

DU Transports Aéronautiques et Rappatriements Sanitaires  
UPMC – Saint-Antoine- 2017

# ECMO

**Guillaume LEBRETON**

MCU-PH

Responsable de l'UMAC et de la CEC  
Service de Chirurgie Thoracique et Cardiovasculaire  
Hôpital de la Pitié Salpêtrière – APHP



# Mrs Jeanine B.

## *CS post MI in NYC*



October 2015, NYC.

Jeanine B, 66 yrs old.

Director of a famous french journal

**Myocardial Infarction in NYC.  
Cardiogenic shock.**

Presbyterian Hospital

ECMO support.

Centrimag (LV apex to right axillary artery).

HTx & HMII Declined.



# Mrs Jeanine B.

## *NYC-Paris non-stop*



Mondial Assistance / Medicaire.  
Pitie-Salpetriere (Mobile ECMO Team).

Switch of Centrimag to Cardiohelp.

24/10/2015

Repatriation under ECMO support.

NYC-Paris : Jet (Falcon).

Flight = 10 hours.

No incident.



Mrs Jeanine B.

*HTx*



*Pitie-Salpetriere ICU.*

Pre-HTx exploration.  
Registration on HTx waiting list.  
« Super Urgence 1 ».

HTx: november, 1st 2015.  
ECMO support during 4 days.

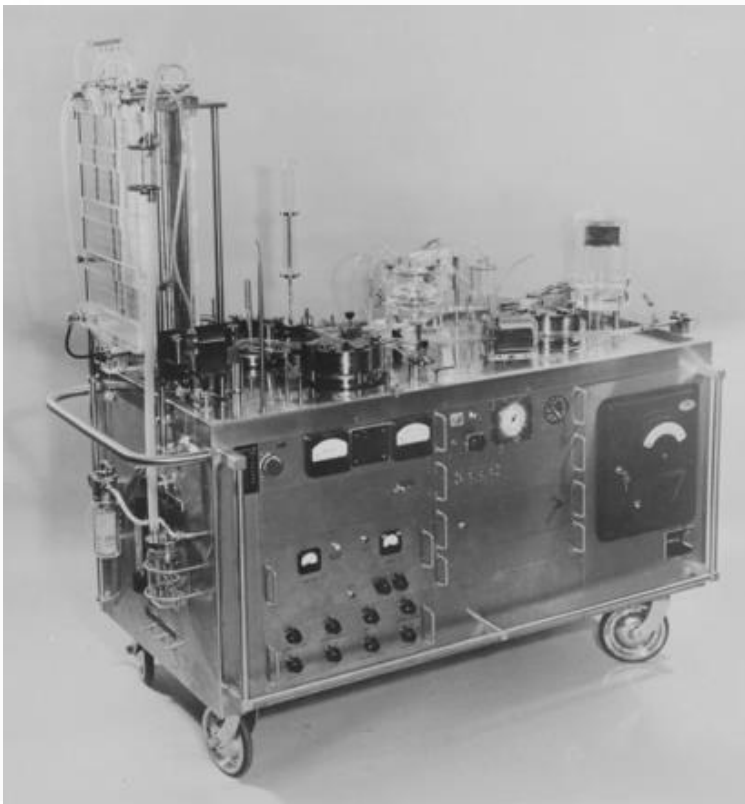
Day 21: ICU discharge.



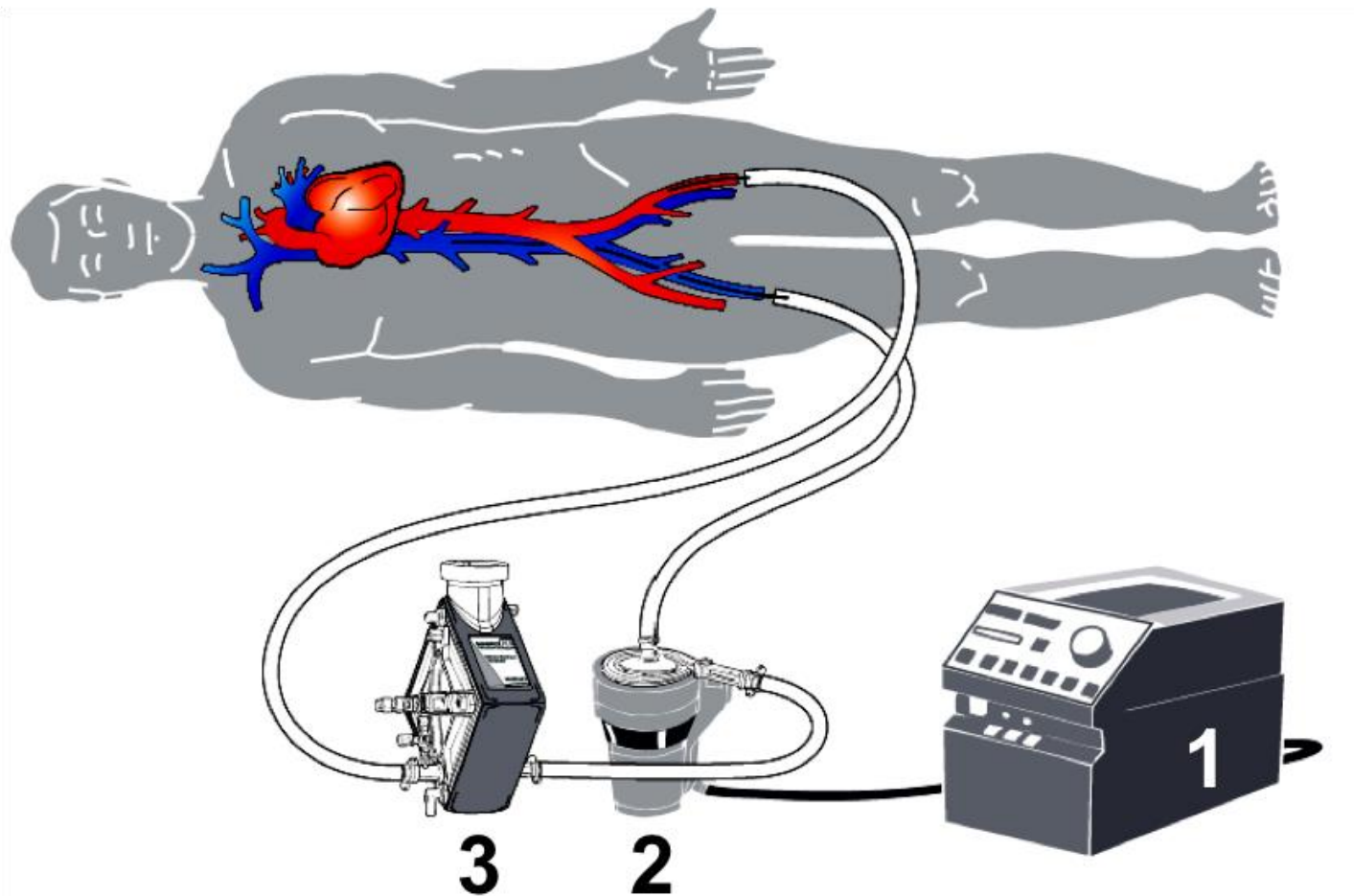


De la CEC...

... à l'ECMO



# ECLS



Peripherique:

- Femoro-femoral.
- Axillaire.

Facile, rapide  
USI, Coro,...  
Peu couteux

# Circuit.





**ECMO**  
*Veino-veineuse*



**ECMO**  
*Veino-Artérielle*

Indications

**SDRA réfractaire.**  
*Hypoxie, Ventilation, Acidose.*

**Choc réfractaire (cardio)**  
*IDM, CMD, intox., EP,...*

Canulation

**Percutanée**  
*Fémoro-jugulaire +++*  
*Fém-fémorale, jug.(avalon).*

**Chirurgicale** >>> Percutanée  
*Fémoro-fémorale (+reperf)+++*  
*Fém-axillaire, Thoracique.*

Débit moyen

**5-6 L/min**  
*Canules: VF=29Fr, VJ=21-23Fr*

**2,5-4 L/min**  
*Canules: VF=25-29Fr, AF=17-21Fr*

Durée moyenne

**3 semaines**  
*1semaine à 3 mois*

**8 jours**  
*24 heures à 15j.*

Bridge to...

- Recovery +++  
- Transplantation pulmonaire

- Recovery +++  
- Transplantation cardiaque  
- Assistance mécanique (LVAD/tAH)





# L'UMAC

*En pratique...*



01.42.16.56.43.

- ◆ *Declenchement.*
- ◆ *Implantation.*
- ◆ *Transfert sous ECMO.*



# Déclenchement

- Appel “Taxi des greffes”.
  - Escorte?
- Préparation Matériel.
- Equipe.



# Départ

- “Taxi des greffes”.
- Escorte.
- Appel du centre.
  - Adresse exacte.
  - Préparer le patient.
  - Matériel (Bistouri, scialytique,...).
  - Garder contact...





# Implantation





# Implantation



# Implantation



# Transfert

- SAMU.
- Escorte.



- Accompagnement.
  - Perfusionniste et Chirurgien.





# L'UMAC

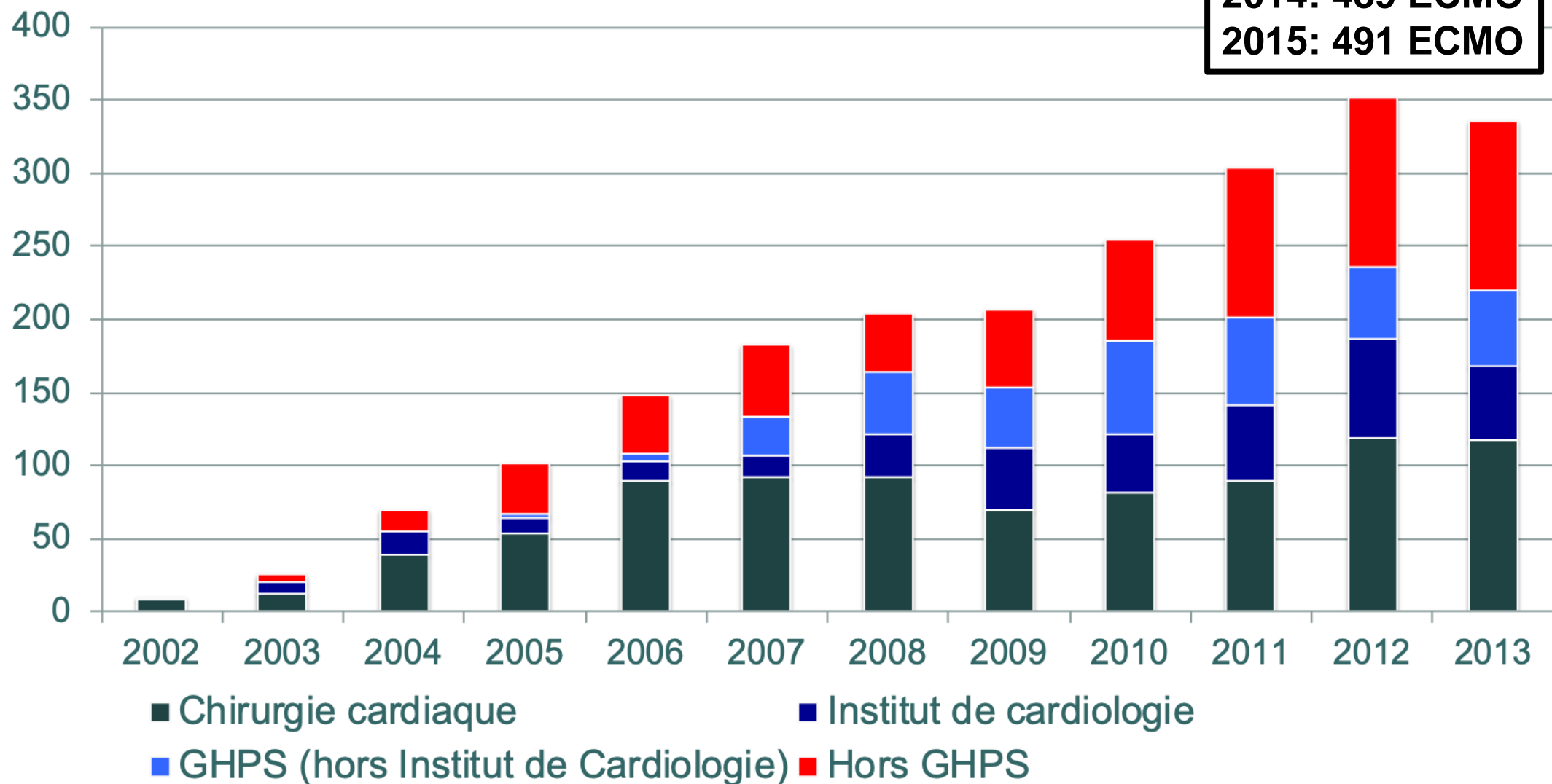
*En chiffres...*



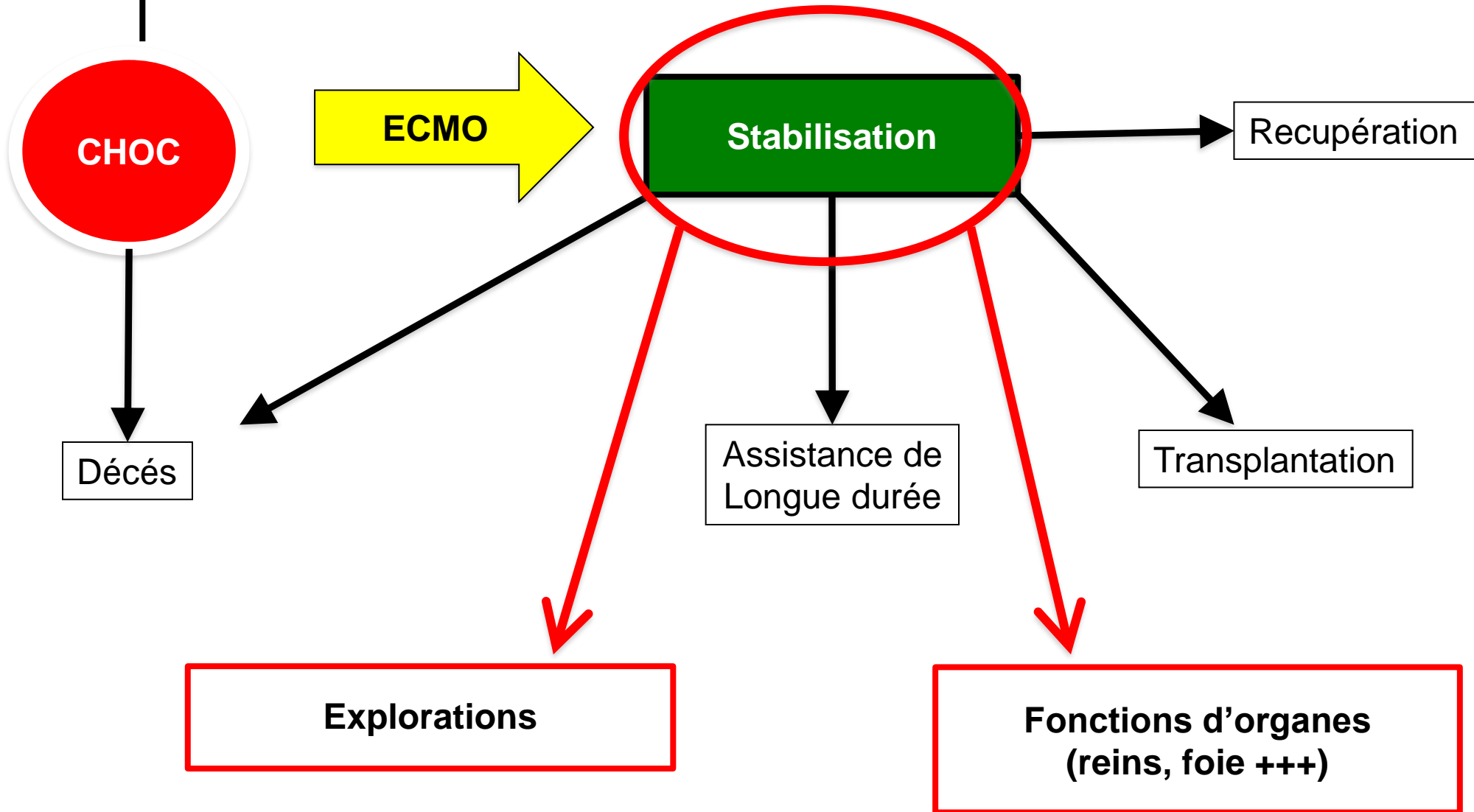


# ECMO Mobile Unit.

**2013: 494 ECMO**  
**2014: 489 ECMO**  
**2015: 491 ECMO**

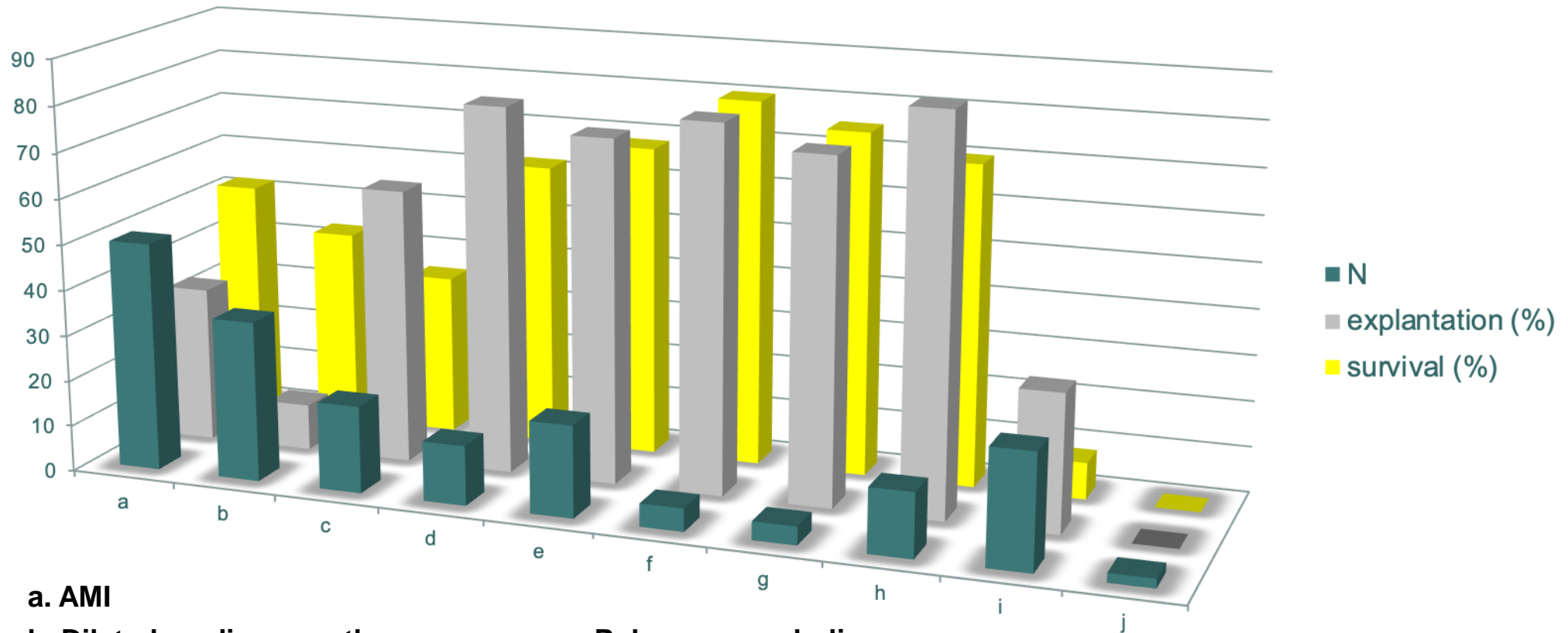


# BRIDGE TO DECISION



# 2009-2011

## 200 peripheral ECLS



**a. AMI**

**b. Dilated cardiomyopathy**

**c. Post-cardiotomy**

**d. Primary graft dysfunction**

**e. Myocarditis**

**f. Drug poisoning**

**g. Pulmonary embolism**

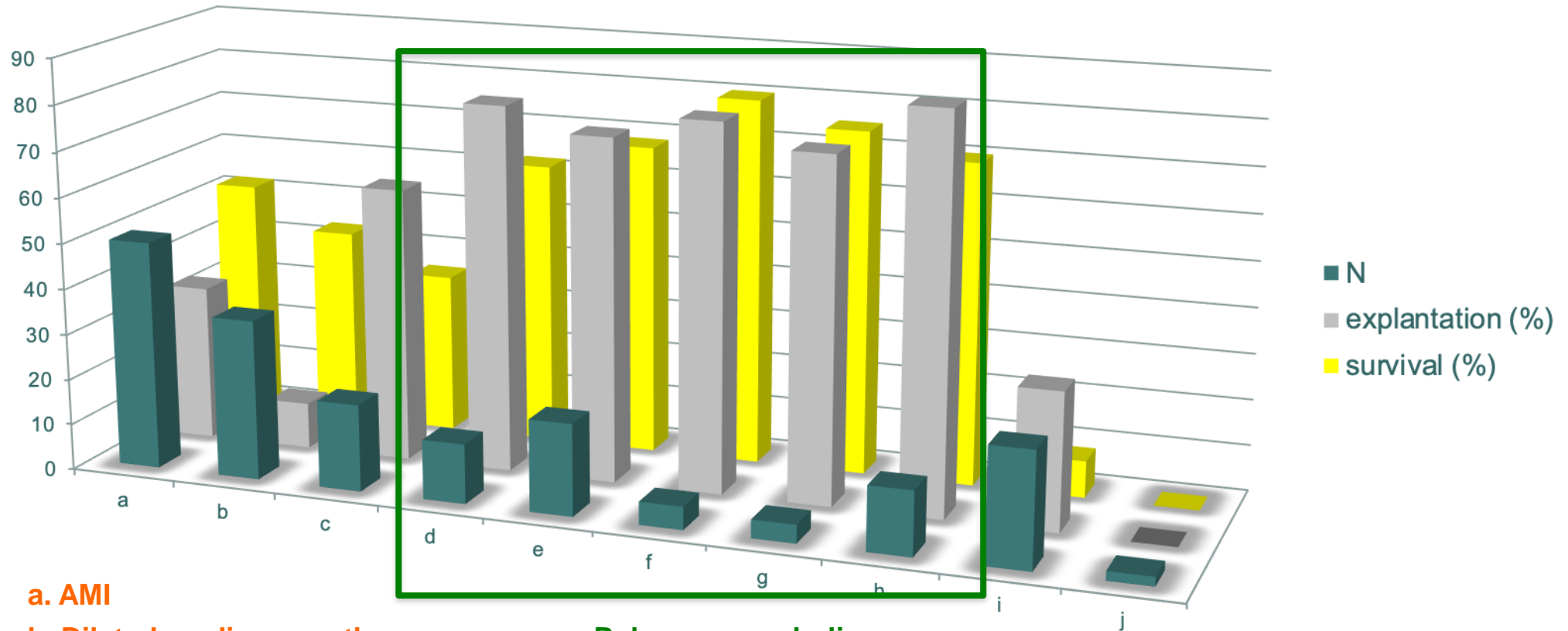
**h. Refractory septic shock**

**i. Refractory out of hospital cardiac arrest**

**j. Late graft dysfunction**

# 2009-2011

## 200 peripheral ECLS



a. AMI

b. Dilated cardiomyopathy

c. Post-cardiotomy

d. Primary graft dysfunction

e. Myocarditis

f. Drug poisoning

g. Pulmonary embolism

h. Refractory septic shock

i. Refractory out of hospital cardiac arrest

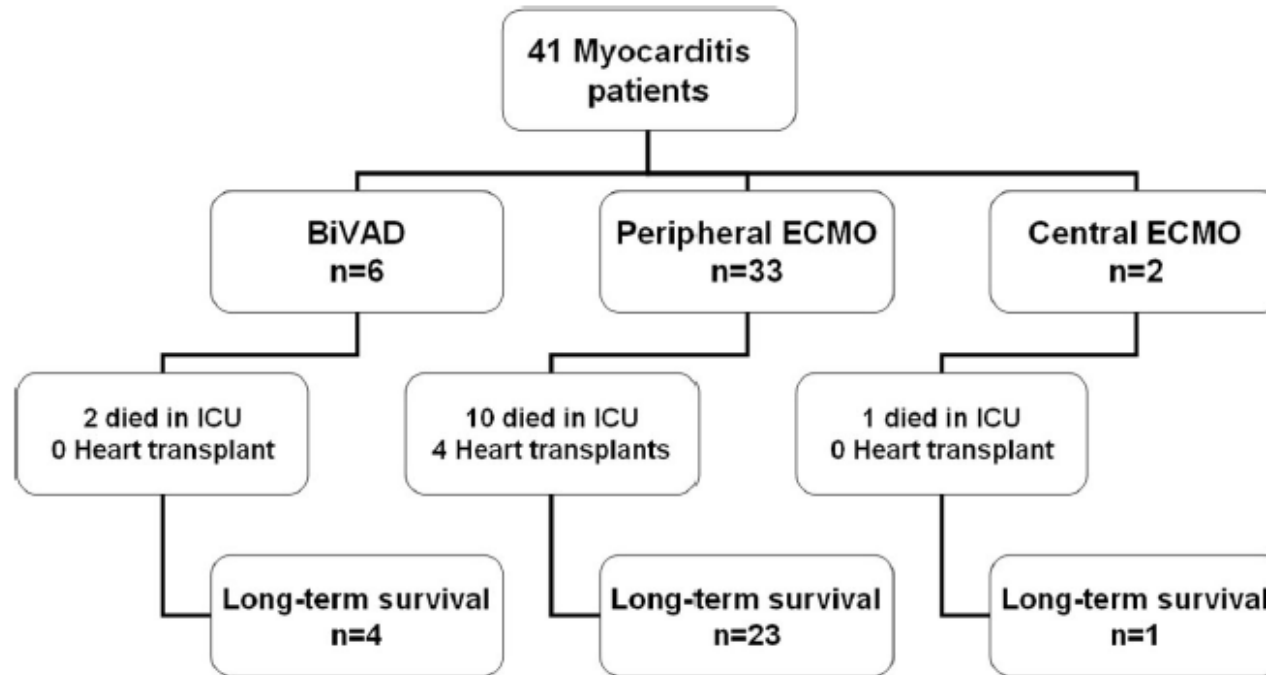
j. Late graft dysfunction



# Outcomes, long-term quality of life, and psychologic assessment of fulminant myocarditis patients rescued by mechanical circulatory support

Mariana Mirabel, MD; Charles-Edouard Luyt, MD, PhD; Pascal Leprince, MD, PhD;  
Jean-Louis Trouillet, MD; Philippe Léger, MD; Alain Pavie, MD; Jean Chastre, MD; Alain Combes, MD, PhD

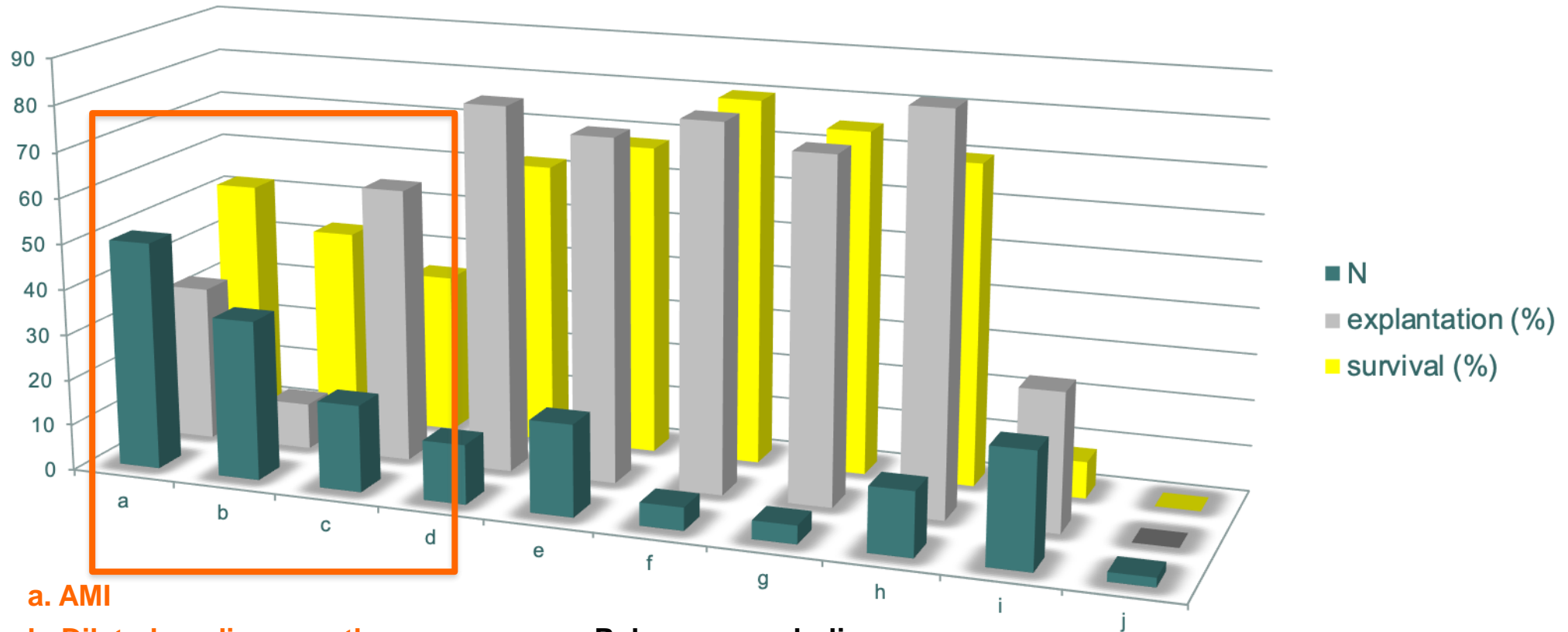
Crit Care Med 2011 Vol. 39, No. 5



**Long term survival: 68%, 4 (10%) patients had heart transplantation**  
Mean LVEF was  $57 \pm 9$

# 2009-2011

## 200 peripheral ECLS



a. AMI

b. Dilated cardiomyopathy

c. Post-cardiotomy

d. Primary graft dysfunction

e. Myocarditis

f. Drug poisoning

g. Pulmonary embolism

h. Refractory septic shock

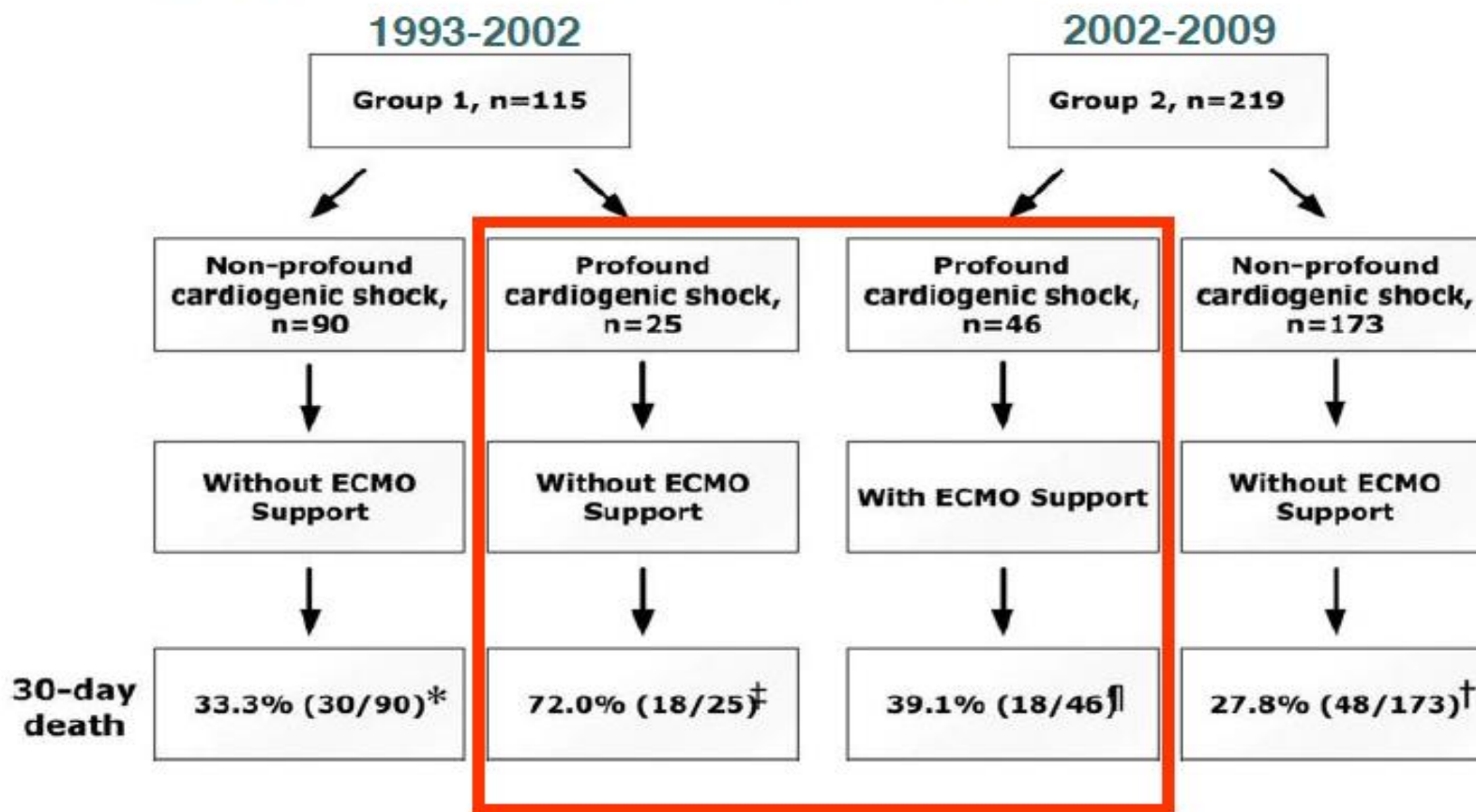
i. Refractory out of hospital cardiac arrest

j. Late graft dysfunction

# Early extracorporeal membrane oxygenator-assisted primary percutaneous coronary intervention improved 30-day clinical outcomes in patients with ST-segment elevation myocardial infarction complicated with profound cardiogenic shock

Jiunn-Jye Sheu, MD; Tzu-Hsien Tsai, MD; Fan-Yen Lee, MD; Hsiu-Yu Fang, MD;  
 Cheuk-Kwan Sun, MD, PhD; Steve Leu, PhD; Cheng-Hsu Yang, MD; Shyh-Ming Chen, MD;  
 Chi-Ling Hang, MD; Yuan-Kai Hsieh, MD; Chien-Jen Chen, MD; Chiung-Jen Wu, MD; Hon-Kan Yip, MD

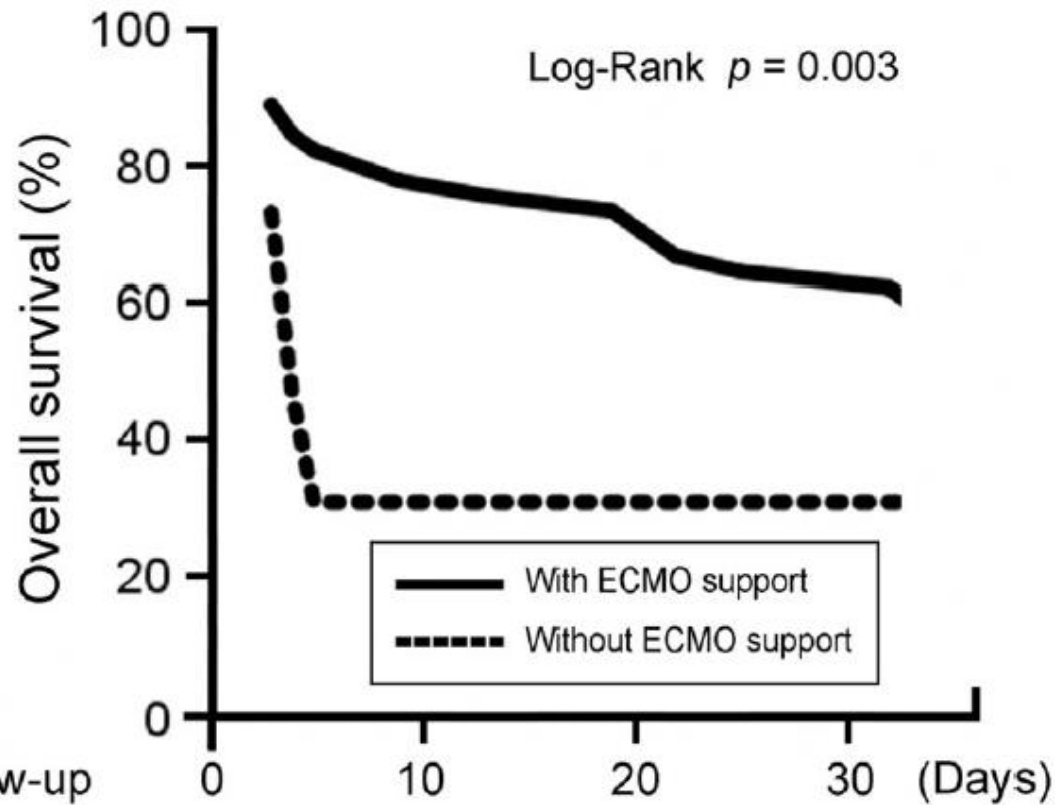
Crit Care Med 2010; 38:1810-1817



# Early extracorporeal membrane oxygenator-assisted primary percutaneous coronary intervention improved 30-day clinical outcomes in patients with ST-segment elevation myocardial infarction complicated with profound cardiogenic shock

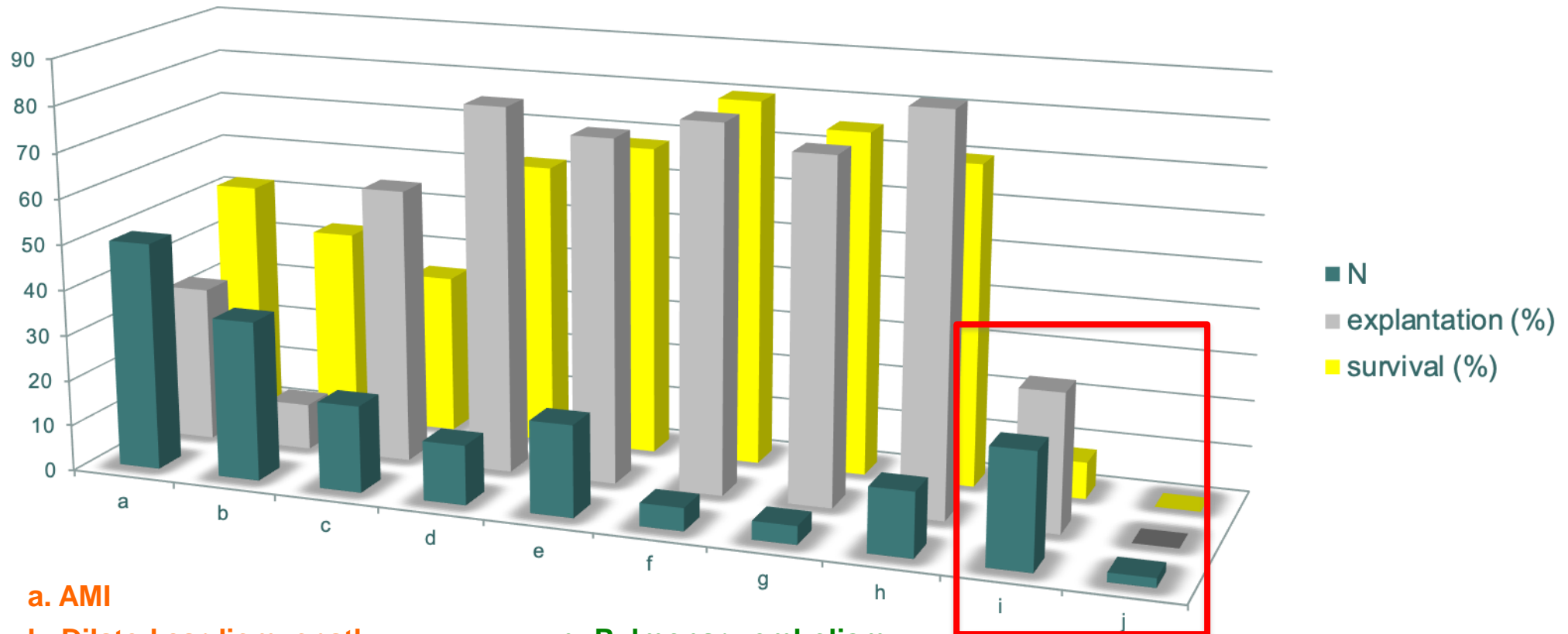
Jiunn-Jye Sheu, MD; Tzu-Hsien Tsai, MD; Fan-Yen Lee, MD; Hsiu-Yu Fang, MD;  
 Cheuk-Kwan Sun, MD, PhD; Steve Leu, PhD; Cheng-Hsu Yang, MD; Shyh-Ming Chen, MD;  
 Chi-Ling Hang, MD; Yuan-Kai Hsieh, MD; Chien-Jen Chen, MD; Chiung-Jen Wu, MD; Hon-Kan Yip, MD

**Crit Care Med 2010; 38:1810–1817**



At risk (n)	With ECMO	46	32	31	28
	Without ECMO	25	7	7	7

# 2009-2011 200 peripheral ECLS



**a. AMI**

**b. Dilated cardiomyopathy**

**c. Post-cardiotomy**

**d. Primary graft dysfunction**

**e. Myocarditis**

**f. Drug poisoning**

**g. Pulmonary embolism**

**h. Refractory septic shock**

**i. Refractory out of hospital cardiac arrest**

**j. Late graft dysfunction**



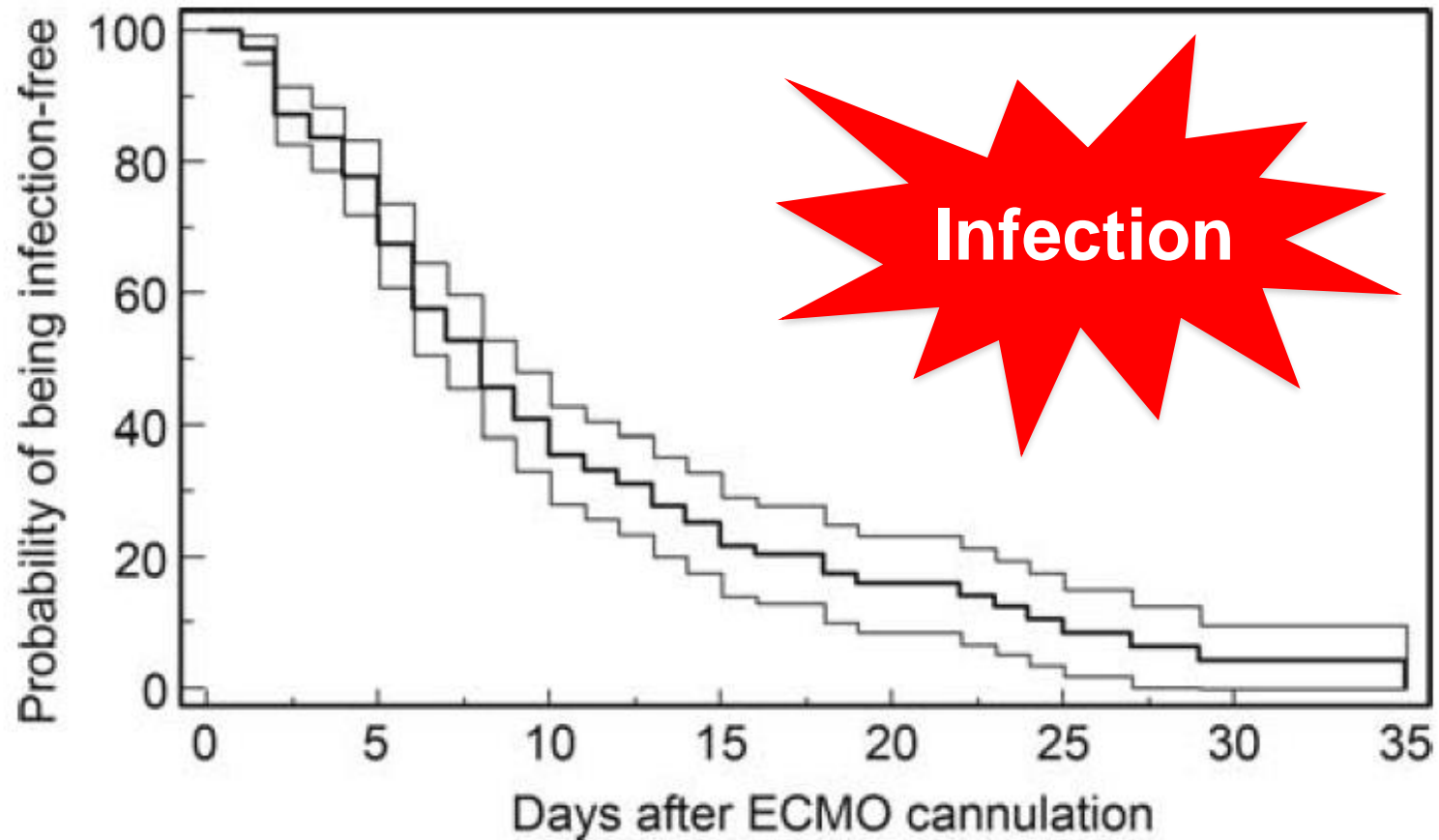
# ECMO et Arrêt cardiaque...



# Limites et Complications...



# ECMO et Infections



# ECMO et OAP



## ○ LV ejection +++

9. Combes A, Leprince P, Luyt C-E, Trouillet J-L, Chastre J. Assistance cardiorespiratoire par *extracorporeal membrane oxygenation* (ECMO). *Réanimation* 2009;18:420-7.

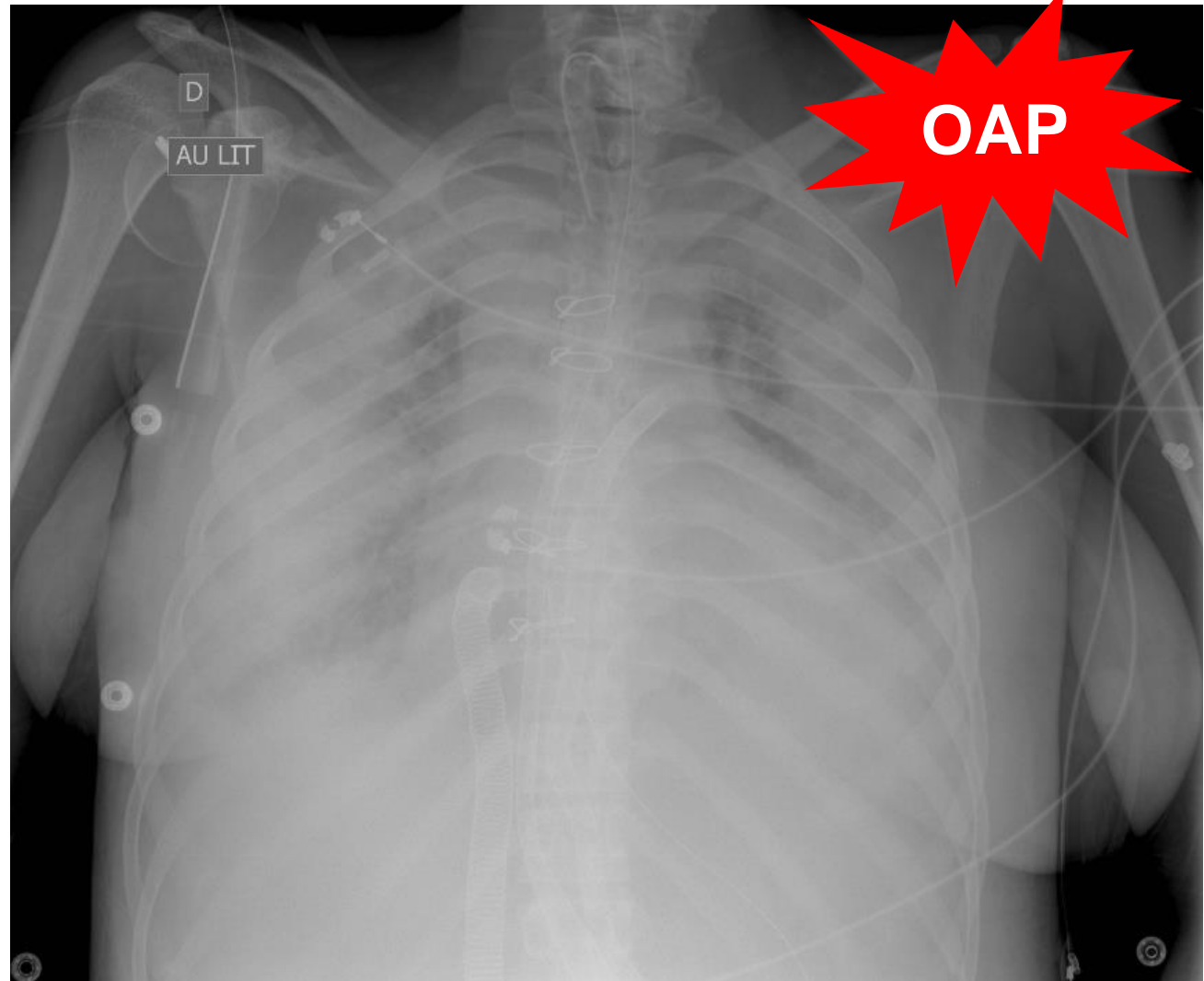
## ○ IABP ?

12. Sauren LD, Reesink KD, Selder JL, Beghi C, van der Veen FH, Maessen JG. The acute effect of intra-aortic balloon counterpulsation during extracorporeal life support: an experimental study. *Artif Organs* 2007;31:31-8.

## ○ Axillary approach?

## ○ Other device?

13. Vlasselaers D, Desmet M, Desmet L, Meyns B, Dens J. Ventricular unloading with a miniature axial flow pump in combination with extracorporeal membrane oxygenation. *Intensive Care Med* 2006;32:329-33.



# Vascular Complications.

- Perforations.
  - Vascular: hémorragies... Shock.
  - Cardiac (RA/RV): Shock.
  - .....
- Dissection: Arteria... Aorta.
- Ischemia.

➤ *Short / long term.*





# *Surgical Complications.*

- Surgical approach.
  - « Scarpa ».
  - Infection... gangrena.
  - Vascular defect...
  - Ischemia...
  - Nervous lesion.
  - ....





**BANALISATION = ACCIDENT**

# ECMO: Bridge to...

- Recovery
- Transplantation
- Bridge
- ... Decision...







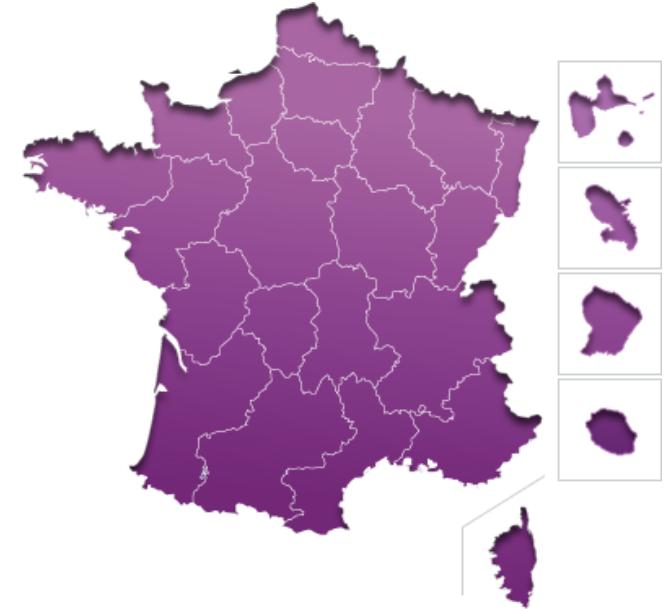
# Conclusion





# UMAC

- Concept efficace.
  - Sollicitations croissantes.
  
- Activité:



**STRUCTURER  
VALORISER**

**RESEAU  
d'UMAC**





*guillaume.lebreton@aphp.fr*

01.42.16.29.79



Guillaume LEBRETON

Service de Chirurgie Cardiaque, Hopital de la Pitié Salpêtrière.  
47-83 Bd de l'Hopital, 75013 PARIS, France