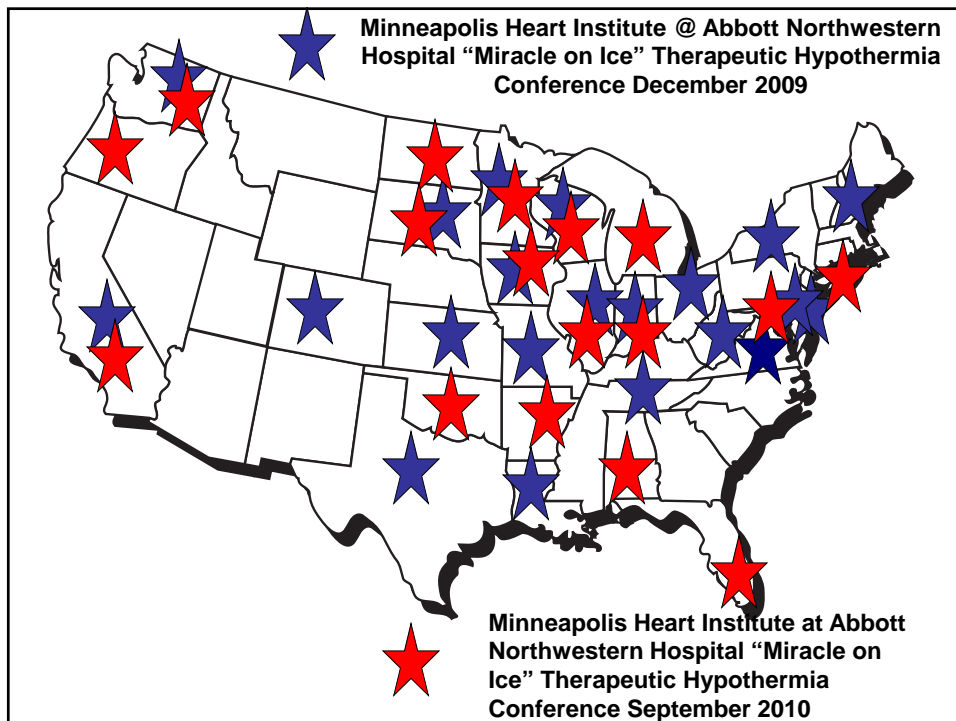


Miracle on Ice 2010 : Therapeutic Hypothermia for Cardiac Arrest Patients

Sept 9 - 10, 2010 Allina Commons
Midtown Exchange
Minneapolis, Minnesota

Course Directors:
Barbara Tate Unger RN, BS, FAACVPR, FAHA
Mike Mooney MD, FACC, FSCAI, FAHA



Miracle on Ice Conference Planning Committee

- Christine Bent COO Minneapolis Heart Institute at Abbott Northwestern Hospital
- Jackie Boucher MS RD CDE VP, Education, Minneapolis Heart Institute Foundation
- Kevin Graham MD FACC President Minneapolis Heart Institute at Abbott Northwestern Hospital
- J Eva Kovacs MBA Professional Education Manager, Minneapolis Heart Institute Foundation
- Michael Mooney, MD, FACC, FSCAI, FAHA, Interventional Cardiologist, Co Director Cardiovascular Labs, Director Coolit Program, Minneapolis Heart Institute
- Monique Ross RN BSN, PHN Cardiovascular Emergency Program Manager, Minneapolis Heart Institute at Abbott Northwestern Hospital
- Barbara Tate Unger RN BS FAHA FAACVPR, Development Director, Systems of Cardiovascular Emergency Care, Minneapolis Heart Institute at Abbott Northwestern Hospital



Faculty Miracle On Ice 2010

- Graham Nichols MD
- Scott Sharkey MD
- David Seder MD
- Paul McMullan MD
- John McPherson MD
- Nainesh C. Patel MD
- Sue Sendelbach RN PhD
- Nader Moazami MD
- Barbara Tate Unger RN
- William Katsiyannis MD
- Michael Mooney MD



Conference objectives

1. Describe the current state of resuscitation, treatment, and outcomes from the national perspective
2. Develop a protocol to initiate and maintain mild hypothermia for the patient that remains comatose following a cardiac arrest.
3. List patient selection inclusion/exclusion criteria for therapeutic hypothermia
4. Describe the simultaneous application of treatments for a patient with STEMI who has suffered a cardiac arrest without regaining consciousness
5. Explain the hemodynamic changes that occur during hypothermia and treatment
6. Evaluate the frequency of cardiogenic shock and the treatment during TH
7. Identify cardiac arrhythmias that occur during hypothermia and treatment protocols for those arrhythmias
8. Collect data to measure clinical outcomes and respond with process improvement.



Updated conference stats

- **19 different states are represented**
- **1 returning attendee from last year**
- **46 different hospitals**
- **5 EMS units**



Statement of public health needs



Hypothermia – The Year in Review

- **New Technology**
- **Randomized trials**
 - RICH – Bernard
 - Rapid MI-ICE – Gotberg ,Lund SW
 - Prince – BeneChill
- New Registries –North American Intcar , Uof Penn**
- New Systems of Care**



Life Recovery Systems

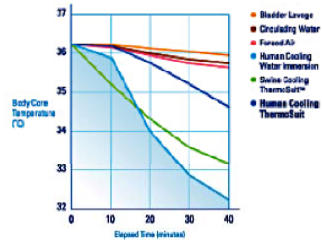
The ThermoSuit™ Approach
 A thin film of ice water circulates in direct contact with the patient's skin.
 Click to learn more.



ThermoSuit – LRC Cooling Rates

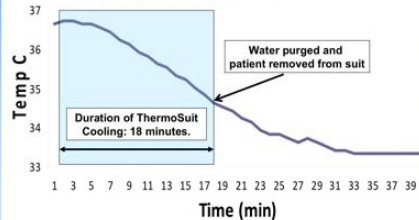
The Unmatched Cooling Speed of Water Immersion

Prior studies of cooling



Human Cooling with the ThermoSuit™ System

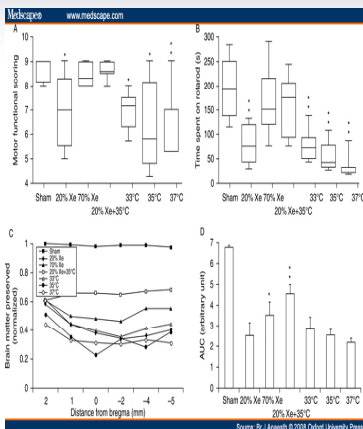
Esophageal Temperature vs Time*



*Case from ThermoSuit Clinical Trial (NCT00410969)

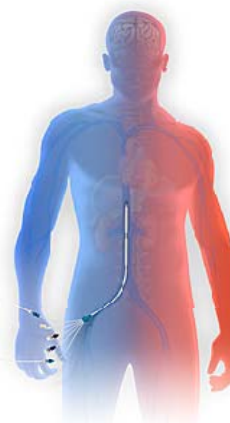
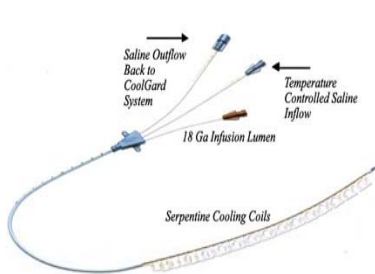


Xenon – Pediatric Neuroprotection



Intravascular Cooling

InnerCool - Phillips



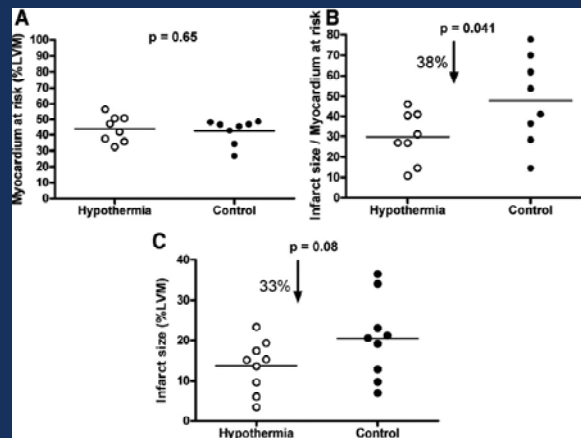
Rapid MI-ICE study summary

- 20 pts w/ STEMI randomized iced saline and intravascular cooling v. control (Innercool)
- Core temp <35 in 40 min D2B 43 min
- 1500 cc 4 deg. Saline . Demerol , busperone
- Day 4 cMRI T2 v. Gadolinium
- Troponin T elution curves
- No difference in clinical outcomes



Rapid MI-ICE Study - Lund, Sweden (Gotberg , Olivecrona)

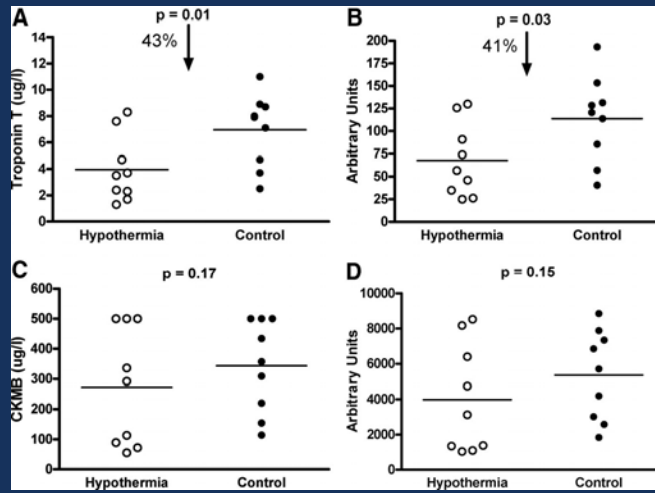
A Pilot Study of Rapid Cooling by Cold Saline and Endovascular Cooling Before Reperfusion In Patients With ST-Elevation Myocardial Infarction



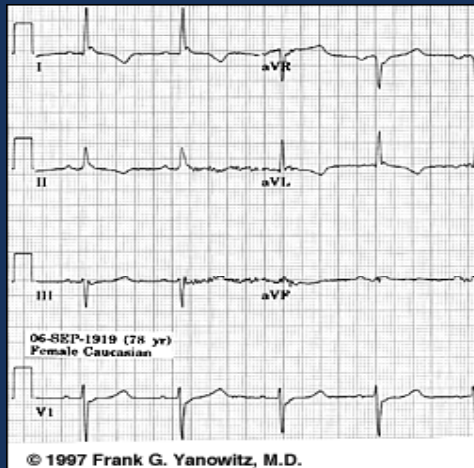
Circ Cardiovasc Interv published online Aug 24, 2010



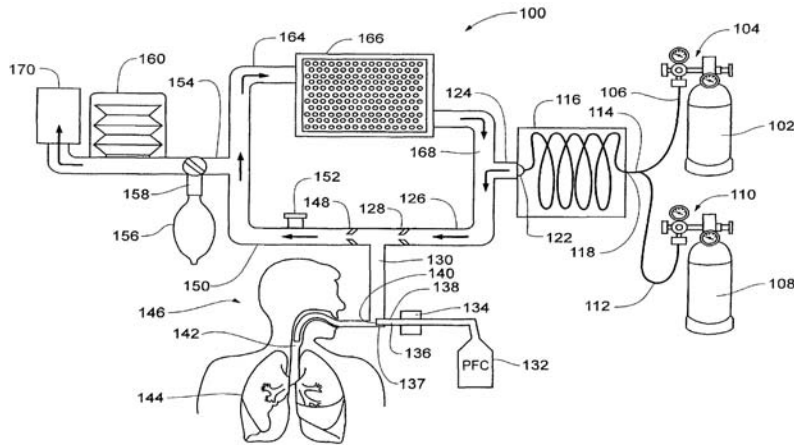
Rapid MI -ICE Study - Lund, Sweden (Gotberg , Olivecrona) Troponin Elution Curves



EKG – Hypothermia – Osborne Waves



Lung PFC Cooling – L Becker



HEART
INSTITUTE



NORTHWESTERN
HOSPITAL
Allina Hospitals & Clinics

Regional Cooling

Authors & Year	Method of Hypothermia	No. of Patients	Initiation of Treatment Post-TBI	Target Cooling Temp (°C)	Cooling Duration (hrs)	Comparison Groups	Key Findings	Neurological Outcome
Wang et al., 2004	cooling helmet	16	<24 hrs	33	48-72	cooling helmet vs no hypothermia	3.4 hours to achieve brain temp of 34°C; 6.7 hrs to reach change in systemic temperature	NA
Andrews et al., 2005	intranasal air	15	0-5 days	NA	6	intranasal air vs no hypothermia	no difference in temp reduction	NA
Giu et al., 2006	cooling cap + neckband	90	on admission	33-35	72	cooling cap vs no hypothermia	decreased ICPs at 24, 48, & 72 hrs in hypothermia group	GOS Score 4 or 5 at 6-mo FU in 68.9% of hypothermia group vs 46.7% of controls; p<0.05
Liu et al., 2006	cooling cap + neckband	66	on admission	33-35	72	cooling cap vs mild systemic hypothermia vs no hypothermia	decreased ICPs at 24, 48, & 72 hrs; increase in serum superoxide dismutase in hypothermia group on Days 3 & 7 after injury	GOS Score 4 or 5 at 2-yr FU in 72.7% of cooling cap group vs 57.1% of systemic group vs 34.8% of controls; p<0.05
Harris et al., 2007	intranasal air (+ NC) + head fanning	12	NA	NA	6	airflow alone vs fanning alone vs airflow + fanning vs neither intervention	reduction in brain temp of 0.31°C w/in 5 min	NA

* FU = follow-up; NA = not available; Temp = temperature.

Medscape

Source: Neurosurg Focus © 2008 American Association of Neurological Surgeons



MINNEAPOLIS
HEART
INSTITUTE

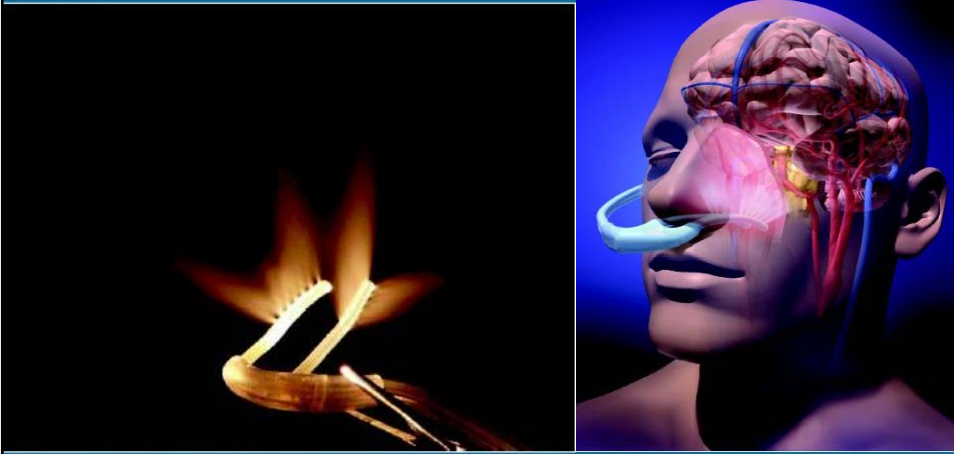


ABBOTT
NORTHWESTERN
HOSPITAL
Allina Hospitals & Clinics

BeneChill Design Concept

Medscape

scape

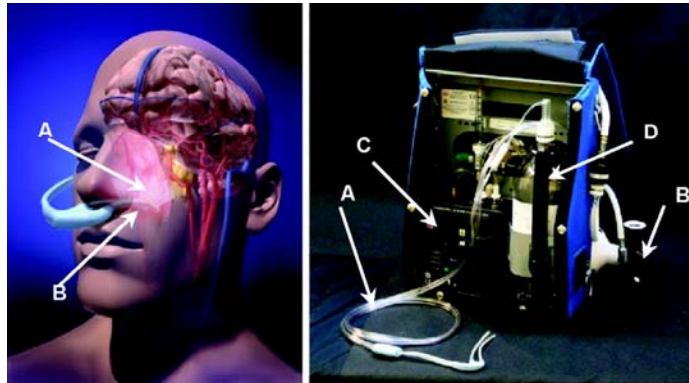


Source: Neurosurg Focus © 2008 American Association of Neurological Surgeons



Northwestern Memorial Hospital
Abbott Northwestern Hospital & Clinics

RhinoChill cooling device



A: coolant spray
B: nasal catheter

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

Castren, M. et al. *Circulation* 2010;122:729-736

Circulation

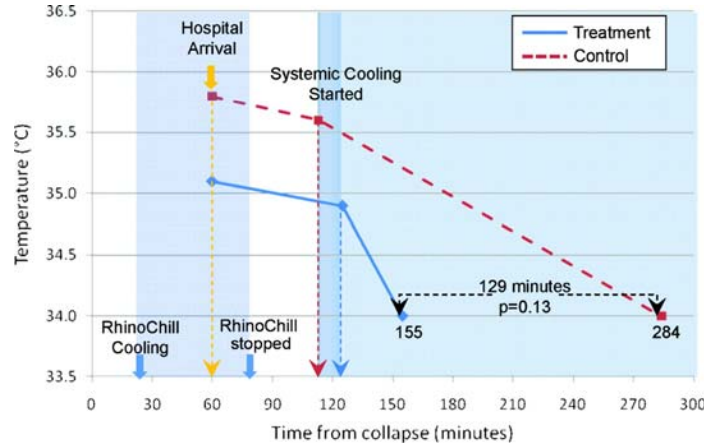
Copyright ©2010 American Heart Association

American Heart Association

Learn and Live

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

Time to target temperature (core) of 34{degrees}C in minutes (median) from the cardiac arrest in the treatment and control groups among those patients admitted to the hospital



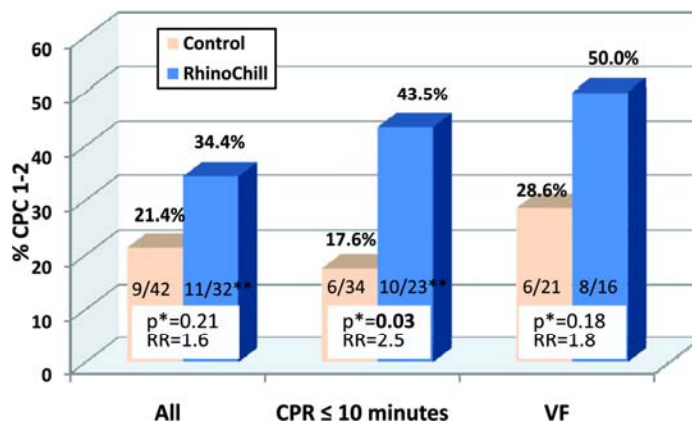
Castren, M. et al. Circulation 2010;122:729-736

Circulation

Copyright ©2010 American Heart Association



Rates of neurologically intact survival (defined as having a cerebral performance category [CPC] of 1 or 2) in the treatment and control groups among those patients admitted to the hospital for the entire group, those who received rescuer CPR within 10 minutes, and those with a presenting rhythm of VF



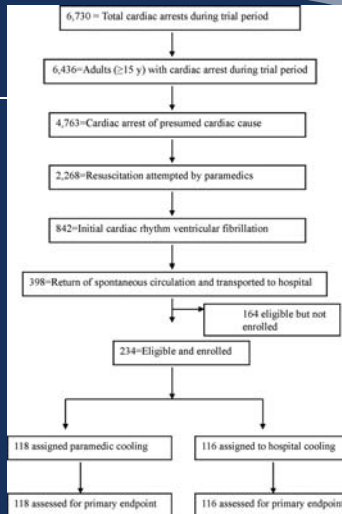
Castren, M. et al. Circulation 2010;122:729-736

Circulation

Copyright ©2010 American Heart Association



RICH - Trial profile



6% VF w/ ROSC



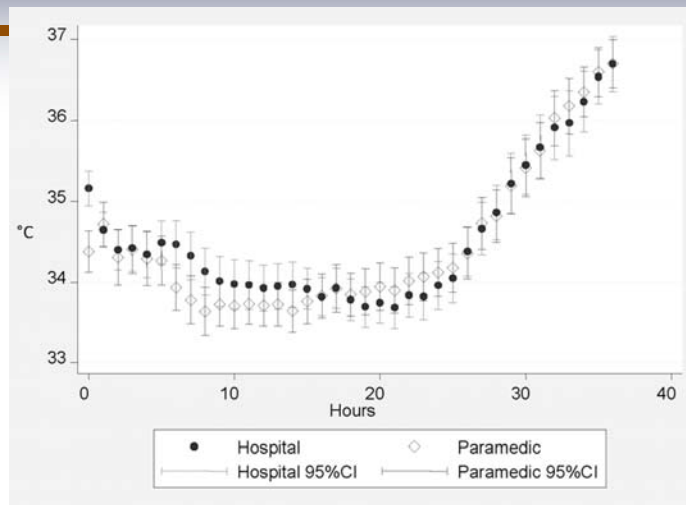
Circulation

Copyright ©2010 American Heart Association

Bernard, S. A. et al. *Circulation* 2010;122:737-742



Temperatures of all patients



Bernard, S. A. et al. *Circulation* 2010;122:737-742

Circulation



Copyright ©2010 American Heart Association



Discharge outcome – Results RICH Trial

	Paramedic Cooling (n=118)	Hospital Cooling (n=116)	P*
Favorable outcome, n (%; 95% CI)	56 (47.5; 38.2–56.9)	61 (52.6; 43.1–61.9)	0.433
Discharge to home, n (%; 95% CI)	24 (20.3; 13.5–28.7)	34 (29.3; 21.2–38.5)	...
Discharge to rehabilitation, n (%; 95% CI)	32 (27.1; 19.3–36.1)	27 (23.3; 15.9–32.0)	...
Discharge to nursing home awake, n	0	0	...
Discharge to nursing home comatose, n (%; 95% CI)	0	1 (0.9; 0.02–4.7)	...
Dead, n (%; 95% CI)	62 (52.5; 43.1–61.8)	54 (46.6; 27.2–56.0)	...

CI indicates confidence interval.
*P calculated by χ^2 test.

Induction of Therapeutic Hypothermia by Paramedics After Resuscitation From Out-of-Hospital Ventricular Fibrillation Cardiac Arrest: A Randomized Controlled Trial
Stephen A. Bernard, Karen Smith, Peter Cameron, Kevin Masci, David M. Taylor, D. James Cooper, Anne-Maree Kelly, William Silvester for the Rapid Infusion of Cold Hartmanns (RICH)
Investigators
Circulation 2010 122: 737-742.

New Insights

- **Response Team Reduces Rate of Cardiac Arrests: Hospital 'Code Blue' emergencies at VA center declined 57 percent in first two years**
- **cardiac arrests decreased 57 percent, from an average of 10.1 to 4.36 cardiac arrests per 1,000 patients**
- **overall death rate decreased 17 percent**
- **Systems of care can also be in hospital –Palo Alto VAH**



Anesthesia & Analgesia, Aug. 26, 2010

Neuro-cognitive recovery team

