XXX
GIORNATE
CARDIOLOGICHE
TORINESI

TURIN,
October
25th-27th
2018

SCDU CARDIOCHIRURGIA
Università degli Studi di Torino
Città della Salute e della Scienza

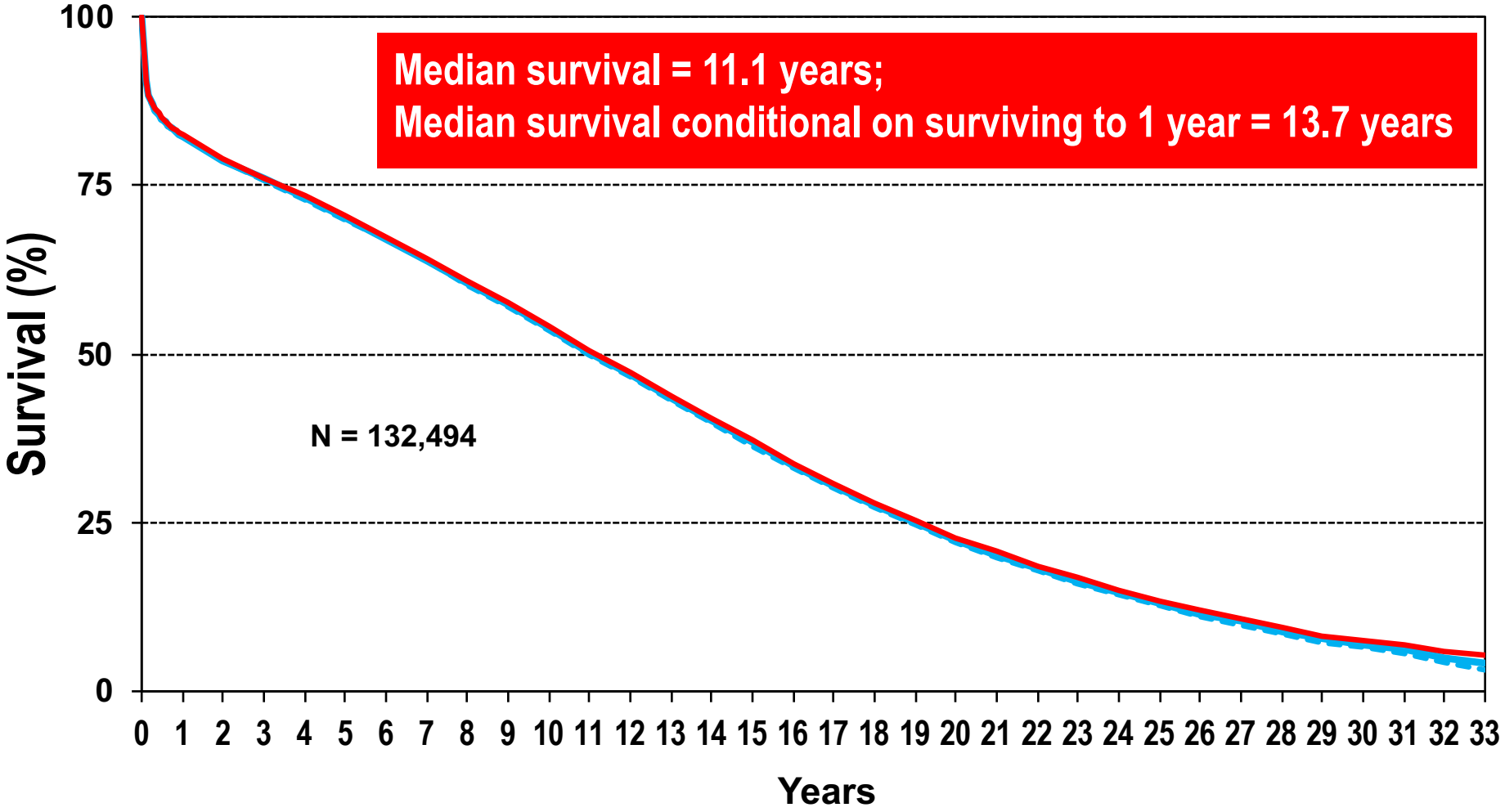
Direttore: Prof. Mauro Rinaldi

50 YEARS AFTER THE FIRST HEART TRANSPLANT: IS IT STILL A MODERN THERAPY IN THE ERA OF MECHANICAL CIRCULATORY SUPPORT?

Massimo Boffini

2nd HEART TRANSPLANT in ITALY (11/1986)
The longest heart transplanted patient alive in Europe
“normal” life

Adult and Pediatric Heart Transplants
Kaplan-Meier Survival
(Transplants: January 1982 – June 2016)



ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION
2018
JHLT. 2018 Oct; 37(10): 1155-1206

1967: the FIRST Heart Transplant

THE RECIPIENT

53 y-old

Man

Smoker

CAD, diabetic, peripheral vascular disease

THE DONOR

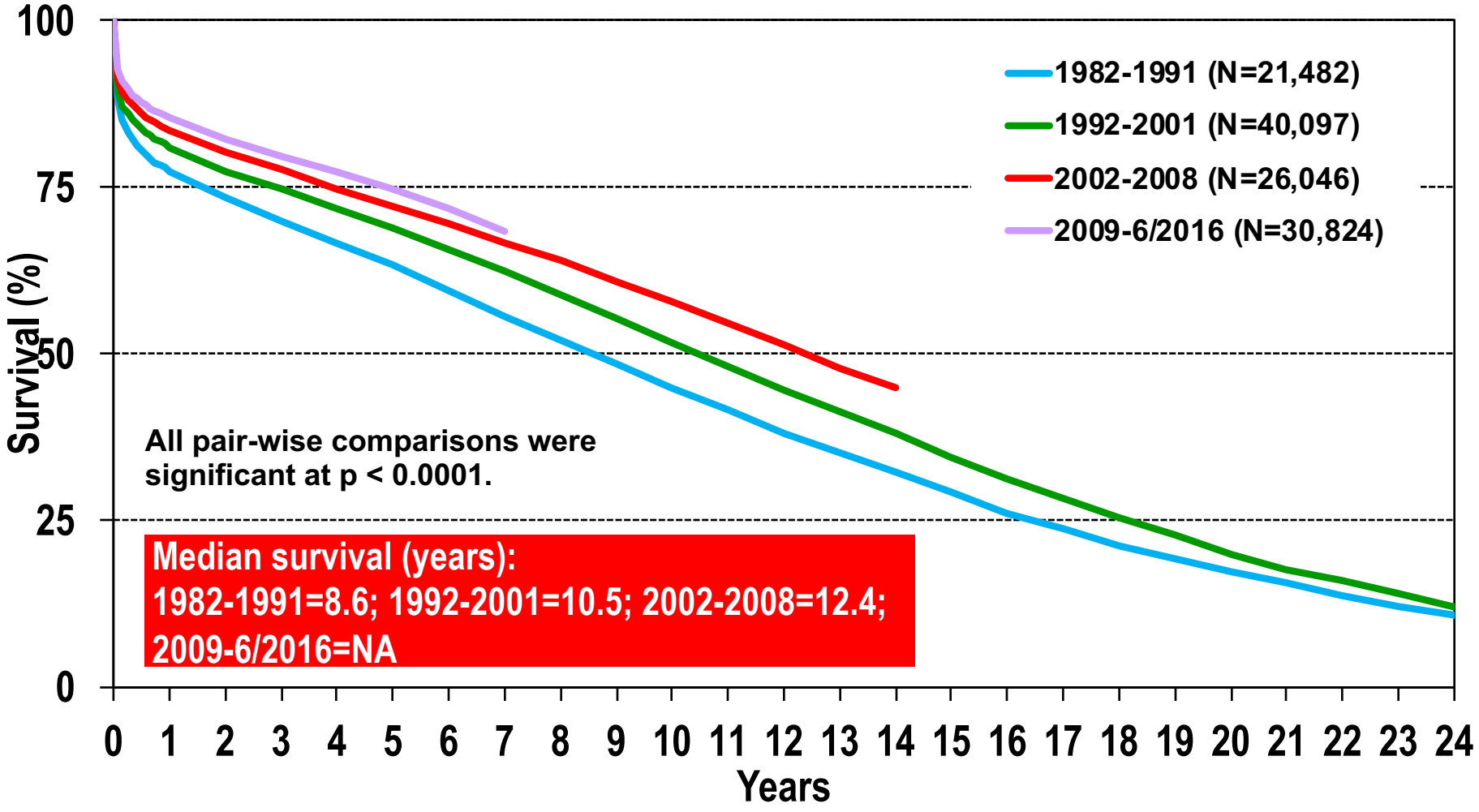
25 y-old

Woman

NO INFORMATION ON

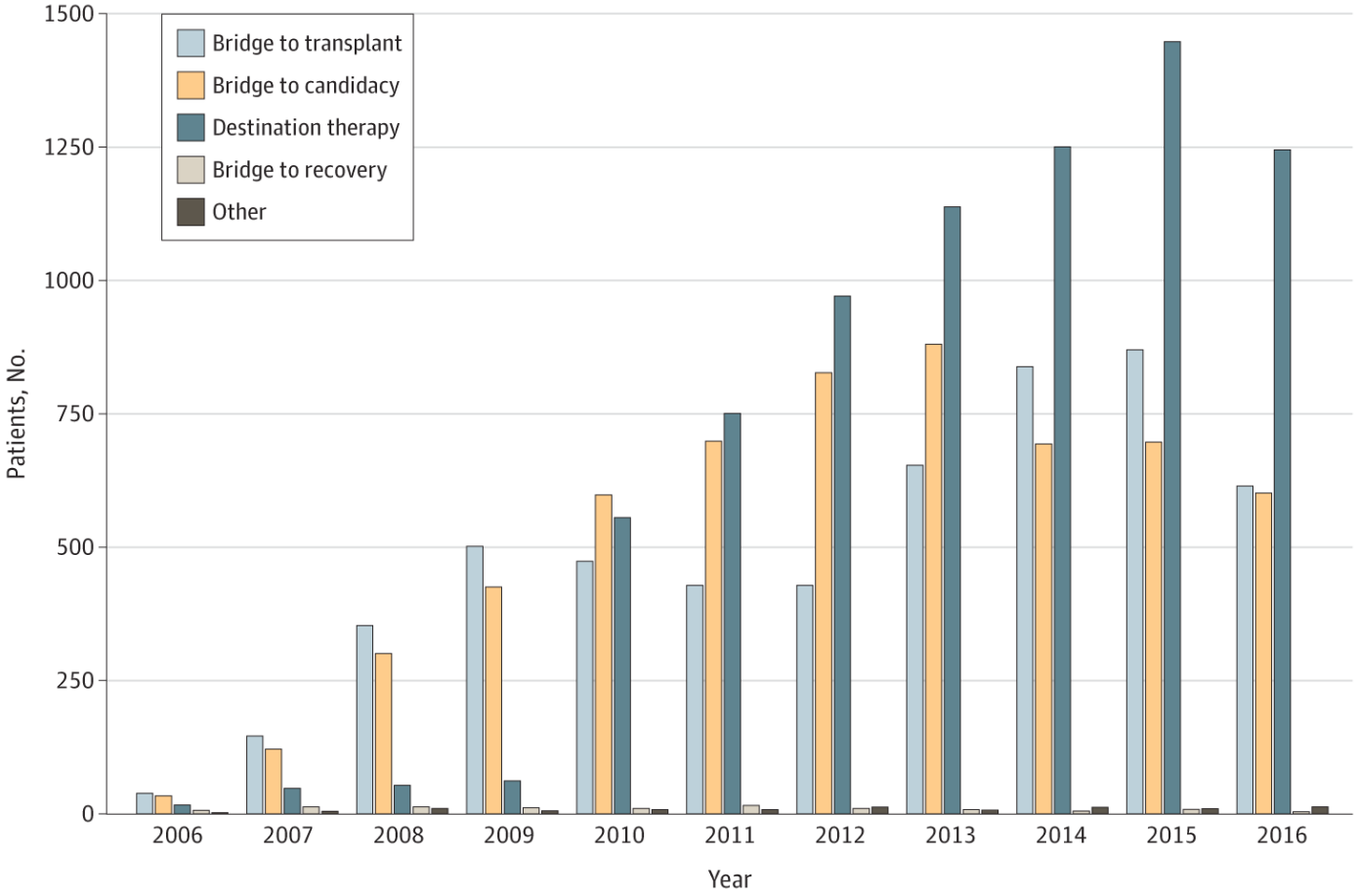
- Haemodynamics
- Immunological status
- BMI mismatch
- Gender mismatch

Adult Heart Transplants
Kaplan-Meier Survival by Era
(Transplants: January 1982 – June 2016)



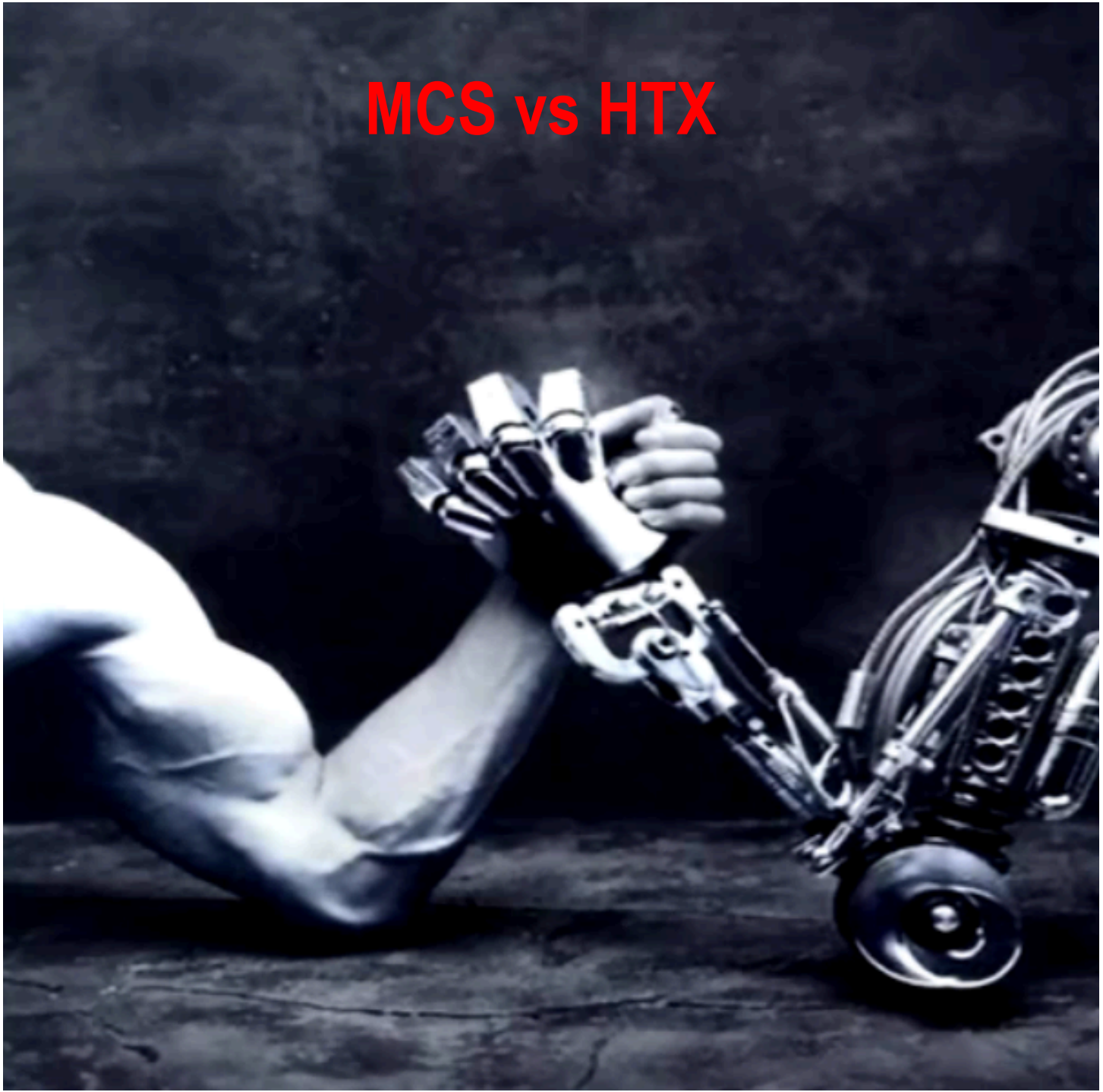
ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION
2018
JHLT. 2018 Oct; 37(10): 1155-1206

VAD IMPLANTATION PER YEAR

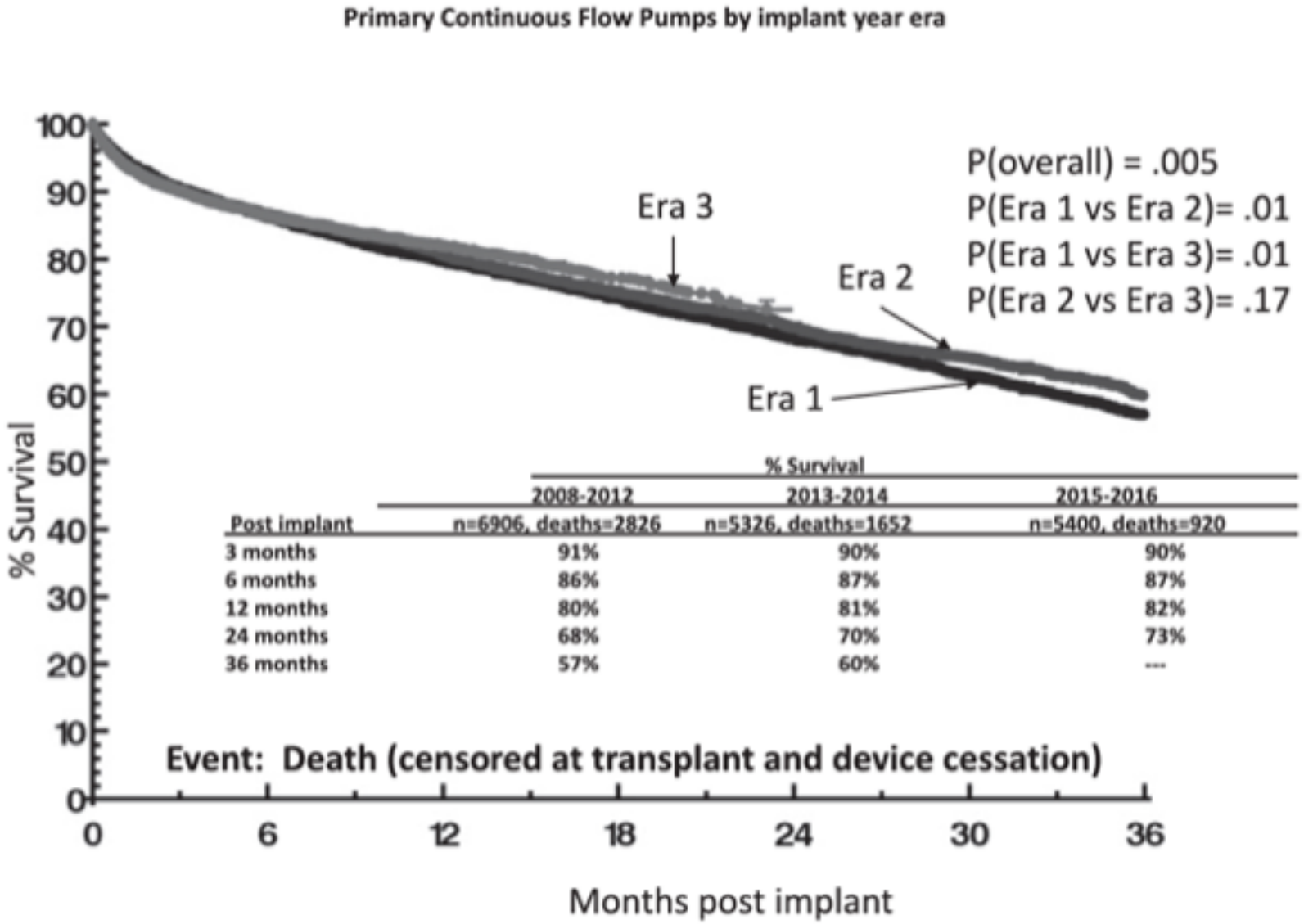


JAMA Cardiol. 2018;3(7):650-658

MCS vs HTX



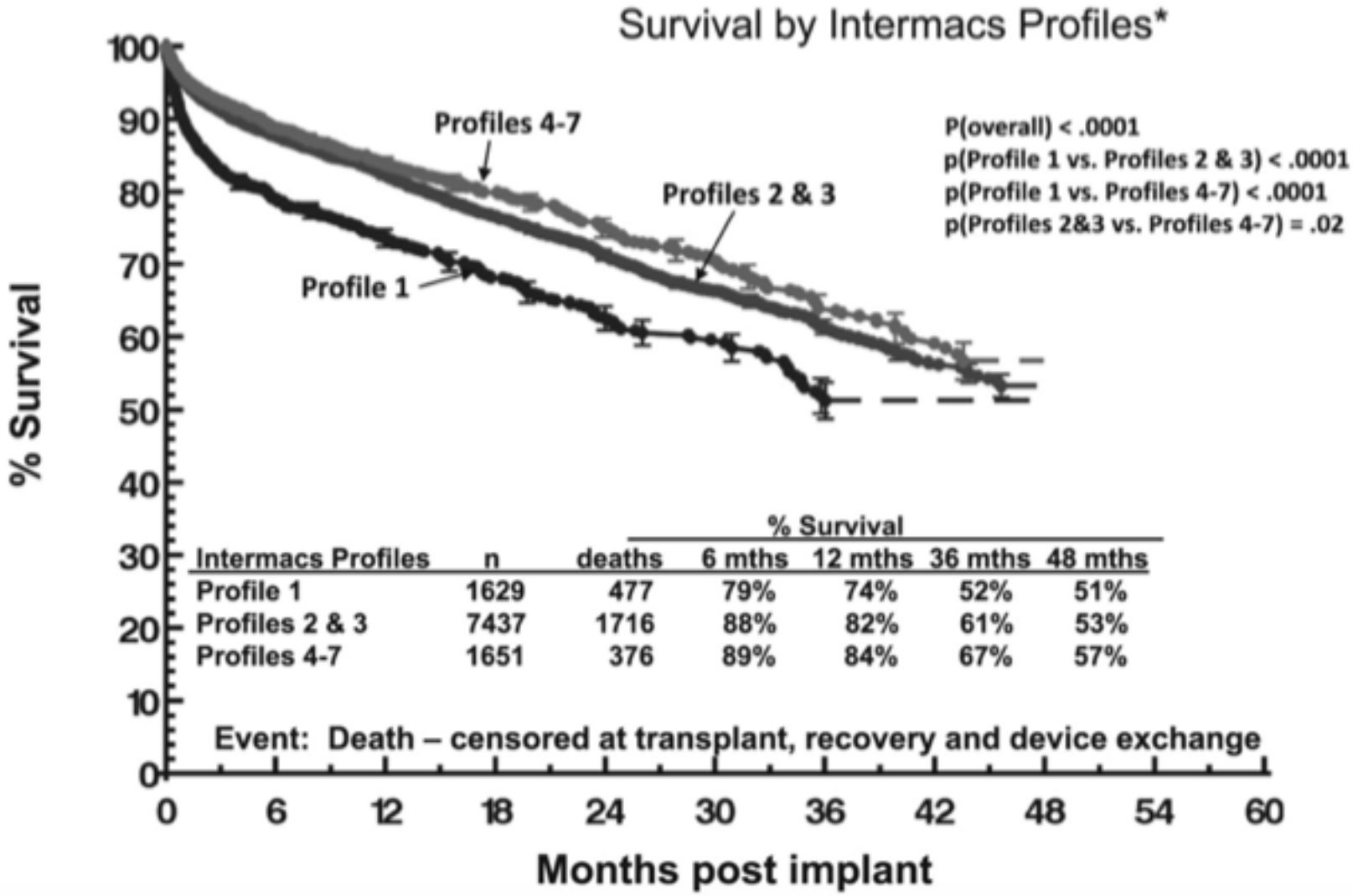
Intermacs Continuous Flow LVAD/BiVAD Implants: 2008 – 2016, n=17633*



	% Survival		
	2008-2012	2013-2014	2015-2016
Post implant	n=6906, deaths=2826	n=5326, deaths=1652	n=5400, deaths=920
3 months	91%	90%	90%
6 months	86%	87%	87%
12 months	80%	81%	82%
24 months	68%	70%	73%
36 months	57%	60%	---

J Heart Lung Transplant 2017;36:1080–1086

Eighth Annual INTERMACS Report



Intermacs Profiles	n	deaths	% Survival 6 mths	12 mths	36 mths	48 mths
Profile 1	1629	477	79%	74%	52%	51%
Profiles 2 & 3	7437	1716	88%	82%	61%	53%
Profiles 4-7	1651	376	89%	84%	67%	57%

J Heart Lung Transplant 2017;36:1080–1086

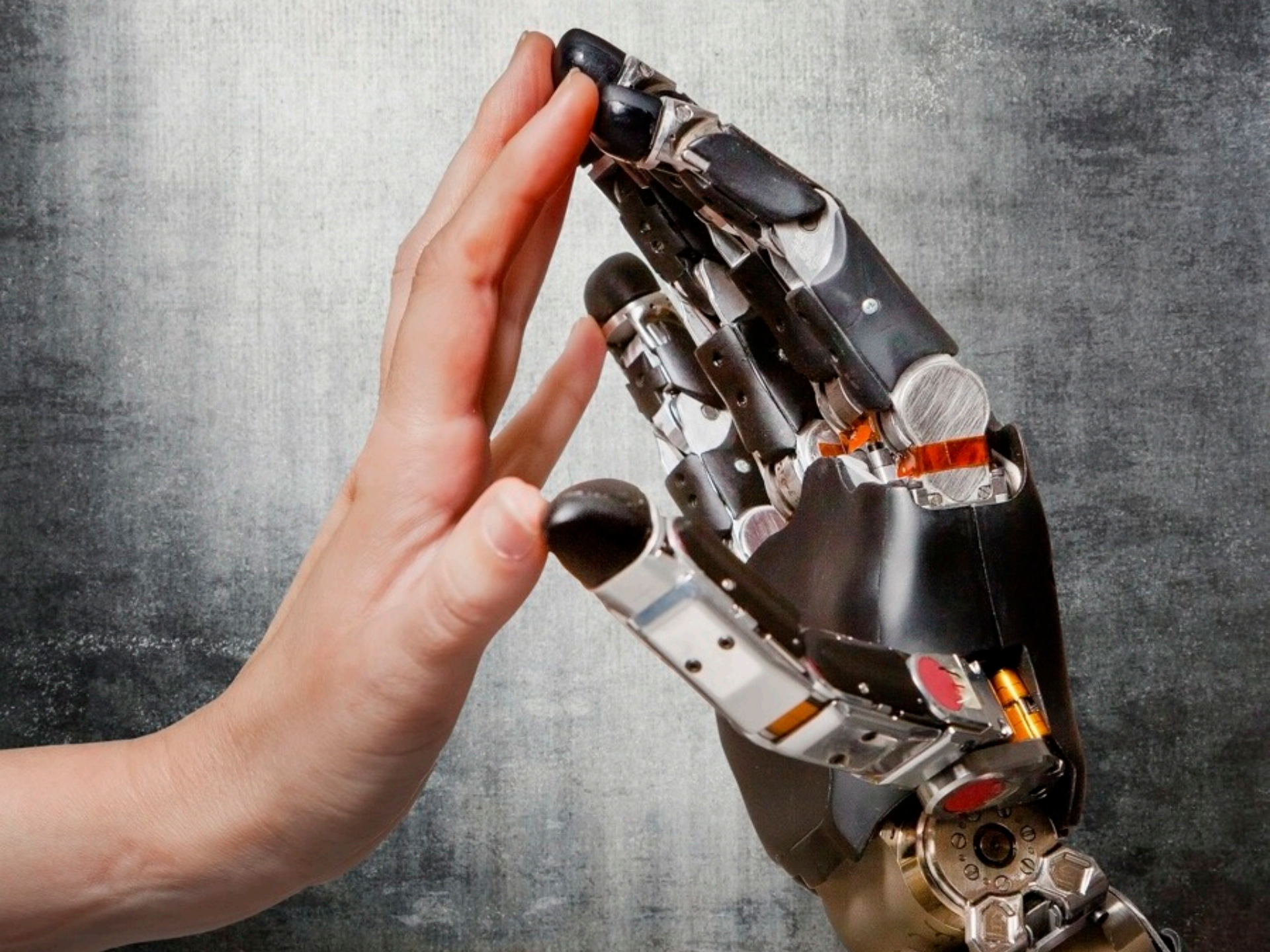
DIFFERENT TARGET OF PATIENTS

HEART TRANSPLANTATION

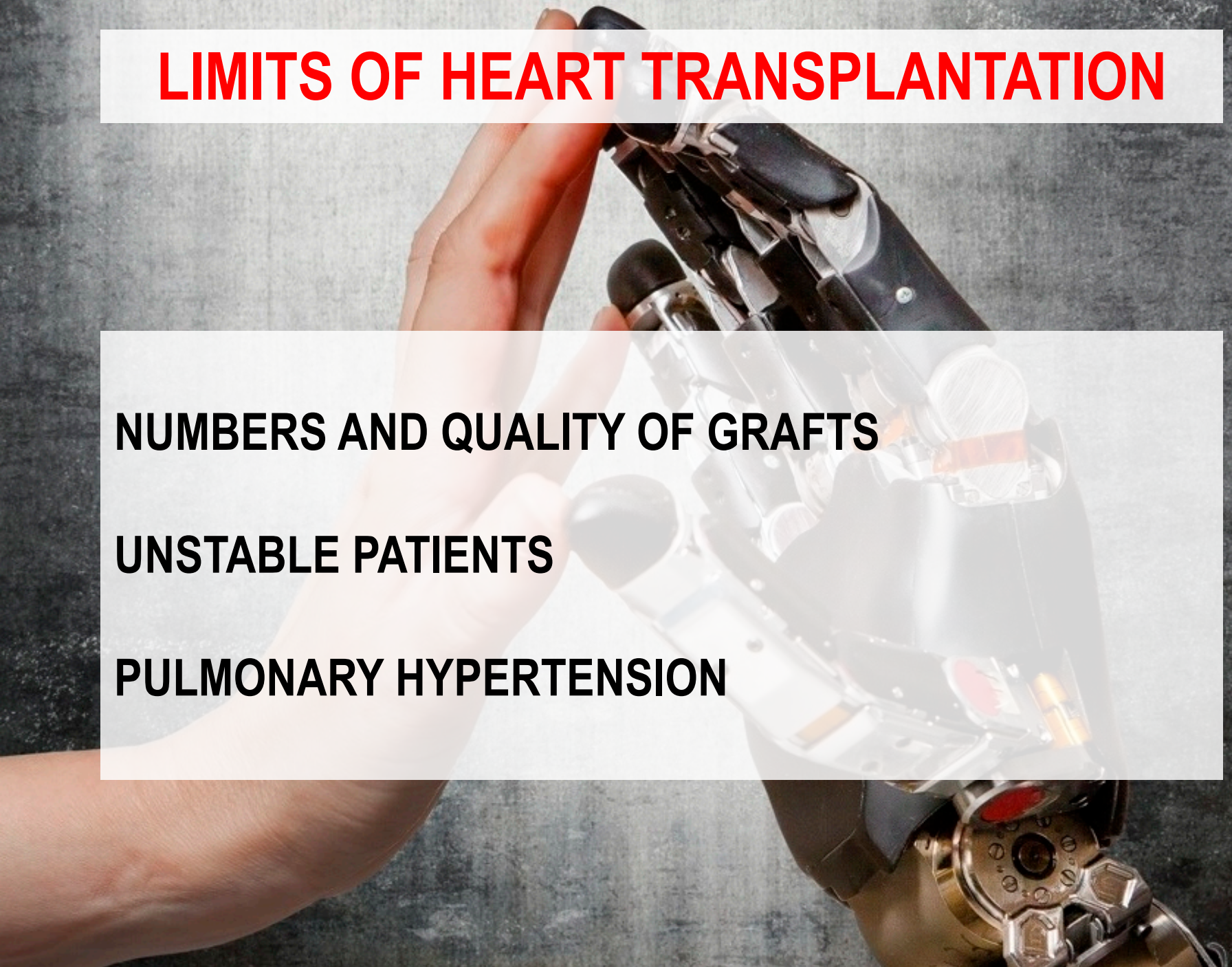
Patients on the waiting list (**known**)

VENTRICULAR ASSIST DEVICE

BTC	**unknown** patients
BTT	**unstable** patients
DT	patients with **contraindication for HTx**



LIMITS OF HEART TRANSPLANTATION

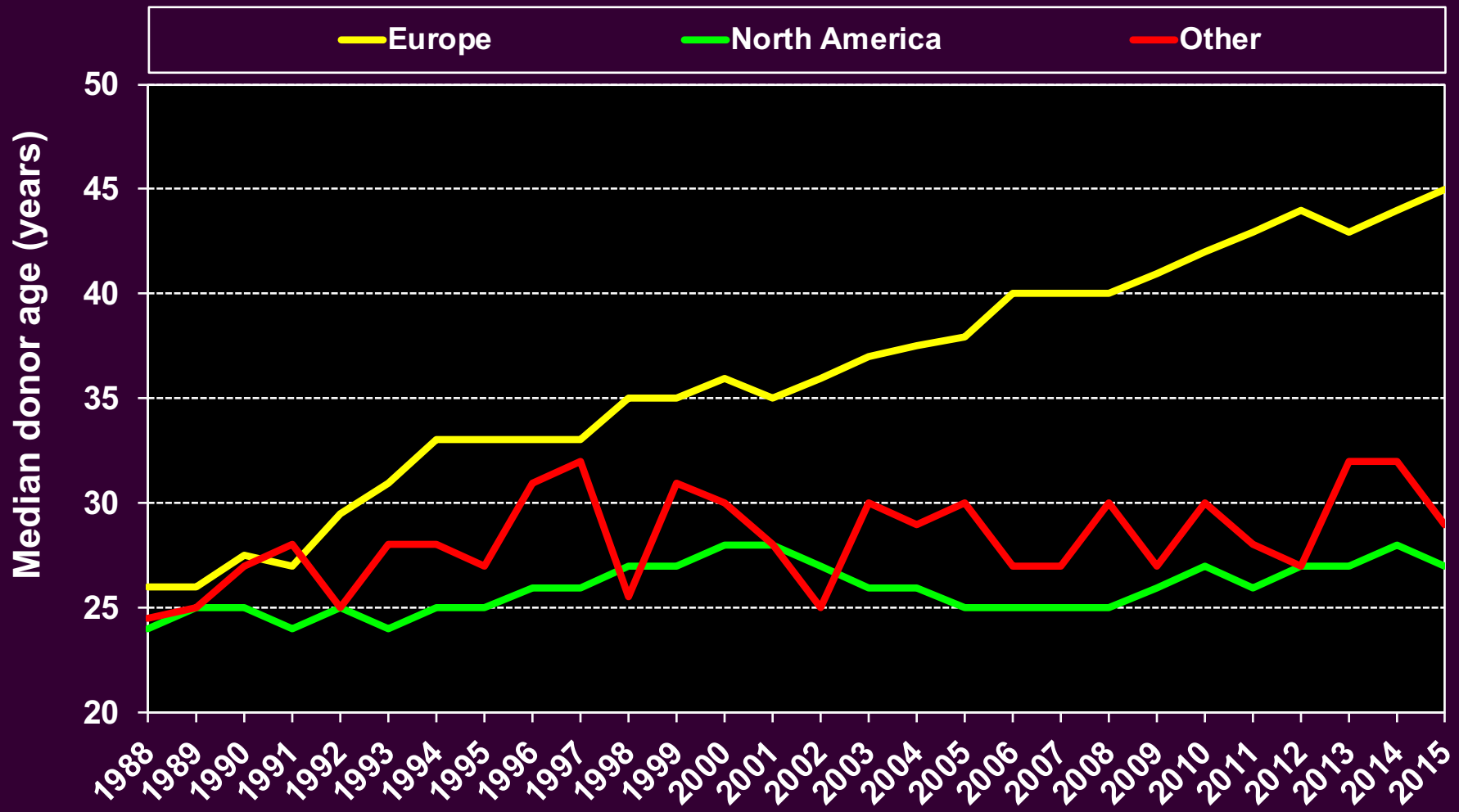


NUMBERS AND QUALITY OF GRAFTS

UNSTABLE PATIENTS

PULMONARY HYPERTENSION

Adult and Pediatric Heart Transplants
Median Donor Age by Location

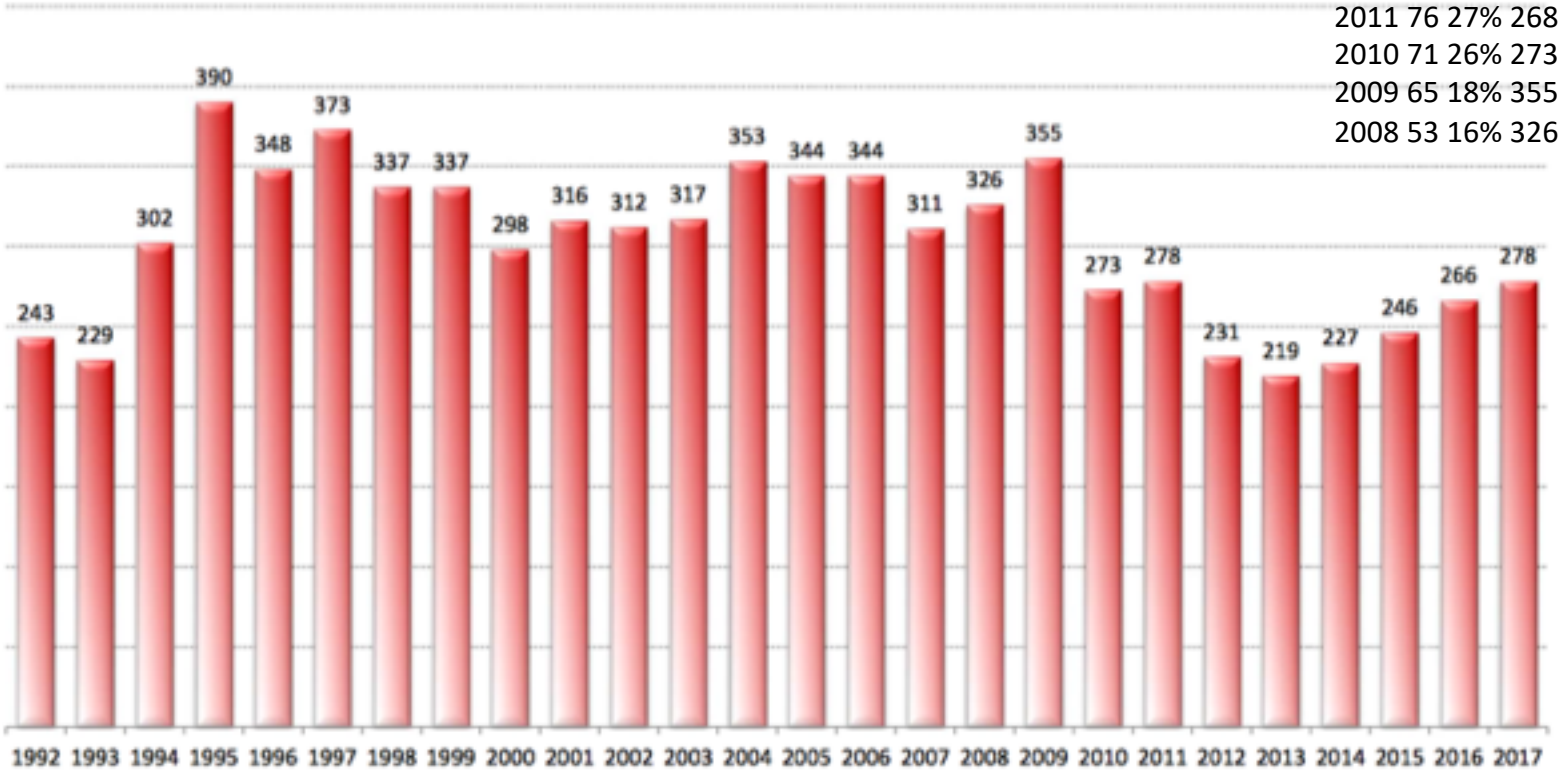


ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION
2017
JHLT. 2017 Oct; 36(10): 1037-1079

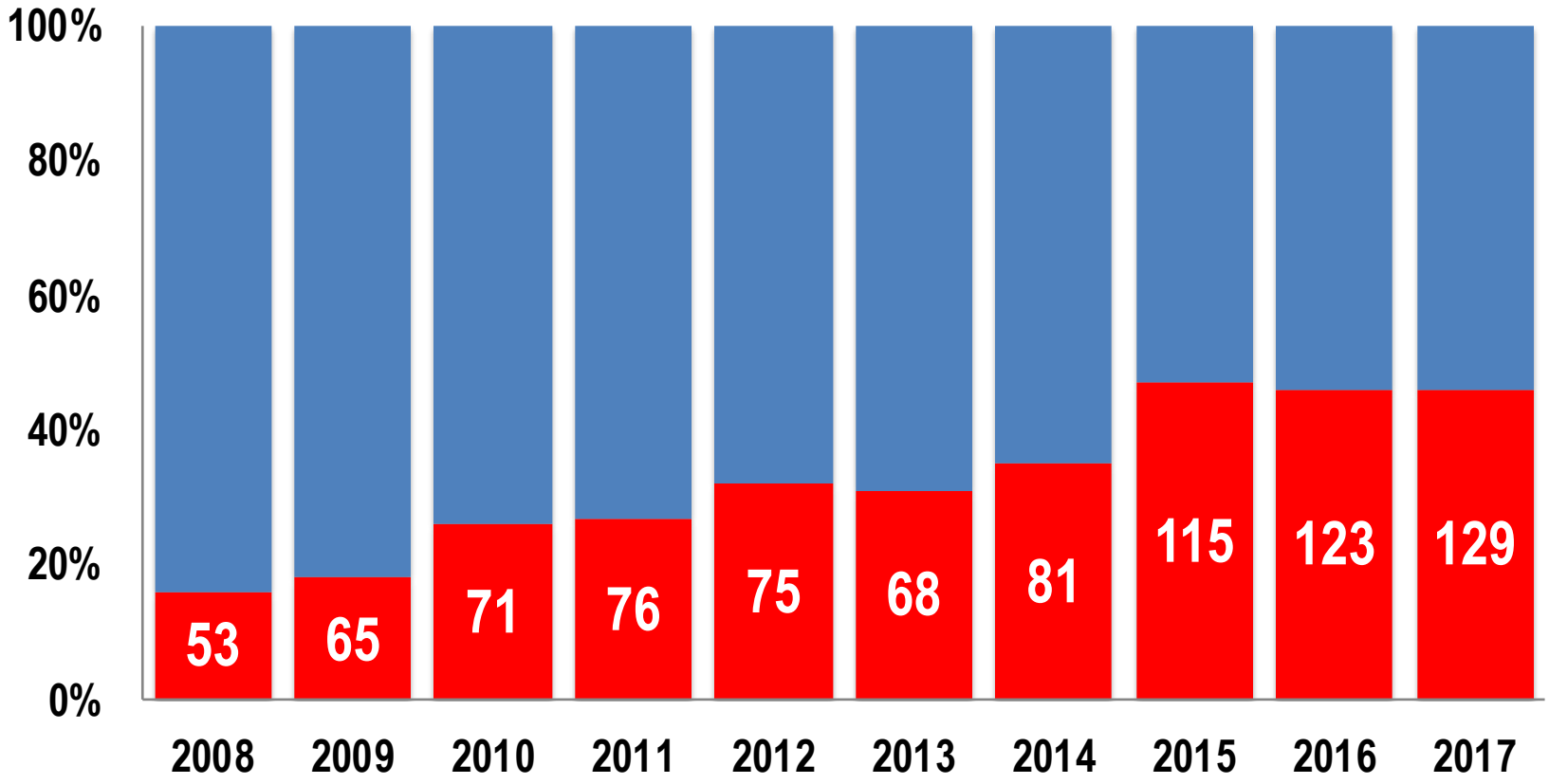
Trapianti di CUORE – Anni 1992-2017*

2017 129 46% 278
2016 123 46% 266
2015 115 47% 246
2014 81 35% 227
2013 68 31% 219
2012 75 32% 231
2011 76 27% 268
2010 71 26% 273
2009 65 18% 355
2008 53 16% 326

Incluse tutte le combinazioni



URGENT HEART TRANSPLANT IN ITALY



Rete Nazionale Trapianti

Centro Nazionale Trapianti

MCS AND UNSTABLE PATIENTS

NO WAITING LIST:

VAD “unlimited” resource
Programmable procedure
Restore optimal perfusion

OPTIMIZATION OF GRAFTS

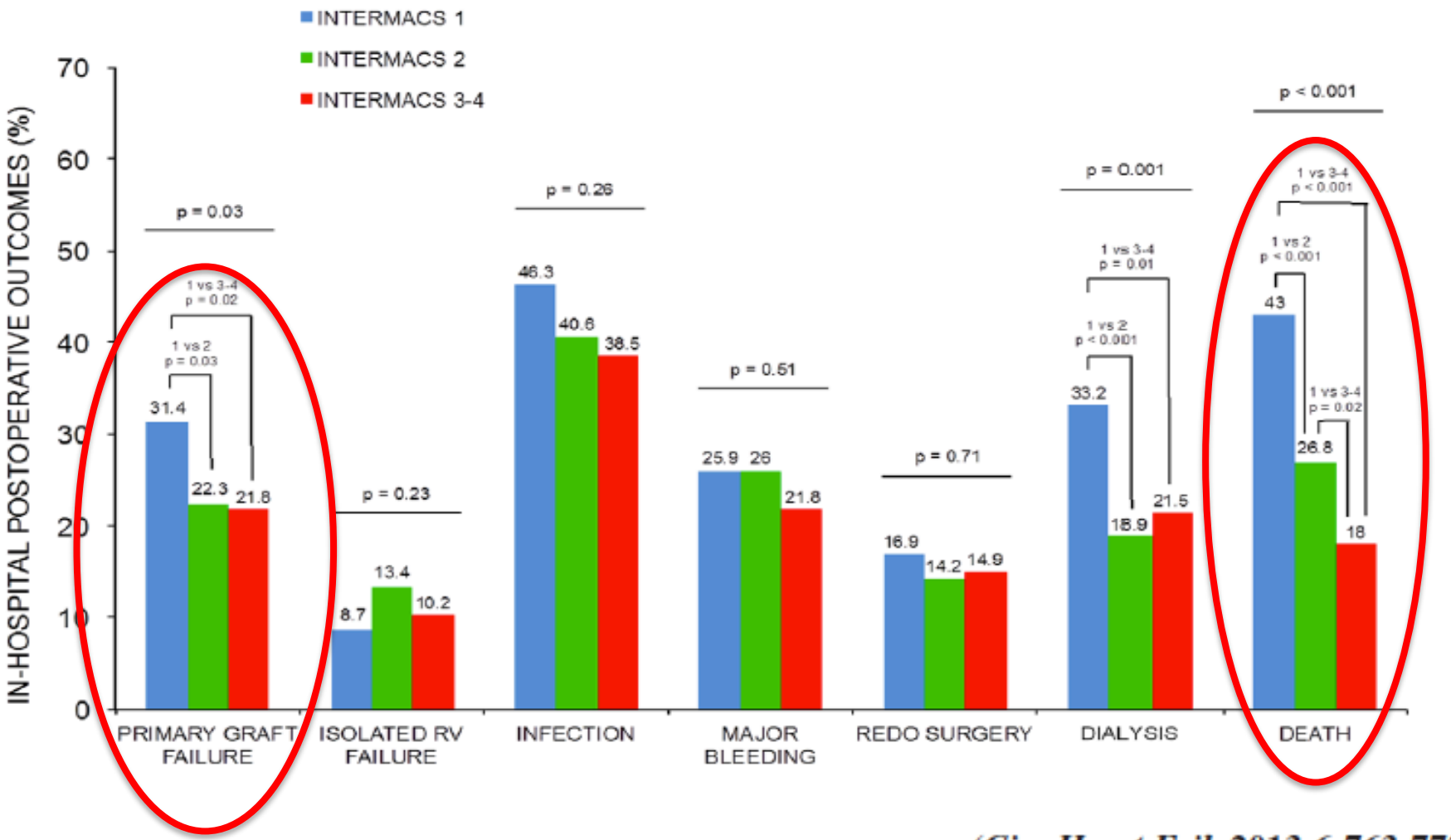
DIFFERENT CLINICAL SCENARIOS

Patient Profile/Status: INTERMACS Levels

1. **Critical cardiogenic shock (“crash and burn”)**
2. **Progressive decline (“sliding fast”)**
3. **Stable but inotrope dependent (stable but dependent)**
4. Recurrent advanced HF (“frequent flyer”)
5. Exertion intolerant
6. Exertion limited (“walking wounded”)
7. Advanced NYHA III

Preoperative INTERMACS Profiles Determine Postoperative Outcomes in Critically Ill Patients Undergoing Emergency Heart Transplantation

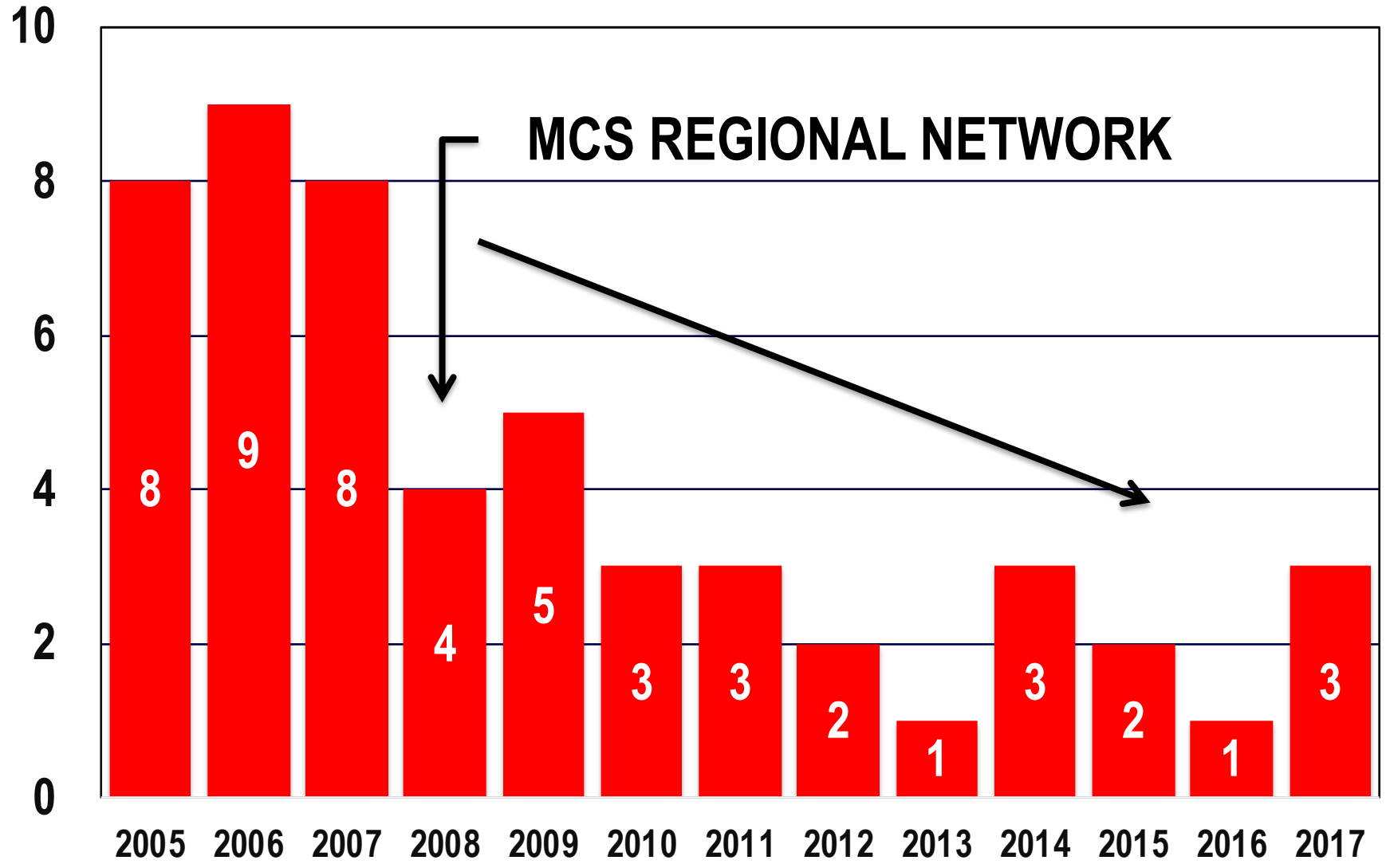
Analysis of the Spanish National Heart Transplant Registry



(*Circ Heart Fail.* 2013;6:763-772.)

BRIDGE TO DECISION

URGENT HEART TRANSPLANT IN TURIN

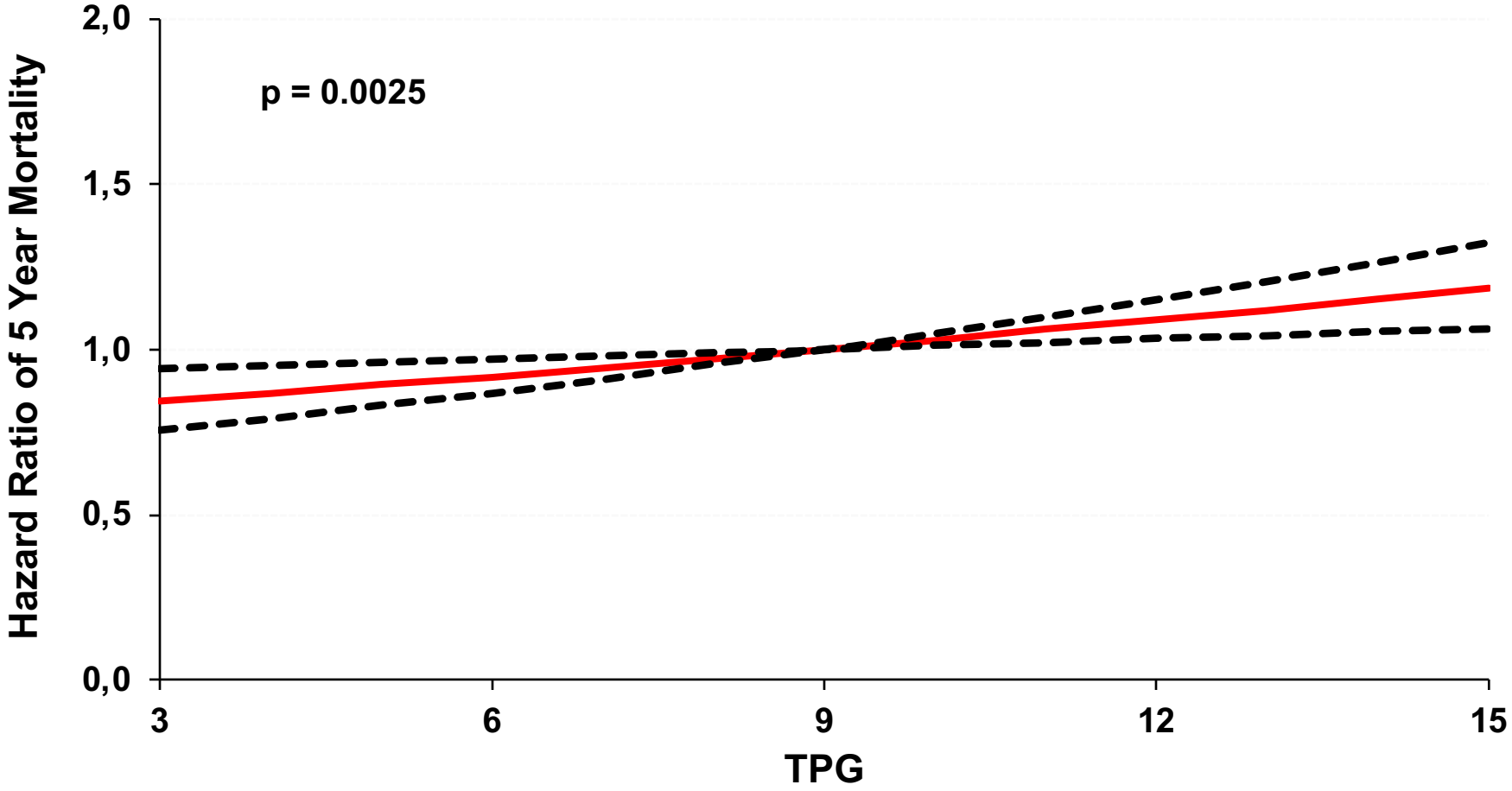


ADULT HEART TRANSPLANTS (2002-6/2007)

Risk Factors For 5 Year Mortality with 95% Confidence Limits

Conditional on Survival to 1 Year

Transpulmonary Pressure Gradient

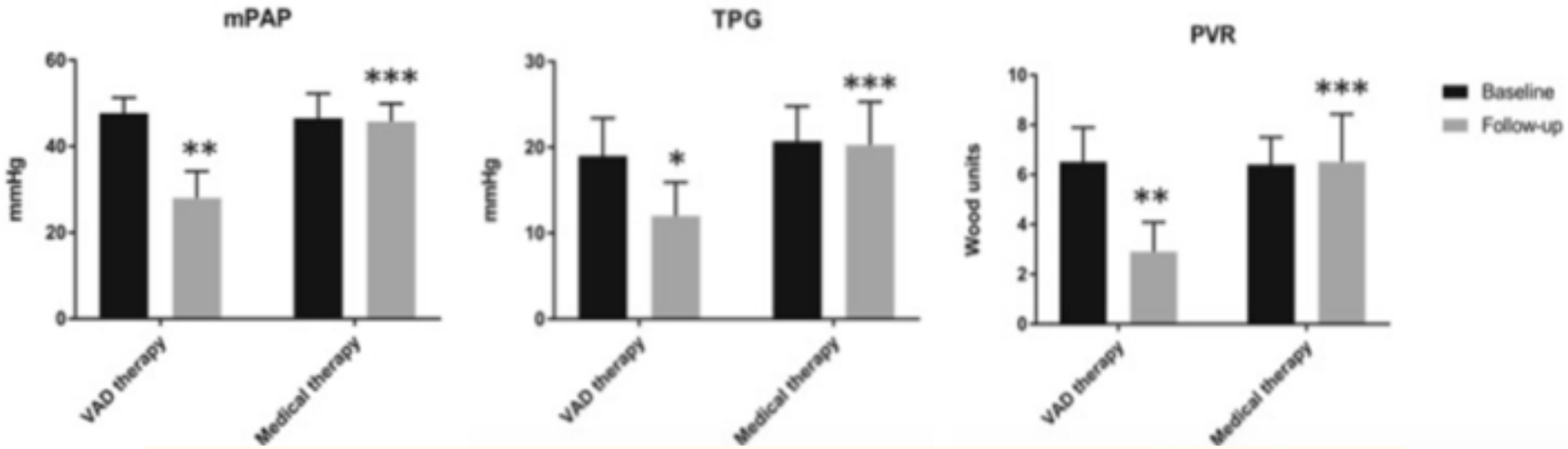


ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION

2013

JHLT. 2013 Oct; 32(10): 951-964

Pulmonary Hypertension

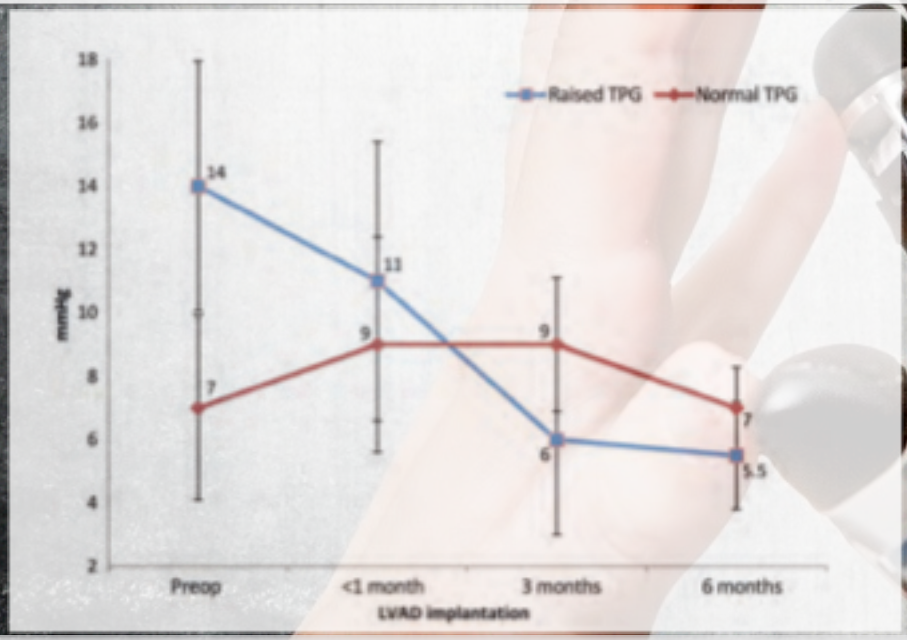


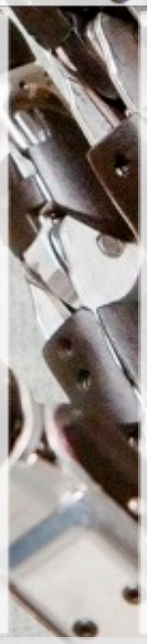
	RHC 1			RHC 2			RHC 1 vs. 2 (*P*-value)	
	LVAD group	Med group	*P*-value	LVAD group	Med group	*P*-value	LVAD group	Med group
mPAP	47.7 ± 4.8	46.5 ± 9.7	0.70	28.0 ± 8.2	45.8 ± 6.9	<0.001	<0.001	0.71
PCWP	28.7 ± 4.9	26.0 ± 6.8	0.27	16.0 ± 3.6	25.6 ± 7.6	<0.001	<0.001	0.85
TPG	19.0 ± 5.8	20.9 ± 7.0	0.49	12.0 ± 5.2	20.3 ± 8.4	0.009	0.046	0.54
DPG	7.9 ± 7.1	7.3 ± 7.1	0.84	3.2 ± 2.9	7.4 ± 6.6	0.09	0.10	0.85
CI	1.6 ± 0.3	1.8 ± 0.5	0.23	2.5 ± 0.5	1.7 ± 0.6	0.002	<0.001	0.60
PVR	6.5 ± 1.8	6.4 ± 1.8	0.88	2.9 ± 1.6	6.5 ± 3.2	0.002	0.003	0.88

ESC Heart Fail. 2018 Aug; 5(4): 695–702.

Use of centrifugal left ventricular assist device as a bridge to candidacy in severe heart failure with secondary pulmonary hypertension†

Ramesh S. Kutty*, Jayan Parameshwar, Clive Lewis, Pedro A. Catarino, Catherine D. Sudarshan, David P. Jenkins, John J. Dunning and Steven S. Tsui





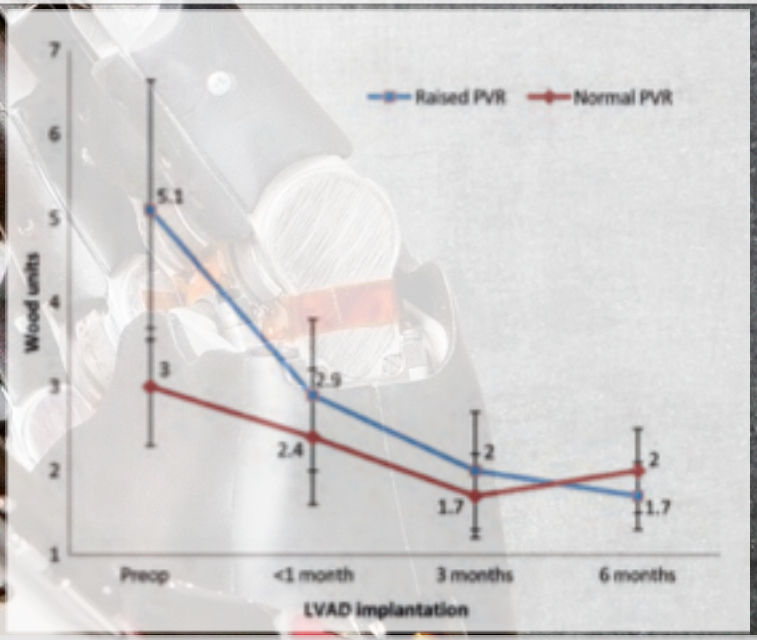
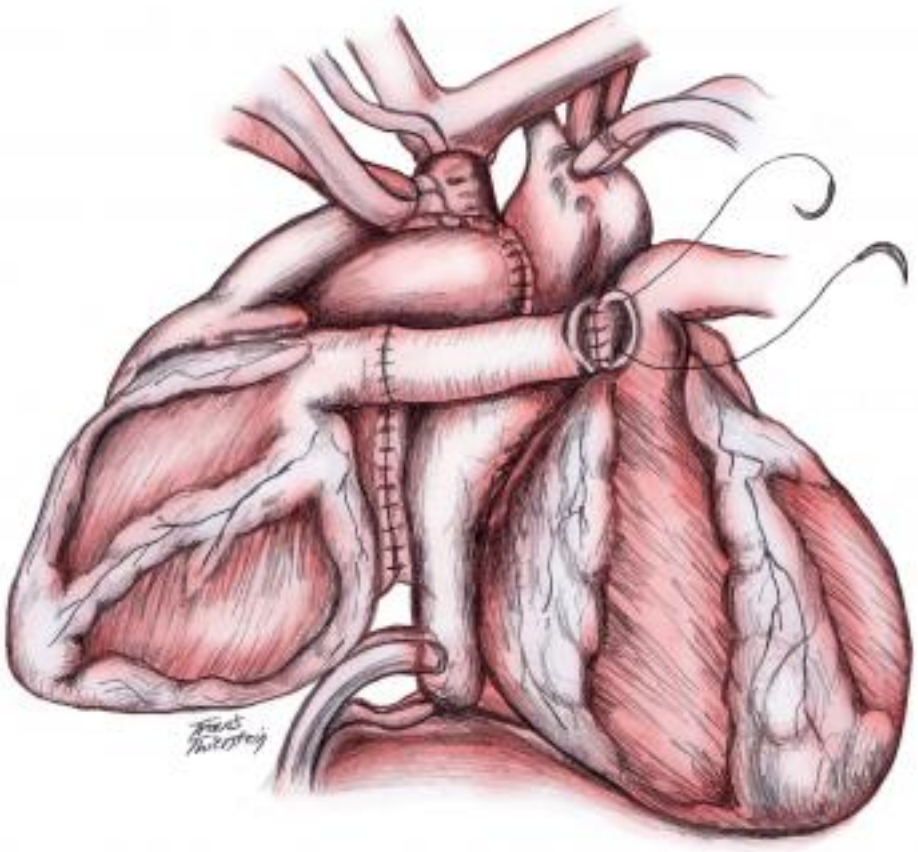


Table 3: Patients with secondary pulmonary hypertension receiving LVAD as a bridge to candidacy ($n = 17$)

	Baseline	<1 month post-LVAD	3 months	6 months	Most recent	*P*-value
sPAP (mmHg)	56.5 ± 9.54	39 ± 6.6	28 ± 6.9	34.5 ± 5.2	29.5 ± 7.88	<0.05
mPAP (mmHg)	42 ± 4.44	25.5 ± 3.4	18 ± 5.7	24 ± 7.9	19.5 ± 5.48	<0.05
TPG (mmHg)	14 ± 3.96	11 ± 4.4	6 ± 3	5.5 ± 1.7	8 ± 2.87	<0.05
PVR (WU)	5.1 ± 1.54	2.9 ± 0.9	2 ± 0.7	1.7 ± 0.4	2.1 ± 0.54	<0.05

Eur J Cardio-Thoracic Surg 43 (2013) 1237–1242

Heterotopic Heart Transplant: Biological Circulatory Assistance



INDICATIONS

- Pulmonary Hypertension
- Size mismatch
- Marginal graft

JACC Journals

JCHF. 2013;1(5):369-378. doi:10.1016/j.jchf.2013.05.006

From: Implant Strategies Change Over Time and Impact Outcomes: Insights From the INTERMACS (Interagency Registry for Mechanically Assisted Circulatory Support)

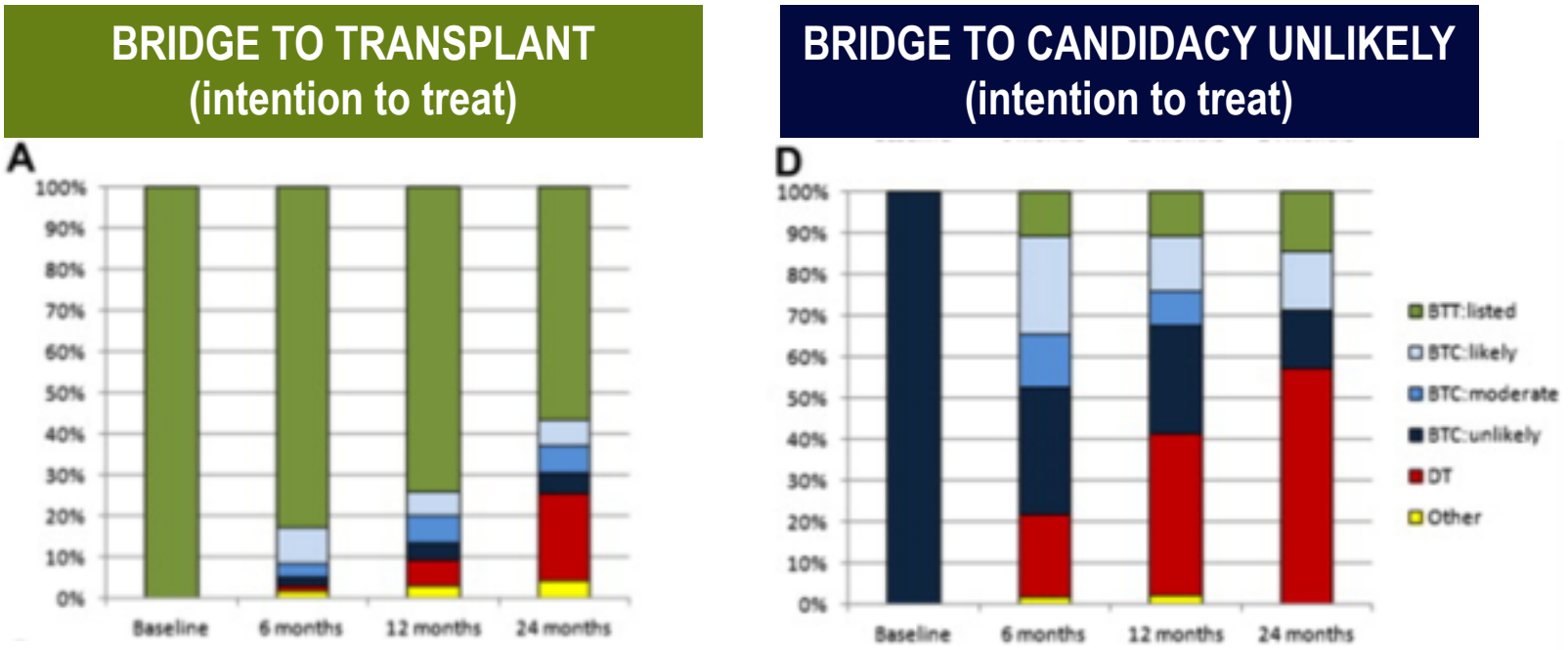


Figure Legend:

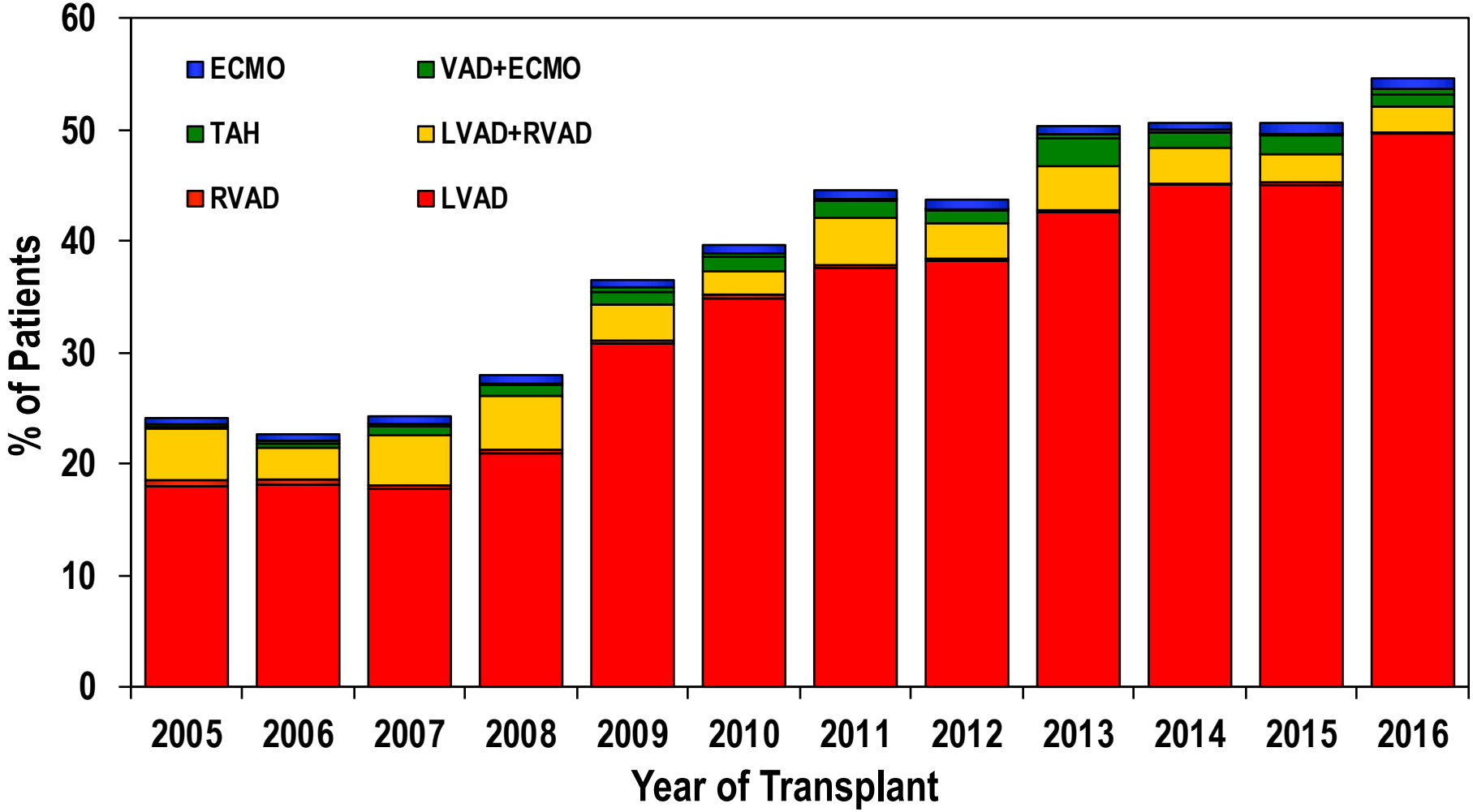
Device Strategies Over Time

(A) BTT; (B) BTC: likely; (C) BTC: moderate; (D) BTC: unlikely; (E) DT.

Strategies have been grouped according to original intent. BTC: likely = BTC and likely to be transplanted; BTC: moderate = BTC and moderately likely to be transplanted; BTC: unlikely = BTC and unlikely to be transplanted; other abbreviations as in Figure 2.

Adult Heart Transplants

% of Patients Bridged with Mechanical Circulatory Support* by Year and Device Type



ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION

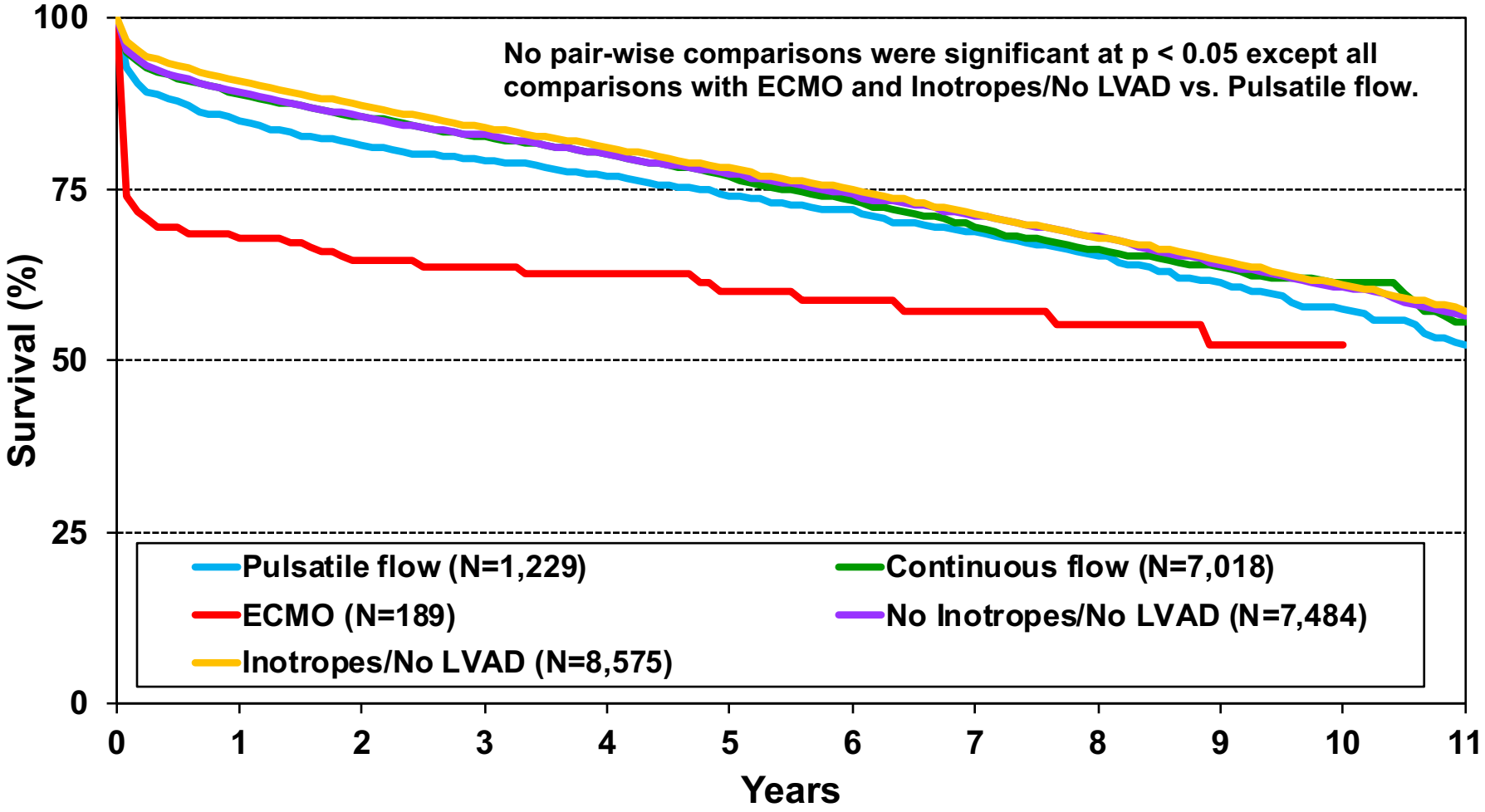
2018

JHLT. 2018 Oct; 37(10): 1155-1206

* LVAD, RVAD, TAH, ECMO

Adult Heart Transplants

Kaplan-Meier Survival by Pre-Transplant Mechanical Circulatory Support Use (Transplants: January 2005 – June 2016)



ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION
2018
JHLT. 2018 Oct; 37(10): 1155-1206

MASSIMO GRAMELLINI

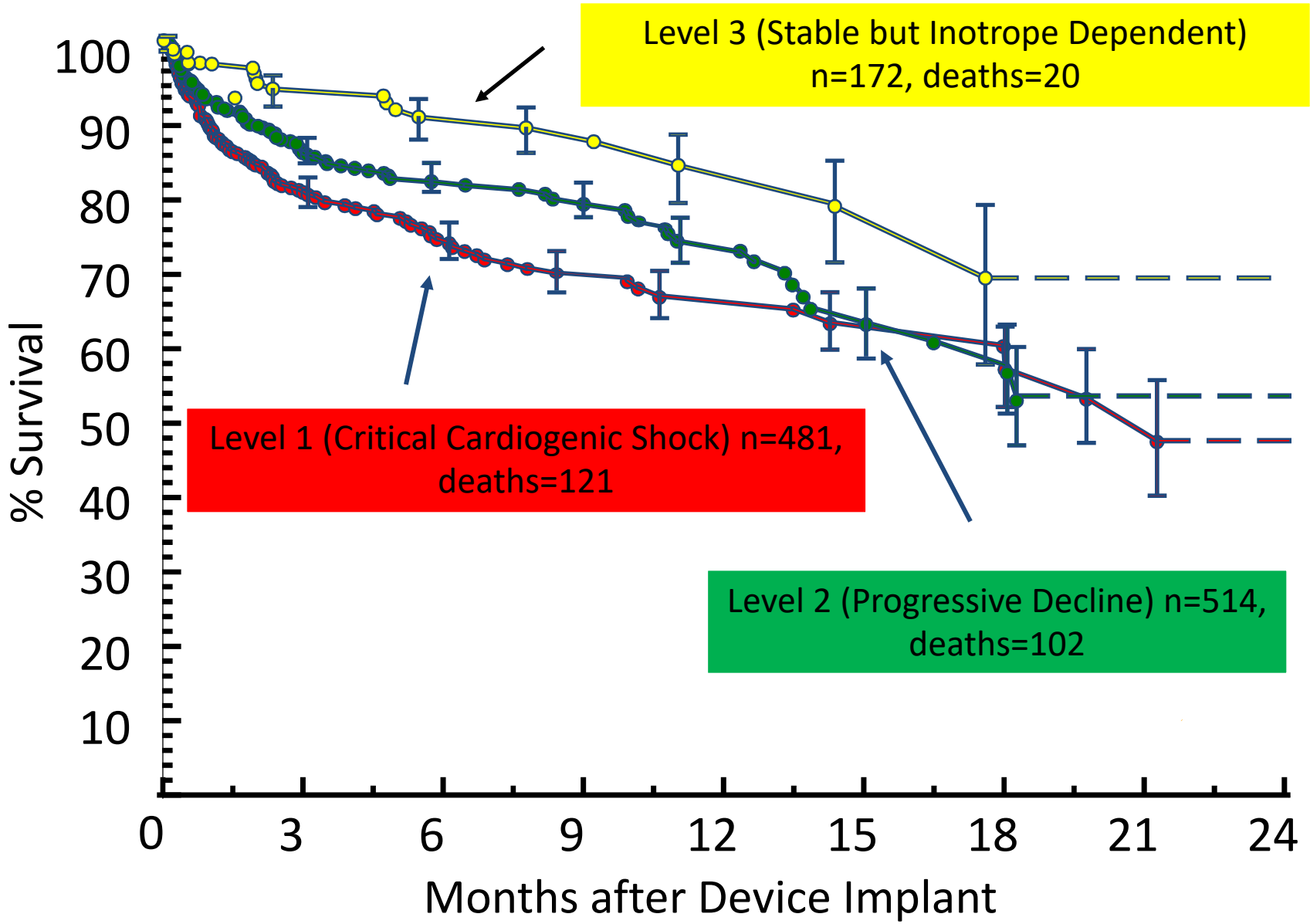
BUONGIORNO

LA STAMPA.it

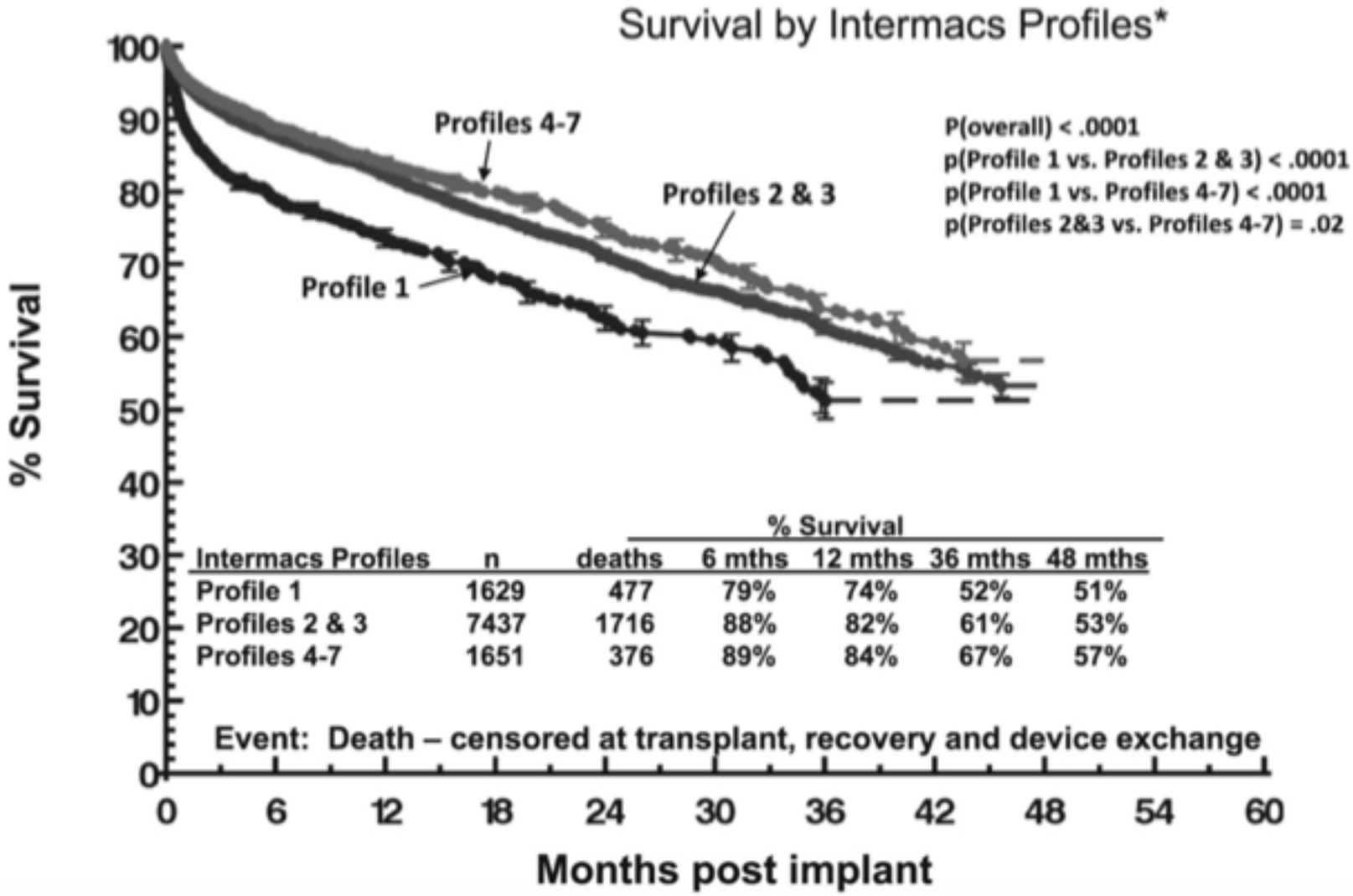
Questa storia comincia con un malato cardiaco che sta morendo in ospedale. E con un cuore nuovo a bordo di un aereo-ambulanza, fermo sulla pista in attesa di spiccare il volo. Fra il malato e il cuore ci sono 400 chilometri e un cielo pieno di neve. In sala operatoria tutto è pronto per l'espianto del cuore guasto, eppure il chirurgo frena: prima, dice, assicuriamoci che l'aereo parta davvero. Scelta giusta numero 1: la saggezza. Sulla pista nevica fitto, non ci sono le condizioni per decollare, ma il pilota e l'équipe medica sanno che è questione di vita o di morte e così decidono di mettere in gioco la loro, di vita. Scelta giusta numero 2: il coraggio.

L'aereo prova ad alzarsi, ma la tormenta lo sbatte a terra, costringendolo a piegarsi su un'ala. Tutti sani e salvi tranne il cuore, che l'urto ha reso inservibile. Nessuno recrimina, nessuno perde la testa. Viene lanciato un appello per un cuore nuovo. Scelta giusta numero 3: il carattere. La fortuna ha un debole per i forti: il cuore viene subito trovato e condotto a destinazione in tempo utile per salvare il paziente. Intanto ha smesso di nevicare e l'aereo azzoppato può decollare: dal cuore inservibile i medici riescono comunque a recuperare due valvole. Serviranno ad altri malati. Il gesto di un eroe dipende, in fondo, da un uomo solo. Mentre questa storia è meravigliosa perché allinea una serie ininterrotta di gesti giusti compiuti da un numero rilevante di persone. Che sia potuta succedere in Italia (fra Torino, Lecco e Forlì) è una di quelle notizie che fanno davvero bene al cuore.

INTERMACS: Survival Curves

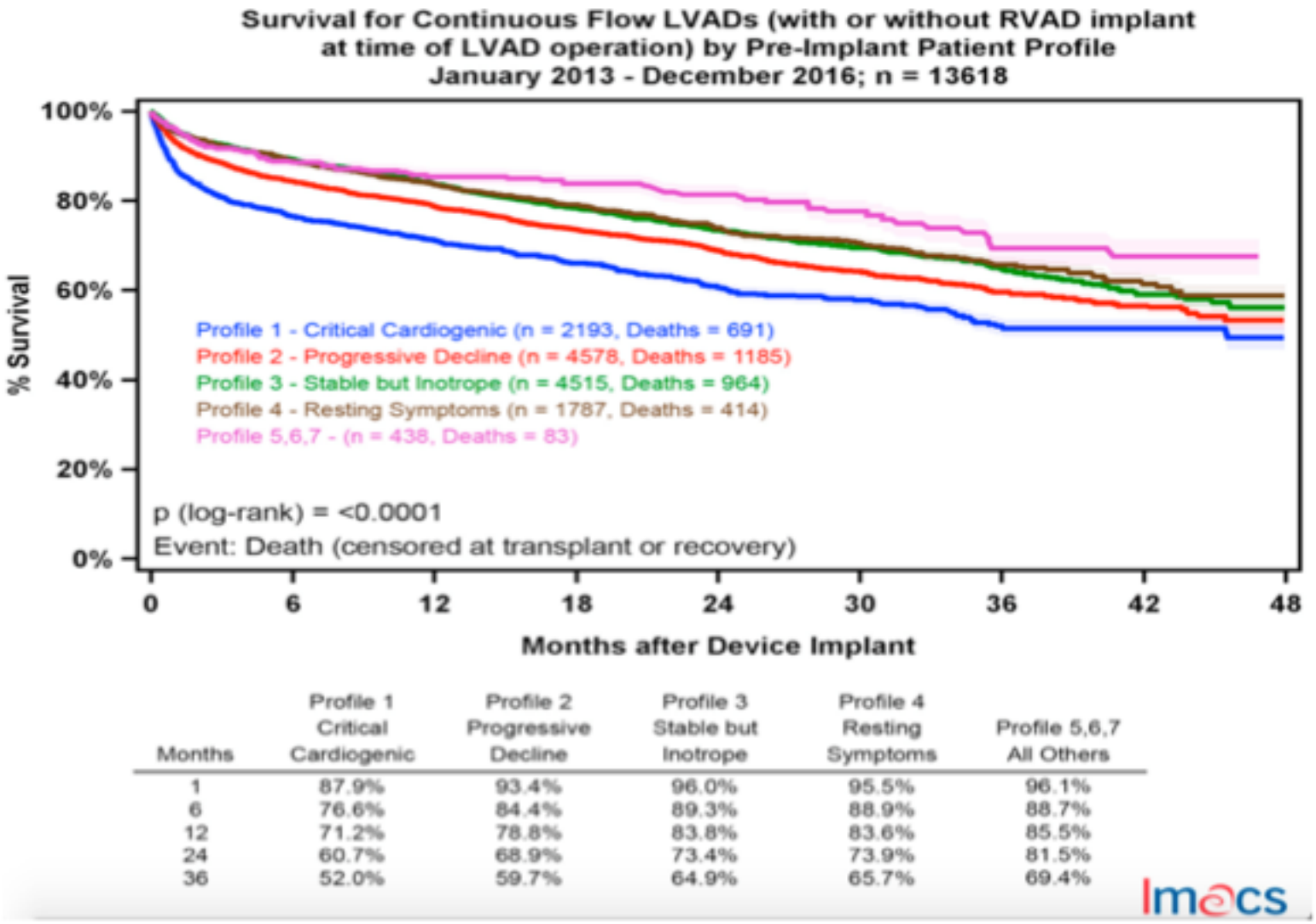


Eighth Annual INTERMACS Report



J Heart Lung Transplant 2017;36:1080–1086

Second Annual Imacs Report

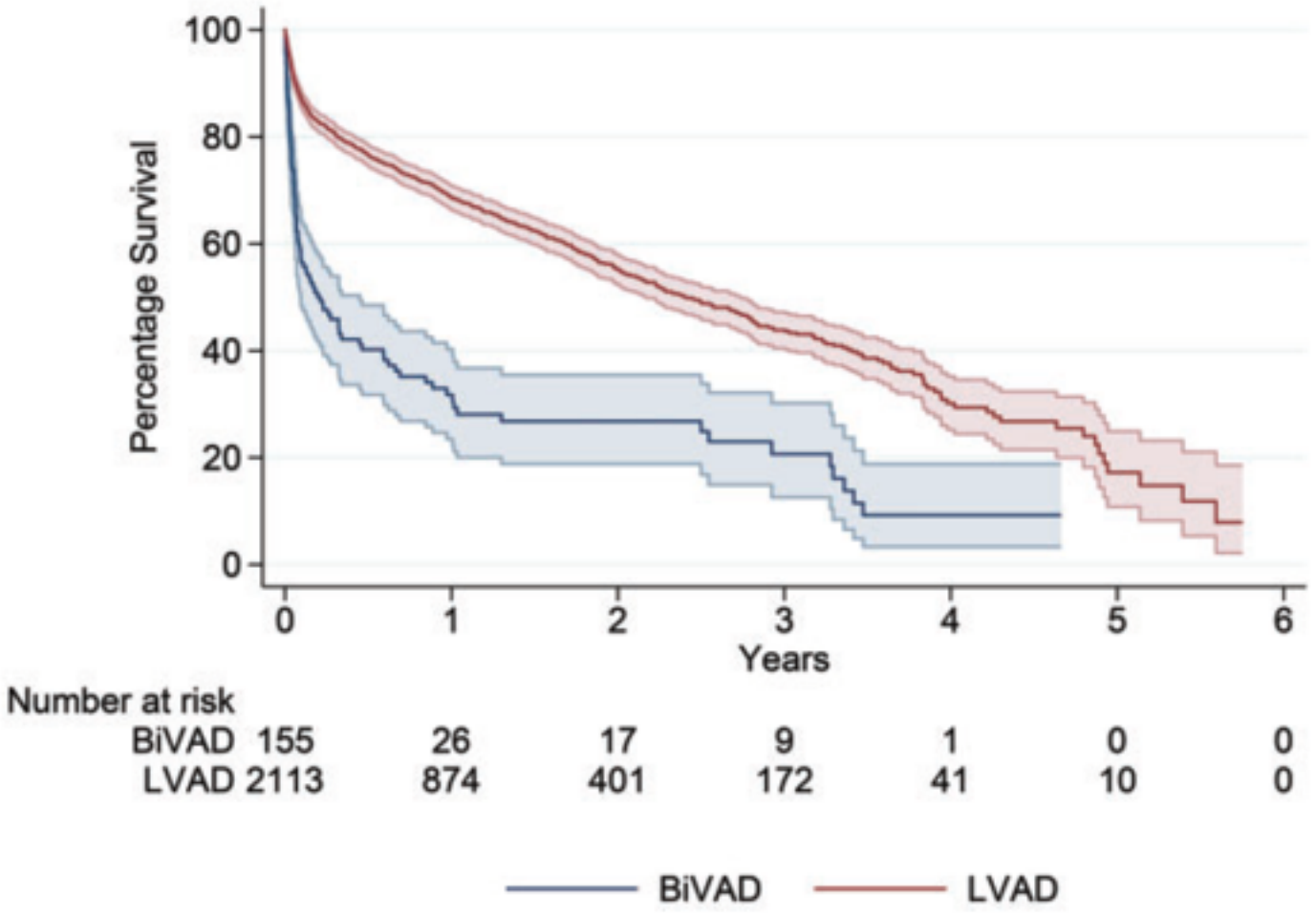


Months	Profile 1 Critical Cardiogenic	Profile 2 Progressive Decline	Profile 3 Stable but Inotrope	Profile 4 Resting Symptoms	Profile 5,6,7 All Others
1	87.9%	93.4%	96.0%	95.5%	96.1%
6	76.6%	84.4%	89.3%	88.9%	88.7%
12	71.2%	78.8%	83.8%	83.6%	85.5%
24	60.7%	68.9%	73.4%	73.9%	81.5%
36	52.0%	59.7%	64.9%	65.7%	69.4%

Imacs

J Heart Lung Transplant 2018;37:685–691

The European Registry for Patients with Mechanical Circulatory Support (EUROMACS) of the European Association for Cardio-Thoracic Surgery (EACTS): second report



European Journal of Cardio-Thoracic Surgery 53 (2018) 309–316

VAD e TRAPIANTO DI CUORE

1. COME IL VAD PUO' "AIUTARE" IL TRAPIANTO
2. IMPATTO DEL VAD SULLA TRAPIANTABILITA'
3. TRAPIANTO DOPO VAD

LIMITI DEL TRAPIANTO DI CUORE

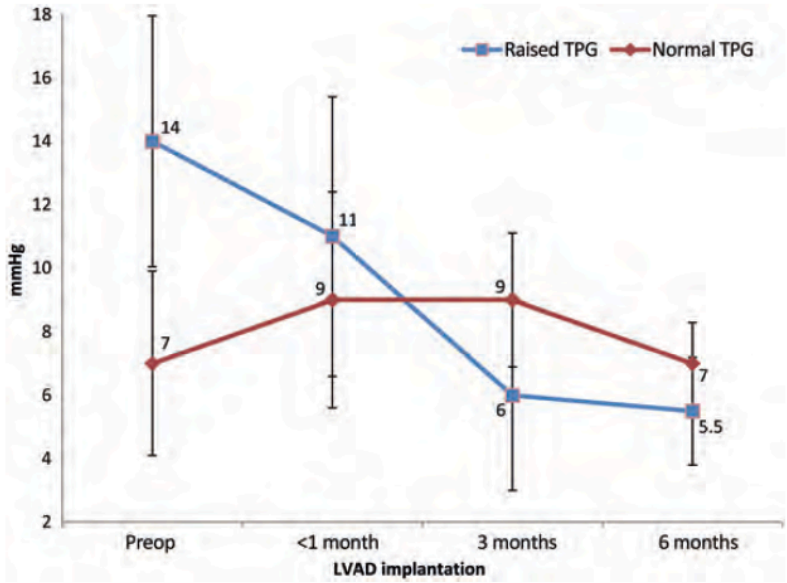
NUMERO DI ORGANI

PAZIENTE INSTABILE

IPERTENSIONE POLMONARE

Use of centrifugal left ventricular assist device as a bridge to candidacy in severe heart failure with secondary pulmonary hypertension†

Ramesh S. Kutty*, Jayan Parameshwar, Clive Lewis, Pedro A. Catarino, Catherine D. Sudarshan, David P. Jenkins, John J. Dunning and Steven S. Tsui



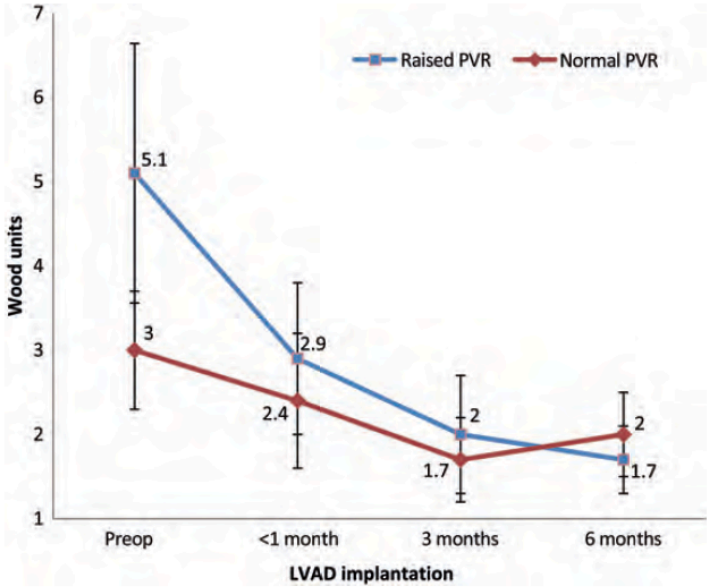


Table 3: Patients with secondary pulmonary hypertension receiving LVAD as a bridge to candidacy ($n = 17$)

	Baseline	<1 month post-LVAD	3 months	6 months	Most recent	*P*-value
sPAP (mmHg)	56.5 ± 9.54	39 ± 6.6	28 ± 6.9	34.5 ± 5.2	29.5 ± 7.88	<0.05
mPAP (mmHg)	42 ± 4.44	25.5 ± 3.4	18 ± 5.7	24 ± 7.9	19.5 ± 5.48	<0.05
TPG (mmHg)	14 ± 3.96	11 ± 4.4	6 ± 3	5.5 ± 1.7	8 ± 2.87	<0.05
PVR (WU)	5.1 ± 1.54	2.9 ± 0.9	2 ± 0.7	1.7 ± 0.4	2.1 ± 0.54	<0.05

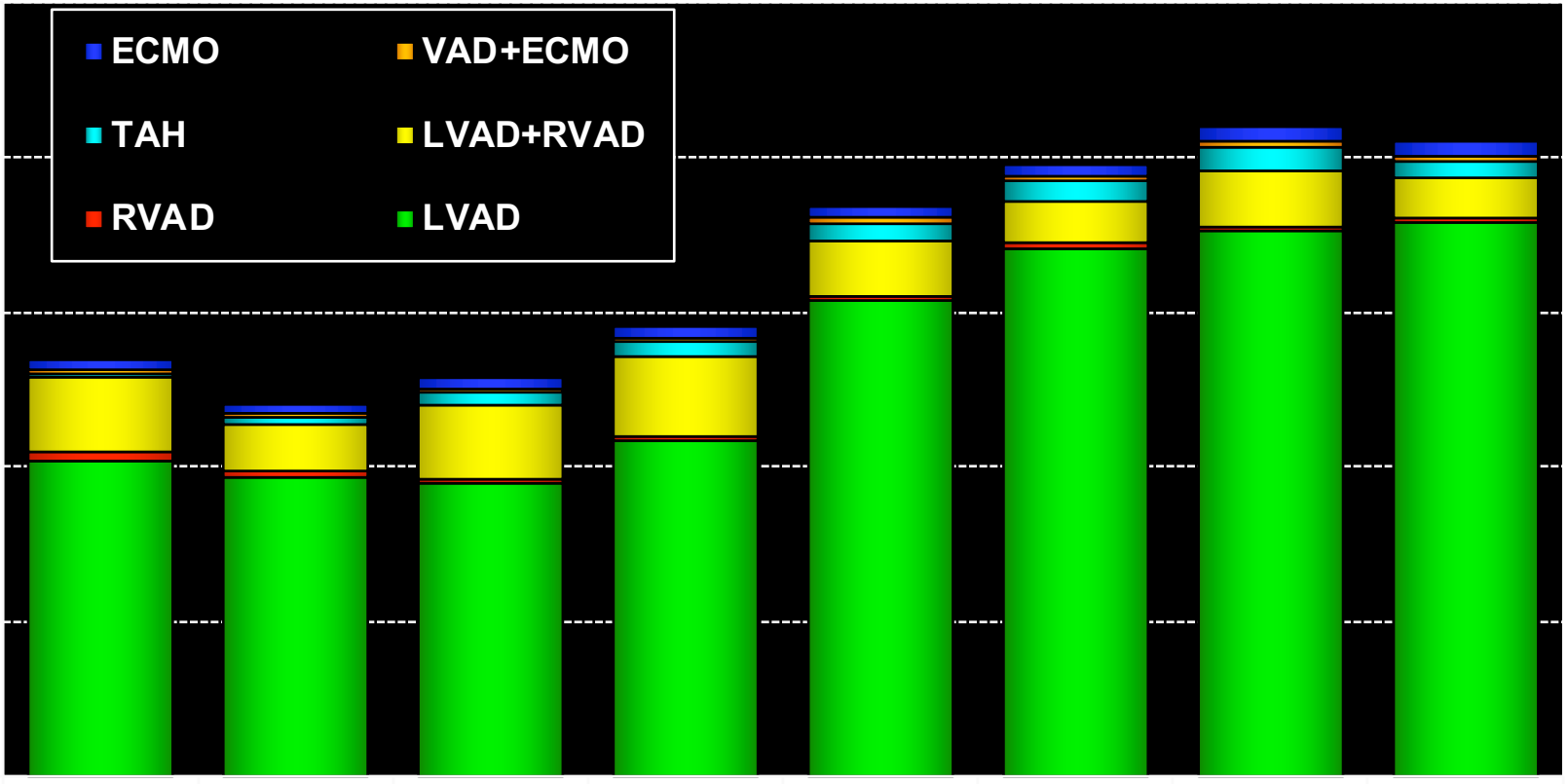
Eur J Cardio-Thoracic Surg 43 (2013) 1237–1242

VAD e TRAPIANTO DI CUORE

1. COME IL VAD PUO' "AIUTARE" IL TRAPIANTO
2. **IMPATTO DEL VAD SULLA TRAPIANTABILITA'**
3. TRAPIANTO DOPO VAD

Adult Heart Transplants

% of Patients Bridged with Mechanical Circulatory Support* by Year and Device Type



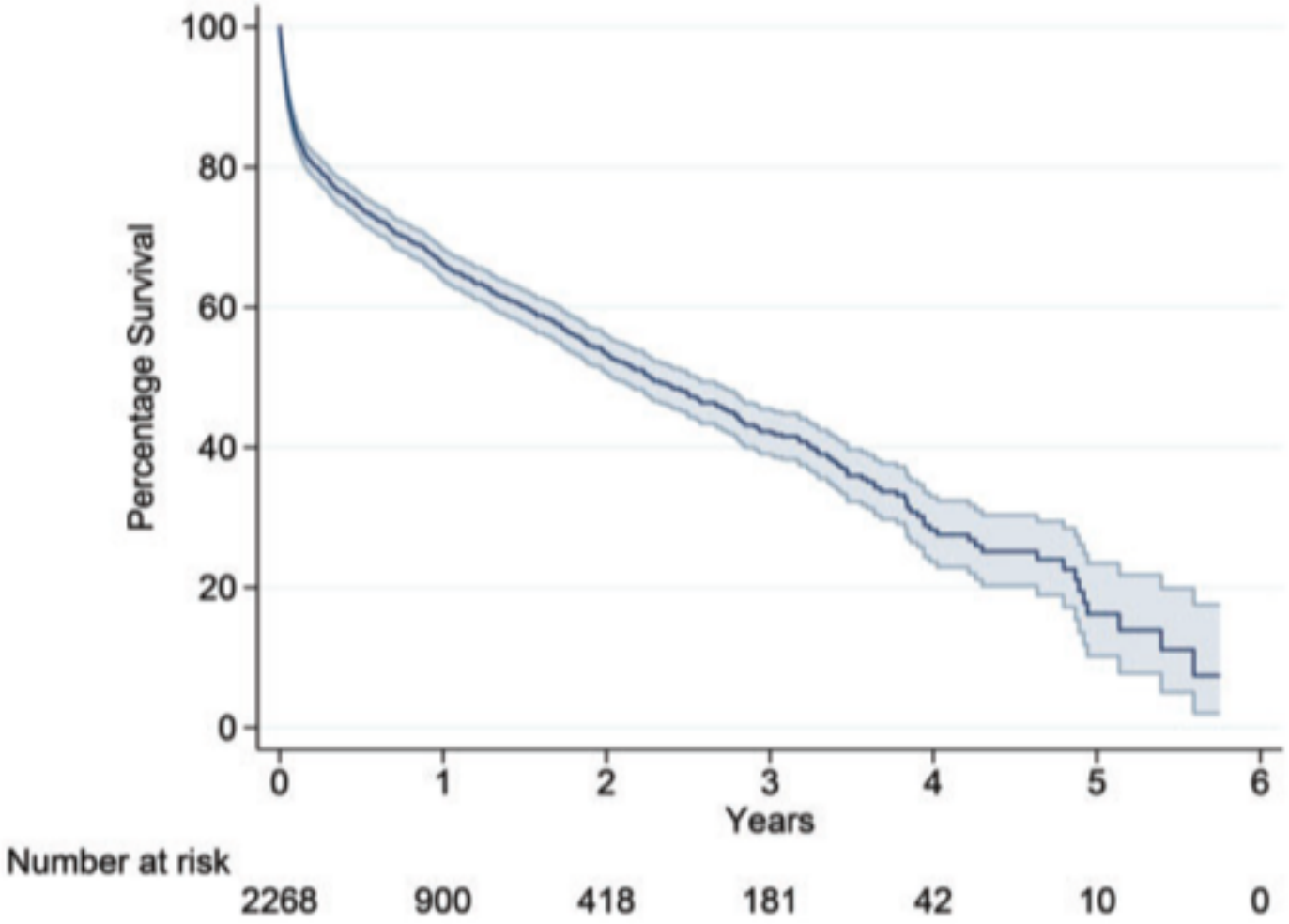
2014

* LVAD, RVAD, TAH, ECMO

ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION

JHLT. 2014 Oct; 33(10): 996-1008

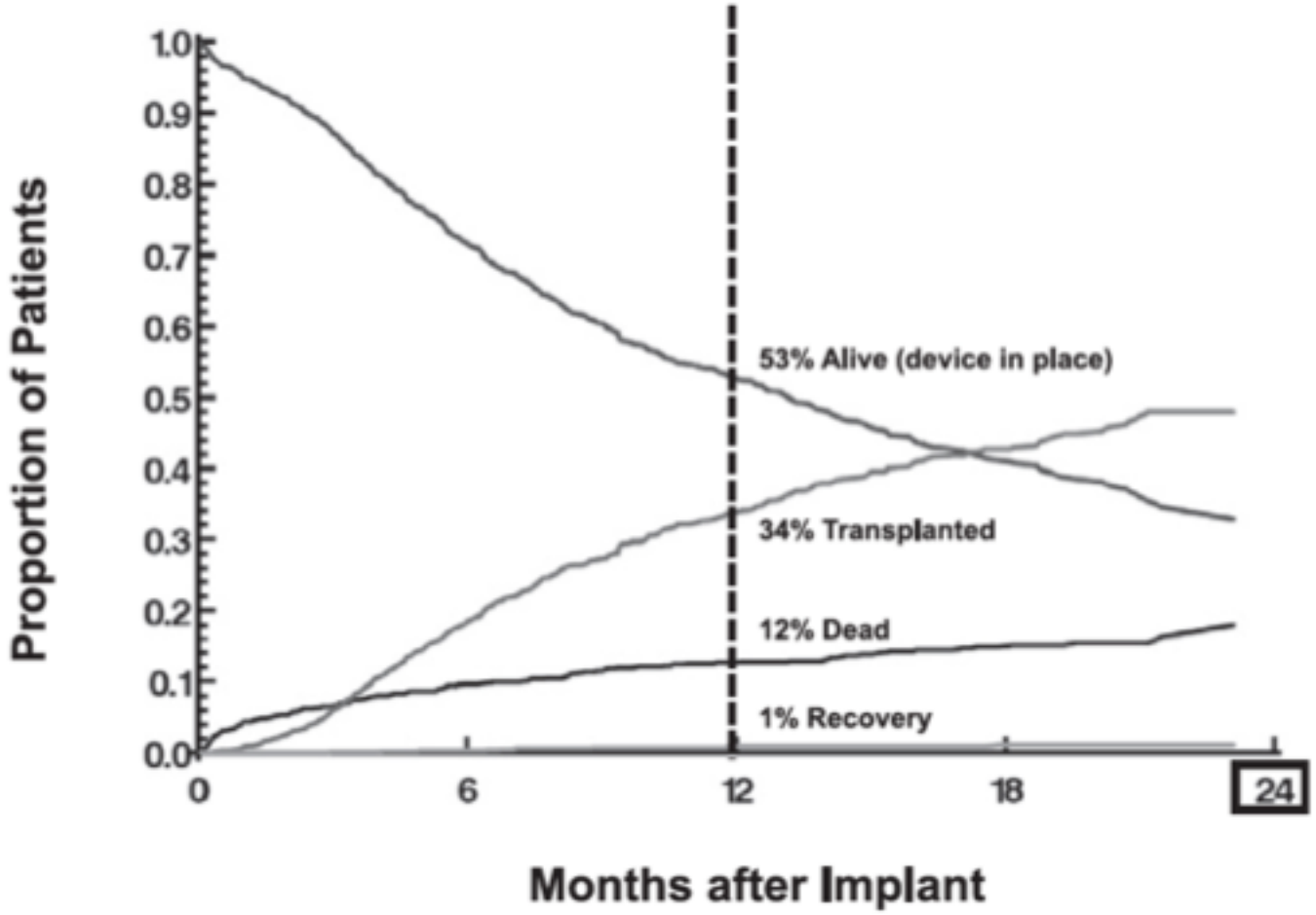
The European Registry for Patients with Mechanical Circulatory Support (EUROMACS) of the European Association for Cardio-Thoracic Surgery (EACTS): second report



European Journal of Cardio-Thoracic Surgery 0 (2017) 1–8

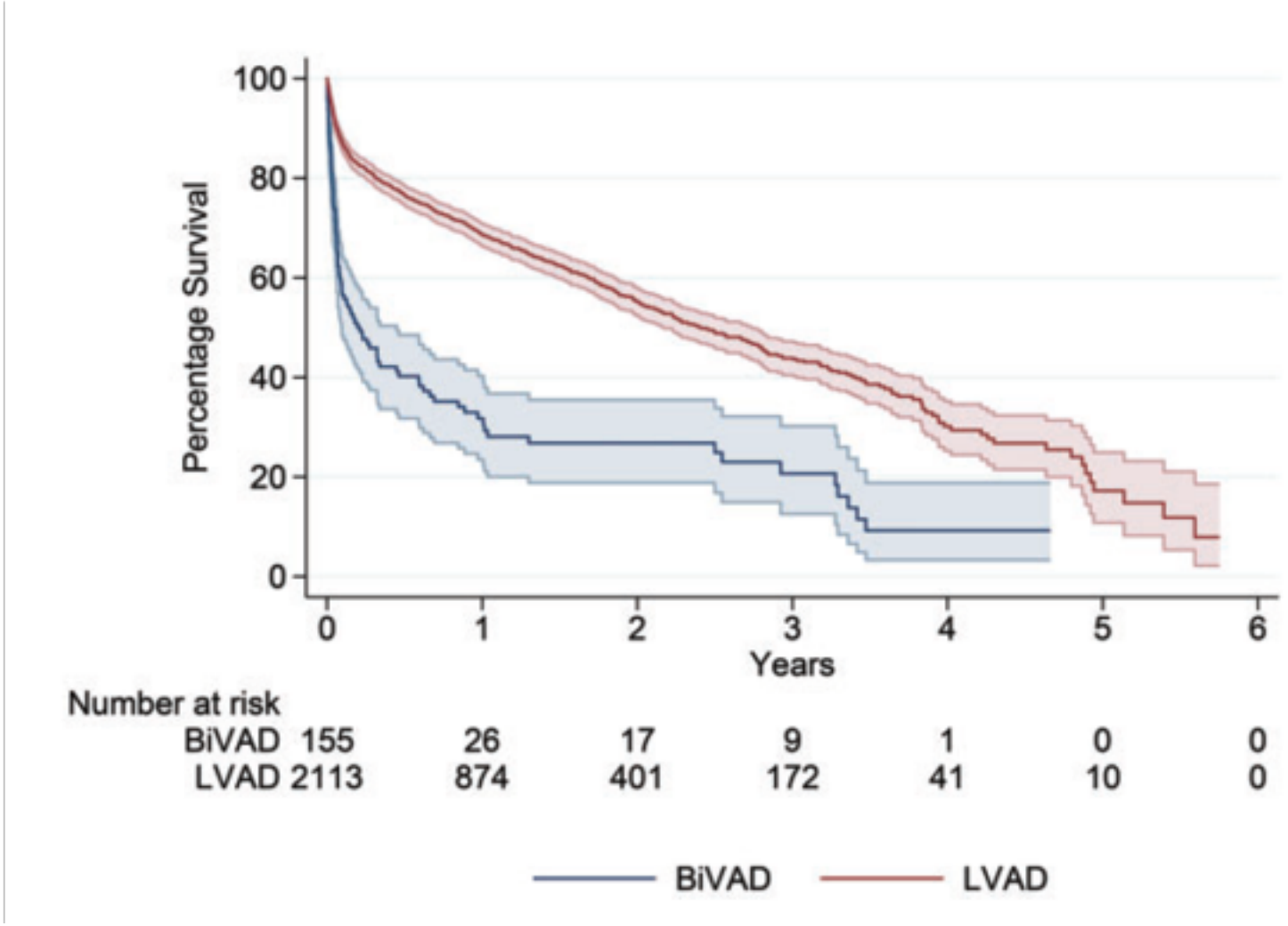
Intermacs **Implants: June 2006 – December 2016, n=18987**

BTT: Listed CFLVADs implants 2015-2016, n=1375



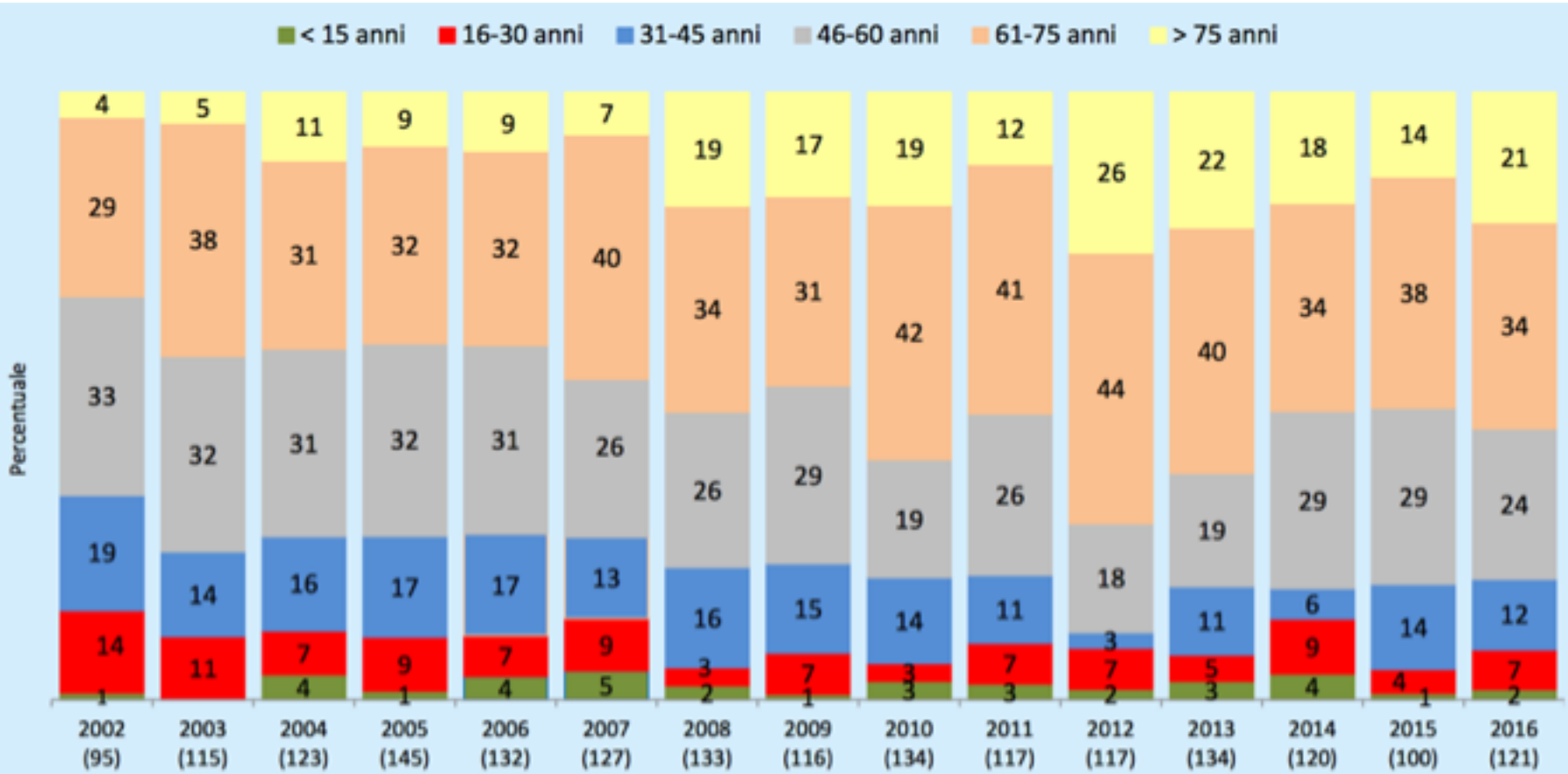
J Heart Lung Transplant 2017;36:1080–1086

The European Registry for Patients with Mechanical Circulatory Support (EUROMACS) of the European Association for Cardio-Thoracic Surgery (EACTS): second report



European Journal of Cardio-Thoracic Surgery 0 (2017) 1–8

DONORS' AGE

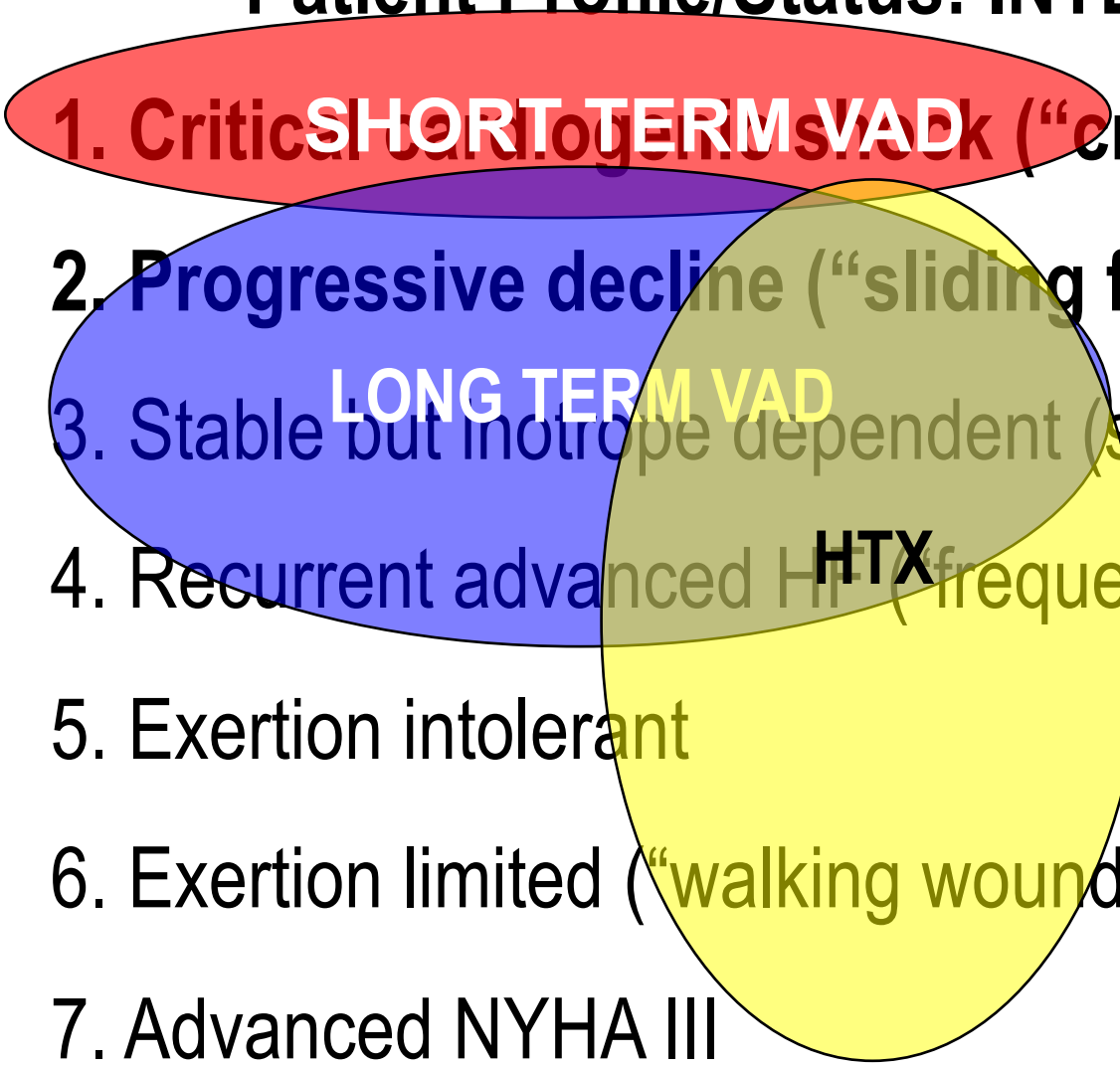


REGIONE PIEMONTE

CRT – Piemonte e Valle d'Aosta
Centro Regionale Trapianti

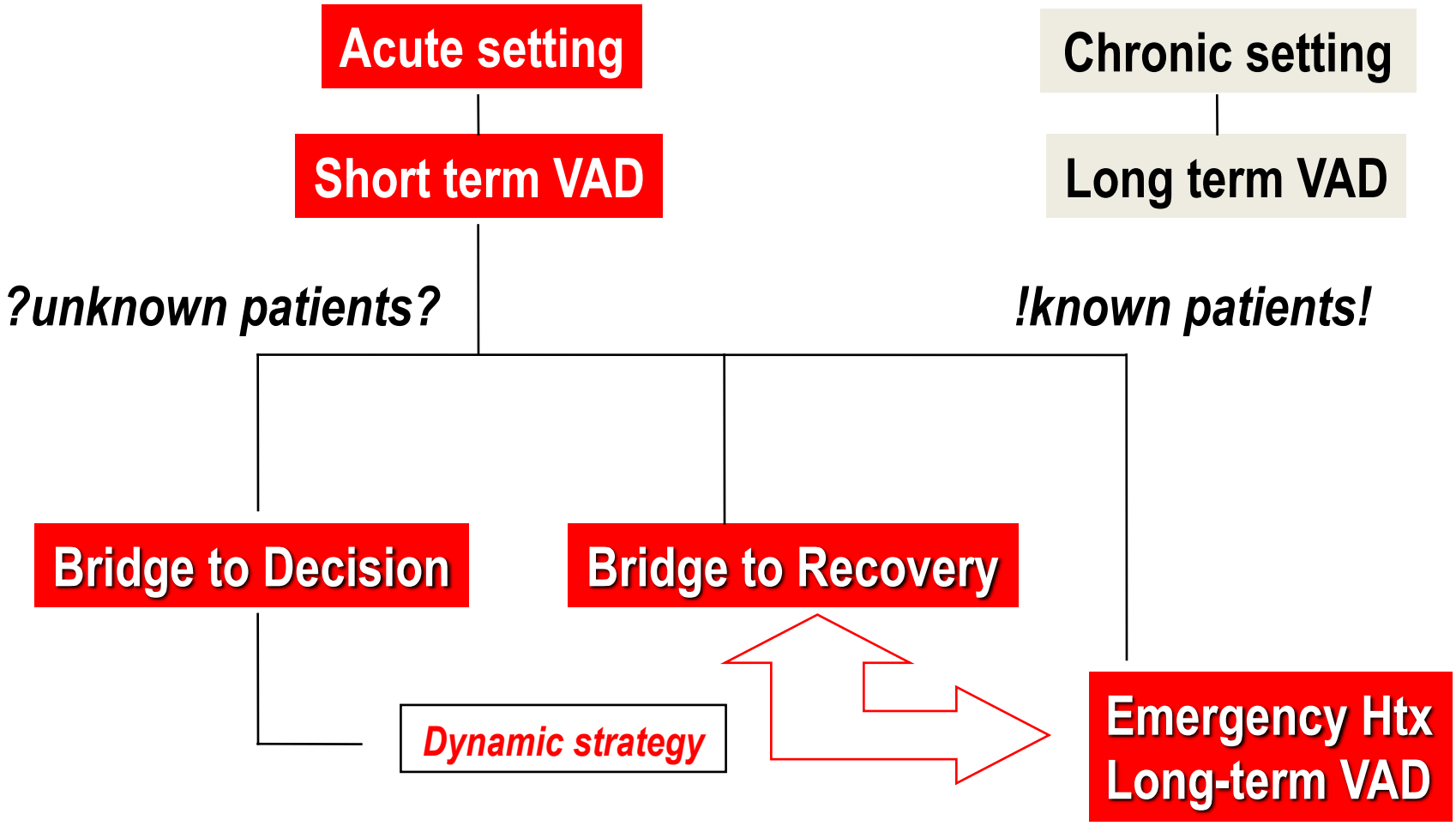
INTERMACS: Patient Selection

Patient Profile/Status: INTERMACS Levels

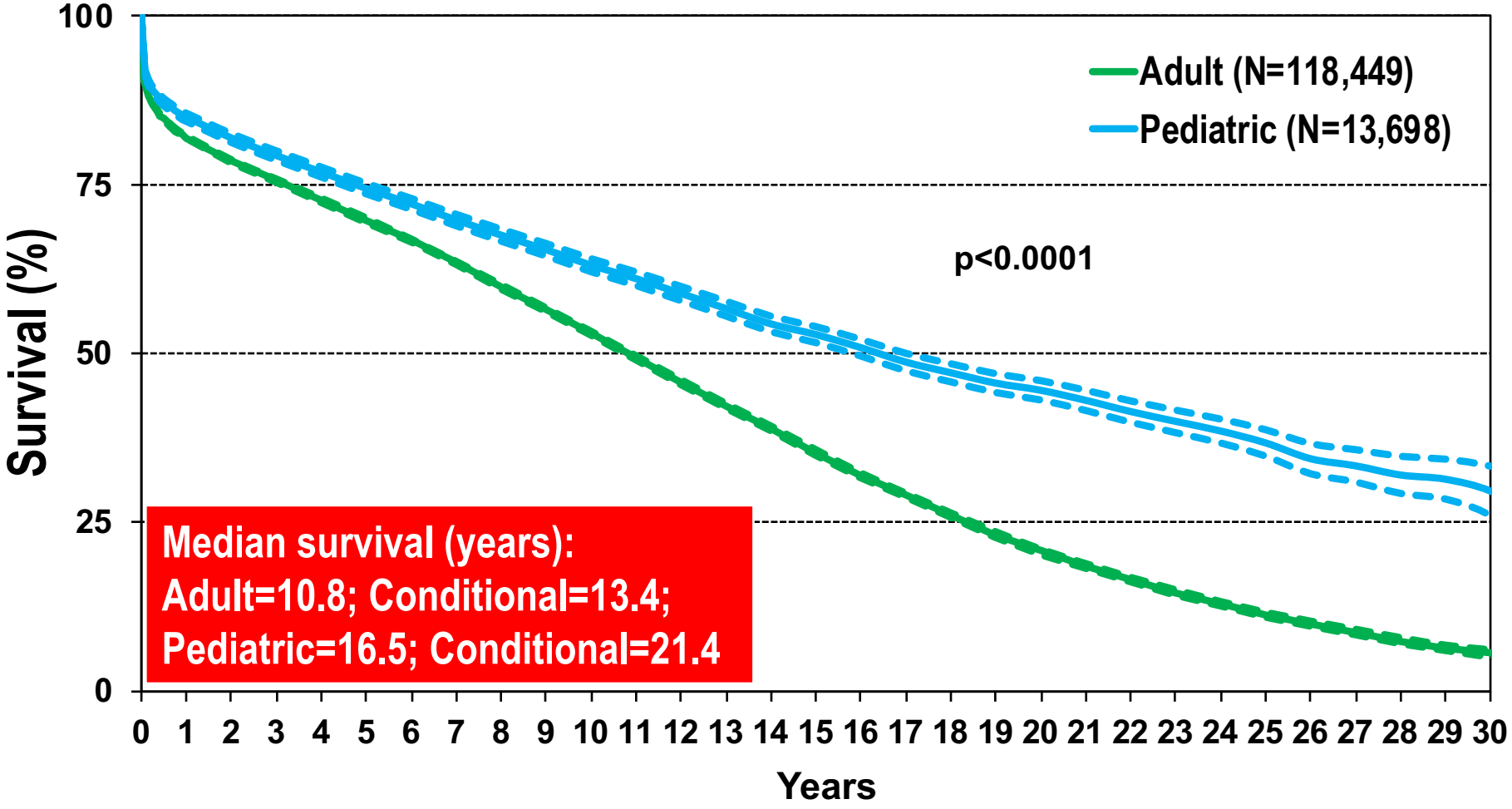


1. Critical cardiogenic shock ("crash and burn")
2. Progressive decline ("sliding fast")
3. Stable but inotrope dependent (stable but dependent)
4. Recurrent advanced HF ("frequent flyer")
5. Exertion intolerant
6. Exertion limited ("walking wounded")
7. Advanced NYHA III

MCS Strategy: BRIDGE to LIFE

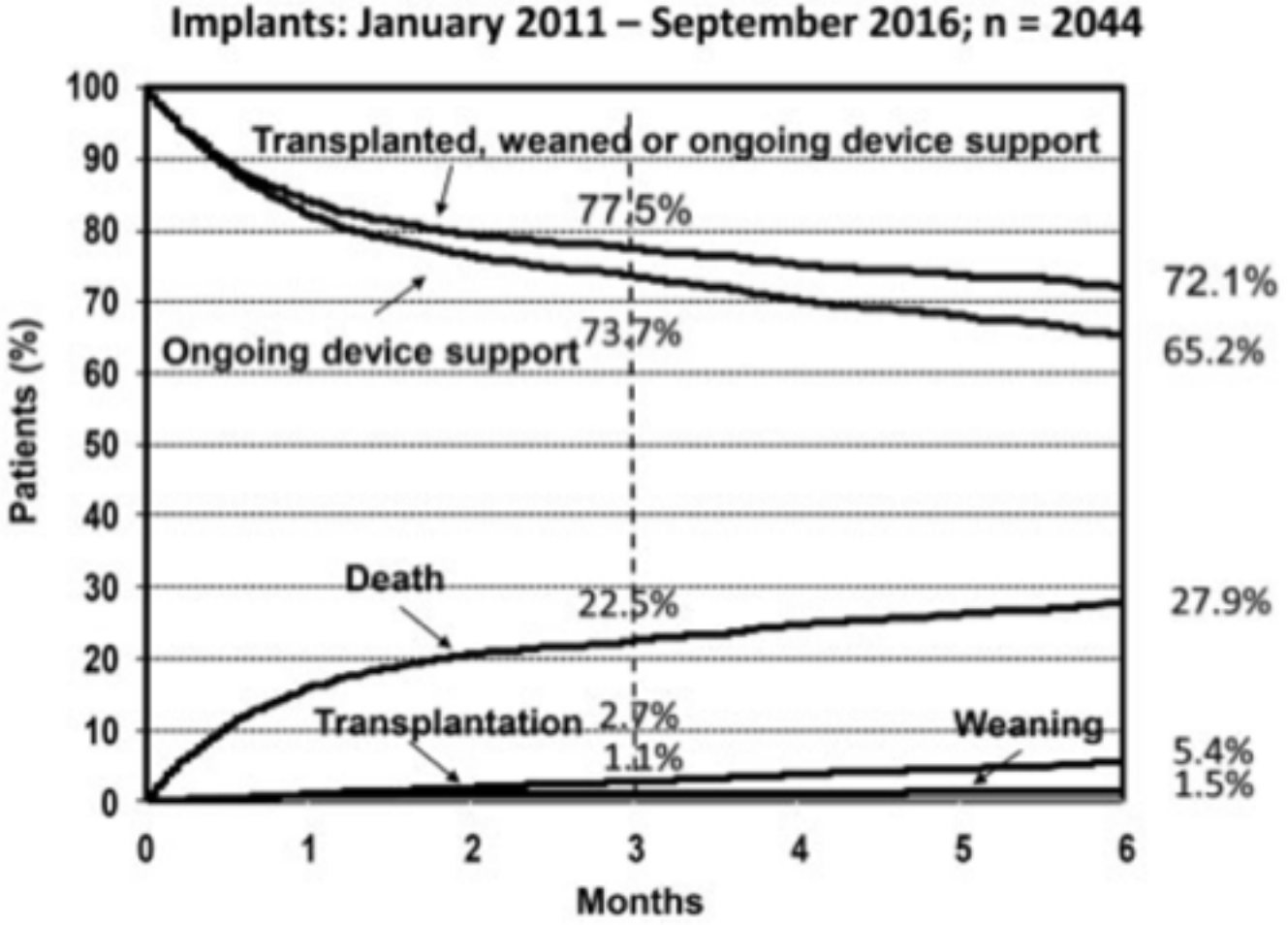


Adult and Pediatric Heart Transplants
Kaplan-Meier Survival by Age Group
(Transplants: January 1982 – June 2016)



ISHLT • INTERNATIONAL SOCIETY FOR HEART AND LUNG TRANSPLANTATION
2018
JHLT. 2018 Oct; 37(10): 1155-1206

The European Registry for Patients with Mechanical Circulatory Support (EUROMACS) of the European Association for Cardio-Thoracic Surgery (EACTS): second report



European Journal of Cardio-Thoracic Surgery 0 (2017) 1–8