

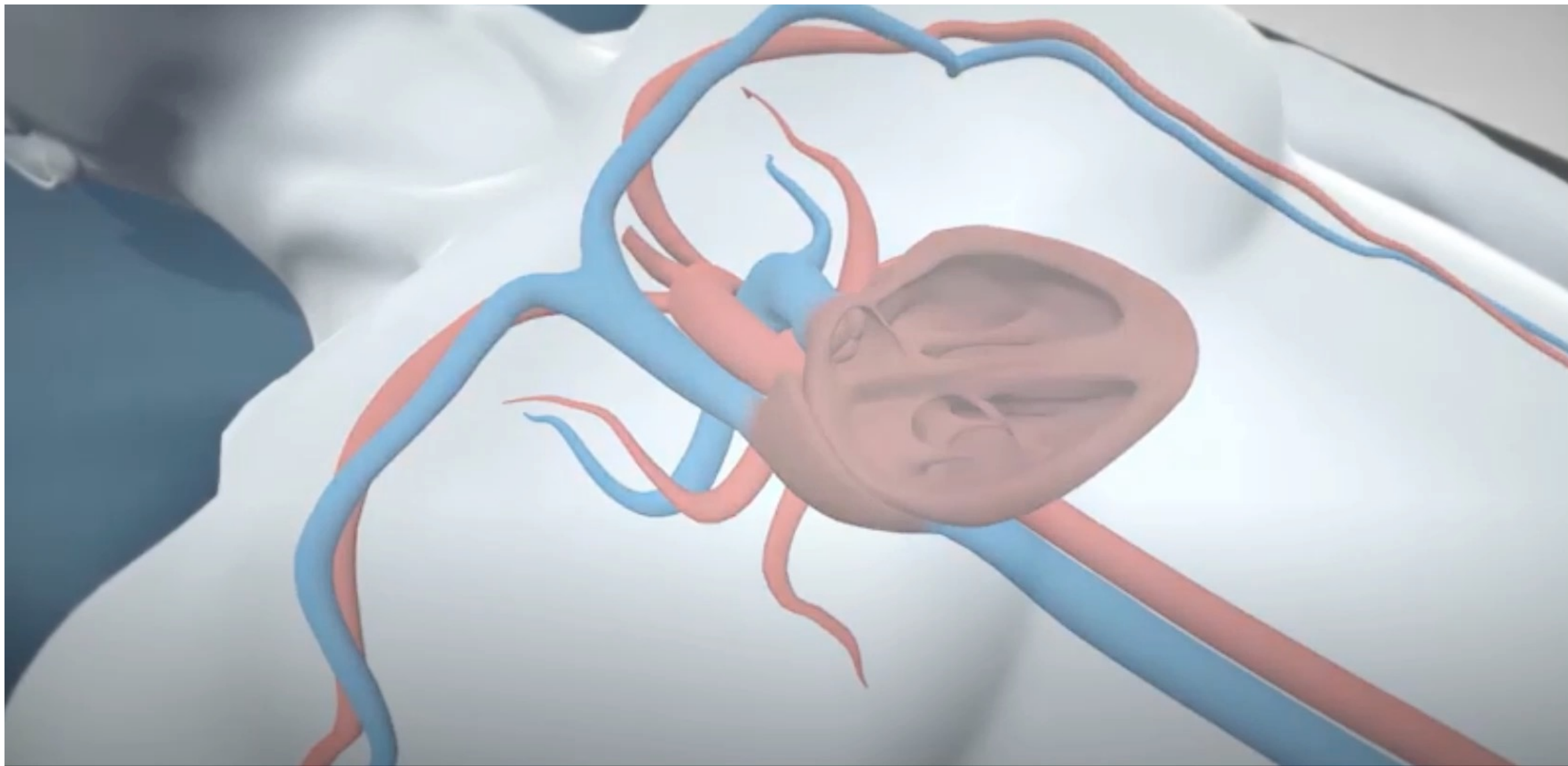


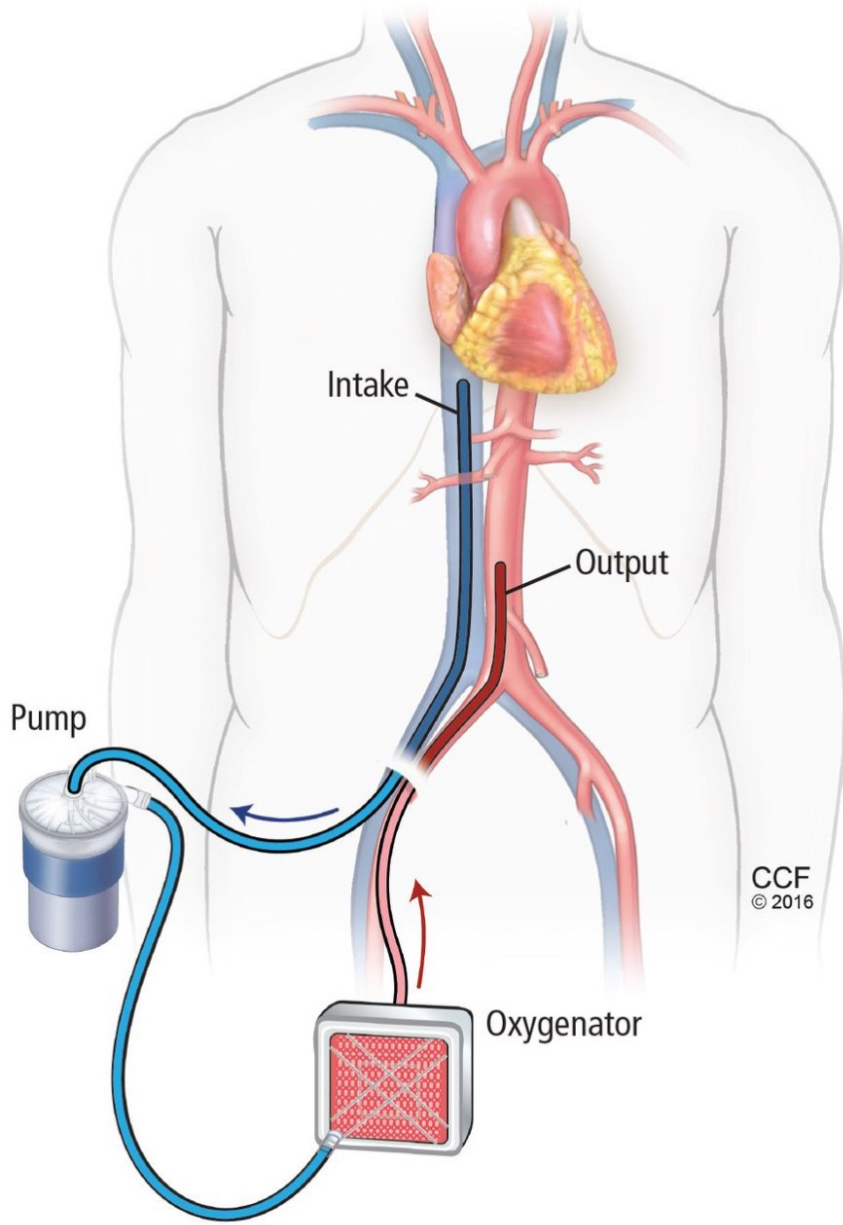
Place de l'ECMO A-V dans l'arrêt cardiaque



Professeur Yazine MAHJOUR
Unité de Réanimation CTVR
CHU Amiens-Picardie
Amiens-France







Réglage:

Débit de pompe

Débit de gaz frais

Fraction d'oxygène

Monitoring:

ETO/ETT

Swann Ganz

ScVO₂

Gaz du sang

Indications de l'ECMO A-V

Choc cardiogénique post IdM

choc cardiogénique post décompensation/intox

Choc cardiogénique post cardiectomie/post greffe

Embolie pulmonaire grave

Myocardite fulminante

Orage rythmique réfractaire

cardiomyopathie septique

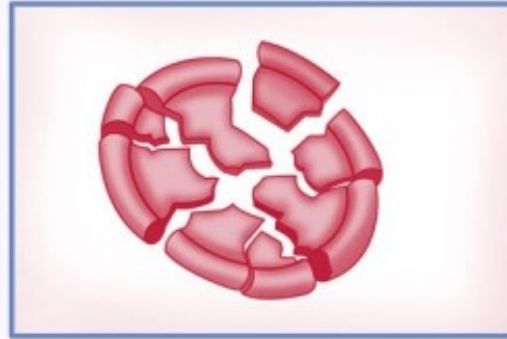
Complications de l'ECMO A-V

Hematological

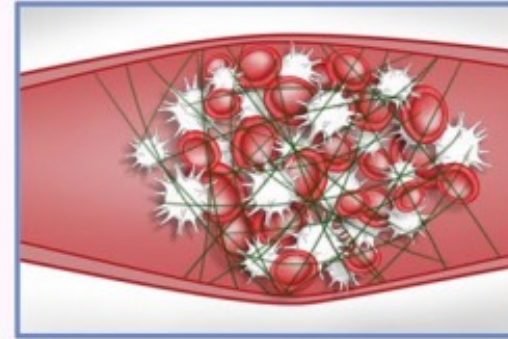
Bleeding



Hemolysis

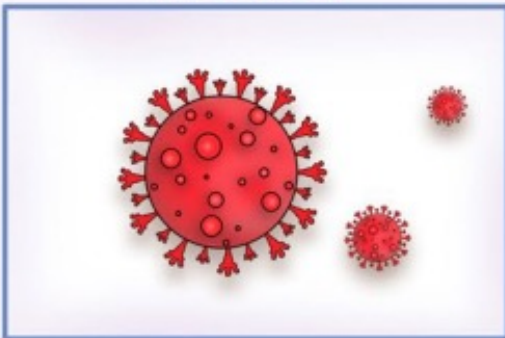


Thrombosis

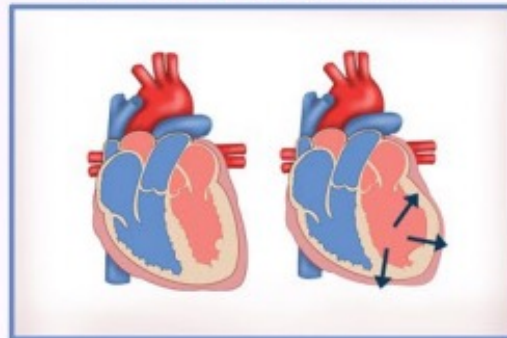


Non-hematological

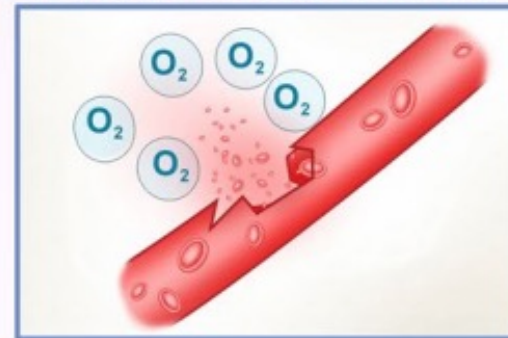
Infection



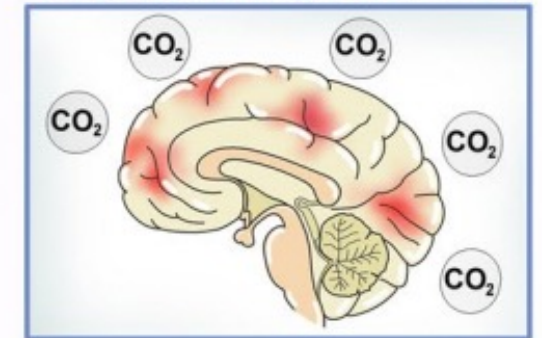
LV overdistention

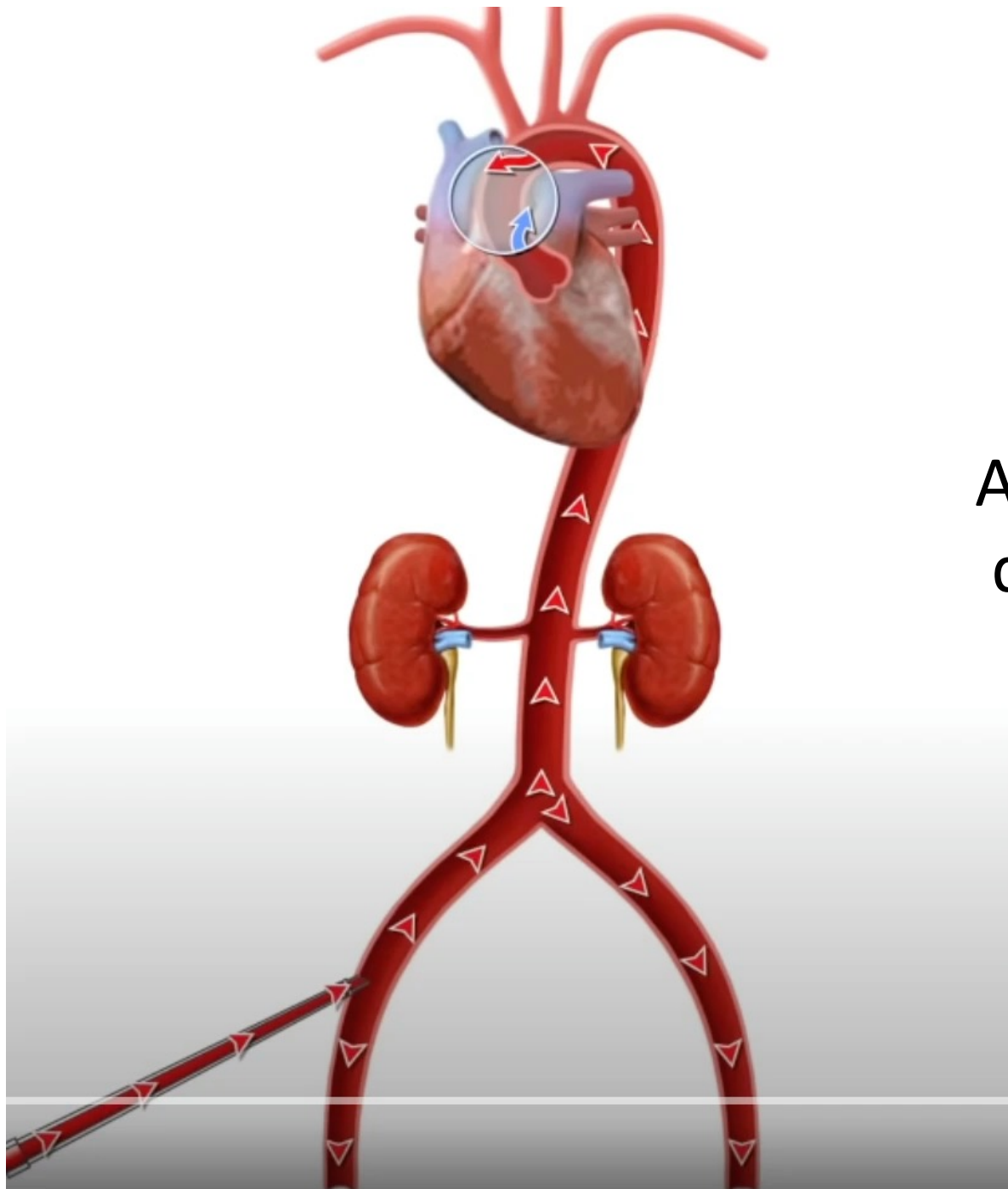


endothelial dysfunction



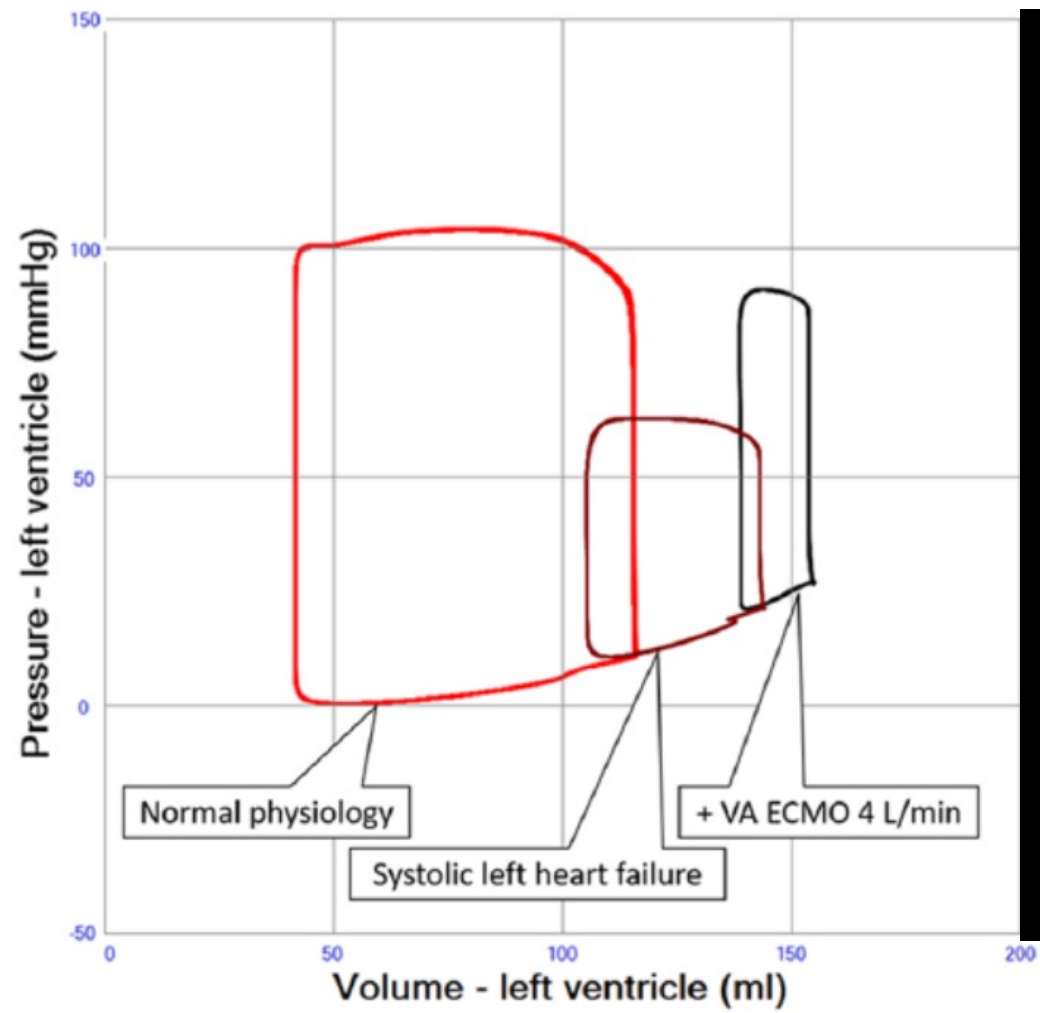
Neurological injury from rapid changes in CO_2



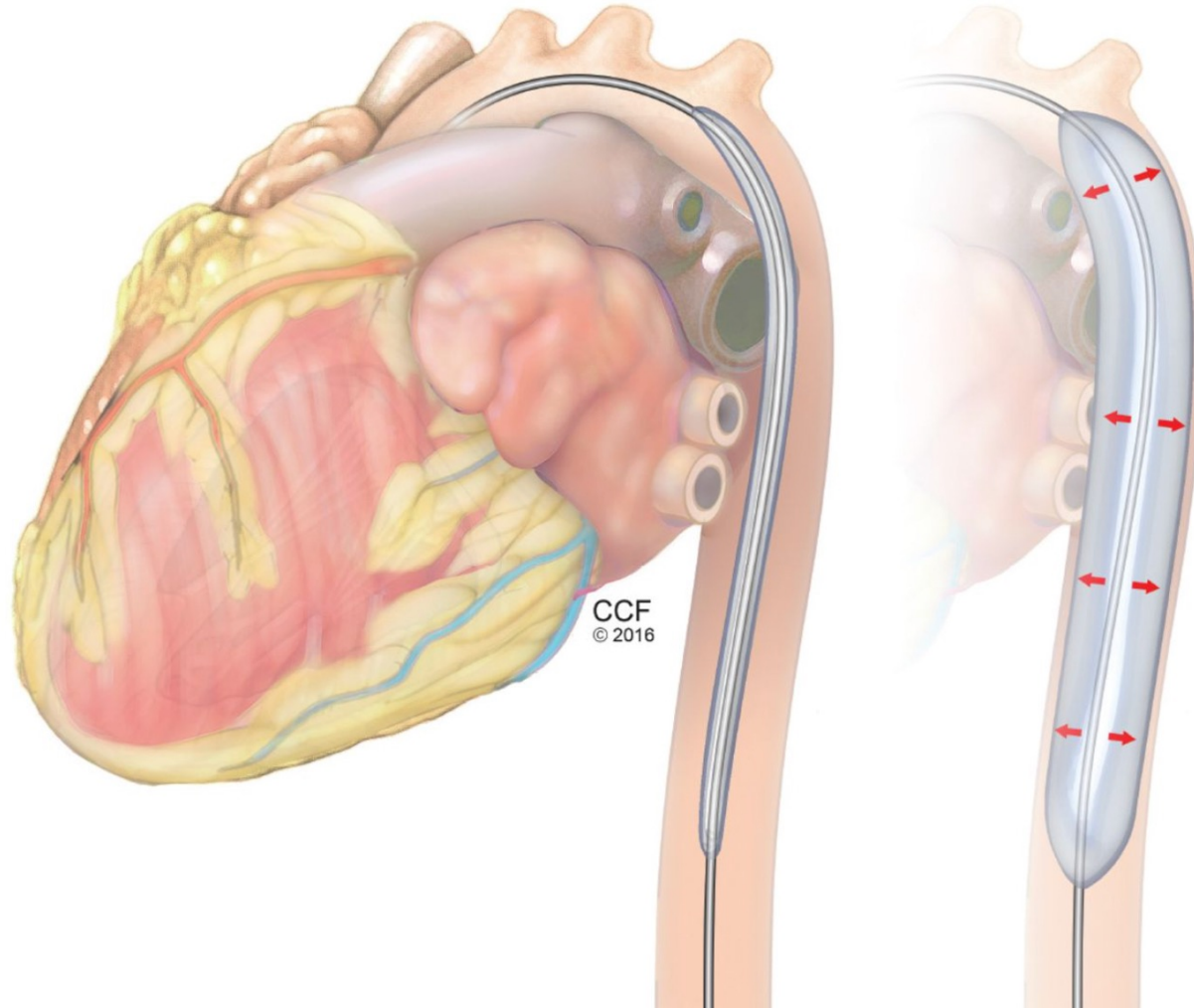


Conflit de flux

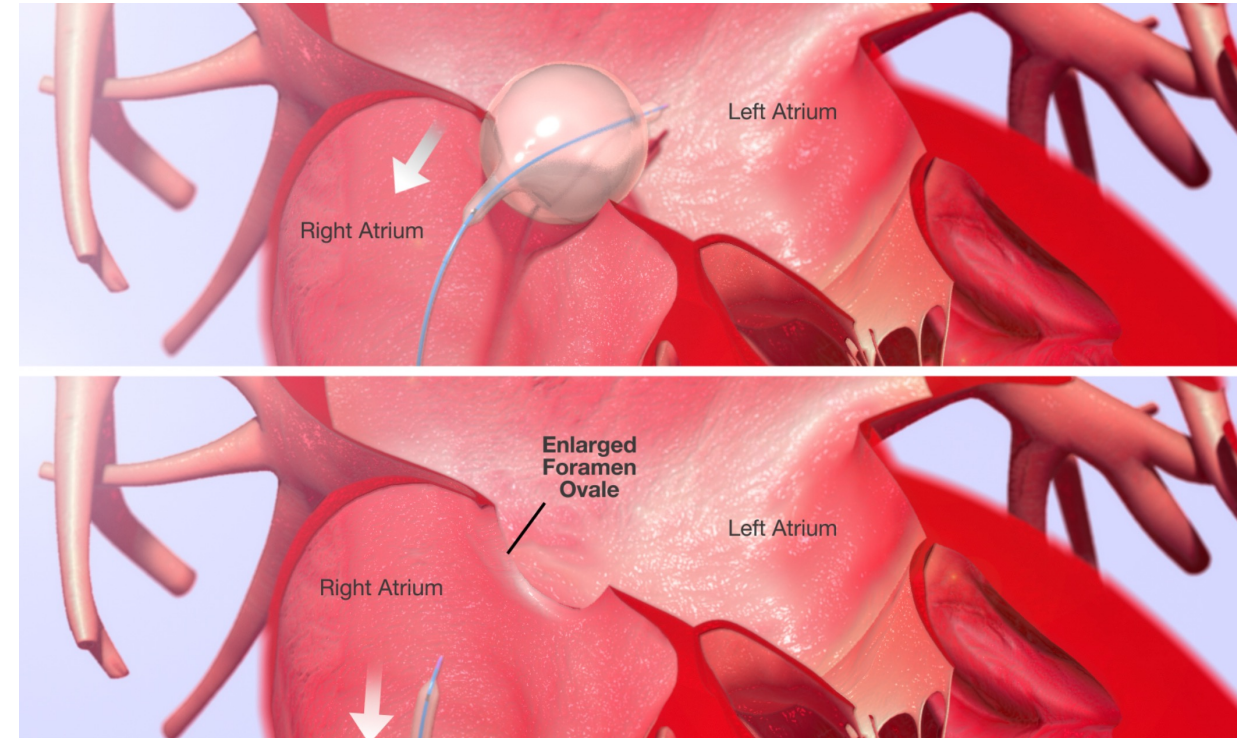
Augmentation de la post-charge
du ventricule gauche



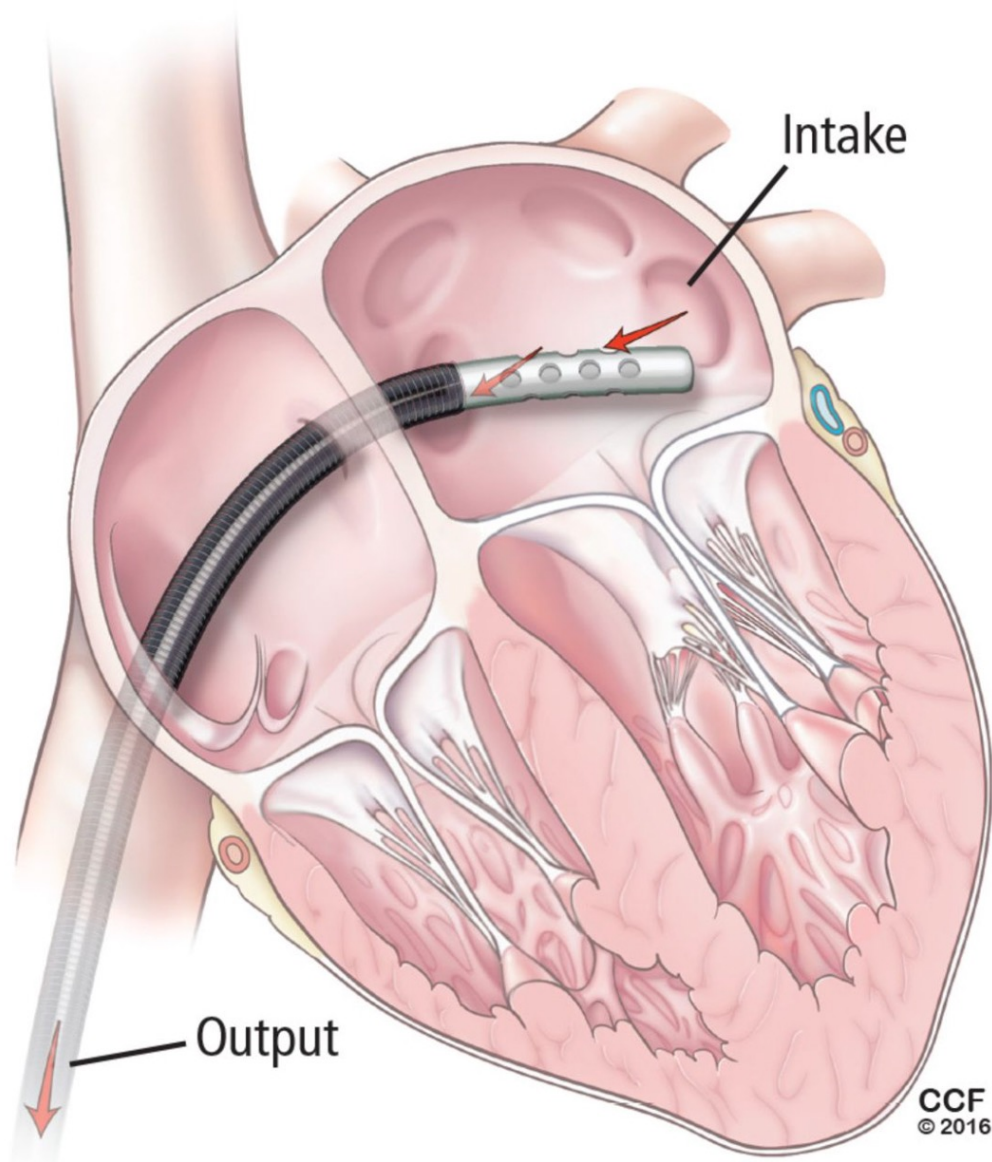
BCPIAo



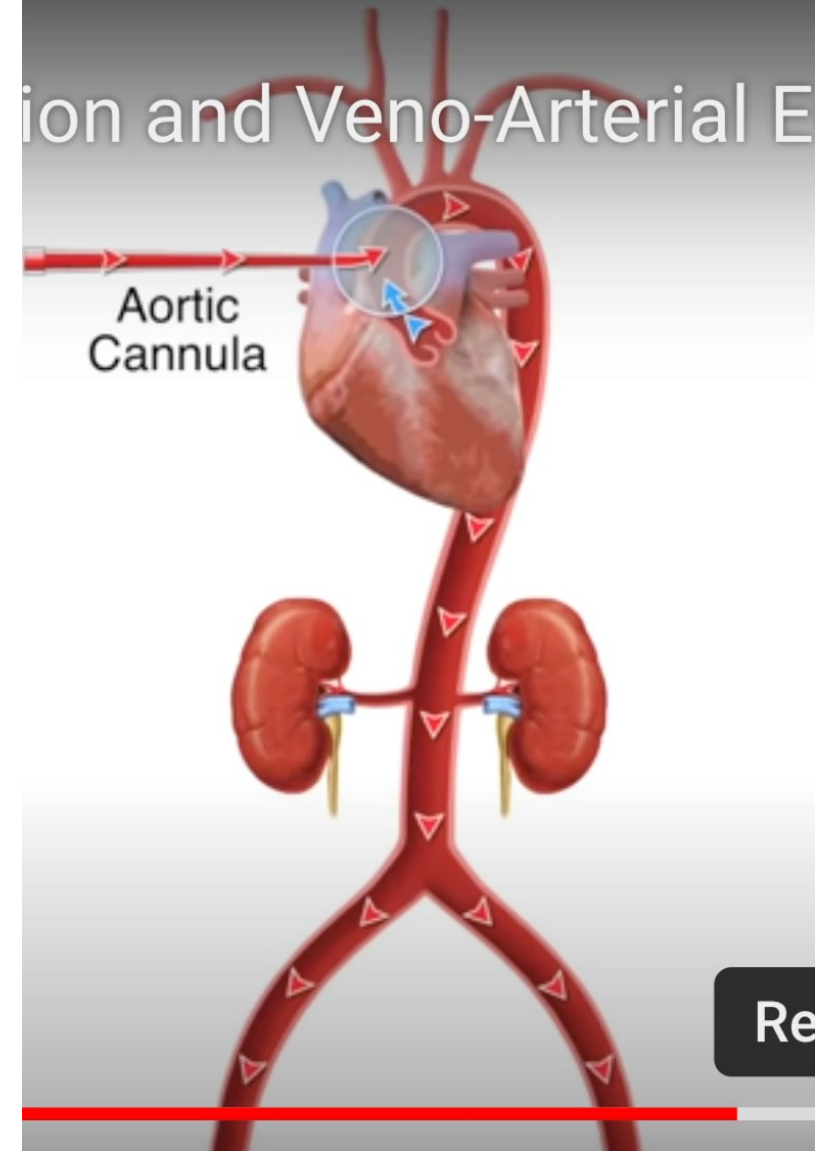
Atrioseptostomie

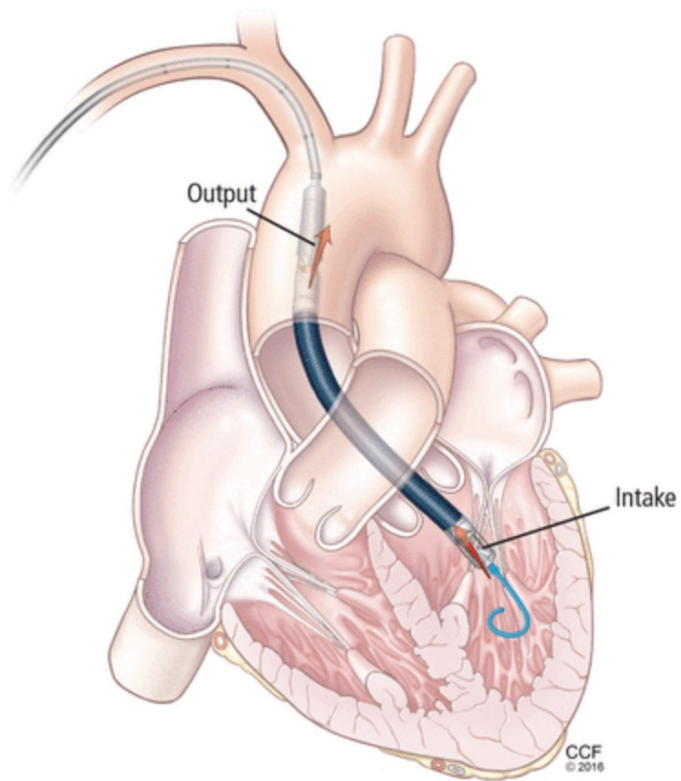
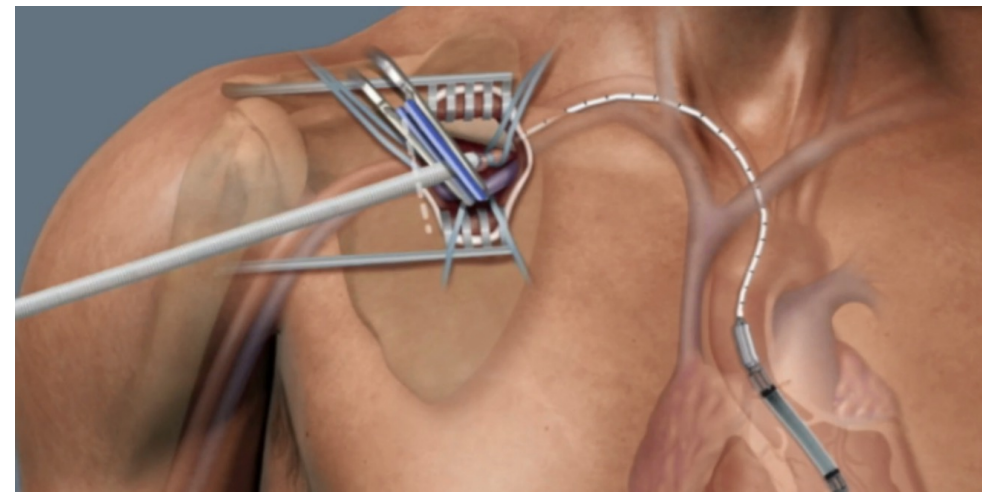


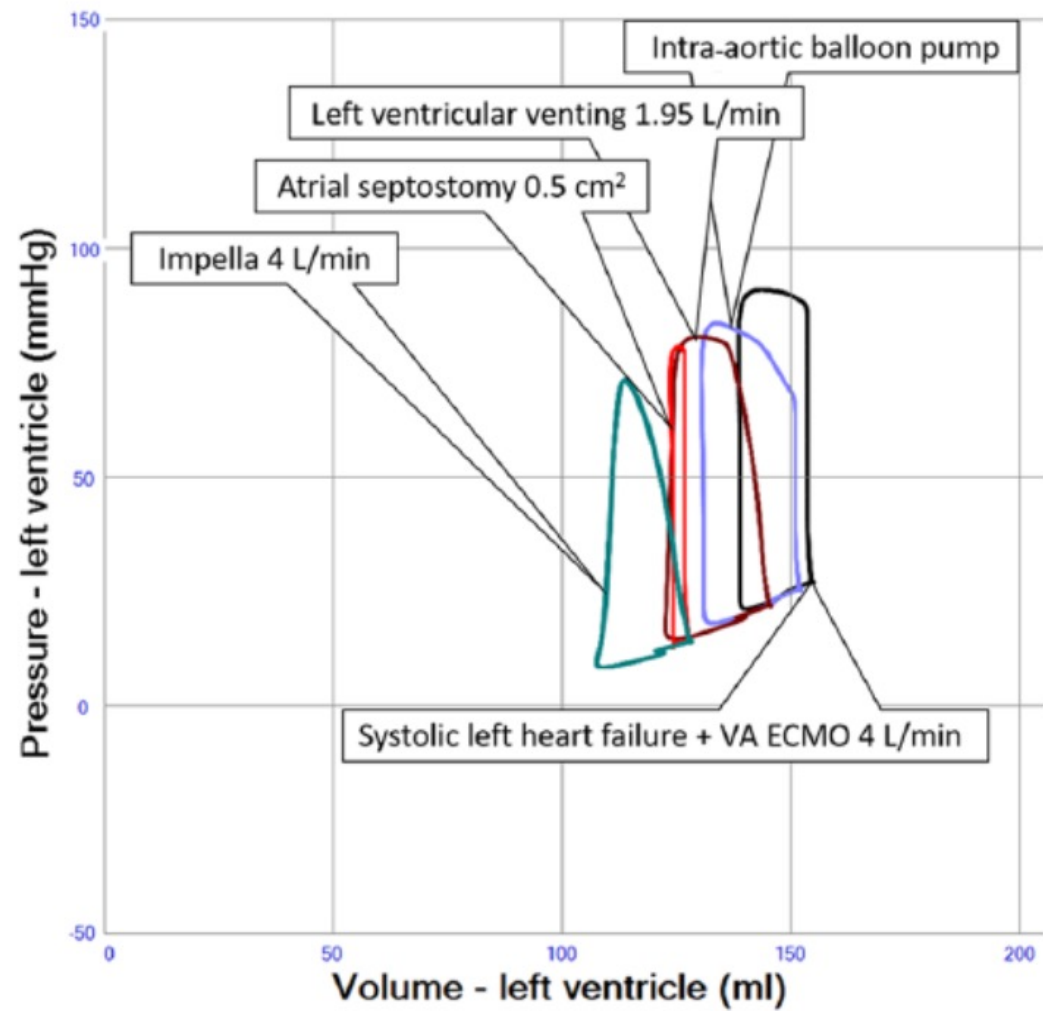
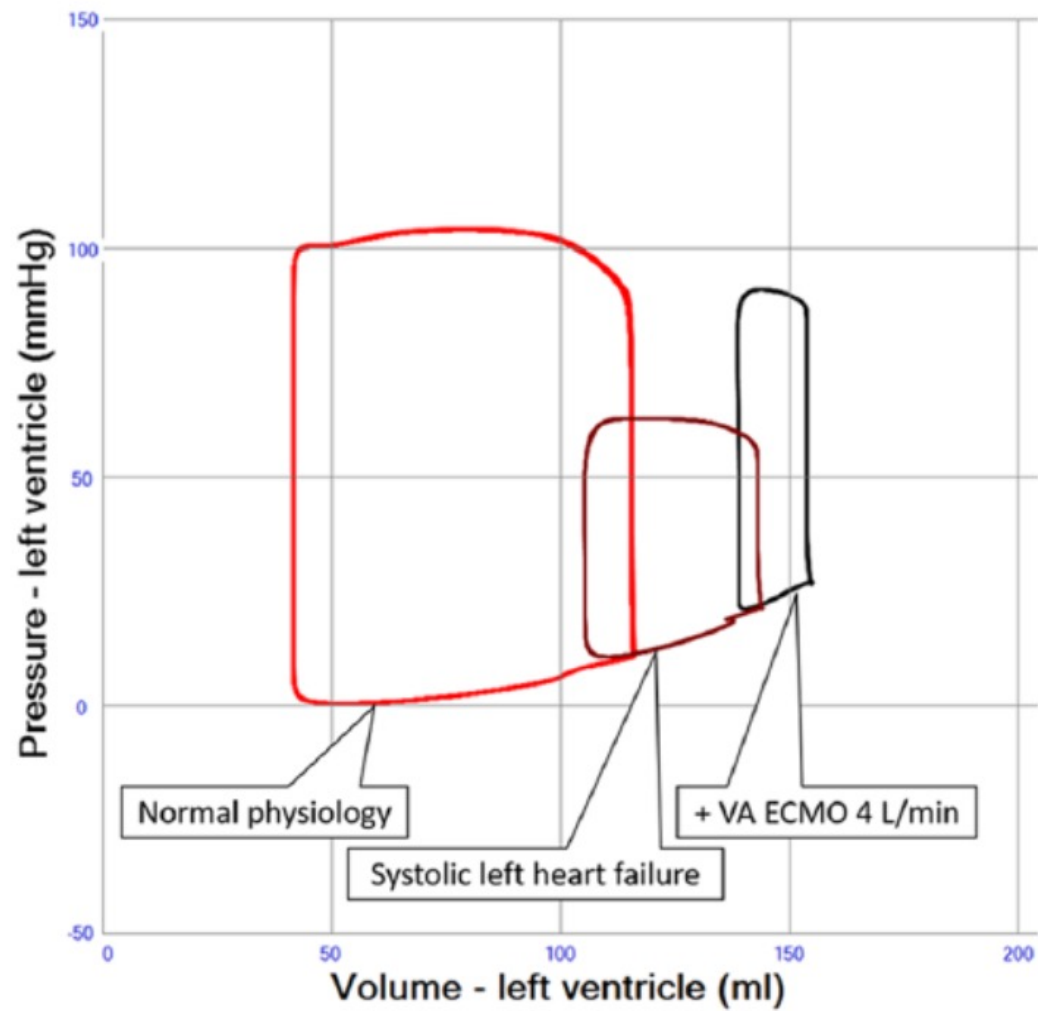
Décharge ventriculaire gauche



Centralisation de l'ECMO







ECMO dans l'arrêt cardiaque réfractaire?

Circulation

AHA FOCUSED UPDATE

2019 American Heart Association Focused Update on Advanced Cardiovascular Life Support: Use of Advanced Airways, Vasopressors, and Extracorporeal Cardiopulmonary Resuscitation During Cardiac Arrest

**An Update to the American Heart Association Guidelines for Cardiopulmonary
Resuscitation and Emergency Cardiovascular Care**

Recommendations—Updated 2019

- 1. There is insufficient evidence to recommend the routine use of ECPR for patients with cardiac arrest.**
- 2. ECPR may be considered for selected patients as rescue therapy when conventional CPR efforts are failing in settings in which it can be expeditiously implemented and supported by skilled providers (*Class 2b; Level of Evidence C-LD*).**

Association of Intra-arrest Transport vs Continued On-Scene Resuscitation With Survival to Hospital Discharge Among Patients With Out-of-Hospital Cardiac Arrest

Brian Grunau, MD, MHSc^{1,2}; Noah Kime, BS³; Brian Leroux, PhD³; [et al](#)

Table 2. Patient Outcomes of the Full Study Cohort and Full Propensity-Matched Cohort

	Full study cohort			Full propensity-matched cohort ^a		
	No. (%)			No. (%)		
	Intra-arrest transport (n = 11 625)	On-scene resuscitation (n = 32 344)	Absolute difference (95% CI) ^b	Intra-arrest transport (n = 9406)	On-scene resuscitation (n = 18 299) ^c	Absolute difference (95% CI), %
Primary end point						
Survival to hospital discharge	446 (3.8)	4072 (12.6)	−8.8 (−8.3 to −9.3)	372 (4.0)	1557 (8.5)	−4.6 (−5.1 to −4.0)

Etude ARREST

Advanced reperfusion strategies for patients with out-of-hospital cardiac arrest and refractory ventricular fibrillation (ARREST): a phase 2, single centre, open-label, randomised controlled trial

2020

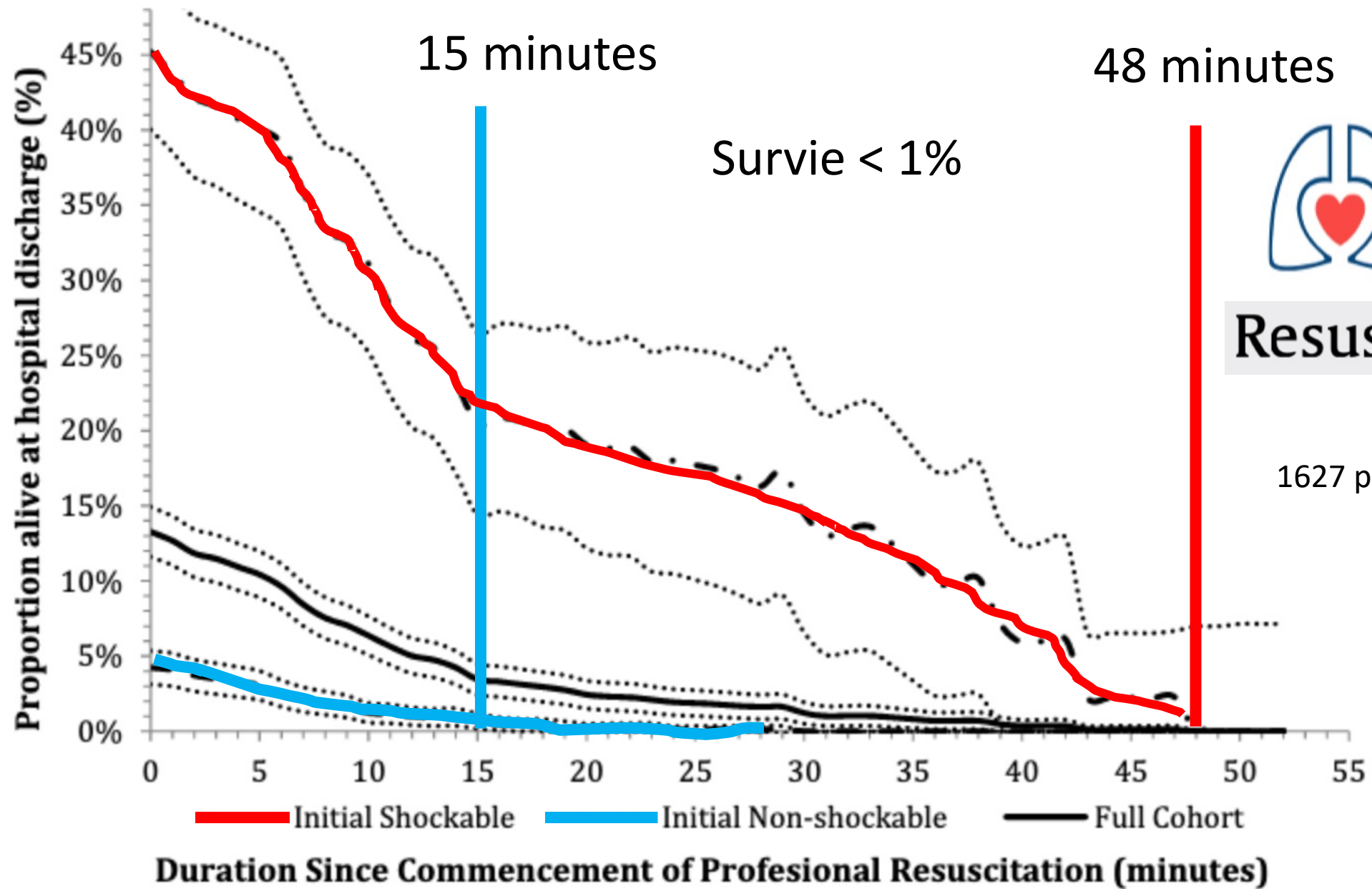
ACR extra hospitalier

Age <75 ans

LUCAS

FV ou TV

Temps de transfert estimé <30 min



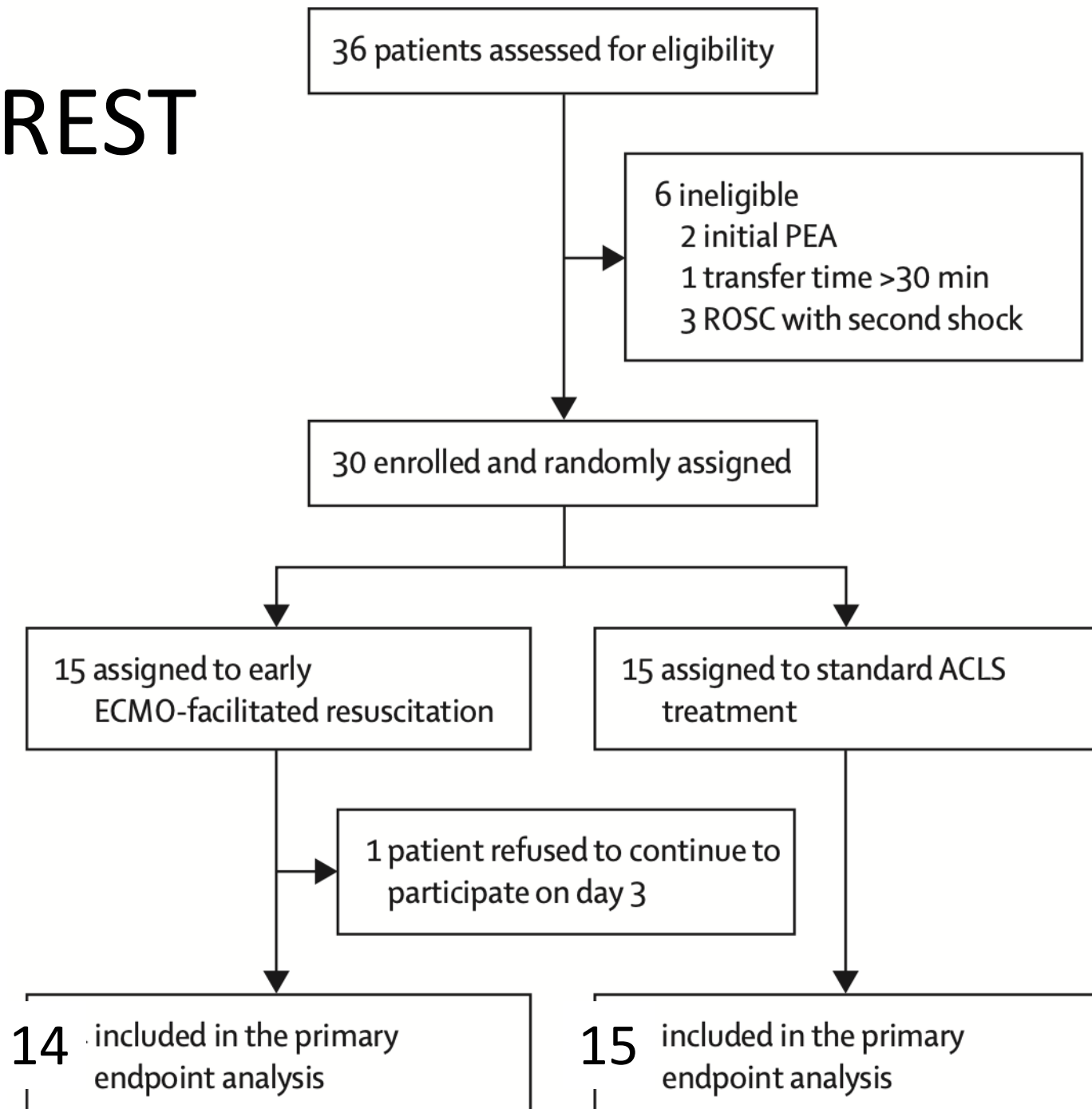
Resuscitation

1627 patients

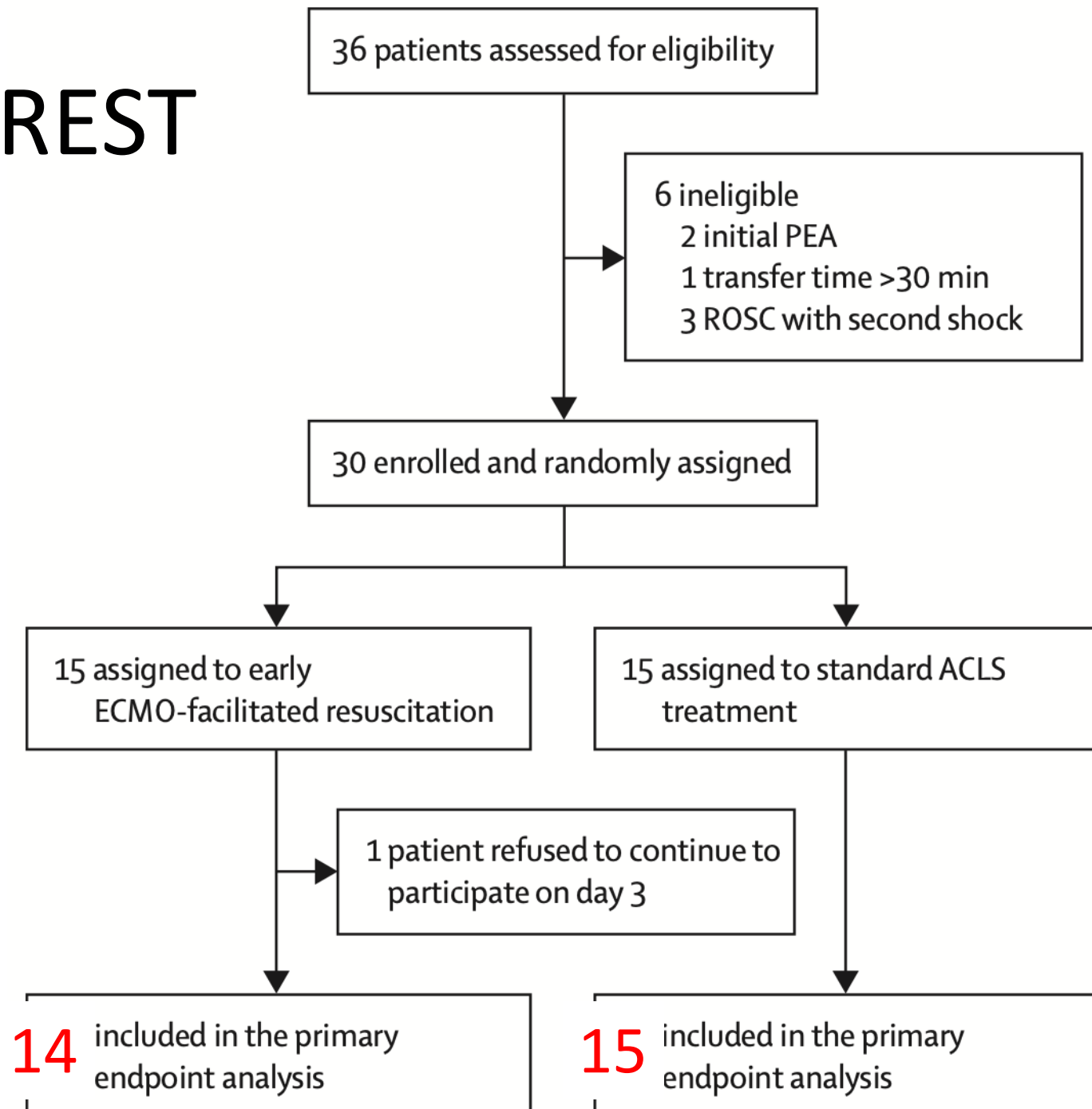
TEMPORALISATION DES EFFETS BIOCHIMIQUES ET VASCULAIRES

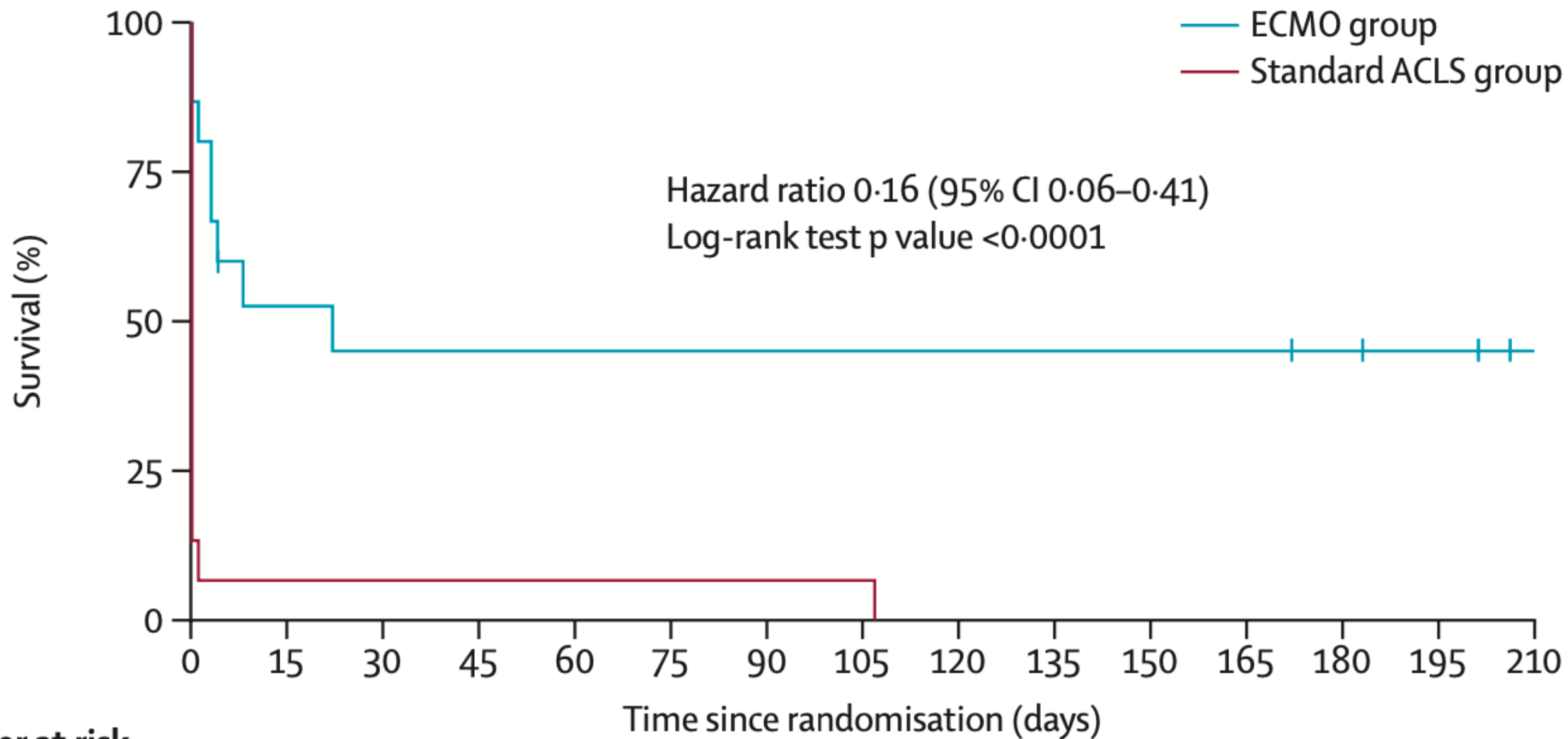
20 s	Perte du stock d'oxygène intracérébral Défaillance énergétique, anaérobiose
5 mn	Perte des stocks de glucose et d'ATP intracérébral Défaillance énergétique, acidose lactique
> 5 mn	Perturbation de la circulation cérébrale
> 5 mn	Cascade biochimique => Mort neuronale 1. Excitotoxicité (Ca²⁺, Glutamate) 2. Dysfonction mitochondriale, stress oxydatif 3. Nécrose, apoptose et œdème cytotoxique
Reperfusion	Aggravation 1. Stress oxydatif 2. Excitotoxicité 3. Troubles circulatoires

Etude ARREST



Etude ARREST





Number at risk

ECMO group	15	7	6	6	6	6	6	6	6	6	6	6	5	3	1
Standard group	15	1	1	1	1	1	1	1	0	0	0	0	0	0	0

Time from 911 call to VA-ECMO
initiation, min

59 (28) (Transport:26 min)

Time from CCL arrival to
VA-ECMO initiation, min

7 (4)

Demographics	ECMO-	Standard	Total
Age, years	59 (10)	58 (11)	59 (10)
Age range, years	43–73	36–71	36–73

Survie à 3 mois

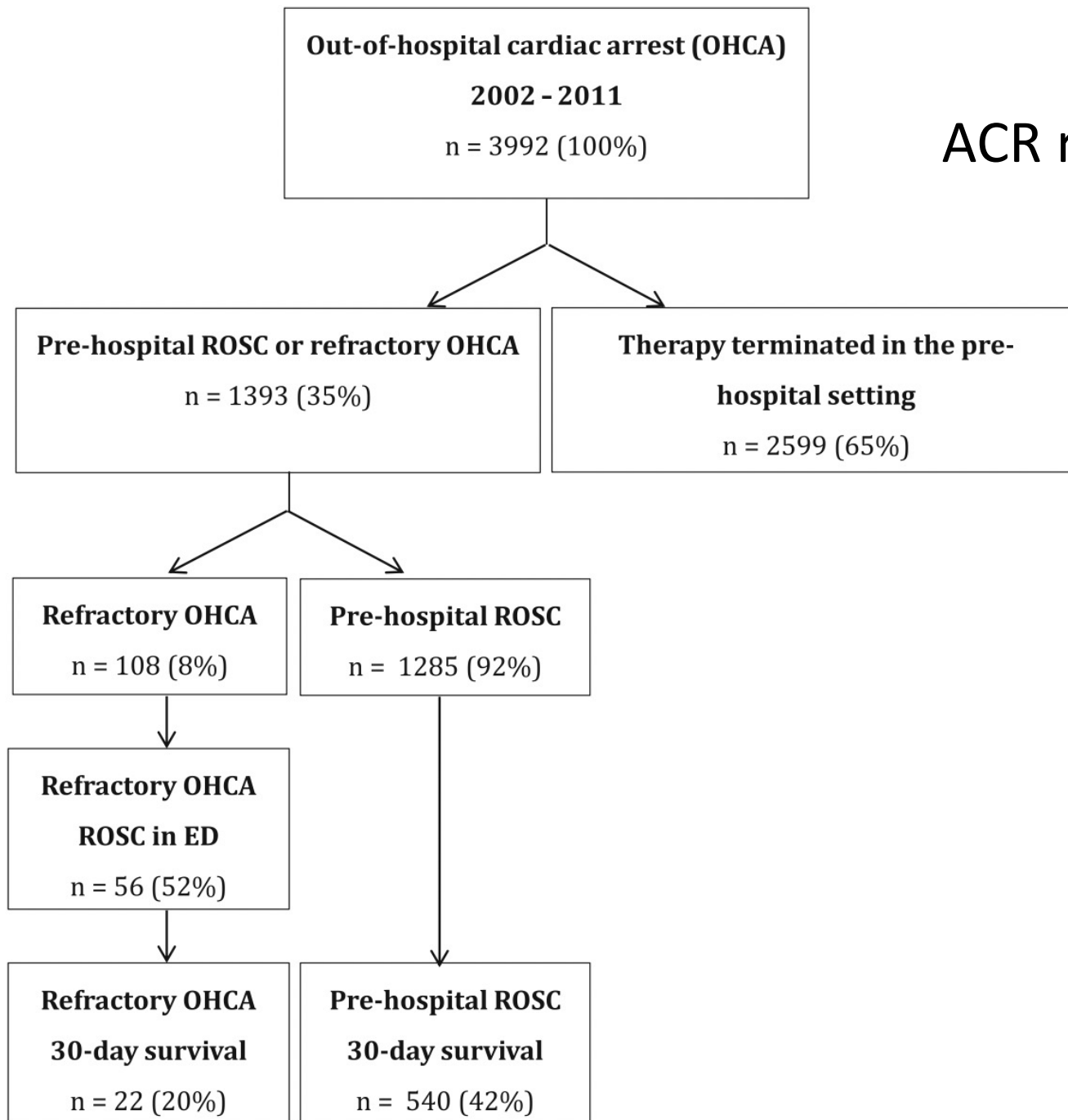
6/14 (43%)

0/15 (0%)

Survie à la sortie

6/14 (43%)

1/15 (6%)



ACR réfractaire: survie sans ECLS

20%



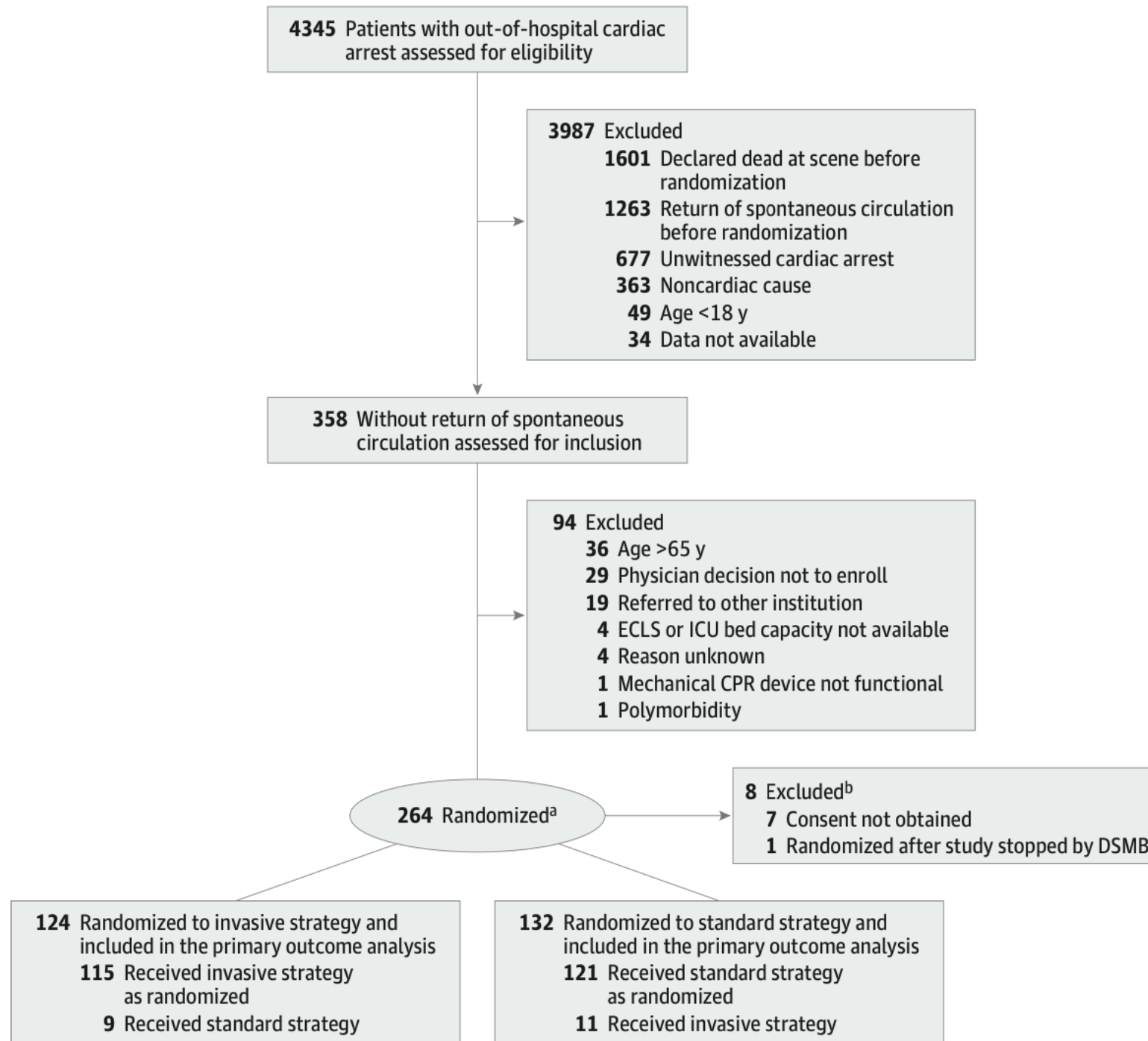
The Journal of the American Medical Association

Prague OHCA 2022

JAMA | **Original Investigation** | CARING FOR THE CRITICALLY ILL PATIENT

Effect of Intra-arrest Transport, Extracorporeal Cardiopulmonary Resuscitation, and Immediate Invasive Assessment and Treatment on Functional Neurologic Outcome in Refractory Out-of-Hospital Cardiac Arrest

A Randomized Clinical Trial

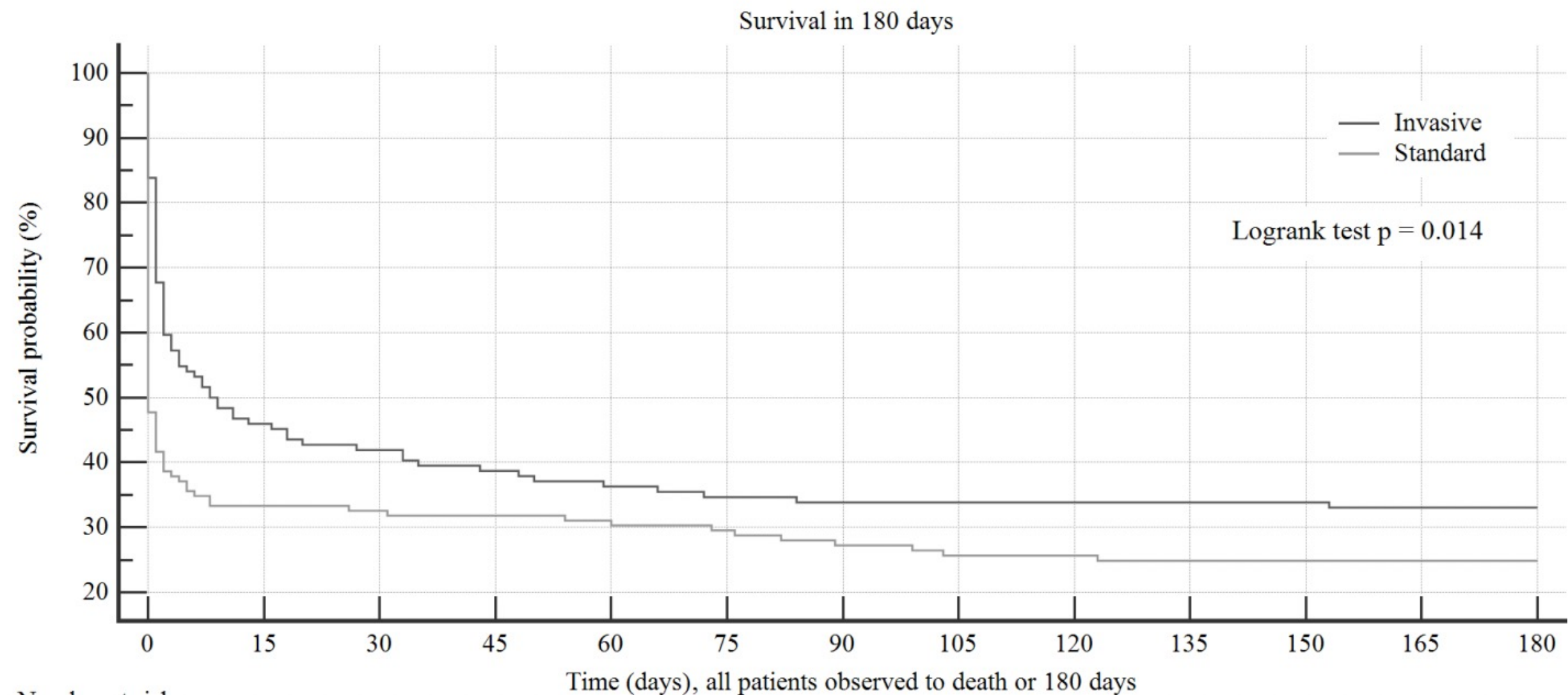


Inclusion criteria	Exclusion criteria
Age ≥ 18 and ≤ 65 years	Out of hospital cardiac arrest of presumed non-cardiac cause
Witnessed out of hospital cardiac arrest of	Unwitnessed collapse

Inclusion criteria	Exclusion criteria
No return of spontaneous circulation or return of spontaneous circulation with ongoing shock (defined as sustained hypotension below 90 mmHg of systolic pressure or need for moderate to high doses of vasopressors)	Signs of death or irreversible organ damage
Admission to cathlab not later than 60 minutes after the collapse/initial call to emergency medical service*	Known bleeding diathesis
Consensus of cardiac center team members on extracorporeal life support initiation	Inadequate arterial and/or venous access for femoro-femoral cannulation

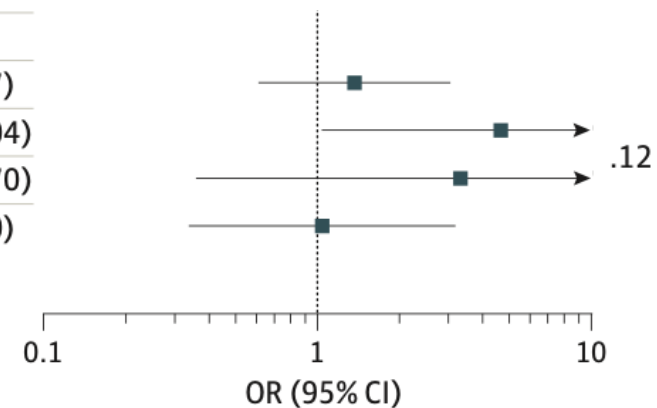
Time to ECLS, median (IQR), min	61 (55-70) [n = 81]	62 (51-73) [n = 10]
Time of implantation (door to ECLS), median (IQR), min	12 (9-15) [n = 80]	16 (11-17) [n = 10]

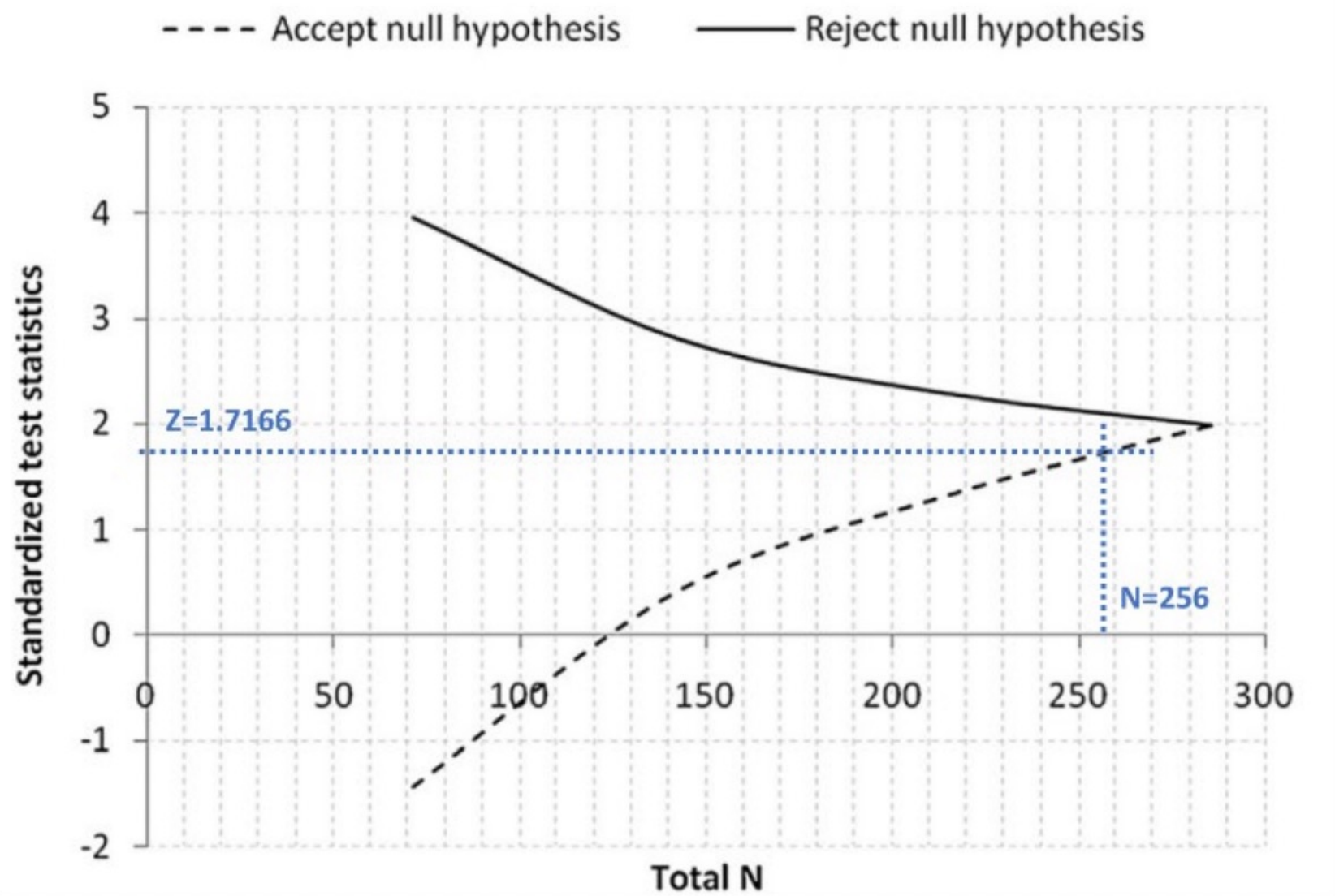
eFigure 3. Kaplan-Meier survival analysis in a Study of Intra-arrest Transport, Extracorporeal Cardiopulmonary Resuscitation, and Immediate Invasive Assessment and Treatment in Refractory Out-of-Hospital Cardiac Arrest



		No. (%)		Absolute difference, % (95% CI)	P value
		Invasive strategy (n = 124)	Standard strategy (n = 132)		
Primary outcome	(CPC 1-2)				
Survival with minimal or no neurologic impairment at 180 d ^a		39 (31.5)	29 (22.0)	9.5 (-1.3 to 20.1)	.09
Secondary outcomes					
Survival with minimal or no neurologic impairment at 30 d ^a		38 (30.6)	24 (18.2)	12.4 (1.9 to 22.7)	.02
Cardiac recovery at 30 d ^b		54 (43.5)	45 (34.1)	9.4 (-2.5 to 21)	.12

Cardiac arrest cause				
ACS	18/64 (28.1)	14/63 (22.2)	5.9 (-9.2 to 21.0)	1.37 (0.61-3.07)
CAD	9/14 (64.3)	5/18 (27.8)	36.5 (4.0 to 69.0)	4.68 (1.04-21.04)
CHF	5/8 (62.5)	2/6 (33.3)	29.2 (-21.3 to 79.6)	3.33 (0.36-30.70)
Other	7/38 (18.4)	8/45 (17.8)	0.6 (-16.0 to 17.3)	1.04 (0.34-3.20)







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Resuscitation

journal homepage: www.elsevier.com/locate/resuscitation

ECPR for Out-of-Hospital Cardiac Arrest *Inclusion/Exclusion Criteria*

INCLUSION

- Age <75 years
- Witnessed arrest
- Initial rhythm is shockable rhythm (VF / VT)
- ECPR can be initiated within 60 minutes of the arrest, though a longer interval may be considered circumstantially (e.g. hypothermic arrest)
- Aggressive ICU care consistent with patient wishes
- No prolonged downtime without CPR
- End-tidal CO₂ ≥ 10 mmHg (unless pulmonary embolism is suspected)
- Treating physician/surgeon agreement to proceed

EXCLUSION

- Contraindication to anticoagulation
- Cannot perform activities of daily living at baseline
- Advanced comorbidities / known irreversible organ failure
- Advanced COPD or other pulmonary comorbidities
- Metastatic malignancy
- Major stroke or neurologic impairment
- Do-not-resuscitate / Do-not-intubate status

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Early Extracorporeal CPR for Refractory Out-of-Hospital Cardiac Arrest

M.M. Suverein, T.S.R. Delnoij, R. Lorusso, G.J. Brandon Bravo Bruinsma, L. Otterspoor, C.V. Elzo Kraemer, A.P.J. Vlaar, J.J. van der Heijden, E. Scholten, C. den Uil, T. Jansen, B. van den Bogaard, M. Kuijpers, K.Y. Lam, J.M. Montero Cabezas, A.H.G. Driessen, S.Z.H. Rittersma, B.G. Heijnen, D. Dos Reis Miranda, G. Bleeker, J. de Metz, R.S. Hermanides, J. Lopez Matta, S. Eberl, D.W. Donker, R.J. van Thiel, S. Akin, O. van Meer, J. Henriques, K.C. Bokhoven, L. Mandigers, J.J.H. Bunge, M.E. Bol, B. Winkens, B. Essers, P.W. Weerwind, J.G. Maessen, and M.C.G. van de Poll

Critères d'inclusion

Age <70 ans

Devant témoin

TV ou FV

Réfractaire >15 min de réanimation spécialisée

Critère d'exclusion

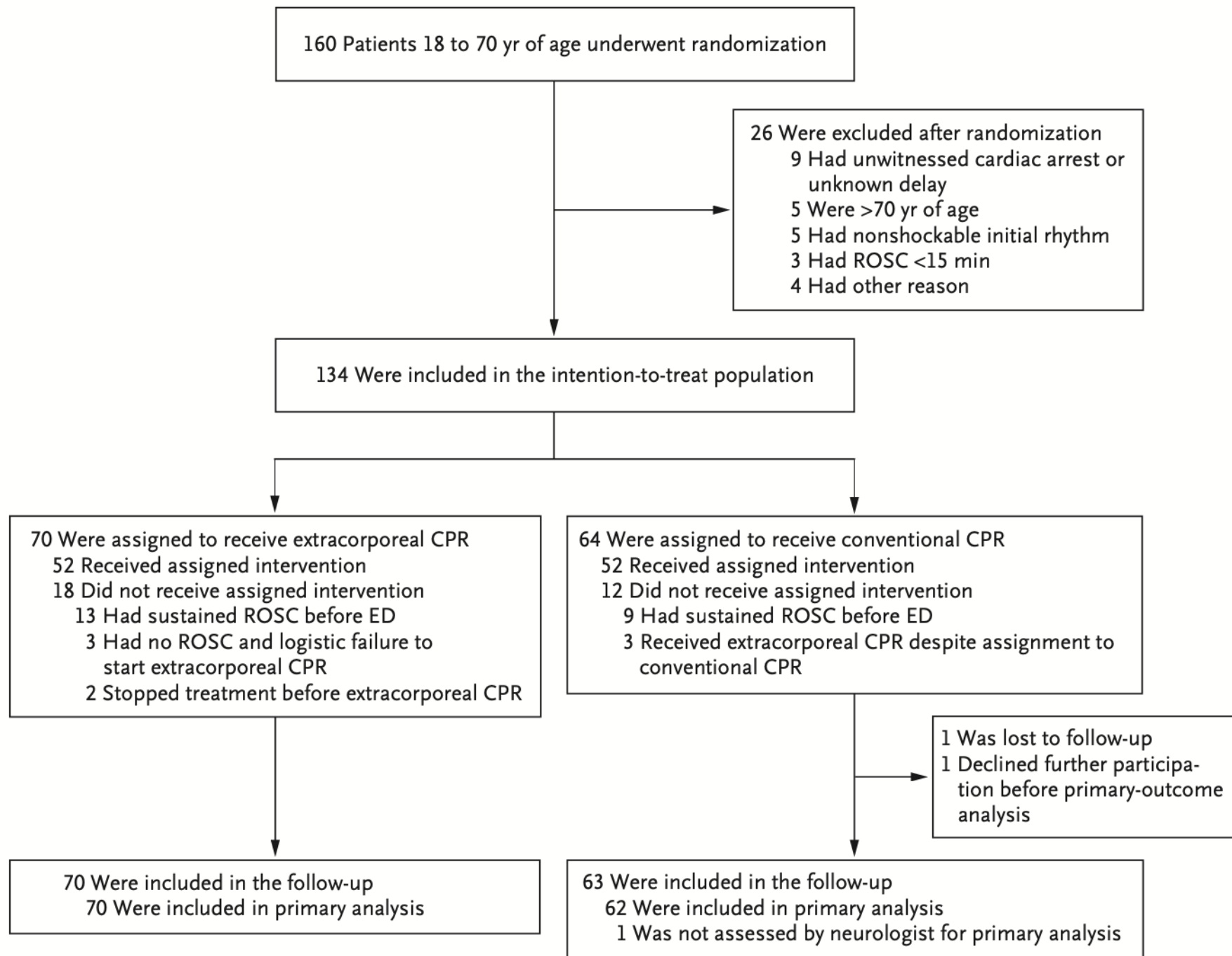
BCPO III ou IV

K métastasé

Femme enceinte

Directives anticipées

Temps estimé ACR-ECLS >60 min



Characteristic	Extracorporeal CPR (N = 70)	Conventional CPR (N = 64)
Age — yr	54±12	57±10
Male sex — no. (%)	63 (90)	57 (89)
Primary shockable rhythm — no. (%)	69 (99)	63 (98)
Arrest occurred at home — no. (%)	31 (44)	24 (38)
Witnessed arrest — no. (%)	68 (97)	63 (98)
CPR started ≤5 min after arrest — no. (%)	69 (99)	61 (95)
Total no. of defibrillations	8±5	9±6
Transport distance — no. of patients (km)	68 (17±10)	63 (16±11)

Outcome	Extracorporeal CPR (N=70)	Conventional CPR (N=64)	Odds Ratio (95% CI) [†]
Initiation of extracorporeal CPR — no. (%)	52 (74)	3 (5)	0.02 (0.0 to 0.6)
Cannulation and circulation successful	46 (66)	3 (5)	
Cannulation or circulation failed	6 (9)	0	
Patient died before ICU admission	2 (3)	0	
Start of arrest to start of ECLS flow			
No. of patients	44		
Median interval (IQR) — min	74 (63 to 87)		
Survived to ICU discharge — no. (%)	14 (20)	15 (23)	1.2 (0.5 to 2.8)
Survived to hospital discharge — no. (%)	14 (20)	13 (20)	1.0 (0.4 to 2.4)

ACR extra hospitalier

Pas de preuve de l'intérêt de l'ECMO

Peut être envisagée au cas par cas

Nécessite une organisation centralisée

Nécessite un centre expert (MAR, Perfusionniste, chirurgien)

ACR réfractaire: 15 min max

Age <65 ans

Devant témoin (No flow < 5 min)

Absence de comorbidités

LUCAS

FV ou TV

Temps estimé ACR-ECLS < 60 min

Je vous remercie de votre attention