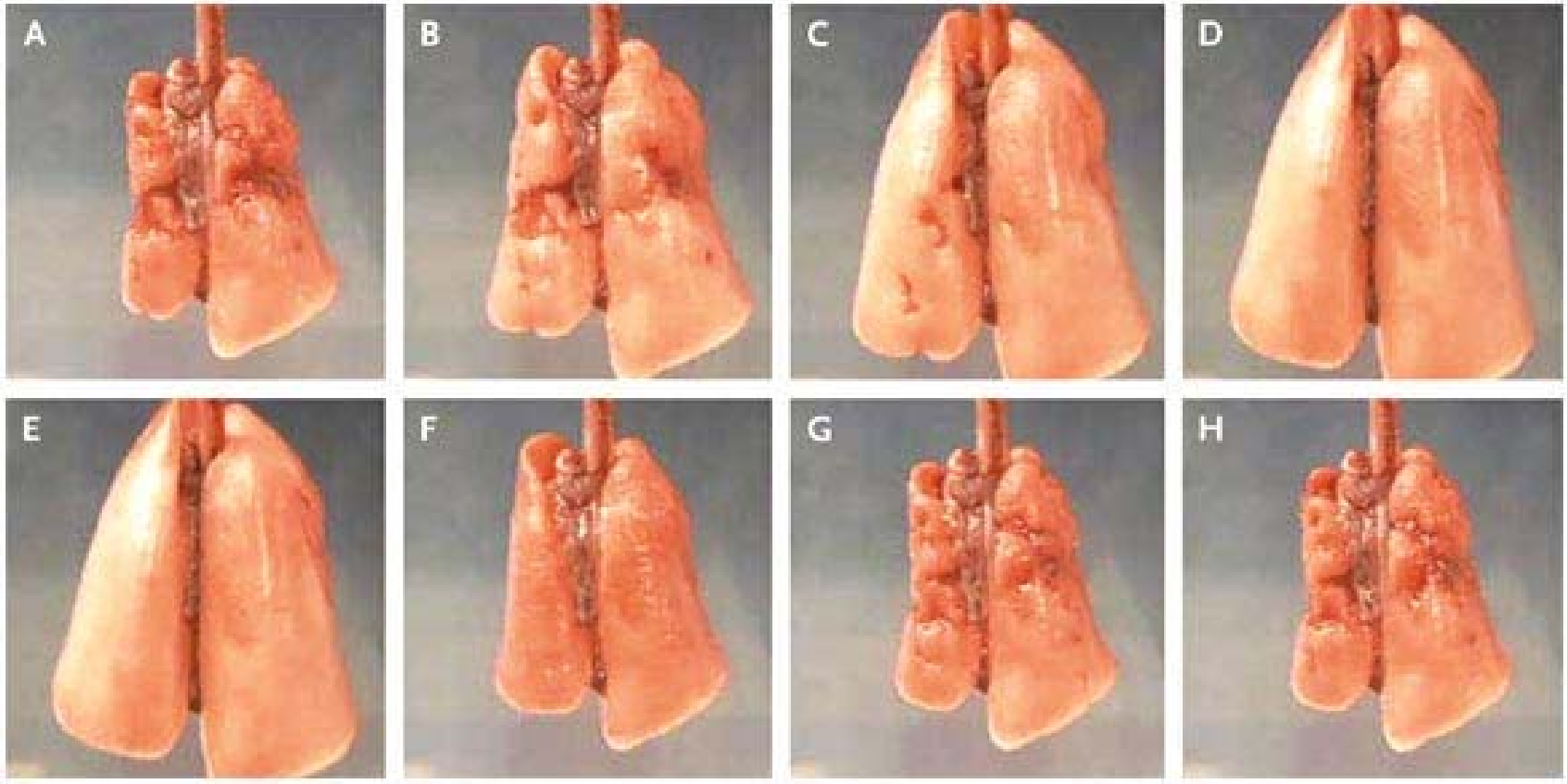
Efecte inflamatori de l'oxigen

Dr Rafael Fernandez
UCI. Hospital Sant Joan de Deu
Fundació Althaia. Manresa.
rfernandezf@althaia.cat

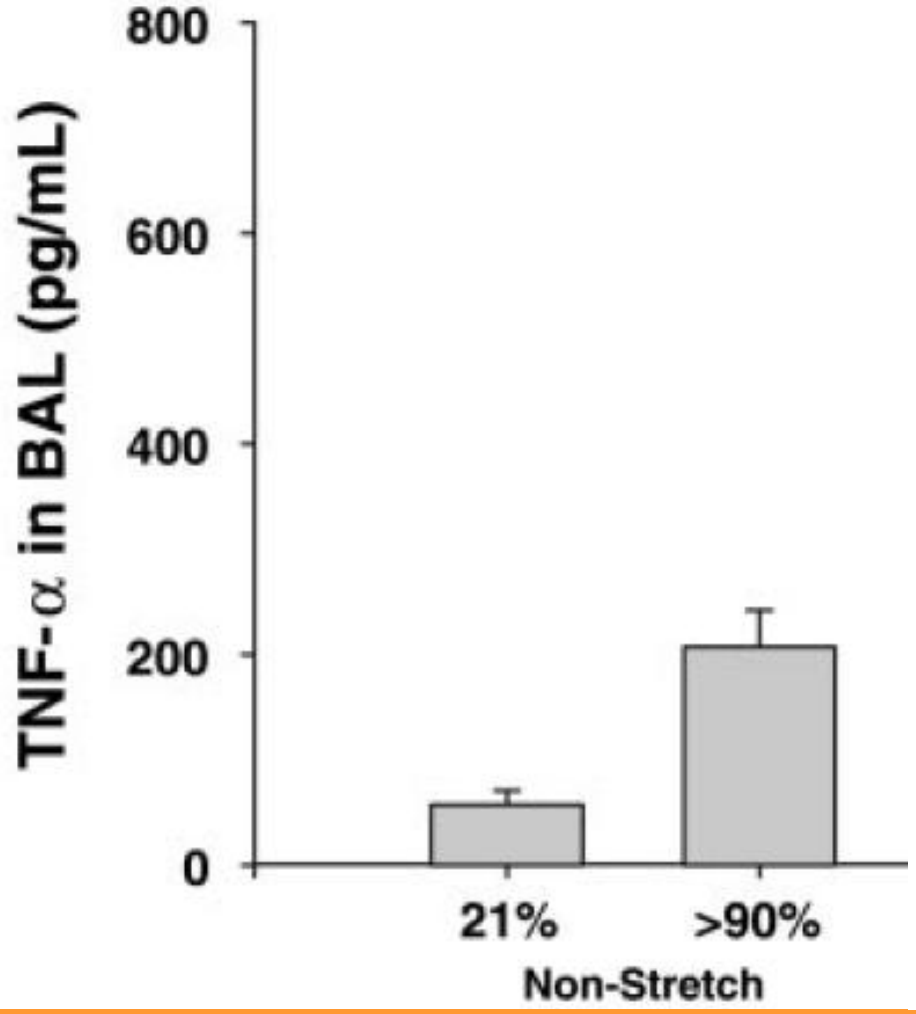
VII CONFERENCIA D'EXPERTS: INSUFICIENCIA RESPIRATORIA AGUDA
SOCMIC
17 gener de 2012


DALE UN RESPIRO A TU VIDA
NUEVO
Más práctico
Más funcional
Más económico
Equilibrio total
Mantengase sano con energía y excelente estado de ánimo durante todo el día
Oxigeno y Sílica 2 en 1
SYNERGY O2
LA NUEVA TENDENCIA
YA LO PROBASTE?

Hyperoxia and mechanical ventilation

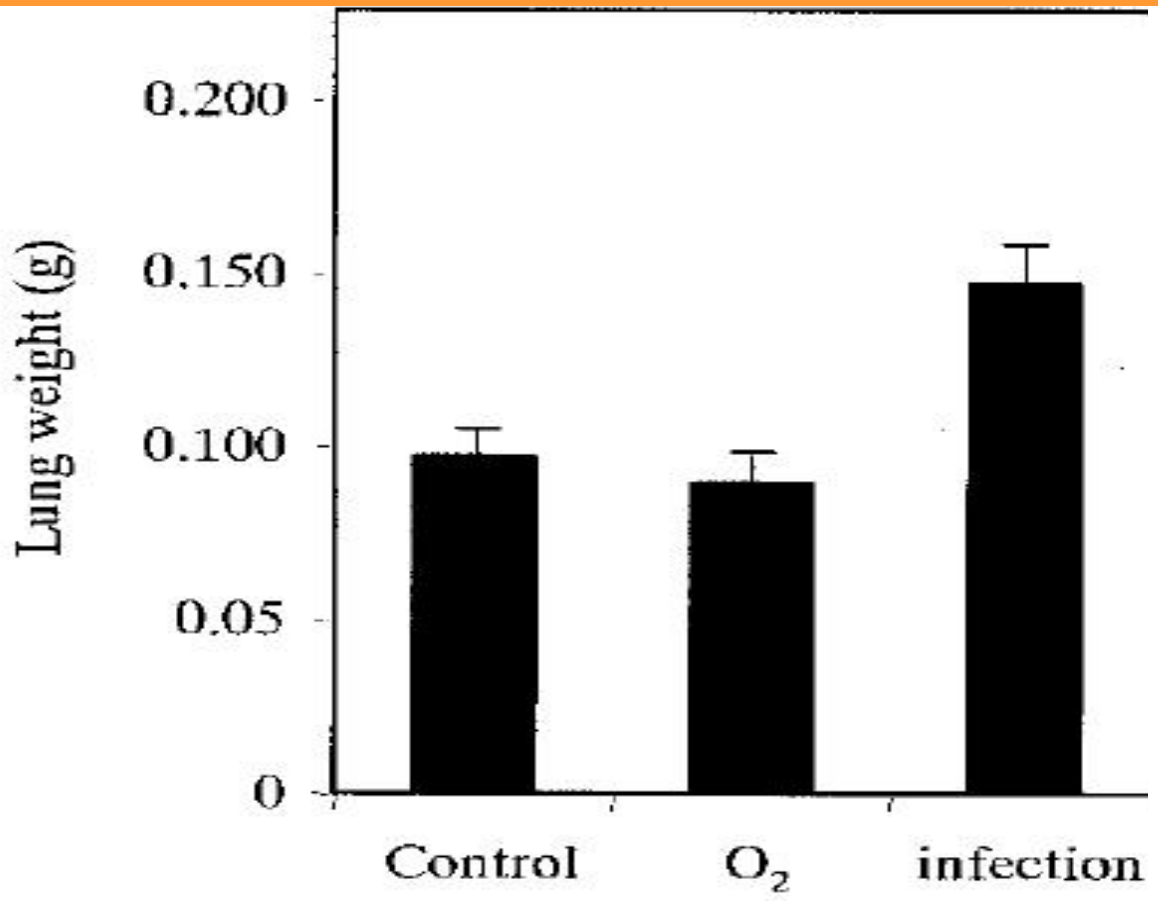


High O_2 concentrations predispose mouse lungs to the deleterious effects of high stretch ventilation



Bailey TC et al. J Appl Physiol 2003; 94: 975–982

Hyperoxia Mediates Acute Lung Injury and Increased Lethality in Murine Legionella Pneumonia: The Role of Apoptosis



Tateda K et al. Journal of Immunology, 2003, 170: 4209–4216

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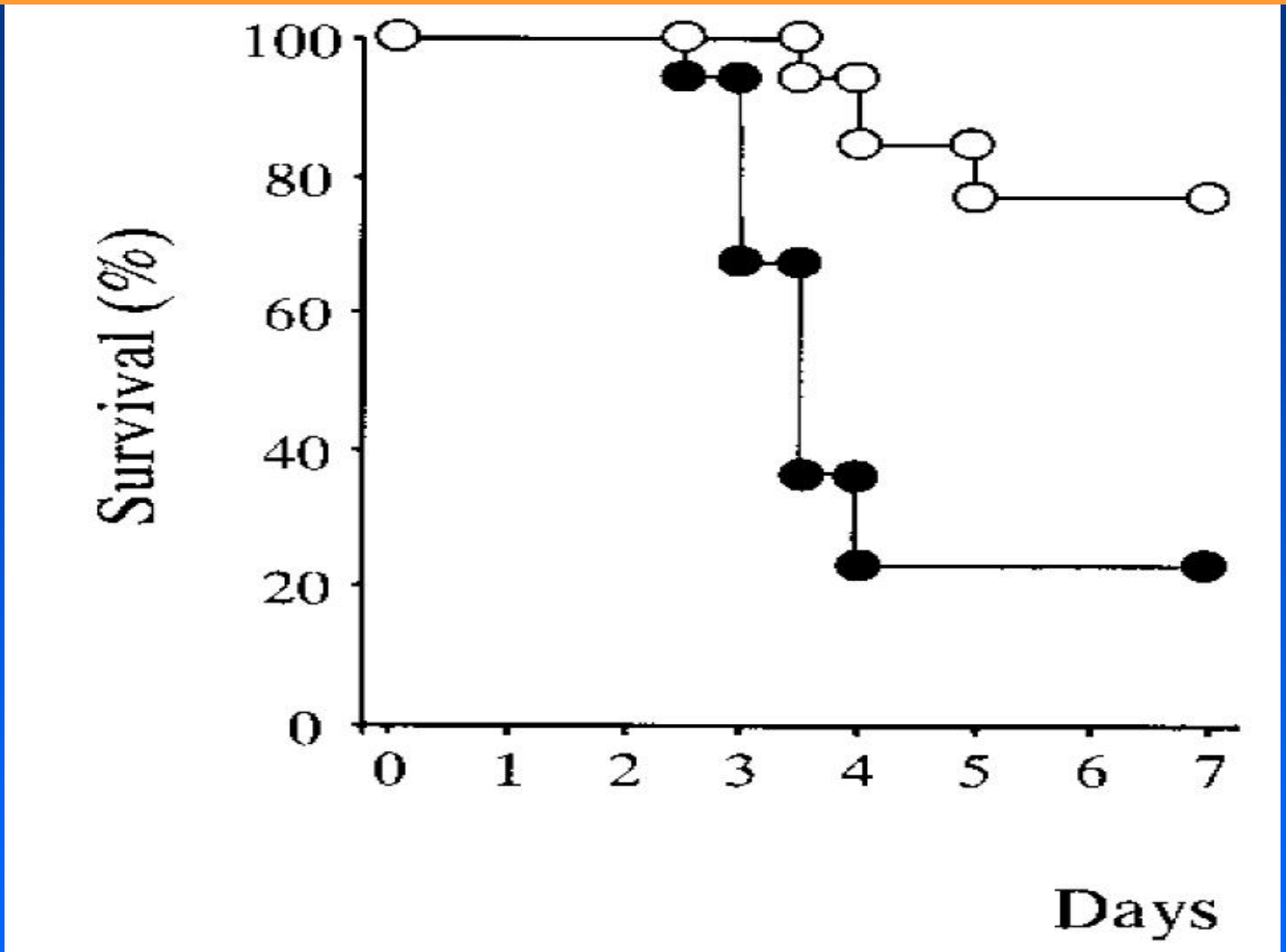
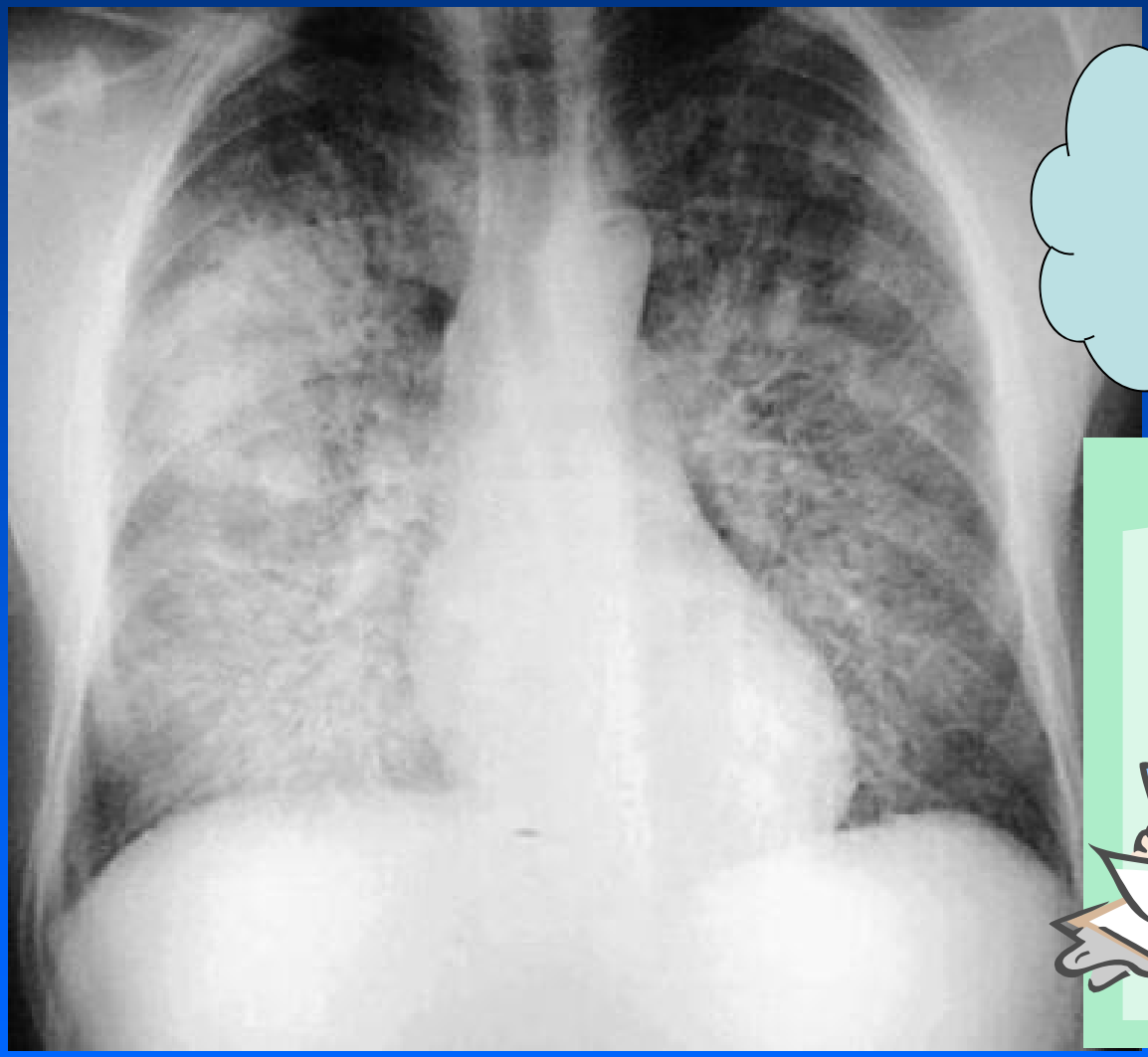


Tateda K et al. Journal of Immunology, 2003, 170: 4209–4216

Hyperoxia and mechanical ventilation



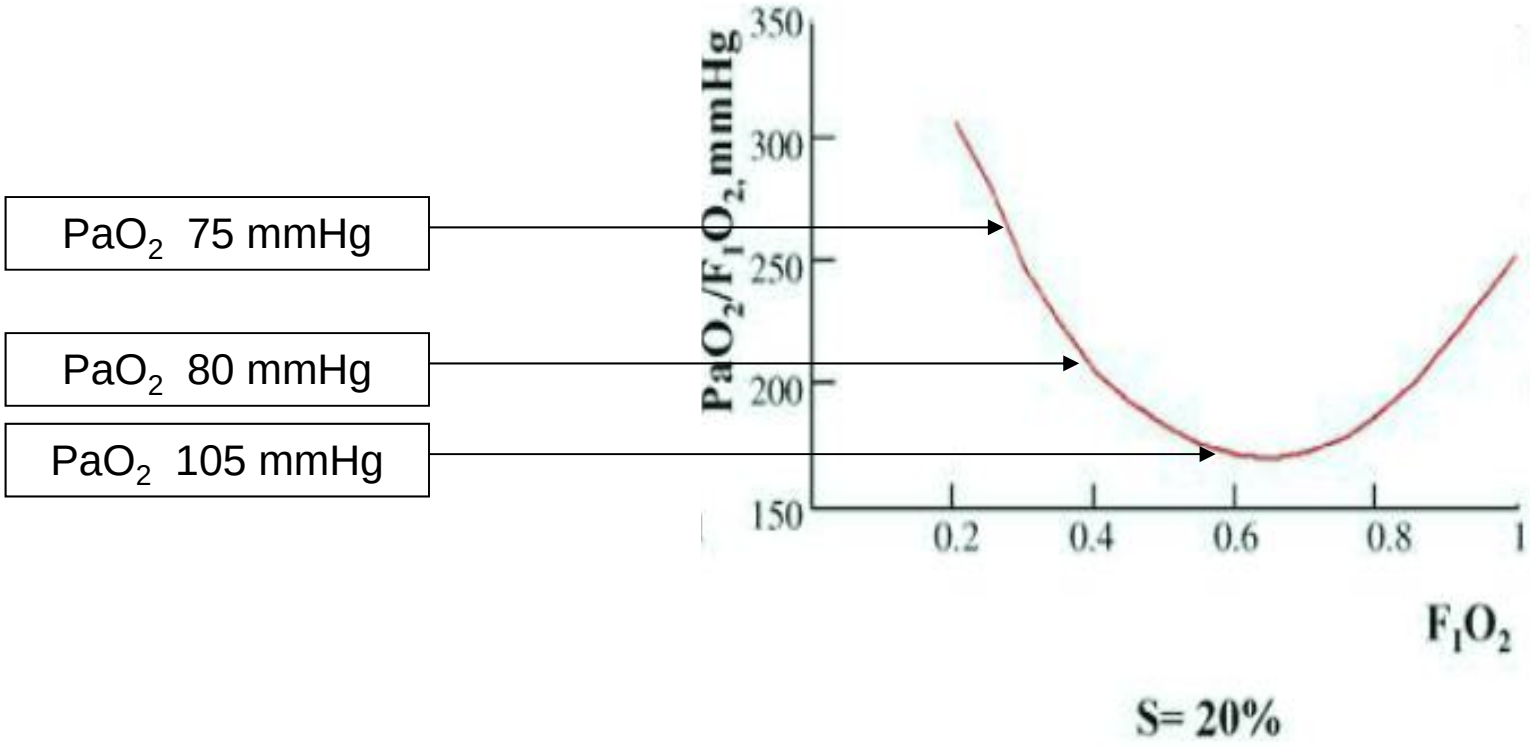
Higher versus Lower PEEP in Patients with ARDS

Variable	Day 1		Day 3		Day 7	
	Lower-PEEP Group	Higher-PEEP Group	Lower-PEEP Group	Higher-PEEP Group	Lower-PEEP Group	Higher-PEEP Group
Tidal volume (ml/kg of predicted body weight)	6.1±0.8	6.0±0.9†	6.1±1.1	5.8±1.0†	6.2±1.3	5.8±1.2
No. of patients	236	258	171	160	83	97
Plateau pressure (cm of water)	24±7	27±6†	24±6	26±7†	26±8	26±6
No. of patients	230	252	165	155	78	96
Mean airway pressure (cm of water)	15±5	20±5†	15±5	18±5†	15±7	19±6†
No. of patients	233	261	167	164	82	94
Respiratory rate (breaths/min)	29±7	29±7	30±7	30±7	28±7	30±7
No. of patients	248	263	180	173	98	102
Minute ventilation (liters/min)	12±4	12±3	12±4	12±3	12±4	12±3
No. of patients	247	264	178	171	96	104
FiO_2	0.54±0.18	0.44±0.17†	0.52±0.18	0.40±0.14†	0.52±0.20	0.40±0.11†
No. of patients	249	264	179	173	98	103
PEEP (cm of water)						
All patients	8.9±3.5	14.7±3.5‡	8.5±3.7	12.9±4.5‡	8.4±4.3	12.9±4.0‡

The NHLBI ARDS Clinical Trials Network. NEJM 2004; 351: 327-36.

El exceso de oxigeno puede confundir nuestros diagnósticos.

El caso del SDRA

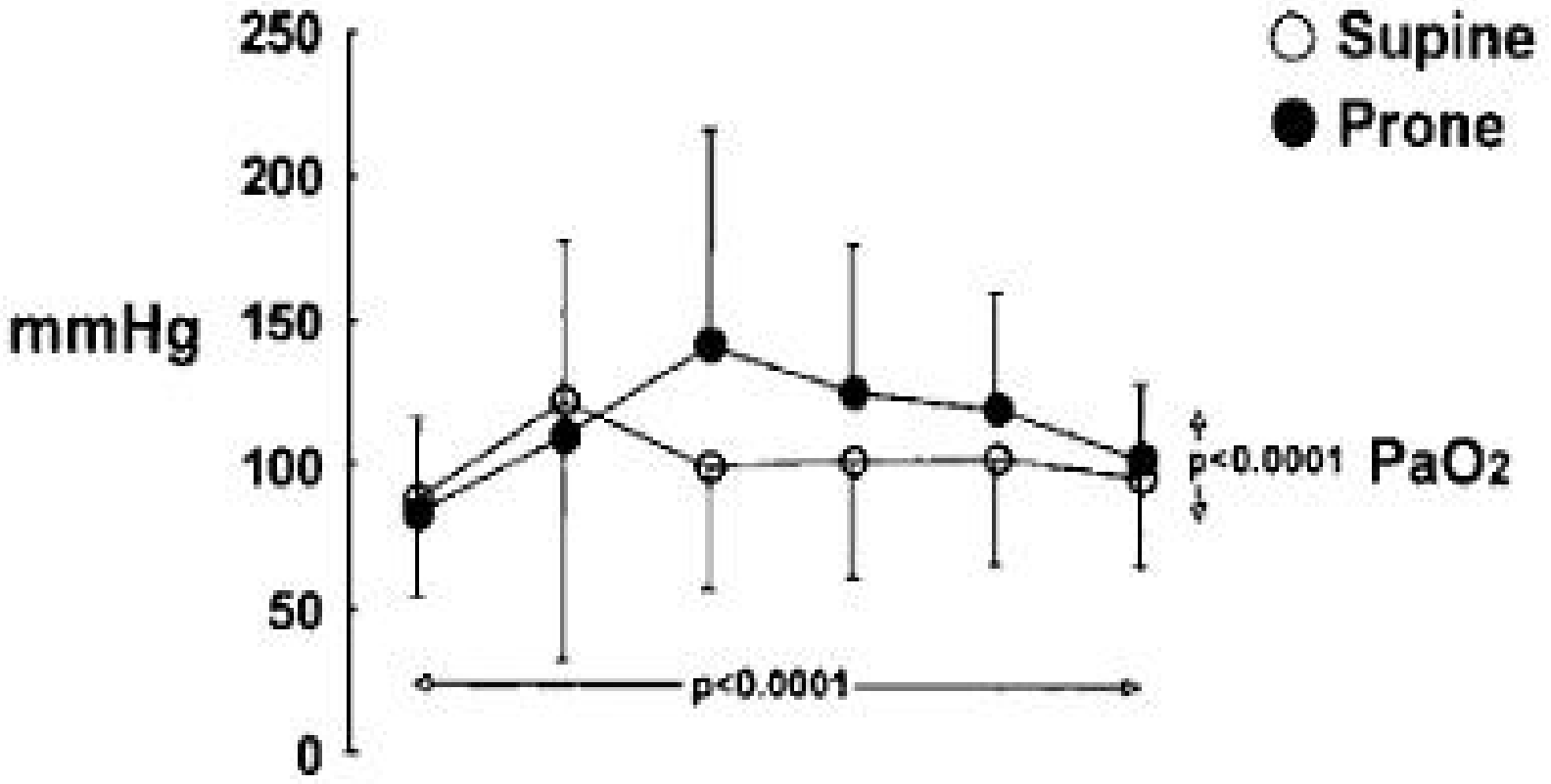


Aboab J et al. Intensive Care Med (2006) 32:1494–1497

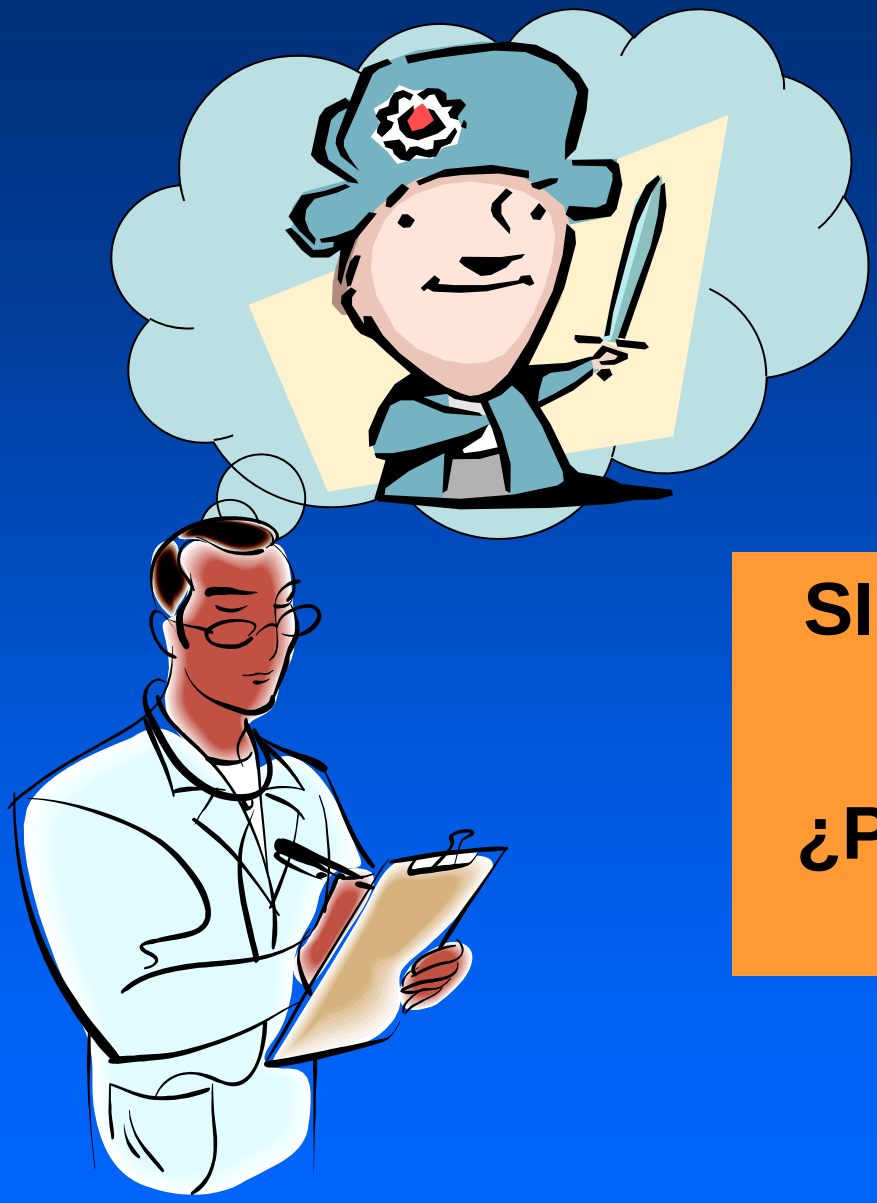
Todos sabemos que el exceso de oxigeno es malo,

y por eso usamos el mínimo imprescindible

A MULTICENTER TRIAL OF PROLONGED PRONE VENTILATION IN ACUTE ARDS

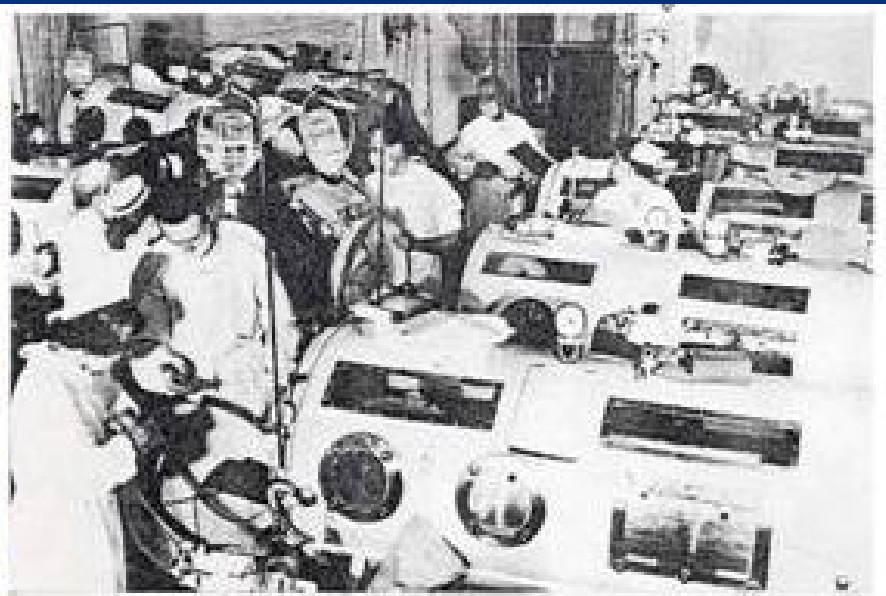


Mancebo J et al. AJRRCM 2006; 173: 1233-1239



SI EL OXIGENO ES TAN MALO,

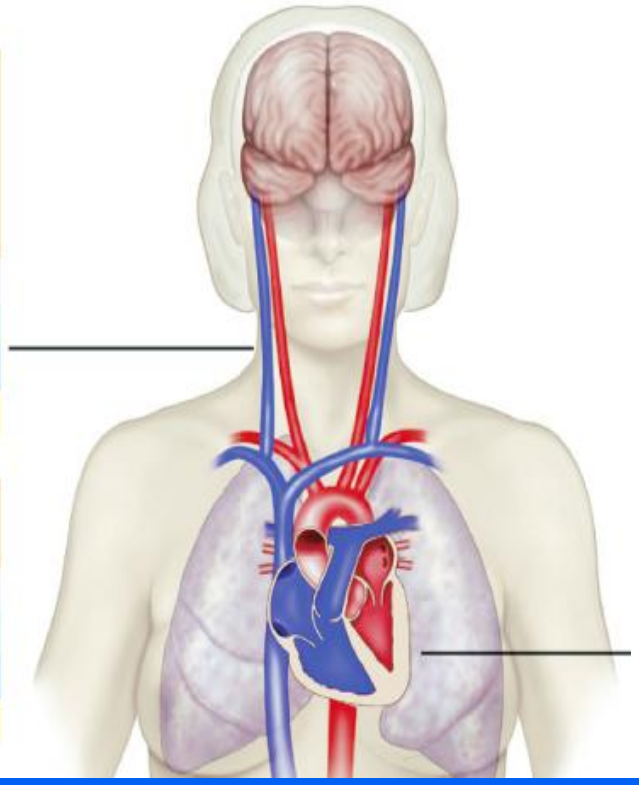
¿POR QUE DAMOS TANTO?



AÑADIR OXIGENO EVITA MUERTES SUBITAS EN PACIENTES VENTILADOS

AIR	Carotid Artery	Jugular Vein
PO_2	100	37
PCO_2	40	50
pH	7.40	7.34
HbO_2	96%	65.5%

	Arterial	Mixed Venous
PO_2	100	40
PCO_2	40	44
pH	7.40	7.37
HbO_2	97%	72%



Supplemental perioperative O_2 and the risk of surgical wound infection: A randomized controlled trial

Table 2. Comparative Outcomes Between High and Low FIO_2 Groups

	30% FIO_2 (n = 143)	80% FIO_2 (n = 148)	*P* Value*
No. of patients (%)			
Surgical site infection	35 (24.4)	22 (14.9)	.04
Daily ASEPSIS score ≥20 at any time	37 (25.9)	25 (16.9)	.06
ICU admission	5 (3.5)	4 (2.7)	.74
Time after surgery, mean (SE), d			
Bowel function	3.1 (1.7)	3.0 (1.5)	.54
First solid food intake	4.4 (2.0)	4.2 (2.2)	.57
Walking	4.2 (2.6)	3.9 (2.2)	.28
Staples removed	10.3 (3.0)	10.5 (3.6)	.71
Hospitalization after surgery	10.5 (4.4)	11.7 (7.0)	.09

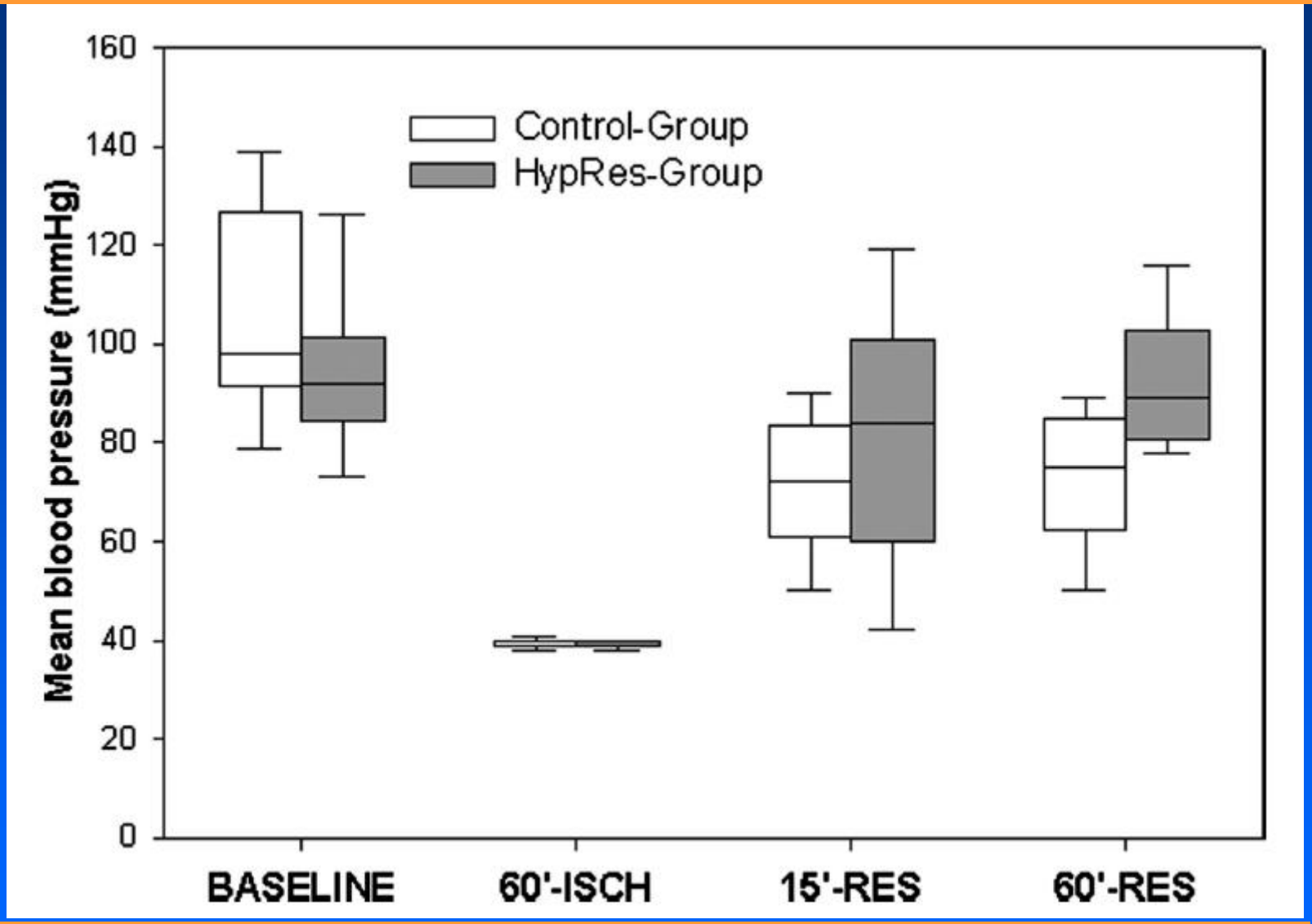
Belda FJ et al. JAMA 2005; 294: 2035-2042

Effect of High Perioperative Oxygen Fraction on Surgical Site Infection and Pulmonary Complications After Abdominal Surgery

Outcome	No. (%) 80% Oxygen (n = 685)	No. (%) 30% Oxygen (n = 701)
Surgical site infection	131 (19.1)	141 (20.1)
Infection location		
Superficial	75 (57.3)	76 (53.9)
Deep	20 (15.3)	26 (18.4)
Organ/space	36 (27.5)	39 (27.7)
ASEPSIS score >20[b]	32 (4.7)	36 (5.1)
Atelectasis	54 (7.9)	50 (7.1)
Pneumonia	41 (6.0)	44 (6.3)

Meyhof ChS et al. JAMA 2009; 302: 1543-1550

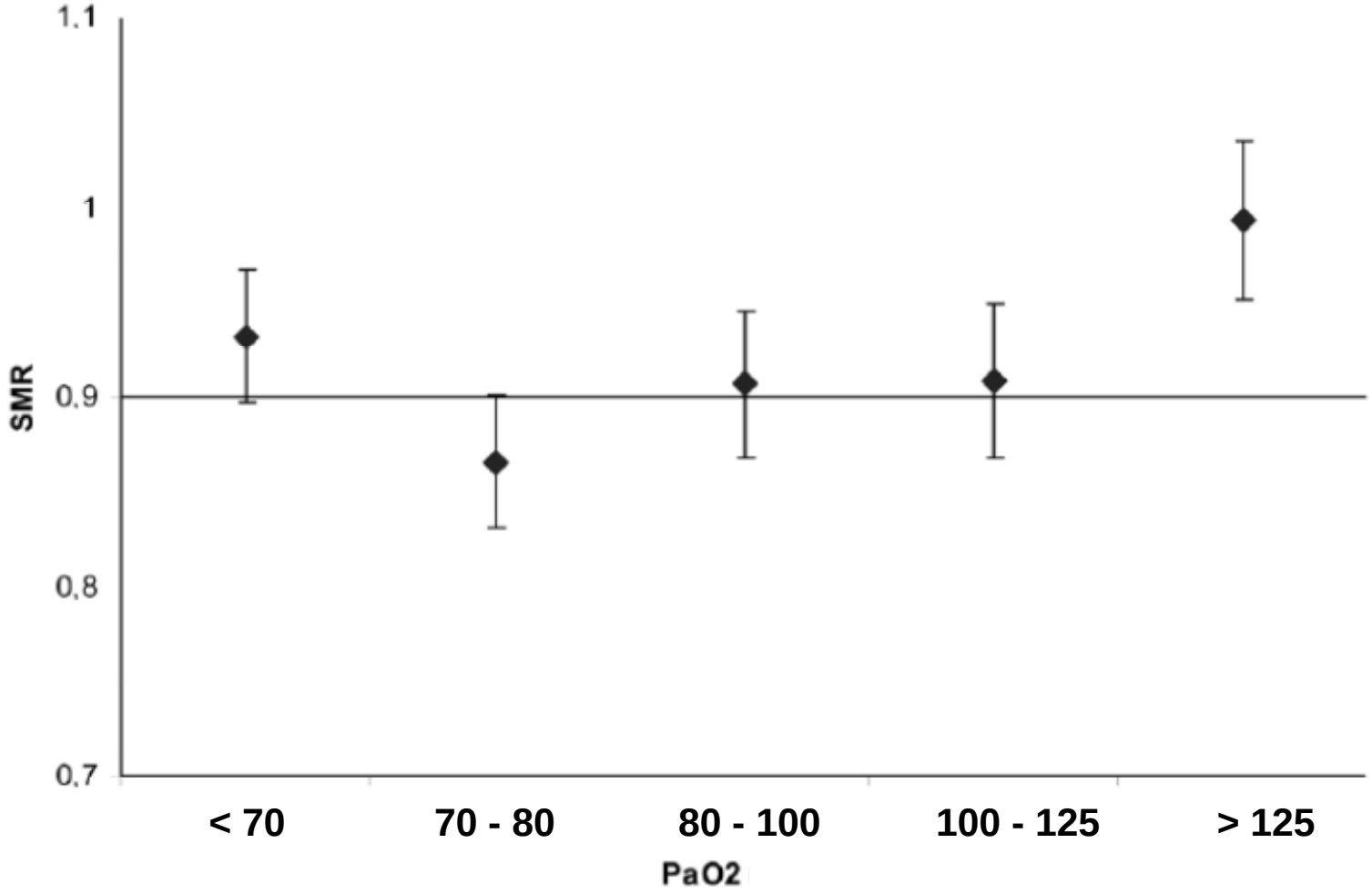
Hypoxemic Resuscitation of Hemorrhagic Shock



Douzinas EE et al. J Trauma. 2006;61:918–923

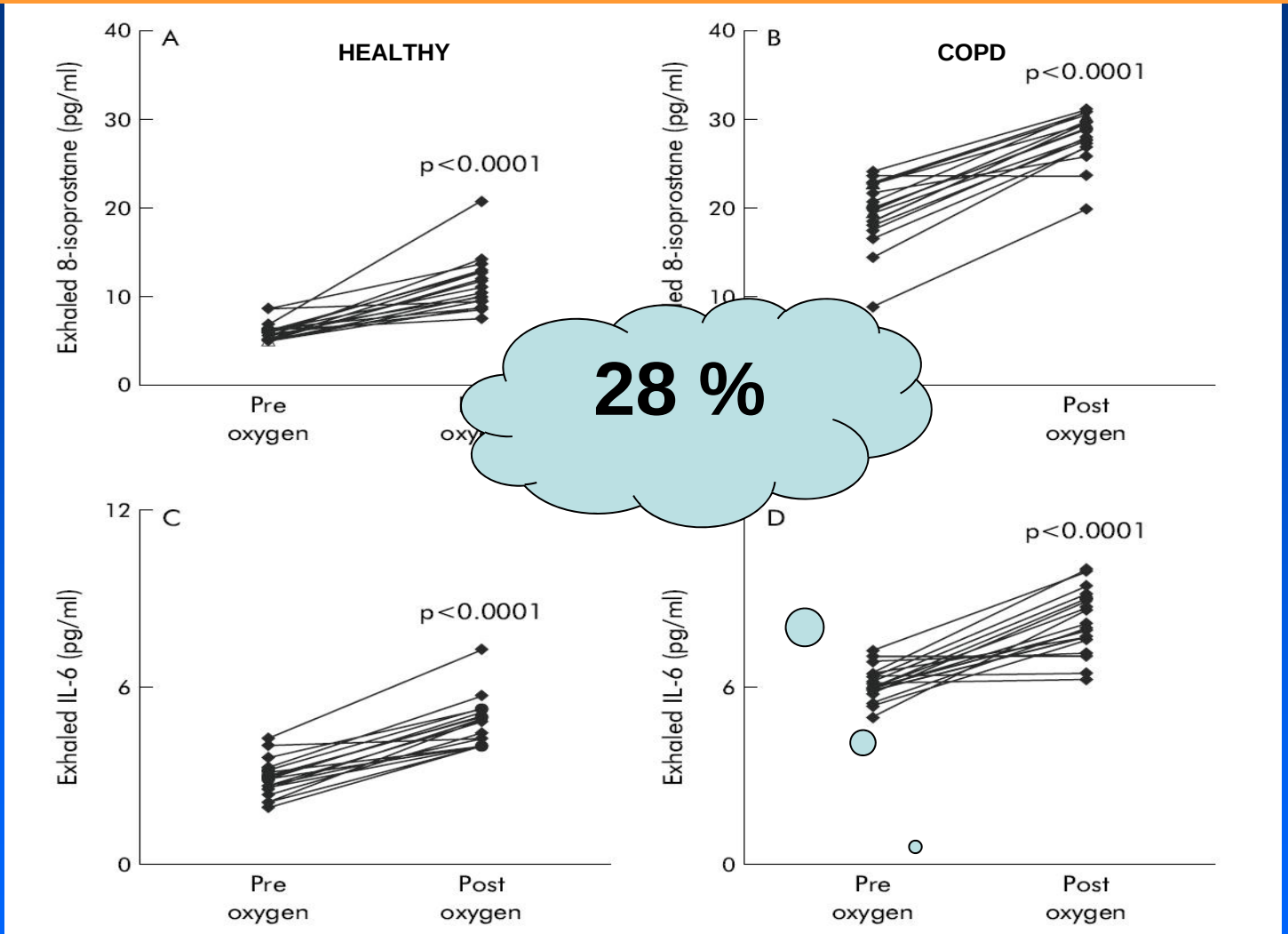
¿A PARTIR DE CUANTA CONCENTRACION DE O_2 NOS HEMOS DE PREOCUPAR?

Association between administered O_2, PaO_2 and mortality in mechanically ventilated ICU patients



De Jonghe E et al. Critical Care 2008, 12:R156

Supplementary oxygen in healthy subjects and those with COPD increases oxidative stress and airway inflammation



Carpagnano GE et al. Thorax 2004;59:1016–1019

Hipótesis:

Dosis bajas de oxígeno pueden producir inflamación pulmonar y aun mayor en pacientes críticos *(“second hit”).*

Objetivo:

Evaluar el efecto de reducir la FiO_2 (del 0.40 al 0.21) sobre los marcadores de inflamación pulmonar y plasmática en pacientes en VM sin insuficiencia respiratoria.

Métodos:

Pacientes en VM > 24h sin insuficiencia respiratoria (PaO_2/FiO_2> 300) y hemodinámicamente estable.

Registramos variables en 3 períodos:

FiO_2 0.4 → FiO_2 0.21 (4h) → FiO_2 0.4 (4h)

Medición de metabolitos de oxidación (NO, NO_2, NO_3, 8-isoprostano) en plasma y en concentrado del aire exhalado (20').

IL-4, IL-6, IL-10, TNF-a en plasma.

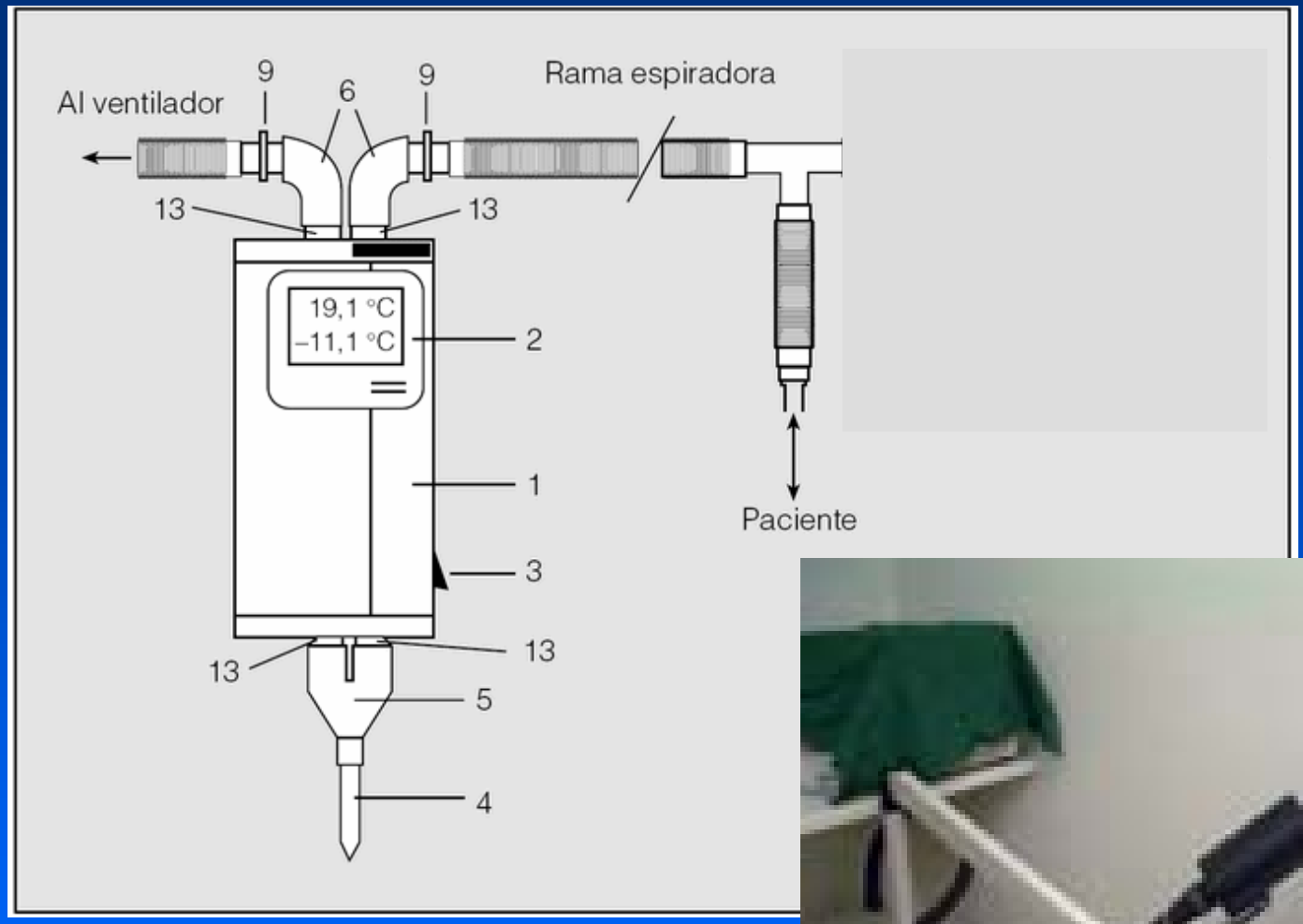
FC, TA, SaO_2, gasometría arterial y venosa central.

Análisis estadístico:

Mediana (25%-75% percentiles)

ANOVA para medidas repetidas con FiO_2 como variable agrupadora,

p <0.05


Al ventilador
9
6
9
Rama espiradora
13
13
19,1 °C
–11,1 °C
2
1
3
13
13
5
4
Paciente

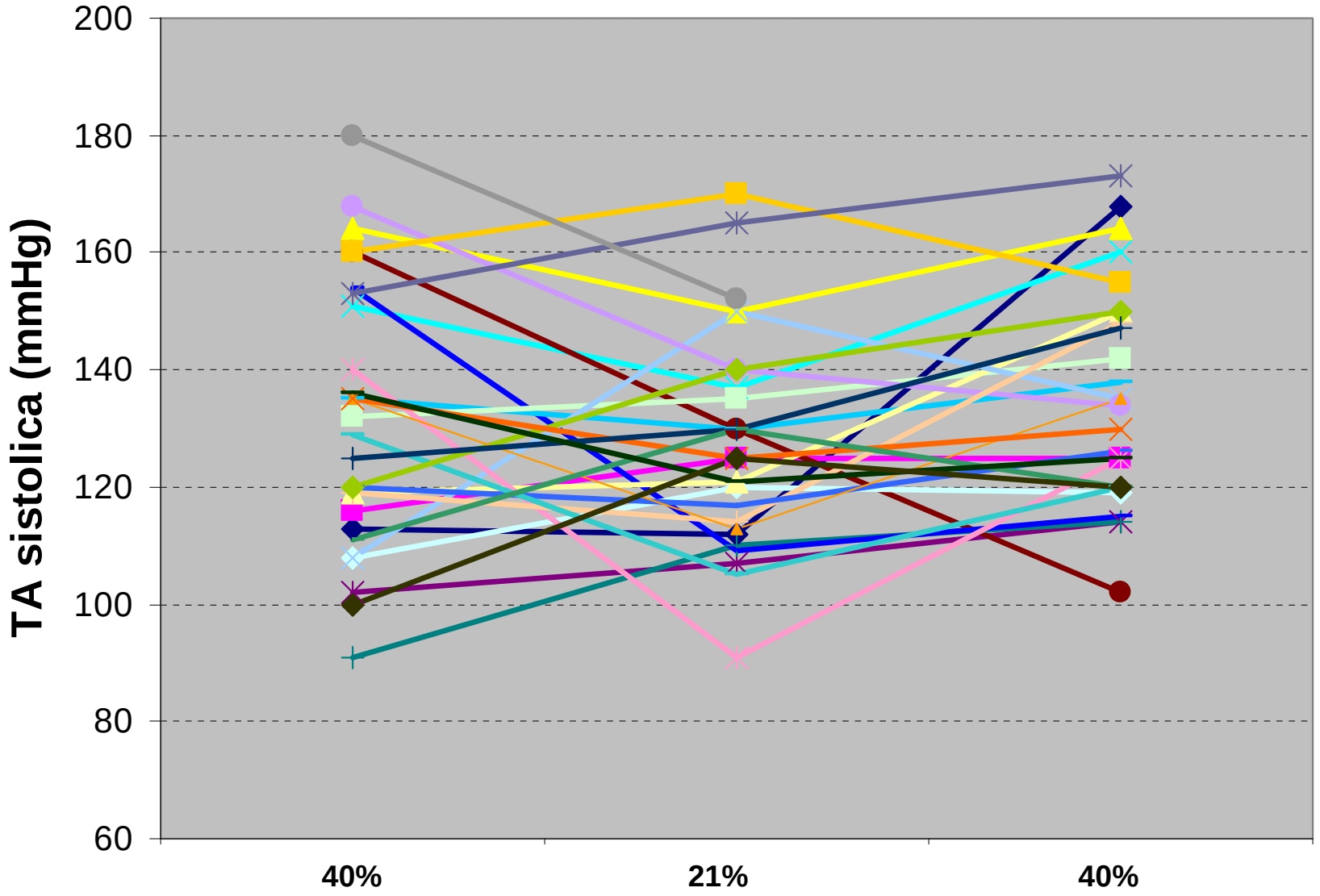
Resultados:

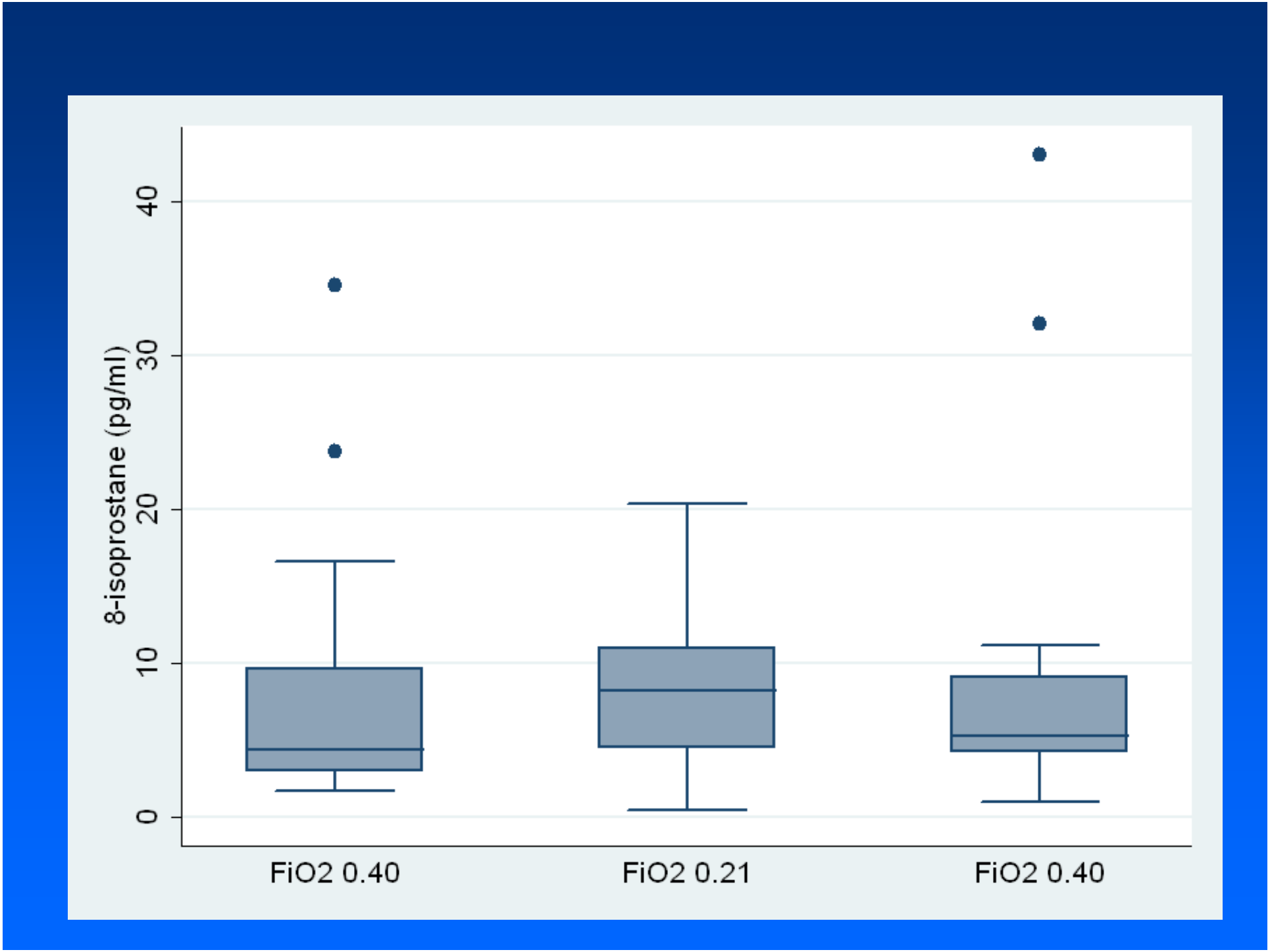
Reclutamos 40 pacientes, pero solo 28 de ellos toleraron la reducción de FiO_2 al 0.21.

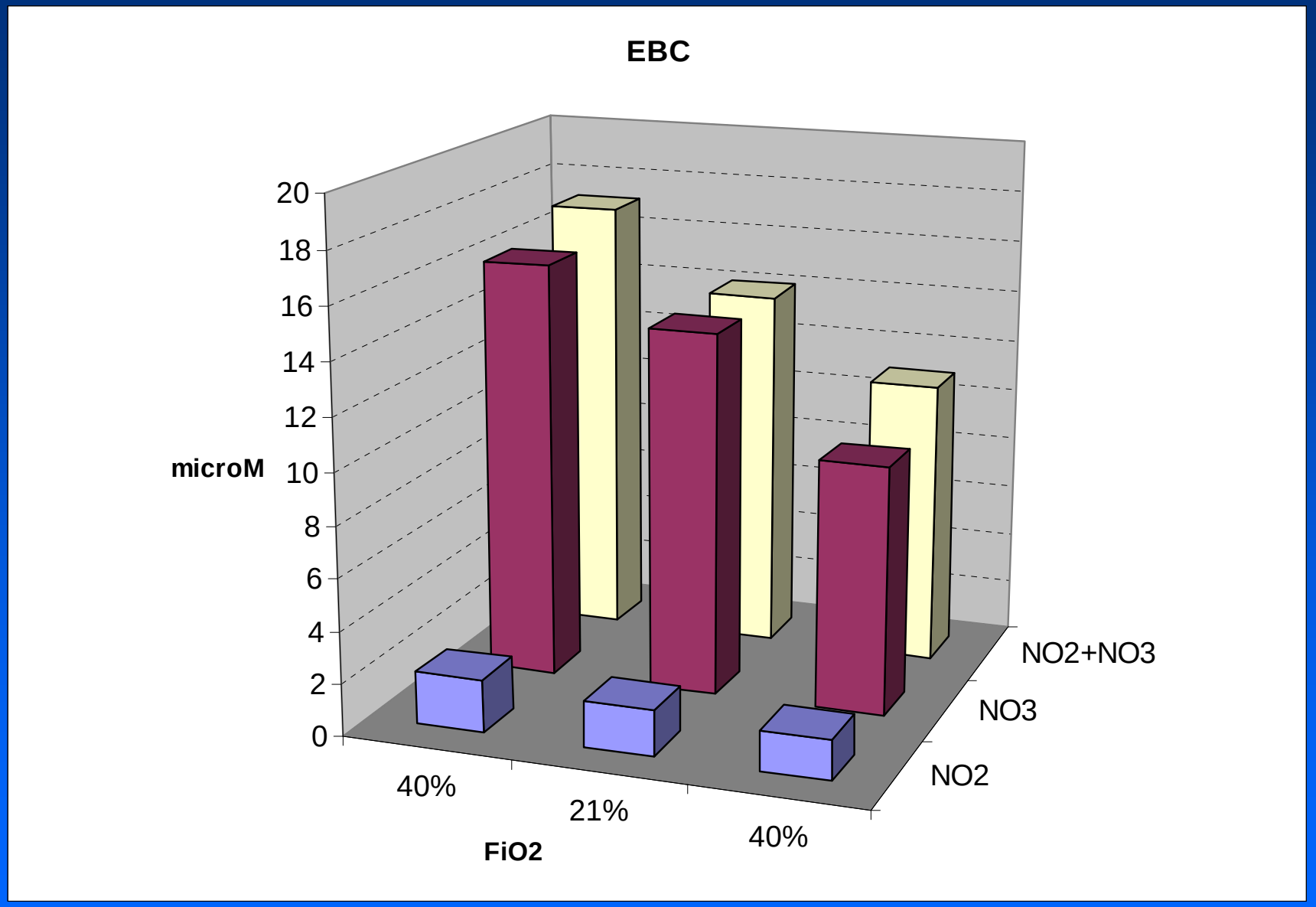
Tiempo en VM: 3 (2-6) días

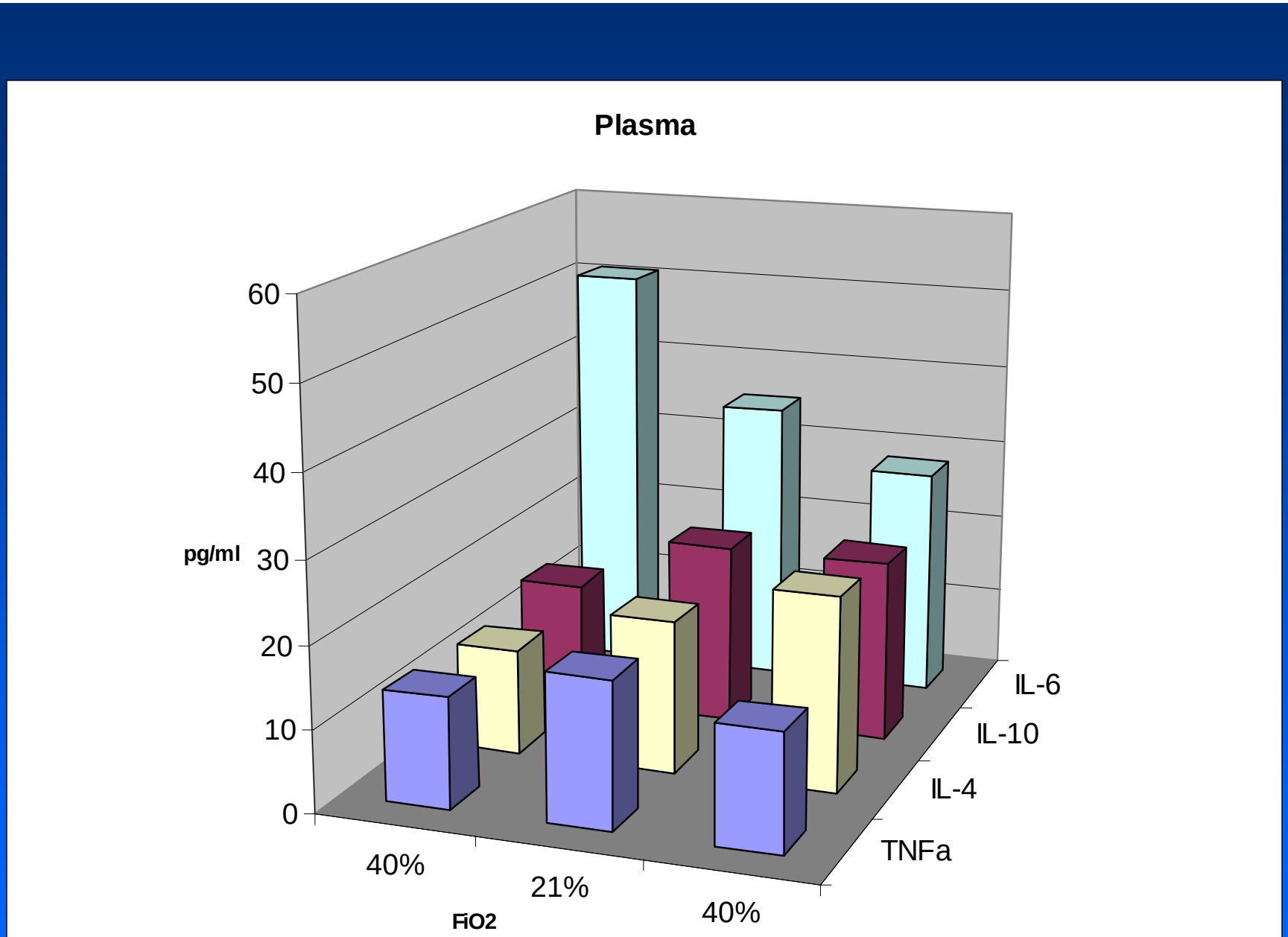
Vt: 431(383- 562) ml, FR: 17 (15-19), PEEP: 5 (4-6)

	FiO_2 0.40	FiO_2 0.21	FiO_2 0.40
Heart rate, min^{-1}	79 (71-90)	78 (70-90)	75 (71-87)
Systolic blood pressure, mmHg	130 (115-151)	125 (114-138)	134 (120-149)
Diastolic blood pressure, mmHg	62 (54-67)	62 (56-67)	65 (56-67)
Arterial pH	7.45 (7.42-7.46)	7.45 (7.41-7.48)	7.44 (7.41-7.47)
$PaCO_2$, mmHg	35 (31-39)	34 (30-38)	36 (32-39)
PaO_2, mmHg	123 (111-141)	74 (66-78) †§	134 (110-149)
SaO_2, %	99 (98-99)	95 (94-97) †§	99 (98-99)
PvO_2, mmHg	40 (38-43)	38 (33-42) †§	42 (38-46)
SvO_2, %	75 (71-77)	71 (66-75) †§	76 (71-79)


TA sistolica (mmHg)
200
180
160
140
120
100
80
60
40%
21%
40%


8-isoprostane (pg/ml)
0
10
20
30
40
FiO2 0.40
FiO2 0.21
FiO2 0.40


EBC
20
18
16
14
12
10
8
6
4
2
0
microM
40%
21%
40%
FiO2
NO2+NO3
NO3
NO2


Plasma
60
50
40
30
20
10
0
pg/ml
40%
21%
40%
FiO2
IL-6
IL-10
IL-4
TNFa

Conclusión

En nuestro medio, el oxígeno rutinariamente administrado (FiO_2 0.4) a pacientes críticos ventilados sin insuficiencia respiratoria no hemos podido demostrar que aumente la inflamación ni a nivel local ni sistémico.

RESUMEN FINAL

EL OXIGENO ES UN MEDICAMENTO QUE DEBE DOSIFICARSE

SUS EFECTOS SECUNDARIOS SON CLAROS

CUANDO SEA PROFILACTICO, DEBEMOS CONTRAPESAR LOS EFECTOS SECUNDARIOS

EXISTEN POCAS INDICACIONES PARA LA HIPEROXIA

PODEMOS REDUCIR EL APORTE DE O_2 EN MUCHOS PACIENTES CON BUENA MONITORIZACION

SIGUE CONTROVERTIDO EL EFECTO INFLAMATORIO A DOSIS BAJAS


OXYGEN BAR
OXYGEN
OXYGEN