

*Angioplasty Summit, TCTAP
Seoul, April 25th 2012*

Advances and Future in PCI



Stephan Windecker



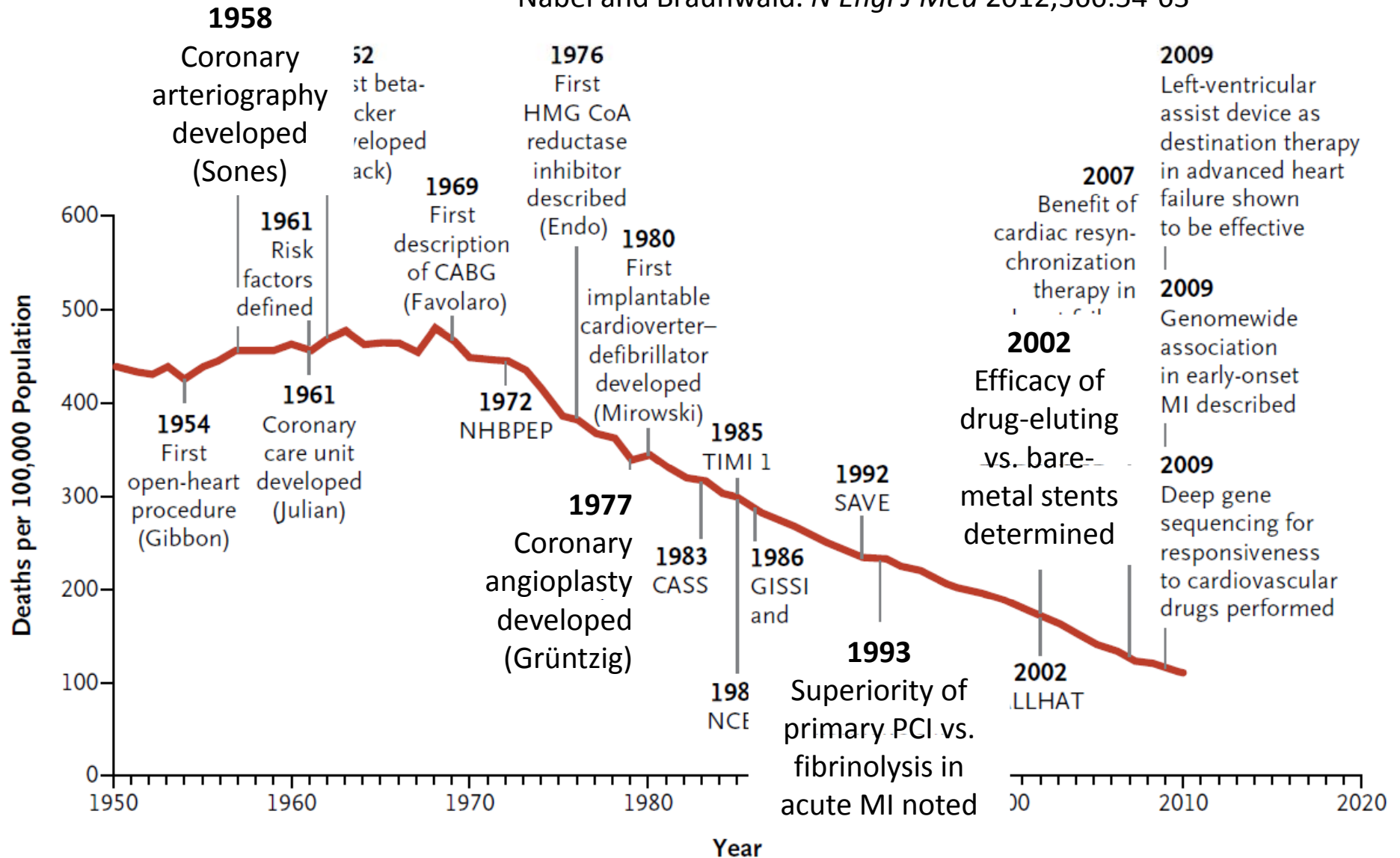
Department of Cardiology

Swiss Cardiovascular Center and Clinical Trials Unit Bern

Bern University Hospital, Switzerland

Scientific Advances and Cardiovascular Mortality

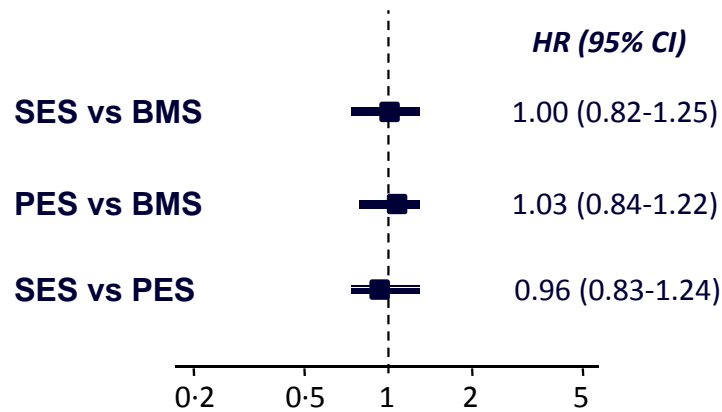
Nabel and Braunwald. *N Engl J Med* 2012;366:54-63



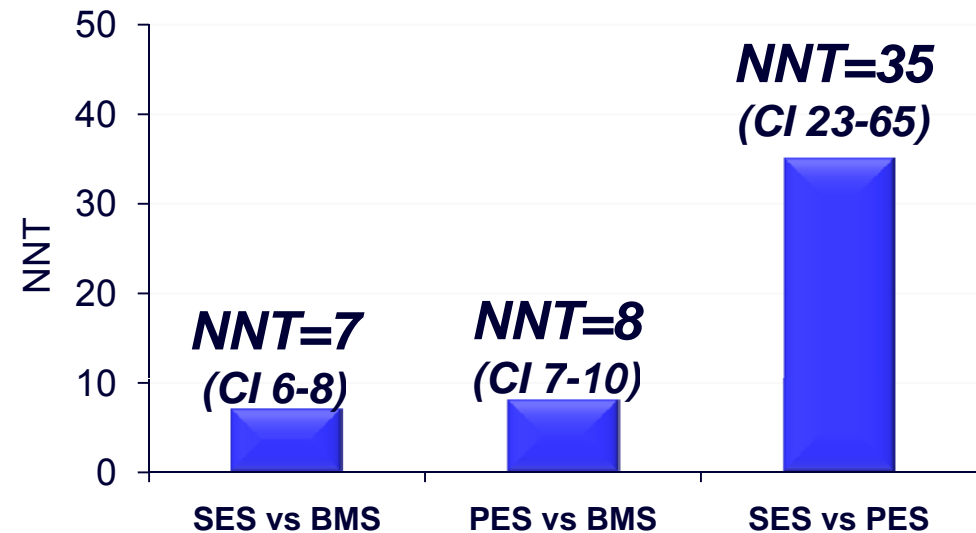
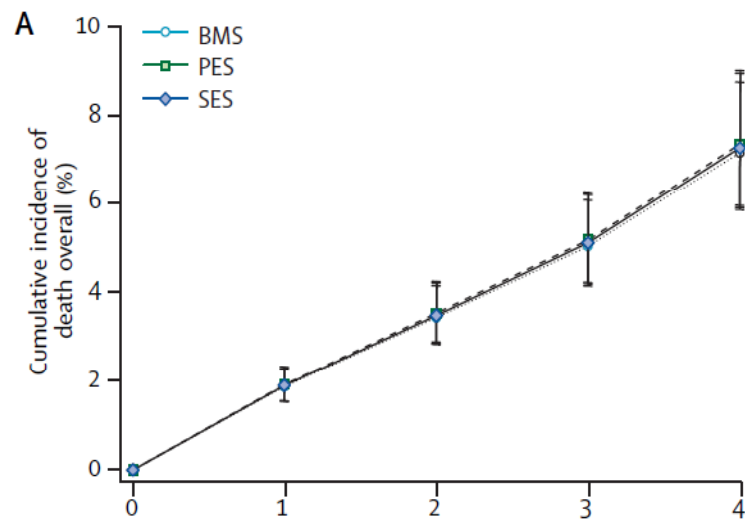
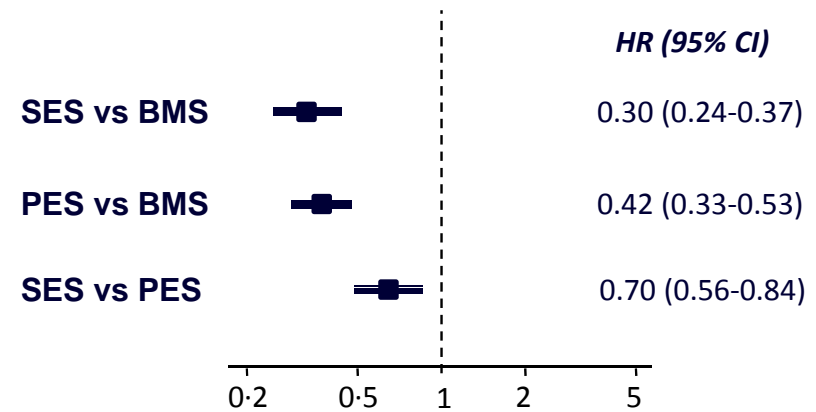
Mortality and Repeat Revascularization with Early Generation DES versus Bare Metal Stents

Stettler C et al. *Lancet* 2007;370:937-48

Mortality



Repeat Revasc

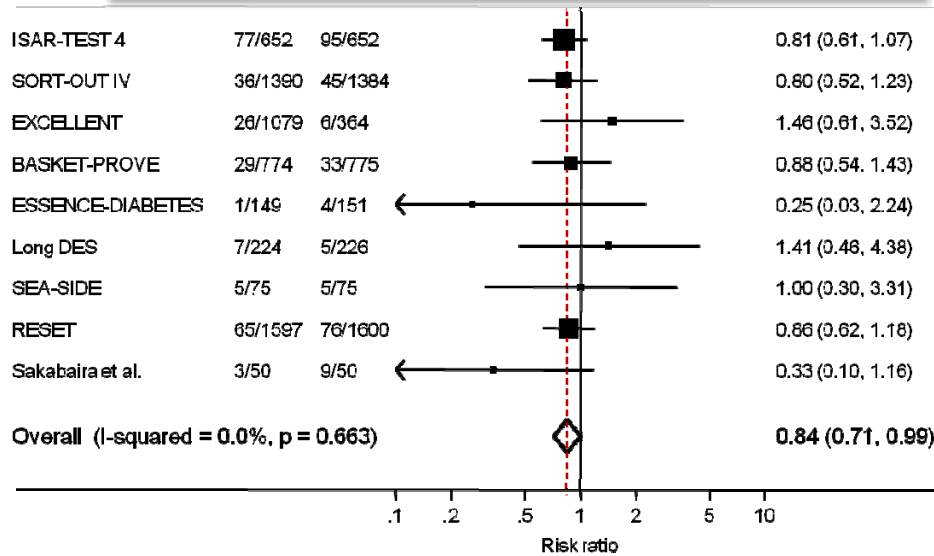


Progress With Newer Generation Drug-Eluting Stents

Newer Generation DES Efficacy and Safety

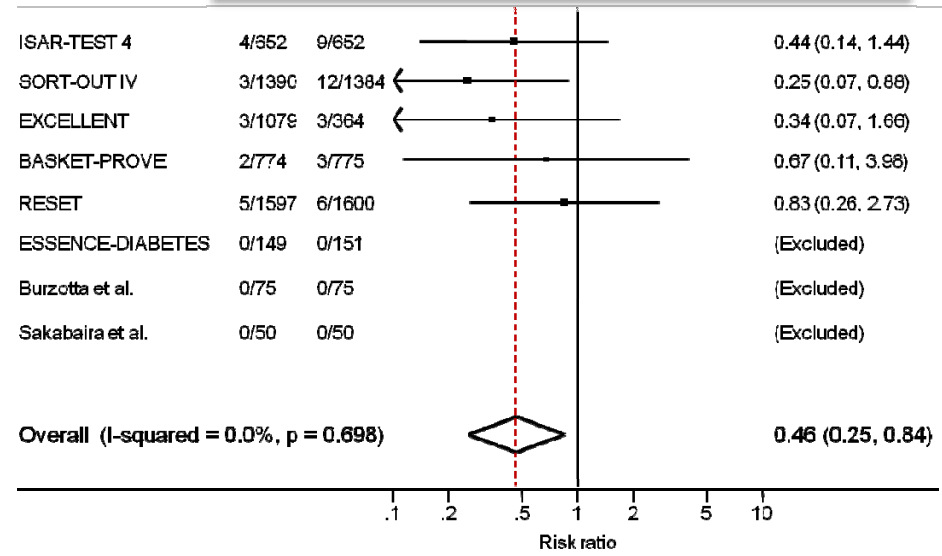
Everolimus-Eluting versus Sirolimus-Eluting Stents

Target Lesion Revasc



Favors EES Favors SES

Definite ST



Favors EES Favors SES

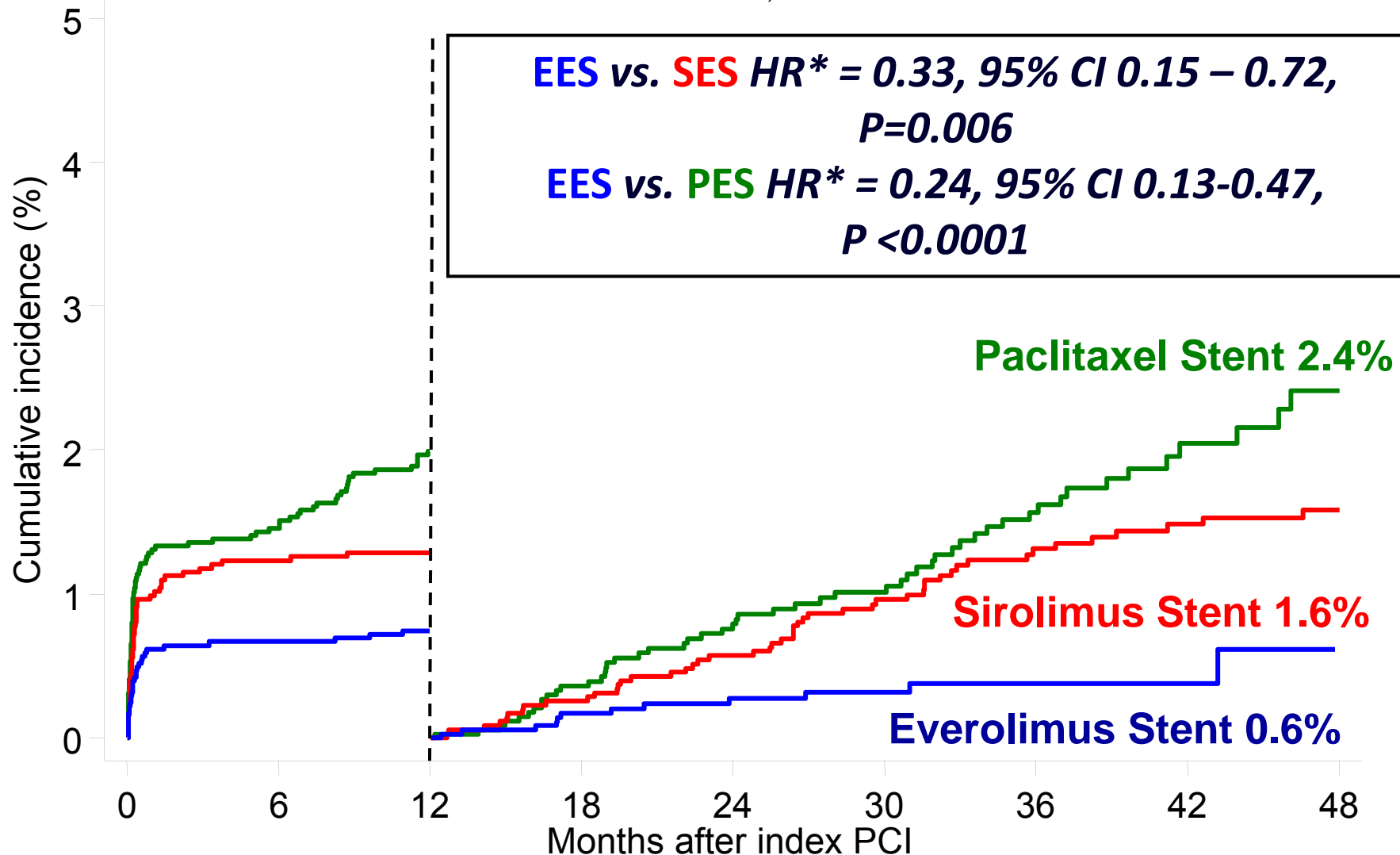
Updated Meta-Analysis N = 11,167

Stefanini, Windecker

Bern-Rotterdam Cohort Study

Very Late Definite ST (1-4 yrs)

Räber et al. *Circulation* 2012; 125:1110-21

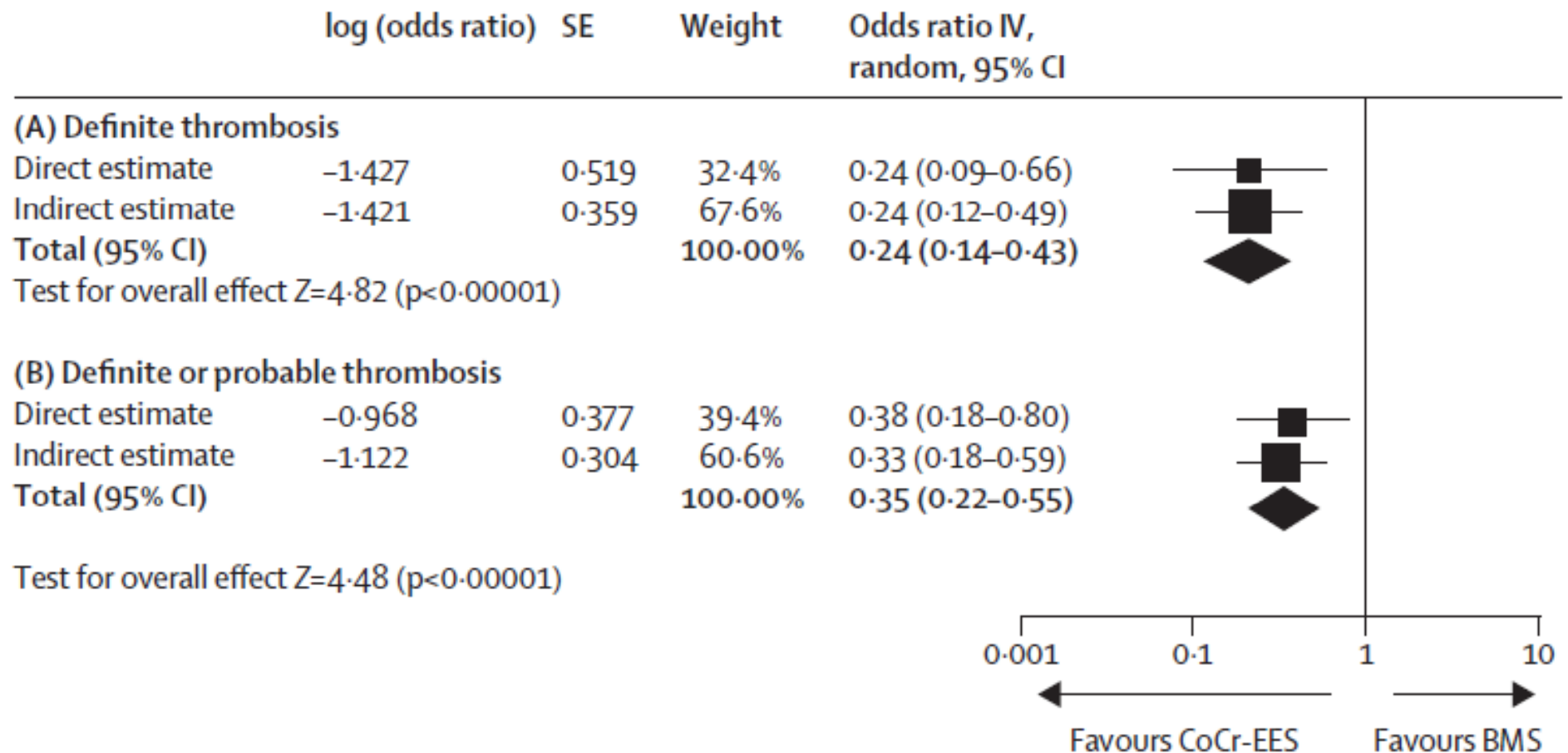


*from Cox proportional hazards model

Stent Thrombosis With Everolimus-Eluting Stents and Bare Metal Stents

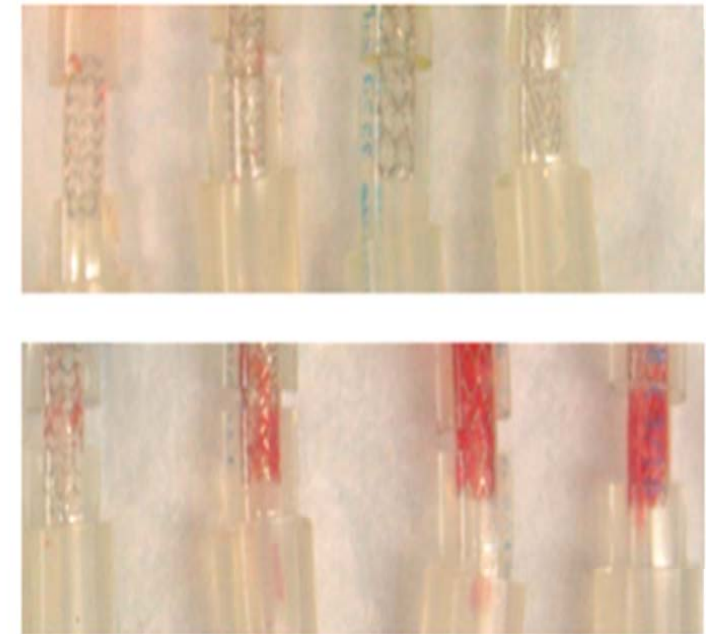
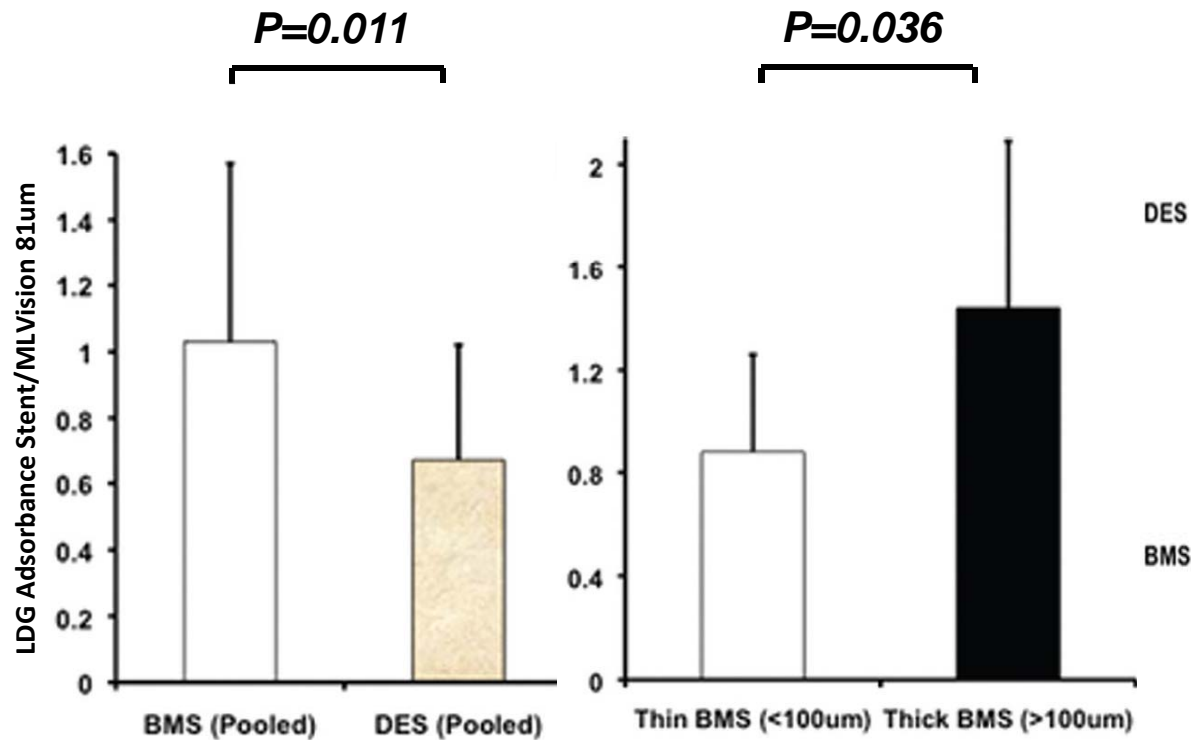
A Network Meta-Analysis

Palmerini T et al. *Lancet* 2012



Impact of Polymer-Drug Coating and Platform Design on Early Stent Thrombogenicity

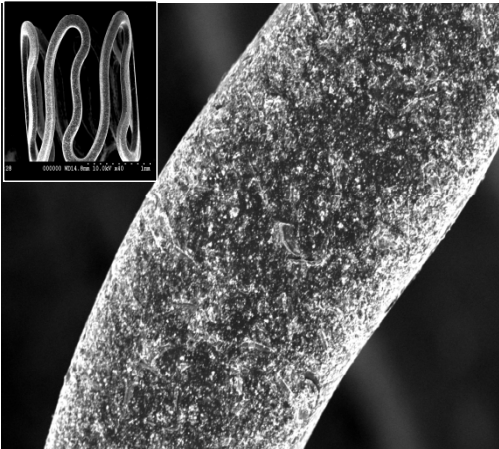
Kolandaivelu K et al. *Circulation* 2011;123:1400-1409.



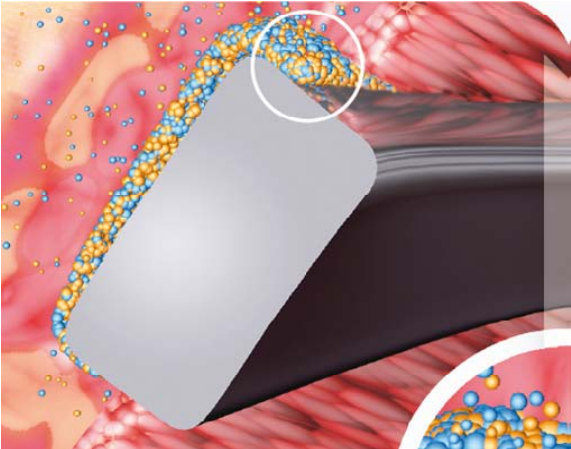
Pooled BMS: ML Vision, Driver, Taxus, Bx Velocity
Pooled DES: Xience V, Endeavor, Taxus Libertè, Cypher

Biodegradable Polymer Based DES Platforms

Sirolimus – ISAR TEST



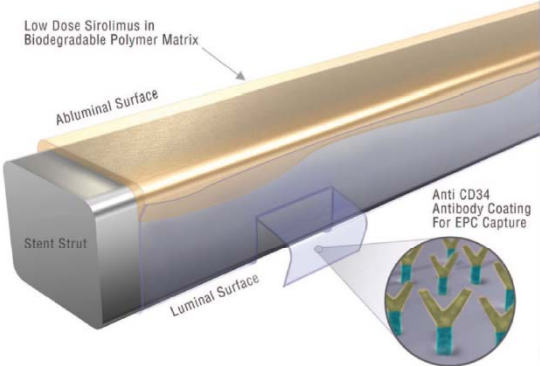
Biolimus A9 – BioMatrix Nobori, Axxess, XTENT



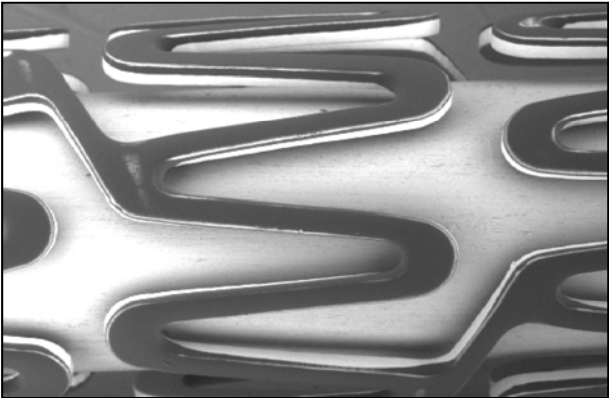
Sirolimus – ORSIRO



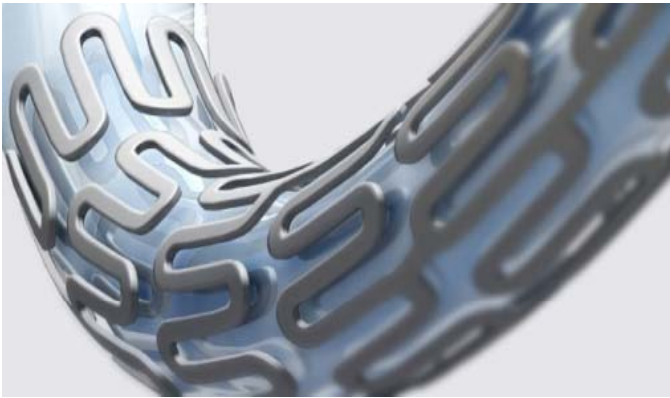
Sirolimus – Genous Bioengineered R Stent



Everolimus – SYNERGY

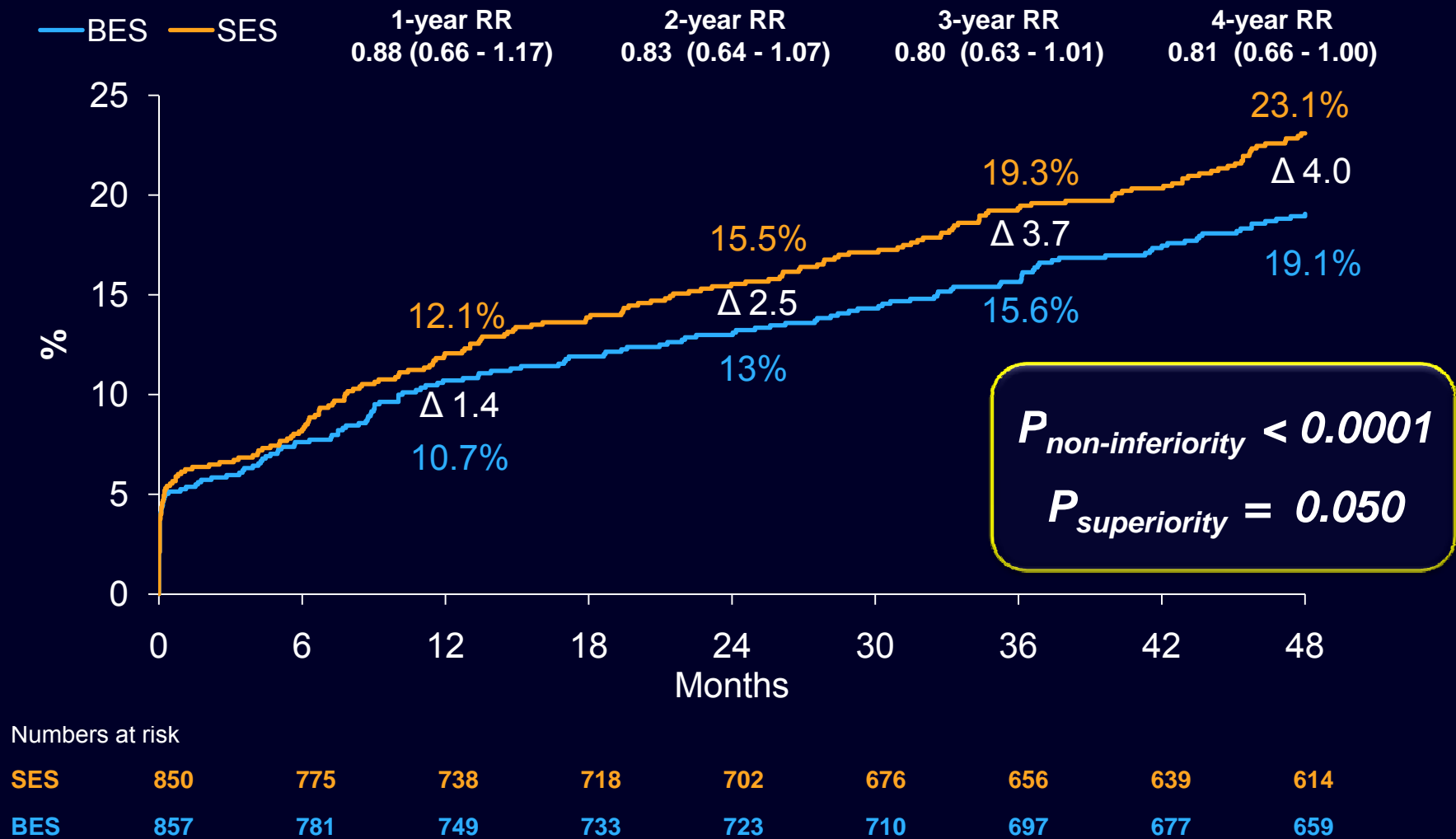


Novolimus – DESyne BD



LEADERS Trial – Primary Endpoint Cardiac death, MI, or Clinically-indicated TVR

Stefanini G et al. *Lancet* 2011;378:1940-8

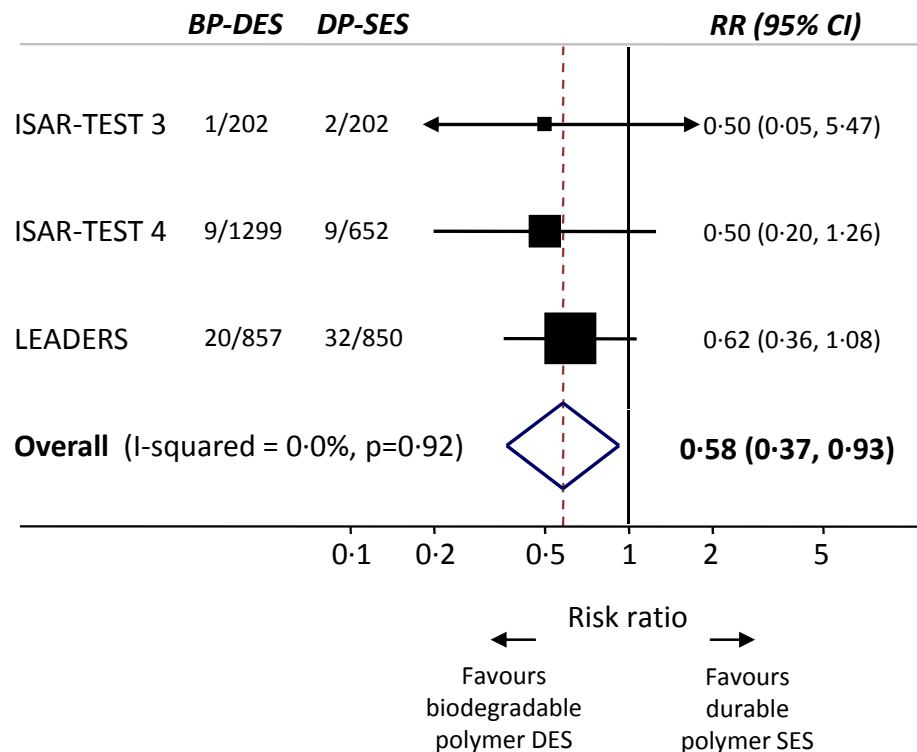


Biodegradable Polymer DES versus Durable Polymer Sirolimus Eluting Stents

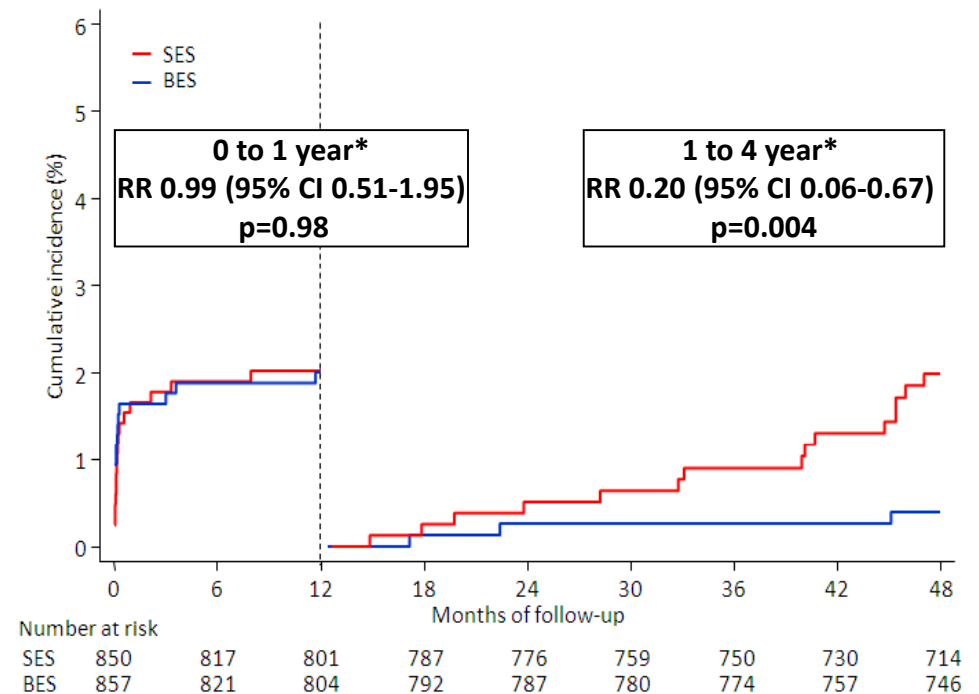
Stefanini G et al. *Lancet* 2011

DES Safety – Risk of Stent Thrombosis

Definite ST
in available randomized studies



Definite ST
in LEADERS trial through 4 years fup

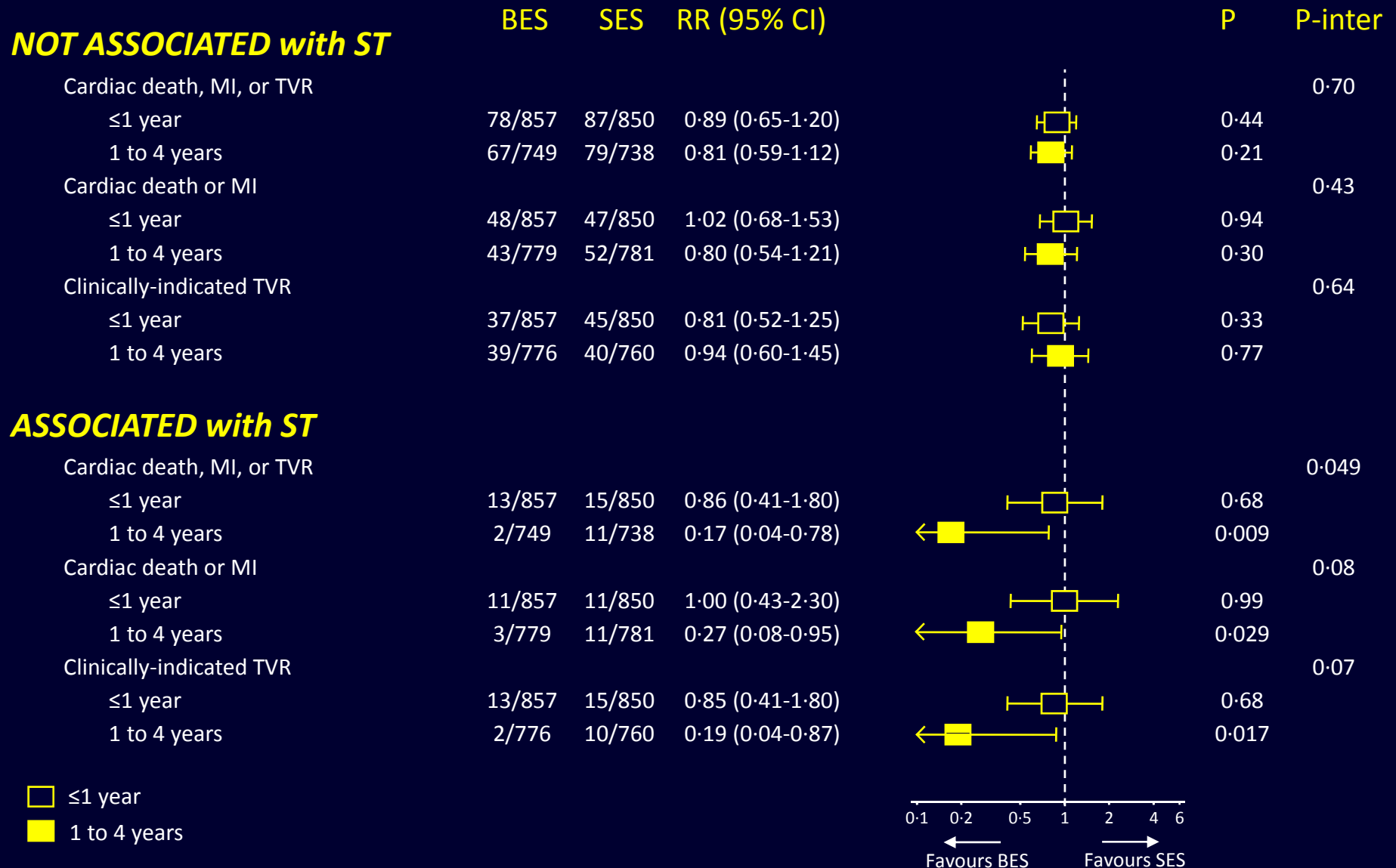


* RR 0-1 vs RR 1-4 p for interaction=0.017

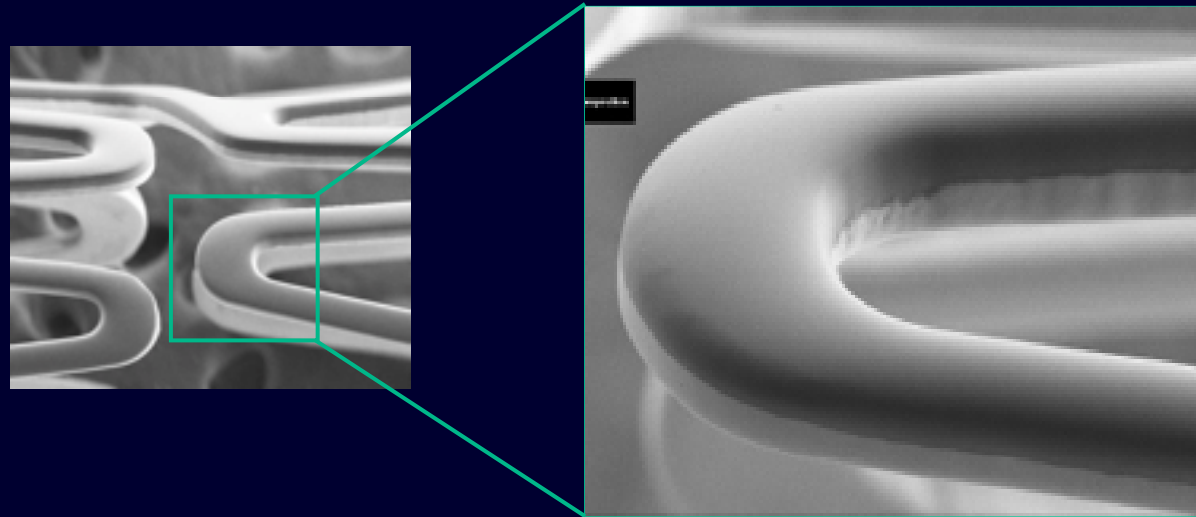
Biodegradable Polymer BES vs Durable Polymer SES

Association of Cardiac Events With Definite ST

Stefanini G et al. *Lancet* 2011;378:1940-8



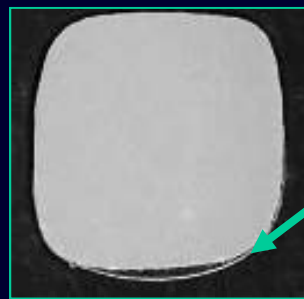
SYNERGY™ Stent



Bioabsorbable polymer (PLGA)

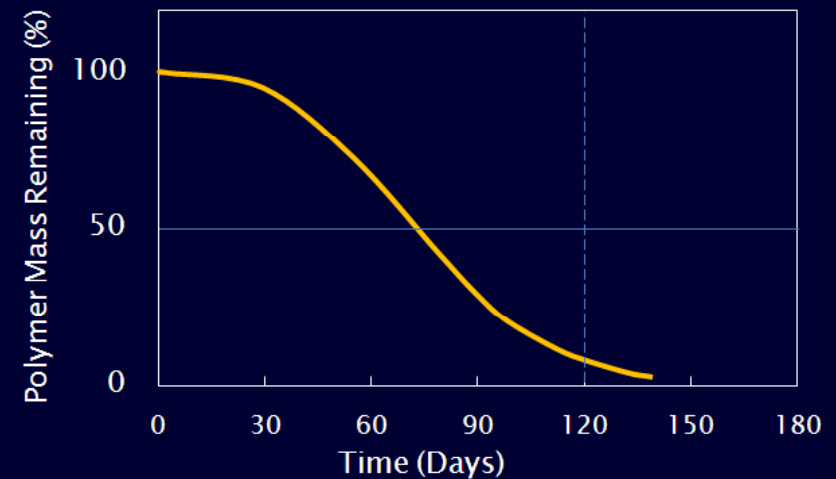
Applied only to the abluminal surface (rollcoat)

Thin strut PtCr Stent



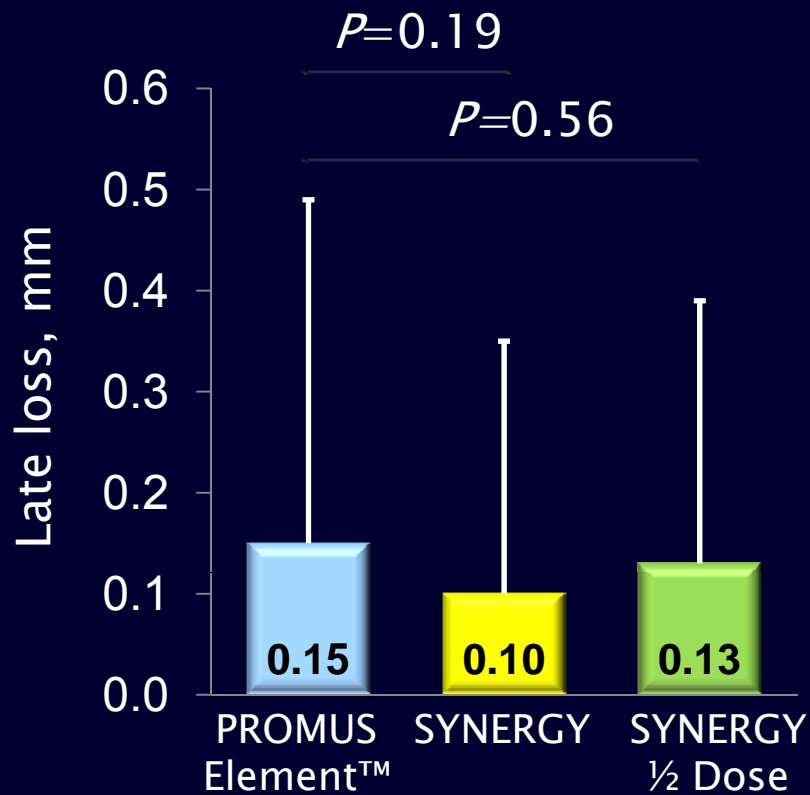
PLGA Bioabsorbable Polymer
+
Everolimus
on Abluminal Side
of Stent

Designed for polymer resorption within 4 months

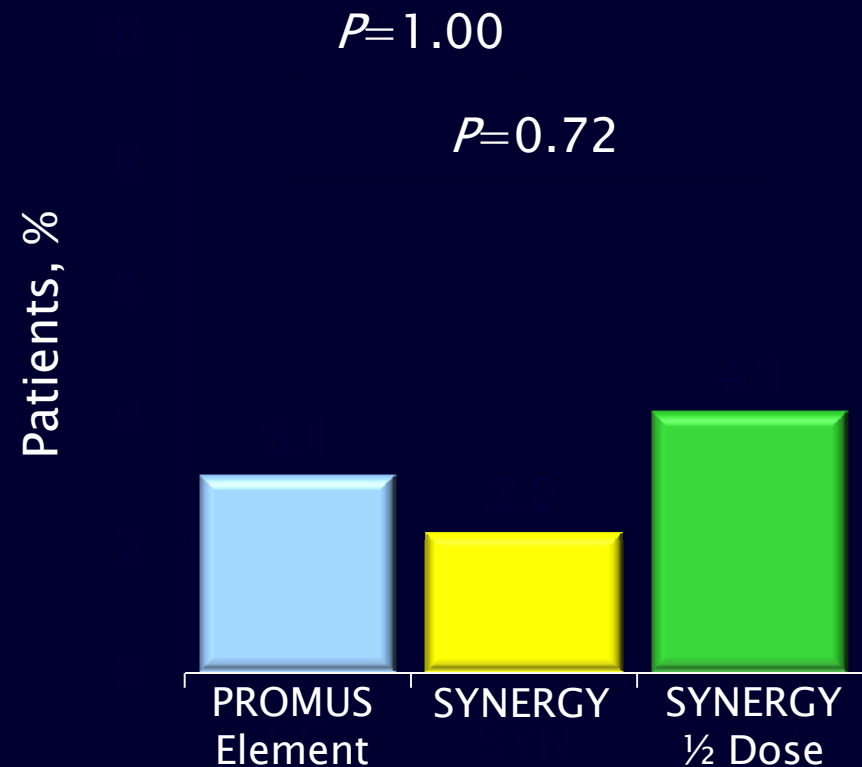


Randomized Evaluation of a Novel Biodegradable Polymer-Based Everolimus-Eluting Coronary Stent

1°EP: In-Stent Late Loss @ 6 Months



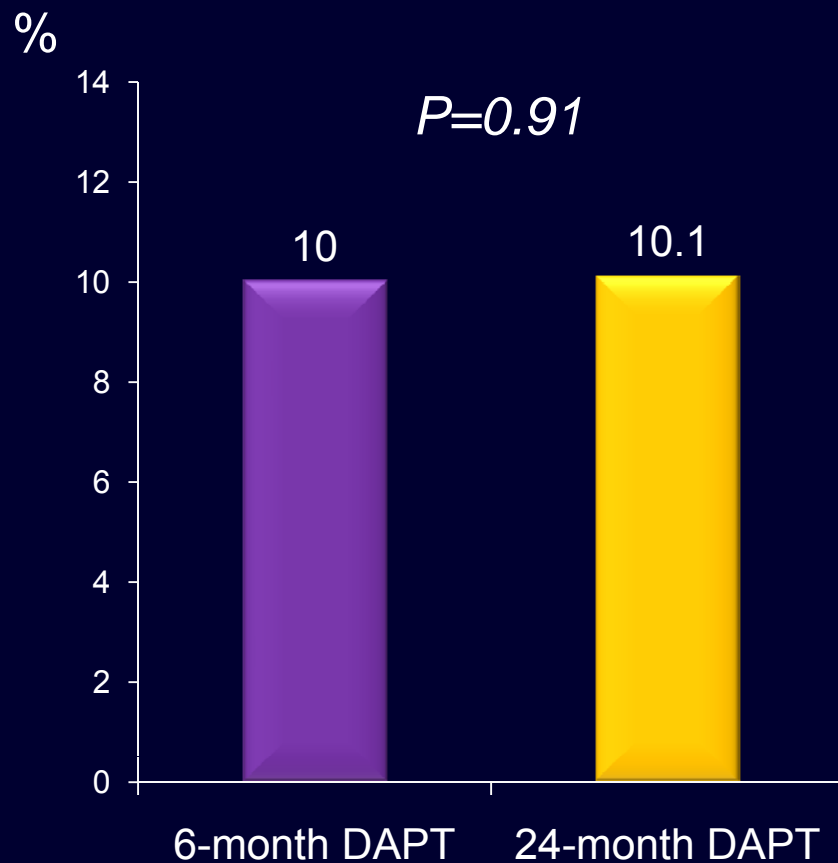
Target Lesion Failure @ 6 Months



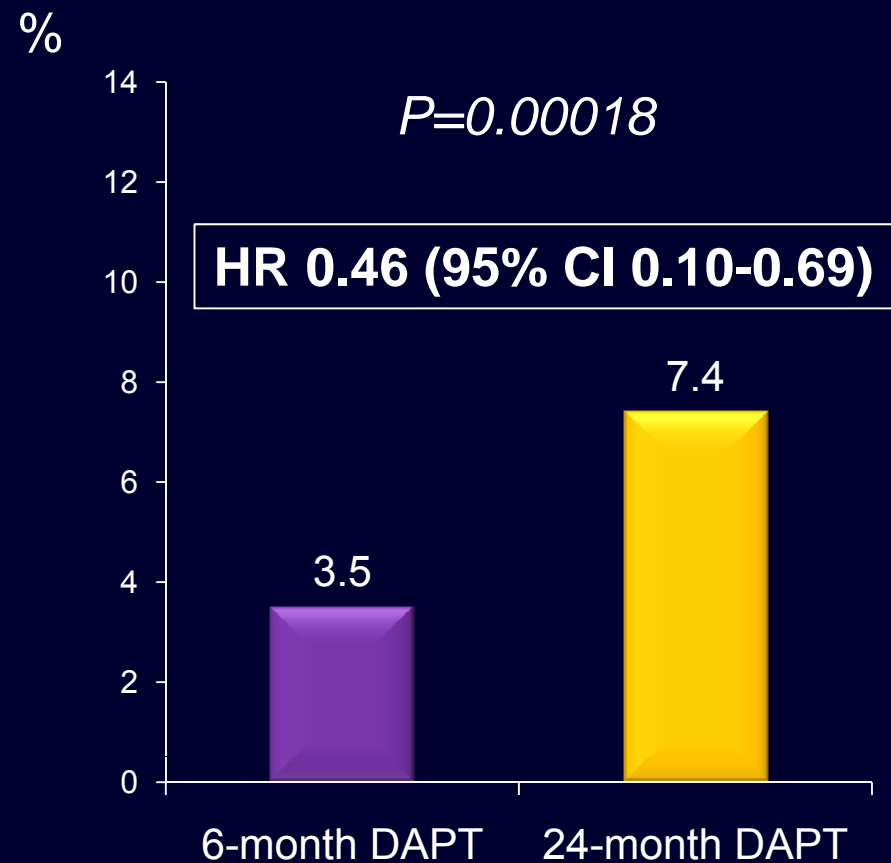
6-month versus 24-month DAPT after PCI

Valgimigli M et al. *Circulation* 2012

**1°EP: Death, MI, or CVA
@ 2 Years**



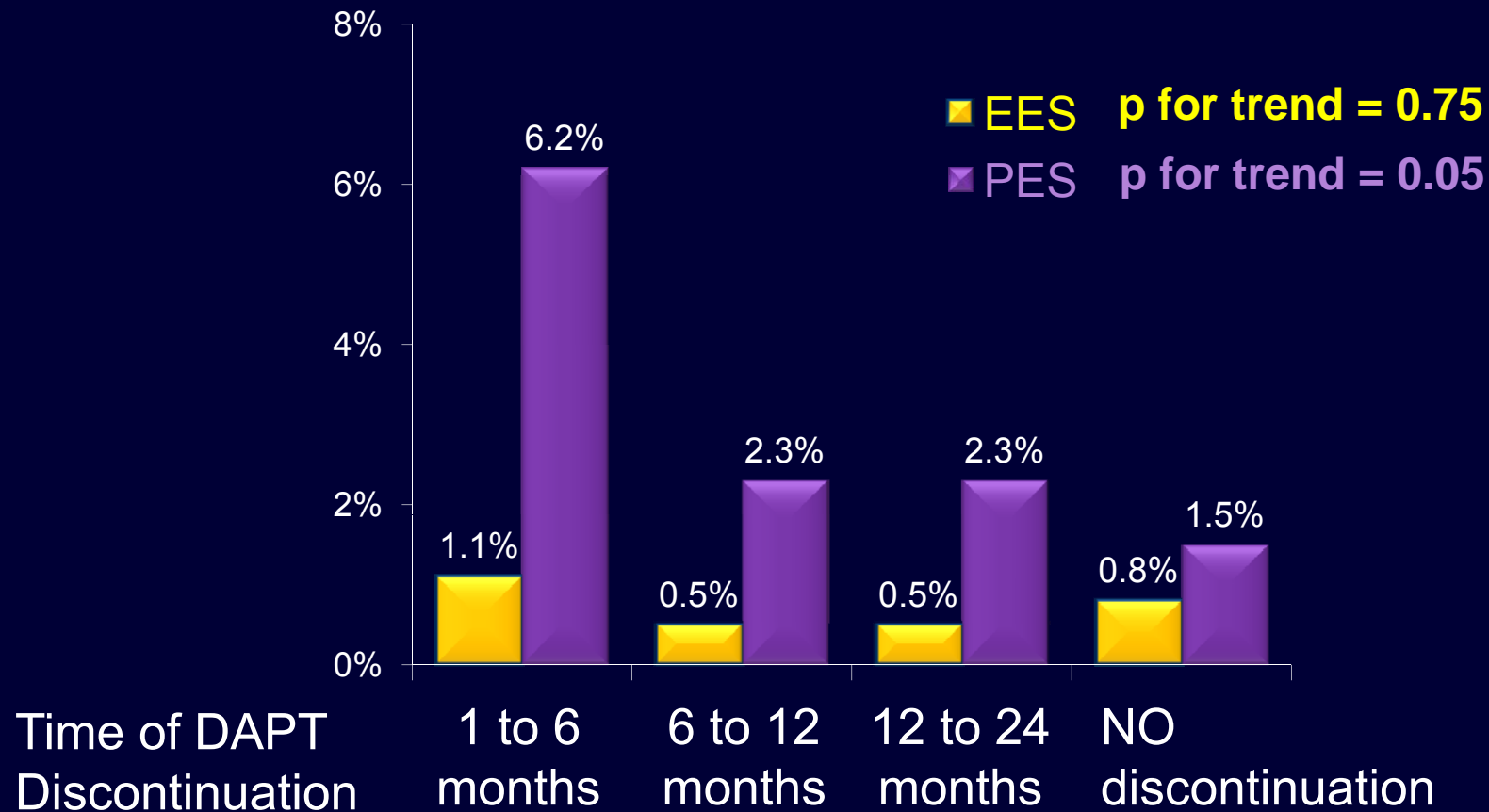
**Type II, III, or V BARC Bleeding
@ 2 Years**



Impact of DAPT Discontinuation on Definite or Probable Stent Thrombosis with Everolimus- and Paclitaxel-Eluting Stents Through 2 Years

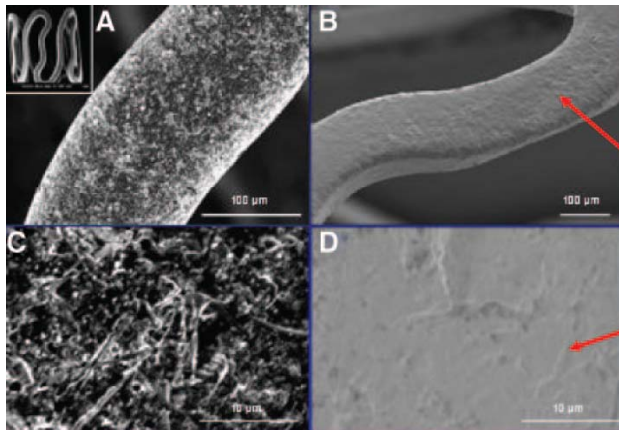
Kedhi E. presented at ACC 2012

A Pooled Analysis of SPIRIT II, III, IV, and COMPARE Trials

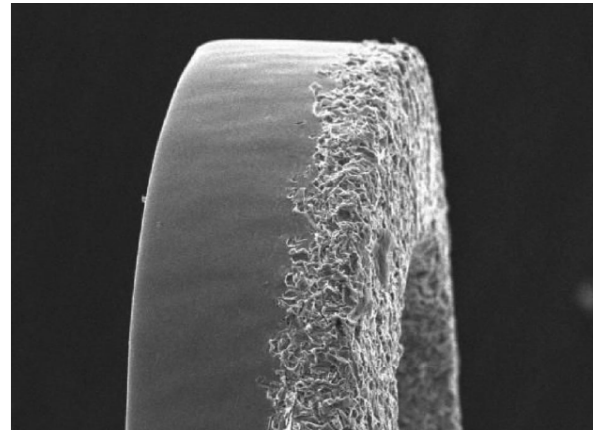


Polymer-Free DES Platforms

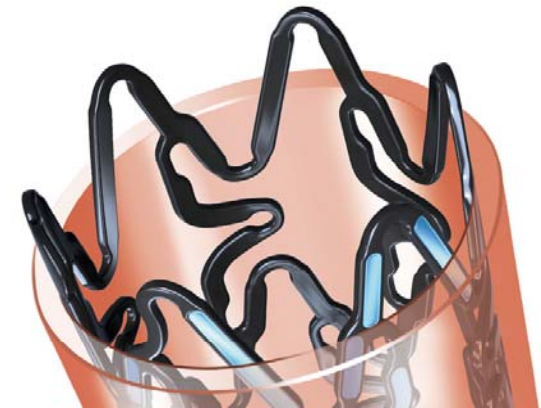
YUKON



BioFreedom



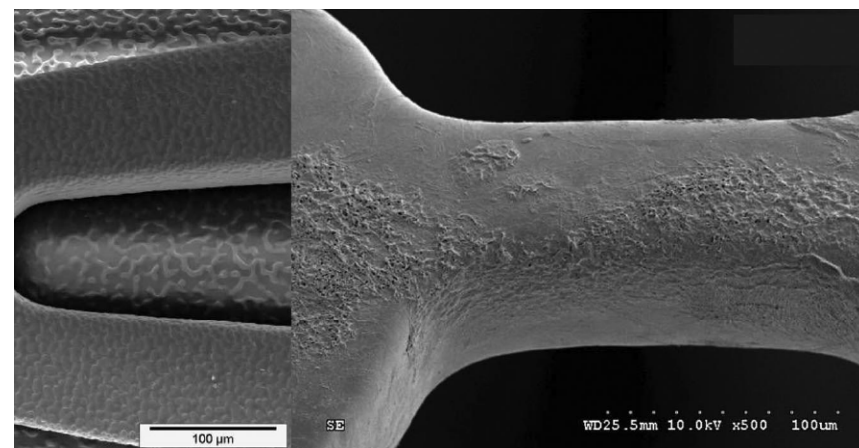
CRE8



DFS Technology



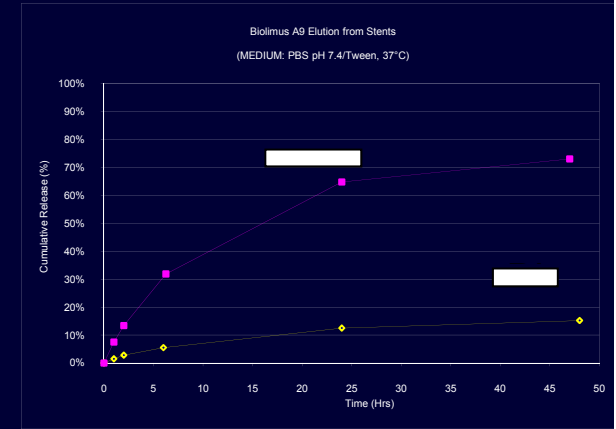
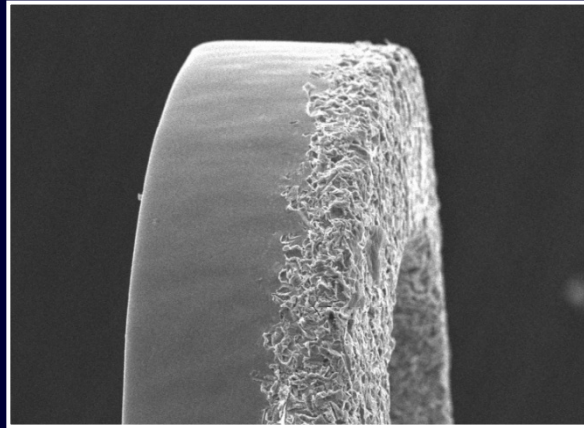
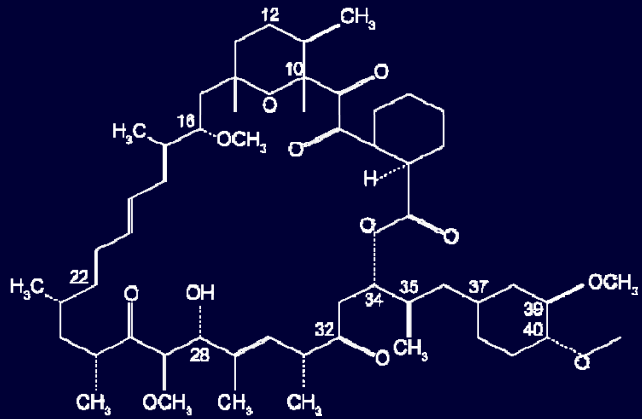
Amazon Pax



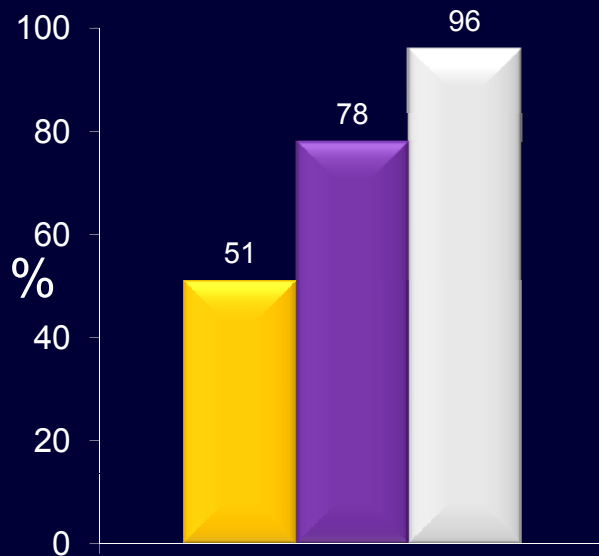
Polymer-Free Biolimus-A9 Coated Stent

Tada N et al. *Circ Cardiovasc Interv* 2010;3:174-83

Biolimus A9

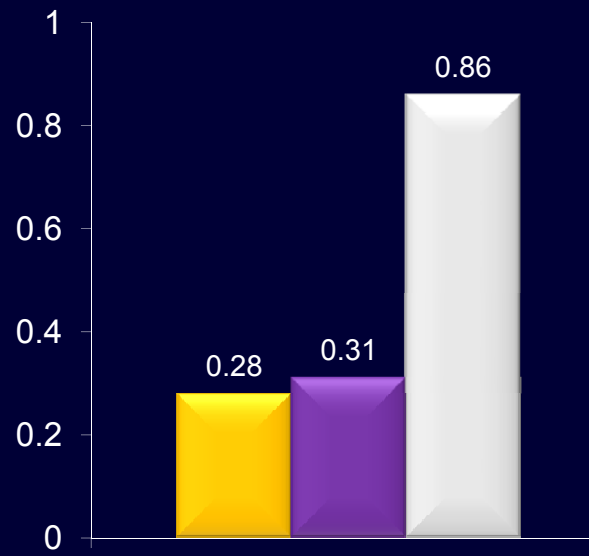


Struts With Fibrin



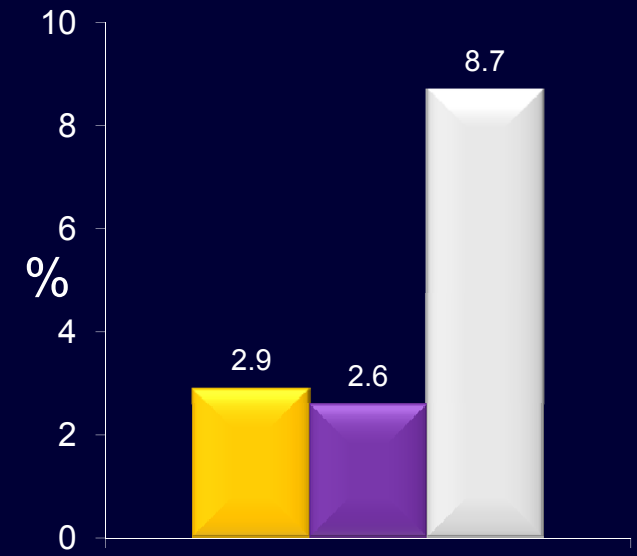
■ BMS ■ BioFreedom ■ SES

Inflammation Score



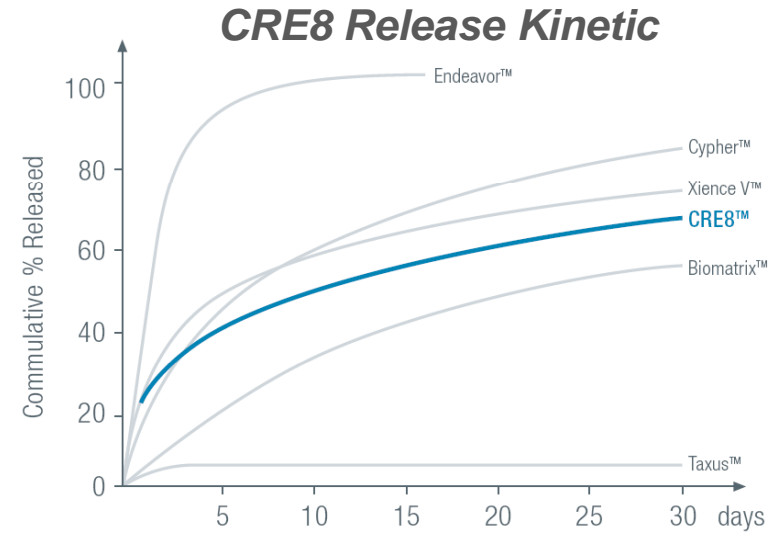
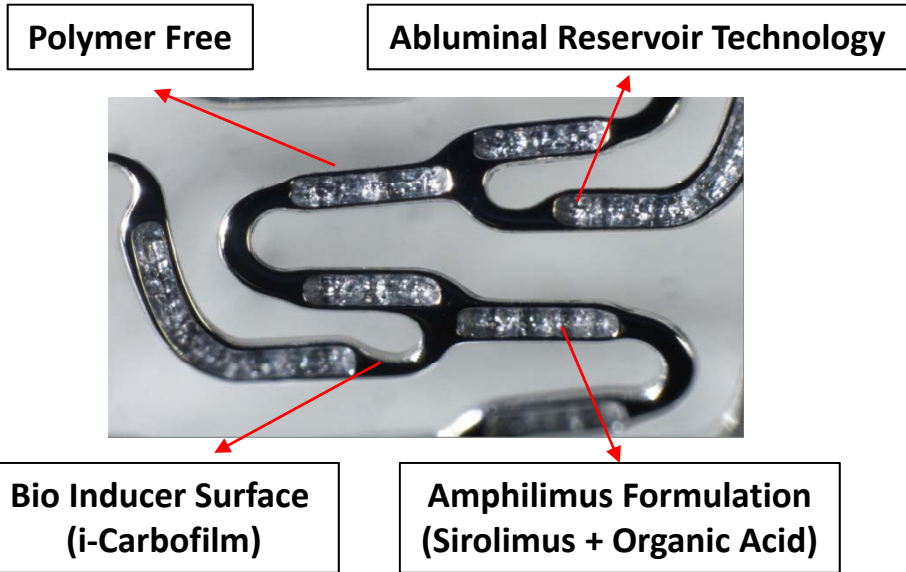
■ BMS ■ BioFreedom ■ SES

Struts With Giant Cells



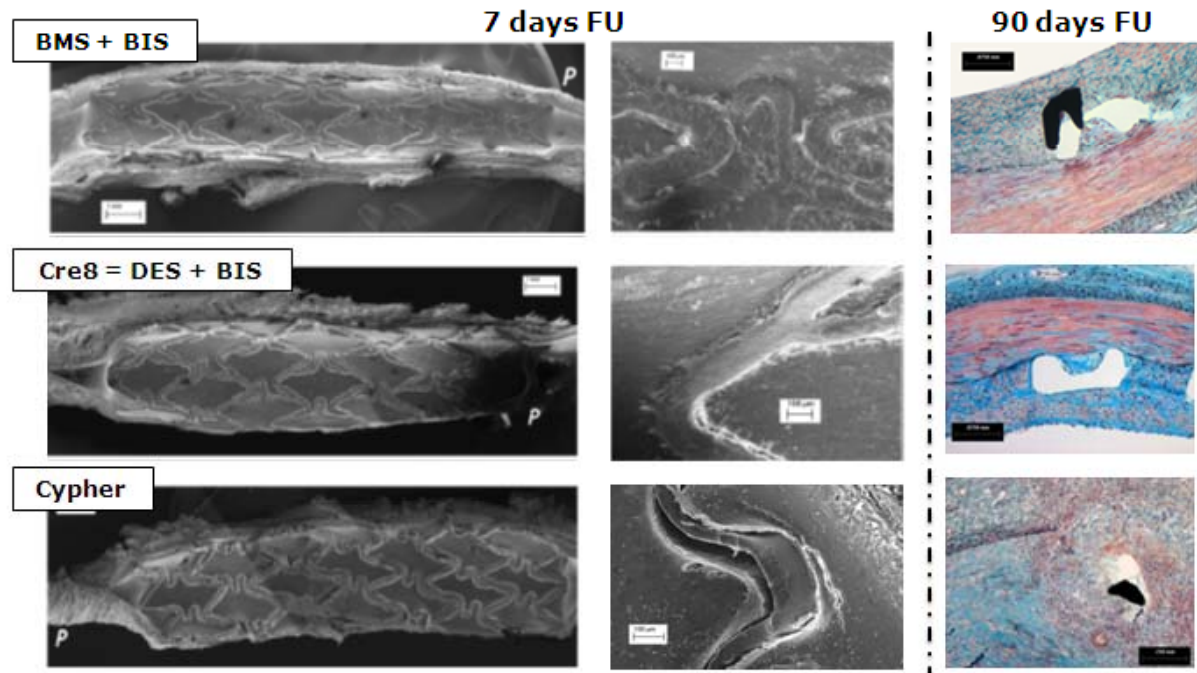
■ BMS ■ BioFreedom ■ SES

Polymer Free Amphilimus-Eluting Cre8™ Stent



Pre Clinical In-Vivo Assessment

Moretti et al. *EuroIntervention* 2011



Cre8™ Stent versus Paclitaxel-Eluting Stent

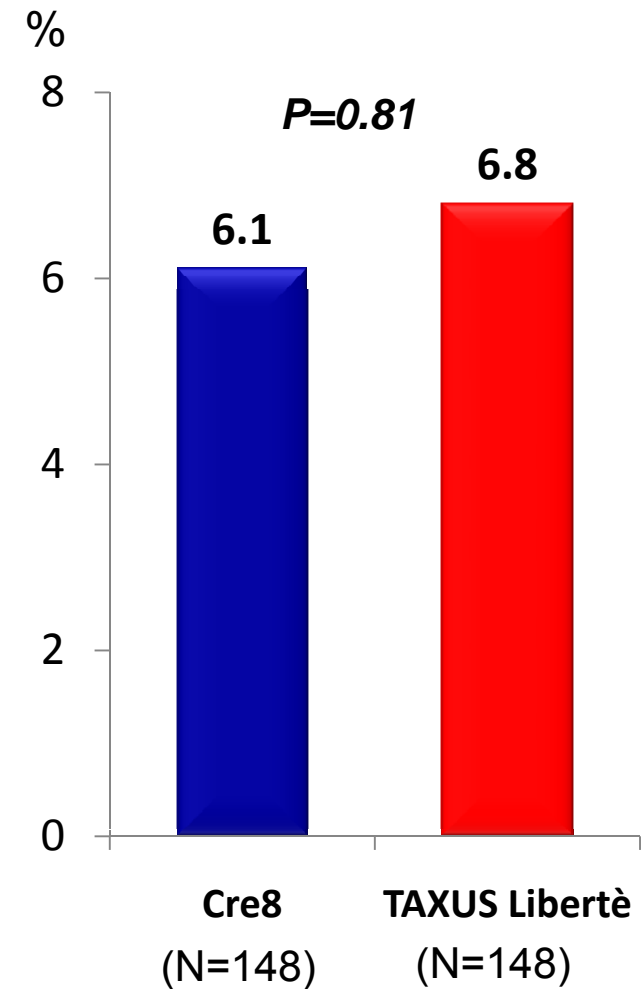
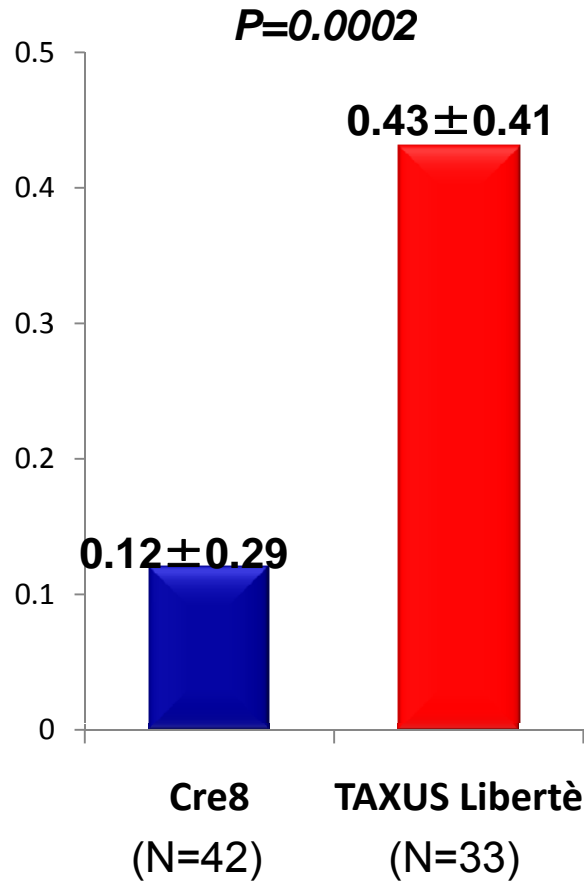
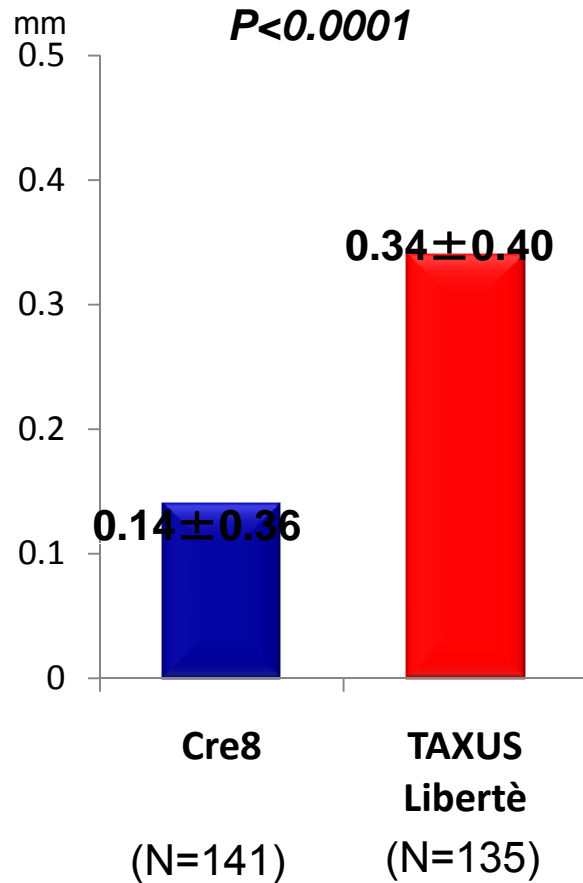
Carrié D et al. *J Am Coll Cardiol* 2012

**1°EP: In-stent Late Loss
@ 6 Months**

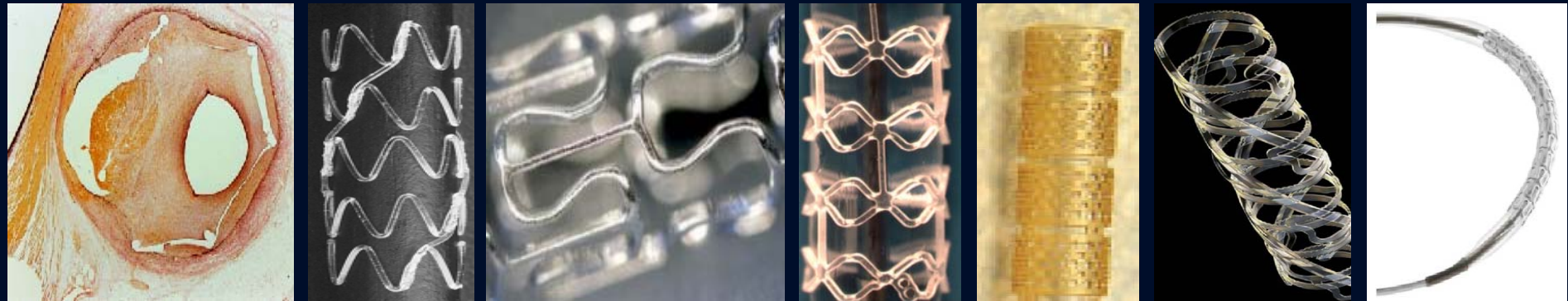
**Cardiac Death, MI, or TLR
@ 12 Months**

Overall

Diabetic Subgroup



Biodegradable Vascular Scaffolds (BVS)



Van der Giessen
Circulation

Tamai
Circulation

Erbel
Lancet

Ormiston
Lancet

Jabara
PCR 2009

Abizaid
TCT 2009

Haude
PCR 2011

1996

2000

2007

2008

2009

2011

Animal studies
polymeric scaffolds
revealing excessive
inflammatory reactions

Igaki Tamai
First fully
biodegradable non
drug eluting scaffold
N=15

AMS-1
first bioabsorbable
metallic non drug-
eluting scaffold
N=64

Bioresorbable
vascular scaffold
first bioabsorbable drug
eluting scaffold
N=31

IDEAL BDS
Polyanhydride
ester and salicylic acid,
drug-eluting scaffold
N=11

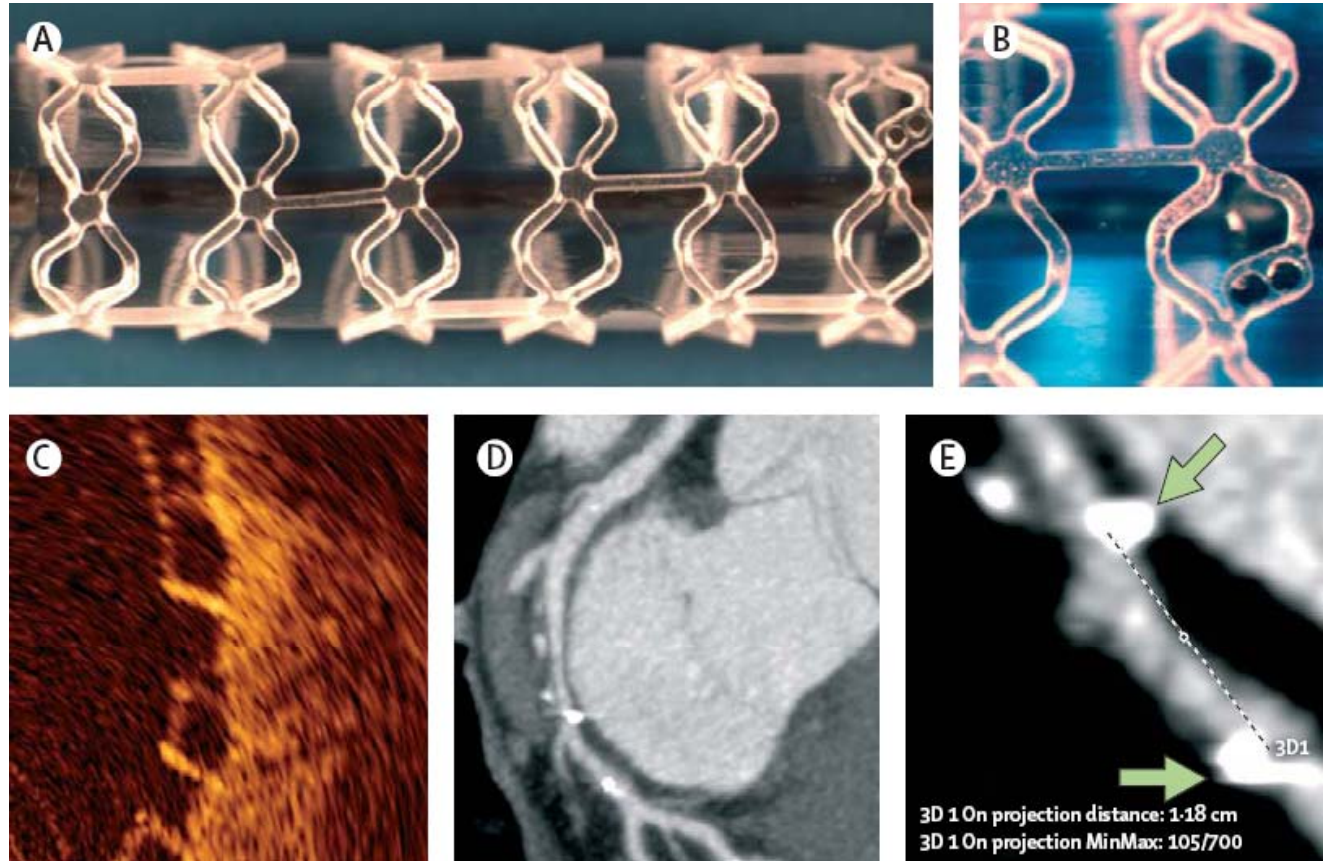
REVA
Polycarbonate stent,
radiopaque, non drug-
eluting scaffold
N=31

DREAMS
first drug-eluting
bioabsorbable
metallic scaffold
N=22

Fully Bioabsorbable Everolimus-Eluting Stent

Ormiston J et al. *Lancet* 2008;371:899-907

Everolimus/PLLA Matrix
Thin coating layer
-1:1 ratio of Everolimus/PDLLA
-Controlled drug release
PLLA stent backbone
-stent integrity
-semicrystalline polymer



Device success: 94%

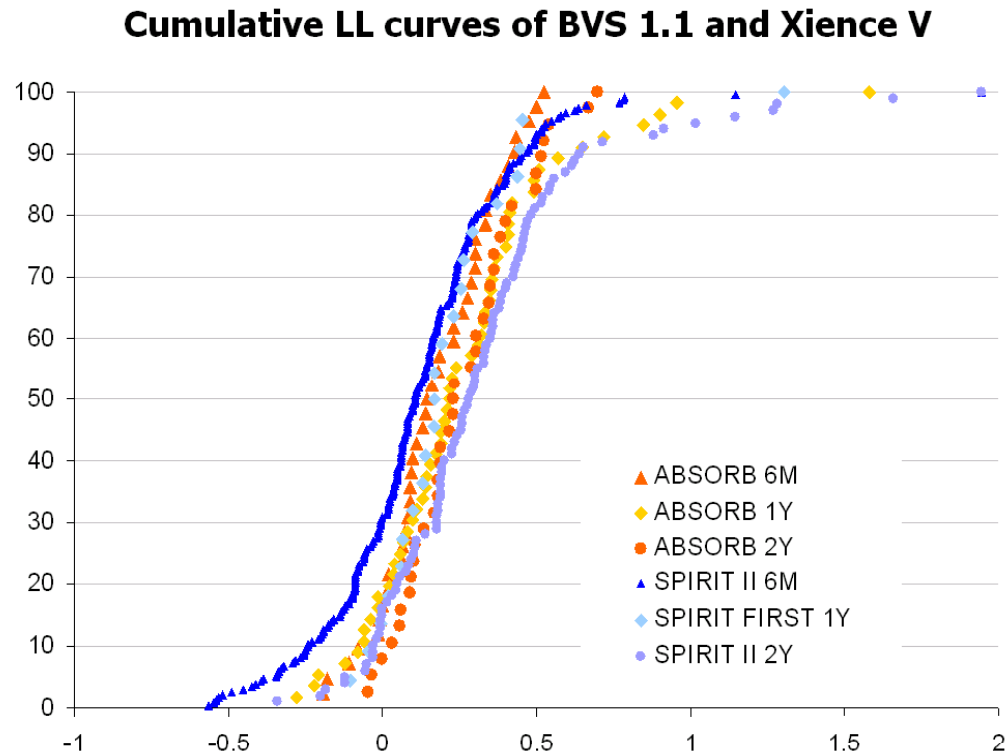
MACE(TLR):3.3%

ST: 0% @ 12 months

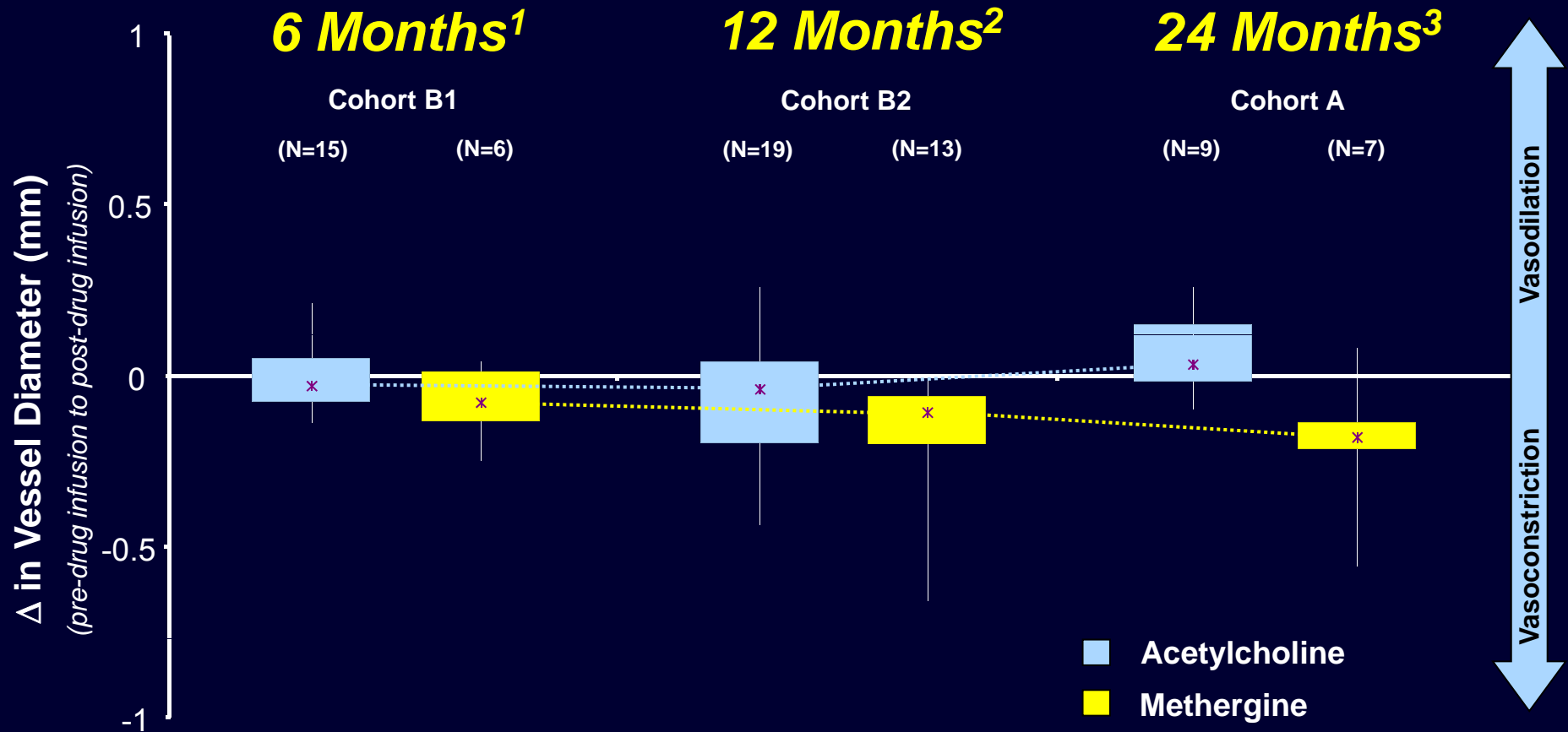
Late loss (in-stent): 0.44 ± 0.35 mm

Cumulative Late Lumen Loss Among ABSORB Cohort B and Patients Treated With Everolimus-Eluting Stents

Serruys PW. Presented at TCT 2011



ABSORB Vasomotor Function Testing Through 2 Years



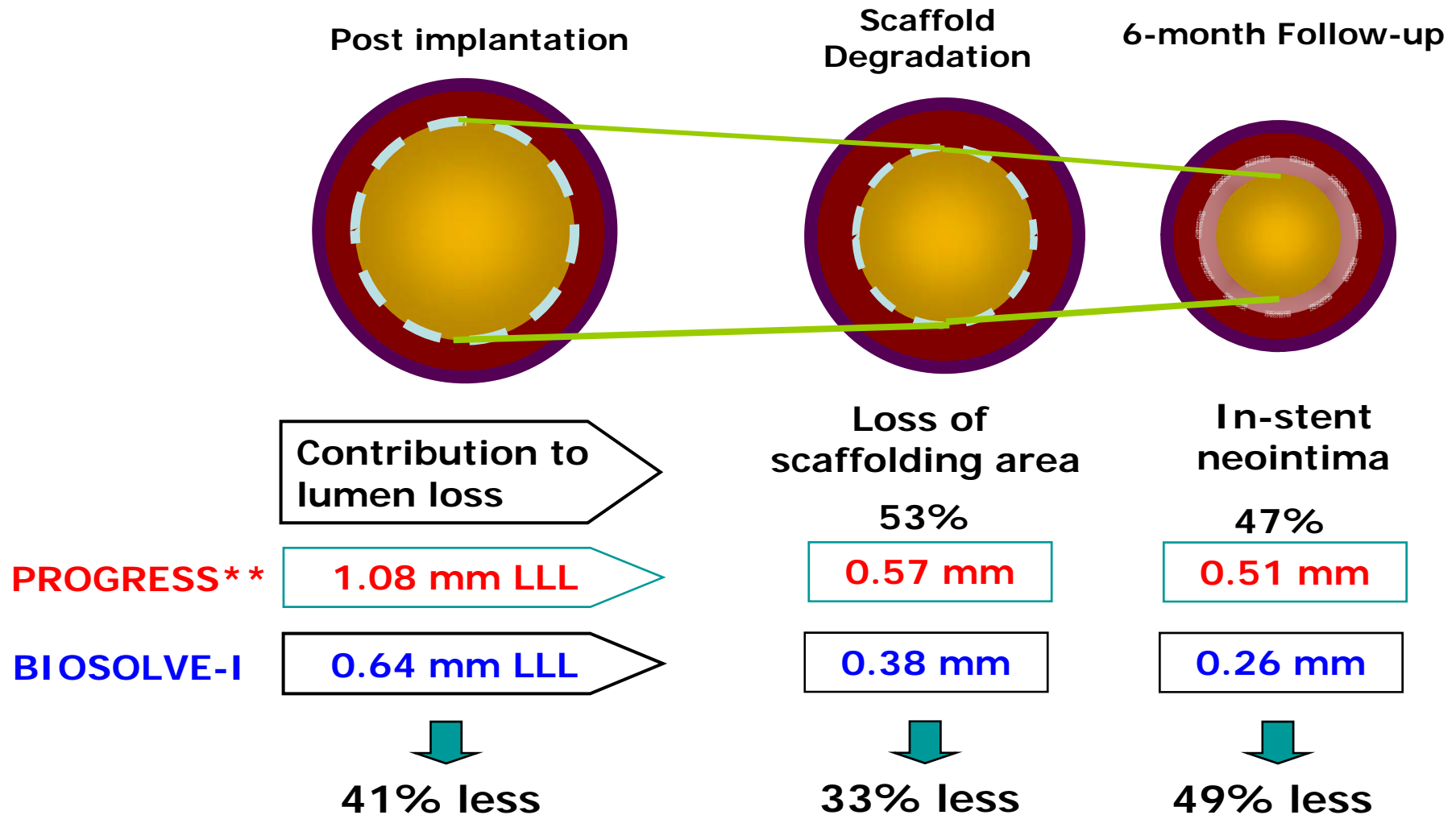
1. Adapted from Serruys, PW. ACC 2011

2. Adapted from Serruys, PW. ACC 2011

3. Adapted from Serruys, PW, et al. *Lancet* 2009; **373**: 897-910.

BIOSOLVE-I IVUS Results at 6-month

Waksman R. presented at CRT 2012



* N= 12 evaluable IVUS runs (volumetric) available at 6-month follow-up for cohort 1

** Erbel R. et al., Lancet 2007; 369: 1869-75,

Waksman et.al, JACC Cardiovasc Intervent 2009; 2: 312-320

Newer Generation Drug-Eluting Stents...What Have We Achieved?

- **Impr**

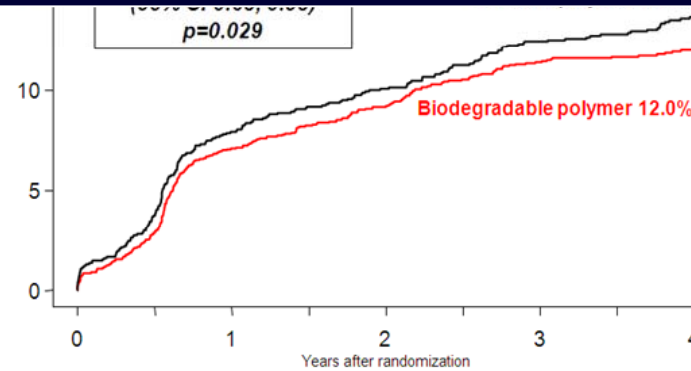
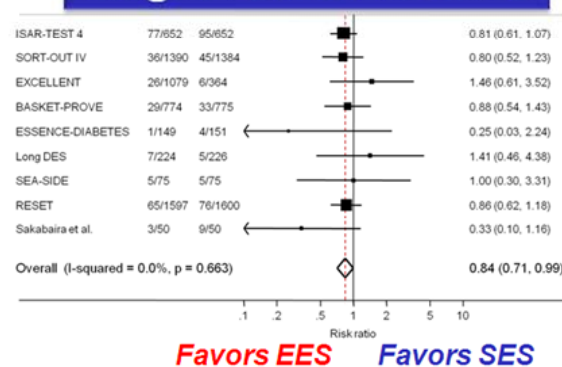
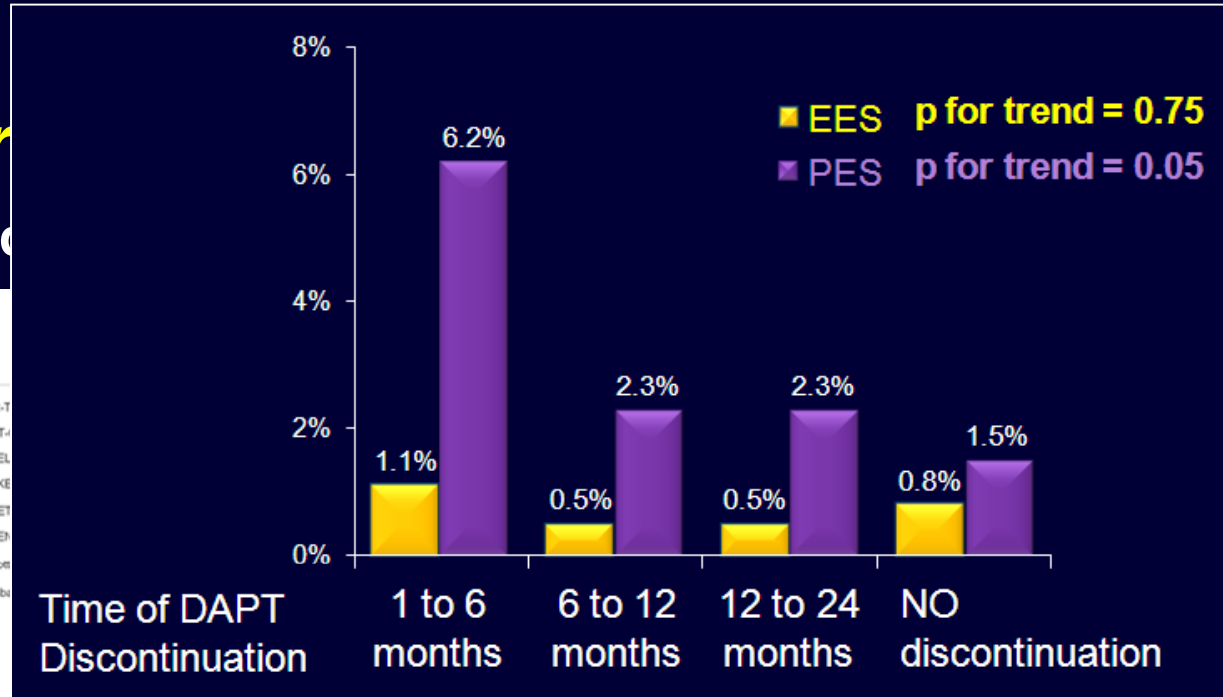
- Rec
- R

- **Imp**

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- **De**

- N
- C



ST

DAPT

Questions for Tomorrow

- Is a very sh
- Are
- Are
- sup
- bas
- Are
- eq
- DE
- Wil

In-stent Late Loss @ 6 Months

mm
0.5
0.4
0.3

$P < 0.0001$

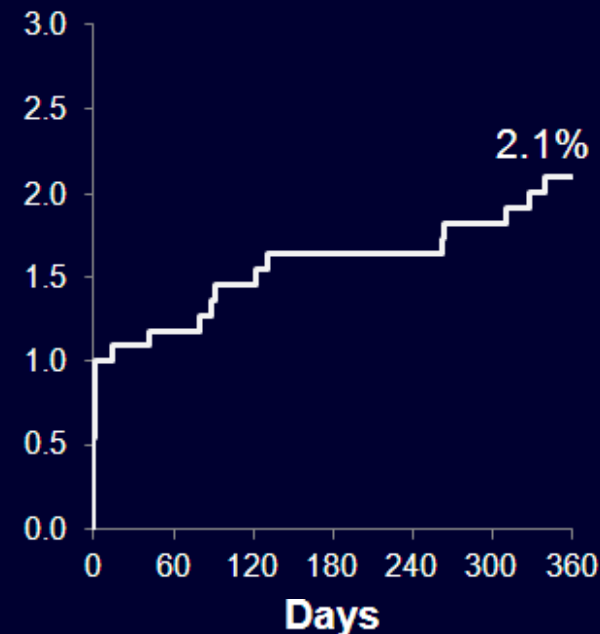
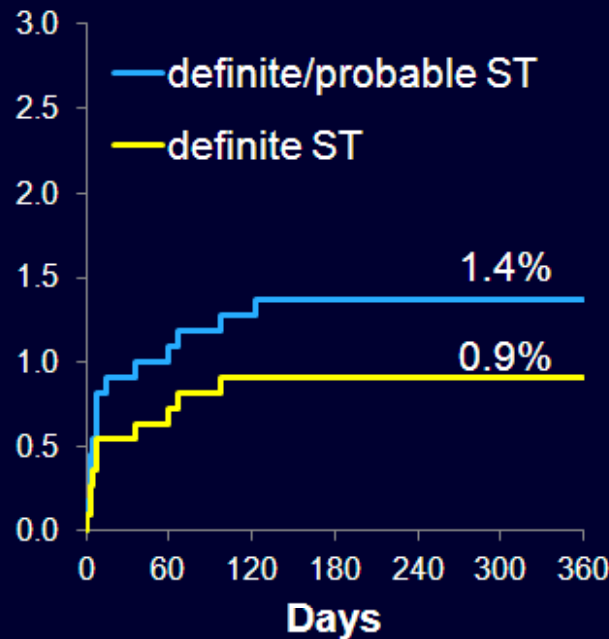
0.34 ± 0.40

PT safe?

2 years

Stent Thrombosis

Major Bleeding



Overall (I-squared = 0.0%, p=0.92) 0.58 (0.37, 0.93)

Overall (I-squared = 0.0%, p = 0.579) 0.51 (0.26, 0.99)

0.1 0.2 0.5 1 2 5

.1 .2 0.5 1 2 5 10

4,144
3,102
1,398
3,273
0
0

S?
mer
sed
S?