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Lille - 1^{er} avril 2011



Arrêt Cardiaque et RCP: recommandations et nouveautés en 2011

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Nouvelles recommandations / RCP

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Reco. ERC 2010 / RCP



- Alerte - « Chaîne de Survie »
- RCP de base
- Défibrillation
- RCP spécialisée
- Suites de la RCP

* [Nouveautés Reco ERC 2010]



Reco. ERC 2010 / RCP



- **Alerte - « Chaîne de Survie »**
- RCP de base
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Alerte

Reconnaissance / Diagnostic de l'AC:

= absence de « signes de vie »

- Conscience - Réactivité = 0
- Respiration absente ou anormale: « gasps » +++
- [+/- pouls = 0]

Conseil téléphonique = MCE seul

Alerte PRIORITAIRE (15 - 112) / début RCP
... sauf enfants



Reco. ERC 2010 / RCP



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RCP de base

RCP Mécanique = Ventilation + MCE

Principe fondamental Reco. 2005/2010

=

Prépondérance MCE

→ Continuité du MCE: ↯↯↯ interruptions

↯ Réduction de la ventilation

↯ Prise de pouls différée

RCP de base en 2007 ? = MCE seul

Articles

Cardiopulmonary resuscitation by bystanders with chest compression only (SOS-KANTO): an observational study

SOS-KANTO study group

Summary

Background Mouth-to-mouth ventilation is a barrier to bystanders doing cardiopulmonary resuscitation (CPR), but few clinical studies have investigated the efficacy of bystander resuscitation by chest compressions without mouth-to-mouth ventilation (cardiac-only resuscitation).

Methods We did a prospective, multicentre, observational study of patients who had out-of-hospital cardiac arrest. On arrival at the scene, paramedics assessed the technique of bystander resuscitation. The primary endpoint was favourable neurological outcome 30 days after cardiac arrest.

Findings 4068 adult patients who had out-of-hospital cardiac arrest witnessed by bystanders were included; 439 (11%) received cardiac-only resuscitation from bystanders, 712 (18%) conventional CPR, and 2917 (72%) received no bystander CPR. Any resuscitation attempt was associated with a higher proportion having favourable neurological outcomes than no resuscitation (5.0% vs 2.2%, $p < 0.0001$). Cardiac-only resuscitation resulted in a higher proportion of patients with favourable neurological outcomes than conventional CPR in patients with apnoea (6.2% vs 3.1%; $p = 0.0195$), with shockable rhythm (19.4% vs 11.2%, $p = 0.041$), and with resuscitation that started within 4 min of arrest (10.1% vs 5.1%, $p = 0.0221$). However, there was no evidence for any benefit from the addition of mouth-to-mouth ventilation in any subgroup. The adjusted odds ratio for a favourable neurological outcome after cardiac-only resuscitation was 2.2 (95% CI 1.2–4.2) in patients who received any resuscitation from bystanders.

Interpretation Cardiac-only resuscitation by bystanders is the preferable approach to resuscitation for adult patients with witnessed out-of-hospital cardiac arrest, especially those with apnoea, shockable rhythm, or short periods of untreated arrest.

Lancet 2007; 369: 920–26

See Comment page 882

*Members listed at end of paper

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SOS-KANTO

58 EMS / Région de KANTO

4068 AC extra-hospitaliers en 16 mois (2002-2003)

⇒ Pas de RCP / témoins = 72 %

⇒ RCP conventionnelle = 18 %

⇒ MCE seul = 11 %

↪ Survie neuro à J+30



SOS-KANTO

RCP = 5,0% vs RCP \ominus = 2,2% ($p < 0.001$)

	MCE seul	MCE + B \grave{a} B	p
Tous AC	6,1%	4,2%	0,14
FV	19,4%	11,2%	0,041
RCP < 4 min	10,1%	5,1%	0,022

RCP de base en 2010 ? = MCE seul



Chest Compression–Only CPR by Lay Rescuers and Survival From Out-of-Hospital Cardiac Arrest

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Robert A. Berg, MD

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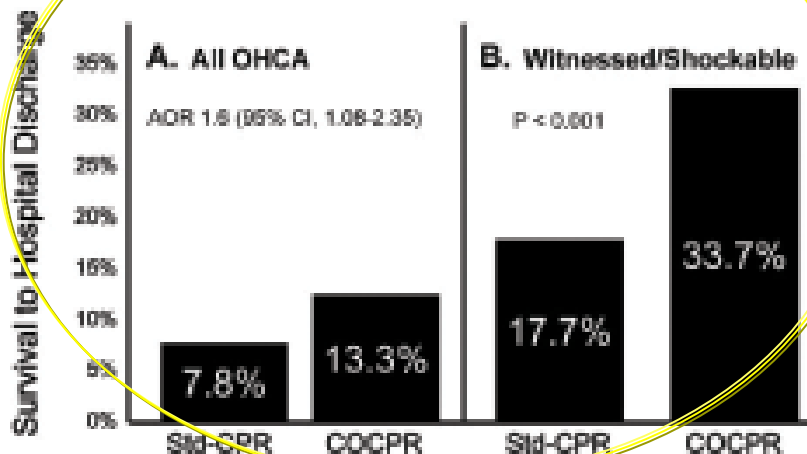
Context Chest compression–only bystander cardiopulmonary resuscitation (CPR) may be as effective as conventional CPR with rescue breathing for out-of-hospital cardiac arrest.

Objective To investigate the survival of patients with out-of-hospital cardiac arrest using compression-only CPR (CO-CPR) compared with conventional CPR.

Design, Setting, and Patients A 5-year prospective observational cohort study of survival in patients at least 18 years old with out-of-hospital cardiac arrest between January 1, 2005, and December 31, 2009, in Arizona. The relationship between layperson bystander CPR and survival to hospital discharge was evaluated using multivariable logistic regression.

Main Outcome Measure Survival to hospital discharge.

Survival after Bystander CPR for OHCA in Arizona (2005 to 2010)
Compression Only CPR Advocated and Taught



MCE seul/2005 = 19,6% vs /2009 = 75,9% (p<0,001)

Survie = 3,7 % (2005) ⇒ 9,8 % (2009)(p<0,001)

Conclusion Among patients with out-of-hospital cardiac arrest, layperson compression-only CPR was associated with increased survival compared with conventional CPR and no bystander CPR in this setting with public endorsement of chest compression–only CPR.



RCP de base en 2010 ? MCE seul ou RCP conventionnelle ?

ORIGINAL ARTICLE

CPR with Chest Compression Alone or with Rescue Breathing

Thomas D. Rea, M.D., Carol Fahrenbruch, M.S.P.H., Linda Culley, B.A.,
Rachael T. Donohoe, Ph.D., Cindy Hambly, E.M.T., Jennifer Innes, B.A.,
Megan Bloomingdale, E.M.T., Cleo Subido, Steven Romines, M.S.P.H.,
and Mickey S. Eisenberg, M.D., Ph.D.

Of the 1941 patients who met the inclusion criteria, 981 were randomly assigned to receive chest compression alone and 960 to receive chest compression plus rescue breathing. We observed no significant difference between the two groups in the proportion of patients who survived to hospital discharge (12.5% with chest compression alone and 11.0% with chest compression plus rescue breathing, $P=0.31$) or in the proportion who survived with a favorable neurologic outcome in the two sites that assessed this secondary outcome (14.4% and 11.5%, respectively; $P=0.13$). Prespecified subgroup analyses showed a trend toward a higher proportion of patients surviving to hospital discharge with chest compression alone as compared with chest compression plus rescue breathing for patients with a cardiac cause of arrest (15.5% vs. 12.3%, $P=0.09$) and for those with shockable rhythms (31.9% vs. 25.7%, $P=0.09$).



RCP de base en 2011 ? MCE seul ou RCP conventionnelle ?



BMJ

RESEARCH

Outcomes of chest compression only CPR versus conventional CPR conducted by lay people in patients with out of hospital cardiopulmonary arrest witnessed by bystanders: nationwide population based observational study

Toshio Ogawa, assistant professor,¹ Manabu Akahane, lecturer,¹ Soichi Koike, associate professor,² Seizan Tanabe, professor,³ Tatsuhiro Mizoguchi, specialist for ambulance service,⁴ Tomoaki Imamura, professor¹

T Ogawa et al. *BMJ* 2011; 342: c7106



RCP de base en 2011 ? RCP conventionnelle > MCE seul ?

Registre National Japonnais / 3 ans: 2005 - 2007

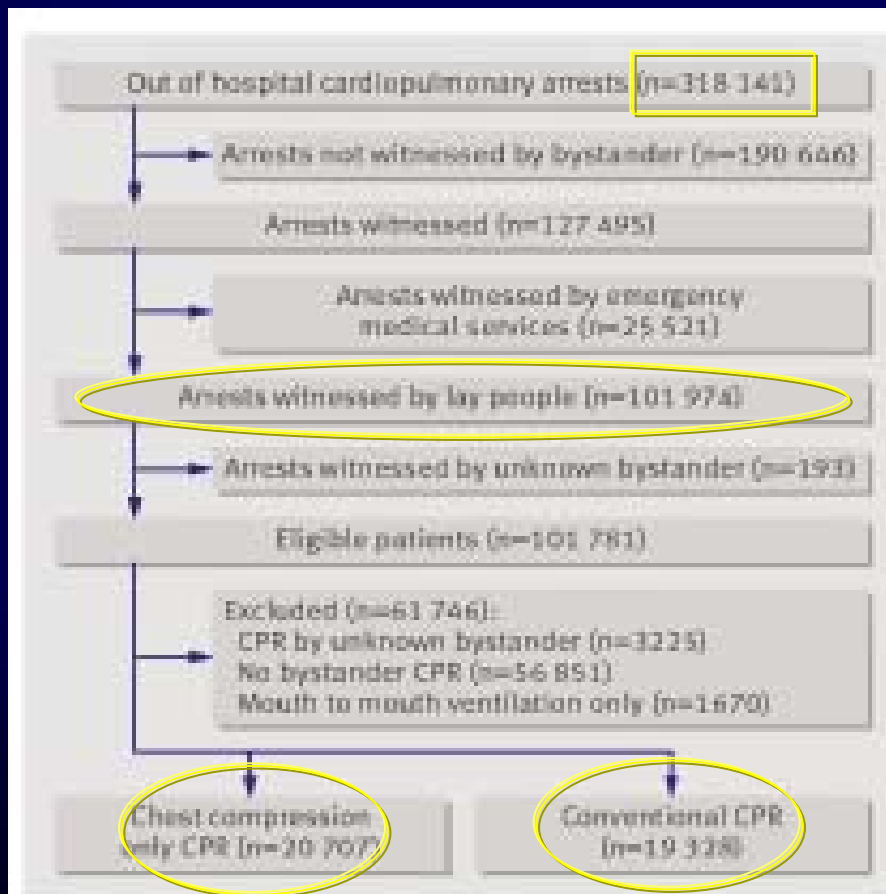


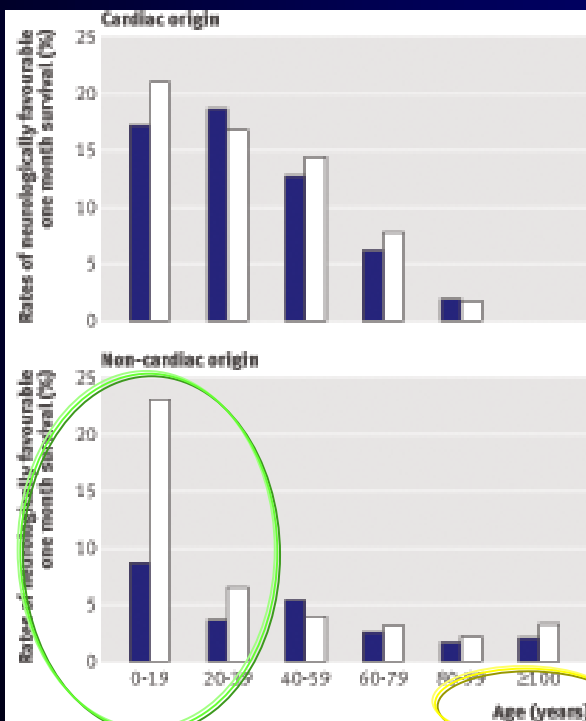
Fig 1 | Study profile with selection of participants

RCP de base en 2011 ? RCP conventionnelle > MCE seul ?

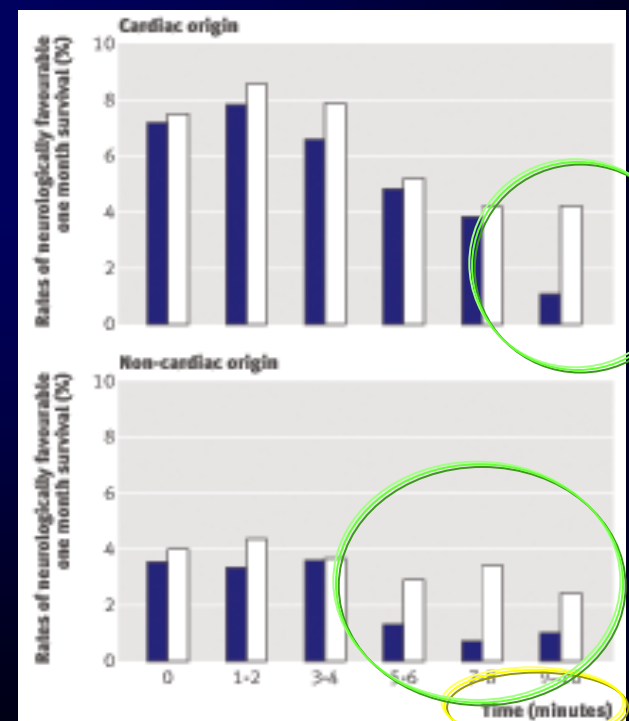
Table 2 | One month survival and neurologically favourable one month survival in cases of out of hospital cardiopulmonary arrest witnessed by bystander with chest compression only CPR and conventional CPR. Figures are percentages (numbers of participants)

	Chest compression only CPR	Conventional CPR	Odds ratio (95% CI), P value	
			Unadjusted	Adjusted*
One month survival	8.7 (1799/20 707)	10.3 (1997/19 327)	1.21 (1.13 to 1.29), <0.001	1.17 (1.06 to 1.29), 0.002
Neurologically favourable one month survival	4.6 (943/20 662)	5.6 (1070/19 247)	1.23 (1.12 to 1.35), <0.001	1.17 (1.01 to 1.35), 0.037

*Adjusted for age, sex, assistance from dispatcher, initial identified cardiac rhythm, cause of cardiac arrest, relation of bystander to patient, use of public access automated external defibrillator, first shock from emergency medical staff, use of drug during CPR, and duration between bystander witnessing event to bystander starting CPR, to CPR by emergency medical staff, and to patient's arrival at hospital.



■ Conventional CPR
■ Compressions only



BMJ 2011; 342: c7106



RCP de base

↘ MCE

Débuter RCP de base / MCE

[MCE seul possible (sans VA) pdt 5 min]

Puis enchaînement MCE / VA = 30 / 2

Fréquence ≥ 100 / min et < 120 / min

Dépression ≥ 5 cm

Ratio compr. / décomp. = 50 / 50

Relaxation complète (contact maintenu)

↘↘↘ interruptions MCE



Qualité du MCE +++





Reco. ERC 2010 / RCP



- Alerte - « Chaîne de Survie »
- RCP de base
- **Défibrillation**
- RCP spécialisée
- Suites de la RCP



Défibrillation

1 - Défibrillation 1^{ère} ou RCP préalable

- 2006: Si FV débutante = choc immédiat (intra-hosp.) et si FV prolongée (> 4 min.) = 2 min. RCP

⇒ Cliniquement : 90 sec de RCP avant CEE / DSA

Survie ⇒ 24 vs 30 %

⇒ 17 vs 27 % si FV > 4 min

(L. Cobb et al : JAMA 1999)

- 2010: pas de période RCP préalable systématique



Défibrillation

2 - 1 choc > 3 chocs

⇒ 1 seul choc + RCP immédiate (30 / 2)

⇒ Prise de pouls différé (avant choc suivant)

⇒ Choc \leq 5 sec d'arrêt MCE

⇒ Particularités: 3 chocs si

- KT cardiaque
- Post-Xie cardiaque

3 - Défibrillation automatisée (DSA > DEA)

= Progrès N° 1 / RCP (Survie: 2 % 6 %)

⇒ Développement programmes DAE et déploiement



Reco. ERC 2010 / RCP



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Optimisation du MCE



- Coup de poing thoracique dénigré ... (USIc)
- Compression - Décompression active (CDA)
- Valve d'impédance inspiratoire (+ CDA)
- « Lucas »
- « Autopulse »
- Intéressants mais ...
... non recommandés en routine



Voies aériennes et VA

- Intubation O-T:
 - N°1 ... mais controversée (si entraînement ++ seult^t)
 - Non prioritaire si VA / masque satisfaisante
 - Vérification instrumentale ++ (CO₂ expiré ...)
- VA : $f = 10$ et $V_T = 6$ à 7 mL / kg en O₂ pur
- Sonde Boussignac non recommandée en routine
- MCE / VA indépendants après intubation
- Rythme MCE ≥ 100 / min. en continu



Médicaments de l' A C

- Voies d'abord
 - N°1 = voie veineuse (VVP)
 - N°2 = voie intra-osseuse (enfant et adulte)
 - Voie endotrachéale non recommandée



Médicaments de l' A C

Voie intra-osseuse





Médicaments de l' A C

Drugs

Or

Not drugs

in 2010 CPR ?

TM Olasveengen *et al*: Intravenous drug administration during out-of-hospital cardiac arrest.
JAMA 2009; 302: 2222-9.



Intravenous Drug Administration During Out-of-Hospital Cardiac Arrest A Randomized Trial

Thomas M. Olasveengen, MD

Kjetil Sunde, MD, PhD

Calvinne Brunborg, MSc

Jon Thorsen

Peter A. Steen, MD, PhD

Lars Wik, MD, PhD

Context: Intravenous access and drug administration are included in advanced cardiac life support (ACLS) guidelines despite a lack of evidence for improved outcomes. Epinephrine was an independent predictor of poor outcome in a large epidemiological study, possibly due to toxicity of the drug or cardiopulmonary resuscitation (CPR) interruptions secondary to establishing an intravenous line and drug administration.

Objective: To determine whether removing intravenous drug administration from an ACLS protocol would improve survival to hospital discharge after out-of-hospital cardiac arrest.



TM Olasveengen *et al*: Intravenous drug administration during out-of-hospital cardiac arrest.
JAMA 2009; 302: 2222-9.



Etude prospective, monocentrique / 5 ans = 851 ACEH

ACLS + médicaments IV vs ACLS sans Médicaments IV

- ✓ Survie / sortie = 10.5 vs 9.2 % (p=0.61)
- ✓ Survie admission = 32 vs 21 % (p<0.001)
- ✓ Survie à 1 an = 10 vs 8 % (p=0.53)
- ✓ Survie CPC 1 = 9.8 vs 8.1 % (p=0.45)

⇒ Pas d'amines ni anti-arythmiques ??

Adrénaline ou placebo



THE UNIVERSITY OF
WESTERN AUSTRALIA
Achieving International Excellence



Placebo versus Adrenaline in Cardiac Arrest

The PACA Trial

Professor Ian Jacobs

Discipline of Emergency Medicine – University of Western Australia
Clinical Services Director – WA Ambulance Service

AHA – Nov 2010



A Randomised Placebo Controlled Trial of Adrenaline in Cardiac Arrest - The PACA Trial

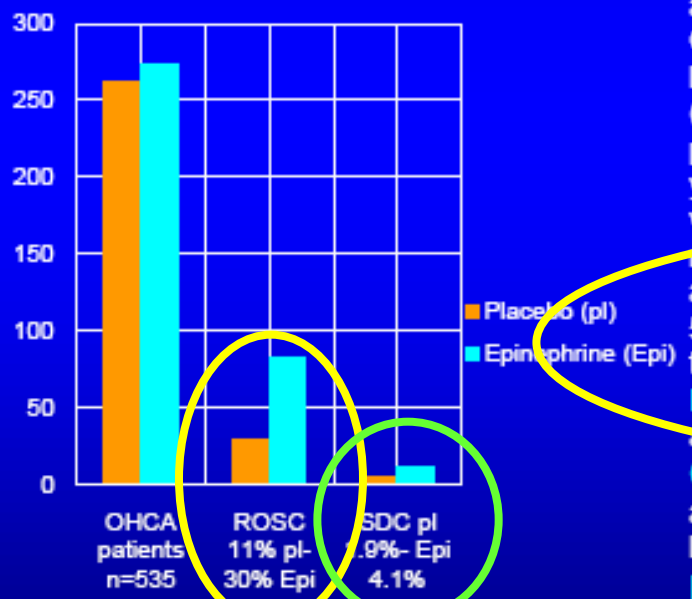


American Heart Association American Stroke Association
Learn and Live

BACKGROUND: Adrenaline (Epinephrine) remains the primary pharmacological agent in cardiac arrest. Despite a total absence of any experimental trials to establish efficacy, adrenaline is considered standard of care in resuscitation.

PURPOSE: To assess if Adrenaline (Epinephrine) is related to return of spontaneous circulation (ROSC), survival to hospital discharge (SDC) and neurological outcome (Cerebral Performance Category Score) at discharge.

A Randomized Placebo Controlled Trial of Epinephrine in Cardiac Arrest



Primary Endpoints: SDC

Secondary Endpoints: ROSC and neurological outcome at discharge

Results: During the study period paramedics attended 4107 cardiac arrests of which resuscitation was commenced in 1586 (38.6%) patients. Of these 602 (37.9%) were enrolled into the study with a further 67 (11.1%) being excluded after randomization. Of the remaining 535 patients 262 (48.9%) and 273 (51.0%) received placebo or adrenaline respectively. The percentage male (70.6% versus 74.8%); mean age (64.8 versus 65.4 years) and percentage of patients who received bystander CPR (55.7% versus 53.1%) were similar for the adrenaline and placebo groups respectively. ROSC was achieved in 83 (30.4%) patients receiving adrenaline and 29 (11.1%) receiving placebo - OR= 3.51 [95% CI 2.21 to 5.58]. Survival to hospital discharge occurred in 11 (4.1%) and 5 (1.9%) of the adrenaline and placebo patients OR= 2.16 [95% CI: 0.74 to 6.30].

Primary Outcome: SDC occurred in 11 (4.1%) and 5 (1.9%) of the adrenaline and placebo patients respectively.

Conclusion: The use of adrenaline in cardiac arrest was associated with a significant increase in the proportion of patients achieving ROSC however this improvement did not extend to SDC.

Implications: The results are unable to rule out a clinically meaningful benefit of Epinephrine in terms of SDC, further investigation into the post resuscitation period for those achieving ROSC is required to identify management strategies to improve survival.



Médicaments de l' AC en 2010

- Vasopresseurs: oui mais,
 - Adrénaline
 - Adrénaline [malgré absence d'étude vs placebo]
 - ♦ Le plus tôt possible si Asystole ou RSP
 - ♦ = 1 mg toutes les 3-5 min (4 min. environ)
 - ♦ Après le 3^e choc si FV/TV sans pouls
 - Vasopressine = alternative non retenue/ERC



Vasopressine et arrêt cardiaque



Espoir clinique en 2008:
... Association adrénaline + vasopressine ?

ORIGINAL ARTICLE

Vasopressin and Epinephrine vs. Epinephrine Alone in Cardiopulmonary Resuscitation

Pierre-Yves Gueugniaud, M.D., Ph.D., Jean-Stéphane David, M.D., Ph.D., Eric Chanzy, M.D., Hervé Hubert, Ph.D., Pierre-Yves Dubien, M.D., Patrick Mauriauourt, M.D., Coralie Bragança, M.D., Xavier Billères, M.D., Marie-Paule Clotteau-Lambert, M.D., Patrick Fuster, M.D., Didier Thiercelin, M.D., Guillaume Debaty, M.D., Agnès Ricard-Hibon, M.D., Patrick Roux, M.D., Catherine Espesson, M.D., Emgan Querellou, M.D., Laurent Ducros, M.D., Patrick Ecollan, M.D., Laurent Halbout, M.D., Dominique Savary, M.D., Frédéric Guillaumée, M.D., Régine Maupoint, M.D., Philippe Capelle, M.D., Cécile Bracq, M.D., Philippe Dreyfus, M.D., Philippe Nouguié, M.D., Antoine Gache, M.D., Claude Meurisse, M.D., Bertrand Boulanger, M.D., Claude Lae, M.D., Jacques Metzger, M.D., Valérie Raphael, M.D., Arielle Beruben, M.D., Volker Wenzel, M.D., Comlavi Guinhouya, Ph.D., Christian Vilhelm, Ph.D., and Emmanuel Marret, M.D.



Etude «A-VA»

SURVIE GLOBALE

	Adrénaline (n = 1452)	Adrénaline + AV (n = 1442)	P
RACS	29,5 %	28,6 %	0.62
Admission	21,3 %	20,7 %	0.69
Survie à 1 an	2.1 %	1.3 %	0.09



Médicaments de l' AC en 2010

■ Anti-arythmiques

- Amiodarone

 - = 300 mg/20 mL IVD (/ large VVP)

 - FV/TV sans pouls après le 3^e choc en même temps que l'adrénaline

 - [Renouvelable 1 fois / 1/2 dose (150 mg) +/- 900 mg/24h PSE]

- Lidocaïne = 0 (sauf « absence d'amiodarone »)

- Magnésium (MgSO₄: 2g IVD)

 - HypoMg et torsades de pointe

 - Pas d'indication élargie



Médicaments de l' AC en 2010

- **Autres médicaments**
 - **Atropine = non recommandée**
 - **Alcalinisation: non recommandée sauf:**
 - HyperK et/ou acidose métabolique pré-existantes
 - AC / intoxications tricycliques
 - **Fibrinolyse:**
 - AC / Embolie pulmonaire
 - **Pas d'indication si AC / IdM**



	TNK	Placebo	P-value
30-day survival	14.7%	17.0%	0.36
Hospital admission	53.5%	55.0%	0.67
ROSC	55.0%	54.6%	0.96
24-h survival	30.6%	33.3%	0.39
Survival / hospital discharge	15.1%	17.5%	0.33

Symptomatic ICH	0.8%	0.0%	0.13
Major bleeds	7.7%	6.4%	0.48



Reco. ERC 2010 / RCP



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... dès la RACS ...



Suites de la RCP

= Syndrome post-AC = « maladie AC »

- ↪ Maintien homéostasie
- ↪ VA \Rightarrow SpO₂ > 92 % (< 98 %: lutte contre hyperoxémie)
- ↪ PA « optimale » / patient = stable
- ↪ Traiter les manifestations épileptiques: sédation ?
- ↪ Protéger coronaires et cerveau: pas de tt protecteur
- ↪ Traiter l'hyperthermie ...
- ↪ Lutter contre hyperglycémie > 10 mmol/L



Suites de la RCP



= Hypothermie induite précoce / coma post-RCP

↳ Précoce pendant 12 - 24 h

↳ Modérée (32 - 34 °C)

* S.A. Bernard et al. Treatment of comatose survivors of out-of-hospital cardiac arrest with induced hypothermia. N Engl J Med 2002 ; 346 : 557-63.

* M. Holzer et Hypothermia ACA Study Group : Mild therapeutic hypothermia to improve the neurologic outcome after cardiac arrest. N Engl J Med 2002 ; 346 : 549-56.

Quelque soit le type d'AC

Hypothermie et post-RCP en 2010



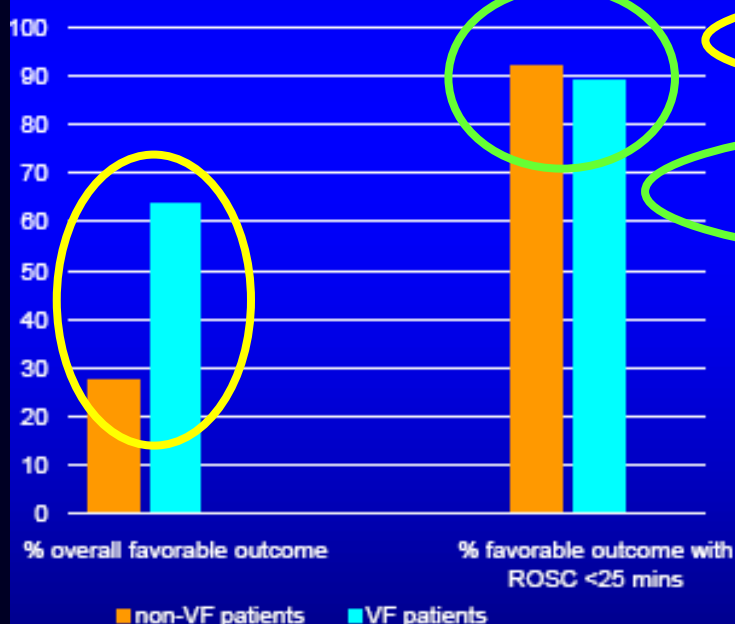
The Relationship Between Time Interval from Collapse to Return of Spontaneous Circulation and Neurologically Intact Survival for Patients Treated with Hypothermia after Non-V. Fibrillation Arrest Out of Hospital.



BACKGROUND: Clinical evidence strongly supports mild therapeutic hypothermia (TH) for unconscious patients with out-of-hospital cardiac arrest (OHCA) due to ventricular fibrillation (VF), but there are insufficient data that hypothermia had neurological benefit for those with non-VF arrest.

PURPOSE: To assess regional variation in frequency and timing of withdrawal of care after OHCA in a statewide system of cardiac receiving centers (CRCs).

Relationship Between Time Interval from Collapse to ROSC and Favorable Outcome



Primary Endpoints: A favorable neurological outcome at hospital discharge

Secondary Endpoints: Time to ROSC for non -VF OHCA ; TH

Results: Of the 452 unconscious adult patients treated with therapeutic hypothermia, 435 were included; 94 were non-VF arrest (non-VF group) and 341 were VF arrest (VF group). The non-VF group had a lower frequency of favorable neurological outcome than the VF group (27.7% vs. 63.7%, $p < 0.0001$). However, in the subgroups of patients who were divided into quartiles on the basis of collapse-to-ROSC interval, the non-VF group had a similar frequency of favorable neurological outcome than the VF group among patients with the quartile-1 interval (92% vs. 89%, $p = 0.75$). The non-VF group had lower frequencies of favorable neurological outcome than the VF group among patients with each quartile-2, quartile-3 and quartile-4 interval. In a multiple logistic-regression analysis among patients with the interval of quartile-1, non-VF arrest was not an independent predictor of a favorable neurological outcome with adjusted odds ratios of 0.53 (95% CI, 0.06-4.70, $p = 0.56$). The area under the ROC curve in the non-VF group was 0.82, and a cut off value of the collapse-to-ROSC interval for identification of a favorable neurological outcome was 25 minutes.

Primary Outcome: A frequency of favorable neurological outcome was 58% in non-VF patients who achieved ROSC within 25 minutes after cardiac arrest.

Conclusion: Therapeutic hypothermia for non-VF patients has neurological benefits when the ROSC was achieved within 25 minutes after cardiac arrest.

Implications: Early ROSC and TH can be beneficial for unconscious non-VF OHCA patients.

Taketomo Soga, MD, American Heart Association Resuscitation Research Fellow



« RéAC »

Registre électronique des Arrêts Cardiaques en France

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En partenariat avec

SFAR

SFMU

FFC

Et le soutien: SFC, SUDF, CFRC et DGS