Que retenir de l'actualité en réanimation ?
Arrêt cardiaque

Pr Martin COUR

Médecine Intensive-Réanimation

Hôpital Edouard Herriot - Hospices Civils de Lyon

Actualités en Réanimation - LYON

7/12/2023

Conflits d'intérêts

Aucun à déclarer

Actualités dans l'arrêt cardiaque : **Recommandations**

EUROPEAN RESUSCITATION COUNCIL

CONFERENCE REPORTS AND EXPERT PANEL

European Resuscitation Council and European Society of Intensive Care Medicine guidelines 2021: post-resuscitation care

ESICM EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE

32-36°C (24h)
<37,8°C (72h)

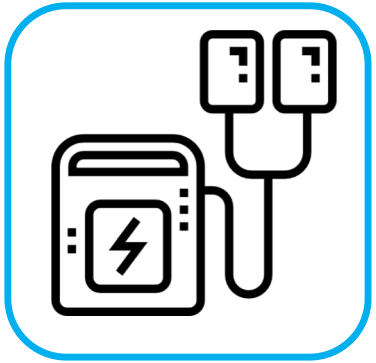
PAM > 65 mmHg

SpO_2 94-98%
PaO_2 75-100 mmHg

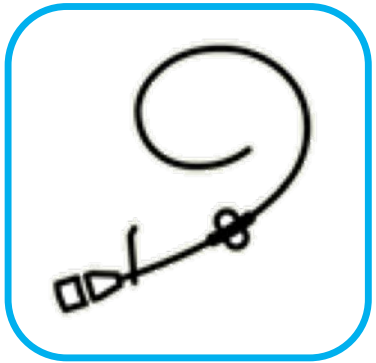
35-45 mmHg

Nolan JP, et al. *Resuscitation* 2021;47:369-421

Que retenir de l'actualité dans l'arrêt cardiaque ? **Conflits d'intérêt**

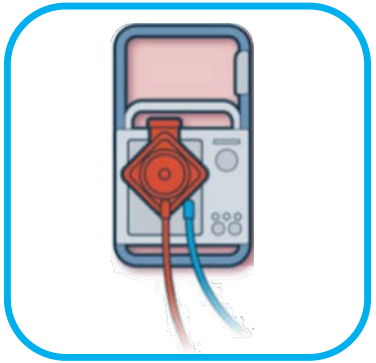


Défibrillation



Coronarographie

Pression artérielle



ECMO

Oxygénation / capnie

Température

Homme 60 ans
HTA, diabète, IDM inférieur

Arrêt cardiaque à Lyon
RCP par témoin - 3 CCE par DSA

What's New ?

Homme 60 ans
HTA, diabète, IDM inférieur

Arrêt cardiaque sans prodromes à Lyon
RCP par témoin - 3 CCE par DSA

RACS après 5ème CCE + CORDARONE
ECG : Sinusal, ST- V2-V6, séquelles inf.

SpO_2 ?
Coro ?

Homme 60 ans
HTA, diabète, IDM inférieur

Arrêt cardiaque sans prodromes à Lyon
RCP par témoin - 3 CCE par DSA

Intubé - ventilé
Admis en réanimation

CO_2 PAM
CIBLES ?
T° PO_2

PAM

PO_2

TTM

BOX TRIAL

n=889

DOSE-VF

n=405

TOMAHAWK

n=532

n=1700

TAME

TTM-2

n=1900

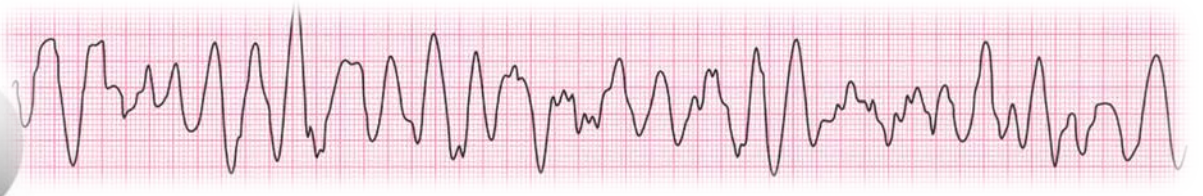
INCEPTION n=133

EXACT

n=425/1416

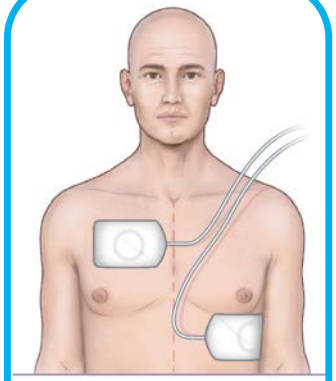
ECLS-shock

n=420



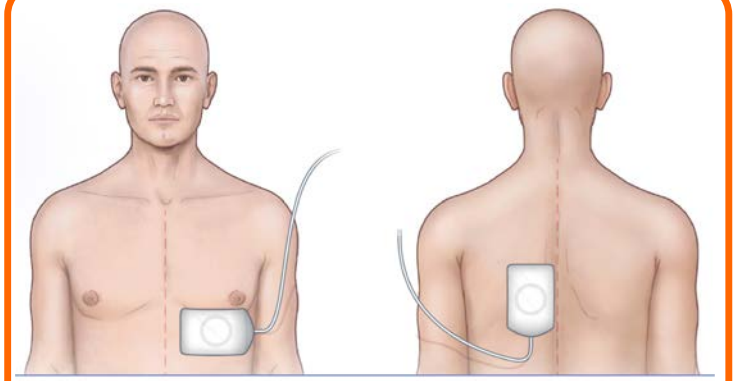
RESEARCH SUMMARY

Defibrillation Strategies for Refractory Ventricular Fibrillation



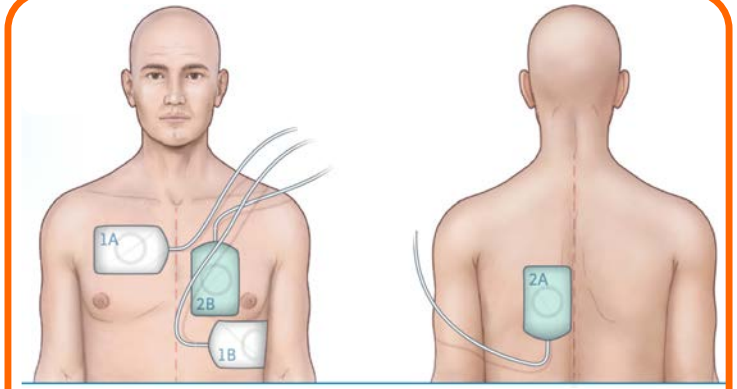
Contrôle

n=136/310



Défibrillation antéro-postérieure (DAP)

n=143/310



Défibrillation double sequence (DDS)

n=125/310

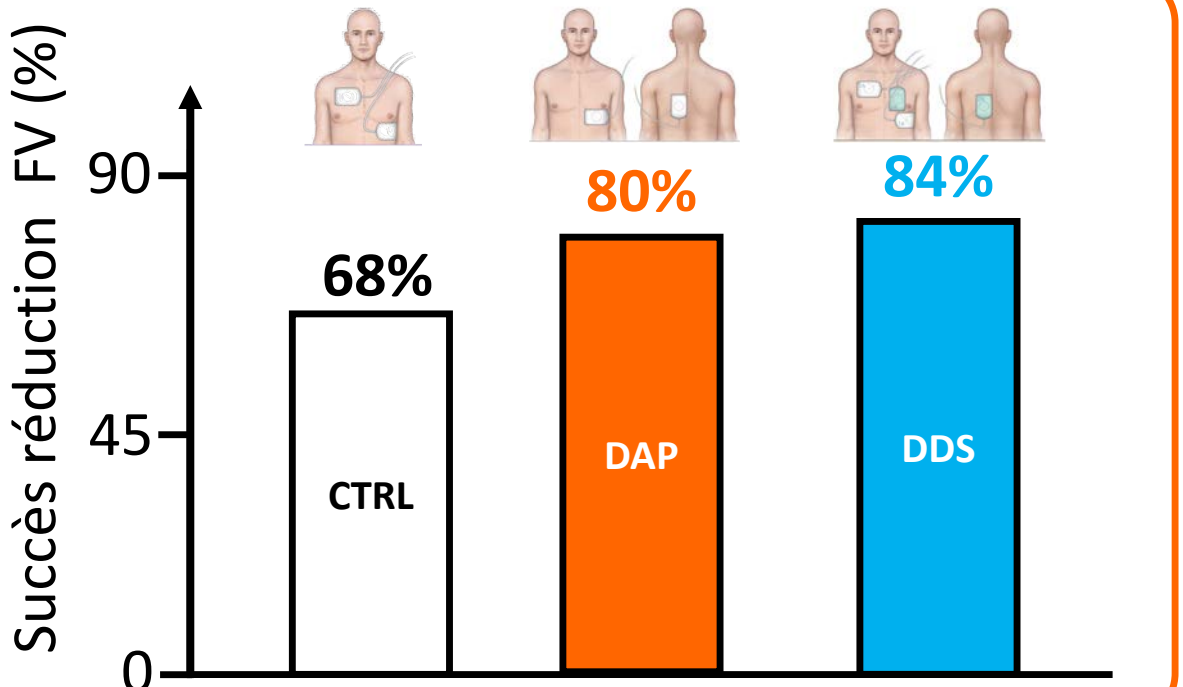
DOSE-VF STUDY

Cheskes S et al. *New Engl J Med 2022; 287:1947-1956*

Defibrillation Strategies for Refractory Ventricular Fibrillation

RCP / paramedics

Age : **64** ans
Homme : **84%**
Témoin : **68%**
911-Paramedics: **7'**
911-1er CEE **: 10'**



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Defibrillation Strategies for Refractory Ventricular Fibrillation

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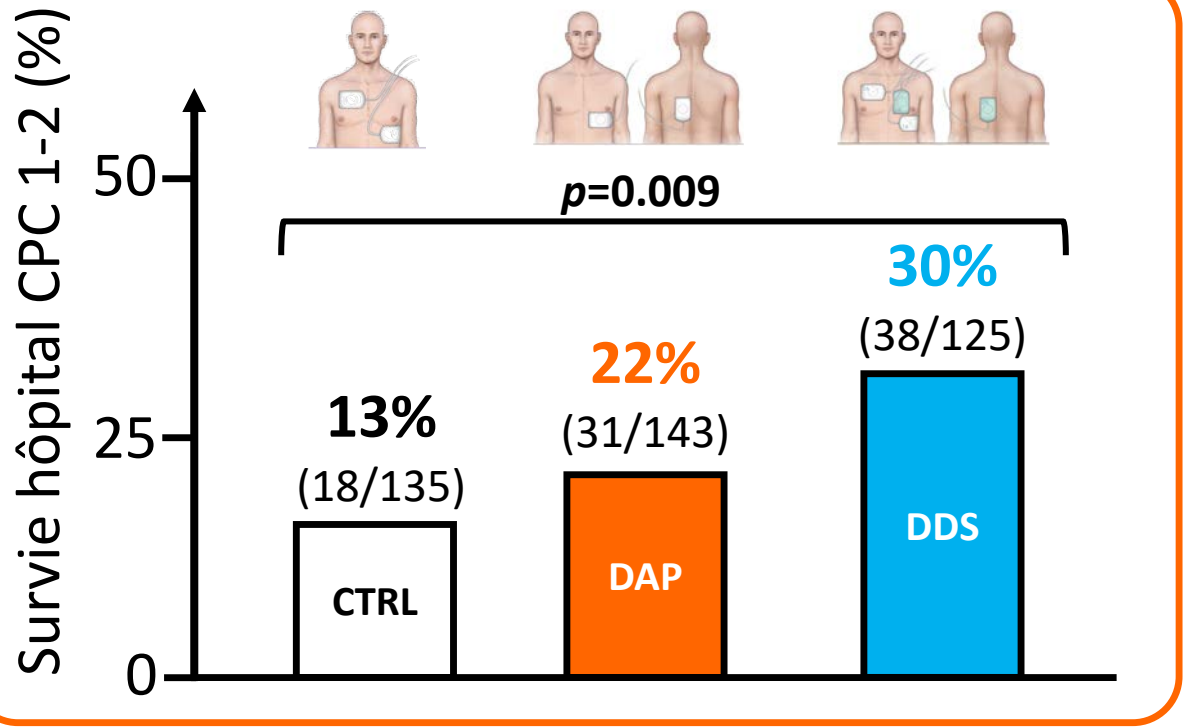
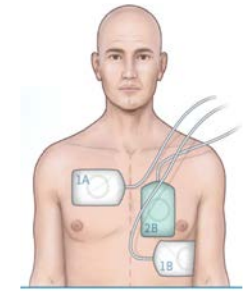
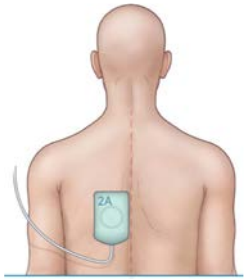


DOSE-VF STUDY

Cheskes S et al. *New Engl J Med 2022; 287:1947-1956*

Double défibrillation

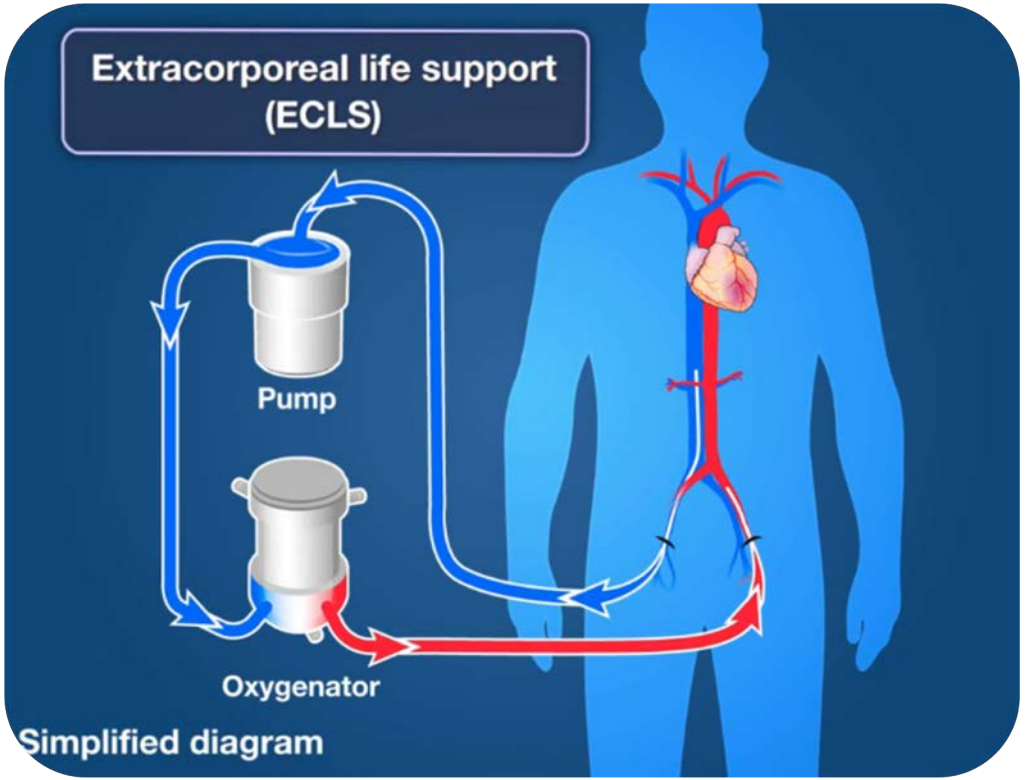




DOUBLE SEQUENTIAL EXTERNAL DEFIBRILLATION

DOSE-VF STUDY

Cheskes S et al. *New Engl J Med 2022; 287:1947-1956*


Extracorporeal life support
(ECLS)
Pump
Oxygenator
Simplified diagram

The NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

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

160 ACEH sur FV réfractaire

INCEPTION TRIAL

Suverein MM et al. *New Engl J Med 2023; 388:299-309*

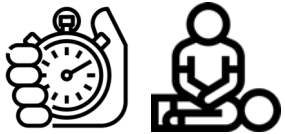
The NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

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

Principaux critères d'inclusion (10 centres)

18-70 ans



RCP spécialisée > 15 min

FV / choc DSA

ACR - bloc ECMO < 60 min

10 Centres - 12 EMS en Allemagne

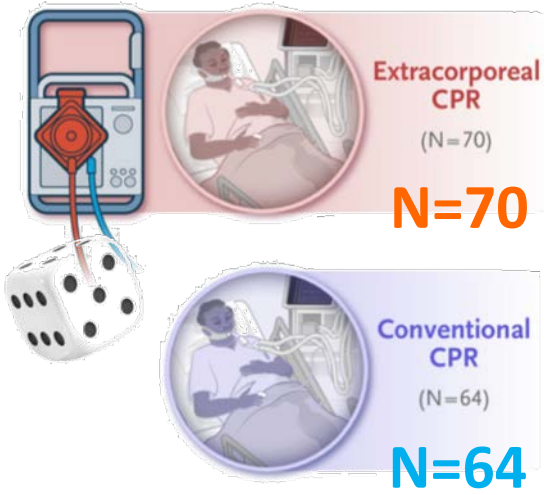
INCEPTION TRIAL

Suverein MM et al. *New Engl J Med 2023; 388:299-309*

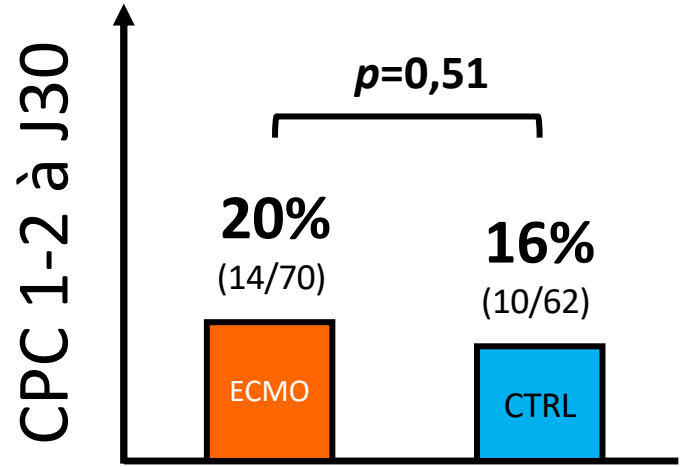
The NEW ENGLAND JOURNAL of MEDICINE

RESEARCH SUMMARY

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



AC-ECMO : 74'



INCEPTION TRIAL

Suverein MM et al. *New Engl J Med 2023; 388:299-309*

	Réa standard	ECMO	P
ARREST (*Lancet* 2020)	**n=15**	**n=14**	
Survie 6 mois CPC1-2	**0%**	**43%**	<0.001
PRAGUE OHCA (*JAMA* 2022)	**n=132**	**n=124**	
Survie 6 mois CPC1-2	**22%**	**32%**	NS
INCEPTION (*NEJM* 2023)	**n=64**	**n=70**	
Survie 6 mois CPC1-2	**16%**	**20%**	NS

ARREST Yannopoulos D et al. *Lancet 2020; 396:1807-16*

PRAGUE OHCA Belohlavek J et al. *JAMA 2022; 327:737-47*

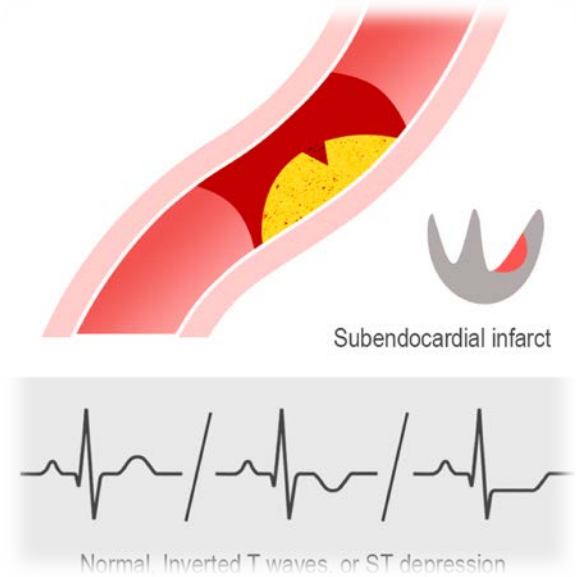
INCEPTION TRIAL Suverein MM et al. *New Engl J Med 2023; 388:299-309*

	Réa standard	ECMO	P
ARREST (*Lancet* 2020)	n=15	n=14	
Survie 6 mois CPC1-2	0%	43%	<0.001
PRAGUE OHCA (*JAMA* 2022)	n=132	n=124	
Survie 6 mois CPC1-2	22%	32%	NS
INCEPTION (*NEJM* 2023)	n=64	n=70	
Survie 6 mois CPC1-2	16%	20%	NS

DOSE VF-STUDY (*NEJM* 2022)	Réa standard	DDS	P
RANKIN modifié ≤2	11%	27%	0.009

Période post-arrêt cardiaque — **?** — **Coronarographie immédiate/différée**

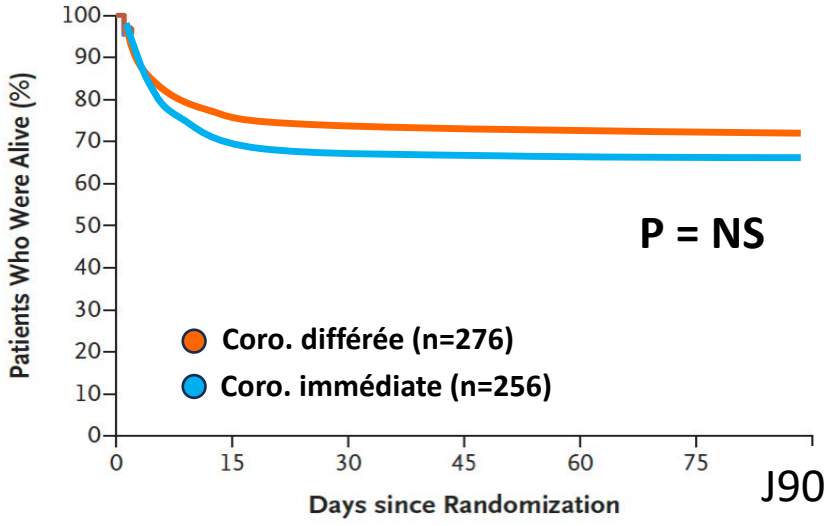
AC sans élévation du segment ST ?
Rythme choquable



N=532

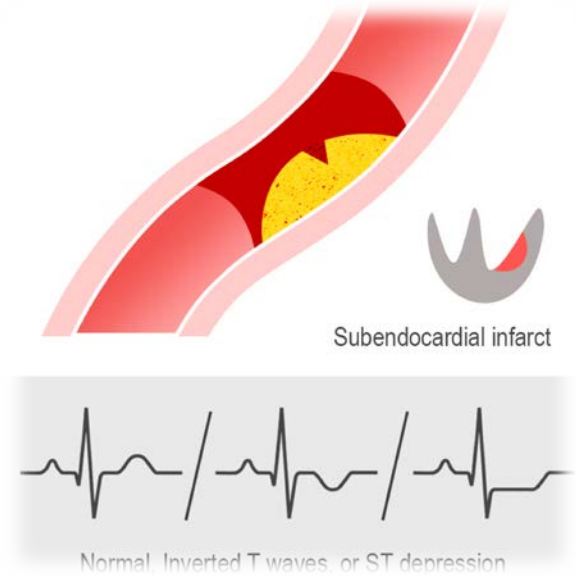
The NEW ENGLAND JOURNAL of MEDICINE
ESTABLISHED IN 1812 APRIL 11, 2019 VOL. 380 NO. 15

Coronary Angiography after Cardiac Arrest without ST-Segment Elevation



Lemkes JS et al. *New Engl J Med* 2019;380:1397-407

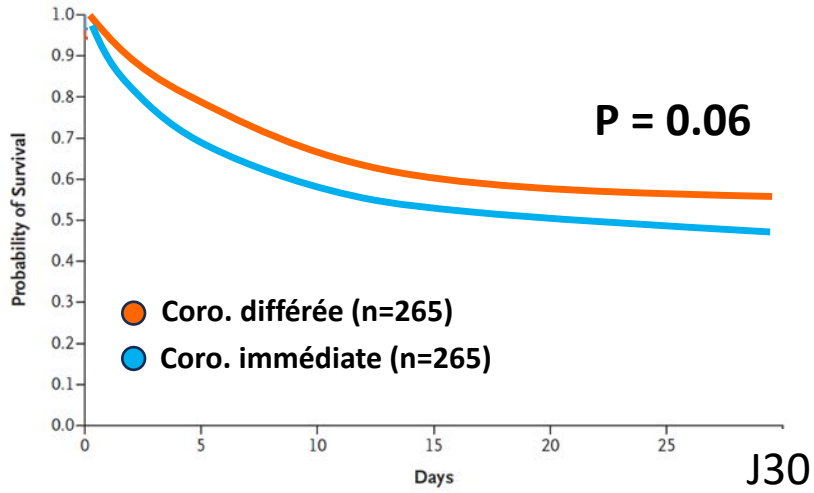
AC sans élévation du segment ST ? Choquable ET non choquable



N=530

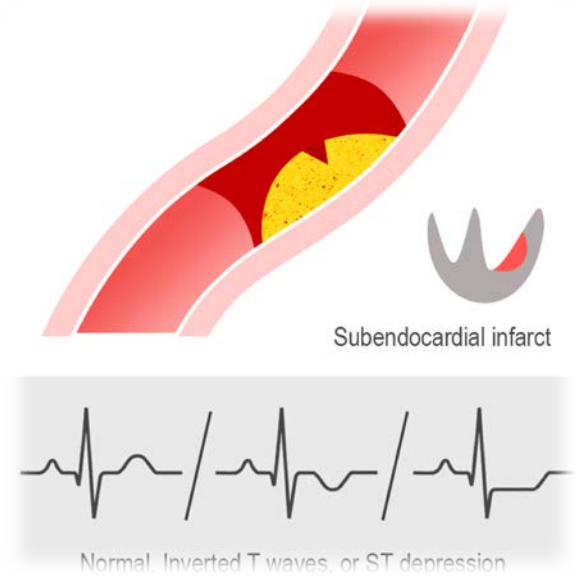
The NEW ENGLAND JOURNAL of MEDICINE

Angiography after Out-of-Hospital Cardiac Arrest without ST-Segment Elevation



Desch S et al. *New Engl J Med* 2021;380:1397-407

AC sans élévation du segment ST ? Choquable ET non choquable

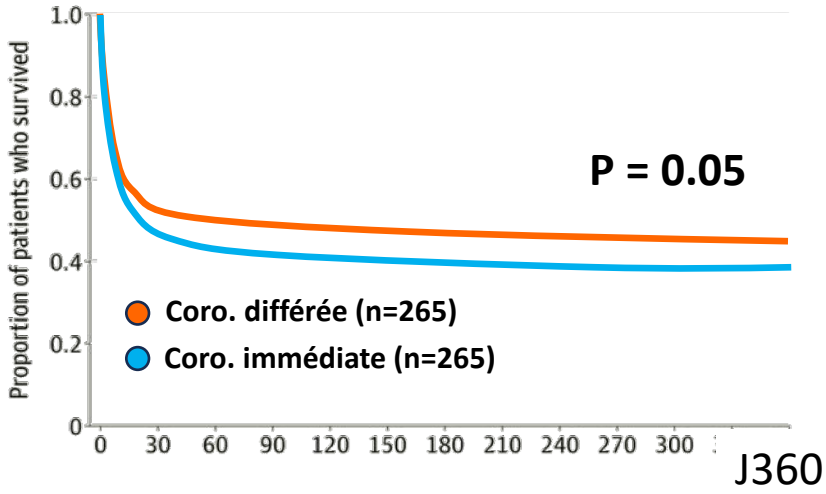


N=530

JAMA Cardiology

Coronary Angiography After Out-of-Hospital Cardiac Arrest Without ST-Segment Elevation

One-Year Outcomes of a Randomized Clinical Trial

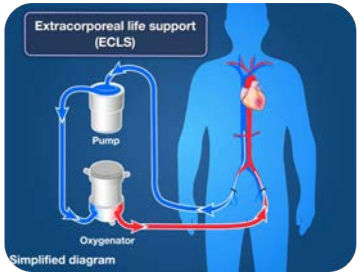


Desch S et al. *JAMA Cardiol* 2023;8:827-834

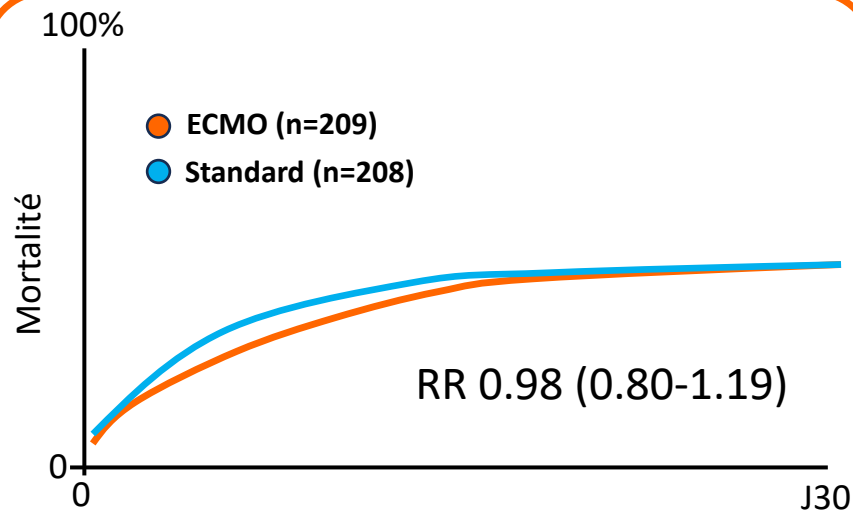
ORIGINAL ARTICLE FREE PREVIEW

Extracorporeal Life Support in Infarct-Related Cardiogenic Shock

STEMI + choc cardiogénique



N=420, **50% post-AC**



ECLS-Shock

Thiele H et al. *New Engl J Med* 2023; 389:1286-97

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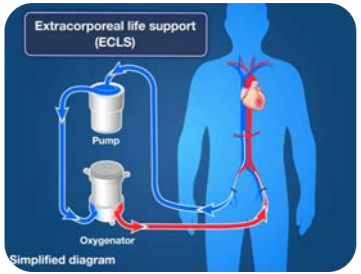
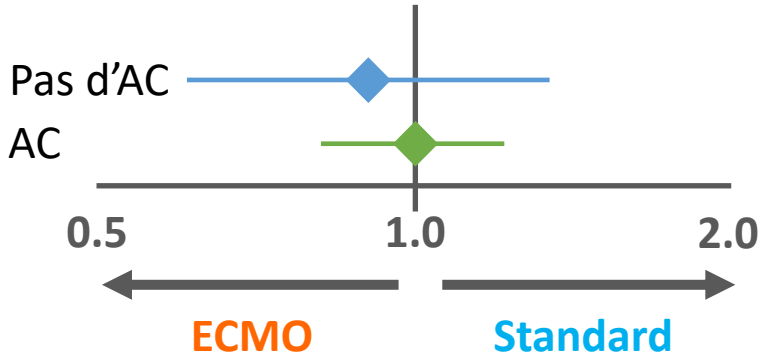


N=420, **50% post-AC**

Sous groupe RCP < RCP



ECLS-Shock

Thiele H et al. *New Engl J Med* 2023; 389:1286-97

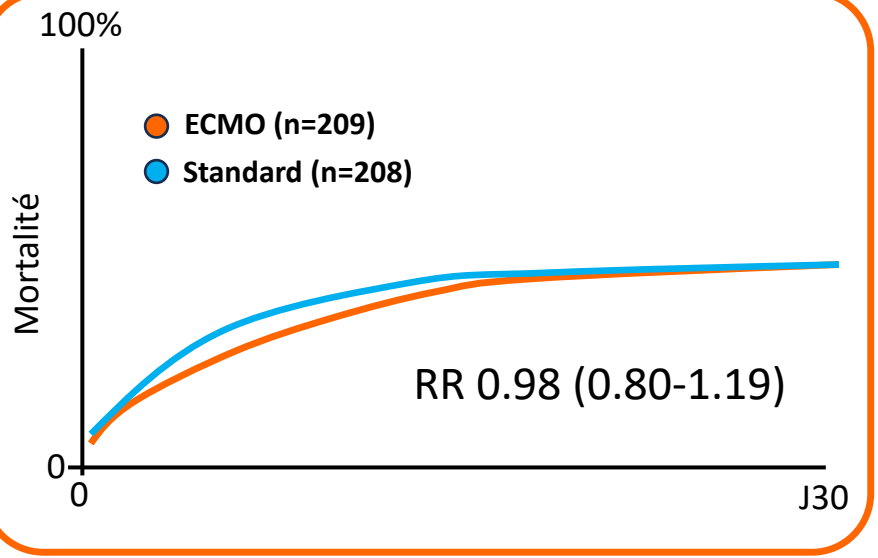
ORIGINAL ARTICLE FREE PREVIEW

Extracorporeal Life Support in Infarct-Related Cardiogenic Shock

Limite : définition choc !

- **PAS<90 mmHg (>30')**
  ou catécholamines
- **Lactate > 3 mM**
- **Signes hypoperfusion**

Standard : 27 Impella, 26 ECMO



Thiele H et al. *New Engl J Med* 2023; 389:1286-97

Période post-arrêt cardiaque SAMU — **?** — **Objectif de PaO_2 / SaO_2 ?**

Original Investigation

October 26, 2022

Effect of Lower vs Higher Oxygen Saturation Targets on Survival to Hospital Discharge Among Patients Resuscitated After Out-of-Hospital Cardiac Arrest

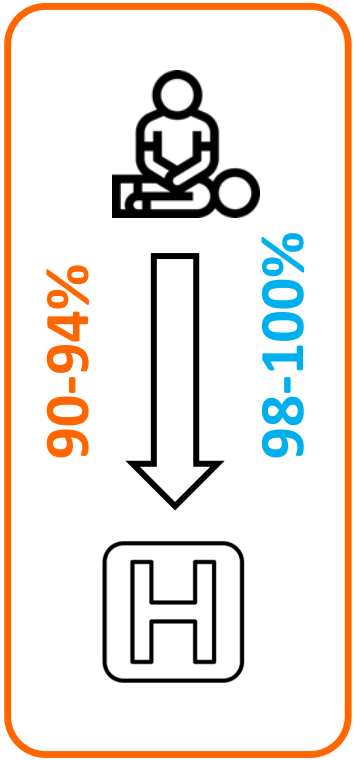
The EXACT Randomized Clinical Trial

Stephen A. Bernard, MD[1,2,3]; Janet E. Bray, PhD[1,3,4]; Karen Smith, PhD[1,2,5]; Michael Stephenson, BHlthSci[1,2,5]; Judith Finn, PhD[1,4]; Hugh Grantham, MBBS[4,6,7]; Cindy Hein, PhD[8]; Stacey Masters, PhD[4]; Dion Stub, PhD[1,2,3]; Gavin D. Perkins, MD[9]; Natasha Dodge, MPH[1]; Catherine Martin, PhD[10]; Sarah Hopkins, MBBS[2]; Peter Cameron, PhD[1,3]; for the EXACT Investigators

EXACT TRIAL

Bernard SA et al. *JAMA* 2022;328:1818-26

Actualités dans l'arrêt cardiaque : **Oxygénation**



POPULATION

325 Men
100 Women

Adults with return of spontaneous circulation after out-of-hospital cardiac arrest

Median age: **66** years

LOCATIONS

2 Emergency medical services and **15** hospitals in Australia

INTERVENTION

425/1416

214

SpO_2 of 90% to 94%

Oxygen reduced and titrated to maintain target range

211

SpO_2 of 98% to 100%

High-flow oxygen titrated to maintain target range

PRIMARY OUTCOME

Survival to hospital discharge

EXACT TRIAL

Bernard SA et al. *JAMA* 2022;328:1818-26

Actualités dans l'arrêt cardiaque : **Oxygénation**

POPULATION

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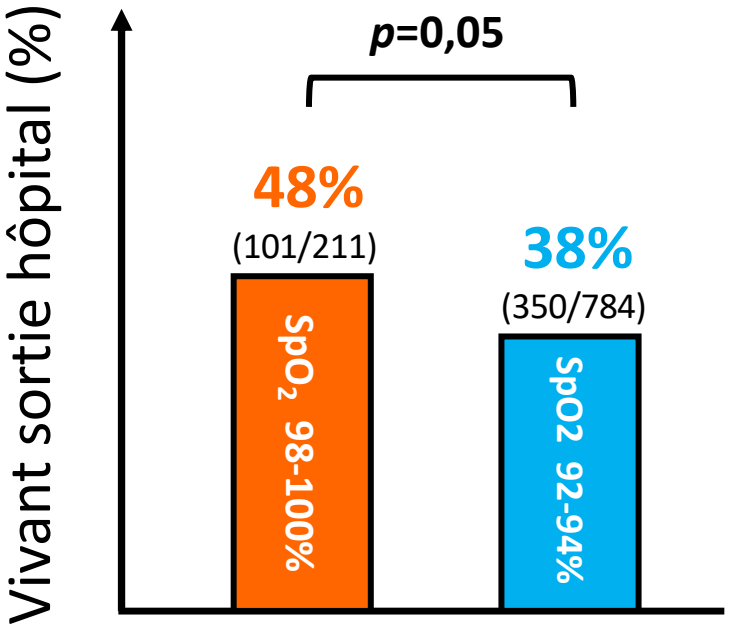


EXACT TRIAL

Bernard SA et al. *JAMA* 2022;328:1818-26

Période post-arrêt cardiaque réa — **?** — **Objectif de PaO_2 / SaO_2 ?**

Période post-arrêt cardiaque — **?** — **Quel objectif de PaO_2 ?**

The NEW ENGLAND JOURNAL of MEDICINE

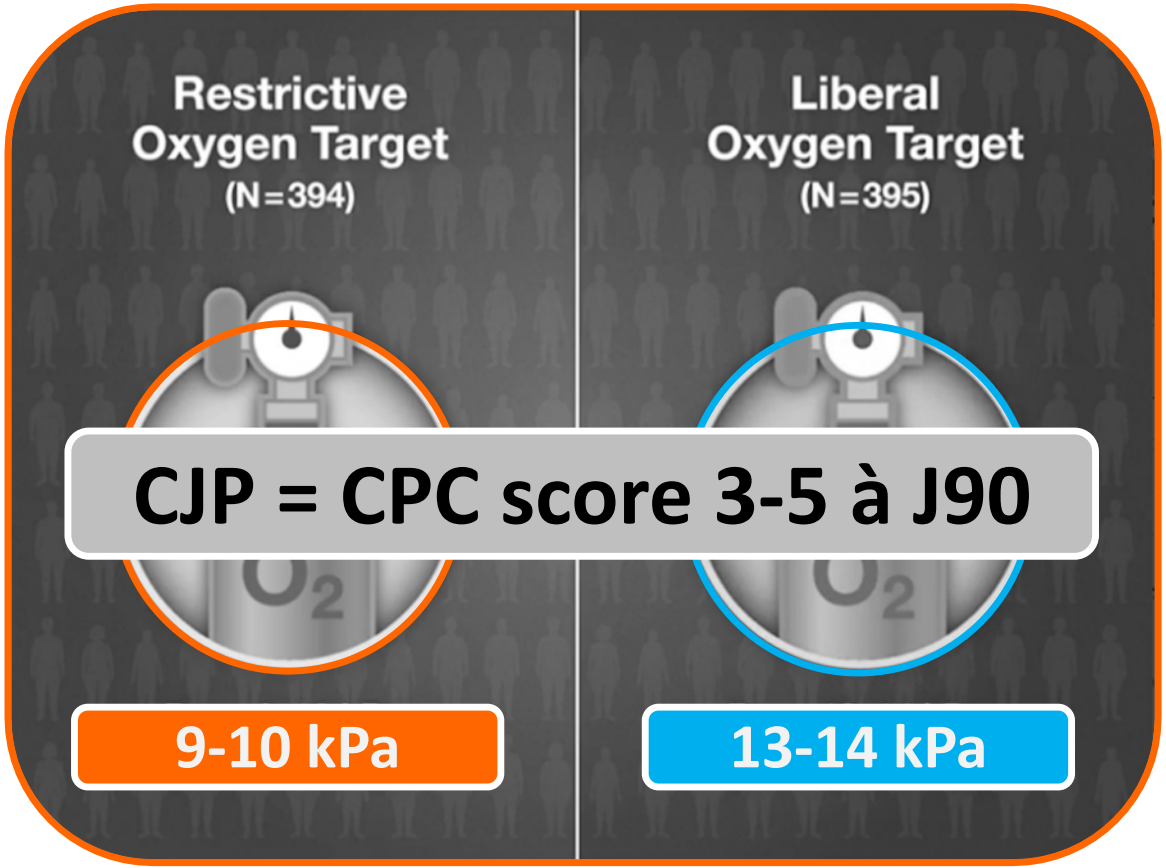
ORIGINAL ARTICLE

Oxygen Targets in Comatose Survivors of Cardiac Arrest

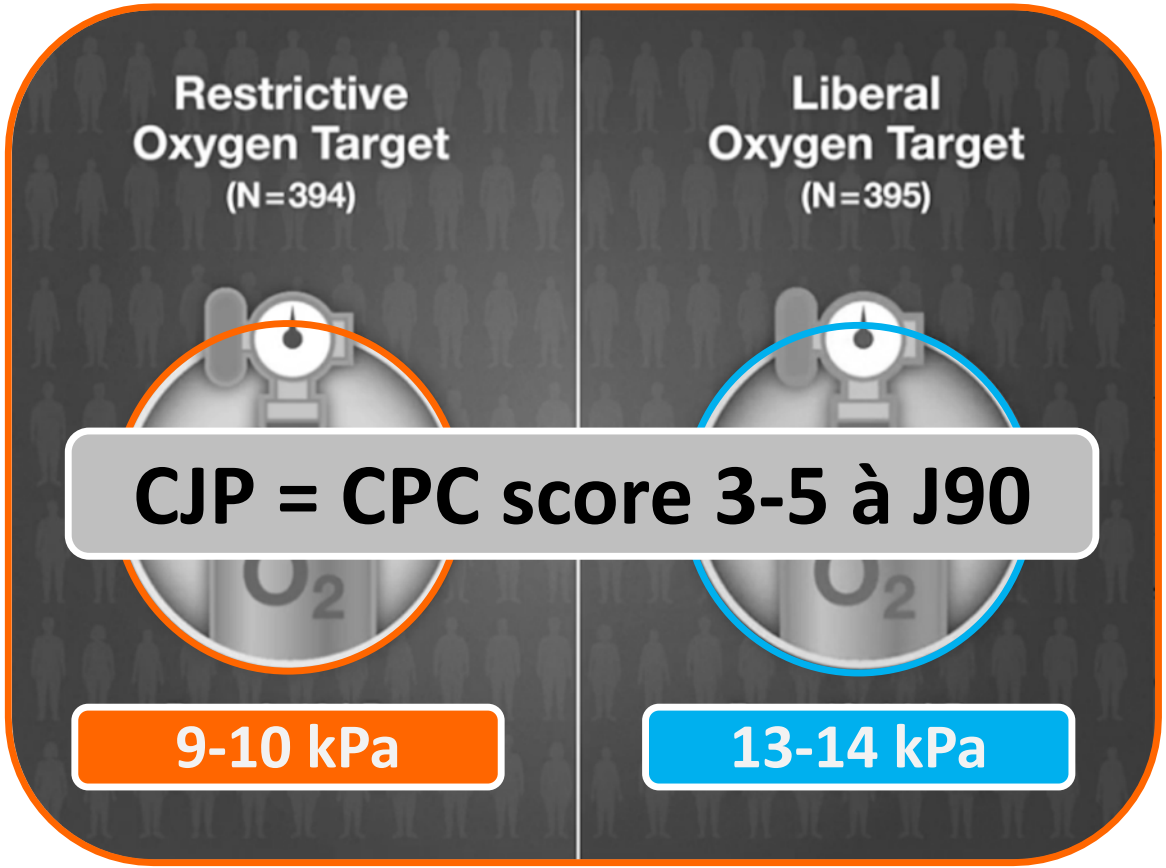
Blood Pressure and Oxygenation Targets in Post Resuscitation Care (BOX)

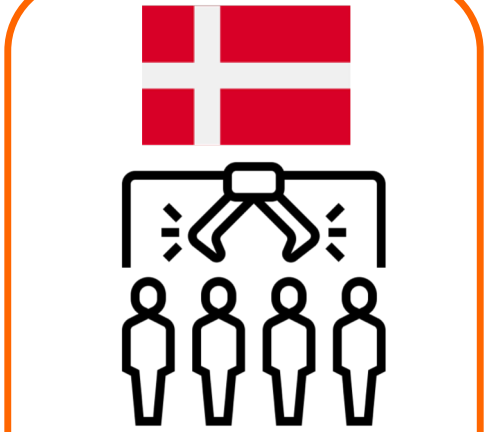
BOX-TRIAL

Schmidt H et al. *New Engl J Med* 2022;387:1467-76



Schmidt H et al. *New Engl J Med* 2022;387:1467-76



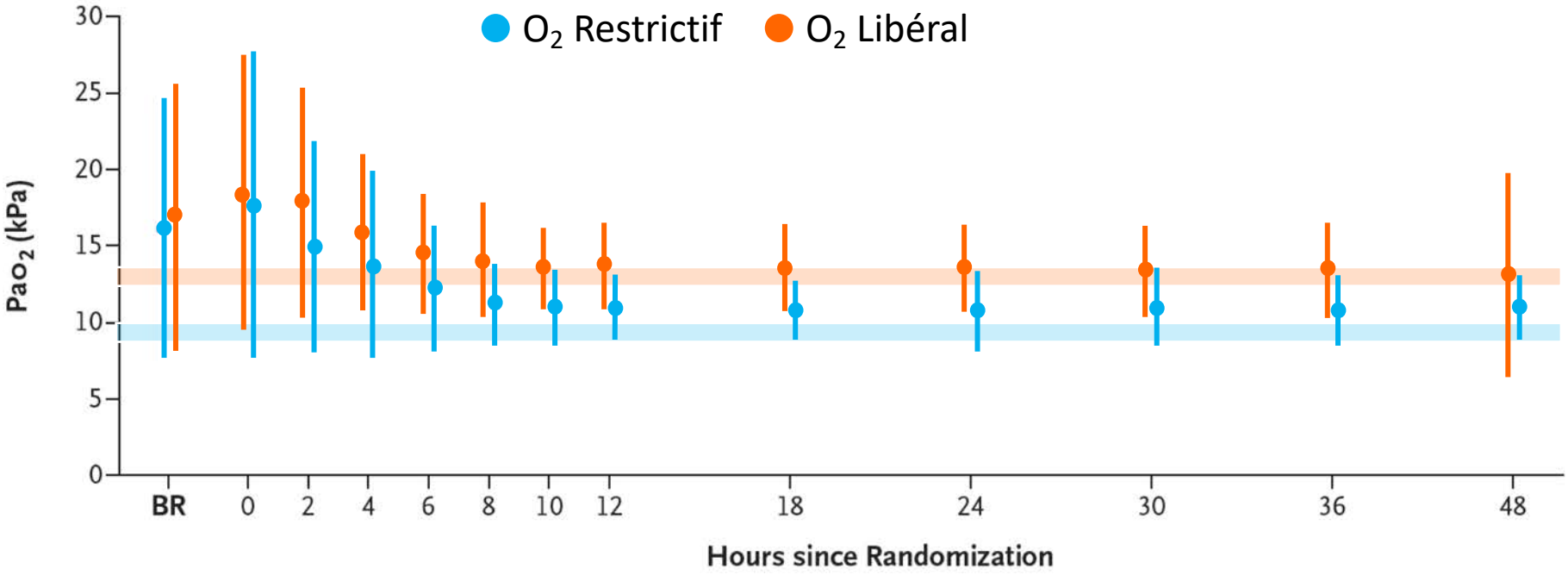


Age : **62** ans
Homme : **80%**
Témoin : **85%**
FV/TV : **85%**
AC-rando: **2,5h**

BOX-TRIAL

Schmidt H et al. *New Engl J Med* 2022;387:1467-76

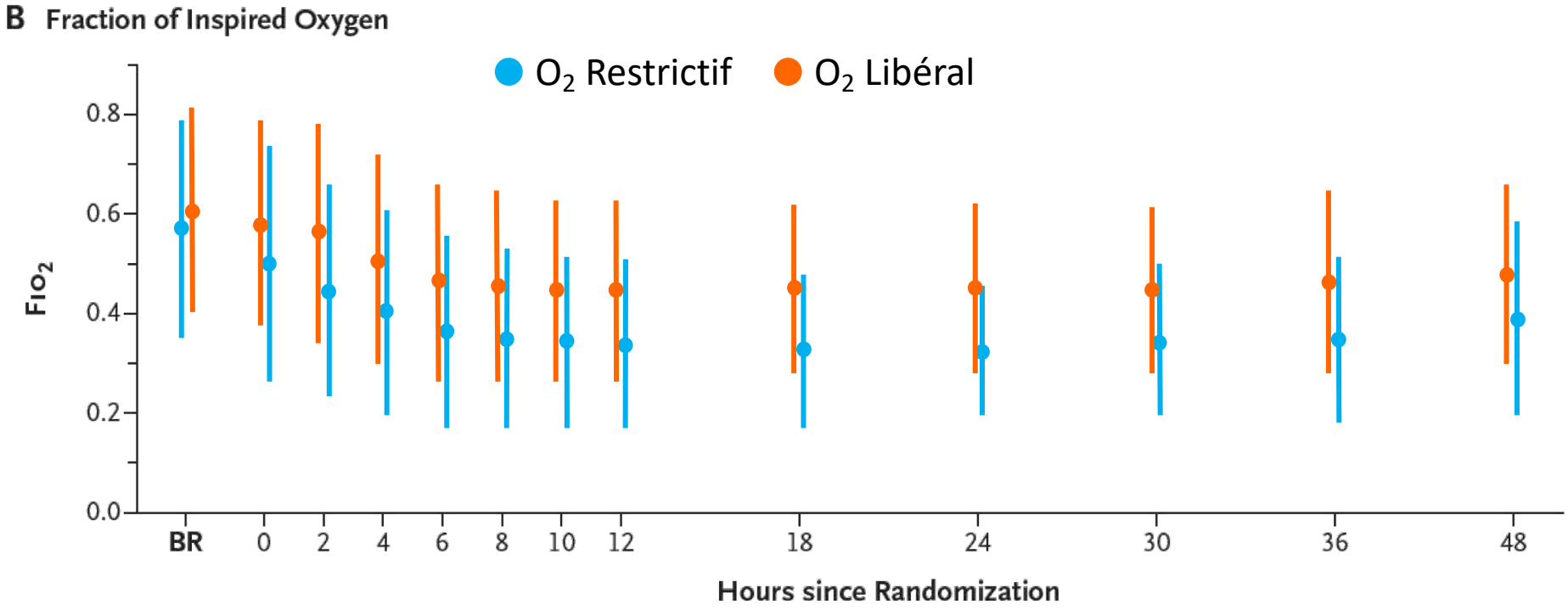
O_2 restrictif vs. libérale



BOX-TRIAL

Schmidt H et al. *New Engl J Med* 2022;387:1467-76

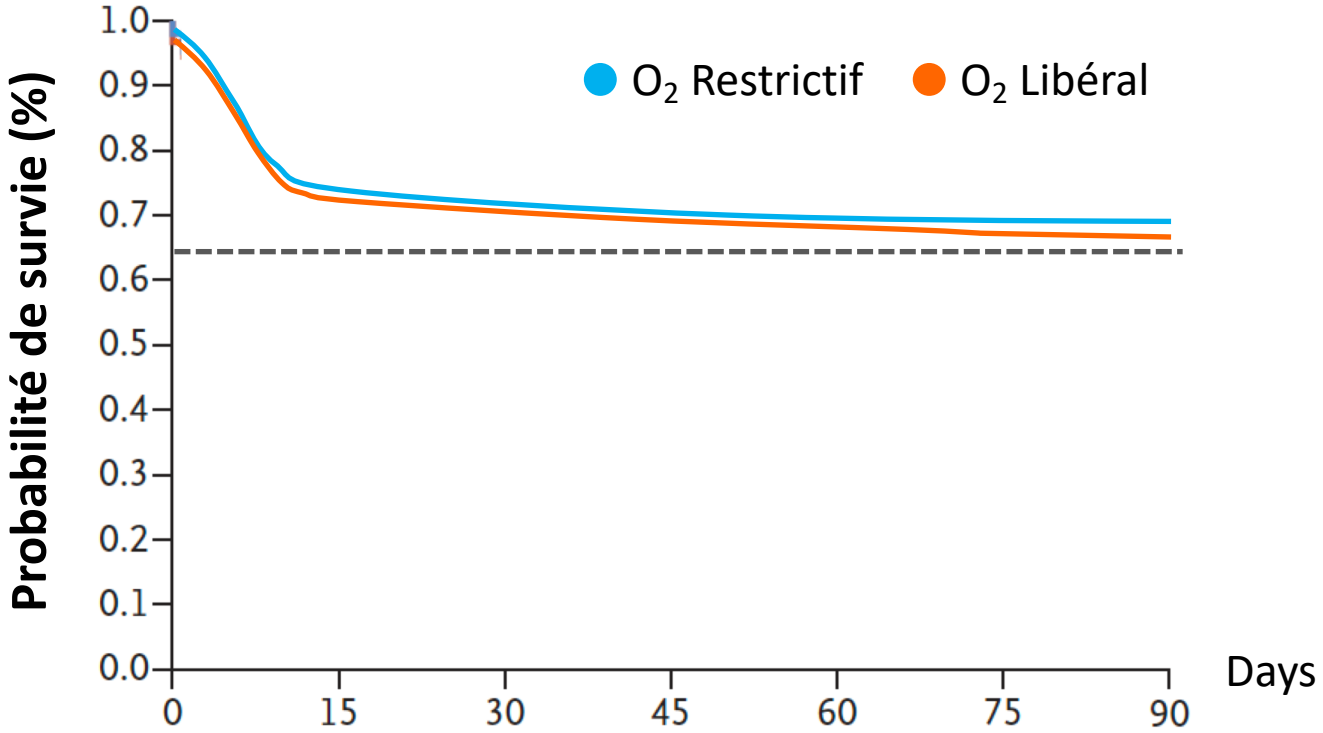
O_2 restrictif vs. libérale



BOX-TRIAL

Schmidt H et al. *New Engl J Med* 2022;387:1467-76

O_2 restrictif vs. libérale



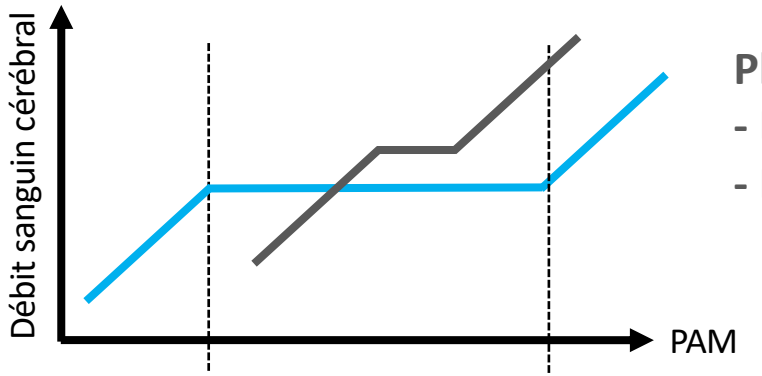
BOX-TRIAL

Schmidt H et al. *New Engl J Med* 2022;387:1467-76

Période post-arrêt cardiaque — **?** — **Objectif de pression artérielle ?**

Actualités dans l'arrêt cardiaque : **Pression artérielle moyenne**

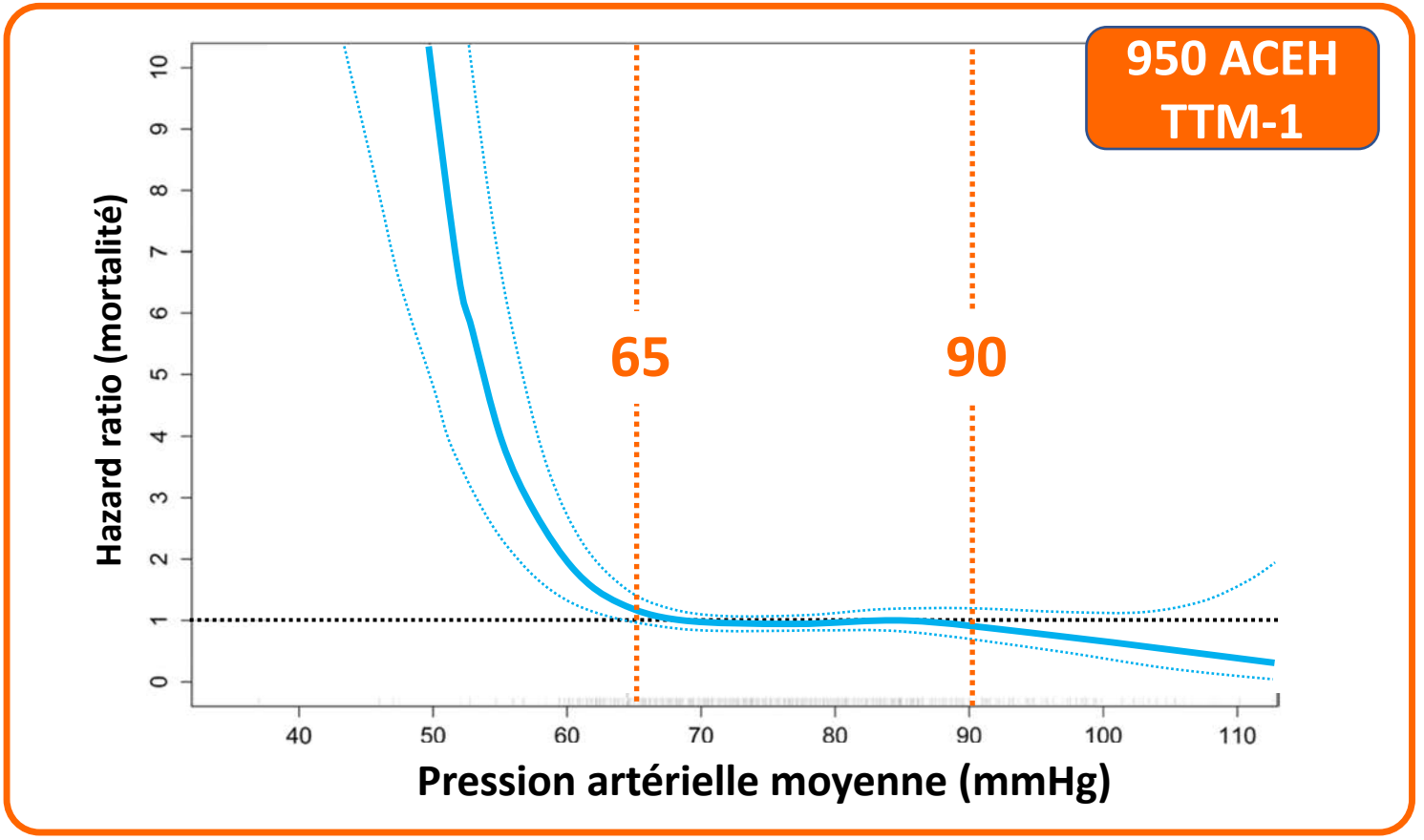
Période post-arrêt cardiaque **?** **Quel objectif de PAM ?**



Plateau d'autorégulation
- **Décalé vers droite**
- **Plus étroit**

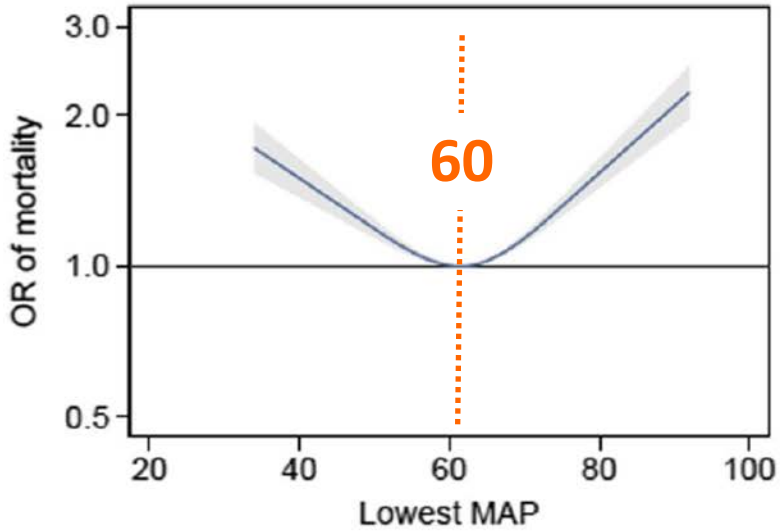
Sekhon M et al. *Crit Care Med* 2019; 47:960-9

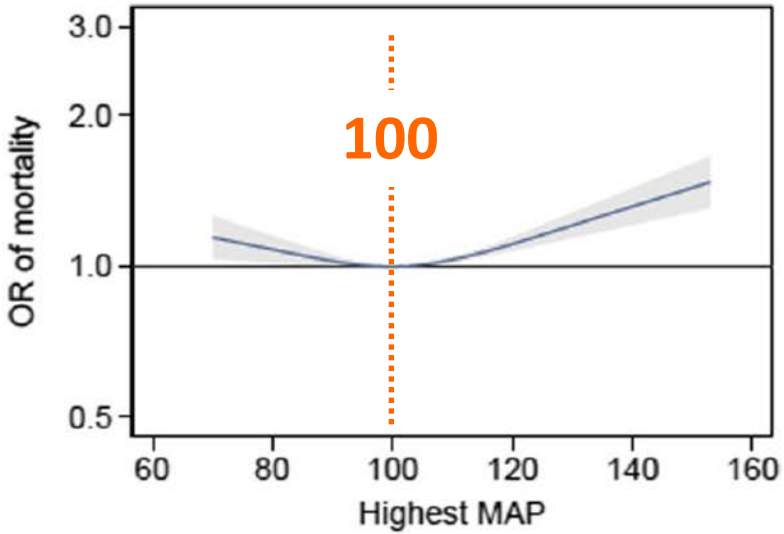
Actualités dans l'arrêt cardiaque : **Pression artérielle moyenne**



Bro-Jeppesen et al. *Crit Care Med* 2015;43:318-27

Et dans la vraie vie ? Données anglaises





32349 ACEH **24h réa**

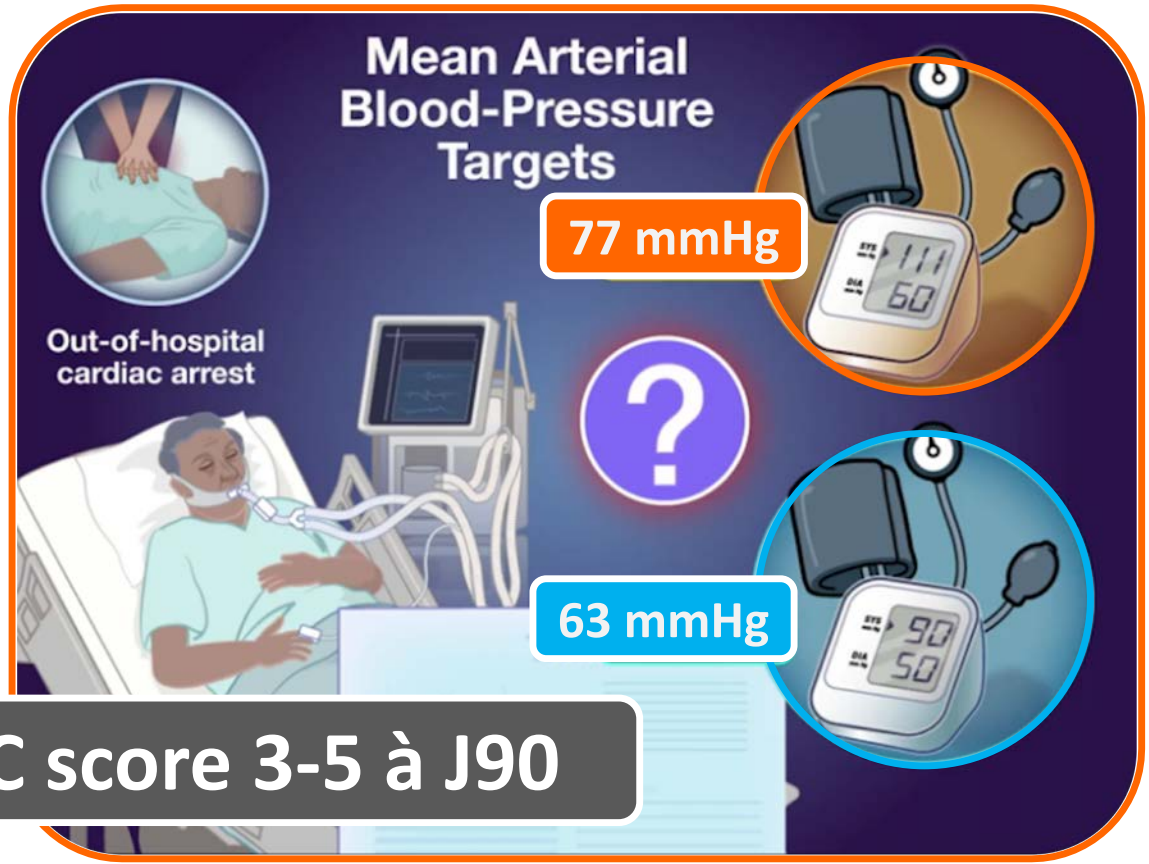
Quel objectif de PAM ?

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Blood-Pressure Targets in Comatose Survivors of Cardiac Arrest

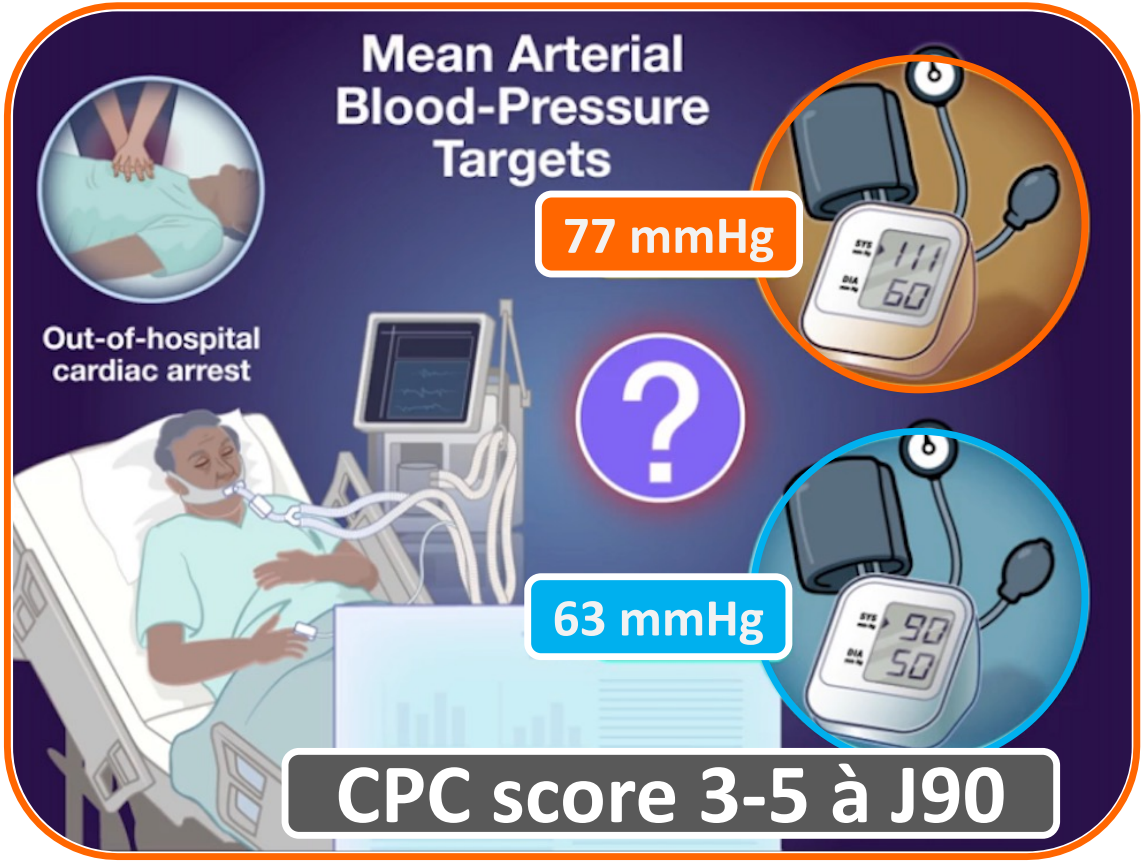
J. Kjaergaard, J.E. Møller, H. Schmidt, J. Grand, S. Mølstrøm, B. Borregaard, S. Venø, L. Sarkisian, D. Mamaev, L.O. Jensen, B. Nyholm, D.E. Høfsten, J. Josiassen, J.H. Thomsen, J.J. Thune, L.E.R. Obling, M.G. Lindholm, M. Frydland, M.A.S. Meyer, M. Winther-Jensen, R.P. Beske, R. Frikke-Schmidt, S. Wiberg, S. Boesgaard, S.A. Madsen, V.L. Jørgensen, and C. Hassager



CJP : CPC score 3-5 à J90

BOX-TRIAL

Kjaergaard J et al. *New Engl J Med* 2022;387:1456-66

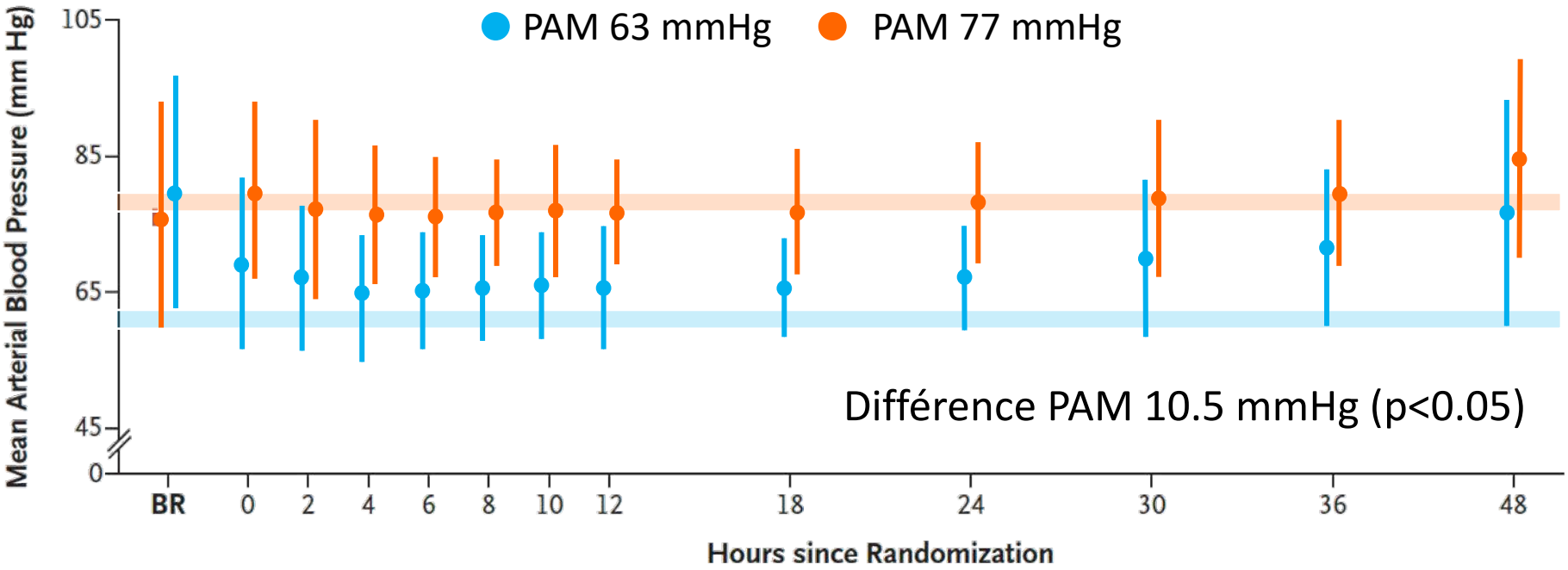


Age : **62** ans
Homme : **80%**
Témoin : **85%**
FV/TV : **85%**
AC-rando: **2,5h**

BOX-TRIAL

Kjaergaard J et al. *New Engl J Med* 2022;387:1456-66

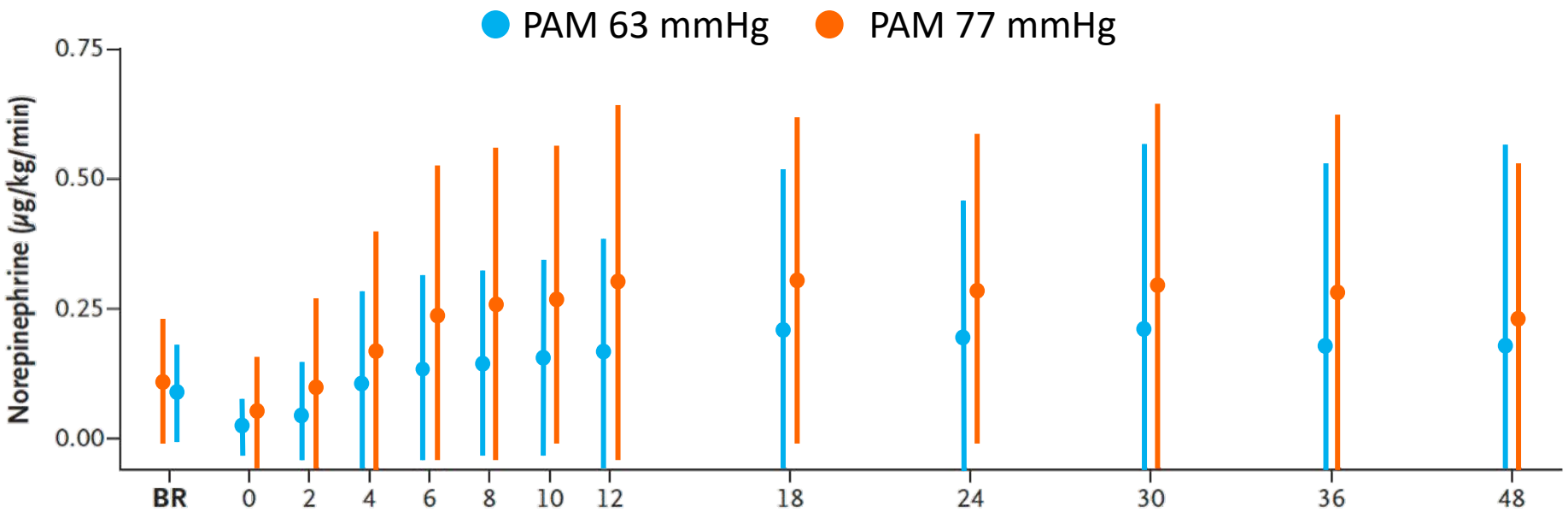
Niveau de PAM ?



BOX-TRIAL

Kjaergaard J et al. *New Engl J Med* 2022;387:1456-66

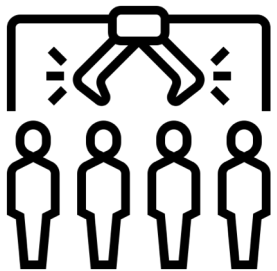
Niveau de PAM ?



Différence dose 0.04 µg/kg/min (p<0.05)

Kjaergaard J et al. *New Engl J Med* 2022;387:1456-66

Niveau de PAM ?



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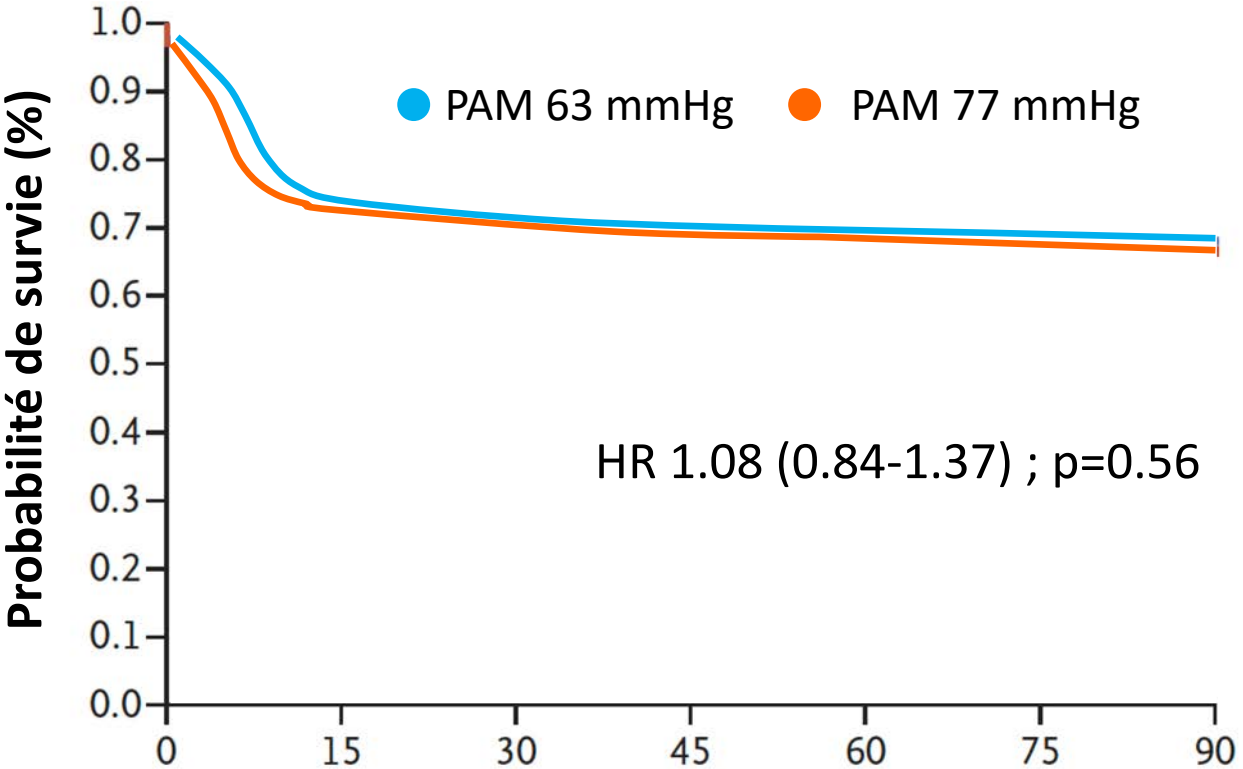


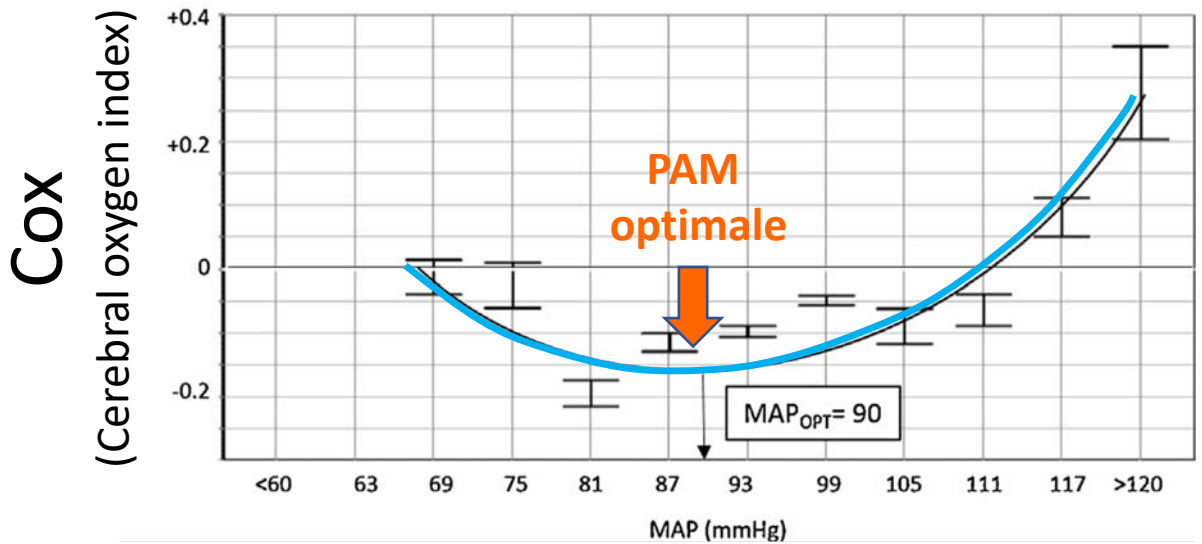
BOX-TRIAL

Kjaergaard J et al. *New Engl J Med* 2022;387:1456-66

Personnalisation de la PAM ?

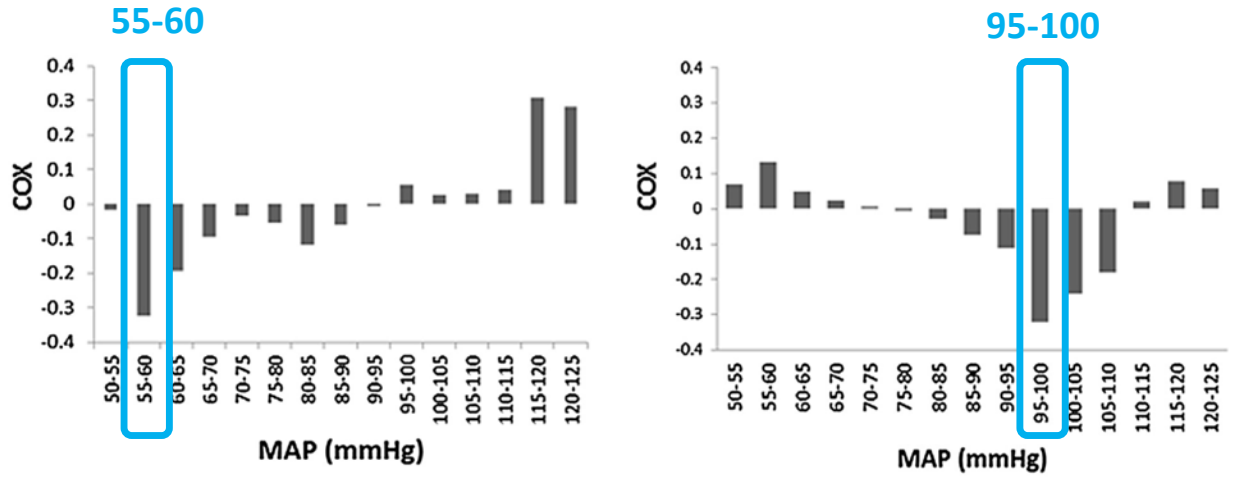
Actualités dans l'arrêt cardiaque : **Pression artérielle moyenne**

Using the relationship between brain tissue regional saturation of oxygen and mean arterial pressure to determine the optimal mean arterial pressure in patients following cardiac arrest: A pilot proof-of-concept study☆



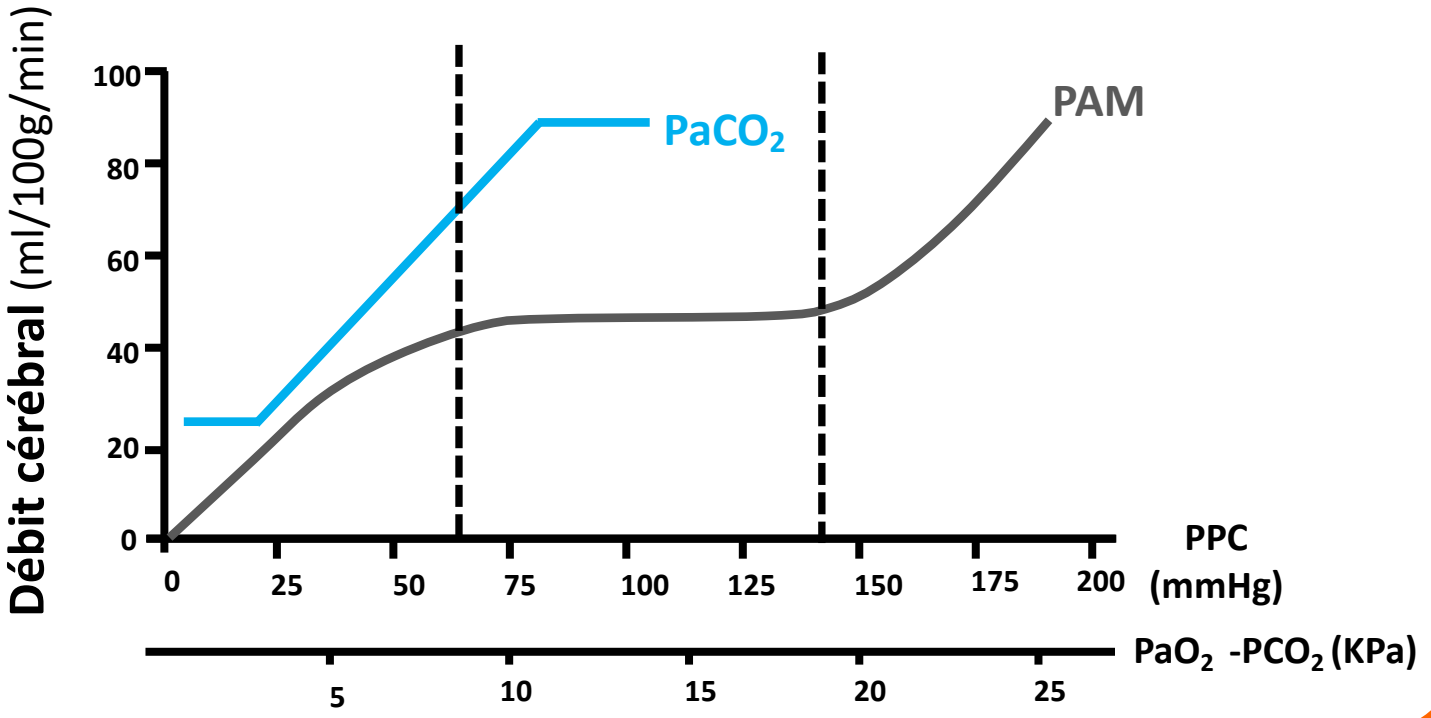
Sekhon MS et al. *Resuscitation* 2016;106:120-5

An observational near-infrared spectroscopy study on cerebral autoregulation in post-cardiac arrest patients: Time to drop 'one-size-fits-all' hemodynamic targets?☆

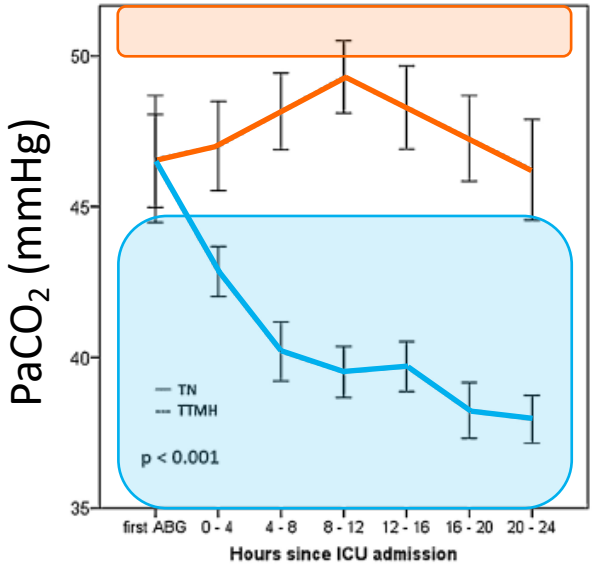


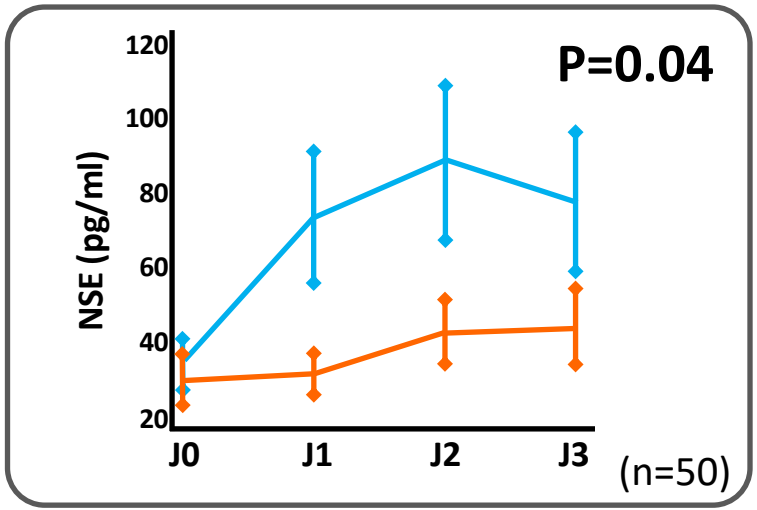
Ameloot K et al. *Resuscitation* 2015;90:121-6

Période post-arrêt cardiaque — **?** — **Hypercapnie modérée**


Débit cérébral (ml/100g/min)
100
80
60
40
20
0
PaCO2
PAM
0
25
50
75
100
125
150
175
200
PPC
(mmHg)
PaO2 -PCO2 (KPa)
5
10
15
20
25

Targeted therapeutic mild hypercapnia after cardiac arrest: A phase II multi-centre randomised controlled trial (the CCC trial)☆



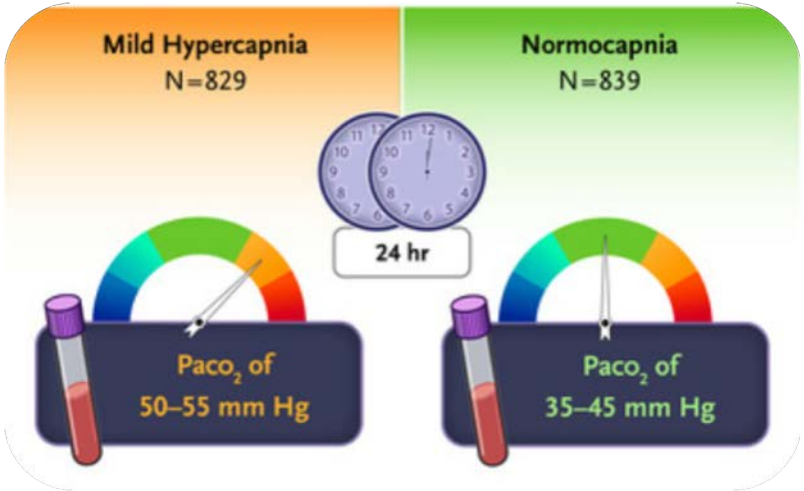


Eastwood GM et al. *Resuscitation* 2016;104:83-90

Hypercapnie thérapeutique

TAME Cardiac Arrest

ttm2

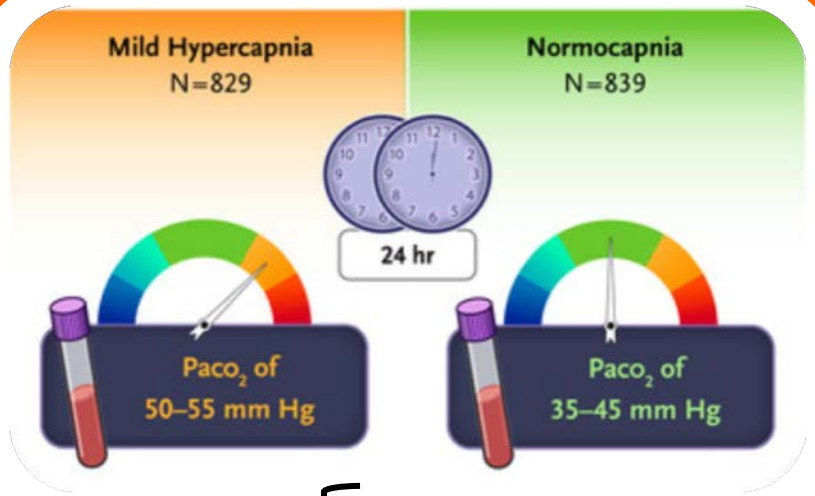


CJP : score GOSE à 6 mois

TAME-TRIAL

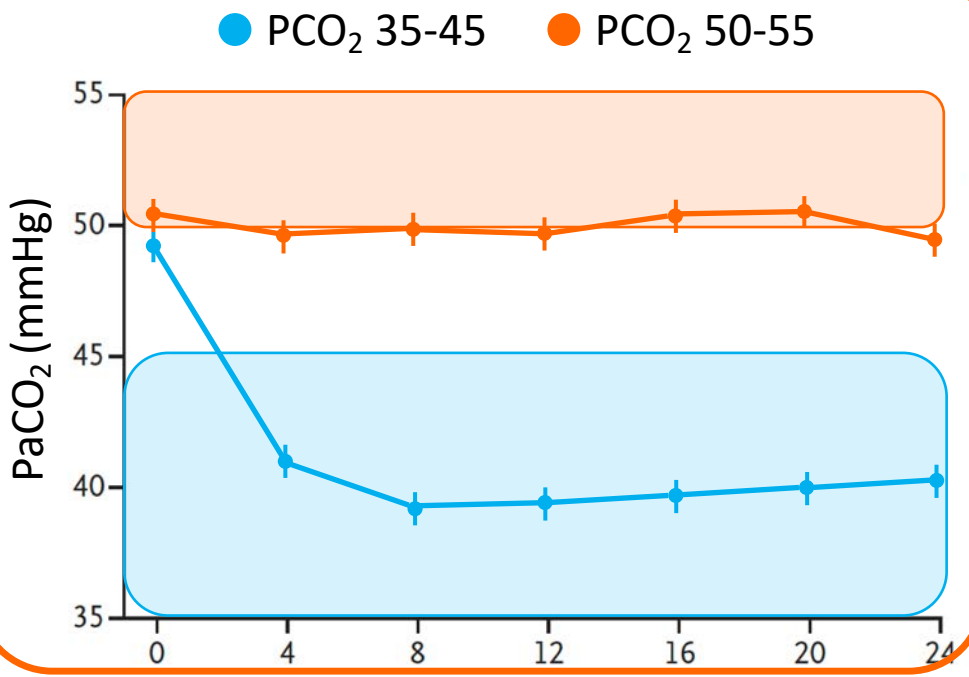
Eastwood et al. *New Engl J Med* 2023; 389:45-57

Hypercapnie thérapeutique



n=1668

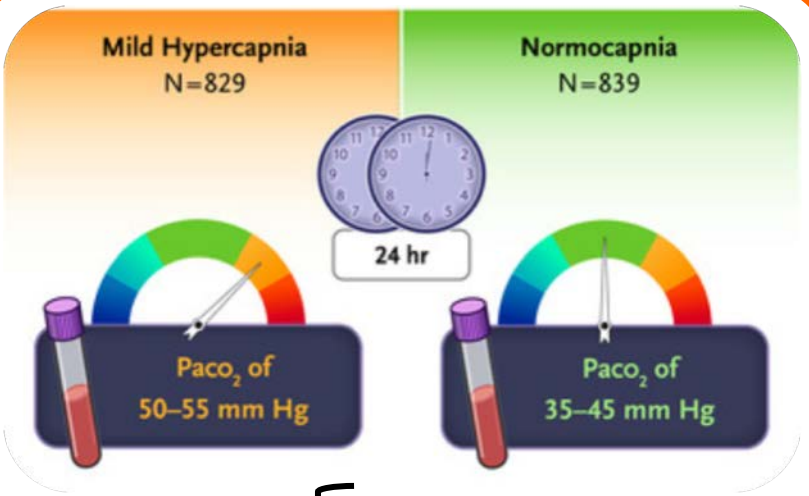
- Age = 60 ans
- Homme = 80%
- FV = 70%



TAME-TRIAL

Eastwood et al. *New Engl J Med* 2023; 389:45-57

Hypercapnie thérapeutique



n=1668

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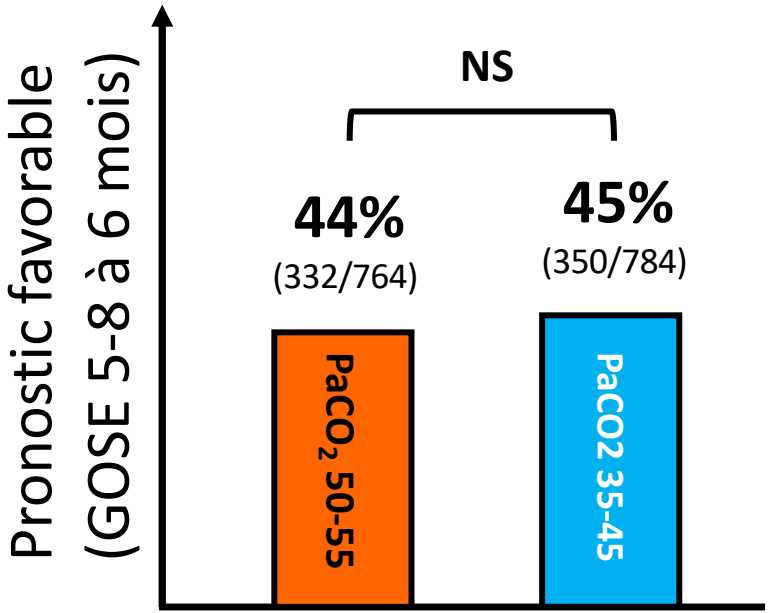


TAME-TRIAL

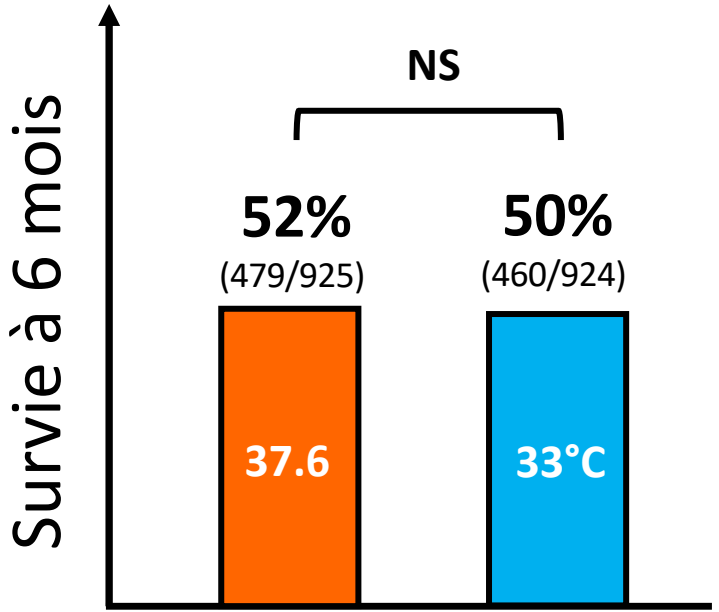
Eastwood et al. *New Engl J Med* 2023; 389:45-57

Période post-arrêt cardiaque — **?** — **Température : cible et durée**

ttm2

33°C versus < 37,9°C

- 1850 patients
- 14 pays
- 80% homme
- ¾ rythme choquable



Dankiewicz et al. *New Engl J Med* 2021;384:2283-94

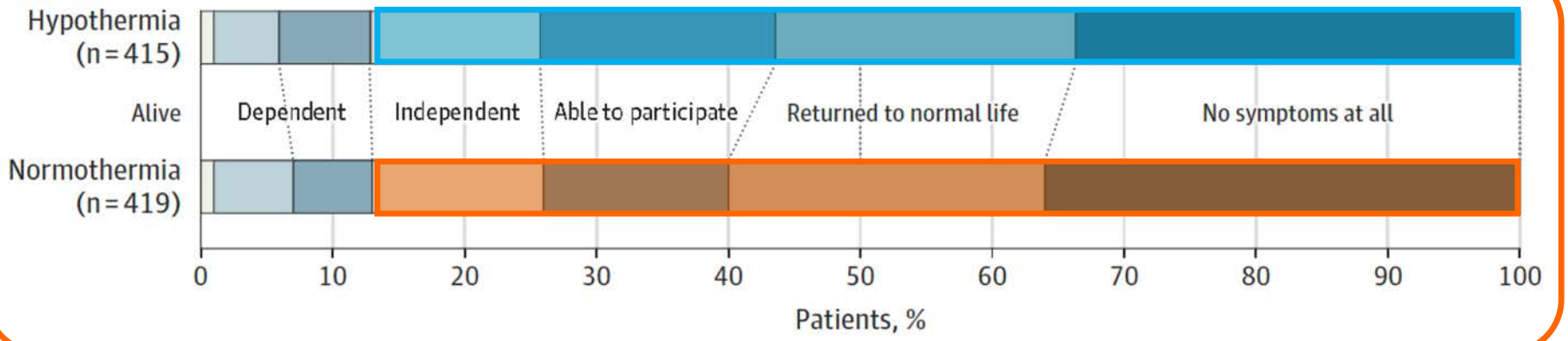
JAMA Neurology | Original Investigation

Effects of Hypothermia vs Normothermia on Societal Participation and Cognitive Function at 6 Months in Survivors After Out-of-Hospital Cardiac Arrest

A Predefined Analysis of the TTM2 Randomized Clinical Trial

ttm2

Devenir des survivants de TTM-2 ?



Etude ancillaire de TTM-2

Lilja L et al. *JAMA Neurol. 2023;80:1070-1079*

JAMA Neurology | Original Investigation

Effects of Hypothermia vs Normothermia on Societal Participation and Cognitive Function at 6 Months in Survivors After Out-of-Hospital Cardiac Arrest

A Predefined Analysis of the TTM2 Randomized Clinical Trial

ttm2

Devenir des survivants de TTM-2 ?

Scores de dysfonction cognitive : 760/939 survivants

Outcome assessment[b]	All including dead; *P* value	Model 1: survivors at 6 mo only	
		Mean difference (95% CI)	*P* value
MoCA-30[c]	.88	0.36 (−0.33 to 1.05)	.37
SDMT z score	.82	0.06 (−0.16 to 0.27)	.62

MoCA, Montreal Cognitive Assessment; SDMT, Symbol Digit Modalities Test.

Durée du contrôle de température ?

ORIGINAL ARTICLE

Duration of Device-Based Fever Prevention after Cardiac Arrest

N=800 ACEH **85% FV/TV** **50% STEMI**

Etude secondaire BOX-TRIAL

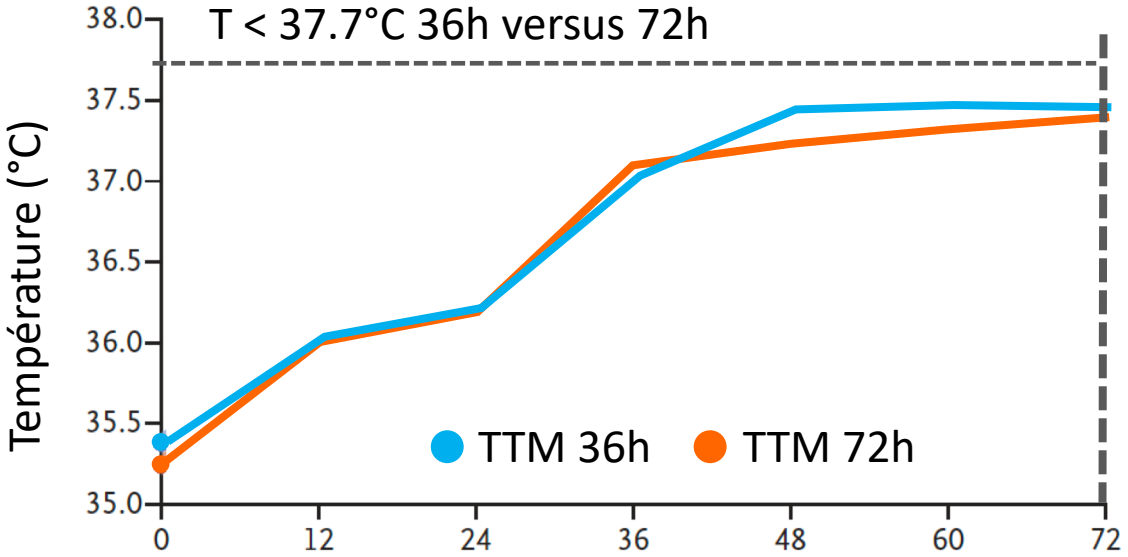
Hassager C et al. *New Engl J Med* 2023;388:888-97

ORIGINAL ARTICLE

Duration of Device-Based Fever Prevention after Cardiac Arrest

N=800 ACEH
85% FV/TV
50% STEMI

TTM 36 vs. 72h



Etude secondaire BOX-TRIAL

Hassager C et al. *New Engl J Med* 2023;388:888-97

Table 2. Outcomes and Adverse Events.*

Outcome or Event	Temperature Control for 36 Hr (N=393)	Temperature Control for 72 Hr (N=396)	Hazard Ratio (95% CI)	P Value
CPC 3-5 à J90	32%	34%	0.99 (0.77–1.2	P=0.7
Secondary outcomes				
Death from any cause within 90 days — no. (%)	116 (29.5)	120 (30.3)	0.97 (0.75–1.26)	
Median CPC among patients alive at 3 mo (IQR)†	1 (1–5)	1 (1–5)		
Median modified Rankin scale score among patients alive at 3 mo (IQR)‡	1 (0–6)	1 (0–6)		

Etude secondaire BOX-TRIAL

Hassager C et al. *New Engl J Med* 2023;388:888-97

EUROPEAN RESUSCITATION COUNCIL

ICM RAPID PRACTICE GUIDELINE

ERC-ESICM guidelines on temperature control after cardiac arrest in adults

Check for updates

ESICM EUROPEAN SOCIETY OF INTENSIVE CARE MEDICINE

MODERATE

We **recommend not** using prehospital cooling with rapid infusion of large volumes of cold IV fluid immediately after ROSC.

LOW

We **recommend** actively preventing fever (defined as a temperature > 37.7°C) in post-cardiac arrest patients who remain comatose.

GOOD PRACTICE

There is currently insufficient evidence to recommend for or against temperature control at 32-36°C in sub-populations of cardiac arrest patients or using early cooling, and future

Sandroni C, et al. *intensive Care Med* 2022;48:261-269

1. FV réfractaire : double défibrillation
2. ECMO / AC réfractaire : plutôt non
3. ST- : coronarographie différée
4. PAM, PO_2, PCO_2 : Guidelines 2021
5. Prévention de l'hyperthermie