

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

**TIMING FOR TRANSPLANT:
ARE WE ALWAYS LATE?**

Mauro Rinaldi

LUNG TRANSPLANTATION

Transplantation is now a generally **accepted therapy** for the management of a wide range of severe lung disorders

Evidence supporting improved **quality of life** and **survival benefit** for transplant recipients

A consensus document for the selection of lung transplant candidates: 2014—An update from the Pulmonary Transplantation Council of the International Society for Heart and Lung Transplantation

TIMING OF LISTING

- NYHA Functional Class III or IV despite a trial of at least 3 months of combination therapy including prostanoids.
- Cardiac index of <2 liters/min/m².
- Mean right atrial pressure of >15 mm Hg.
- 6-minute walk test of <350 m.
- Development of significant hemoptysis, pericardial effusion, or signs of progressive right heart failure (renal insufficiency, increasing bilirubin, brain natriuretic peptide, or recurrent ascites).^{1,61,62}

PUSHING THE LIMITS

AF M, 48 y-old (1969), B group, 49 Kg x 180 cm

1979	ASD O Secundum 10 y-old
1993	ASD closure (sternotomy)
2002	PH center (PA 98/42/63 IC 2.6)
2003	sildenafil
2007	ambrisentan (PA 104/24/53, IC 3.9)
2012	FA, Giant PA, LCMS compression: BMS of LM
2014	SOB NYHA III
2016	mPA 47, CI 3,2, 6MWT 465m:
	Indication to URGENT transplant LISTING

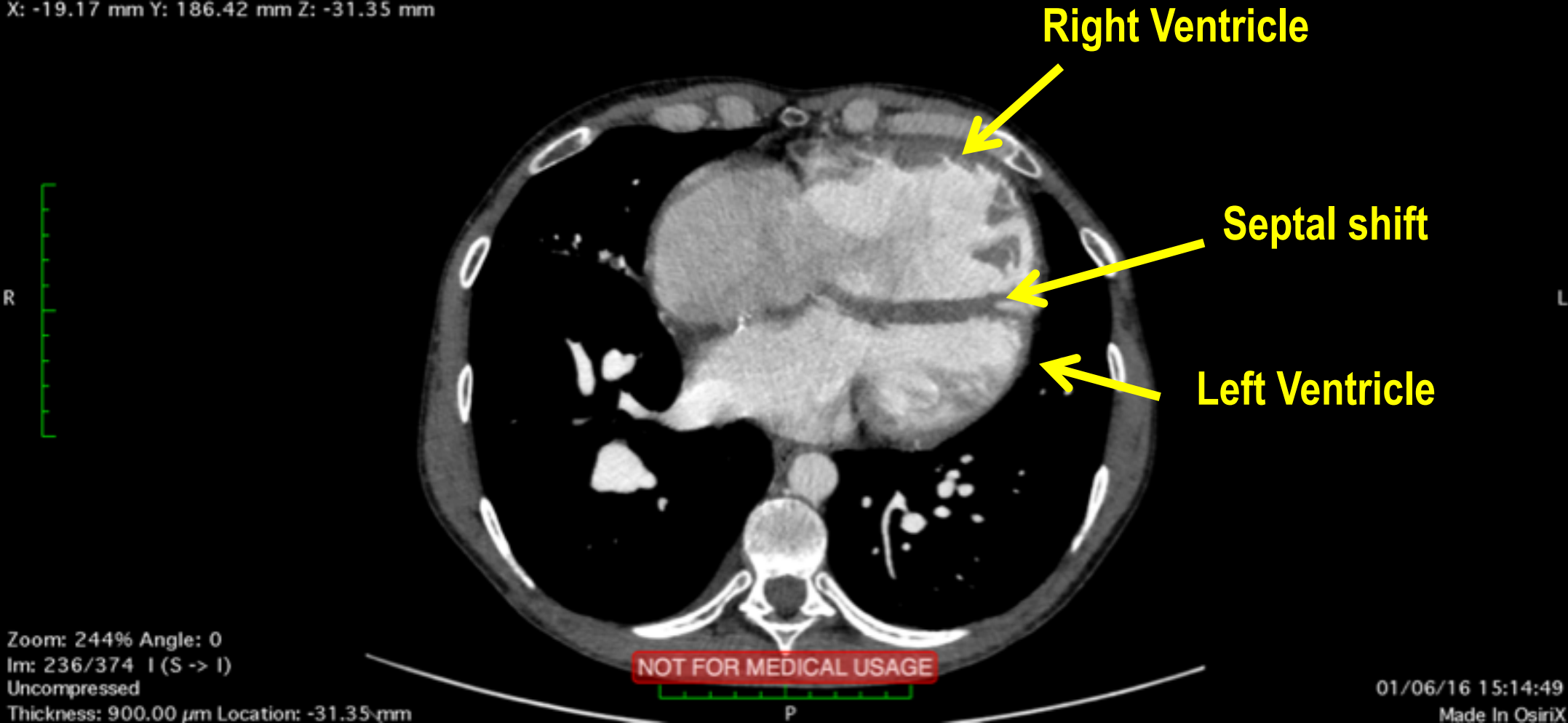
CHEST X-RAY



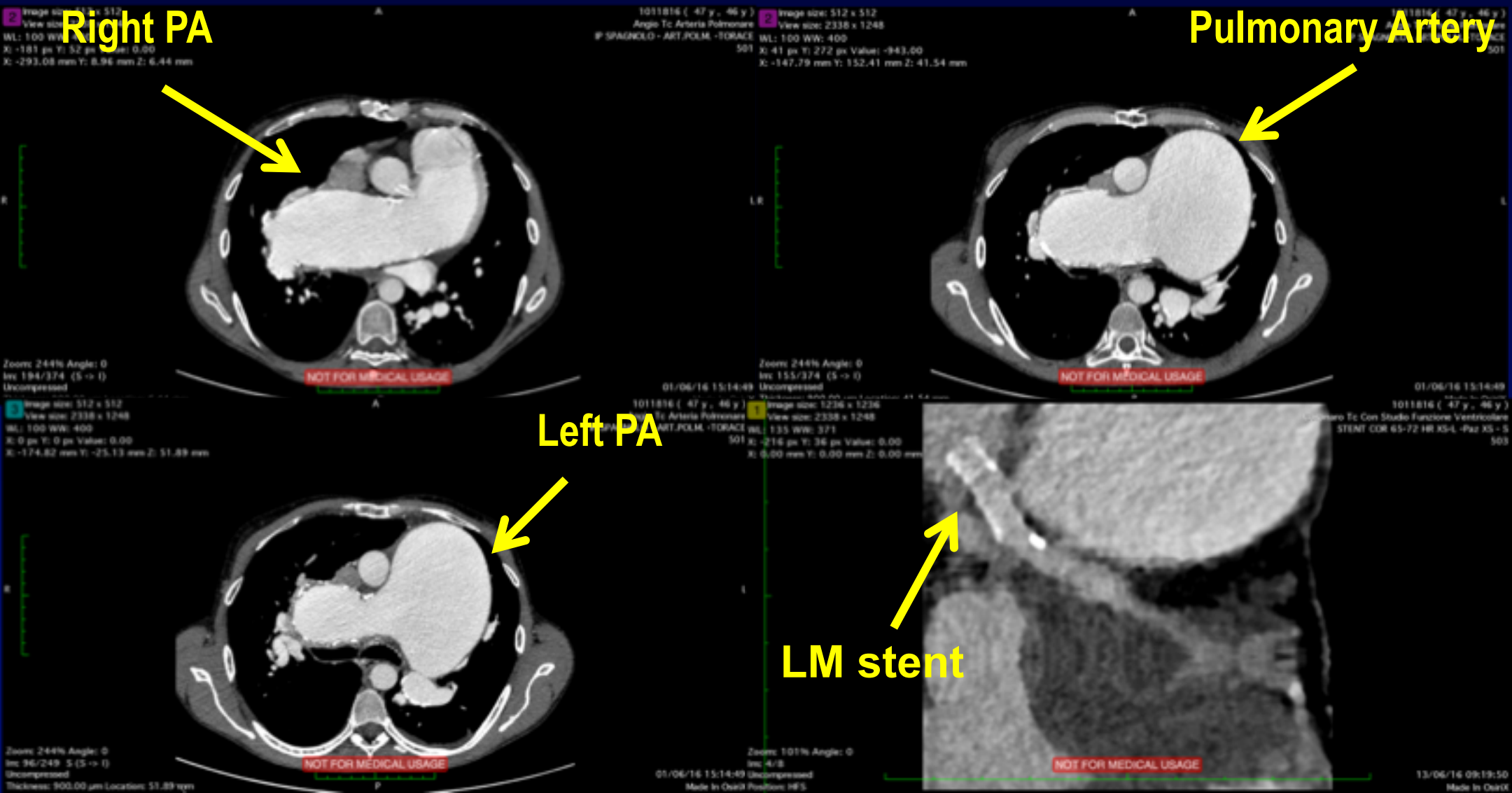
LUNG CT SCAN

2 Image size: 512 x 512
View size: 2338 x 1248
WL: 100 WW: 400
X: 239 px Y: 325 px Value: -16.00
X: -19.17 mm Y: 186.42 mm Z: -31.35 mm

1011816 (47 y , 46 y)
Angio Tc Arteria Polmonare
IP SPAGNOLO - ART.POLM. -TORACE
501



LUNG CT SCAN



PULMONARY HYPERTENSION

TYPES OF TRANSPLANT

- **HEART AND LUNG TX**
 - **DOMINO-TX**
- **LUNG TRANSPLANT**

HEART AND LUNG TRANSPLANTATION

IN THE PAST

CONCERNS about **RV** dysfunction

NOWADAYS

only in case of **severe LV** dysfunction

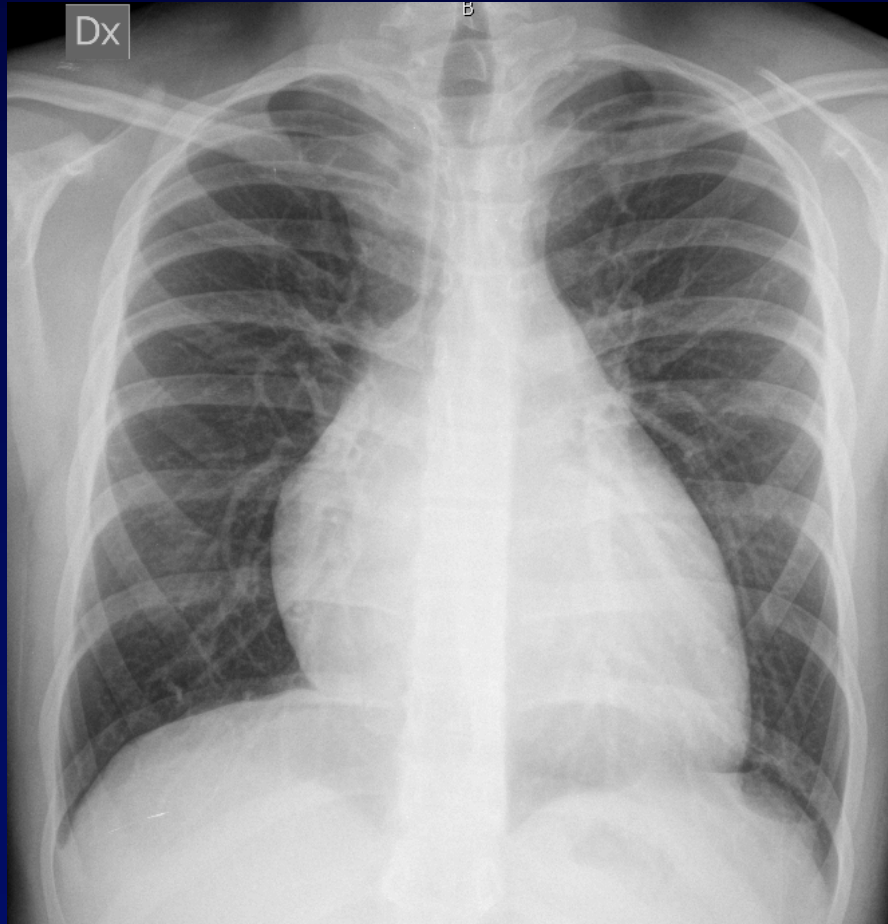
systolic or **DYASTOLIC LV** dysfunction

INDICATIONS

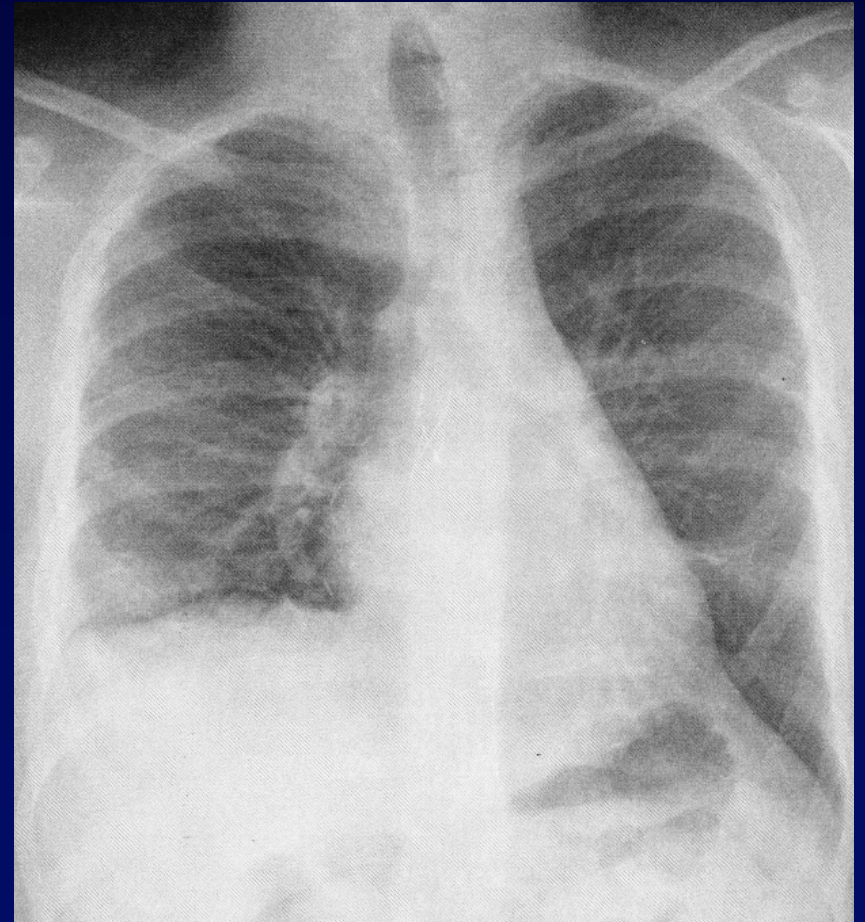
HEART AND LUNG TRANSPLANTATION

- EISENMENGER SYNDROME due to congenital heart disease not amenable for conservative correction
- PRIMARY PH with severe LV dysfunction
- LUNG DISEASE with end-stage cardiac disease

POST-TX HEART REMODELING



PRE-TRANSPLANT



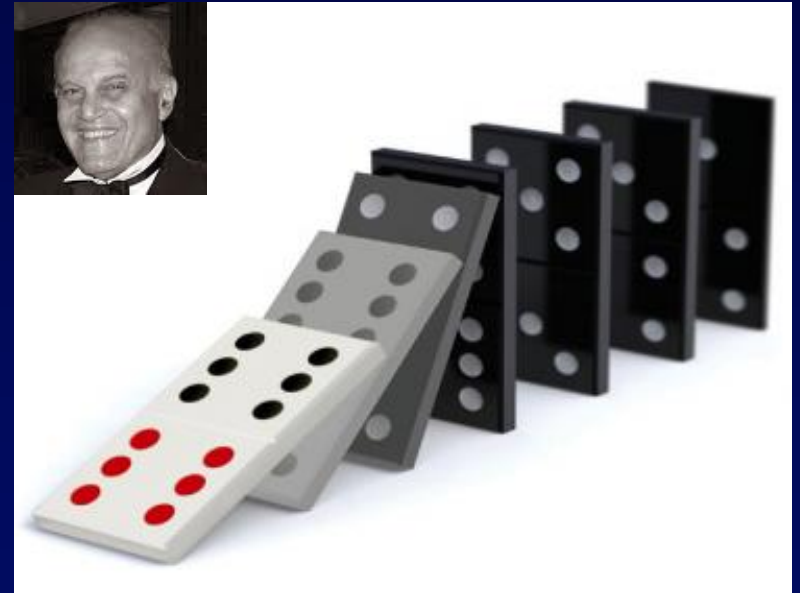
SIX MONTHS AFTER TX

DOMINO TRANSPLANTATION

Yacoub M: 1987

PPH recipient: HLTx

Use the heart of the recipient of a H-L Tx as a graft for a recipient with end-stage heart disease with pulmonary hypertension



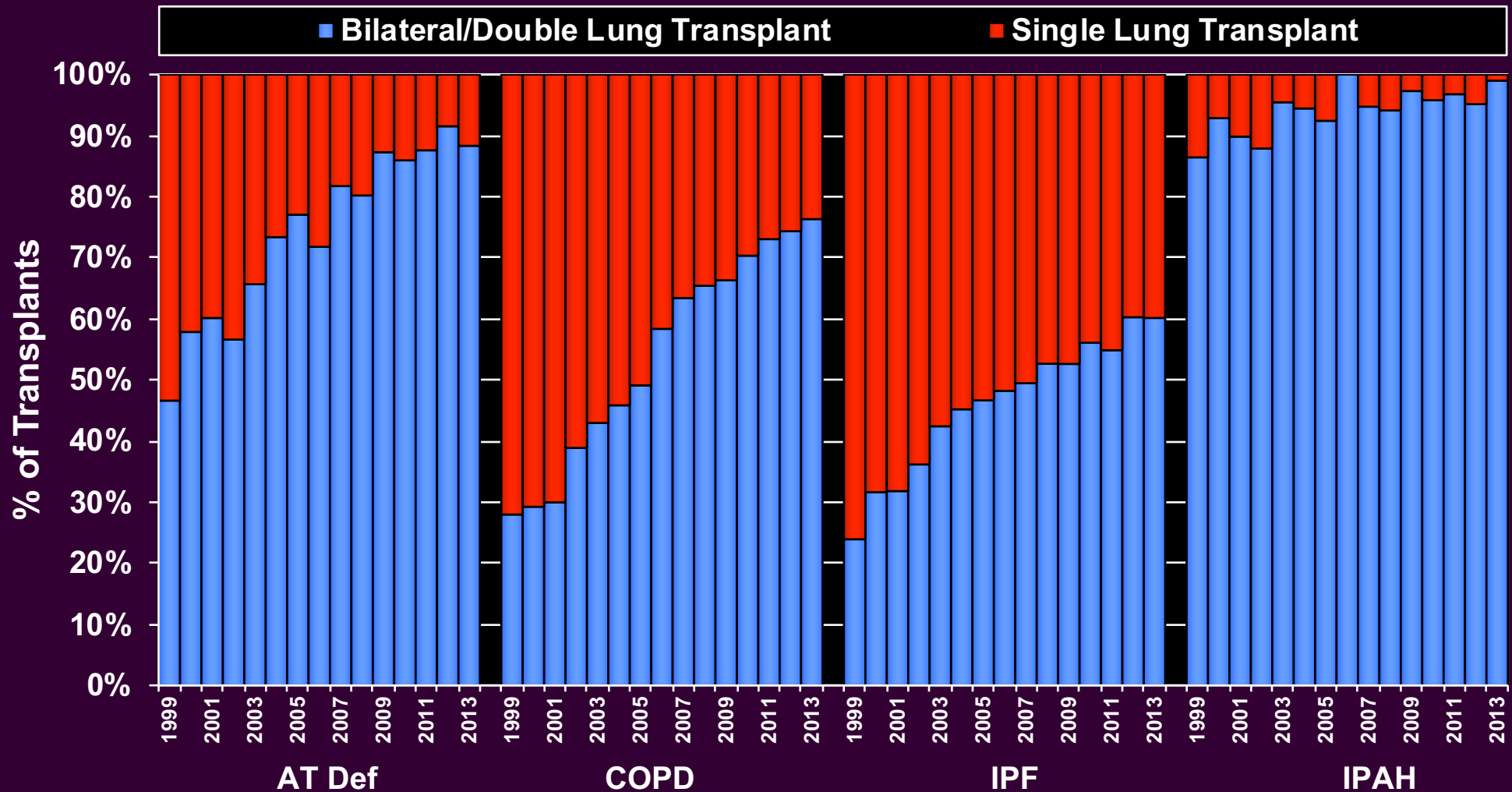
Adult Lung Transplants

Indications (Transplants: January 1995 – June 2016)

Diagnosis	SLT (N=18,207)	BLT (N=36,046)	TOTAL (N=54,253)
COPD	7,266 (39.9%)	9,539 (26.5%)	16,805 (31.0%)
IIP	6,449 (35.4%)	6,990 (19.4%)	13,439 (24.8%)
CF	218 (1.2%)	8,266 (22.9%)	8,484 (15.6%)
ILD-not IIP	1,078 (5.9%)	1,925 (5.3%)	3,003 (5.5%)
A1ATD	797 (4.4%)	1,912 (5.3%)	2,709 (5.0%)
Retransplant	922 (5.1%)	1,269 (3.5%)	2,191 (4.0%)
IPAH	88 (0.5%)	1,481 (4.1%)	1,569 (2.9%)
Non CF-bronchiectasis	67 (0.4%)	1,413 (3.9%)	1,480 (2.7%)
Sarcoidosis	312 (1.7%)	1,026 (2.8%)	1,338 (2.5%)
PH-not IPAH	135 (0.7%)	690 (1.9%)	825 (1.5%)
LAM/tuberous sclerosis	146 (0.8%)	381 (1.1%)	527 (1.0%)
OB	73 (0.4%)	395 (1.1%)	468 (0.9%)
CTD	140 (0.8%)	282 (0.8%)	422 (0.8%)
Cancer	7 (0.0%)	27 (0.1%)	34 (0.1%)
Other	509 (2.8%)	450 (1.2%)	959 (1.8%)

Adult Lung Transplants

Procedure Type within Indication, by Year



SINGLE LUNG TRANSPLANTATION

PULMONARY HYPERTENSION

- Optimization of donors' pool
- Potential reduction of waiting list time and mortality
- More difficult clinical management
- High risk of V/O mismatch (IRI and BOS)
- Emergency strategy only

BILATERAL LUNG TRANSPLANTATION

PULMONARY HYPERTENSION

Lower risk of IRI / PGD

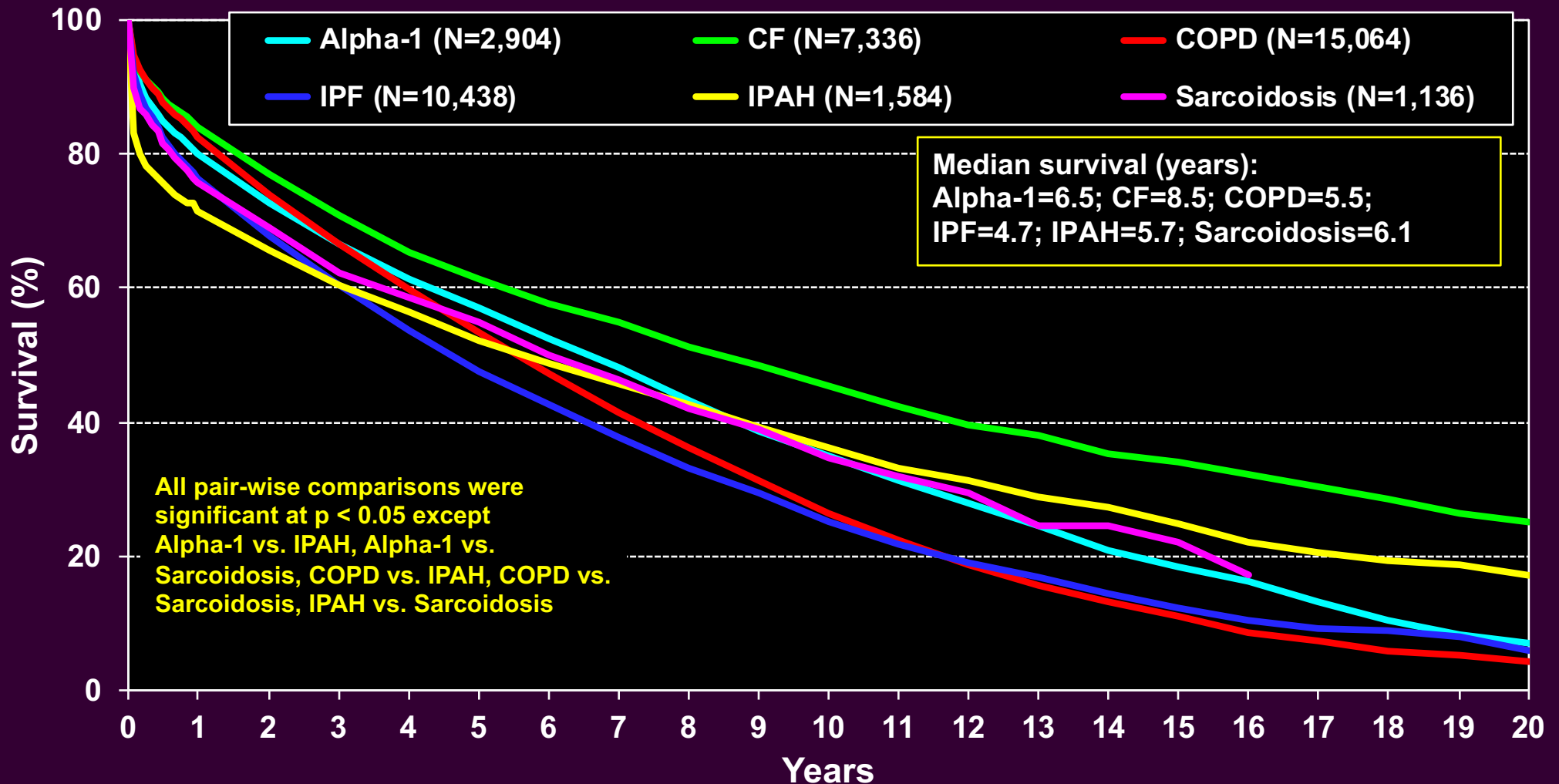
Absence of V/O mismatch

Two grafts for one patient

Adult Lung Transplants

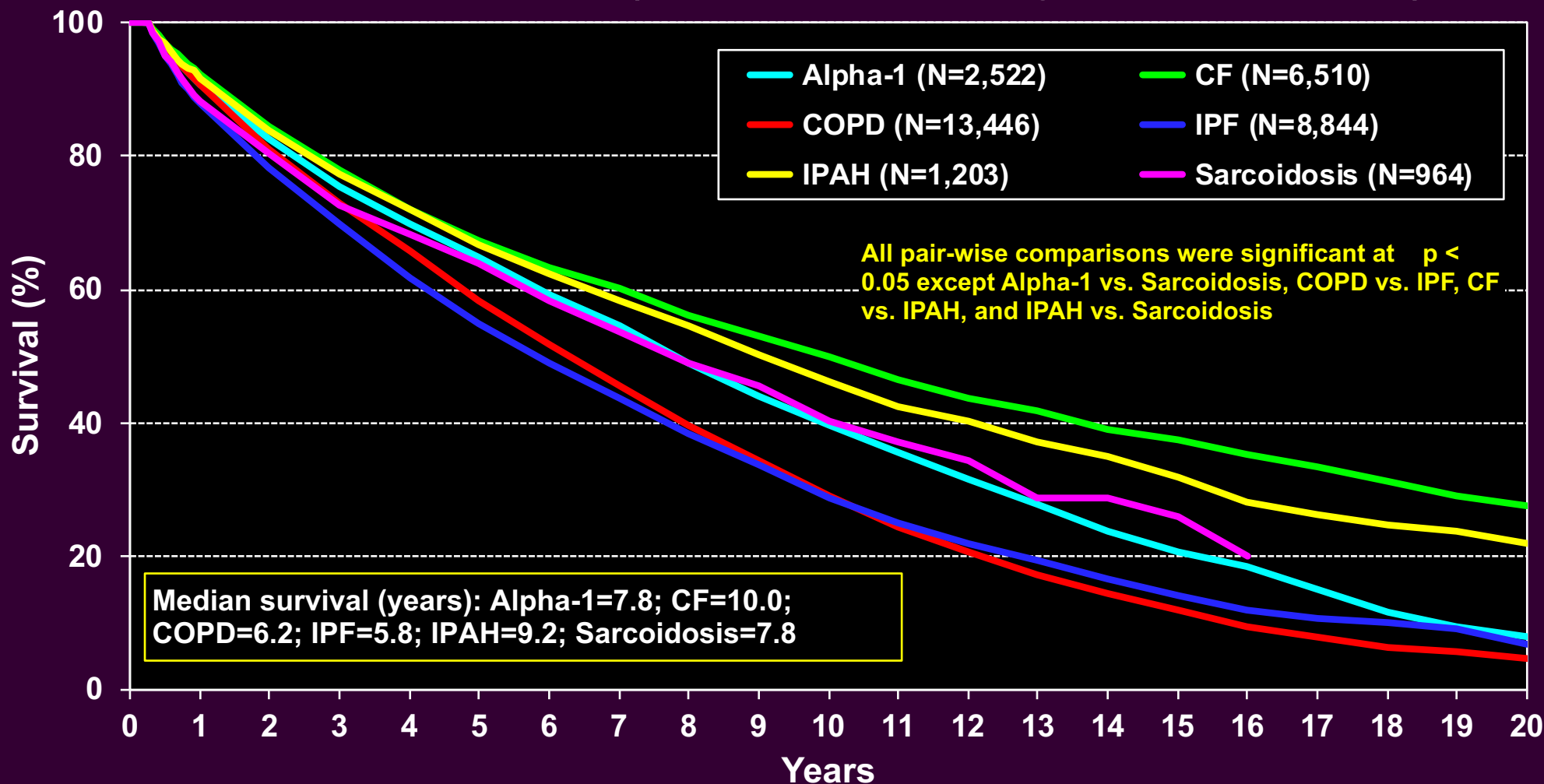
Kaplan-Meier Survival by Diagnosis

(Transplants: January 1990 – June 2013)



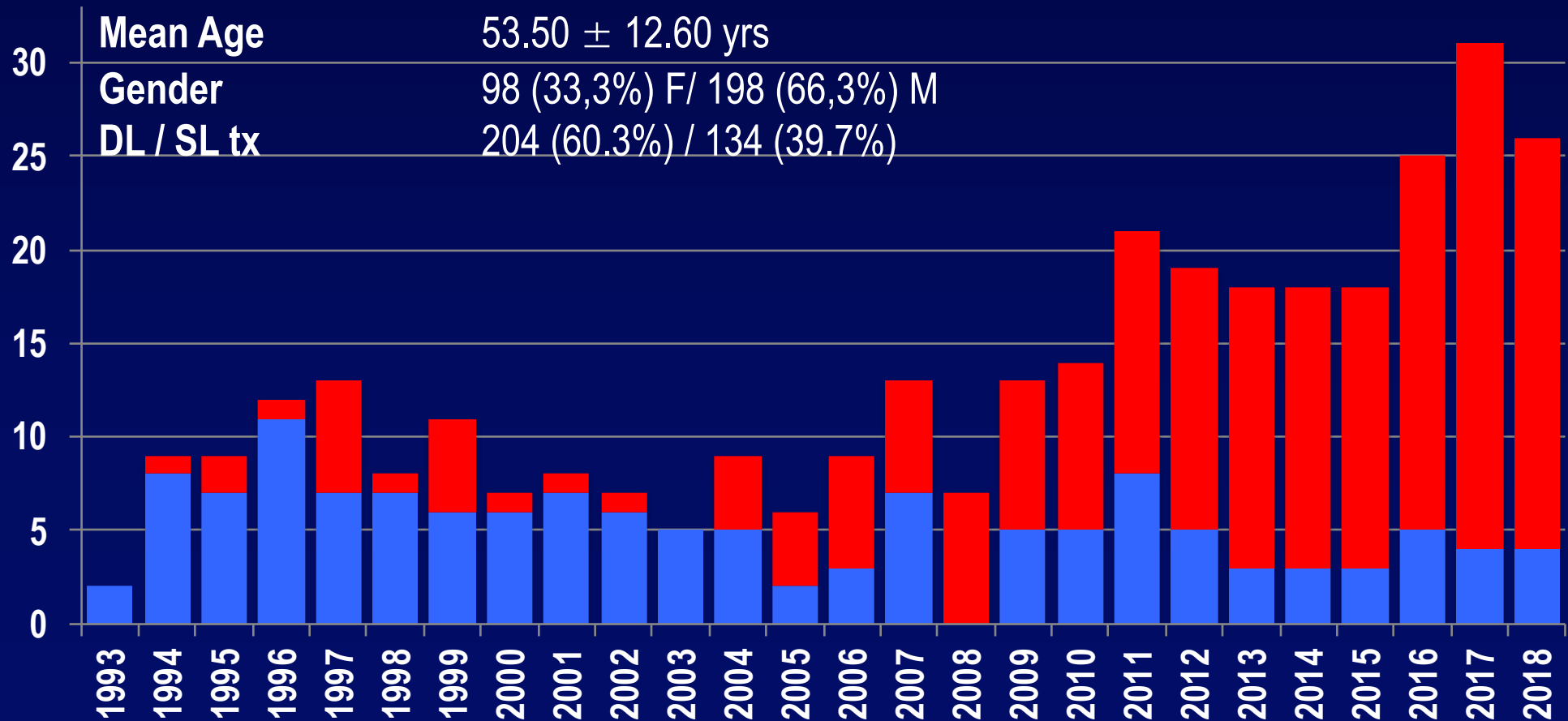
Adult Lung Transplants

Kaplan-Meier Survival by Diagnosis Conditional on Survival to 3 Months (Transplants: January 1990 – June 2013)



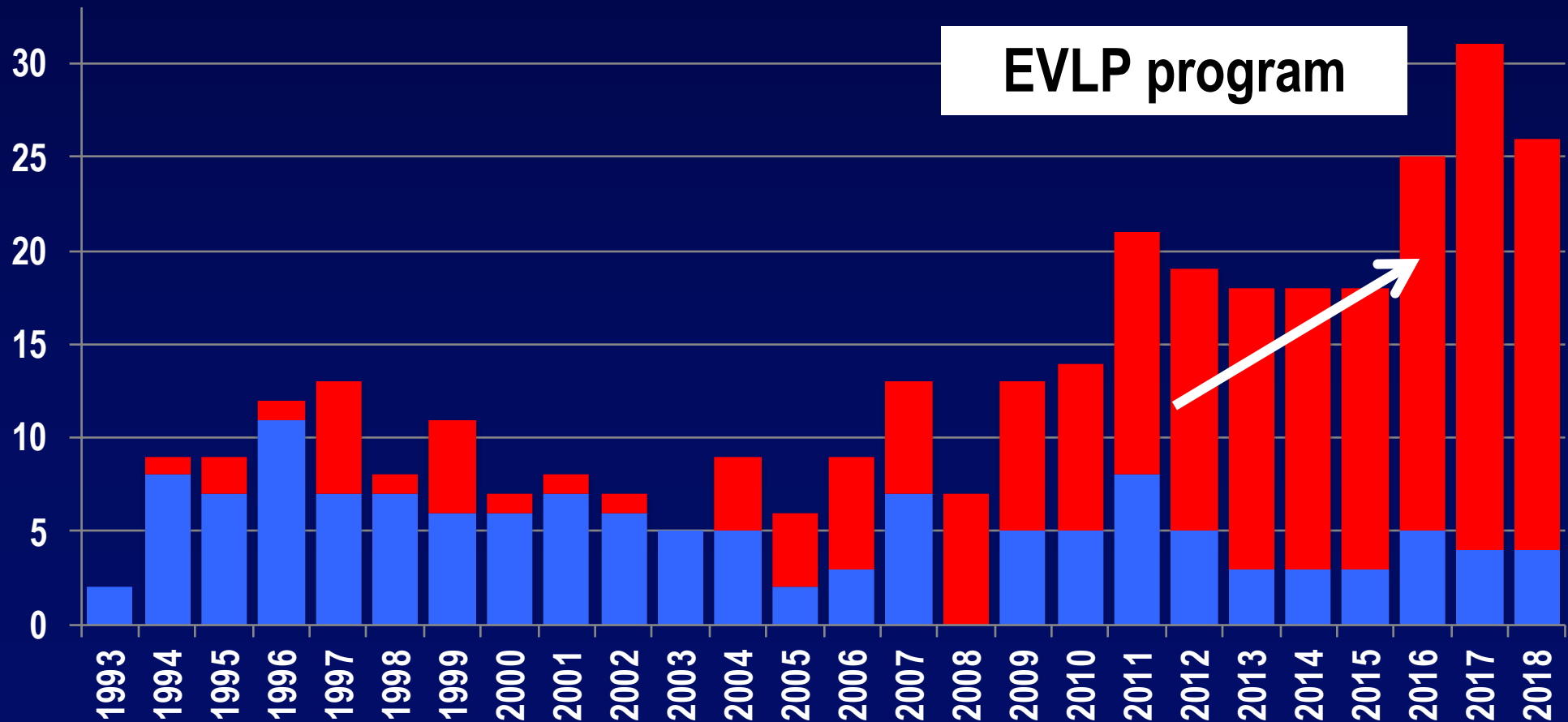
TURIN LUNG TRANSPLANT PROGRAM

From January 1993 to October 2017: **338 Lung Transplants**



TURIN LUNG TRANSPLANT PROGRAM

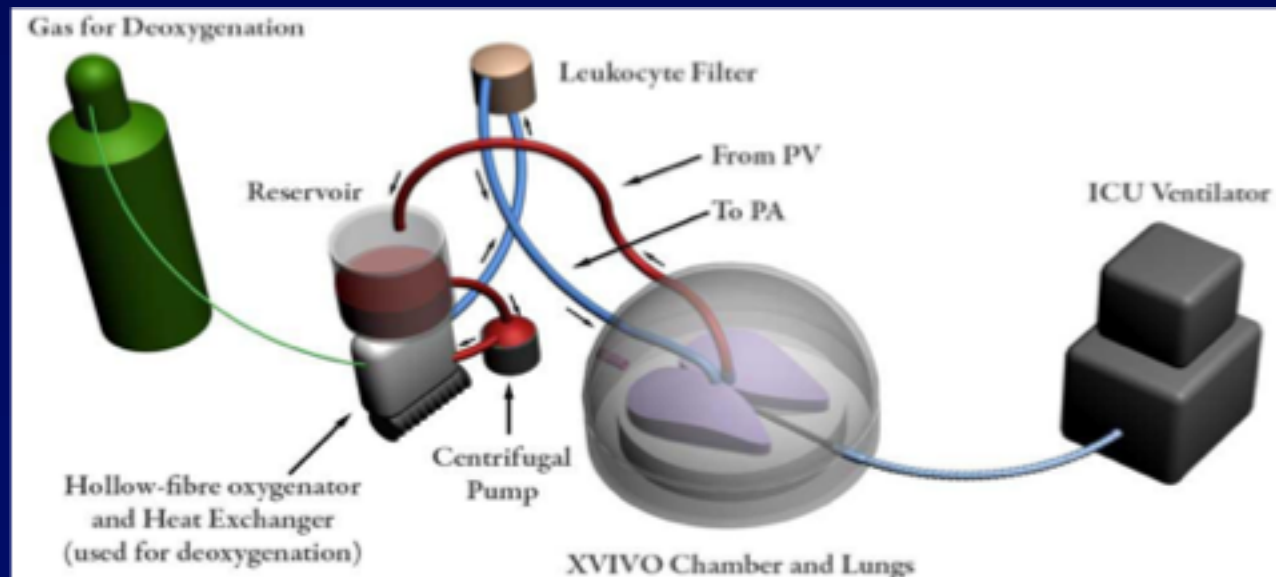
From January 1993 to October 2017: **338 Lung Transplants**



ORIGINAL ARTICLE

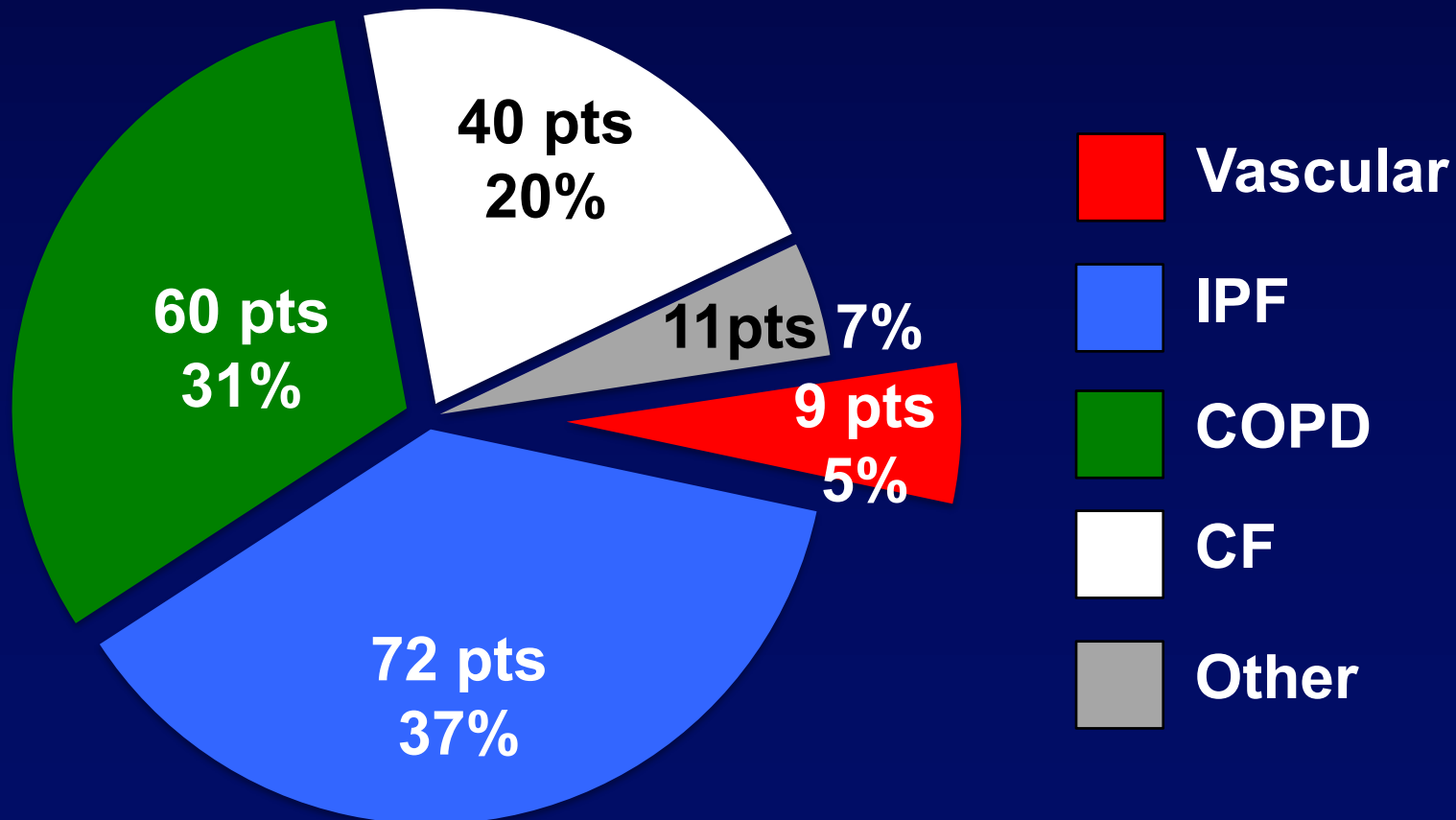
Normothermic Ex Vivo Lung Perfusion in Clinical Lung Transplantation

Marcelo Cypel, M.D., Jonathan C. Yeung, M.D., Mingyao Liu, M.D., Masaki Anraku, M.D., Fengshi Chen, M.D., Ph.D., Wojtek Karolak, M.D., Masaaki Sato, M.D., Ph.D., Jane Laratta, R.N., Sassan Azad, C.R.A., Mindy Madonik, C.C.P., Chung-Wai Chow, M.D., Cecilia Chaparro, M.D., Michael Hutcheon, M.D., Lianne G. Singer, M.D., Arthur S. Slutsky, M.D., Kazuhiro Yasufuku, M.D., Ph.D., Marc de Perrot, M.D., Andrew F. Pierre, M.D., Thomas K. Waddell, M.D., Ph.D., and Shaf Keshavjee, M.D.



TURIN LUNG TRANSPLANT PROGRAM

From January 2008 to June 2018: **195 Lung Transplants**



TURIN LUNG TRANSPLANT PROGRAM

From January 2008 to June 2018: **195 Lung Transplants**

Age at transplant	49 ± 15 (11-69) years
Male sex	123 (62%) pts
Waiting time on the waiting list	256 ± 329 (1-2402) days
Mechanical ventilation before transplant	18 (9%) pts
ECMO before transplant	14 (7%) pts
Urgent LTx	23 (12%) pts
Ex vivo lung perfusion	32 (16%) pts
Bilateral lung transplantation	157 (80%) pts
Mean ischemic time	376 ± 184 (376-1380) min

TURIN LUNG TRANSPLANT PROGRAM

NEED OF ECMO AFTER LTX

	ECMO after LTx (n=25)	No ECMO after LTx (n=170)	p value
sPAP	51 ± 20 mmHg	39 ± 13 mmHg	< 0.01
mPAP	36 ± 16 mmHg	25 ± 9 mmHg	< 0.01
Need for CPB during transplant	17 (68%) pts	43 (25%) pts	< 0.01
Mechanical ventilation before TX	6 (24%) pts	12 (7%) pts	< 0.01
ECMO before transplant	6 (24%) pts	8 (5%) pts	< 0.01
Urgent LTx	7 (28%) pts	16 (9%) pts	< 0.01
Donor age	49 ± 10 years	43 ± 14 years	< 0.01

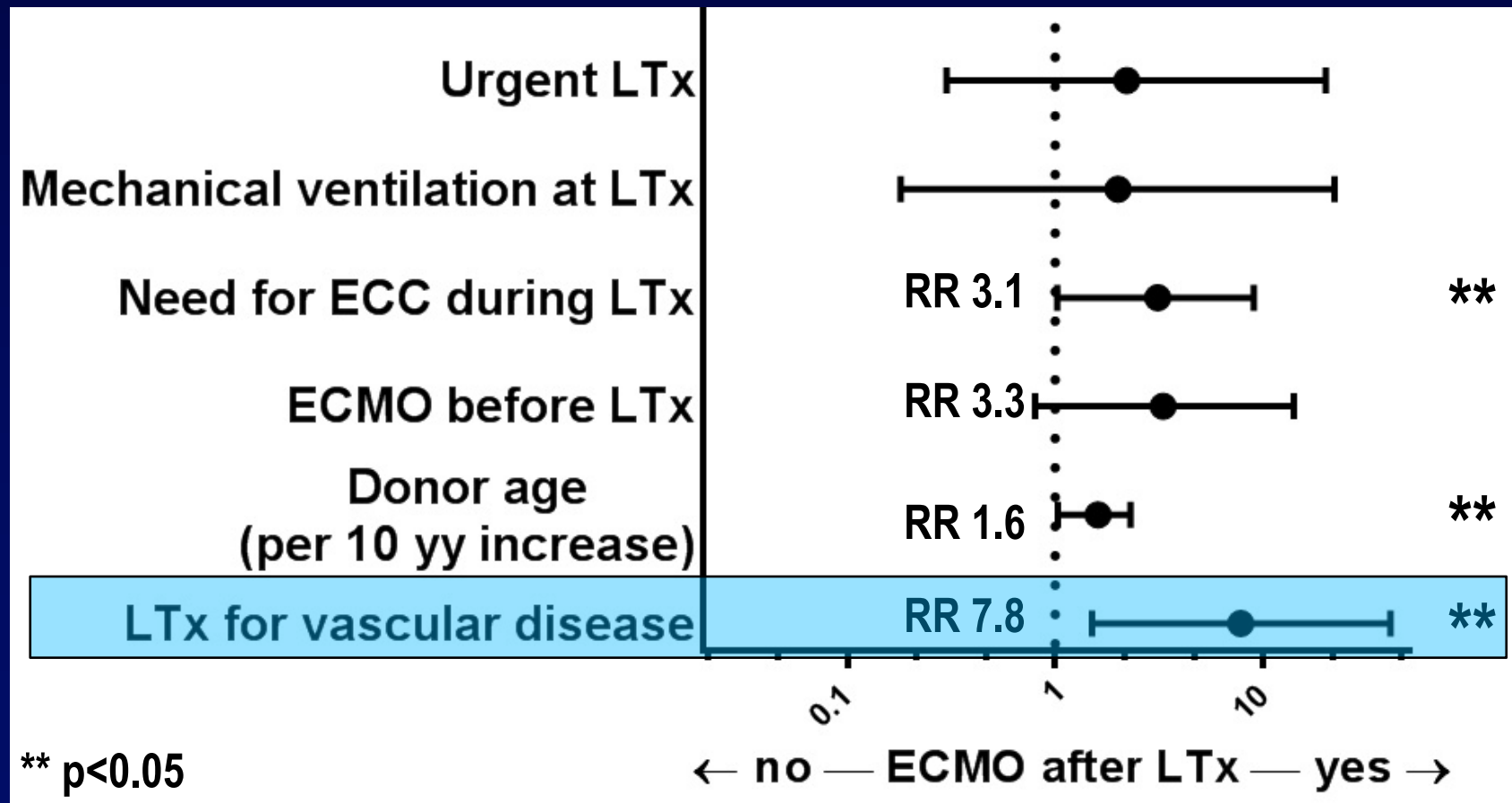
TURIN LUNG TRANSPLANT PROGRAM

	ECMO after LTx (n=25)	No ECMO after LTx (n=170)	p
Number of transfused RBC units*	5 [IQR 2 - 11]	1 [IQR 0 - 3]	< 0.01
Length of ICU stay*	28 days [IQR 9 - 43.5]	6 days [IQR 3 - 15]	< 0.01
Length of mechanical ventilation*	8.2 days [IQR 3.0 - 24.5]	1 day [IQR 0.8 - 3]	< 0.01
In-hospital mortality	11 (44%)	13 (7.6%)	< 0.01

* median

TURIN LUNG TRANSPLANT PROGRAM

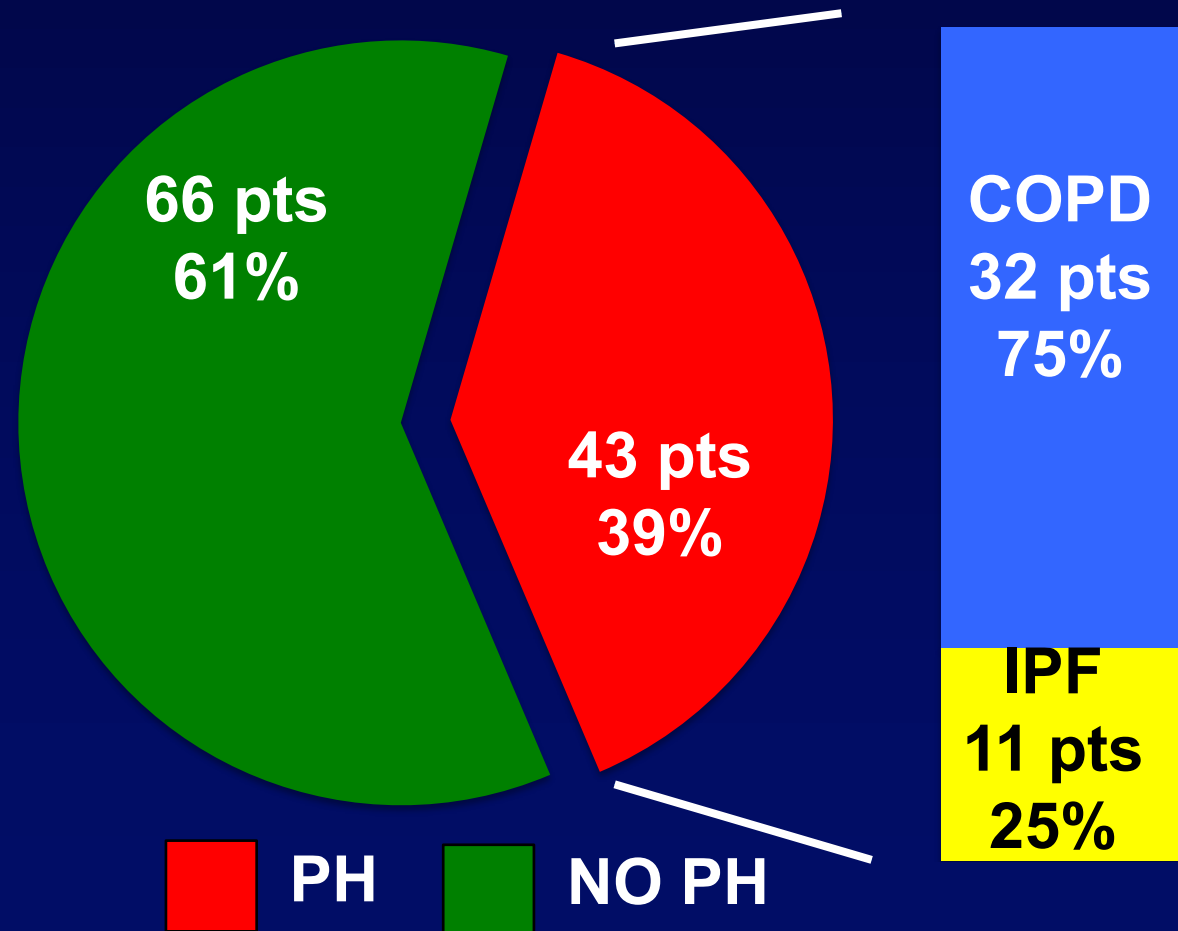
INDEPENDENT RISK FACTORS FOR POST-TX ECMO



IPF and COPD POPULATION

From July 2005 to October 2016: **109 Lung Transplants**

IPF	54 pts
COPD	55 pts
Mean age	56.6±8.3 yrs
Gender	29 F / 80 M
Mean PAP	27.4±8.2 mmHg



Pulmonary Hypertension in Chronic Obstructive Pulmonary Disease and Pulmonary Fibrosis: Prevalence and Hemodynamic Differences in Lung Transplant Recipients at Transplant Center's Referral Time

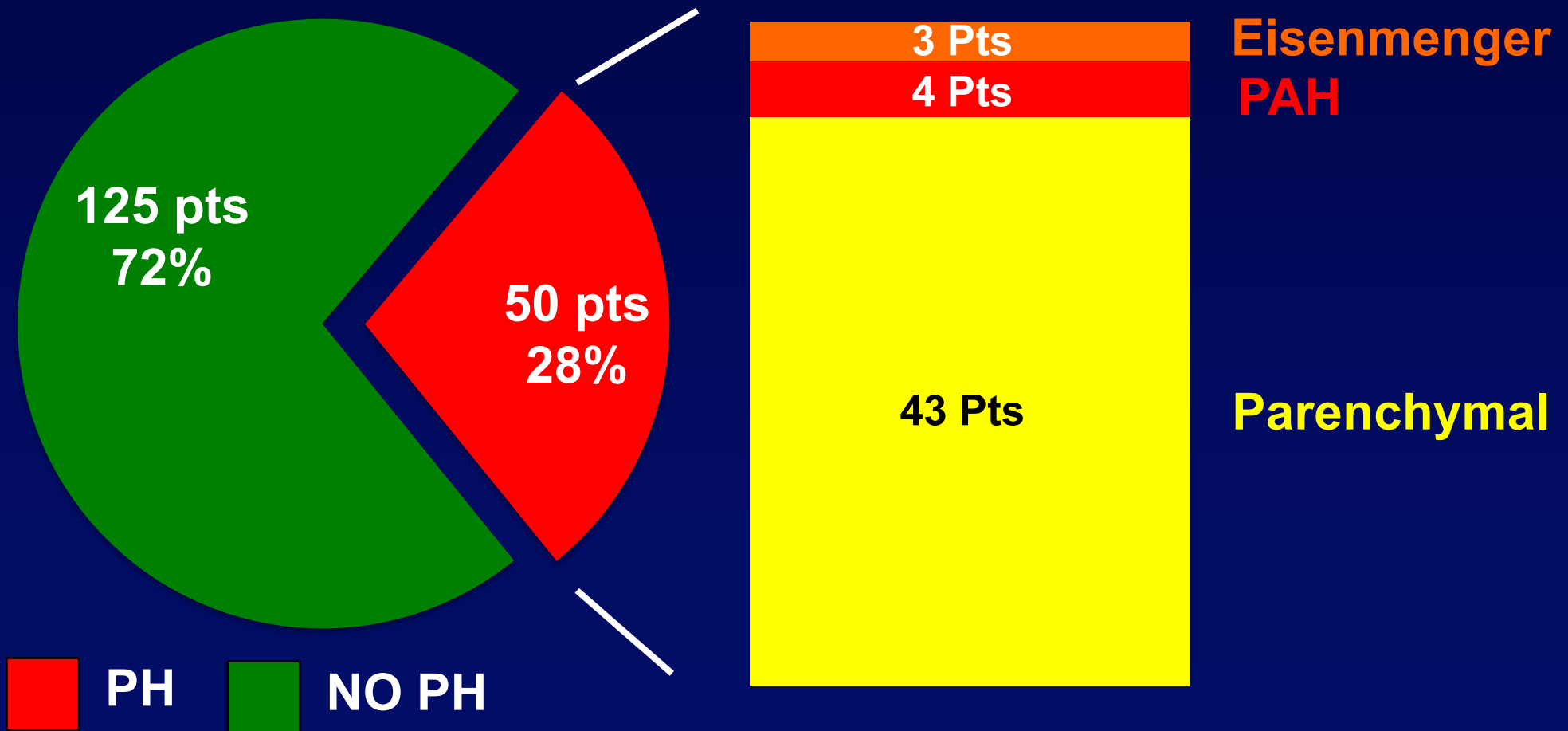
P. Solidoro^{a,*}, F. Patrucco^a, R. Bonato^b, M. Boffini^b, D. Libertucci^a, D. Ricci^b, E. Allara^c, M. Rinaldi^b, and C. Bucca^a

Transplantation Proceedings, 47, 2161–2165 (2015)

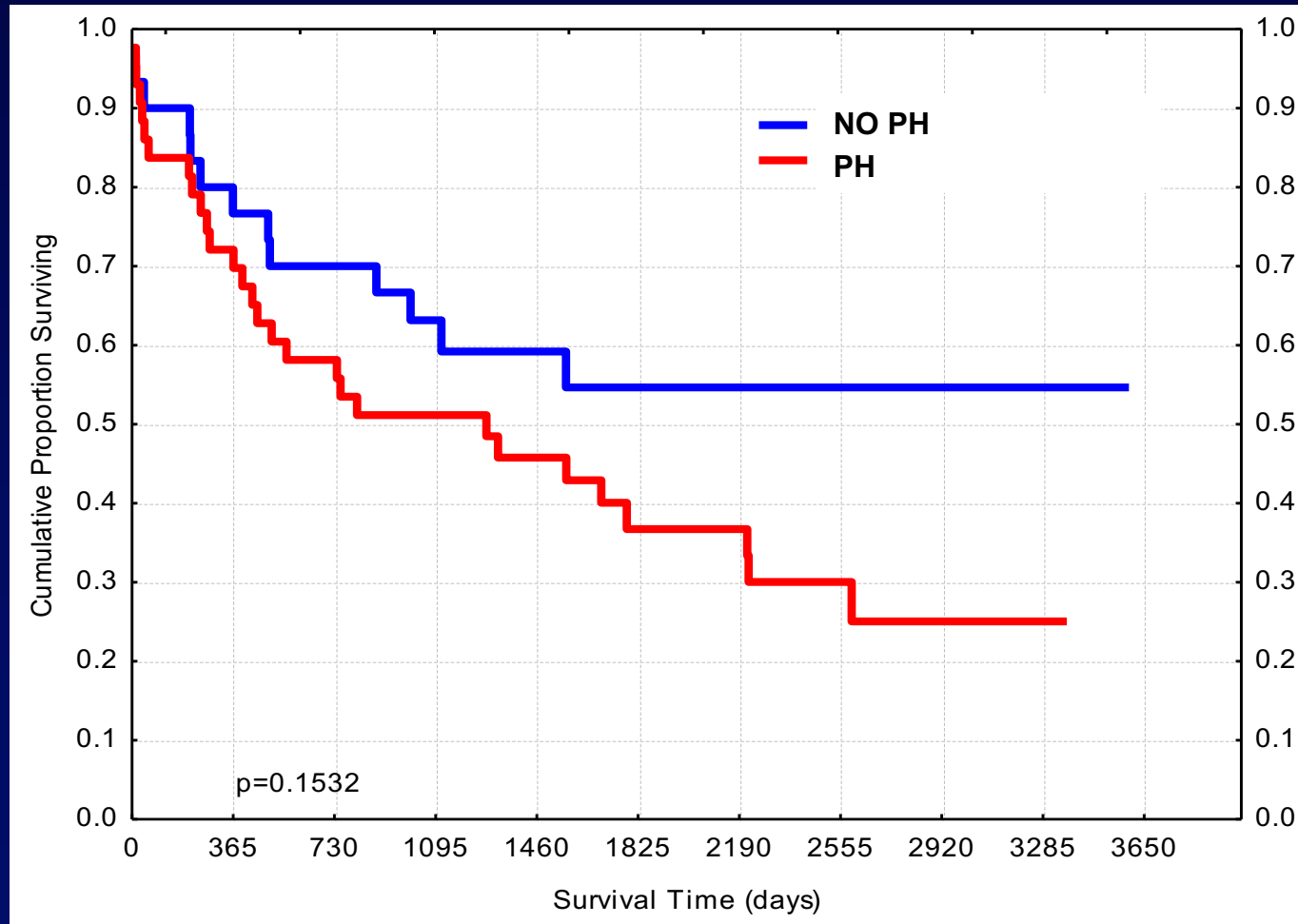
Hemodynamic parameters	Fibrosis	COPD	<i>P</i>
Mean sPAP ($\pm$ SD) (in mm Hg)	41.1 (18.8)	43.1 (12.4)	n.s.
Mean dPAP ($\pm$ SD) (in mm Hg)	15.9 (8.2)	22.2 (7.7)	<.005
Mean mPAP ($\pm$ SD) (in mm Hg)	24.1 (8.2)	30.3 (6.9)	<.001
Mean PWP ($\pm$ SD) (in mm Hg)	10.1 (0.8)	13.7 (1.1)	<.05
Mean CO	6.3 (1.6)	6.2 (2.5)	n.s.
Mean CI	3.3 (0.6)	3.7 (1.1)	n.s.
Mean total pulmonary vascular resistances	4 (2)	5.5 (2)	<.01

PULMONARY HYPERTENSION POPULATION

From July 2005 to October 2016: **175 Lung Transplants**



LONG TERM SURVIVAL OF LUNG TRANSPLANTED PTS WITH OR WITHOUT PH





Cattedra di Cardiochirurgia
UNIVERSITA' DEGLI STUDI DI TORINO
ASOU CITTA' DELLA SALUTE E DELLA SCIENZA



PROGRAMMA DI TRAPIANTO ORGANI TORACICI

Direttore: Prof. M. Rinaldi

Cardiochirurgia

Prof. M. Boffini
Dott. D. Ricci
Dott. M. Attisani
Dott. C. Barbero
Dott. F. Scalini
Dott. E. Simonato

Malattie Infettive

Prof. Di Perri
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Direzione Sanitaria

Dott. A. Scarmozzino



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Pneumologia

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Dott.ssa L. Mercante

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