New Strategies in the Management of Acute and Advanced Heart Failure

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Disclosures

- Research Support :Merck,Roche, Resmed, NHLBI
- Consultant: Resmed,Merck, FDA
- Equity : BisCardia

Why Do We Care : Quantity of Life?

The Next Generation

Mom at 88

Quality of Life

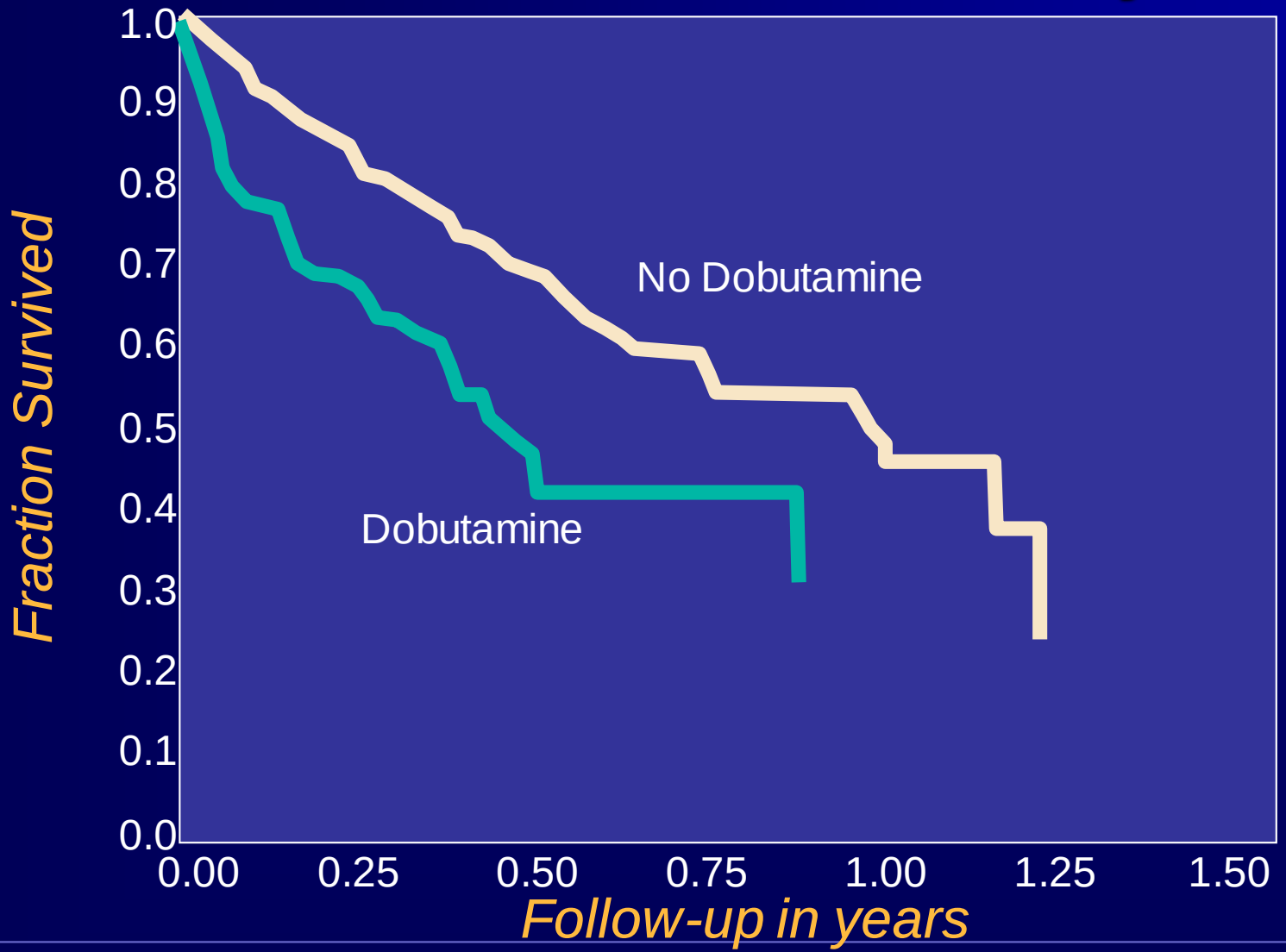
Charlie going to UNC formal

Duke BB Lovefest

Goals of Therapy

1) Relieve symptoms
2) Stabilize condition and lower risk for rehospitalization and death
3) Initiate treatments that will slow disease progression and improve long-term survival
4) Limit significant adverse effects (arrhythmia, renal failure)

Dobutamine and Increased Mortality



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O'Connor, et al, AHJ, 138 (1): 78-86

The OPTIME Trial: First Large Trial

Short-term Intravenous Milrinone for Acute Exacerbation of Chronic Heart Failure

A Randomized Controlled Trial

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Robert M. Califf, MD
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Robert Bourge, MD
Wilson S. Colucci, MD
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Christopher M. O'Connor, MD
Ileana Pina, MD
Rebecca Quigg, MD
Marc A. Silver, MD
Mihai Gheorghiade, MD

for the Outcomes of a Prospective Trial of Intravenous Milrinone for Exacerbations of Chronic Heart Failure (OPTIME-CHF) Investigators

Context Little randomized evidence is available to guide the in-hospital management of patients with an acute exacerbation of chronic heart failure. Although intravenous inotropic therapy usually produces beneficial hemodynamic effects and is labeled for use in the care of such patients, the effect of such therapy on intermediate-term clinical outcomes is uncertain.

Objective To prospectively test whether a strategy that includes short-term use of milrinone in addition to standard therapy can improve clinical outcomes of patients hospitalized with an exacerbation of chronic heart failure.

Design Prospective, randomized, double-blind, placebo-controlled trial conducted from July 1997 through November 1999.

Setting Seventy-eight community and tertiary care hospitals in the United States.

Participants A total of 951 patients admitted with an exacerbation of systolic heart failure not requiring intravenous inotropic support (mean age, 65 years; 92% with baseline New York Heart Association class III or IV; mean left ventricular ejection fraction, 23%).

Intervention Patients were randomly assigned to receive a 48-hour infusion of either milrinone, 0.5 μg/kg per minute initially (n=477), or saline placebo (n=472).

Main Outcome Measure Cumulative days of hospitalization for cardiovascular cause within 60 days following randomization.

Results The median number of days hospitalized for cardiovascular causes within 60 days after randomization did not differ significantly between patients given milrinone (6 days) compared with placebo (7 days; $P=.71$). Sustained hypotension requiring intervention (10.7% vs 3.2%; $P<.001$) and new atrial arrhythmias (4.6% vs 1.5%; $P=.004$) occurred more frequently in patients who received milrinone. The milrinone and placebo groups did not differ significantly in in-hospital mortality (3.8% vs 2.3%; $P=.19$), 60-day mortality (10.3% vs 8.9%; $P=.41$), or the composite incidence of death or readmission (35.0% vs 35.3%; $P=.92$)

Conclusion These results do not support the routine use of intravenous milrinone as an adjunct to standard therapy in the treatment of patients hospitalized for an exacerbation of chronic heart failure.

JAMA. 2002;287:1541-1547 www.jama.com

CHRONIC HEART FAILURE IS ONE of the most common and life-threatening cardiovascular conditions, affecting nearly 5 million people in the United States.[1] It causes more than 200 000 deaths each year[2-4] and is the leading discharge diagnosis among the Medicare population.[5,6] Treatment costs for chronic heart failure, most of which are incurred by inpatients, are more than $30 billion yearly.[7] Almost half of the patients with

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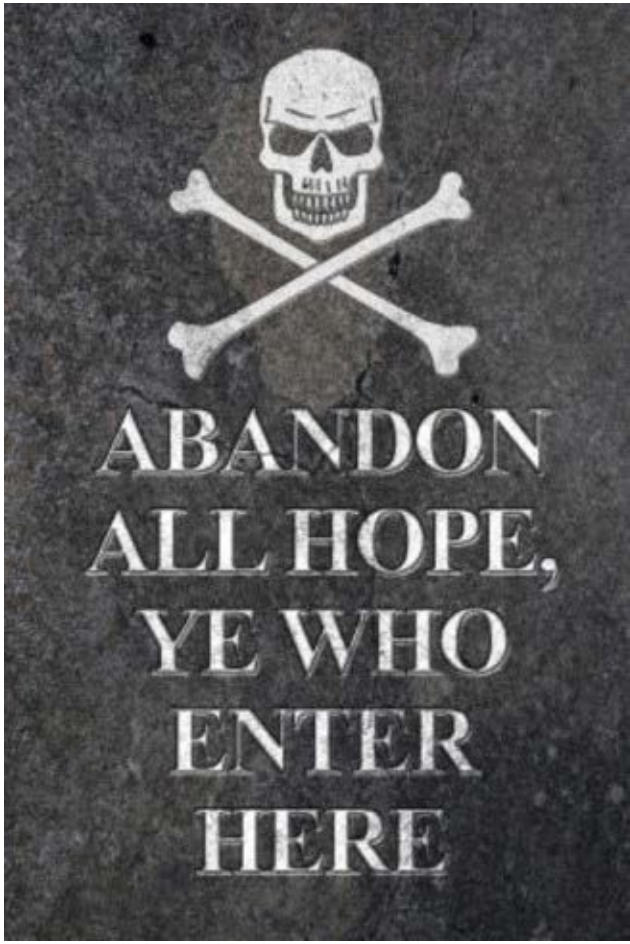
History of Drug Development in Acute HF



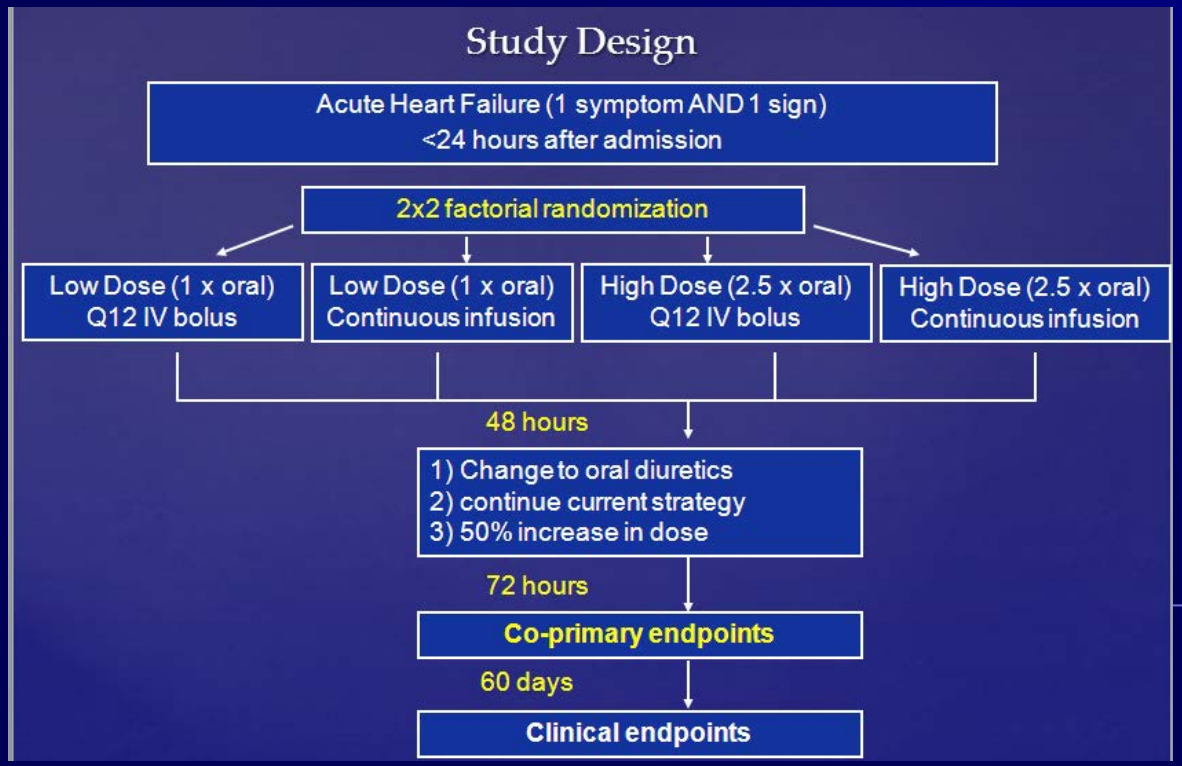
DukeMedicine

The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812 MARCH 3, 2011 VOL. 364 NO. 9

Diuretic Strategies in Patients with Acute Decompensated Heart Failure

G. Michael Felker, M.D., M.H.S., Kerry L. Lee, Ph.D., David A. Bull, M.D., Margaret M. Redfield, M.D., Lynne W. Stevenson, M.D., Steven R. Goldsmith, M.D., Martin M. LeWinter, M.D., Anita Deswal, M.D., M.P.H., Jean L. Rouleau, M.D., Elizabeth O. Ofili, M.D., M.P.H., Kevin J. Anstrom, Ph.D., Adrian F. Hernandez, M.D., Steven E. McNulty, M.S., Eric J. Velazquez, M.D., Abdallah G. Kfoury, M.D., Horng H. Chen, M.B., B.Ch., Michael M. Givertz, M.D., Marc J. Semigran, M.D., Bradley A. Bart, M.D., Alice M. Mascette, M.D., Eugene Braunwald, M.D., and Christopher M. O'Connor, M.D., for the NHLBI Heart Failure Clinical Research Network*



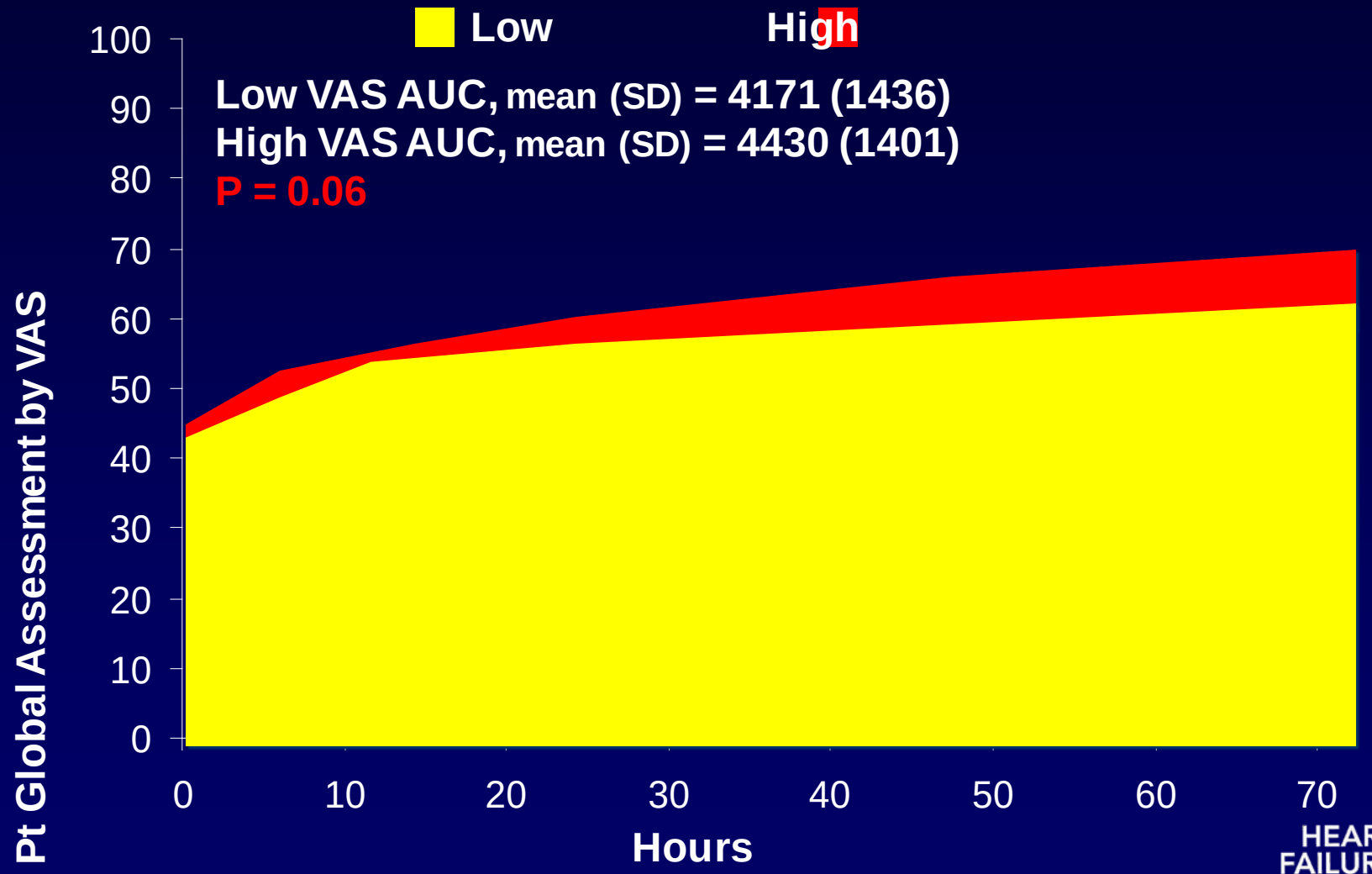
The Dose Trial

No difference between lasix drip and bolus

High Dose associated with improved global status, dyspnea, urine output, BNP levels

High dose safe without sustained creatinine increase

Patient Global Assessment VAS AUC: Low vs. High Intensification



HEART FAILURE NETWORK

Secondary Endpoints: Low vs. High Intensification

	Low	High	P value
Dyspnea VAS AUC at 72 hours	4478	4668	0.041
% free from congestion at 72 hrs	11%	18%	0.091
Change in weight at 72 hrs	-6.1 lbs	-8.7 lbs	0.011
Net volume loss at 72 hrs	3575 mL	4899 mL	0.001
Change in NTproBNP at 72 hrs (pg/mL)	-1194	-1882	0.06
% Treatment failure	37%	40%	0.56
% with Cr increase > 0.3 mg/dL within 72 hrs	14%	23%	0.041
Length of stay, days (median)	6	5	0.55

HEART FAILURE NETWORK

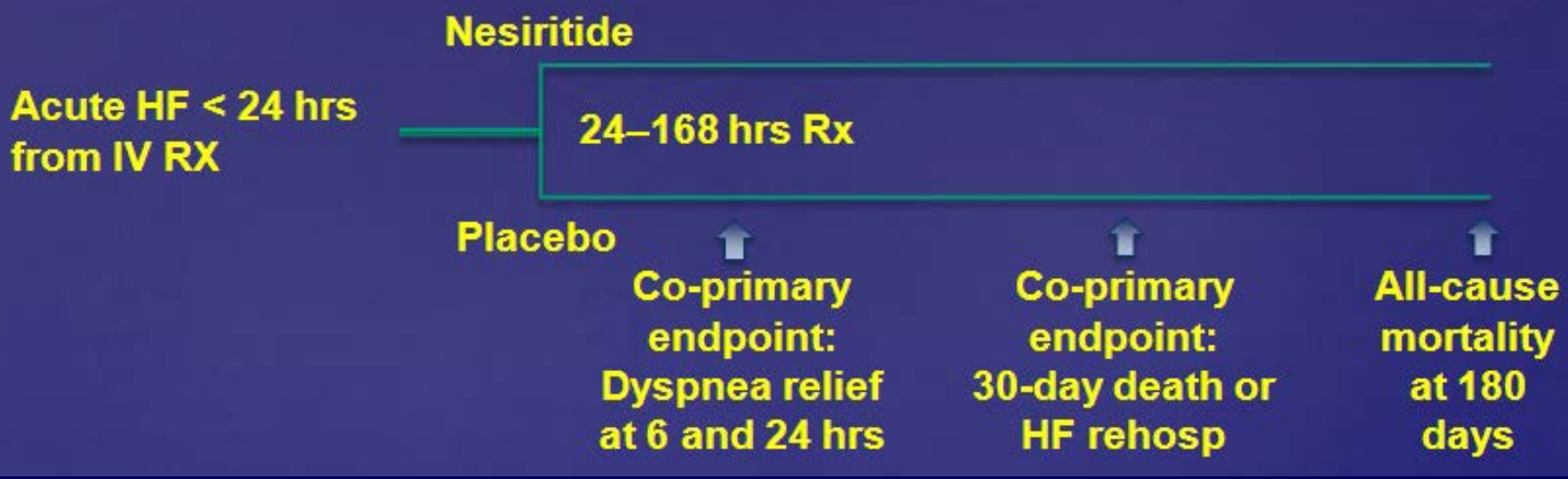
The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Effect of Nesiritide in Patients with Acute Decompensated Heart Failure

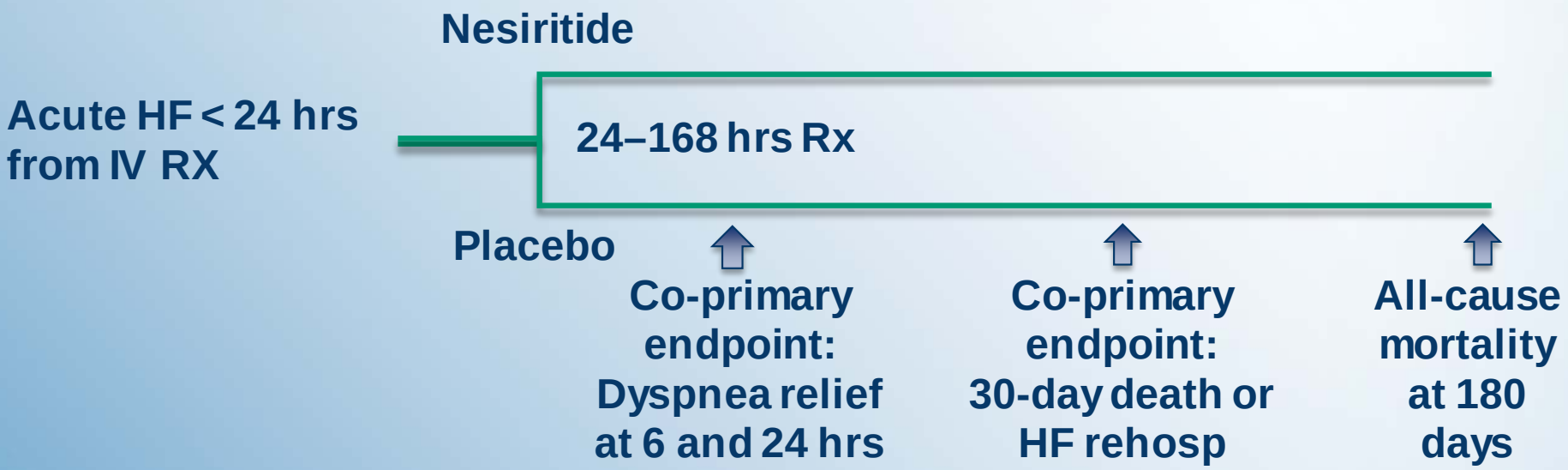
C.M. O'Connor, R.C. Starling, A.F. Hernandez, P.W. Armstrong, K. Dickstein, V. Hasselblad, G.M. Heizer, M. Komajda, B.M. Massie, J.J.V. McMurray, M.S. Nieminen, C.J. Reist, J.L. Rouleau, K. Swedberg, K.F. Adams, Jr., S.D. Anker, D. Atar, A. Battler, R. Botero, N.R. Bohidar, J. Butler, N. Clausell, R. Corbalán, M.R. Costanzo, U. Dahlstrom, L.I. Deckelbaum, R. Diaz, M.E. Dunlap, J.A. Ezekowitz, D. Feldman, G.M. Felker, G.C. Fonarow, D. Gennevois, S.S. Gottlieb, J.A. Hill, J.E. Hollander, J.G. Howlett, M.P. Hudson, R.D. Kociol, H. Krum, A. Laucevicius, W.C. Levy, G.F. Méndez, M. Metra, S. Mittal, B.-H. Oh, N.L. Pereira, P. Ponikowski, W.H.W. Tang, S. Tanomsup, J.R. Teerlink, F. Triposkiadis, R.W. Troughton, A.A. Voors, D.J. Whellan, F. Zannad, and R.M. Califf

Study design and drug procedures



Study design and drug procedures

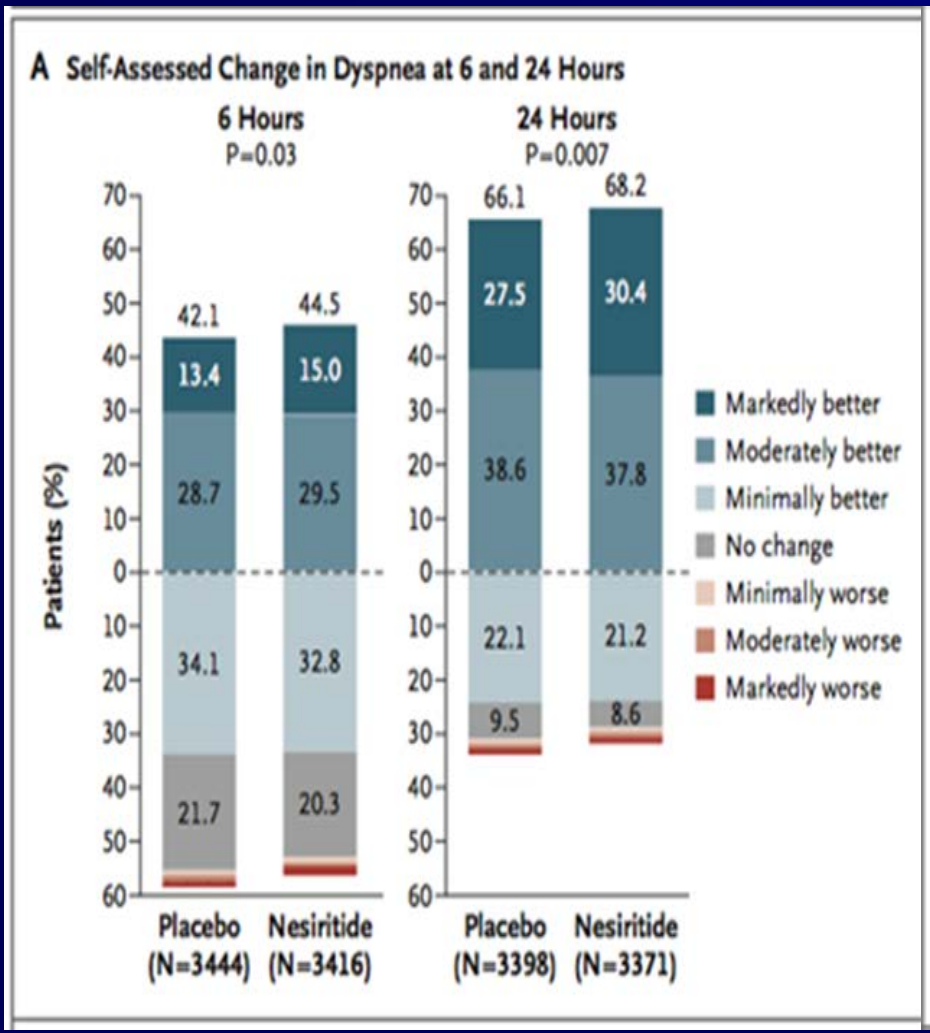
ASCEND-HF
Acute Study of Clinical Effectiveness of Nesiritide in Decompensated Heart Failure

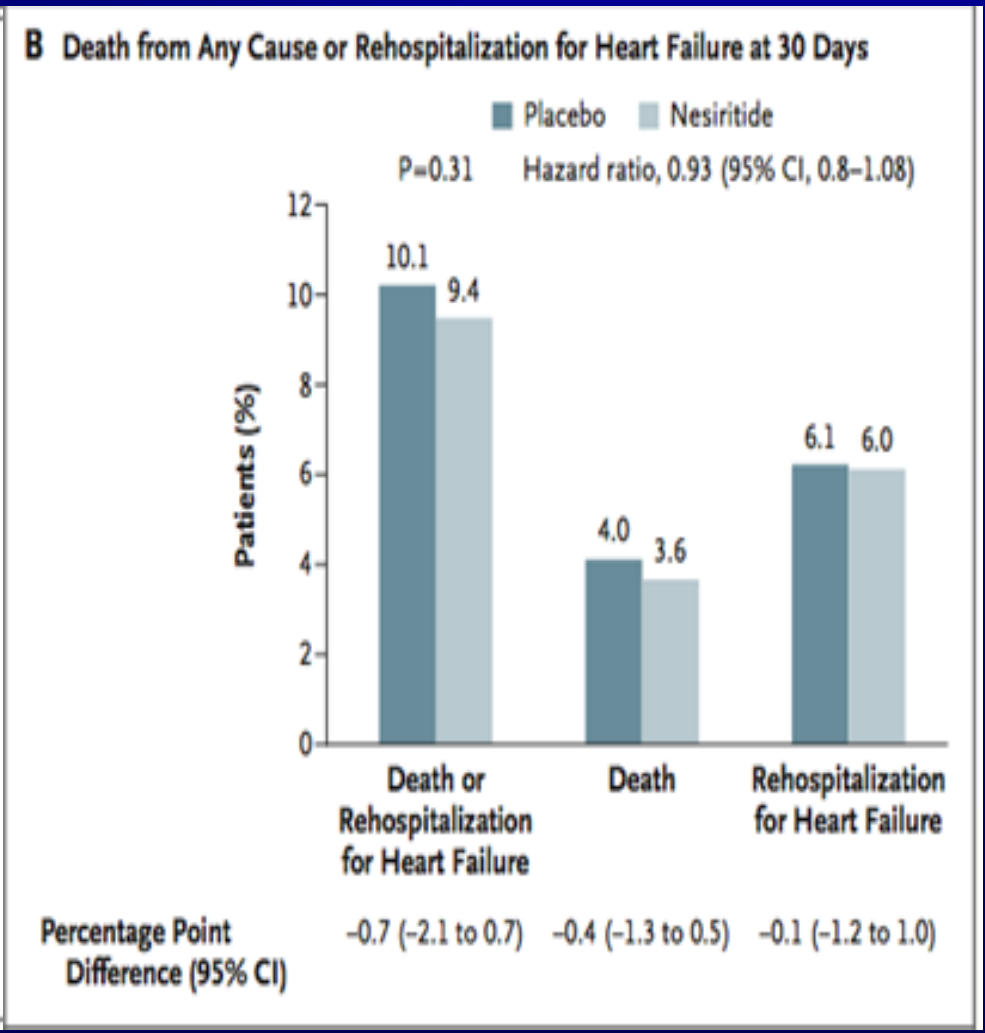


- Double – blind placebo controlled
- IV bolus (loading dose) of 2 µg/kg nesiritide or placebo
  - Investigator's discretion for bolus
  - Followed by continuous IV infusion of nesiritide 0.01 µg/kg/min or placebo *for up to 7 days*
- Usual care per investigators including diuretics and/or other therapies as needed
- Duration of treatment per investigator based on clinical improvement

ASCEND RESULTS

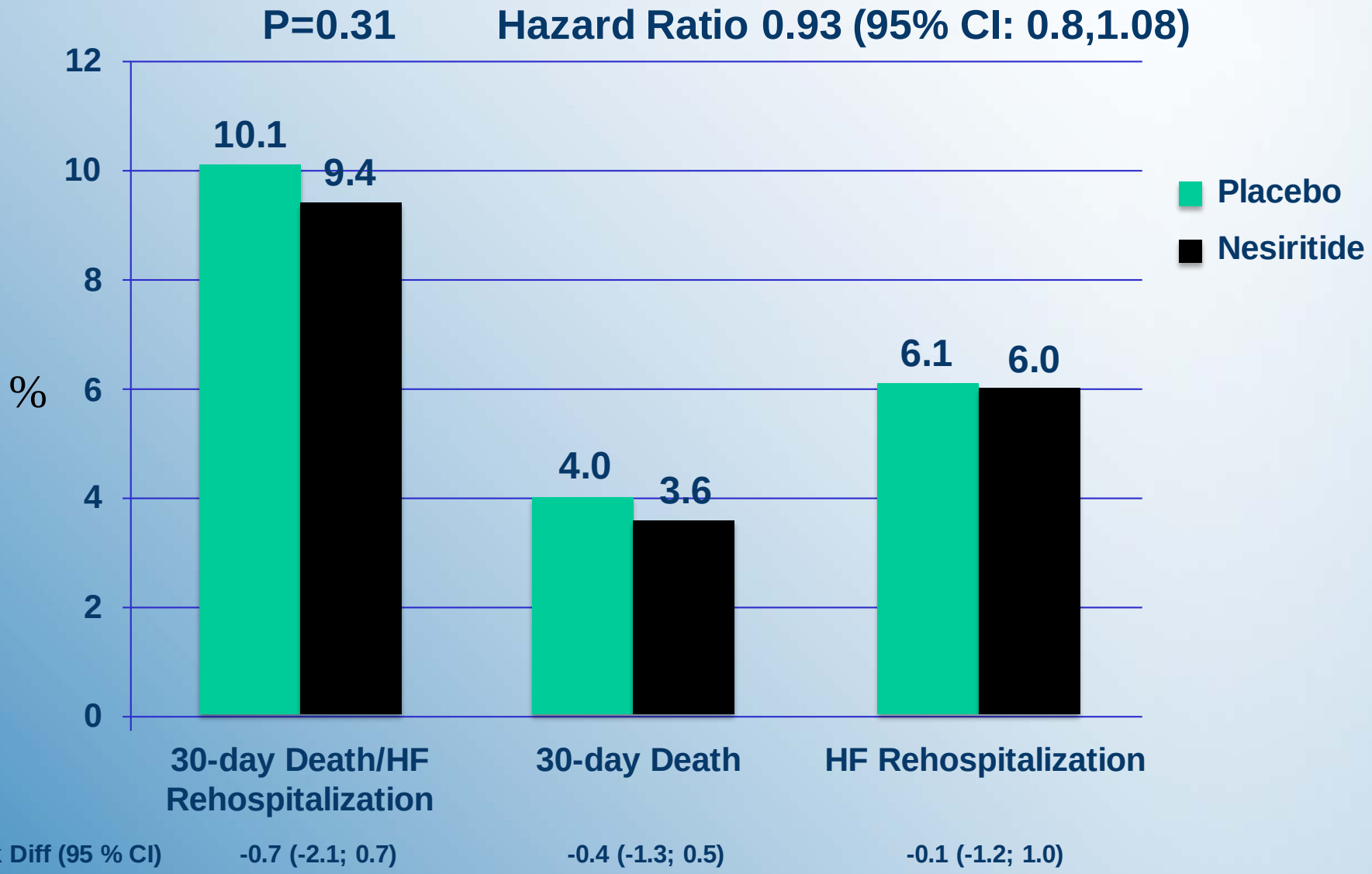
Minimal Improvement in Dyspnea and no difference in HF hosp. or Death





Co-Primary outcome: 30-day all-cause mortality or HF rehospitalization

ASCEND-HF
Acute Study of Clinical Effectiveness of Nesiritide in Decompensated Heart Failure



Risk Diff (95 % CI)	-0.7 (-2.1; 0.7)	-0.4 (-1.3; 0.5)	-0.1 (-1.2; 1.0)

Autopsy : High Income Attenuated Benefit

ASCEND-HF
Acute Study of Clinical Effectiveness of Nesiritide in Decompensated Heart Failure

30-day all-cause death or hospitalization (Nesiritide efficacy)		0.039
High, >$11,455	1.04 (0.89-1.23)	
Upper-Middle, $3,706-$11,455	0.68 (0.49-0.94)	
Lower-Middle, $936-$3,705	0.77 (0.53-1.12)	

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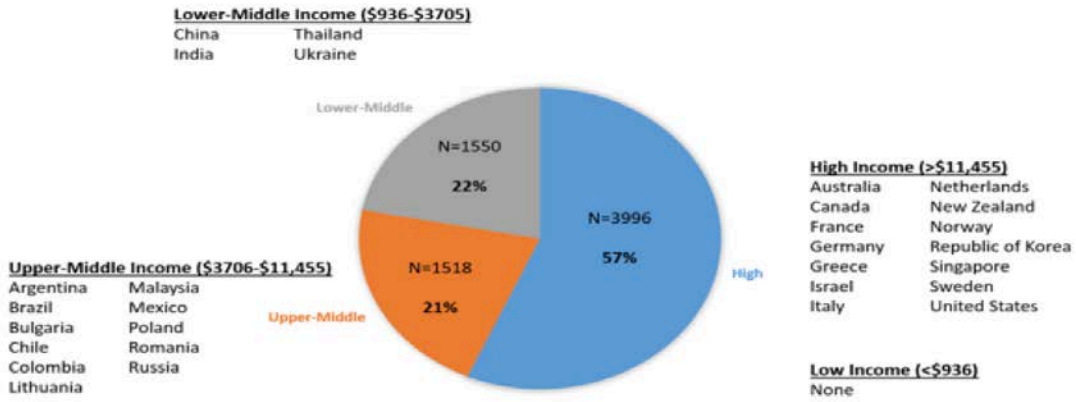
Figure 1.



Greene et. al

JACC: HEART FAILURE VOL. 4, NO
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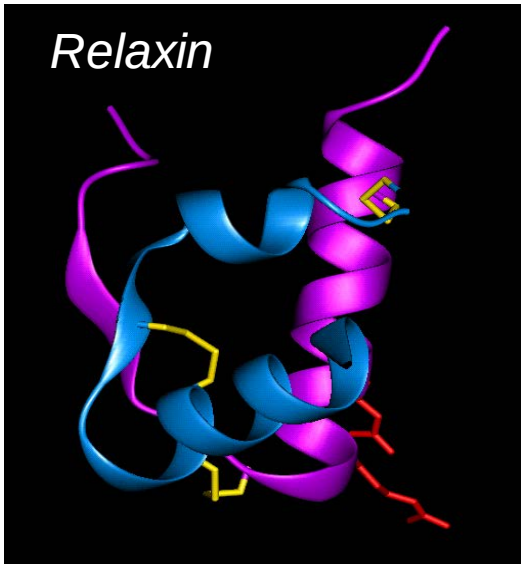
PUBLISHED BY ELSEVIER http://dx.doi.org/10.1016/j.jchf.201

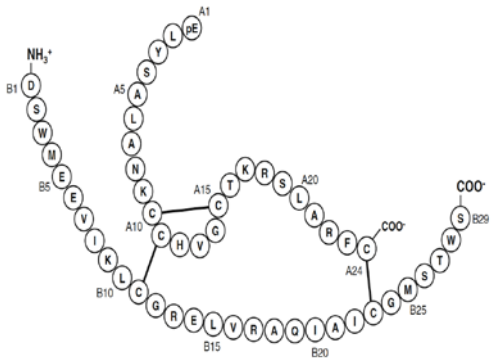
EDITOR'S PAGE

Why Negative Trials Are Positive for Heart Failure Patients

Christopher M. O'Connor, MD, FACC, *Editor-in-Chief, JACC: Heart Failure*

Relaxin





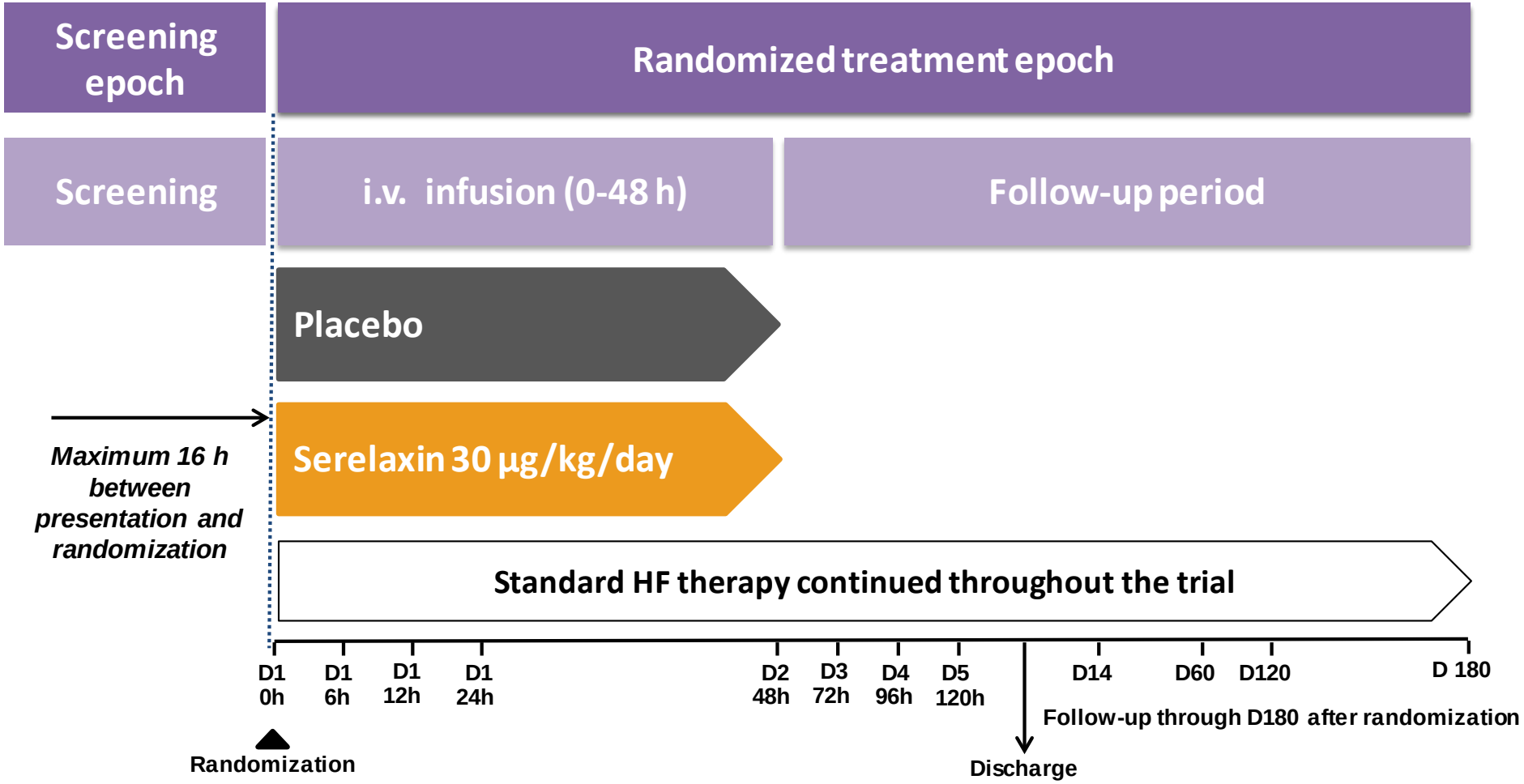
1. Szlachter BN *et al. Obstet & Gynecol* 1982;59:167-70;
2. Stewart DR *et al. J Clin Endocrinol Metab* 1990;70:1771-3.

- Insulin-like protein
- Naturally-occurring peptide
- Found in men and women
- Normal hormone of pregnancy
- In humans, contributes to maternal hemodynamic adaptations to pregnancy
- Women “exposed” for 9 months to increased plasma concentrations: 0.8–1.6 ng/mL pregnancy[1,2]
- Benign safety profile

RELAX-AHF-2
Outcomes of seRELAXin in AHF

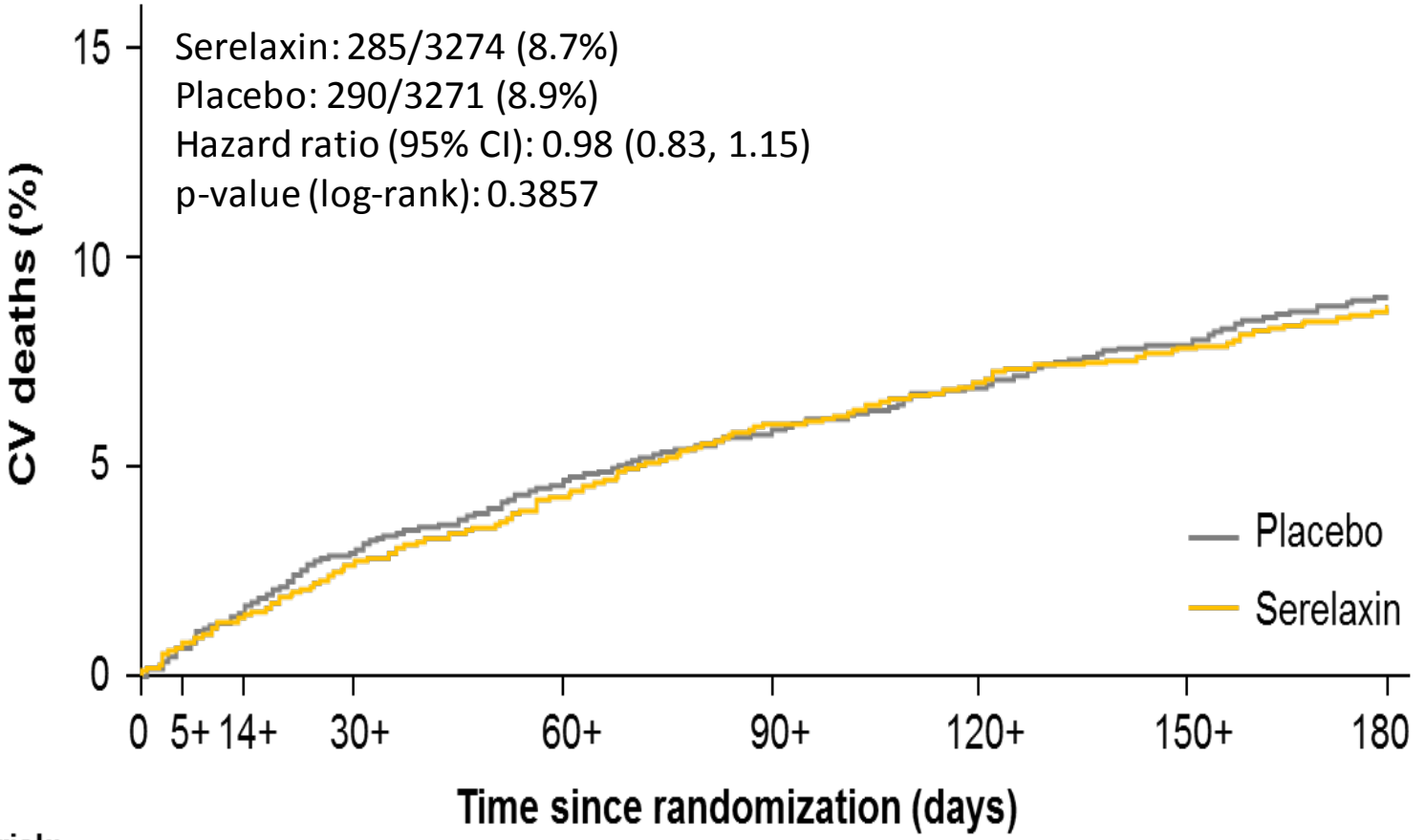
Study design

Teerlink JR, *et al. Eur J Heart Fail* 2017;*doi:*10.1002/ejhf.830.



RELAX-AHF-2
Outcomes of seRELAXin in AHF

Primary endpoint: CV mortality through Day 180

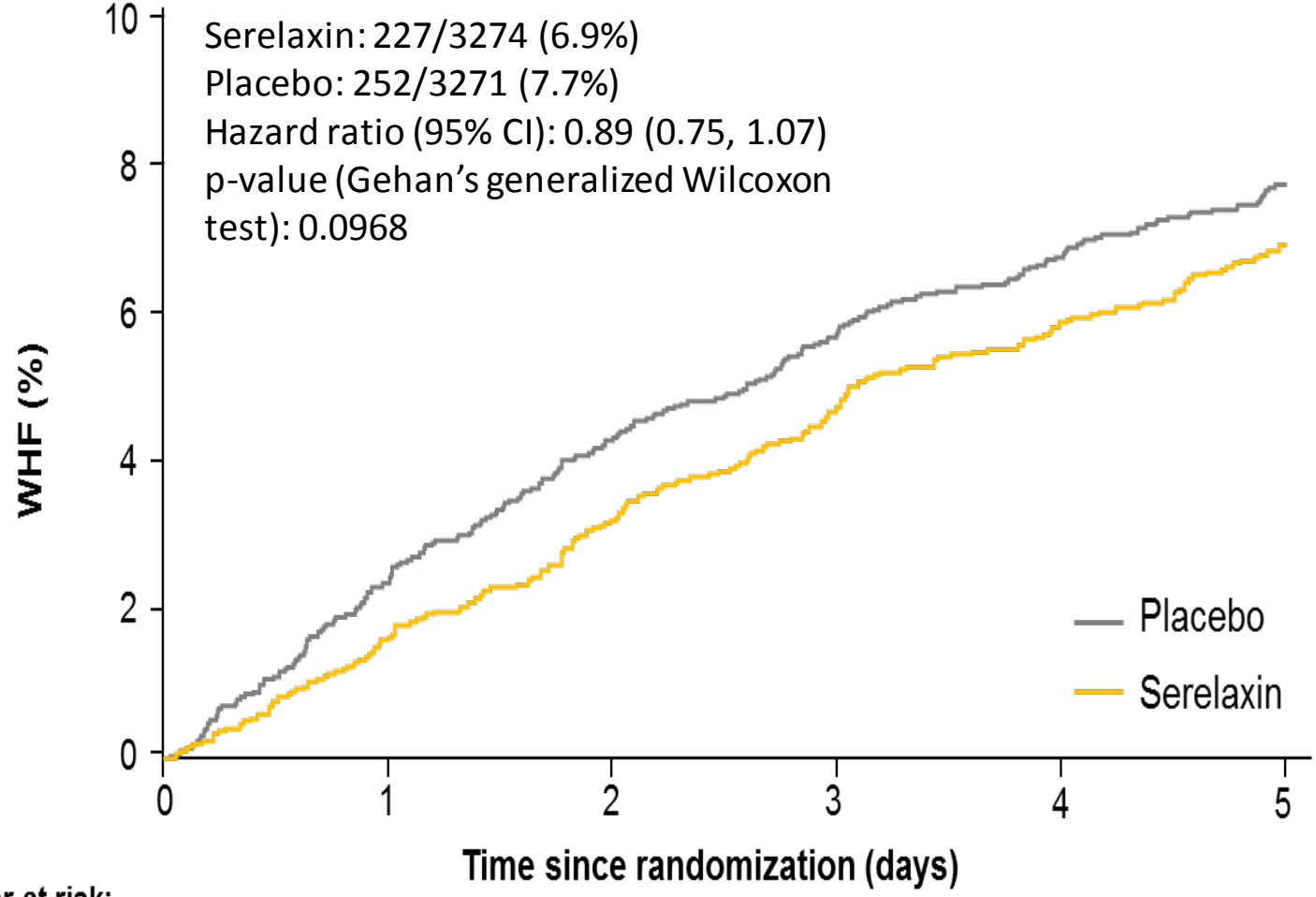


Number at risk:

Placebo	3271	3244	3210	3149	3080	3018	2962	2912	2545
Serelaxin	3274	3247	3218	3165	3100	3032	2988	2949	2548

RELAX-AHF-2
Outcomes of seRELAXin in AHF

Primary endpoint: WHF through Day 5

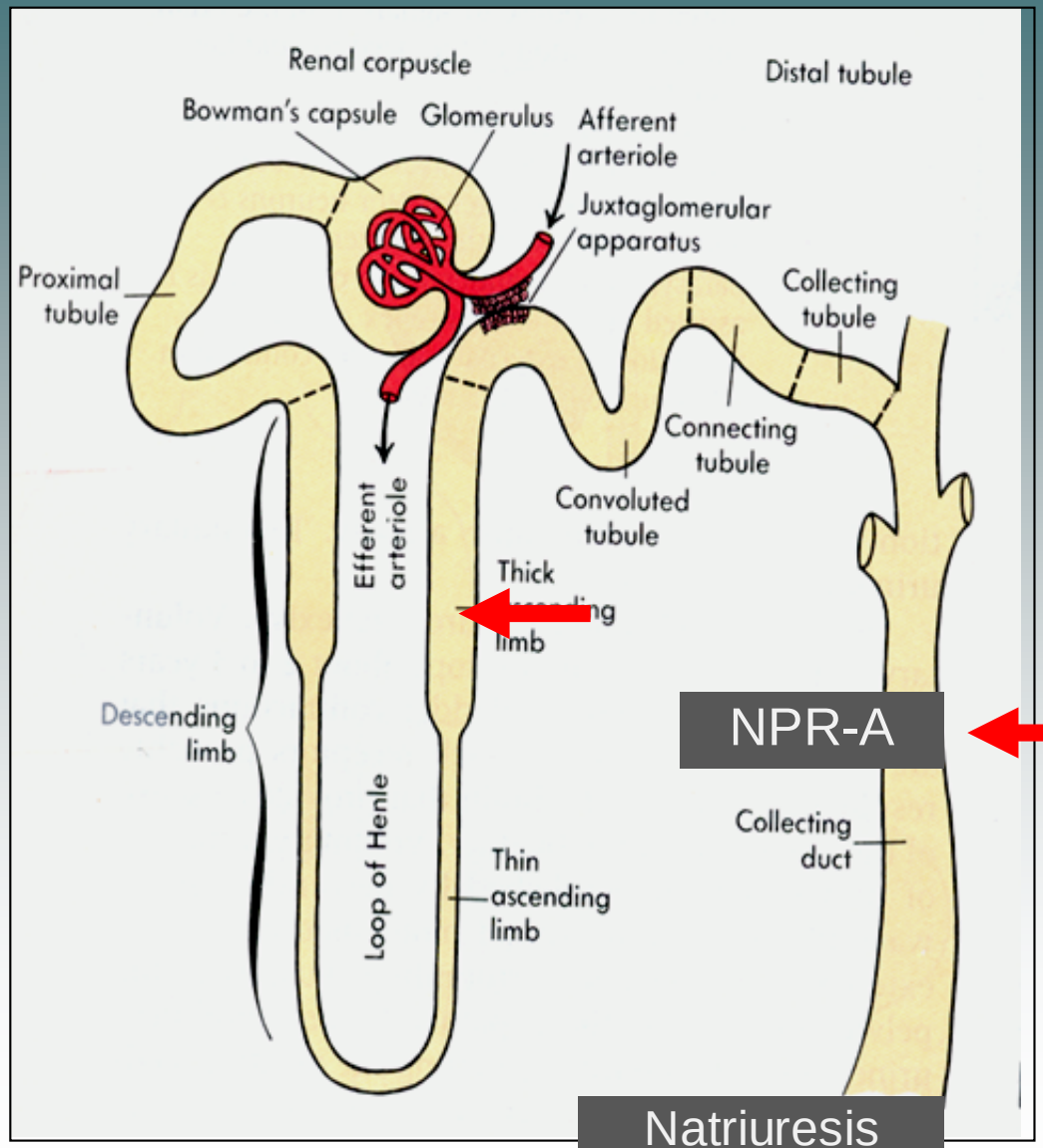


Number at risk:

Placebo	3271	3190	3128	3081	3047	3016
Serelaxin	3274	3219	3166	3117	3078	3043

- WHF includes in-hospital WHF, adjudicated rehospitalization due to HF and death through Day 5

Physiology of Urodilatin (INN:Ularitide)



Urodilatin is synthesized in the distal tubulus cells

⇓

is luminally secreted

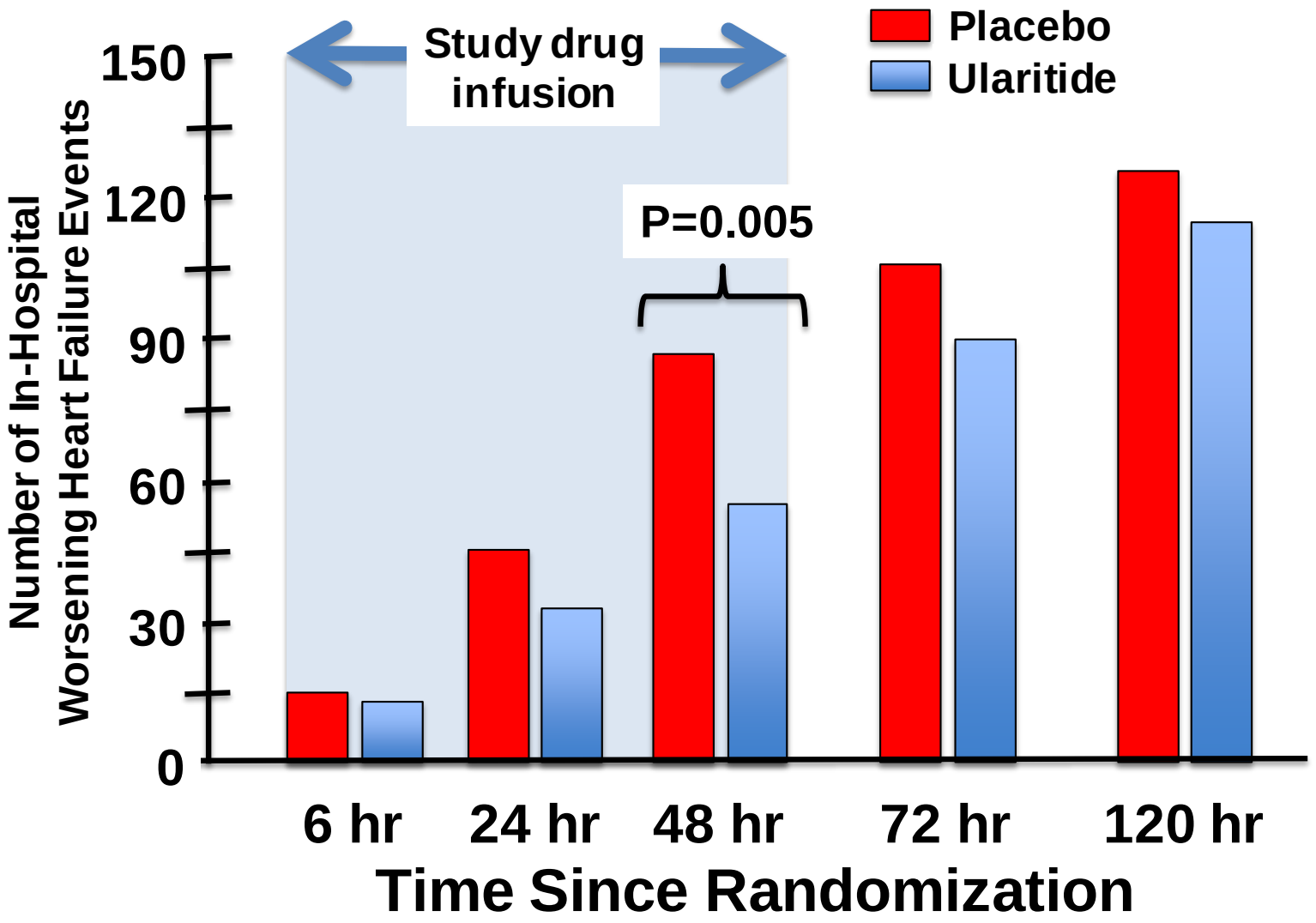
⇓

binds downstream in inner medullar-collecting duct to NPR-A and acts via cGMP

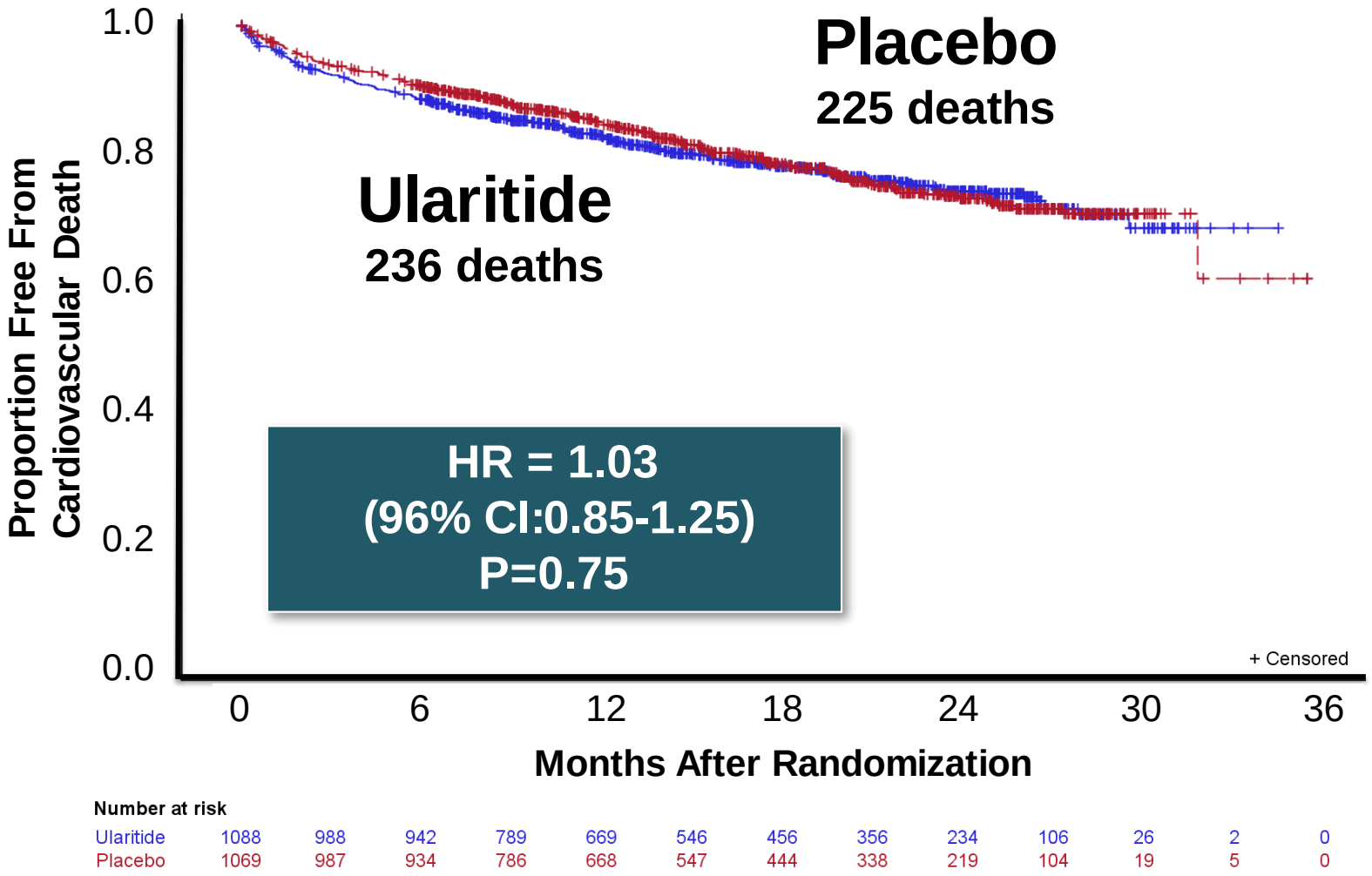
⇓

and inhibits Na-reabsorption

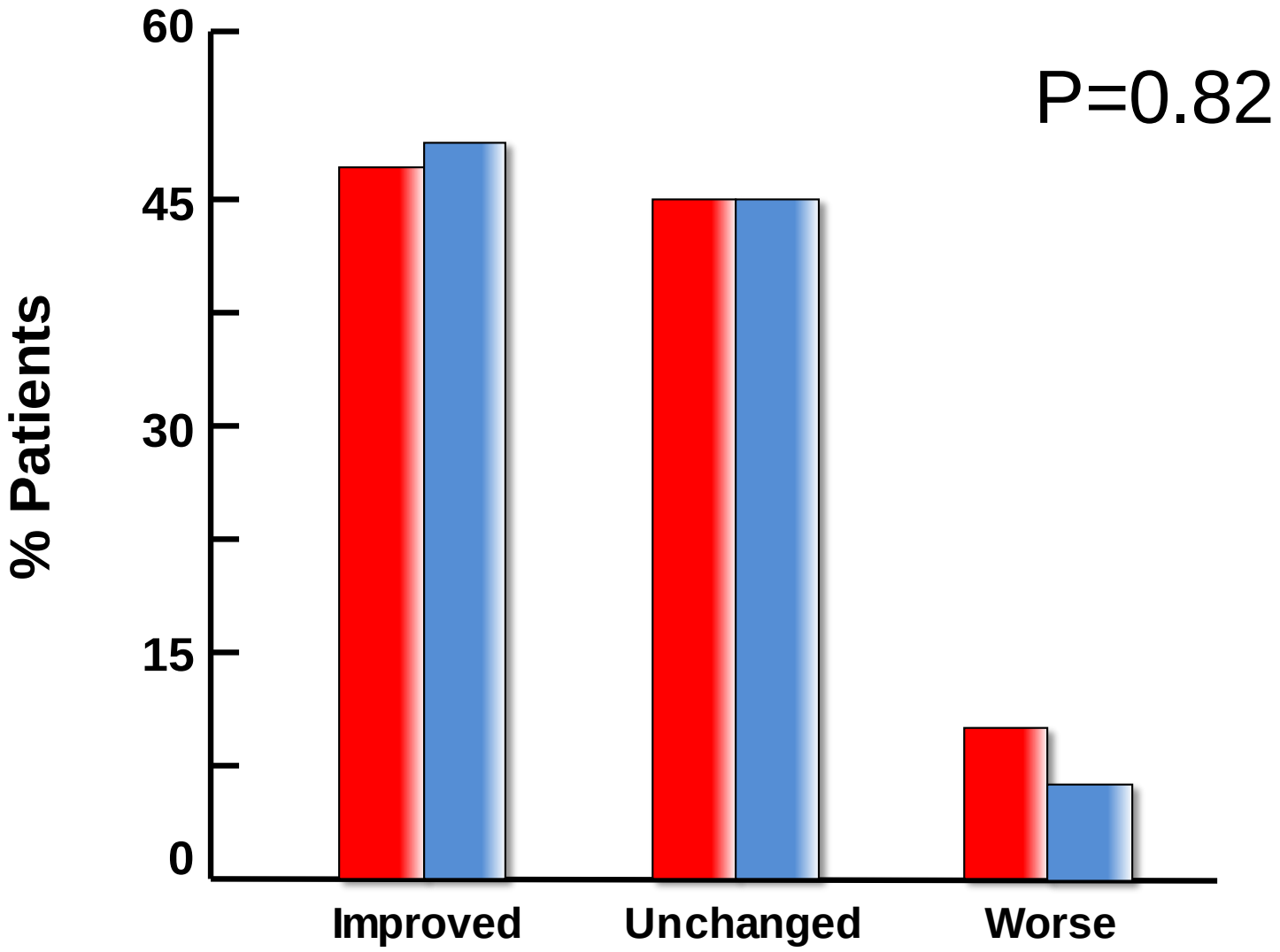
Effect of Ularitide on In-Hospital Heart Failure Events During First 120 Hours



TRUE-AHF: Cardiovascular Mortality



TRUE-AHF: Clinical Composite



“Why can’t you conduct a positive HF trial?”

Designer Drugs vs. Lasix

JACC: HEART FAILURE VOL. ■, NO. ■, 2017

ISSN 2213-1779/$36.00
PUBLISHED BY ELSEVIER https://doi.org/10.1016/j.jchf.2017.10.001

Efficacy of Intravenous Furosemide Versus a Novel, pH-Neutral Furosemide Formulation Administered Subcutaneously in Outpatients With Worsening Heart Failure

Nisha A. Gilotra, MD,[a] Oluseyi Princewill, MD,[b] Bonnie Marino, RN,[a] Ike S. Okwuosa, MD,[a] Jessica Chasler, PharmD,[a] Johana Almansa, DNP,[a] Abby Cummings, CRNP,[a] Parker Rhodes, MS,[a] Julianne Chambers, RN,[a] Kimberly Cuomo, CRNP,[a] Stuart D. Russell, MD[a]

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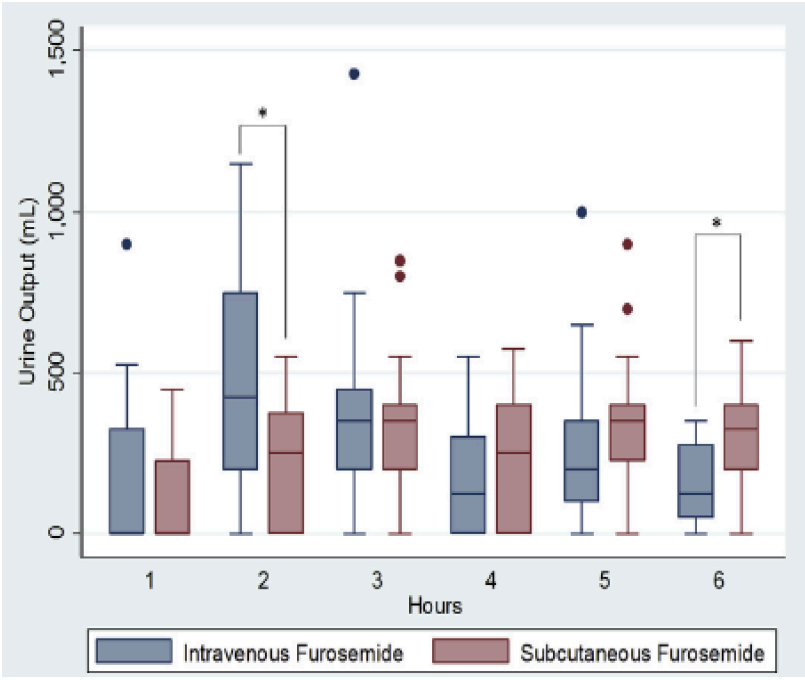
SQ Lasix Equal to IV: Call for Transitional Therapy

METHODS Outpatients presenting with decompensated HF were randomized to receive a single SC or IV dose of furosemide. Primary outcome was 6-h urine output, and secondary outcomes were weight change, natriuresis, and adverse events.

RESULTS Forty-one patients were randomized: 19 were treated with IV (mean dose: 123 ± 47 mg) and 21 with SC furosemide (fixed dose of 80 mg over 5 h). The 6-h urine output in the IV group was not significantly different from that in the SC furosemide group (median IV: 1,425 ml; interquartile range [IQR]: 1,075 to 1,950 ml; vs. median SC: 1,350 ml; IQR: 900 to 1,900 ml; p = 0.84). Additionally, mean weight loss was not significantly different (−1.5 ± 1.1 kg in the IV group vs. −1.5 ± 1.2 kg in the SC group; p = 0.95). Hourly urine output was significantly higher in the IV group at hour 2 (425 ml in the IV group vs. 250 ml in the SC group; p = 0.02) and higher in the SC group at hour 6 (125 ml, IV group vs. 325 ml, SC group; p = 0.005). Natriuresis was higher in the SC group (IV: 7.3 ± 35.3 mEq/l vs. SC: 32.8 ± 43.6 mEq/l; p = 0.05). There was no worsening renal function, ototoxicity, or skin irritation with either formulation. Thirty-day hospitalization rates were similar.

FIGURE 1 Hourly Urine Output With Diuresis



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JACC: HEART FAILURE

PUBLISHED BY ELSEVIER

VOL. ■, NO. ■, 2017
ISSN 2213-1779/$36.00
https://doi.org/10.1016/j.jchf.2017.10.005

EDITORIAL COMMENT

Furosemide Reimagined

Novel Subcutaneous Formulation for a 50-Year-Old Loop Diuretic Agent for the Treatment of Acute Decompensated Heart Failure*

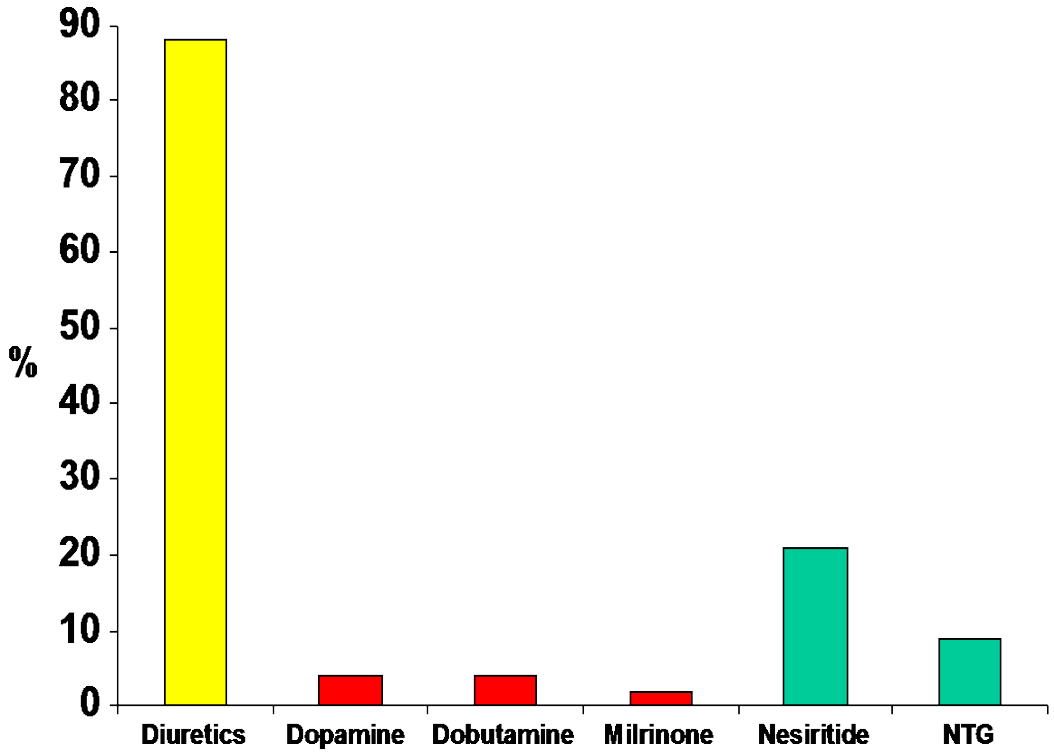
Gary S. Francis, MD, Tamas Alexy, MD, PhD

State of the Art ADHF Therapy

1974

- Diuretics
- Vasodilators
- Oxygen
- Consider inotropic therapy

2017

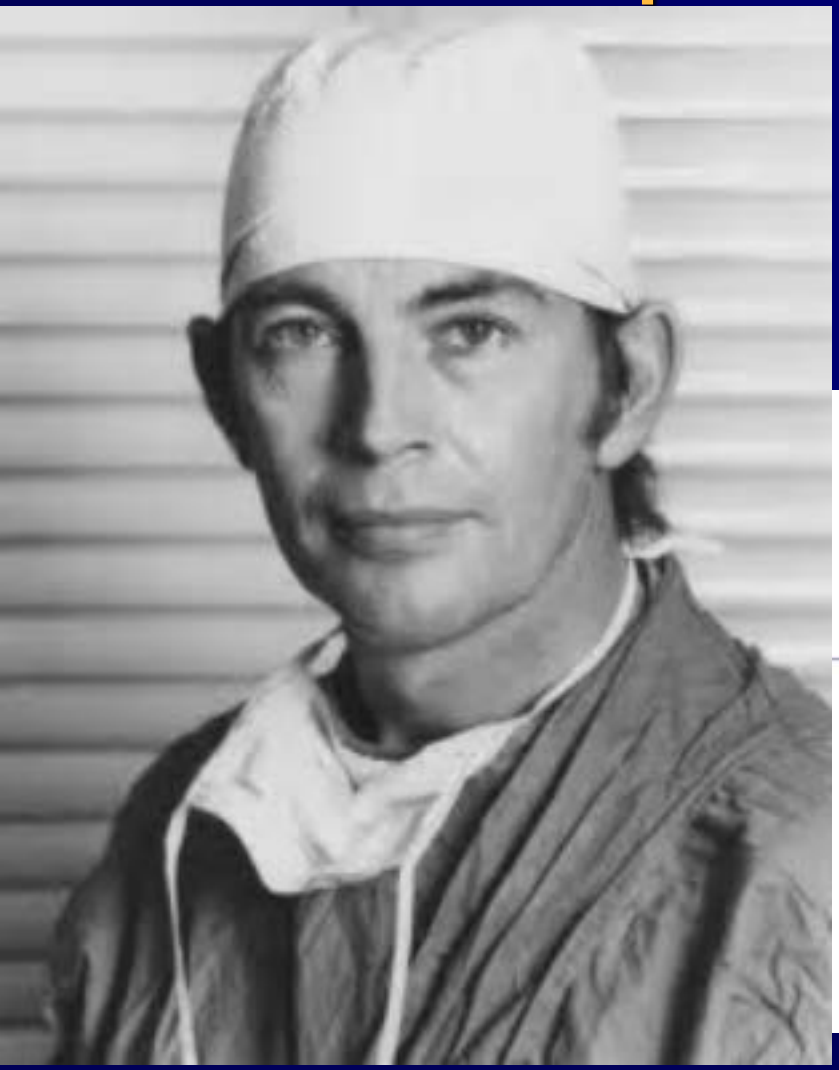


Ramirez and Abelmann, New Engl J Med, 1974

Fonarow,GC et al. AHJ 2007,16

DukeMedicine

Cardiac Transplantation : 50 Years



JACC: HEART FAILURE
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PUBLISHED BY ELSEVIER

VOL. 5, NO. 12, 2017
ISSN 2213-1779/$36.00
https://doi.org/10.1016/j.jchf.2017.11.001

GUEST EDITORS' PAGE

Happy 50th Birthday, Cardiac Transplantation

Happy 5th Birthday, *JACC: Heart Failure*

Joseph G. Rogers, MD, JoAnn Lindenfeld, MD

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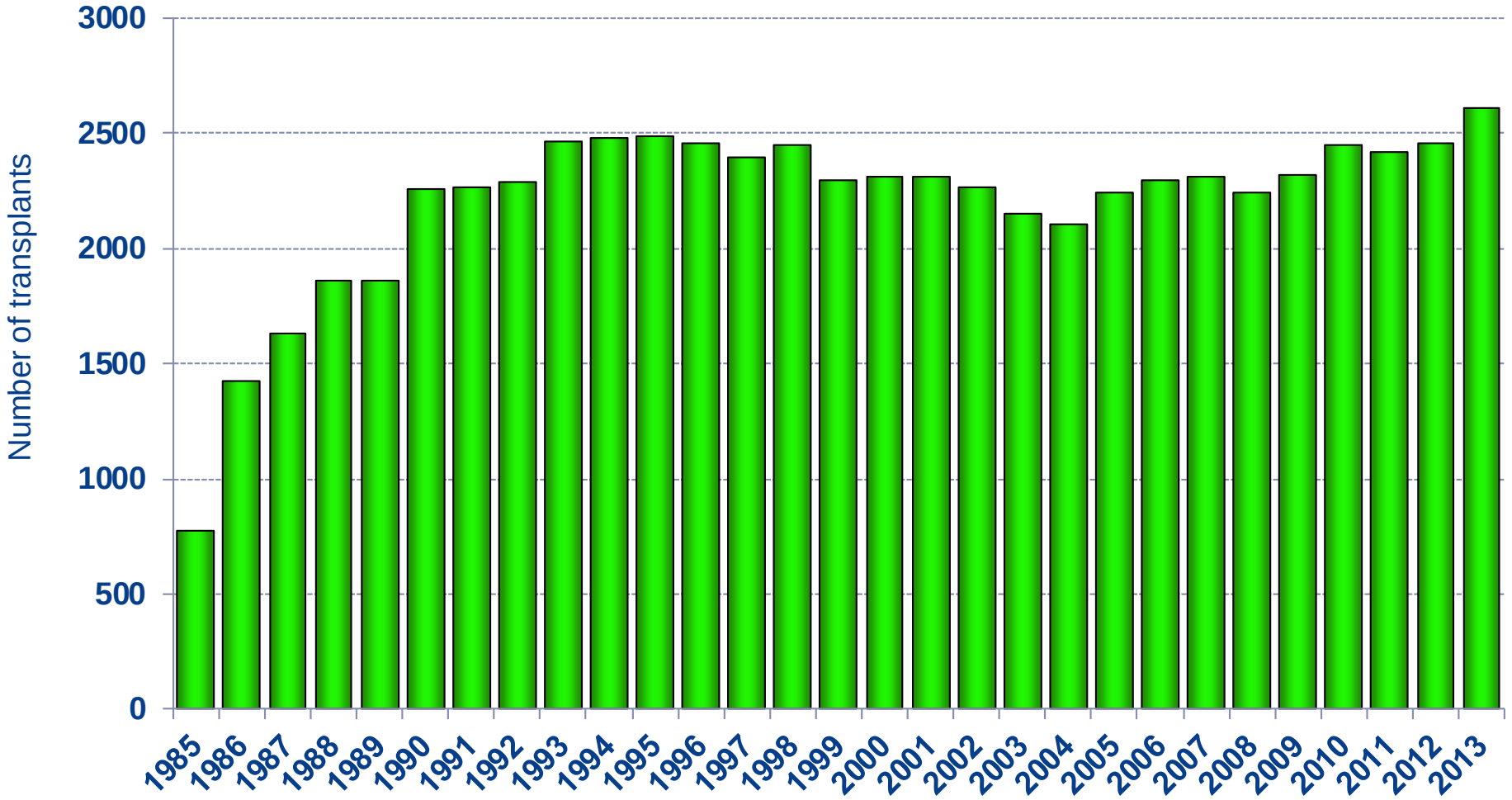
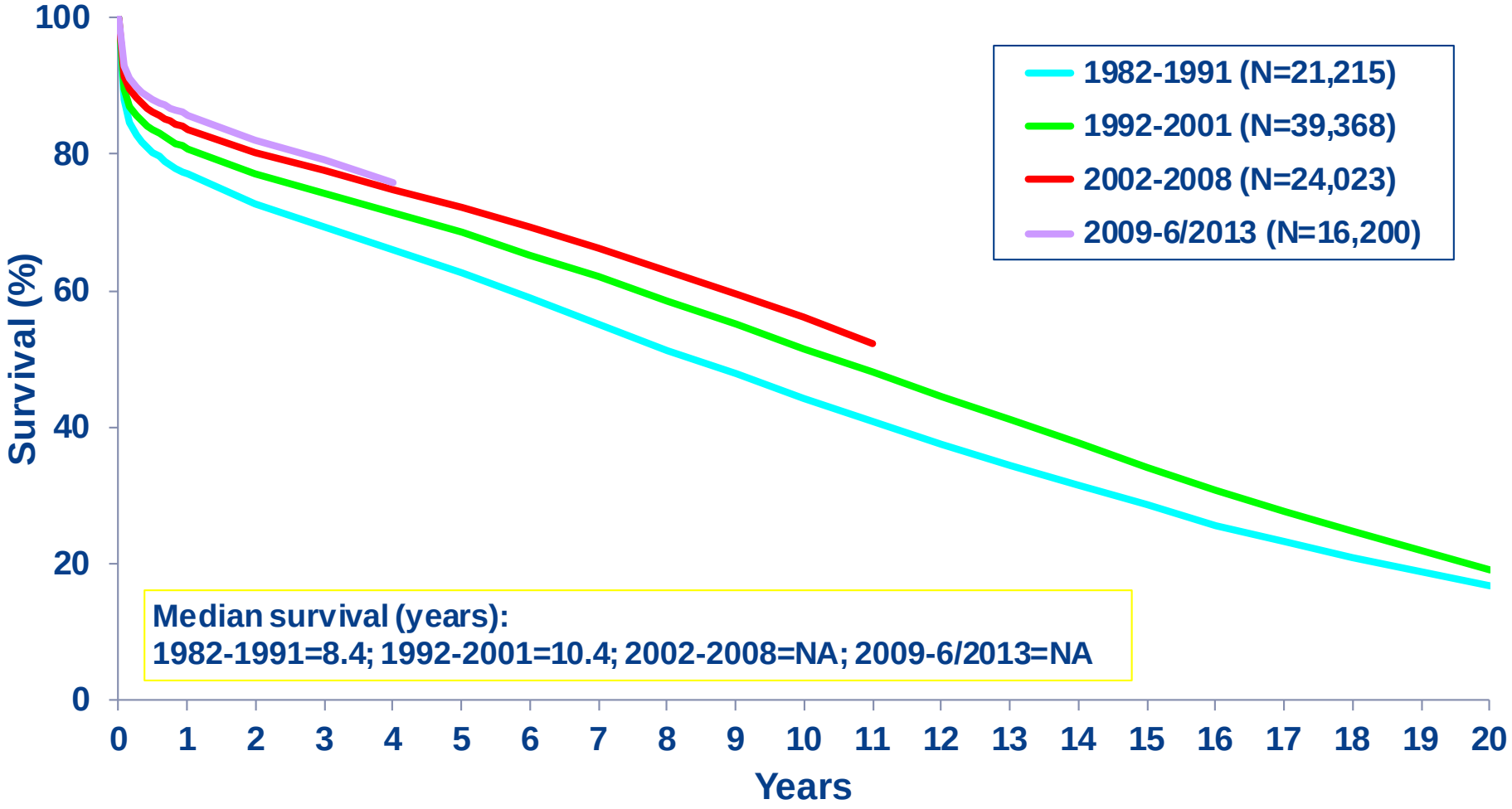
US Adult and Pediatric Heart Transplants



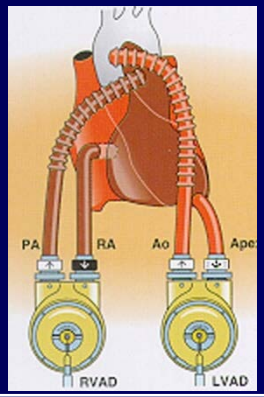
J Heart Lung Transplant 2015;34: 1244-1254

Adult Heart Transplants
Kaplan-Meier Survival by Era
(Transplants: January 1982 – June 2013)



JHLT. 2015; 34: 1244-1254

The Evolution of MCS Devices

					
Position	External	Internal	Internal	Internal	Internal
Size	Large	Large	Small	Smaller	Smallest
Power	Pneumatic	Electric	Electric	Electric	Electric
Flow	Pulsatile	Pulsatile	Continuous	Continuous	Continuous
Mechanics	Complex	Complex	Simplified	Simplified	Simplified

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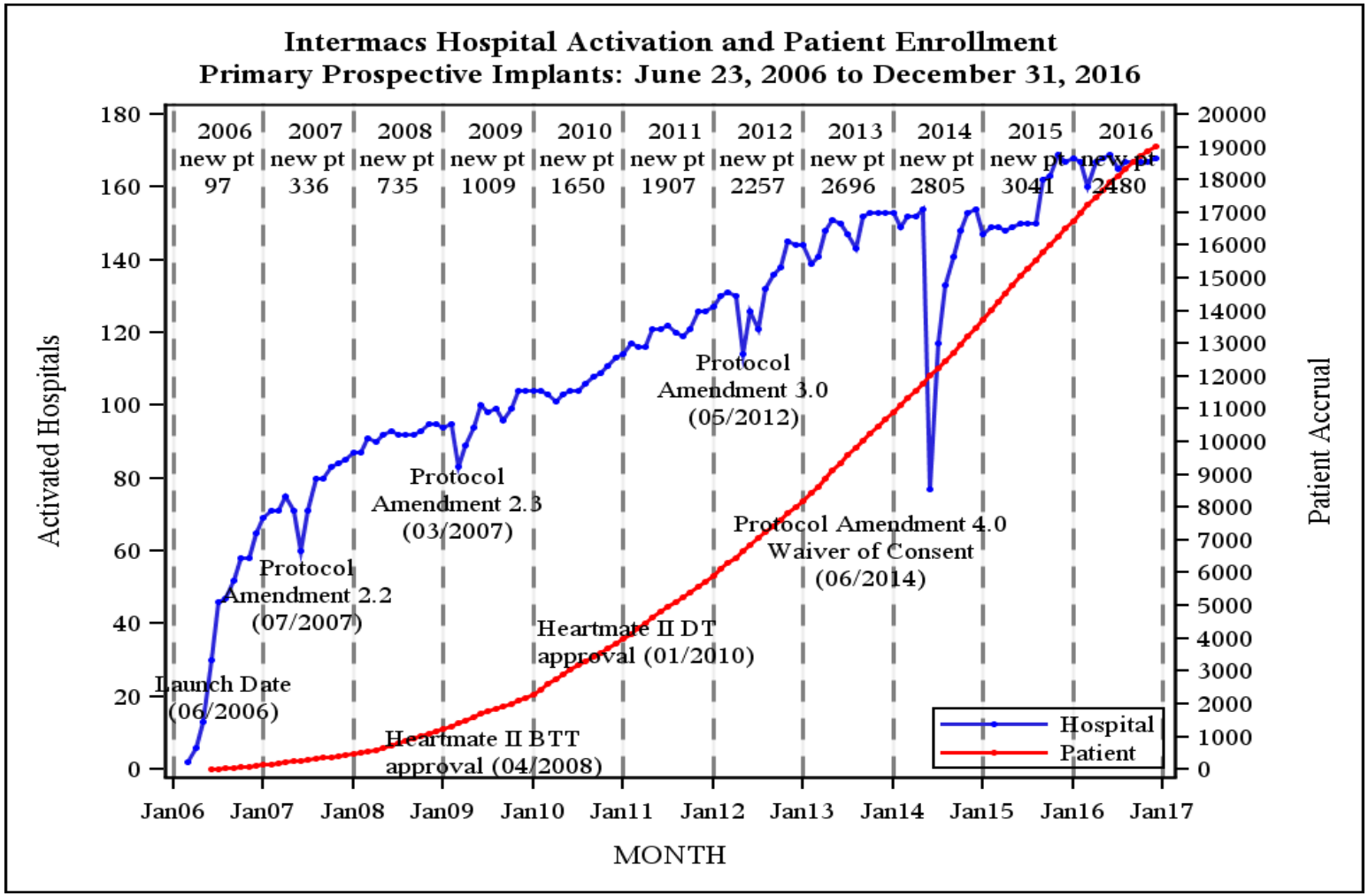
The Evolution of Mechanically Assisted Circulation



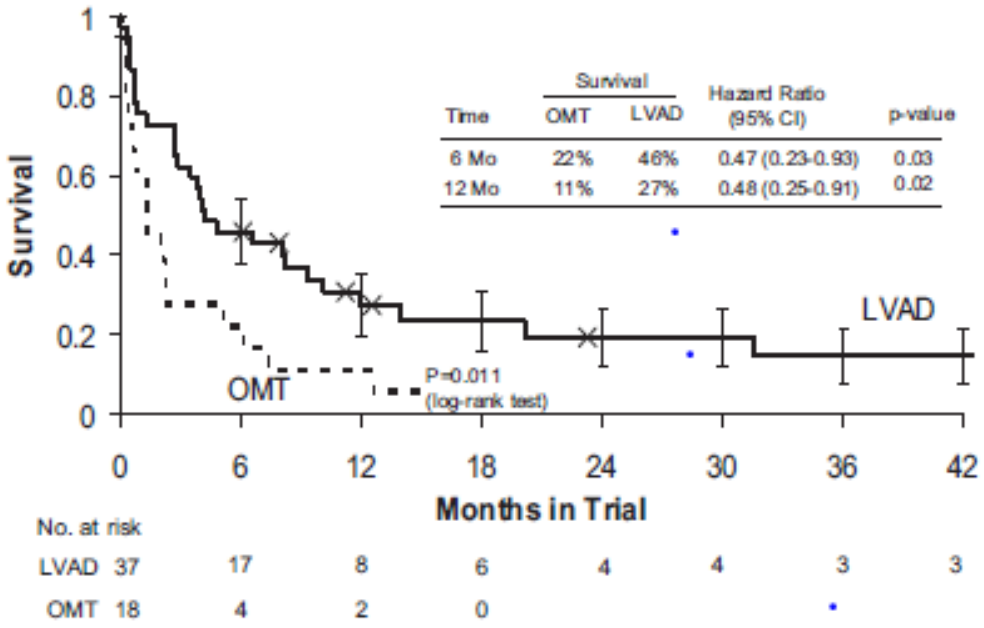
Data Source: INTERMACS website, May 2017

Chronic Mechanical Circulatory Support for Inotrope-Dependent Heart Failure Patients Who Are Not Transplant Candidates

Results of the INTrEPID Trial

Joseph G. Rogers, MD, FACC,* Javed Butler, MD, FACC,† Steven L. Lansman, MD, PHD,‡ Alan Gass, MD, FACC,§ Peer M. Portner, PHD, FACC,‖ Michael K. Pasque, MD,# Richard N. Pierson III, MD, FACC,** for the INTrEPID Investigators

Durham, North Carolina; Atlanta, Georgia; Valhalla and New York, New York; Palo Alto, California; St. Louis, Missouri; and Baltimore, Maryland



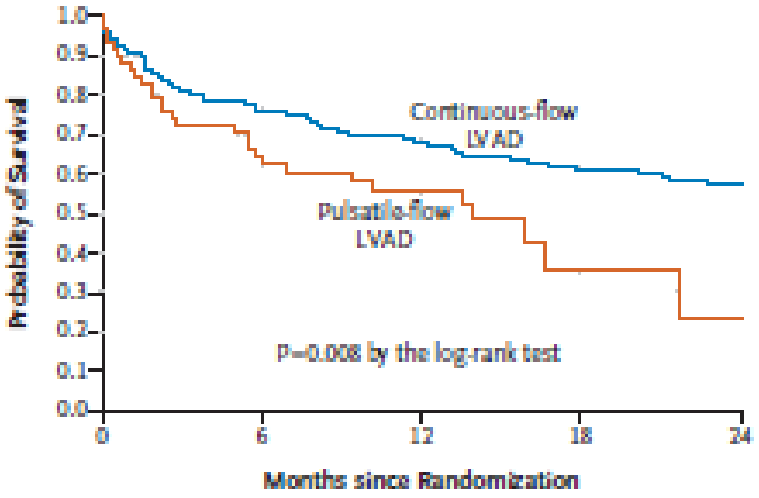
J Am Coll Cardiol 2007;50:741-50

Contemporary LVAD Survival Outcomes

ORIGINAL ARTICLE

Advanced Heart Failure Treated with Continuous-Flow Left Ventricular Assist Device

Mark S. Slaughter, M.D., Joseph G. Rogers, M.D., Carmelo A. Milano, M.D., Stuart D. Russell, M.D., John V. Conte, M.D., David Feldman, M.D., Ph.D., Benjamin Sun, M.D., Antone J. Tatooles, M.D., Reynolds M. Delgado, III, M.D., James W. Long, M.D., Ph.D., Thomas C. Wozniak, M.D., Waqas Ghumman, M.D., David J. Farrar, Ph.D., and O. Howard Frazier, M.D., for the HeartMate II Investigators*

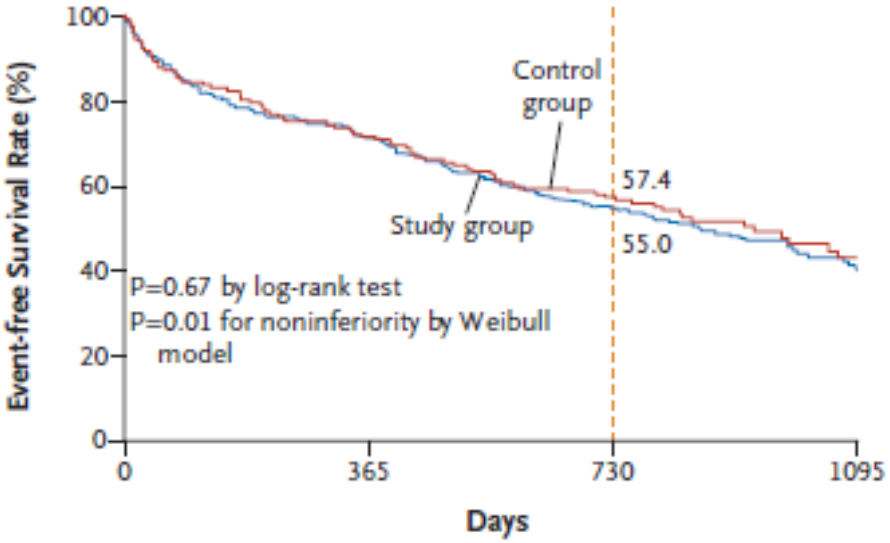


N Engl J Med 2009; 361:2241-51

ORIGINAL ARTICLE

Intrapericardial Left Ventricular Assist Device for Advanced Heart Failure

Joseph G. Rogers, M.D., Francis D. Pagani, M.D., Ph.D., Antone J. Tatooles, M.D., Geetha Bhat, M.D., Mark S. Slaughter, M.D., Emma J. Birks, M.B., B.S., Ph.D., Steven W. Boyce, M.D., Samer S. Najjar, M.D., Valluvan Jeevanandam, M.D., Allen S. Anderson, M.D., Igor D. Gregoric, M.D., Hari Mallidi, M.D., Katrin Leadley, M.D., Keith D. Aaronson, M.D., O.H. Frazier, M.D., and Carmelo A. Milano, M.D.

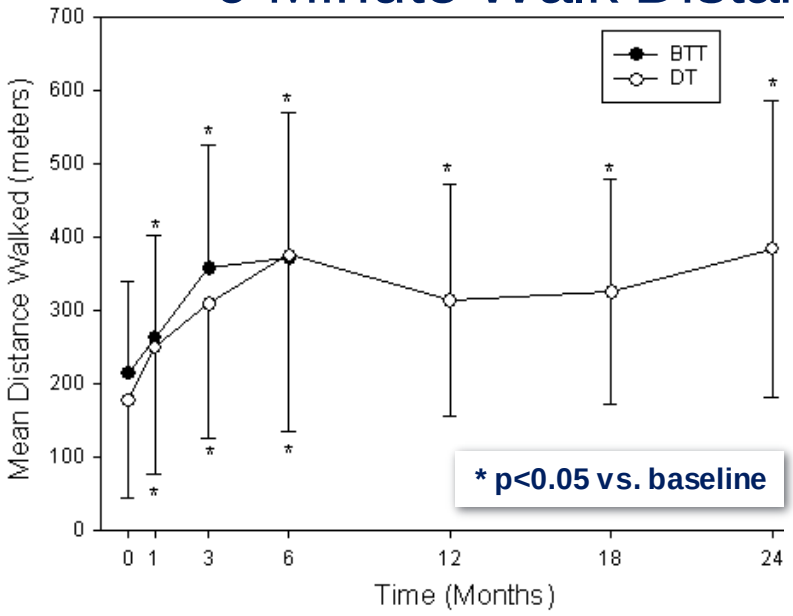


N Engl J Med 2017; 376:451-60

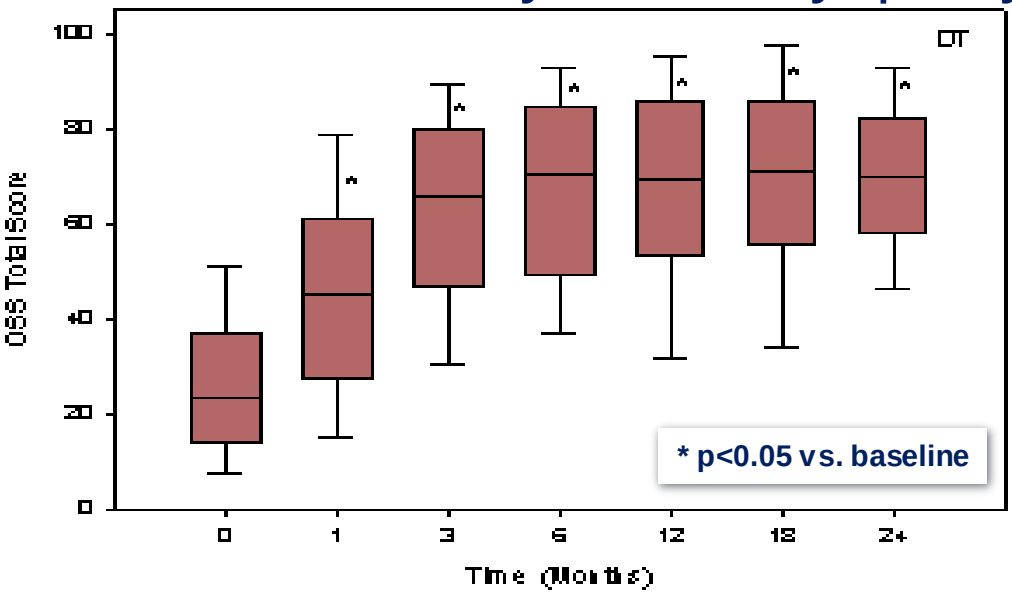
Continuous Flow Left Ventricular Assist Device Improves Functional Capacity and Quality of Life of Advanced Heart Failure Patients

Joseph G. Rogers, MD,* Keith D. Aaronson, MD,† Andrew J. Boyle, MD,‡ Stuart D. Russell, MD,§ Carmelo A. Milano, MD,* Francis D. Pagani, MD,† Brooks S. Edwards, MD,‖ Soon Park, MD,‖ Ranjit John, MD,‡ John V. Conte, MD,§ David J. Farrar, PHD,¶ Mark S. Slaughter, MD,# for the HeartMate II Investigators

6 Minute Walk Distance



Kansas City Cardiomyopathy



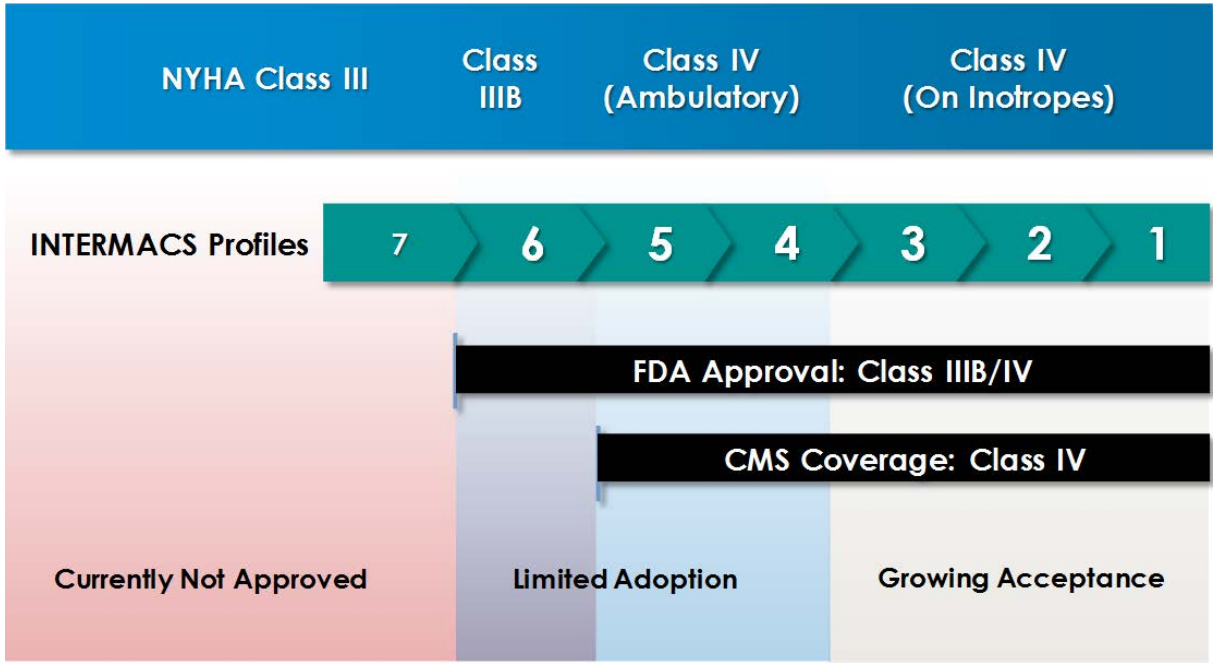
J Am Coll Cardiol 2010;55:1826-34

Risk Assessment and Comparative Effectiveness of Left Ventricular Assist Device and Medical Management in Ambulatory Heart Failure Patients

Results From the ROADMAP Study

Jerry D. Estep, MD,* Randall C. Starling, MD, MPH,† Douglas A. Horstmanshof, MD,‡ Carmelo A. Milano, MD,§
Craig H. Selzman, MD,‖ Keyur B. Shah, MD,¶ Matthias Loebe, MD, PHD,* Nader Moazami, MD,†
James W. Long, MD, PHD,‡ Josef Stehlik, MD, MPH,‖ Vigneshwar Kasirajan, MD,¶ Donald C. Haas, MD,#
John B. O'Connell, MD,** Andrew J. Boyle, MD,†† David J. Farrar, PHD,** Joseph G. Rogers, MD,§
for the ROADMAP Study Investigators

- Non-randomized
- Current indication for DT VAD but not on inotropes
- 6MWD < 300 m
- Primary endpoint: survival + 6MWD at 12 months
- Secondary



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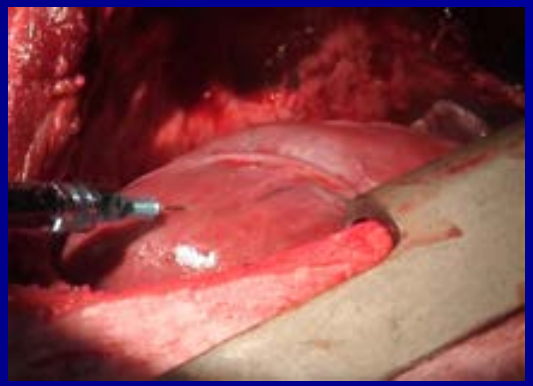
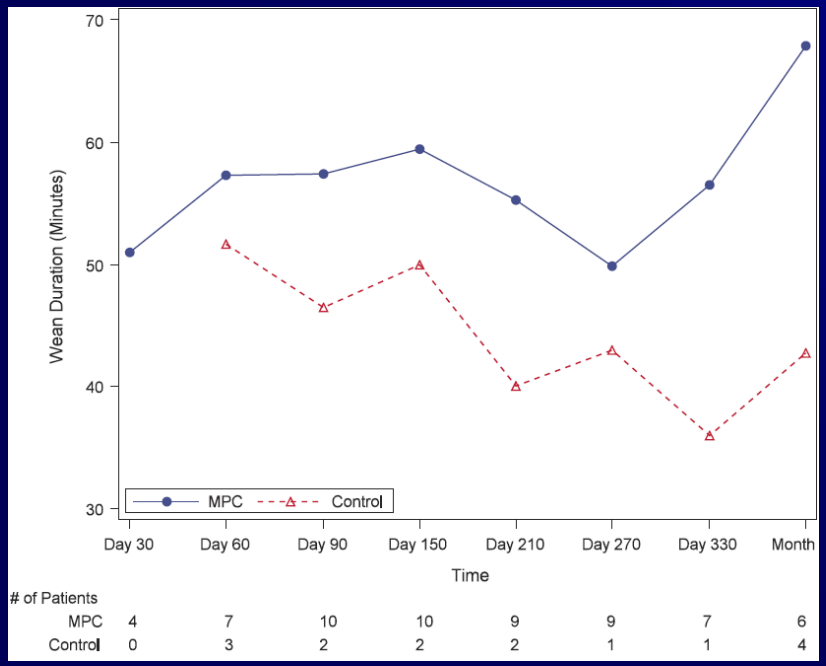
	OMM (n = 82)*	LVAD (n = 85)†	Odds Ratio (95% Confidence Interval)
Alive at 12 months on original therapy with increase in 6MWD by 75 m	17 (21)	33 (39)	2.4 (1.2–4.8) p = 0.012
First event that prevented success:	65 (79)	52 (61)	
Death within 1 yr	18 (22)	17 (20)	
Delayed LVAD	18 (22)‡	NA	
Delta 6MWD <75 m	29 (35)	33 (39)	
Urgent transplant	0	2 (2)	

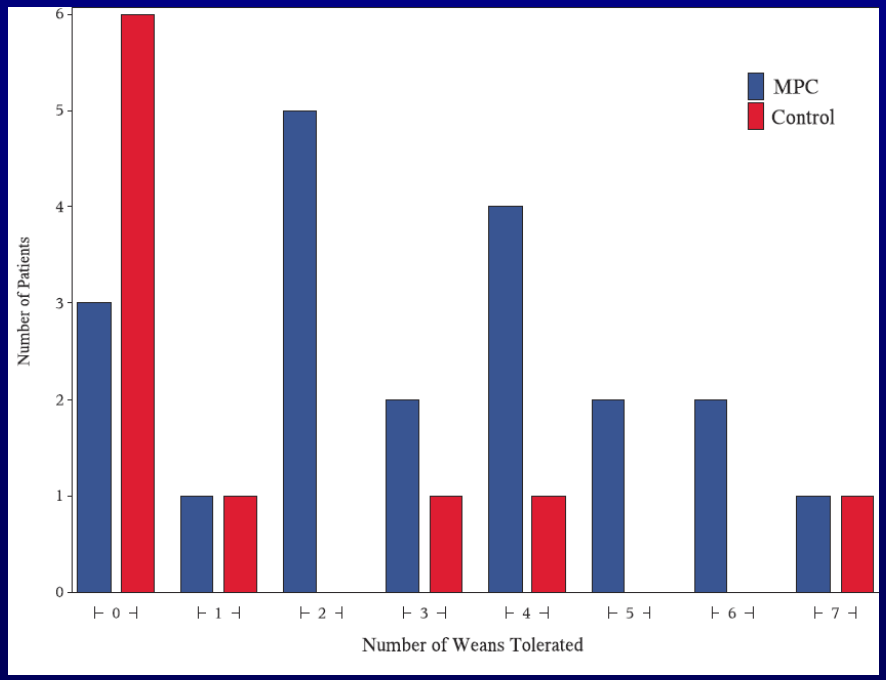
Values are n (%). Odds ratio is calculated (95% confidence interval) as LVAD versus OMM. *Excluded OMM patients: 9 withdrawn, 12 missing 6MWD. †Excluded LVAD patients: 3 withdrawn, 8 missing 6MWD, 1 elective heart transplant. ‡Including 1 total artificial heart.

J Am Coll Cardiol 2015; 66:1747-61

Facilitated Myocardial Recovery: Mesenchymal Precursor Cells





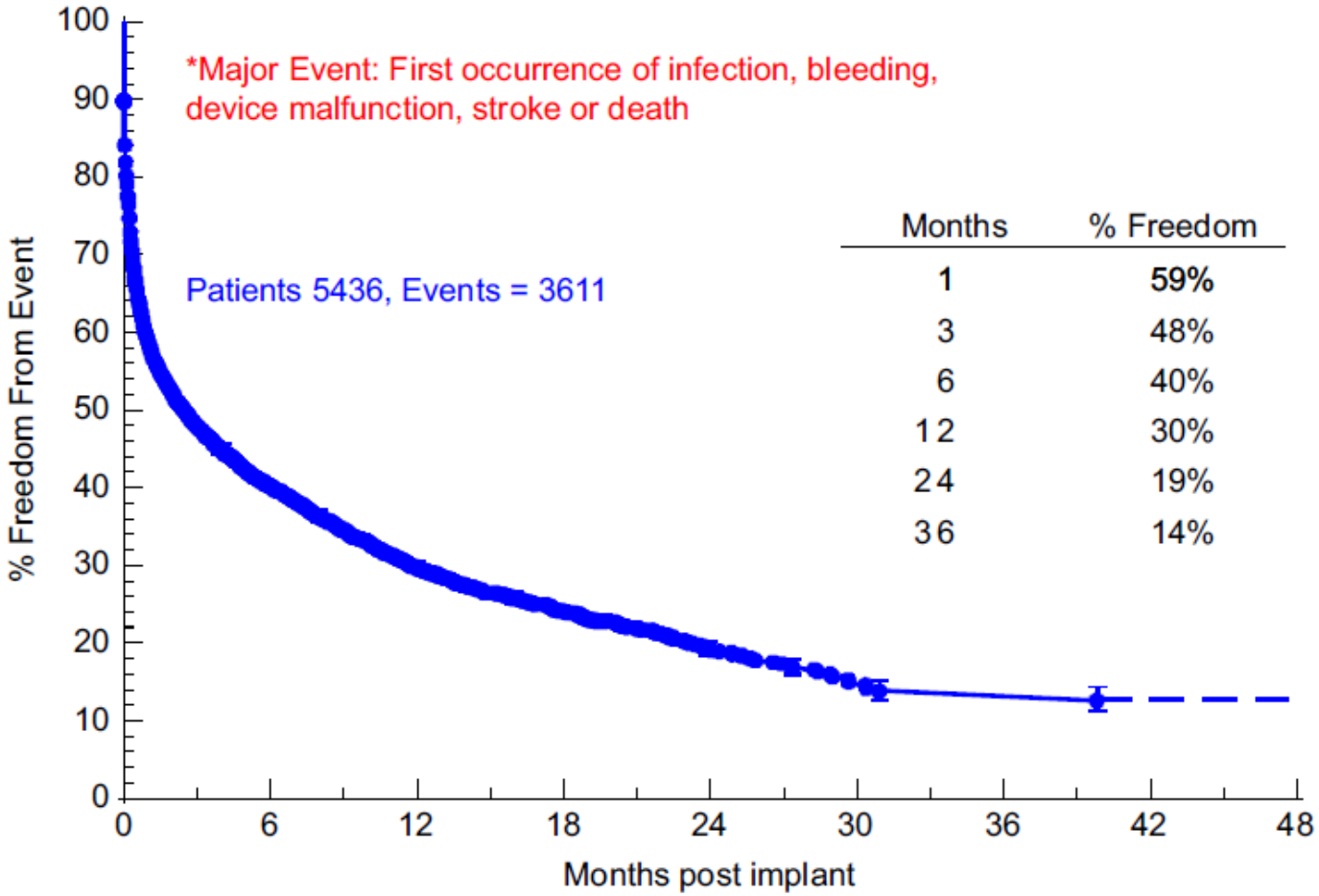


Circulation 2014;129:2287-96

Comorbidities and Complications

- Bleeding
- Thrombosis
- Infection
- Stroke

Adverse Events: INTERMACS



J Heart Lung Transplant 2013;32:141-56

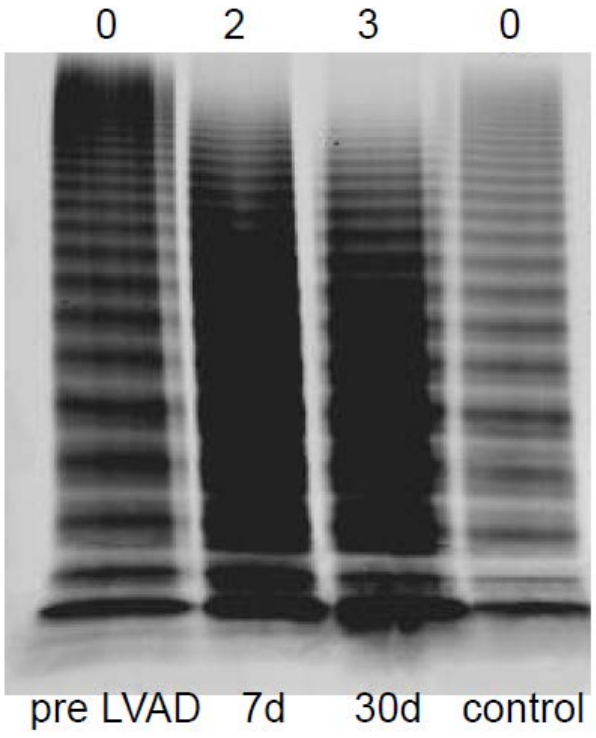
ENDURANCE: Hemocompatibility Adverse Events

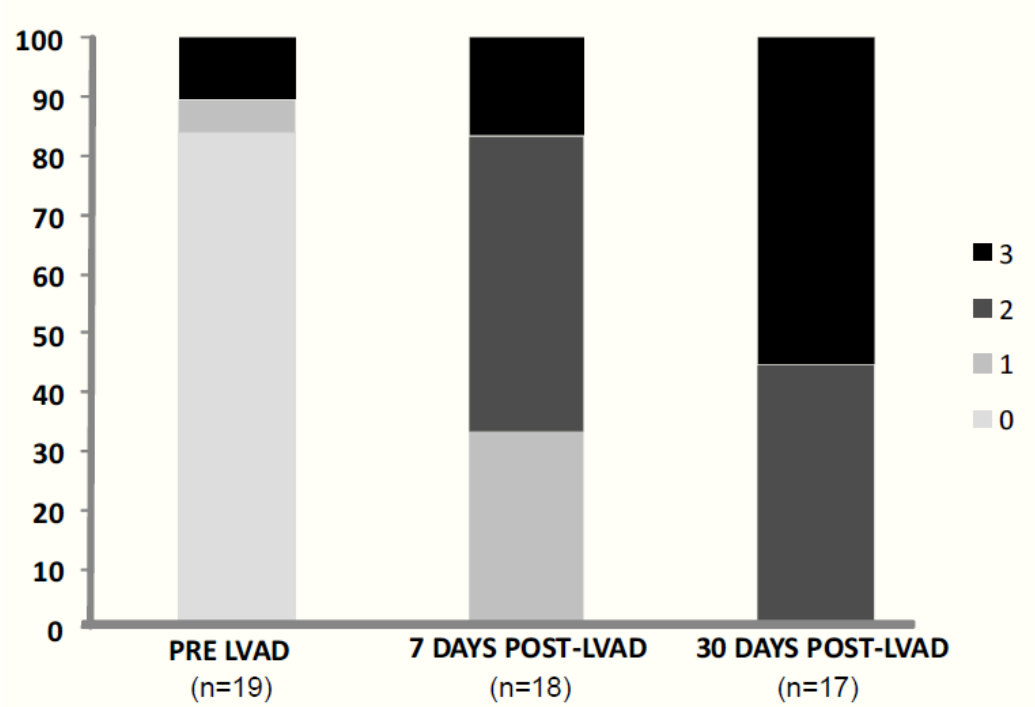
	HVAD (n=296)		HMII (n=149)		
Adverse Event	**No. of Patients**	**No. of events**	**No. of Patients**	**No. of events**	**P value**
Bleeding	176 (59.5%)	400	90 (60.4%)	196	0.92
GI Bleed	103 (34.8%)	225	51 (34.2%)	90	0.92
Stroke	85 (28.7%)	110	18 (12.1%)	19	<0.001
Ischemic CVA	50 (16.9%)	65	13 (8.7%)	13	0.021
Hemorrhagic CVA	42 (14.2%)	45	6 (4.0%)	6	0.001
TIA	24 (8.1%)	27	7 (4.7%)	7	0.24
Pump Exchange	23 (7.8%)	27	20 (13.4%)	23	0.06

Adapted from N Engl J Med 2017;376:451-460

Non-Surgical Bleeding in LVAD Patients

- 37 CF VAD patients
- High molecular weight vWF (0=normal, 3=severe loss)
- 100% of patients demonstrated loss of HMW vWF
- 10/37 patients had bleeding complications



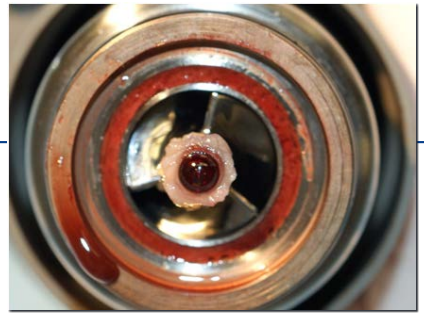


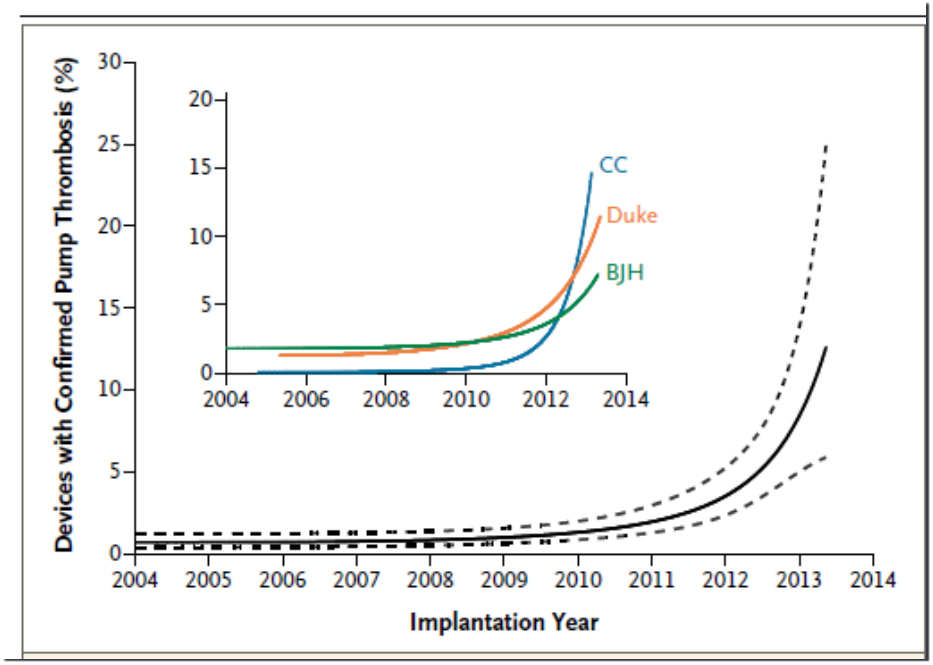
Ann Thorac Surg 2010;90:1263-9

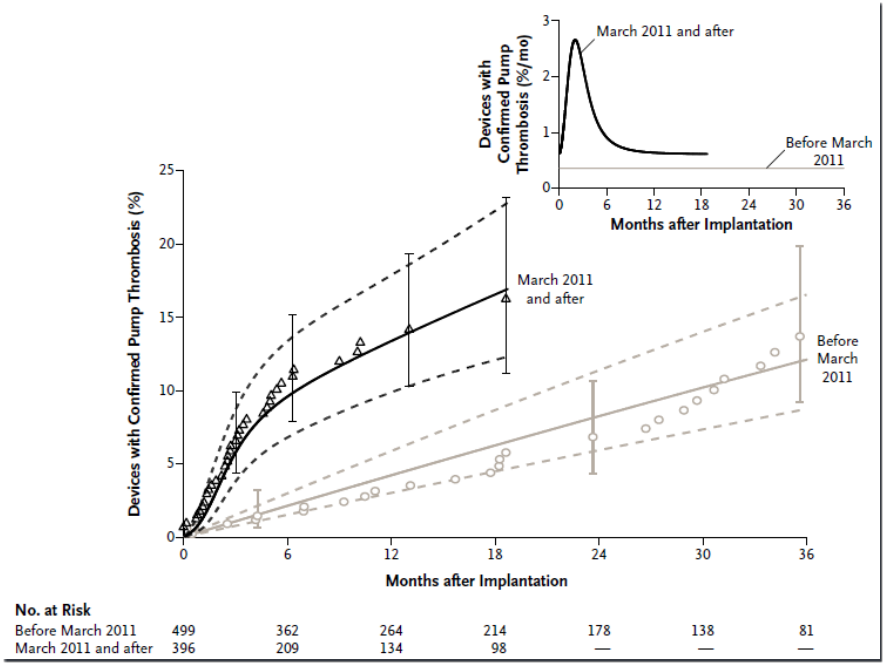
ORIGINAL ARTICLE

Unexpected Abrupt Increase in Left Ventricular Assist Device Thrombosis

Randall C. Starling, M.D., M.P.H., Nader Moazami, M.D., Scott C. Silvestry, M.D., Gregory Ewald, M.D., Joseph G. Rogers, M.D., Carmelo A. Milano, M.D., J. Eduardo Rame, M.D., Michael A. Acker, M.D., Eugene H. Blackstone, M.D., John Ehrlinger, Ph.D., Lucy Thuita, M.S., Maria M. Mountis, D.O., Edward G. Soltesz, M.D., M.P.H., Bruce W. Lytle, M.D., and Nicholas G. Smedira, M.D.







PAL-HF

Palliative Care in Heart Failure

Trial Design

- Prospective, single-center, randomized, controlled clinical trial in patients (n=200) at high risk of 6-month re-hospitalization or death comparing:
  - GDMT
  - GDMT + multidisciplinary palliative care intervention
- Co-primary endpoint
  - KCCQ overall summary score
  - FACIT-PAL
- Secondary endpoints
  - FACIT - Spiritual Well-Being
  - HADS - Depression
  - Composite of death, hospitalization, QoL
  - Resource utilization

PAL-HF

Palliative Care in Heart Failure

Baseline Characteristics

TABLE 1 Baseline Characteristics

	UC + PAL (n = 75)	UC Alone (n = 75)
Age, yrs	71.9 ± 12.4	69.8 ± 13.4
Female	33 (44.0)	38 (50.7)
Race		
Black	36 (48.0)	26 (34.7)
Asian	1 (1.3)	1 (1.3)
White	38 (50.7)	48 (64.0)
Other	0 (0.0)	0 (0.0)
History of coronary artery disease	38 (50.7)	47 (62.7)
History of stroke	18 (24.0)	10 (13.3)
History of hypertension	61 (81.3)	52 (69.3)
History of diabetes mellitus	42 (56.0)	38 (50.7)
NYHA functional class III	54 (72.0)	58 (77.3)
NYHA functional class IV	15 (20.0)	5 (6.7)
Ischemic heart failure	34 (45.3)	38 (50.7)
Level of impairment of most recent ejection fraction		
Normal (>55%)	21 (28.0)	14 (18.7)
Mildly impaired (40%-55%)	14 (18.7)	19 (25.3)
Moderately impaired (25%-40%)	17 (22.7)	14 (18.7)
Severely impaired (<25%)	23 (30.7)	28 (37.3)

TABLE 1 Baseline Characteristics

	UC + PAL (n = 75)	UC Alone (n = 75)
Prior ICD/pacemaker implantation	35 (46.7)	34 (45.3)
ICD only	8 (10.7)	12 (16.0)
Pacemaker only	9 (12.0)	7 (9.3)
Biventricular pacer only	1 (1.3)	2 (2.7)
Biventricular pacer and ICD	17 (22.7)	13 (17.3)
NT-proBNP, pg/ml	10,040.2 ± 9,434.2	13,212.4 ± 14,698.2
Duration of HF, months	64.7 ± 70.0	69.1 ± 76.5
Importance of religion/spirituality		
Fairly	15 (20.0)	13 (17.3)
Deeply	54 (72.0)	49 (65.3)
Time spent in bed/couch/chair in past month		
More than one-half	16 (21.3)	20 (26.7)
Almost all	25 (33.3)	29 (38.7)
Depression treated with medications	12 (16.0)	13 (17.3)
Alcohol abuse	6 (8.0)	8 (10.7)
Drug abuse	5 (6.7)	5 (6.7)
Creatinine, mg/dl	1.8 (0.83)	1.9 (0.81)

TABLE 1 Baseline Characteristics

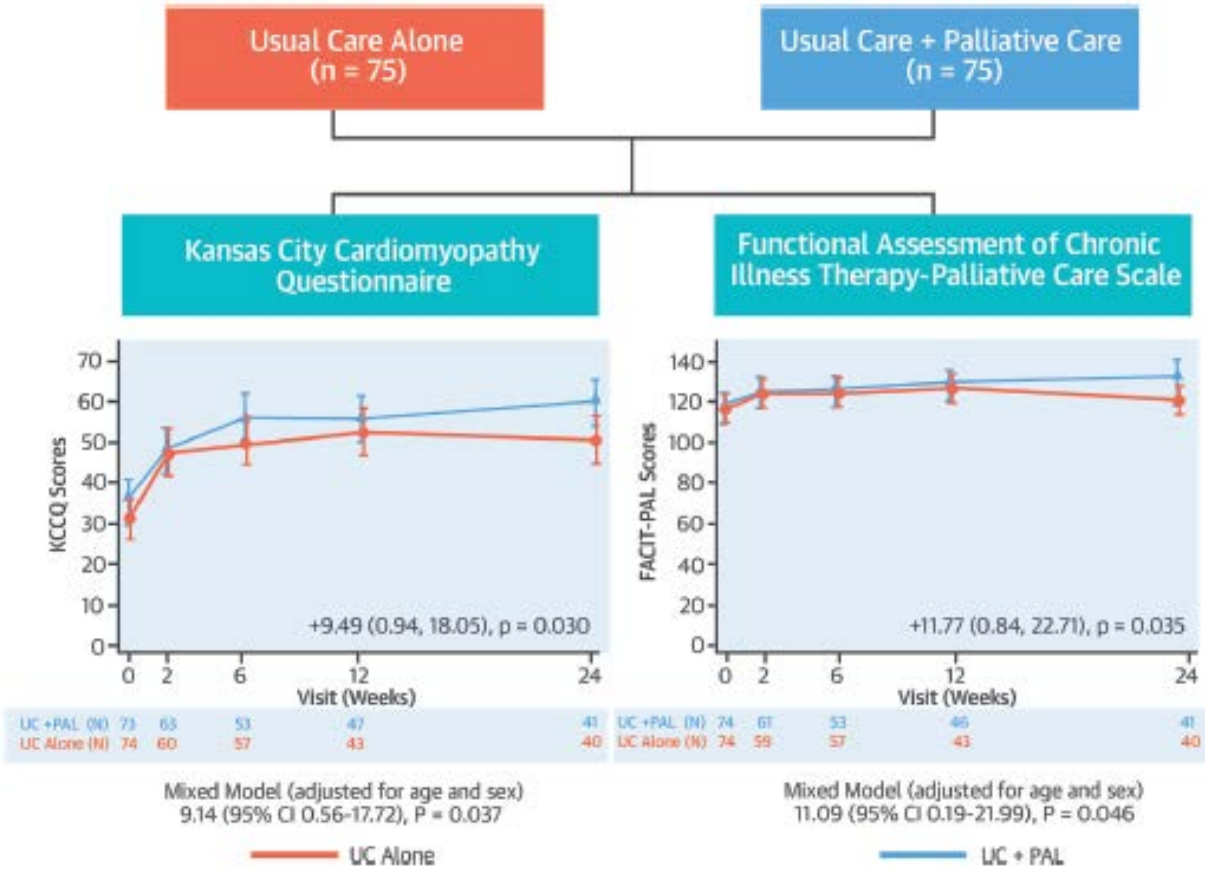
	UC + PAL (n = 75)	UC Alone (n = 75)
ACE inhibitor	17 (22.7)	16 (21.3)
ARB	4 (5.3)	7 (9.3)
Aldosterone antagonist	30 (40.0)	22 (29.3)
Aspirin	54 (72.0)	46 (61.3)
Beta-blocker	51 (68.0)	48 (64.0)
Diuretics		
Bumetanide	1 (1.3)	1 (1.3)
Furosemide	39 (52.0)	49 (65.3)
Torsemide	27 (36.0)	14 (18.7)
Statin	43 (57.3)	41 (54.7)

J Am Coll Cardiol. 2017;70:331-41

PAL-HF

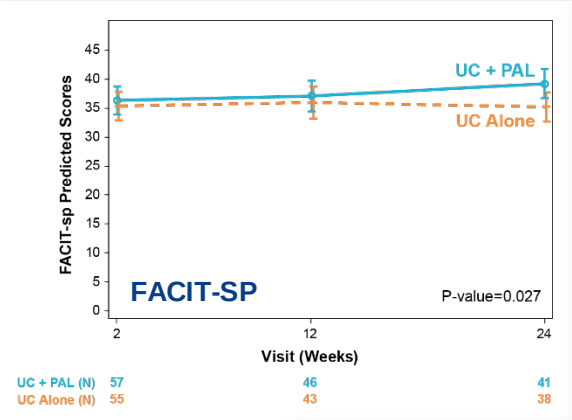
Palliative Care in Heart Failure

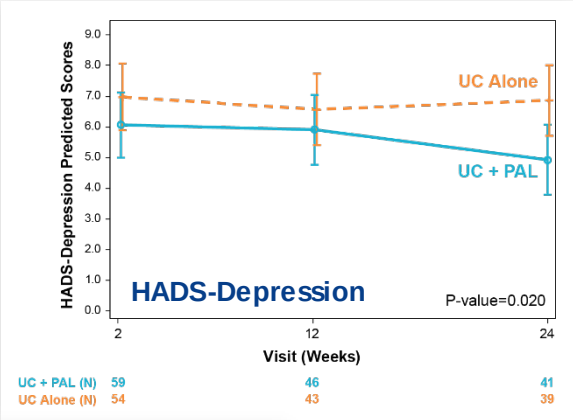
- RCT of palliative care intervention in patients with advanced HF and high mortality risk
- Focus on advance care planning, symptom reduction
- Inpatient and outpatient intervention by palliative care NP and MD

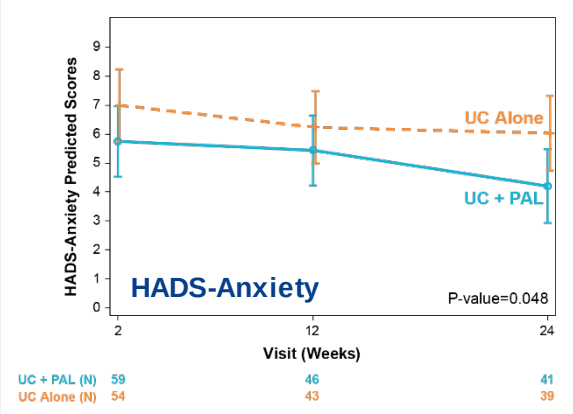


J Am Coll Cardiol. 2017;70:331-41

Impact of Palliative Care Intervention on Spirituality, Depression, and Anxiety







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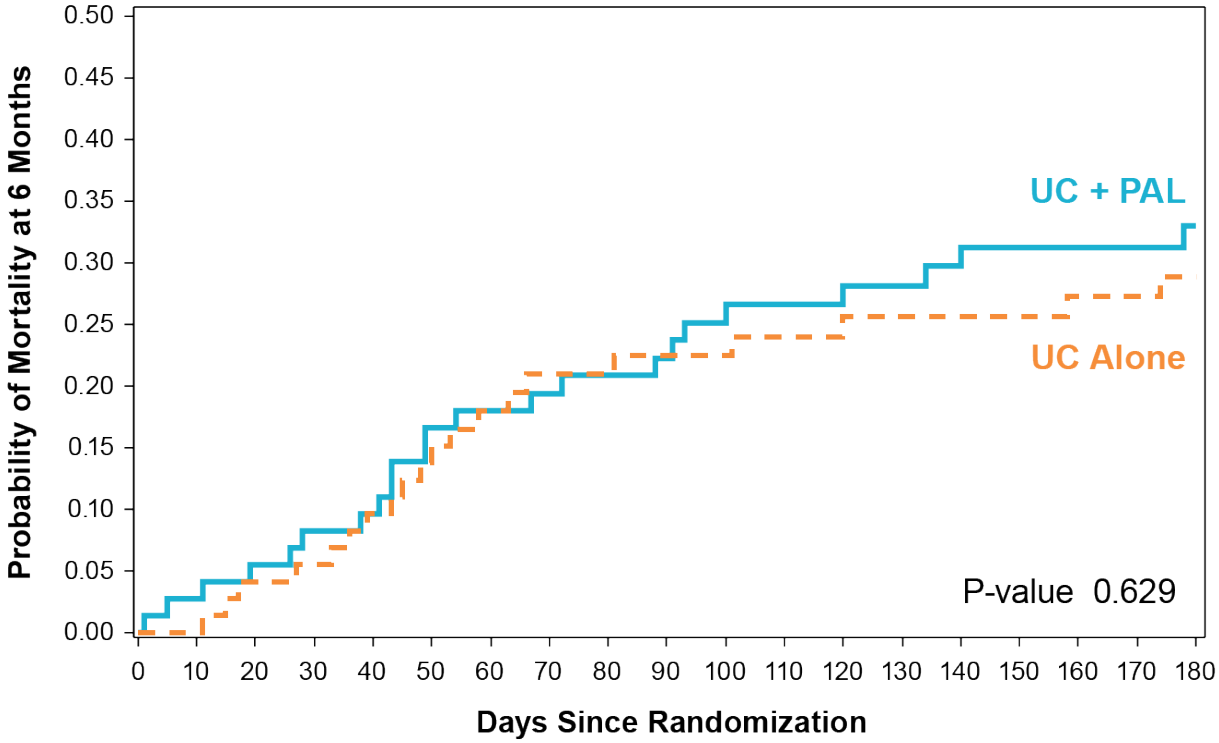
PAL-HF

Palliative Care in Heart Failure



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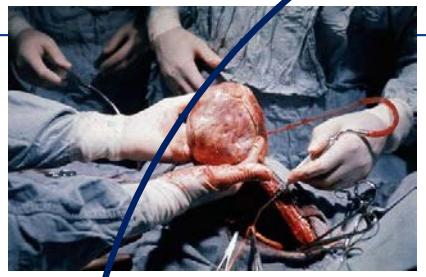
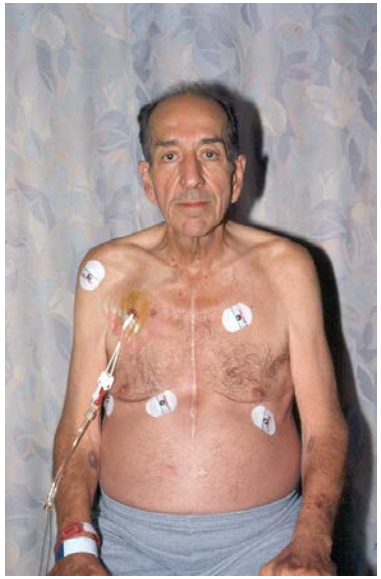
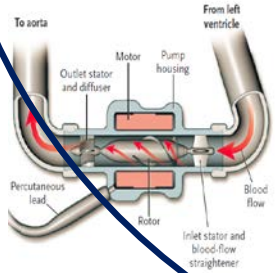
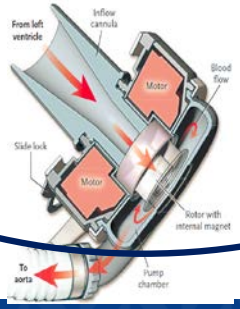




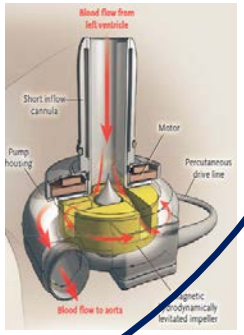
HeartMate II



HeartMate III



HVAD



Summary

- Acute Heart Failure starts the negative cascade towards increase morbidity and mortality without any breakthroughs of new therapies
- Advanced heart failure remains a condition accompanied by high residual morbidity and mortality.
- Transplant improves survival but is limited by the number of donors.
- LVADs have been shown to improve survival, quality of life and submaximal functional capacity.
- The PAL-HF trial was the first randomized, controlled clinical trial to test a longitudinal palliative care intervention in a heart failure population resulting in improved quality of life
- More research is needed for advanced heart failure; acute heart failure research deserves a pause