Donor Heart Risk Factors

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PRACTICE | POLICY | POLITICS

FEBRUARY 25-27, 2016 • PHOENIX, ARIZONA

Conflict of Interest Disclosure

- Research support from Astellas (investigator initiated clinical trial)
- No off-label use

Agenda

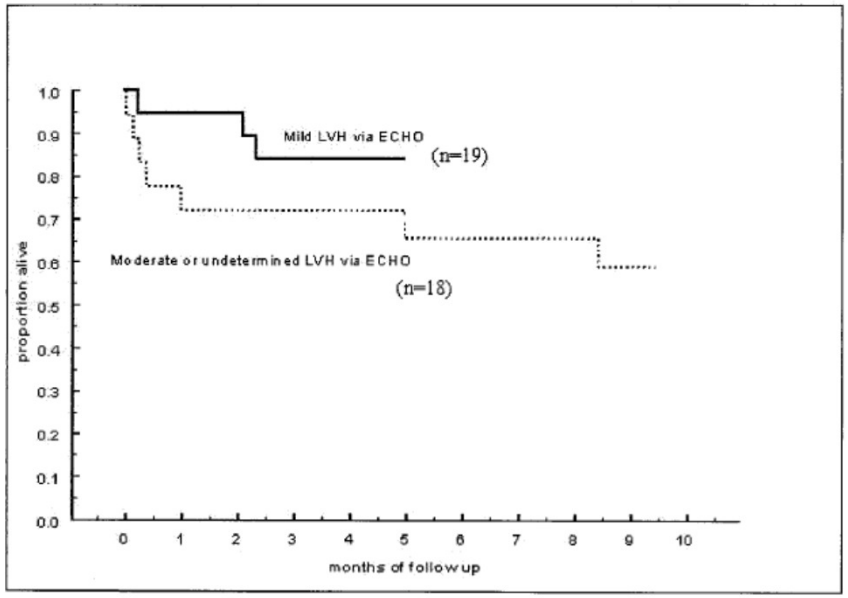
- Hypertrophy
- Age
- Coronary artery disease
- Dysfunctional donors
- 2007-2014 Snapshot with Donor Sequence Numbers

Left Ventricular Hypertrophy

The Use of Donor Hearts with Left Ventricular Hypertrophy

Daniel Marelli, MD, Hillel Laks, MD, Daniel Fazio, BS, Sara Moore, BA,
Jaime Moriguchi, MD, and Jon Kobashigawa, MD

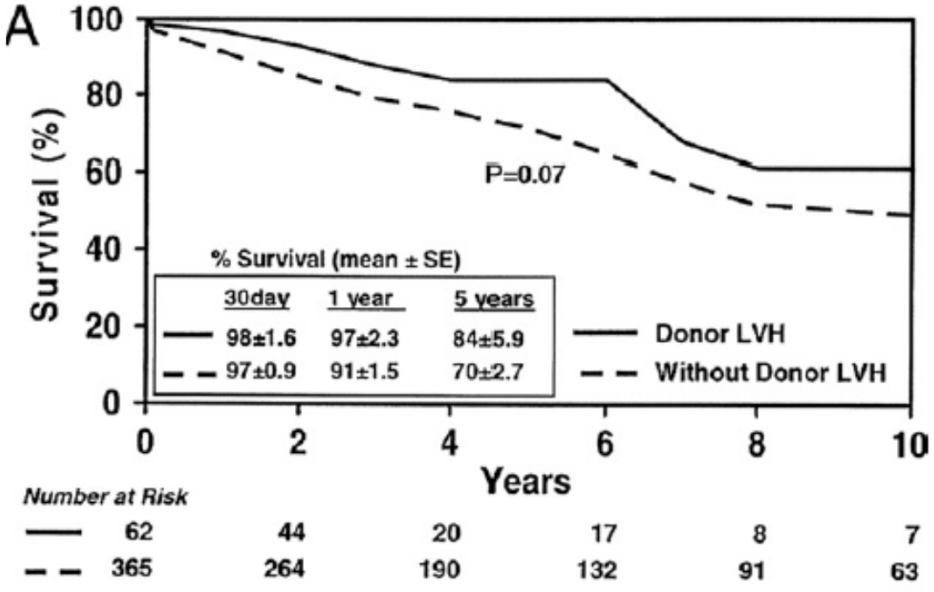
J Heart Lung Transplant 2000;19:496–503.

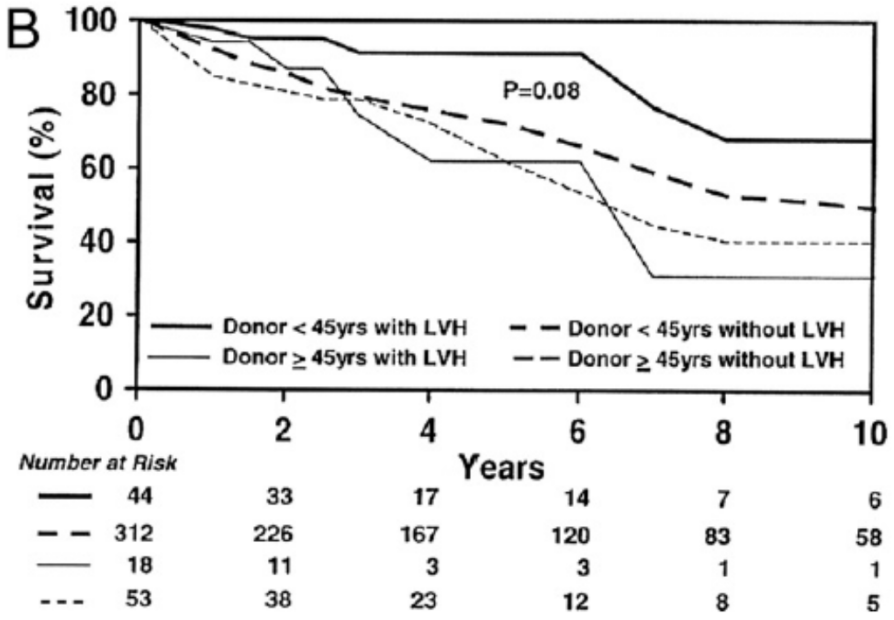


n-=37
Mild vs Mod LVH
P=0.11

Use of Cardiac Allografts With Mild and Moderate Left Ventricular Hypertrophy Can Be Safely Used in Heart Transplantation to Expand the Donor Pool

Sorel Goland, MD,‡ Lawrence S. C. Czer, MD,* Robert M. Kass, MD,† Robert J. Siegel, MD,* James Mirocha, MS,† Michele A. De Robertis, RN,† Jason Lee, BS,† Sharo Raissi, MD,† Wen Cheng, MD,† Gregory Fontana, MD,† Alfredo Trento, MD†

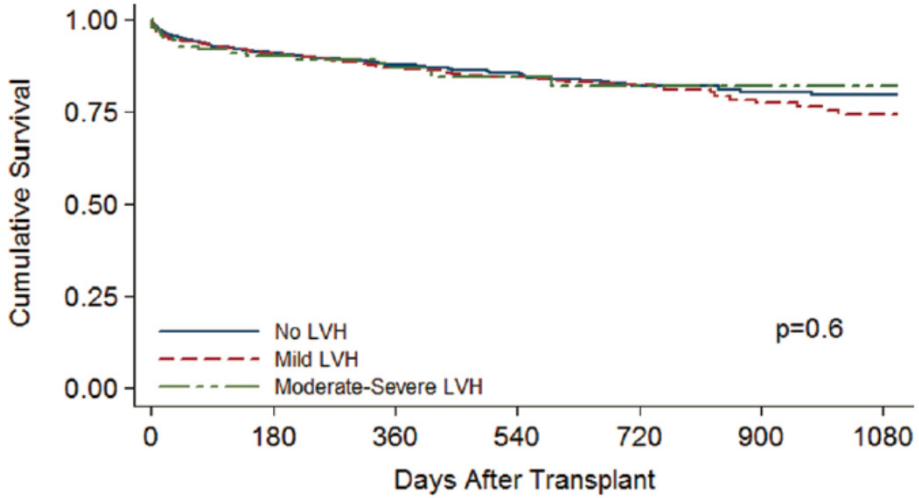




Impact of Donor Left Ventricular Hypertrophy on Survival After Heart Transplant

O. Wever Pinzon[a,b,c], G. Stoddard[a], S. G. Drakos[a,c], E. M. Gilbert[a,b], J. N. Nativi[a,b], D. Budge[c], F. Bader[a,b], R. Alharethi[c], B. Reid[c], C. H. Selzman[a,b], M. D. Everitt[d], A. G. Kfoury[c] and J. Stehlik[a,b,*]

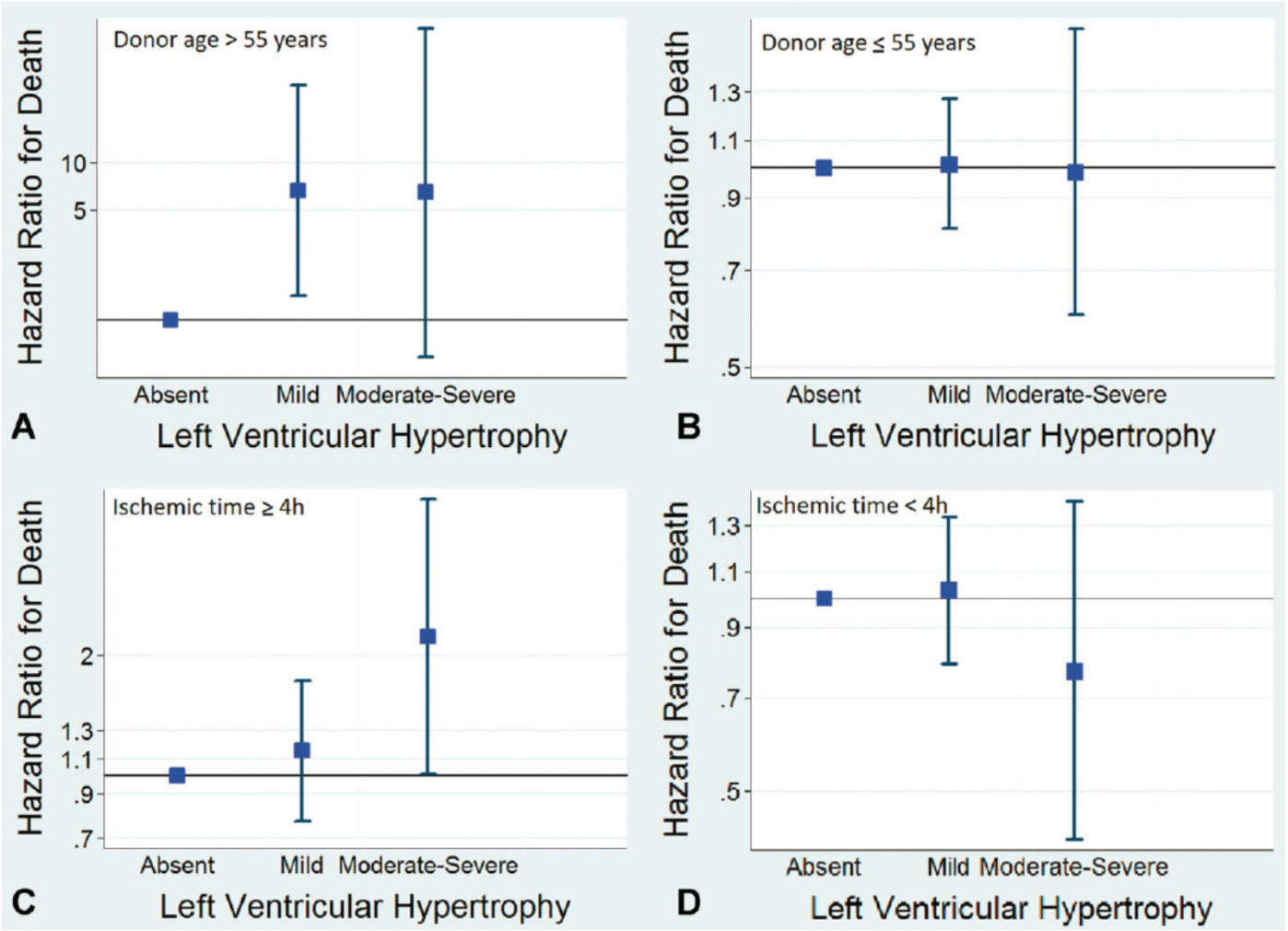
- 2626 donors
- 1002 mild LVH, 148 mod- severe LVH



Age and Ischemic Time

Older

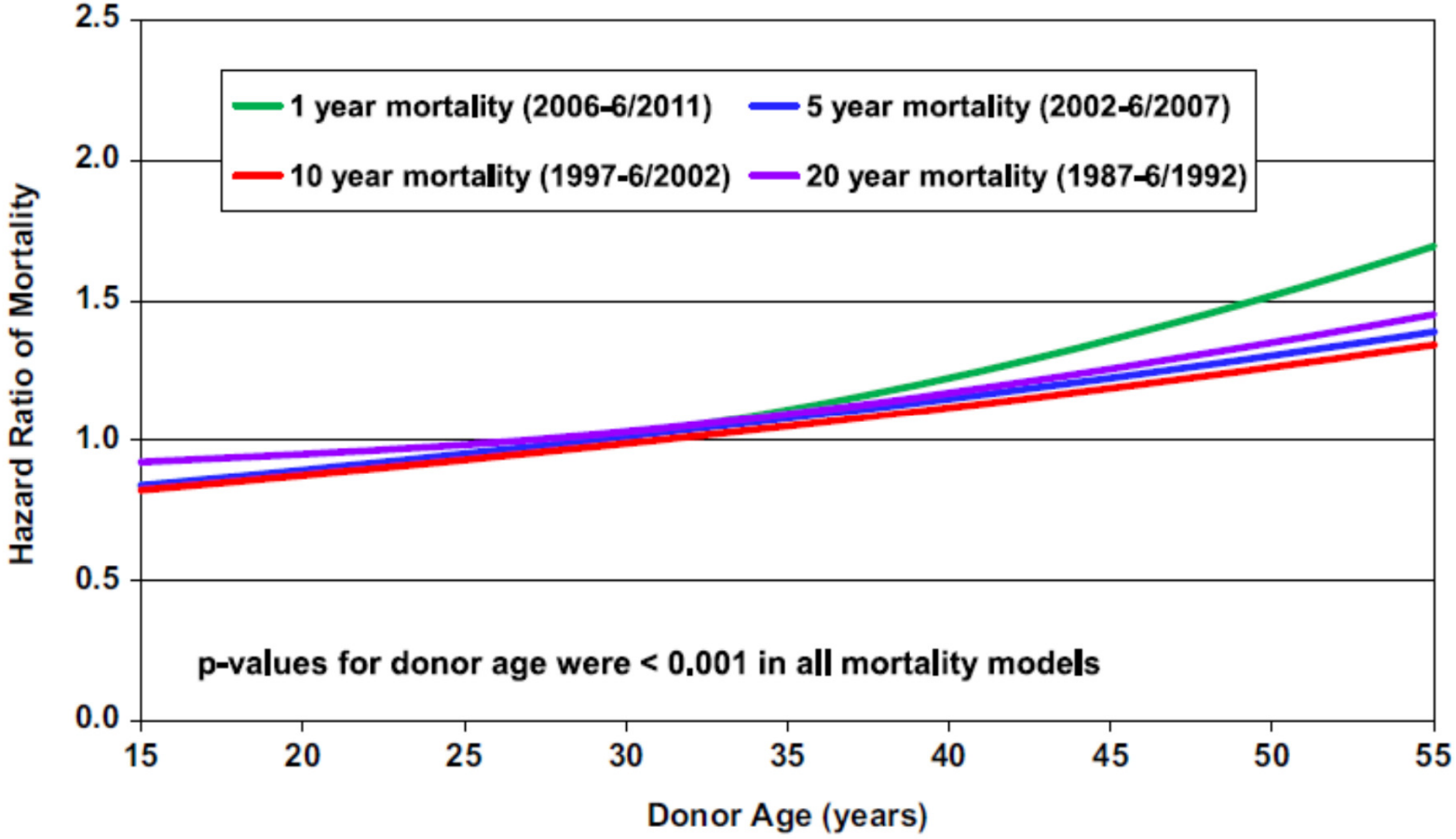
Younger



Longer

Shorter

Impact of Older Donors



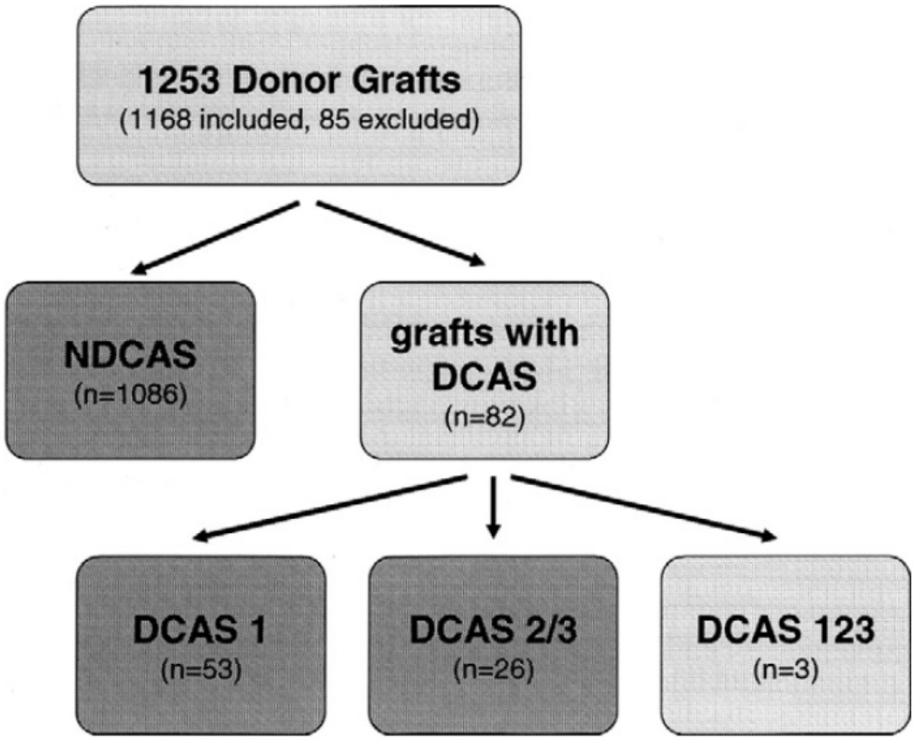
Lund, LH et. al. J Heart Lung Transplant. 2013 Oct;32(10):951-64

CAD of the Donor

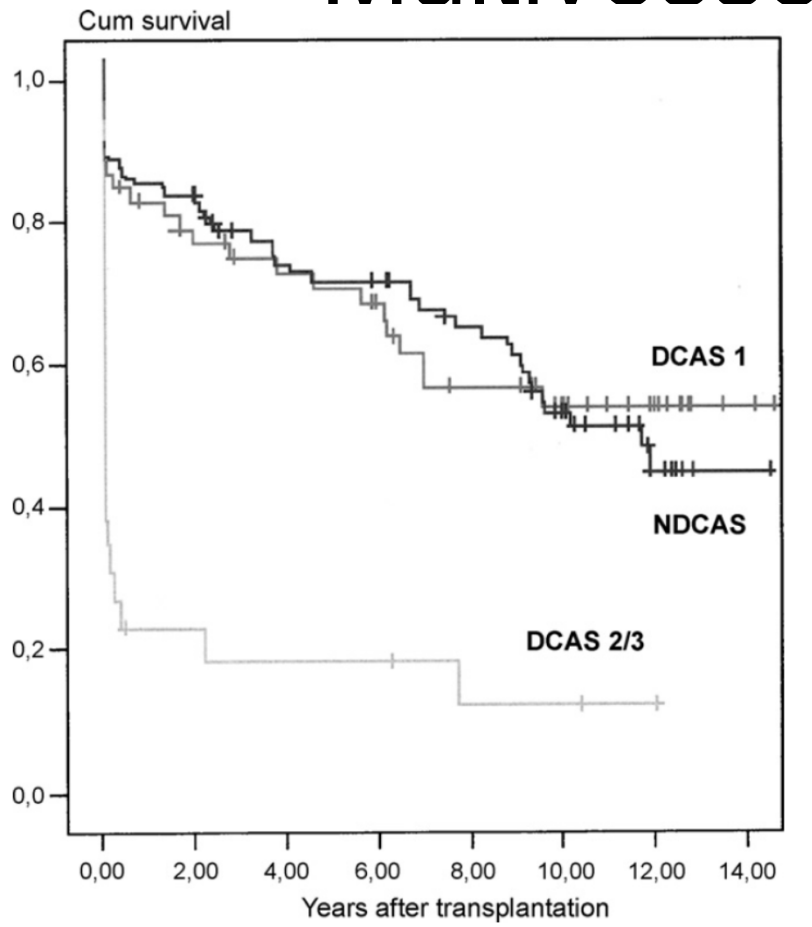
Coronary atherosclerosis of the donor heart — impact on early graft failure☆

Onnen Grauhan*, Henryk Siniawski, Michael Dandel, Hans Lehmkuhl, Christoph Knosalla, Miralem Pasic, Yu-Guo Weng, Roland Hetzer

European Journal of Cardio-thoracic Surgery 32 (2007) 634–638



Single Vessel Disease vs Multivessel



One vessel CAD does not influence survival within limits of selection bias of this study.

Dysfunctional Donors

- Not a new problem

☐ **Donor shortage: use of the dysfunctional donor heart.**

15. Boucek MM, Mathis CM, Kanakriyeh MS, McCormack J, Razzouk A, Gundry SR, Bailey L.
J **Heart** Lung **Transplant**. 1993 Nov-Dec;12(6 Pt 2):S186-90.
PMID: 8312334
Related citations

- Likely related to catecholamine surge from brain death
- May be similar to Takosubo / stress cardiomyopathy

Research Correspondence

Frequency and Pattern of Left Ventricular Dysfunction in Potential Heart Donors

Implications Regarding Use of Dysfunctional Hearts for Successful Transplantation

*Burhan Mohamedali, MD Geetha Bhat, PhD, MD
Allan Zelinger, MD

*University of Illinois at Chicago (UIC)

Table 1 Summary of 11 Potential Donors With Cardiac Dysfunction

Age (Yrs)	Sex	Cause	Dysfunction Pattern	Peak Troponin I	Peak CK-MB	Pressors	Initial EF	Repeat EF	Repeat EF Time Frame
31	Male	Head trauma	Diffuse global	0.55	7.0	Desmopressin, phenylephrine	34%	45%	10 h
46	Male	Drug overdose	Diffuse global	9.57	27.6	Dopamine, norepinephrine	40%		
25	Male	Vehicle accident	Diffuse global	0.36	38.9	Dopamine, phenylephrine	25%	60%	10 h
20	Male	Gun shot head	Basal	1.55	22.0	Norepinephrine	45%		
45	Female	Drug overdose	Diffuse global	2.92	6.5	Dopamine, phenylephrine	12%		
20	Male	Gun shot head	Diffuse global	0.73	33.9	Desmopressin	30%		
55	Female	SAH	Basal	NA	14.7	Desmopressin, phenylephrine	43%		
18	Male	Gun shot head	Midcavity	4.14	14.1	No pressors	35%	41%	3 h
63	Male	SAH	Basal	3.22	17.6	Desmopressin	40%		
51	Female	Cardiac arrest	Apical	0.32	14.1	Desmopressin	35%	56%	36 h
23	Male	Gun shot head	Apical	NA	NA	Phenylephrine	30%	60%	10 h

How Do We Place Available Donors?

- DonorNet launched in 2006 from UNOS
- Assigns PTR (potential transplant recipient) # based on exact priority on the waiting list
- Electronic notification, availability of documents and some images across all US centers
- Simplified notification and communication among the OPO and local coordinators and potentially distant accepting physicians
- Transparent- Can see how many candidates are ahead and behind as well as real time “provisional acceptance” and denial codes

Downsides of Electronic Notifications

- Relies on correct information in chart
  - Echo's change, details may develop
- Reduces personal element of discussion
- By showing the full list, may create a psychological disincentive to take organs turned down by others

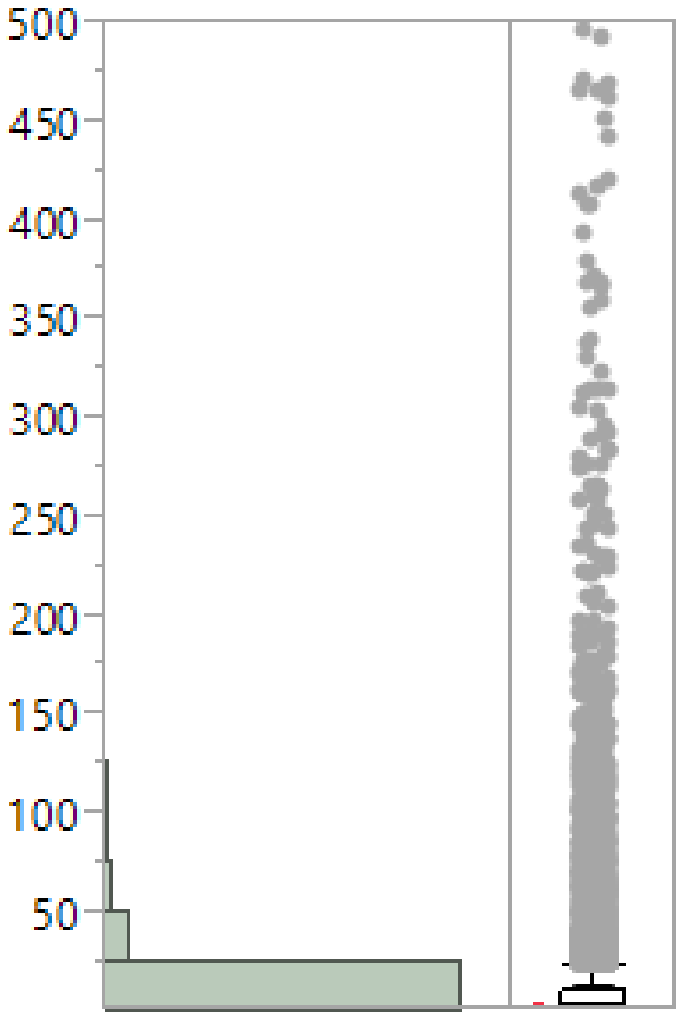
Donor Sequence # and Survival

- Queried UNOS /OPTN for custom dataset with PTR #s
- 13,481 adult heart transplants with PTR data from 5/1/2007 – 3/31/2014
- Disclaimer: Analyses in progress, UNPUBLISHED at this moment
- Accepted at ISHLT 2016 for presentation

Snapshot 2007-2014: 13,481 Hearts

Factor	Range	Mean ± Std Dev
Male Recipient	74%	
Recipient Age	18-79	52.63 ± 12.84
Days Status 1A Waiting	0-943	24.76 ± 47.27
Days Status 1B Waiting	0-1904	77.82 ± 141.74
Days Status 2 Waiting	0-3164	65.88 ± 201.54
Donor Age	9-66	31.68 ± 11.7
Male Donor	71 %	
Donor Gender Mismatch	74.1 %	
Female Donor into Male Recip	14.3 %	
Donor HTN	15 %	
Donor Smoking hx	14.2 %	
Donor Diabetes	3 %	
Donor "CDC High Risk"	10.5 %	
Ischemic Time	0.22-12 hours	3.24 ± 1.06
Donor LVEF	40-81 %	61.6 ± 7.1

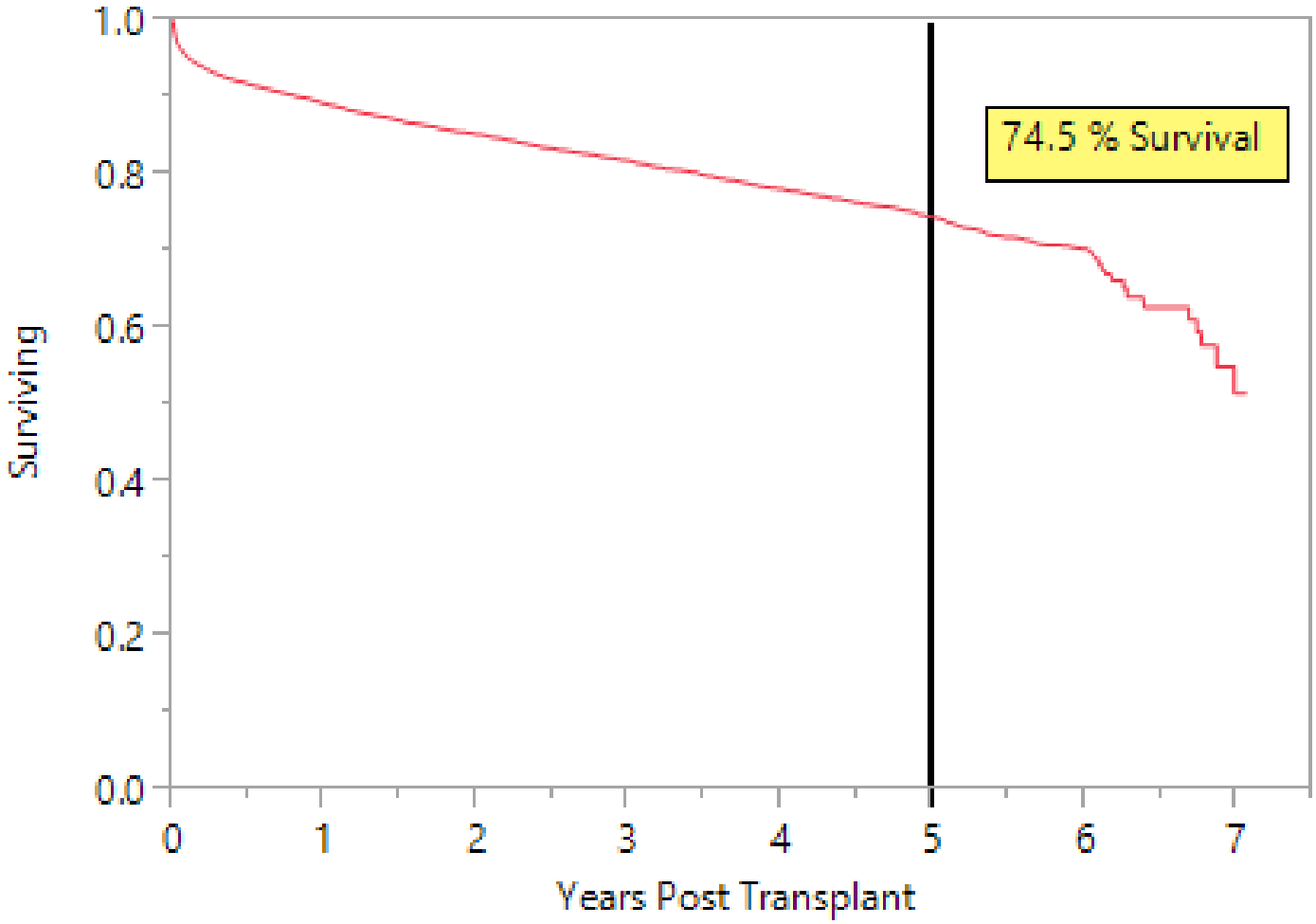
Donor PTR/ Sequence



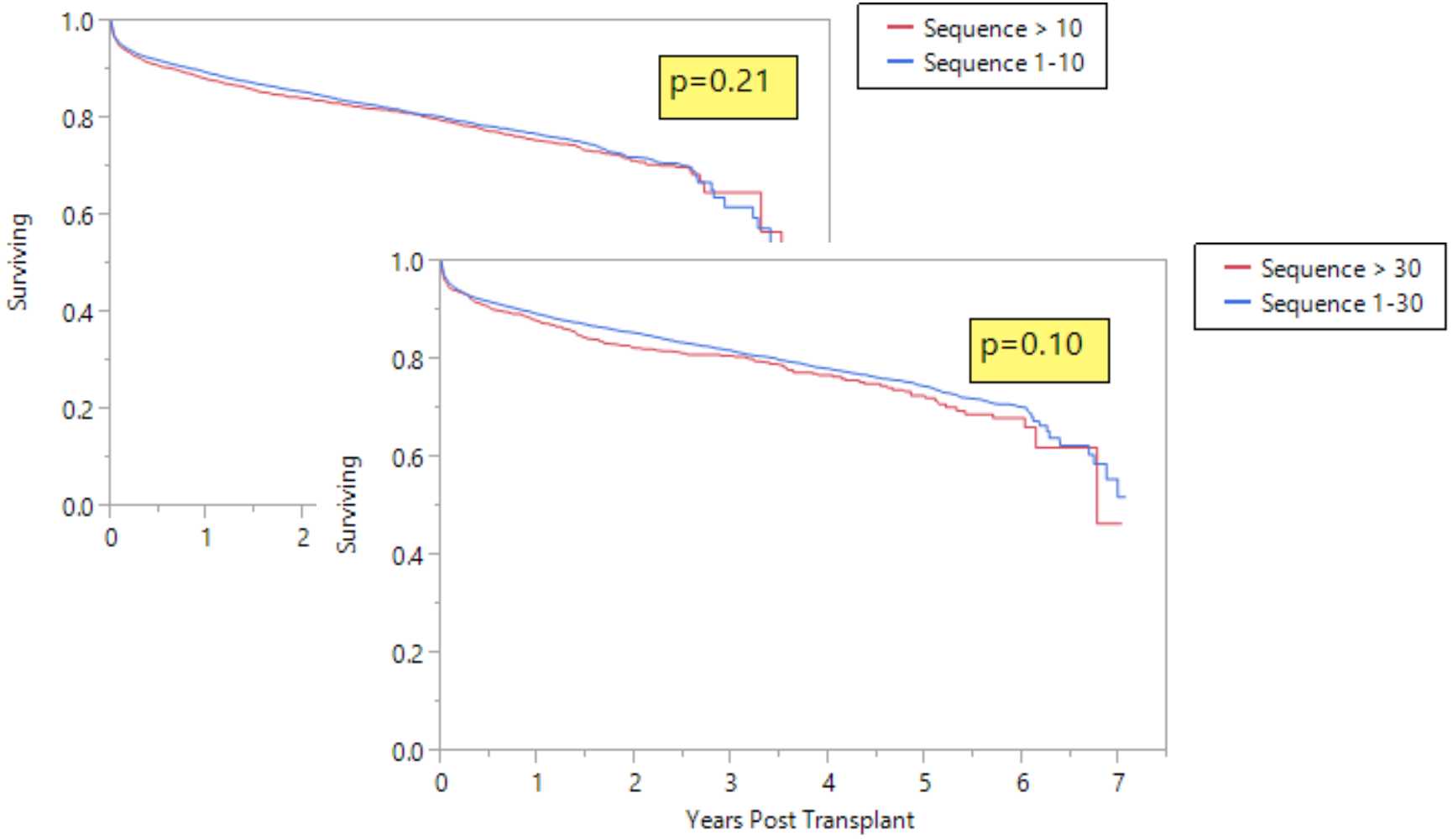
Quantiles		
100.0%	maximum	1263
99.5%		291.28
97.5%		84
90.0%		27
75.0%	quartile	10
50.0%	median	3
25.0%	quartile	1
10.0%		1
2.5%		1
0.5%		1
0.0%	minimum	1

Summary Statistics	
Mean	13.364236
Std Dev	45.689345
Std Err Mean	0.395538
Upper 95% Mea	14.139546
Lower 95% Mean	12.588925
N	13343

Survival, n=13,438, 2007-2014



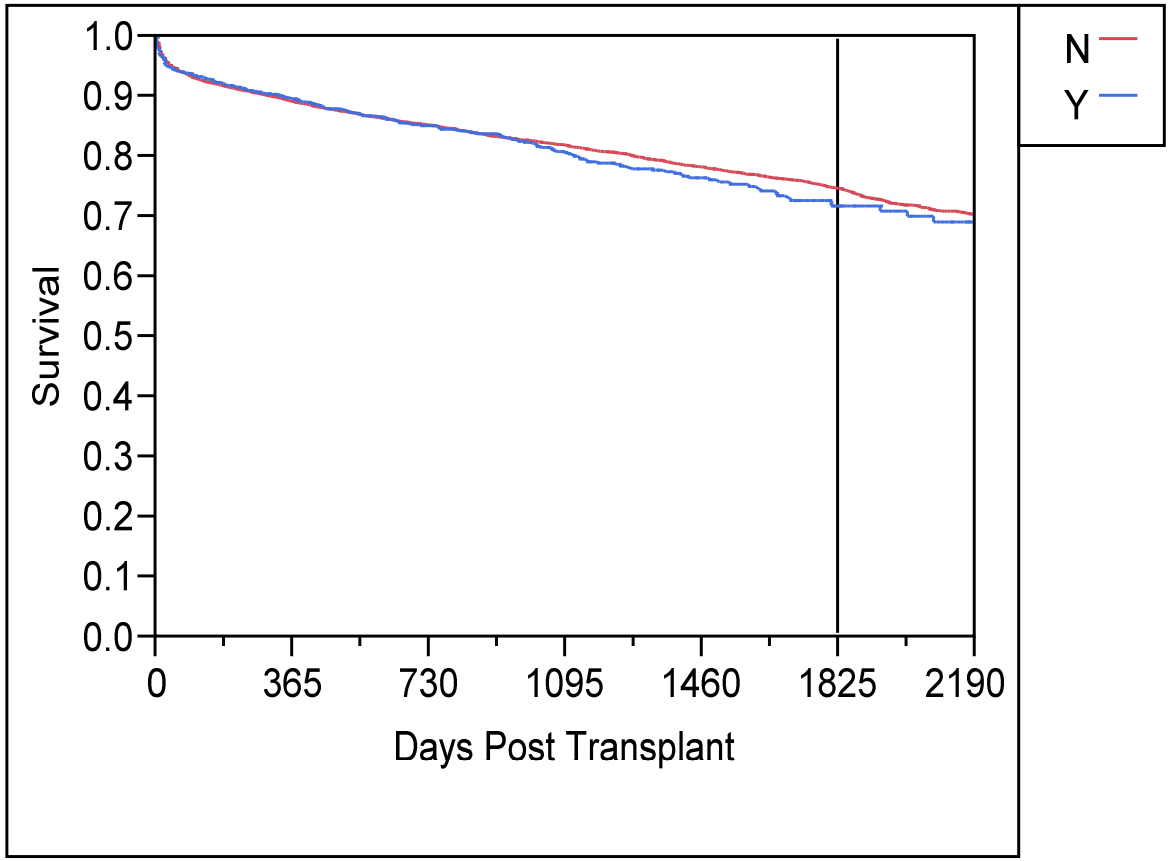
Sequence #: Survival Similar



Factor	Mean (Seq 1-30)	Mean (Seq ≥ 31)	p-value
Recipient ABO O	38.13%	**46.13%**	p<0.0001
Recipient ABO AB	**6.00%**	**1.98%**	p<0.0001
Recipient Age	**52.41 ± 12.90**	**55.05 ± 11.98**	p<0.0001
Donor Age	**31.18 ± 11.47**	**36.70± 12.83**	p<0.0001
CDC High Risk	**10.20%**	**16.61%**	p<0.0001
UNOS Status 1A Days	**25.79 ± 47.65**	**13.28 ± 39.37**	p<0.0001
UNOS Status 1B Days	**79.44 ± 143.40**	**60.27± 121.37**	p<0.0001
Miles to Donor Hospital	**164.77± 200.20**	**376.81± 273.75**	p<0.0001
Donor Gender: Male	**73.00%**	50.69**%**	p<0.0001
Donor Hx Hypertension	**13.32%**	**26.16%**	p<0.0001
Ischemic Time	**3.19 hr ± 1.05**	**3.76 hr ± 0.98**	p<0.0001
LVEF	**61.70 %± 7.08**	**61.07 %± 7.21**	p=0.005

Outcomes With Traditional Risk Groups

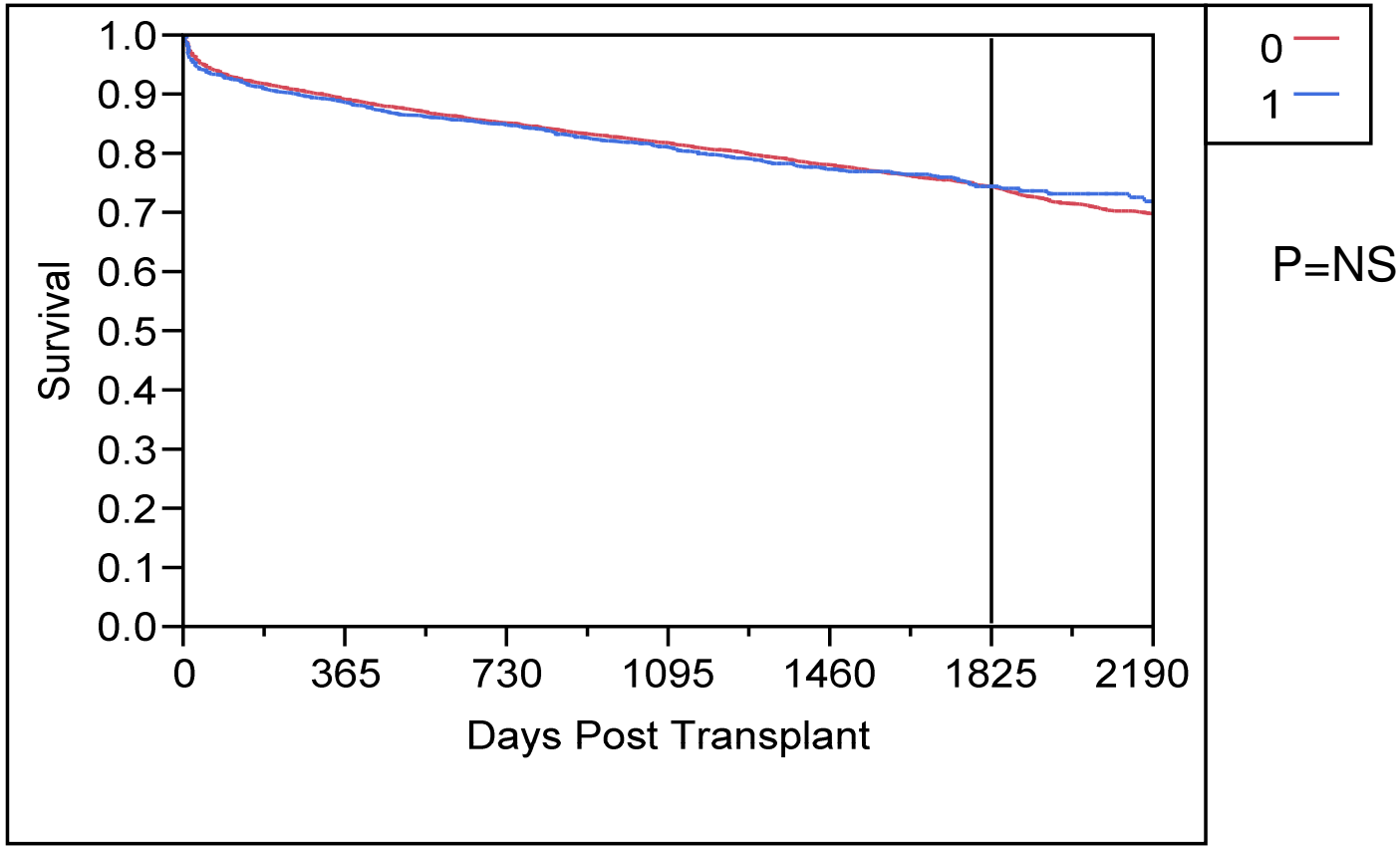
Donor CDC High Risk



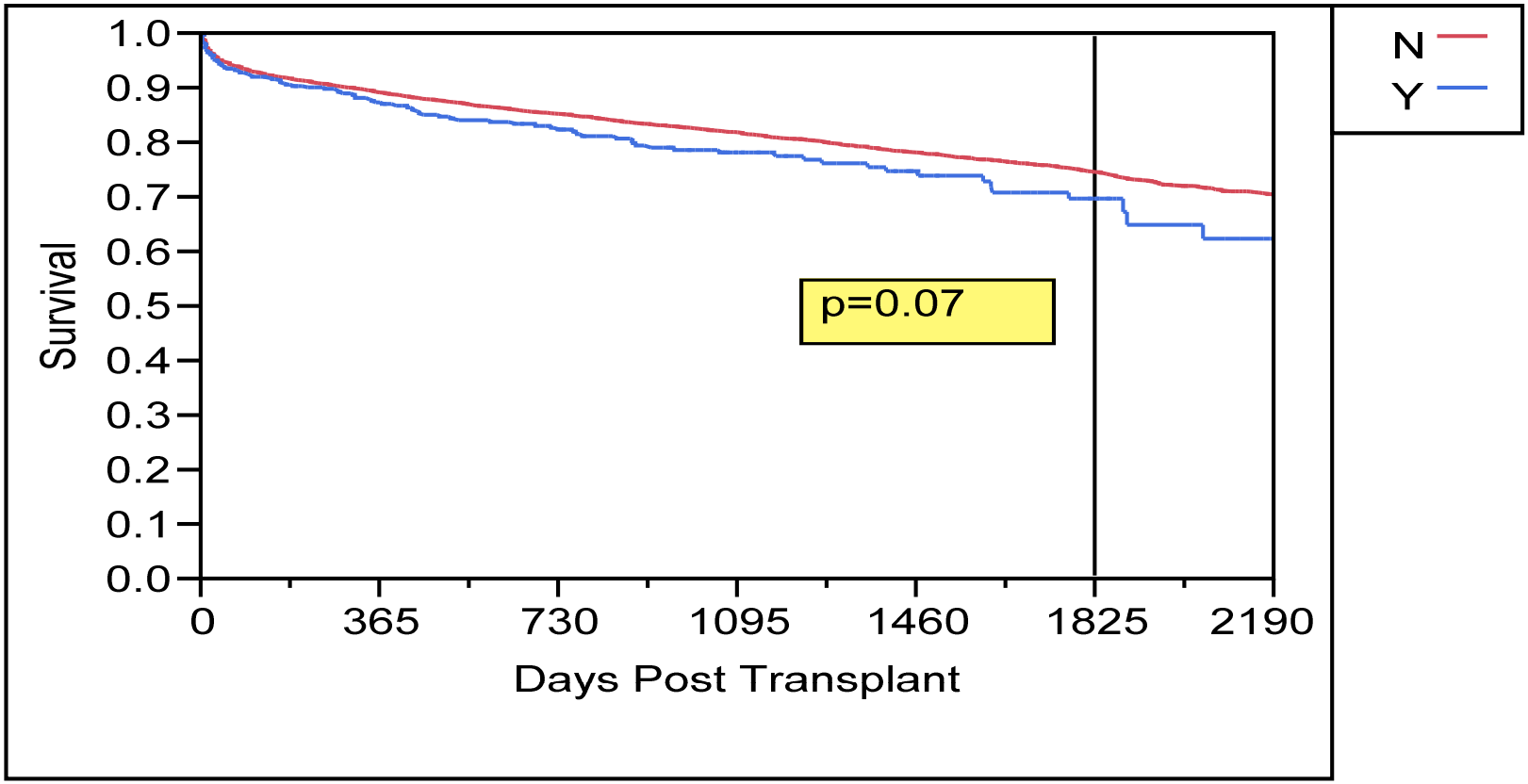
P=NS

Outcomes With Traditional Risk Groups

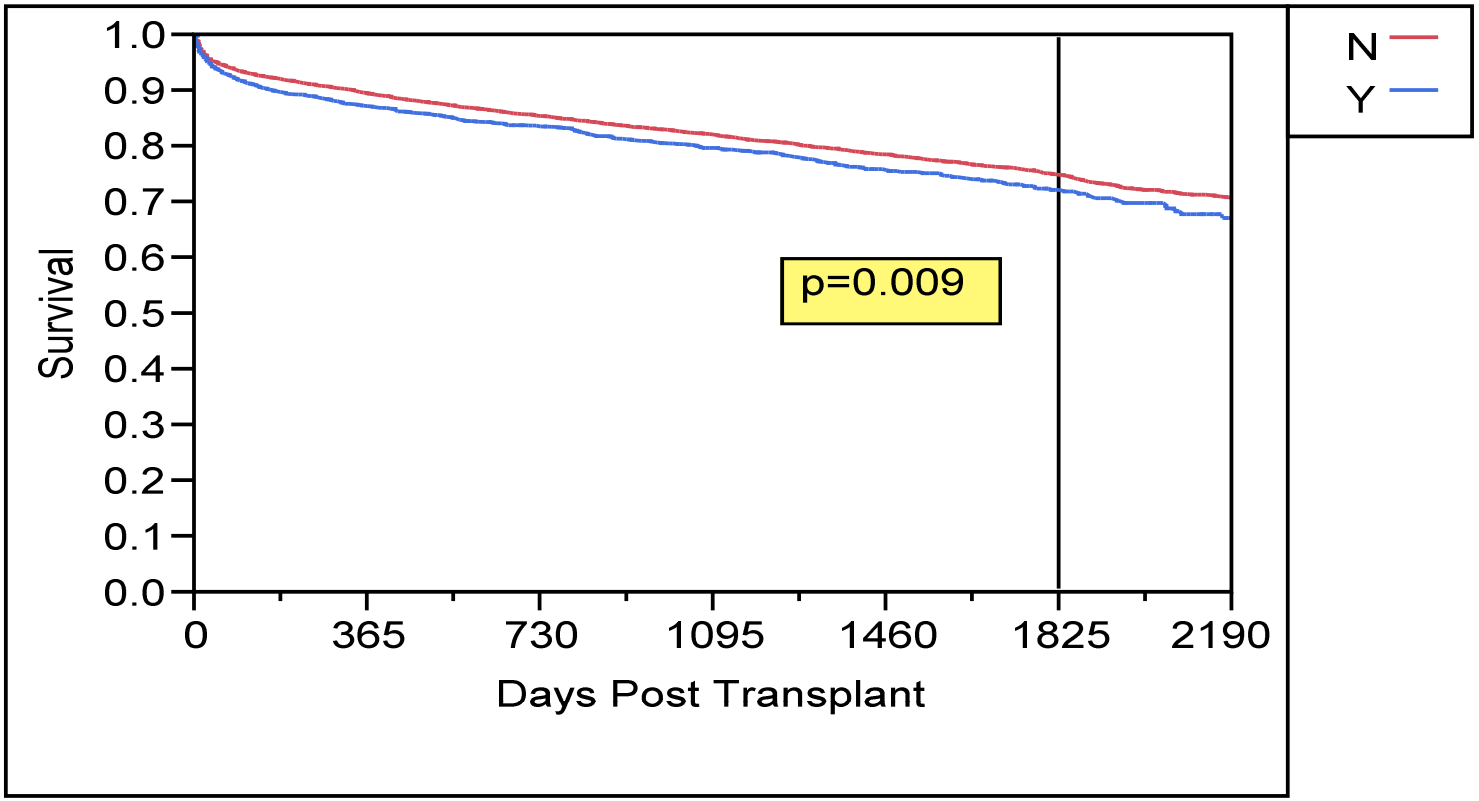
Female Donor / Male Recipient



Diabetic Donor



Hypertension Hx in Donor



Why Don't We Use High Sequence Donors?

Unintended Consequences

- DonorNet transparency and sequences should have made increased efficiency
- Utilization should have gone up
- As we embark on a drastic reworking of allocation and geographic distribution for hearts in the US we must be mindful of unintended consequences

Conclusions

- We will never have sufficient donors to meet the demand for this life saving therapy
- We must use evidence to see that we are leaving donors that could be utilized safely.
- Sequence # could be a way of identifying “extended criteria donors” and potentially moving them out of the UNOS PSR assessment to encourage use in a trial setting.