



P-22

# Case & Quality Reports 2025

Tomorrow.bio

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**Notice: The data in this report is incomplete, in large parts not fully trustworthy, and CT scan analysis was not possible due to differences in CPA composition. While we can't fully analyze the quality of preservation, the procedures and outcomes were not in line with our quality standards.**

## Introduction

The initial SST team consisted of five members with the following roles: lead surgeon, surgical assistant, perfusionist, and two supports. The TB team arrived at the patient's location with the ambulance and remained on standby in Europe for six days. The patient was subsequently relocated to a hospital in the United States without our involvement. After approx. one month, the patient deanimated. At that time, four members of the U.S. partner team and the mobile operations vehicle (MOV) were on site.

The following stabilization procedures were performed by the partner team; several procedures were performed in parallel:

- Nasopharyngeal temperature probes inserted.
- Tympanic temperature probes inserted into each ear.
- Rectal temperature probe insertion (with occlusion device).
- Chest compressions with LUCAS 3 device.
- Approximately 18 kg of ice and 38 L of water placed into the portable ice bath.

The following medication was administered via the patient's pre-existing PICC line:

| Medication        | Dosage    |
|-------------------|-----------|
| Sodium Citrate    | 90 cc     |
| Heparin           | 50,000 IU |
| Decaglycerol/THAM | 185 cc    |
| Minocycline       | 200 mg    |

SCCD water flow around the body and cooling mask were initiated. The patient was transported from the hospital to the partner facility via the MOV, arriving approximately four hours after legal death. During transport, dry ice was procured and logistical planning for perfusion was finalized. Upon arrival at the partner facility, approximately 137 kg of ice water was placed into the ice bath.

The surgical team then arrived and began preparations for surgery and perfusion. The following procedures were carried out:

- Perfusion system primed with 5% VM1.
- Median sternotomy for cardiac surgical access.
- Aorta cannulated and perfusion initiated.
- The inferior vena cava was cannulated and cardiotomy suction was established.
- Streptokinase (250,000 IU) was administered through the arterial line.
- Three blood samples were drawn from the venous line for serology testing.
- One burr hole was drilled for brain temperature monitoring and visualization.
- Cryoprotectant perfusion was performed with gradually increasing concentrations, as shown in the table below:

| Concentration |
|---------------|
| 5% VM-1       |
| 10% VM-1      |
| 30% VM-1      |
| 70% VM-1      |

Perfusion was conducted in an open-circuit configuration. During perfusion, significant edema was observed, including abdominal swelling and lung prolapse through the chest cavity. Severe edema was also noted in the patient's face and extremities. Following consultation with Tomorrow.bio advisors, the decision was made to discontinue perfusion at a final venous refractive index of 1.4103.

The patient was then placed on dry ice and transported to the European Biostasis Foundation for cooldown. Transport temperature remained stable at  $-79^{\circ}\text{C}$  throughout the transfer. Upon arrival at the facility, the patient was received, CT scanned and prepared for cooldown to cryogenic temperatures. After cooldown, an additional CT scan was taken at  $-196^{\circ}\text{C}$  and subsequently the patient was placed into long-term storage dewar.

Cooldown and CT analysis proceeded as follows:

- CT scan performed at  $-80^{\circ}\text{C}$ .
- Rapid cooldown to temperatures above the glass transition temperature.
- Slow, gradual cooldown from above the glass transition temperature to cryogenic temperatures.
- CT scan performed at  $-196^{\circ}\text{C}$ .

Following completion of cooldown and CT analysis, the patient was carefully transferred in a storage pod to a long-term storage dewar.

## Cryoprotection Data

### Temperature

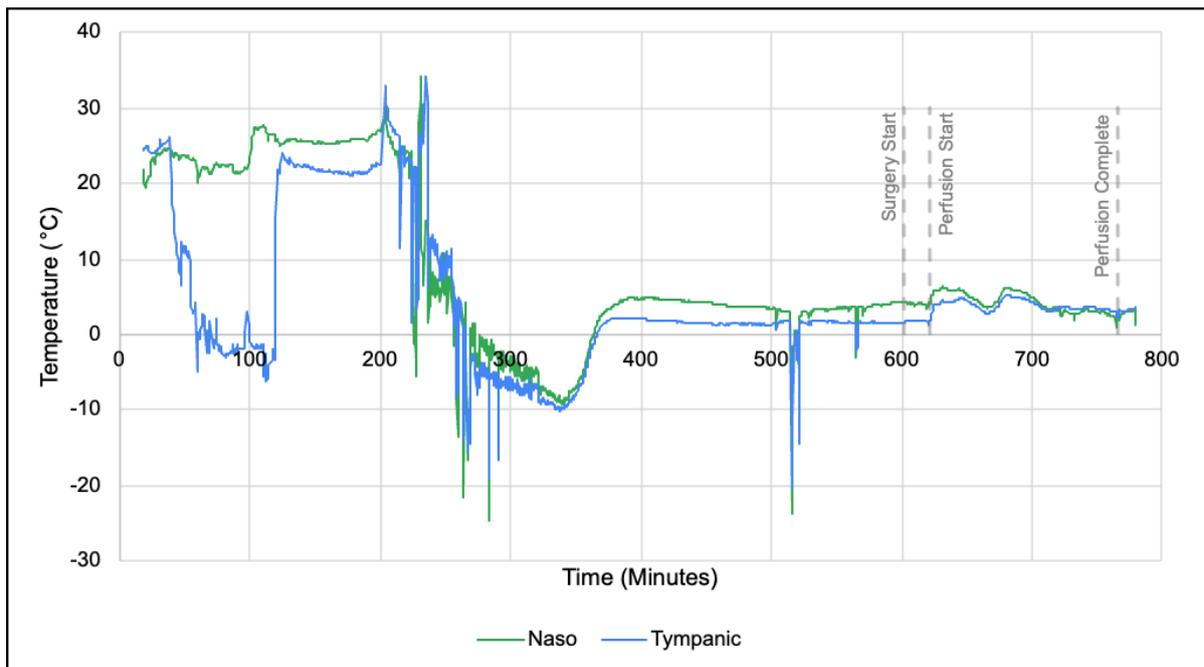


Figure 1. Patient temperature during stabilization, surgery, and perfusion, with a timeline highlighting surgery and perfusion.

## Refractive Index

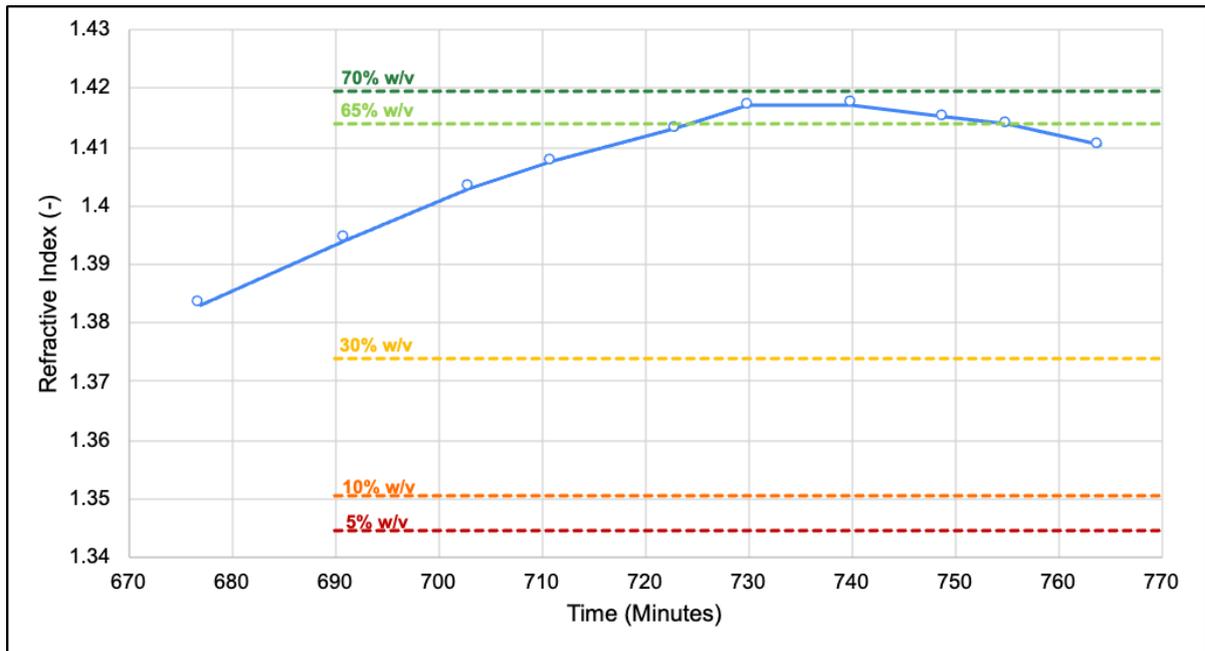


Figure 2. Patient's refractive index during surgery and perfusion.

## Pressure

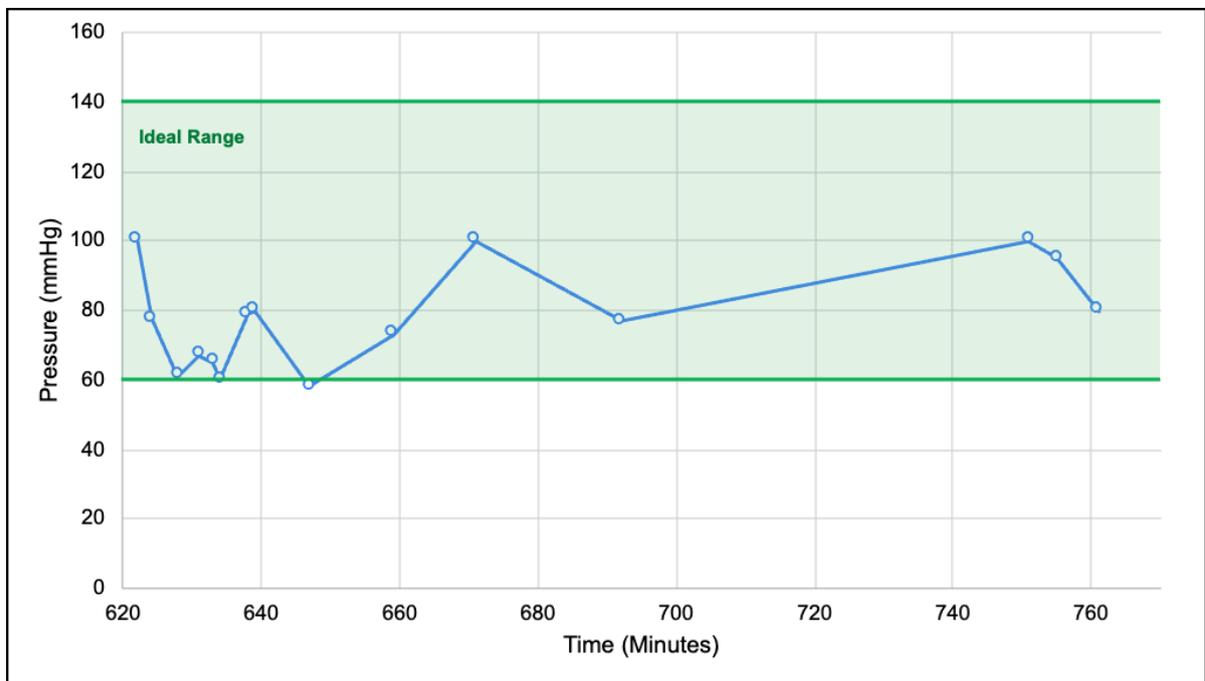


Figure 3. Perfusion pressure over time, with the ideal pressure range highlighted.

## Cooldown

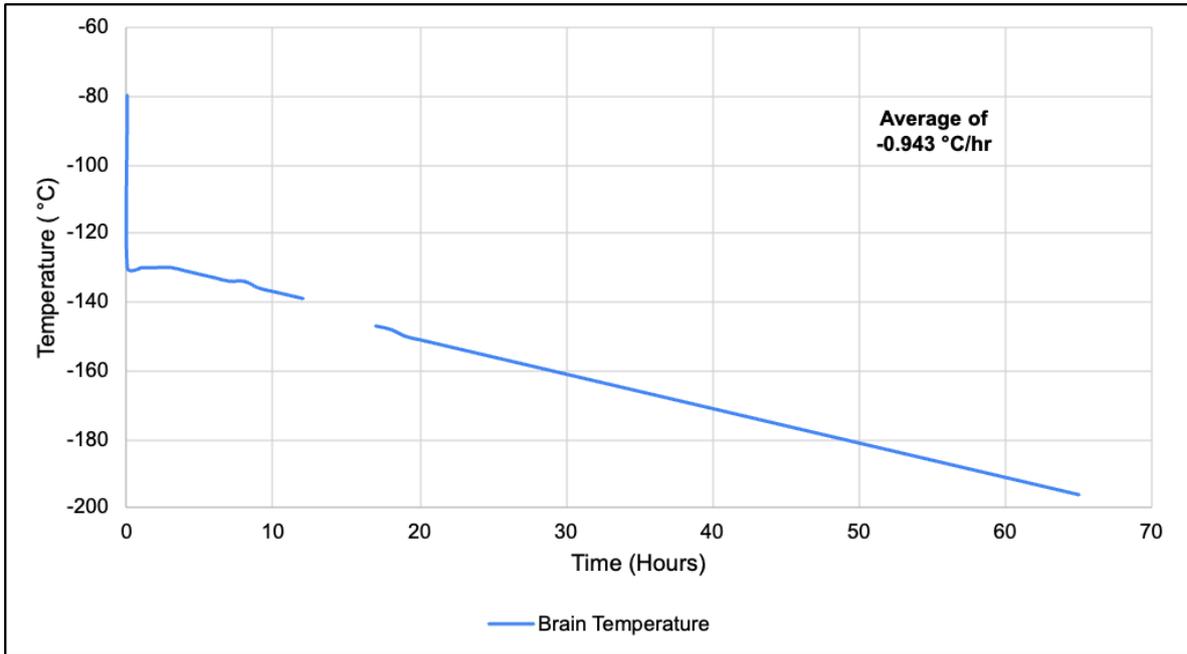


Figure 4. Patient cooldown to -196°C.

## S-MIX

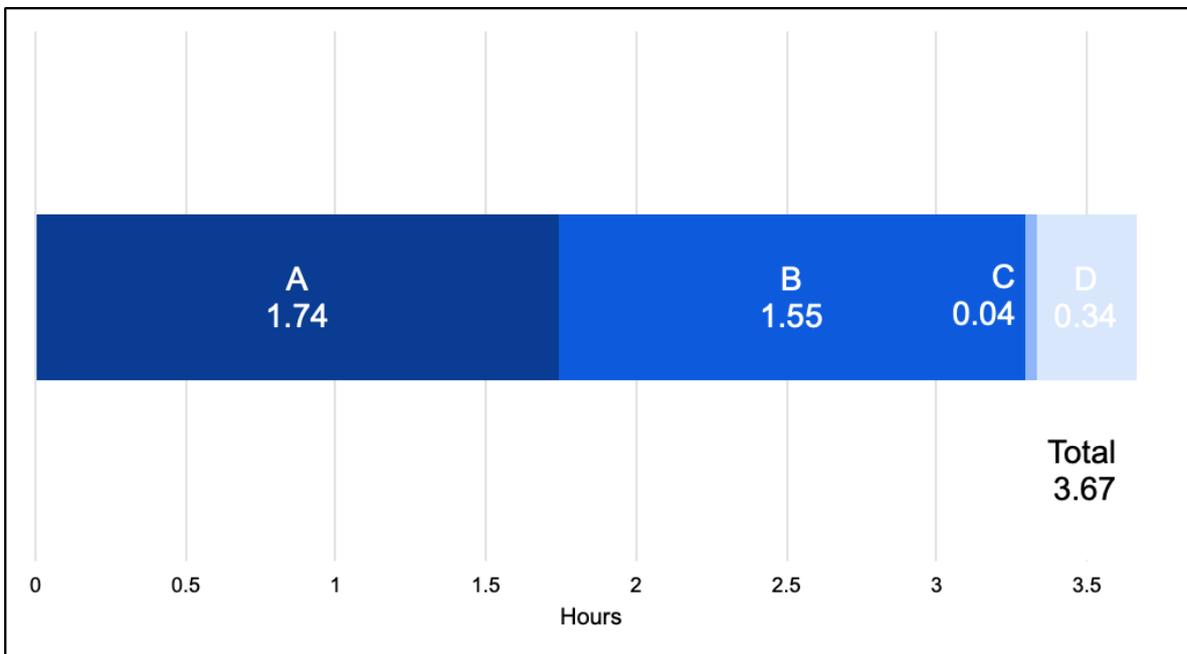


Figure 5. S-MIX calculation.

Segment A: Time of death until start of chest compressions – 1.74

Segment B: Start of chest compressions until LUCAS off – 1.55

Segment C: LUCAS off until start of surgery – 0.04

Segment D: Start of surgery until the end of perfusion – 0.34

# CT Scan Analysis

## Overview

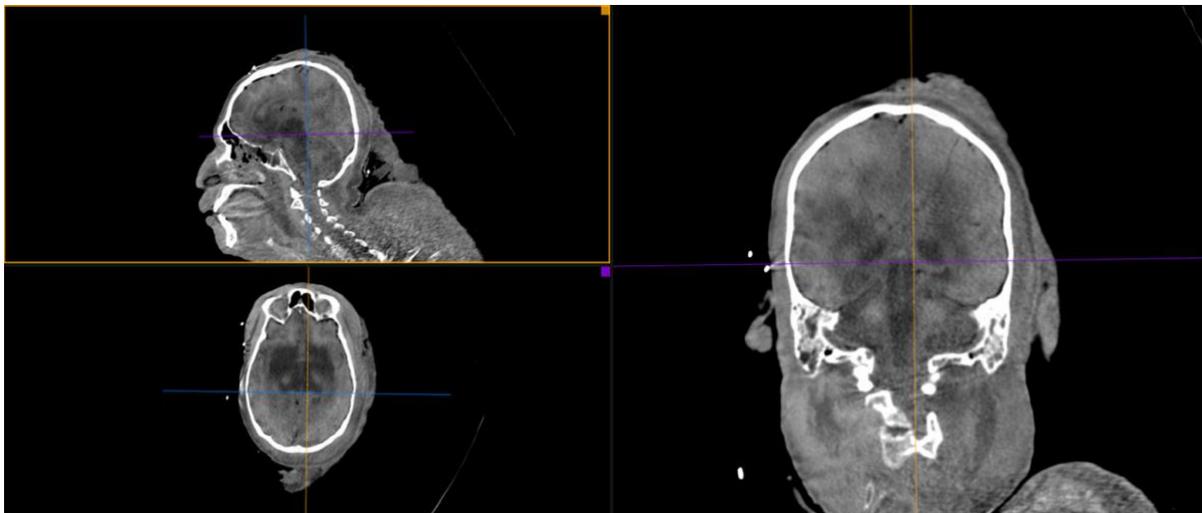


Figure 6. 3-panel projection (gray-scale).

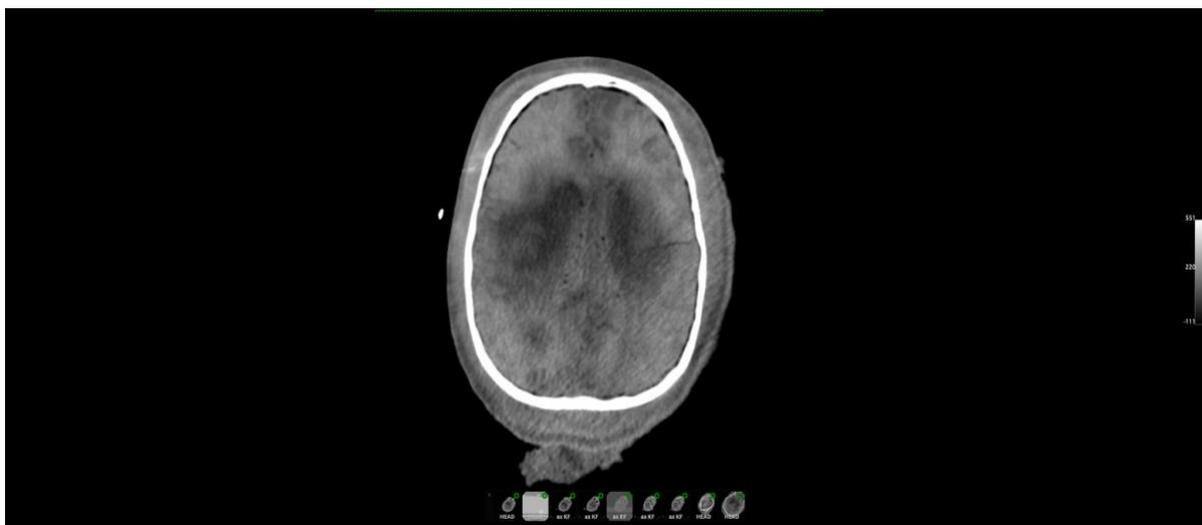


Figure 7. Axial plane CT slice 1.

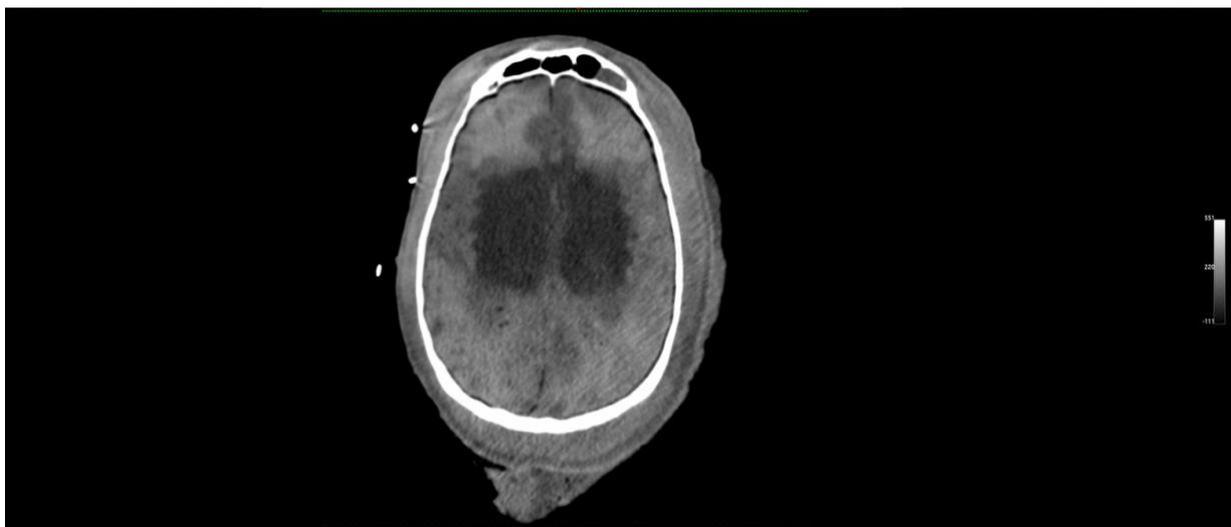


Figure 8. Axial plane CT slice 2.

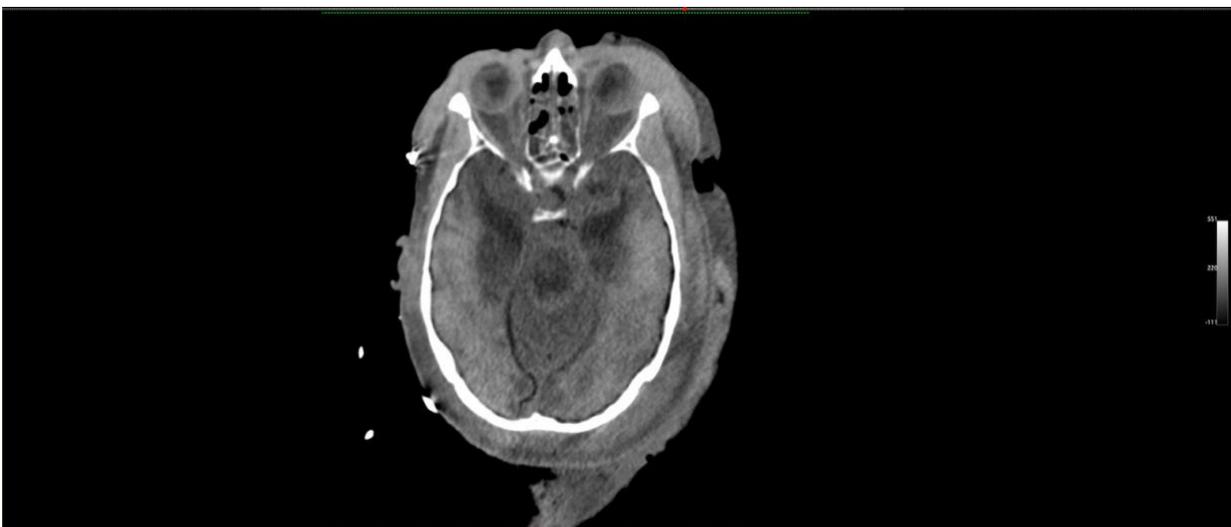


Figure 9. Axial plane CT slice 3.

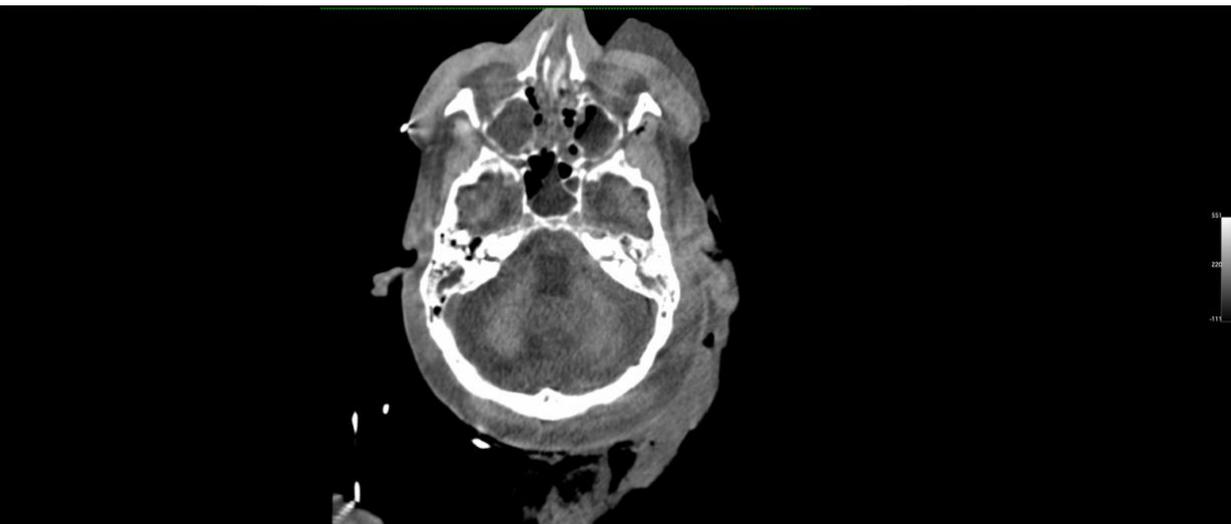


Figure 10. Axial plane CT slice 4.

## Discussion of Results

The patient arrived at the European Biostasis Foundation at  $-79^{\circ}\text{C}$ . An initial CT scan was performed prior to cooldown. Cooldown was then initiated, and following completion of the process, a second CT scan was performed at  $-196^{\circ}\text{C}$ . The patient was subsequently placed into a dewar for long-term storage.

## Timeline

| <b>Activity</b>                       | <b>Timestamp from cardiopulmonary arrest (minutes)</b> | <b>Timestamp from patient pick-up (minutes)</b> |
|---------------------------------------|--|---|
| Patient transfer to portable ice bath | 150  | 0   |
| Chest compressions (LUCAS 3)          | 152  | 2   |
| First medication administered         | 157  | 7   |
| SCCD pump activated                   | 159  | 9   |
| Final medication administered         | 160  | 10  |
| Stabilization complete                | 160  | 10  |
| Transport to partner facility         | 161  | 11  |
| Arrived at partner facility           | 241  | 91  |
| LUCAS deactivated                     | 739  | 589   |
| First cut                             | 744  | 594   |
| Chest opened                          | 746  | 596   |
| Aorta cannulated                      | 754  | 604   |
| IVC cannulated                        | 756  | 606   |
| Perfusion started (open circuit)      | 763  | 613   |
| Burr hole drilled                     | 779  | 629   |
| Perfusion completed                   | 908  | 758   |