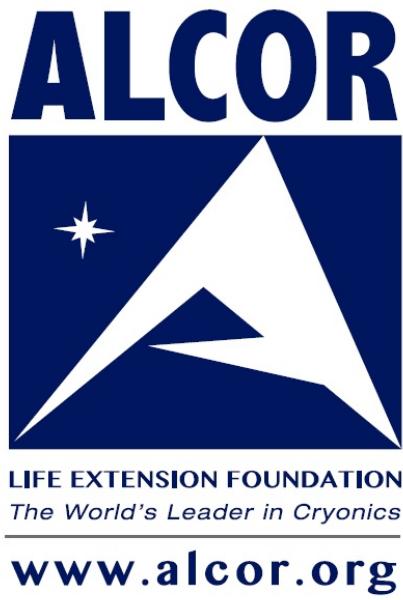


# **Alcor A-3024**

## **Case Report**



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**September – 2021**

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## 1. Summary

Information was derived from multiple sources and was all converted to Mountain Standard Time (MST). For de-identification, dates are not shown. T-0 represents the date of pronouncement of legal death, T-X represents occurrences before T-0, and T+X represents occurrences following T-0.

A-3024 was a 68-year-old male with inoperable brain cancer who had neuro cryopreservation arrangements. The patient was pronounced legally deceased in California at 06:45 hrs on T-0 days in April of 2021. His time of cardiac arrest estimated by the hospice nurse was 03:45 hrs.

After stabilization and [Field Cryoprotection](#), the patient was transported to Alcor in dry ice for cryogenic cooldown. The patient arrived at Alcor on T+1 days at 20:21 hrs and cryogenic cooldown was initiated at 20:52 hrs. Cooldown was terminated on T+6 days at 10:50 hrs.. CT scans were made of the patient's brain at liquid nitrogen temperature on T+36 days at 11:20 hrs. The patient was transferred to long-term maintenance at liquid nitrogen temperature on T+48 days at 12:32 hrs.

## 2. Patient Assessment and Pre-Deployment

### T-261 days

The member contacted Alcor by email to report that he was not yet in imminent need of being cryopreserved, but his health had declined, and his timeline was shorter than he previously anticipated. He had been diagnosed with a stage IV glioblastoma multiforme brain tumor and the median life expectancy, with treatment, was about two years. As the member was having regular MRIs, it was anticipated that the member and Alcor would have sufficient warning to plan a timely standby. The member's height was 6'1" and he weighed 150 pounds.

### T-109 days

The member's daughter contacted Alcor to report that the member's health continued to decline. The member was interested in utilizing the California Death with Dignity (DWD) law and the family would explore that option. The member's daughter was the point of contact between the member and Alcor going forward and promised to keep Alcor updated with any changes.

### T-50 days

The member's daughter reported that the DWD process had been started. She also spent time with Alcor's Medical Response Director (MRD) familiarizing herself with how a potential standby would work and other questions that the family had regarding Alcor's procedures, etc.

### T-17 days

The member's daughter reported that her father's mental capacity had declined to the point that DWD was no longer an option and that he had been enrolled in in-home hospice care. The MRD discussed with her the potential for delayed pronouncement of legal death associated with in-home hospice care. The MRD recommended that the daughter contact a funeral home near her that had served Alcor well in the past.

## **3. Preparation and Deployment**

### T-14 days

It was decided that both of Alcor's strategic partners, International Cryomedicine Experts (ICE) and Suspended Animation (SA) would be deployed when standby was appropriate. ICE, with experience in FCP procedures, would provide training for SA in those procedures.

### T-10 days

The member could no longer get out of bed. A hospital bed had been placed in the member's bedroom on the top floor of the house. Physicians estimated that the member had approximately 1 to 1.5 months to live.

### T-1 days

Hospice personnel predicted that the member still had weeks to live and planned to visit the member at home twice per week. Additionally, the member was reportedly awake for 6-8 hours per day and was eating and drinking during awake hours.

The member's level of consciousness had diminished, and he experienced bouts of diaphoresis (abnormal sweating). The family called the hospice organization to report these changes. The hospice organization told the family that these changes did not indicate imminent clinical death.

### T-0 days

Alcor's medical answering service reported at 05:51 hrs that the member had experienced cardiac arrest. Alcor deployed ICE and SA giving instructions that the first team to arrive would administer the abbreviated stabilization medications. The member's wife had stayed up with him until 02:30 hrs but when she woke up at 05:30 hrs, she found him in cardiac arrest.

The MRD confirmed this with the member's daughter by phone. The funeral home was then called to arrange for retrieval of the patient; they estimated that they could be at the member's home in 90 minutes. At 06:13 hrs, hospice personnel reported that they would arrive in roughly 45 minutes to pronounce legal death.

#### 4. Stabilization

The patient was pronounced legally deceased by the hospice nurse at 06:45 hrs, however, based on her assessment she estimated that the patient likely suffered cardiac arrest at 03:45 hrs. The hospice nurse confirmed at 07:21 hrs that the patient was in rigor mortis upon her arrival. The patient was covered with ice by the funeral home transport driver soon after he picked up the patient. The funeral home added more ice when the patient arrived at the funeral home. The patient had been placed in a white plastic sheet, not a body bag, that was taped up to contain the melting ice.

The patient arrived at the funeral home at approximately 09:40 hrs (the time was not recorded). The team members from SA arrived at the airport at 09:25 hrs and began preparing the stabilization medications while en route to the funeral home.

The SA team members arrived at the funeral home at 10:40 hrs. At 10:53 hrs an intraosseous (IO) device was placed in the right proximal tibia, approximately 2 cm medial to the tibial tuberosity. At 10:55 hrs the administration of the stabilization medications was started (see the below Table of Medications Administered for the names of the medications, dosages and the times of administration) together with manual cardiopulmonary support (CPS) to circulate the medications.

Streptokinase was excluded at this point as this medication was not included in the SA ischemia kit for non-washout cases, it was added during cryoprotection. All medications had been administered by 11:00 hrs. Team members continued CPS until 11:28 hrs. Nasopharyngeal probes were placed in the patient's nares at 11:06 hrs. The right nasopharyngeal temperature (NPT) was 17.9°C and the left NPT was 15°C. Nasal putty was placed in the patient's nares around the probes to prevent water and ice from entering the nares and interfering with correct temperature measurement.

#### 5. Field Surgery and Cryoprotection

The ICE and Alcor team members arrived at the airport at 12:16 hrs and arrived at the funeral home at 12:57 hrs. The top of the patient's head was prepped with alcohol for the burr holes at 13:15 hrs. The right burr hole was established at 13:19 hrs using a Codman perforator bit. The left burr hole was initiated at 13:21 hrs but was only partially finished due to the drill not being strong enough (see the Discussion section).

At 13:28 hrs the initial incision was made to isolate the left carotid artery, which was isolated at 13:30 hrs. The artery was secured at 13:32 hrs. The first incision to isolate the right carotid artery was made at 13:34 hrs. A large blood clot was removed, and significant calcification of the artery was noted. The right carotid artery was isolated at 13:38 hrs and secured at 13:40 hrs.

The left burr hole was completed at 13:42 hrs. Concurrently, the cephalic isolation was initiated. At 13:44 hrs both the left and right carotid arteries were severed. The cephalic isolation was completed at 13:46 hrs. A hole was drilled in the vertebra for later insertion of the eyebolt to facilitate ease of handling of the cephalon during cryogenic cooldown.

The left carotid artery was cannulated with an 18-gauge catheter and secured at 13:49 hrs. The right (internal) carotid artery was cannulated with a 16-gauge catheter and secured at 13:54 hrs. At 13:59 hrs the NPT was 12°C. The left vertebral artery was cannulated with an 8-French (Fr) catheter at 14:00 hrs. The right vertebral artery was also cannulated with an 8-Fr catheter. A thermocouple was placed into and secured to the scalp at the burr hole at 14:10 hrs. The cephalon was placed into the field neuro cryoprotection basin designed by Alcor and surrounded with water ice at 14:12 hrs.

The [Field Cryoprotection](#) (FCP) was initiated at 14:13 hrs by hanging cryoprotectant bladder #1 (bladder concentration 0.05 concentration needed to vitrify (CNV) on the elevated tripod (see the below Table of Concentrations (Brix) of nM22 Solution). 25,000 IU of streptokinase, which helps dissolve blood clots, was added to the bladder. The full dose of 250,000 IU was not used because this was being administered directly into the artery instead of into a vein as when it is administered as part of the stabilization protocol.

The first bladder was hung and opened to flow, but the second bladder was opened when the first bladder was about half empty. The third bladder was hung when the first bladder was empty and opened when the second was about half empty, and so on. By hanging two bladders with different cryoprotectant concentrations on a teeter-totter atop an elevated tripod, a smoother transition of increasing concentrations of cryoprotectant can be achieved (see the Discussion section for a more detailed explanation of the field equipment). The perfusate bladders were hung an estimated 36-38" above the infusion site. The arterial pressure induced by this elevation was estimated to be 74-78 mmHg at the cannula.

Bladder #2 (bladder concentration 0.08 CNV) was hung at 14:19 hrs. The temperatures at 14:19 hrs were right NPT 5.3°C, left NPT 5.9°C and burr hole 12.2°C. The temperatures at 14:24 hrs were right NPT 4.6°C, left NPT 3.3°C and burr hole 11.9°C.

Bladder #3 (bladder concentration 0.14 CNV) was hung at 14:26 hrs. A sample taken from the jugular effluent showed a cryoprotectant concentration of 13.4 Brix. The temperatures at 14:36 hrs were right NPT 3.4°C, left NPT 2.2°C and burr hole 11.8°C.

Bladder #4 (bladder concentration 0.23 CNV) was hung at 14:42 hrs. A sample taken from the jugular effluent showed a cryoprotectant concentration of 17.8 Brix. The temperatures at 14:36 hrs were right NPT 3.4°C, left NPT 2.2°C and burr hole 11.8°C.

Bladder #5 (bladder concentration 0.50 CNV) was hung at 14:52 hrs. No temperatures or effluent sample were recorded.

Bladder #6 (bladder concentration 0.50 CNV again) was hung at 14:58 hrs. A sample taken from the jugular effluent showed a cryoprotectant concentration of 29.9 Brix. The temperatures were right NPT 2.1°C, left NPT 1°C and burr hole 6.6°C.

Bladder 7 (bladder concentration 1.06 CNV, all remaining bladders had this same concentration) was hung at 15:15 hrs. No effluent samples or temperatures were taken.

Bladder 8 (bladder concentration 1.06 CNV Brix,) was hung at 15:26 hrs. Ethylene glycol antifreeze was added to the ice in the heat exchanger. The temperatures were right NPT -2.5°C, left NPT -1.8°C and burr hole 2.2°C. (See the Discussion section for an exploration of this inconsistent and temporary drop in temperatures).

Bladder 9 (bladder concentration 1.06 CNV) was hung at 15:58 hrs. No effluent sample or temperatures were recorded.

Bladder 10 (bladder concentration 1.06 CNV) was hung at 16:14 hrs. A sample taken from the jugular effluent at 16:17 hrs showed a cryoprotectant concentration of 45.4 Brix. The temperatures at 16:35 hrs were right NPT 2.2°C, left NPT 1.20°C and burr hole 0.5°C.

Bladder 11 (bladder concentration 1.06 CNV) was hung at 16:31 hrs. A sample taken from the jugular effluent at 16:35 hrs showed a cryoprotectant concentration of 47.9 Brix. No temperatures were recorded.

Bladder 12 (bladder concentration 1.06 CNV) was hung at 16:45 hrs. No effluent sample or temperatures were recorded.

Bladder 13 (bladder concentration 1.06 CNV) was hung at 17:00 hrs. The temperatures at 17:03 hrs were right NPT -0.9°C, left NPT 0.5°C and burr hole 0.2°C. A sample taken from the jugular effluent at 17:12 hrs showed a cryoprotectant concentration of 48.6 Brix.

An eyebolt was inserted into the vertebra at 17:13 hrs for ease of handling the cephalon during cooldown. The temperatures at 17:15 were right NPT -0.3°C, left NPT also -0.3°C and burr hole 0.6°C. A sample taken from the jugular effluent at 17:23 hrs showed a cryoprotectant concentration of 49.7 Brix.

Bladder 14 (bladder concentration 1.06 CNV) was hung at 17:32 hrs. A sample taken from the jugular effluent at 17:36 hrs showed a cryoprotectant concentration of 50.1 Brix. No temperatures were recorded.

Bladder 15 (bladder concentration 1.06 CNV) was hung at 18:03 hrs. No effluent samples or temperatures were recorded.

Bladder 16 (bladder concentration 1.06 CNV) was hung at 18:16 hrs. No effluent samples or temperatures were recorded.

Cryoprotectant perfusion was terminated at 18:20 hrs even though bladder #16 had not been expended as the field cryoprotection protocol is to not perfuse over an hour at the final

concentration. The final effluent concentration was not recorded either manually or on the video. The last recorded effluent concentration was 50.1 Brix at 17:36 hrs above. The cephalon weighed 4.780 kg but was not weighed before cryoprotection so no weight gain or loss can be calculated (see the Discussion section for why the cephalon had not been weighed before cryoprotection). The cephalon was placed into a neuro container and covered with dry ice at 18:24 hrs.

## 6. Transport

### T+1 days

Additional dry ice was placed around the patient. The NPT data logger was not functioning, but burr hole data was used to create the graphs. The team had planned to transport the patient by a commercial airline to depart at 08:00 hrs. At 07:40 hrs the team was contacted by the Transportation Security Agency (TSA) about shipment problems (see the Discussion section for details).

After discussions between ICE and Alcor management, the quickest solution was to transport the patient to Alcor by car. The patient arrived at Alcor at 20:21 hrs. Dry ice levels had been monitored during transport; no additional dry ice was needed. The initial graphed burrhole temperature was -78°C, and pharyngeal temperature -70 °C.

## 7. Cooling to Liquid Nitrogen Temperature

The appropriate computer program was used to initiate cryogenic cooldown at 20:52 hrs on T+1 days, plunging to -110°C and descending thereafter at -1°C/hour to liquid nitrogen temperature. On T+6 days at 10:50 hrs an uneventful cooldown was terminated. On T+36 days at 11:20 hrs CT scans were made of the patient's brain at liquid nitrogen temperature. On T+48 days at 12:32 hrs the patient was transferred to long-term maintenance at liquid nitrogen temperature.

## 8. Timeline and Time Summaries

### Timeline

#### T-0 days

03:45 Estimated time of the cardiac arrest  
06:45 Pronouncement of legal death  
09:40 Estimated time that ice was applied to the patient  
09:43 Transport patient to the mortuary (for surgery and field cryoprotection)  
10:53 Placement of the intraosseous device  
10:55 Start of chest compressions  
----- No airway was placed  
10:55 Administration of the first medication (100 mL sodium citrate)  
11:00 Administration of the final medication (200 mL decaglycerol)  
11:28 Termination of cardiopulmonary support (right NPT 18.16°C, left NPT 15.98°C)  
13:15 Start of the field surgery (burr holes)  
13:42 Start of the cephalic isolation  
13:46 End of the cephalic isolation  
----- The cephalon was not weighed before cryoprotection  
14:13 Start of the field cryoprotection  
17:36 Last recorded effluent concentration was 50.1 Brix  
18:20 End of the field cryoprotection (final Brix reading not recorded)  
18:22 Weight of the patient cephalon after cryoprotection (4.780 kg)  
18:24 Start of the dry ice cooling (placement of dry ice around cephalon)

#### T+1 days

18:24 (est 24 hrs) Dry ice temperature achieved  
20:21 Arrival of the patient at Alcor  
20:52 Start of patient cryogenic cooldown at Alcor (initial burrhole brain temperature -78°C)

T+6 days      10:50 End of cryogenic cooldown at LN<sub>2</sub> temperature

T+36 days      11:20 CT scan of cephalon at LN<sub>2</sub> temperature

T+48 days      12:32 Transfer of patient to long-term maintenance at LN<sub>2</sub> temperature

## Time Summaries

### Stabilization

hrs: mins

- 40:36** From estimated time of cardiac arrest (ETCA) to patient arrival at Alcor:  
03:45 hrs on T-0 days to 20:21 hrs on T+1 days
- 07:10** From ETCA to start of cardiopulmonary support: 03:45 hrs to 10:55 hrs
- 07:10** From ETCA to start of medication administration: 03:45 hrs to 10:55 hrs
- 00:05** From start to the end of medication administration: 10:55 hrs to 11:00 hrs

### Field Surgery and Field Cryoprotection

hrs: mins

- 09:30** From ETCA to start of surgery: 03:45 hrs to 13:15 hrs
- 00:31** From the start of surgery to end of surgery: 13:15 hrs to 13:46 hrs
- 10:28** From ETCA to start of field cryoprotection (FCP): 03:45 hrs to 14:13 hrs
- 04:07** From the start of FCP to end of FCP: 14:13 hrs to 18:20 hrs
- 14:35** From ETCA to end of FCP: 03:45 hrs to 18:20 hrs
- 04:30** From arrival at funeral home to the start of surgery: 09:43 hrs to 14:13 hrs
- 00:58** From the start of surgery to the start of the FCP: 13:15 hrs to 14:13 hrs
- 05:05** From the start of surgery to the end of the FCP: 13:15 hrs to 18:20 hrs

### Cryogenic Cooldown

- 00:04** From the end of FCP to the start of dry ice application: 18:20 hrs to 18:24 hrs
- 14:39** From ETCA to start of dry ice application: 03:45 hrs to 18:24 hrs
- 00:31** From arrival at Alcor to the start of cooldown at Alcor: 20:21 hrs to 20:52 hrs

## 9. Table of Medications Administered

TIME	MEDICATION	DOSE	PURPOSE
10:55 hrs	Sodium citrate	100 mL Note 1	Anticoagulant; prevents blood clot formation.
10:56 hrs	Heparin	50,000 IU	Anticoagulant; prevents blood clot formation.
10:57 hrs	Tempol	5 g Note 2	Low molecular weight superoxide scavenger used to mitigate ischemia-induced free radical damage.
10:58 hrs	Minocycline	200 mg	Antibiotic; reduces microbial overgrowth during long transport times.
11:00 hrs	Decaglycerol/THAM	200 mL Note 3	Decaglycerol inhibits cerebral edema.

Notes:

1. The standard formulation for sodium citrate is 20% w/v. 10 grams of sodium citrate are given to patients who weigh less than 40 kg and 20 grams are given to patients who weigh over 40 kg. This patient received 20 grams of sodium citrate because his weight was over 40 kg.
2. Tempol is administered as a fixed dosage of 5 grams and is given by IV using a 2-micron filter.
3. Decaglycerol/THAM is administered as a fixed dosage of 200 mL and is given by IV. This medication was given in 4 doses of 50 mL each starting at 10:58 hrs and ending at 11:00 hrs.
4. Streptokinase was not administered as it is not included in the SA ischemia kit for non-washout cases, but it was added to cryoprotectant bladder #1 during cryoprotection. Only 25,000 IU were added instead of the normal stabilization dose of 250,000 IU because this was an isolated head perfusion.

## 10. Table of Concentrations (Brix) of nM22 Solution

<b>Step-ramp calculator, nM22</b>			
sixth root of [% CNV]		1.6636	step ratio
bag #	contents	[nM22], CNV	Brix (calc)
1	0.05	0.05	11.81
2	0.08	0.08	13.14
3	0.14	0.14	15.35
4	0.23	0.23	19.03
5	0.50	0.50	29.85
6	0.50	0.50	29.85
7	1.06	1.06	52.31
8	1.06	1.06	52.31
9	1.06	1.06	52.31
10	1.06	1.06	52.31
11	1.06	1.06	52.31
12	1.06	1.06	52.31
13	1.06	1.06	52.31
14	1.06	1.06	52.31
15	1.06	1.06	52.31
16	1.06	1.06	52.31
17	1.06	1.06	52.31

## 11. Discussion

Prior to deployment, Alcor's MRD, CEO and select scientific advisors as well as the Standby, Stabilization and Transport (SST) Committee held ongoing discussions about what type of procedures would be optimal for this member. It was decided that field cryoprotection (FCP) would be utilized because 1) the inherent potential for an unknown time delay between cardiac arrest and the ability of hospice personnel to respond to the home and pronounce legal death, 2) the fact that the team had planned to be on standby prior to cardiac arrest while the member was enrolled in hospice care, 3) the family was cooperative and planned to allow the team to enter the member's room immediately after declaration of legal death in order to expedite stabilization procedures, 4) International Cryomedicine Experts (ICE) was available for FCP and therefore

transport times from the member's location to Alcor in Scottsdale would have significantly decreased cold ischemia time. As it turned out, however, the member went into cardiac arrest prematurely and the team was not on standby as planned, so FCP was then even more appropriate for this case.

During stabilization the streptokinase was not administered as the team members to first arrive at the location of the patient had not previously used on cases that required the abbreviated medications protocol. For future cases, the contractor has added this to their stabilization procedures. The streptokinase was added to the first cryoprotectant bladder.

During surgery, the cephalon was not weighed before cryoprotection because the funeral home did not have a scale and the team was not aware that a hanging scale had been added to the kits for this purpose. All strategic partners have been made aware of the need to weigh the cephalon both before and after cryoprotection so a better idea of brain shrinking or edema can be obtained.

The left burr hole was only partially finished due to the drill not being strong enough. The drill needs to be sufficiently strong to power a Codman perforator bit which has an integrated clutch designed to stop drilling once the dura matter of the brain is encountered. This prevents damage to the brain tissue. It was unknown at the time of the procedure if the drill was underpowered to complete two full burr holes, or if the charge was insufficient. The drill was returned to Alcor for further analysis.

Alcor staff investigated this issue by using the same model drill to drive several thick screws into a 2x4 board. The drill power was more than adequate if the drill speed selector was in position '1'. The drill power was not adequate if the drill speed selector was in position '2' and the clutch was not fully locked. Therefore, the following steps need to always be taken: 1) ensure the drill is placed into position '1', 2) ensure the drill clutch is 'locked', and 3) only drill burr holes with a fully charged battery.

During the field surgery it was noted that the vertebral cannulae become rigid when cold. This had already been investigated and, for now, the cannulae used are the best option available.

The gravity feed system for FCP uses a tripod that can be adjusted for height to control the arterial pressure. The pre-mixed cryoprotectant was in a series of bladders with graduated concentrations [measured by the refractive index (RI) in Brix units]. By hanging two bladders with different RI concentrations on a teeter-totter atop the tripod, as the bladder with the lower RI runs out and becomes lighter, at the mid-way point the teeter-totter will allow both bladders to flow, essentially mixing the two concentrations and creating a smoother transition from one concentration to the next. When the bladder with the lower RI runs out, the full concentration of the bladder with higher RI is then flowing exclusively. This process allows for a smoother curve in the increasing concentrations of cryoprotectant.

The height the perfusate bladders have been hung has not previously been reported, but will be standard for future FCP cases so that the maximum perfusion pressure can be calculated from the height. For this case, estimates of bladder heights were made for this purpose. The cephalon was placed on a preparation table and the perfusate bladders were hung an estimated 36-38" above

the infusion site. The arterial pressure induced by this elevation is estimated to be 74-78mmHg at the cannula. The goal is to have the pressure between 70 and 80 mmHg and the bladders can be raised or lowered as needed to optimize flow and protection of the vasculature.

During the FCP procedure a dramatic and inconsistent drop in temperature took place. At 14:58 hrs while bladder #6 was in use the right nasopharyngeal temperature (NPT) was 2.12°C. This temperature was consistent with temperatures previously recorded. However, at 15:26 hrs while bladder #8 was in use the right NPT was -2.48°C. This was an inconsistent drop in temperature. At 16:14 hrs while bladder #10 was in use the right NPT was 2.2°C, which was again consistent with the temperature cooldown rate and remained so throughout the rest of the perfusion.

This inconsistency in the right NPT was not noticed in the field but was noted as the case report was being drafted. International Cryomedicine Experts (ICE) personnel reviewed the video tapes of the field procedure to see if the cause could have simply been a reporting error. The temperatures had been recorded and reported correctly. The cause of the temperature anomaly is not definitive, but one possibility is that the temperature reading in question was taken within 30 minutes of the addition of antifreeze to the ice water in the heat exchanger. This may have had a temporary effect on the ice water temperature, which in turn significantly and temporarily dropped the perfusate temperature.

It might be insightful to compare this data with previous cases to see if this is an anomaly or if it is similar to other outcomes. Could the brand or the concentration of the antifreeze also be a variable in the temperature drops? Could there be a way to titrate the addition of antifreeze to reduce the exaggerated effect? This event may have exposed an additional area of needed refinement in the FCP procedures.

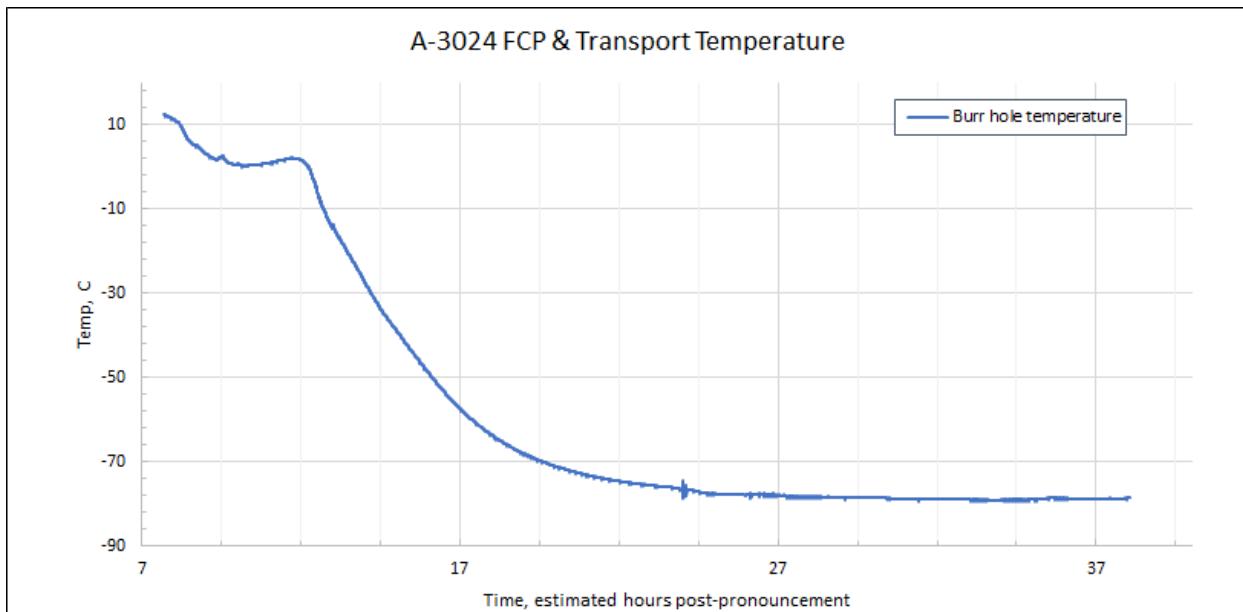
During transport, the team was not able to get the patient onto a plane without being given a clear explanation as to why. A Department of Homeland Security (DHS) explosives expert, a TSA supervisor, a local police officer and the airport manager, who was not present and only communicated via telephone, were all involved but did not give a specific reason to why the team was not allowed to proceed. The TSA supervisor did state that the amount of dry ice in the shipper was within regulations, but he provided no other information. The airline and the DHS explosives expert were fine with the package but were not able to convince the airport manager to allow the team to travel with the patient. The airport manager would not allow the package to be loaded onto any aircraft from that airport.

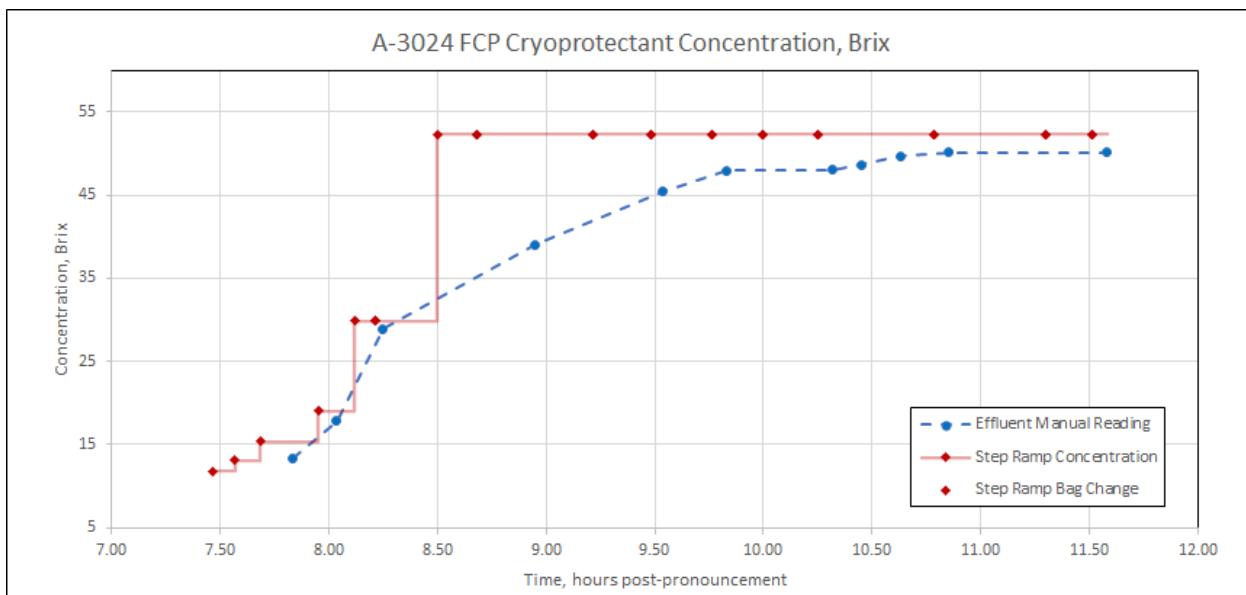
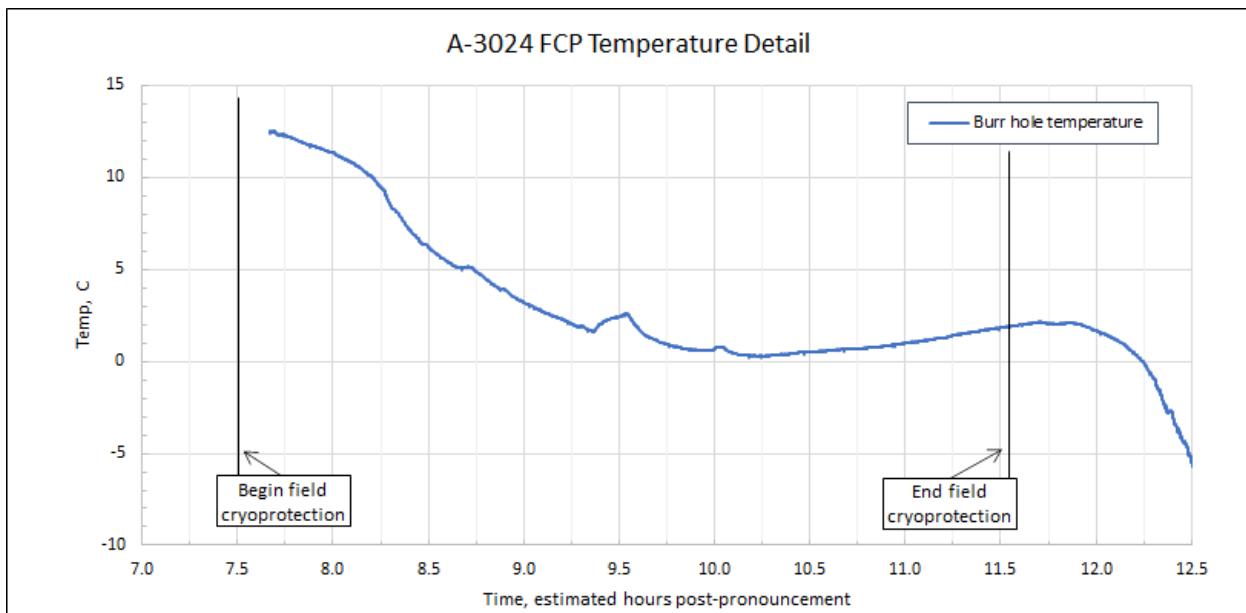
The airport officials repeatedly referenced a Las Vegas shooting incident that took place a few years earlier. Apparently, the brain of that individual was flown to another location for scientific analysis. The overriding regulation that covered that particular transport required paperwork to be submitted 30 days in advance for approval. The Alcor team explained that that was not the same regulation that covered anatomical donations under the UAGA as donated organs cannot survive 30 hours, let alone 30 days, before their viability has ended. The team was not able to gain cooperation. To help prevent issues like this, Alcor staff will research the shipping guidelines and have them readily available in the event this scenario happens again.

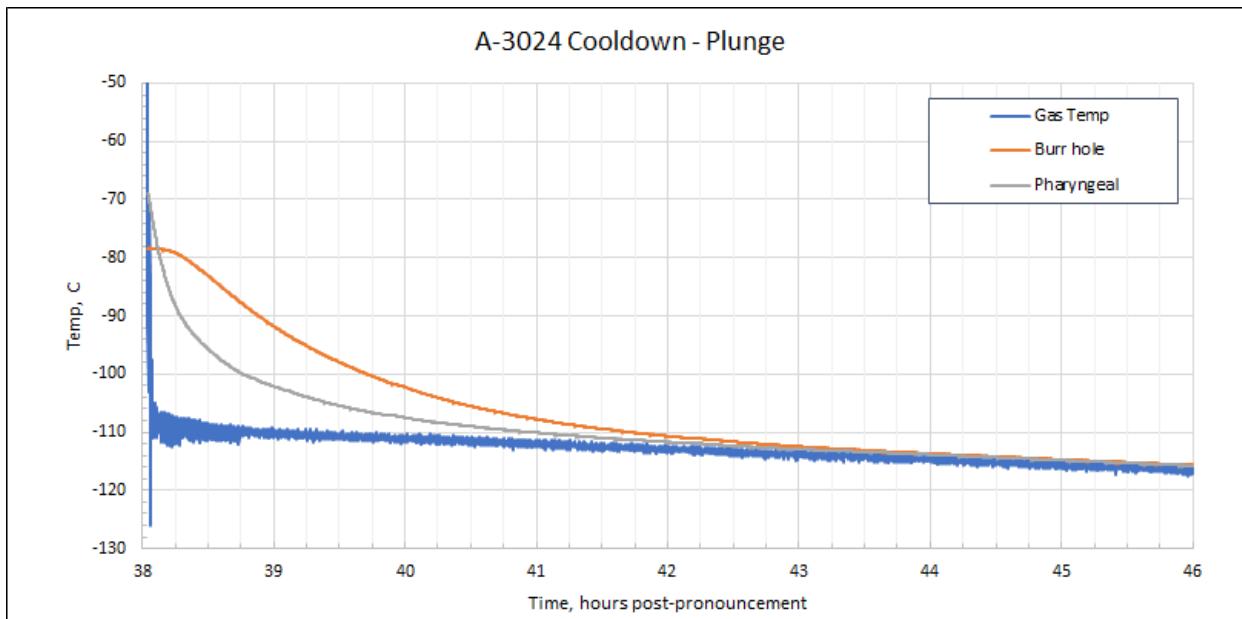
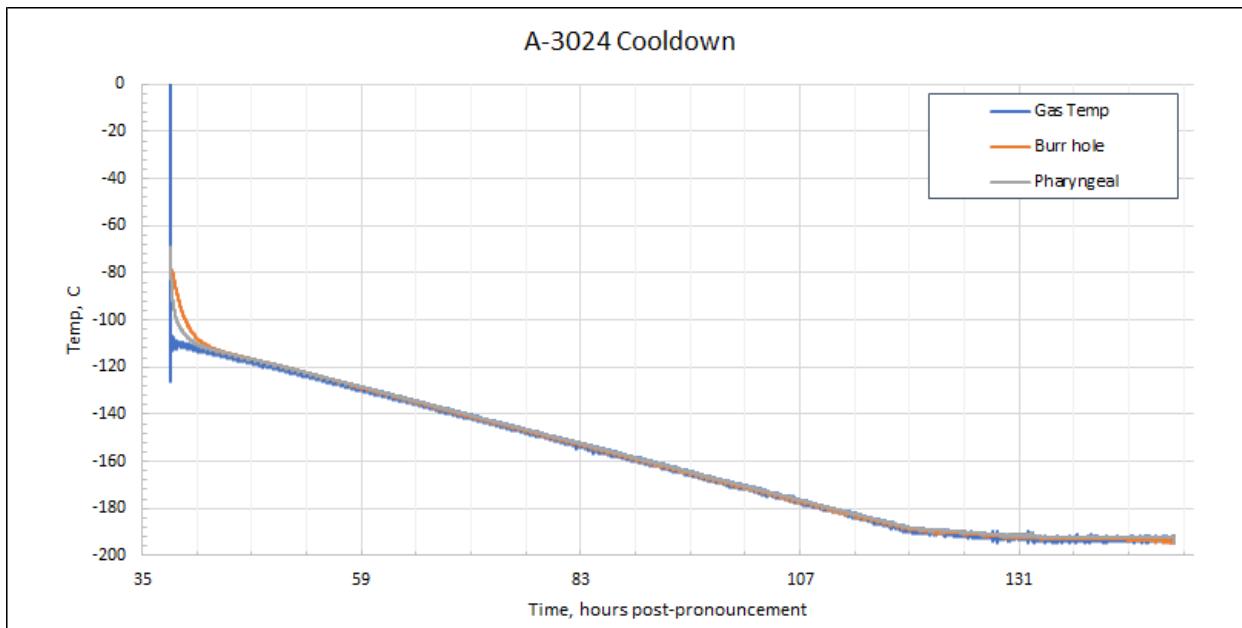
When the patient arrived at Alcor it was found that the nasopharyngeal temperature (NPT) logger was nonfunctional, but the one measuring the burr hole and dry ice was functional. Commercially available loggers have been a frequent source of data loss. The Alcor staff is working to correct this problem. Waterproof cases will be provided to all strategic partners, and an in-house universal data logger (UDL) is under development.

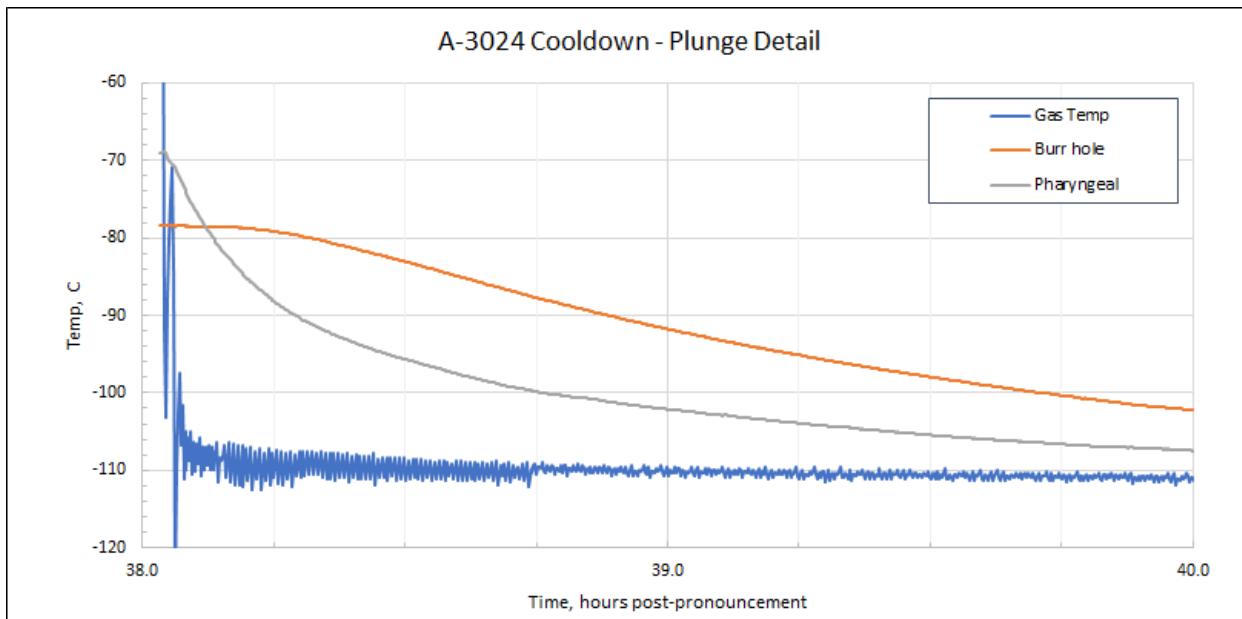
The post-cryopreservation CT scan reveals large areas of low cryoprotectant concentration and freezing, which is consistent with the extensive ischemic delays of the patient.

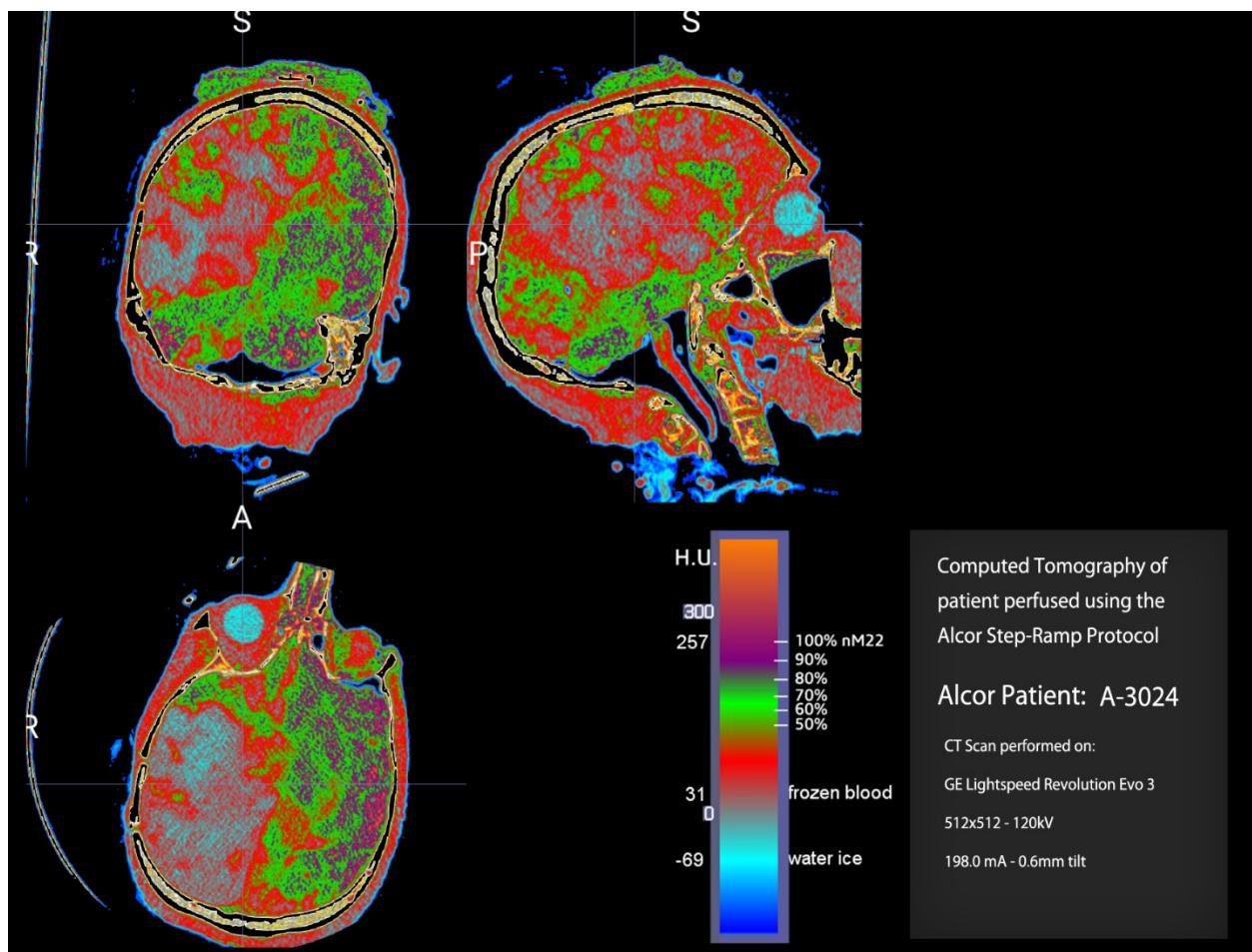
## 12. Graphs and CT Scans









**Cryoprotectant Distribution (Post-cryopreservation CT scan)**

The post cryoprotection CT scan was obtained on T+36 days at 11:20 hrs; the patient was at liquid nitrogen temperature (-196°C).