

# Prolonged preservation of livers donated after circulatory death using dual hypothermic oxygenated machine perfusion

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## Introduction

The use of Dual Hypothermic Oxygenated machine Perfusion (DHOPE) has emerged as the standard preservation strategy for livers donated after circulatory death (DCD), as its protective effect against ischemia-reperfusion injury mitigates the risk of complications post-transplantation.

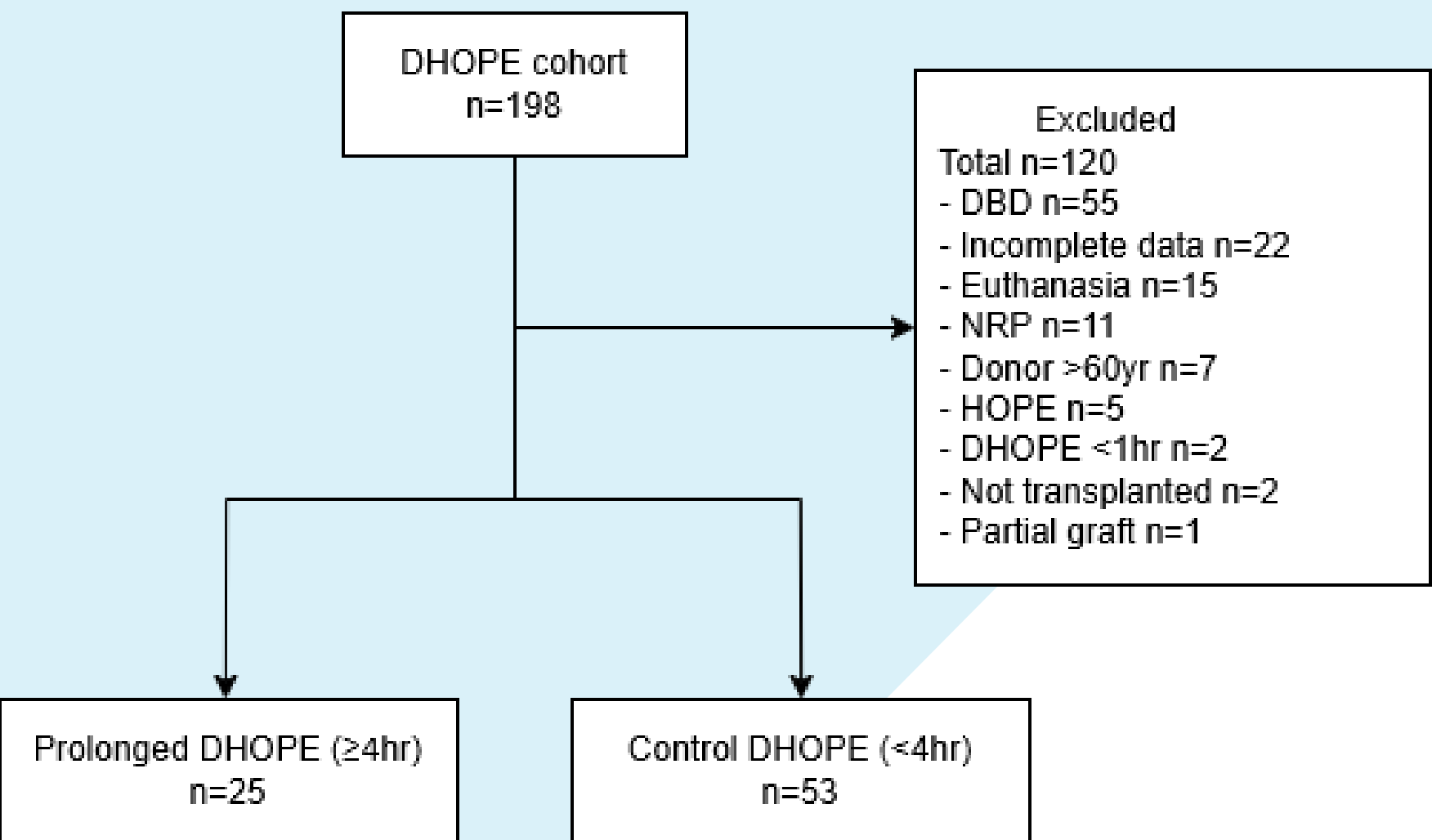
Preservation of especially DCD livers is limited during static cold storage, which challenges the logistical organization of DCD liver transplantation. Prolonged preservation using DHOPE has been shown to be safe and reliable in livers from brain-dead donors, optimizing logistics and enabling daytime transplantations.

The safety of prolonged DHOPE in DCD livers, without additional perfusion (i.e. after standard rapid procurement) remains unclear.

**Aim of this study: Determine the safety of DCD liver transplantation following prolonged DHOPE preservation.**

## Methods

- Retrospective single-center cohort study
- Inclusion of adult recipients of DCD livers following DHOPE preservation
- 2 groups based on DHOPE duration
  - N=25 livers ≥4 hours
  - N=53 livers <4 hours
- Outcomes within the first year post-transplantation:
  - Operation duration
  - Intra-abdominal bleeding
  - Renal replacement therapy and acute kidney injury
  - Primary non function rate
  - Biliary complications:
    - Nonanastomotic strictures
    - Anastomotic strictures
    - Biliary leakage
  - Vascular complications
    - Hepatic artery thrombosis
    - Portal vein thrombosis
  - Death-censored graft and overall patient survival



## Results

| Outcomes                         | Prolonged DHOPE (n=25) | Controls (n=53) | P value |
|----------------------------------|------------------------|-----------------|---------|
| Operation duration (hours)       | 7.3 (1.8)              | 5.7 (1.3)       | <0.001  |
| Intra-abdominal bleeding (n, %)  | 8 (32%)                | 6 (11%)         | 0.054   |
| Renal replacement therapy (n, %) | 6 (24%)                | 3 (6%)          | 0.027   |
| Acute kidney injury (n, %)       | 12 (48%)               | 24 (44%)        | 0.822   |
| Primary non function (n, %)      | 1 (4%)                 | 1 (2%)          | 0.541   |
| Nonanastomotic strictures (n, %) | 4 (16%)                | 3 (6%)          | 0.202   |
| Anastomotic strictures (n, %)    | 7 (28%)                | 11 (21%)        | 0.478   |
| Biliary leakage (n, %)           | 5 (20%)                | 6 (11%)         | 0.316   |
| Hepatic artery thrombosis (n, %) | 1 (5%)                 | 2 (4%)          | 1       |
| Portal vein thrombosis (n, %)    | 0 (0%)                 | 1 (2%)          | 1       |

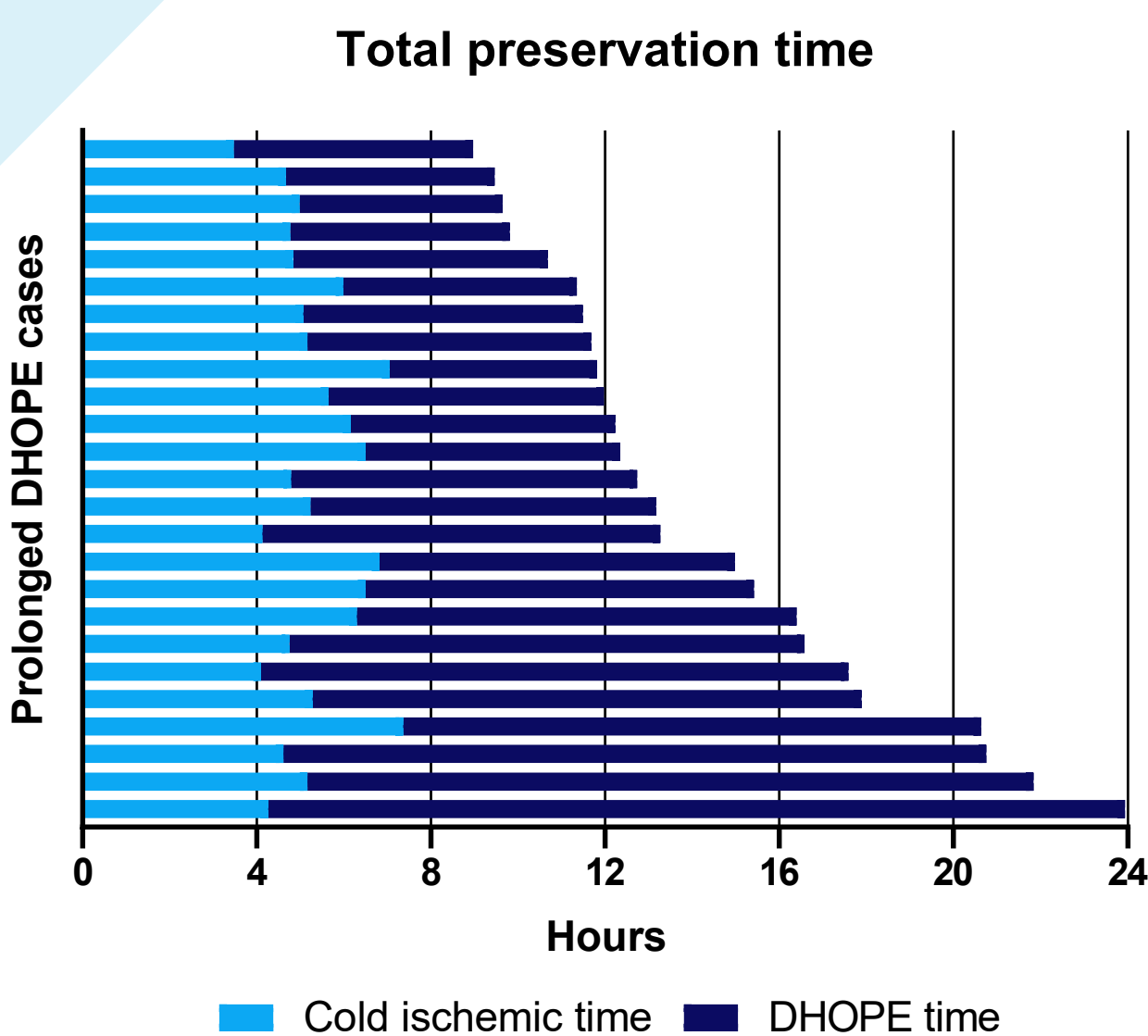


Figure 1. Total preservation time of DCD livers during prolonged DHOPE.

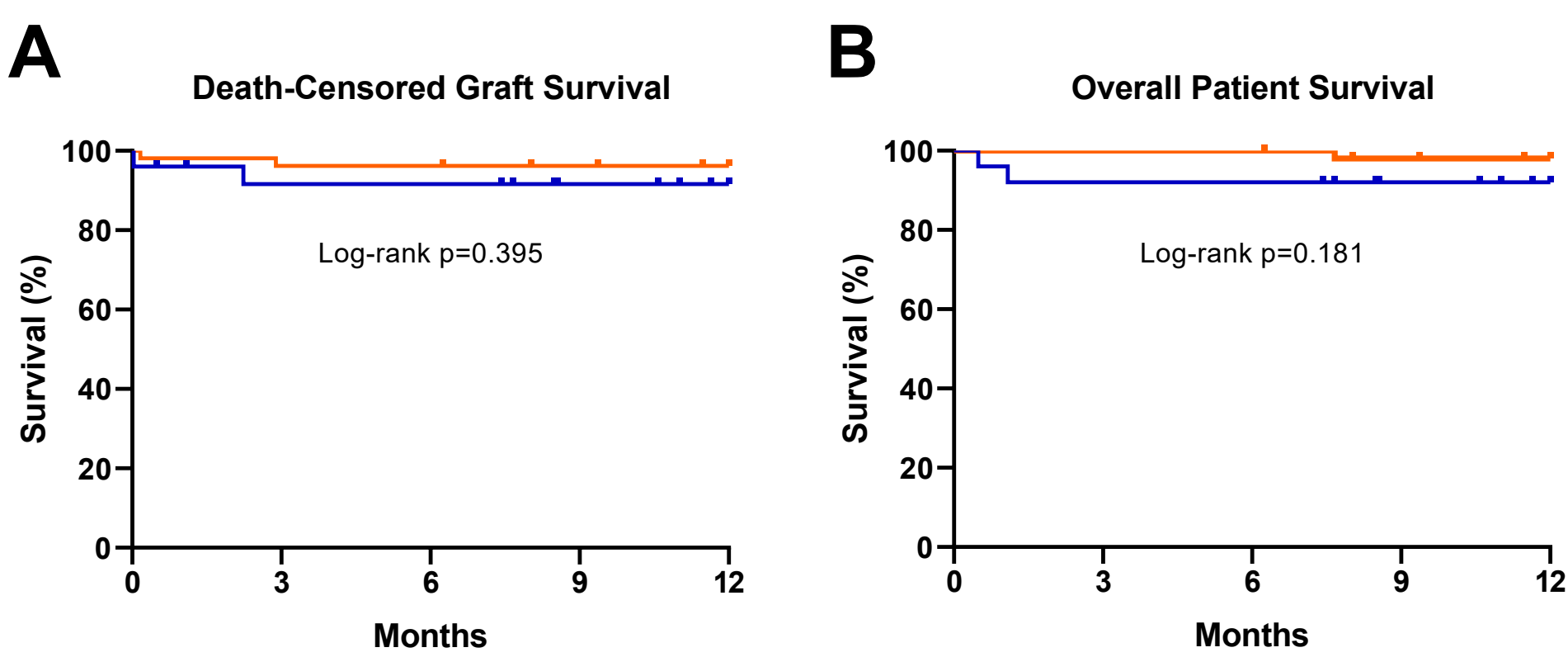


Figure 2. Kaplan-Meier curve of 1-year death-censored graft survival (A) and overall patient survival (B).

## Conclusion

- Prolonged DHOPE enables prolonged preservation of DCD livers up to 24 hours.
- Prolonged DHOPE was associated with a significant longer operation time and the need for renal replacement therapy.
- Overall graft and patient survival was comparable between both groups.

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