HYPOTHERMIA SZEREPE AZ ÚJRAÉLESZTÉSBEN

BERÉNYI TAMÁS DR.

DEBRECEN - 2010. NOVEMBER 5.

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

International Liaison Committee on Resuscitation

ILCOR

American Heart Association (AHA)
European Resuscitation Council (ERC)
Heart and Stroke Foundation of Canada (HSFC)
Australian and New Zealand Committee on Resuscitation (ANZCOR)
Inter American Heart Foundation (IAHF)
Resuscitation Council of Asia
(RCA - current members Japan, Korea, Singapore, Taiwan)

Dallas, Texas from 31 January to 6 February 2010

ANESTHESIA & ANALGESIA

THE USE OF HYPOTHERMIA AFTER CARDIAC ARREST

DONALD W. BENSON, M.D.
G. RAINEY WILLIAMS, JR., M.D.
FRANK C. SPENCER, M.D.
ADOLPH J. YATES, M.D.
Baltimore, Maryland*

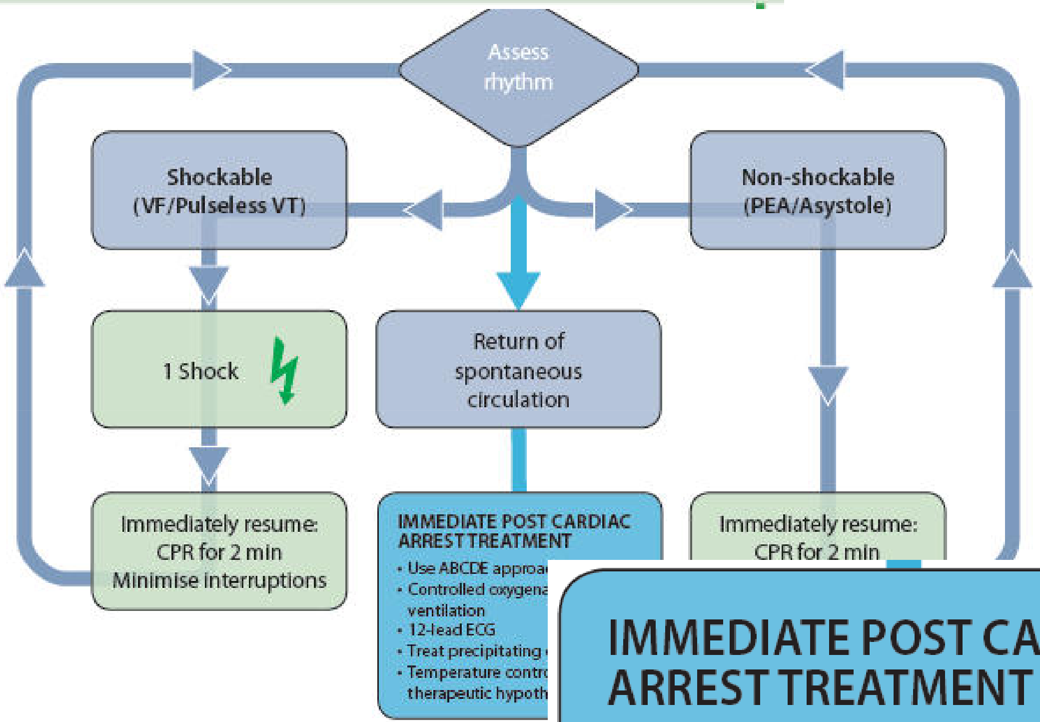
THE USE OF HYPOTHERMIA AFTER CARDIAC ARREST
BENSON ET AL. ANESTH ANALG.1959; 38: 423-428

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

EUROPEAN RESUSCITATION COUNCIL

Advanced Life Support
Universal Algorithm



DURING CPR

- Ensure high-quality CPR: rate, depth, recoil
- Plan actions before interrupting CPR
- Give oxygen
- Consider advanced airway and capnography
- Continuous chest compressions when advanced airway in place
- Vascular access (intravenous, intraosseous)
- Give adrenaline every 3-5 min
- Correct reversible causes

IMMEDIATE POST CARDIAC ARREST TREATMENT

- Use ABCDE approach
- Controlled oxygenation and ventilation
- 12-lead ECG
- Treat precipitating cause
- Temperature control / therapeutic hypothermia

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Resuscitation 81 (2010) 1219–1276
Contents lists available at ScienceDirect
Resuscitation
journal homepage: www.elsevier.com/locate/resuscitation
ELSEVIER

- Use of therapeutic hypothermia to include comatose survivors of cardiac arrest associated initially with non-shockable rhythms as well shockable rhythms. The lower level of evidence for use after cardiac arrest from non-shockable rhythms is acknowledged.

Therapeutic hypothermia. Animal and human data indicate that mild hypothermia is neuroprotective and improves outcome after a period of global cerebral hypoxia-ischaemia.[352,353] Cooling suppresses many of the pathways leading to delayed cell death, including apoptosis (programmed cell death). Hypothermia decreases the cerebral metabolic rate for oxygen ($CMRO_2$) by about 6% for each 1 °C reduction in temperature[354] and this may reduce the release of excitatory amino acids and free radicals.[352] Hypothermia blocks the intracellular consequences of excitotoxin exposure (high calcium and glutamate concentrations) and reduces the inflammatory response associated with the post-cardiac arrest syndrome.

All studies of post-cardiac arrest therapeutic hypothermia have included only patients in coma. There is good evidence supporting the use of induced hypothermia in comatose survivors of out-of-hospital cardiac arrest caused by VF. One randomised trial[355] and a pseudo-randomised trial[356] demonstrated improved neurological outcome at hospital discharge or at 6 months in comatose patients after out-of-hospital VF cardiac arrest. Cooling was initiated within minutes to hours after ROSC and a temperature range of 32–34 °C was maintained for 12–24 h. Extrapolation of these data to other cardiac arrests (e.g., other initial rhythms, in-hospital arrests, paediatric patients) seems reasonable but is supported by only lower level data.[317,357–363]

The practical application of therapeutic hypothermia is divided into three phases: induction, maintenance, and rewarming.[364] Animal data indicate that earlier cooling after ROSC produces better outcomes.[365] External and/or internal cooling techniques can be used to initiate cooling. An infusion of 30 ml kg^{-1} of 4 °C saline or Hartmann's solution decreases core temperature by approximately 1.5 °C. Other methods of inducing and/or maintaining hypothermia include: simple ice packs and/or wet towels; cooling blankets or pads; water or air circulating blankets; water circulating gel-coated pads; intravascular heat exchanger; and cardiopulmonary bypass.

In the maintenance phase, a cooling method with effective temperature monitoring that avoids temperature fluctuations is preferred. This is best achieved with external or internal cooling devices that include continuous temperature feedback to achieve a set target temperature. Plasma electrolyte concentrations, effective intravascular volume and metabolic rate can change rapidly during rewarming, as they do during cooling. Thus, rewarming must be achieved slowly: the optimal rate is not known, but the consensus is currently about 0.25–0.5 °C of warming per hour.[362]

The well-recognised physiological effects of hypothermia need to be managed carefully.[364]

Table 1 Classes of recommendations

Classes of Recommendations	Definition
Class I	Evidence and/or general agreement that a given treatment or procedure is beneficial, useful, effective.
Class II	Conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of the given treatment or procedure.
Class IIa	Weight of evidence/opinion is in favour of usefulness/efficacy.
Class IIb	Usefulness/efficacy is less well established by evidence/opinion.
Class III	Evidence or general agreement that the given treatment or procedure is not useful/effective, and in some cases may be harmful.

Table 2 Levels of evidence

Level of Evidence A	Data derived from multiple randomized clinical trials or meta-analyses.
Level of Evidence B	Data derived from a single randomized clinical trial or large non-randomized studies.
Level of Evidence C	Consensus of opinion of the experts and/or small studies, retrospective studies, registries.

SZENT IMRE
KÓRHÁZ

SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM

Circulation:
Cardiovascular
Quality and Outcomes

Now indexed in Medline/PubMed

Predictors of Survival From Out-of-Hospital Cardiac Arrest

A Systematic Review and Meta-Analysis

Comilla Sasson, MD, MS; Mary A.M. Rogers, MS, PhD;
Jason Dahl, MD; Arthur L. Kellermann, MD, MPH

Background—Prior studies have identified key predictors of out-of-hospital cardiac arrest (OHCA), but differences exist in the magnitude of these findings. In this meta-analysis, we evaluated the strength of associations between OHCA and key factors (event witnessed by a bystander or emergency medical services [EMS], provision of bystander cardiopulmonary resuscitation [CPR], initial cardiac rhythm, or the return of spontaneous circulation). We also examined trends in OHCA survival over time.

Methods and Results—An electronic search of PubMed, EMBASE, Web of Science, CINAHL, Cochrane DSR, DARE, ACP Journal Club, and CCTR was conducted (January 1, 1950 to August 21, 2008) for studies reporting OHCA of presumed cardiac etiology in adults. Data were extracted from 79 studies involving 142 740 patients. The pooled survival rate to hospital admission was 23.8% (95% CI, 21.1 to 26.6) and to hospital discharge was 7.6% (95% CI, 6.7 to 8.4). Stratified by baseline rates, survival to hospital discharge was more likely among those: witnessed by a bystander (6.4% to 13.5%), witnessed by EMS (4.9% to 18.2%), who received bystander CPR (3.9% to 16.1%), were found in ventricular fibrillation/ventricular tachycardia (14.8% to 23.0%), or achieved return of spontaneous circulation (15.5% to 33.6%). Although 53% (95% CI, 45.0% to 59.9%) of events were witnessed by a bystander, only 32% (95% CI, 26.7% to 37.8%) received bystander CPR. The number needed to treat to save 1 life ranged from 16 to 23 for EMS-witnessed arrests, 17 to 71 for bystander-witnessed, and 24 to 36 for those receiving bystander CPR, depending on baseline survival rates. The aggregate survival rate of OHCA (7.6%) has not significantly changed in almost 3 decades.

Conclusions—Overall survival from OHCA has been stable for almost 30 years, as have the strong associations between key predictors and survival. Because most OHCA events are witnessed, efforts to improve survival should focus on prompt delivery of interventions of known effectiveness by those who witness the event. (***Circ Cardiovasc Qual Outcomes*. 2010;3:63-81.**)

INTENSIVE INSULIN THERAPY IN CRITICALLY ILL PATIENTS

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 26, 2009 VOL. 360 NO. 13

Intensive versus Conventional Glucose Control in Critically Ill Patients

The NICE-SUGAR Study Investigators*

Friedrich *et al. Critical Care* 2010, 14:324
http://ccforum.com/content/14/5/324

CRITICAL CARE

VIEWPOINT

Does intensive insulin therapy really reduce mortality in critically ill surgical patients? A reanalysis of meta-analytic data

Jan O Friedrich[1,2,3]*, Clarence Chant[4] and Neill KJ Adhikari[1,5]

GREET VAN DEN BERGHE, M.D., PH.D

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

The New England Journal of Medicine

Established in 1812 as The New England Journal of Medicine and Surgery

VOLUME 346 FEBRUARY 21, 2002 NUMBER 8

THIS WEEK IN THE JOURNAL

ORIGINAL ARTICLES

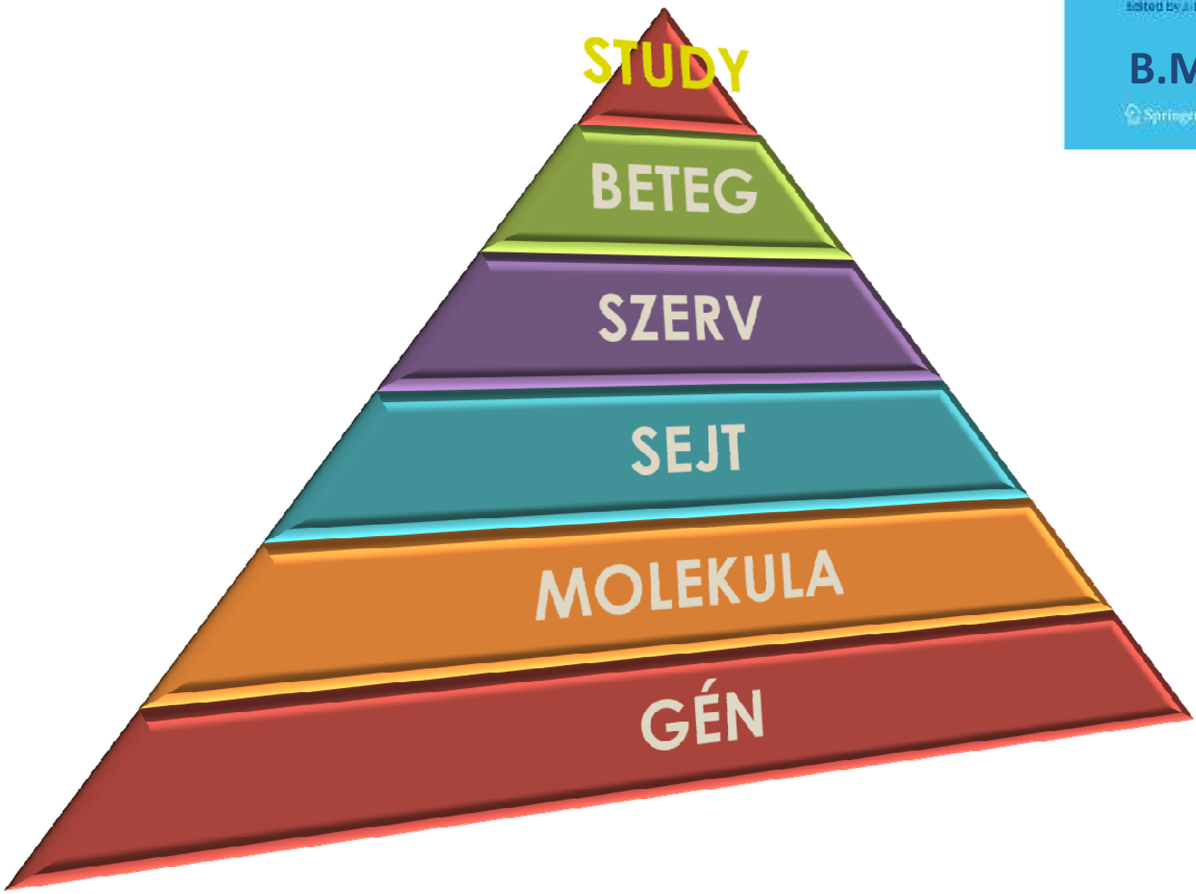
EDITORIAL

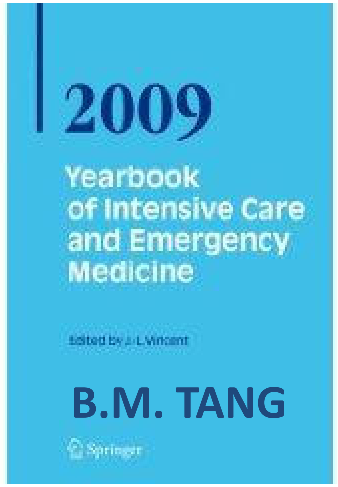
CLINICAL IMPLICATIONS OF BASIC RESEARCH

SOUNDING BOARD

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM





SZENT IMRE
KÓRHÁZ

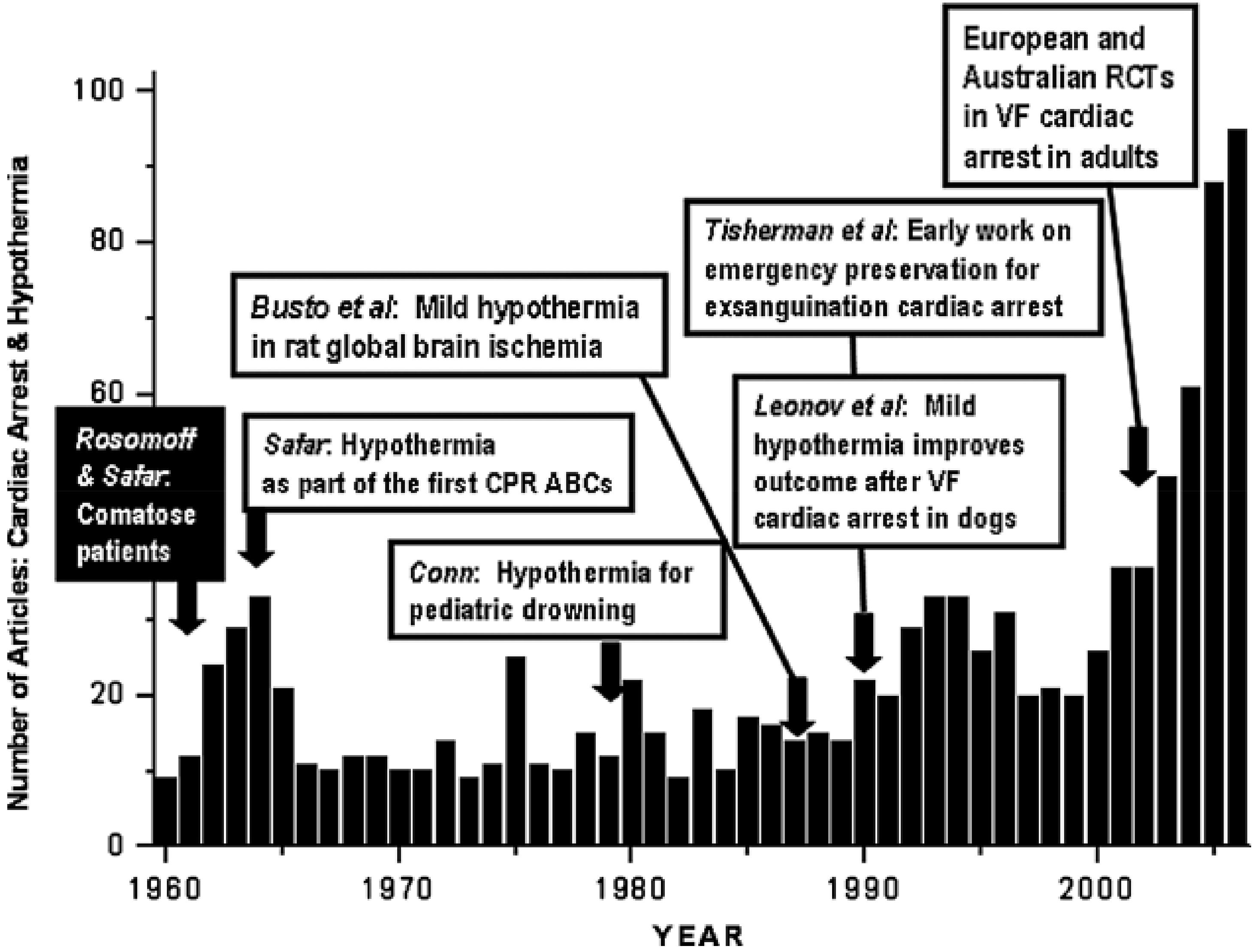
SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM

MISSION

INPOSSIBLE

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM



SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

SZENT IMRE
KÓRHÁZ

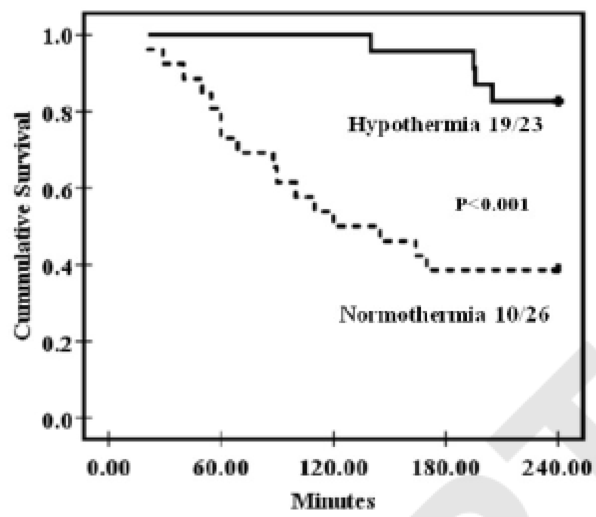
SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM

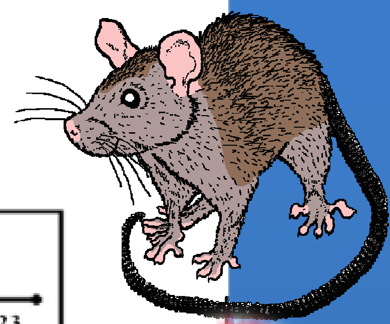
Shock, Publish Ahead of Print
DOI: 10.1097/SHK.0b013e318196ee99

Cardioprotective effect of therapeutic hypothermia for post-resuscitation myocardial dysfunction

Chiung-Yuan Hsu*, Chien-Hua Huang*, Wei-Tien Chang*, Huei-Wen Chen†, Hsiao-Ju Cheng*, Min-Shan Tsai*, Tzung-Dau Wang‡, Zui-Shen Yen*, Chien-Chang Lee*, Shyr-Chyr Chen*, Wen-Jone Chen*§

*Department of Emergency Medicine, National Taiwan University Medical College and Hospital, Taipei, Taiwan

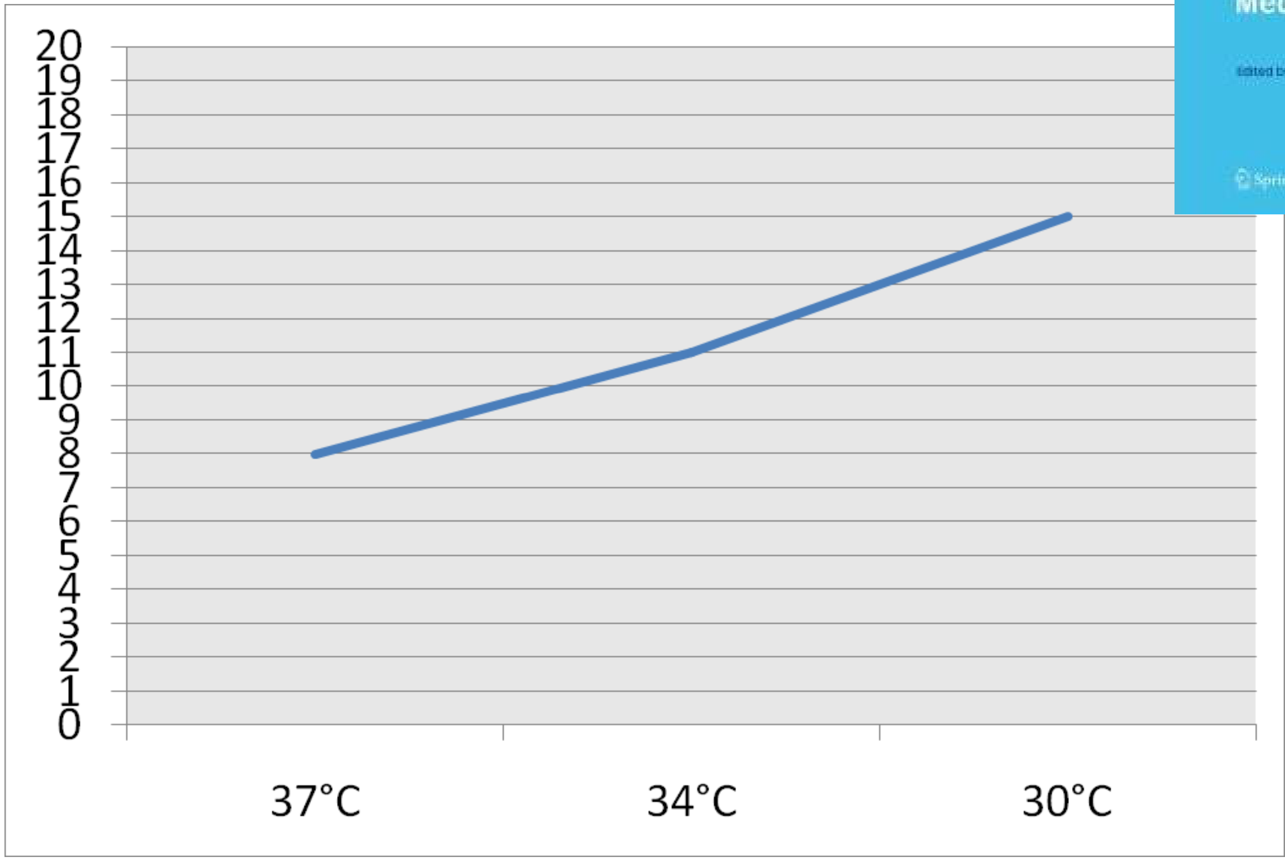




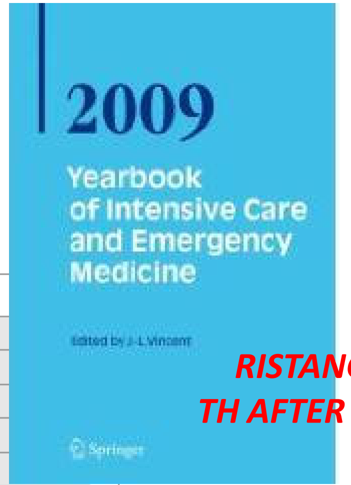
POSTRESUSCITATION MODERATE HYPOTHERMIA THERAPY IS BENEFICAL FOR POST-RESUSCITATION MYOCARDIAL DYSFUNCTION OF THE ASPHYXIA INDUCED CARDIAC ARREST AND RESUSCITATION. IT PRESERVES HEART FUNCTION, DECREASES MYOCARDIAL DAMAGE AND IMPROVES SHORT-TERM SURVIVAL SIGNIFICANTLY. THERAPEUTIC HYPOTHERMIA MAY ACTIVATE ERK1/2 AND INCREASE AKT ACTIVATION, WHICH COULD, AT LEAST IN PART, EXPLAIN THE MECHANISMS FOR CARDIOPROTECTION.

BETEGLLÁTÓ
CENTRUM

CONTRACTILIS MYOCYTA (%)



MAGHŐ



RISTANGO
TH AFTER CA

↑MYOFILAMENTALIS Ca SENSITIVITÁS

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Resuscitation (2008) 77, 242–249

available at www.sciencedirect.com

ScienceDirect

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

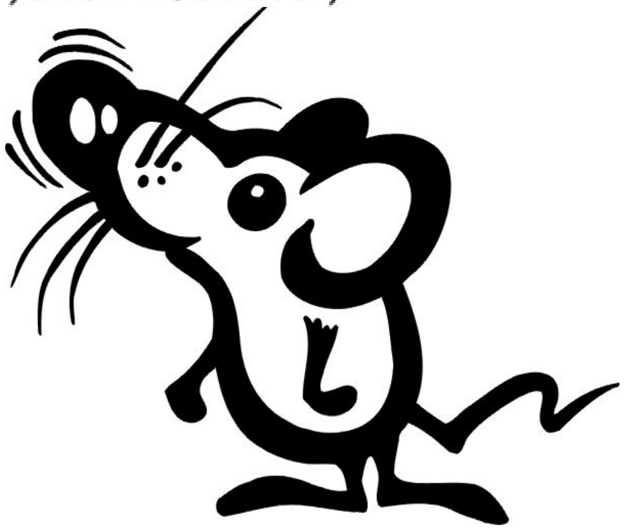
ELSEVIER

RESUSCITATION

EXPERIMENTAL PAPER

Intra-arrest cooling with delayed reperfusion yields higher survival than earlier normothermic resuscitation in a mouse model of cardiac arrest☆

Danhong Zhao[a,1], Benjamin S. Abella[b,*,1], David G. Beiser[a],



SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Acta Anaesthesiol Scand 2010; 54: 494–501
Printed in Singapore. All rights reserved

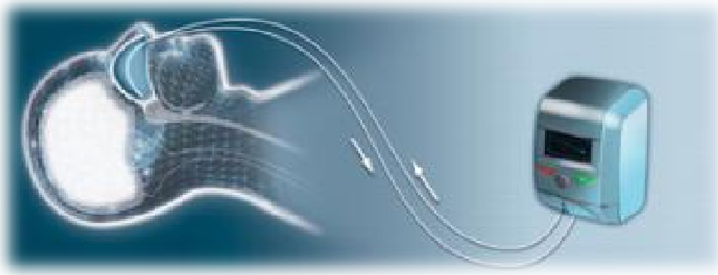
ACTA ANAESTHESIOLOGICA SCANDINAVICA
doi: 10.1111/j.1399-6576.2009.02157.x

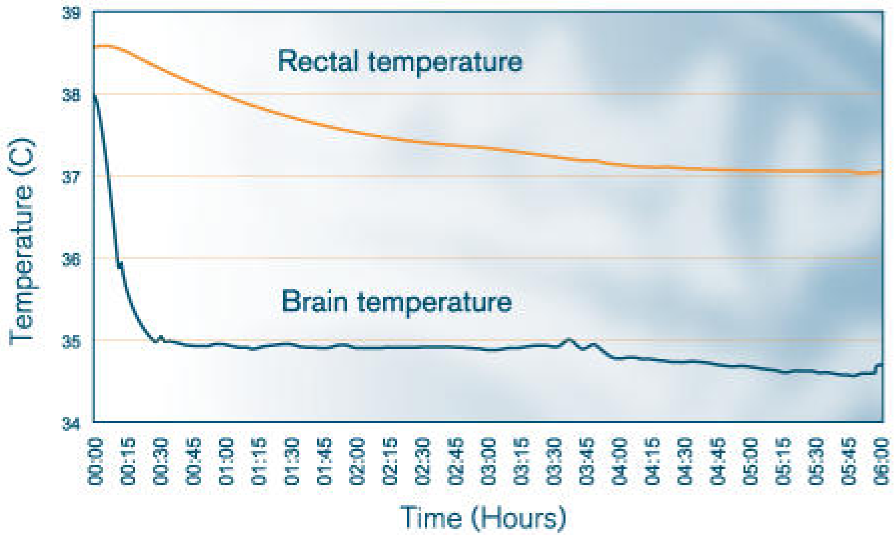
Acta Anaesthesiologica Scandinavica

Intranasal cooling with or without intravenous cold fluids during and after cardiac arrest in pigs

L. Covaciu[1], M. Allers[2], A. Lunderquist[3] and S. Rubertsson[1]

Conclusions: Intranasal balloon catheters can be used for therapeutic hypothermia initiation, maintenance and rewarming during CPR and after successful resuscitation in pigs.





SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Boy, I would love to be his pet cat!

SZENT IMRE
KÓRHÁZ

SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION
American Heart Association®
Learn and Live℠

Pilot Randomized Clinical Trial of Prehospital Induction of Mild Hypothermia in Out-of-Hospital Cardiac Arrest Patients With a Rapid Infusion of 4°C Normal Saline

Francis Kim, Michele Olsufka, W.T. Longstreth, Jr, Charles Maynard, David Carlbom, Steven Deem, Peter Kudenchuk, Michael K. Copass and Leonard A. Cobb

Circulation 2007;115;3064-3070; originally published online Jun 4, 2007;
DOI: 10.1161/CIRCULATIONAHA.106.655480
Circulation is published by the American Heart Association. 7272 Greenville Avenue, Dallas, TX 72514
 Print ISSN: 0009-7322. Online ISSN: 1524-4539

JOURNAL OF NEUROTRAUMA 26:359–363 (March 2009)

DOI: 10.1089/neu.2008.0558

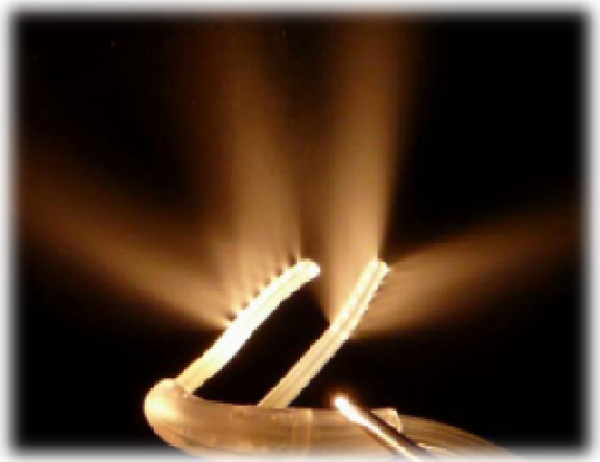
The Use of Pre-Hospital Mild Hypothermia after Resuscitation from Out-of-Hospital Cardiac Arrest

Francis Kim, Michele Olsufka, Graham Nichol, Michael K. Copass, and Leonard A. Cobb

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

TRANSNASALIS HŰTÉS



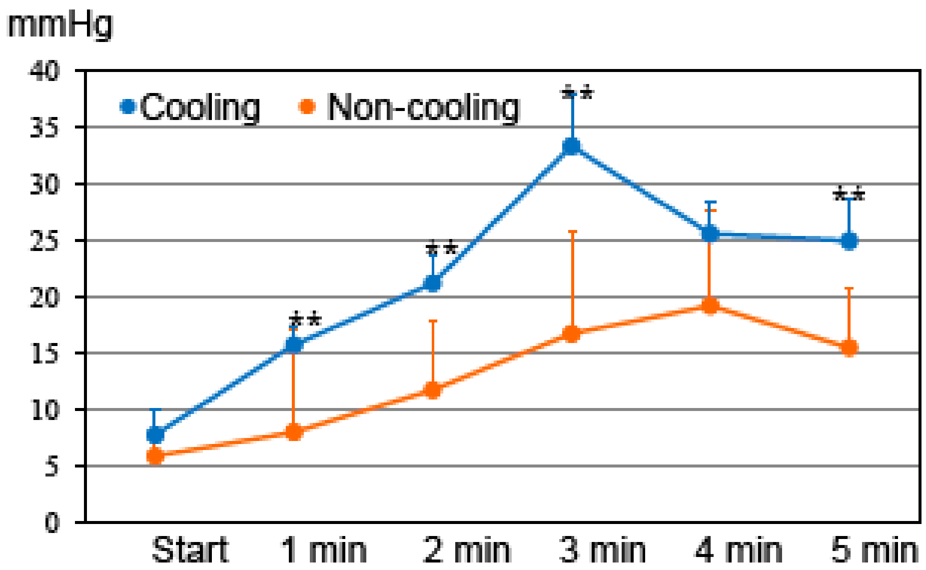


Figure 1. Figure showed CPP differences between two groups during CPR. *indicates statistically significant difference between groups. (*; P<0.05 **; P<0.01).

Jun Hwi Cho, MD[1,2]; Denise Barbut MD[4]; Giuseppe Ristagno, MD[1]; Yongqin Li, PhD[1]; Shijie Sun, MD[1,3]; Carlos Castillo, MSEE[1]; Max Harry Weil, MD, PhD[1,3]; Wanchun Tang, MD[1,3]

[1]*The Weil Institute of Critical Care Medicine, Rancho Mirage, CA, USA*
[2]*Depatment of Emergency Medicine, College of Medicine, Kangwon National University, Chuncheonsi, South Korea*
[3]*The Keck School of Medicine of the University of Southern California, Los Angeles, CA, USA*
[4]*BeneChill, San Diego, CA, USA*

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

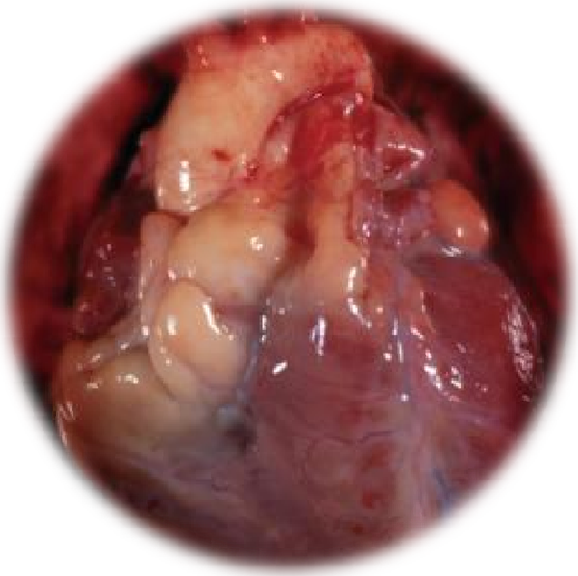
Anaesthesia
Journal of the Association of Anaesthetists of Great Britain and Ireland

Anaesthesia, 2010, **65**, pages 505–515 doi:10.1111/j.1365-2044.2009.06237.x

REVIEW ARTICLE

The effects of mild induced hypothermia on the myocardium: a systematic review

F. E. Kelly[1] and J. P. Nolan[2]



Conclusion

Animal studies and early human observational studies suggest a beneficial effect of induced hypothermia on the heart, but further human studies, possibly in the field of cardiology, may provide definitive answers. Its use in daily clinical routine solely to improve myocardial function or reduce myocardial infarct size cannot be recommended based on the available evidence [23]. However, if patients are cooled rapidly following cardiac arrest, achieve target temperature as quickly as possible, and have core temperatures maintained within the recommended limits for the recommended period of time, it is possible that their myocardial function, as well as their neurological outcome, may be improved.

Contents lists available at ScienceDirect

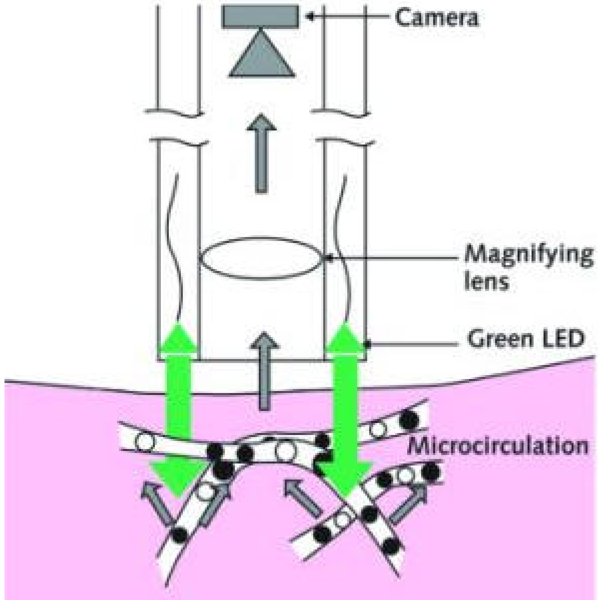
Resuscitation

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

Case report

Imaging the human microcirculation during cardiopulmonary resuscitation in a hypothermic victim of submersion trauma☆

Paul W.G. Elbers[a,c,*], Antonius J. Craenen[a], Antoine Driessen[d], Marco C. Stehouwer[b],

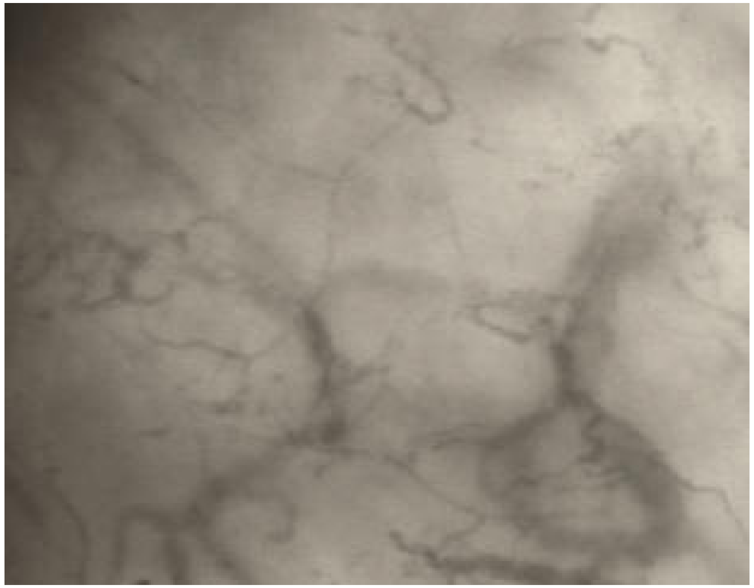


SIDESTREAM DARK FIELD

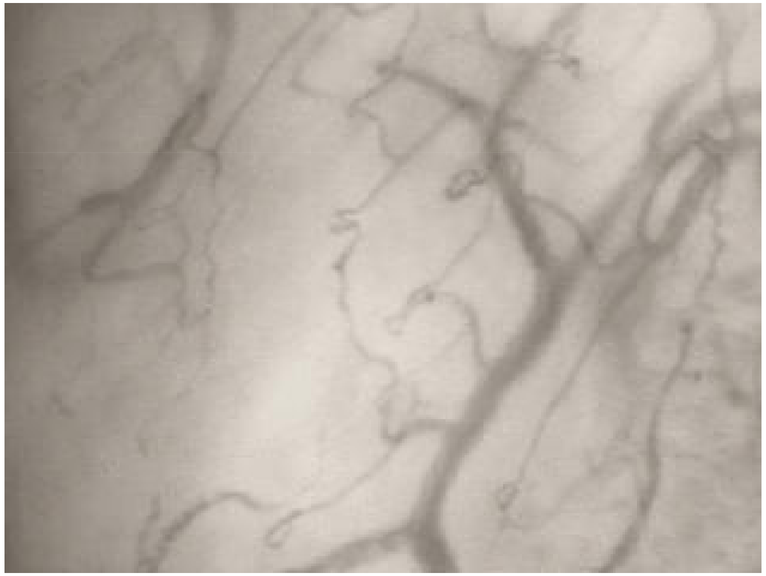
ORTHOGONAL POLARIZÁLT SPEKTRUM

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM



INTERRUPTION



RoSC

P.W.G. Elbers et al. / Resuscitation 81 (2010) 123–125

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

6. Conclusion

This is the first report on human microvascular imaging during CPR. mCPR is able to provide microvascular perfusion. However, indices of microvascular perfusion seem low and improve vastly after conversion to sinus rhythm. Microvascular perfusion was relatively independent from global hemodynamic parameters in this setting. The microcirculation may prove a sensitive monitor to determine the adequacy of CPR. Albeit prone to movement artifacts, it may prove possible to use SDF imaging in this context.

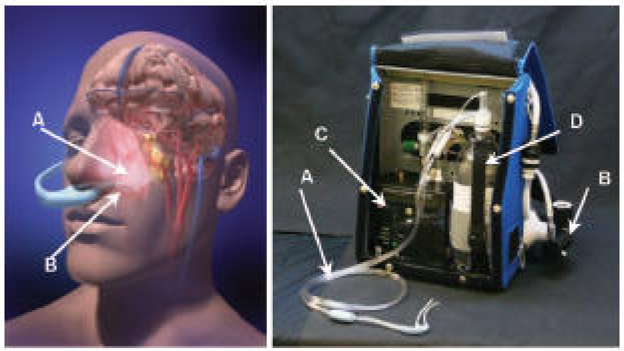
P.W.G. Elbers et al. / Resuscitation 81 (2010) 123–125

Resuscitation Science

Intra-Arrest Transnasal Evaporative Cooling

A Randomized, Prehospital, Multicenter Study (PRINCE: Pre-ROSC IntraNasal Cooling Effectiveness)

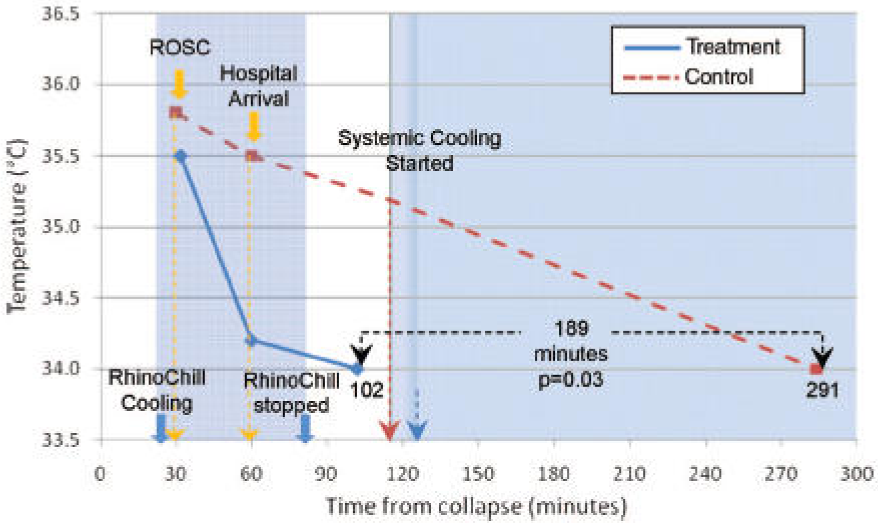
Maaret Castrén, MD, PhD*; Per Nordberg, MD*; Leif Svensson, MD, PhD; Fabio Taccone, MD; Jean-Louise Vincent, MD, PhD; Didier Desruelles, MD; Frank Eichwede, MD; Pierre Mols, MD, PhD; Tilmann Schwab, MD; Michel Vergnion, MD; Christian Storm, MD; Antonio Pesenti, MD, PhD; Jan Pachl, MD, PhD; Fabien Guérisse, MD; Thomas Elste, MD; Markus Roessler, MD, DEAA; Harald Fritz, MD; Pieterjan Durnez, MD; Hans-Jörg Busch, MD; Becky Inderbitzen, MSE; Denise Barbut, MD



A: coolant spray
B: nasal catheter

A: nasal catheter
B: oxygen tank
C: control unit
D: coolant bottle

Figure 1. RhinoChill cooling device.

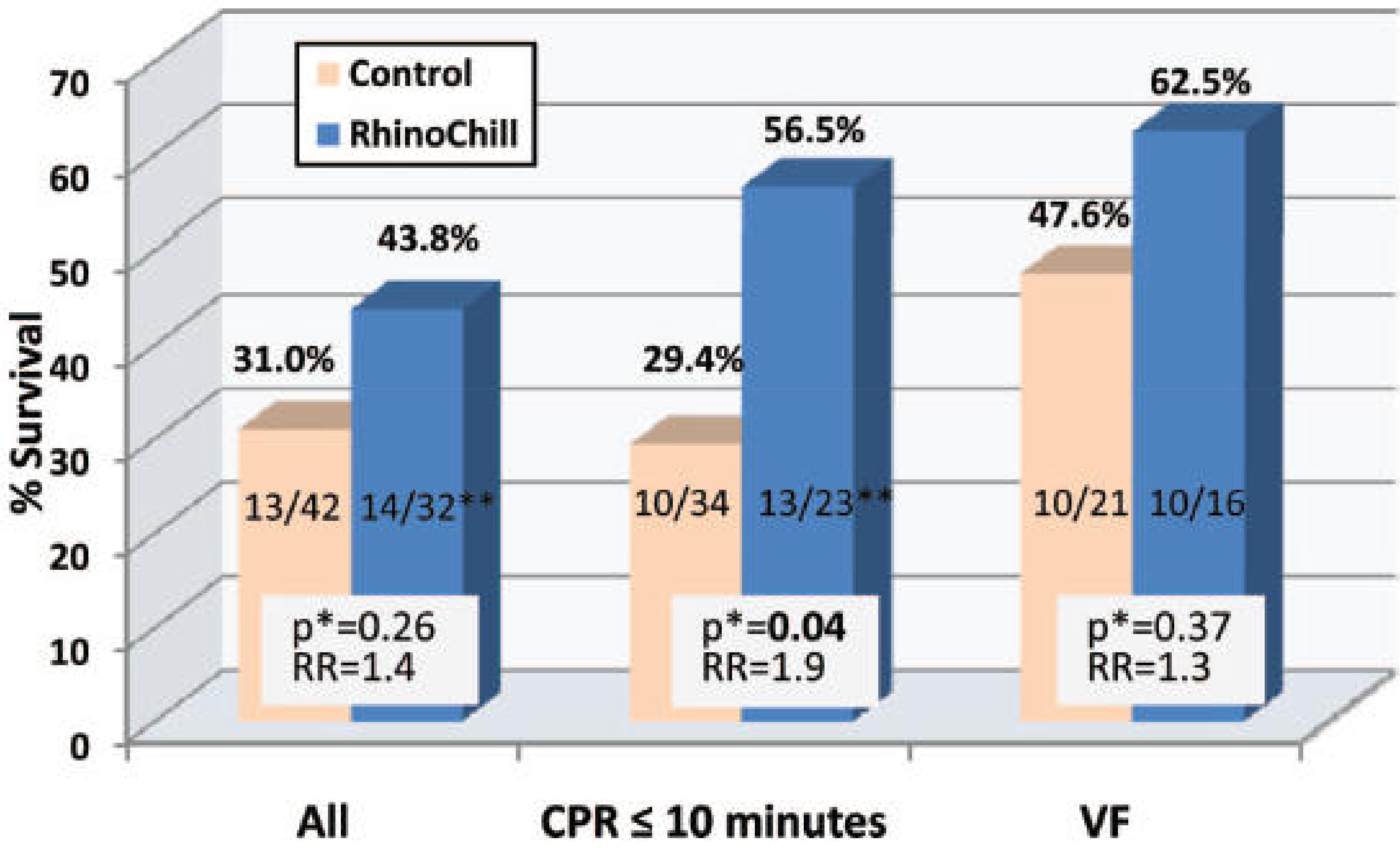


N=93 vs. N= 101

(*Circulation*. 2010;122:729-736.)

SZENT IMRE KÓRHÁZ

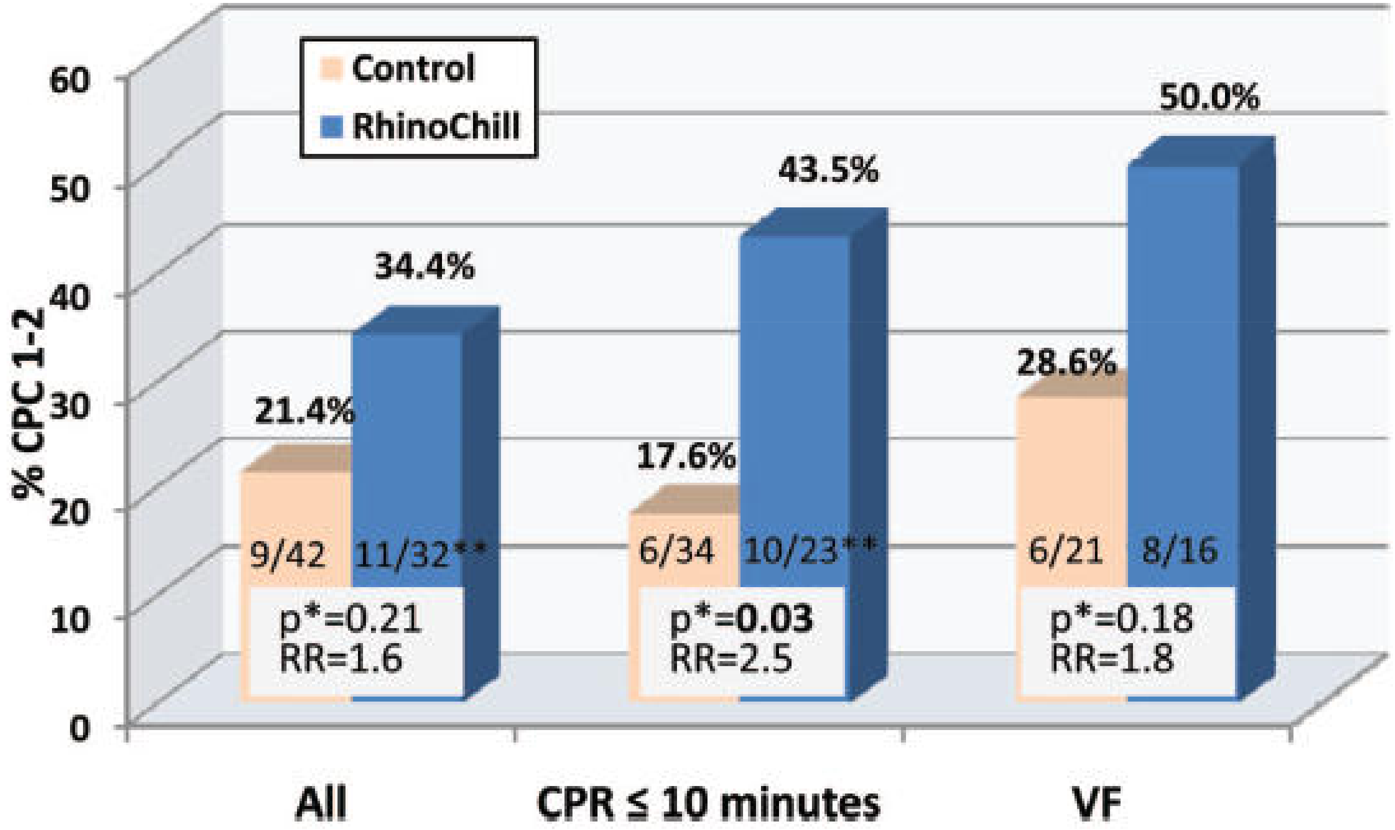
SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM



SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Circulation August 17, 2010



SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION
American Heart Association
Learn and Live

CLINICAL PERSPECTIVE

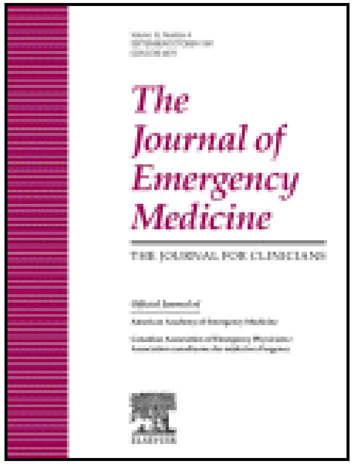
Therapeutic hypothermia has been shown to benefit survival in survivors of ventricular fibrillation or ventricular tachycardia, even when cooling is initiated with substantial delays in a hospital setting. Current guidelines from the American Heart Association and the International Liaison Committee on Resuscitation recommend cooling all such patients, and the use of cooling is becoming the standard of care in this setting. Many animal studies have shown significant added benefit when cooling is initiated earlier, with maximal benefit achieved when cooling is initiated during the arrest. Intra-arrest cooling has been shown to ease the resuscitation effort, increase resuscitation rates, and improve subsequent myocardial function. To date, intra-arrest cooling has not been studied in randomized human studies, largely because of the absence of methods suitable for use in the field. We have studied a new method of transnasal evaporative cooling that allows cooling to be initiated within minutes of the arrest and that has been shown to cool the brain before circulation is reestablished. The device previously has been shown to be safe for use in humans in an emergency room setting. In a randomized field study, we have shown that this method of cooling can be performed safely during an arrest without derailing the resuscitation effort and that it is relatively easy to implement. Furthermore, we have shown that target tympanic and core temperatures are achieved several hours earlier than with standard hospital-based cooling. Although outcomes are reported, larger studies will be required to determine the extent of the added outcome benefit over hospital-based cooling alone.

FIELD-INDUCED THERAPEUTIC HYPOTHERMIA FOR NEUROPROTECTION AFTER OUT-OF HOSPITAL CARDIAC ARREST: A SYSTEMATIC REVIEW OF THE LITERATURE

José G. Cabanas, MD,*†‡ Jane H. Brice, MD, MPH,§ Valerie J. De Maio, MD, MSC,*†‡ Brent Myers, MD, MPH,*‡ and Paul R. Hinchey, MD, MBA‡[1]

Included Studies (First Authors)	Main Outcomes of Interest
Callaway, 2001 (18)	Temperature changes
Bernard, 2002 (11)	Survival to discharge
Virkkunen, 2004 (21)	Temperature changes
Busch, 2006 (22)	Volume infusion Adverse events Survival to discharge
Kamarainen, 2007 (23)	Temperature changes Volume infusion
Kim, 2007 (24)	Temperature changes Adverse events
Storm, 2008 (25)	Temperature changes
Bruel, 2008 (26)	Temperature changes
Kamarainen, 2008 (27)	Temperature changes
Uray, 2008 (28)	Temperature changes
Hinchey, 2010 (29)	Survival to hospital discharge

ALBEIT LIMITED, THE CURRENT EVIDENCE SUGGESTS THAT PREHOSPITAL INITIATION OF THERAPEUTIC HYPOTHERMIA IS SAFE AND POTENTIALLY FEASIBLE; NEVERTHELESS, THERE IS A NEED FOR MORE RIGOROUS STUDIES TO UNDERSTAND ITS IMPACT AND EFFECTIVENESS AS IT PERTAINS TO THE PREHOSPITAL ENVIRONMENT.



SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

SZENT IMRE
KÓRHÁZ

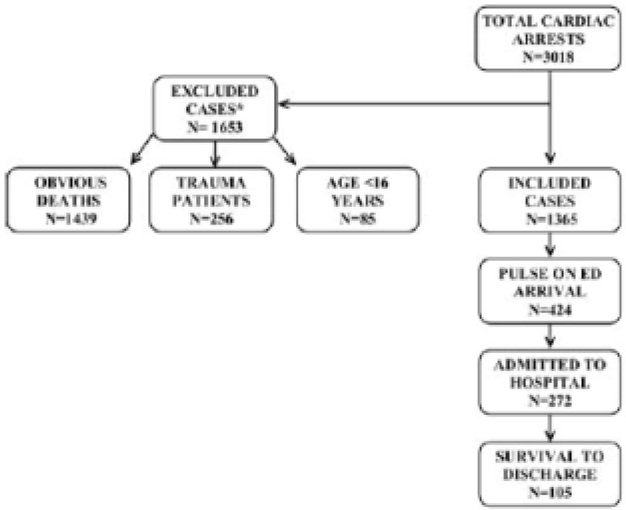
SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM

Improved Out-of-Hospital Cardiac Arrest Survival After the Sequential Implementation of 2005 AHA Guidelines for Compressions, Ventilations, and Induced Hypothermia: The Wake County Experience

Paul R. Hinchey, MD, MBA, J. Brent Myers, MD, MPH, Ryan Lewis, MS, EMT-P, Valerie J. De Maio, MD, MSc, Eric Reyer, MSN, ACNP, Daniel Licatese, RN, Joseph Zalkin, BSHS, Graham Snyder, MD, For the Capital County Research Consortium

From WakeMed Health and Hospitals (Hinchey, Myers, De Maio, Reyer, Snyder); the Clinical Research Unit, Emergency Services Institute (Hinchey, De Maio); Wake County EMS (Hinchey, Myers, Lewis, Zalkin); and Rex Healthcare (Licatese), Raleigh, NC.

Conclusion: In the context of a community-wide focus on resuscitation, the sequential implementation of 2005 American Heart Association guidelines for compressions, ventilations, and induced hypothermia significantly improved survival after cardiac arrest. Further study is required to clarify the relative contribution of each intervention to improved survival outcomes. [Ann Emerg Med. 2010;56:348-357.]



American College of Emergency Physicians
ADVANCING EMERGENCY CARE

Annals *of* Emergency Medicine

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Steffen *et al. Critical Care* 2010, **14**:R69
http://ccforum.com/content/14/2/R69

CRITICAL CARE

RESEARCH Open Access

Mild therapeutic hypothermia alters neuron specific enolase as an outcome predictor after resuscitation: 97 prospective hypothermia patients compared to 133 historical non-hypothermia patients

Ingo G Steffen†[1], Dietrich Hasper†[1], Christoph J Ploner[3], Joerg C Schefold[1], Ekkehart Dietz[2], Frank Martens[1], Jens Nee[1], Anne Krueger[1], Achim Jörres[1] and Christian Storm*[1]

Conclusions: Recommended cutoff levels for NSE 72 hours after ROSC do not reliably predict poor neurological outcome in cardiac arrest patients treated with MTH. Prospective multicentre trials are required to re-evaluate NSE cutoff values for the prediction of neurological outcome in patients treated with MTH.

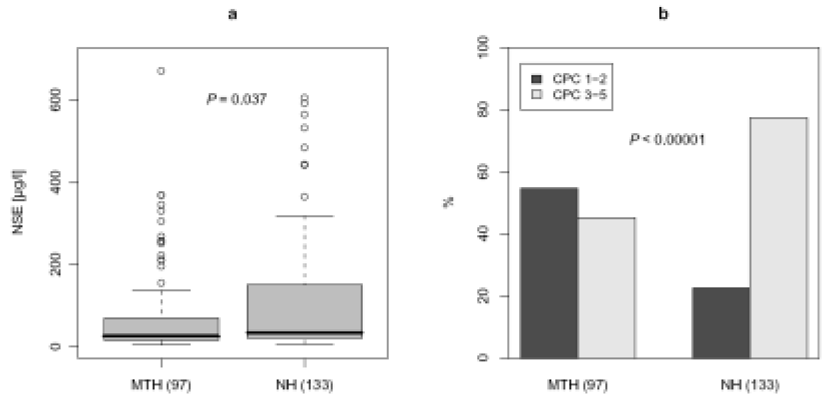


Figure 1 NSE serum levels (a) and neurological outcome (b) of patients treated with mild hypothermia and non-hypothermia group.

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Rossetti *et al. Critical Care* 2010, **14**:R173
http://ccforum.com/content/14/5/R173

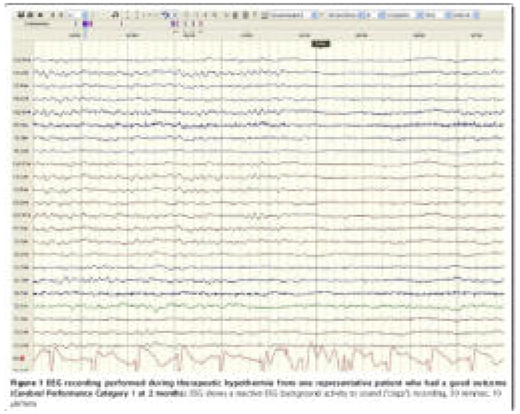
CRITICAL CARE

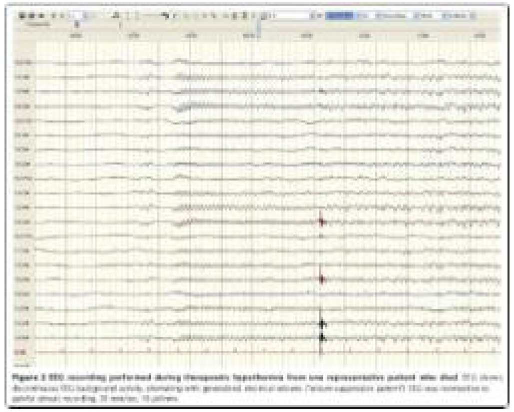
RESEARCH Open Access

Prognostic value of continuous EEG monitoring during therapeutic hypothermia after cardiac arrest

Andrea O Rossetti[1†], Luis A Urbano[2†], Frederik Delodder[2], Peter W Kaplan[3], Mauro Oddo[2*]

Conclusions: Continuous EEG monitoring showing a nonreactive or discontinuous background during TH is strongly associated with unfavorable outcome in patients with coma after CA. These data warrant larger studies to confirm the value of continuous EEG monitoring in predicting prognosis after CA and TH.





N = 34

NON REACTIVE EEG
BURST SUPRESSION
EEG SEIZURES

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

American Society of Critical Care Anesthesiologists

ANESTHESIA & ANALGESIA

Section Editor: **Michael J. Murray**

Anesthesia and Analgesia Protocol During Therapeutic Hypothermia After Cardiac Arrest: A Systematic Review

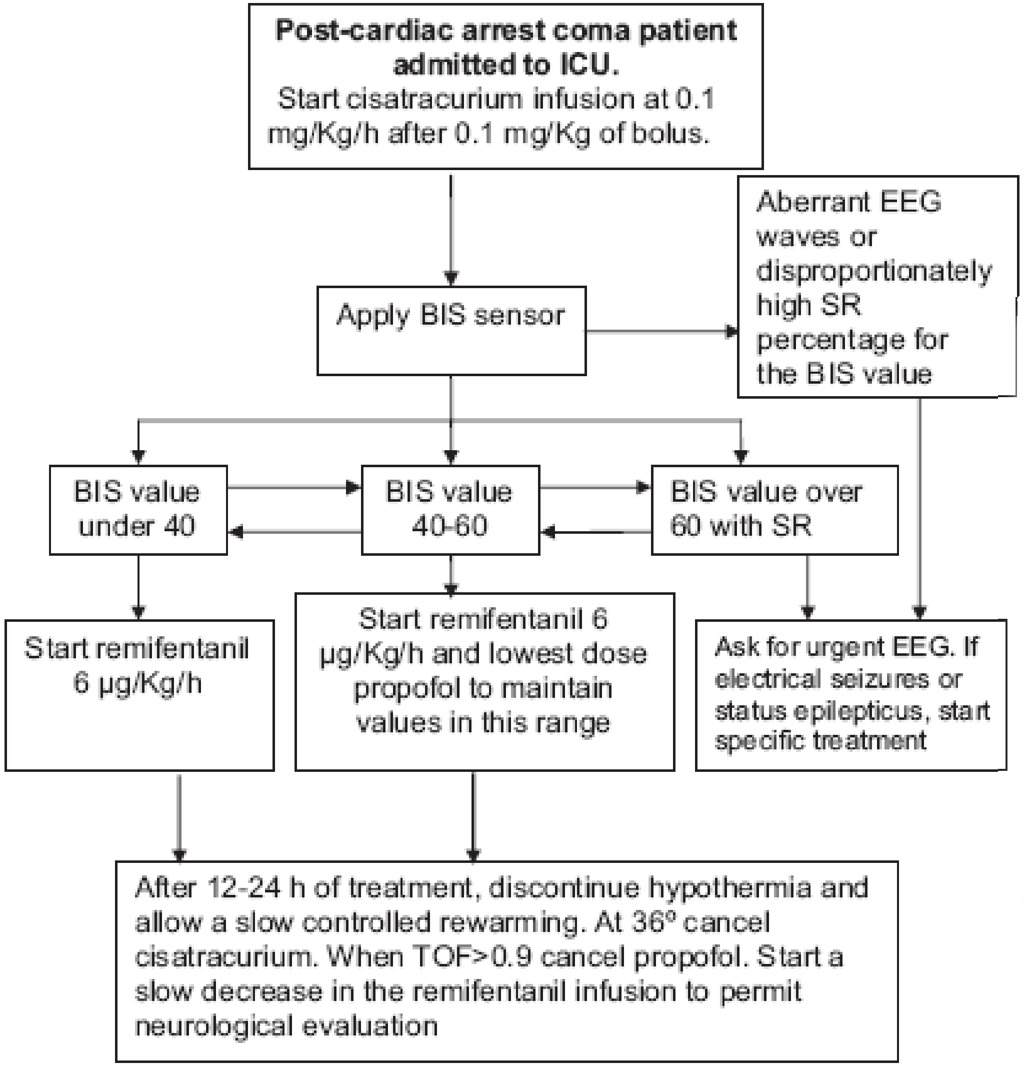
Carlos Chamorro, MD, PhD,* Jose M. Borrallo, MD,† Miguel A. Romera, MD,* Jose A. Silva, MD,† and Bárbara Balandín, MD*

May 2010 • Volume 110 • Number 5

CONCLUSIONS: There is great variability in the protocols used for anesthesia and analgesia during therapeutic hypothermia. Very often, the drug and the dose used do not seem the most appropriate. Only 3 ICUs routinely used electroencephalographic monitoring during paralysis. It is necessary to reach a consensus on how to treat this critical care population. (Anesth Analg 2010;110:1328–35)

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM



ICU: Intensive Care Unit. EEG: electroencephalographic monitoring. BIS: bispectral index. TOF: Train-of-four. SR = suppression rate

ANESTHESIA & ANALGESIA May 2010 • Volume 110 • Number 5

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

SZENT IMRE
KÓRHÁZ

SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM

Crit Care Med 2011 Vol. 39, No. 1

Influence of mild therapeutic hypothermia after cardiac arrest on hospital mortality

Greetje van der Wal, MD; Sylvia Brinkman, MSc; Laurens L. A. Bisschops, MD;
Cornelia W. Hoedemaekers, MD, PhD; Johannes G. van der Hoeven, MD, PhD; Dylan W. de Lange, MD, PhD;
Nicolette F. de Keizer, PhD; Peter Pickkers, MD, PhD

OBSERVATIIOS
10 ÉV --- 13.962

GCS < 8

N=5317
GROUP_BEFOR TH
GROUP_AFTER TH N=3777

Society of Critical Care Medicine
The Intensive Care Professionals

ARTICLE IN PRESS

SZENT IMRE KÓRHÁZ
SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Crit Care Med 2011 Vol. 39, No. 1

Influence of mild therapeutic hypothermia after cardiac arrest on hospital mortality

Greetje van der Wal, MD; Sylvia Brinkman, MSc; Laurens L. A. Bisschops, MD;
Cornelia W. Hoedemaekers, MD, PhD; Johannes G. van der Hoeven, MD, PhD; Dylan W. de Lange, MD, PhD;
Nicolette F. de Keizer, PhD; Peter Pickkers, MD, PhD

20% R.RIZIKÓ CSÖKKENÉS

In conclusion, this observational study shows a significant reduction in hospital mortality since implementation of MTH following cardiac arrest. This observation was associated with a decrease in minimal and maximal temperatures and appears to be related directly to the use of MTH, but significant influence from other confounders cannot be excluded. To our knowledge, the present study represents the largest observational cohort published to date, underlines the clinical benefit of MTH in daily clinical ICU practice, and supports the current best medical practice as recommended by the guidelines.

Society of Critical Care Medicine
The Intensive Care Professionals

ARTICLE IN PRESS

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Crit Care Med 2011 Vol. 39, No. 1

Adverse events and their relation to mortality in out-of-hospital cardiac arrest patients treated with therapeutic hypothermia

Niklas Nielsen, MD, PhD; Kjetil Sunde, MD, PhD; Jan Hovdenes, MD, PhD; Richard R. Riker, MD; Sten Rubertsson, MD, PhD; Pascal Stammet, MD; Fredrik Nilsson, PhD; Hans Friberg, MD, PhD; the Hypothermia Network

N= 765 / 22 CENTRUM
2004-2008

- Bleeding requiring transfusion
- Pneumonia
- Sepsis
- Antibiotic prophylaxis
- Antibiotic therapy
- Bradycardia <40 bpm
- Tachycardia >130 bpm
- Atrial fibrillation
- Ventricular tachycardia
- Ventricular fibrillation
- Hypoglycemia <3.0 mmol/L
- Hyperglycemia >8 mmol/L >4 hrs
- Hypokalemia <3.0 mmol/L
- Hypomagnesemia <0.7 mmol/L
- Hypophosphatemia <0.7 mmol/L
- Seizures
- Anticonvulsants
- Renal replacement therapy

CONCLUSIONS

In this large, multicenter, international registry of patients treated with TH as standard care, sustained hyperglycemia and seizures treated with anticonvulsants were associated with increased mortality. Bleeding and infection, although more common after invasive procedures, were not related to increased mortality. Other adverse events such as arrhythmias and electrolyte abnormalities also were not associated with mortality in our study.

Society of Critical Care Medicine
The Intensive Care Professionals

ARTICLE IN PRESS

SZENT IMRE KÓRHÁZ

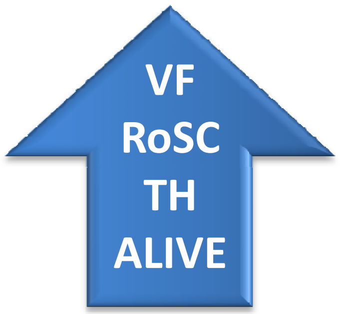
SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

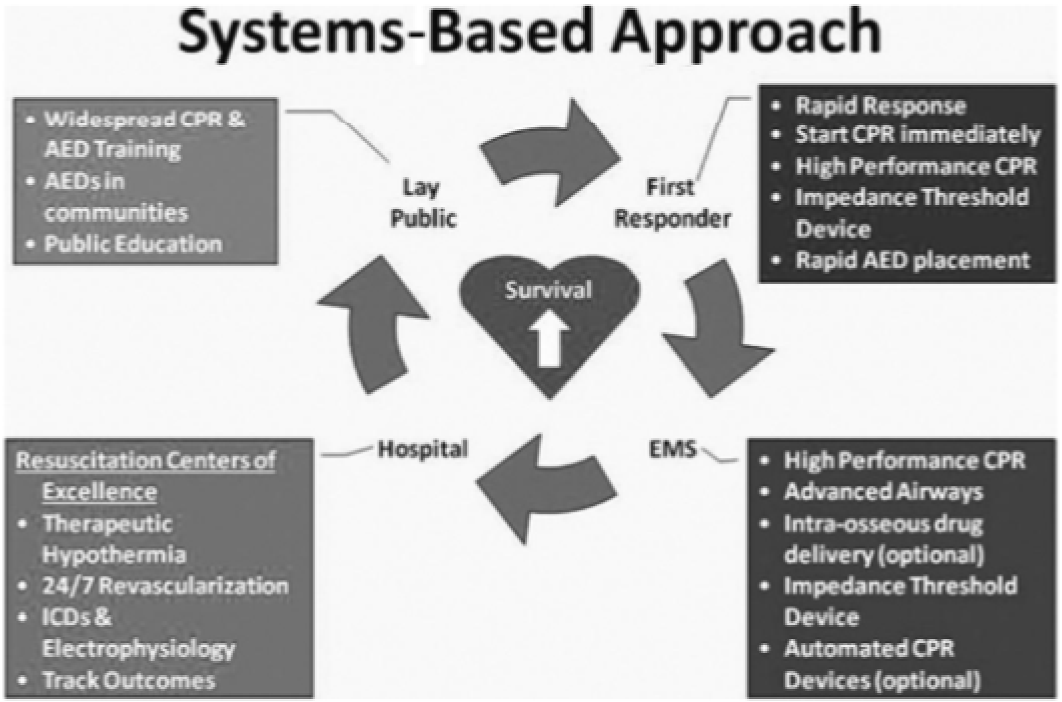
Crit Care Med 2011 Vol. 39, No. 1

Take Heart America: A comprehensive, community-wide, systems-based approach to the treatment of cardiac arrest

Charles J. Lick, MD; Tom P. Aufderheide, MD; Robert A. Niskanen, MSEE; Janet E. Steinkamp, MA; Scott P. Davis, MD, FCCM; Susan D. Nygaard, RN; Kim K. Bemenderfer, NREMT-I; Louis Gonzales, EMT-P; Jeffrey A. Kalla, NREMT-P; Sarah K. Wald, BA; Debbie L. Gillquist, EMT-P; Michael R. Sayre, MD; Susie Y. Osaki Holm, MPH; Dana A. Oakes, BS; Terry A. Provo, EMT-P; Ed M. Racht, MD; John D. Olsen, MD; Demetris Yannopoulos, MD; Keith G. Lurie, MD

28.000	KÉPZETT (EBLS)
3	CA CENTRUM





Society of Critical Care Medicine
The Intensive Care Professionals

ARTICLE IN PRESS

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Crit Care Med 2011 Vol. 39, No. 1

Take Heart America: A comprehensive, community-wide, systems-based approach to the treatment of cardiac arrest

Charles J. Lick, MD; Tom P. Aufderheide, MD; Robert A. Niskanen, MSEE; Janet E. Steinkamp, MA; Scott P. Davis, MD, FCCM; Susan D. Nygaard, RN; Kim K. Bemenderfer, NREMT-I; Louis Gonzales, EMT-P; Jeffrey A. Kalla, NREMT-P; Sarah K. Wald, BA; Debbie L. Gillquist, EMT-P; Michael R. Sayre, MD; Susie Y. Osaki Holm, MPH; Dana A. Oakes, BS; Terry A. Provo, EMT-P; Ed M. Racht, MD; John D. Olsen, MD; Demetris Yannopoulos, MD; Keith G. Lurie, MD

CONCLUSIONS

Comprehensive translation of the 2005 AHA Guidelines into practice throughout two communities (with cost-effective, AHA-recommended interventions intended to optimize circulation and defibrillation during CPR and to preserve heart and brain function after cardiac arrest) resulted in a doubling in survival rates when compared with historical controls. Additional initiatives are underway to determine whether the THA program can be effectively expanded to larger cities and regions.

Society of Critical Care Medicine
The Intensive Care Professionals

ARTICLE IN PRESS

SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

Circulation
JOURNAL OF THE AMERICAN HEART ASSOCIATION
American Heart Association®
Learn and Live™

International Liaison Committee on Resuscitation
ILCOR

Therapeutic Hypothermia After Cardiac Arrest: An Advisory Statement by the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation

J.P. Nolan, P.T. Morley, T.L. Vanden Hoek, R.W. Hickey, W.G.J. Kloeck, J. Billi, B.W. Böttiger, P.T. Morley, J.P. Nolan, K. Okada, C. Reyes, M. Shuster, P.A. Steen, M.H. Weil, V. Wenzel, R.W. Hickey, P. Carli, T.L. Vanden Hoek and D. Atkins

Circulation 2003;108;118-121

ILCOR Recommendations

On the basis of the published evidence to date, the Advanced Life Support (ALS) Task Force of the International Liaison Committee on Resuscitation (ILCOR) made the following recommendations in October 2002:

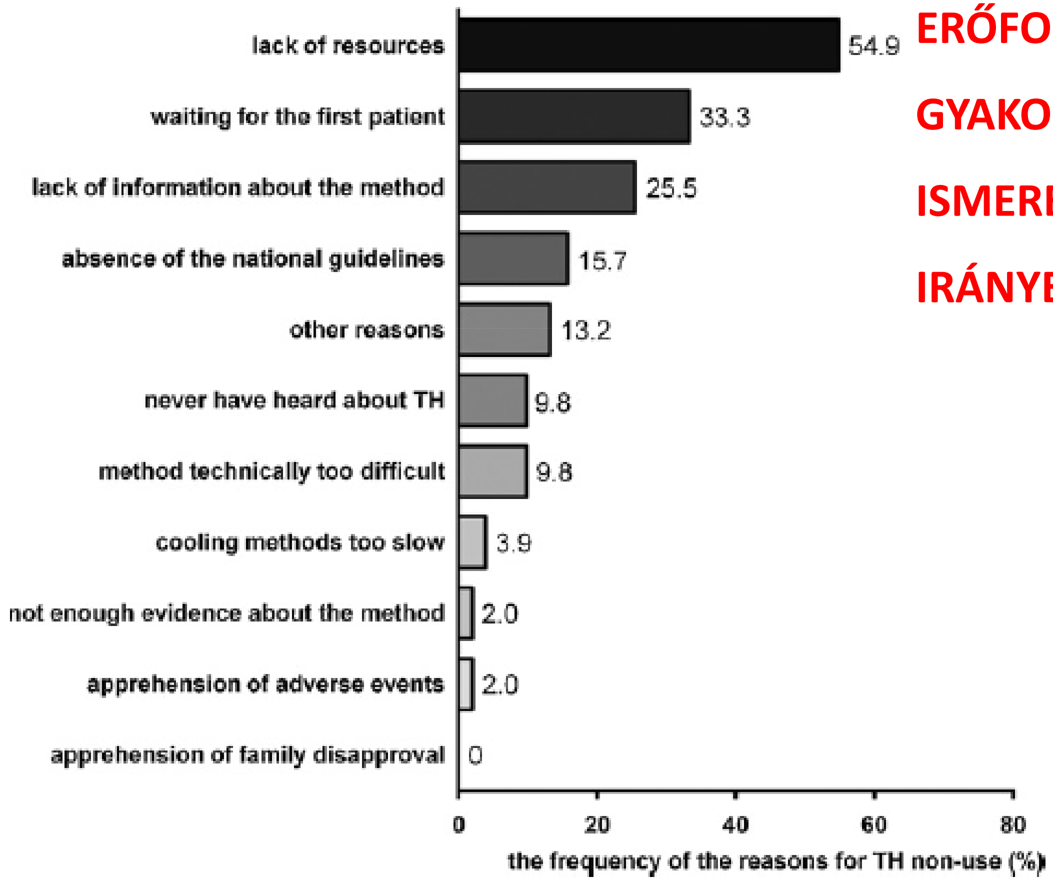
- Unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest should be cooled to 32°C to 34°C for 12 to 24 hours when the initial rhythm was ventricular fibrillation (VF).
- Such cooling may also be beneficial for other rhythms or in-hospital cardiac arrest.

Resuscitation 81 (2010) 779–780

Contents lists available at ScienceDirect

Resuscitation

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



ERŐFORRÁS

GYAKORLAT

ISMERET

IRÁNYELV

Fig. 1. The reasons for TH non-use given by post-cardiac arrest care providers in 2008.

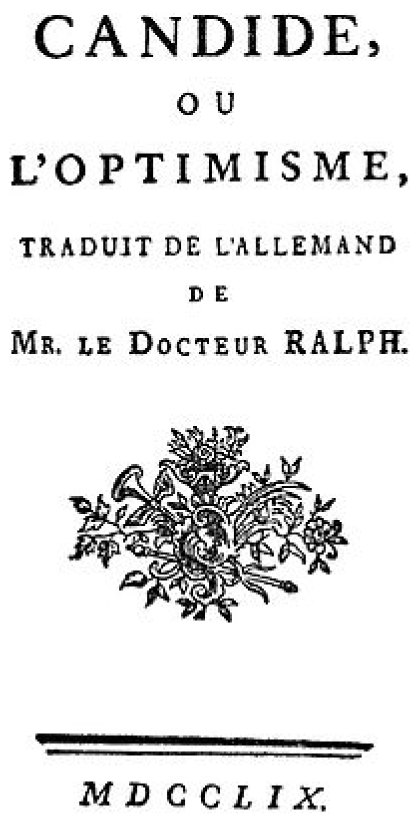
SZENT IMRE KÓRHÁZ

SÜRGŐSSÉGI BETEGLLÁTÓ CENTRUM

SZENT IMRE
KÓRHÁZ

SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM

FRANÇOIS MARIE AROUET



CANDIDE,

OU

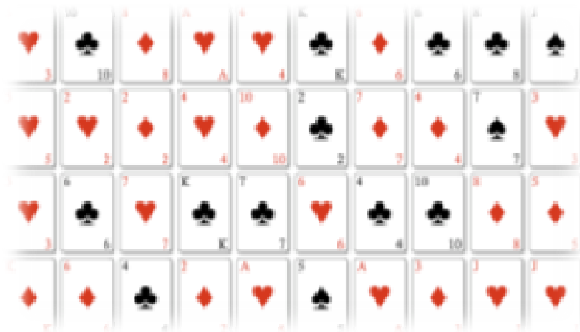
L'OPTIMISME,

TRADUIT DE L'ALLEMAND

DE

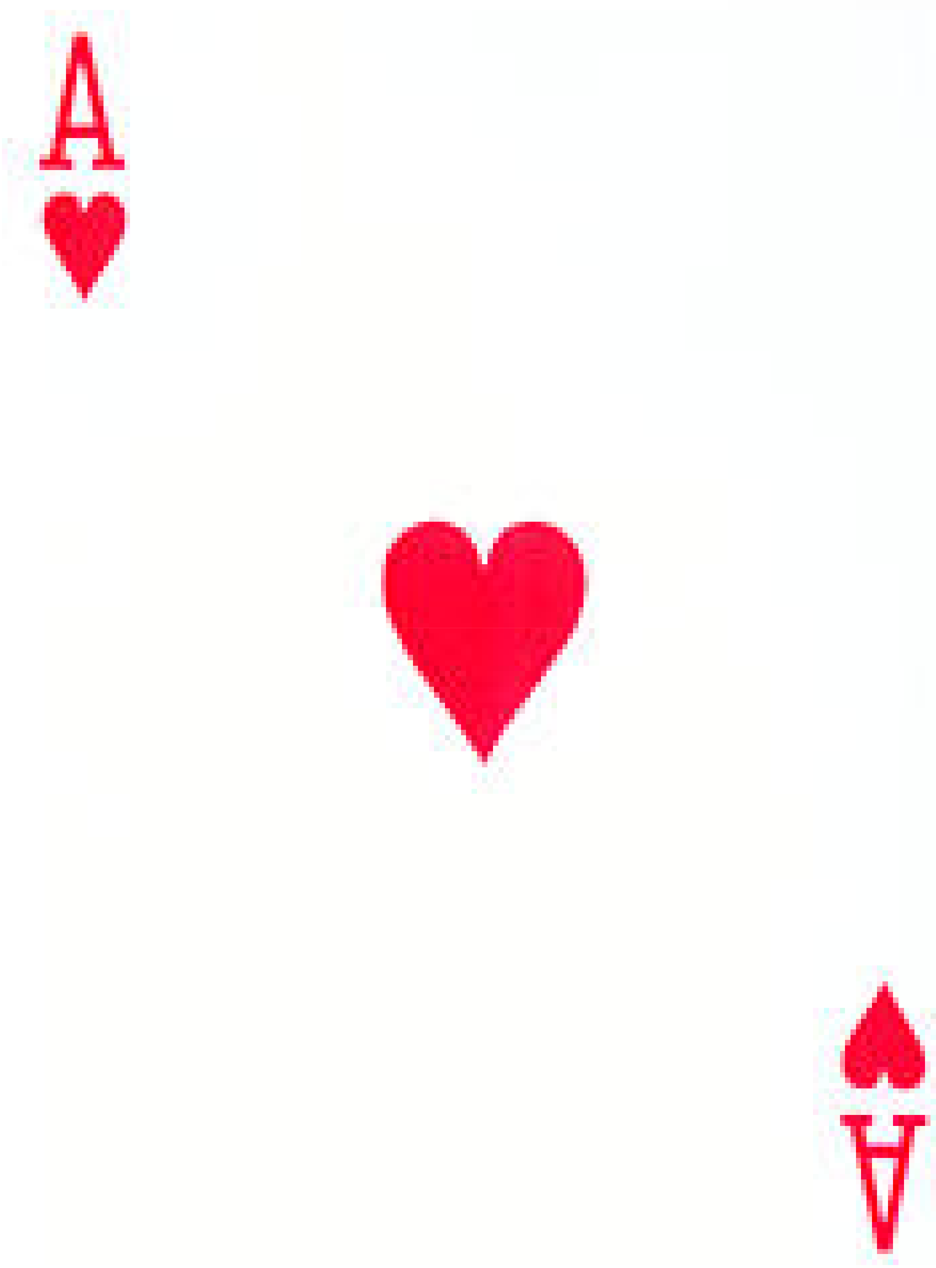
MR. LE DOCTEUR RALPH.

MDCCLIX.



SZENT IMRE
KÓRHÁZ

SÜRGŐSSÉGI
BETEGLLÁTÓ
CENTRUM


A