

EMERGENCY INSTRUCTIONS FOR STABILIZATION OF ALCOR CRYONIC SUSPENSION PATIENTS

Introduction

Cryonic Suspension is a low temperature preservation process applied to patients after they have exhausted the resources of contemporary medical care and have been pronounced legally dead. The process of placing a patient into cryonic suspension involves prompt "post-mortem" cardiopulmonary support (to minimize ischemic damage), concomitant with induction of hypothermia by surface and/or blood cooling, treatment of the patient with agents to minimize freezing damage, and cooling to ultra low temperature for continued long-term care. The ultimate objective of cryonic suspension is the restoration of life and health to the patient at some point in the future should biomedical technology reach a degree of sophistication equal to reversal of the cause of legal death as well as the injury which results from the application of current, unperfected preservation techniques.

Stabilization Protocol

If the patient is pronounced legally dead (i.e., resuscitation efforts have failed or were deemed medically inappropriate), we request that you allow the Alcor Transport Technician to undertake the following steps:

1. **Cardiopulmonary resuscitation (CPR):** *Immediately* begin administration of 100% oxygen via face mask or (preferably) endotracheal tube or esophageal gastric tube airway (EGTA) using positive pressure ventilation. Begin sternal compression.

If a mechanical heart-lung resuscitator (such as the Thumper) is available, apply it.

Continue CPR during the administration of all medications listed below.

Do not defibrillate the patient.

2. Establish and maintain a patent intravenous line (preferably a subclavian or peripheral cut-down) for administration of all medications. Patency of the IV should be maintained by filling the catheter with heparinized saline (2,500 units of heparin per cc) or maintaining TKO flow of normal saline or other solution *which does not contain dextrose*.

3. Administer **potassium chloride** 1 mEq/kg, IV push to reduce cerebral metabolic demand *or* **sodium pentobarbital** 30 mg/kg IV push.

4. Administer **deferoxamine HCl (Desferal)** 2 g, IV push to scavenge free iron and reduce ischemia-induced free radical damage.

5. Administer **epinephrine (adrenalin chloride)** 0.2 mg/kg, IV push, followed by 0.1 mg/kg every 10 minutes until patient temperature is 25°C. The purpose of epinephrine is to improve perfusion by supporting blood pressure during cardiopulmonary support.

6. Administer **nimodipine** 10 *micrograms*/kg, IV push, followed by continuous IV infusion at a rate of 60 *micrograms*/kg/hour until patient esophageal temperature is 30°C.

Where continuous intravenous administration is not possible, the loading dose of 10µg/kg should be followed by repeated 10µg/kg doses given as a bolus every 10 minutes until patient temperature is 30°C.

As an alternative to nimodipine, **diltiazem HCl** may be given in a dose of 300 micrograms/kg, IV push. Administer through a .2 micron filter.

The purpose of both nimodipine and diltiazem is the prevention of cerebral vasospasm and protection against intracellular calcium loading and cerebral "no-reflow".

7. Administer **sodium citrate** 120 mg/kg, IV push to chelate serum calcium and reduce cerebral reperfusion injury.

8. Administer **E-Celle (micellized d-alpha tocopherol acetate)** 80 IU/kg, IV push, followed by continuous infusion at a rate of 10 IU/kg/hour. E-Celle is a potent antioxidant and free radical buffer.

*****Note on the E-Celle: A medication that has been previously prepared in-house, we are temporarily discontinuing the manufacturing of E-Celle. Coordinators should deplete their stock as required by an emergency, but until we reinstate this item, this medication will not be replenished.

9. Administer **ascorbic acid (Cevalin)** 125 mg/kg by continuous IV infusion. The ascorbic acid may be added to the mannitol.

10. Administer **tromethamine (THAM)**, 250 mg/kg, IV (give 200 cc of 0.3 molar THAM rapidly, then set rate of infusion at 30 drops per minute) to combat acidosis.

11. Administer **heparin**, 420 IU/kg, IV push for anticoagulation.

12. Administer **chlorpromazine HCl (Thorazine)**, 3 mg/kg IV push to provide membrane stabilization and protection against cold ischemic injury.

13. Administer **methylprednisolone HCl (Solu-Medrol)**, 1 g by slow IV injection to provide membrane stabilization and protection against cold ischemic injury.

14. Administer **mannitol (Osmitol)**, 2 g/kg, high-flow IV infusion to reduce ischemia-induced free radical injury and prevent cerebral edema.

15. Concurrently with the above, begin surface cooling by **packing the patient in crushed or small-cubed ice**. Particular attention should be given to packing the head, neck, axillary, and femoral areas in ice. In situations where the supply of ice is limited, concentrate on cooling the head and neck.

16. Administer **metubine iodide (Metubine)**, 0.07 mg/kg or **succinylcholine (Anectine)** 0.80 mg/kg, IV push to inhibit any possible shivering.

17. Administer **gentamicin sulfate (Garamycin)** 1 mg/kg IV push and **Bactrim: trimethoprim** 160 mg and **sulfamethoxazole** 800 mg by slow IV infusion to inhibit microbial overgrowth.

Alternatively, **erythromycin (Erythrocin)**, 1 g adults or 500 mg for children under 12, (or if unavailable, Keflex 1 g), IV push may be used.

18. Administer **dextran-40 (Rheomacrodex)** in normal saline only, 250-500 cc via high flow IV infusion to minimize capillary sludging and to support blood pressure (in volume

depleted patients). *Do not use Rheomacrodex solutions containing dextrose.*

19. **Continue CPR for at least 10 minutes** after the injection of the last medication.
20. It is highly desirable to **continue cardiopulmonary support until a pharyngeal temperature of 15°C or a rectal temperature of 25°C has been reached.**
21. If a nasogastric tube is in position, it should be used to administer 250 cc of **Maalox, Riopan, or Titalac**, in order to neutralize gastric hydrochloric acid and eliminate the risk of erosion of the gastric mucosa and hemorrhage during subsequent cryoprotective perfusion.
22. The **eyelids should be closed** with tape to prevent corneal dehydration.
23. Clamp but **do not remove any drainage tubes, catheters, or IV lines** in the patient.
24. Completely pack the patient in water ice for transport to our facilities.
25. **It is of critical importance that the patient not be subjected to freezing temperatures (i.e., those below 0°C (32°F)).** This includes, but is not limited to, storage in a hospital morgue "cooler" at a temperature below 4°C (34°F), temporary storage in an unheated ambulance, hearse, or aircraft during transport when the ambient temperature is below freezing, or the use of refrigerants such as dry ice or water ice/salt mixtures for cooling or transport. If there is any question about the accuracy or reliability of mechanical refrigeration equipment, it should be checked frequently on a manual basis with an accurate thermometer.
26. If you need further information call the emergency number listed below and ask to be connected with the Emergency Rescue Technician on call.

EMERGENCY PHONE #: (714) 736-1703

Thank you for your cooperation.

An abbreviated protocol for use in situations where cooperation is minimal or where the interval between the start of cardiac arrest and the discovery of the patient is greater than 60 minutes is as follows.

ABBREVIATED EMERGENCY INSTRUCTIONS FOR STABILIZATION OF ALCOR CRYONIC SUSPENSION PATIENTS

Introduction

Cryonic suspension is a low temperature preservation process applied to patients after they have exhausted the resources of contemporary medical care and have been pronounced legally dead. The process of placing a patient into cryonic suspension involves prompt "post-mortem" cardiopulmonary support (to minimize ischemic damage) concomitant with induction of hypothermia by surface and/or blood cooling, treatment of the patient with agents to minimize freezing damage, and cooling to ultra low temperature for continued long term care. The ultimate objective of cryonic suspension is the restoration of life and health to the patient at some point in the future should biomedical technology reach a degree of sophistication equal to reversal of the cause of death as well as the injury which results from the application of current, unperfected preservation techniques.

Stabilization Protocol

If the patient has been pronounced legally dead and has experienced a period of more than 60 minutes of normothermic cardiac arrest (in the absence of any cardiopulmonary support) and there is no rigor mortis present (if rigor is present do not administer any IV medications and proceed to #9 below), we request that you undertake the following steps:

1. Carry out sternal compressions **without ventilating the patient** at a rate of 60 per minute **during** and for 5 minutes **after** the administration of the following medications:
2. **Heparin**, 800 IU/kg IV push for anticoagulation.
3. **Streptokinase (Streptase)** 1,000 IU/kg IV push to a maximum dose of 100,000 IU to reverse/inhibit ischemia related clotting.
4. **Deferoxamine (Desferal)** 2 g, IV push to scavenge free iron and minimize ischemia-induced free radical damage.
5. **Verapamil (Isoptin, Calan)** 0.30 mg/kg, IV push to reduce ischemia-induced intracellular calcium loading.
6. **Chlorpromazine HCl (Thorazine)**, 3 mg/kg IV push to provide membrane stabilization and protection against cold ischemic injury.
7. **Methylprednisolone HCl (Solu-Medrol)**, 1 g by slow IV injection to provide membrane stabilization and protection against cold ischemic injury.
8. **Erythromycin (Erythrocin)**, 1 g, (or if unavailable Keflex 1 g), IV push to inhibit microbial overgrowth.

9. Cool the patient as quickly as possible by completely packing the body in bags of crushed or small cubed water ice. In situations where the supply of ice is limited, concentrate on the head.

10. If a nasogastric tube is in position, it should be used to administer 250 cc of Maalox, Riopan, Titralac, or similar antacid in order to neutralize gastric hydrochloric acid and eliminate the risk of erosion of the gastric mucosa and hemorrhaging during subsequent cryoprotective perfusion.

11. The eyelids should be closed with tape to prevent corneal dehydration.

12. Clamp but do not remove any drainage tubes, catheters, or IV lines in the patient.

13. Completely pack the patient in water ice for transport to our facilities.

14. **It is of critical importance that the patient not be subjected to freezing temperatures (i.e., those below 0°C (32°F)).** This includes, but is not limited to, storage in a hospital morgue "cooler" at a temperature below 4°C (34°F), temporary storage in an unheated ambulance, hearse, or aircraft during transport when the ambient temperature is below freezing, or the use of refrigerants such as dry ice or water ice/salt mixtures for cooling or transport. If there is any question about the accuracy or reliability of mechanical refrigeration equipment, it should be checked frequently on a manual basis with an accurate thermometer.

15. If you need further information, call the emergency number listed below and ask to be connected with the Emergency Rescue Technician on call.

EMERGENCY PHONE #: (714) 736-1703

Thank you for your cooperation.

Transport Data Collection Sheet

Date _____

Patient Name _____

Alcor # _____ Age _____ Weight _____ (kg) Temp* _____ (°C)

1) Hypoxia Time Prior to Arrest _____ min.
(i.e., severe hypotension,
severe hypoxemia, or severe
anemia)

2) Time of Cardiac Arrest _____

3) Start of CPR - _____

4) Ischemic Time = _____

5) Hypoxia Time After Arrest _____
(i.e., inadequate perfusion:
EtCO₂ < 2%, MAP < 50 mm Hg @
30°C+)

6) Total Insult Time _____
(Sum of 1, 4 & 5 above)

Start of External Cooling _____

*Rectal temperature at time of clinical death.

Medications Administered

Drug	Dose	Amount	Package	Volume	Time
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Potassium chloride	1 mEq/kg				
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OR

Sodium Pentobarbital	30 mg/kg				
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Epinephrine (Administered IV push)	0.2 mg/kg				
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Followed by 0.1 mg/kg IV every 10 minutes until patient temperature is 25°C.

Deferoxamine HCl (Desferal) (Administer as IV push.)	2 gm				
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Nimodipine (Administered as IV push.)	10 micrograms/kg				
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Followed by 60 micrograms/kg/hr IV infusion until patient temperature is 30°C.

OR

10 micrograms/kg/hr IV bolus every 10 minutes until patient temperature is 30°C

Drug	Dose	Amount	Package	Volume	Time
OR Diltiazem HCl	300 <i>micrograms/kg</i>				
Sodium Citrate	120 mg/kg				
E-Cell	80 IU/kg				
Followed by 10 IU/kg/hr IV infusion.					
Ascorbic Acid (administer as IV infusion)	125 mg/kg				
THAM (Tromethamine)	250 mg/kg				
Heparin	420 IU/kg				
Chlorpromazine HCl	3 mg/kg				
Methylprednisolone HCl	1 g				
Mannitol	2 g/kg				
Metubine Iodide	0.07 mg/kg				
OR Anectine	0.8 mg/kg				
Bactrim	(160 mg Trimethoprim and 800 mg Sulfamethoxazole)		80 mg/5cc 400 mg/5cc	10 ml	
Gentamicin Sulfate (Garamycin)	1 mg/kg				
OR Erythromycin (Erythrocin)		1 gm (500 mg for children)			
Maalox, Riopan, or Titalac		250 cc			
Dextran-40 (Rheomacrodex)		250 - 500 cc			
(Administer 250 cc slow infusion (prn to maximum of 500 cc))					

