INDUCED HYPOTHERMIA
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)

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 O² 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 CO₂ production
- Bradycardia
Methods for achieving mild hypothermia:

- Ice packs to head/neck/groin – 0.9°C/hr
- Chilled saline infusion at 4°C – 1.7°C/hr
- Cooling blanket – 0.3°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?