Clinical Evidence to Support the Use of Therapeutic Hypothermia for Comatose Post Cardiac Arrest Patients

Cardiac Arrest: Overview

- Heart stops suddenly
- Underlying causes:
  - Cardiovascular disease
  - Accident
  - Electrical abnormality
- Most occur outside of the hospital
- Time to CPR is critical
- No effective therapy for brain damage that occurs during and after heart is reperfused until....

Hypothermia Therapy

Why is the "Brain" Important in Cardiac Arrest?

- The major reason that patients die after successful cardiac resuscitation is **due to irreversible brain damage** caused by global cerebral ischemia. Of those that survive, most suffer serious brain damage.
- Until recently treatment was focused on early defibrillation

Clinical Evidence

The New England
Journal of Medicine

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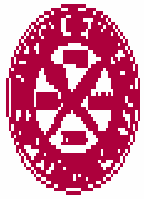
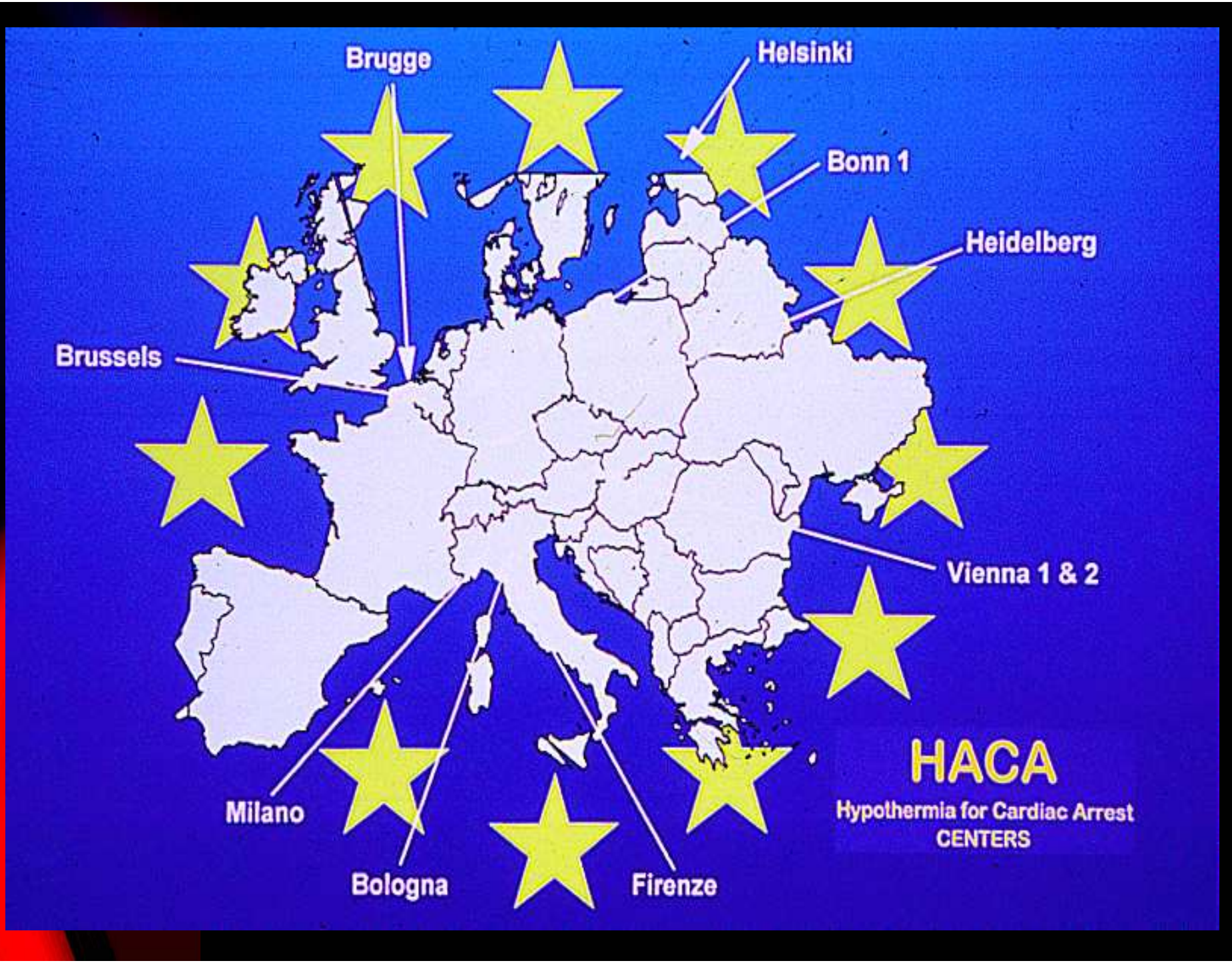


MILD THERAPEUTIC HYPOTHERMIA TO IMPROVE THE NEUROLOGIC OUTCOME AFTER CARDIAC ARREST

THE HYPOTHERMIA AFTER CARDIAC ARREST STUDY GROUP*


Brugge
Helsinki
Bonn 1
Heidelberg
Brussels
Vienna 1 & 2
Milano
Bologna
Firenze
HACA
Hypothermia for Cardiac Arrest
CENTERS

Clinical Evidence

- 2 separate trials were conducted
  - HACA: Hypothermia After Cardiac Arrest (pan-European Trial)
    - PI – Fritz Sterz M.D.Vienna, Austria
    - Used surface cooling (KCI Therakool tent…blew cold air over patient)
    - Randomized to either cooled or normothermia arms
  - Australian Trial:
    - PI – Stephen Bernard MD Dandenong, Australia
    - Used ice packs
    - Randomized to either cooled or normothermia

What were the Results?

Hypothermia and Cardiac Arrest

European Study: HACA

- 275 patients
- Cooling time: 6.5 hours to target temp (34 ºC)

Results:	*Hypothermia*	Normothermia
Good Outcome	*55%*	39%
Mortality	*41%*	55%

Australian Study

- 77 patients
- Cooling time: .9 C/hour but method was messy and prohibitive

Results:	*Hypothermia*	Normothermia
Good Outcome	*49%*	26%
Mortality	*51%*	68%

Hypothermia: Treatment Guideline for Cardiac Arrest

Therapeutic hypothermia after cardiac arrest.
An advisory statement by the Advanced Life Support Task Force of the International Liaison Committee on Resuscitation
Resuscitation 57 (2003) 231- 235

ILCOR recommendations:

Unconscious adult patients with spontaneous circulation after out-of-hospital cardiac arrest should be cooled to 32- 34°C for 12- 24 hrs when the initial rhythm was ventricular fibrillation (VF).

Such cooling may also be beneficial for other rhythms or in-hospital cardiac arrest.

American Heart Association
Learn and Live

European Resuscitation Council

Circulation 2003;108:118-121

Resuscitation 57 (2003) 231-235

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

Post Cardiac Arrest Syndrome, Epidemiology, Pathophysiology, Treatment, and Prognostication. A consensus Statement from the International Liaison Committee on Resuscitation and AHA

DOI: 10.1161/CIRCULATIONAHA.108.190652
published online Oct 23, 2008; *Circulation*

ILCOR Consensus Statement

- **“ Induction can be instituted easily and inexpensively with intravenous ice-cold fluids (saline 0.9% or Ringer’s lactate, 30 mL/kg) or traditional ice packs placed on the groin and armpits and around neck and head.”……”Surface or internal cooling device can be used either alone or in combination with the above measures to facilitate induction.”**

On cooling methods:

- In the maintenance phase, effective temperature monitoring is needed to avoid significant temperature fluctuations. This is best achieved with external or internal cooling devices that include continuous temperature feedback to achieve a target temperature…..intravascular cooling catheters are internal cooling devices that are usually inserted into a femoral or subclavian vein. (Page 13)

ILCOR Consensus Statement

- **Less sophisticated methods, such as cold, wet blankets placed on the torso and around the extremities or ice packs combined with ice-cold fluids, can be effective, but these methods may be more time consuming for nursing staff, result in great temperature fluctuations, and do not enable controlled rewarming. Ice-cold fluids alone cannot be used to maintain hypothermia. (page 13)**

ILCOR Consensus Statement

On shivering:

- **The shivering threshold can also be reduced by warming the skin; the shivering threshold is reduced by 1-C for every 4-C increase in skin temperature. (page 13)**
- **The clearance of sedative drugs and neuromuscular blockers is reduced by up to 30% at a temperature of 34C (page13)**

Final Thoughts on Hypothermia