

# Heart Transplantation Following Medically Assisted Dying Using *Ex-Situ* Normothermic Machine Perfusion

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NSW Bone Bank  
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# Introduction

- Patients with terminal illness electing for medically assisted dying (MAD) have the potential to donate organs after circulatory death
- Successful heart transplantation after *in situ* cardiac reanimation using thoraco-abdominal normothermic regional perfusion (TA-NRP) has been reported following MAD<sup>1</sup>, and is commonly utilized in some countries
- TA-NRP is, however, associated with ethical concerns and may not be legal in some jurisdictions
- Direct procurement of hearts and *ex-situ* machine perfusion following MAD has been shown to be feasible, however in this report the hearts were not transplanted<sup>2</sup>
- We now report successful procurement & transplantation of a heart from a patient after MAD with *ex-situ* cardiac reanimation using normothermic machine perfusion (NMP)

1. Tchana-Sato V *et al.* Am J Transplant. 2022;22:3146–3149.
2. van Suylen V *et al.* Transplantation Direct 2021;7: e676.

# Case Report

## History

45 ♂

2-year history of glioblastoma multiforme WHO Grade 4

- Treated with definitive chemoradiotherapy; no resection or shunt

No other past history of note

Approved for MAD on basis of deteriorating quality of life & life expectancy < 6 months

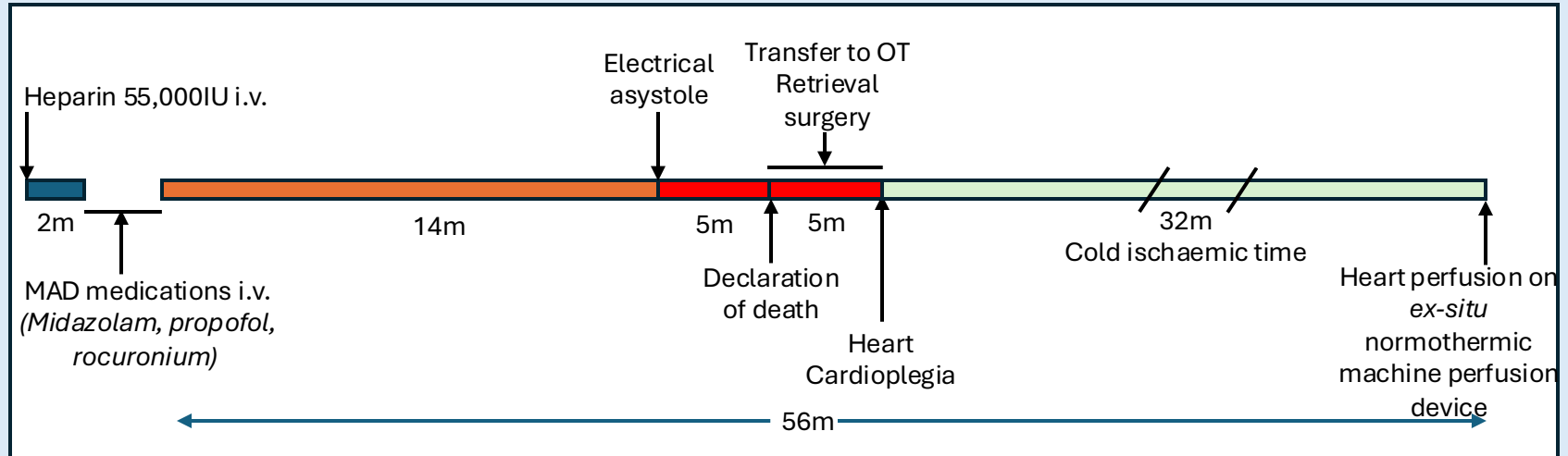
- Expressed wish to donate his organs on death
- Trans-thoracic echocardiogram performed during donor work-up
  - Normal biventricular function, normal valve structures & function

## Medically Assisted Dying

Admitted to hospital on chosen date for death

Heparin 55,000IU administered 2 minutes prior to intravenous administration of MAD medications, in an anaesthetic bay of an operating theatre in the presence of his family

Death determined 5 minutes following electrical asystole on ECG monitoring:

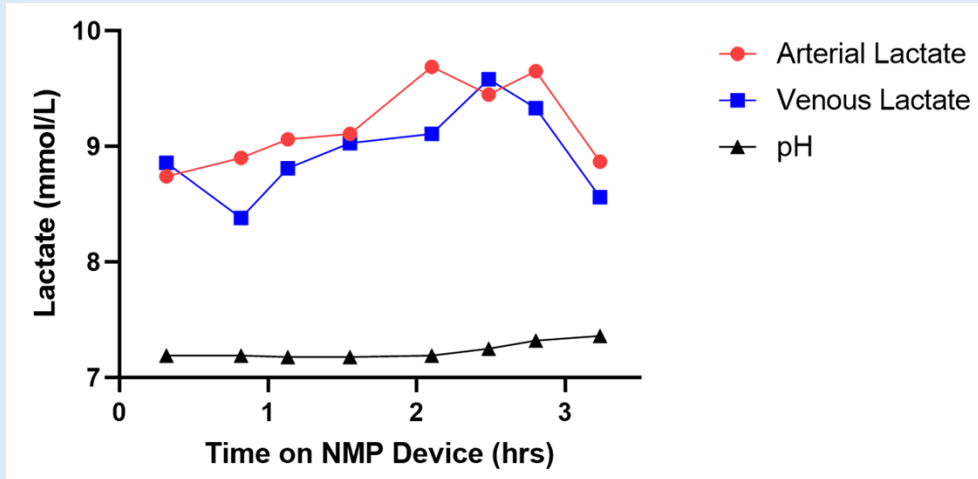


## Heart Perfusion

The heart was perfused on the NMP device for 217m

Donor heart viability was assessed using a combination of lactate profiles, NMP haemodynamic parameters & visual assessment of RV contractility:

- Lactate uptrend with associated metabolic acidosis for 146m
- Given down-trending lactates in the 3<sup>rd</sup> hour, presence of arterio-venous lactate extraction + haemodynamic performance, decision made to continue to transplant



RV diastole



RV systole & ejecting

## Transplantation and Outcome

Heart successfully transplanted into a 52 ♂ following re-do sternotomy and explant of a HeartMate3 LVAD

- Recipient weaned off bypass easily with no signs of primary graft dysfunction (168min bypass time, 97min cross-clamp time)
- ICU length of stay was 2 days
- D4 whilst hypertensive suffered R-sided parietal lobe haemorrhagic stroke with associated midline shift
  - Oedema and midline shift resolved by time of discharge with good neurological recovery
  - Residual mild L-sided neglect only at 4 months
- 43-day acute hospital stay + 8 days in-patient rehab
- Remains well 7 months post transplant with normal echocardiogram at 4 months showing no signs of rejection (ISHLT Grade 0)

# Discussion

- Successful heart transplantation after retrieval and reanimation using *ex-situ* NMP from patients undertaking MAD is feasible
  - NMP is a practical alternative to TA-NRP where this technique is not available due to legal or perceived ethical barriers
- Donor hearts following MAD may demonstrate atypical lactate profiles during NMP
  - Although this did not appear to impair overall function in our case, potential pharmacotoxicity from MAD medications and the impact on NMP should be explored in future retrievals