

*TAVR Should Replace Surgery
in (Almost) ALL
Aortic Stenosis Patients!*

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Disclosure Statement of Financial Interest

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Martin B. Leon, MD

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation / Financial Relationship

- Grant / Research Support
- Consulting Fees / Honoraria
- Shareholder / Equity

Company

- Abbott, Boston Scientific, Edwards Lifescience, Medtronic
- Meril Lifescience, Micell,
- Apica, Claret, Coherex, Elixir, GDS, Medinol, Mitralign, Valve Medical

Primary Thesis...

**TAVR Should be the
Procedure of Choice in
(almost) Every Patient
with Severe Aortic Stenosis,
Regardless of Risk Status!**

To Accept this Primary Thesis requires...

1. *A “suspension of belief”*
(uncoupling from the past)
2. *A reasonable body of evidence*
(parity or superiority vs. surgery -
mortality, strokes, QOL, valve
performance, secondary benefits)

TAVR for (almost) Everyone

Background

Dr. Alain Cribier

First-in-Man PIONEER



OK, What Now?

TAVR Arrives

Current Generation Devices

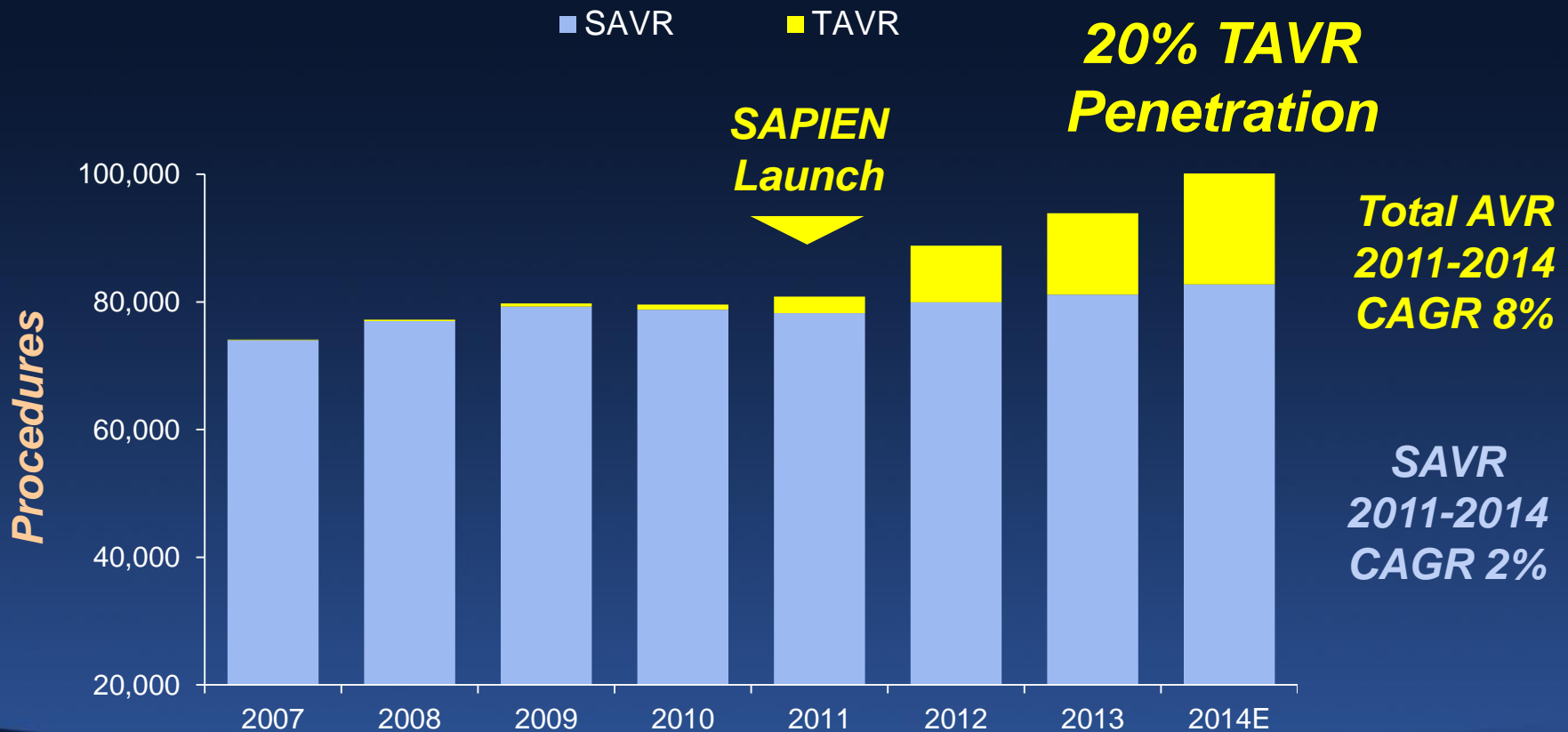
***>125,000 patients treated thru 2014
in >750 interventional centers
around the world!***

Edwards Lifesciences

Medtronic CoreValve

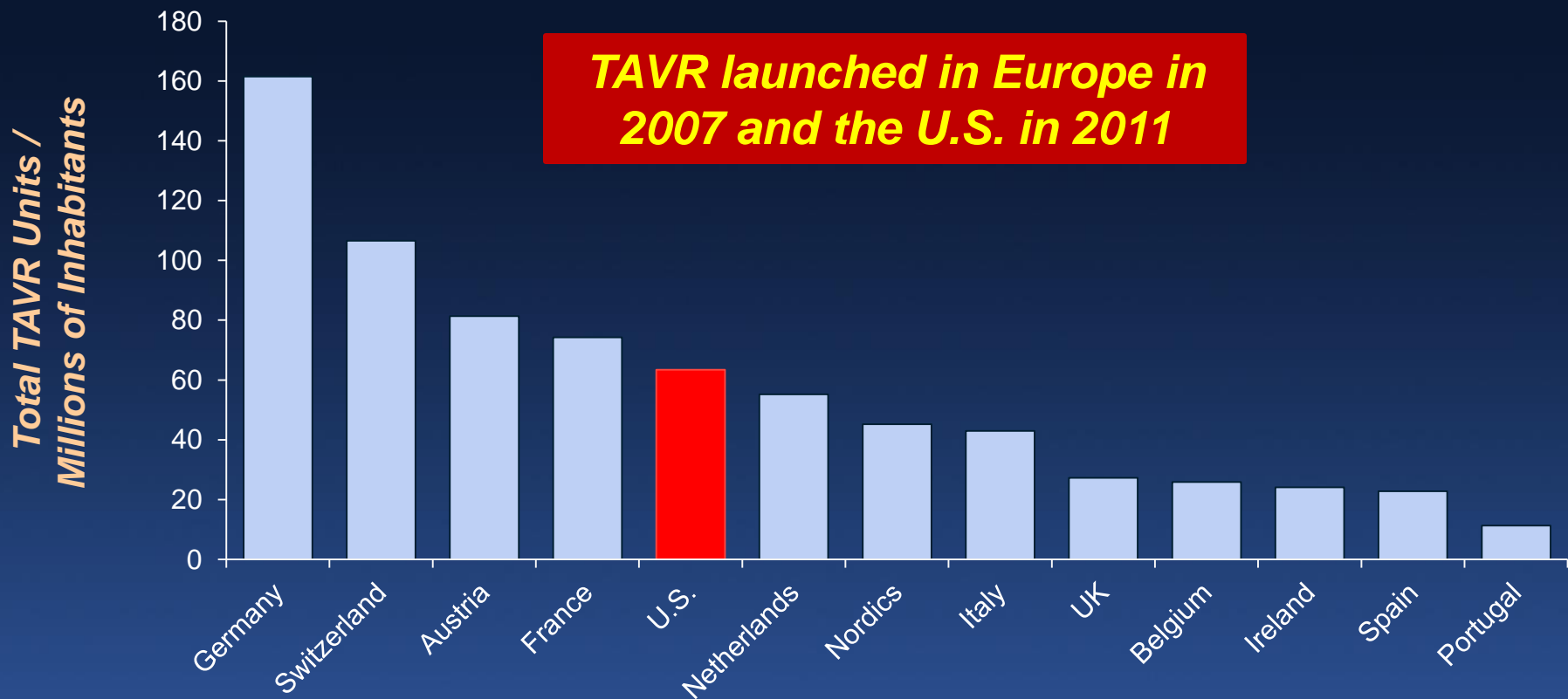
TAVR Has Accelerated the Treatment of Aortic Stenosis Patients

Estimated AVR Procedures in the U.S.



U.S. TAVR Penetration After 3 Years

2014 Country TAVR Penetration Total TAVR Units / Millions of Inhabitants



TAVR for (almost) Everyone

**Start with the
Guidelines**

PRACTICE GUIDELINE

2014 AHA/ACC Guideline for the Management of Patients With Valvular Heart Disease: Full Text

A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines

Developed in Collaboration With the American Association for Thoracic Surgery, American Society of Echocardiography, Society for Cardiovascular Angiography and Interventions, Society of Cardiovascular Anesthesiologists, and Society of Thoracic Surgeons

Rick A. Nishimura, MD, MACC, FAHA, Co-Chair†

Catherine M. Otto, MD, FACC, FAHA, Co-Chair†

Robert O. Bonow, MD, MACC, FAHA†

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Carlos E. Ruiz, MD, PhD, FACC†

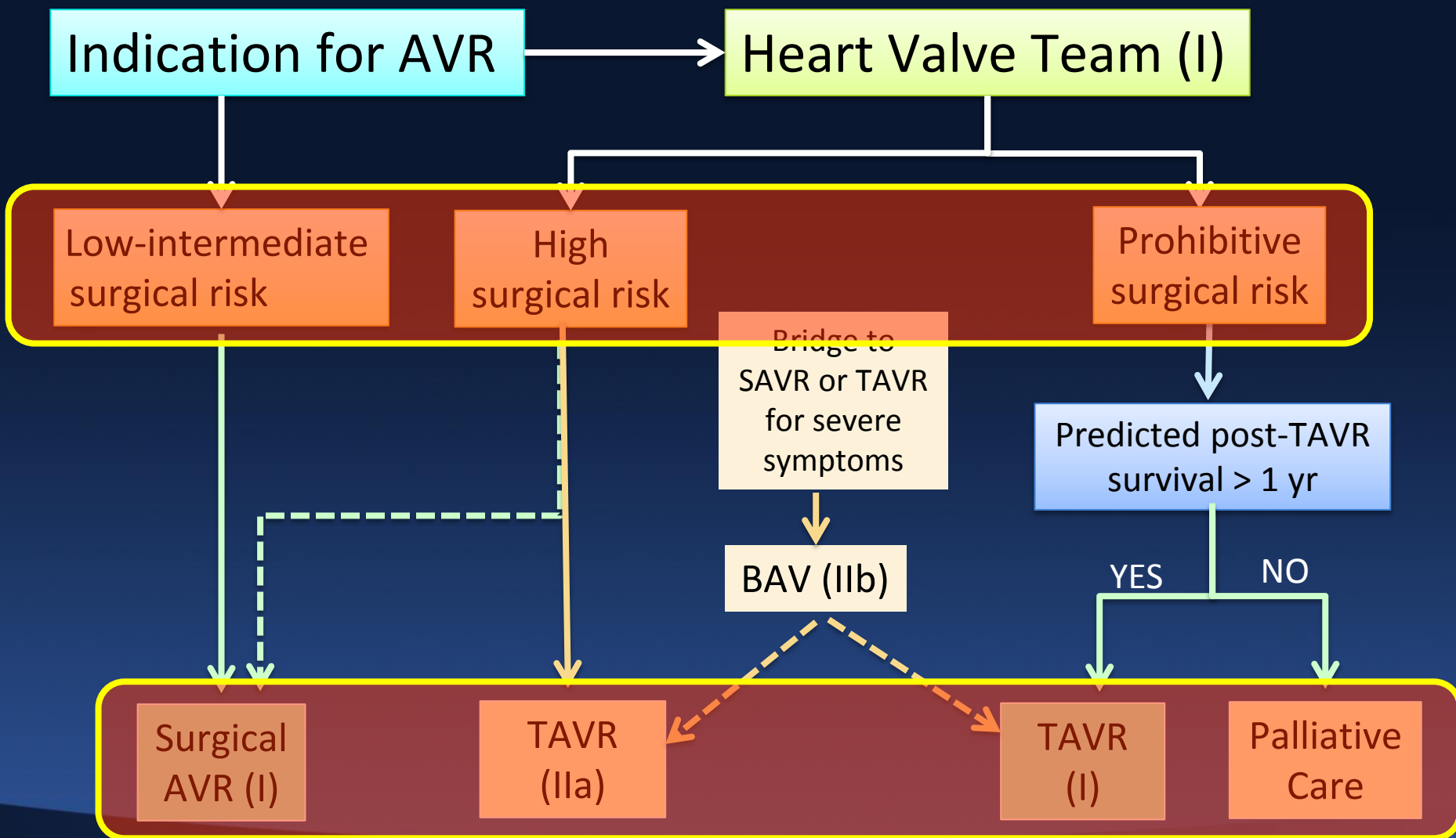
Nikolaos J. Skubas, MD, FASE¶

Paul Sorajja, MD, FACC, FAHA#

Thoralf M. Sundt III, MD* **††

James D. Thomas, MD, FASE, FACC, FAHA‡‡

CHOICE of Intervention for AS



The severe AS-T

- Old...very old...
- Frail...very frail
- Lots of co-morbidities
 - Prior CABG (poor)
 - CKD
 - Severe COPD
 - PVD
 - Chronic AF
 - Cancer in remission



But still enjoying life !

PARTNER THV Evolution



PI - 2007

*Edwards SAPIEN™ THV
23 mm and 26 mm*



PII - 2010

*Edwards SAPIEN XT™ THV
23 mm, 26 mm, and 29mm*



PII S3 - 2013

*Edwards SAPIEN 3™ THV
20 mm, 23 mm, 26 mm, and 29mm*

***PARTNER enrolled 8,494 patients in FDA studies
(including 4 RCTs) with 3 generations of
TAVR systems in ~ 7 years!***

PARTNER Manuscripts in NEJM (October, 2010 – May, 2012)



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

OCTOBER 21, 2010

VOL. 363 NO. 17

Transcatheter Aortic-Valve Implantation for Aortic Stenosis in Patients Who Cannot Undergo Surgery

Martin B. Leon, M.D., Craig R. Smith, M.D., Michael Mack, M.D., D. Craig Miller, M.D., Jeffrey W. Moses, M.D., Lars G. Svensson, M.D., Ph.D., E. Murat Tuzcu, M.D., John G. Webb, M.D., Gregory P. Fontana, M.D., Raj R. Makkar, M.D., David L. Brown, M.D., Peter C. Block, M.D., Robert A. Guyton, M.D., Augusto D. Pichard, M.D., Joseph E. Bavaria, M.D., Howard C. Herrmann, M.D., Pamela S. Douglas, M.D., John L. Petersen, M.D., Jodi J. Akin, M.S., William N. Anderson, Ph.D., Duolao Wang, Ph.D., and Stuart Pocock, Ph.D., for the PARTNER Trial Investigators*

The NEW ENGLAND JOURNAL of MEDICINE

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JUNE 9, 2011

VOL. 364 NO. 23

Transcatheter and Surgical Aortic-Valve Replacement in High-Risk Patients

Craig R. Smith, M.D., Martin B. Leon, M.D., Michael J. Mack, M.D., D. Craig Miller, M.D., Jeffrey W. Moses, M.D., Lars G. Svensson, M.D., Ph.D., E. Murat Tuzcu, M.D., John G. Webb, M.D., Gregory P. Fontana, M.D., Raj R. Makkar, M.D., Mathew Williams, M.D., Todd Dewey, M.D., Samir Kapadia, M.D., Vasilis Babaliaros, M.D., Vinod H. Thourani, M.D., Paul Corso, M.D., Augusto D. Pichard, M.D., Joseph E. Bavaria, M.D., Howard C. Herrmann, M.D., Jodi J. Akin, M.S., William N. Anderson, Ph.D., Duolao Wang, Ph.D., and Stuart J. Pocock, Ph.D., for the PARTNER Trial Investigators*

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Transcatheter Aortic-Valve Replacement for Inoperable Severe Aortic Stenosis

Raj R. Makkar, M.D., Gregory P. Fontana, M.D., Hasan Jilaihawi, M.D., Samir Kapadia, M.D., Augusto D. Pichard, M.D., Pamela S. Douglas, M.D., Vinod H. Thourani, M.D., Vasilis C. Babaliaros, M.D., John G. Webb, M.D., Howard C. Herrmann, M.D., Joseph E. Bavaria, M.D., Susheel Kodali, M.D., David L. Brown, M.D., Bruce Bowers, M.D., Todd M. Dewey, M.D., Lars G. Svensson, M.D., Ph.D., Murat Tuzcu, M.D., Jeffrey W. Moses, M.D., Matthew R. Williams, M.D., Robert J. Siegel, M.D., Jodi J. Akin, M.S., William N. Anderson, Ph.D., Stuart Pocock, Ph.D., Craig R. Smith, M.D., and Martin B. Leon, M.D., for the PARTNER Trial Investigators*

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Two-Year Outcomes after Transcatheter or Surgical Aortic-Valve Replacement

Susheel K. Kodali, M.D., Mathew R. Williams, M.D., Craig R. Smith, M.D., Lars G. Svensson, M.D., Ph.D., John G. Webb, M.D., Raj R. Makkar, M.D., Gregory P. Fontana, M.D., Todd M. Dewey, M.D., Vinod H. Thourani, M.D., Augusto D. Pichard, M.D., Michael Fischbein, M.D., Wilson Y. Szeto, M.D., Scott Lim, M.D., Kevin L. Greason, M.D., Paul S. Teirstein, M.D., S. Chris Malaisrie, M.D., Pamela S. Douglas, M.D., Rebecca T. Hahn, M.D., Brian Whisenant, M.D., Alan Zajarias, M.D., Duolao Wang, Ph.D., Jodi J. Akin, M.S., William N. Anderson, Ph.D., and Martin B. Leon, M.D., for the PARTNER Trial Investigators*

PARTNER 5-year FU in Lancet (March, 2015)



5-year outcomes of transcatheter aortic valve replacement compared with standard treatment for patients with inoperable aortic stenosis (PARTNER 1): a randomised controlled trial

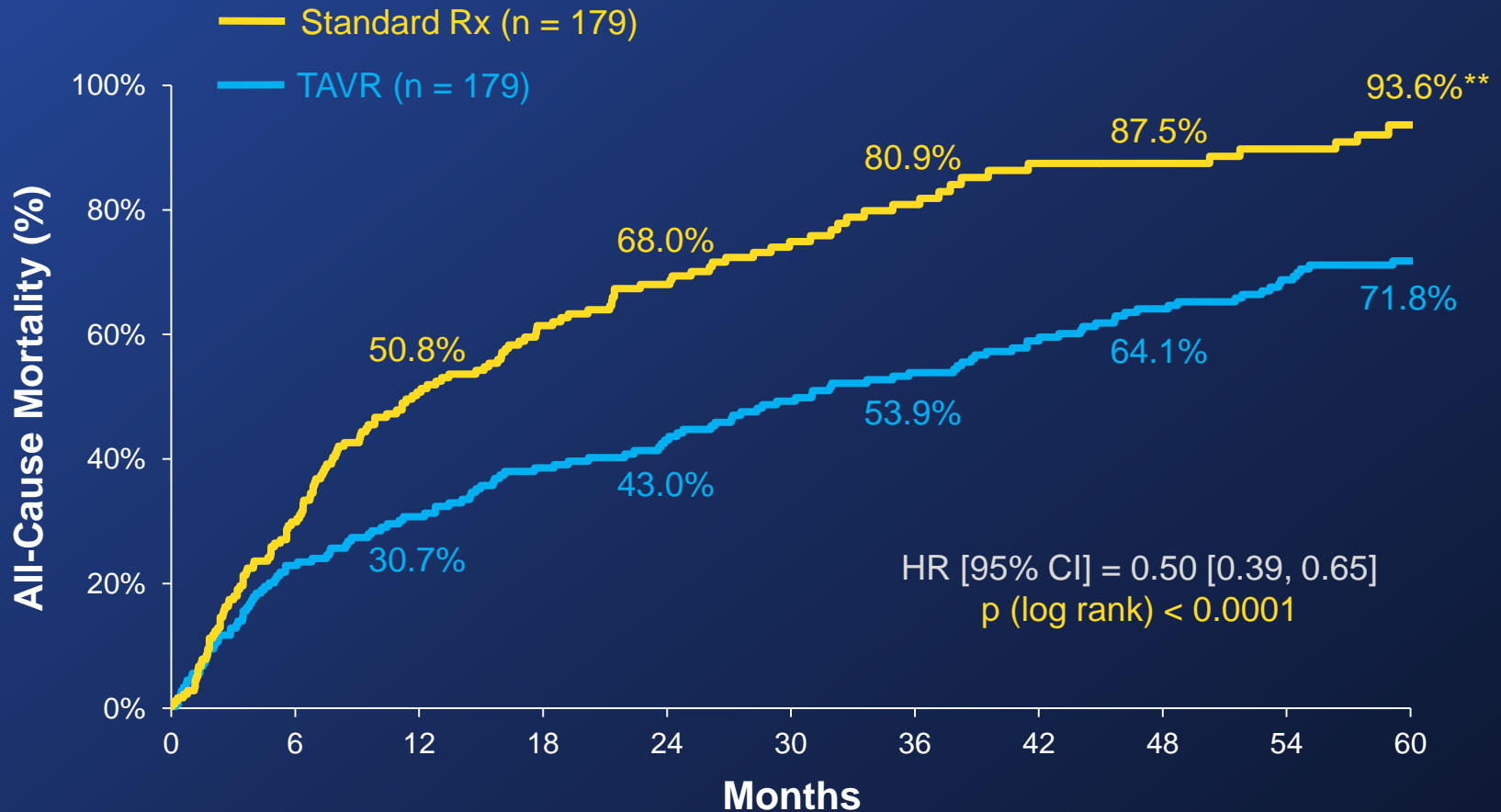
Samir R Kapadia, Martin B Leon, Raj R Makkar, E Murat Tuzcu, Lars G Svensson, Susheel Kodali, John G Webb, Michael J Mack, Pamela S Douglas, Vinod H Thourani, Vasilis C Babaliaros, Howard C Herrmann, Wilson Y Szeto, Augusto D Pichard, Mathew R Williams, Gregory P Fontana, D Craig Miller, William N Anderson, Jodi J Akin, Michael J Davidson†, Craig R Smith, for the PARTNER trial investigators*

5-year outcomes of transcatheter aortic valve replacement or surgical aortic valve replacement for high surgical risk patients with aortic stenosis (PARTNER 1): a randomised controlled trial

Michael J Mack, Martin B Leon, Craig R Smith, D Craig Miller, Jeffrey W Moses, E Murat Tuzcu, John G Webb, Pamela S Douglas, William N Anderson, Eugene H Blackstone, Susheel K Kodali, Raj R Makkar, Gregory P Fontana, Samir Kapadia, Joseph Bavaria, Rebecca T Hahn, Vinod H Thourani, Vasilis Babaliaros, Augusto Pichard, Howard C Herrmann, David L Brown, Mathew Williams, Jodi Akin, Michael J Davidson†, Lars G Svensson, for the PARTNER 1 trial investigators*

All-Cause Mortality (ITT)

Crossover Patients Censored at Crossover

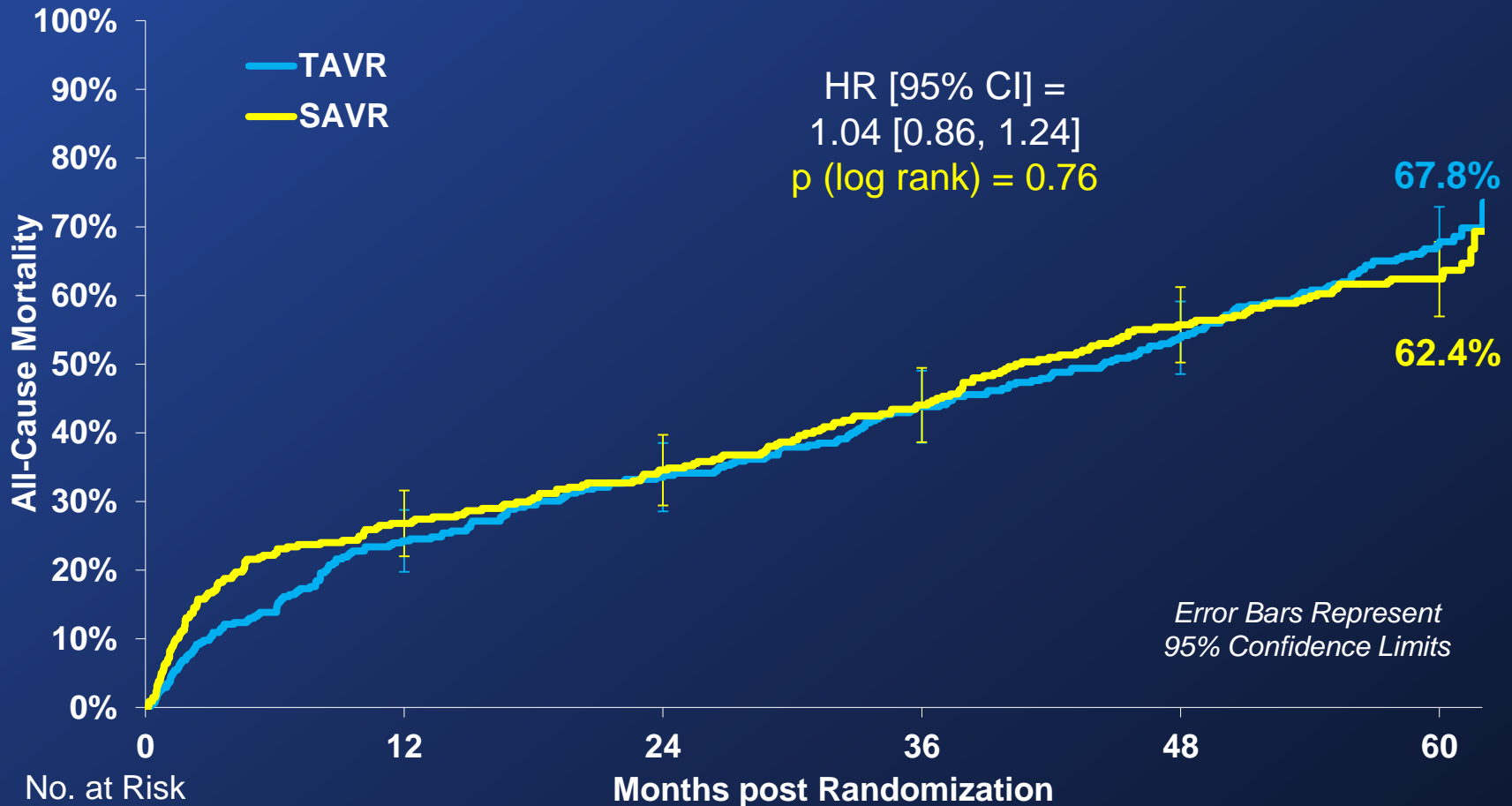


* In an age and gender matched US population without comorbidities, the mortality at 5 years is 40.5%.

** Only 1 standard Rx patient was alive at 5 years who didn't crossover to TAVR or had SAVR (out of protocol)

All-Cause Mortality (ITT)

All Patients



No. at Risk

TAVR 348

262

228

191

154

61

SAVR 351

236

210

174

131

64

CoreValve High-Risk U.S. Pivotal Trial (presented at ACC 2014)

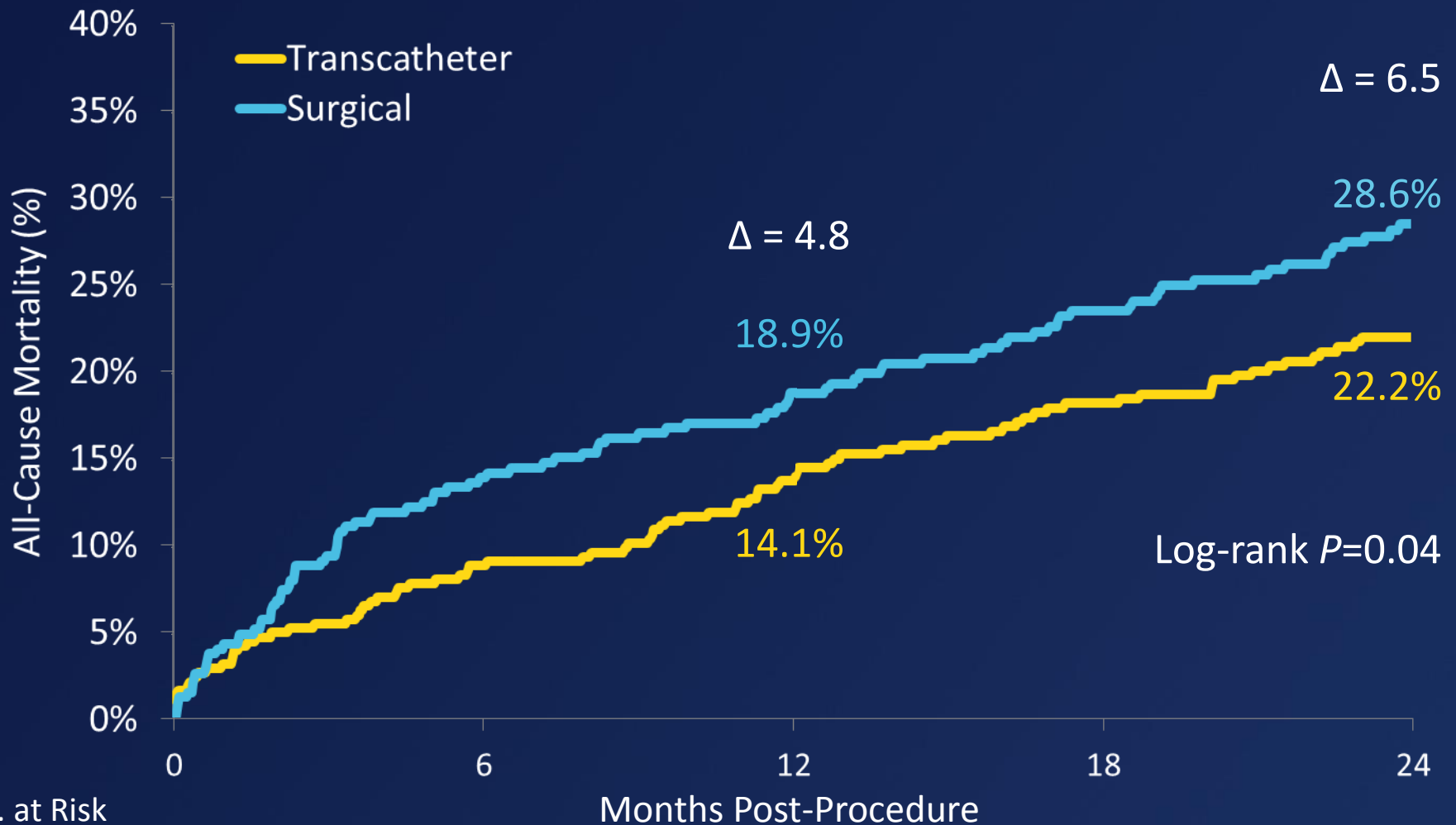
ORIGINAL ARTICLE

Transcatheter Aortic-Valve Replacement with a Self-Expanding Prosthesis

David H. Adams, M.D., Jeffrey J. Popma, M.D., Michael J. Reardon, M.D.,
Steven J. Yakubov, M.D., Joseph S. Coselli, M.D., G. Michael Deeb, M.D.,
Thomas G. Gleason, M.D., Maurice Buchbinder, M.D., James Hermiller, Jr., M.D.,
Neal S. Kleiman, M.D., Stan Chetcuti, M.D., John Heiser, M.D., William Merhi, D.O.,
George Zorn, M.D., Peter Tadros, M.D., Newell Robinson, M.D.,
George Petrossian, M.D., G. Chad Hughes, M.D., J. Kevin Harrison, M.D.,
John Conte, M.D., Brijeshwar Maini, M.D., Mubashir Mumtaz, M.D.,
Sharla Chenoweth, M.S., and Jae K. Oh, M.D.,
for the U.S. CoreValve Clinical Investigators*

*Adams DH, Popma JJ, Reardon MJ, et al.
Published in N Engl J Med on March 29, 2014
at NEJM.org*

All-Cause Mortality (AT)



No. at Risk

Months Post-Procedure

Transcatheter	391	378	354	334	219
Surgical	359	343	304	282	191

TAVR for (almost) Everyone

**Shifting to
Lower Risk
Patients**

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

- *Contemporary clinical practice has already evolved in the EU and in the U.S. – risk strata are “downshifting”*

Lower surgical risk patients in the EU are being treated by TAVR

MINI-FOCUS ON TAVI

CLINICAL RESEARCH

A 3-Center Comparison of 1-Year Mortality Outcomes Between Transcatheter Aortic Valve Implantation and Surgical Aortic Valve Replacement on the Basis of Propensity Score Matching Among Intermediate-Risk Surgical Patients

Nicolo Piazza, MD, PhD,*† Bindu Kalesan, PhD,‡ Nicolas van Mieghem, MD,§ Stuart Head, MSc,|| Peter Wenaweser, MD,¶ Thierry P. Carrel, MD,# Sabine Bleiziffer, MD,*† Peter P. de Jaegere, MD, PhD,§ Brigitta Gahl,# Robert H. Anderson, MD, PhD,** Arie-Pieter Kappetein, MD, PhD,|| Ruediger Lange, MD, PhD,†† Patrick W. Serruys, MD, PhD,§ Stephan Windecker, MD,¶ Peter Jüni, MD‡
Munich, Germany; Bern, Switzerland; Rotterdam, the Netherlands; Montreal, Canada; and Newcastle-Upon-Tyne, United Kingdom

STRUCTURAL HEART DISEASE

Acute and Late Outcomes of Transcatheter Aortic Valve Implantation (TAVI) for the Treatment of Severe Symptomatic Aortic Stenosis in Patients at High- and Low-Surgical Risk

GERHARD SCHYMIK, M.D.,¹ HOLGER SCHRÖFEL, M.D.,² JAN S. SCHYMIK,³ RAINER WONDASCHEK,¹ TIM SÜSELBECK, M.D.,⁴ RÜDIGER KIEFER,² VERONIKA BALTHASAR, M.D.,² ARMIN LUIK, M.D.,¹ HERBERT POSIVAL, M.D.,² and CLAUS SCHMITT, M.D.¹

From the ¹Medical Clinic IV, Municipal Hospital Karlsruhe, Germany; ²Clinic for Cardiac Surgery Karlsruhe, Germany; ³University of Munich, Germany; and ⁴Department of Medicine, University Medical Centre Mannheim, Germany

Improvements in Transcatheter Aortic Valve Implantation Outcomes in Lower Surgical Risk Patients

A Glimpse Into the Future

Ruediger Lange, MD, PhD, Sabine Bleiziffer, MD, Domenico Mazzitelli, MD, Yacine Elhmidi, MD, Anke Opitz, MD, Marcus Krane, MD, Marcus-Andre Deutsch, MD, Hendrik Ruge, MD, Gernot Brockmann, MD, Bernhard Voss, MD, Christian Schreiber, MD, Peter Tassani, MD, PhD, Nicolo Piazza, MD, PhD

Munich, Germany

Clinical outcomes of patients with estimated low or intermediate surgical risk undergoing transcatheter aortic valve implantation

Peter Wenaweser^{1†*}, Stefan Stortecky^{1†}, Sarah Schwander¹, Dik Heg², Christoph Huber³, Thomas Pilgrim¹, Steffen Gloekler¹, Crochan J. O'Sullivan¹, Bernhard Meier¹, Peter Jüni², Thierry Carrel³, and Stephan Windecker^{1,2}

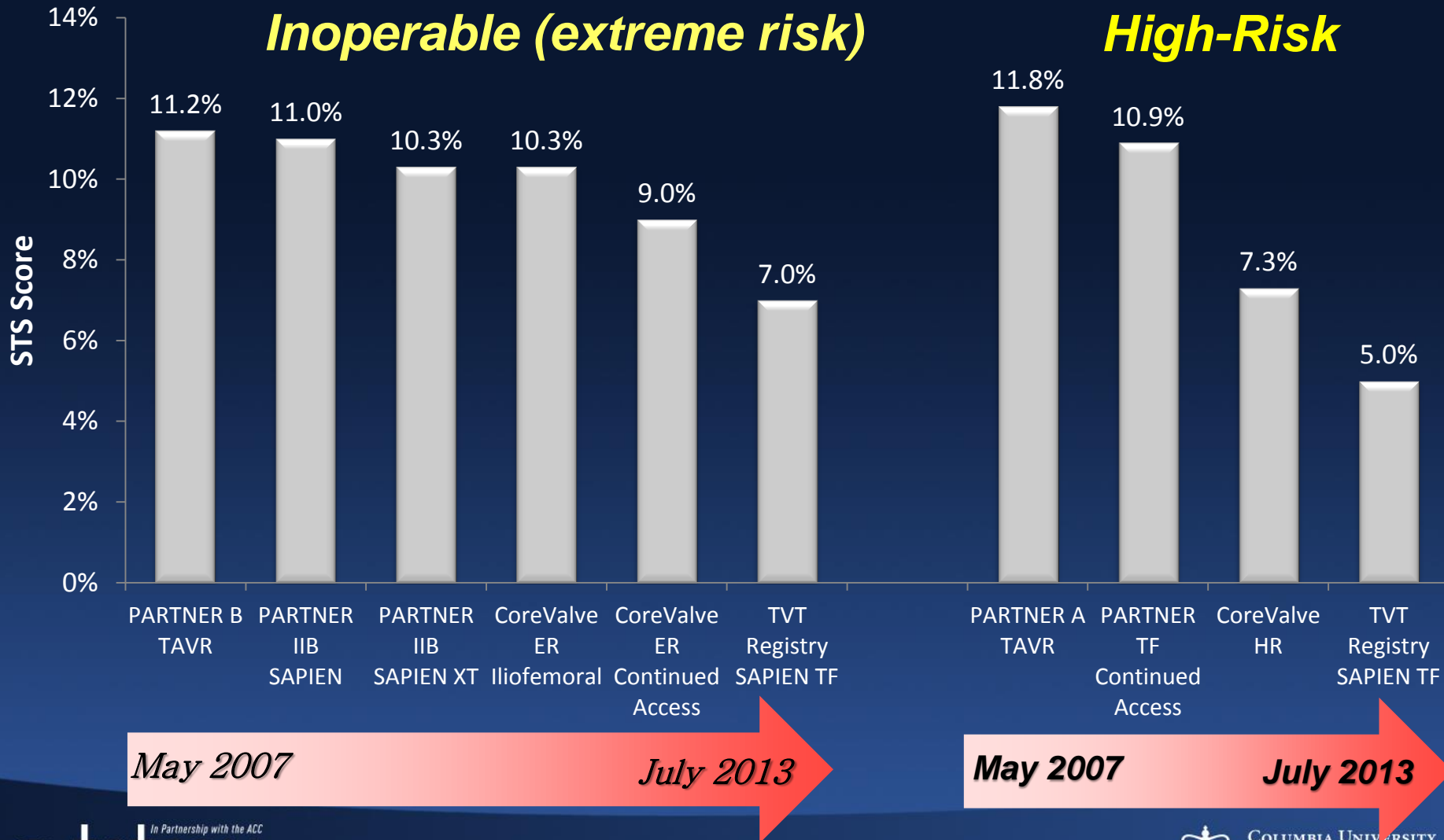
Transcatheter vs surgical aortic valve replacement in intermediate-surgical-risk patients with aortic stenosis: A propensity score-matched case-control study

Azeem Latib, MB ChB,^{a,b,f} Francesco Maisano, MD,^{c,f} Letizia Bertoldi, MD,^b Andrea Giacomini, MD,^c Joanne Shannon, MD,^a Micaela Cioni, MD,^c Alfonso Ielasi, MD,^b Filippo Figini, MD,^{a,b} Kensuke Tagaki, MD,^a Annalisa Franco, MD,^d Remo Daniel Covelto, MD,^d Antonio Grimaldi, MD,^d Pietro Spagnolo, MD,^c Gill Louise Buchanan, MD,^b Mauro Carlino, MD,^b Alaide Chieffo, MD,^b Matteo Montorfano, MD,^b Ottavio Alfieri, MD,^c and Antonio Colombo, MD^{a,b} *Milan, Italy*

Transcatheter aortic valve implantation versus surgical aortic valve replacement for severe aortic stenosis: Results from an intermediate risk propensity-matched population of the Italian OBSERVANT study

Paola D'Errigo^a, Marco Barbanti^{b,c,*}, Marco Ranucci^d, Francesco Onorati^e, Remo Daniel Covelto^f, Stefano Rosato^a, Corrado Tamburino^{b,c}, Francesco Santini^e, Gennaro Santoro^g, Fulvia Seccareccia^a and on behalf of the OBSERVANT Research Group

Evolution in Patient Selection in U.S. TAVR Clinical Trials



TAVR Categories

(risk is a continuum)

Operable AS patients




TAVR in 2015

irresponsible, reckless

“equipoise” OK preferred No

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

- Contemporary clinical practice has already evolved in the EU and in the U.S. – risk strata are “downshifting”
- *TAVR results have been better in lower risk patients (early [30 days] and late [1 year] mortality).*

Retrospective Analyses Indicate Improved Outcomes in Lower risk Patients

euro
PCR
2012 YEAR OF THE
TEXTBOOK

Procedural, 30-day, 6 month, 1 year, 2 years
and 3 years outcome following CoreValve or
Edwards Sapien TAVI

results of the Belgian TAVI

Prof Dr Johan Bosmans
Interventional cardiologist
University Hospital Antwerp
Belgium

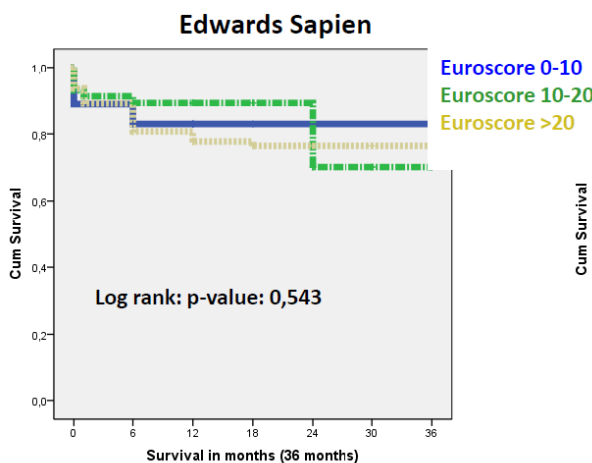
ASHOK Pruvazian, M.D., Christophe Caussin, M.D.,
Jacques Bosch, M.D., Herve Le Breton, M.D., Franck
Remi Houel, M.D., Stephane Delpine, M.D., Gerard
Xavier Favereau, M.D., Patrick Ohlmann, M.D., Vincent
Gilles Grollier, M.D., Antoine Gommeaux, M.D., Jean-
Francois Bourlon, M.D., Bernard Bertrand, M.D., Eric
and Marc Laskar, M.D., for the FRANCE 2 I

results from 13 680 patients
disease[†]

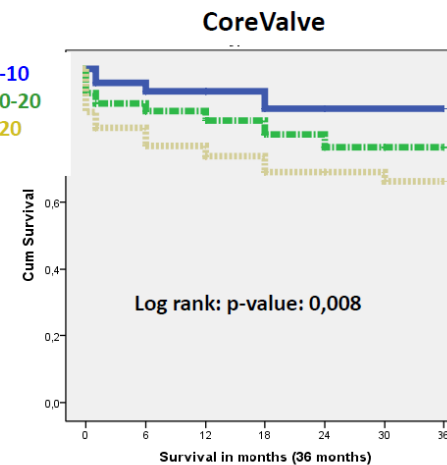
And EuroSCORE 10 - < 20

euro
PCR

Medium outcome of transfemoral TAVI in relation to EuroScore:
Edwards Sapien vs CoreValve



		Survival	1 m	6 m	12 m	18 m	24 m	30 m	36 m
Edwards	Survival								
	EuroScore 0-10	no	2	2	3	3	3	3	3
	yes	16	15	11	15	4	1	1	
EuroScore 10-20	no	4	5	6	6	6	9	9	
	yes	53	46	34	19	14	7	4	
EuroScore > 20	no	13	23	37	41	42	43	43	
	yes	190	149	108	67	23	20	18	



		Survival	1 m	6 m	12 m	18 m	24 m	30 m	36 m
CoreValve	Survival								
	EuroScore 0-10	no	0	2	3	3	4	4	4
	yes	48	38	29	20	13	8	6	
EuroScore 10-20	no	7	9	12	14	16	17	17	
	yes	95	79	62	42	22	15	6	
EuroScore > 20	no	19	27	34	37	40	40	41	
	yes	132	107	77	47	32	27	20	

TAVR in Low/Moderate Risk Patients

2 EU centers have directly compared TAVR outcomes of patients at lower- and higher-risk...

	Bern ¹		Munich ²	
	Lower Risk (n=254)	Higher Risk (n=94)	Lower Risk (n=105)	Higher Risk (n=105)
STS (%)	5.1 ± 1.4	13.3 ± 7.1	4.8 ± 2.6	7.13 ± 5.4
Log EuroSCORE (%)	22.1 ± 11.9	35.1 ± 15.7	17.8 ± 12.0	25.44 ± 16.0
30 Day Mortality (%)	3.9	14.9	3.8	11.4
Total Vascular Complications (%)	17.7	20.3	14.7	28.6
Stroke / TIA (%)	5.0	3.4	1	6.7

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

- Contemporary clinical practice has already evolved in the EU and in the U.S. – risk strata are “downshifting”
- TAVR results have been better in lower risk patients (early [30 days] and late [1 year] mortality).
- *Propensity matched cohorts indicate parity with surgery in moderate risk patients and randomized trials are ongoing (PARTNER 2A and SURTAVI).*

TAVR vs. Surgery in “Matched” Moderate Risk Patients

3 EU studies have compared TAVR vs. Surgery using propensity-matching in moderate risk patients...

	Piazza ¹			OBSERVANT ²			Latib ³		
	TAVI (n=255)	SAVR (n=255)	p	TAVI (n=133)	SAVR (n=133)	p	TAVI (n=111)	SAVR (n=111)	p
STS (%, mean)	3-8	3-8		na	na		4.6	4.6	
Log EuroSCORE (%, mean)	17.3	17.6		8.9	9.4		23.2	24.4	
30 Day Mortality (%)	7.8	7.1	0.74	3.8	3.8	1.000	1.8	1.8	1.00

¹Piazza, et al. , *J Am Coll Cardiol Intv* 2013; 6: 443-51;

²D’Errigo, et al., *Int J Cardiol* 2013; 167: 1945-52;

³Latib, et al., *Am Heart J* 2012; 164: 910-7

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

- Contemporary clinical practice has already evolved in the EU and in the U.S. – risk strata are “downshifting”
- TAVR results have been better in lower risk patients (early [30 days] and late [1 year] mortality).
- Propensity matched cohorts indicate parity with surgery in moderate risk patients and randomized trials are ongoing (PARTNER 2A and SURTAVI).
- *Important TAVR procedure-related complications have been declining which have already favorably impacted mortality.*

Influence of Transcatheter Aortic Valve Replacement Strategy and Valve Design on Stroke After Transcatheter Aortic Valve Replacement



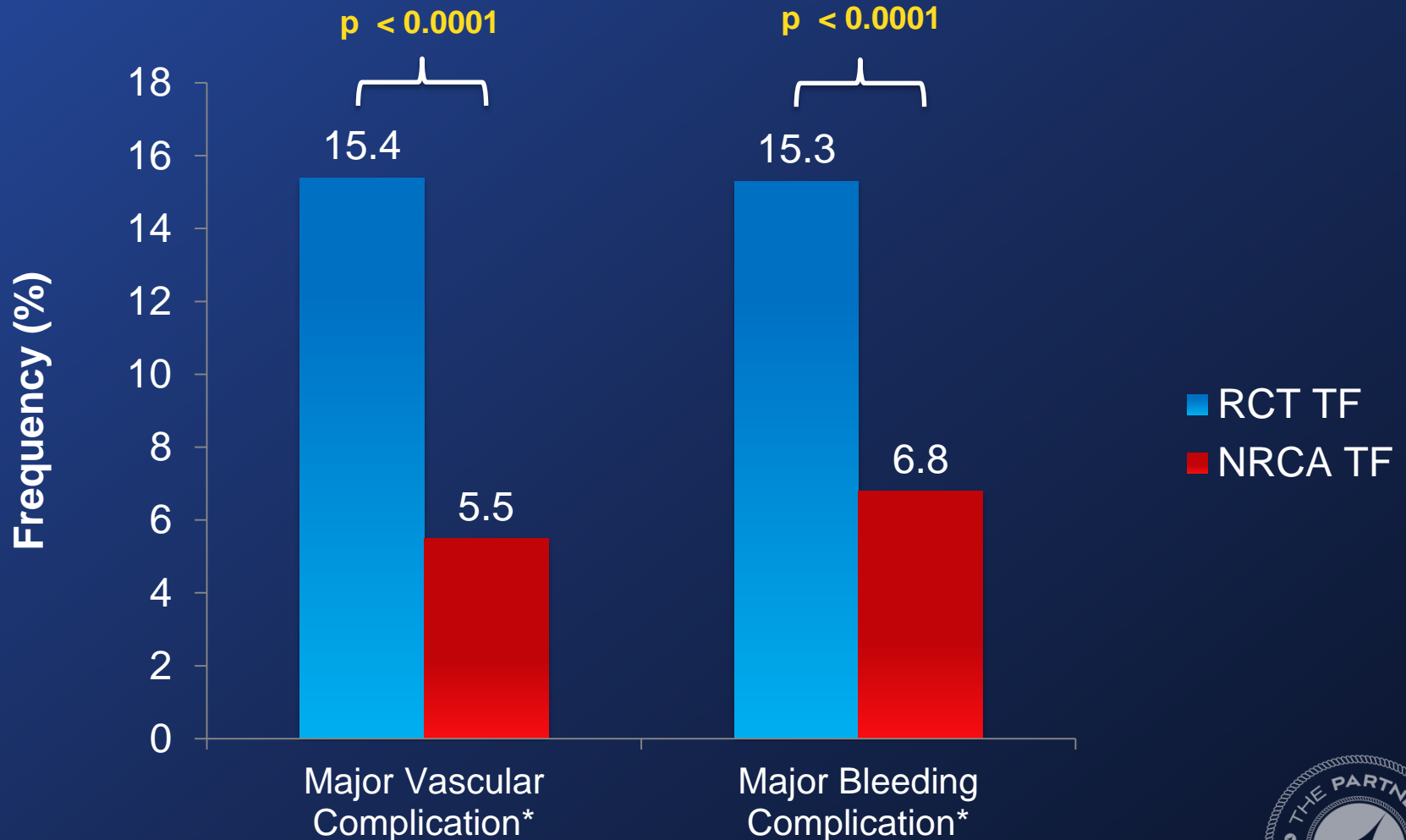
A Meta-Analysis and Systematic Review of Literature

Ganesh Athappan, MD,* R. Dilip Gajulapalli, MD,† Prasanna Sengodan, MD,* Anju Bhardwaj, MD,* Stephen G. Ellis, MD,† Lars Svensson, MD, PhD,† Emin Murat Tuzcu, MD,† Samir R. Kapadia, MD†
Cleveland, Ohio

- 25 multicenter registries and 33 single center studies
- No differences in 30-day stroke rates for...
 - TF vs. TA (multicenter 2.8% vs. 2.8% and single-center 3.8% vs. 3.4%)
 - CoreValve vs. SAPIEN (multicenter 2.4% vs. 3.0% and single-center 3.8% vs. 3.2%)
- ***Decline in stroke risk with increased operator experience and technological advancement (newer TAVR systems)***

PARTNER I A+B (high-risk + inoperable)

Procedural Complications (RCT vs. NRCA)

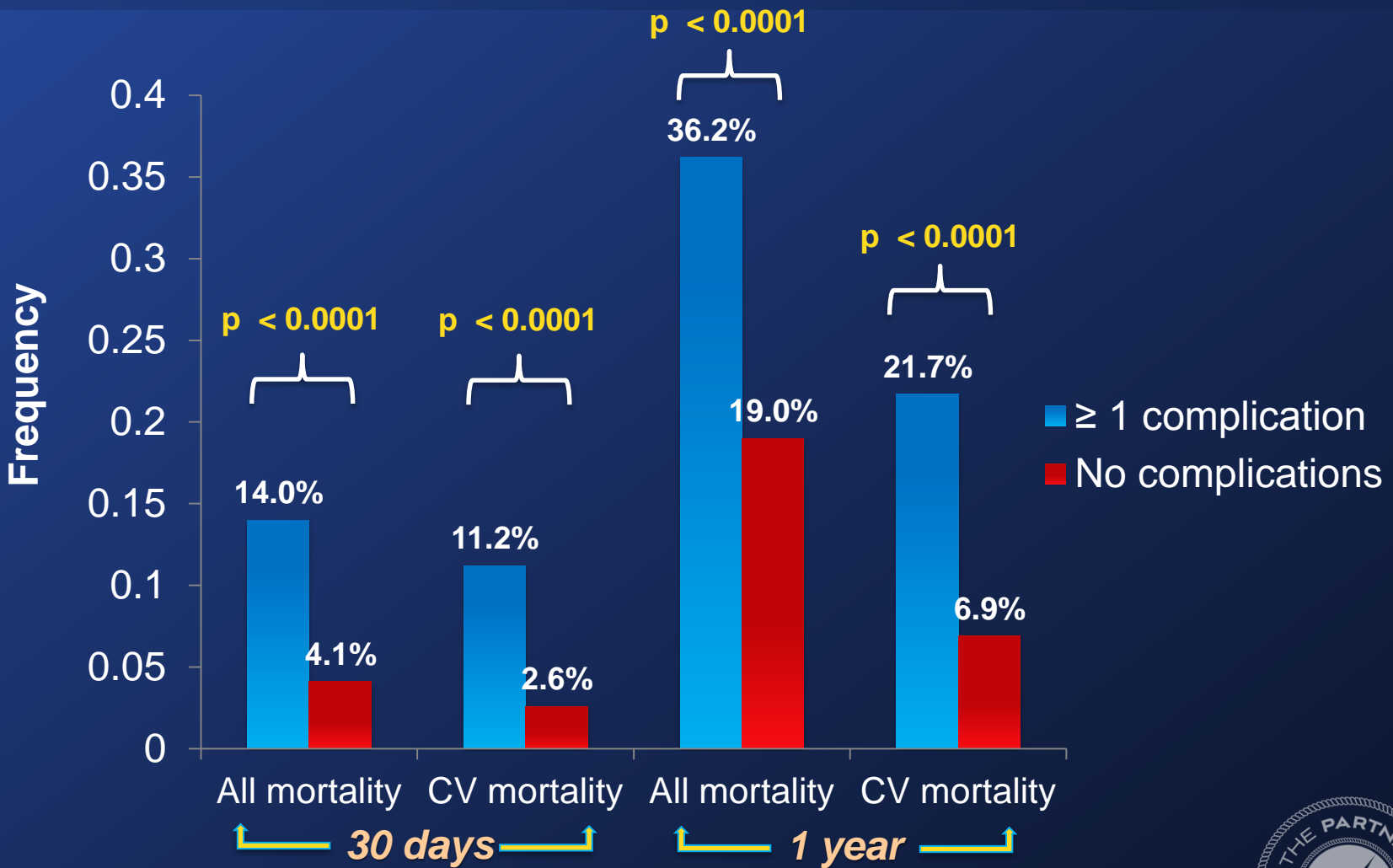


**Based on Modified VARC 1 Definitions (TF patients only)*



PARTNER I A+B (high-risk + inoperable)

With (n=514) vs. Without (n=2005) complications*



*Complication = Stroke, major vasc, major bleeding, mod/severe PVL, and AV reintervention (Modified VARC 1 Definitions)



TAVR for (almost) Everyone

Shifting to Lower Risk Patients

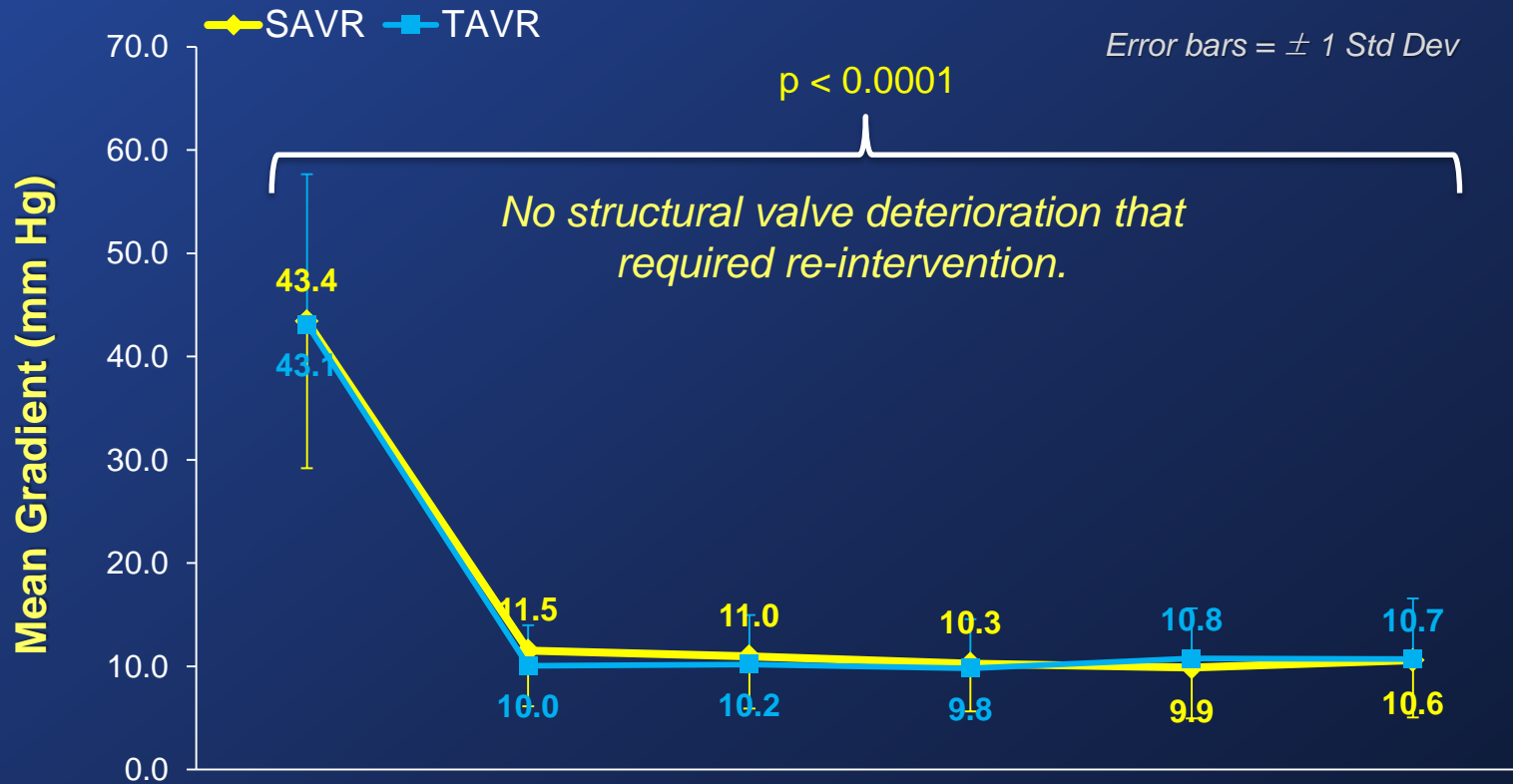
- *TAVR bioprosthetic valve performance has been excellent (? PVR) with good durability (no premature structural valve deterioration).*

Mean Gradient & Valve Area (AT)

All Patients



Aortic Valve Mean Gradient



	Baseline	1 Year	2 Year	3 Year	4 Year	5 Year
TAVR	310	219	156	106	79	56
SAVR	299	158	123	86	61	48

SAPIEN TAVR has Demonstrated Durability up to 9 Years (Vancouver experience)

1st generation



Horse pericardium
Untreated

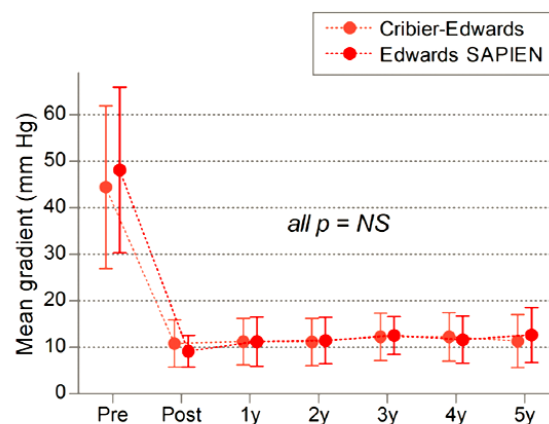
2nd generation SAPIEN



Bovine pericardium
Anticalcification treatment

Valves explanted after 7 years

Vancouver 9 year durability experience



Vancouver

- 9 year experience
- >1,000 implants
- 5 failed valves

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

- TAVR bioprosthetic valve performance has been excellent (? PVR) with good durability (no premature structural valve deterioration).
- *TAVR has had at least equivalent and often more favorable clinical outcomes vs. SAVR in multiple important clinical subgroups.*

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

TAVR “Friendly” Subgroups

- Female gender
- Diabetics
- Small annulus size (less PPM)
- AS + moderate/severe MR
- AS + concomitant CAD (non-complex)
- AS + LV dysfunction
- Low flow - low gradient AS

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

TAVR “Friendly” Subgroups

- Oxygen-dependent COPD
- Chronic kidney disease
- Frailty and extreme age (e.g. >90 yo)
- Mild/moderate dementia
- Mild/moderate hepatic dysfunction

TAVR for (almost) Everyone

Shifting to Lower Risk Patients

- TAVR bioprosthetic valve performance has been excellent (? PVR) with good durability (no premature structural valve deterioration).
- TAVR has had at least equivalent and often more favorable clinical outcomes vs. SAVR in multiple important clinical subgroups.
- *TAVR in the “modern era” is “less invasive” with simplified procedures and the next generation technologies have significantly improved clinical outcomes in both high and lower risk patients!*

TAVR for (almost) Everyone

The “Modern” TAVR Era

Procedural Considerations - *There is a strong trend (led by many physician thought leaders) to maximally simplify TAVR procedures!*

- preferential percutaneous transfemoral access (>90%)
- reduced use of general anesthesia
- less intra-procedural TEE
- eliminate pre-dilatation
- decreased use of complex and costly hybrid cath lab/OR environments
- early discharge programs

The 3M strategy in Vancouver

- Multidisciplinary
- Multimodality
- Minimalist
 - ✓ TF access
 - ✓ next day discharge

THE VANCOUVER SUN



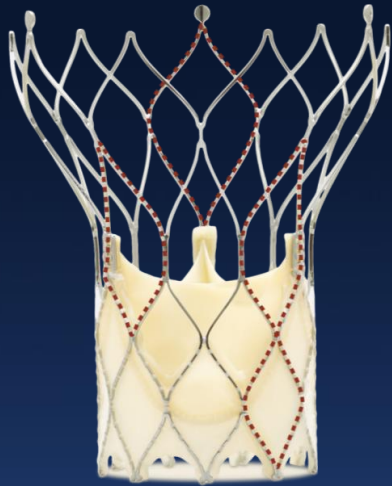
Dr David Wood from St-Paul Hospital: Same day discharge after TAVR!



A 97 years old women discharged the same day after a TAVR procedure stretching while waiting for the bus to get home... read more on page 3.

New TAVR Technologies

New Self-Expanding TAVR Systems



PORTICO
(St. Jude)



ENGAGER
(Medtronic)



ACURATE
(Symetis)



EVOLUT R
(Medtronic)



ACC.15

TCT@ACC-15 | innovation in intervention

64th Annual Scientific Session & Expo

An All-comers Randomized Clinical Trial Comparing Transcatheter with Surgical Aortic Valve Replacement in Patients with Aortic Valve Stenosis

Nordic Aortic Valve Intervention Trial (NOTION)

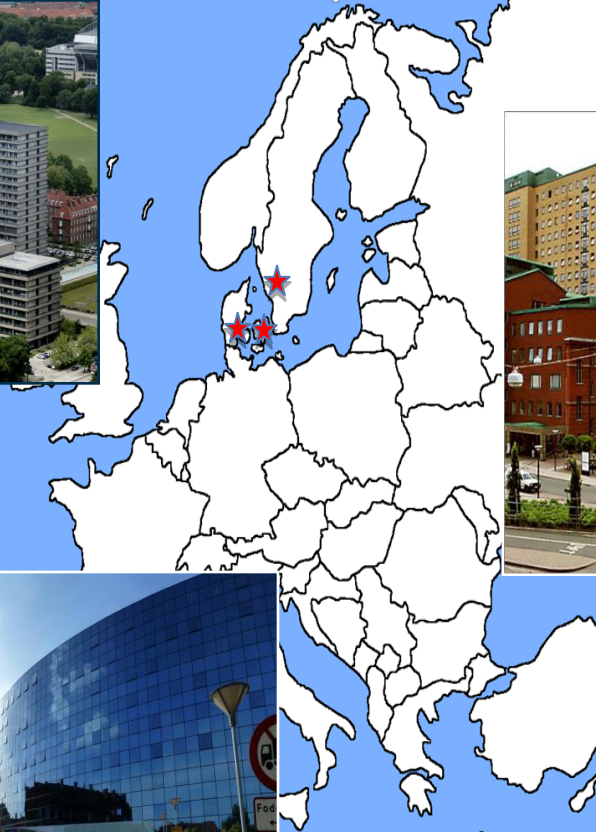
Hans Gustav Hørsted Thyregod, MD

Dep. of Cardiothoracic Surgery, Copenhagen University Hospital, Denmark

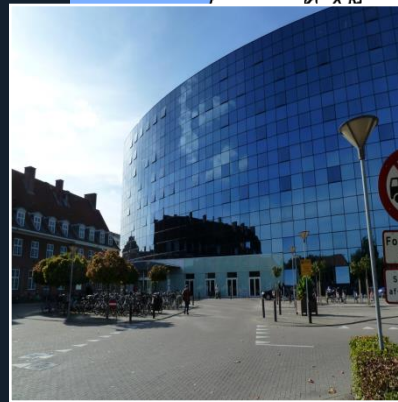
NOTION: Participating Centers



**Rigshospitalet,
Copenhagen
University
Hospital,
Copenhagen,
Denmark**

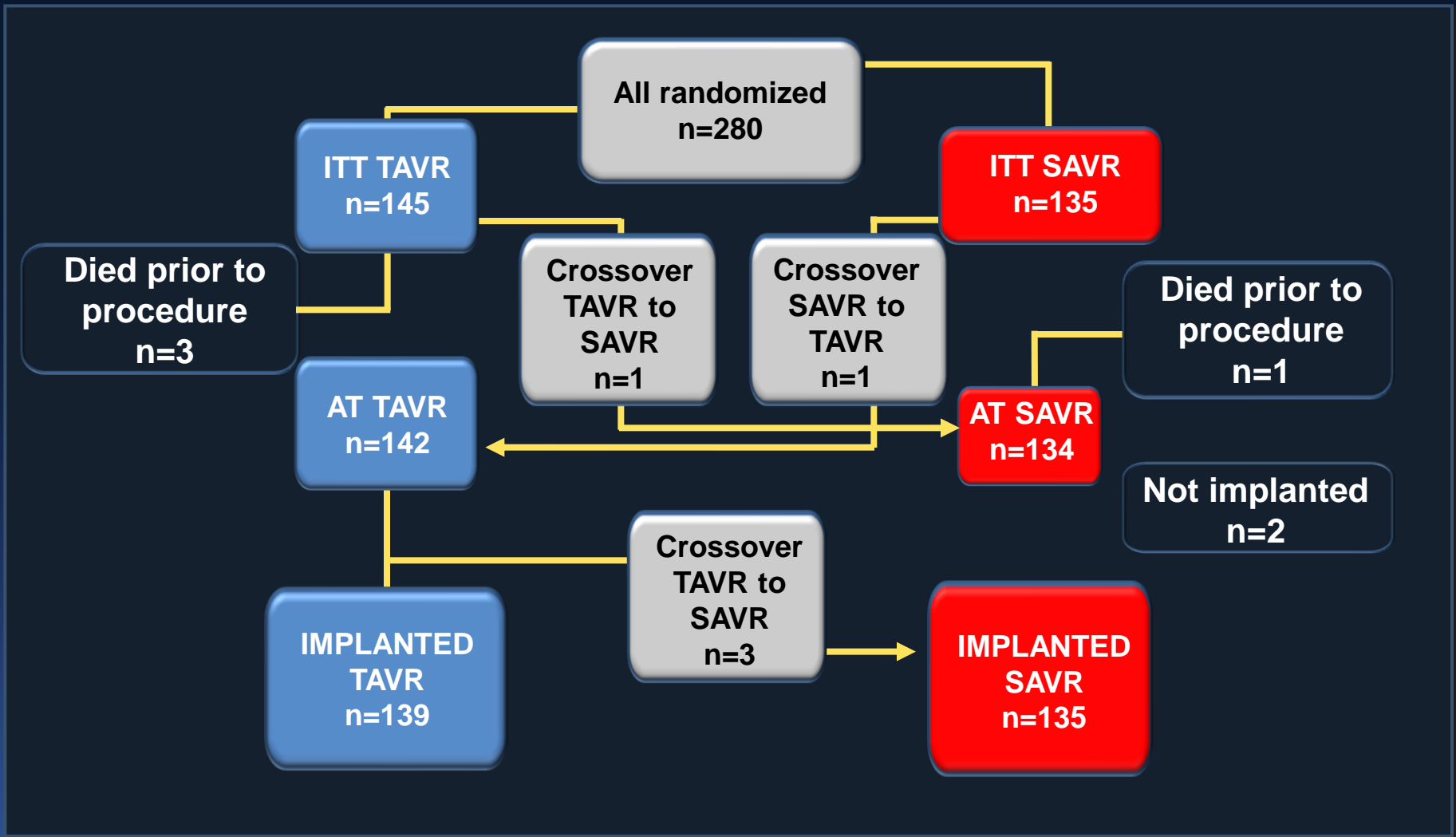


**Sahlgrenska
University
Hospital,
Gothenburg,
Sweden**



**Odense University Hospital,
Odense, Denmark**

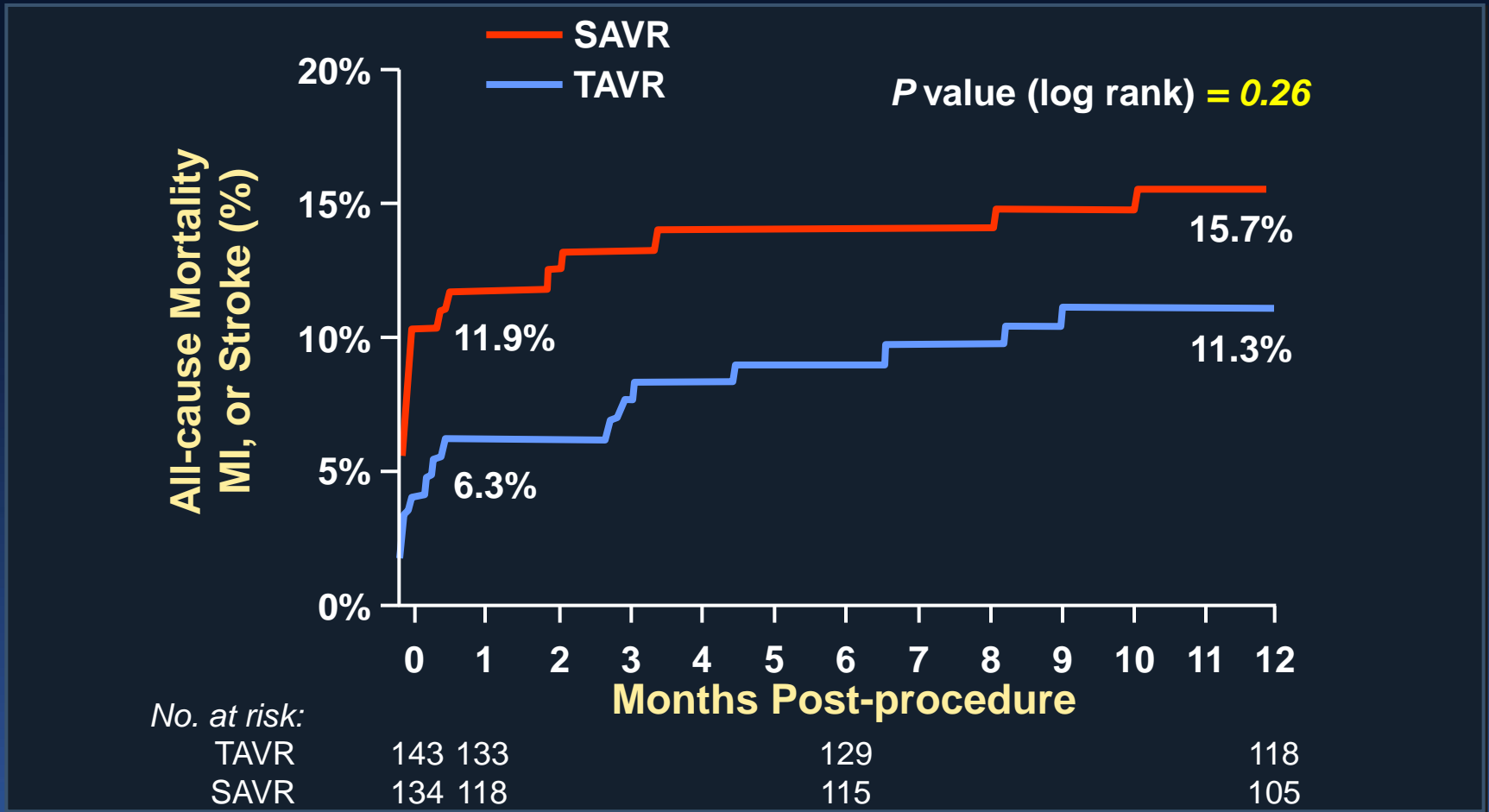
NOTION: Study Flow



NOTION: Baseline Characteristics

Characteristic, % or mean \pm SD	TAVR n=145	SAVR n=135	P value
Age (yrs)	79.2 \pm 4.9	79.0 \pm 4.7	0.71
Male	53.8	52.6	0.84
Society of Thoracic Surgeons (STS) Score	2.9 \pm 1.6	3.1 \pm 1.7	0.30
STS Score < 4%	83.4	80.0	0.46
Logistic EuroSCORE I	8.4 \pm 4.0	8.9 \pm 5.5	0.38
NYHA class III or IV	48.6	45.5	0.61

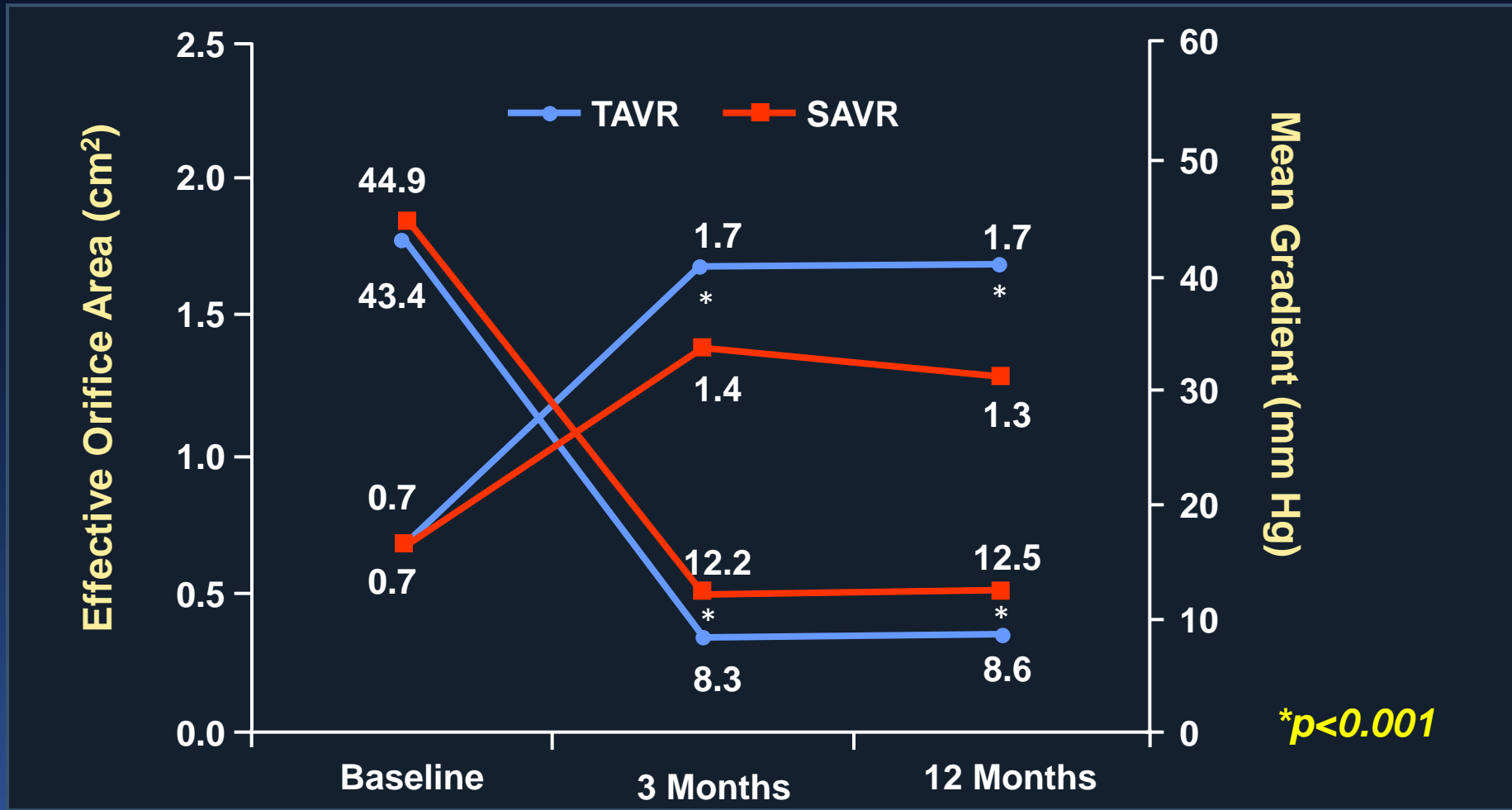
NOTION: Death (all-cause), Stroke or MI at 1 Year (as-treated)



NOTION: 2^{ry} Outcomes at 30 Days

Outcome, %	TAVR n=142	SAVR n=134	P value
Death, any cause	2.1	3.7	0.43
Death, cardiovascular	2.1	3.7	0.43
Bleeding, life-threatening+major	11.3	20.9	0.03
Cardiogenic shock	4.2	10.4	0.05
Vascular lesion, major	5.6	1.5	0.10
Acute kidney injury (stage II+III)	0.7	6.7	0.01
Stroke	1.4	3.0	0.37
TIA	1.4	0	0.17
Myocardial infarction	2.8	6.0	0.20
Atrial fibrillation	16.9	57.8	<0.001
Pacemaker	34.1	1.6	<0.001

NOTION: Aortic Valve Performance



*p<0.001

New TAVR Technologies

Not All New TAVR Systems are Self-Expanding Designs



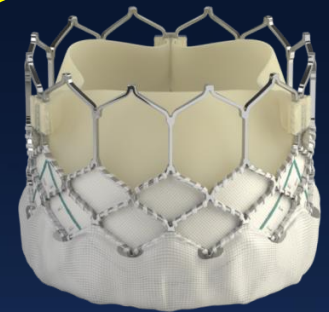
Direct Flow:
Polyester fabric cuff with two inflatable rings; positioning wires for placement; bovine tissue valve



Lotus:
Nitinol wire frame, bovine tissue valve; outer PU skirt; mechanical expansion and locking



Jena Valve:
Nitinol-based, positioning feelers and clipping mechanism; porcine aortic root valve



SAPIEN 3:
balloon exp (4 sizes), cobalt frame; bovine tissue valve; outer skirt; precise positioning

Clinical and Echocardiographic Outcomes at 30 Days with the SAPIEN 3 TAVR System in Inoperable, High-Risk and Intermediate-Risk AS Patients

Susheel Kodali, MD

on behalf of The PARTNER Trial Investigators

ACC 2015 | San Diego | March 15, 2015



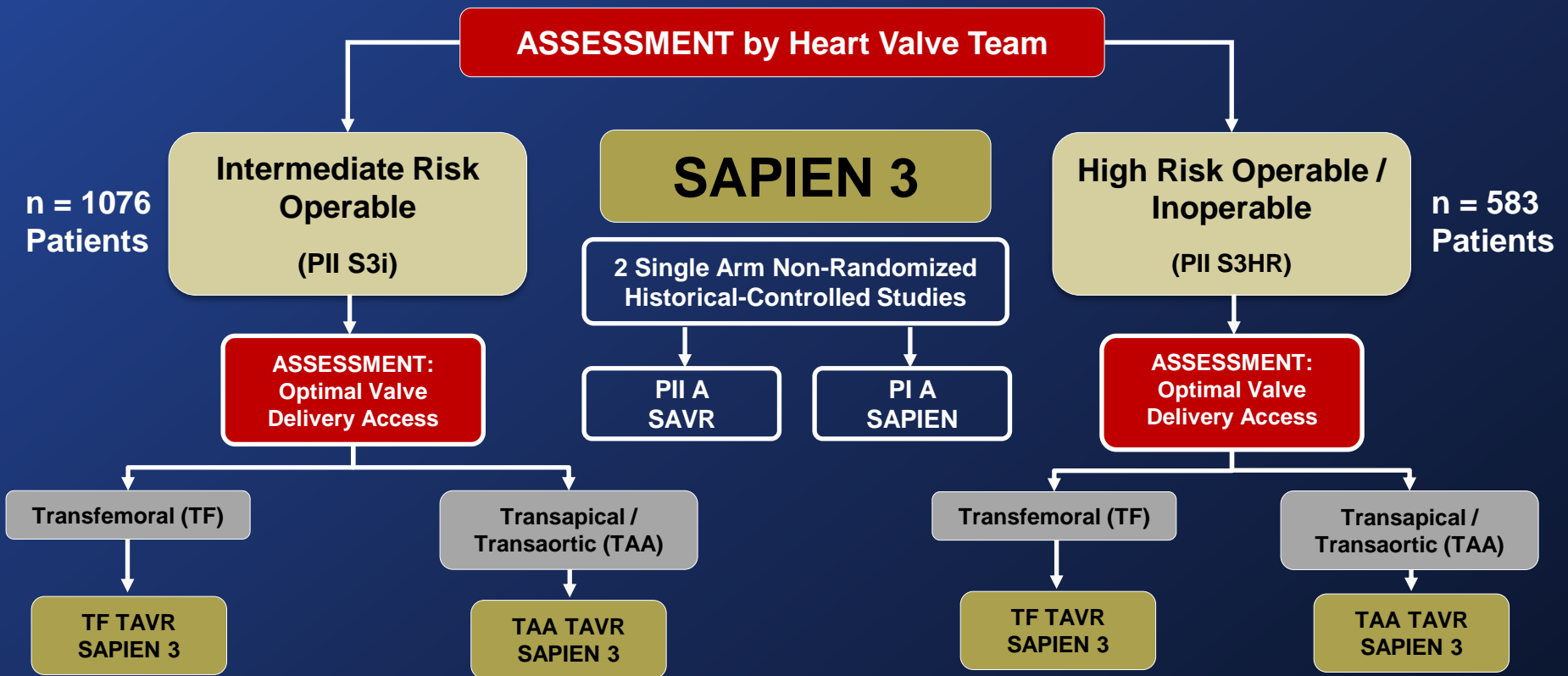
THE
PARTNER II
TRIAL

The PARTNER II S3 Trial

Study Design



Symptomatic Severe Aortic Stenosis



Baseline Patient Characteristics

S3HR Patients (n=583 at 29 sites)

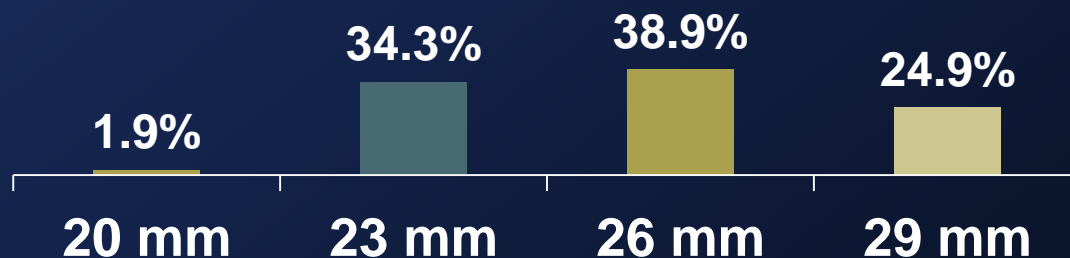
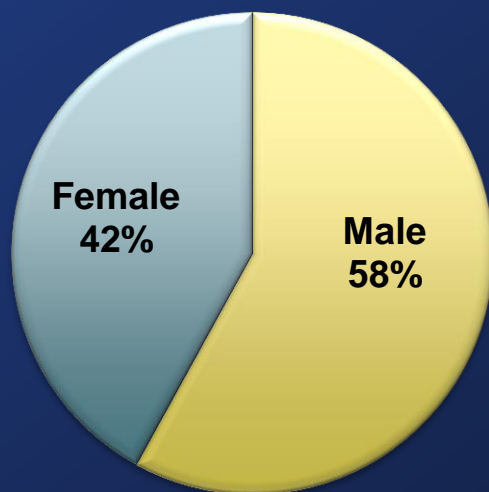
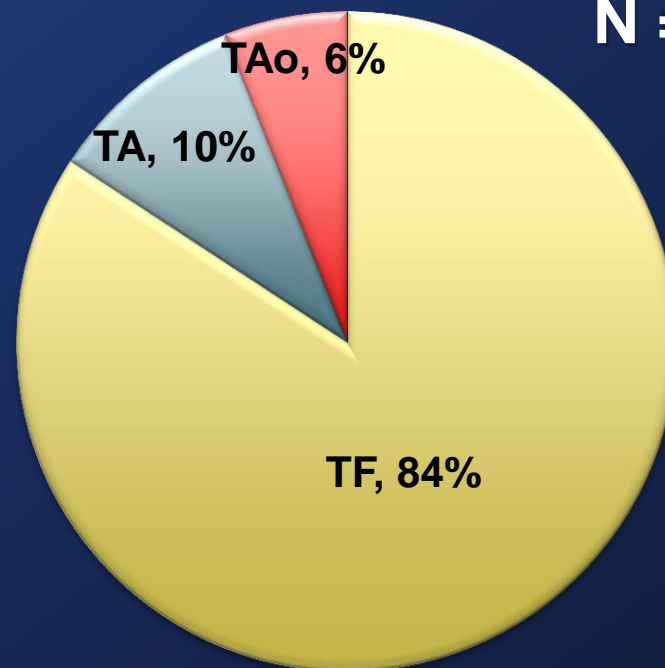


THE
PARTNER II
TRIAL

Average STS =
8.6%
(Median 8.4%)

Average Age =
82.6yrs

N = 583

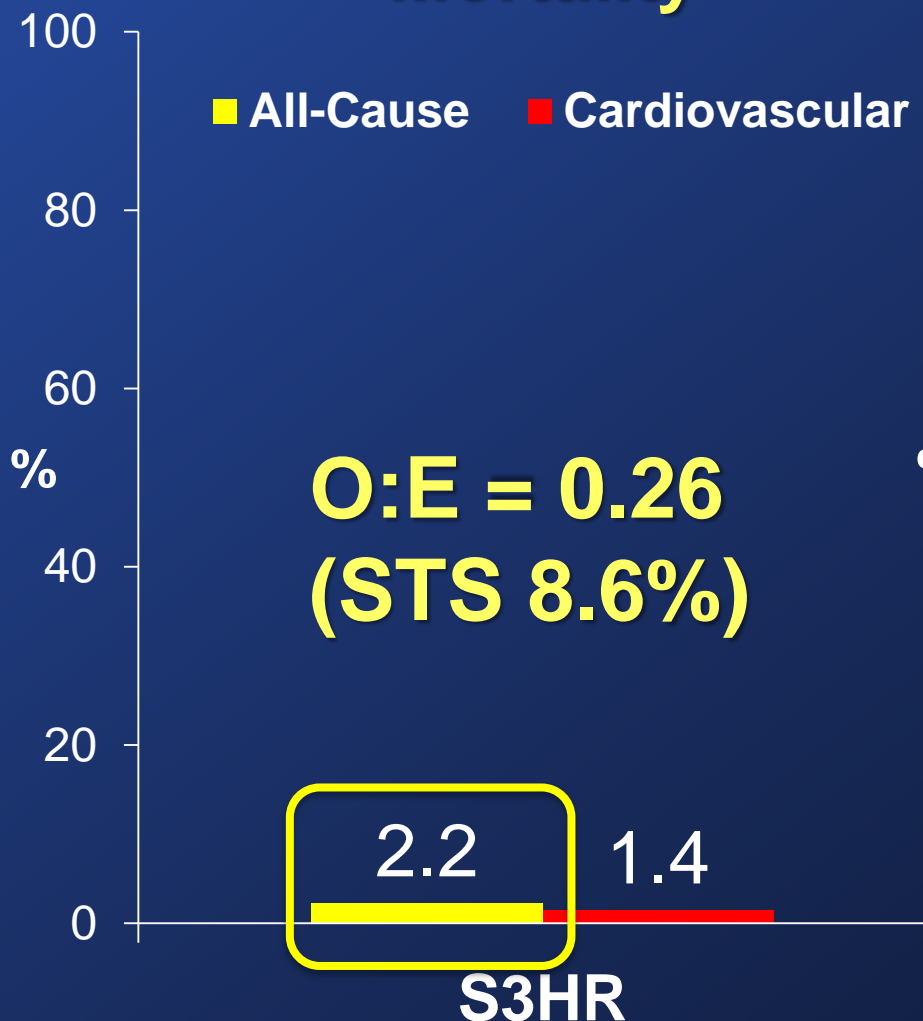


Mortality and Stroke: S3HR

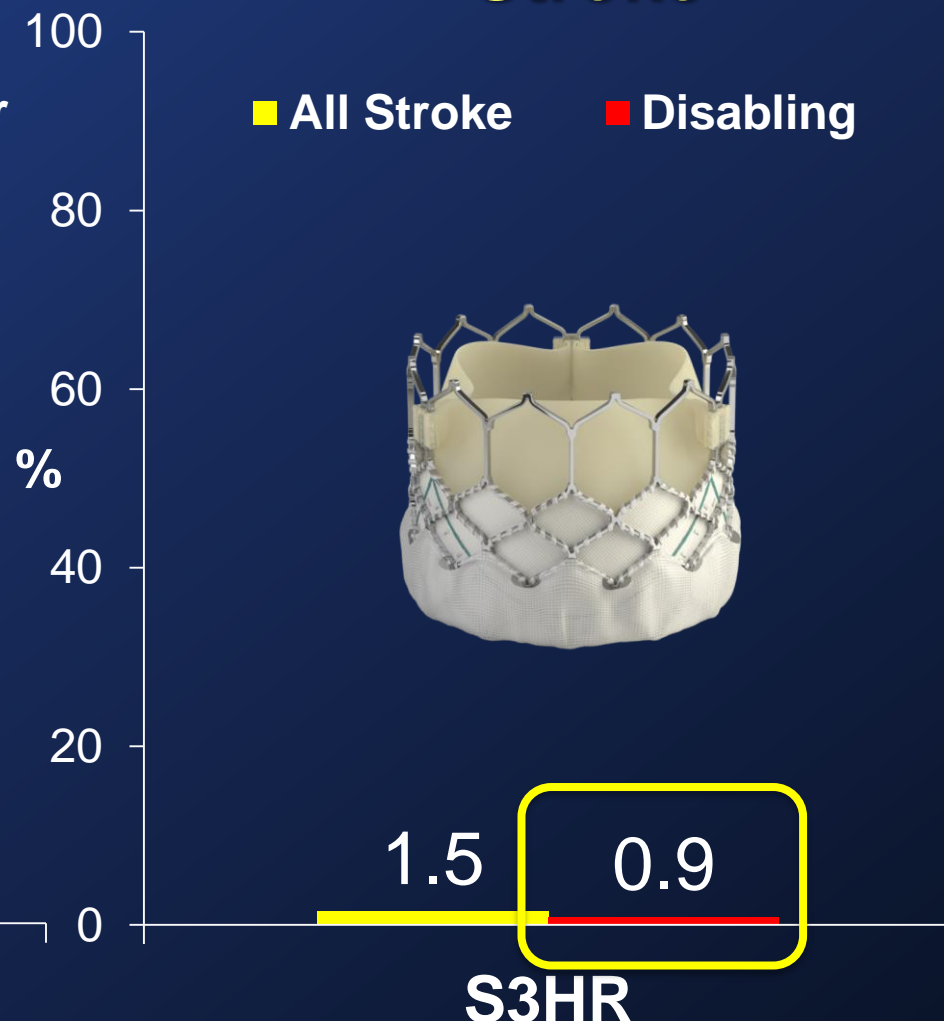
At 30 Days (As Treated Patients)



Mortality



Stroke



Baseline Patient Characteristics

S3i Patients (n=1076 at 51 sites)



THE
PARTNER II
TRIAL

Average STS =

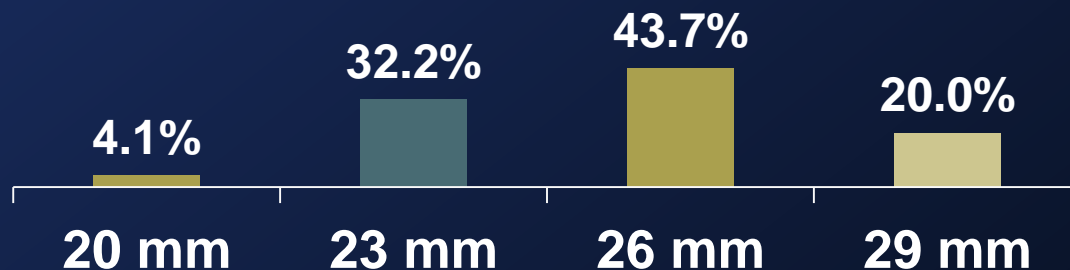
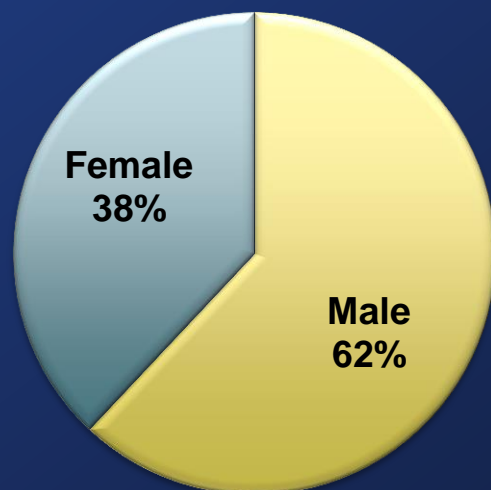
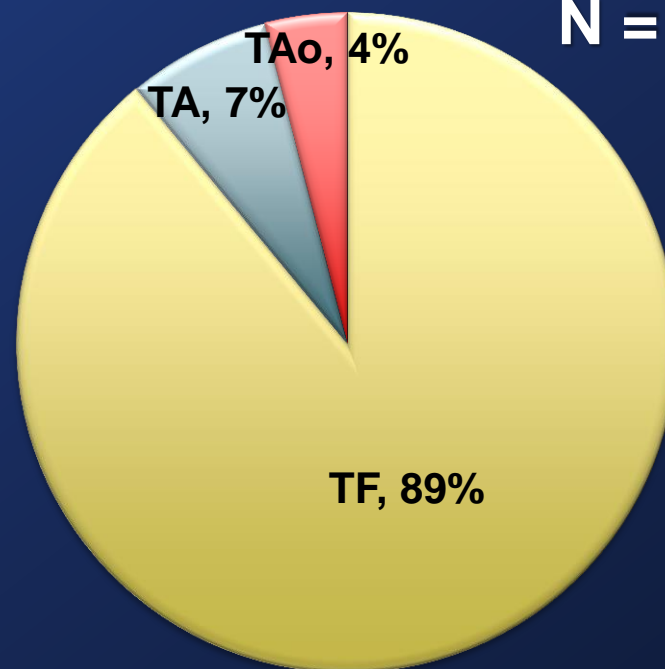
5.3%

(Median 5.2%)

Average Age =

81.9yrs

N = 1076

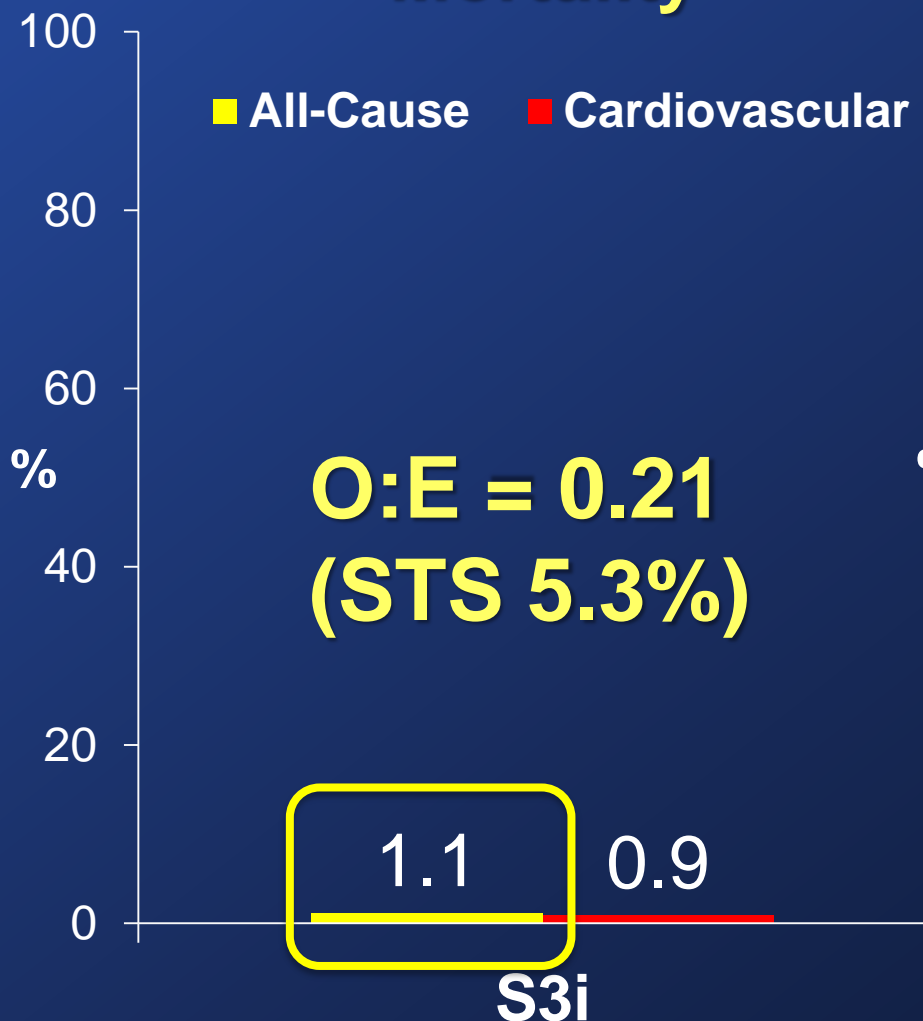


Mortality and Stroke: S3i

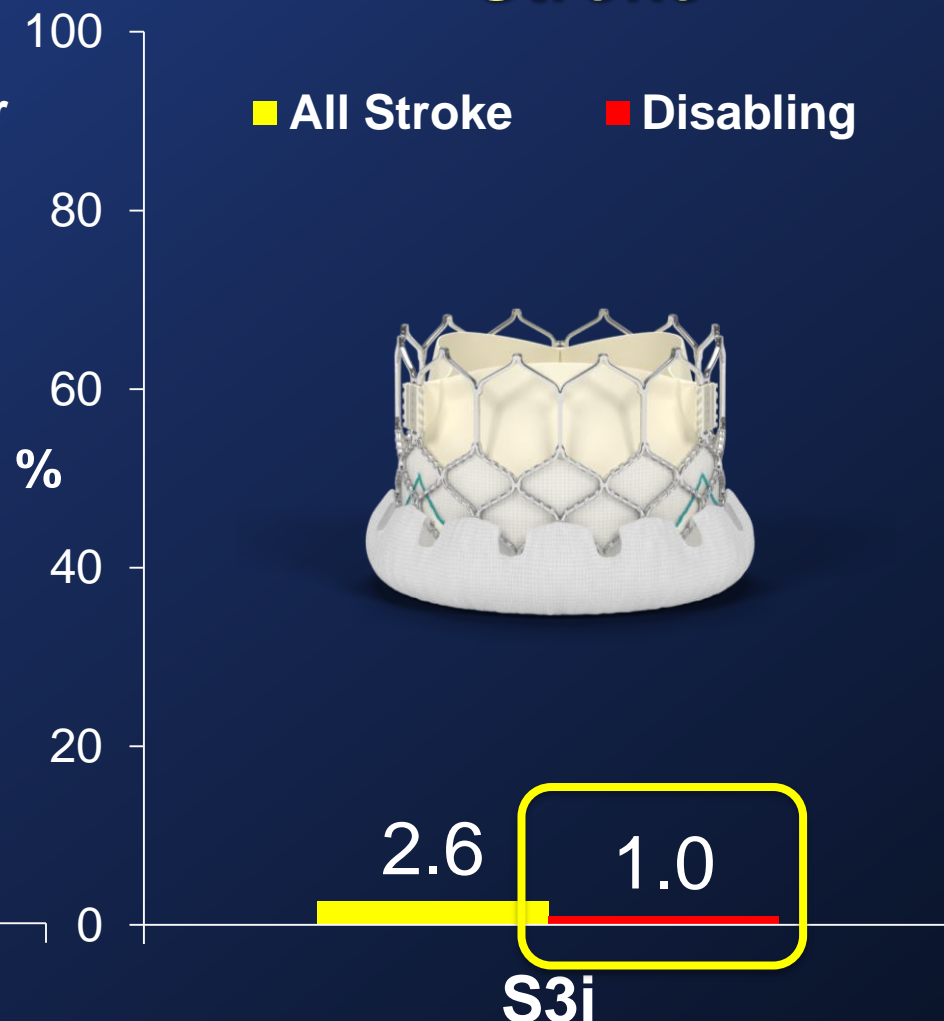
At 30 Days (As Treated Patients)



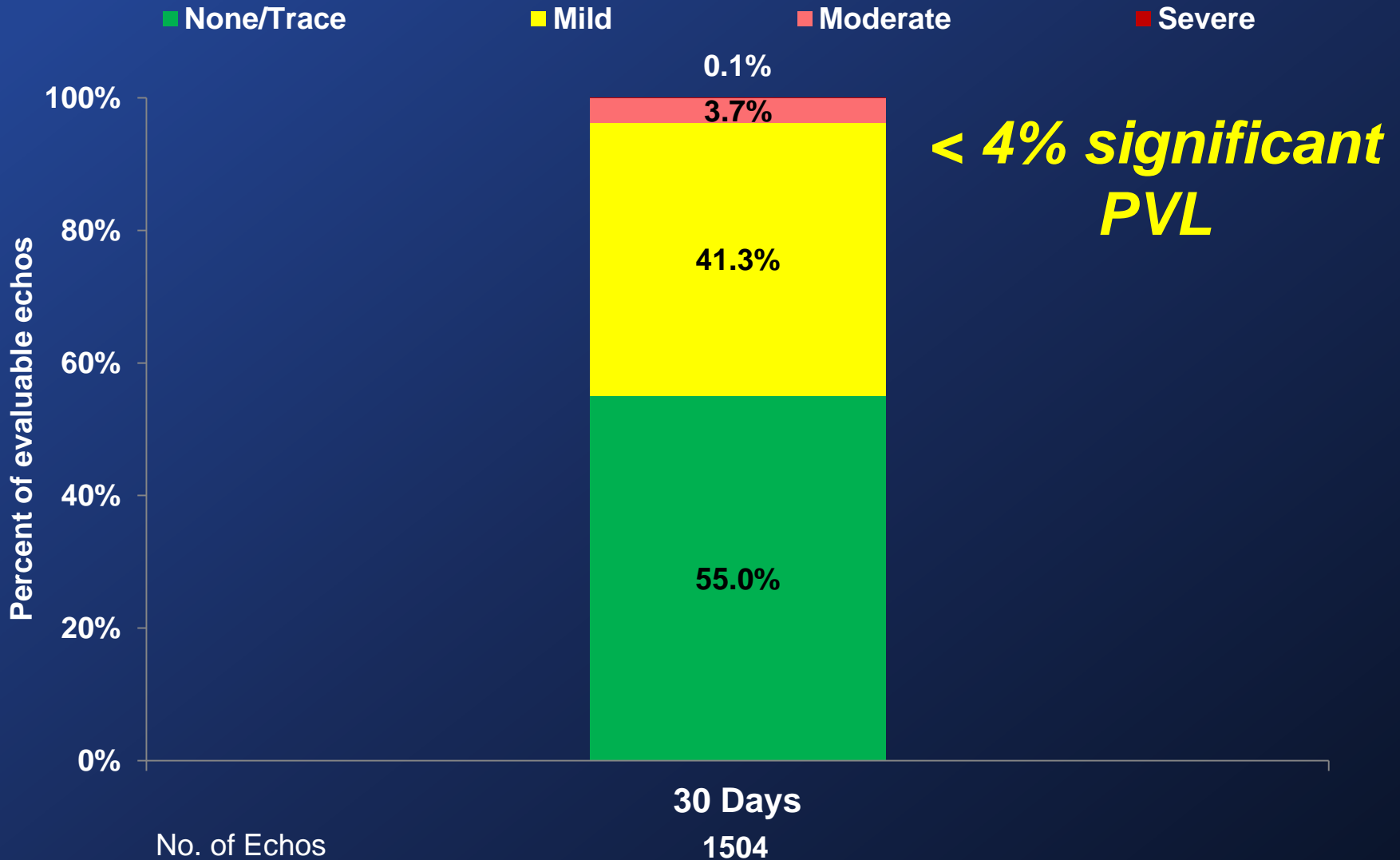
Mortality



Stroke



Paravalvular Leak: S3HR & S3i (Valve Implant Patients)



TAVR for (almost) Everyone

**Changing the
Paradigm**

TAVR for (almost) Everyone

Checking the “Low Risk” Boxes

- ✓ It's already being done (risk strata downshifted)
- ✓ Outcomes are better in lower risk patients
- ✓ Parity with or superior to surgery (need more data in lower risk patients, but NOTION and S3i helps)
- ✓ Complications are rapidly decreasing (already there – PVR dilemma is solved)
- ✓ Excellent valve performance and encouraging durability (mid-term results)
- ✓ Procedure becoming simplified and remarkable iterative technology evolution!

CHANGING THE CONVERSATION

Who does poorly with stagers?

TAVR for (almost) Everyone

Who Does Well with TAVR?

- *Calcific aortic stenosis* (avoid some bicuspid aortic valves)
- *Acceptable aortic valvar complex* – annulus size matched to valve size availability, calcium patterns
- *Percutaneous femoral access*
- *Avoid unfavorable anatomies* – severe CAD, multi-valve disease, extreme aorta pathologies

Almost Everyone!

TAVR for (almost) Everyone

Changing the Paradigm

- Use the most recent guidelines to decide on the *timing for intervention* in patients with AS (less emphasis on Sx).
- Rely heavily on the multi-disciplinary heart team to determine the *choice of intervention*; starting with, *is the patient a good candidate for TAVR* (the less invasive intervention) vs. SAVR (based on clinical, anatomic, and patient preference factors), *independent of risk profiles?*
- Careful *informed patient consent* to discuss current data gaps with TAVR (especially in low risk patients).
- Convince regulators and payors that *TAVR is not a niche therapy, but rather should be endorsed as a mainstream therapy* with appropriate reimbursement!

“Outpatient” Same-Day TAVR

Sacre-Coeur Hospital; Montreal, CN



**Philippe
Genereux**

**Philippe
Demers**

**Donald
Palisaitis**

Dr. Alain Cribier

First-in-Man PIONEER



**Now, TAVR for
(almost)
EVERYONE!**