

Alcor A-3079

Case Report



LIFE EXTENSION FOUNDATION
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Prepared by:
Linda Chamberlain, Co-Founder and
Director of Special Projects,
Alcor Life Extension Foundation

Sources:
Josh Lado, Medical Response Director,
Hugh Hixon, Alcor Research Fellow,
Steve Gruber, Alcor Technical Coordinator, and
R. Michael Perry, Ph.D., of
Alcor Life Extension Foundation, and
email exchanges between members of
the Alcor Research Committee

Editing by Marji Klima of
Alcor Life Extension Foundation

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1. Overview

Information is derived from multiple sources and is all converted to Mountain Standard Time (MST).

On November 15, 2017, Alcor was notified of a confidential, non-member who had been pronounced clinically deceased on November 12, 2017, per an affidavit from a London funeral director, in Nice, France. She became Alcor's 154th patient.

Due to restrictive laws in France that do not allow funeral homes to freeze human remains, the patient was packed in water ice and moved to London, England in order to place her on dry ice for transport to Alcor. The patient departed England on November 28, 2017, and due to time zones arrived at the Phoenix Sky Harbor Airport on November 28, 2017, and was then transported to Alcor. Once at Alcor, she was prepared for liquid nitrogen cooldown. Cooldown was completed on December 3, 2017 and the patient was transferred to long term care.

2. Personnel

Membership, Transport and Cryoprotection:

Josh Lado, EMT, Alcor Medical Response Director; organization and transport
Hugh Hixon, Jr., Alcor Research Fellow; organization, readiness and cooldown

Steve Graber, Alcor Technical & Readiness Coordinator; technical readiness

Max More, Ph.D., Alcor CEO; photography and general assistant

R. Michael Perry, Ph.D.; technical readiness

Diane Cremeens, Membership Director; membership paperwork and coordination

Deployment Committee:

Max More (MM), Ph.D., Alcor CEO, policy, strategy and outreach

Steve Harris (SH), M.D., Alcor Chief Medical Advisor

Josh Lado (JL), EMT; Alcor Medical Response Director

3. Pre-Deployment and Patient Assessment

This case involved an 80-year-old female with a history of heart disease. She was not yet a member of Alcor but had spoken to her son about cryonics after a previous heart attack and had written a letter showing interest in being cryopreserved. The letter and other information were passed on to Alcor's Board of Directors for consideration. The family was notified that this would be a straight freeze case and they wanted to proceed. The Alcor Board approved the case, her son signed Third Party paperwork to make her a member and arrangements were started to transport her to Alcor. She became Alcor's 154th (non-public) patient.

4. Preparation and Deployment

Between November 15, 2017, and November 17, 2017, there was extensive email exchange between Alcor staff and the Alcor Research Committee about how to best proceed with this case which included potential problems with French and English customs and laws, stabilization and transport, making sure the bagged ice used would not be colder than 0°C, the understanding that freezing after embalming was no longer considered as damaging as it once was held to be, and what kind of shipper to use. There was also a great deal of email among Alcor staff about finalizing the member's paperwork and funding arrangements.

To comply with the laws in France, the patient was embalmed and kept cool. French law restricts funeral homes from freezing any human remains. Therefore, the patient was transported on water ice to London on November 18, 2017, to get her to a country with laws more amenable to cryonics. The early time course of her temperature decline was not documented. The patient arrived at the funeral home in London in the early morning, where dry ice cooling was initiated and continued while the paperwork for Alcor, the French government and the British government was all completed and the patient could be transported back to Alcor.

5. Transport

The patient departed England on November 28, 2017, at 19:30 hrs (estimated) in the Alan Sinclair shipper, which he had made years ago. The shipper weighed 395 lbs. empty. Its performance had been measured in February of 2009 at 43.6 lbs. of dry ice per day. The current shipping label claimed shipment with 45 kg (99 lbs.) of dry ice, placed at the head and foot outside the Ziegler case.

The patient arrived at Phoenix Sky Harbor Airport and was then transported directly to Alcor.

6. Cooling to Liquid Nitrogen

Upon arrival at Alcor at 20:55 hrs (note that time zone changes affected the times), there was frost on the interior of the shipper lid, and the bottom of the lid of the Ziegler case. There was less than 10 lbs. of dry ice remaining, all at the foot of the case. Additional foam had been added for insulation, to fill unused volume, and to prevent the Ziegler case from slipping inside the shipper.

There was no frost on the patient's face. A thermocouple was placed in the patient's nose about 2.5" deep and the nasopharyngeal temperature was observed to be -30°C as the reading continued to descend at a rate consistent with a final, stable measurement several degrees lower, but still much higher than dry ice temperature.

Her face was touched with a bare hand while maneuvering a lifting strap around the patient's body; the skin was solidly frozen.

It had been planned to transfer the patient to liquid nitrogen (LN_2) cooldown in the morning, but due to the lack of sufficient dry ice in the shipper, it was decided to proceed without delay. The patient was removed from the Ziegler case, her head was wrapped in Dacron wool for protection, and an LN_2 -precooled neurocan was placed over her head for protection.

She was then placed in a precooled -40°C LN_2 high-grade mummy bag, strapped into a patient pod and placed in the precooled cooldown dewar. A thermocouple could not be placed in a good location in her head. Cooldown was a plunge to -80°C circulating gas temperature and then a descent at $-1^\circ\text{C}/\text{hr}$ to LN_2 .

In precooling the cooldown dewar, too much LN_2 had been used, which resulted in the head of the pod being cooled directly with LN_2 for about five hours until the LN_2 in the dewar bottom was exhausted and the head of the pod warmed to the control temperature of -93°C .

To resolve conflicting indications, on November 29, 2017, the cooldown lid was lifted off the dewar for a few moments to see if the spray bar of the fanless cooldown lid was aligned correctly with the pod. It was, and the cooldown was resumed. The remainder of the cooldown to LN_2 was uneventful, ending at 22:56 hrs on December 3, 2017.

At approximately 12:00 hrs on December 8, 2017, the patient was transferred to permanent storage in the recently activated BF-20. The boil-off rate was approximately 13.2 L/day after nine days.

On December 16, 2017, a test of the Sinclair shipper with 400 lbs. of dry ice (shipper + case + dry ice = 900.0 lbs.) showed a weight loss of 40 lbs./day by days 2 and 3. There had been 48 dry ice packages in the shipper, probably with a sales weight of 1 kg each. On December 21, 2017, after eight days of testing the Sinclair shipper, the dry ice consumption had declined from over 40 lbs./day to under 30 lbs./day.

7. Timeline

November 12, 2017

13:35 Patient pronounced (per affidavit from London funeral director) in Nice, France

November 15, 2017

10:37 Alcor contacted oft-used London funeral service to coordinate transport from France to London and then to Alcor.

November 17, 2017

05:52 Encountered problems with British customs and a potential autopsy

November 18, 2017

The early temperature time course was not recorded. The patient was packed with water ice and transported from France to England where she was then packed in dry ice

November 28, 2017

19:30 (est) The patient was shipped from England to the Phoenix Sky Harbor Airport in the Alan Sinclair shipper

20:55 Arrival at Alcor (time zone changes) and start of cooldown to LN₂

December 3, 2017

22:56 Termination of cooldown

December 8, 2017

Transfer to long-term maintenance at LN₂ temperature.

8. Issues & Actions

No debriefing meeting was held following this case. However, there was email discussion between Alcor staff and the Cases Committee. The following issues were identified.

Issue 1: The patient arrived at a temperature substantially higher than dry ice temperature (-79 °C).

Discussion: The failure was not biologically catastrophic, and maybe not even biologically significant, because if a patient is frozen without cryoprotective perfusion, i.e., a “straight Freeze” (that is a crucial aspect), most ice will remain frozen until the tissues warm past -20°C (the eutectic temperature of sodium chloride salt/water mixtures), with most melting happening near 0°C.

The patient had been under dry ice (-79°C) since November 18, 2017 (10 days). She was obviously in the process of warming up, and below -30°C in the center of the head was probably the coldest temperature upon arrival. Most other locations in the head were probably somewhat warmer. Since the case surface was still below 0°C and there were a couple of air gaps, the skin surface was probably approximately -20°C.

If this patient arrived at a temperature of approximately -30°C, then the patient was well on the way toward melting, but never actually reached the temperature zone of major melting for straight-frozen tissue.

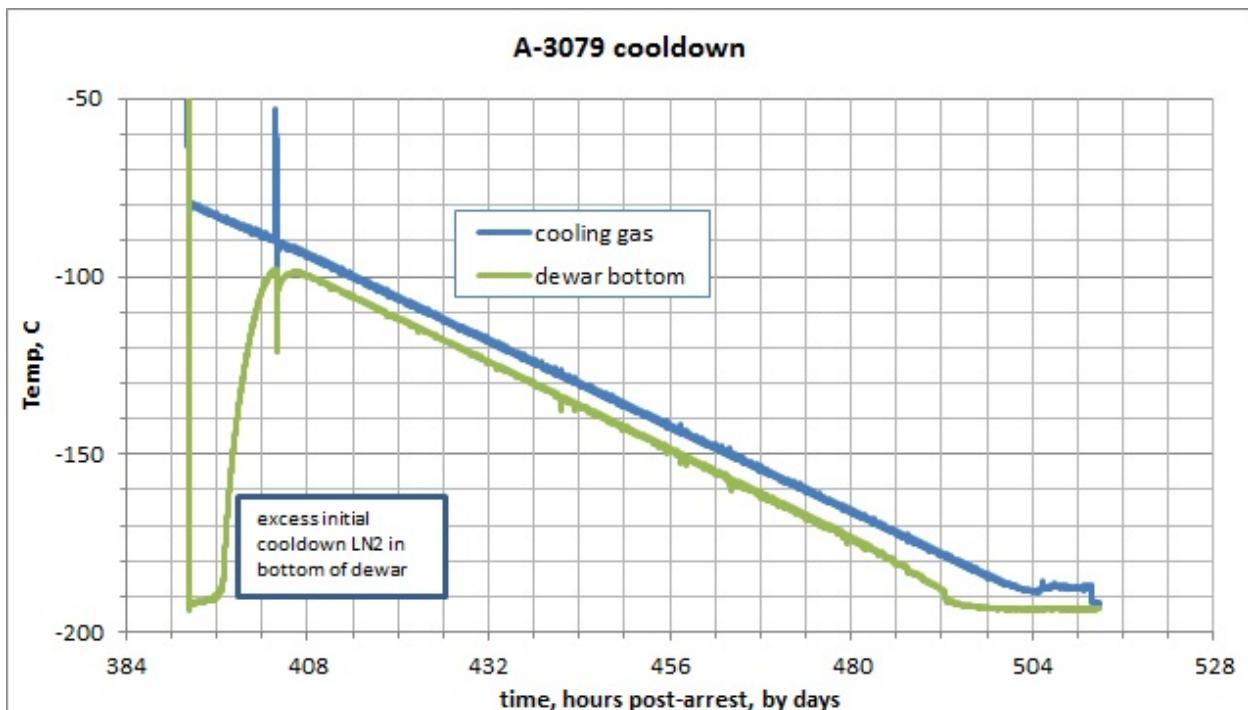
Issue 2: The straight-frozen patient arrived at a temperature tens of degrees below 0°C, but still warmer than dry ice temperature, narrowly avoiding thawing.

Corrective Action: Confirm with the mortuary packing the patient for shipping that the shipping container is topped off with the maximum permissible amount of dry ice as near as possible to the shipping time, and that this amount is consistent with the amount of dry ice required for the anticipated shipping time (plus safety margin) as determined by tests with the specific container being used for shipping.

Issue 3: There is no information about the patient's storage temperature at the mortuary prior to shipment from France to England on water ice.

Corrective Action: Whenever Alcor receives notification that a member or prospective member has legally died, obtain information about the storage temperature as soon as possible.

9. Graphs



As this case was a straight freeze, no CT scans were made.