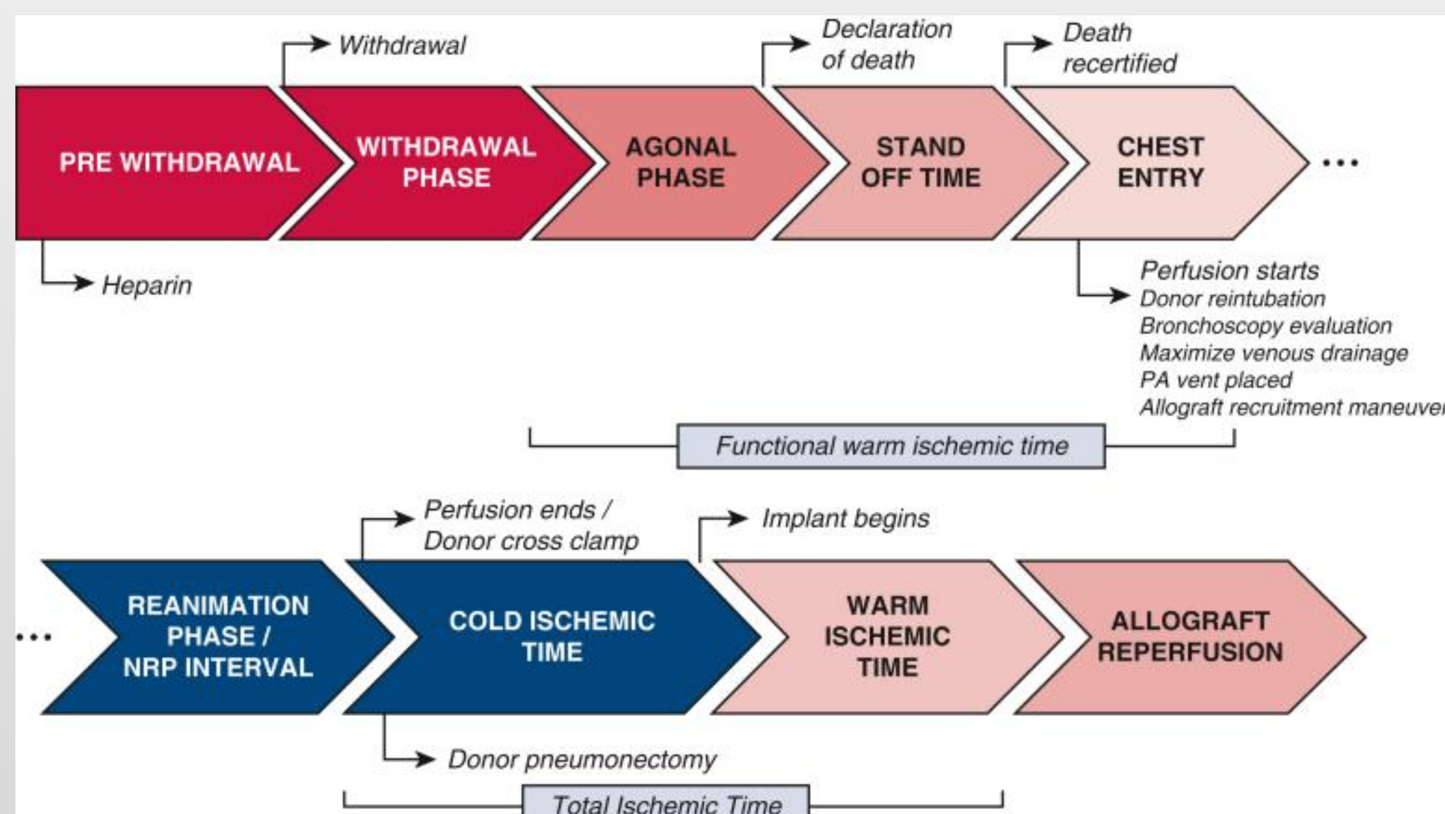
Donation after circulatory death with thoracoabdominal normothermic regional perfusion recovery has similar outcomes with donation after brain death for lung

Sarah Y. Park, MD, **Emily Hay-Arthur, BA**, Elizabeth J. Bashian, MD, Han Le, MS, Michal Schäfer, MD, PhD, David N. Campbell, MD, Nicholas R. Teman, MD, Alice L. Gray, MD, Jordan R.H. Hoffman, MD, MPH, and Michael T. Cain, MD

Department of Surgery, Division of Cardiothoracic Surgery, University of Colorado Anschutz Medical Campus

Introduction

•Multiple techniques aim to expand the donor pool of lung allografts.
•The standard of Donation after brain death (DBD) has strict criteria. Donation after circulatory death (DCD) allows for transplant without diagnosed brain death.
•DCD donors have multiple procurement options. Thoracoabdominal normothermic regional perfusion (TA-NRP) places patients on a modified cardiopulmonary bypass following cardiac death to simultaneously perfuse organs (see figure below).
•There are limited outcome comparisons between DBD and DCD TA-NRP procured lungs. Here is the University of Colorado experience.



Schematic of thoraco-abdominal normothermic regional perfusion *Credit:* Cain et al. Lung recovery utilizing thoracoabdominal normothermic regional perfusion during donation after circulatory death: The Colorado experience. 2023.

Methods

Retrospective single institution review of all lung transplants at the University of Colorado Anschutz from October 1, 2022 through December 31, 2024. No multi-organ transplants were included **(n=112)**

DBD lung allografts **(n = 85)**

Double lung **(n=65)**
Left single lung **(n=9)**
Right single lung **(n=11)**

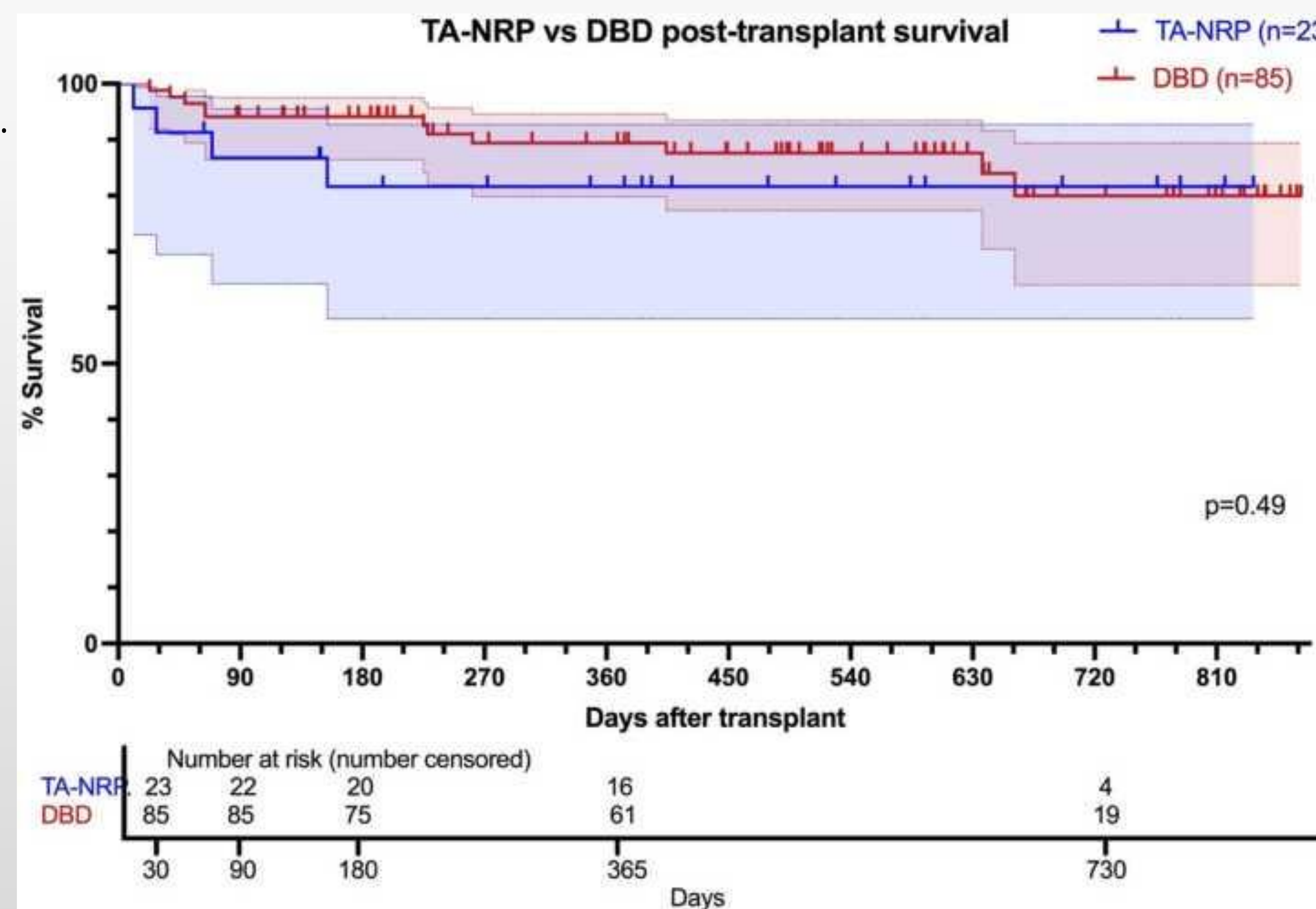
DCD rapid recovery lung allografts (n=4)
*not included in analysis

DCD TA-NRP lung allografts (n=23)

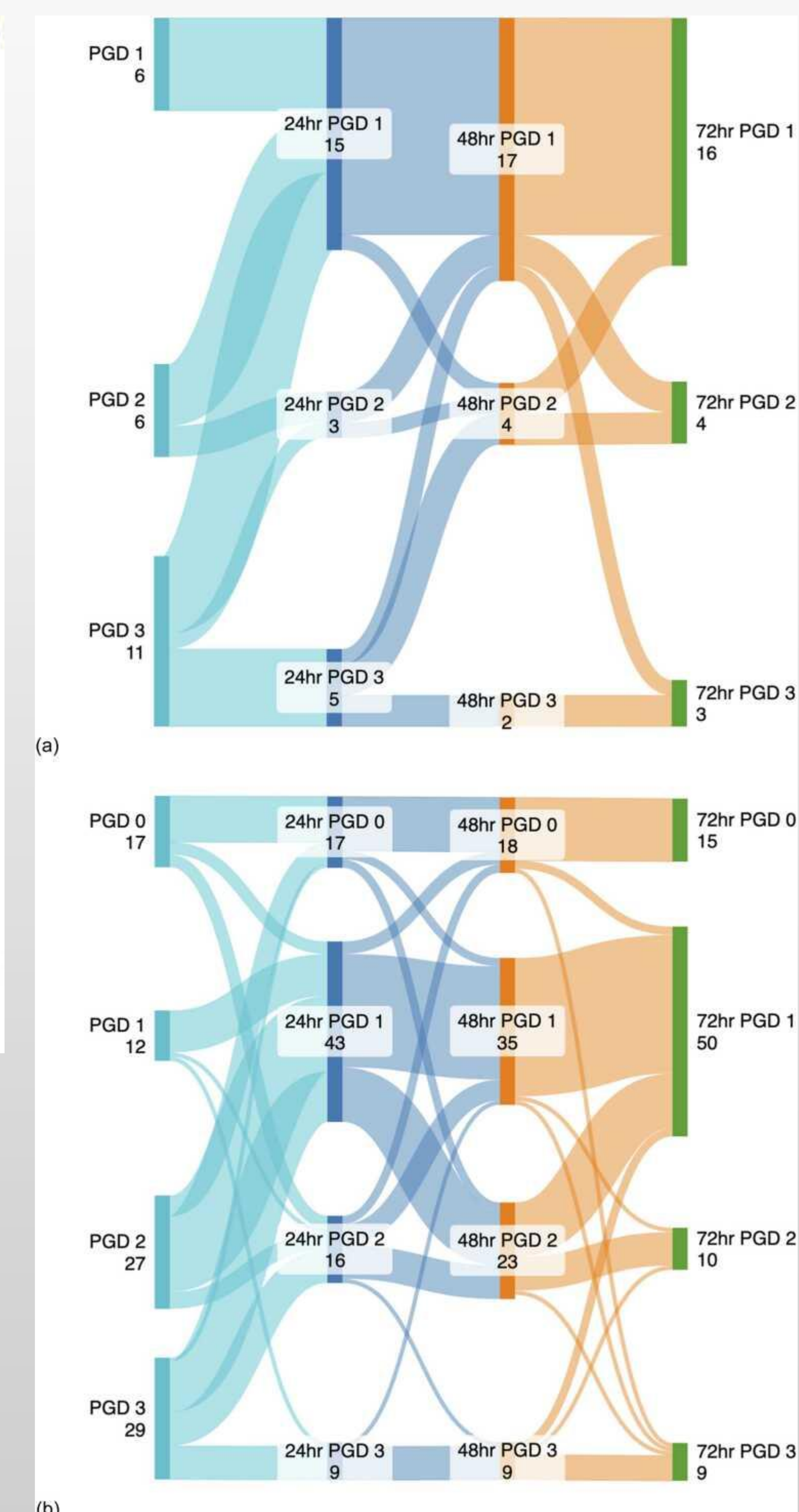
24 potential donors evaluated after cardiac death, 1 refused for pneumonia
*Cardiac death donors outside of allotted time not included

Double lung **(n=20)**
Left single lung **(n=1)**
Right single lung **(n=2)**

Results



Kaplan-Meier survival curves comparing DCD TA-NRP and DBD recovered lung transplants with 95% CI error bars. Number at risk included at 30 days, 90 days, 6 months, 1 year, and 2 years.



Sankey Diagram depicting primary graft dysfunction (PGD) at 0, 24, 48, and 72 hours after transplant comparing (a) DCD TA-NRP and (b) DBD lung transplants*.
*One DBD lung transplant patient's 72-hour PGD was not recorded in their chart and therefore not included in the Sankey diagram.

Discussion

•Overall survival was not significantly different by Kaplan-Meier curve. DCD TA-NRP cohort had one pulmonary-related mortality and six deaths for DBD.

•Primary graft dysfunction (PGD) for lungs reflects pulmonary infiltrates and hypoxemia measured by a P/F ratio. Rates of severe graft dysfunction (grade 3) were not significantly different on post operative day 0 through 3.

•Institutional 90-day survival rates with DCD TA-NRP and DBD are lower than the ISHLT DCD lung transplant registry, however most of mortalities were during the first year of DCD TA-NRP recovery at the institution. Survival rates will likely continue to improve as institutional experience continues to grow. DCD lung transplant survival at 1 year is comparable with national averages.

•DCD TA-NRP does not significantly worsen overall postoperative outcomes and pulmonary-related survival and may be considered as a viable method to increase the lung donor pool.

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