XII Meeting. State of the Art in

HEART FAILURE

CLINICAL PRACTICE AND ORGANIZATIONAL MODELS

Venue: Hotel Meliá María Pita, A Coruña

A Coruña 26-27 September 2025

A Coruña Heart Failure Academy

#ACORUÑAHF2025





Donation After Circulatory Death Determination (DCD)

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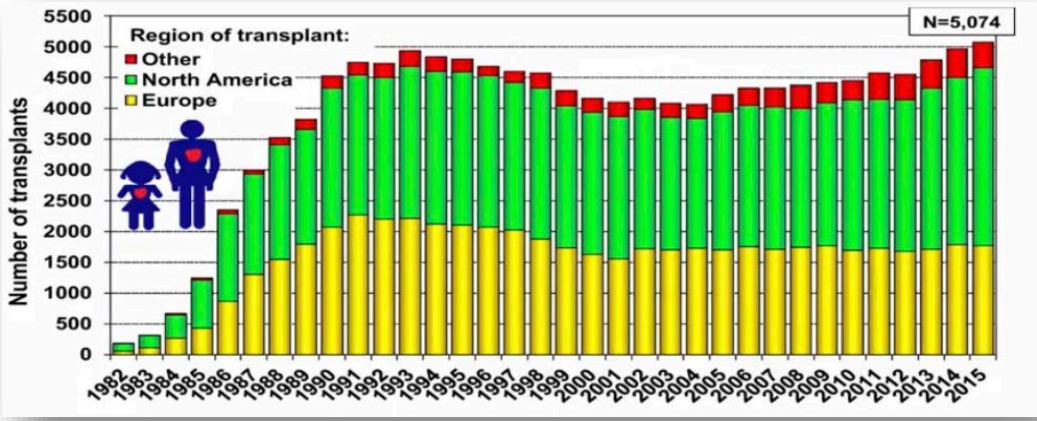
Why DCD Hearts Now?

- Persistent donor shortage; DBD plateau in many regions.
- Modern **normothermic perfusion** enables viability assessment and injury mitigation.
- Rapid global uptake since 2020; **RCT** and national pilots confirm safety.



Lund et al. J Heart and Lung Trasplant 2017 36(10):1037-1046.

Classification of Donation after Circulatory Death

The absence of circulation will be demonstrated by at least one of the following criteria:

- absence of blood flow in invasive arterial pressure monitoring;
- asystole with absence of continuous electrocardiographic tracing;
- absence of aortic flow on echocardiography.

DONACIÓN EN ASISTOLIA NO CONTROLADA	I	Fallecido fuera del hospital	Incluye víctimas de una muerte súbita, traumática o no, acontecida fuera del hospital que, por razones obvias, no son resucitadas.
	II	Resucitación infructuosa	Incluye pacientes que sufren una parada cardiaca y son sometidos a maniobras de reanimación que resultan no exitosas. En esta categoría se diferencian dos subcategorías: **II.a. Extrahospitalaria** La parada cardiaca ocurre en el ámbito extrahospitalario y es atendida por el servicio de emergencias extrahospitalario, quien traslada al paciente al hospital con maniobras de cardio-compresión y soporte ventilatorio. **II.b. Intrahospitalaria** La parada cardiaca ocurre en el ámbito intrahospitalario, siendo presenciada por el personal sanitario, con inicio inmediato de maniobras de reanimación.
DONACIÓN EN ASISTOLIA CONTROLADA	III	A la espera del paro cardiaco	Incluye pacientes a los que se aplica limitación del tratamiento de soporte vital* tras el acuerdo entre el equipo sanitario y éste con los familiares o representantes del enfermo.
	IV	Paro cardiaco en muerte encefálica	Incluye pacientes que sufren una parada cardiaca mientras se establece el diagnóstico de muerte encefálica o después de haber establecido dicho diagnóstico, pero antes de que sean llevados a quirófano. Es probable que primero se trate de restablecer la actividad cardiaca pero, cuando [illegible] de donación en asistolia.

*Incluye la retirada de c[illegible]siste[illegible]ncia ventricular[illegible]

Maastricht type V denotes organ donation after legally regulated euthanasia

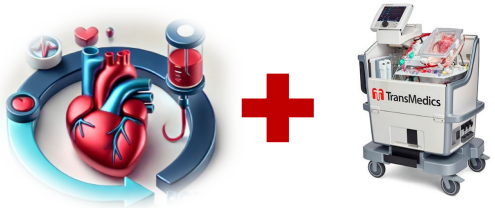
Donación en asistolia en España: situación actual y recomendaciones. Documento de Consenso 2012. Madrid: ONT, 2012. http://www.ont.es/infesp/DocumentosDeConsenso/donaci%C3%93n%20en%20asistolia%20en%20espa%C3%91a.%20situaci%C3%93n%20[illegible]

Heart Retrieval of DCD Hearts

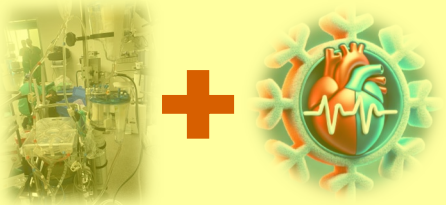
- Different techniques for the retrieval of DCD hearts for transplantation:
  - Simple extraction followed by static cold preservation.



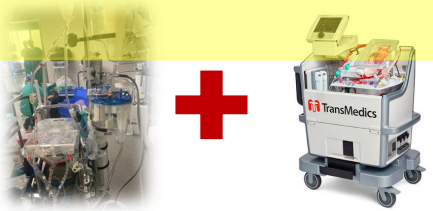
  - Simple extraction followed by ex situ machine perfusion.



  - **NRP (Normothermic Regional Perfusion) followed by static cold preservation.**



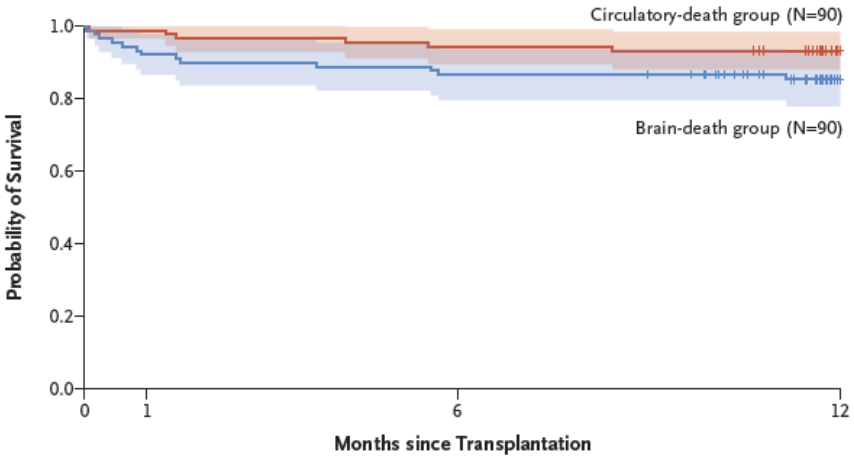
  - NRP followed by ex situ machine perfusion.




The NEW ENGLAND JOURNAL of MEDICINE

Transplantation Outcomes with Donor Hearts after Circulatory Death

Randomized Evidence (Practice-Changing)



NEJM 2023 RCT (U.S., 15 centers)

- Design: noninferiority; DCD (OCS, DPP) vs standard DBD cold storage.
- **6-month survival:** 94% (DCD) vs 90% (DBD), **non-inferior**.
- **No excess serious graft-related events** at 30 days.
- Conclusion: **DCD outcomes comparable** to DBD.



Key Contemporary Studies in DCD Heart Transplantation (2023–2025)

NEJM 2023



- RCT (US, 15 centers)
- 6-month survival: 94% (DCD) vs 90% (DBD), **non-inferior**

NHSBT Pilot 2023 (JHLT)



- UK national cohort (50 DCD / 179 DBD)
- **+28% increase** in total HTx activity
- Early survival equivalent to DBD

Jolliffe 2025 (Transplantation)



- Meta-analysis (923 DCD / 7,236 DBD)
- **12-month survival equivalent**
- Slight trend towards ↑ PGD in DCD

Williams 2025 (Circulation)

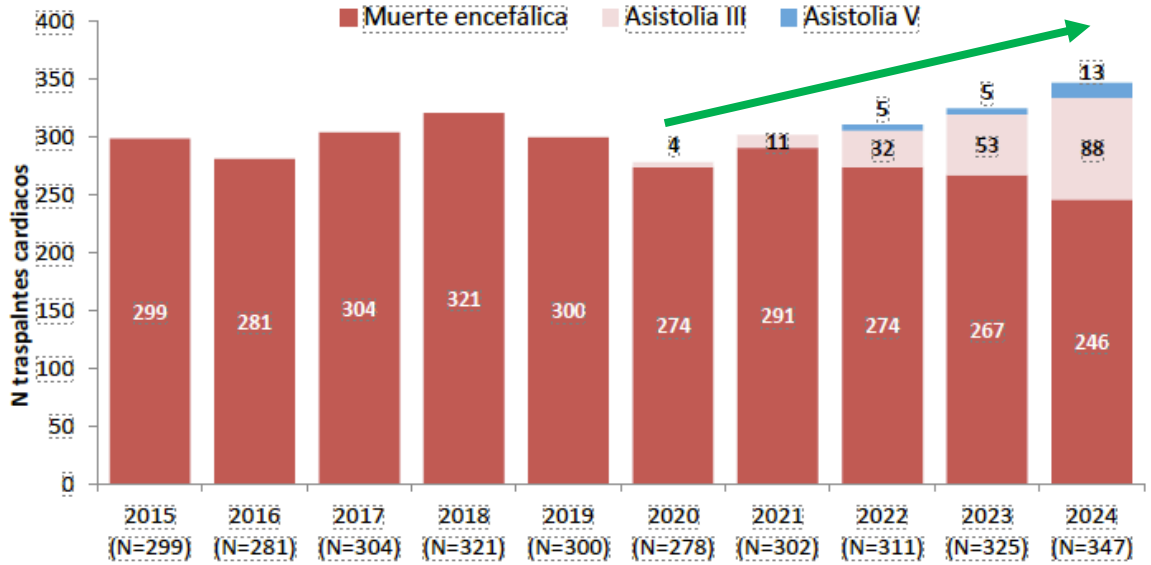


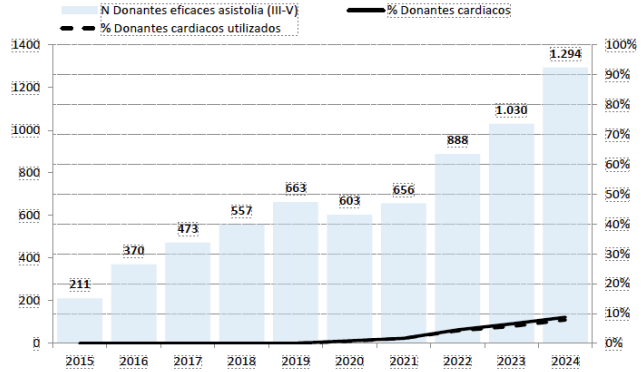
- Single-center (200 DCD attempts)
- **88% transplanted** successfully
- Expanded donor criteria without outcome penalty



Heart Transplantation from Controlled Donation after Circulatory Death (DCD) – Spain 2020–2025

- Program started in **2020**
- Rapid increase in activity:
  - 2020 → 4 cases
  - 2021 → 11 cases
  - 2022 → 37 cases
  - 2023 → 58 cases
  - **2024 → 101 cases (29% of all heart transplants)**
- Spain among the **world leaders** in DCD heart transplantation





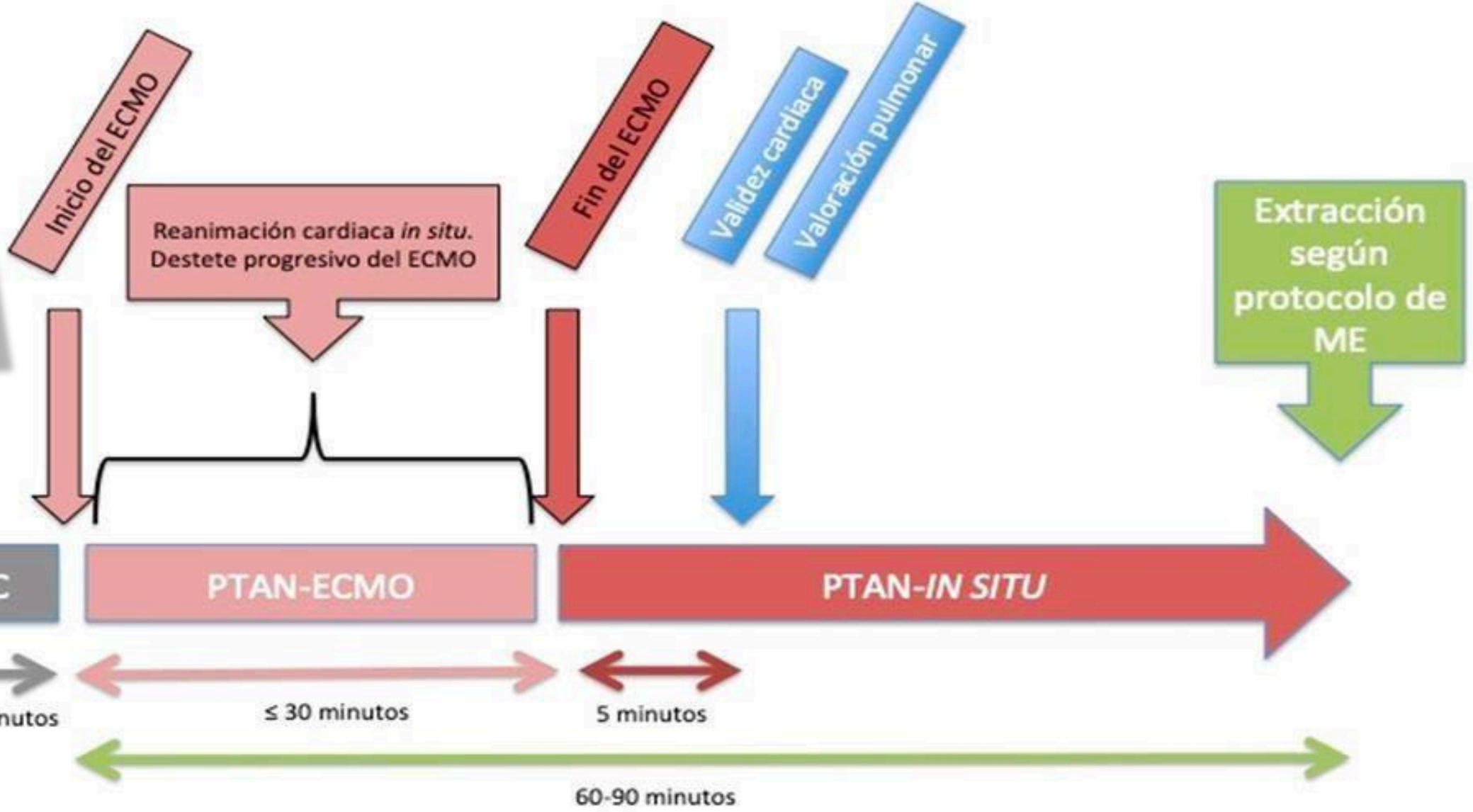


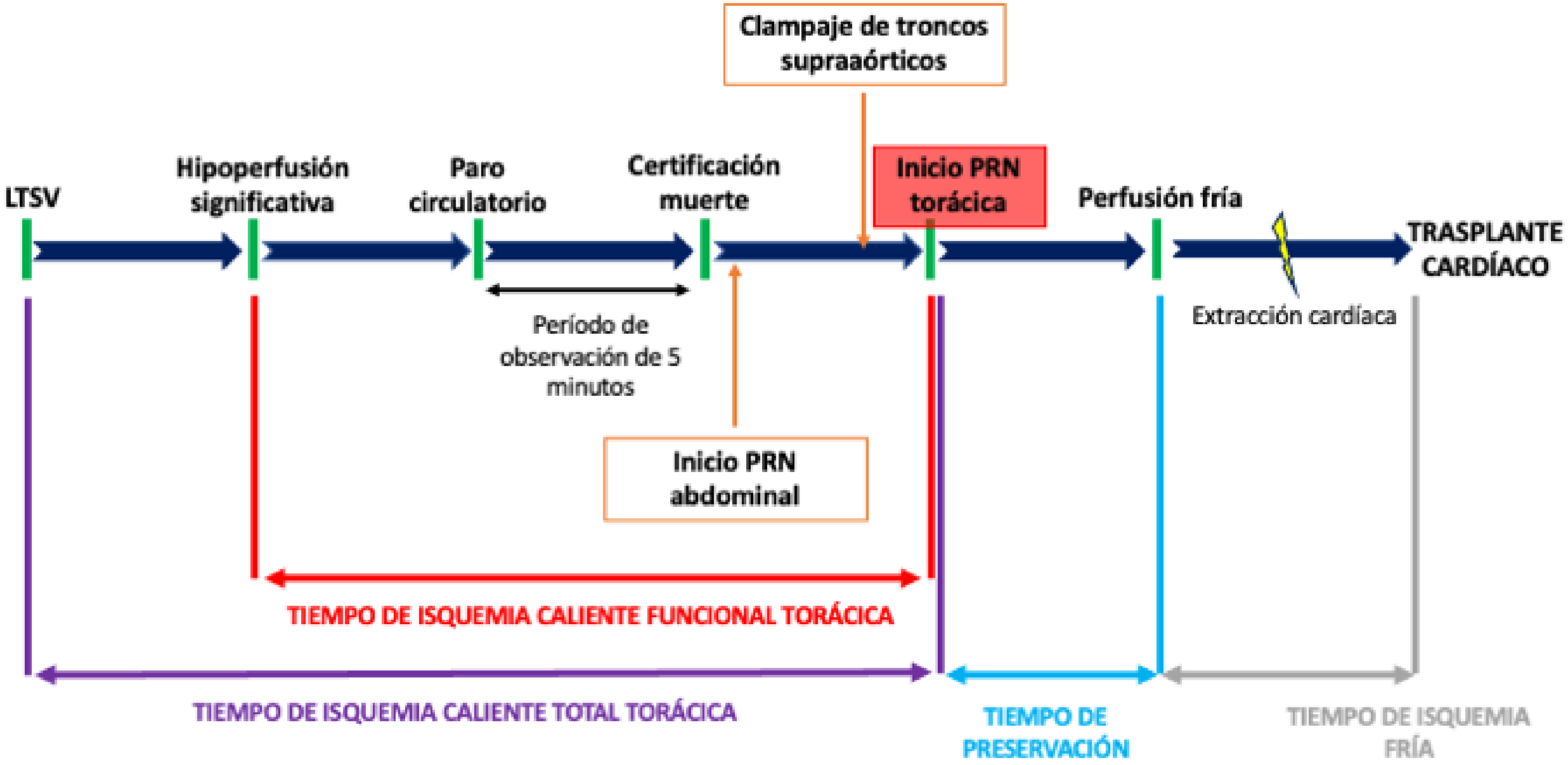
Hospital	2020	2021	2022	2023	2024	TOTAL
C.H.U. A CORUÑA		2	1	1	11 (1)	15 (1)
H.U. CLÍNIC BARCELONA		1	4	3	6	14
H.U. VIRGEN DE LA ARRIXACA	2	2	7	14	6	31
H.G.U. GREGORIO MARAÑÓN		1 (1)	2 (2)	2	8 (4)	13 (7)
H.U. DE BELLVITGE		1	7	9	13	30
H.U. DE GRAN CANARIA DR. NEGRÍN		1	4	7	8 (1)	20 (1)
H.U. LA FE			2	8	21	31
H.U. LA PAZ		2 (1)	5 (4)	3 (2)	5 (2)	15 (9)
H.U. MARQUÉS DE VALDECILLA	1	1	1	4	6	13
H.U. PUERTA DE HIERRO	1	0	3	4	9	17
H.U. VALL D` HEBRON			1 (1)	1 (1)	2 (2)	4 (4)
H.U. VIRGEN DEL ROCIO				2	5	7
H.U. DOCE DE OCTUBRE					1	1
TOTAL	4	11 (2)	37 (7)	58 (3)	101(10)	211 (22)

(infantil), <18 años incluidos en el total

- >50% of deceased donors in Spain are DCD (1,316 in 2024)
- Heart DCD now routine clinical practice in major centers
- Spain performs ~9% of all global DCD heart transplants

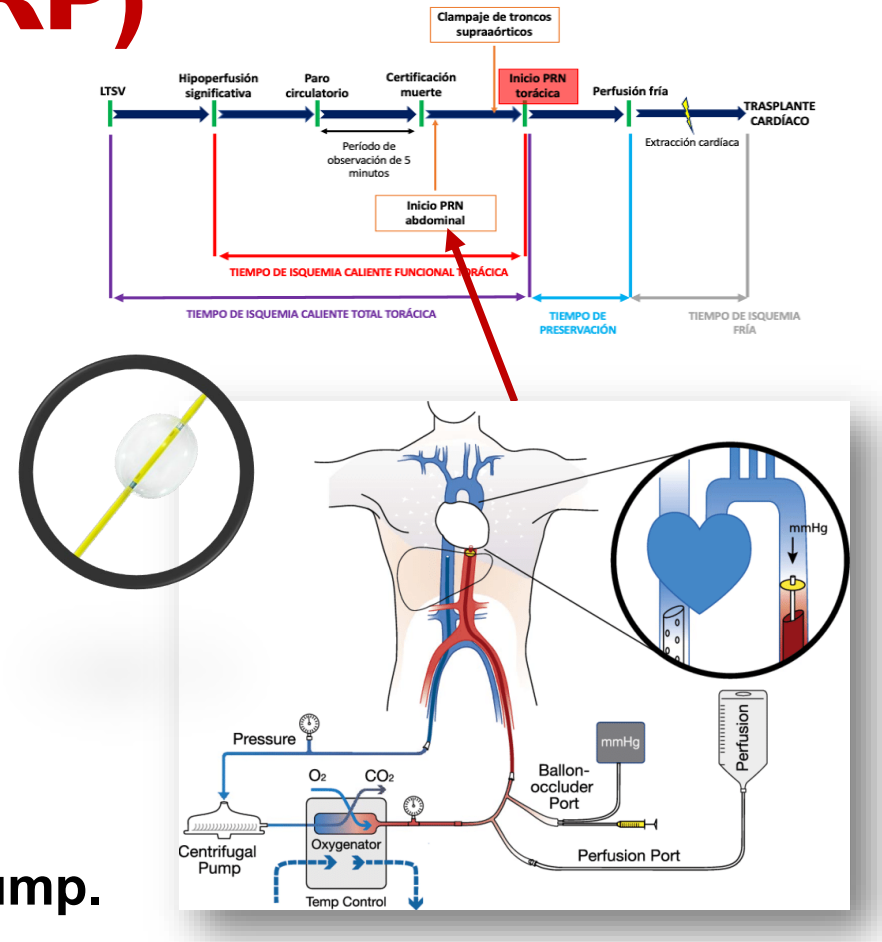

PROTOCOLO NACIONAL DE TRASPLANTE CARDIACO DE DONANTE EN ASISTOLIA CONTROLADA
ONT
SOCIEDAD ESPAÑOLA DE CARDIOLOGÍA
SECCE
Diciembre 2022.
Versión modificada en marzo de 2023


Inicio del ECMO
Reanimación cardiaca *in situ*. Destete progresivo del ECMO
Fin del ECMO
Validez cardiaca
Valoración pulmonar
Extracción según protocolo de ME
TIC
PTAN-ECMO
PTAN-*IN SITU*
≤ 30 minutos
≤ 30 minutos
5 minutos
60-90 minutos


Clampaje de troncos supraaórticos
LTSV
Hipoperfusión significativa
Paro circulatorio
Certificación muerte
Inicio PRN torácica
Perfusión fría
TRASPLANTE CARDÍACO
Extracción cardíaca
Período de observación de 5 minutos
Inicio PRN abdominal
TIEMPO DE ISQUEMIA CALIENTE FUNCIONAL TORÁCICA
TIEMPO DE ISQUEMIA CALIENTE TOTAL TORÁCICA
TIEMPO DE PRESERVACIÓN
TIEMPO DE ISQUEMIA FRÍA

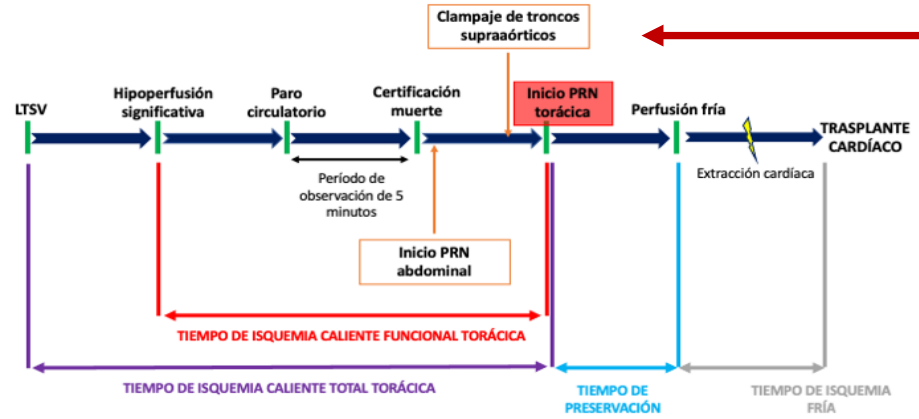
Start Abdominal Normothermic Regional Perfusion (A NRP)

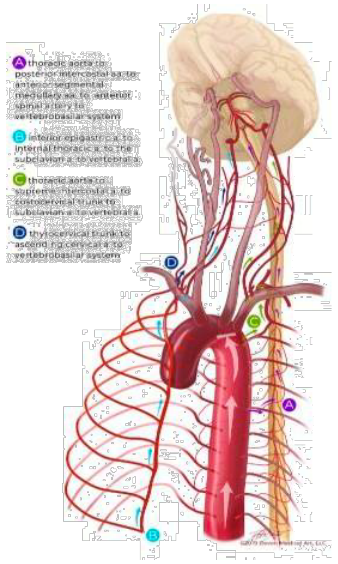




- **NRP performed with either an ECMO support or a CPB pump.**
- **With Aortic Occlusion Balloon:** After 5 minutes of cardiac arrest, inflate balloon and start A NRP.
- **Without Aortic Balloon:** Wait 5 minutes post-arrest, clamp and section SAT, then start TA NRP.

Clamping & Sectioning SAT





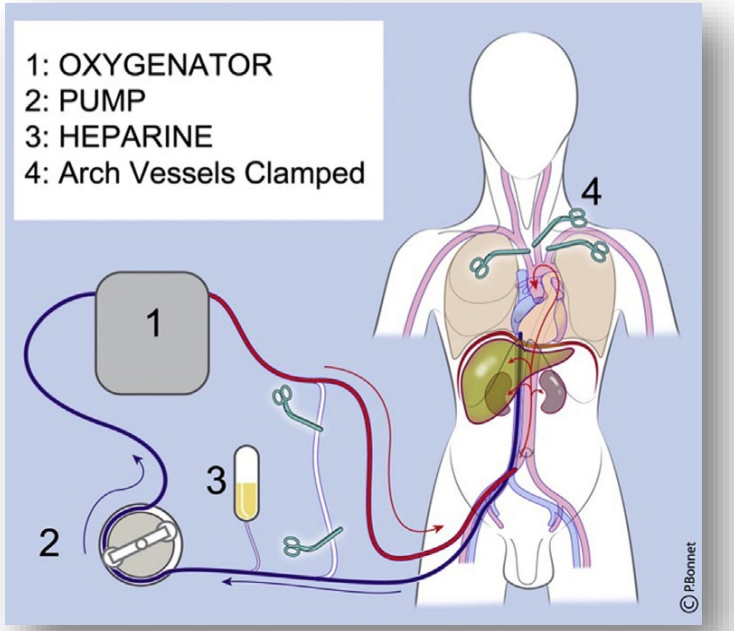
- **Collateral Pathways:** Blood flow from intercostal, mammary, and spinal arteries can reach the brain despite SAT ligation during NTAP.
- **Diagnosis Risk:** Cerebral blood flow may compromise the diagnosis of death; consensus requires eliminating this risk.
- **Manara et al.'s Approach:** Clamp and ligate SAT at the aorta, with drainage cannulas placed distally.
- **Protocol:** NTAP starts only after complete SAT isolation and drainage. Protocol mandates clamping and sectioning, leaving them open to the atmosphere.

Start Thoraco-Abdominal Normothermic Regional Perfusion (TA NRP)







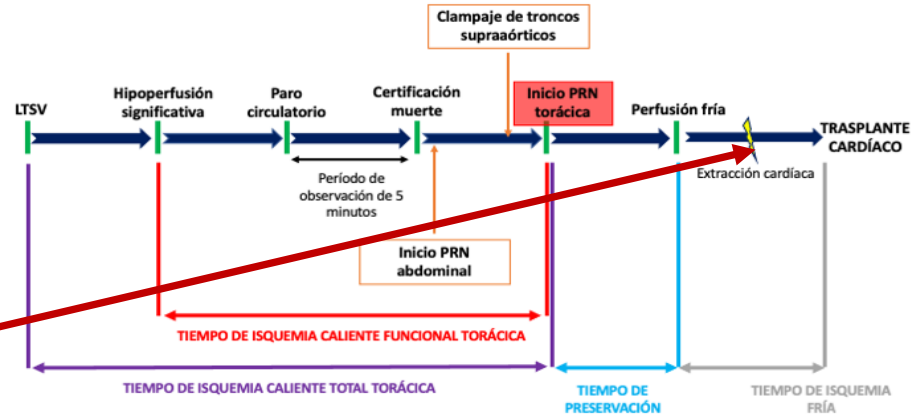


Weaning off TA NRP

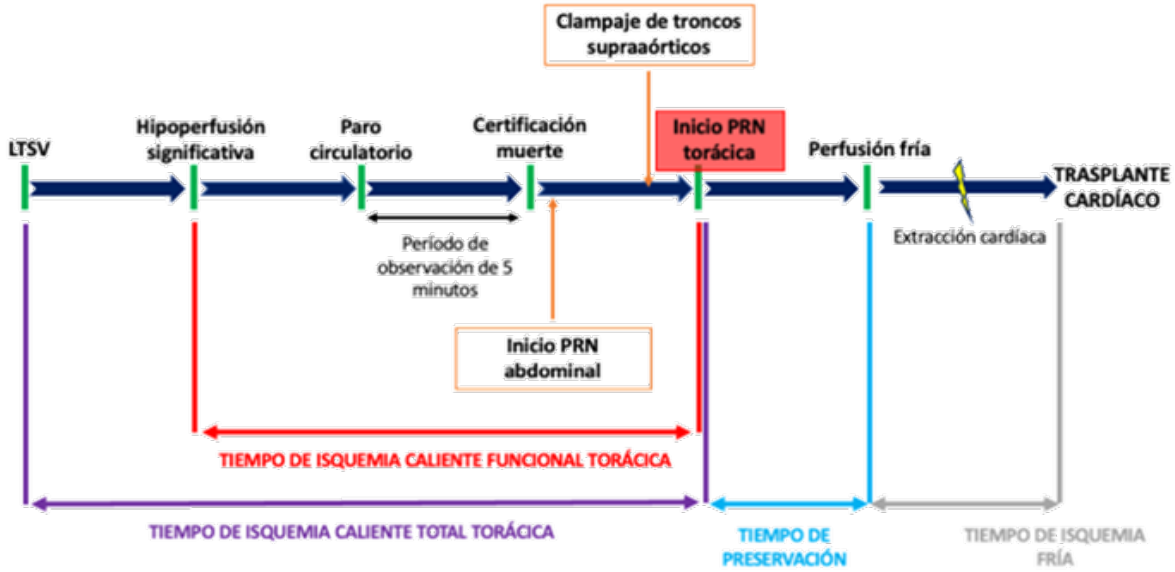


- **Optimal PRN duration:** 60 to 120 min
- **Maintenance of MAP:** ≥ 50 mmHg at all times
- **Respiratory control:** Strict, with arterial blood gas monitoring
- **Cardiac evaluation:** Trendelenburg > CVP between 6–8 mmHg to assess filling and contractility
- If MAP decreases → reinitiate PRN and start dopamine (max. 2.5 µg/kg/min) and norepinephrine (max. 0.05 µg/kg/min)
- **Final assessment:** TEE + Swan-Ganz if contractility is adequate
- **Exclusion criterion:** If MAP < 50 mmHg despite vasoactive drugs, the heart is discarded for transplantation

Cardiac Retrieval



- The cardiac retrieval technique in DCD donation is identical to cardiac retrieval in donation after brain death.



Variable	Mediana (IQR)
Inicio LET a Hipoperfusión significativa	14 min (5.5 min)
Tiempo LET a Periodo “no touch”	15 min (6 min)
TIC torácica total	18.5 min (9.1 min)
TIC torácica verdadera o funcional	9 min (2.5 min)
Tiempo del primer latido desde inicio PTAN	**0.67 min (0.8 min)**
Tiempo de recirculación (total en ECMO/CEC)	65 min (29.8 min)
Tiempo inicio PTAN a Extracción Cardíaca	89.5 min (45.5 min)

11 pts CHUAC



Variable	Frequency/ mean±SD (n=21, +1)
Sex	
Male	15, (71.4%)
Female	6, (28.6%)
Age (yrs)	42.7±13.2 años
Cause of DAC	
Non-lethal stroke	10, 47.6%
MAID	6, 28.6%
Anoxic encephalopathy	4, 19% (+1 pt)
TBI	1, 4.8%





Variable	Mediana (RIQ)
Tiempo isquemia (minutos) global de casos	100 (99.5)
Tiempo isquemia (minutos) donantes CHUAC	98.5 (80.5)
Estancia UCI (días)	7 (8)
Estancia hospitalaria postoperatoria (días)	41.5 (29.5)
Mortalidad intrahospitalaria	8% (1 caso)



Complications & How We Mitigate Them

- **Severe PGD**: slightly higher trend in DCD—**prehab** (donor), **controlled reperfusion**, **early MCS** mitigate risk.
- **Right-heart failure**: similar rates; watch PVR and volume strategy.
- **Rejection & CAV**: **no excess risk** to date vs DBD at 1–3 years



Frontiers & Trials to watch

- **Cold, hypothermic oxygenated perfusion (HOPE)** platforms under evaluation (e.g., PRESERVE/XVIVO).
- **Beating-heart implant** to eliminate second ischemic time.
- **Broader donor criteria** (age, ischemia limits) with protocolized assessment.



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HEART FAILURE (HJ EISEN, SECTION EDITOR)

The Rapidly Evolving Landscape of DCD Heart Transplantation

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Abstract

Purpose of Review To summarise current international clinical outcomes from donation after circulatory death heart transplantation (DCD-HT), discuss procurement strategies, their impact on outcomes and overall organ procurement; and identify novel approaches and future areas for research in DCD-HT.

Recent Findings Globally, DCD-HT survival outcomes (regardless of procurement strategy) are comparable to heart transplantation from brain dead donors (BDD). Experience with normothermic machine perfusion sees improvement in rates of primary graft dysfunction. Techniques have evolved to reduce cold ischaemic exposure to directly procured DCD hearts, though controlled periods of cold ischaemia can likely be tolerated. There is interest in hypothermic machine perfusion (HMP) for directly procured DCD hearts, with promising early results.

Summary Survival outcomes are firmly established to be equivalent between BDD and DCD-HT. Procurement strategy (direct procurement vs. regional perfusion) remains a source of debate. Methods to improve allograft warm ischaemic tolerance are of interest and will be key to the uptake of HMP for directly procured DCD hearts.

Keywords Donation after circulatory death · Heart transplantation · Normothermic machine perfusion · Hypothermic machine perfusion · Normothermic regional perfusion

Introduction

Over the last decade, there has been growing global uptake of heart transplantation from donation after circulatory death donors in an effort to address the increasing demand for donor hearts [1–4].

The last review from our unit on DCD heart transplantation focussed on the long journey of DCD hearts [5]. The world's first heart transplant performed by Christiaan Barnard [6] was in fact from a DCD donor. However, concerns surrounding the impact of warm ischaemia on cardiac allografts, and subsequent clarification of the definition of

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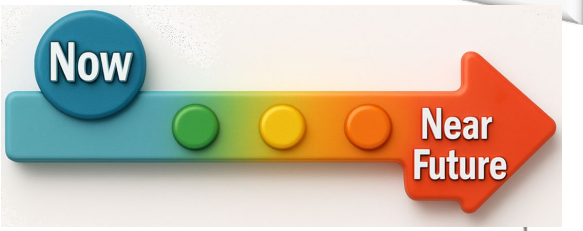



Practical Take-Home



- **Evidence**: DCD ≃ DBD for survival; scaled safely in national programs.
- **Techniques**: NRP and DPP are both valid; choose based on **system fit**.
- **Impact**: Adds **20–33%** donor supply in mature systems.
- **Focus now**: PGD mitigation, viability metrics & extended criteria.



DCD is no longer experimental – it is a new standard of practice





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THANK YOU