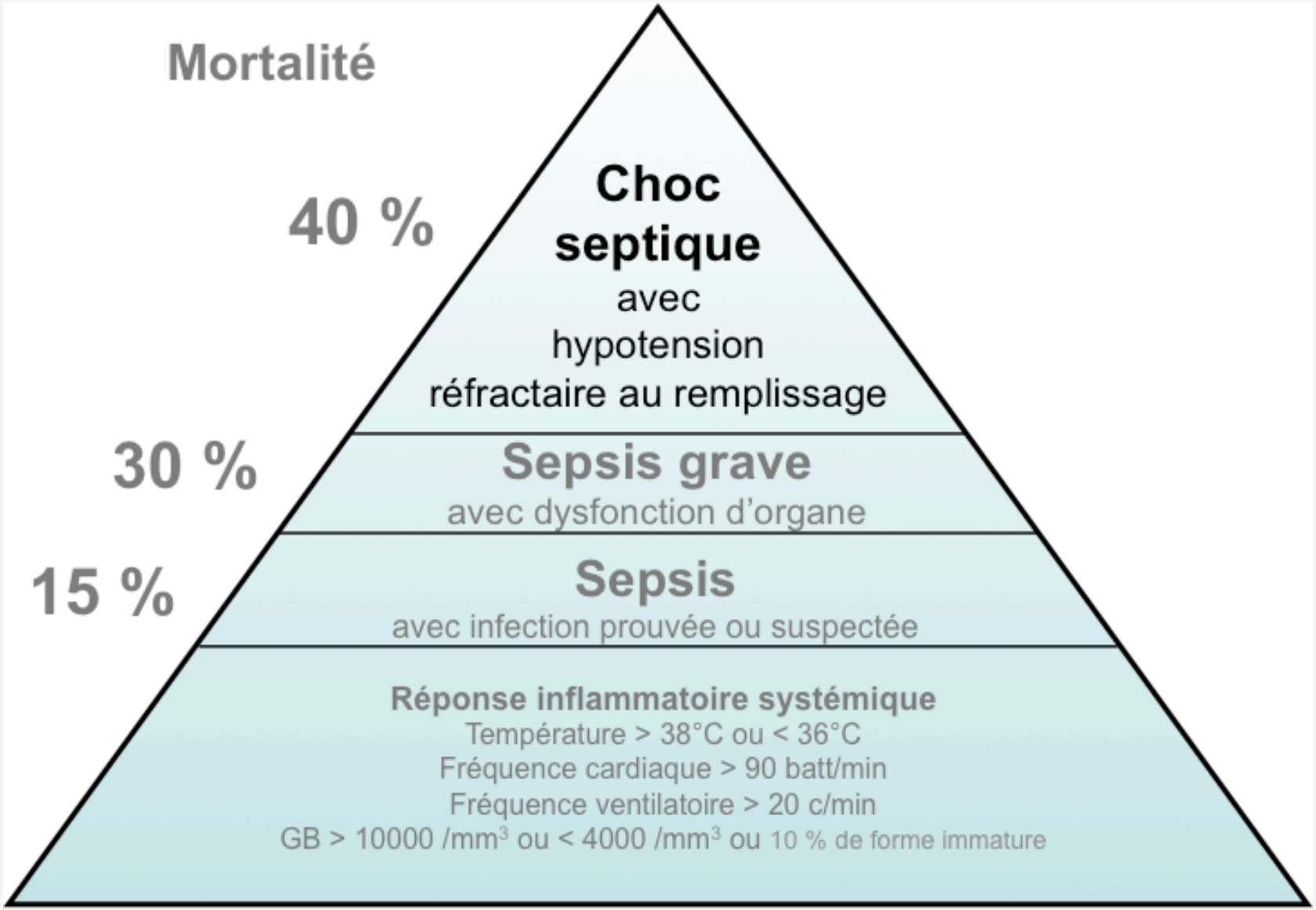
Actualités sur la prise en charge du choc septique

Antoine Roch

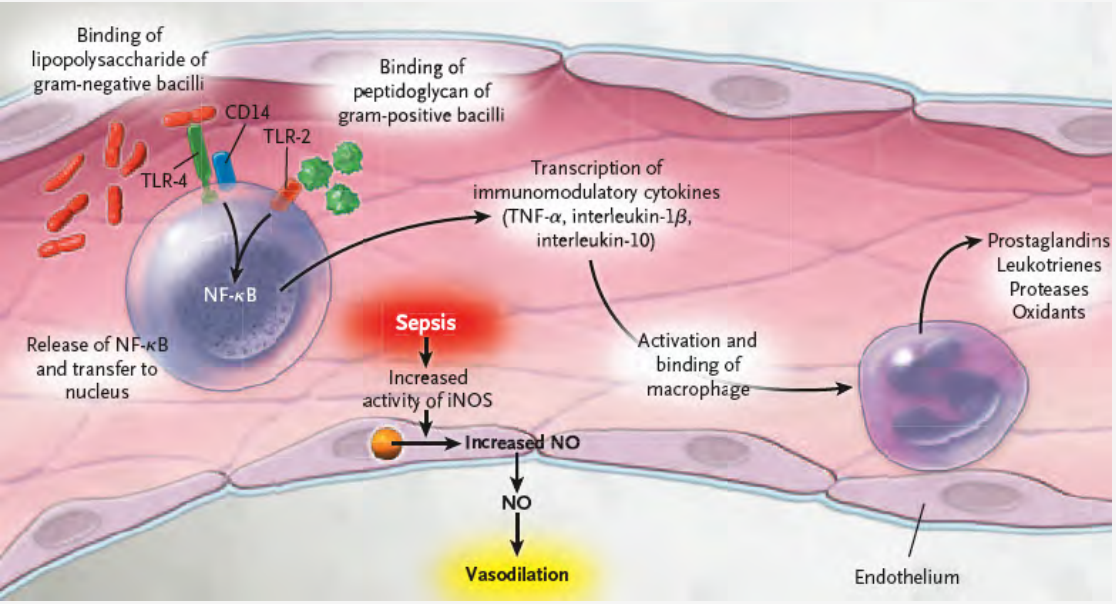
SAU- Réanimation DRIS

CHU Nord

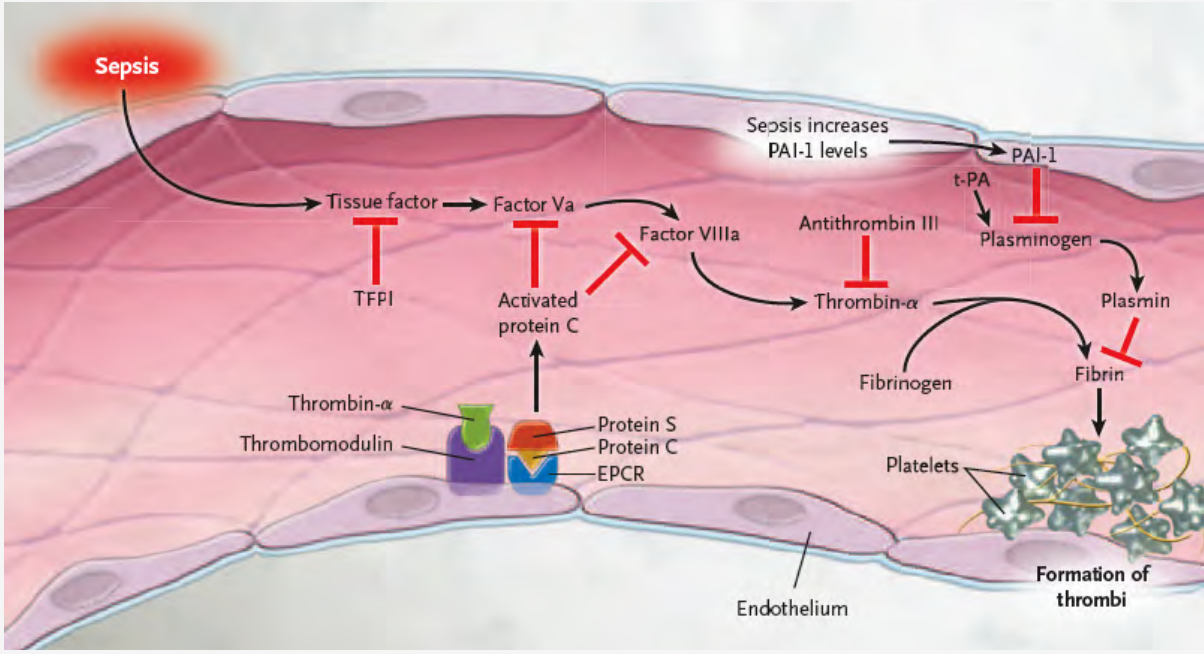
Marseille


Mortalité
40 %
Choc septique
avec
hypotension
réfractaire au remplissage
30 %
Sepsis grave
avec dysfonction d'organe
15 %
Sepsis
avec infection prouvée ou suspectée
Réponse inflammatoire systémique
Température > 38°C ou < 36°C
Fréquence cardiaque > 90 batt/min
Fréquence ventilatoire > 20 c/min
GB > 10000 /mm3 ou < 4000 /mm3 ou 10 % de forme immature

Physiopathologie



- Inflammation
- Atteinte endothéliale
- Tb coagulation



Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock, 2012

SURVIVING SEPSIS CAMPAIGN CARE BUNDLES

TO BE COMPLETED WITHIN 3 HOURS:

1) Measure lactate level
2) Obtain blood cultures prior to administration of antibiotics
3) Administer broad spectrum antibiotics
4) Administer 30 mL/kg crystalloid for hypotension or lactate ≥ 4 mmol/L

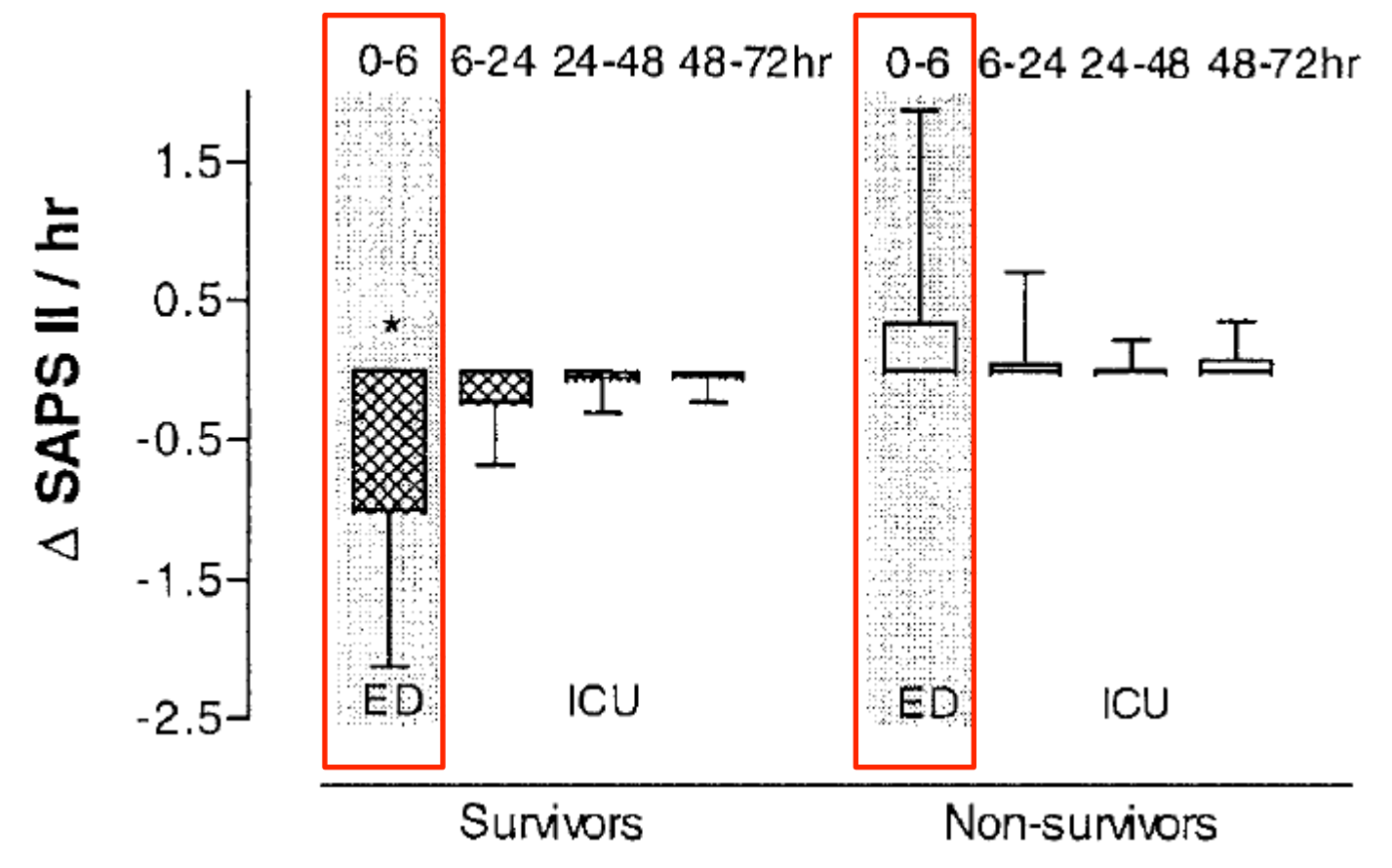
TO BE COMPLETED WITHIN 6 HOURS:

5) Apply vasopressors (for hypotension that does not respond to initial fluid resuscitation) to maintain a mean arterial pressure (MAP) ≥ 65 mm Hg
6) In the event of persistent arterial hypotension despite volume resuscitation (septic shock) or initial lactate ≥ 4 mmol/L (36 mg/dL):
   - Measure central venous pressure (CVP)*
   - Measure central venous oxygen saturation ($ScvO_2$)*
7) Remeasure lactate if initial lactate was elevated*

*Targets for quantitative resuscitation included in the guidelines are CVP of ≥8 mm Hg, $ScvO_2$ of ≥ 70%, and normalization of lactate.

Critical Care in the Emergency Department: A Physiologic Assessment and Outcome Evaluation

ACADEMIC EMERGENCY MEDICINE • December 2000, Volume 7, Number 12



- Ne pas considérer que la rea va venir, donc on peut ne plus rien faire
- Ce n'est pas parce que qu'un patient s améliore vite qu'il ne nécessite pas la rea par la suite

Prise en charge

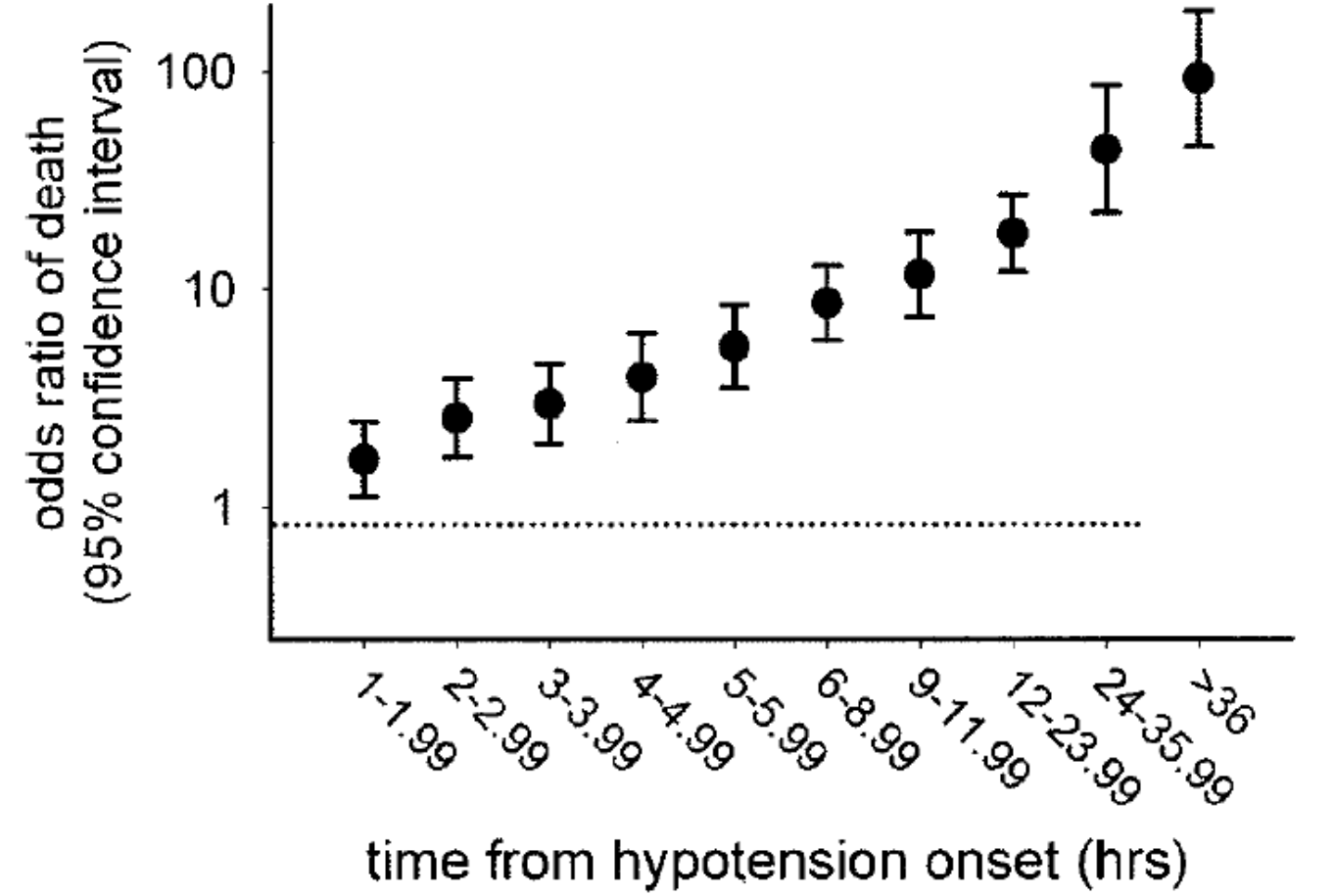
- **Arrêter le processus infectieux**
  - **Antibiothérapie (< 1 h du diagnostic)**
  - **Contrôle du foyer infectieux (6 h)**

Duration of hypotension before initiation of effective antimicrobial therapy is the critical determinant of survival in human septic shock

Anand Kumar, MD; Daniel Roberts, MD; Kenneth E. Wood, DO; Bruce Light, MD; Joseph E. Parrillo, MD;

Crit Care Med 2006 Vol. 34, No. 6

- 2750 patients en choc septique, rétrospectif en réanimation



Antibiothérapie

Effect of Empirical Treatment With Moxifloxacin and Meropenem vs Meropenem on Sepsis-Related Organ Dysfunction in Patients With Severe Sepsis

No difference

SOFA score

Mortality D28

Mortality D90

No effect of combination

No positive RCTs

Contrôle foyer infectieux

1C

- aussi rapidement que possible (6 h)
  - à rechercher chez tous les patients
  - imagerie rapide
  - retrait cathéter intravasculaire, PAC…

Prise en charge

- Arrêter le processus infectieux
  - Antibiothérapie (1 h)
  - Contrôle du foyer infectieux (6 h)
- **Conduire la réanimation hémodynamique**
  - **Objectifs hémodynamiques (1 et 6 h)**
  - **Prise en charge (6 h)**

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7) Remeasure lactate if initial lactate was elevated*

*Targets for quantitative resuscitation included in the guidelines are CVP of ≥8 mm Hg, $ScvO_2$ of ≥ 70%, and normalization of lactate.

Objectifs hémodynamiques

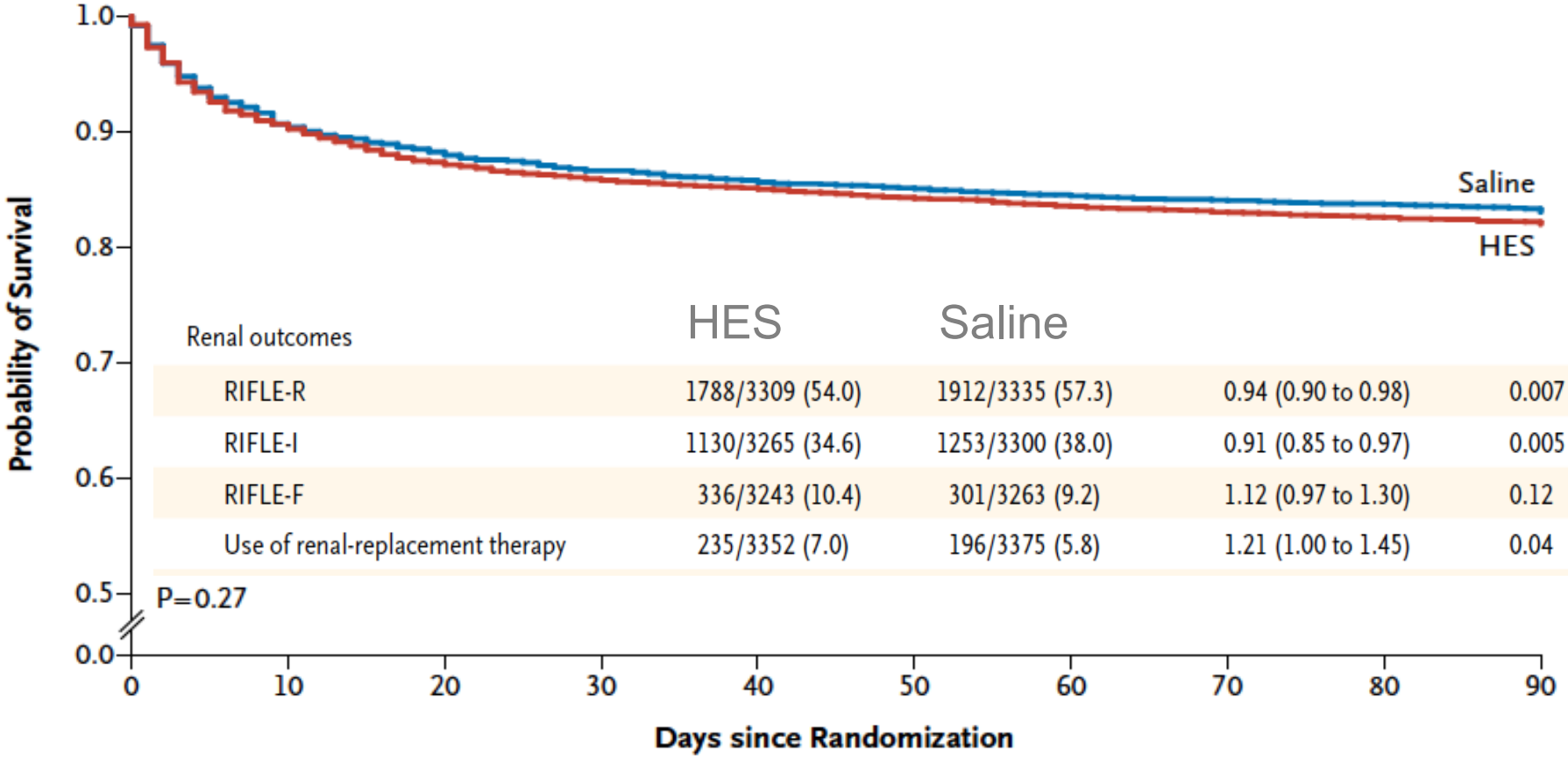
- **« Survivre au sepsis »**
  - **PAM** ≥ 65 mmHg (1 h)
  - **Diurèse horaire** ≥ 0,5 ml/kg/h (6 h)
  - **PVC** : 8 - 12 mmHg ou **équivalent** (1 h)

  - **$ScvO_2$** ≥ 70 % (6 h) **ET Lactate** < 20% (2h)

Remplissage vasculaire

- **Cristalloïde**

Hydroxyethyl Starch or Saline for Fluid Resuscitation in Intensive Care



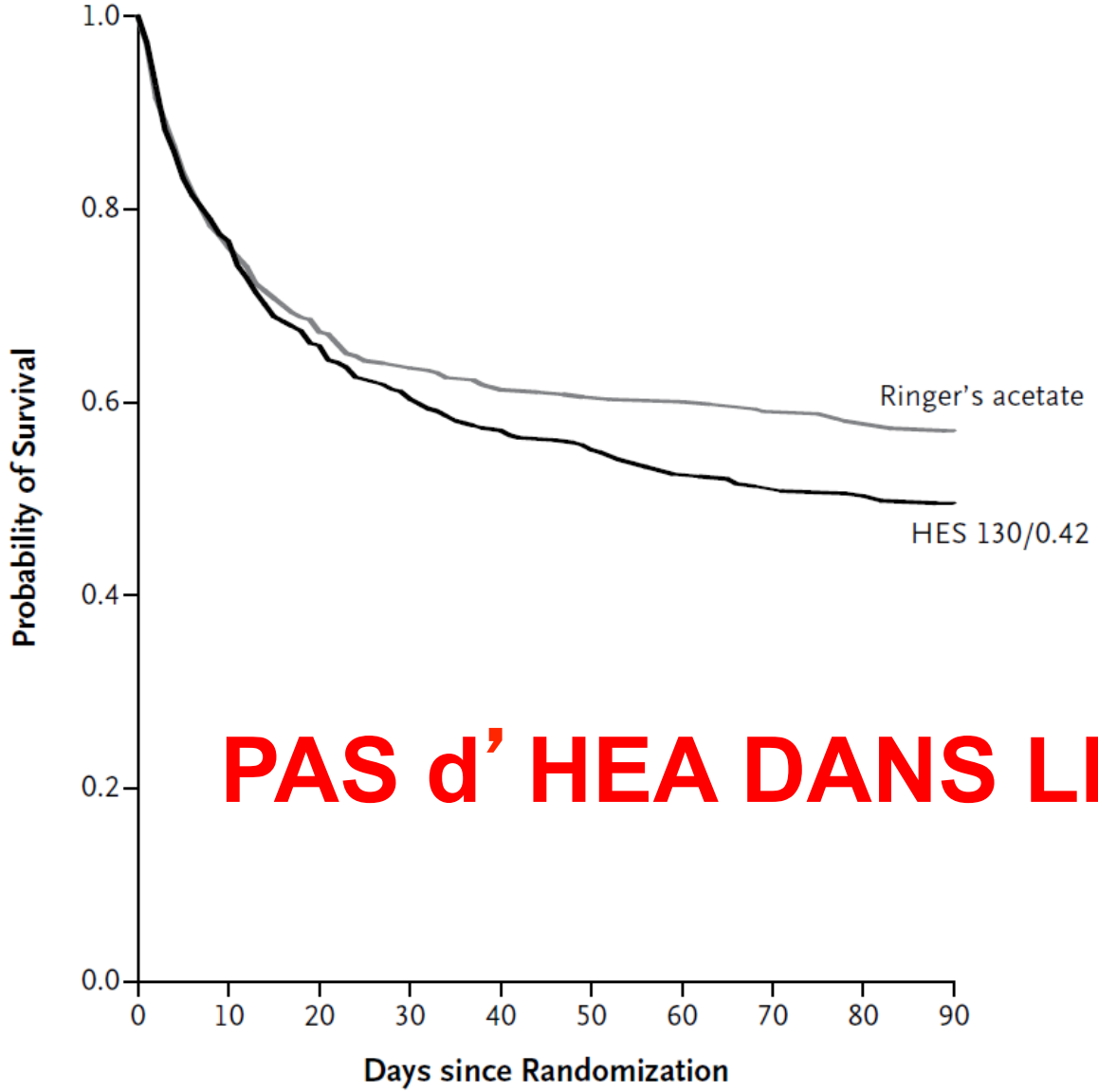
Renal outcomes	HES	Saline		
RIFLE-R	1788/3309 (54.0)	1912/3335 (57.3)	0.94 (0.90 to 0.98)	0.007
RIFLE-I	1130/3265 (34.6)	1253/3300 (38.0)	0.91 (0.85 to 0.97)	0.005
RIFLE-F	336/3243 (10.4)	301/3263 (9.2)	1.12 (0.97 to 1.30)	0.12
Use of renal-replacement therapy	235/3352 (7.0)	196/3375 (5.8)	1.21 (1.00 to 1.45)	0.04

Myburgh *et al.*, N Engl J Med 2013

Hydroxyethyl Starch 130/0.42 versus Ringer's Acetate in Severe Sepsis

Anders Perner, M.D., Ph.D., Nicolai Haase, M.D.,

N Engl J Med 2012;367:124-34

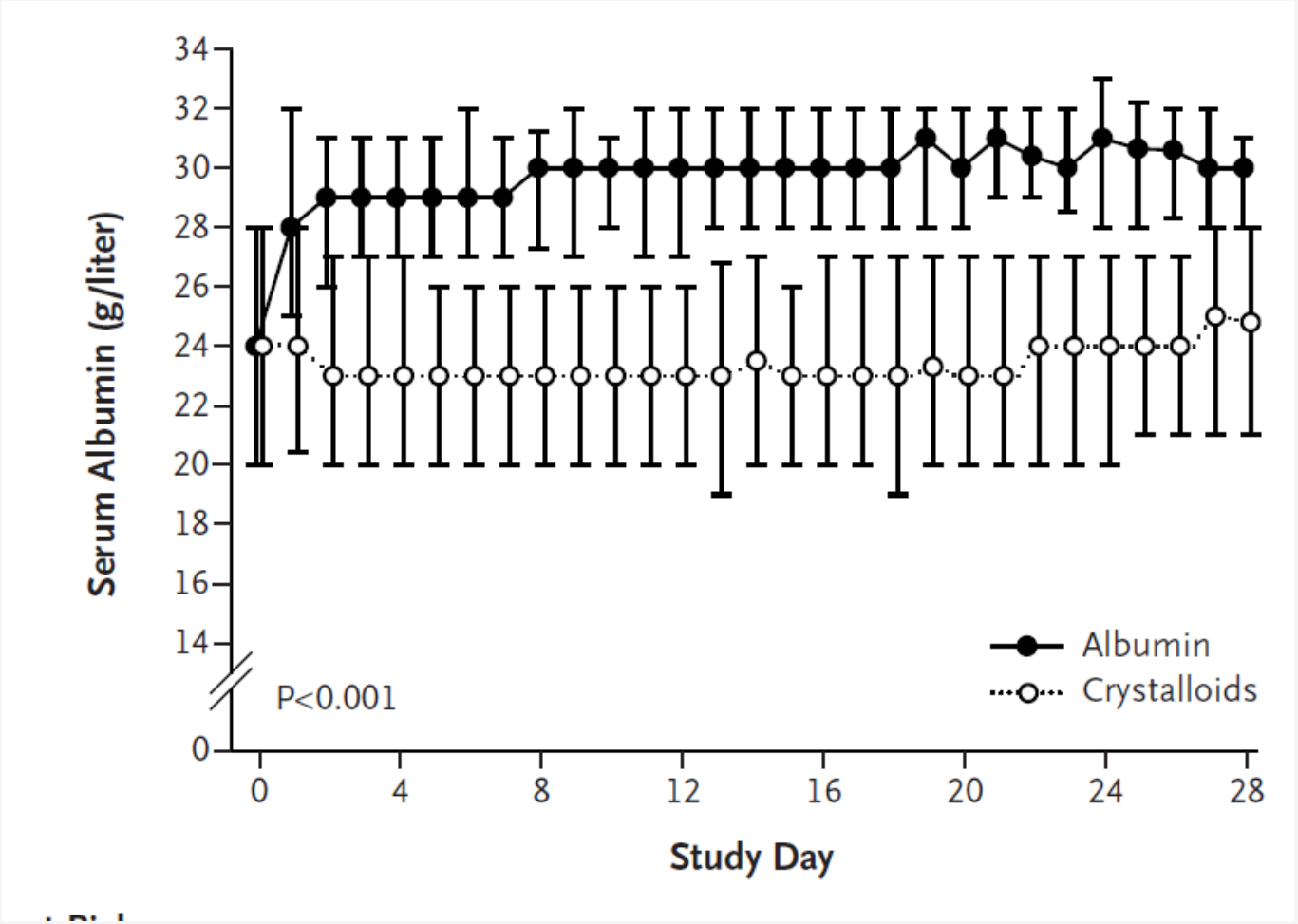


PAS d'HEA DANS LE SEPSIS

Albumin Replacement in Patients with Severe Sepsis or Septic Shock

NEJM march 18, 2014

- 1800 patients
- albumine si > 30 g/l vs si < 20 g/l

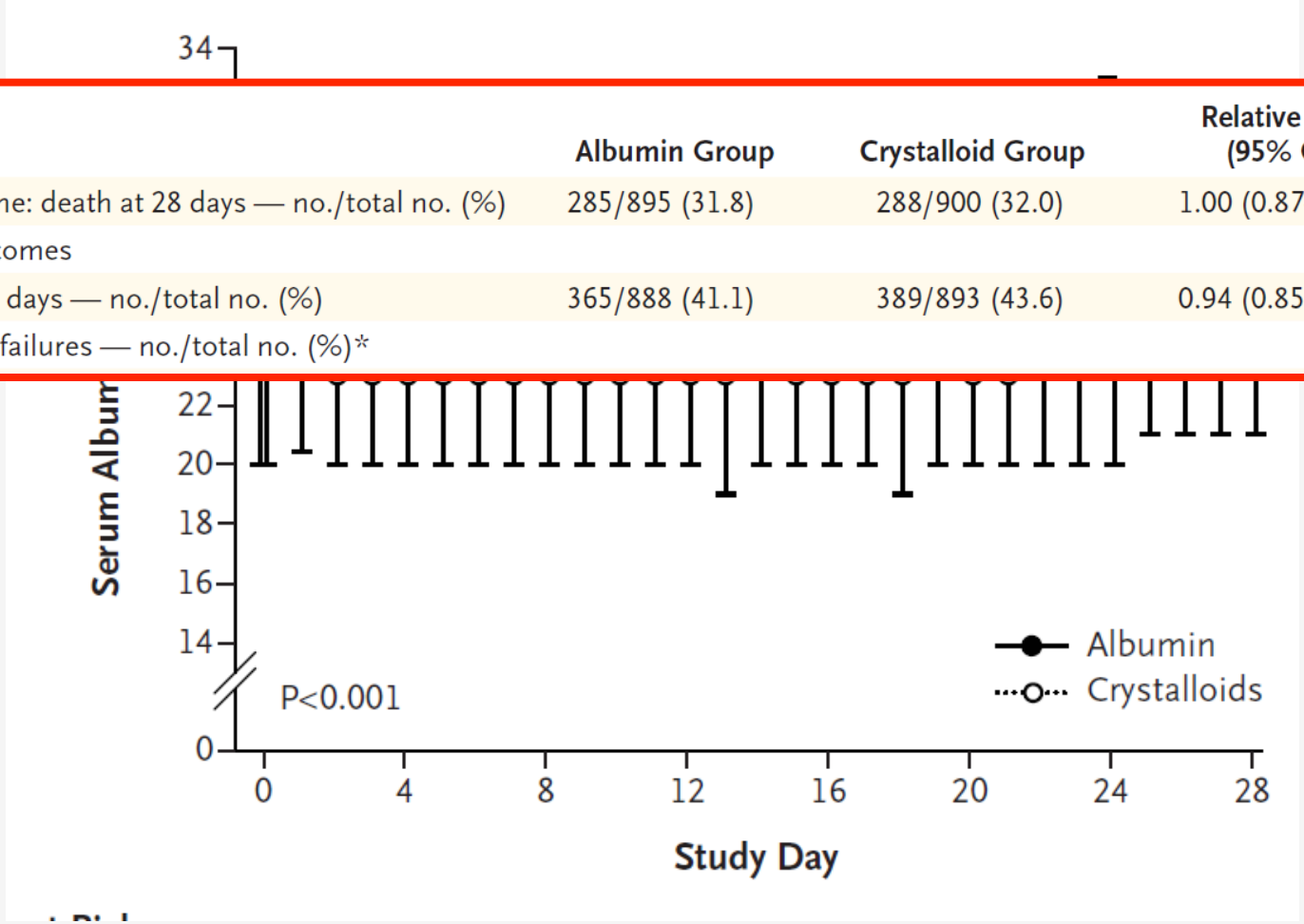


Albumin Replacement in Patients with Severe Sepsis or Septic Shock

NEJM march 18, 2014

- 1800 patients
- albumine si > 30 g/l vs si < 20 g/l

Outcome	Albumin Group	Crystalloid Group	Relative Risk (95% CI)	P Value
Primary outcome: death at 28 days — no./total no. (%)	285/895 (31.8)	288/900 (32.0)	1.00 (0.87–1.14)	0.94
Secondary outcomes				
Death at 90 days — no./total no. (%)	365/888 (41.1)	389/893 (43.6)	0.94 (0.85–1.05)	0.29
New organ failures — no./total no. (%)*				0.99

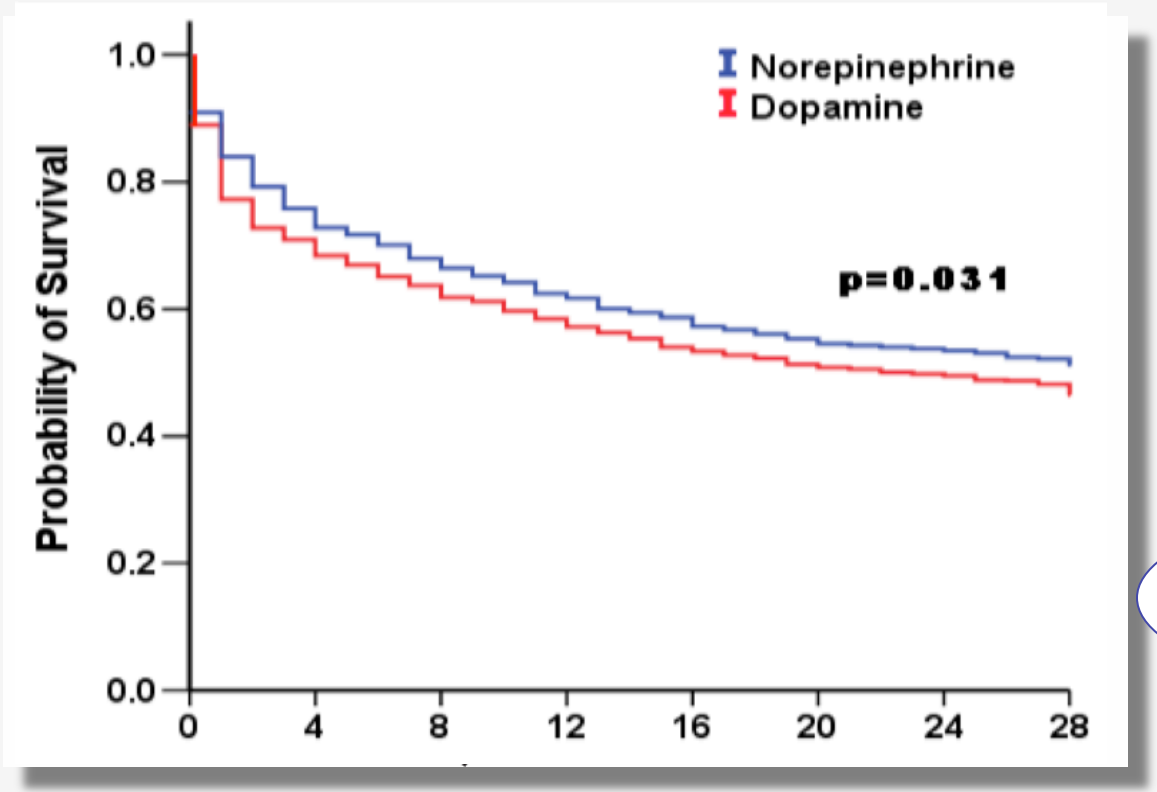


Vasopresseurs

- **Noradrénaline**

Dellinger *et al*., Intensive Care Med 2013

- Dopamine : ↑ **échec clinique** et effets secondaires



Arythmie

24 % *vs.* 12 %

***p* < 0,001**

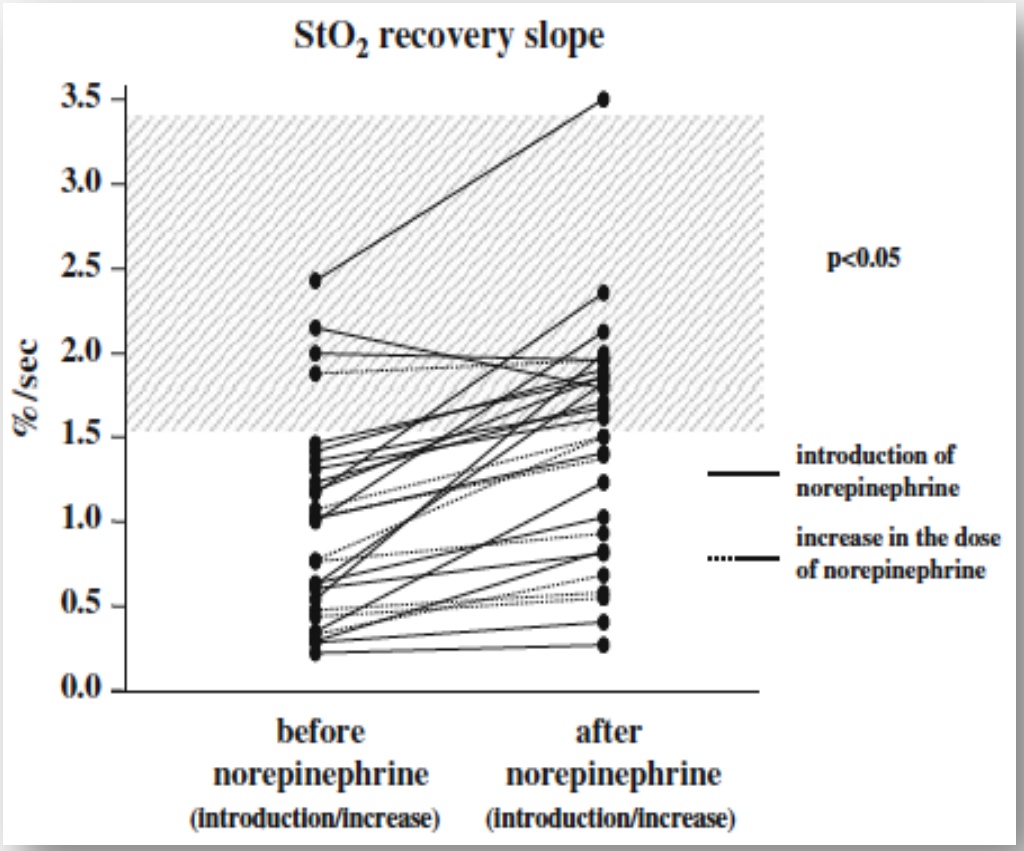
Noradrénaline

De Backer *et al*., N Engl J Med 2010; Martin *et al*., Crit Care Med 1993; Martin *et al*., Crit Care Med 2000; 2008; Sakr *et al*., Crit Care Med 2006

Objectifs hémodynamiques

- **PAM ≥ 65 mmHg**

Restoring arterial pressure with norepinephrine improves muscle tissue oxygenation assessed by near-infrared spectroscopy in severely hypotensive septic patients

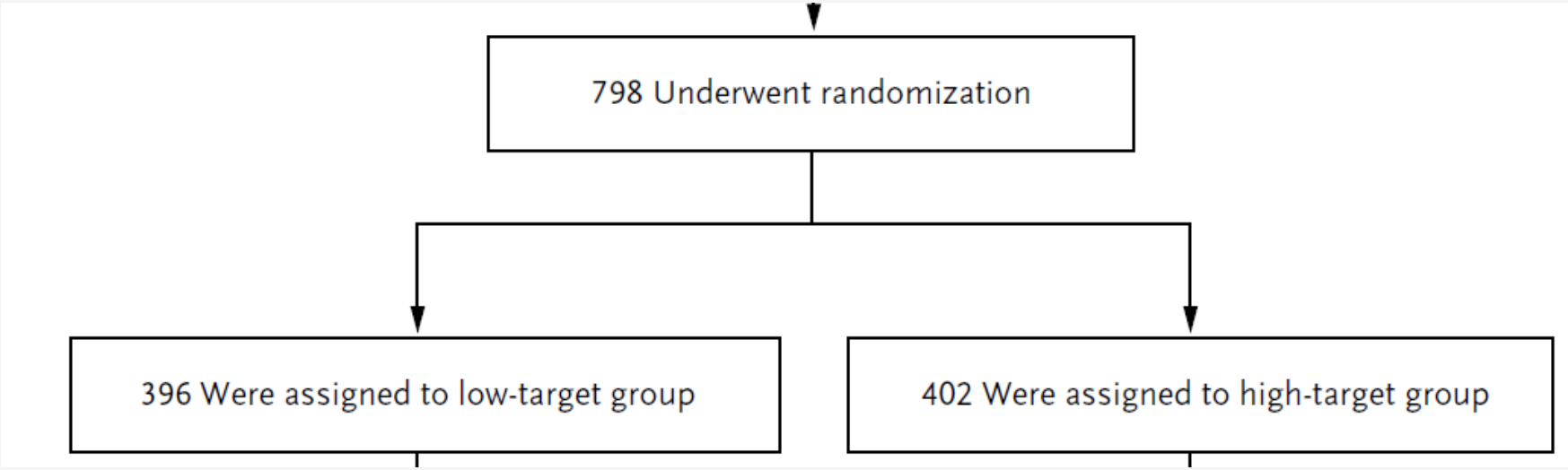


MAP
54 ± 8 mmHg
vs.
77 ± 9 mmHg

High versus Low Blood-Pressure Target in Patients with Septic Shock

Pierre Asfar, M.D., Ph.D., Ferhat Meziani, M.D., Ph.D., Jean-François Hamel, M.D.,

NEJM march 18, 2014

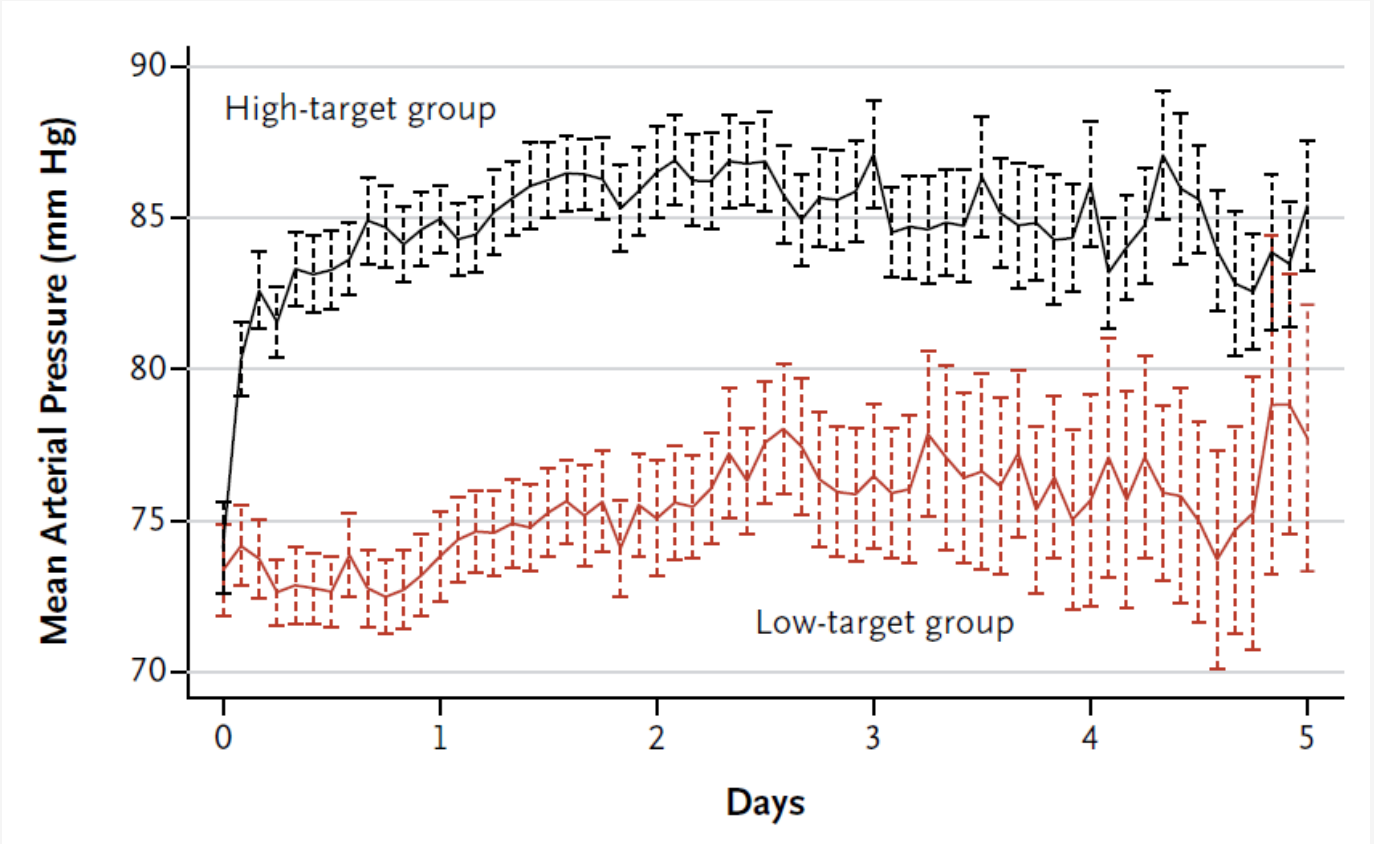


65-70 mmHg

80-85 mmHg

Jusqu'à J5 ou sevrage vasopresseurs

Characteristic	Low-Target Group (N = 388)	High-Target Group (N = 388)
Vasoactive drug infusions at randomization — no. (%)		
Norepinephrine	368 (94.8)	373 (96.1)
Epinephrine	20 (5.2)	15 (3.9)
Dobutamine	21 (5.4)	16 (4.1)
Median vasopressor dose at randomization — μg/kg/min (IQR)		
Norepinephrine	0.35 (0.20–0.61)	0.40 (0.20–0.62)
Epinephrine	0.23 (0.17–0.32)	0.22 (0.13–0.64)
Mechanical ventilation — no. (%)	286 (73.7)	308 (79.4)



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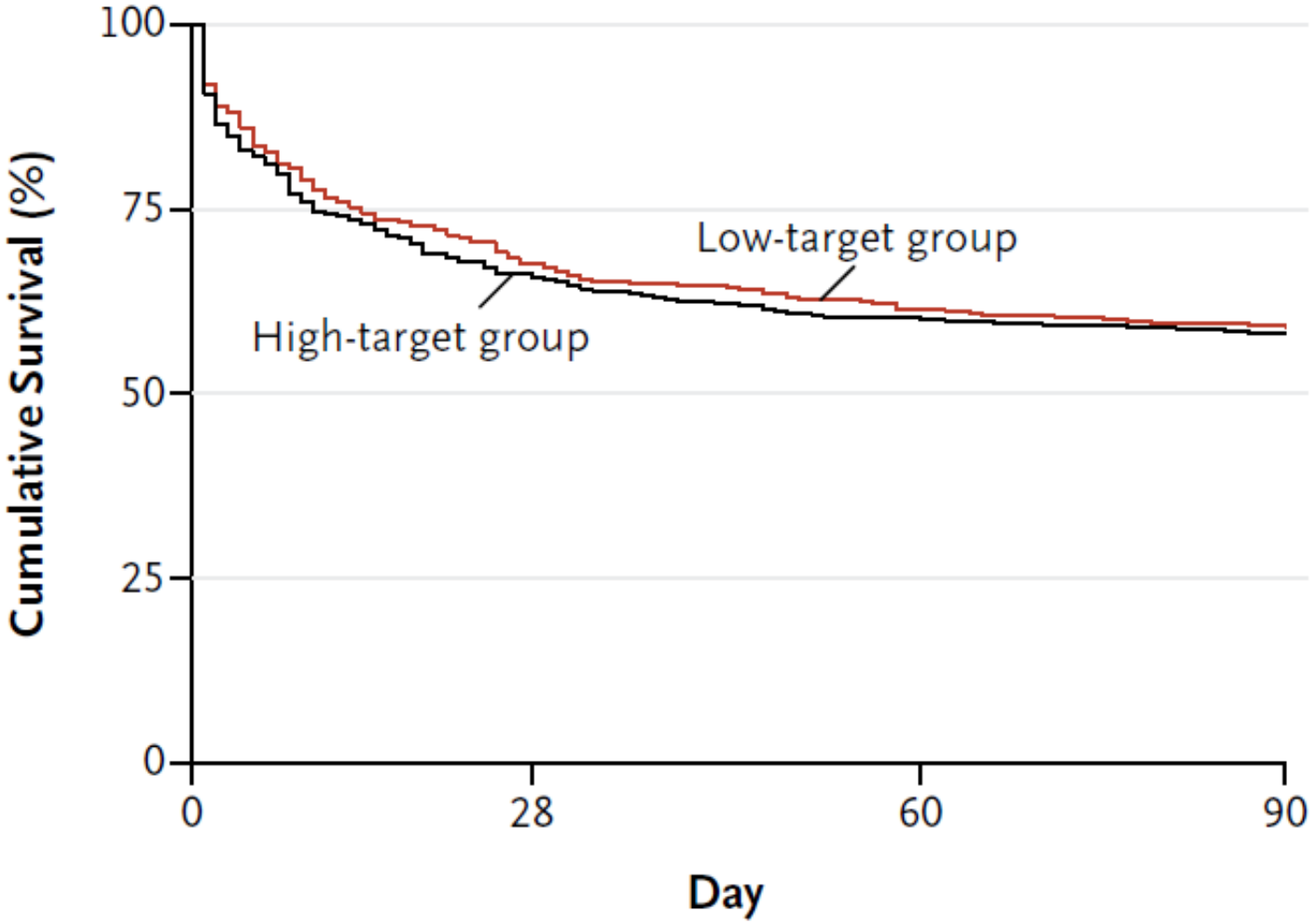

Table 2. Clinical Results, Primary and Secondary Outcomes, and Serious Adverse Events.

Variable	Low-Target Group (N = 388)	High-Target Group (N = 388)	P Value
Cumulative fluid intake from day 1 to day 5 — liters	10.0 (5.8–14.0)	10.5 (5.5–14.0)	0.89
Cumulative urine output from day 1 to day 5 — liters	6.7 (2.9–10.7)	6.9 (2.4–10.7)	0.87
Cumulative fluid balance from day 1 to day 5 — liters	2.8 (0.0–6.2)	2.4 (0.0–6.0)	0.74
Median dose of norepinephrine (IQR) — μg/kg/min			
Day 1	0.45 (0.17–1.21)	0.58 (0.26–1.80)	<0.001
Day 2	0.16 (0.03–0.48)	0.38 (0.14–0.90)	<0.001
Day 3	0.02 (0.00–0.16)	0.14 (0.01–0.50)	<0.001
Day 4	0.00 (0.00–0.05)	0.03 (0.00–0.22)	<0.001
Day 5	0.00 (0.00–0.03)	0.01 (0.00–0.15)	<0.001
Duration of catecholamine infusion — days	3.7±3.2	4.7±3.7	<0.001
Primary outcome: death at day 28 — no. (%)*	132 (34.0)	142 (36.6)	0.57
Secondary outcomes — no./total no. (%)			
Death at day 90†	164 (42.3)	170 (43.8)	0.74
Survival at day 28 without organ support‡	241 (62.1)	235 (60.6)	0.66
Doubling of plasma creatinine	161 (41.5)	150 (38.7)	0.42
No chronic hypertension	71/215 (33.0)	85/221 (38.5)	0.32
Chronic hypertension	90/173 (52.0)	65/167 (38.9)	0.02
Renal-replacement therapy from day 1 to day 7	139 (35.8)	130 (33.5)	0.50
No chronic hypertension	66/215 (30.7)	77/221 (34.8)	0.36
Chronic hypertension	73/173 (42.2)	53/167 (31.7)	0.046
Serious adverse events — no. (%)			
Any	69 (17.8)	74 (19.1)	0.64
Acute myocardial infarction§	2 (0.5)	7 (1.8)	0.18
Atrial fibrillation	11 (2.8)	26 (6.7)	0.02
Ventricular fibrillation or tachycardia	15 (3.9)	22 (5.7)	0.24
Digital ischemia	9 (2.3)	10 (2.6)	0.82
Mesenteric ischemia	9 (2.3)	9 (2.3)	1.00
Bleeding	42 (10.8)	31 (8.0)	0.22

Objectifs hémodynamiques

- **« Survivre au sepsis »**
  - **PAM** ≥ 65 mmHg (1 h)
  - **Diurèse horaire** ≥ 0,5 ml/kg/h (6 h)
  - **PVC** : 8 - 12 mmHg ou **équivalent** (1 h)

  - **$ScvO_2$** ≥ 70 % (6 h) **ET Lactate** < 20% (2h)

Optimisation hémodynamique

Rivers, New Engl J Med, 2001

Treatment	Hours after the Start of Therapy		
	0–6	7–72	0–72
Total fluids (ml)			
Standard therapy	3499±2438	10,602±6,216	13,358±7,729
EGDT	4981±2984	8,625±5,162	13,443±6,390
P value	<0.001	0.01	0.73
Red-cell transfusion (%)			
Standard therapy	18.5	32.8	44.5
EGDT	64.1	11.1	68.4
P value	<0.001	<0.001	<0.001
Any vasopressor (%)†			
Standard therapy	30.3	42.9	51.3
EGDT	27.4	29.1	36.8
P value	0.62	0.03	0.02
Inotropic agent (dobutamine) (%)			
Standard therapy	0.8	8.4	9.2
EGDT	13.7	14.5	15.4
P value	<0.001	0.14	0.15
Mechanical ventilation (%)			
Standard therapy	53.8	16.8	70.6
EGDT	53.0	2.6	55.6
P value	0.90	<0.001	0.02

Variable	Standard Therapy (N=133)	Early Goal-Directed Therapy (N=130)
	no. (%)	
In-hospital mortality†		
All patients	59 (46.5)	38 (30.5)

ORIGINAL ARTICLE

A Randomized Trial of Protocol-Based Care for Early Septic Shock

The ProCESS Investigators*

NEJM march 18, 2014

- 31 SAU aux USA
- Sepsis+ hypotension < 90 mmHg après remplissage ou nécessitant vasopresseurs ou avec lactate > 4 mmol/l
- Inclusion dans les 2 h suivant le début du sepsis

ORIGINAL ARTICLE

A Randomized Trial of Protocol-Based Care for Early Septic Shock

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NEJM march 18, 2014

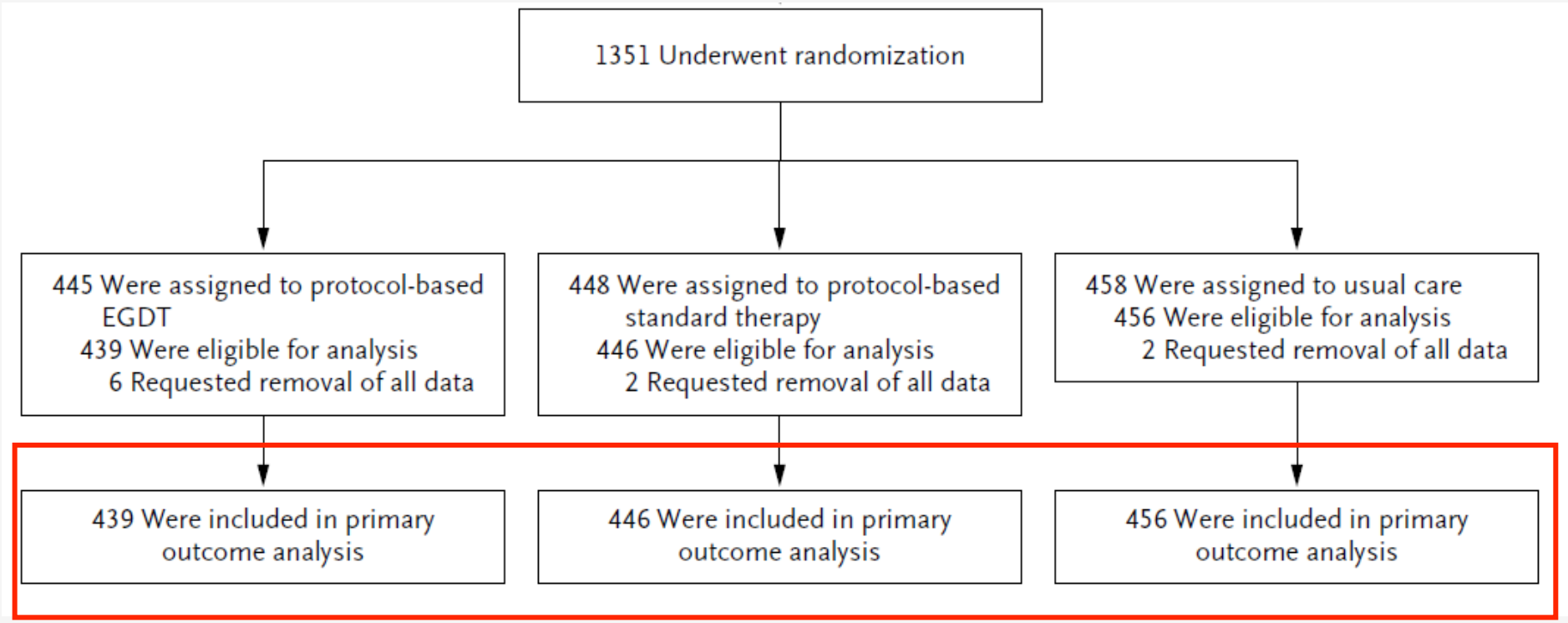


Figure S1. – Protocol for early goal-directed therapy (EGDT)

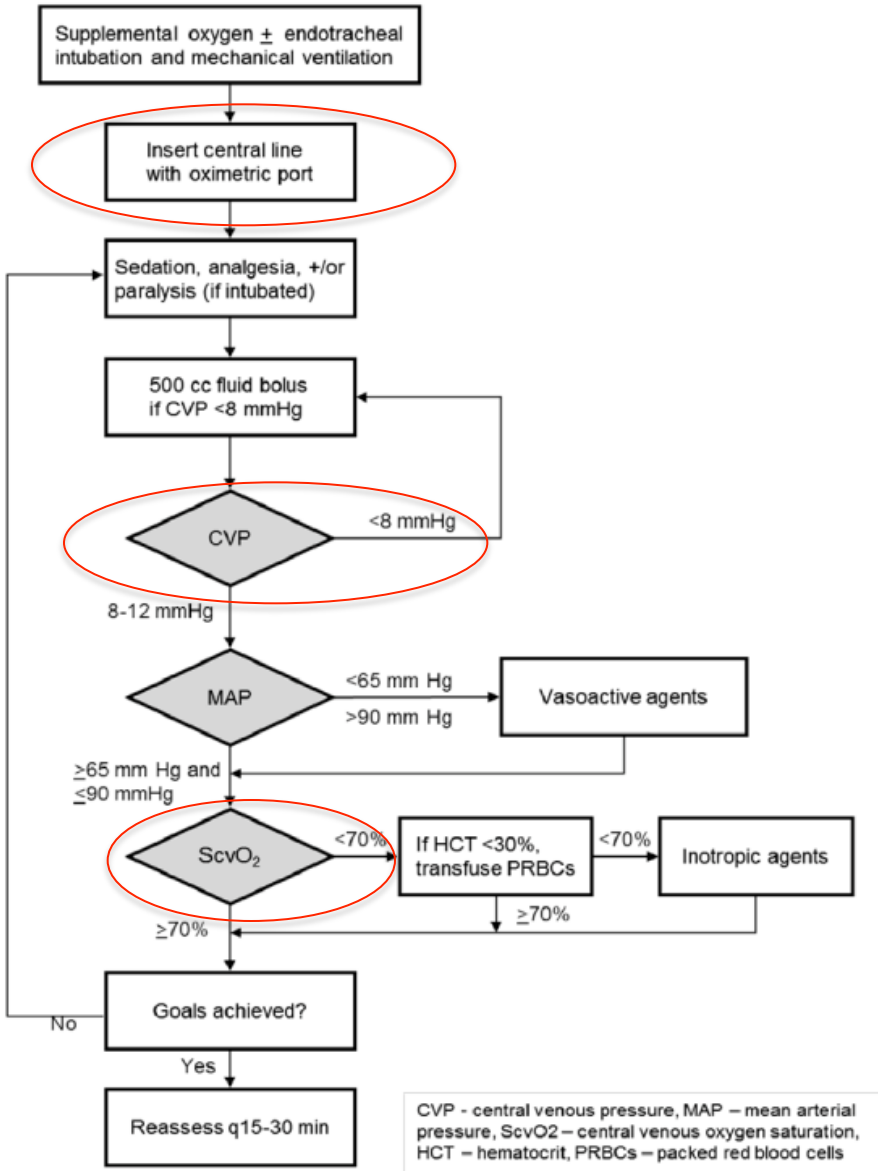
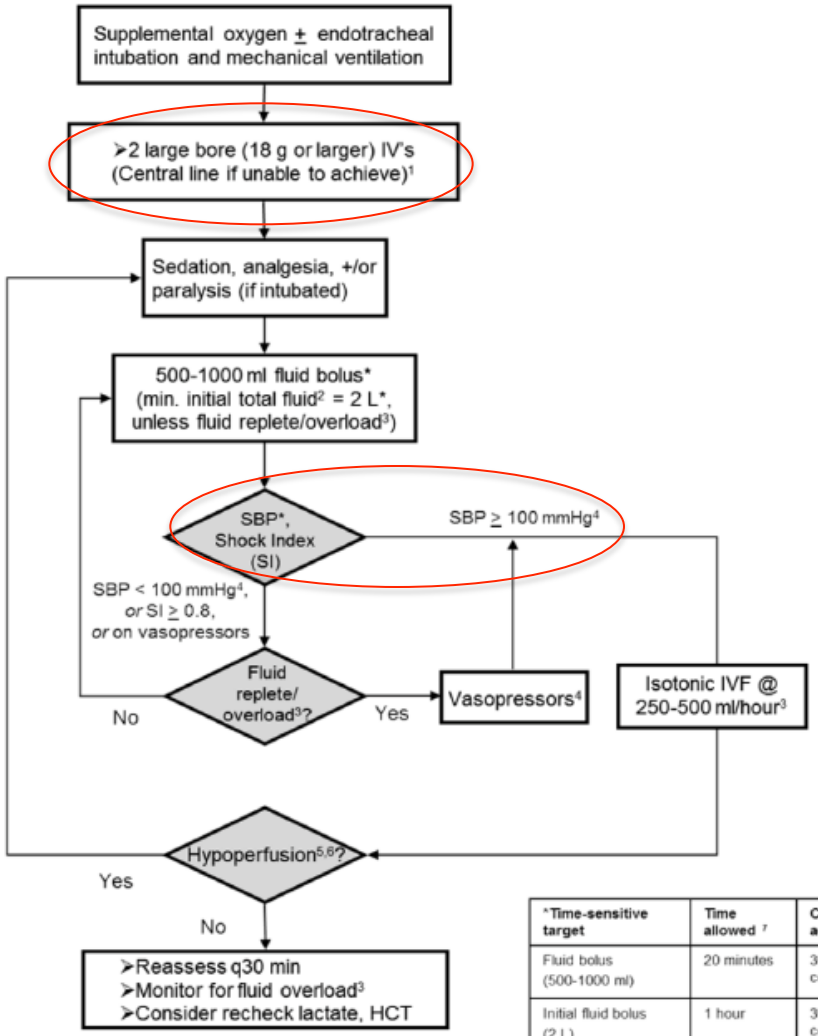


Figure S2. – Protocol for Standard Therapy.

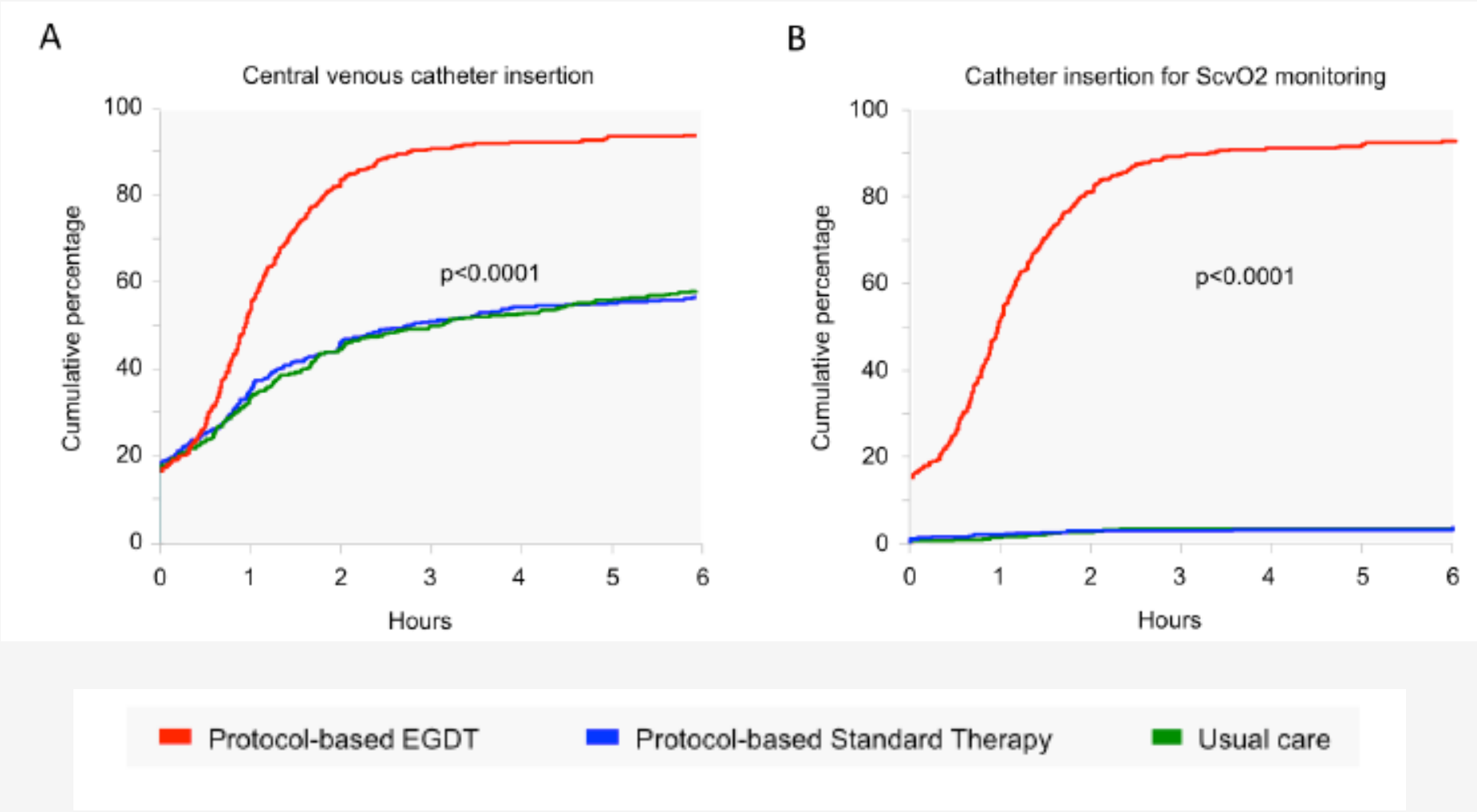


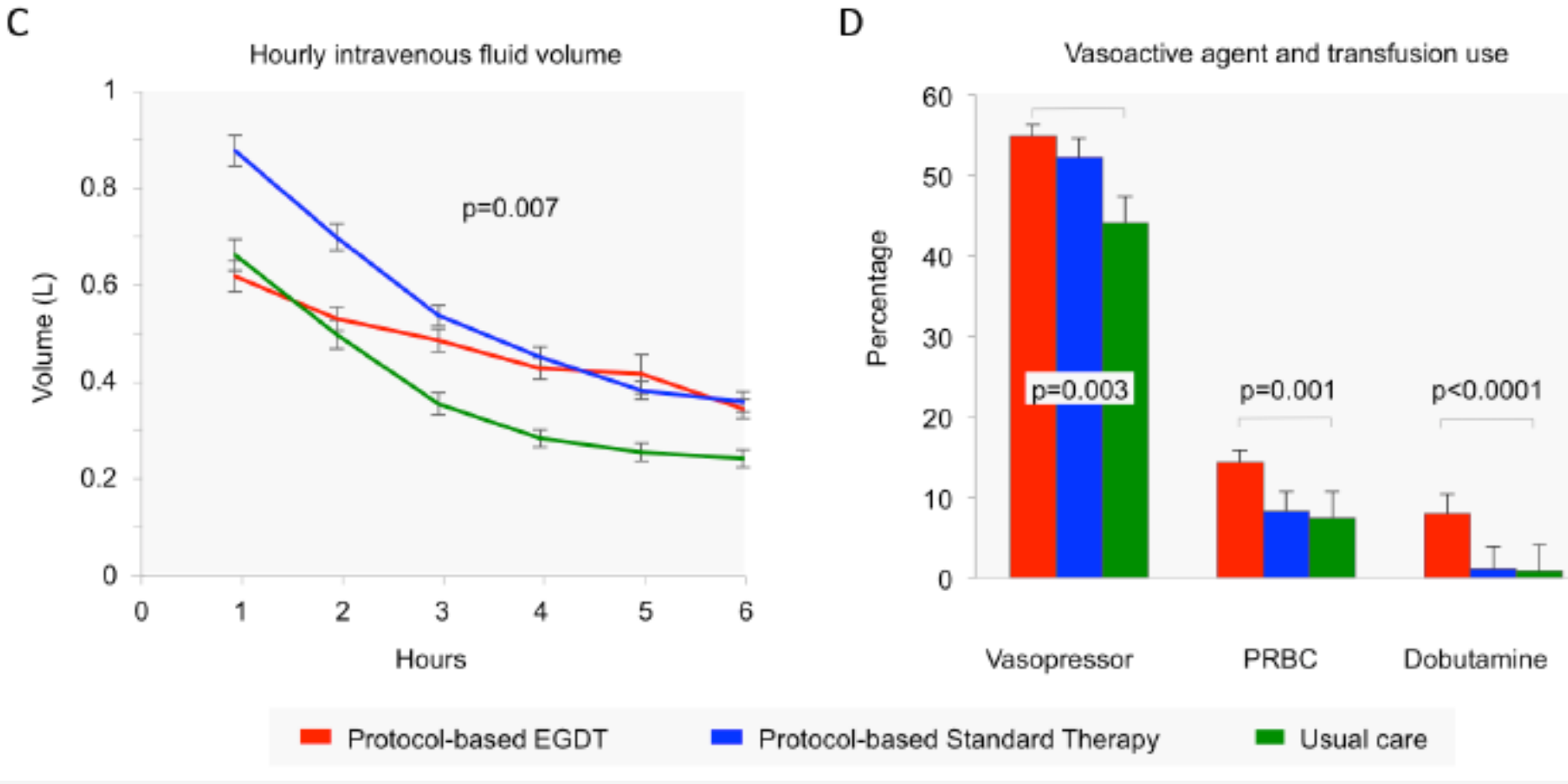
*Time-sensitive target	Time allowed [7]	Corrective action
Fluid bolus (500-1000 ml)	20 minutes	3rd IV or central line
Initial fluid bolus (2 L)	1 hour	3rd IV or central line
SBP ≥ 100 mmHg	1 hour	Vasopressors

Table 1. Characteristics of the Patients at Baseline.*

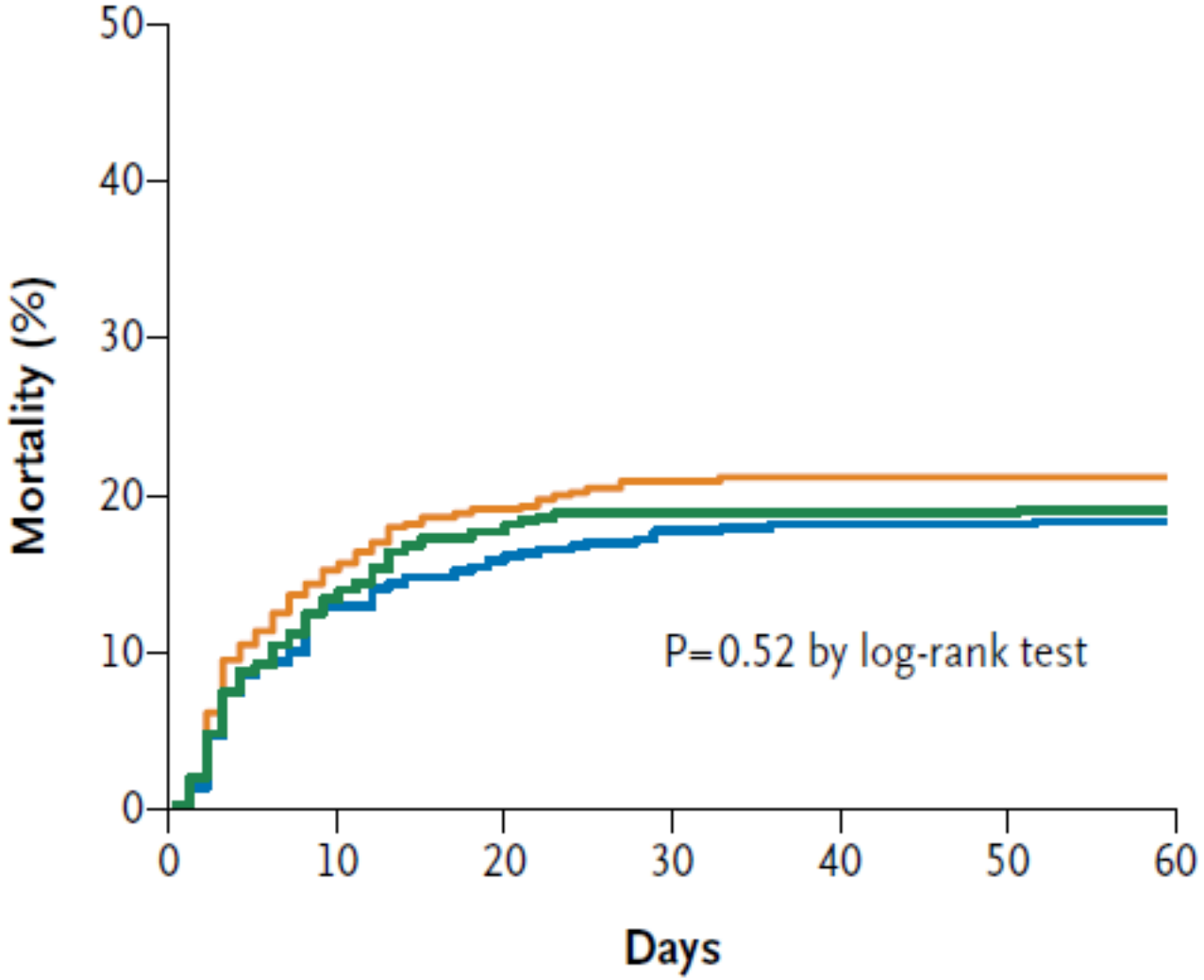
Characteristic	Protocol-Based EGDT (N=439)	Protocol-Based Standard Therapy (N=446)	Usual Care (N=456)
Age — yr†	60±16.4	61±16.1	62±16.0
Male sex — no. (%)	232 (52.8)	252 (56.5)	264 (57.9)
Residence before admission — no. (%)‡			
Nursing home	64 (14.6)	72 (16.1)	73 (16.0)
Other	373 (85.0)	373 (83.6)	382 (83.8)
Charlson comorbidity score§	2.6±2.6	2.5±2.6	2.9±2.6
Source of sepsis — no. (%)			
Pneumonia	140 (31.9)	152 (34.1)	151 (33.1)
Urinary tract infection	100 (22.8)	90 (20.2)	94 (20.6)
Intraabdominal infection	69 (15.7)	57 (12.8)	51 (11.2)
Infection of unknown source	57 (13.0)	47 (10.5)	66 (14.5)
Skin or soft-tissue infection	25 (5.7)	33 (7.4)	38 (8.3)
Catheter-related infection	11 (2.5)	16 (3.6)	11 (2.4)
Central nervous system infection	3 (0.7)	3 (0.7)	4 (0.9)
Endocarditis	1 (0.2)	3 (0.7)	3 (0.7)
Other	28 (6.4)	31 (7.0)	26 (5.7)
Determined after review not to have infection	5 (1.1)	14 (3.1)	12 (2.6)
Positive blood culture — no. (%)	139 (31.7)	126 (28.3)	131 (28.7)
APACHE II score¶	20.8±8.1	20.6±7.4	20.7±7.5
Entry criterion — no. (%)			
Refractory hypotension	244 (55.6)	240 (53.8)	243 (53.3)
Hyperlactatemia‖	259 (59.0)	264 (59.2)	277 (60.7)
Physiological variables			
Systolic blood pressure — mm Hg	100.2±28.1	102.1±28.7	99.9±29.5
Serum lactate — mmol/liter**	4.8±3.1	5±3.6	4.9±3.1
Time to randomization — min			
From arrival in the emergency department††	197±116	185±112	181±97
From meeting entry criteria	72±77	66±38	69±45

Remplissage 2 l avant randomisation


A
Central venous catheter insertion
Cumulative percentage
100
80
60
40
20
0
p<0.0001
0
1
2
3
4
5
6
Hours
B
Catheter insertion for ScvO2 monitoring
Cumulative percentage
100
80
60
40
20
0
p<0.0001
0
1
2
3
4
5
6
Hours
Protocol-based EGDT
Protocol-based Standard Therapy
Usual care


C
Hourly intravenous fluid volume
Volume (L)
1
0.8
0.6
0.4
0.2
0
p=0.007
0
1
2
3
4
5
6
Hours
D
Vasoactive agent and transfusion use
Percentage
60
50
40
30
20
10
0
p=0.003
p=0.001
p<0.0001
Vasopressor
PRBC
Dobutamine
Protocol-based EGDT
Protocol-based Standard Therapy
Usual care

A Cumulative In-Hospital Mortality to 60 Days



Inotropisme

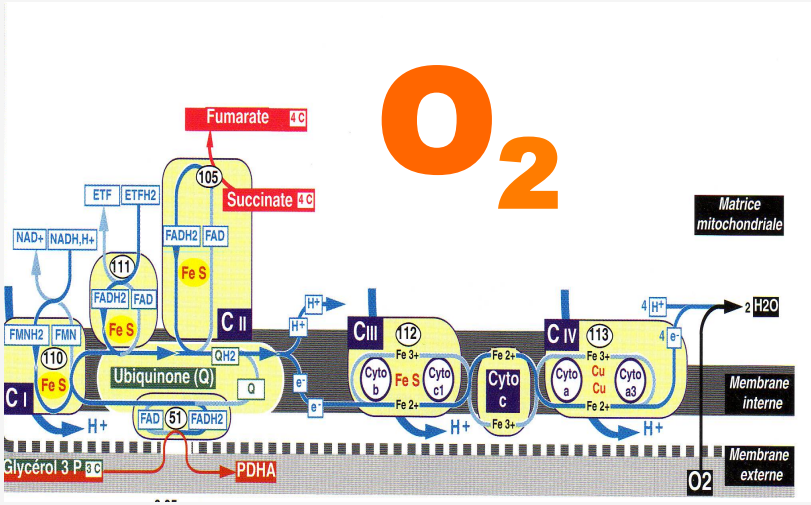
$ScvO_2$ < 70 %

↓

SaO_2 > 95%
Hb > 9 g/dL
VO_2 (ramsay 3)

↓

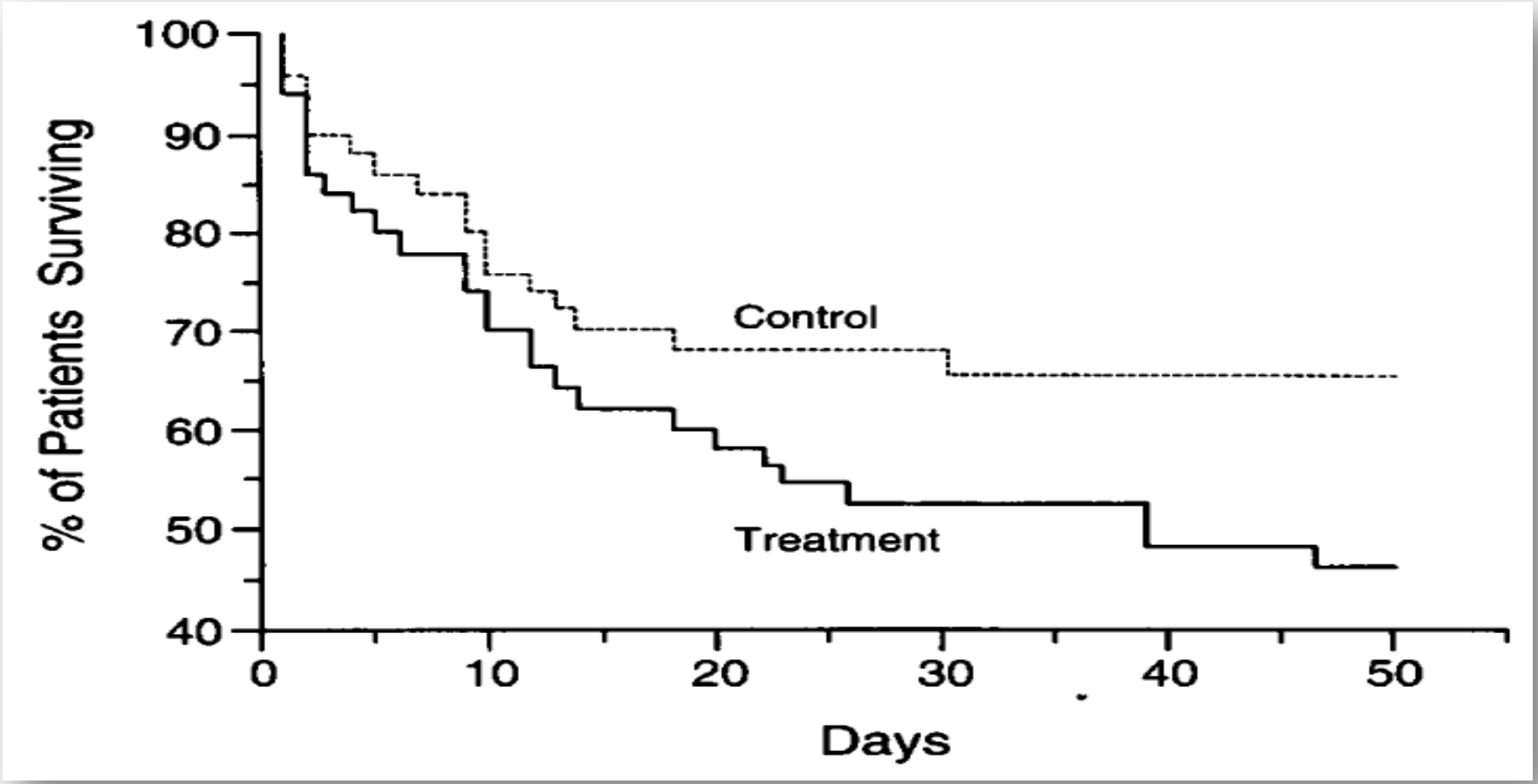
DC inadapté → **Inotrope positif**



Dellinger *et al.*, Intensive Care Med 2013 ; Rivers *et al.*, N Engl J Med 2001

Inotropisme

- **Hyperdébit = Surmortalité**



Hayes *et al.*, N Engl J Med 1994

Surmortalité ?

↓

Comment gérer l'hyperdébit ?

↓

↓ Demande énergétique

Hypothermie

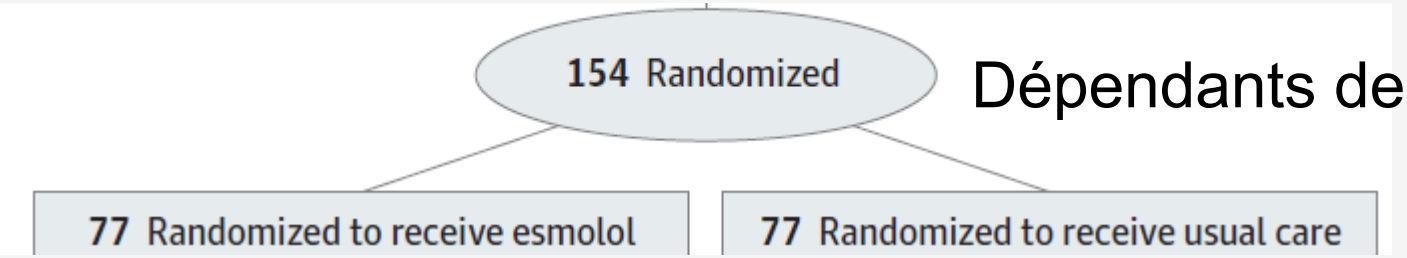
B-bloquants

Beta-bloquants

Contrôle FC

Preliminary Communication | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Heart Rate Control With Esmolol on Hemodynamic and Clinical Outcomes in Patients With Septic Shock
A Randomized Clinical Trial



Dépendants de NAD à H24

IVSE pour FC < 95 /min

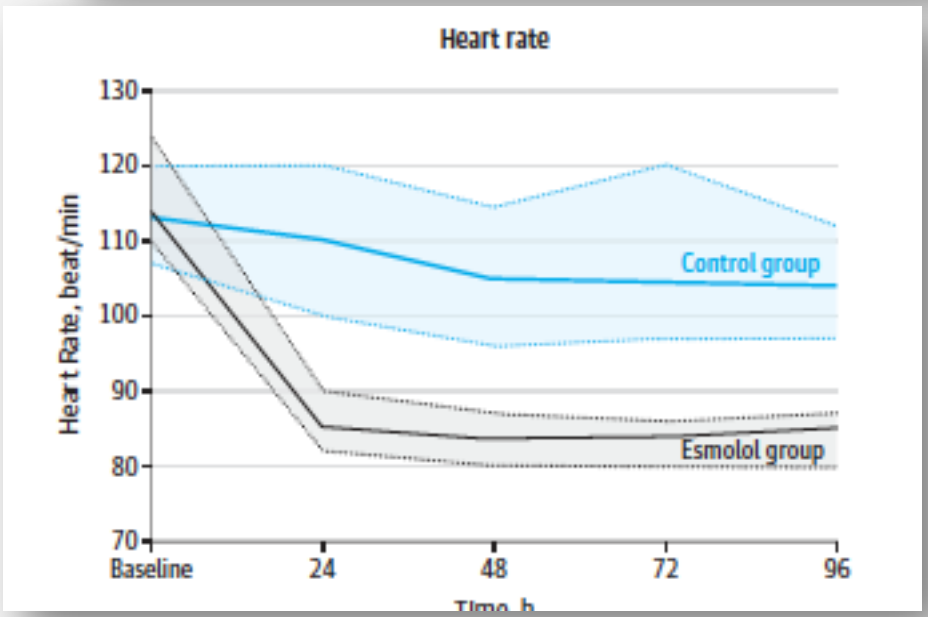
Beta-bloquants

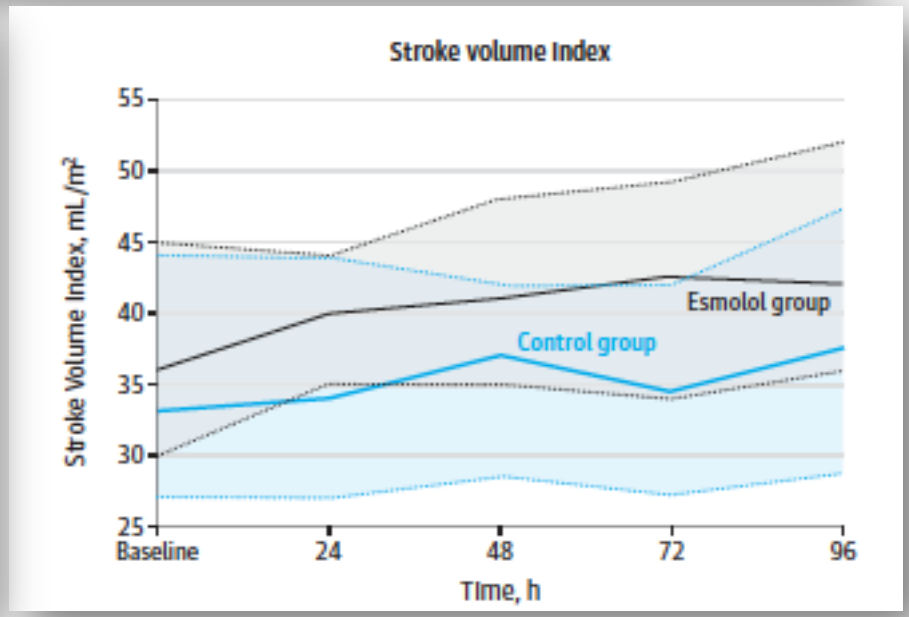
Contrôle FC

Preliminary Communication | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Heart Rate Control With Esmolol on Hemodynamic and Clinical Outcomes in Patients With Septic Shock

A Randomized Clinical Trial





Beta-bloquants

Contrôle FC

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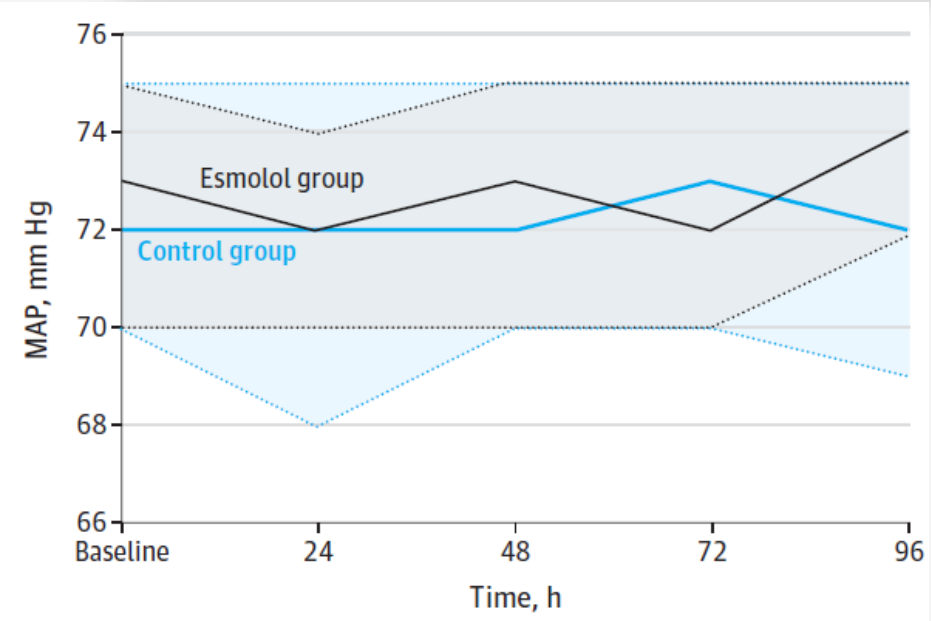
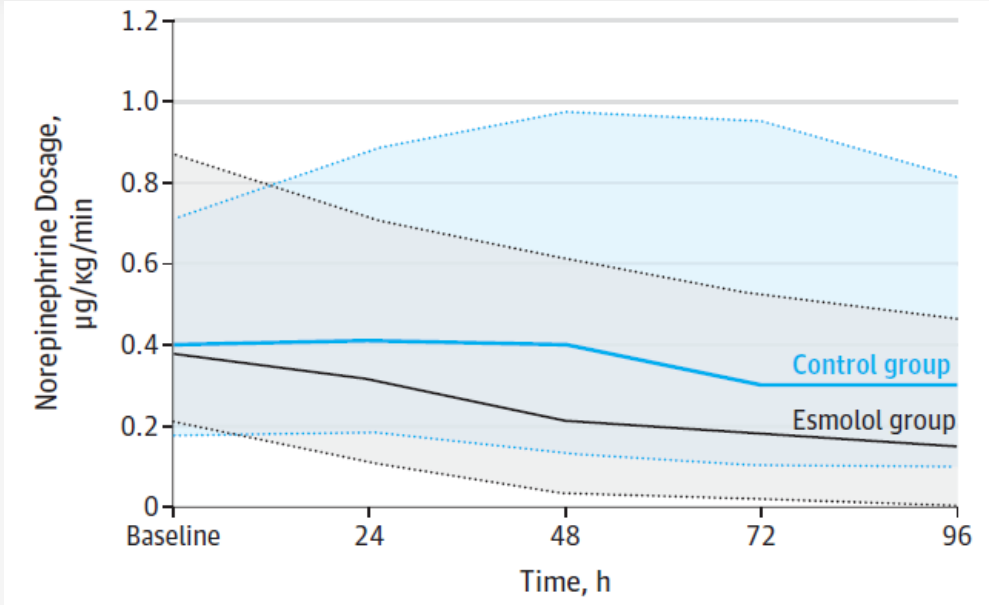
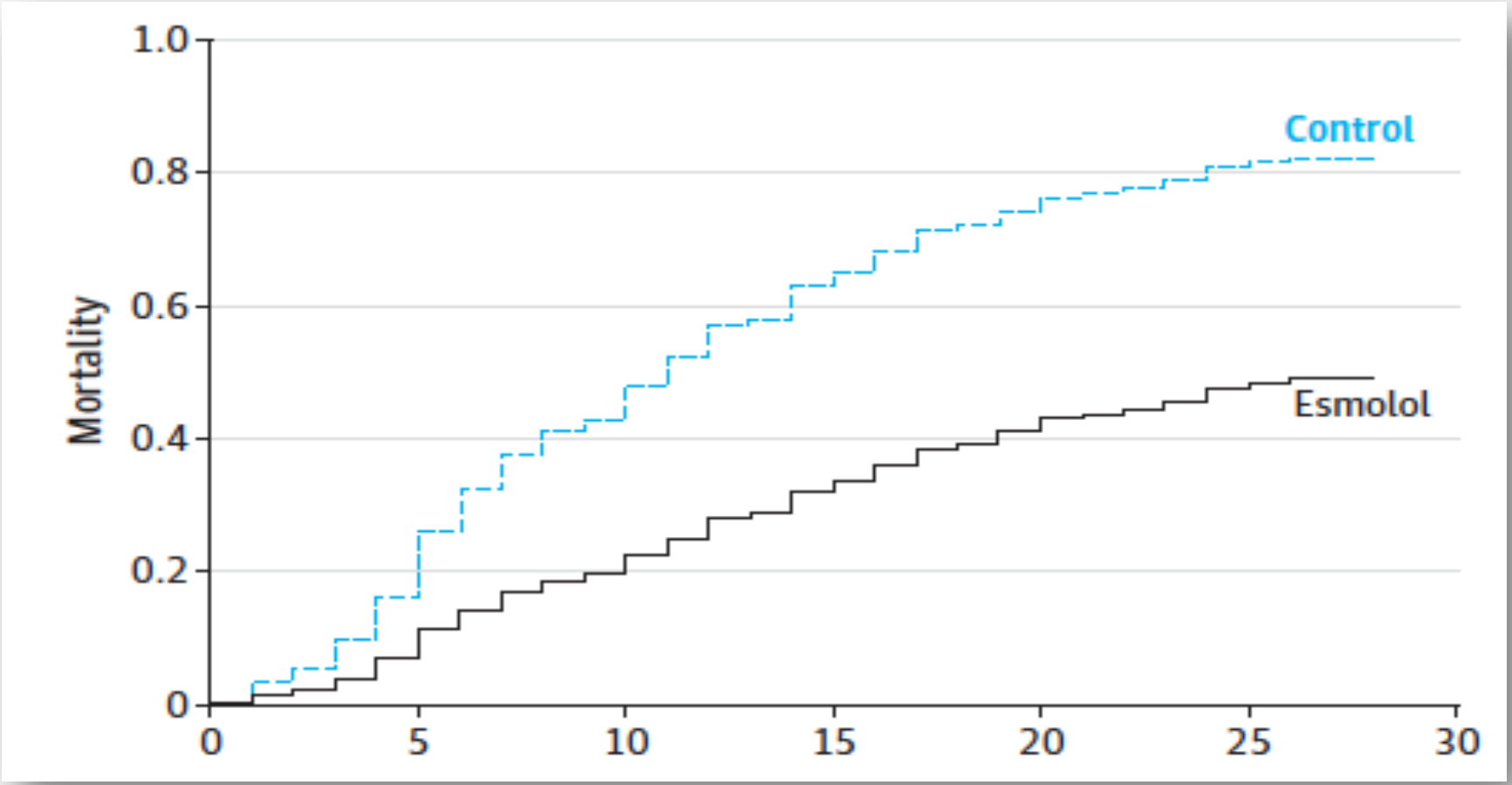




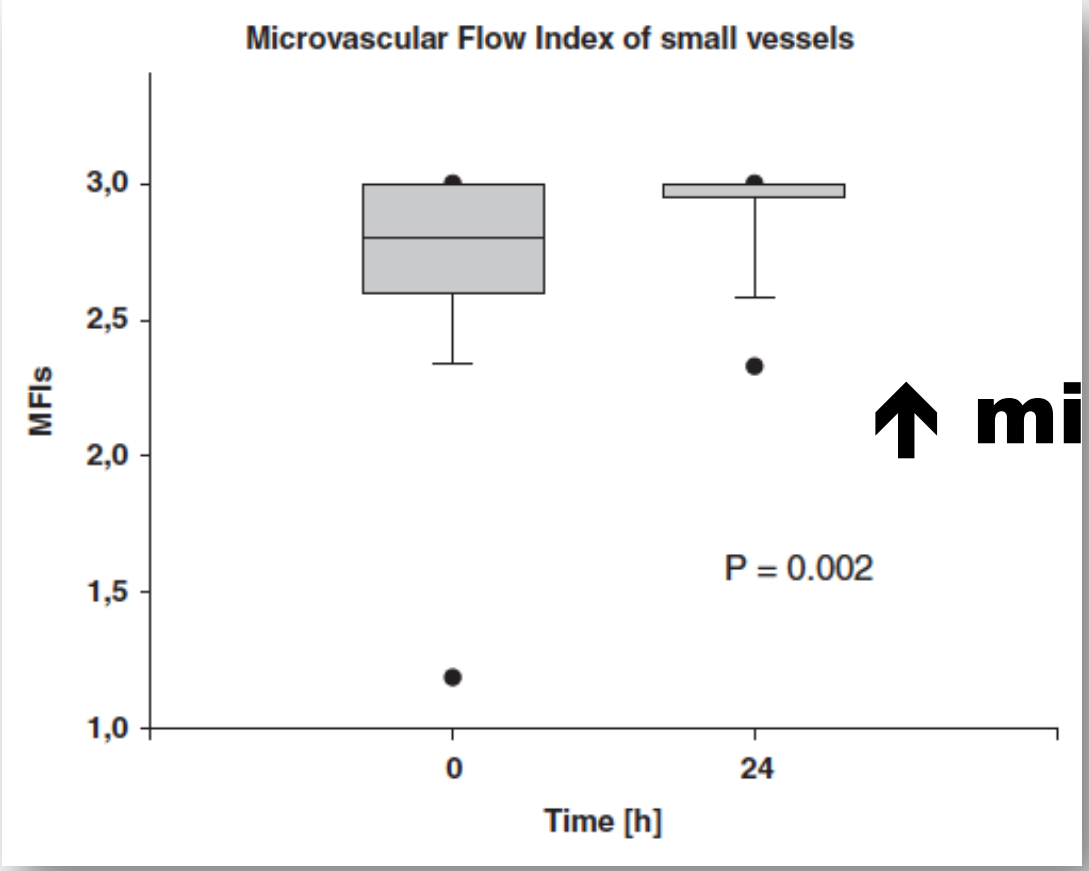
Beta-bloquants

- **Contrôle FC**



Beta-bloquants

- **Contrôle FC**



↑ microcirculation

Surmortalité ?

↓

Comment gérer l'hyperdébit ?

↓

↓ Demande énergétique

Hypothermie

B-bloquants

Contrôle température

Fever Control Using External Cooling in Septic Shock: a Randomized Controlled Trial

- Body temperature : 36.8 ± 0.7 *vs.* 38.4 ± 1.1°C
- ↓ 50% vasopressor dose : 54% *vs.* 20%
- Shock reversal : 86% *vs.* 73%
- Day-14 mortality : 19% *vs.* 34% (similar at ICU discharge)
- Attention, surmortalité si sepsis + antipyrétique

Hydrocortisone ?

- **Hydrocortisone ? Immunomodulation**

1. Ne pas utiliser si stabilisation
2. Si absence de stabilisation, 200 mg/j
3. Pas de test de stimulation
4. Décroissance progressive

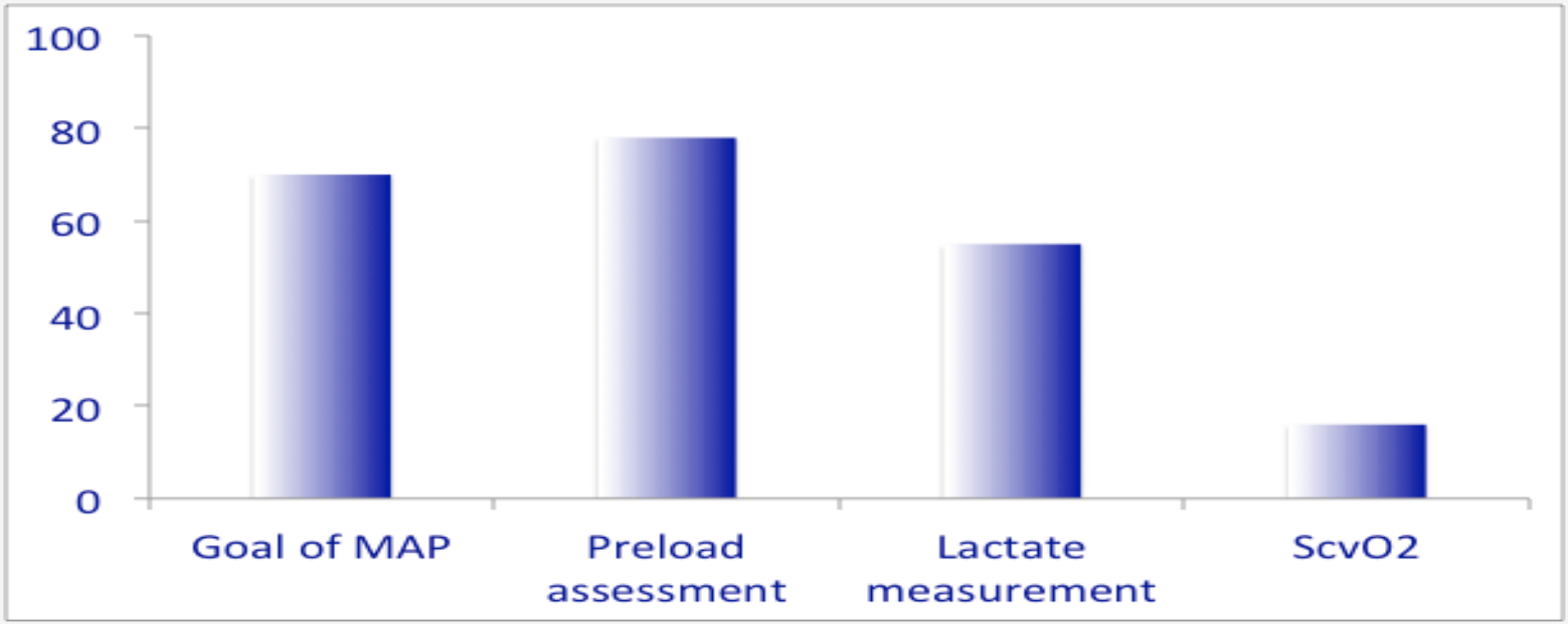
2 études contradictoires : résultats APPROCHS ?

Dellinger *et al*., Intensive Care Med 2013

Améliorer nos pratiques

9. Glucose control: **45%**
10. Ventilator setting: 37%
11. **Sepsis bundle**: **34%**
12. ET Tube cuff pressure: **26%**
13. Analgesia monitoring: **24%**

Variable compliance with clinical practice guidelines identified in a 1-day audit at 66 French adult intensive care units



Conclusion

- **Basiques**
  - Cristalloïdes
  - Antibiotiques
  - Noradrénaline
  - Eviction du foyer

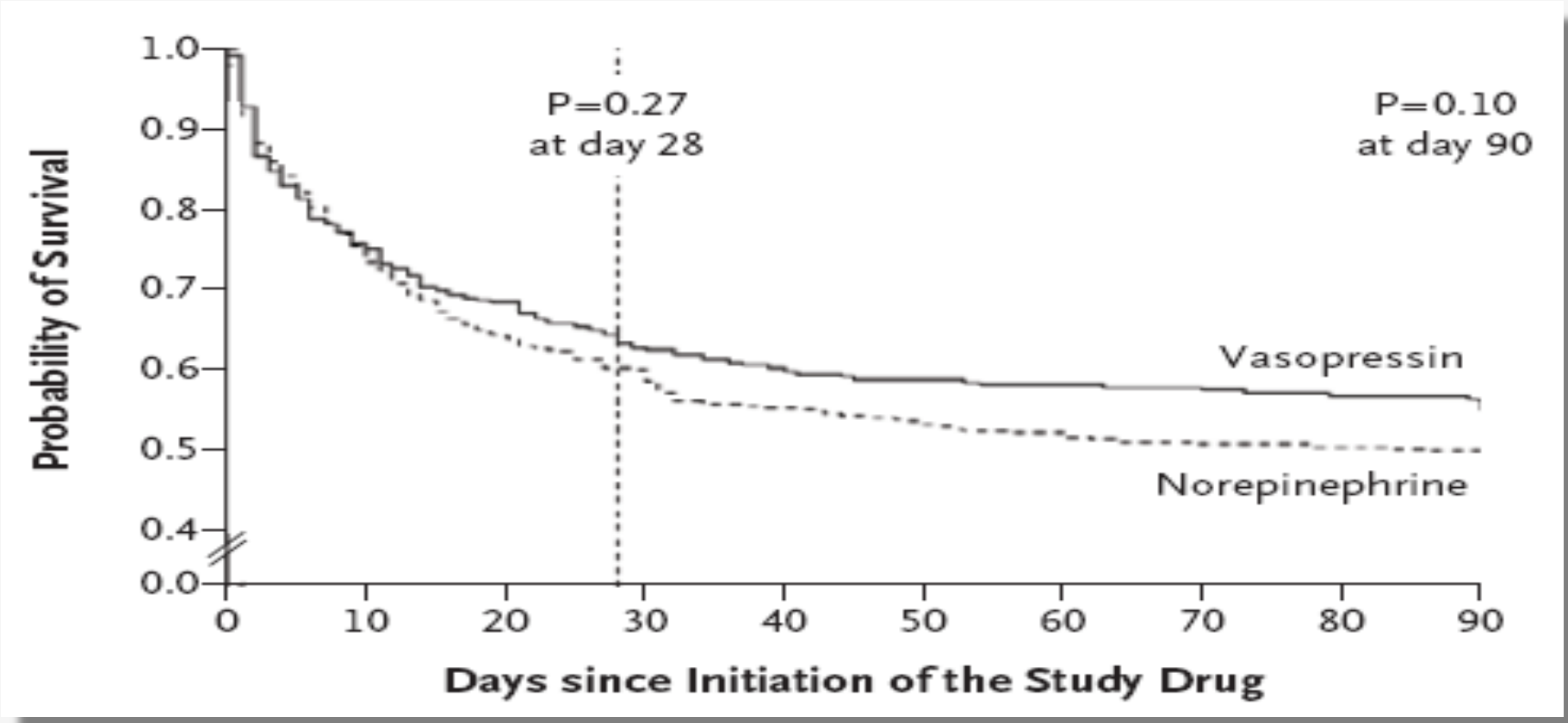
Monitoring

- **Vers le futur**
  - Immunostimulation
  - Hibernation
  - Microcirculation

Vasopresseurs

- **Vasopressine : traitement de recours**
  - VASST: AVP + NE = NE

Dellinger *et al*., Intensive Care Med 2013



Russell *et al*., N Engl J Med 2008; Choong *et al*., Am J Resp Crit Care Med 2009

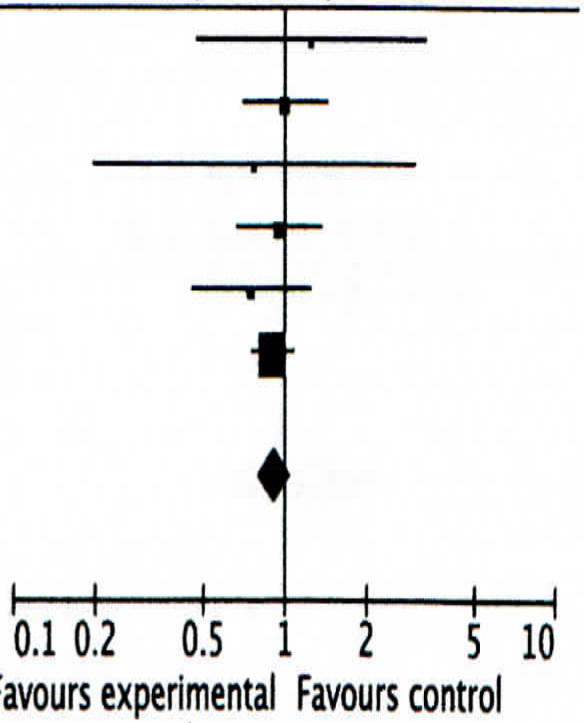
Vasopresseurs

- **Vasopressine** : traitement de recours

Study or Subgroup	Experimental Events	Experimental Total	Control Events	Control Total	Weight	Risk Ratio M-H, Random, 95% CI
Albanese 2005	5	10	4	10	2.1%	1.25 [0.47, 3.33]
Dunser 2003	17	24	17	24	15.0%	1.00 [0.70, 1.44]
Lauzier 2006	3	13	3	10	1.0%	0.77 [0.20, 3.03]
Morelli 2008	26	39	14	20	15.0%	0.95 [0.66, 1.37]
Morelli 2009	15	30	10	15	7.7%	0.75 [0.45, 1.24]
Russell 2008	140	396	150	382	59.2%	0.90 [0.75, 1.08]
Total (95% CI)		**512**		**461**	**100.0%**	**0.91 [0.79, 1.05]**
Total events	206		198			

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 1.36$, df = 5 (P = 0.93); $I^2 = 0\%$

Test for overall effect: Z = 1.25 (P = 0.21)



Vasopresseurs

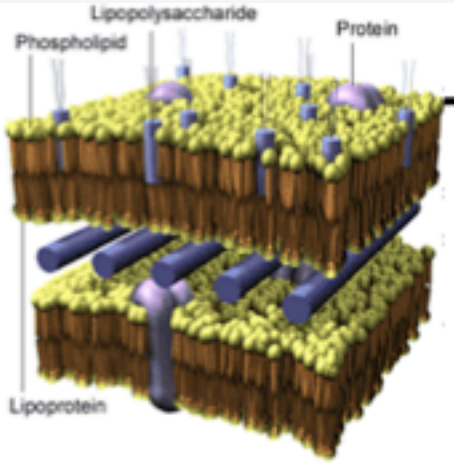
- **Vasopressine** : traitement de recours ?

Vasopressin Compared with Norepinephrine Augments the Decline of Plasma Cytokine Levels in Septic Shock

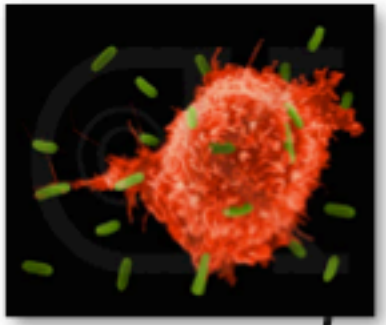
1. Survivants : ↑ clairance des cytokines
2. AVP : ↑ clairance / NE

Immunomodulation et AVP

Physiopathologie



Endotoxine (LPS)



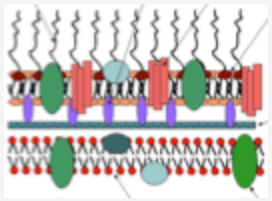
Médiateurs inflammatoires

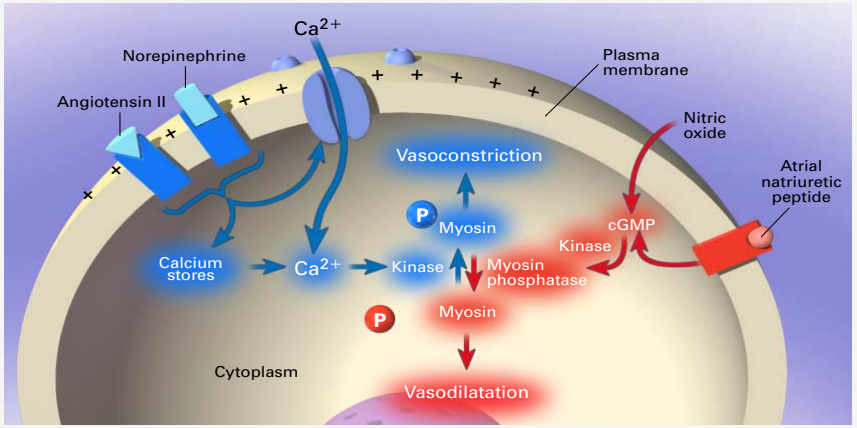
Inflammation locale

décompartiment

Choc septique

Physiopathologie





TNF

NF-KB/ IKB

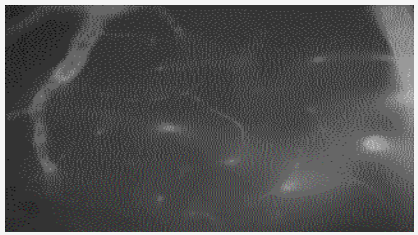
IL-1

TLR-4

NO

Vasodilation

Perfusion pressure



DIC

contractility

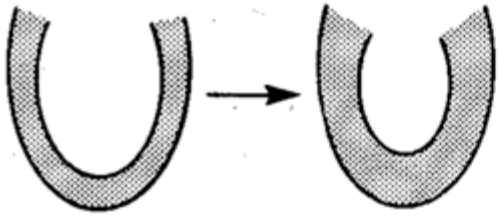
Tissue hypoxia

Physiopathologie

Défaillance cardiaque

Profound but Reversible Myocardial Depression in Patients with Septic Shock

ACUTE PHASE OF SEPTIC SHOCK



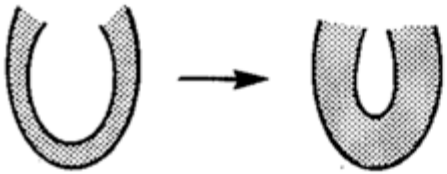
Left Ventricular End Diastolic Volume = 200ml

Left Ventricular End Systolic Volume = 150ml

Stroke Volume = 50ml

Ejection Fraction = $\frac{200ml - 150ml}{200ml}$ = 25%

RECOVERY PHASE OF SEPTIC SHOCK

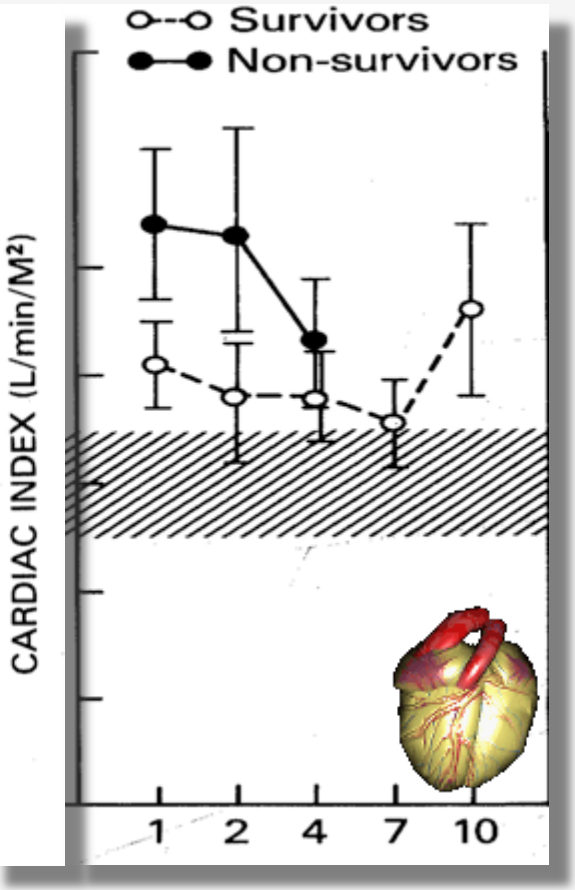


Left Ventricular End Diastolic Volume = 100ml

Left Ventricular End Systolic Volume = 50ml

Stroke Volume = 50ml

Ejection Fraction = $\frac{100ml - 50ml}{50ml}$ = 50%



Physiopathologie

The sepsis seesaw

The immune response goes haywire during sepsis, a deadly condition triggered by infection. Richard S. Hotchkiss and his colleagues take the focus off of the prevailing view that the key aspect of this response is an exuberant inflammatory reaction. They assess recent human studies bolstering the notion that immunosuppression is also a major contributor to the disease. Many people with sepsis succumb to cardiac dysfunction, a process examined by Peter Ward. He showcases the factors that cause cardiomyocyte contractility to wane during the disease.

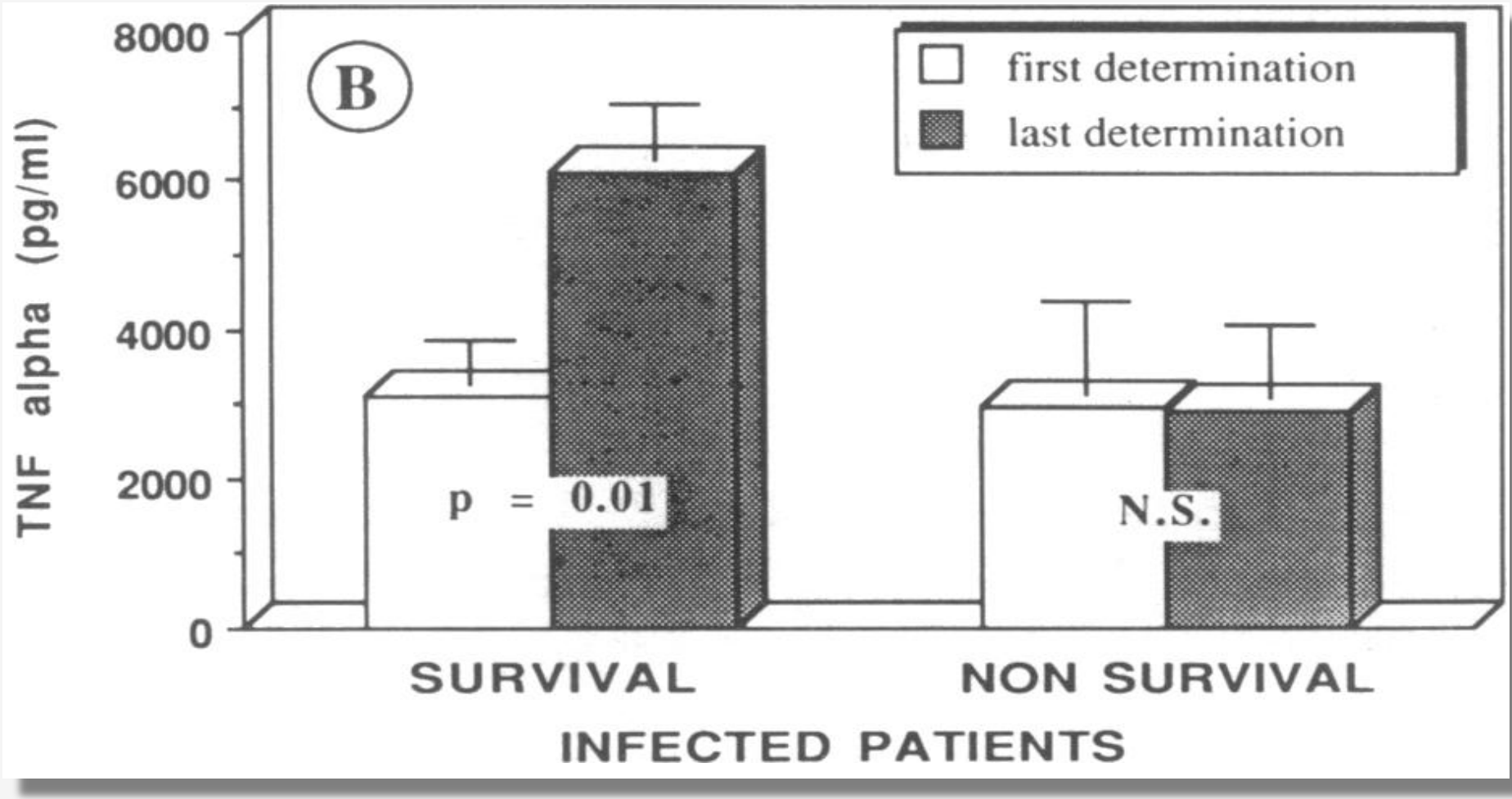
■ BEDSIDE TO BENCH

Tilting toward immunosuppression

Richard S Hotchkiss, Craig M Coopersmith, Jonathan E McDunn & Thomas A Ferguson

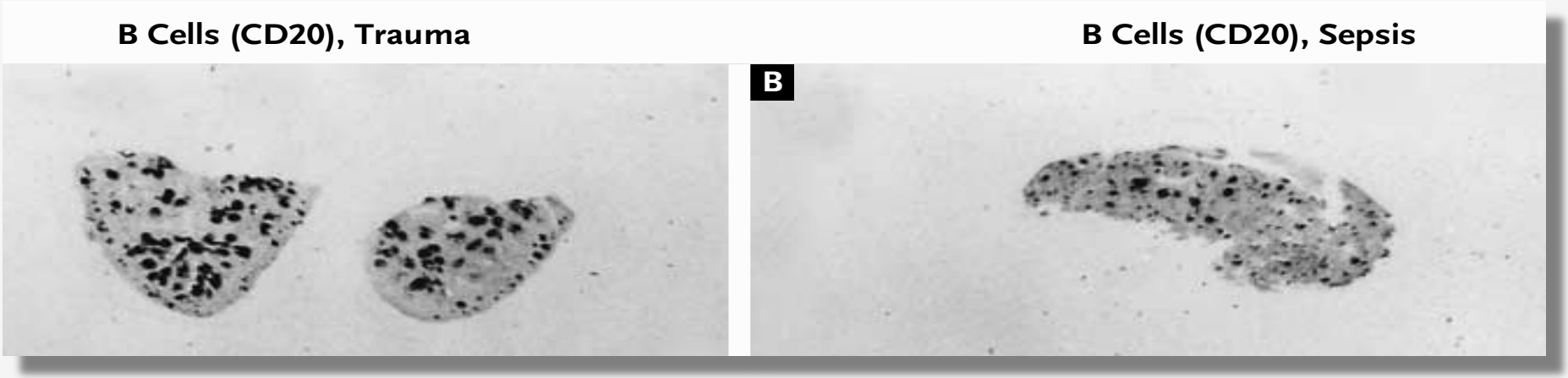
1. Anergie
2. Immunodépression
3. Temps

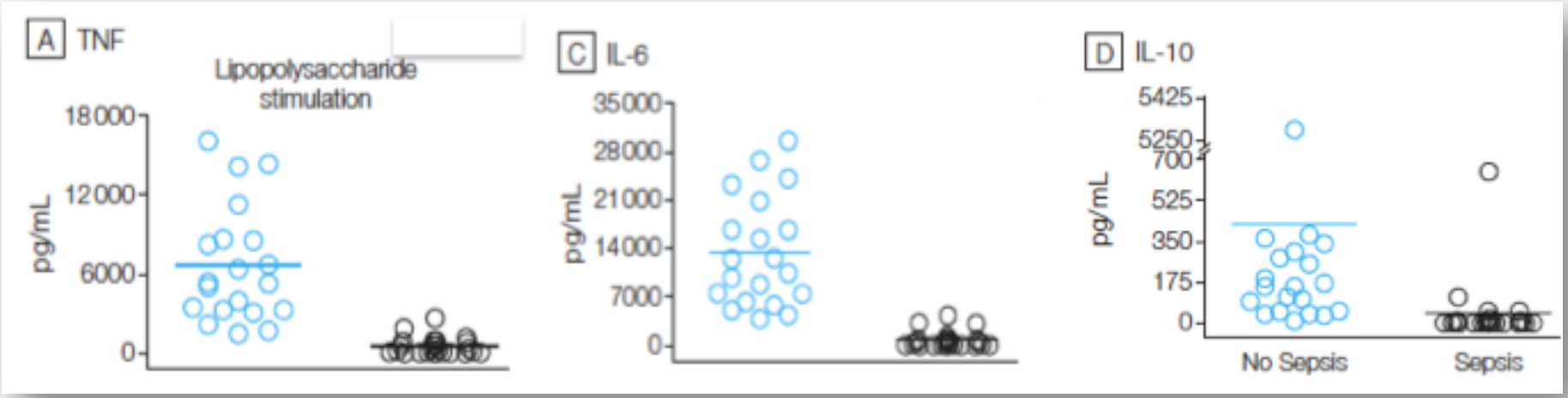
Anergie



Seconde stimulation : anergie

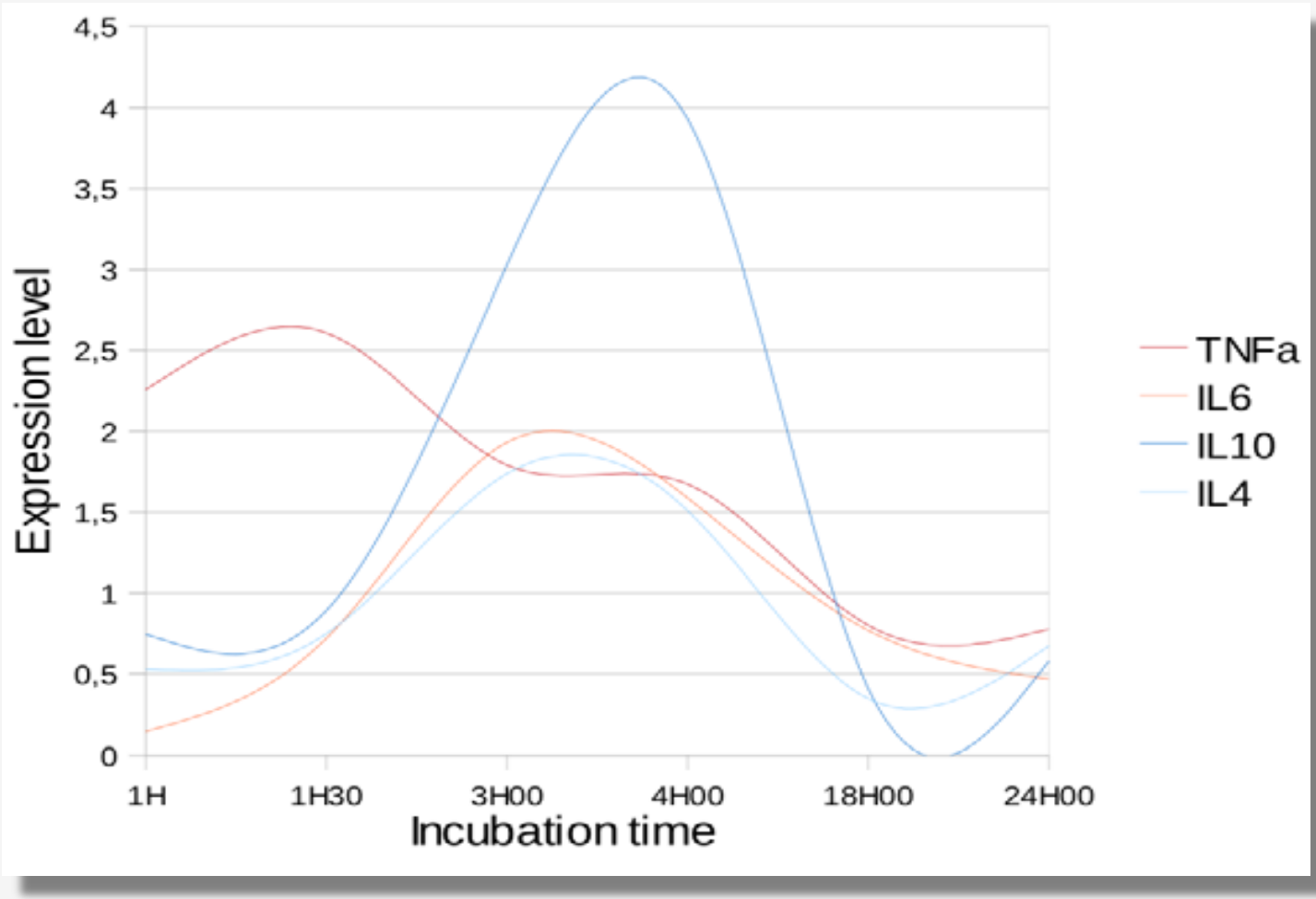
Immunodépression

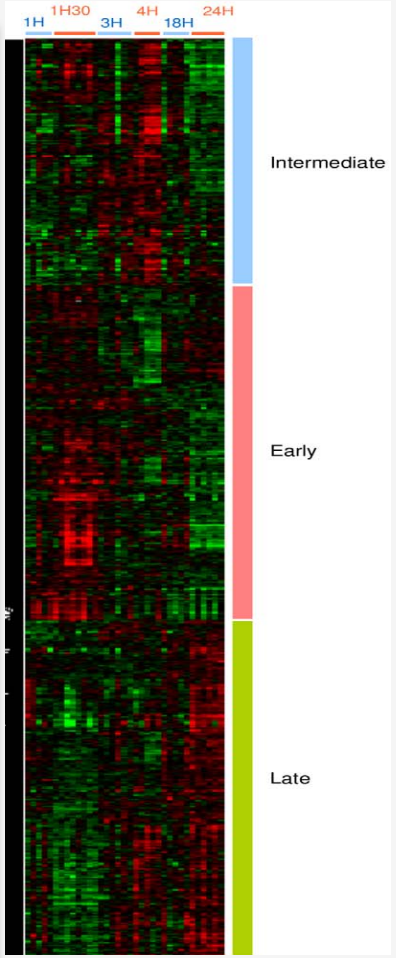




No Sepsis Sepsis No Sepsis Sepsis No Sepsis Sepsis

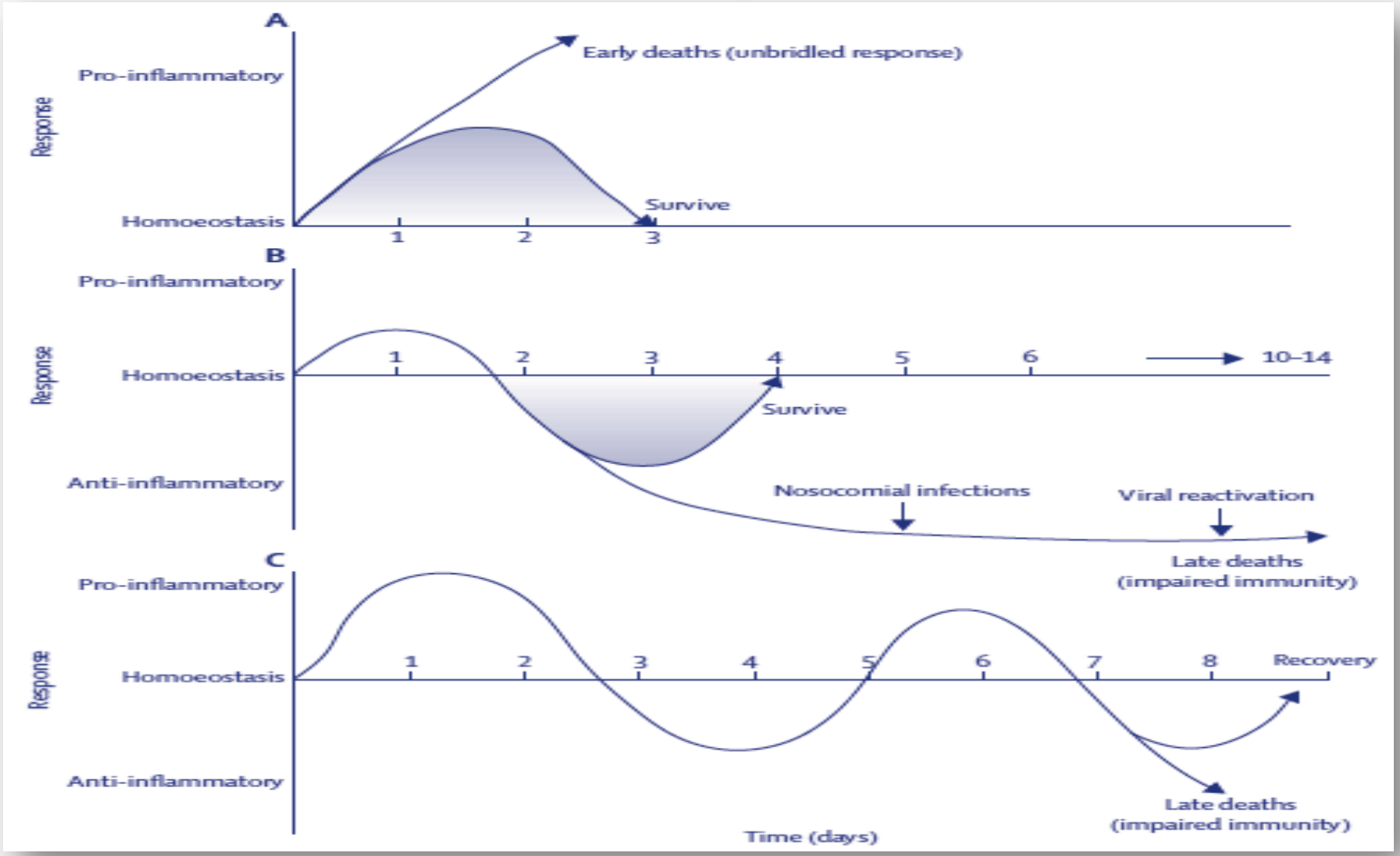
Temps





Temps : précoce *vs.* tardif

Temps



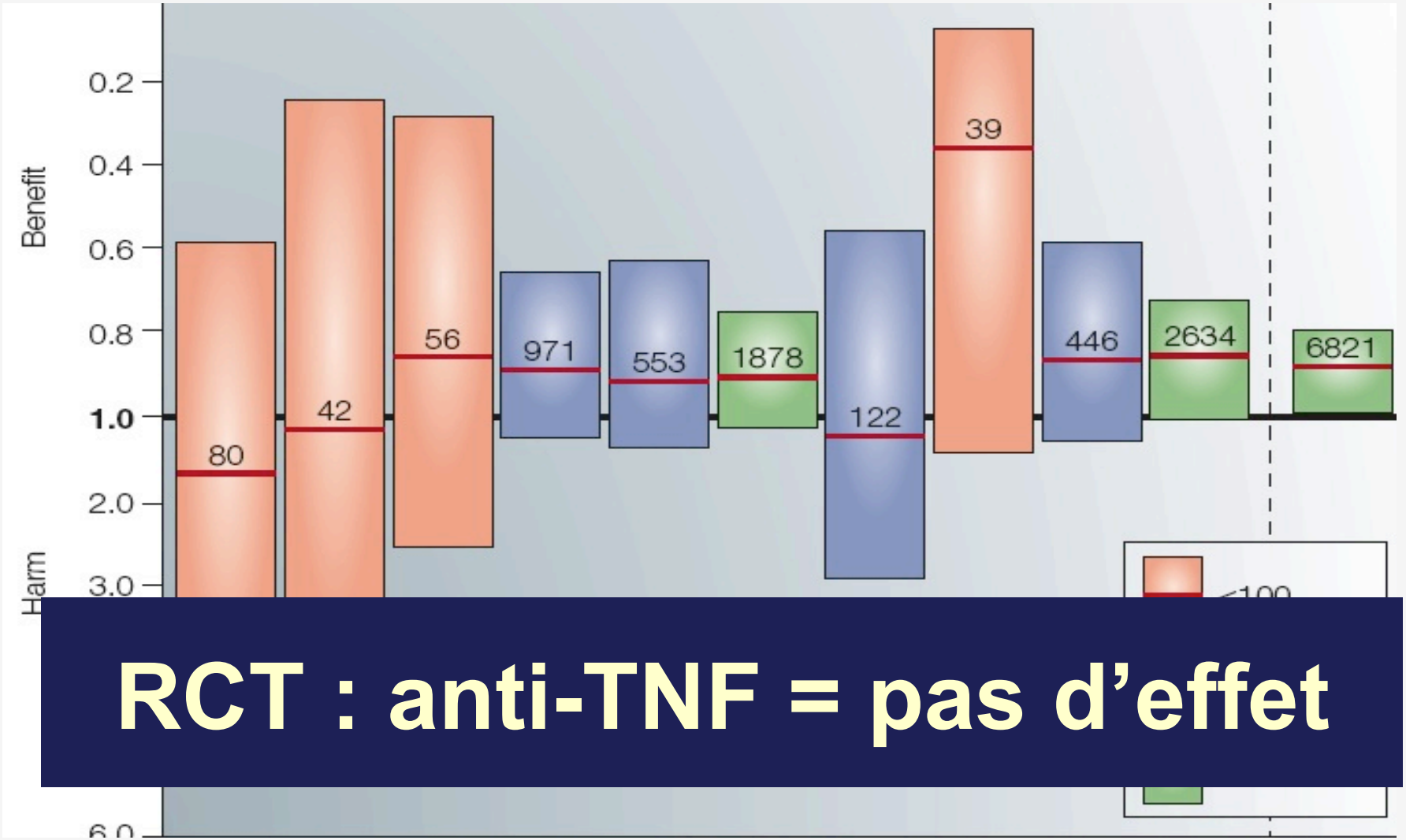
Hotchkiss *et al*., Lancet Infect Dis 2013

Physiopathologie

Réponse immune : dépression

Futur : stimuler l'immunité

Preuve du concept

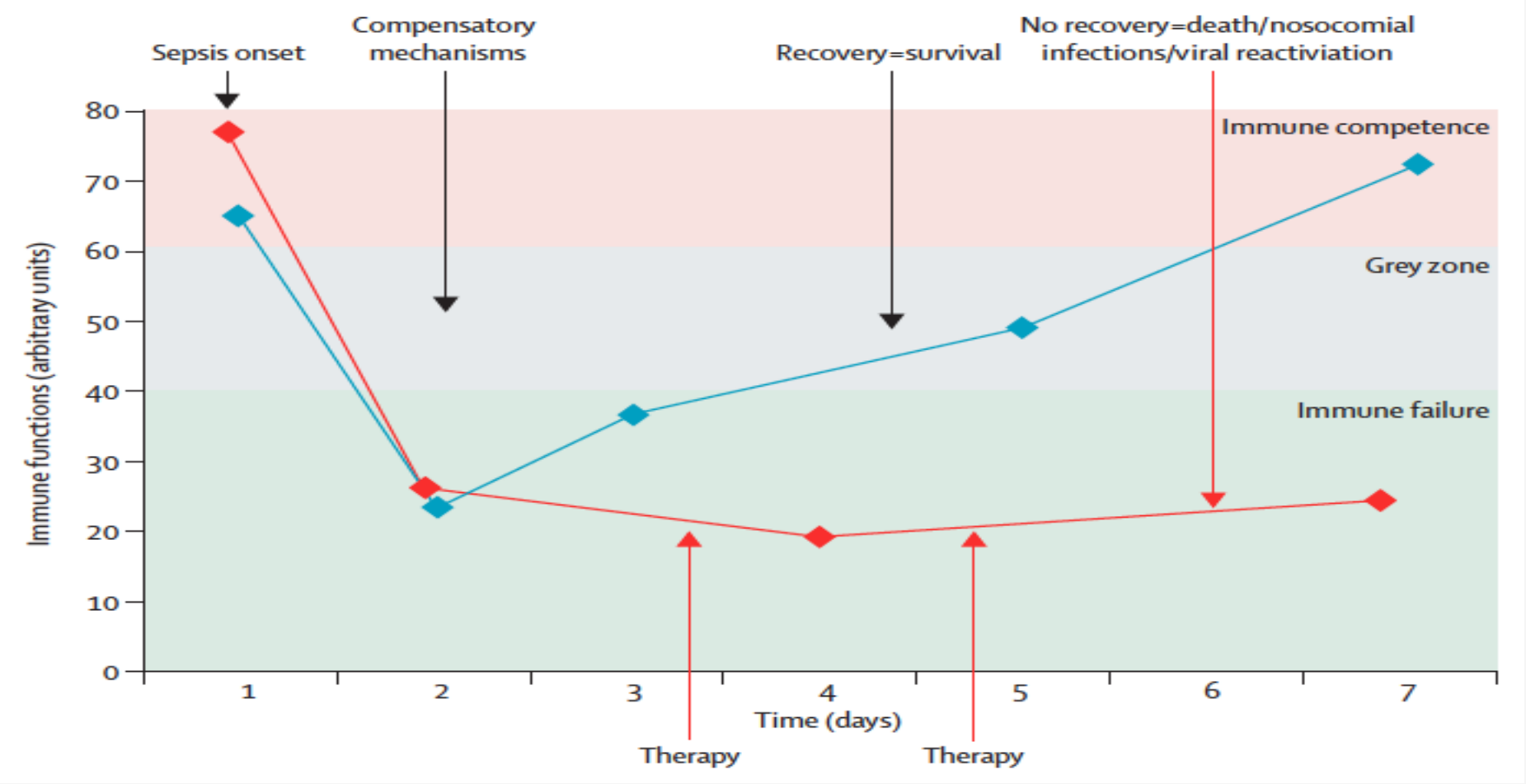


RCT : anti-TNF = pas d'effet

Marshall. Nat Rev Drug Disc 2003

Biomarqueur : GPS

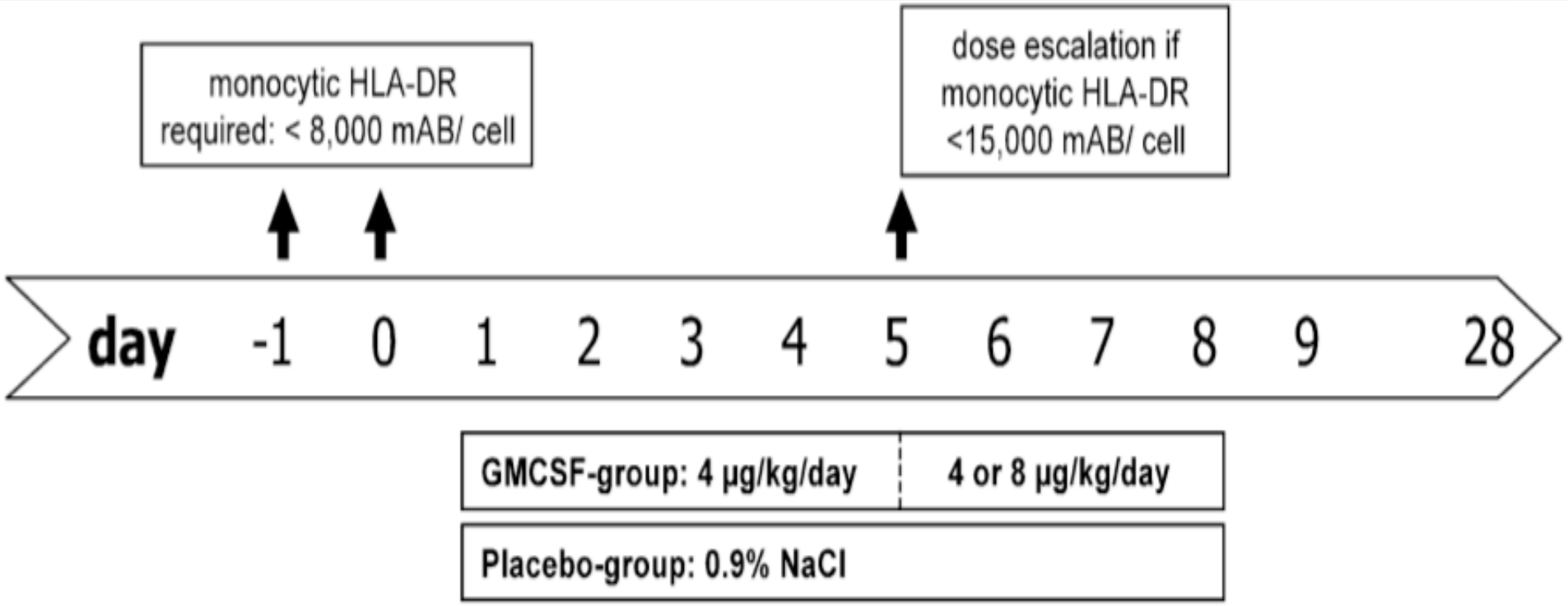
HLA-DR



GM-CSF : préliminaire

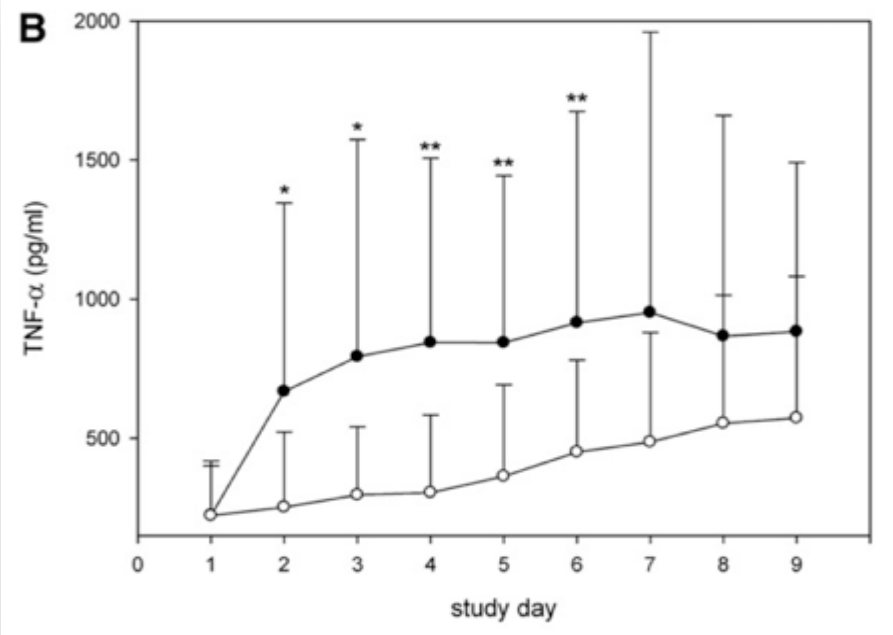
Granulocyte–Macrophage Colony-stimulating Factor to Reverse Sepsis-associated Immunosuppression

A Double-Blind, Randomized, Placebo-controlled Multicenter Trial



Meisel et al. Am J Respir Crit Care Med 2009

GM-CSF : préliminaire



Ventilation mécanique

GM-CSF: 148 ± 103 h

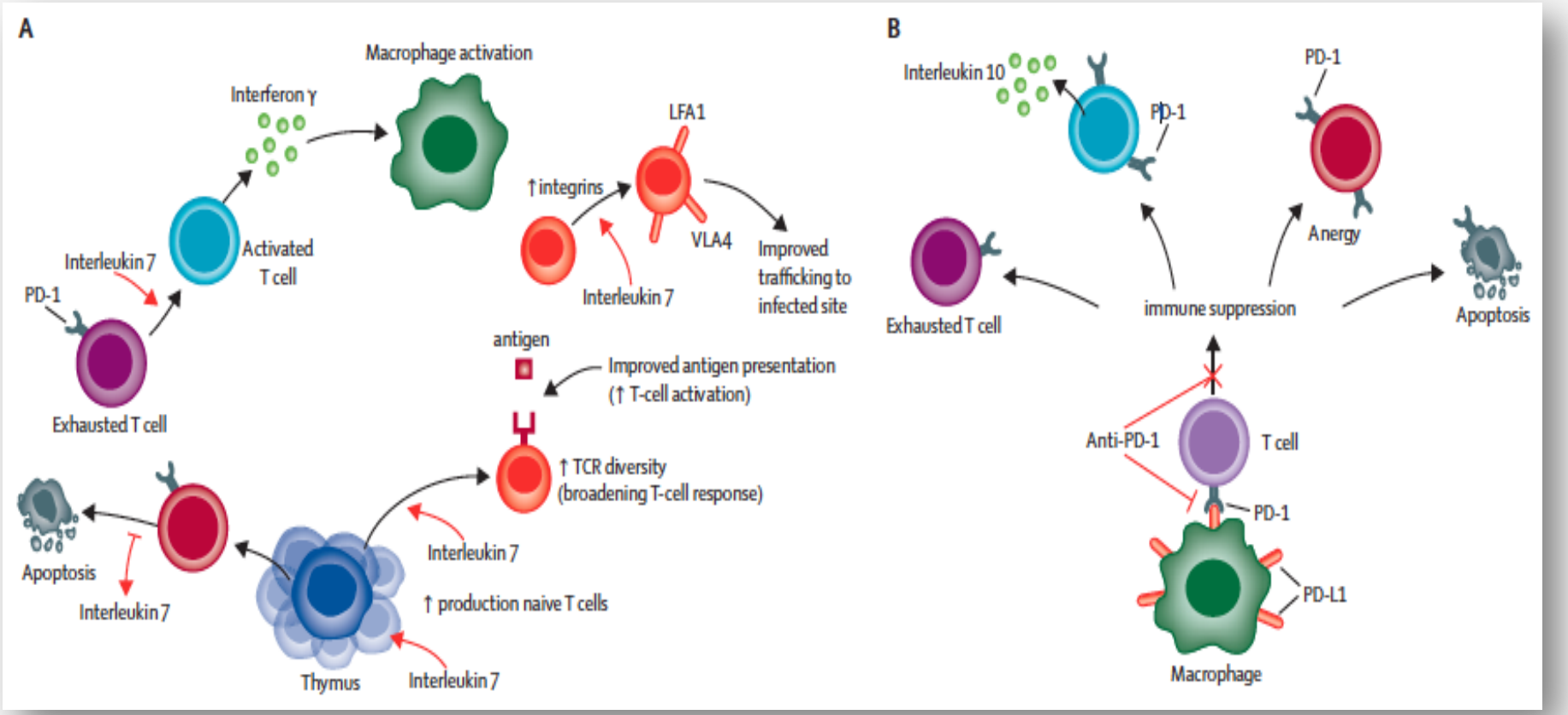
vs.

Placebo: 207 ± 57 h,

$p = 0,04$

Etudes multicentriques en cours

Interleukine 7 ?

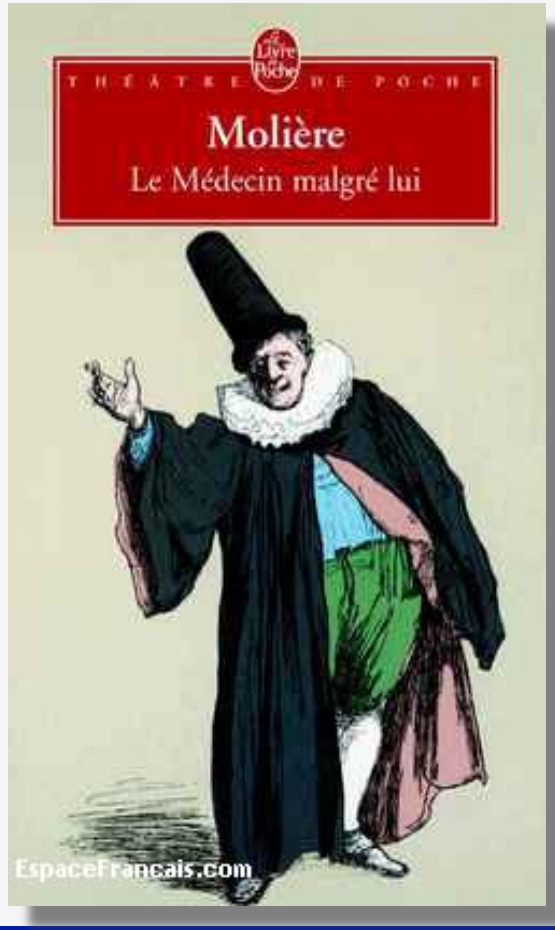


THE JOURNAL OF IMMUNOLOGY

IL-7 Promotes T Cell Viability, Trafficking, and Functionality and Improves Survival in Sepsis

Hotchkiss et al. Lancet Infect Dis 2013; Unsinger et al. J Immunol 2013

Croyance et business



Sepsis

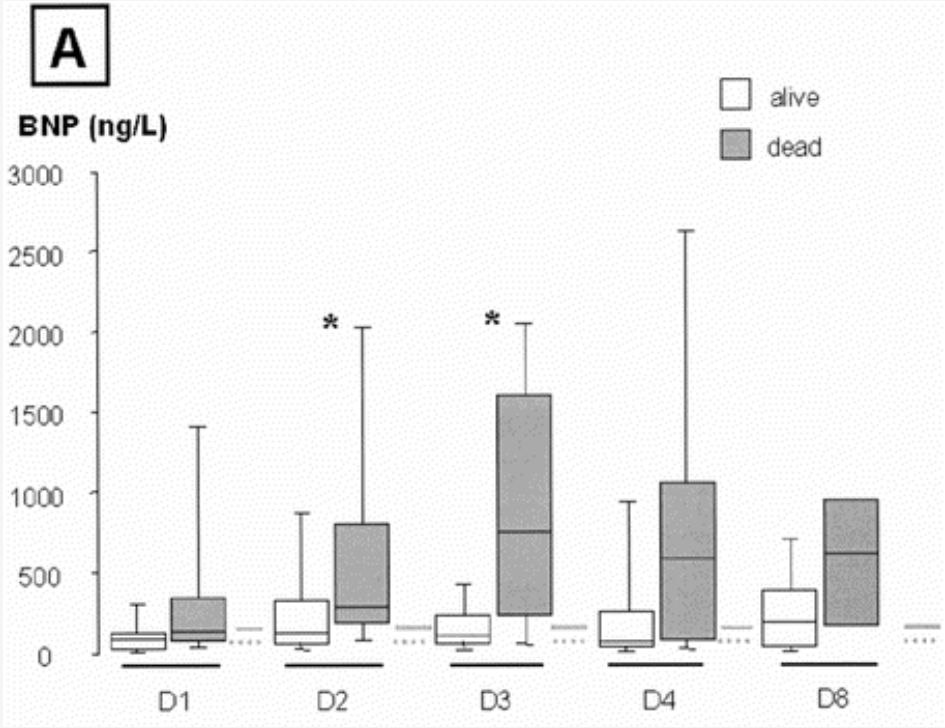
- Dépression myocardique

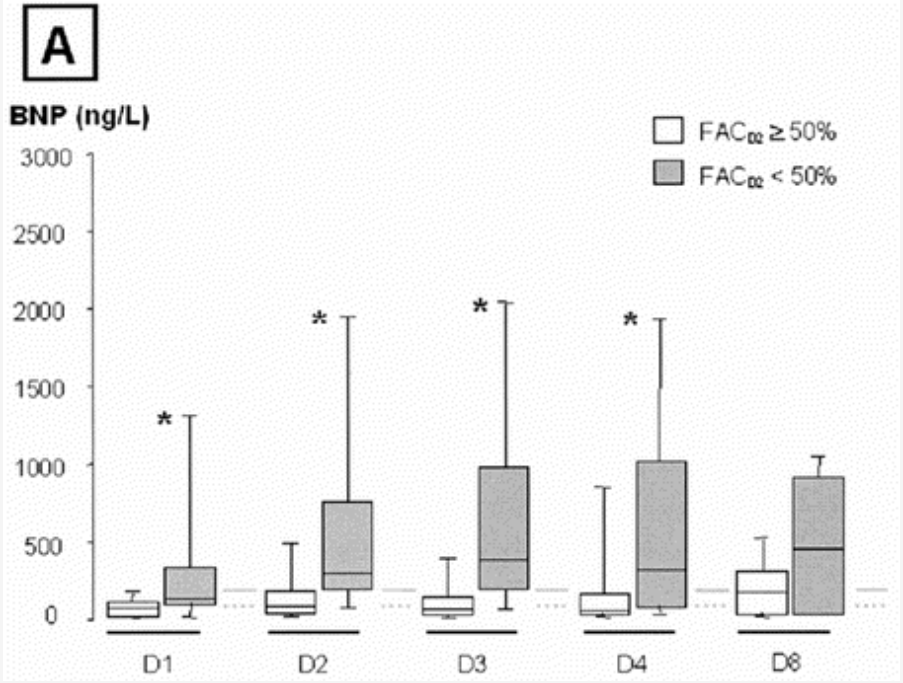
  Ann Intern Med 1984; 100:483–490

- Baisse contractilité VG
- Mais baisse de postcharge
- Donc le plus souvent pas de congestion

Charpentier et al. Crit Care Med 2004; 32 : 660.

BNP- 34 patients en choc septique

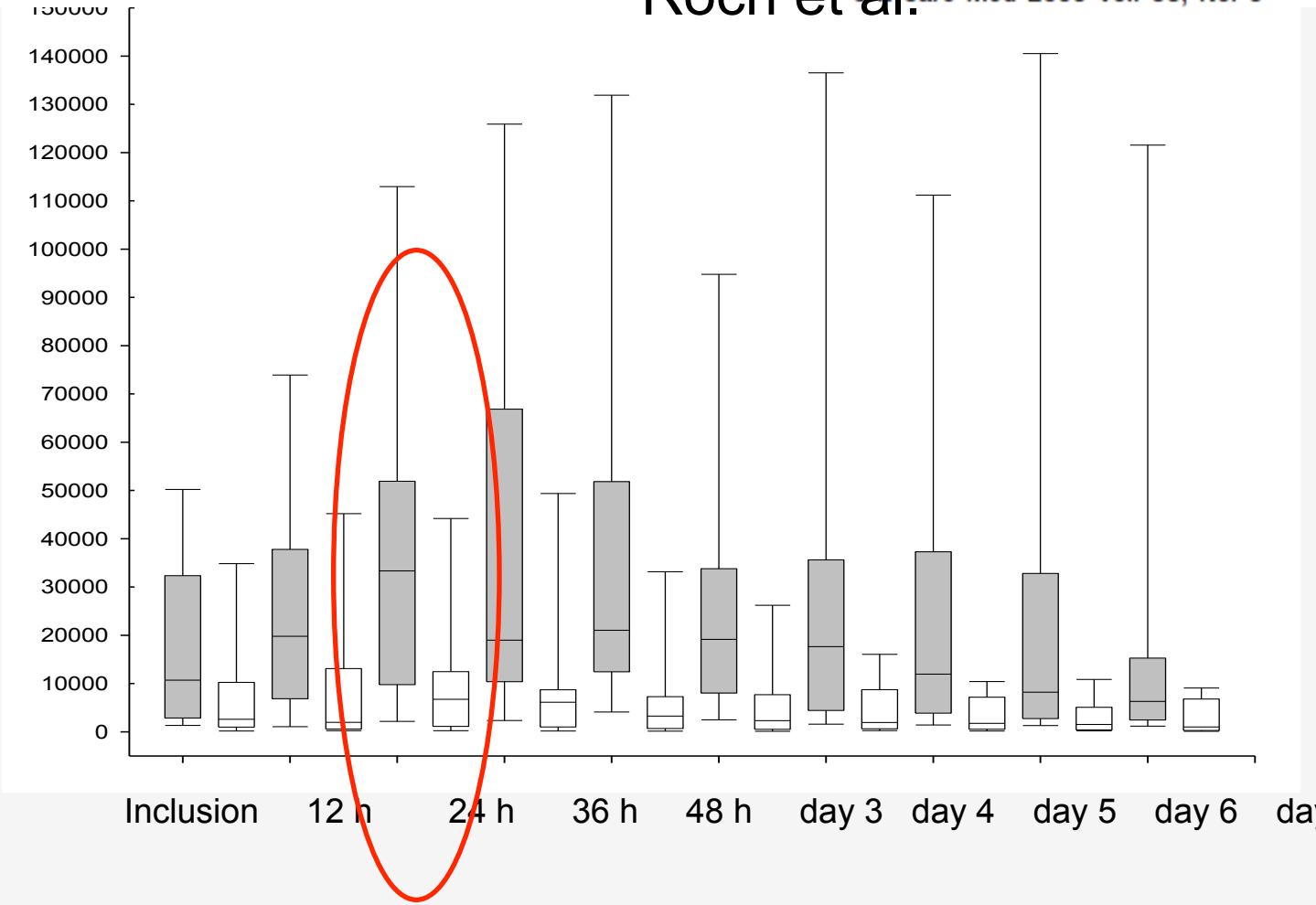




NH_2 terminal pro–brain natriuretic peptide plasma level as an early marker of prognosis and cardiac dysfunction in septic shock patients*

Roch et al.

Crit Care Med 2005 Vol. 33, No. 5



p < 0.05 entre non-survivants (n = 22) et survivants (n=17) à chaque temps

NH_2 terminal pro–brain natriuretic peptide plasma level as an early marker of prognosis and cardiac dysfunction in septic shock patients*

Crit Care Med 2005 Vol. 33, No. 5

Roch et al.

Table 3. Factors that potentially influenced intensive care unit mortality by univariate analysis[a]

	Nonsurvivors	Survivors	*p* Value
Age, yrs	66 ± 10	60 ± 15	.15
Male sex	18/22	14/17	1.0
SOFA[b]	13 ± 3	9 ± 2	<.001
NT-proBNP, pg/mL[b]			
Median	34028	7856	.002
Interquartile range	11,735–49,320	1,291–12,972	
Lactate,[b] mmol/L	7.5 ± 6	4 ± 3	.034
Creatinine,[b] μmol/L	225 ± 77	161 ± 81	.016
LVSWI,[c] $g \cdot m^{-1} \cdot m^{-2}$	23 ± 10	36 ± 16	.005
cTnI,[b] μg/L			
Median	1.4	0.2	.002
Interquartile range	0.2–3.1	0.03–0.25	

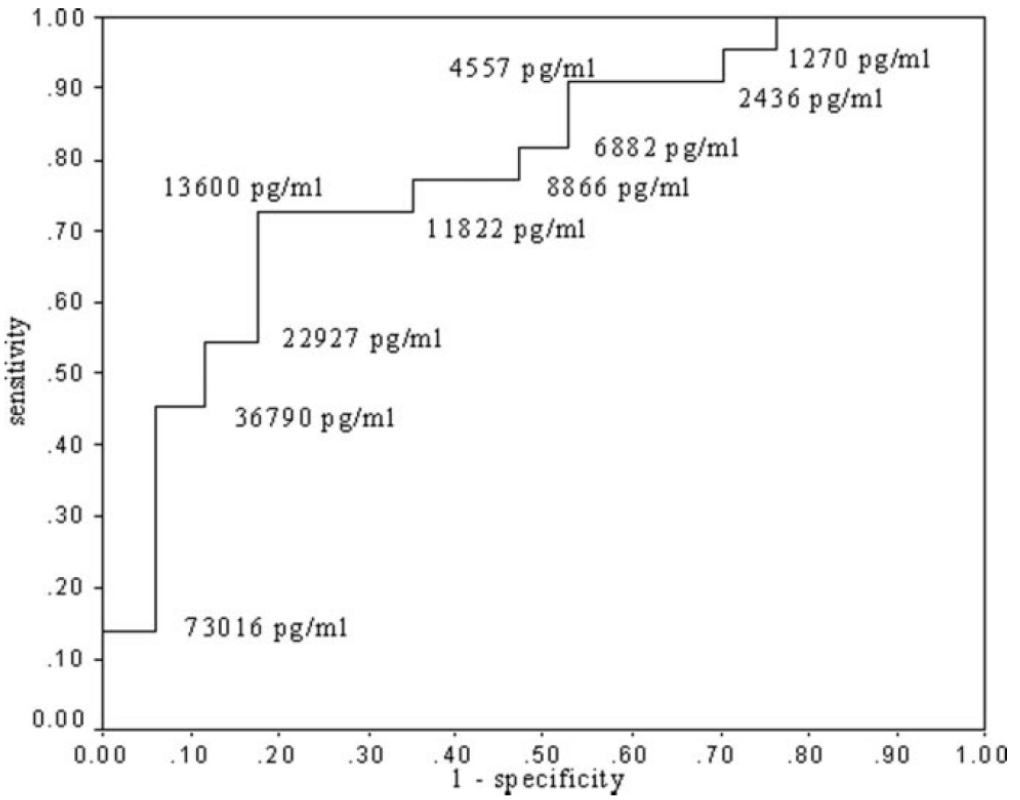
NH_2 terminal pro–brain natriuretic peptide plasma level as an early marker of prognosis and cardiac dysfunction in septic shock patients*

Roch et al.

Crit Care Med 2005 Vol. 33, No. 5

Table 4. Multivariate logistic regression of factors influencing intensive care unit mortality

Variable	*p* Value	OR	95% CI
Age, yrs	.143		
Sex	.136		
SOFA[a]	.031	4.71	1.15–19.3
NT-proBNP[a] per 1000 pg/mL increase	.041	1.13	1.005–1.26
Lactate,[a] mmol/L	.465		
LVSWI,[b] $g \cdot m^{-1} \cdot m^{-2}$	.536		
cTnI,[a] µg/L	.789		
Creatinine,[a] µmol/L	.371		



NH_2 terminal pro–brain natriuretic peptide plasma level as an early marker of prognosis and cardiac dysfunction in septic shock patients*

Roch et al.

Crit Care Med 2005 Vol. 33, No. 5