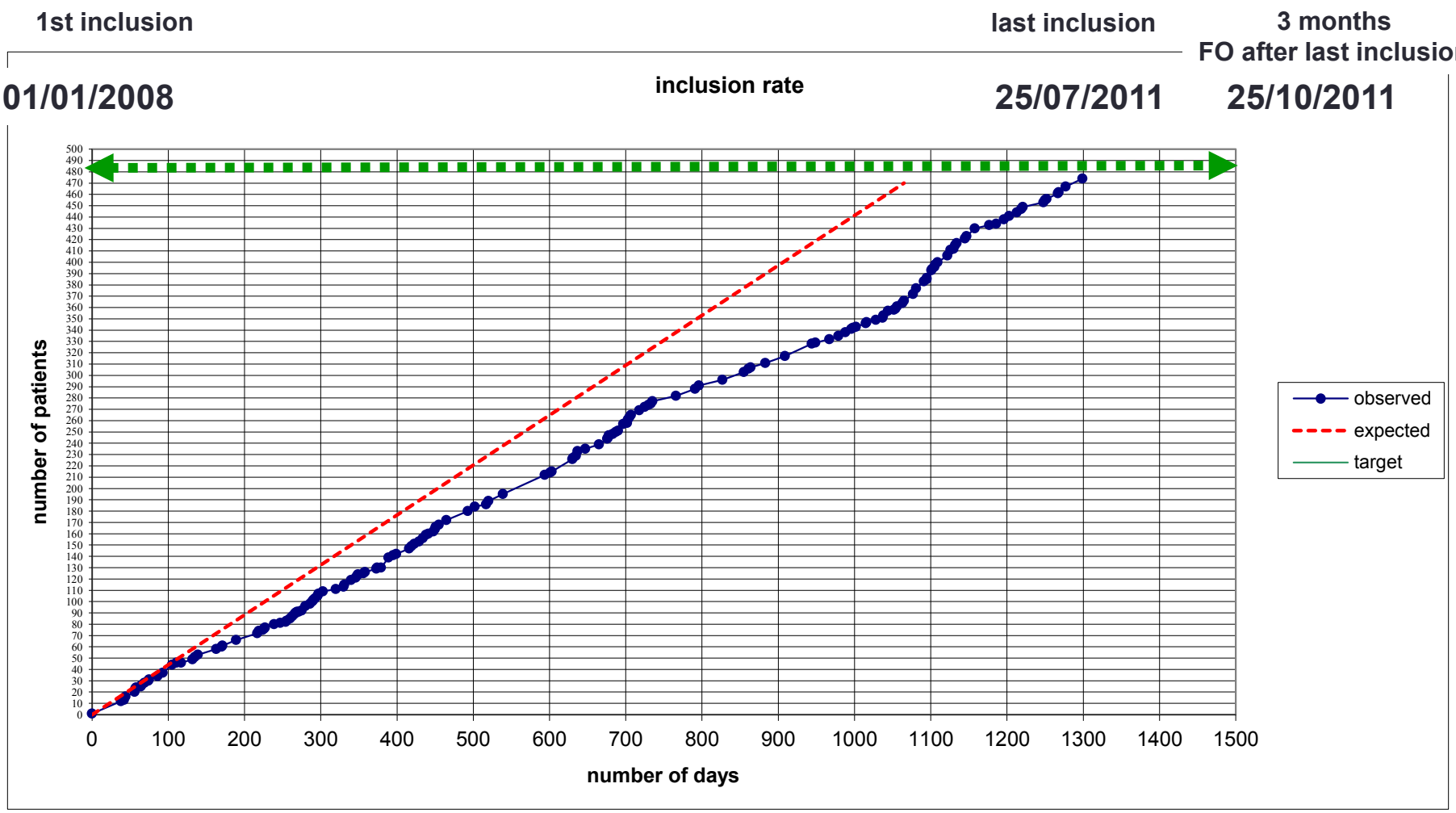
- STOP Neuromuscular blockade
- STOP Sedation
- STOP Proning

↓

- **PEEP weaning test**
- **Patient weanable if RR ≤ 35 b/min with PEEP 5 cmH2O and F_IO_2< 60%**
- **PRESSURE SUPPORT**

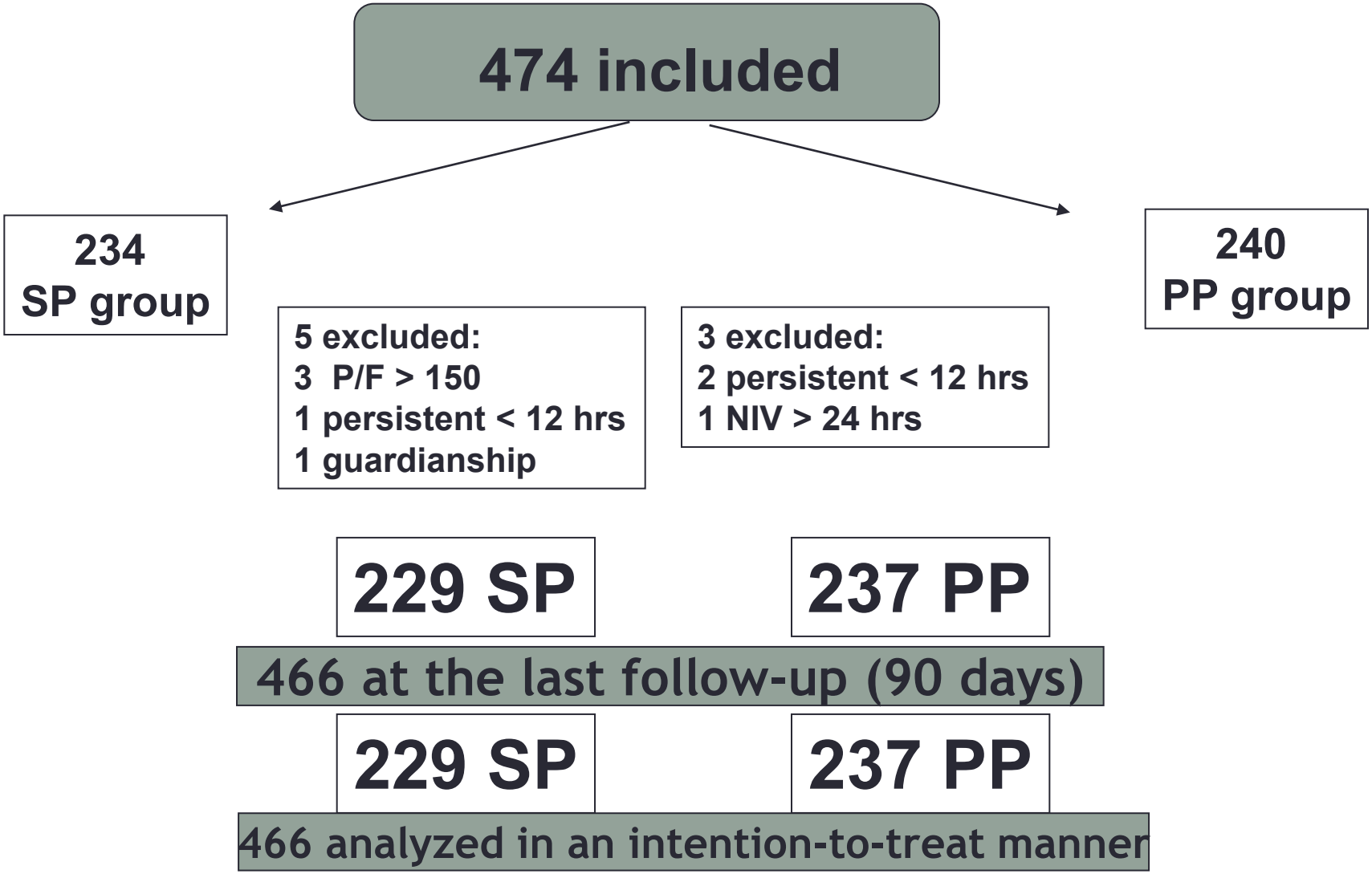
Power computation

- Unilateral formulation
- α = 0.05 and β = 0.10
- Δ mortality from 60% in SP to 45% in PP
- Two parallel groups
- Two-hundred and twenty-eight (228) patients per group
- Interim analysis at halfway point



After the interim analysis, DSMB advised to continue the trial which was performed up to its planned end

Patient flow



INCLUSION

	Supine Position group (n=229)	Prone Position group (n=237)
Age, years	60 ± 16	58 ± 16
Gender, N° male (%)	152 (47.8)	166 (52.2)
Patient origin		
Emergency room	98 (42.8)	101 (42.6)
Acute care	87 (38.0)	86 (36.3)
Home	26 (11.4)	31 (13.1)
ICU	9 (3.9)	11 (4.6)
Other	9 (3.9)	8 (3.4)
Setting, N° (%)		
Medical	203 (88.6)	211 (89.0)
Elective surgery	9 (3.9)	6 (2.50)
Non elective surgery	15 (6.6)	12 (5.1)
Trauma	2 (0.9)	8 (3.4)
MacCabe, N° (%)		
A	183 (79.9)	197 (83.1)
B	45 (19.7)	39 (16.5)
C	1 (0.4)	1 (0.4)
Immunodeficiency, N° (%)	38 (16.6)	32 (13.5)
SAPS II ICU admission	47 ± 17	45 ± 15
SOFA score*	10.4 ± 3.4	9.6 ± 3.2
Height (cm)	168 ± 10	168 ± 9
Ideal body weight (kgs)	62 ± 10	63 ± 10

INCLUSION

	Supine Position group (n=229)	Prone Position group (n=237)
Lung Injury Score	3.3 ± 0.4	3.3 ± 0.4
Pneumonia	58.1%	62.4%
Aspiration	17.9%	19%
Extra-pulmonary sepsis	12.2%	7.2%
Other	11.8%	11.4%

INCLUSION

	Supine Position group (n=229)	Prone Position group (n=237)
NIV in the 24 hours before inclusion n, %	67 (29.3)	73 (30.8)
Tidal volume (ml)	381 ± 66	384 ± 63
Tidal volume (ml.kg^{-1})	6.1 ± 0.6	6.1 ± 0.6
Respiratory Rate (breaths.min^{-1})	27 ± 5	27 ± 5
PEEP (cm H_2O)	10 ± 4	10 ± 3
F_IO_2 (%)	79 ± 16	79 ± 16
Plateau Pressure,rs (cm H_2O)	23 ± 5 (n=222)	24 ± 5 (n=212)
Cst,rs (ml.cmH_2O^{-1})	35 ± 15 (n=221)	36 ± 23 (n=222)
PaO_2 (mm Hg)	80 ± 18	80 ± 19
PaO_2 / F_IO_2 (mm Hg)	100 ± 20	100 ± 30
$PaCO_2$ (mm Hg)	52 ± 32	50 ± 14
Arterial pH	7.30 ± 0.10	7.30 ± 0.10
Plasma bicarbonate (mmol.l^{-1})	25 ± 5 (n=227)	25 ± 5 (n=236)
Plasma lactate (mmol.l^{-1})	2.6 ± 3.5 (n=204)	2.5 ± 3.4 (n=201)

Time from intubation to randomization

- SP 31.4 ± 25.6 hours (n=212)
- PP 33.0 ± 23.9 hours (n=227)

P=0.657

Dose of proning in PP group

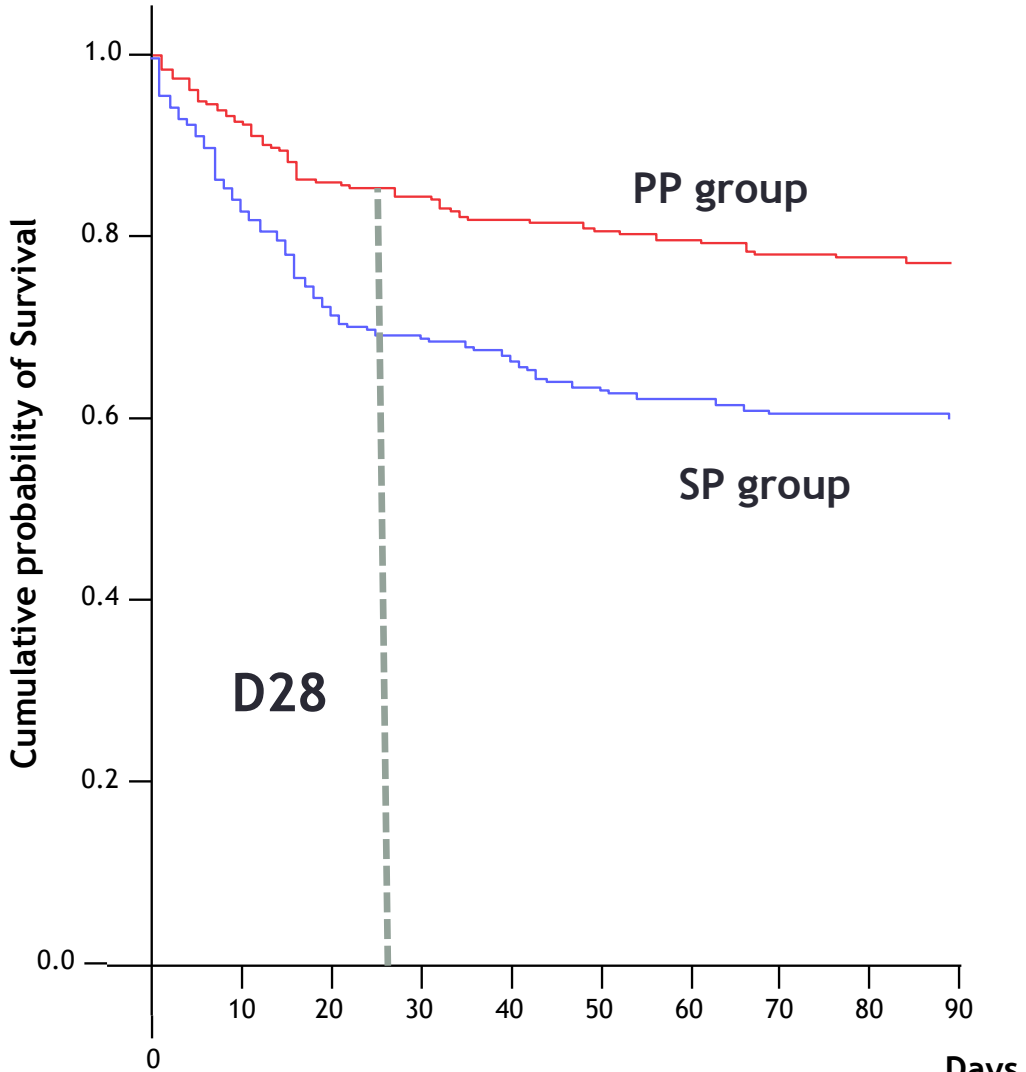
- Time from randomization to first PP session = 55 ± 55 minutes
- Number of PP sessions per patient = 4 ± 4
- PP session duration = 17 ± 3 hours
- Time in PP = 22,334 hours x patient
  - (73% of time between onset of first and end of last PP session)

Primary outcome: Mortality at D28

	SP group (n=229)	PP group (n=237)	P value
N° deaths	75	38	0.0000256
% death [95% CI]	32.8 [26.4-38.6]	16.0 [11.3-20.7]	
Unadjusted HR with PP [95% CI]	0.39 [0.25-0.63]		
Adjusted HR for SOFA score with PP [95% CI]	0.42 [0.26-0.66]		0.0002

Secondary outcome: Mortality at D90

	SP group (n=229)	PP group (n=237)	P value
N° deaths	94	56	0.0000573
% death [95% CI]	41.0 [34.6-47.4]	23.6 [18.2-29.0]	
Unadjusted HR with PP [95% CI]	0.44 [0.29-0.67]		
Adjusted HR for SOFA score with PP [95% CI]	0.48 [0.32-0.72]		0.0004



P < 0.001

Subjects at risk

PP	237	202	191	186	182
SP	229	163	150	139	136

Complications: assessment at Day 90

N° (%)	SP group (n=229)	PP group (n=237)	P value
Unscheduled extubation	25 (10.9)	31 (13.1)	0.473
Selective intubation	5 (2.2)	6 (2.5)	0.804
Endotracheal tube obstruction	5 (2.2)	11 (4.9)	0.141
Hemoptysis	12 (5.2)	6 (2.5)	0.129
Pneumothorax requiring chest tube	13 (5.7)	15 (6.3)	0.767
Cardiac arrest	31 (13.5)	16 (6.8)	0.015
SpO2<85% or PaO2<55mmHg (< 7,3 kPa) > 5 minutes	164 (71.6)	155 (65.4)	0.149
Heart Rate<30/min>1 minute	27 (11.8)	26 (11.0)	0.780
SBP < 60 mmHg>5 minutes	48 (21.0)	35 (14.8)	0.081

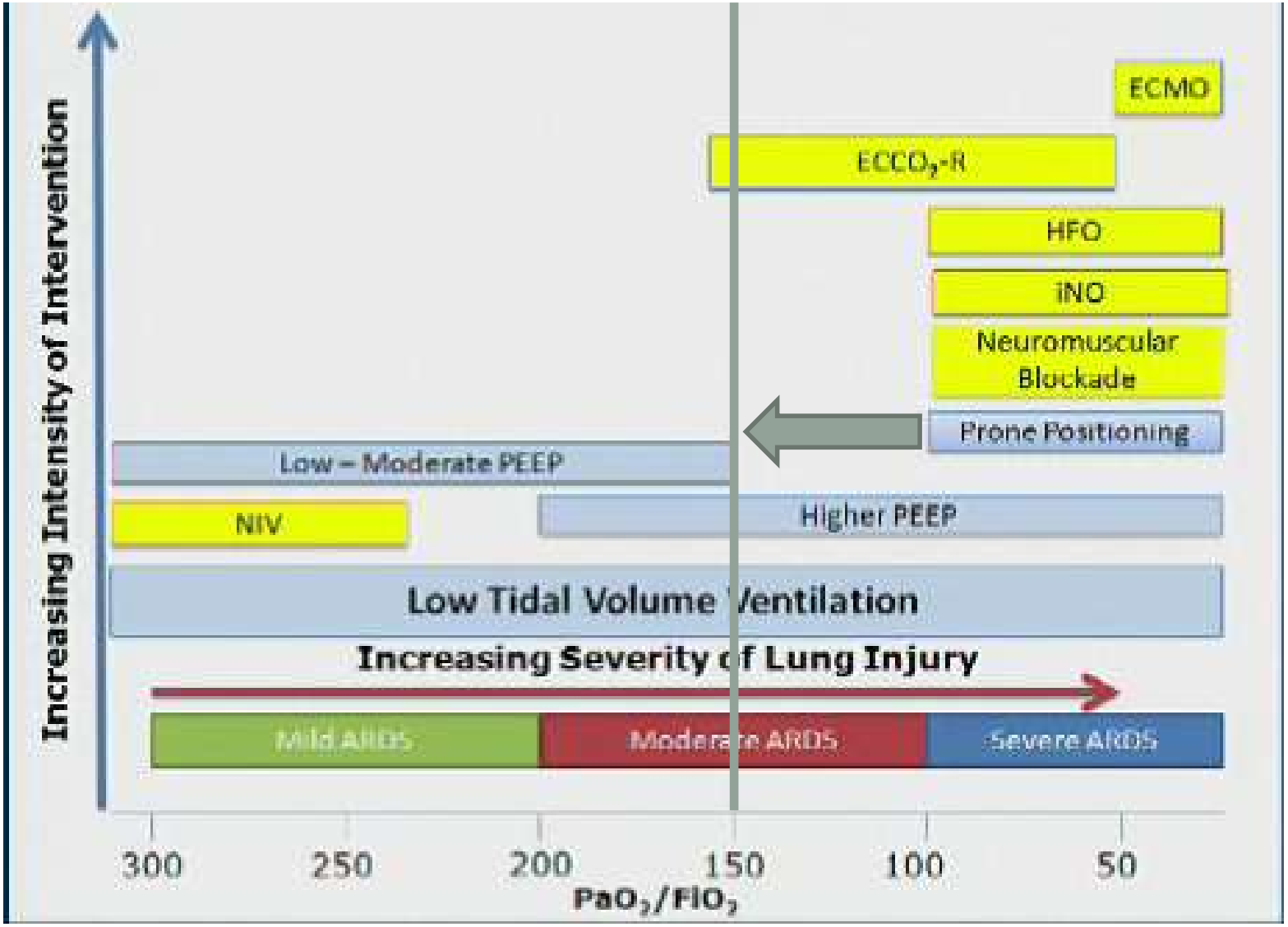
Conclusions

- DV augmente la survie dans SDRA sévère (PaO_2/FIO_2 < 150 mmHg + PEEP ≥ 5 cm H_2O + FIO_2 ≥ 60%) et confirmé à H12-H24
- Devrait être utilisé précocément et pour de longues séances chez ces malades
- À condition d'avoir une expérience de service solide présente 24 heures sur 24 et 7 jours sur 7

CERTITUDES SUR EFFETS BENEFIQUES DU DV

↑ Oxygénation	Oui
↓ VILI	Oui
↓ Mortalité	Oui

Stratégies thérapeutiques selon le stade du SDRA



Ferguson ICM 2012