



**UTIC** | **ANMCO**  
**CLUB** |  
CRITICAL CARE COMMUNITY

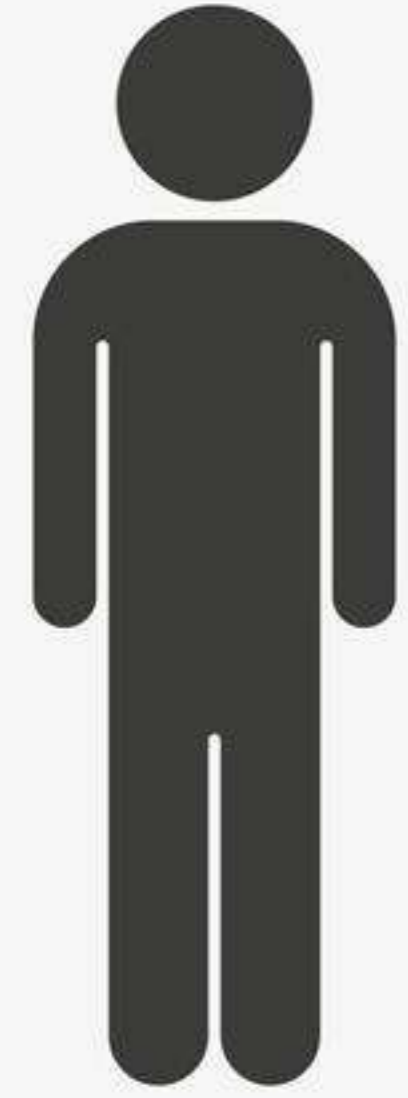
# Esperienza condivisa: terapia sostitutiva cardiaca

Paolo Manca, MD  
ISMETT IRCCS, Palermo

# Fonti di finanziamento

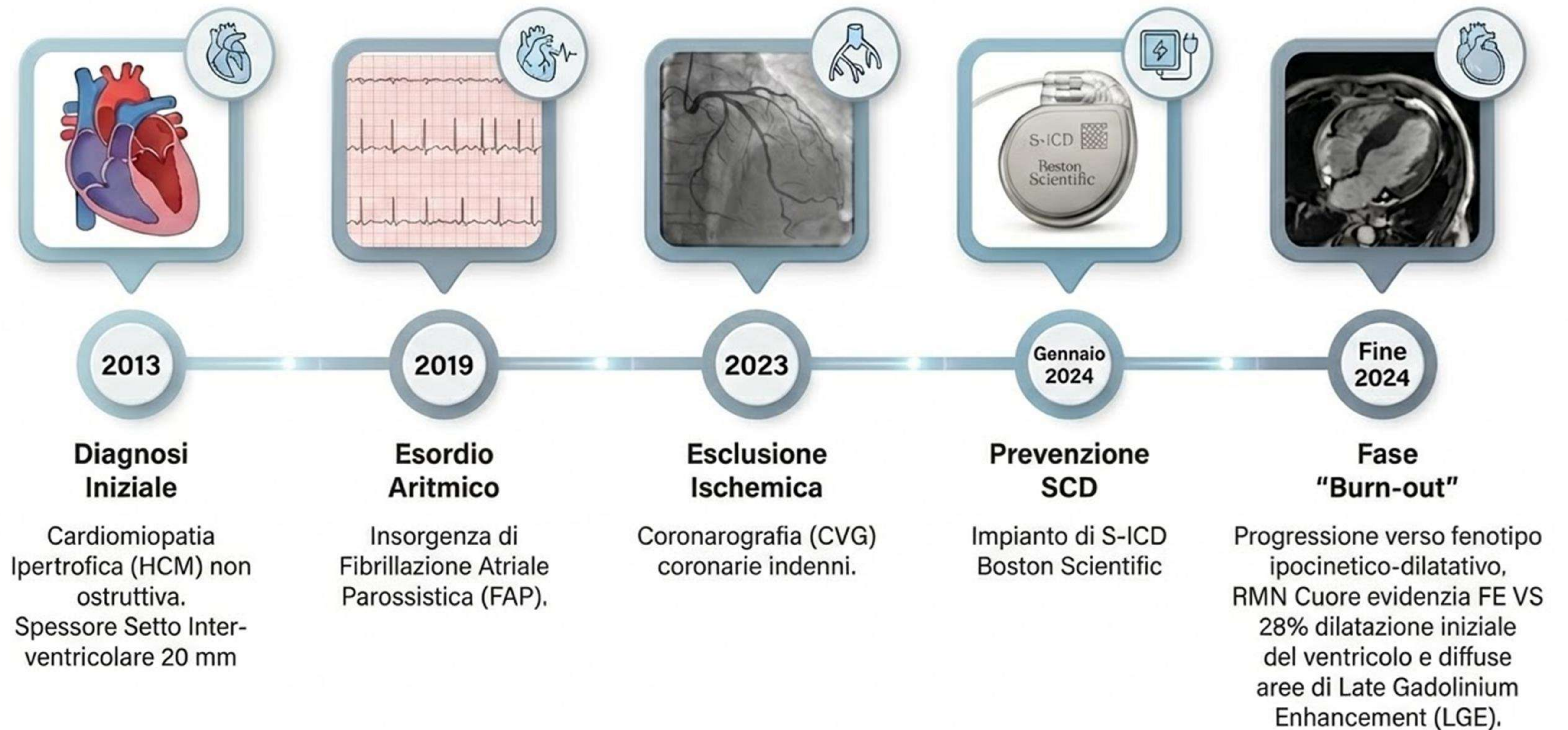
- Nessuna

# Caso clinico



ETÀ: 57 ANNI  
H: 167 CM W: 82 KG  
BMI: 30 BSA: 1.91  
EMOGRUPPO: B +

## ANAMNESI CARDIOLOGICA (2013-2024)



# Settembre 2025 - Quadro clinico

-PA 80/60mmHg, NYHA II.

- GDMT ottimizzata (ARNI, SGLT2i, MRA, Beta-bloccante)  
Furosemide 50mg/die



Esami ematochimici

creatinina 1.11 mg/dl, NT-proBNP **1049 pg/ml ↑**, nei limiti della norma i restanti.

# Ecocardiogramma

## Ventricolo sinistro:

FE 22% Biplano  
VTD: 109 ml (57 ml/m<sup>2</sup>)  
Ipocinesia diffusa  
Diametro telediastolico  
56 mm

## Diastole:

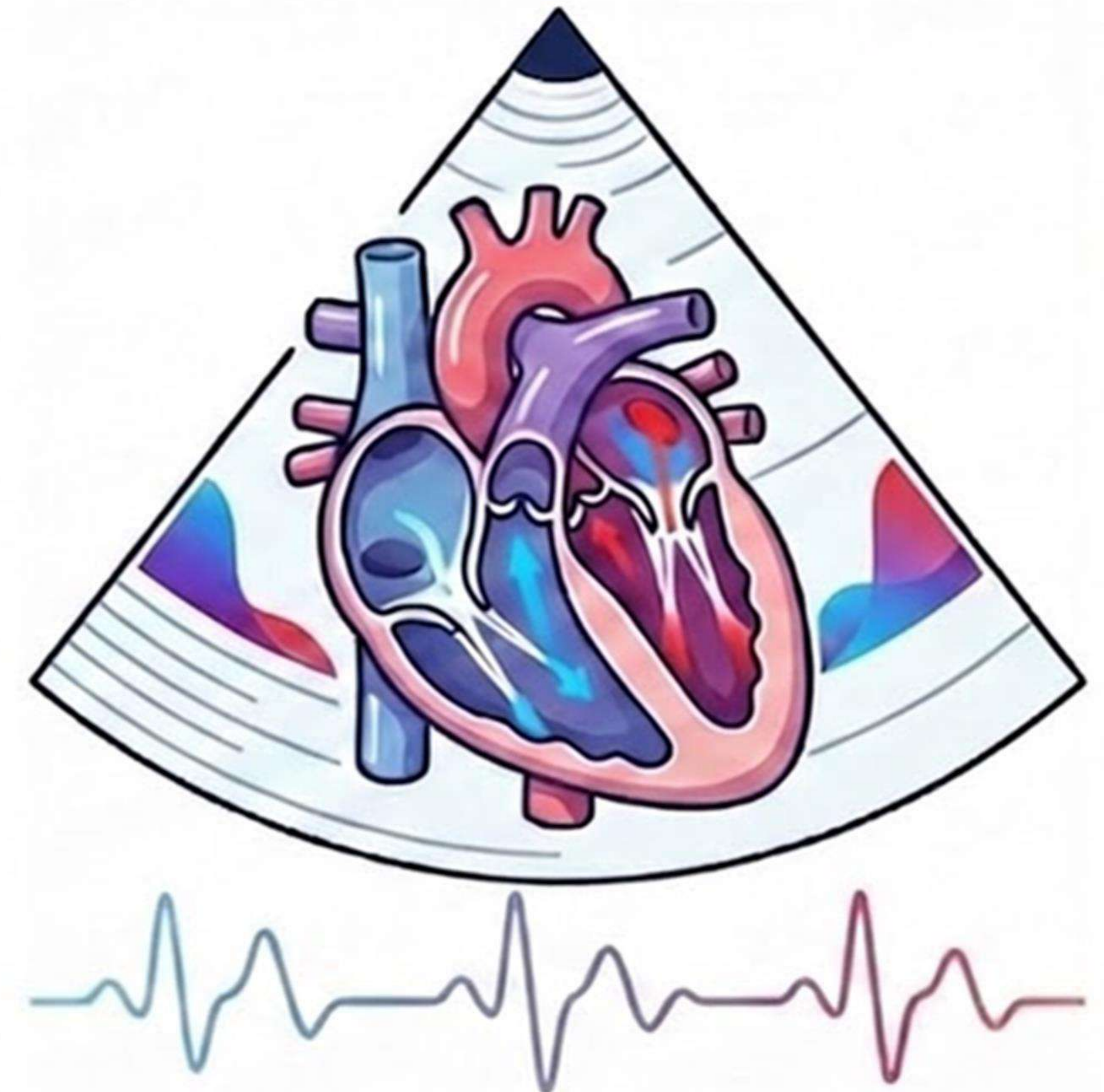
E/A 4.27  
LAVi: 50.3 ml/m<sup>2</sup>

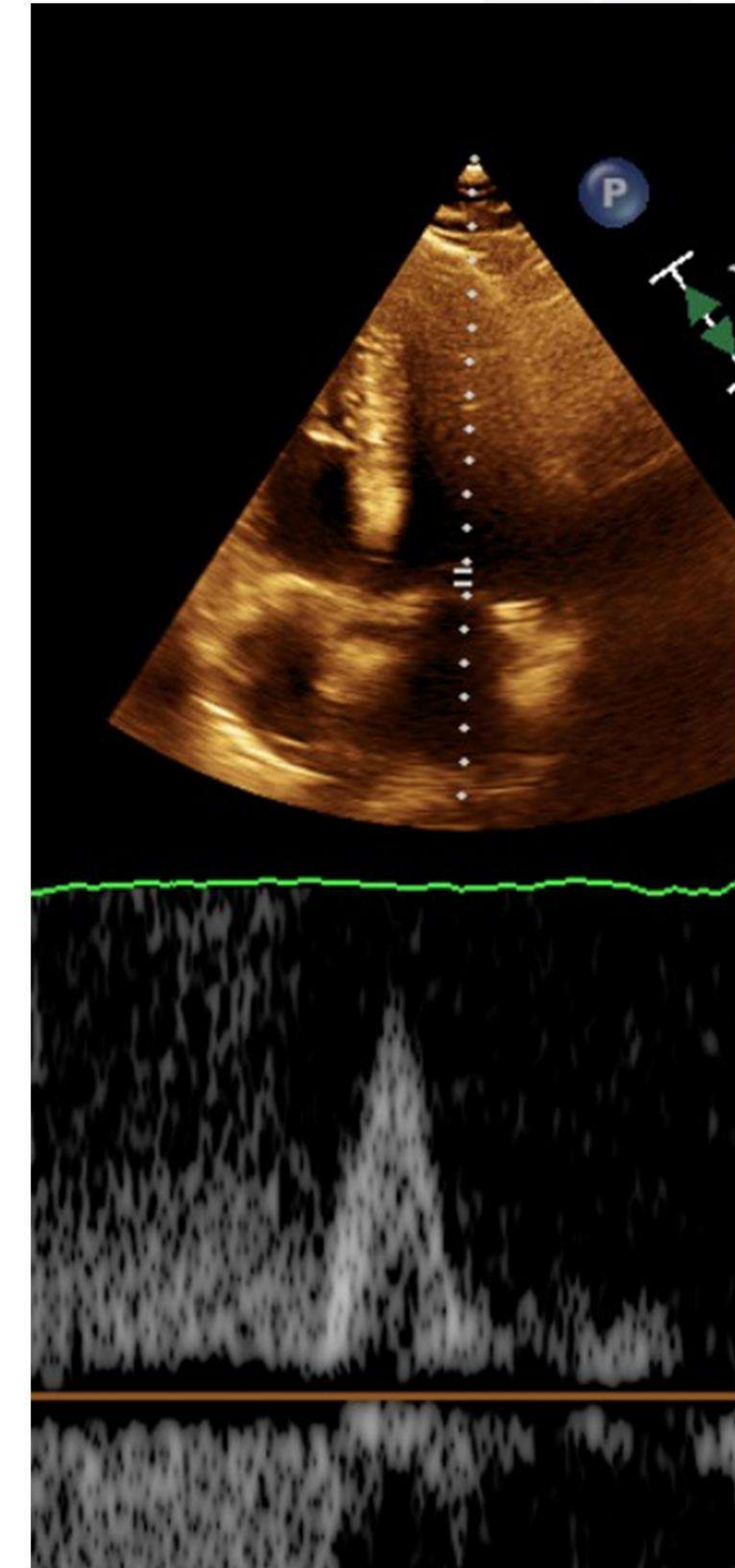
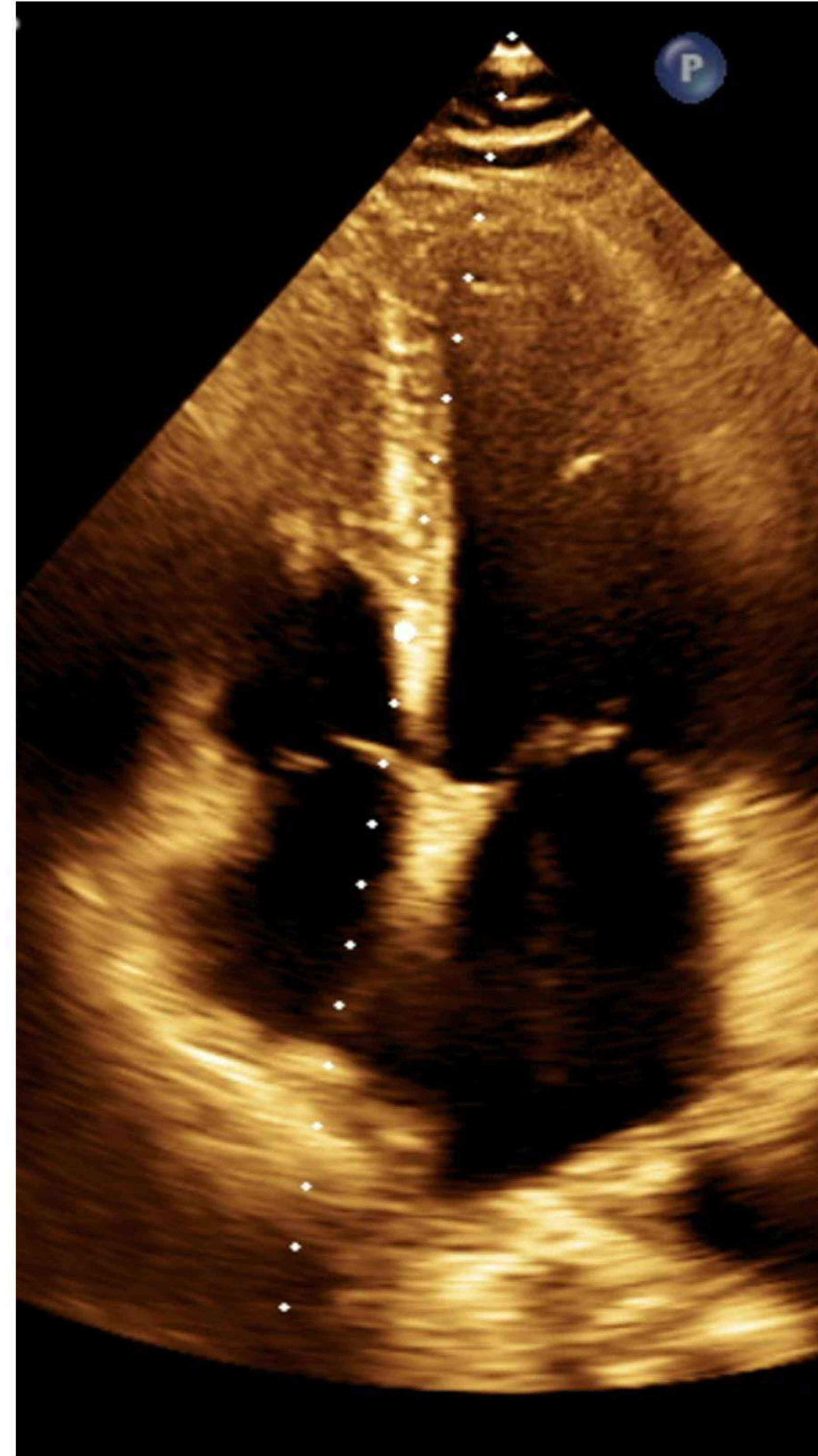
## Ventricolo destro:

TAPSE 17 mm  
FAC 22.3%

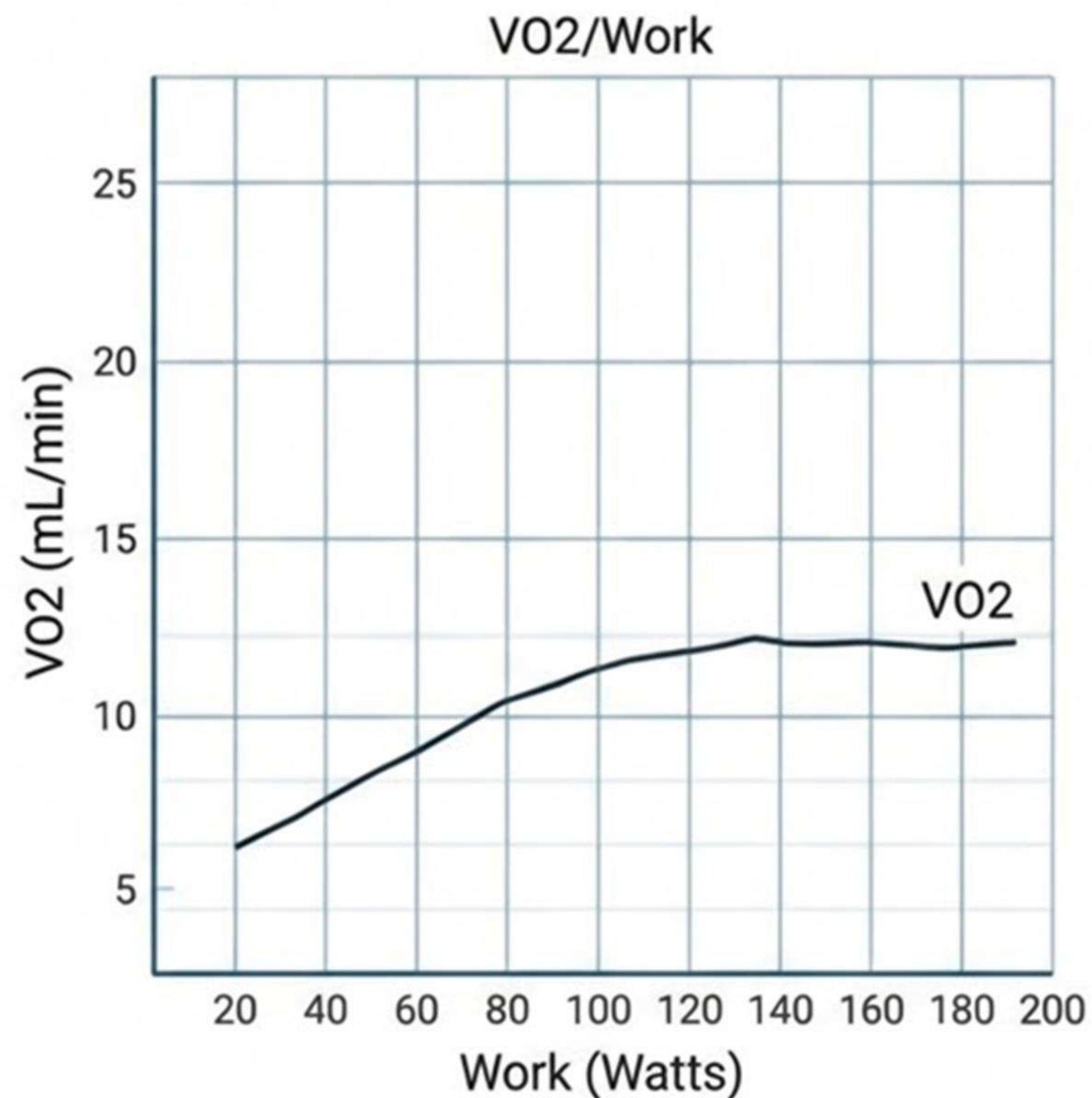
## Apparati valvolari:

Insufficienza mitro-  
tricuspide lieve





# Test cardiopolmonare (DH)



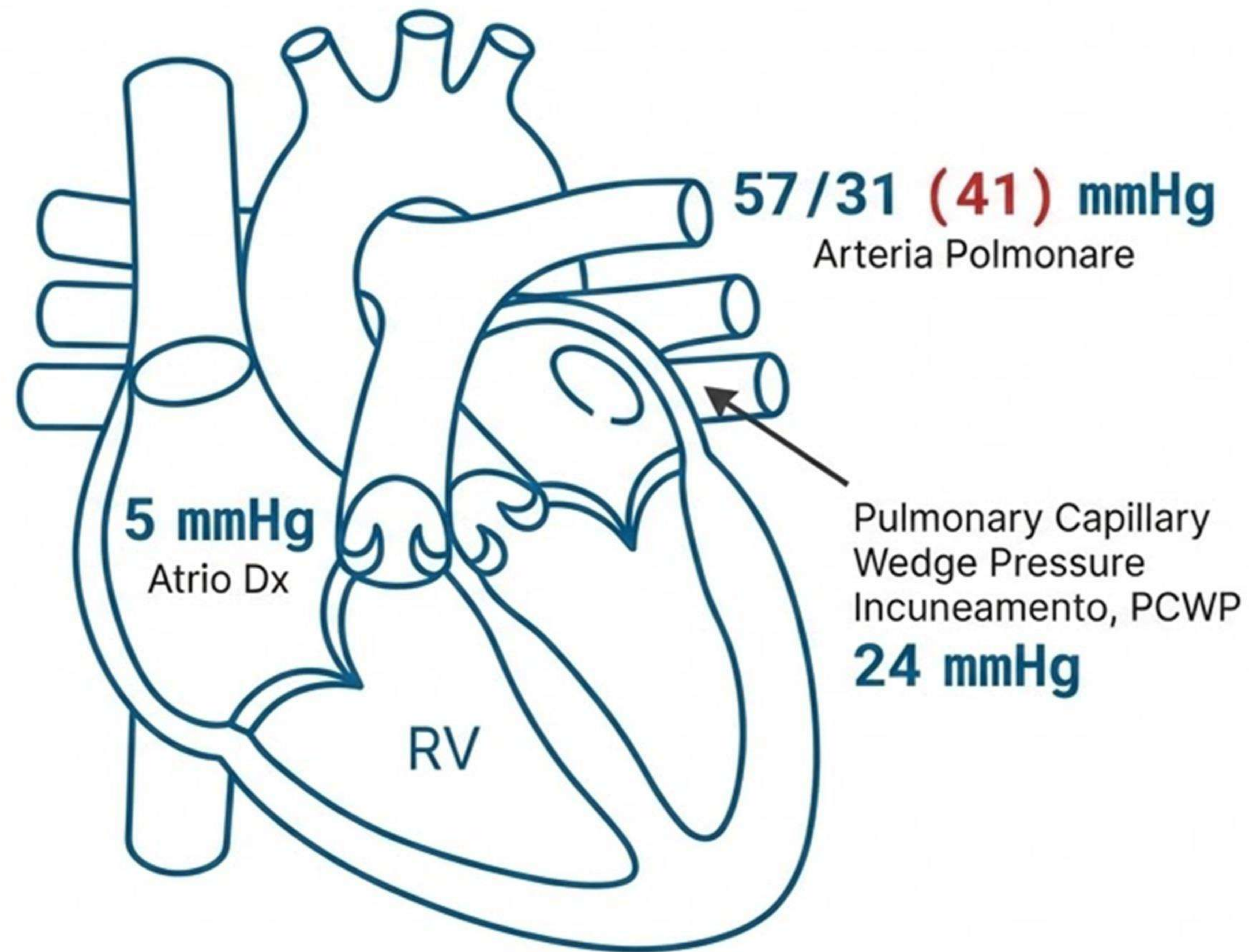
**VO<sub>2</sub> Picco: 14.9 mL/kg/min**  
(56% del predetto)

**VE/VC0<sub>2</sub> Slope: 43.54**  
(Inefficienza ventilatoria)

**Polso O<sub>2</sub>: 68% del predetto**

Inter Regular

# Cateterismo destro (DH)



## Indici di Flusso

Indice Cardiaco (CI): **1.74 L/min/m<sup>2</sup>**

Resistenze Polmonari (PVR): **4.63 WU**

# È un paziente con insufficienza cardiaca avanzata?

## Criteri di Insufficienza Cardiaca Avanzata

**Sintomi severi e persistenti:** Classe NYHA III o IV, con limitazione grave dell'attività fisica.

**Disfunzione Cardiaca Severa:** Definita come frazione di elezione ventricolare sinistra (FEVS  $\leq 30\%$ ) oppure necessità di inotropi, oppure insufficienza ventricolare destra isolata (es. ARVC), oppure cardiopatia congenita/valvolare non operabile.

**Elevati Biomarcatori:** Livelli di BNP o NT-proBNP persistentemente elevati o in aumento.

**Congestione/Bassa Portata:** Episodi di congestione sistemica o polmonare (che richiedono diuretici e.v. ad alte dosi o infusione continua) o episodi di bassa portata che necessitano di inotropi, oppure aritmie maligne.

**Ospedalizzazioni Ricorrenti:** Almeno un episodio di ricovero o visita non programmata per SC negli ultimi 12 mesi.

**Bassa Capacità di Esercizio:** grave deterioramento, con impossibilità a svolgere attività fisica, o distanza al test del cammino 6 minuti (6MWT)  $< 300$  m o  $pVO_2 < 12$

## Stato del Paziente

✗ Classe NYHA II

✓ FE 22%

✓ NT-ProBNP 1059 pg/ml

✗ Non necessità di diuretici

✗ Non ospedalizzazioni in 12 mesi

✗  $pVO_2$  14 ml/kg/m<sup>2</sup>

**HCM evoluta; Disfunzione Vdx; Iperensione polmonare;**

# Se usassimo gli score?

## **MECKI Score**

13%  
Death or  
Transplant  
at 2 Years

## **Seattle HF Model**

97%  
1-Year Survival

## **MAGGIC Score**

10%  
1-Year Mortality

## Predicting survival in patients with severe heart failure: Risk score validation in the HELP-HF cohort

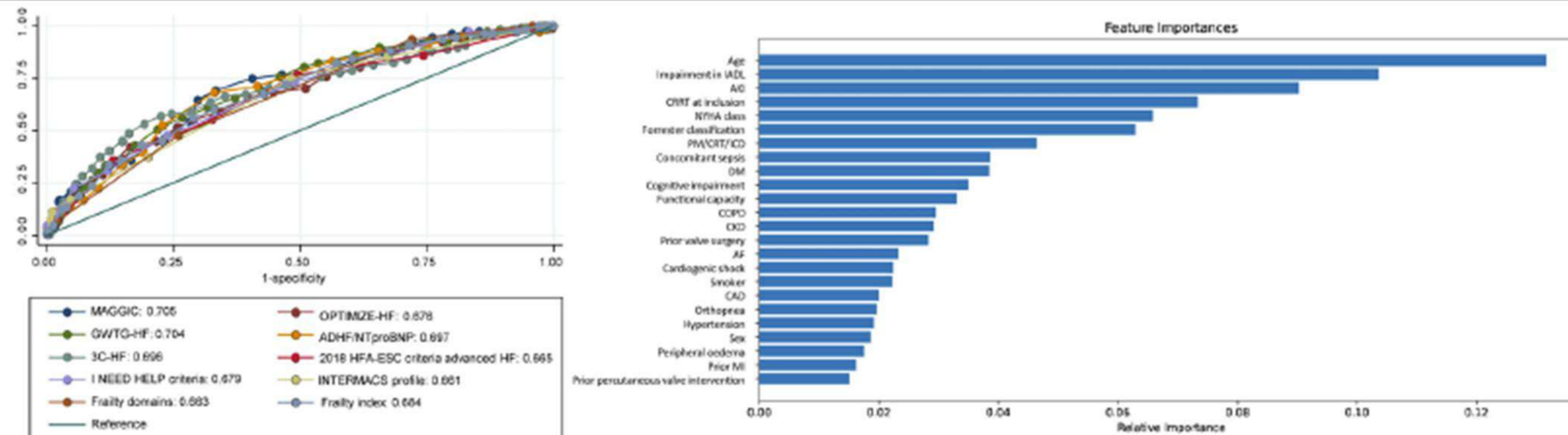
Mauro Chiarito<sup>1,2,\*†</sup>, Davide Stolfo<sup>3†</sup>, Alessandro Villaschi<sup>1,2</sup>, Samantha Sartori<sup>4</sup>, Luca Baldetti<sup>5</sup>, Carlo Mario Lombardi<sup>6</sup>, Marianna Adamo<sup>6</sup>, Ferdinando Loiacono<sup>1,2</sup>, Antonio Maria Sammartino<sup>6</sup>, Mauro Riccardi<sup>6</sup>, Daniela Tomasoni<sup>6</sup>, Riccardo Maria Inciardi<sup>6</sup>, Marta Maccallini<sup>1,2</sup>, Gaia Gasparini<sup>1,2</sup>, Benedetta Grossi<sup>2,7</sup>, Stefano Contessi<sup>3</sup>, Daniele Cocianni<sup>3</sup>, Maria Perotto<sup>3</sup>, Giuseppe Barone<sup>5</sup>, Marco Merlo<sup>3</sup>, Alberto Maria Cappelletti<sup>8</sup>, Gianfranco Sinagra<sup>3</sup>, Daniela Pini<sup>1</sup>, Marco Metra<sup>6</sup>, and Matteo Pagnesi<sup>6</sup>

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### Predicting survival in patients with severe heart failure: risk scores validation in the HELP-HF cohort

1,149 patients with severe HF from the HELP-HF Registry



#### ML-based models

Relevant features selected via RFE with cross validation

RF SVM DT KNN

#### 1-year mortality

All-cause CV Non-CV

#### Main findings

Low-to-moderate accuracy of risk scores

↓ in patients at high risk

No difference among scores' AUCs

Similar predictive ability of ML-based models

RFE identified relevant features not included in many scores

Slightly better predictive ability for CV death

Poor performance for non-CV death

#### Aims

Accurate selection of patients with severe heart failure (HF) who might benefit from advanced therapies is crucial. The present study investigates the performance of the available risk scores aimed at predicting the risk of mortality in patients with severe HF.

#### Methods and results

The risk of 1-year mortality was estimated in patients with severe HF enrolled in the HELP-HF cohort according to the MAGGIC, 3-CHF, ADHF/NT-proBNP, and GWTC-HF risk scores, the number of criteria of the 2018 HFA-ESC definition of advanced HF, I NEED HELP markers, domains fulfilled of the 2019 HFA-ESC definition of frailty, the frailty index, and the INTERMACS profile. In addition, we tested the performance of different machine learning (ML)-based models to predict 1-year mortality. At 1-year follow-up, 265 patients (23.1%) died. The prognostic accuracy, tested in the subgroup of patients with completeness of all data regarding the variables included in the scores (497/1149 patients), resulted moderate for MAGGIC, GWTC-HF, and ADHF/NT-proBNP scores (area under the curve [AUC]  $\geq 0.70$ ) and only poor for the other tools. All the scores lost accuracy in estimating the rate of 1-year mortality in patients at the highest risk. Support vector machine-based model had the best AUC among ML-based models, slightly outperforming most of the tested risk scores.

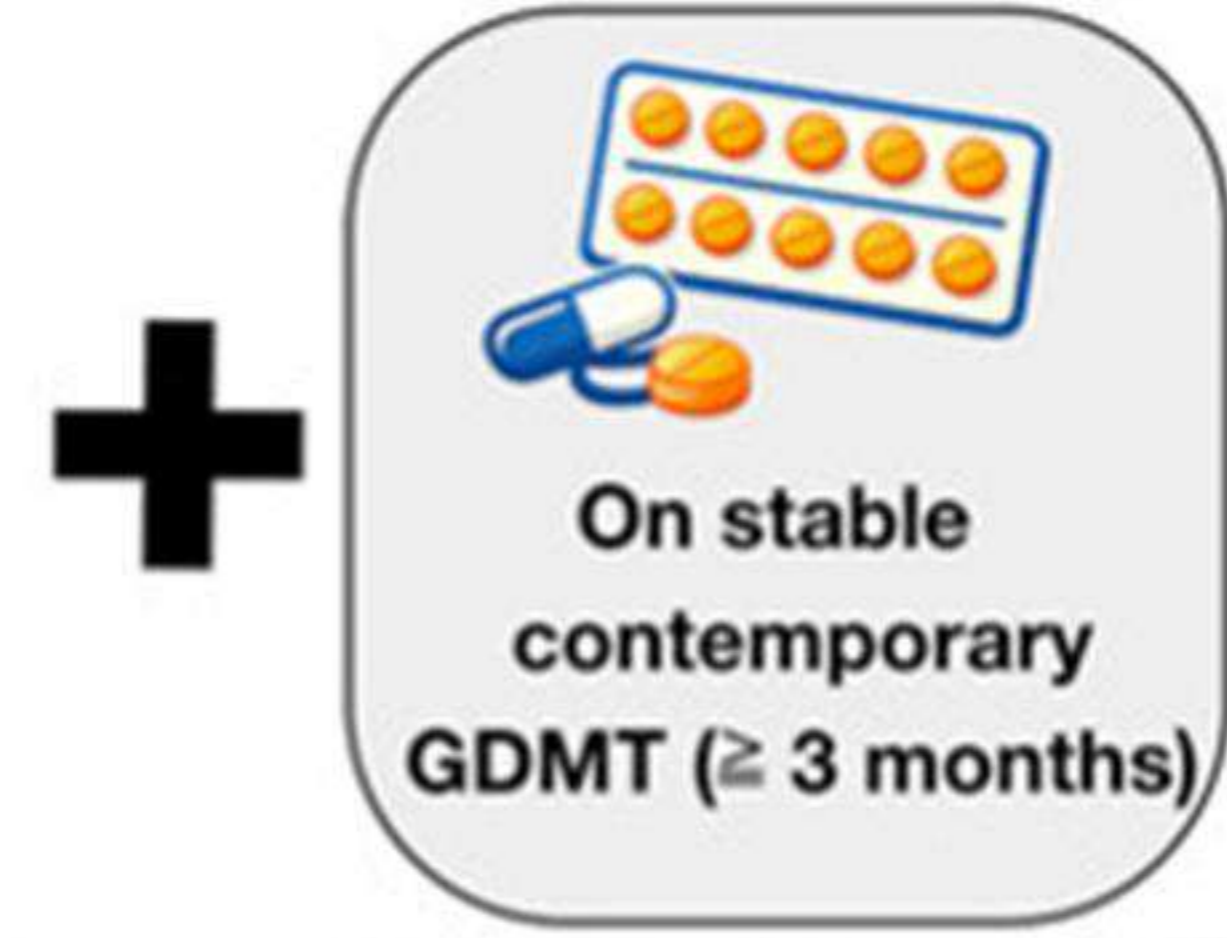
#### Conclusion

Most of the scores used to predict the risk of mortality in HF performed poorly in real-world patients with severe HF and provided inaccurate estimate of the risk of 1-year mortality in patients at the highest risk. ML-based models did not significantly outperform the currently available risk scores and their use must be validated in large cohort of patients.

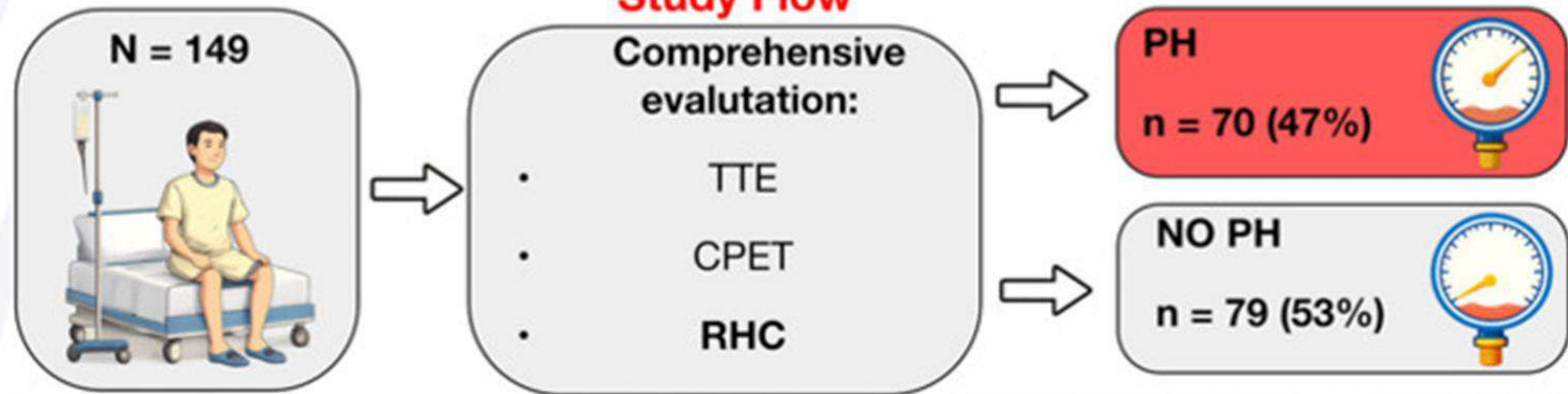
# Prognostic Role of Pulmonary Hypertension in Ambulatory Advanced Heart Failure

## Study Participants

- Prospective cohort
- Consecutive ambulatory patients referred for HTx/LVAD evaluation
- Meets  $\geq 1$  ESC Advanced HF criterion
- INTERMACS Profile  $\geq 4$



## Study Flow



## Baseline Characteristics of the Study Population

Age:  $53 \pm 12$  y

Female: 24.8 %

Ischemic: 36.2 %

Treatment

- ACEI / ARB / ARNI: 85.2 %
- BB: 94.0%
- MRA: 86.6%
- SGLT2i: 82.6 %
- On 4-drug GDMT: 75.2 %

## Primary Composite Outcome

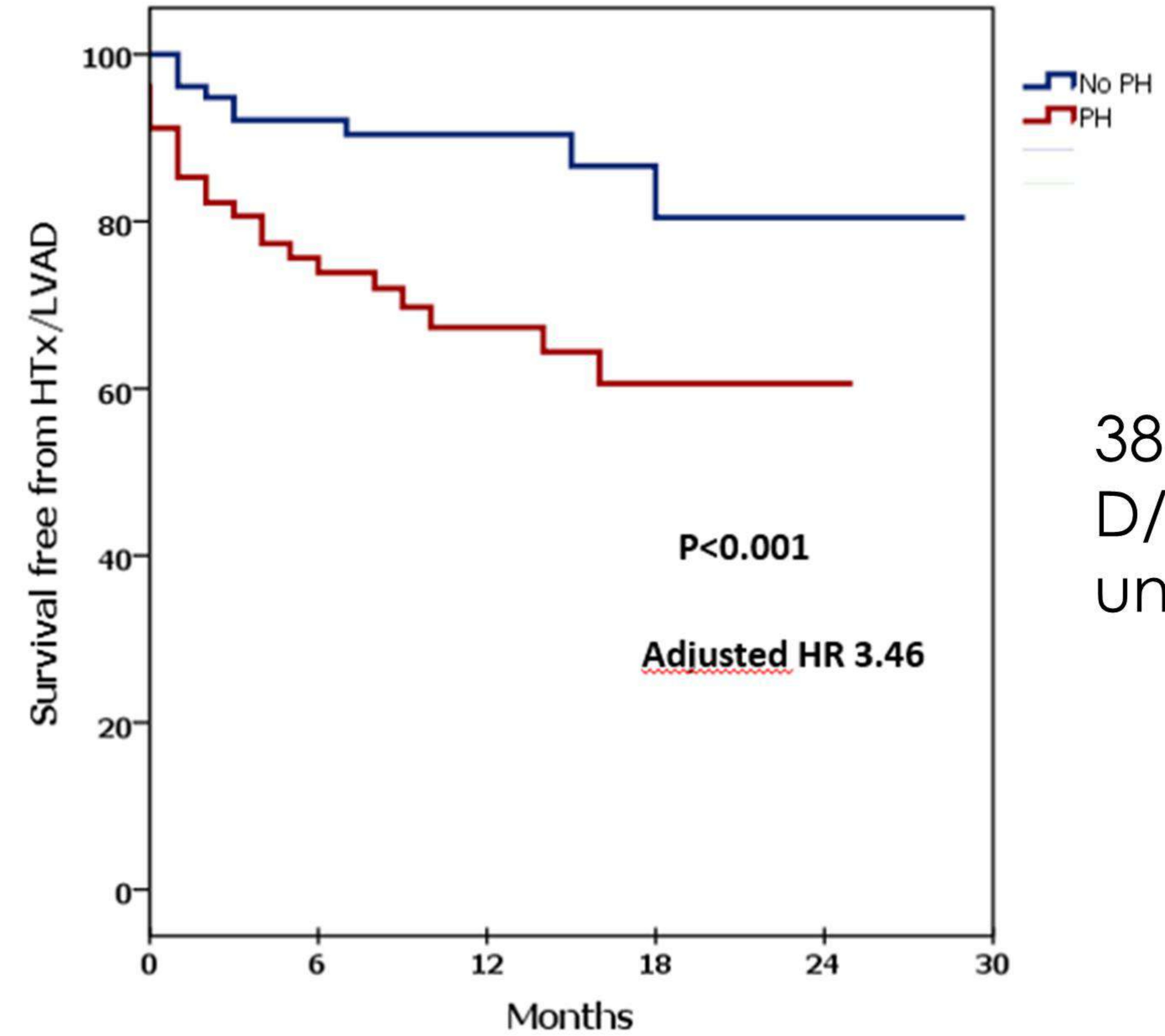
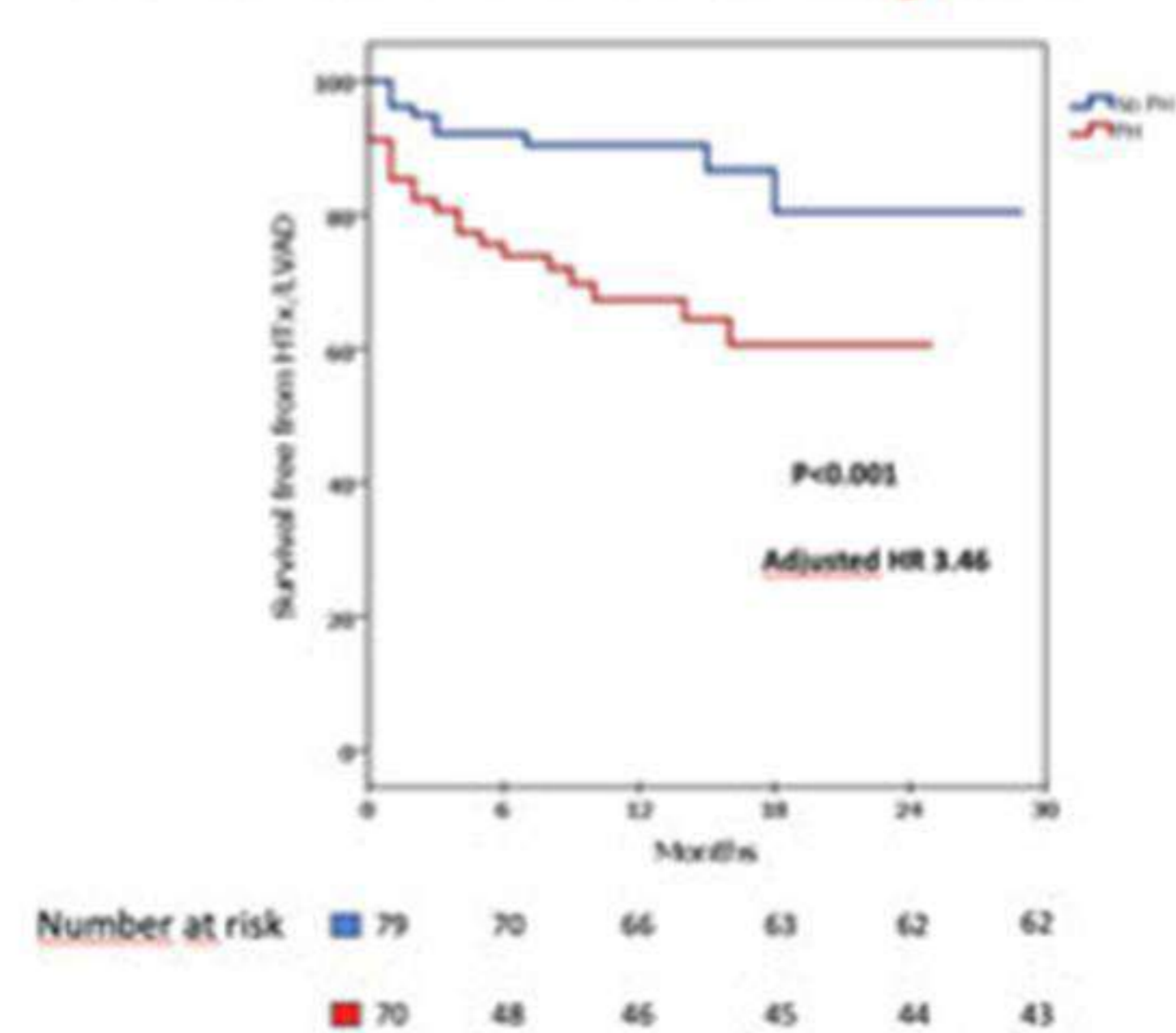
all-cause death + HTx + LVAD

Median Follow-up: 16 months

## Adjusted Risk for the Composite Outcome

Characteristics	P value	HR	95% CI
SBP	0.168	0.971	0.931-1.013
HR	0.569	1.013	0.969-1.060
Na	0.073	0.799	0.624-1.021
LVGLS	0.059	0.763	0.575-1.011
VE_VCO <sub>2</sub> slope	0.054	1.053	0.999-1.109
CI	0.262	0.555	0.199-1.551
<b>PH</b>	<b>0.037</b>	<b>3.455</b>	<b>1.081-11.046</b>

## Time-to-Event Analysis



## Number at risk

	0	6	12	18	24	30
No PH	79	70	66	63	62	62
PH	70	48	46	45	44	43

38.6% vs 21.5%  
D/HTx/LVAD ad  
un anno

Manca P. et al. CP Cardiol, 2026

# Ricovero per test di reversibilità e possibile inserimento in lista Htx

Parametro	Basale (15/09)	Nitroprussiato (07/10)
mPAP (mmHg)	41	24
PCWP (mmHg)	24	17
CI (l/min/m <sup>2</sup> )	1.89	1.84
PVR (WU)	4.63	1.99

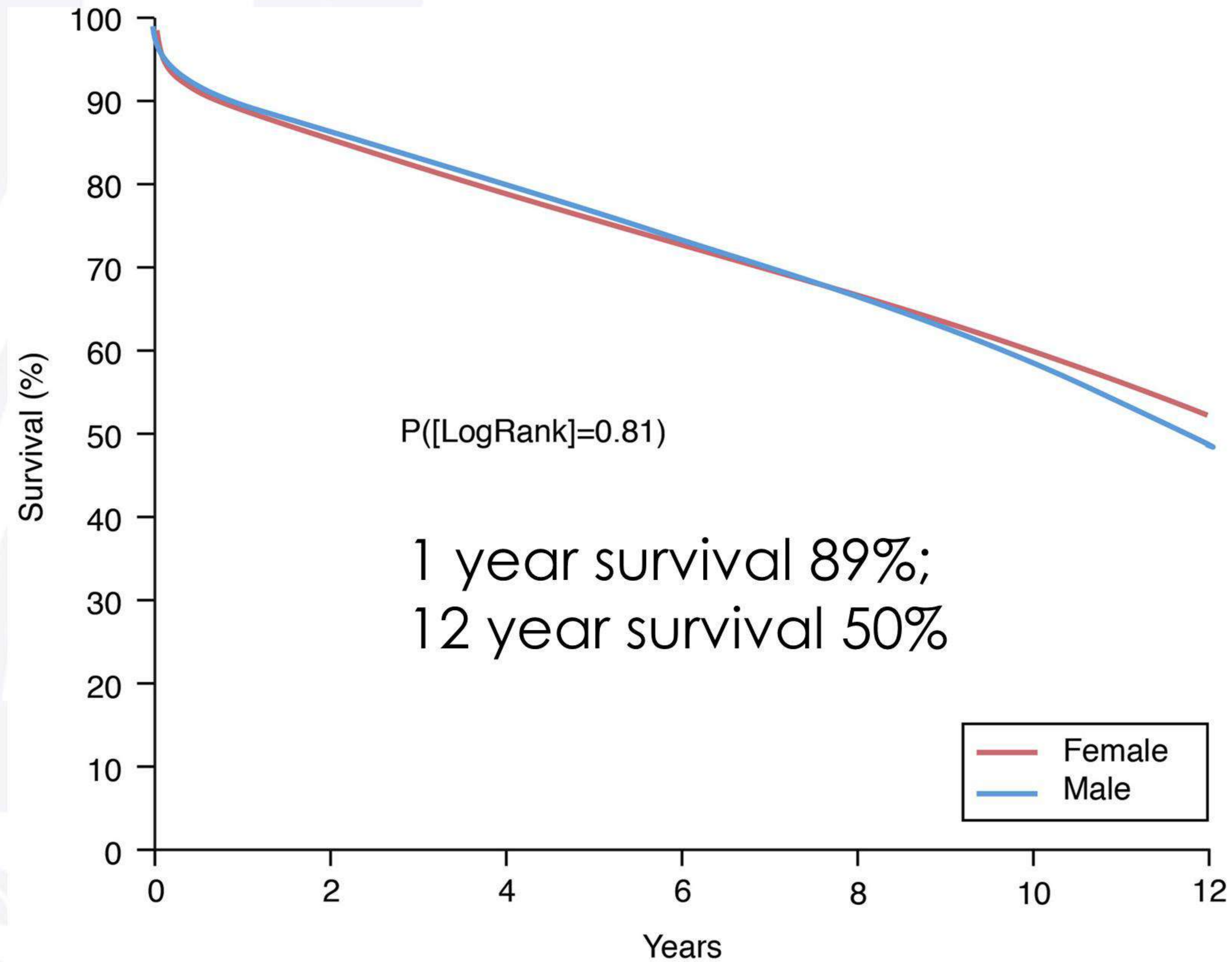


. Ipertensione polmonare reversibile



Inserimento in lista trapianto.

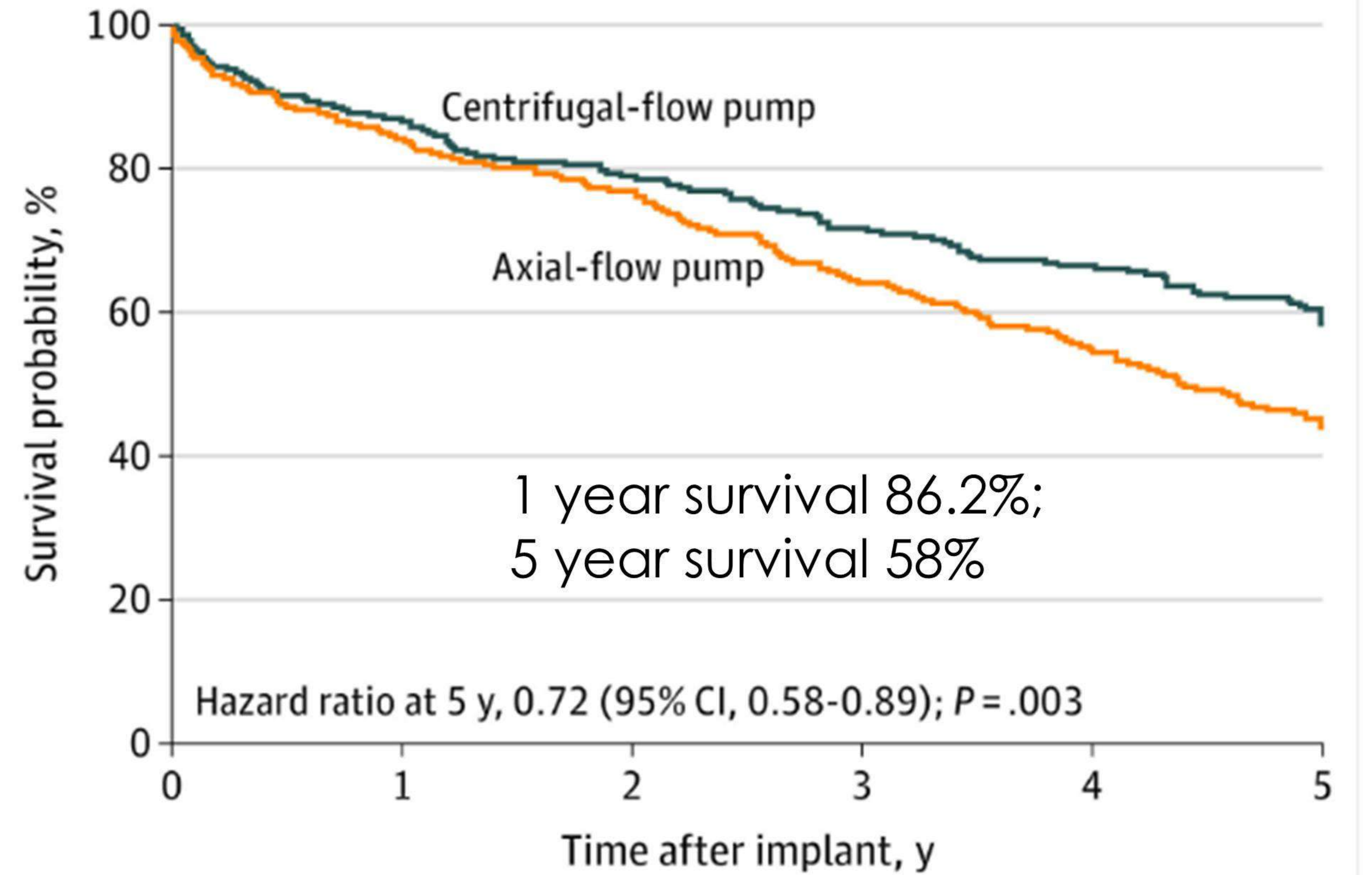
# Htx



Years	0	2	4	6	8	10	12
Female	7,778	5,096	3,672	2,505	1,602	901	414
Male	22,828	15,285	11,238	7,934	5,173	2,972	1,211

Hsich et al. JACC HF, 2020

# LVAD







515	383	289	213	184	141
505	339	247	165	124	85

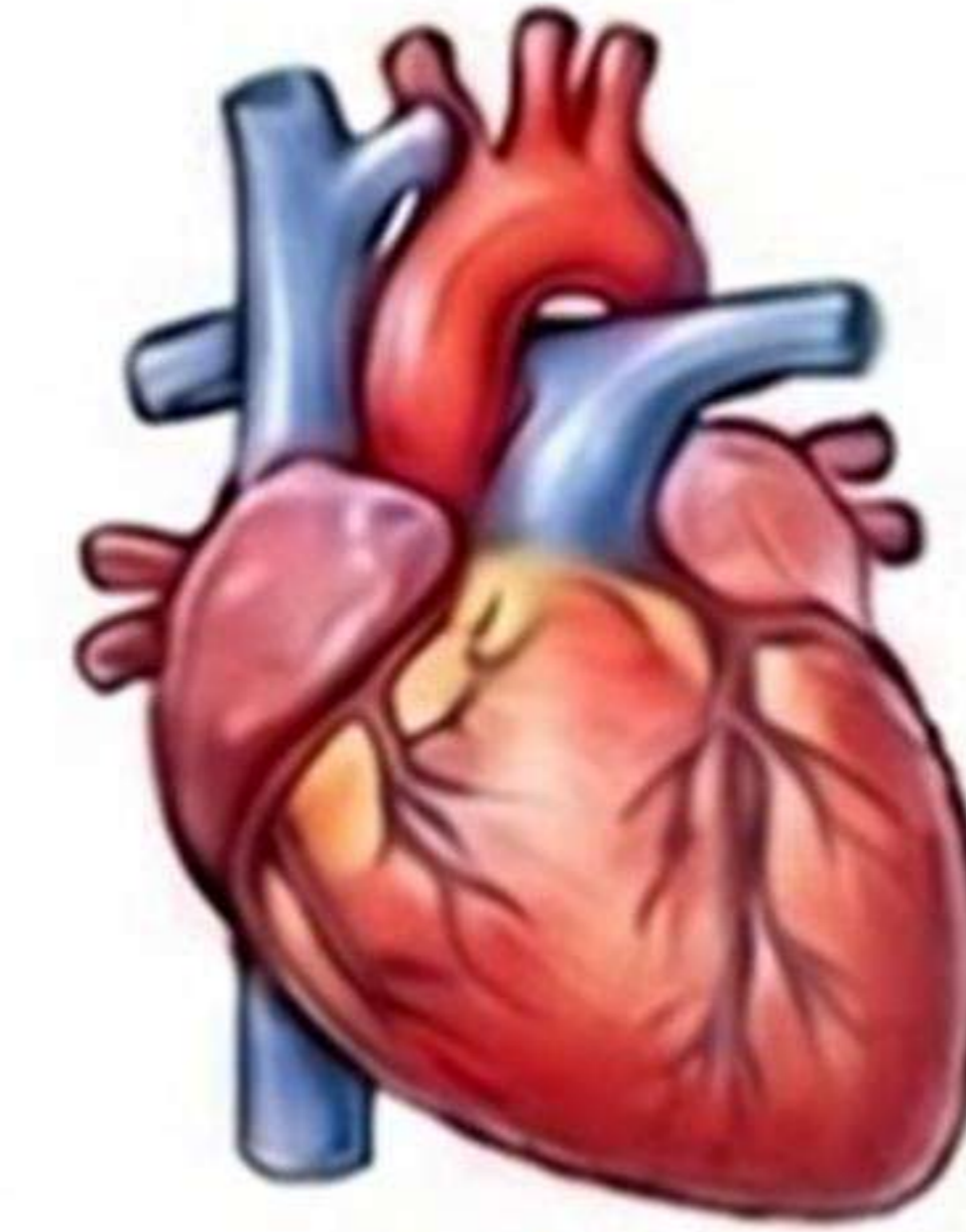
Mehra M. et al. JAMA 2022



## LVAD



-  Ventricolo sinistro relativamente piccolo
-  Rischio di eventi di "suction"
-  Disfunzione diastolica con fisiologia restrittiva
-  Disfunzione del ventricolo destro

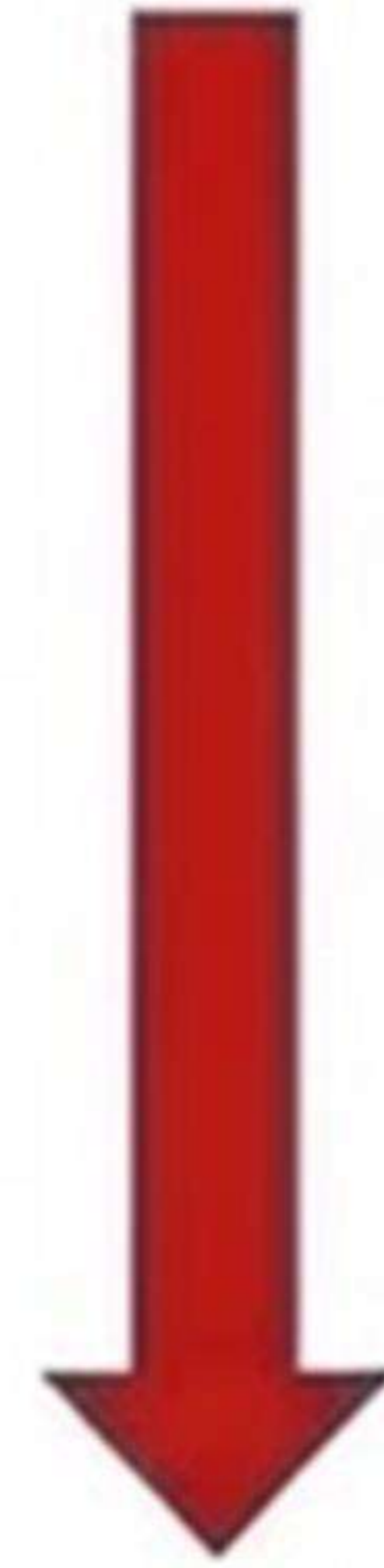
## Trapianto cardiaco



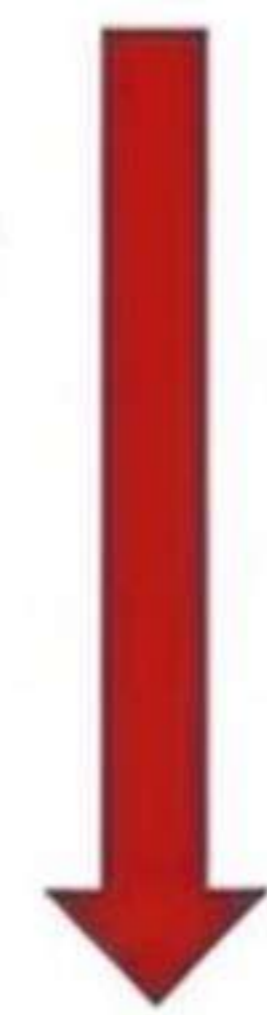
-  Tempo d'attesa in lista
-  Ipertensione polmonare reversibile

Alla sospensione del  
vasodilatatore, peggioramento  
emodinamico

FA rapida



Multiple CVE fallite;

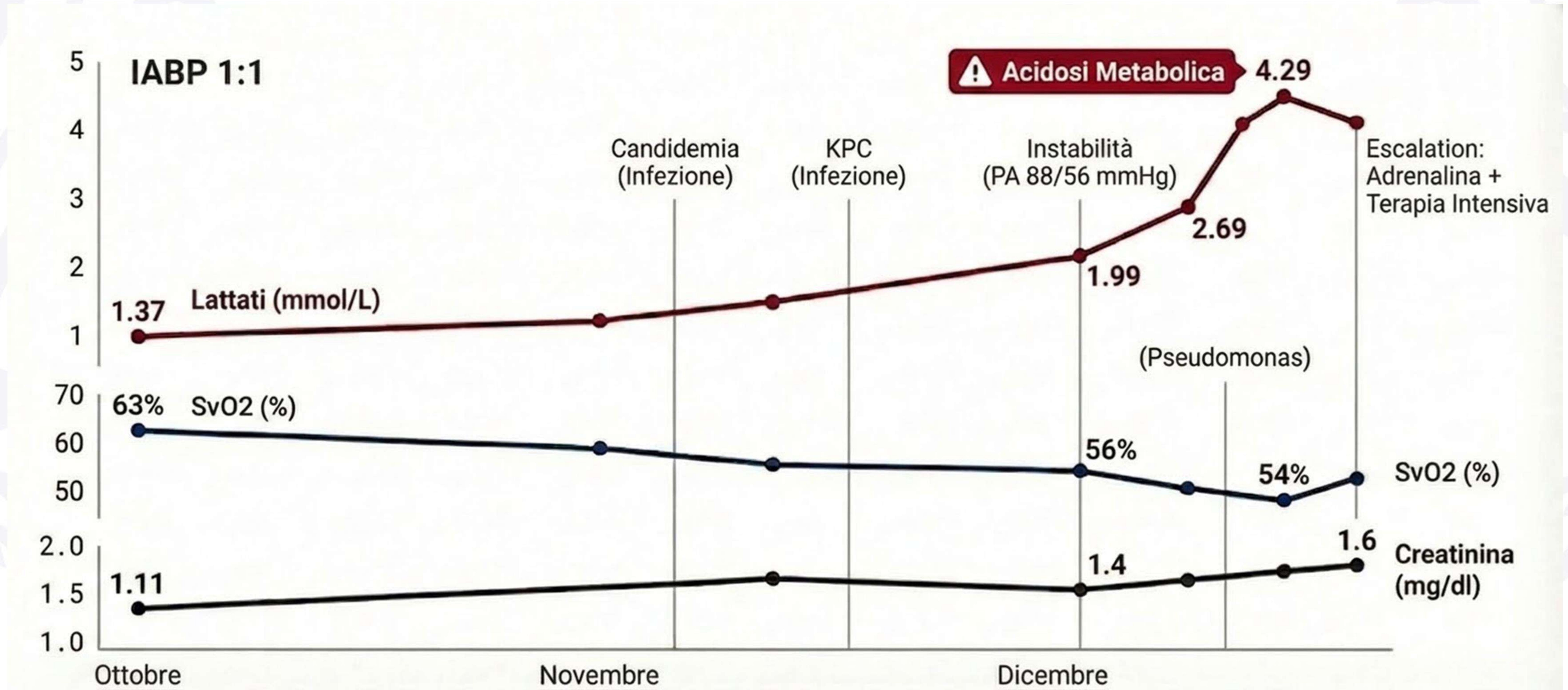


Urgentizzazione trapianto



Lac 5.5 mmol/l → IABP ascellare

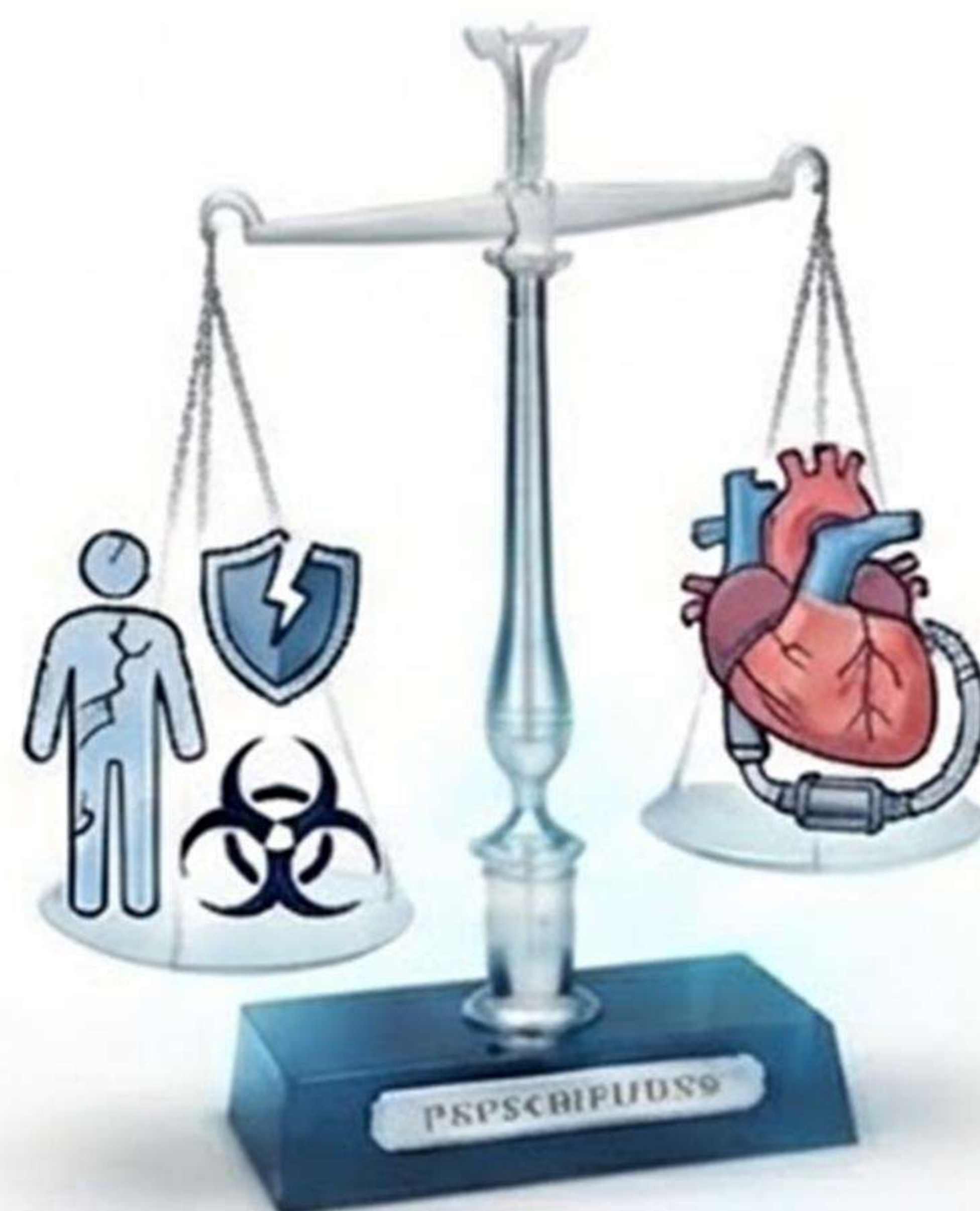
# Due mesi dopo il ricovero



## Gennaio 2026: stabilità emodinamica in IAPB e adrenalina

### Trapianto:

-  Fragilità
-  Immunosoppressione
-  Rischio infettivologico (sepsi)



### LVAD:

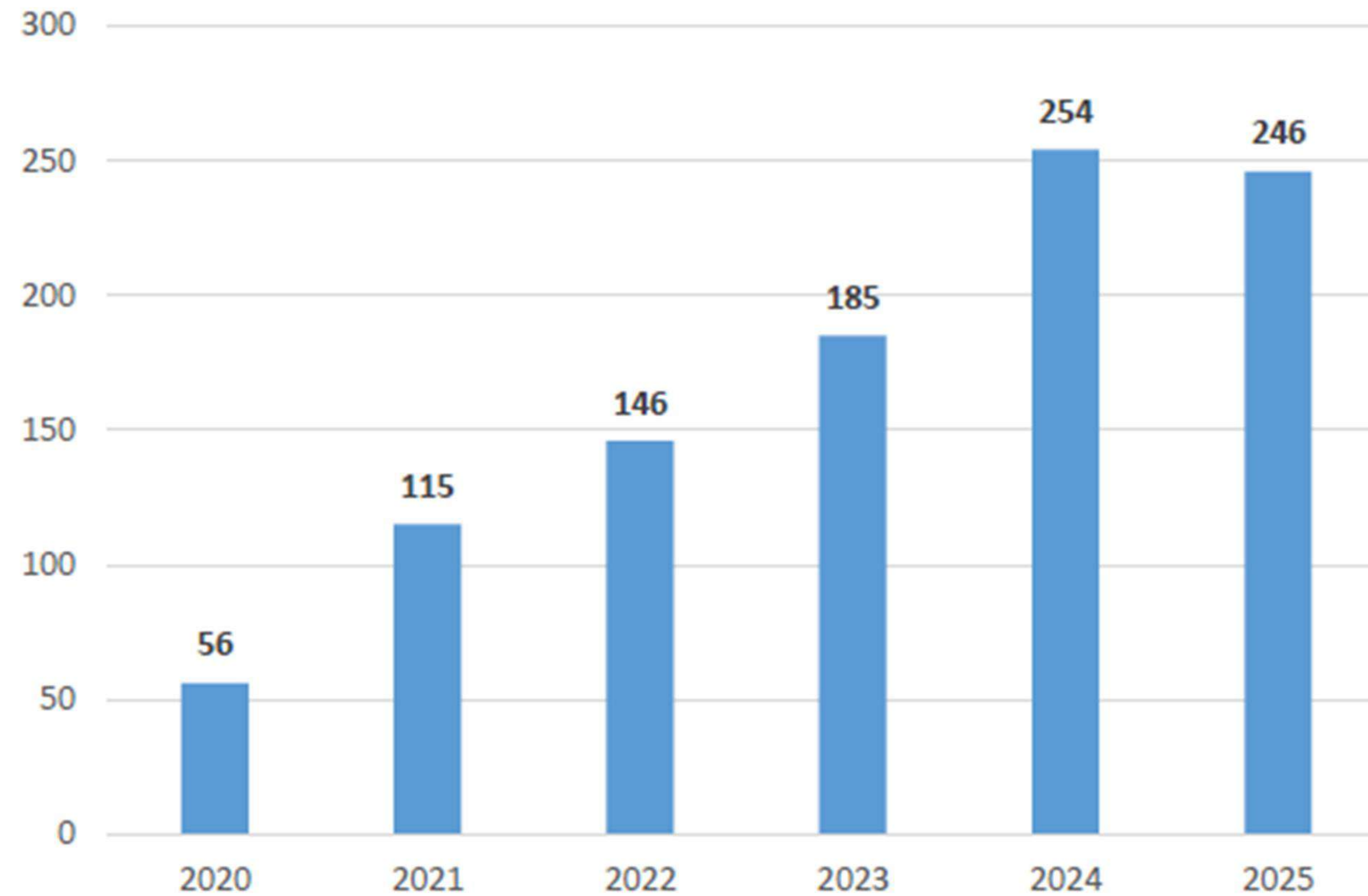
-  Caratteristiche anatomiche non ottimali

**Riconsideriamo LVAD?**

# RICHIESTE DI URGENZA DI MACROAREA

## Anni 2020-2025

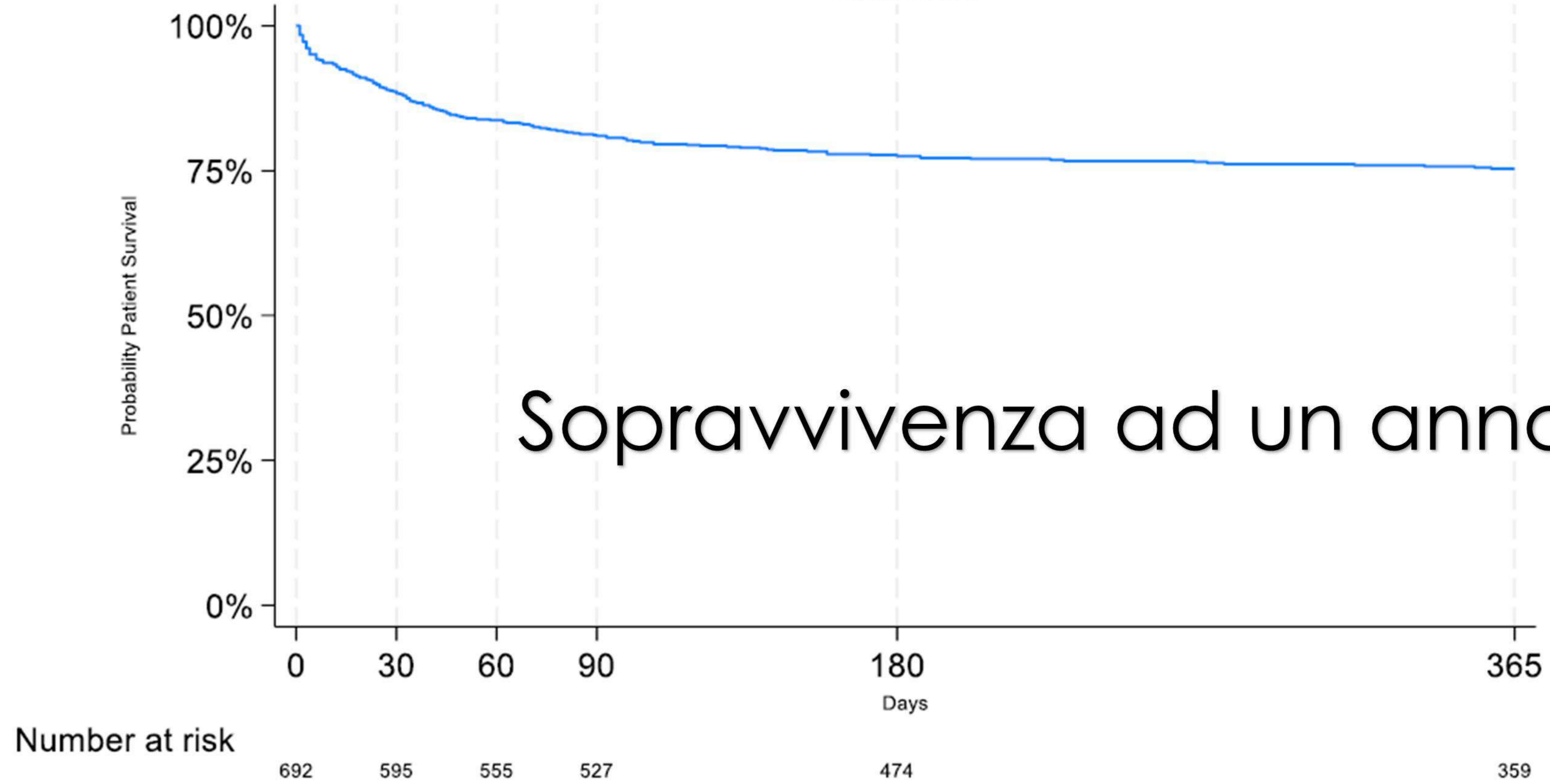
N = 1002



Dati preliminari

MA & URG

Trapianti di Cuore Adulti  
2020 - 2024  
MA & URG  
Patient Survival

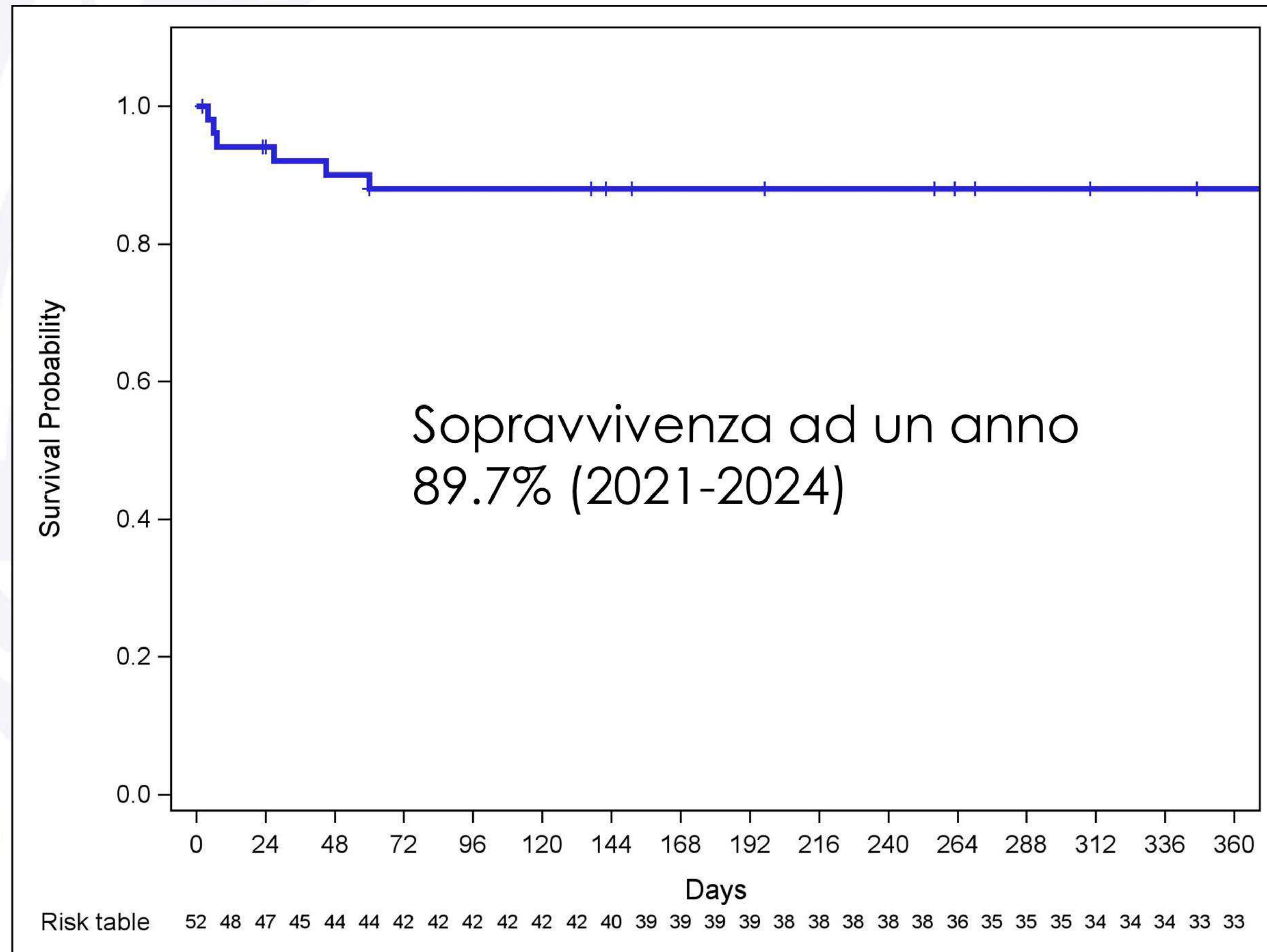


Sopravvivenza ad un anno <80%

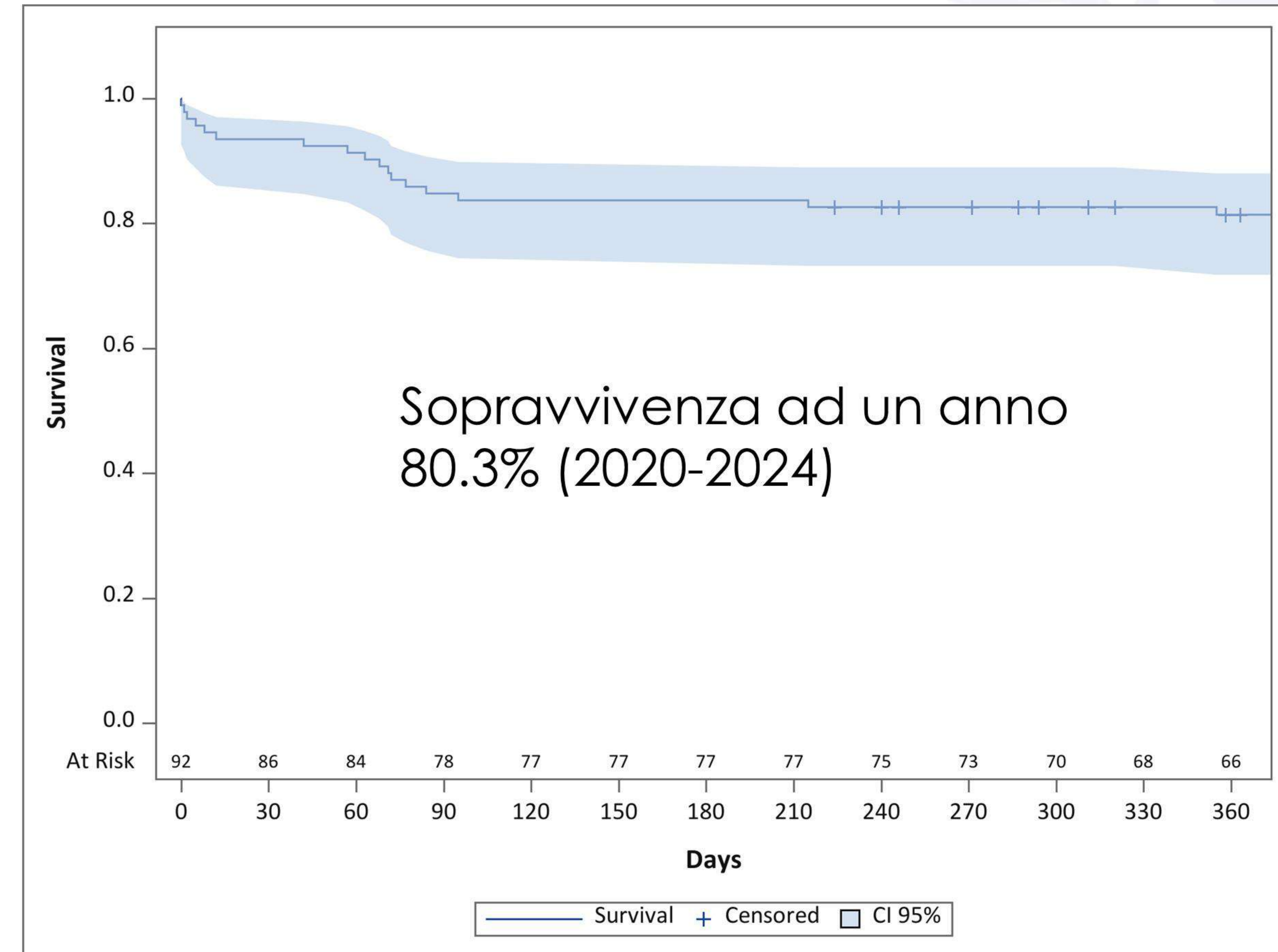
Dati preliminari

# Dati ISMETT

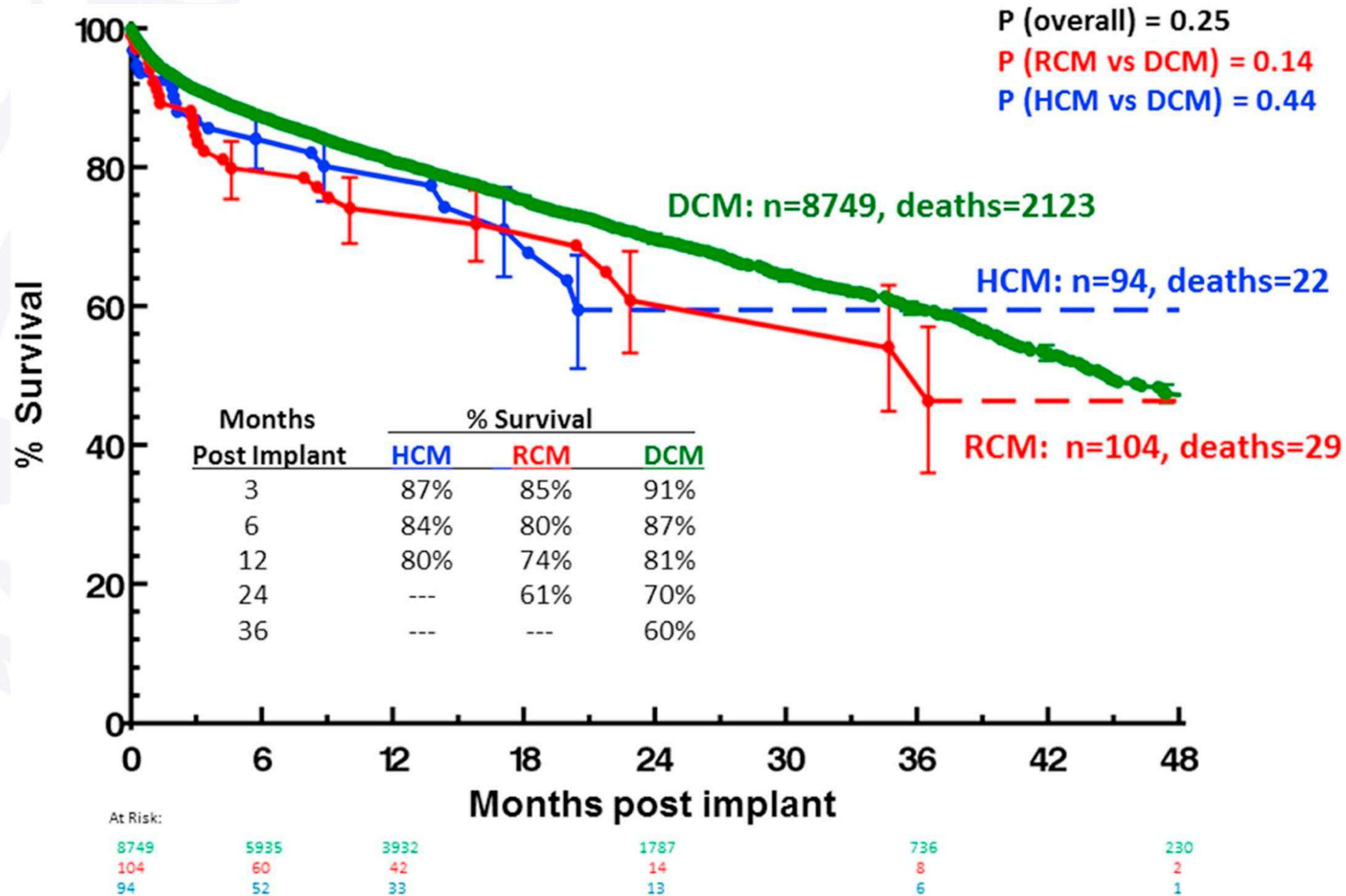
## HM III (N= 53)



## Htx (N= 91)



# LVAD in HCM and RCM



LVEDD medio in HCM 62mm

Patel et al. Journal of Card Fail, 2013

# HM III risk score

## WITHOUT AN LVAD

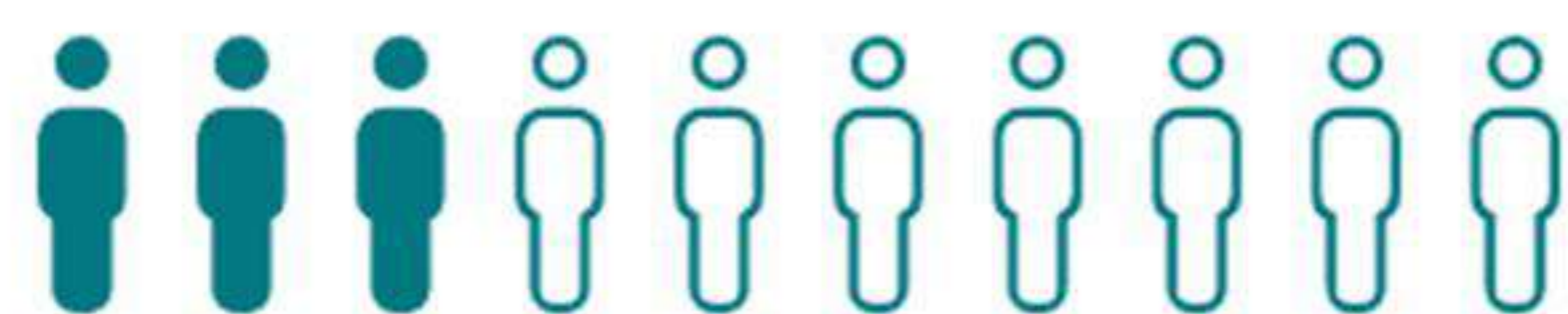
WE ESTIMATE THAT:

Below is our best guess for your survival past 1 and 2 years **without an LVAD**.

5 out of 10 patients will survive past 1 year.



3 out of 10 patients will survive past 2 years.



**Patients who will survive**



**Patients who will not survive**

## WITH AN LVAD

WE ESTIMATE THAT:

Below are personalized estimates for surviving past 1 and 2 years **with an LVAD**.

8 out of 10 patients **like you** will survive past 1 year.



7 out of 10 patients **like you** will survive past 2 years.



The survival estimates for living without an LVAD are generated differently by different healthcare teams, and if you are on IV medications, your prolongation may be lower. The numbers you see represent your healthcare team's best guess at your survival at 1 and 2 years. The personalized estimates are generated by the HM3RS calculator, which compares your clinical profile against others like you who have received an LVAD. For more, go to

[www.lvaddecisionaid.com](http://www.lvaddecisionaid.com).

# Discussione in TEAM

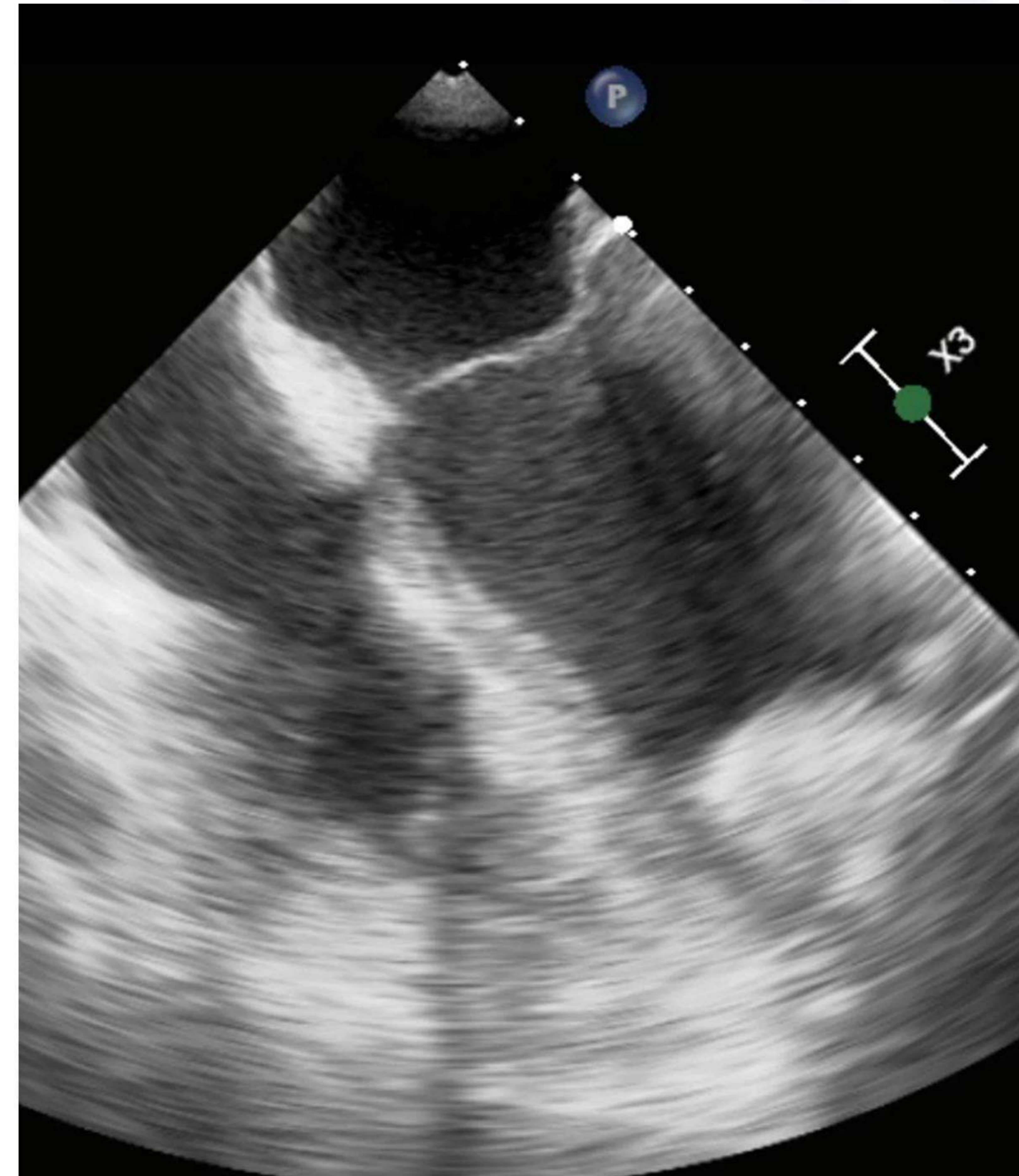


# Impianto di LVAD

07/01/2026

Impianto di LVAD con  
approccio mininvasivo  
(ministernotomia +  
minitoracotomia sinistra)

TEE in sala



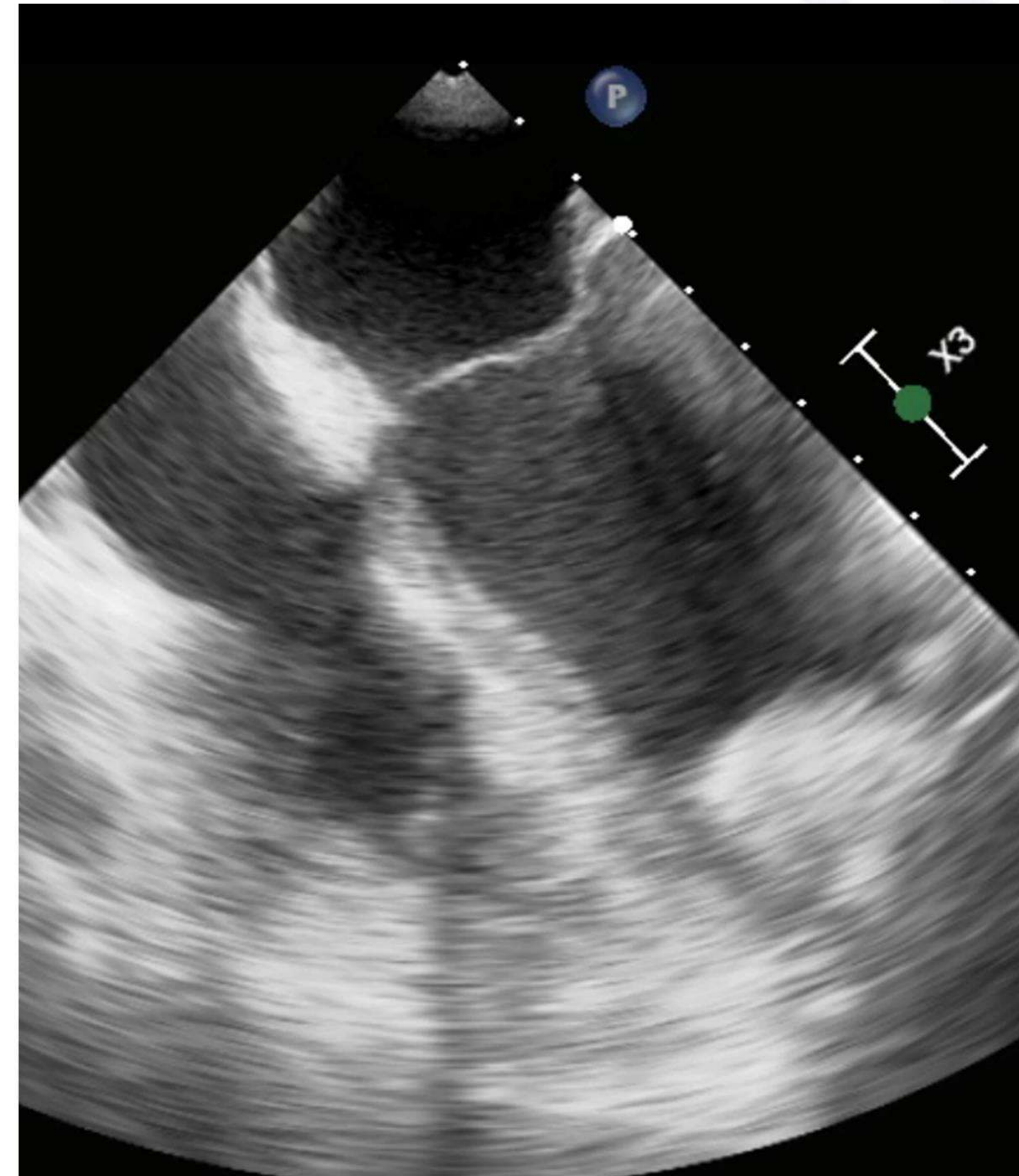
LVAD 4900rpm + adrenalina 0.08mcg/kg/min

07/01/2026

Impianto di LVAD con  
approccio mininvasivo  
(ministernotomia +  
minitoracotomia sinistra)

Attuale NYHA II in riabilitazione

TEE in sala



LVAD 4900rpm + adrenalina 0.08mcg/kg/min

Grazie per l'attenzione



