

# INDUCED HYPOTHERMIA

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# Historical Use of Induced Hypothermia

- 1950's - Moderate hypothermia (30°-32° C) in open heart surgery to protect brain against global ischemia
- 1960 - 1980's - Use of moderate hypothermia after CVA's and head injuries resulted in uncertain benefit and high complication rate
- 1990's – Lab studies showed benefits of mild hypothermia (32° - 34° C) for 12-24 hours without high complication rate

Two randomized prospective trials:

Mild Therapeutic Hypothermia To Improve the Neurologic Outcome After Cardiac Arrest (N Engl J Med 2002)

Treatment of Comatose Survivors of Out-of-Hospital Cardiac Arrest With Induced Hypothermia (N Engl J Med 2002)

## Three End Points Evaluated:

- Favorable neurological outcome at six months (able to live independently and work at least part time)
- Overall mortality at six months
- Significant difference in complication rate



## Patients Receiving Induced Hypothermia:

- 16% higher favorable neurological status
- 14% lower mortality rate
- No significant difference in complication rate

## 2005 AHA Post Resuscitation Guidelines:

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

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

# Beneficial effects of mild hypothermia after cardiac arrest:

- Reduction in cerebral O<sup>2</sup> consumption
- Suppression of free radical reactions
- Reduction of intracellular acidosis
- Inhibition of destructive enzymatic reactions caused by reperfusion

## Other physiological effects of mild hypothermia:

- Vasoconstriction (cold diuresis, mottled appearing skin)
- Decreased insulin production
- Potassium levels decrease (shifts into muscle cells)
- Decreased CO<sub>2</sub> production
- Bradycardia



## Methods for achieving mild hypothermia:

- Ice packs to head/neck/groin –  $0.9^{\circ}\text{C/hr}$
- Chilled saline infusion at  $4^{\circ}\text{C}$  –  $1.7^{\circ}\text{C/hr}$
- Cooling blanket –  $0.3^{\circ}\text{C/hr}$

# Core temperature measurement during mild hypothermia:

- Tympanic temp – not accurate during hypothermia but use to make an initial temperature reading in the field before beginning induced hypothermia (as a baseline).
- Bladder probe and esophageal probe – more reliable method for determining core temp during hypothermia

## Inclusion criteria for induced hypothermia:

- Adults 18 years of age or older
- Negative pregnancy test for women <50 y.o.
- Post cardiac arrest with ROSC <90 minutes
- Hypothermia begun within 6 hrs of ROSC
- Comatose, GCS <6
- Hemodynamically stable with SBP >90

## Absolute contraindications:

- DNR or terminal illness
- Cardiac arrest from trauma, head injury, stroke, or sepsis
- Active bleeding or severe coagulopathy
- Refractory hypotension SBP <90 despite inotropic support



## Relative contraindications:

- Conflict with advance directives
- Major surgery within 14 days
- Cardiac arrest 2° to or associated with drug OD
- Uncontrollable arrhythmia
- Age 75 or older

## Pre-hospital phase:

- Medics will use inclusion/exclusion criteria to identify possible candidates with guidance by Base Station
- Medics will notify Base Station they are initiating induced hypothermia
- Medics will begin cooling using chemical ice packs to head, neck, groin

PRIORITY IS ALWAYS  
MANAGING THE PATIENT'S  
AIRWAY, BREATHING, AND  
CIRCULATION FIRST

## Emergency Department:

- ER Physician will make final inclusion decision
- Infusion of 4°C NaCl at 250 ml/hr or more begun in ER
- Cooling blankets started in ER
- Sedation, analgesia started in ER
- Paralytics started if necessary to prevent shivering



# ICU

- Target temp of 33°C within 6 hours of beginning induced hypothermia
- Begin rewarming patient 24 hours after hypothermia induced
- Possible transfer to interventional cath lab

ANY QUESTIONS?

