

Interventional Cardiovascular Medicine: **Past, Now, and Future Perspectives**

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**Columbia University Medical Center
Cardiovascular Research Foundation
New York City**

CARDIOVASCULAR SUMMIT
TCTAP 2014

19th April 22-25, 2014
COEX, Seoul, Korea
www.summit-tctap.com



Disclosure Statement of Financial Interest

TCTAP2014: Seoul, Korea; April 22-25, 2014

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

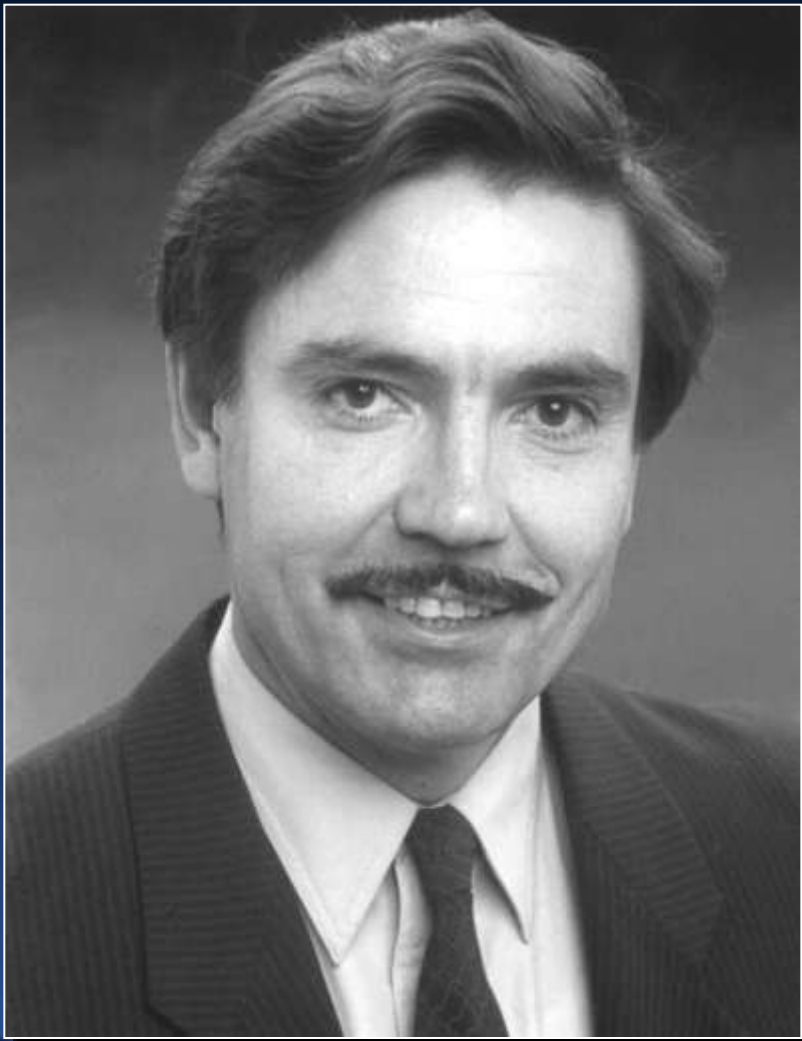
Company

- Abbott, Boston Scientific, Edwards Lifescience, Medtronic
- Angioscore, Meril Lifescience, Micell,
- Apica, Angiometrix, Backbeat, Caliber, Cappella, Claret, Coherex, Elixir, GDS, Medinol, Mitralign, Valve Medical

Interventional Perspectives

TCT at 25 Years

The Father of PTCA!

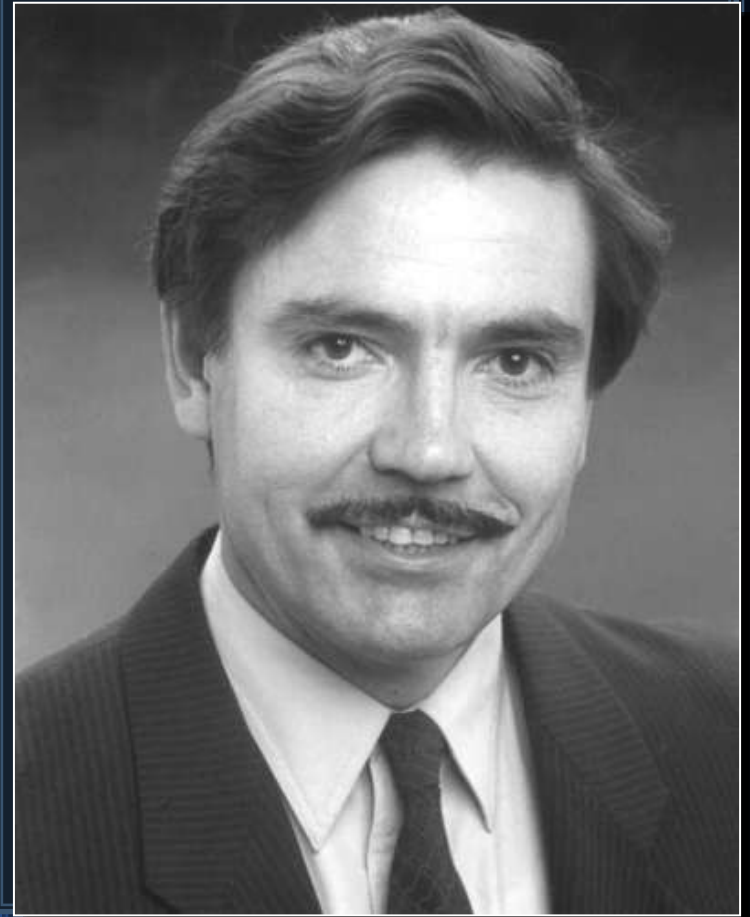


**Andreas Gruentzig
1939 - 1985**

***His dream was the
catheter-based
percutaneous
treatment of vascular
disease in alert, awake
patients!***

The TCT Career Achievement Award

2013



The 1st TCT - 1988

PURPOSE

- Explore a *new era* of interventional device therapies - ***innovation!***
- Re-introduce the live case demonstration format - ***education***
- Apply rigorous methods to evaluate devices and clinical outcomes - ***evidence-based***
- Create an international network of multi-disciplinary scientists - ***GLOBAL!***



GEORGETOWN UNIVERSITY SCHOOL OF MEDICINE
AND HOSPITAL
Washington, D.C.

Department of Cardiology
presents

TRANSCATHETER CARDIOVASCULAR THERAPEUTICS

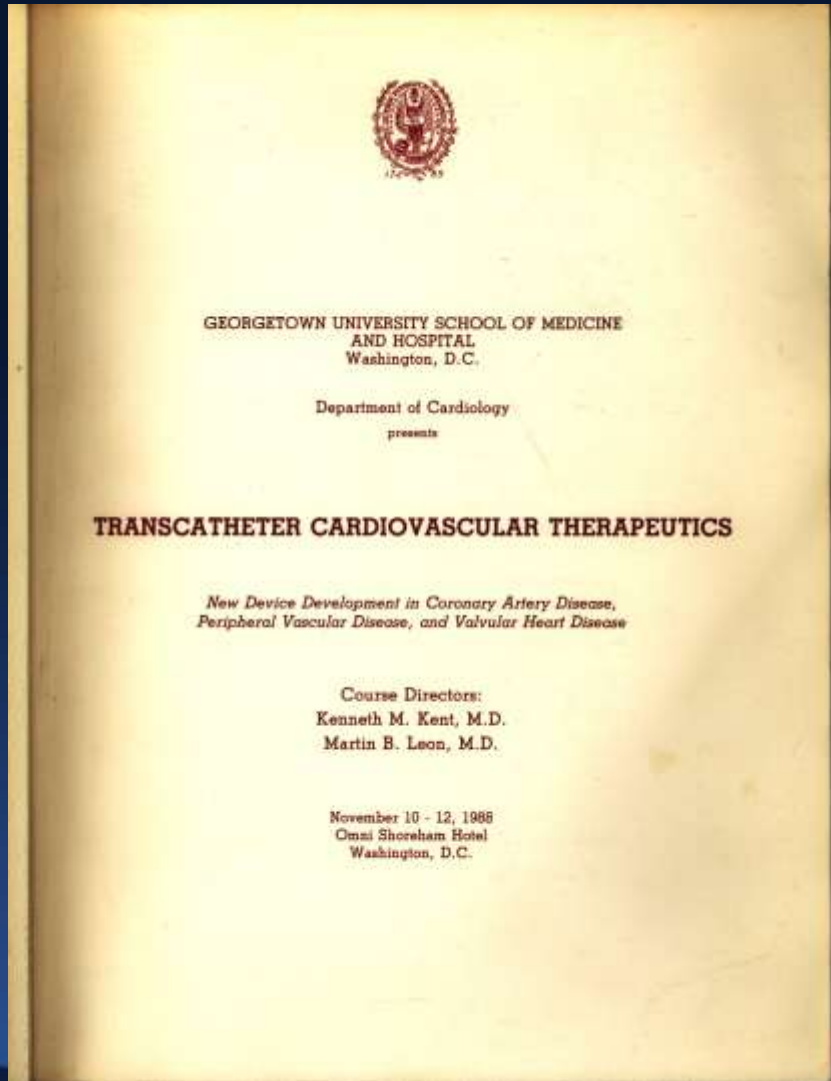
*New Device Development in Coronary Artery Disease,
Peripheral Vascular Disease, and Valvular Heart Disease*

Course Directors:
Kenneth M. Kent, M.D.
Martin B. Leon, M.D.

November 10 - 12, 1988
Omni Shoreham Hotel
Washington, D.C.



The 1st TCT - 1988



Meeting Details

- **FACULTY: 25**
- **PARTICIPANTS: 225**
- **LECTURES: 32**
- **LIVE CASES: 5 (+ 3 taped)**
- **INDUSTRY EXHIBITORS: 23**
- **VENUE: Omni Shoreham Hotel; Washington, DC**

TCT 2013: In Partnership with ACC

San Francisco, CA; Oct 27 – Nov 1, 2013



TCT 2013

Meeting Milestones

- **11,500 attendees from >90 countries**
(52% US, 48% non-US)
 - 1,220 Full-time Faculty
- 34 Late Breaking Trials, First Reports and Featured Clinical Research
 - 851 peer-reviewed Abstracts presented
(from 1750 submitted)
- 300 peer-reviewed Challenging Cases presented
(from 626 submitted)
- ~100 HD live case transmissions from 20 sites

TCT Perspectives: 1988 - 2013

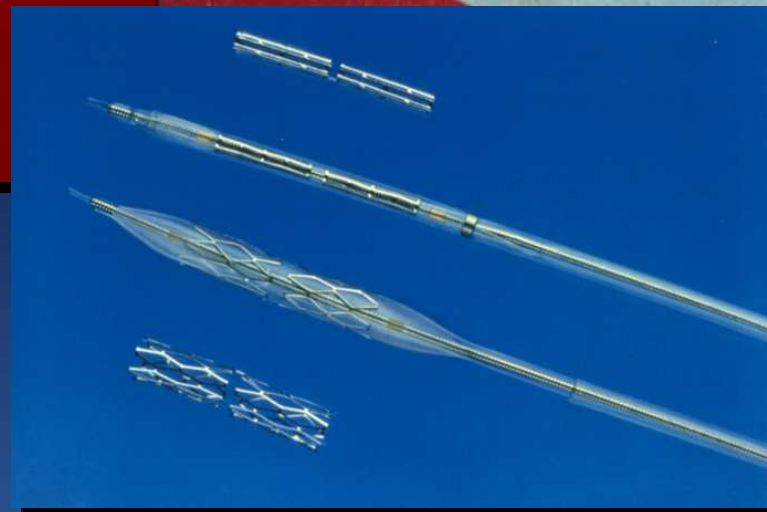
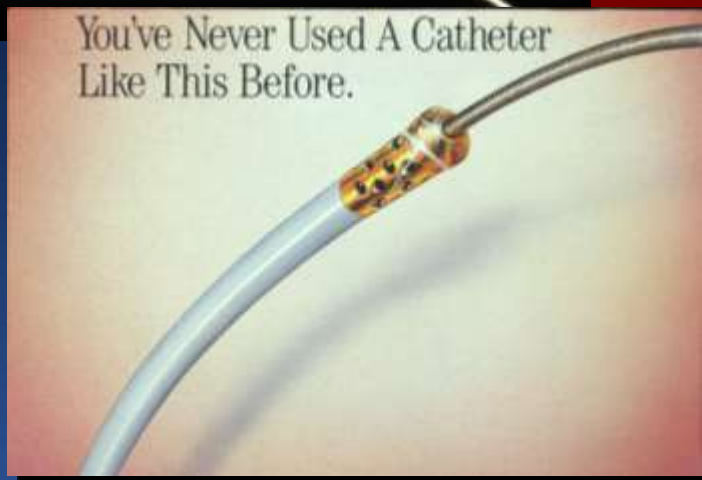
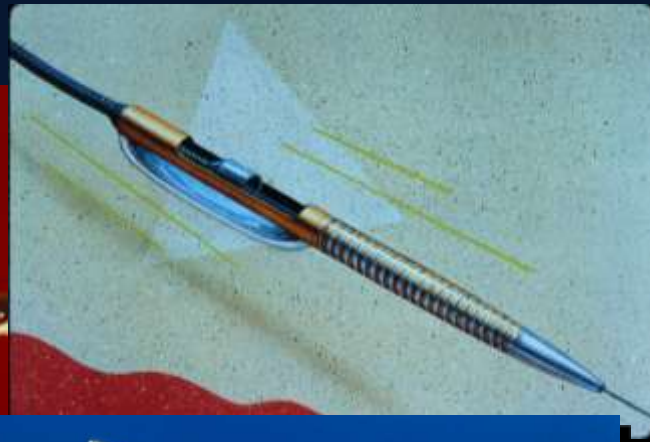
Phase 1: 1988 - 1993

Exploring and Validating the New Device Era

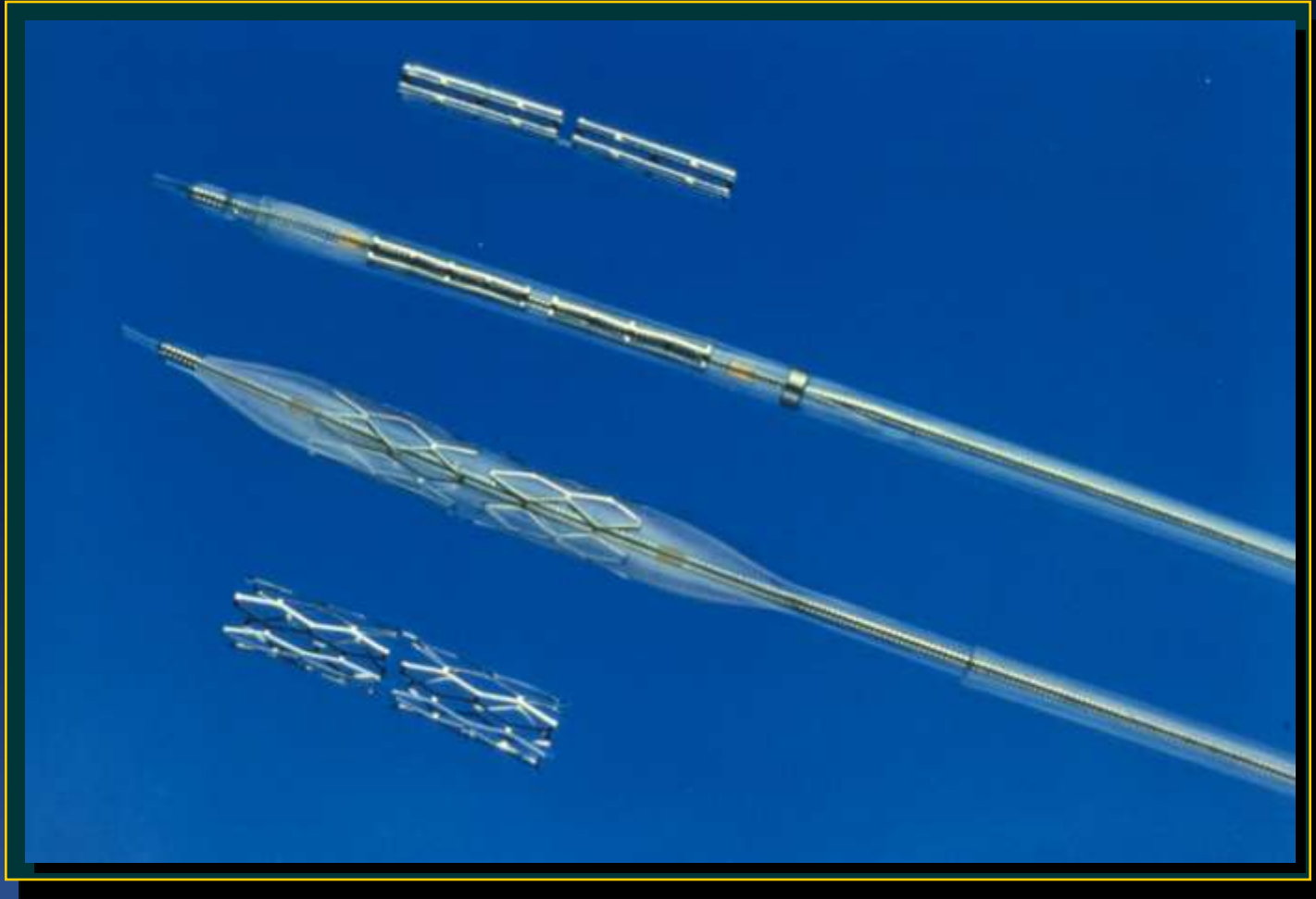
- ‘Post-balloon’ proliferation of new devices - early collaborations with industry/engineers
- Rudimentary clinical research initiatives (the “age of empiricism”)
- Reinforcement of the live case format as a vital educational vehicle

TCT Perspectives: 1988 - 2013

Early Innovation



The Palmaz-Schatz Stent



Early Days of Coronary Stents



First Palmaz-Schatz Stent in Human
December 31st, 1987

TCT Perspectives: 1988 - 2013

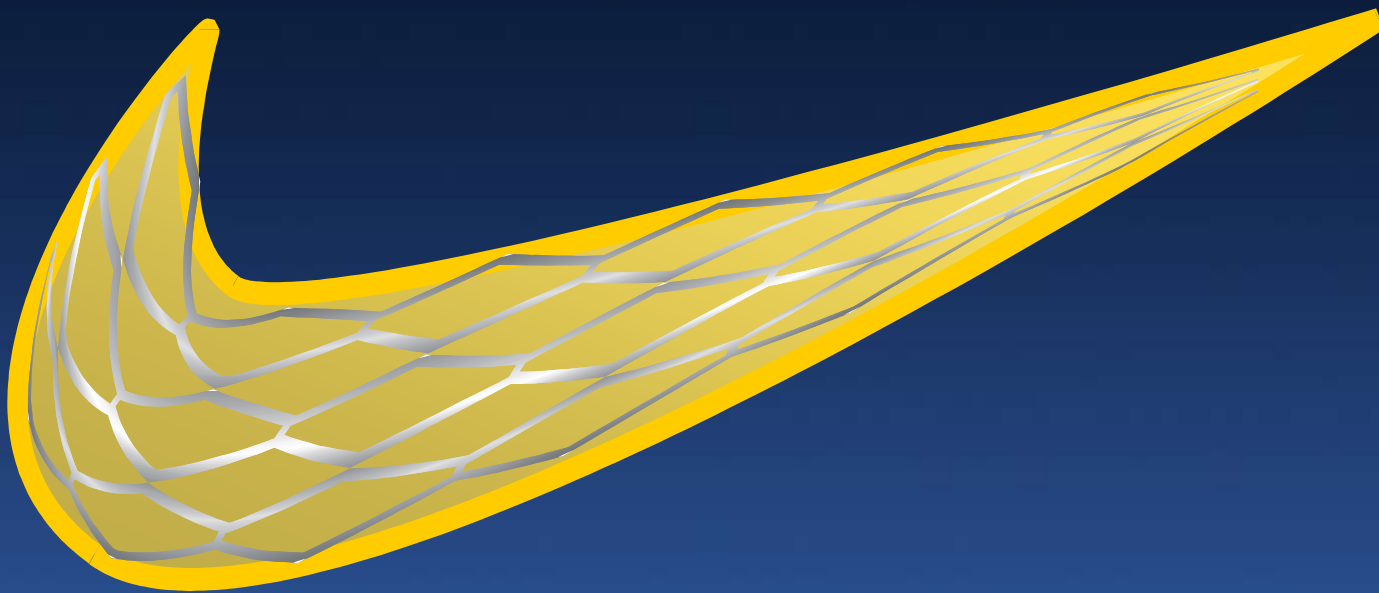
Phase 2: 1993 - 1998

TCT Goes Global!

- Stents “reign supreme” - dramatic growth of interventional cardiology
- Early RCTs - evolution to strict evidence-based medicine principles for clinical research
- Shift from U.S. to EU - device availability, early clinical experiences, live cases

Intervention 1998

Just Stent It!



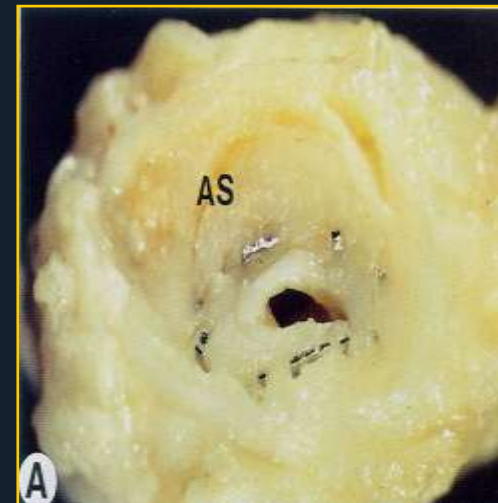
TCT Perspectives: 1988 - 2013

Phase 3: 1998 - 2008

The Birth of a Subspecialty

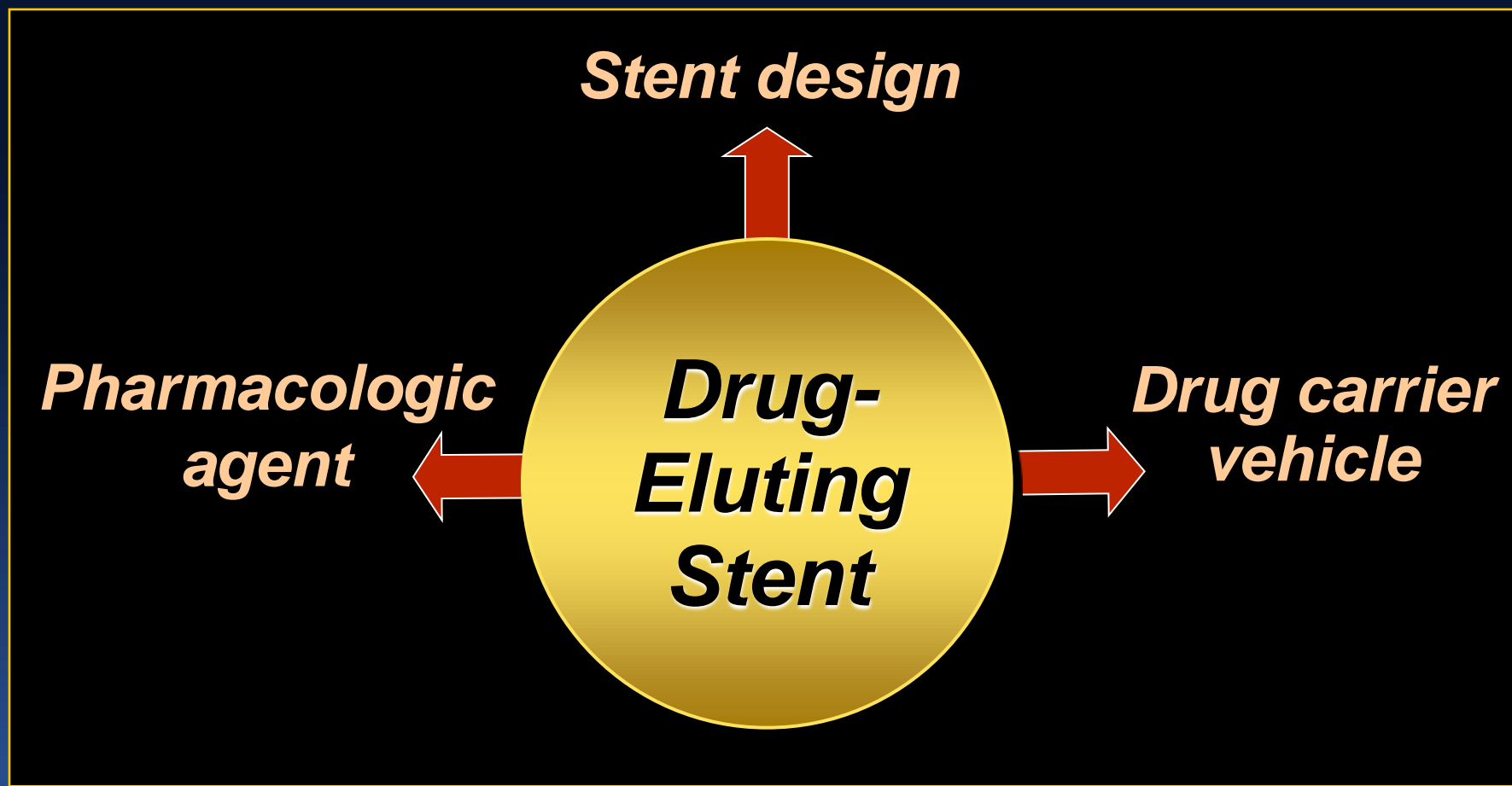
- DES dominate - Restenosis “cured” but “dark side” (late ST) emerges - a rosy prophecy can stumble
- EBM “goes wild” and subspecialty recognition
- Expansion to extra-coronary targets (endo-vascular, early structural and imaging)
- Shift from U.S. / EU to Asia-Pacific and beyond

Bare Metal Stents.... the good, the bad, and the ugly!



Drug-Eluting Stents

Advanced Biotechnology Platform

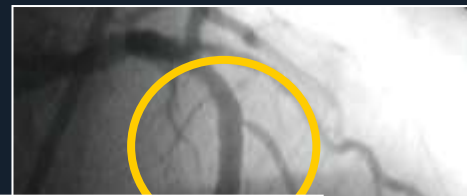


First-In-Man study with CYPHER

Sao Paulo, FU completed



DES - A Transforming Technology



***My Rosey Prophecy:
Restenosis is CURED!***

12 months

24 months

48 months

First Generation DES

TAXUS

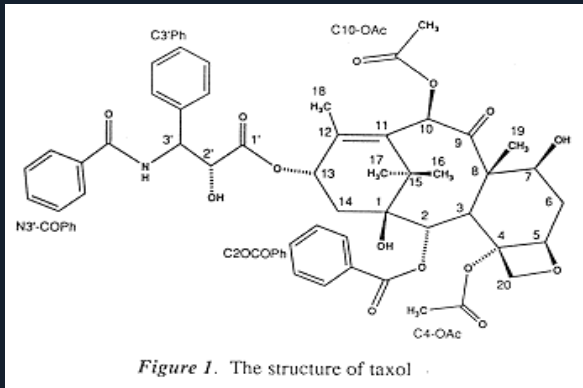
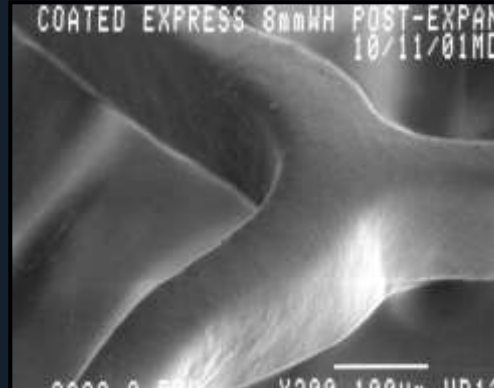


Figure 1. The structure of taxol

Paclitaxel
Drug

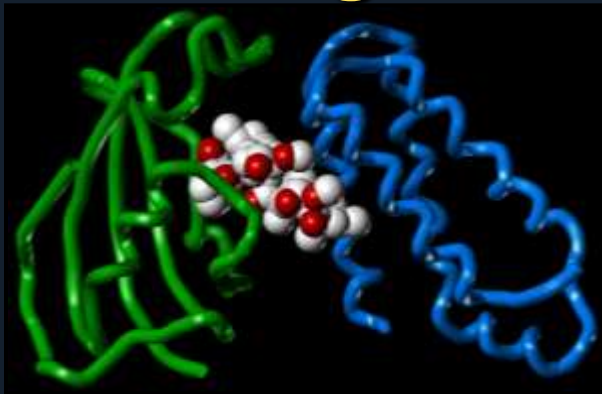


Polyolefin derivative
Polymer

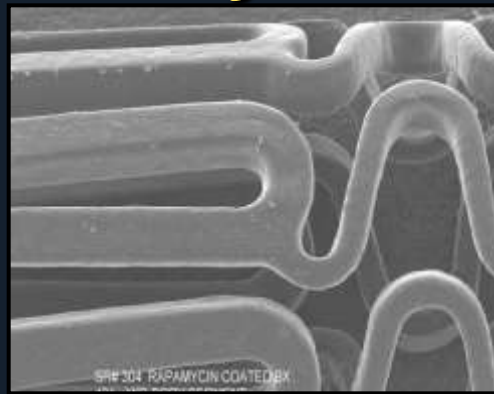


Express²
Stent

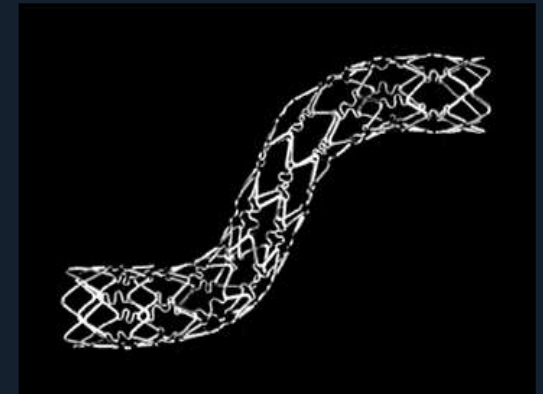
Cypher



Sirolimus



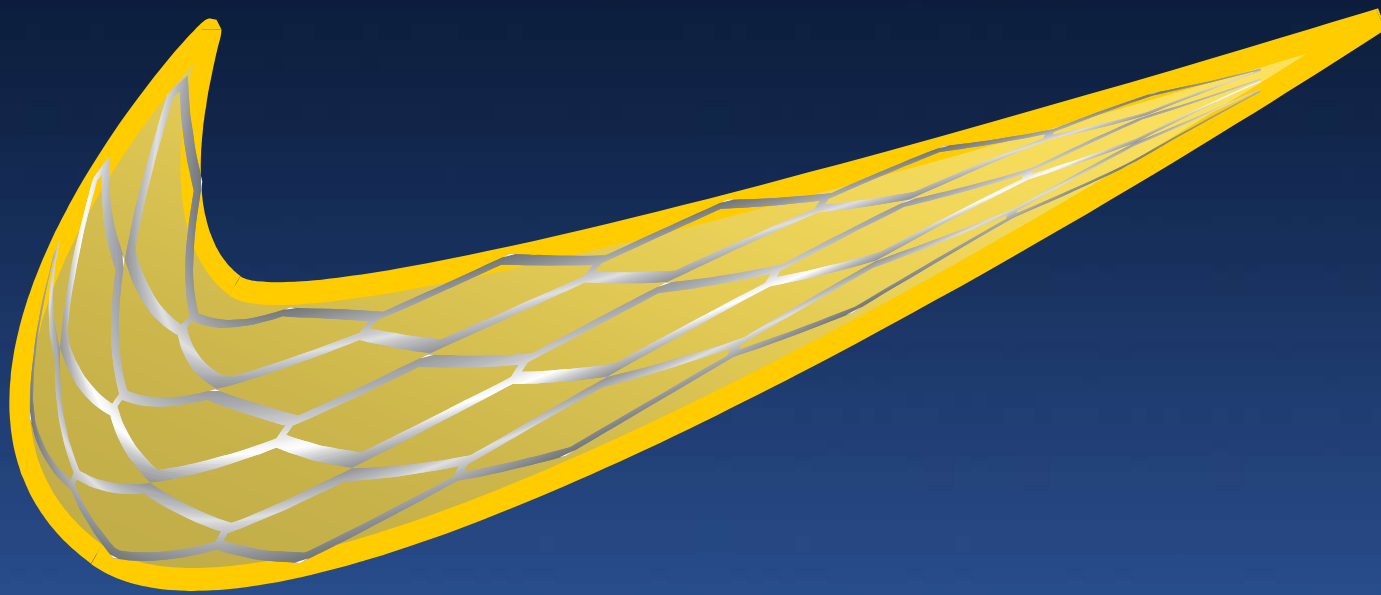
PEVA + PBMA blend



BX Velocity

Intervention 2006

Just DEStent It!



The ESC Firestorm (August '06)

TUESDAY

ESC Congress News



WORLD HEART FEDERATION*
EUROPEAN SOCIETY OF CARDIOLOGY**

World Congress of Cardiology 2006

The unique meeting of the European Society of Cardiology Congress 2006 and the World Heart Federation's XVth World Congress of Cardiology

Do drug-eluting stents increase deaths?

TWO SEPARATE, independent meta-analyses, presented in Hot Line session I, suggest drug-eluting stents (DES) may increase death, Q-wave myocardial infarction (clinical surrogates of in-stent thrombosis) and cancer deaths, bringing the long-term safety of DES firmly into the spotlight. Discussant Salim Yusuf (McMaster University, Canada) hailed the data as one of the most important presentations to come out of this year's meeting.

"Six million people in the world have been implanted with DES; yet their long-term safety and efficacy is unknown," said Yusuf. "I've a feeling the data we're seeing today is only the tip of the iceberg. We need to encourage more public access to the data."

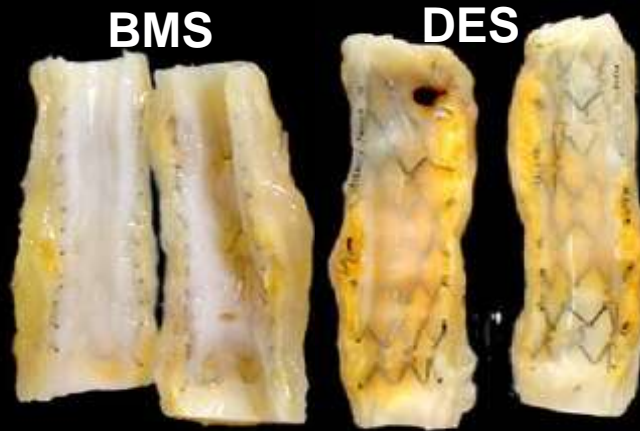
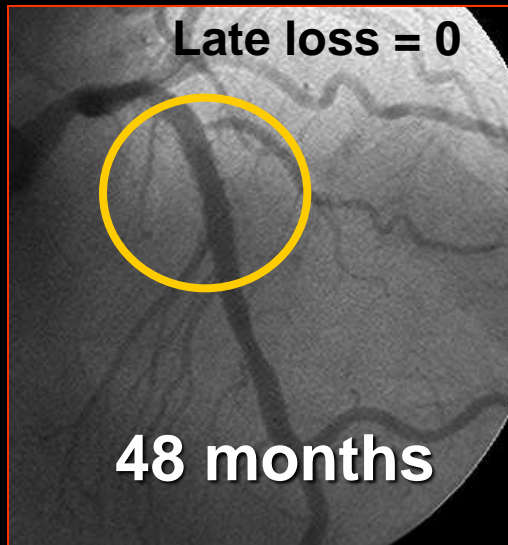


obtain this data from the manufacturers," said Nordmann. He speculated that the increase in cancer might be due to a rapid impairment of the immune system.

Yusuf widened the debate to include percutaneous coronary intervention (PCI). "The overuse of PCI is an insidious change in the culture of cardiology that needs to be reversed," he said. The use of PCI was established in MI, high-risk unstable angina and cardiogenic shock. However, its use in stable disease was a totally different question.

"There's no beneficial influence on mortality - PCI does nothing to prevent heart attack. All we are doing is providing short-term relief of chest pain. It's not re-stenosis that kills but the

DES....the good, the bad, and the ugly!



Delayed Healing!



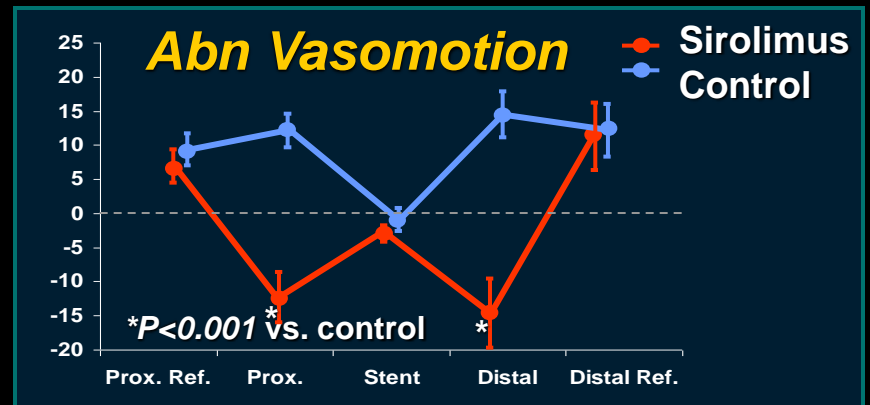
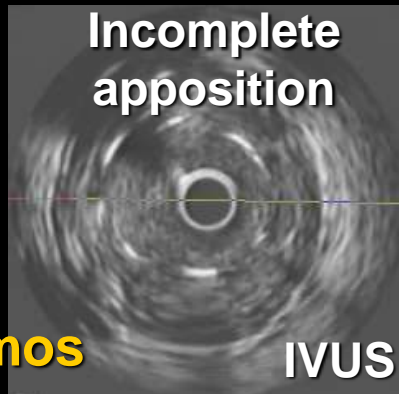
Angioscopy



Inflammation



40 mos

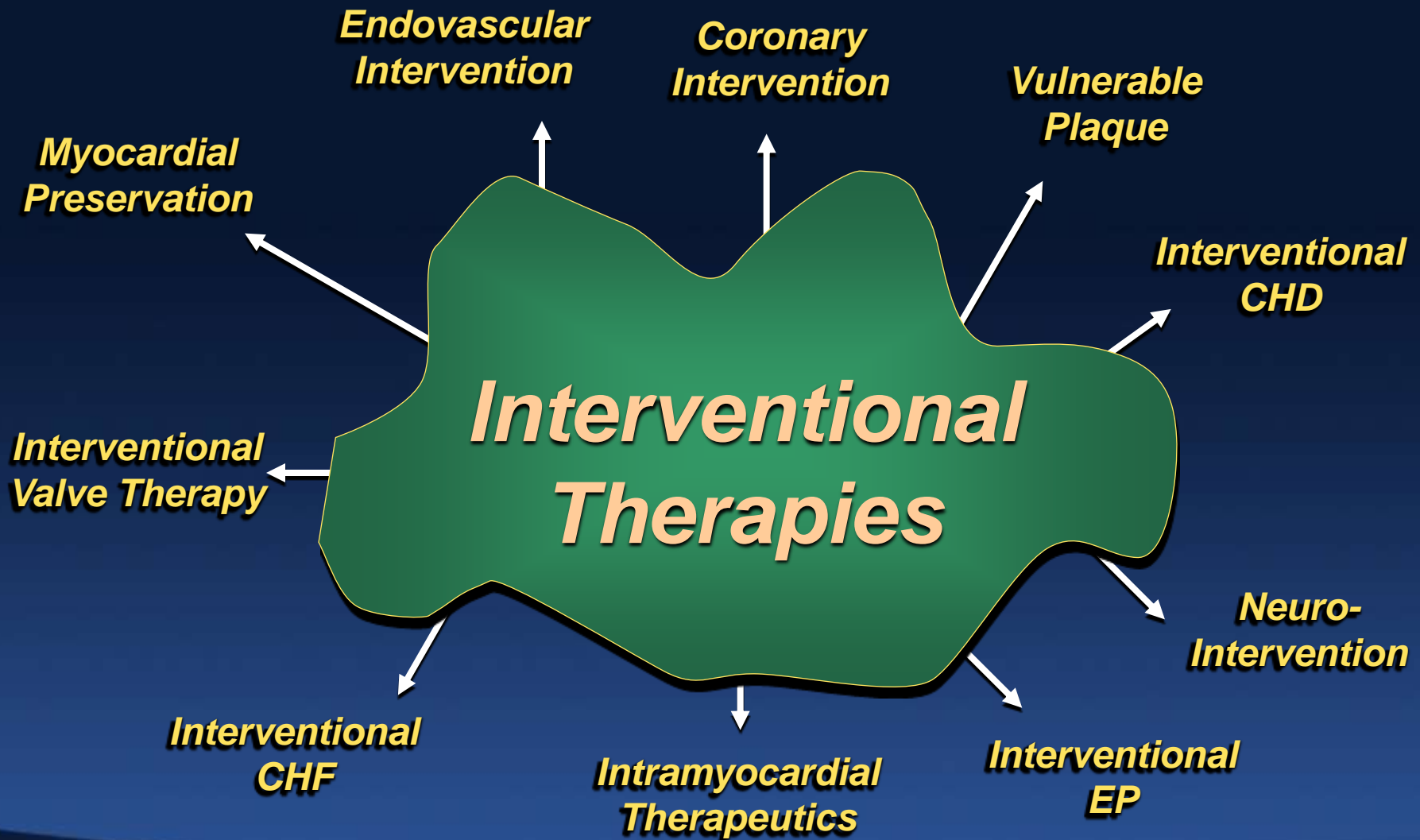


DES Clinical Trials

Evidence-Based Medicine

Over 2,500 peer review manuscripts on DES clinical use have been published between 2002 and 2012!

Intervention 2001



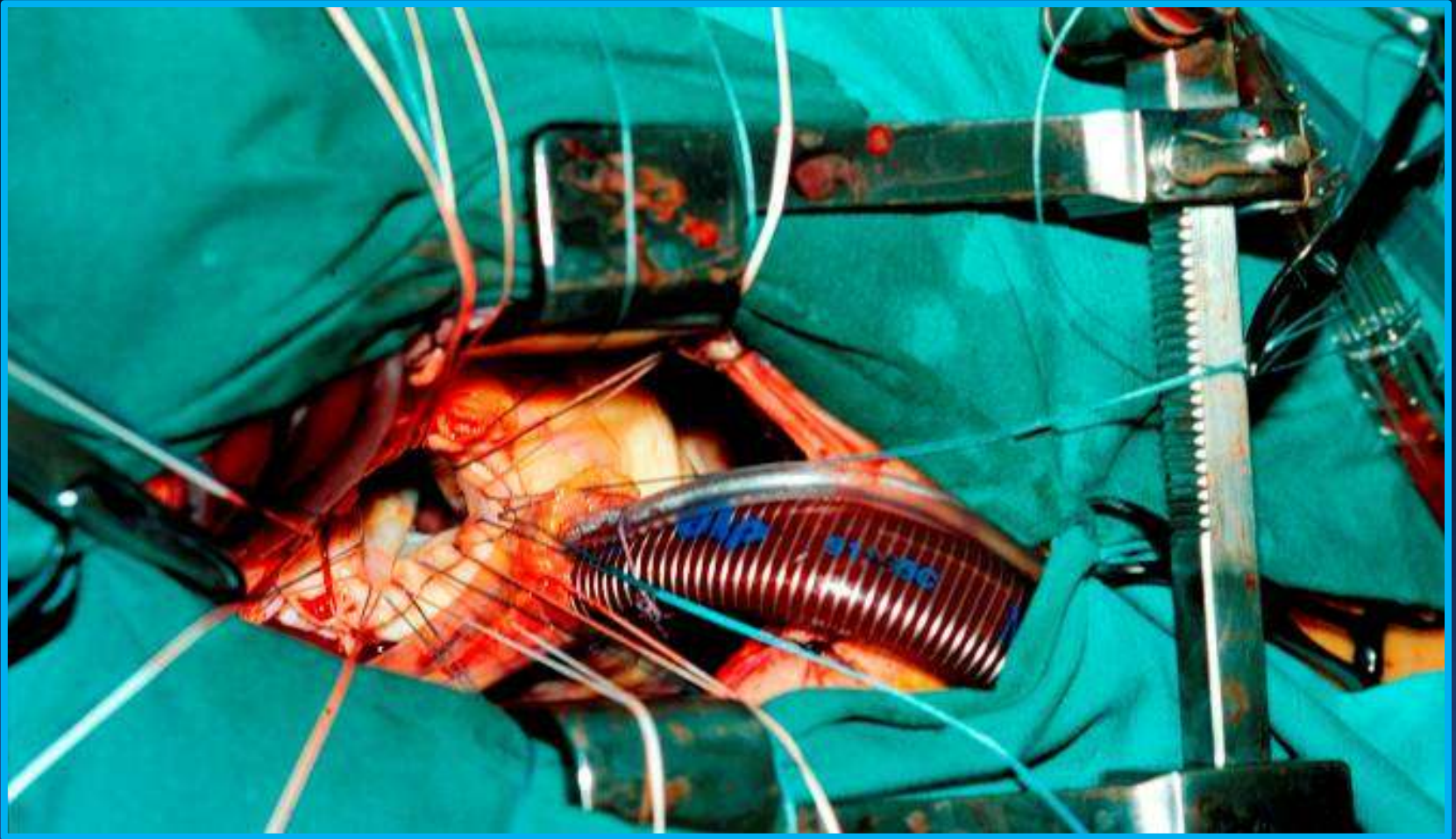
TCT Perspectives: 1988 - 2013

Phase 4: 2008 - 2013

Evolution to Extravascular and Mainstream Therapies

- Ascent of the structural revolution (case study = TAVR); rise of multi-disciplinary heart teams
- EBM is now a global affair and broadly accepted
- Shift to mainstream therapies – e.g. VHD, HBP, AF
- International networks solidified for innovation, clinical research, and education

Conventional Surgery



Is there a better way?

Dr. Alain Cribier

First-in-Man PIONEER



TAVR Arrives

Current Generation Devices

***>75,000 patients treated thru 2013
in >750 interventional centers
around the world!***

Edwards Lifesciences

Medtronic CoreValve

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



The NEW ENGLAND JOURNAL of MEDICINE

ESTABLISHED IN 1812

OCTOBER 21, 2010

VOL. 364 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., Mathew 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*

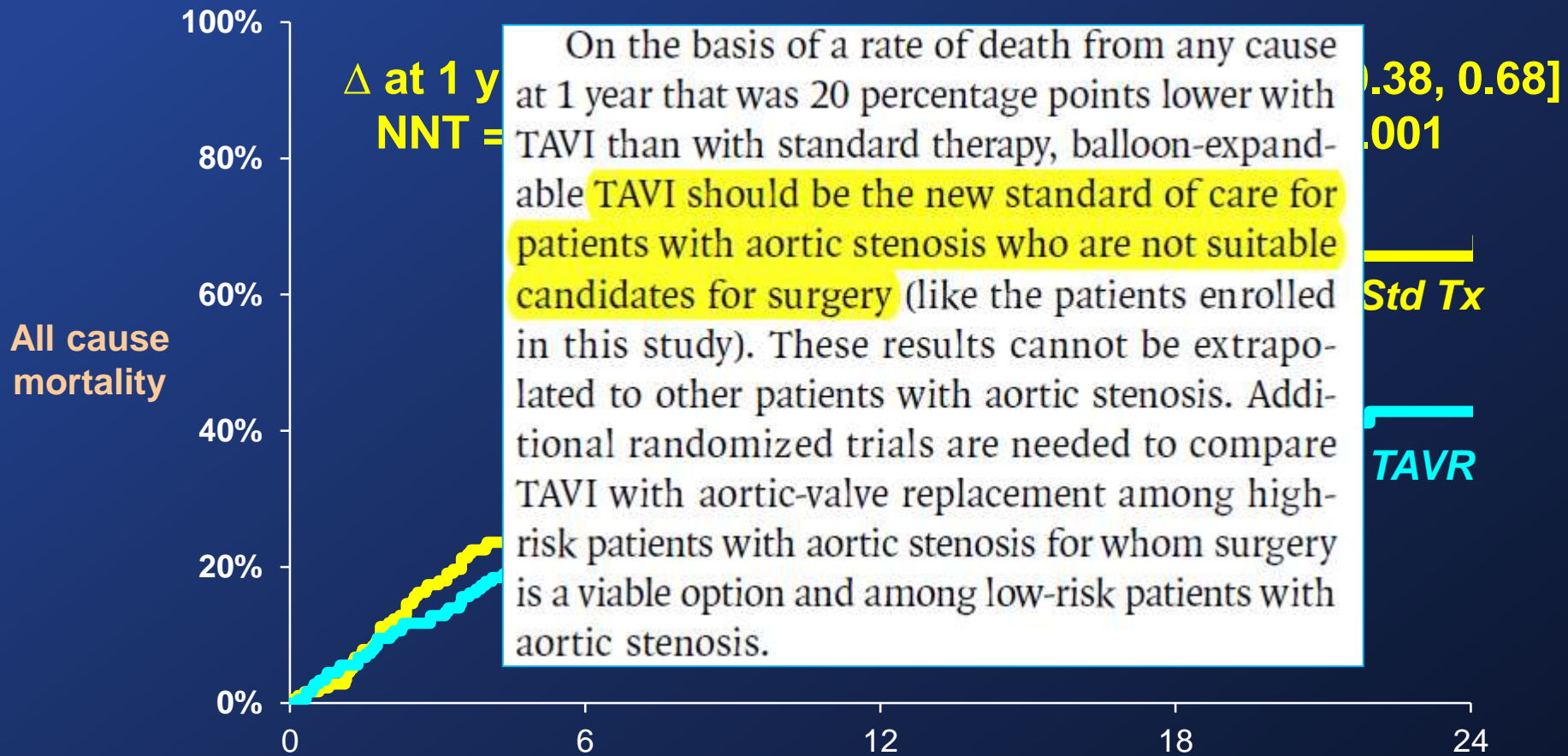
The NEW ENGLAND JOURNAL of MEDICINE

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*

Primary Endpoint: All Cause Mortality



Numbers at Risk

	0	6	12	18	24
Std Tx	179	121	85	56	24
TAVR	179	138	124	103	60

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

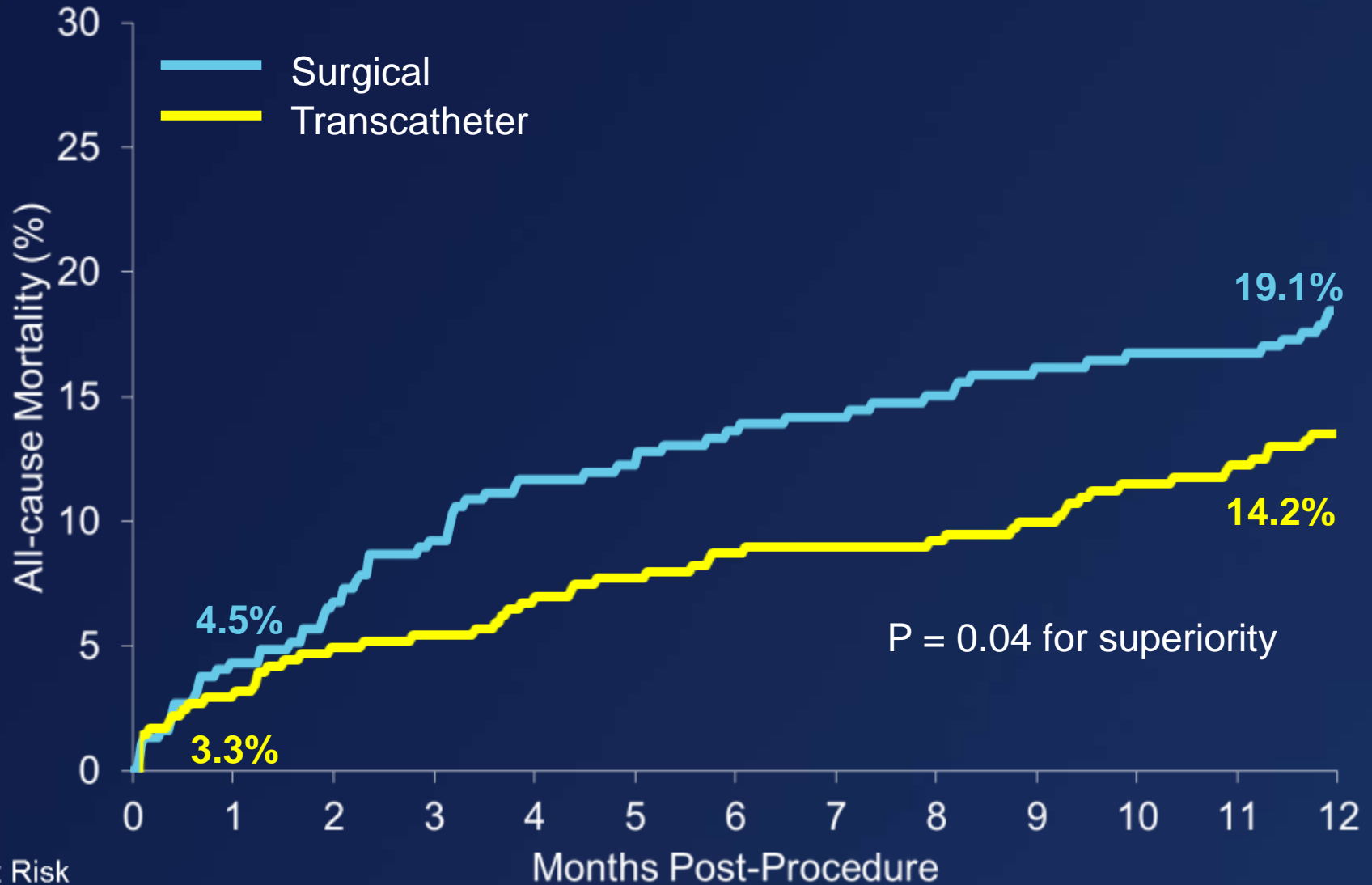
ORIGINAL ARTICLE

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*

Primary Endpoint: 1 Year All-cause Mortality



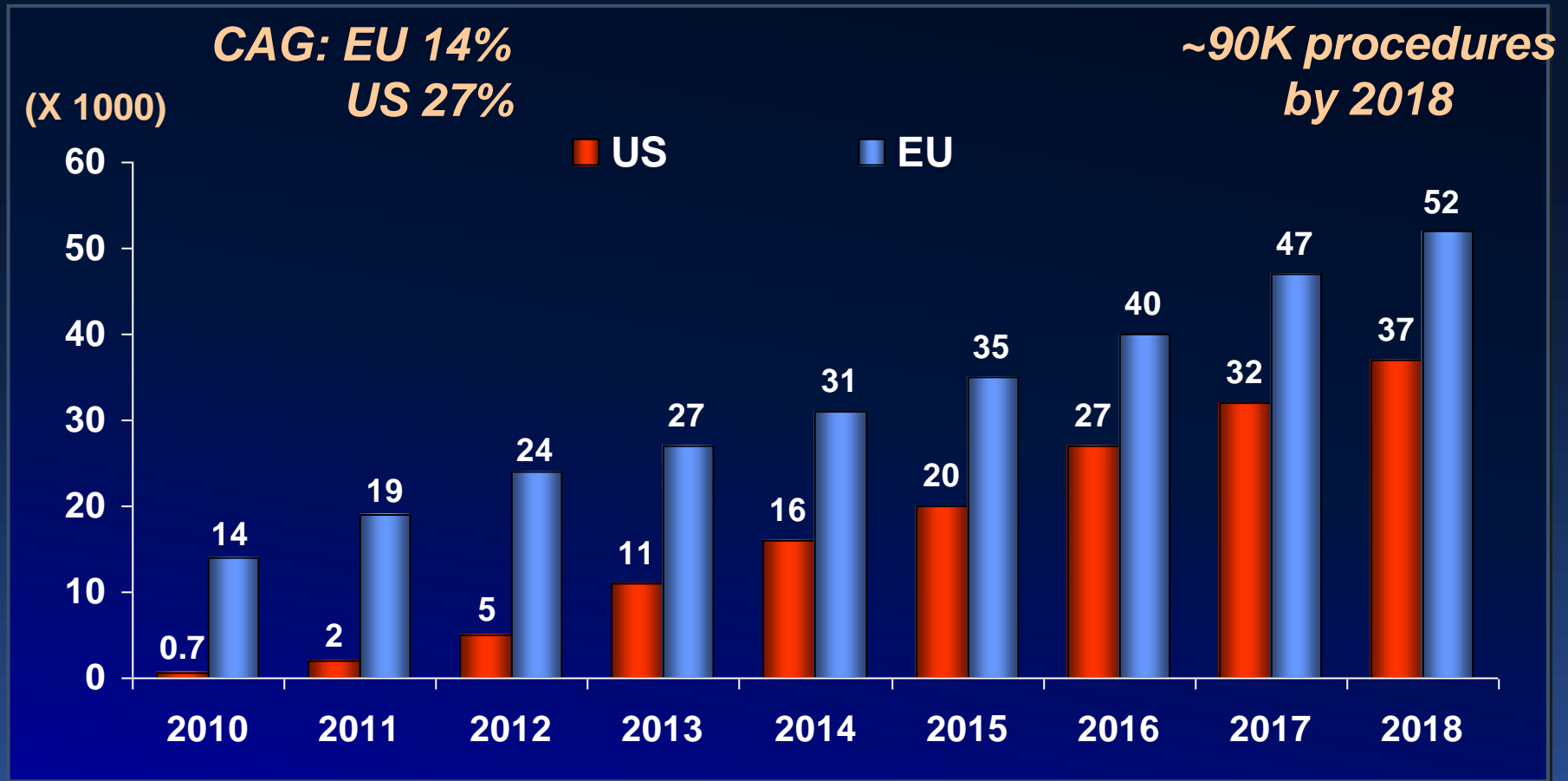
P = 0.04 for superiority

No. at Risk

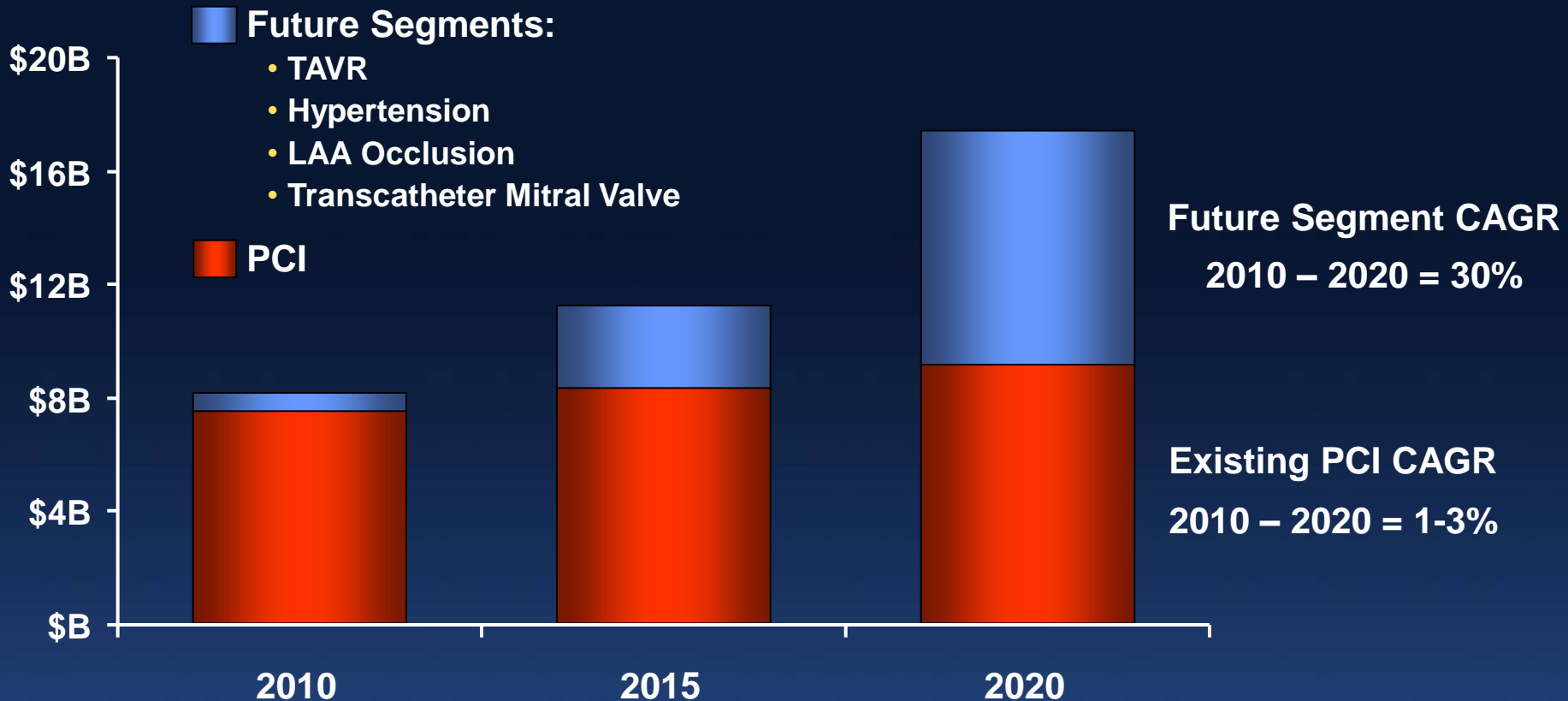
	0	1	6	12
Surgical	357	341	297	274
Transcatheter	390	377	353	329

TAVR Procedures

Growth from 2010 - 2018



WW Cardiology Market Trends



- New market segments may exceed PCI market size by 2020
- Emergence of future segments relies on technology and clinical data
- OUS markets will lead and exceed the size of US markets

TCT Perspectives: 1988 - 2013

Evolution to Mainstream Therapies

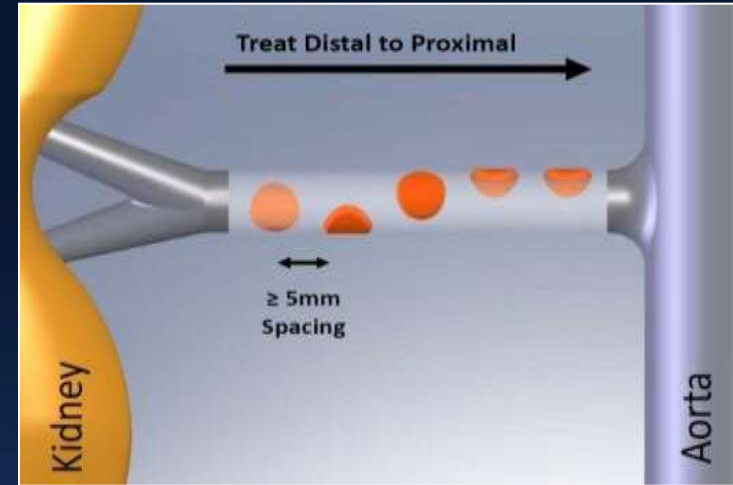
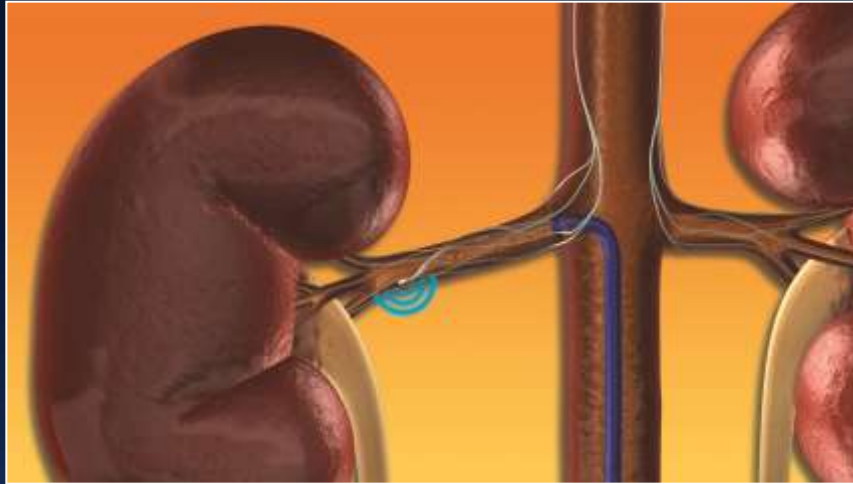
- The less-invasive (non-surgical) use of catheter-based therapies to remotely treat distant disease targets has transformed medicine.
 - *Neuro-radiology and neuro-surgery*
 - *Minimally invasive endoscopic surgery*
 - *Gastroenterology*
 - *Orthopedics*
 - *Oncology*
 - *Pulmonology (and ENT)*
 - *Urology and gynecology*

TCT Perspectives: 1988 - 2013

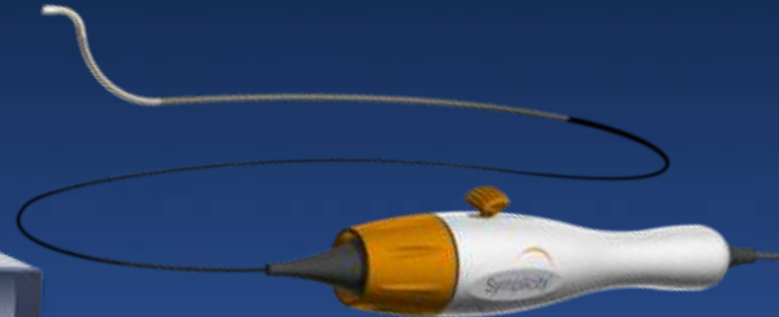
Evolution to Mainstream Therapies

- The less-invasive (non-surgical) use of catheter-based therapies to remotely treat distant disease targets has transformed medicine.
- A major current effort is to redirect intra-vascular interventional therapies to address “mainstream” cardiovascular and non-cardiovascular disease (e.g. new HTN, AF, and CHF therapies).

Renal Denervation for Refractory Hypertension



- Standard interventional technique
- 4-6 two-minute treatments per artery
- Proprietary RF Generator
 - Automated
 - Low-power
 - Built-in safety algorithms



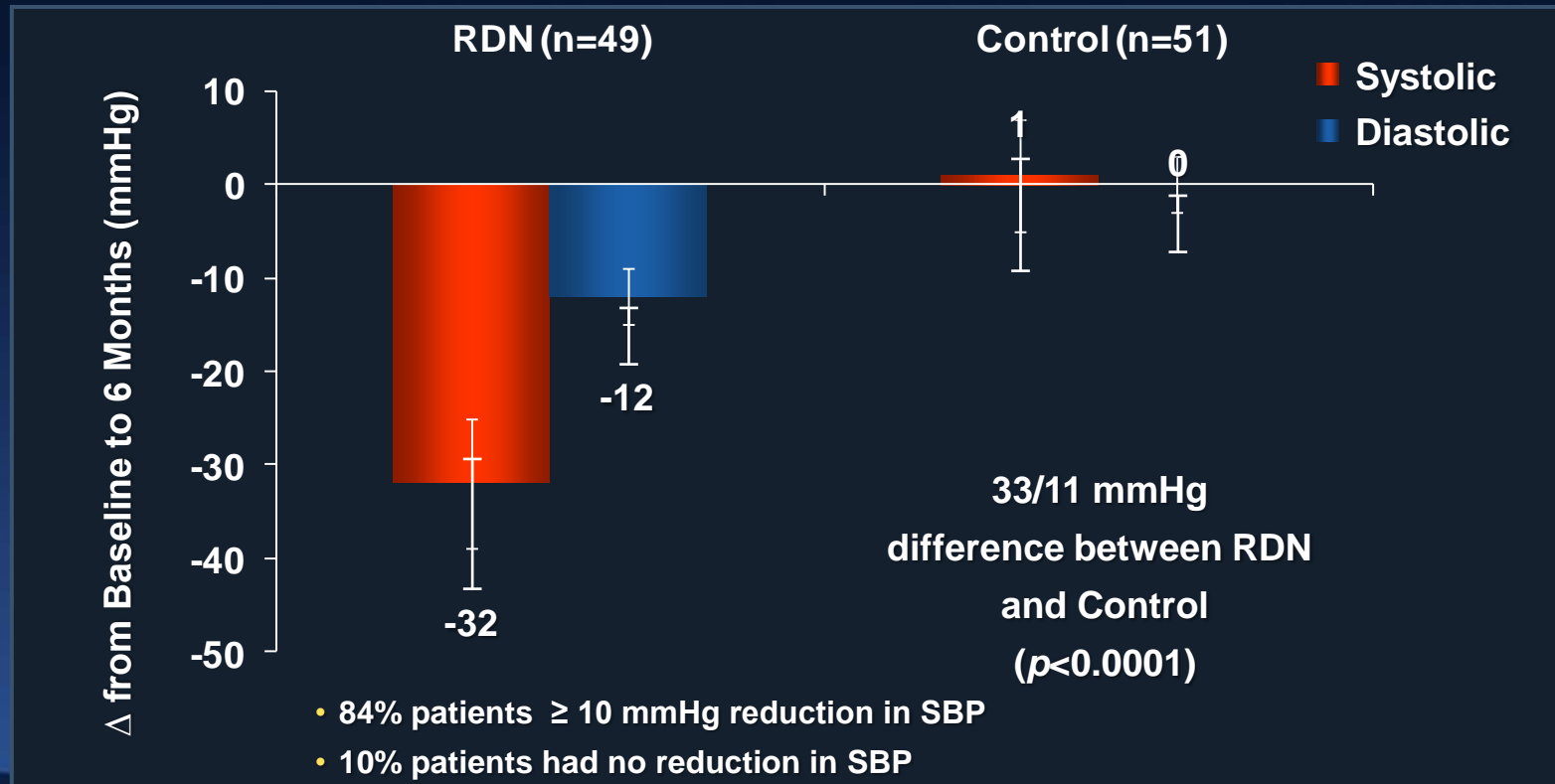
THE LANCET

Renal sympathetic denervation in patients with treatment-resistant hypertension (The Symplicity HTN-2 Trial): a randomised controlled trial

Symplicity HTN-2 Investigators*

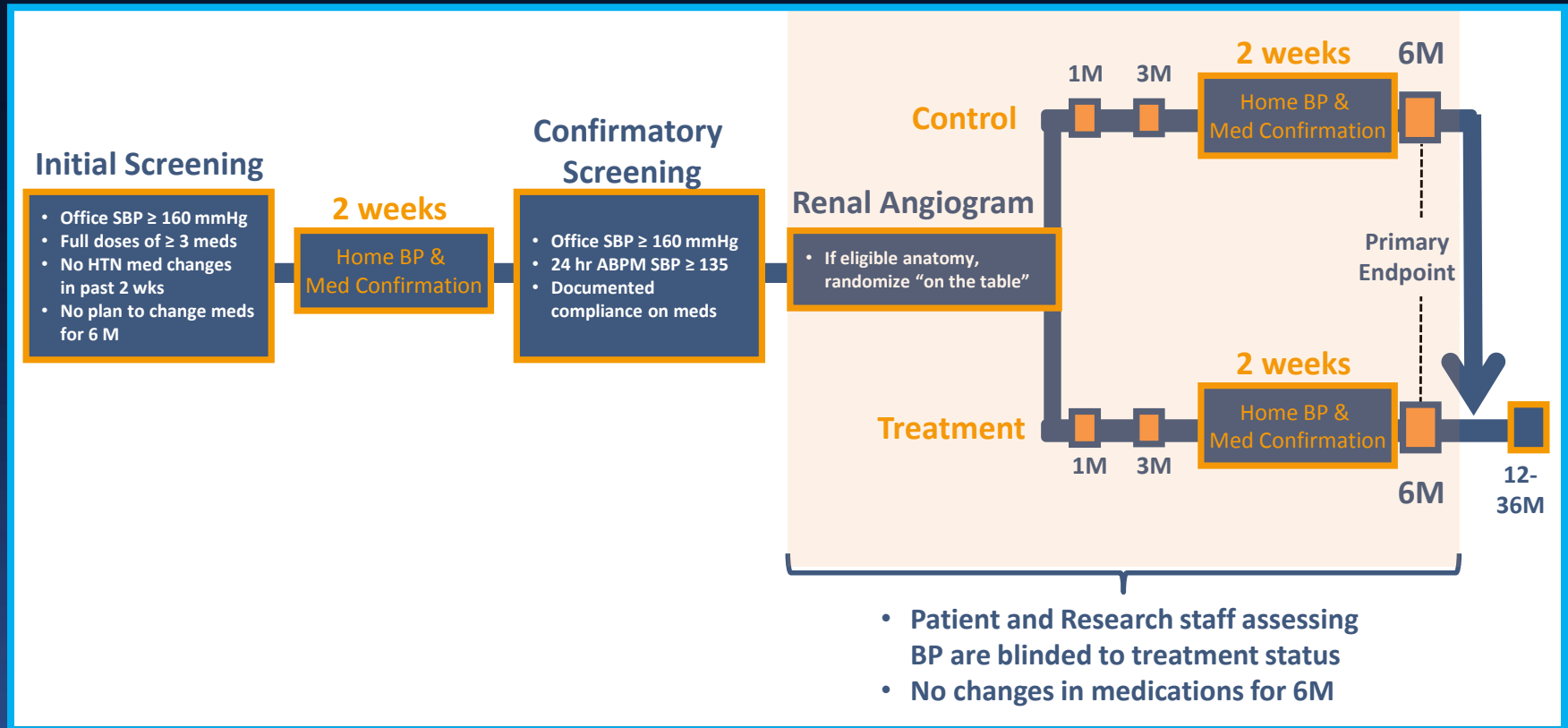
Symplicity HTN-2: RDN vs. Control

Primary Endpoint: 6-Month Office BP



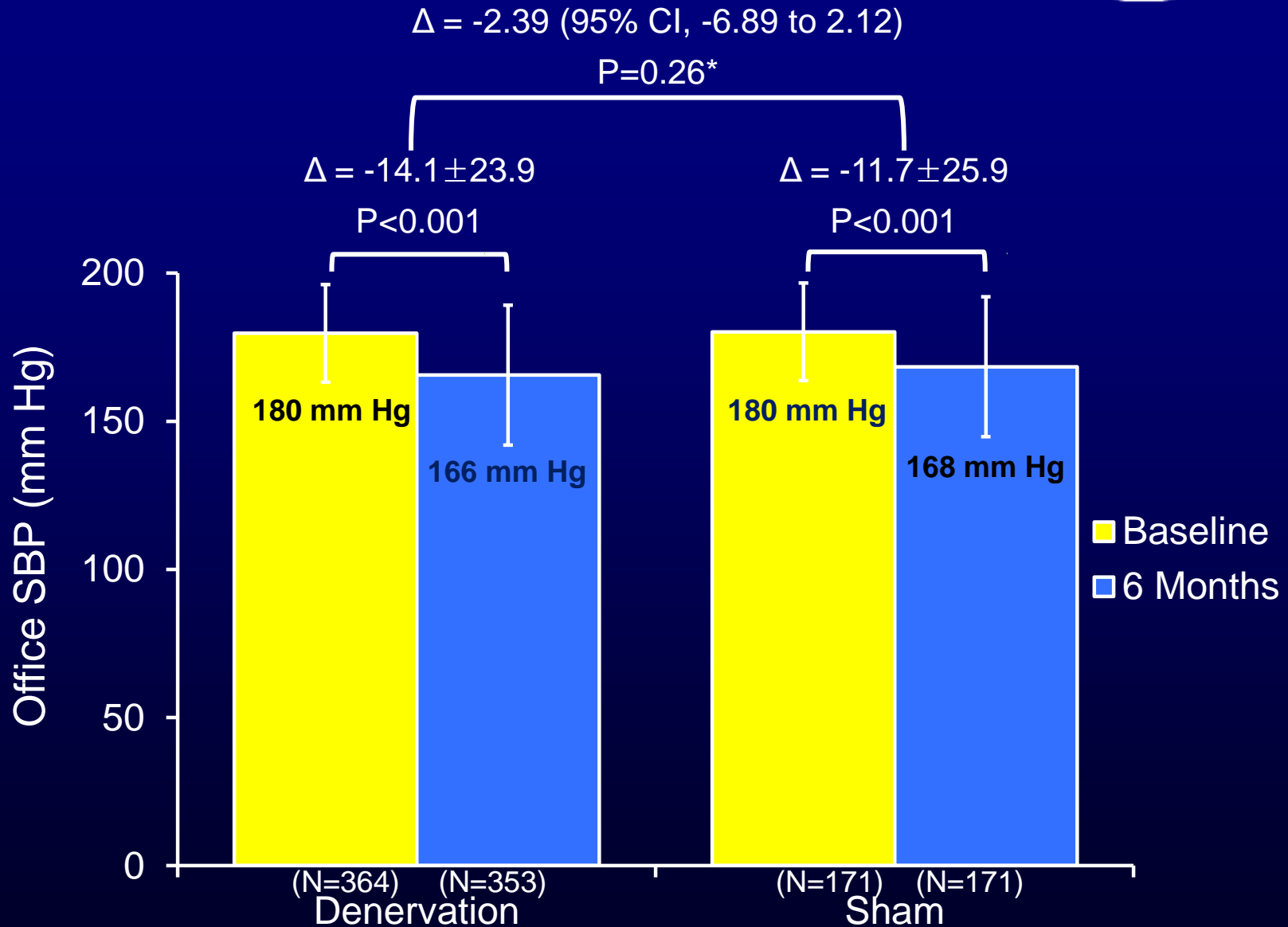
Symplicity HTN-3 Study Design

- Uncontrolled (refractory) HTN (535 patients)
- 2:1 randomization - TREND vs. sham control



1^{ry} effectiveness endpoint: Δ SBP at 6 months

Primary Efficacy Endpoint



*P value for superiority with a 5 mm Hg margin; bars denote standard deviations

Renal Denervation for Refractory Hypertension

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

CONCLUSIONS

This blinded trial did not show a significant reduction of systolic blood pressure in patients with resistant hypertension 6 months after renal-artery denervation as compared with a sham control. (Funded by Medtronic; SYMPPLICITY HTN-3 ClinicalTrials.gov number, NCT01418261.)

Ralph D.'Agostino, Ph.D., John W. Flack, M.D., M.P.H., Barry F. Katz, M.D., Martin B. Leon, M.D., Minglei Liu, Ph.D., Laura Mauri, M.D., Manuela Negoita, M.D., Sidney A. Cohen, M.D., Ph.D., Suzanne Oparil, M.D., Krishna Rocha-Singh, M.D., Raymond R. Townsend, M.D., and George L. Bakris, M.D.,
for the SYMPPLICITY HTN-3 Investigators*

What Next ???

TCT Perspectives: 1988 - 2013

Evolution to Mainstream Therapies

- The less-invasive (non-surgical) use of catheter-based therapies to remotely treat distant disease targets has transformed medicine.
- A major current effort is to redirect intra-vascular interventional therapies to address “mainstream” cardiovascular and non-cardiovascular disease (e.g. new HTN, AF, and CHF therapies).
- This requires that the interventionalist become an integrated member of a multi-disciplinary team AND learn new cognitive skills; the transformation from isolated proceduralist to engaged therapist!

TCT Perspectives: 1988 – 2013

Important Evolution

“Early” Days

Devices



Proceduralists

Modern Era

Therapies



Therapists

Interventional Perspectives

Future Directions

Interventional Perspectives

What lies ahead?



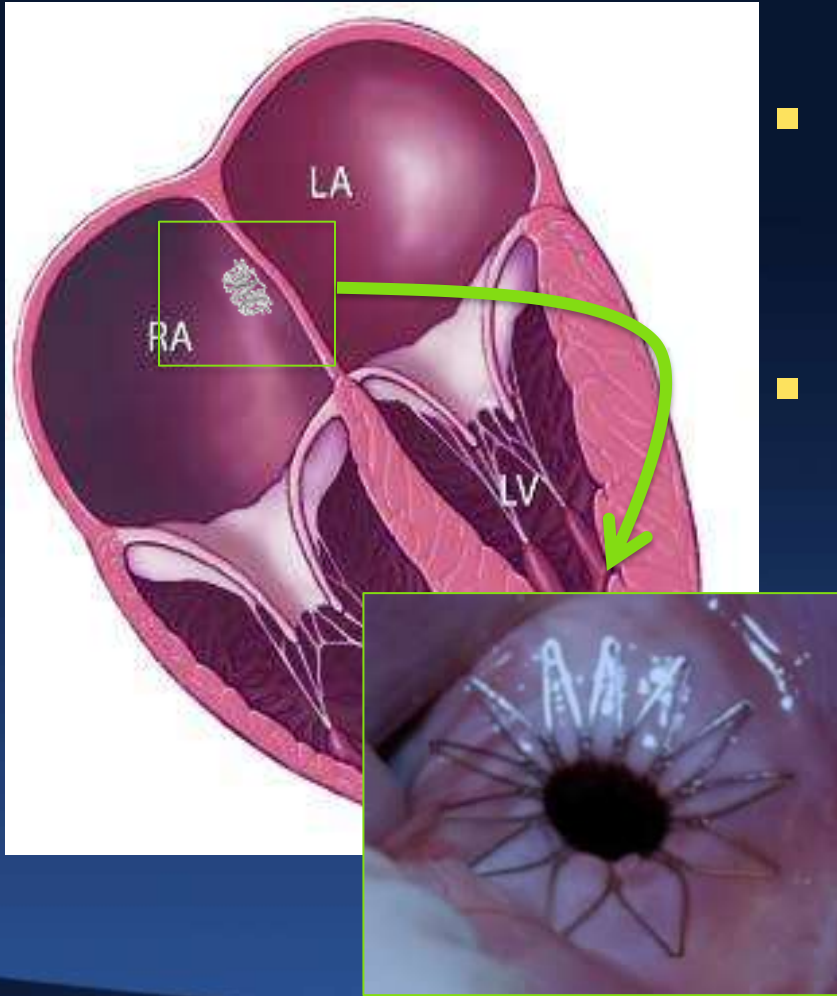
Interventional Perspectives

The Next Big Breakthrough?

New CHF Therapies...

- Sensors to monitor therapy
- LV remodeling devices
- Contractility modulation
- Micro-VADs (interventional)
- Inter-atrial shunt implants
- Stem cell therapies

Inter-Atrial Shunt Device (IASD) (DC Devices)



- Stiff LV results in high LA pressure (LAp) and pulmonary congestion
- Transcatheter implant to create permanent interatrial shunt
 - Shunt allows blood to move from the higher pressure LA to the lower pressure more compliant right heart which reduced LAp without affecting cardiac output

Interventional Perspectives

Important Iterative Changes

Vascular Therapies

- Bioabsorbable stents
- Drug-coated balloons
- Advanced balloon technologies
- Vascular remodeling
- New therapeutic targets

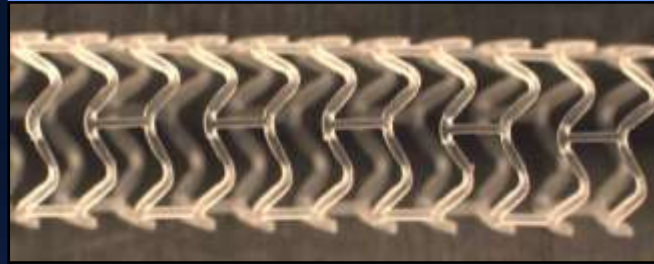
Fully Bioresorbable Stents (Scaffolds)

Igaki-Tamai



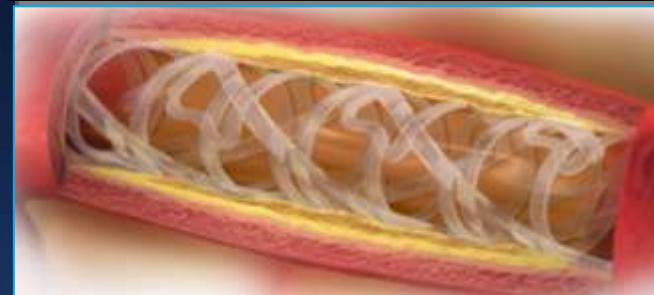
PLA

BVS



PLLA (with everolimus)

REVA



Iodinated tyrosine-polycarbonate (with sirolimus)

ELIXIR



PLLA (with novolimus)

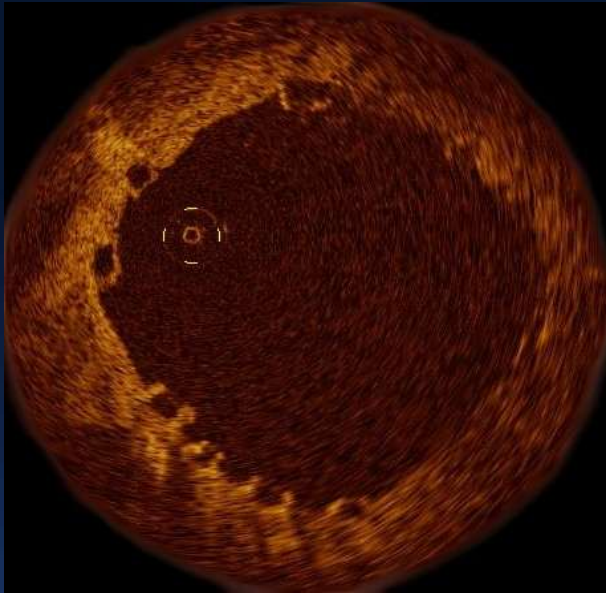
Biotronik



Magnesium (with sirolimus)

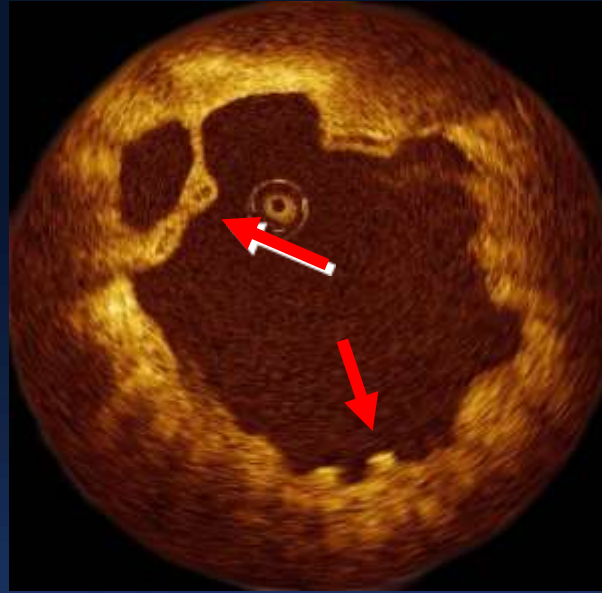
Absorb Trial: OCT Results

Post-stenting



Complete strut apposition

6-month



Late acquired incomplete stent apposition with tissue bridges between the struts

Corrugated endolumen

24-month



Smooth endoluminal lining

Struts largely disappeared although remnant just visible (arrow)

Drug-Eluting Balloons (and beyond)

SeQuent® Please
Paccocath® Technology – B. Braun



DIOR® - EuroCor



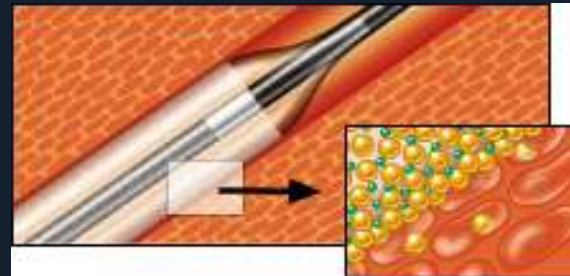
Cricket™
Mercator



Genie™
Acrostak



In.Pact
Invatec



Elutax® - Aachen Resonance



ClearWay™
Atrium



Chronic CerebroSpinal Venous Insufficiency (CCSVI) and Multiple Sclerosis

Research paper

Chronic cerebrospinal venous insufficiency in patients with multiple sclerosis

P Zamboni,¹ R Galeotti,¹ E Menegatti,¹ A M Malagoni,¹ G Tacconi,¹ S Dall'Ara,¹ I Bartolomei,² F Salvi²



Multiple Significant Venous Stenoses

*65/65 MS pts
0/235 Control pts*

Jugular veins – 91%

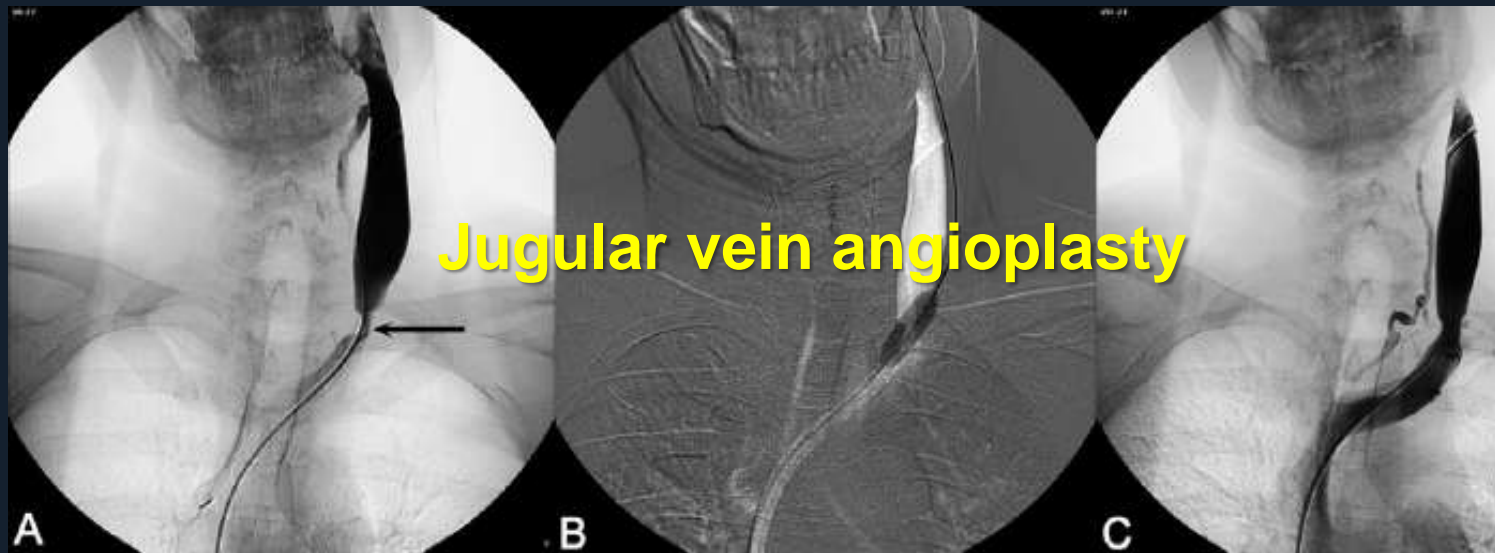


Azygos vein – 86%

Chronic CerebroSpinal Venous Insufficiency (CCSVI) and Multiple Sclerosis

A prospective open-label study of endovascular treatment of chronic cerebrospinal venous insufficiency

Paolo Zamboni, MD,^a Roberto Galeotti, MD,^a Erica Menegatti, RVT,^a Anna Maria Malagoni, MD,^a Sergio Giancesini, MD,^a Ilaria Bartolomei, MD,^b Francesco Mascoli, MD,^a and Fabrizio Salvi, MD,^b *Ferrara and Bologna, Italy*



Chronic CerebroSpinal Venous Insufficiency (CCSVI) and Multiple Sclerosis

A prospective open-label study of endovascular treatment of chronic cerebrospinal venous

Menegatti, RVT,^a Anna Maria Malagoni, MD,^a
... MD,^a and

Is it REAL?

- Efficacy especially
- **12 month patency**
 - IJV 53%
 - Azygos 96%

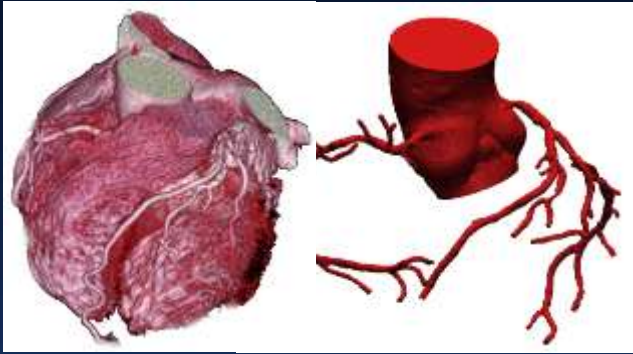
Interventional Perspectives

Future Directions...

- Enhanced diagnostics
- Emphasis on prevention (digital healthcare)
- Robotics and tele-manipulation
- Sympathetic / hormonal modulation
- The Structural revolution
- Advanced imaging modalities
- New platform technologies

Non-invasive FFR_{CT} from coronary CT scans

3D Computational Model based on coronary CTA



Physiologic models:

- Myocardial mass
- Morphometry-based boundary conditions
- Effect of adenosine on microcirculation

CFD Blood Flow Solution

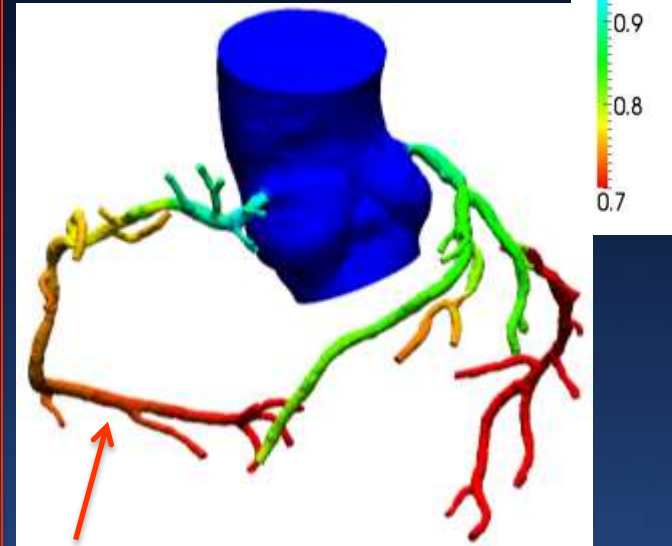
Blood flow equations solved on supercomputer

$$\begin{aligned}\rho \bar{v}_{,t} + \rho \bar{v} \cdot \nabla \bar{v} &= -\nabla p + \nabla \cdot \tau \\ \nabla \cdot \bar{v} &= 0\end{aligned}$$



Calculate FFR_{CT}

3-D FFR_{CT} map computed



$FFR_{CT} = 0.72$
(can select any point on model)

Consumer Paths...will be patient paths



**Congestive
Heart Failure**



Diabetes



Hypertension



Pediatrics



- **Decrease 30 day re-hospitalization for heart failure patients**
- **Prevent episodes of hypoglycemia for diabetic patients**
- **Decrease ER visits for childhood asthma exacerbations**



***No lead, no radiation
& less X-ray and
contrast for our
patients....***

Device Landscape 2014

Percutaneous MV Repair

Edge-to-edge

- Evalve MitraClip*

Chordal shortening and other

- Cardiosolutions Mitra-Spacer*
 - NeoChord
- Valtech VChordal

Coronary sinus annuloplasty

- Cardiac Dimensions Carillon*
Cerclage annuloplasty

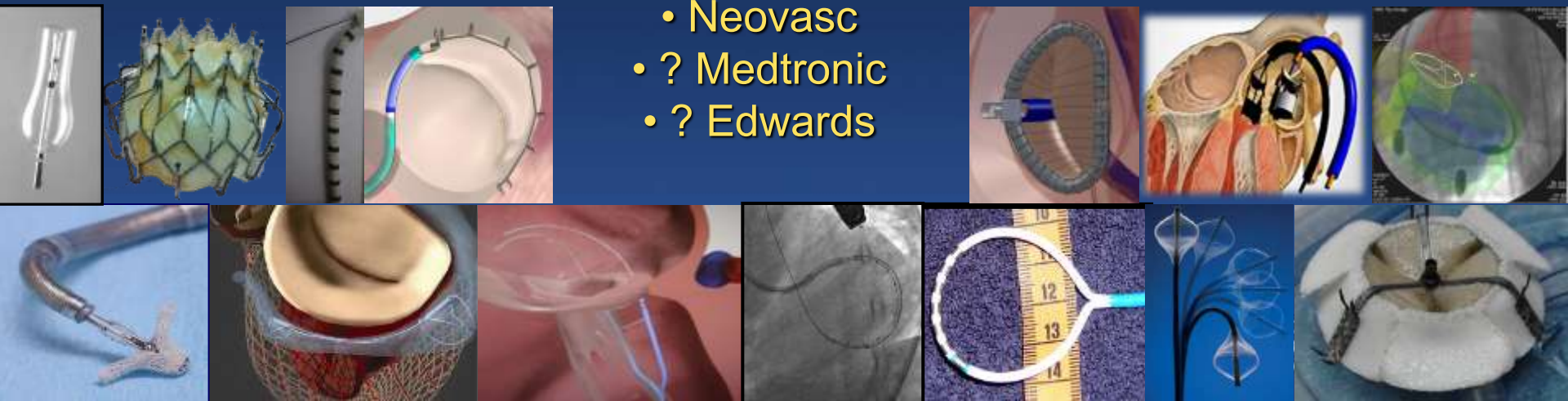
MV replacement

- EndoValve
- CardiAQ
- Valtech Cardiovalve
- ValveXchange
 - Neovasc
 - ? Medtronic
 - ? Edwards

Direct annuloplasty

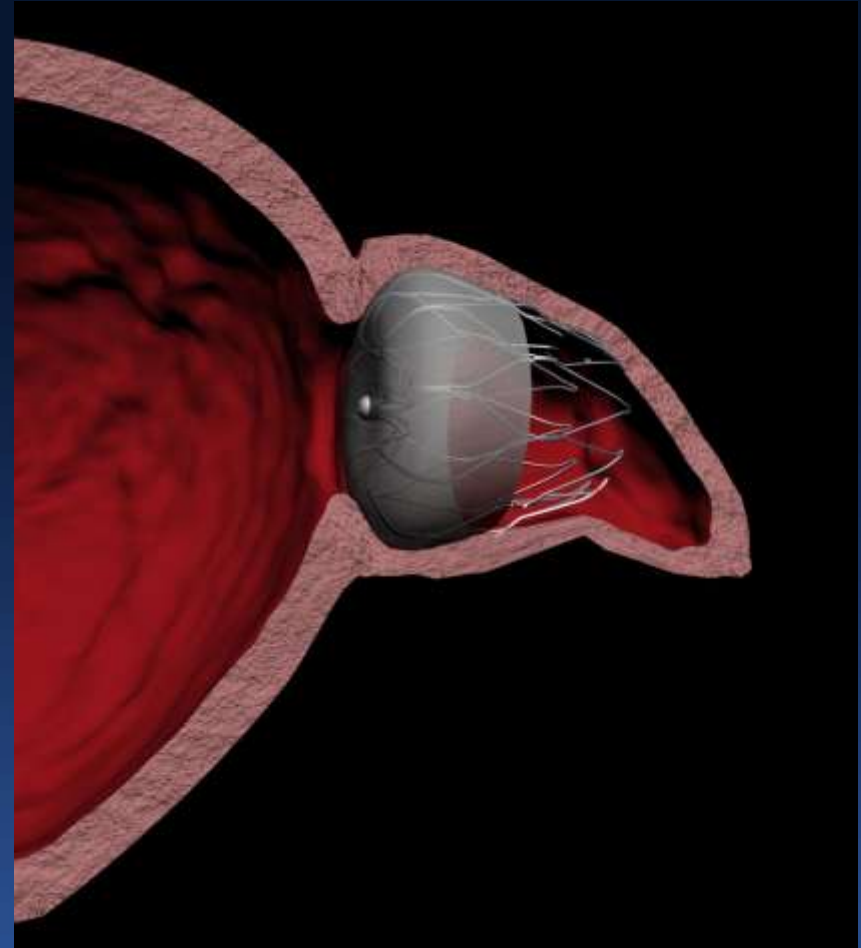
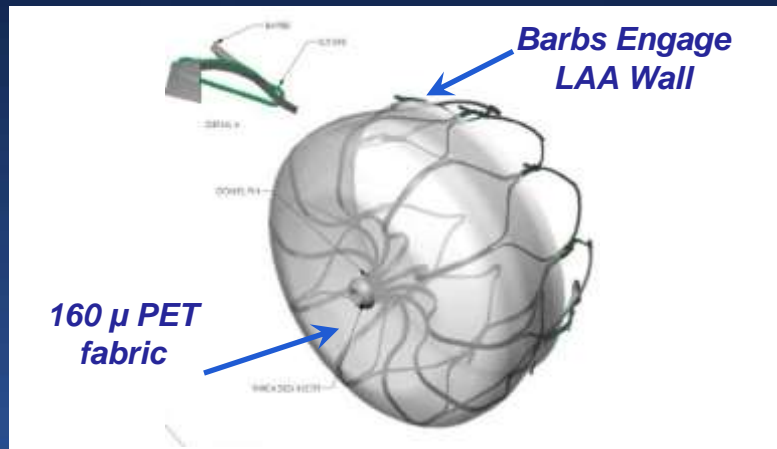
- Mitralign Bident*
- GDS Accucinch*
 - ~~ReCor (US)*~~
- Quantum Cor (RF)
- Valtech Cardioband
 - Micardia enCor

*In patients



LAA Closure for Stroke Prevention in AF

- **Difficulties with Warfarin use**
 - Frequent Monitoring
 - Difficulty in Compliance (TTR 48-63%)
 - Drug / Diet Interactions
 - Bleeding Risk (ICH)
 - Risks in Elderly (Falls, Poly-pharmacy)
- **Autopsy & TEE data implicate LAA**
- **LAA Closure Devices**

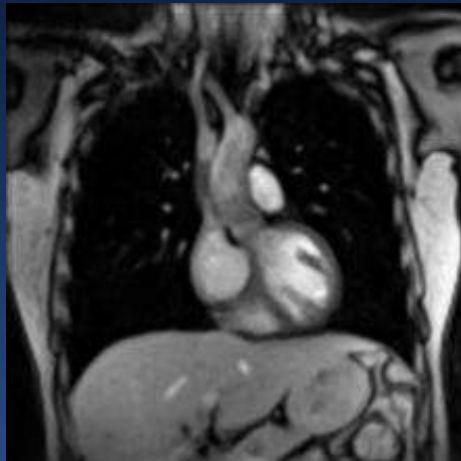


3D Bioprinting: The Unlimited Potential of Automated Tissue Engineering Processes

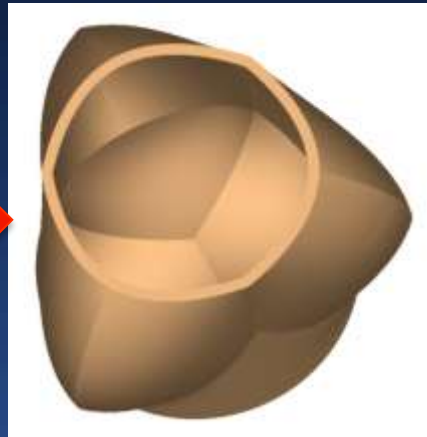
Biocompatible Matrix

+ Cells +

Cell friendly printing conditions



Modeling Software



3D-Bioplotter



Patient Scan

Solid Model File

Printed Valve

Flexible Electronics: From Sensors to Therapy Delivery

Core Technology = Soft biointegrated electronics



Thinned
→
Oriented

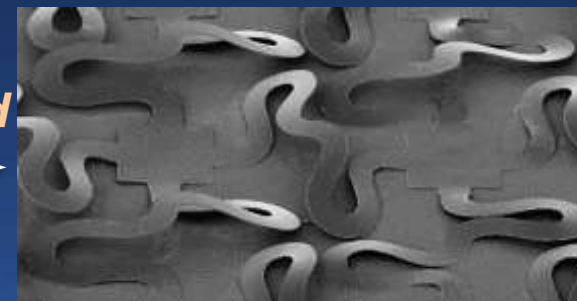


Thinned
→



Oriented
→

Stretchable Electronics



Interventional Perspectives

Final Thoughts

Heritage of Intervention

- **We believe that “less invasive” is better** (certainly for patients and also for the healthcare system in general; and less-invasive means catheter-based, non-surgical, whenever possible)
- **We are technology addicts** (esp. new gizmos which can shorten procedures, improve outcomes, and expand treatment indications)
- **We are passionate about experimental and clinical research and evidence-based medicine** (fundamental to every important therapy change and to the interventional device development process)

Heritage of Intervention

- We rely heavily on adjunctive imaging - a visual subspecialty (a growing trend...echo/IVUS, MR/CT, “fusion” imaging, and other new invasive imaging modalities)
- We are passionate about the interface of clinical medicine and the rapid communication of ideas (educational meetings, physician training, new IT developments, patient care initiatives, and marketing opportunities)
- We have a vibrant entrepreneurial spirit, are risk-takers, and rapidly embrace new therapies
- We strongly support and promote global and multi-disciplinary collaborations

Heritage of Intervention

- *We have a cultural identity ... innovation, strong industry partnerships, impatience leading to evolution and forward motion; we have a need to stimulate change and to continually re-invent ourselves, in pace with advances in bio-medical science and technology!*

Interventional Perspectives

The *FUTURE!*

*There's never been
a better time to be
an interventional
cardiologist!*

Interventional Perspectives

The *FUTURE!*

Our Message:
ADAPT
and
EVOLVE!

TCT Perspectives: 1988 - 2013

It's All About the Patients!



First Cypher S



First TAVR

tct 25

 CARDIOVASCULAR
RESEARCH
FOUNDATION

