HUMANITAS
CARDIO CENTER

HUMANITAS UNIVERSITY

Torino, 27.10.2017

Novelties in the Interventional Cardiology Laboratory

BIOABSORBABLE POLYMER STENTS: IS THE FUTURE?

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Potential Conflicts of Interest

Speaker's name: Giulio Stefanini

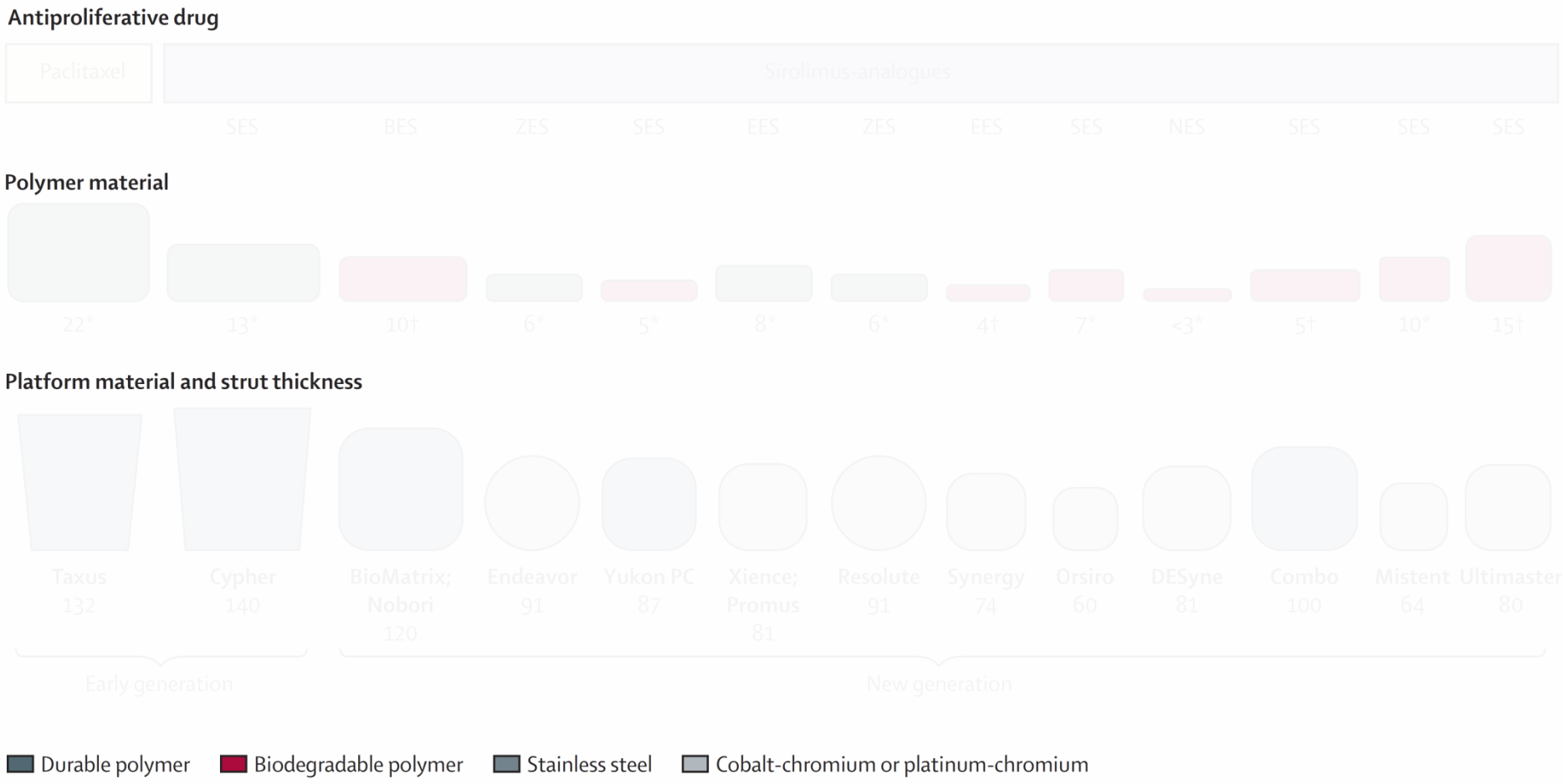
I have the following potential conflicts of interest to report:

Receipt of grants/research support:
Boston Scientific

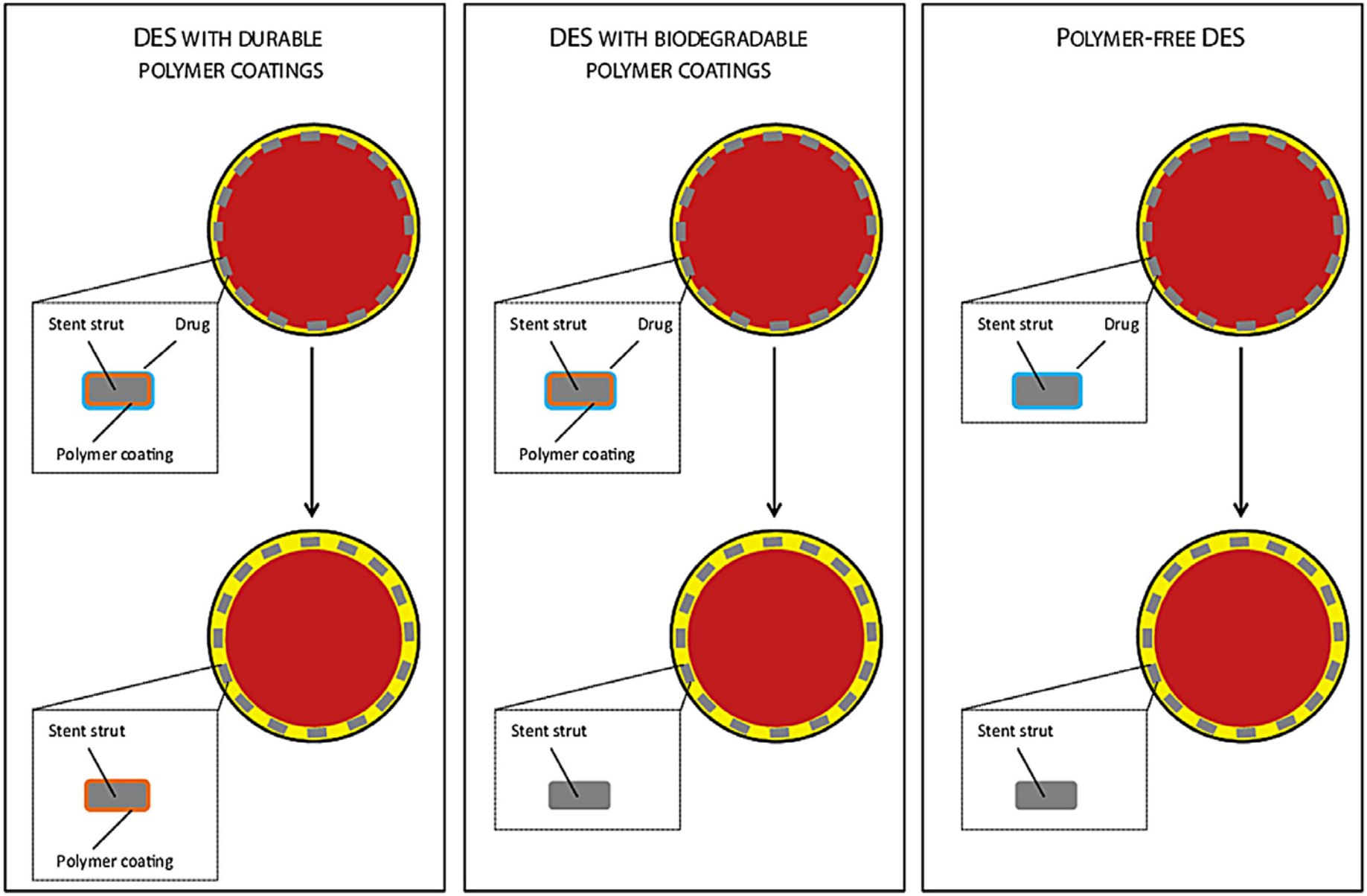
Receipt of honoraria or consultation fees:
B.Braun, Biosensors, Boston Scientific, Edwards Lifesciences

PROGRESS WITH METALLIC DRUG-ELUTING STENTS

Piccolo R et al. *Lancet* 2015; 386:702-713



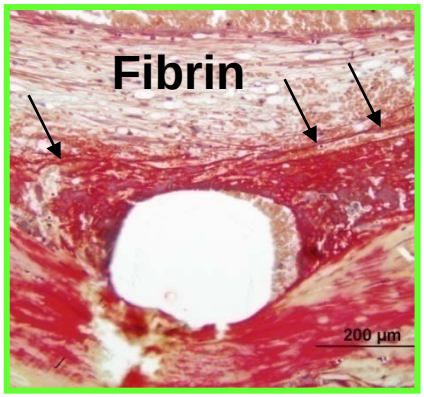
DES TECHNOLOGIES

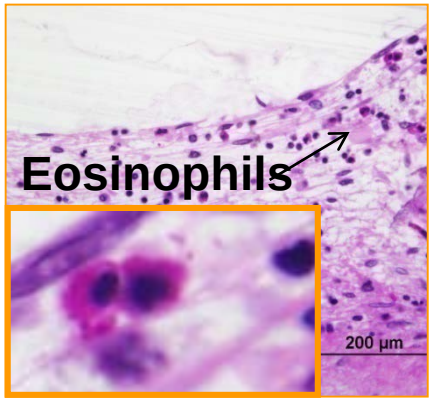


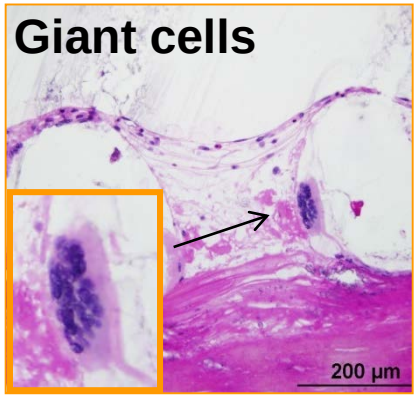
Stefanini G et al. *Heart* 2014

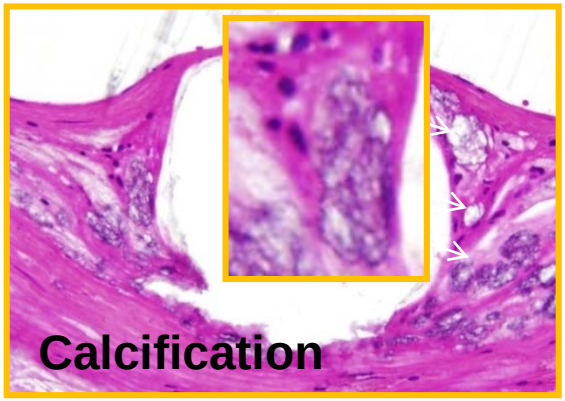
POLYMER ASSOCIATED INFLAMMATION

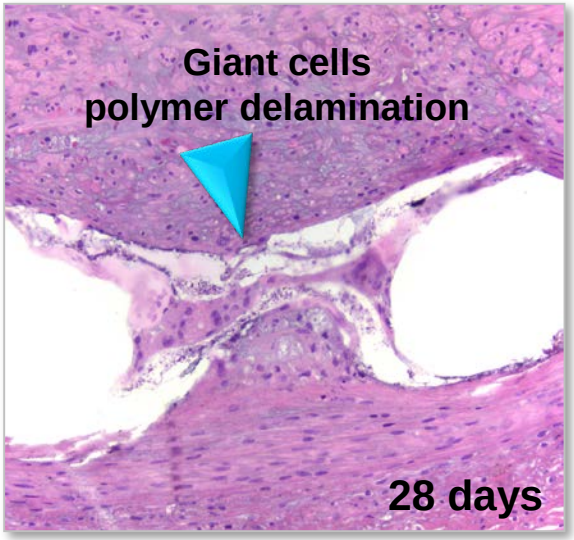
Inflammatory response to durable polymer coatings plays a central role in delayed arterial healimng

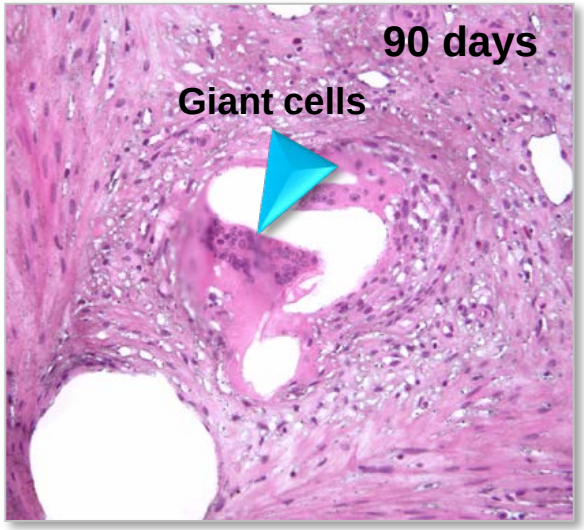


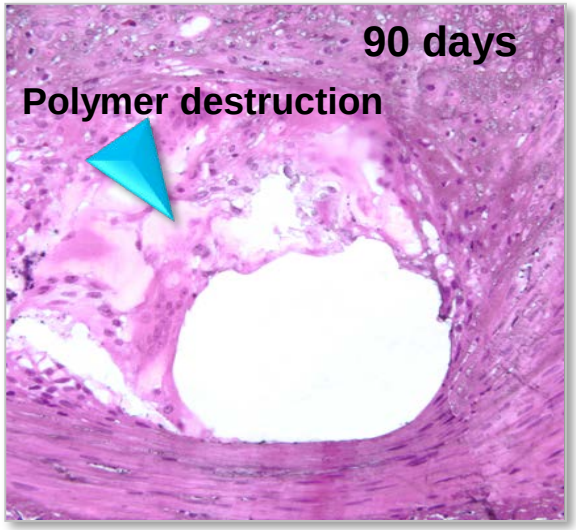












BIOABSORBABLE POLYMER DES VERSUS DURABLE POLYMER SES THROUGH 4 YEARS

Stefanini G, Byrne R et al. *Eur Heart J* 2012; 33:1214-22

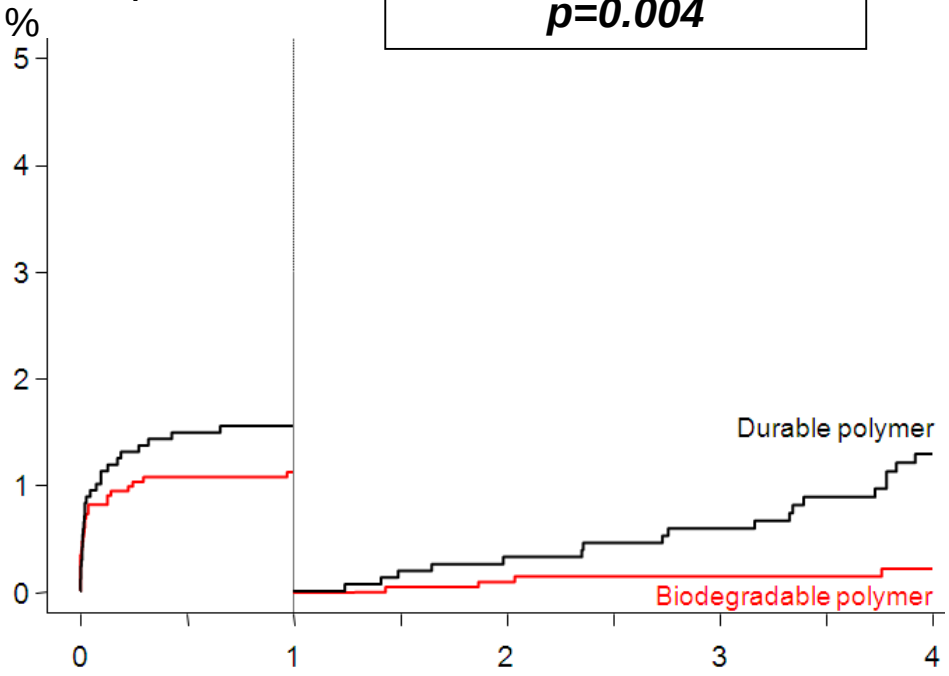
Definite ST

0 to 1 year:

HR 0.80
(95% CI 0.47-1.38)
p=0.43

1 to 4 years:

HR 0.22
(95%CI 0.08 – 0.61)
p=0.004



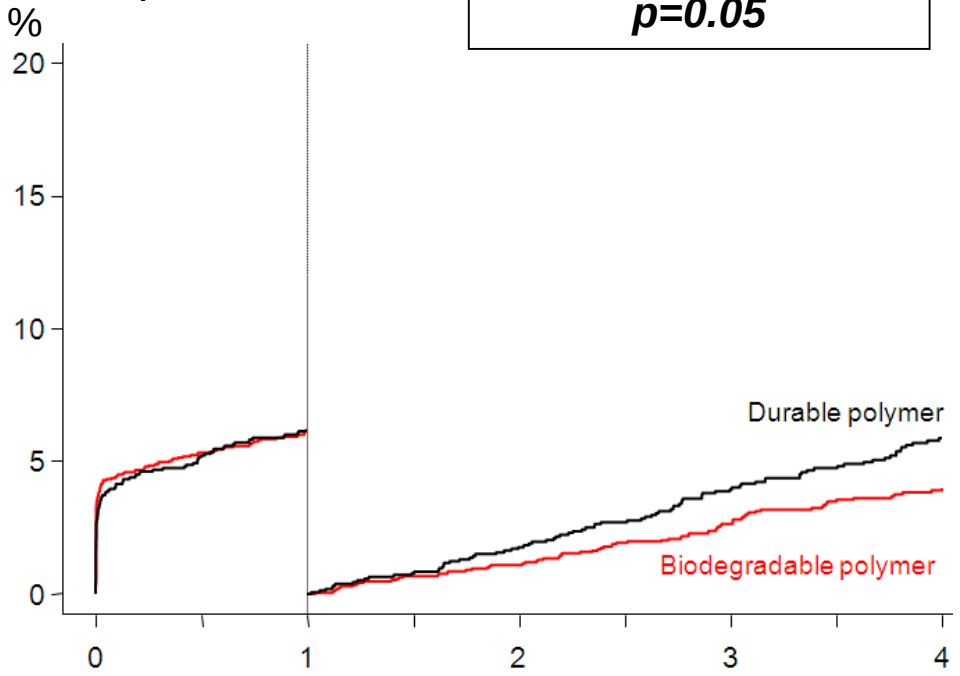
Cardiac Death or MI

0 to 1 year:

HR 1.02
(95% CI 0.78-1.31)
p=0.91

1 to 4 years:

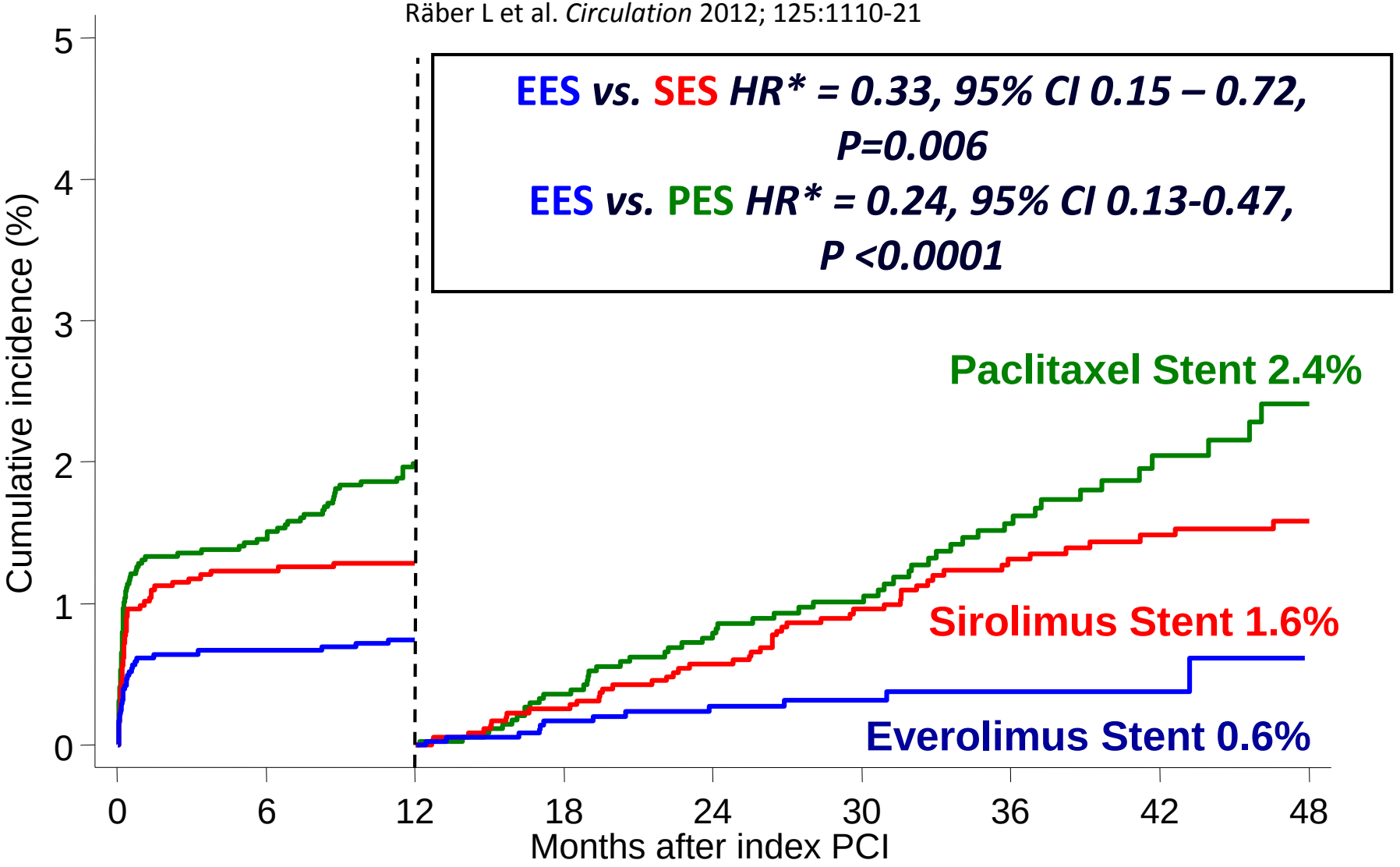
HR 0.73
(95% CI 0.53 – 1.00)
p=0.05



BERN-ROTTERDAM COHORT STUDY II

Very Late Definite ST (1-4 yrs)

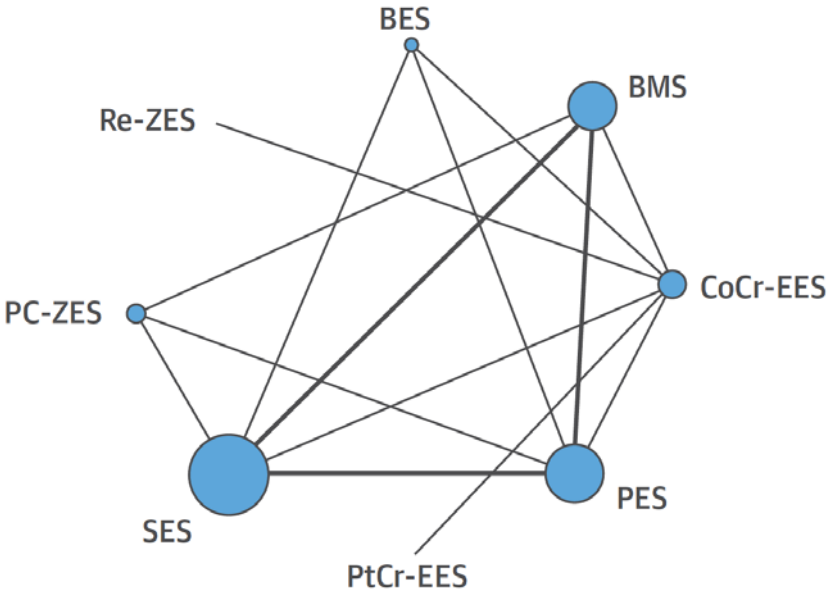
Räber L et al. *Circulation* 2012; 125:1110-21

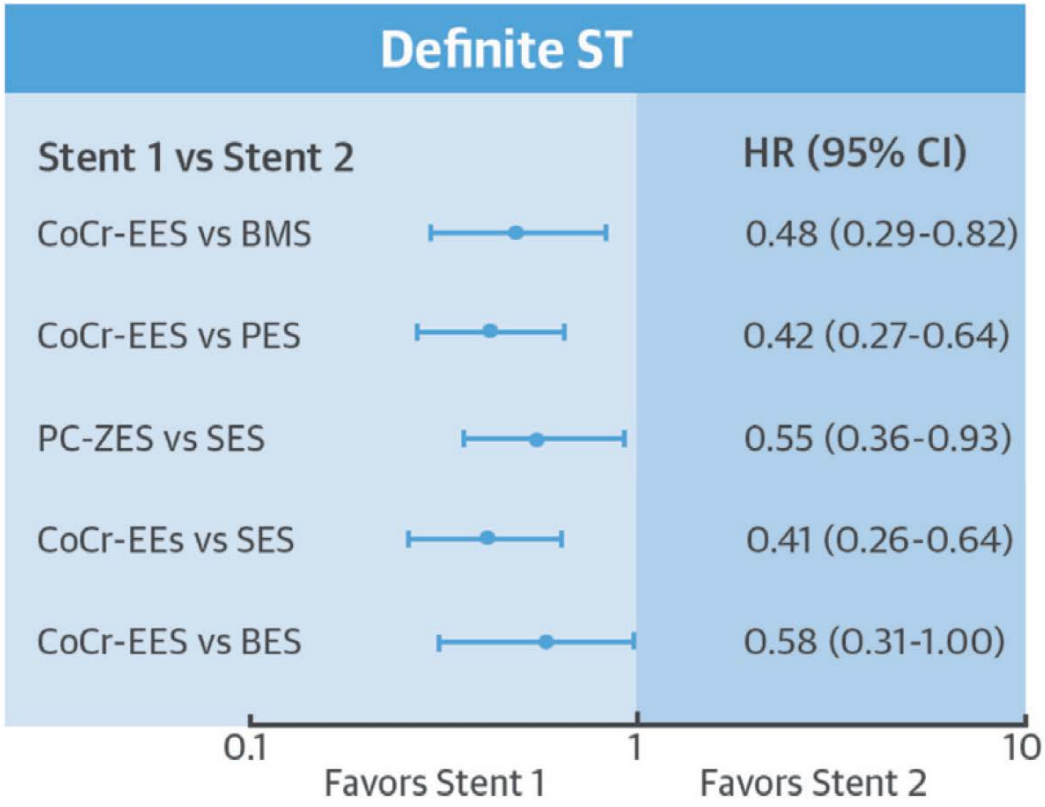


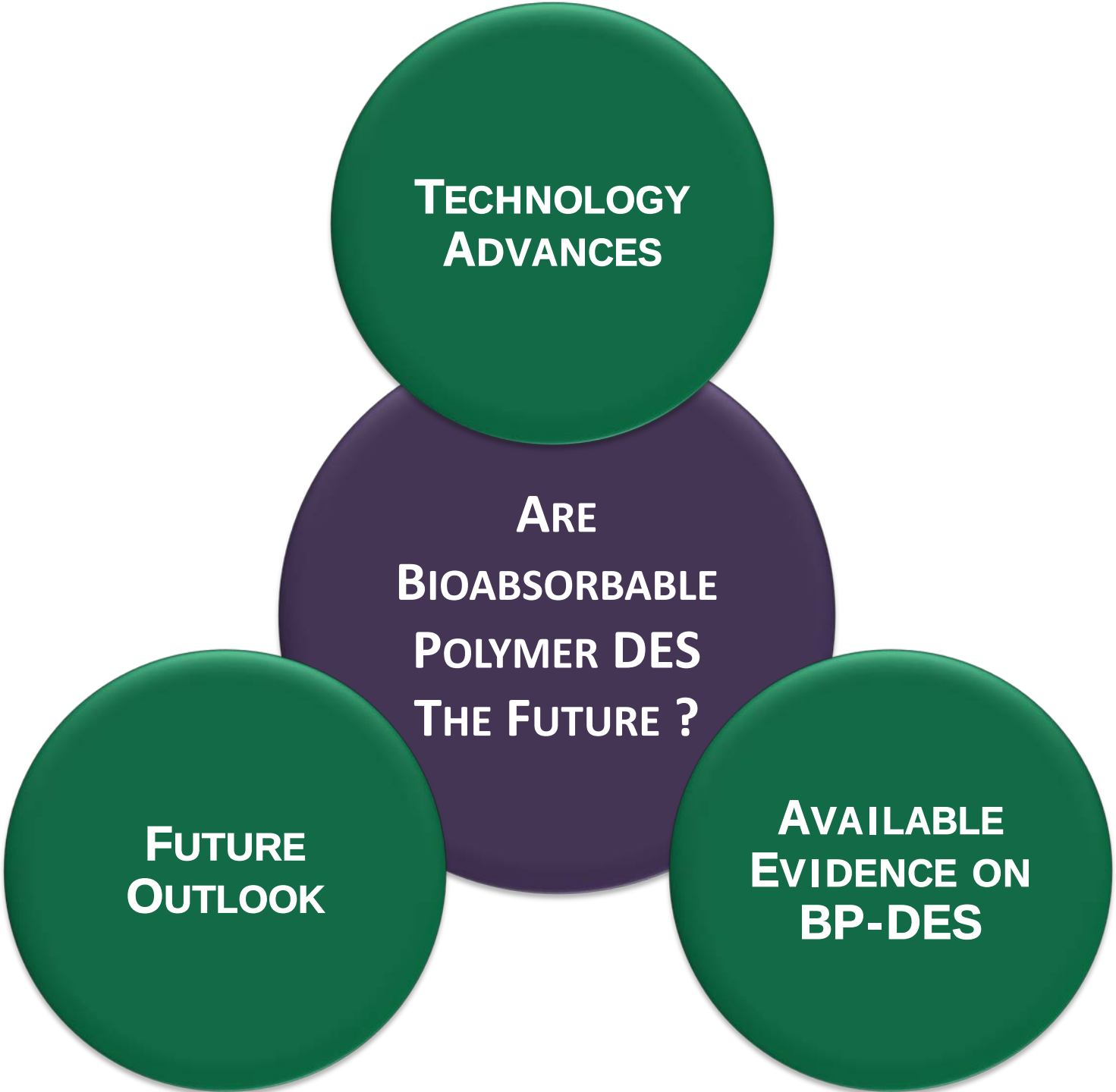
*from Cox proportional hazards model

Long-Term Safety of CoCr-EES: A Network Meta-Analysis

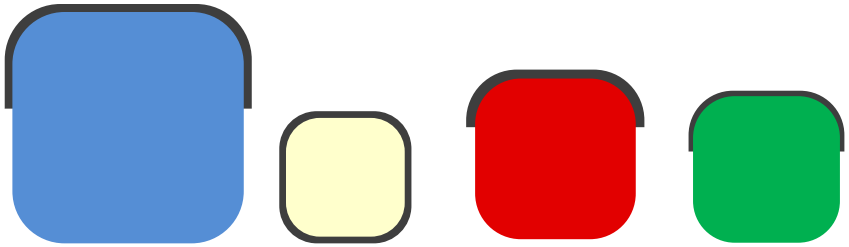
Palmerini T et al. *J Am Coll Cardiol* 2015;65:2496–507






TECHNOLOGY ADVANCES
ARE BIOABSORBABLE POLYMER DES THE FUTURE ?
FUTURE OUTLOOK
AVAILABLE EVIDENCE ON BP-DES

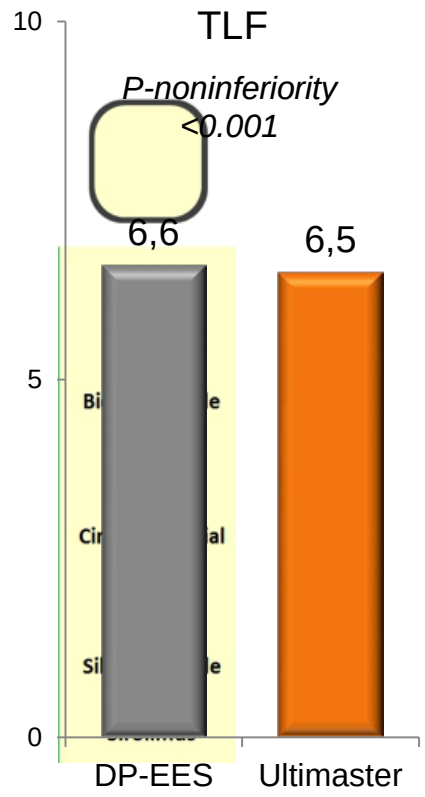
NOVEL BIOABSORBABLE POLYMER DES



	BioMatrix Nobori	Orsiro	Ultimaster	Synergy
Platform material	SS	CoCr	CoCr	PtCr
Strut thickness (µm)	120	60	80	74
Polymer material	PDLLA	PLLA	PDLLA-PCL	PLGA
Coating distribution	Abluminal	Conformable	Abluminal	Abluminal
Polymer thickness (µm)	10	7	15	4
Additional coating	-	Silicon carbide	-	-
Drug released	Biolimus	Sirolimus	Sirolimus	Everolimus

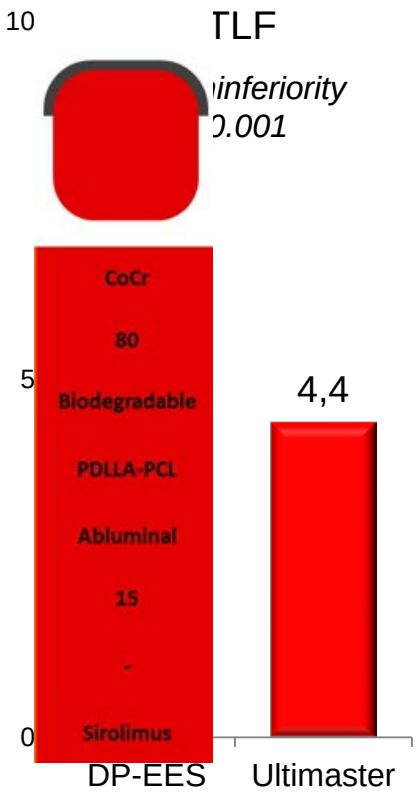
THIN-STRUT DES WITH BIOABSORBABLE POLYMER COATINGS

Orsiro



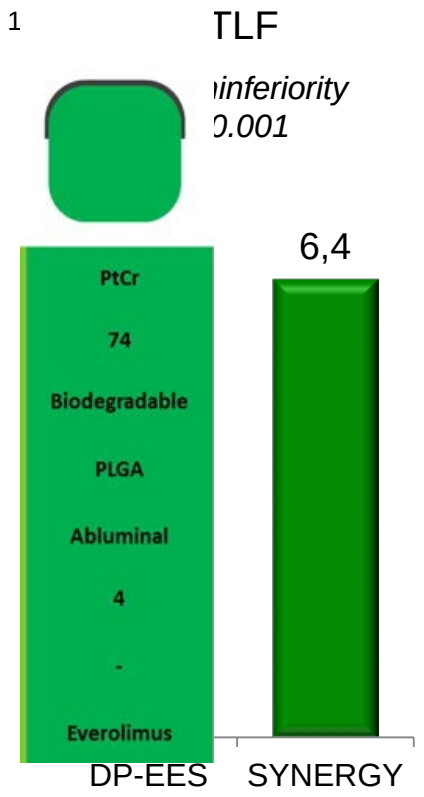
BIOSCIENCE Trial
(N=2119)

Ultimaster



CENTURY-2 Trial
(N=1123)

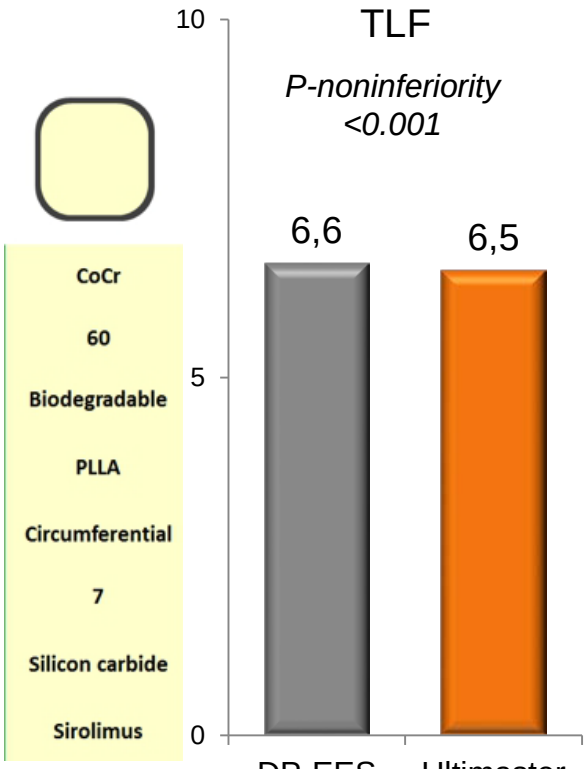
Synergy



EVOLVE-2 Trial
(N=1684)

THIN-STRUT DES WITH BIOABSORBABLE POLYMER COATINGS

Orsiro



BIOSCIENCE Trial
(N=2119)

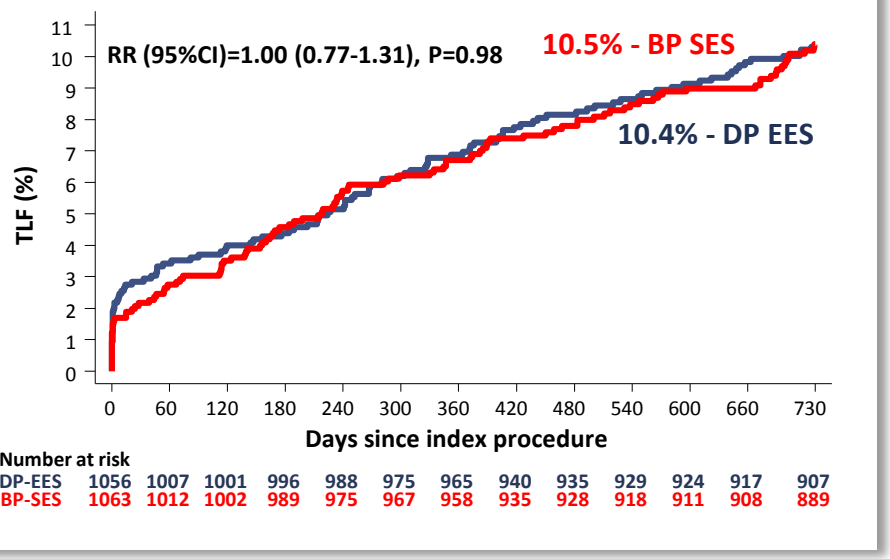
Ultimaster

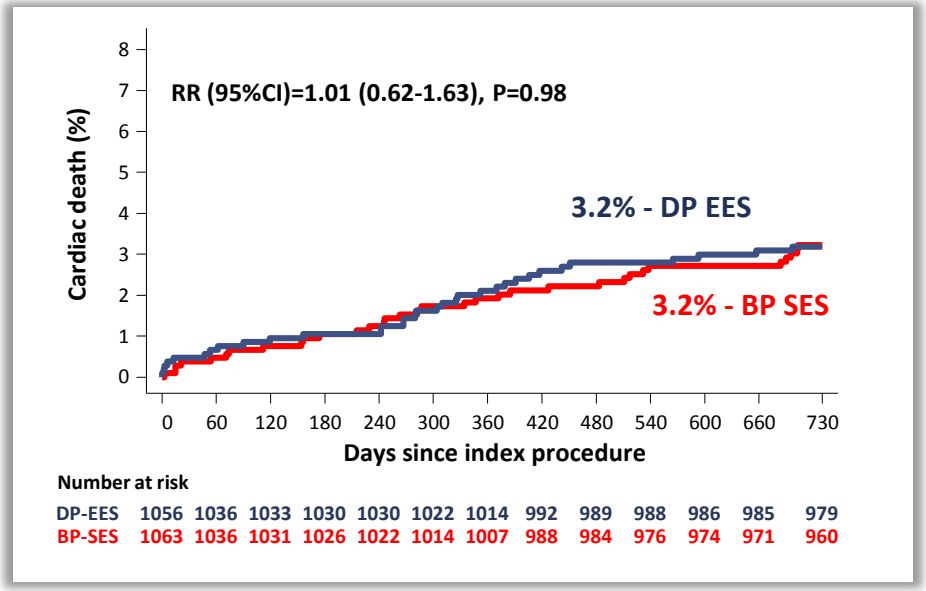
CENTURY-2 Trial
(N=1123)

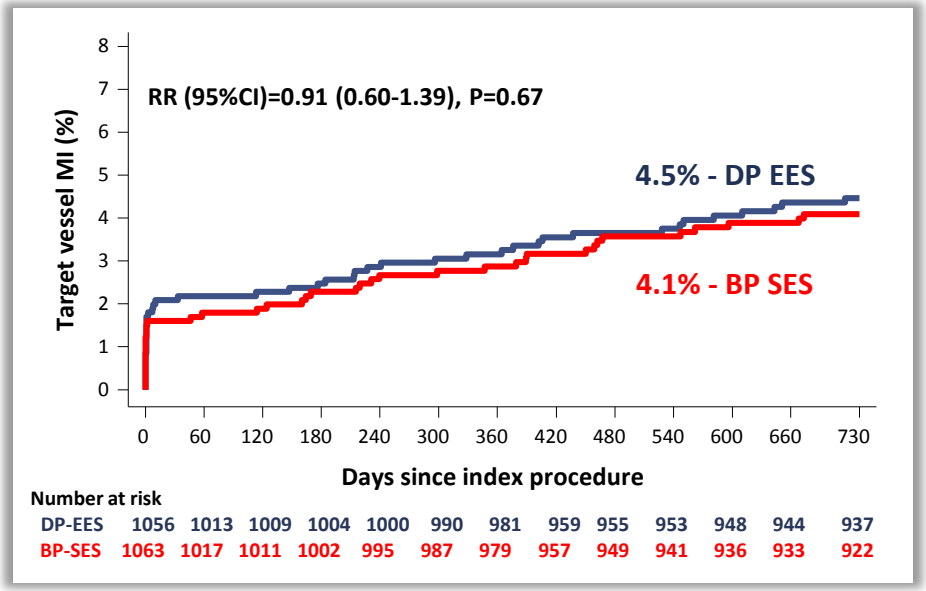
Synergy

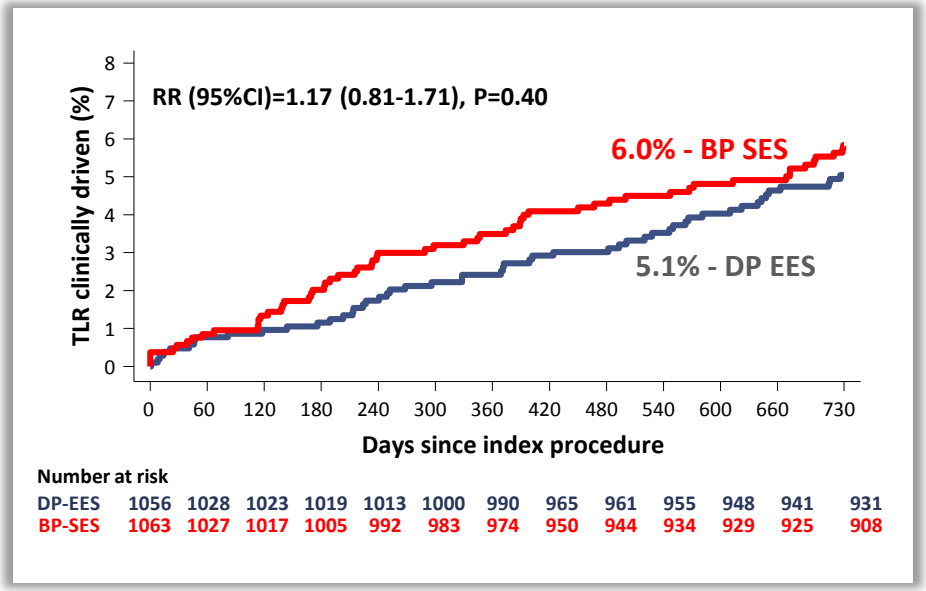
EVOLVE-2 Trial
(N=1684)

BIOSCIENCE 2 Years: Individual Components of Target Lesion Failure



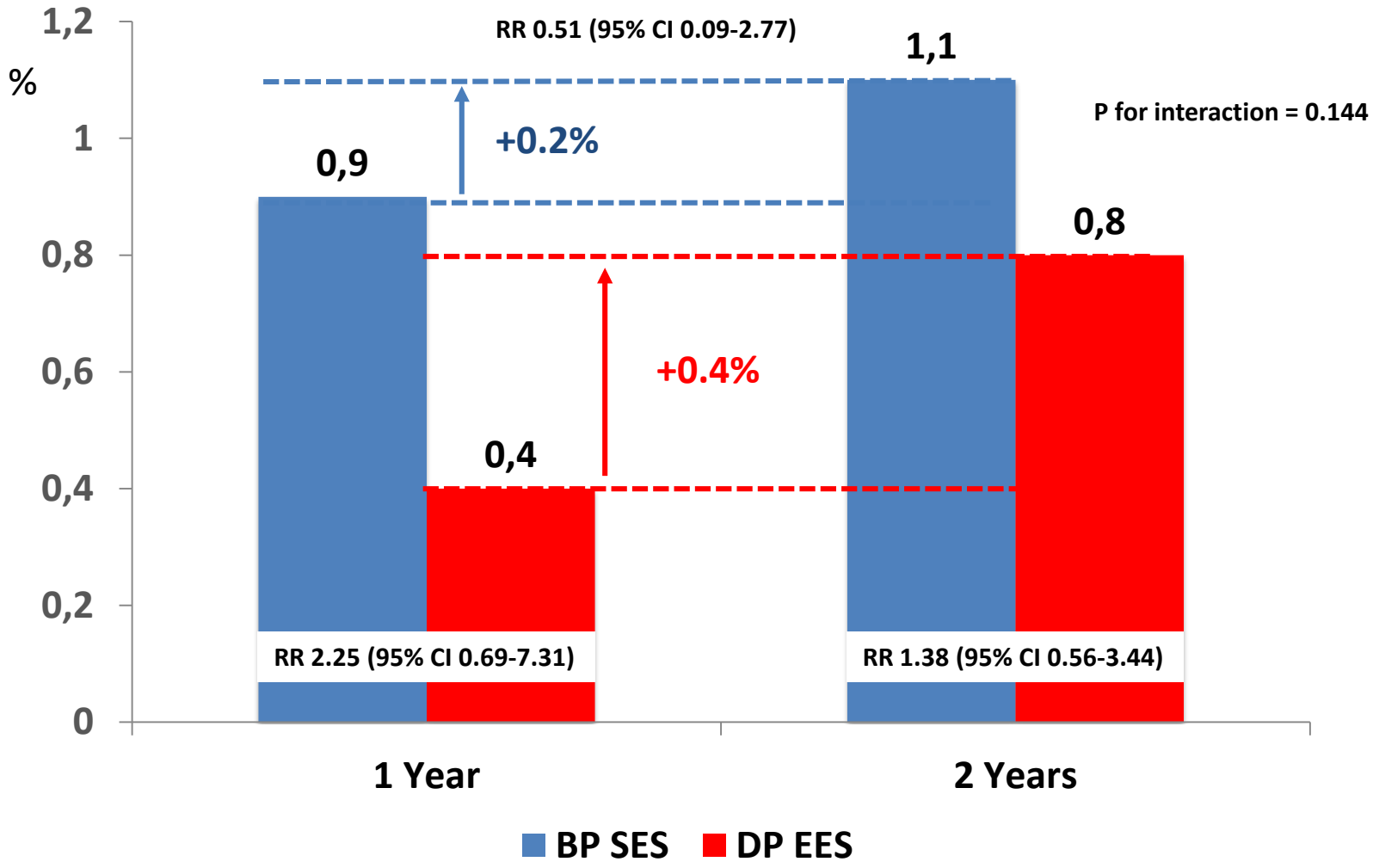






Zbinden et al. *JAHA* 2016; in press

DEFINITE STENT THROMBOSIS AT 12 AND 24 MONTHS

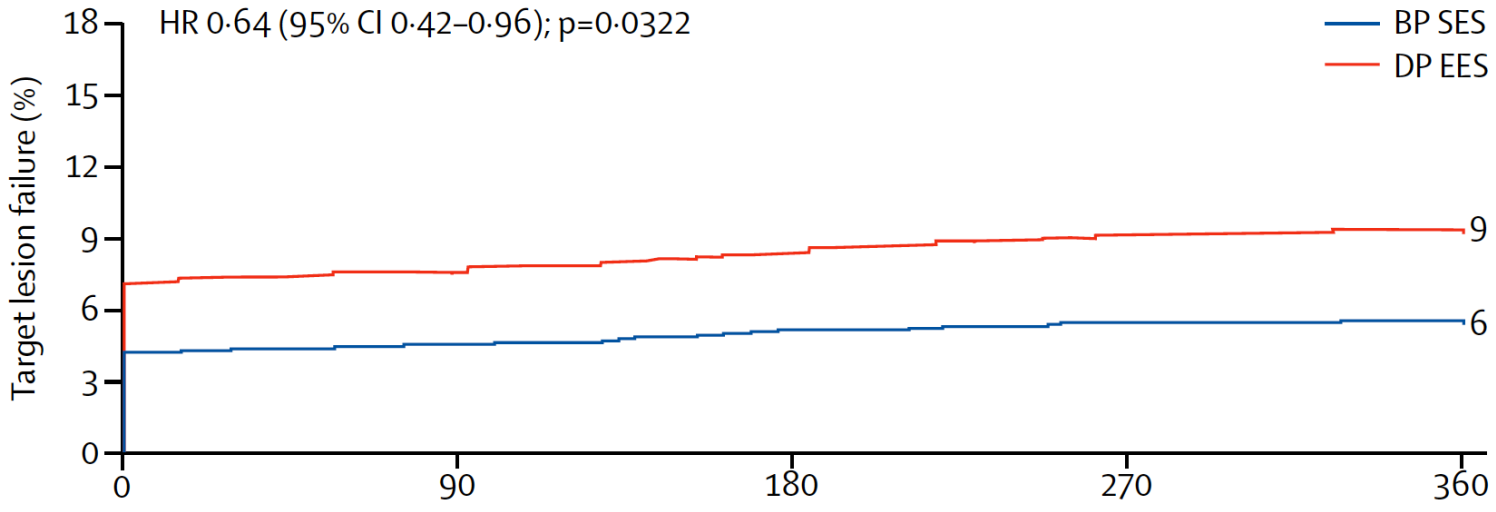


Zbinden et al. *JAHA* 2016

BioFlow V: BP-SES vs. DP-EES

Kandzari D et al. *Lancet* 2017; 390: 1843–52

Primary Endpoint: TLF at 12 Months



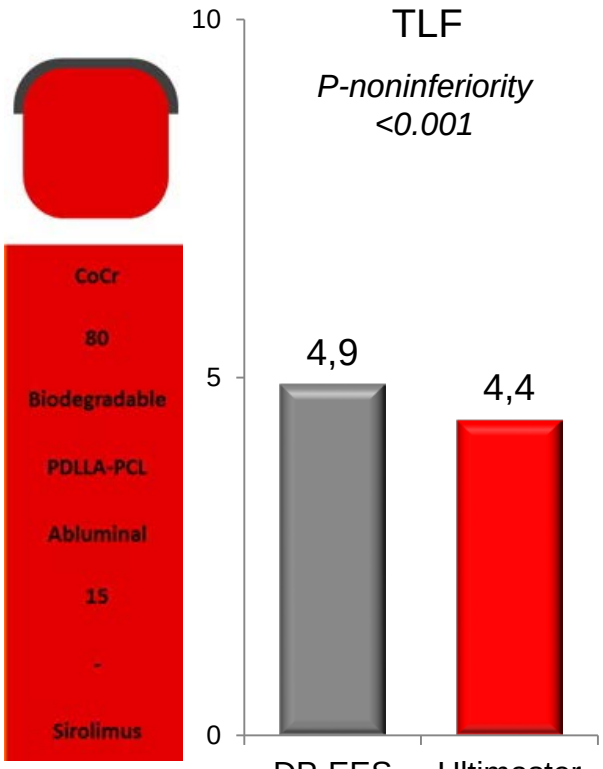
Number at risk

BP SES	884	848	828	814	792
DP EES	450	421	411	400	392

1,334 Patients with stable CAD and NSTEMI with max 2 native vessels treated

THIN-STRUT DES WITH BIOABSORBABLE POLYMER COATINGS

Ultimaster

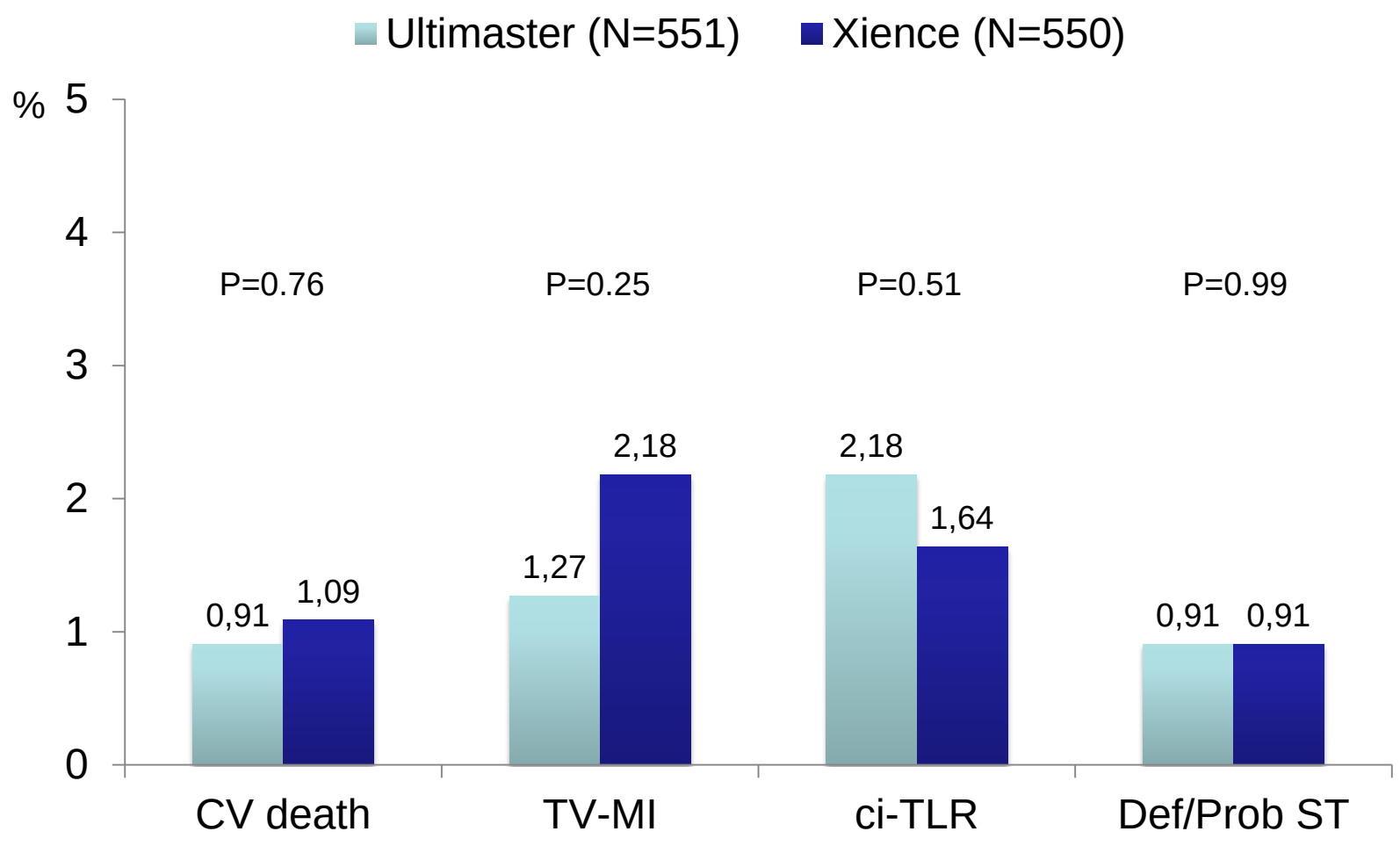


CENTURY-2 Trial
(N=1123)

CENTURY-II TRIAL: ULTIMASTER SES VS XIENCE

12-Months Clinical Outcomes

Saito S et al. *Eur Heart J* 2014; 35:2021–2031



THIN-STRUT DES WITH BIOABSORBABLE POLYMER COATINGS

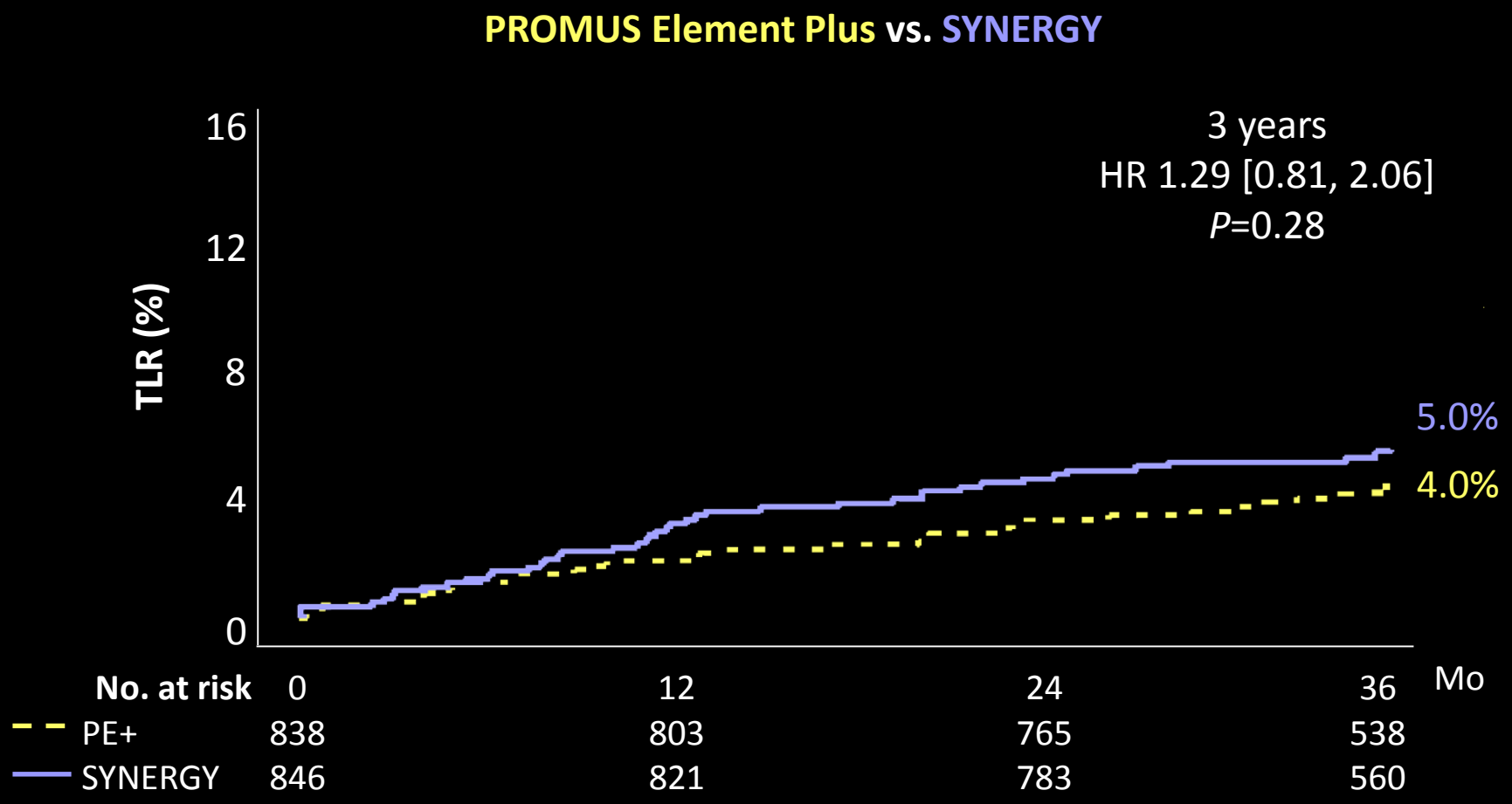
Orsiro

Ultimaster

Synergy

EVOLVE-2 Trial
(N=1684)

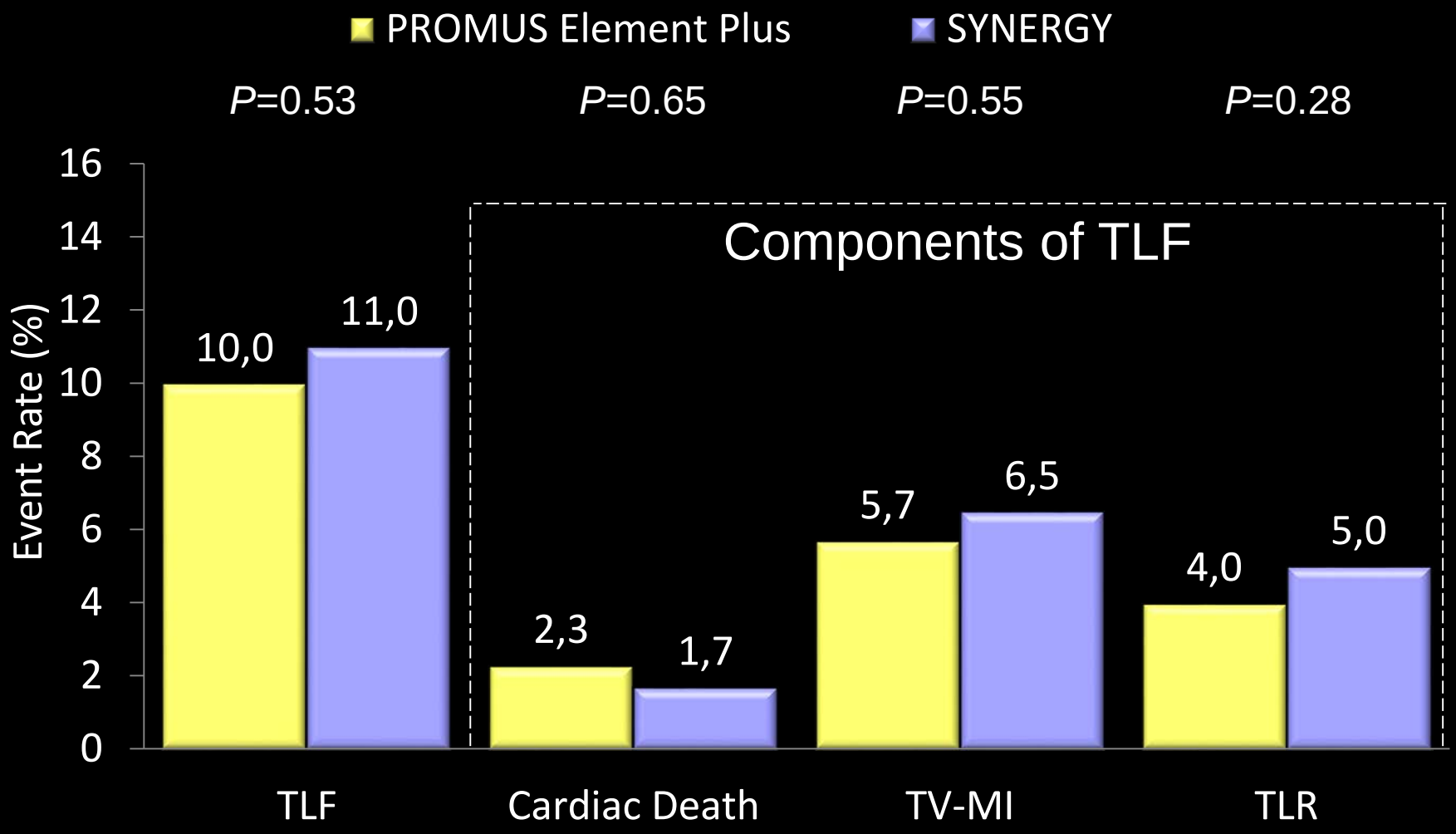
EVOLVE II TLR at 3 years



ITT; Patients who did not receive a study stent were censored at 1 year; KM Event Rate; log-rank *P* values

Presented by Kereiakes ACC 2017

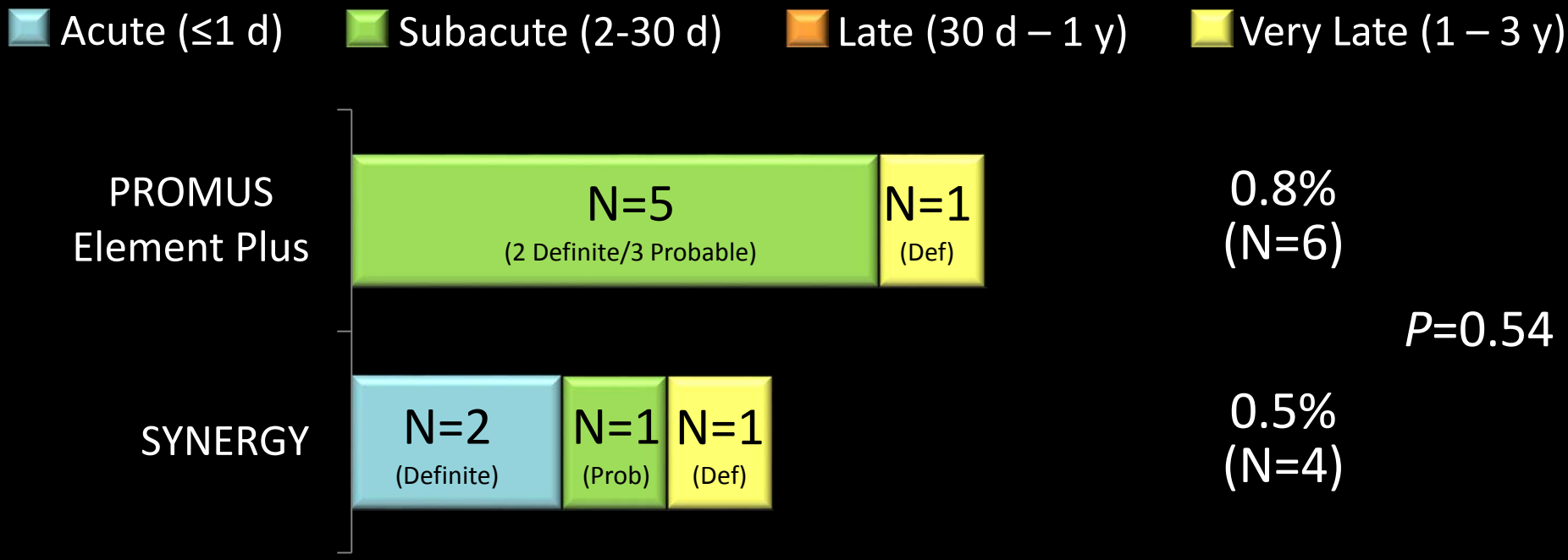
TLF and Components at 3 years



Presented by Kereiakes ACC 2017

Stent Thrombosis at 3 years

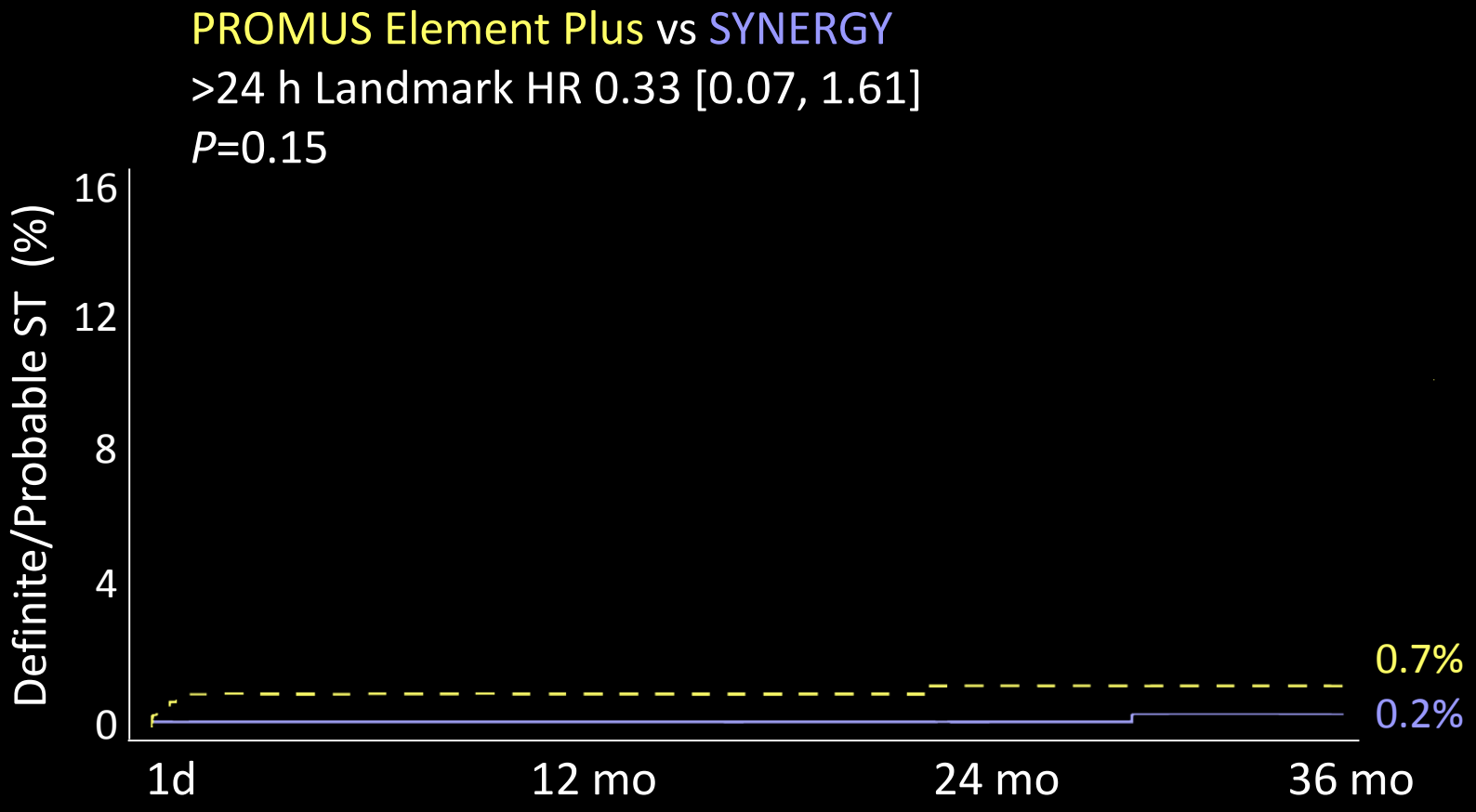
Definite/Probable: ITT Population



CEC confirmed MI/TLR/ST Day 901 in the *SYNERGY arm*

ST Landmark Analysis

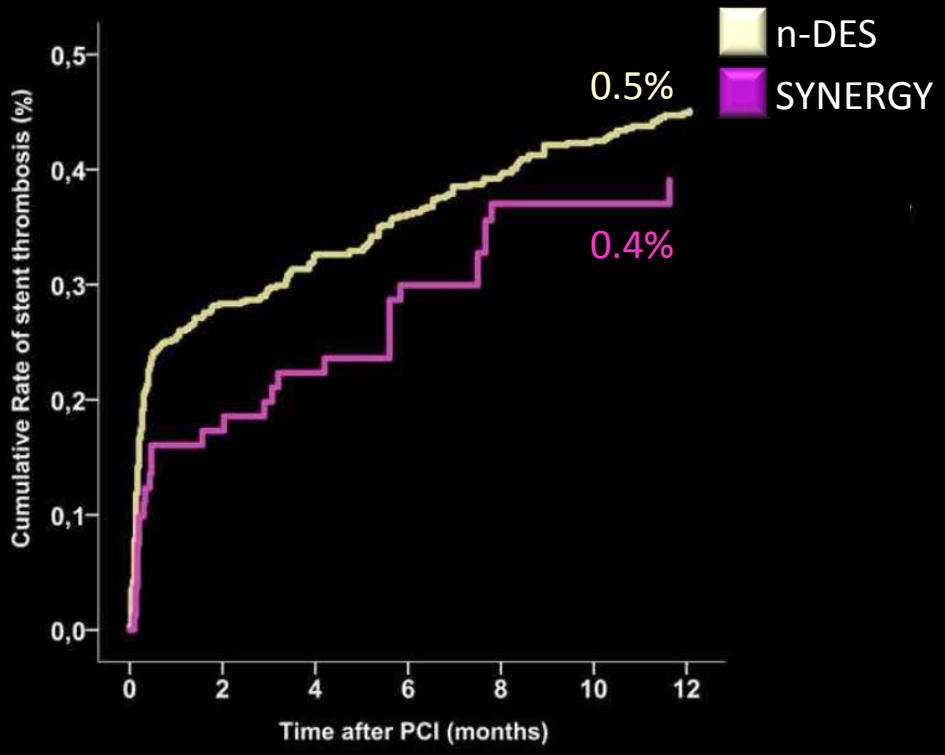
Definite/Probable ST after 24 hours



SCAAR Registry

SYNERGY vs New Generation DES (n-DES) in All-Comers

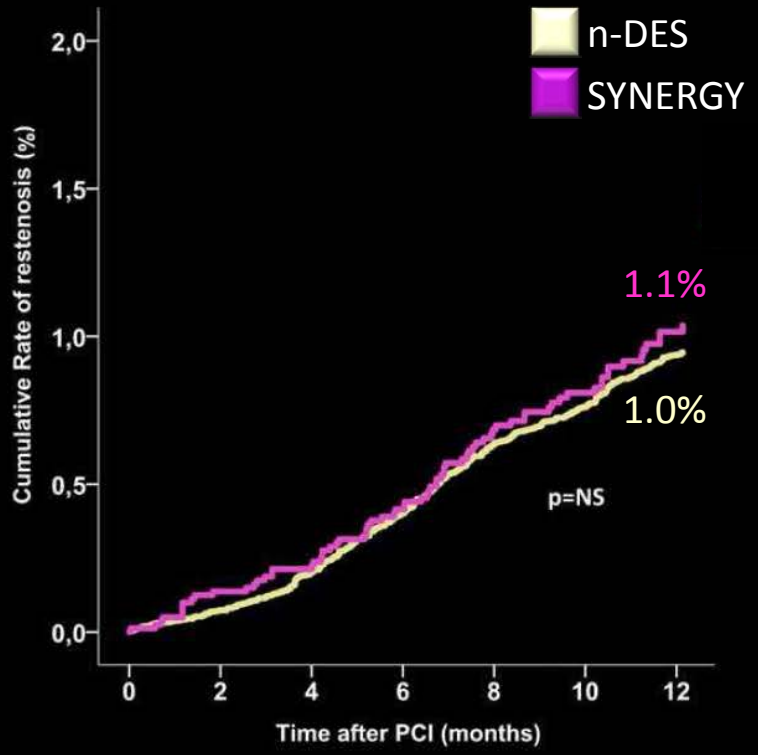
Definite Stent Thrombosis



Number at risk	0 months	1 month	6 months	12 months
Synergy	7886	7859	7840	4613
n-DES	64429	63718	62499	50739

0.4% vs. 0.5%, adjusted HR: 0.97; 95% CI: 0.63-1.50; *P*=0.17

Restenosis



Number at risk	0 months	1 month	6 months	12 months
Synergy	7886	7859	7840	4613
n-DES	64429	63718	62499	50739

1.1% vs. 1.0%; adjusted HR: 1.24; 95% CI: 0.88-1.75; *P*=0.21

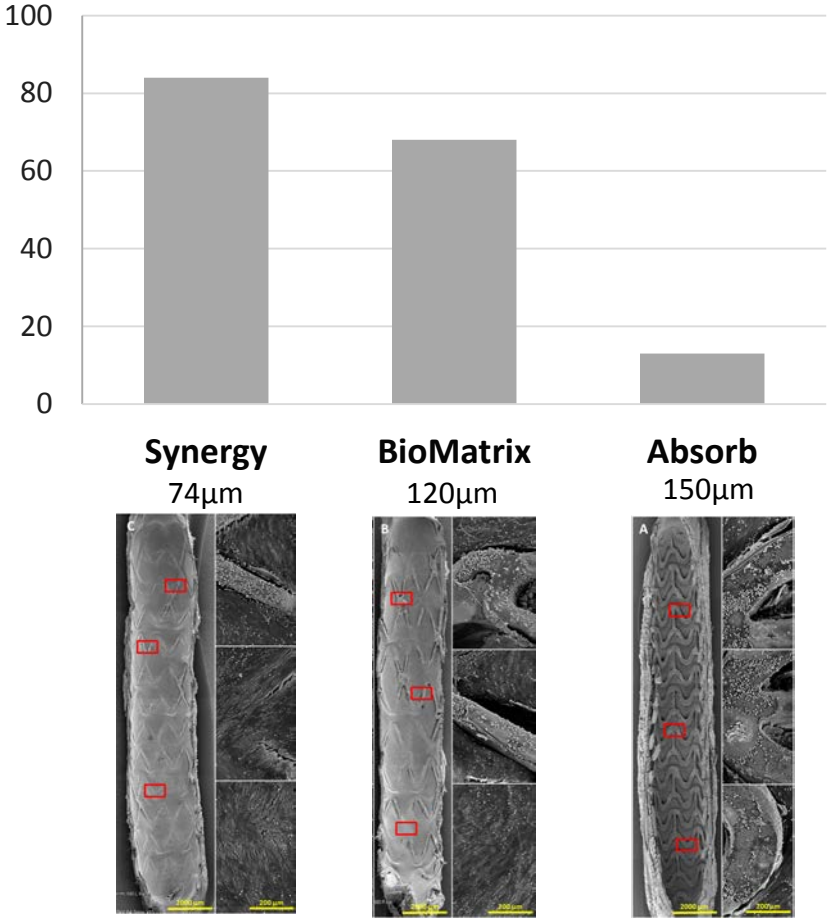
*n-DES includes: BioMatrix, Orsiro, Promus Element Plus, Promus PREMIER, Xience Xpedition, Resolute/Resolute Integrity, Ultimaster, & Resolute Onyx.

Sarno, et al. *Catheter Cardiovasc Interv* 2017

Impact of Stent Strut Thickness on Arterial Healing and Acute Thrombogenicity

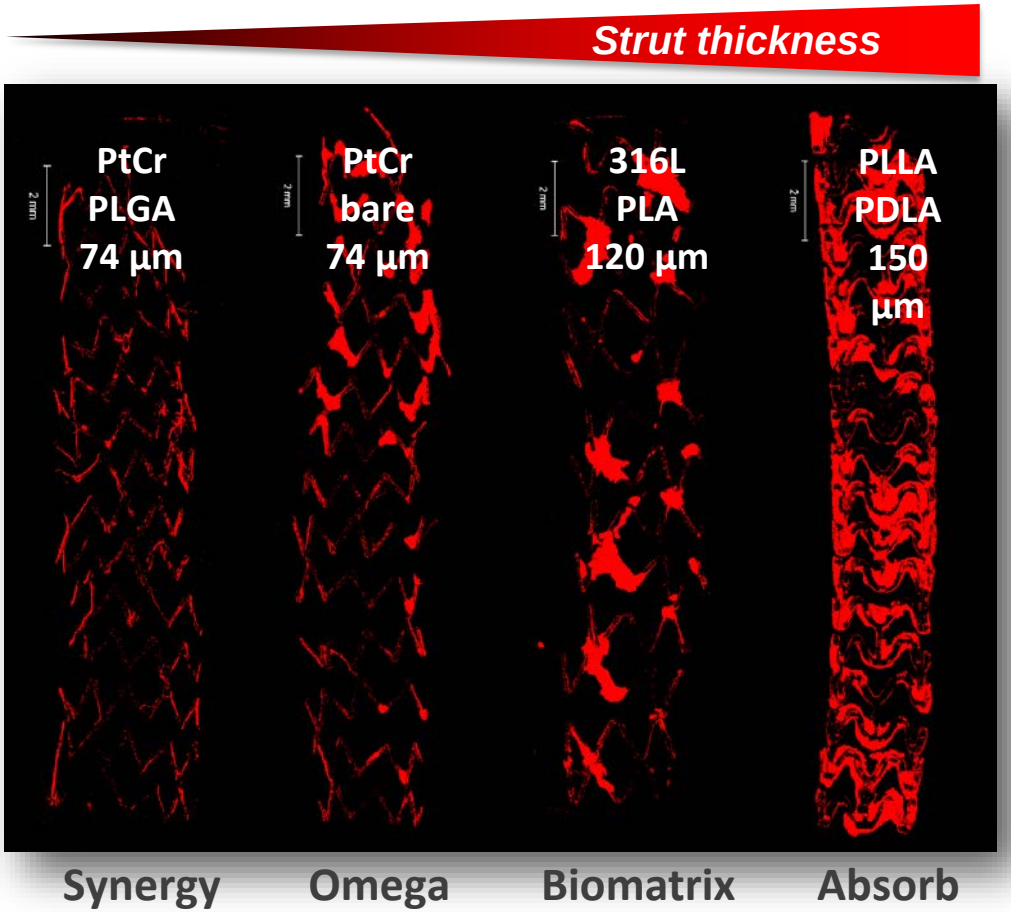
Endothelialization

Endothelialization above struts
rabbit, 28 days



Platelet Deposition

Immuno-fluoroscent staining (CD61/CD42b)
in porcine ex-vivo arterio-venous shunt model



Courtesy: M Joner

PCI With Synergy EES in High Bleeding Risk Patients Followed By 1 Month DAPT

Patients With CAD At High Bleeding Risk (N=1023)

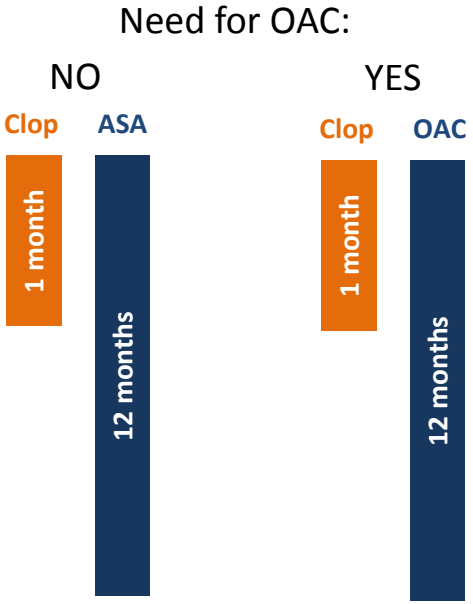
PCI with Synergy EES

Multicenter trial

- Age ≥75 years
- Need for OAC
- Hb <11 g/l
- Recent transfusion
- Platelets <100'000
- Bleeding event <12 months
- Stroke <12 months
- History of ICH
- Severe chronic liver disease
- GFR <40 ml/min,
- Cancer <3 years
- Planned major surgery
- Need for glucocorticoids/NSAIDS
- Non-adherence to >30 days DAPT

Antithrombotic Strategy

Need for OAC:



1-month clinical follow-up

12-month clinical follow-up

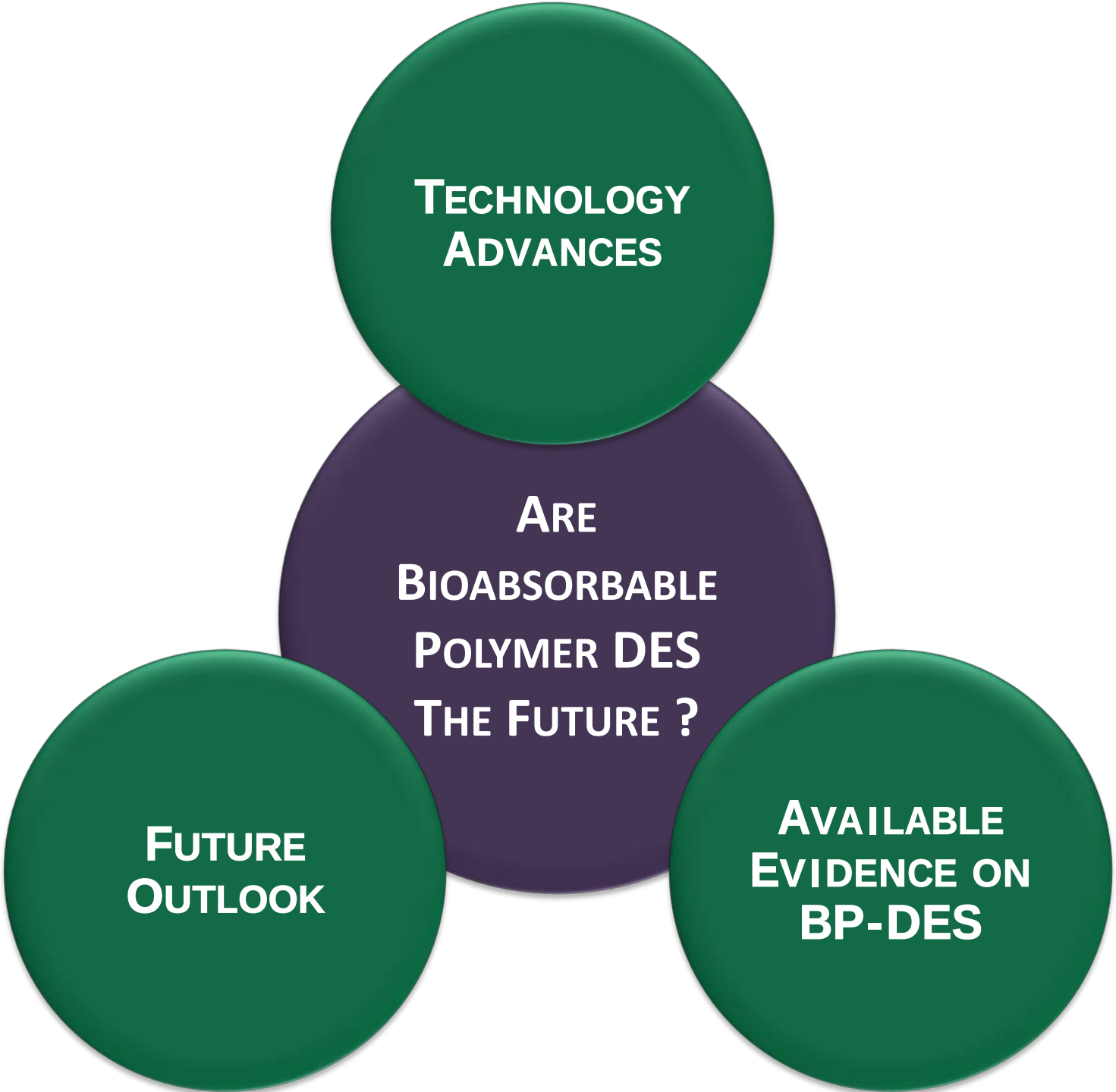
1EP: cardiac death, MI, or def/prob ST @12 months

NCT03112707

ONGOING STUDIES ON SHORT DAPT

Study	Device	DAPT Duration	Status
COBRA REDUCE	Cobra PzF	2 weeks	recruiting
MASTER-DAPT	Ultimaster	1 month	recruiting
POEM	Synergy	1 month	recruiting
RESOLUTE ONYX ONE-MONTH DAPT	Resolute	1 month	announced
SENIOR	Synergy	1 month (SCAD) 6 months (ACS)	recruit complete
ISAR-DAPT	Coroflex-ISAR	3 months	recruiting

LBT Presentation
TCT 2017
Nov 1st at 11:00 AM


TECHNOLOGY ADVANCES
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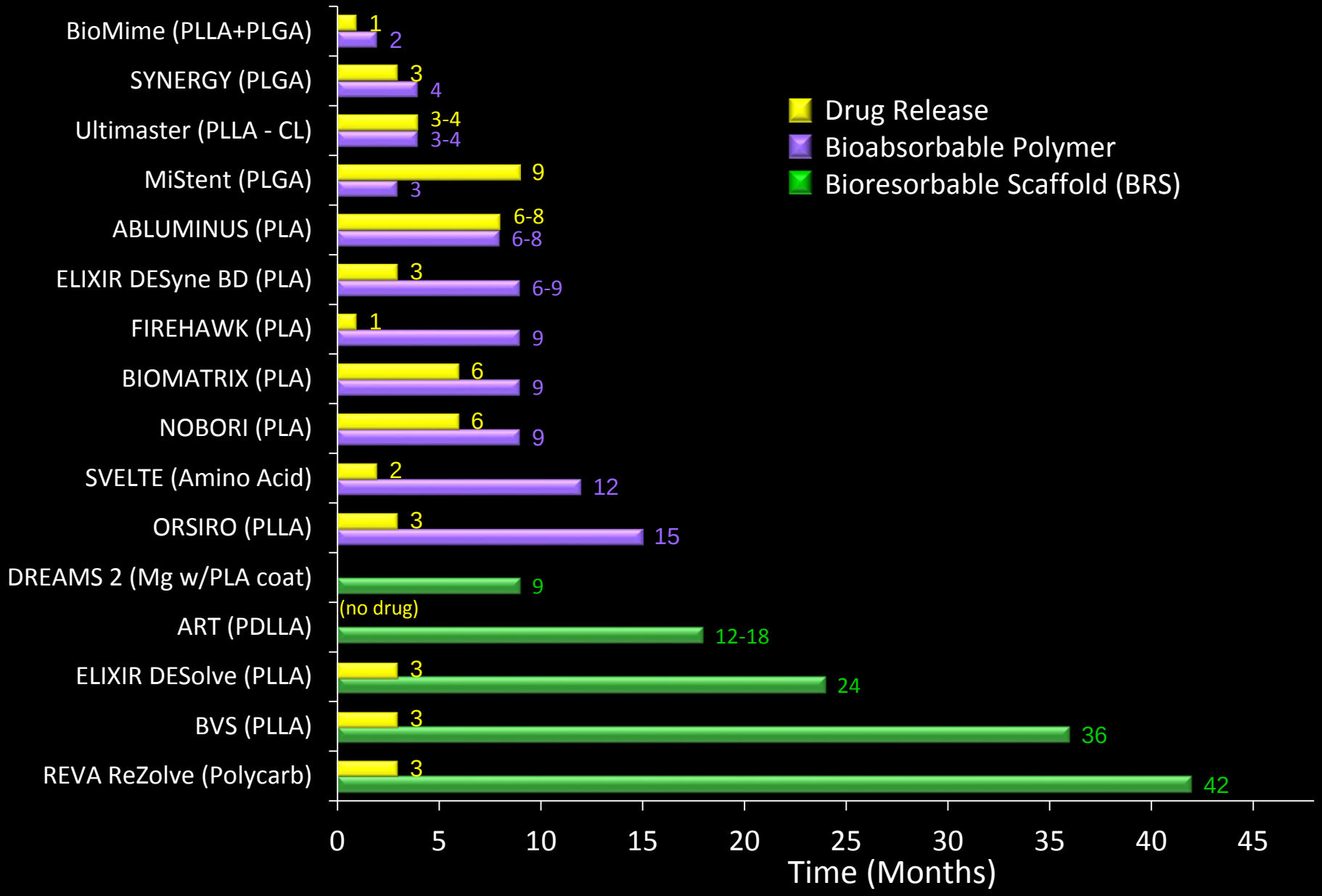
FUTURE OUTLOOK
AVAILABLE EVIDENCE ON BP-DES

Not All Bioresorbable Technologies Are Equal

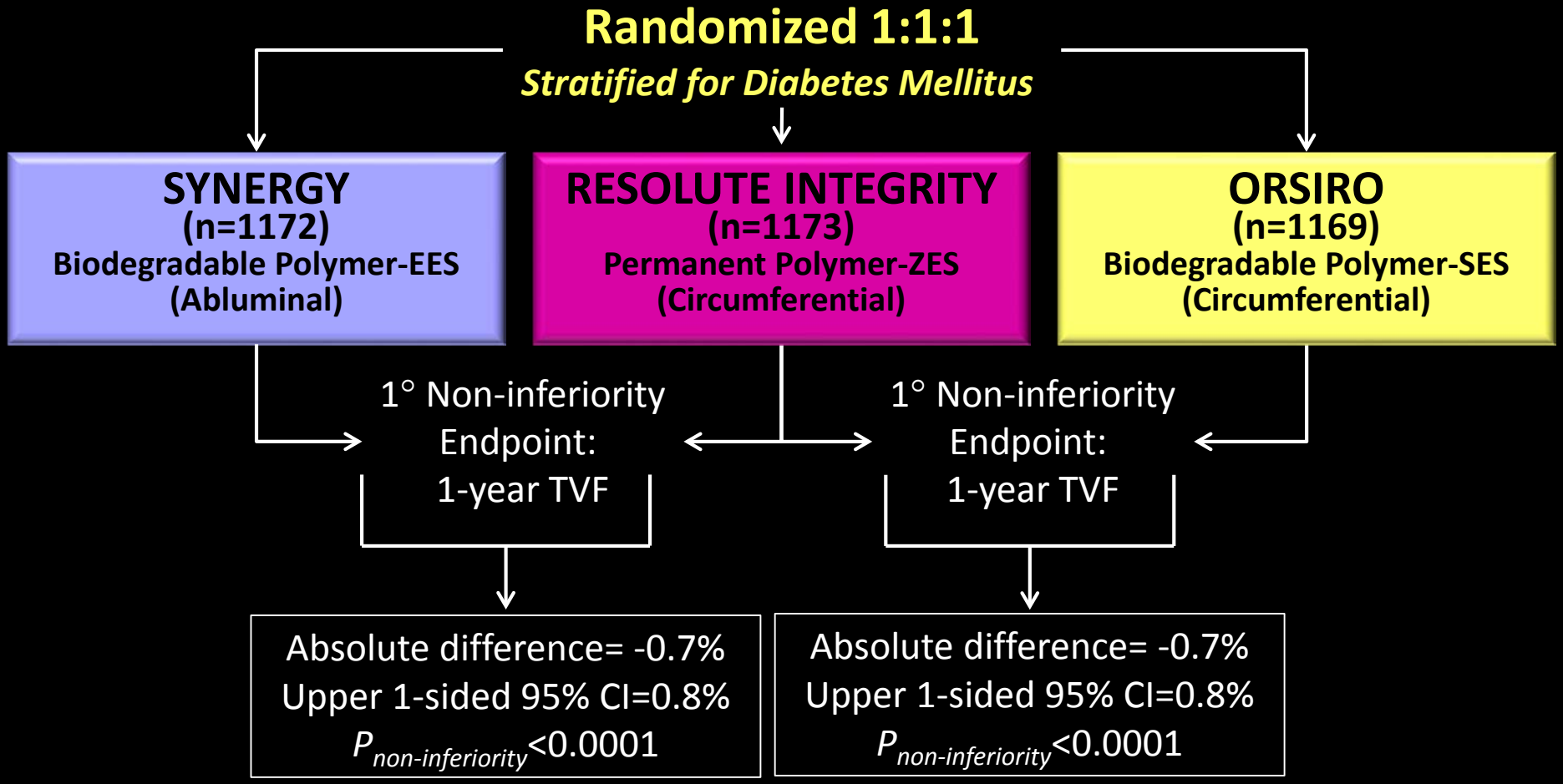
Time Course For Polymer Bioabsorption



BIO-RESORT Trial

Primary Non-inferiority Endpoint

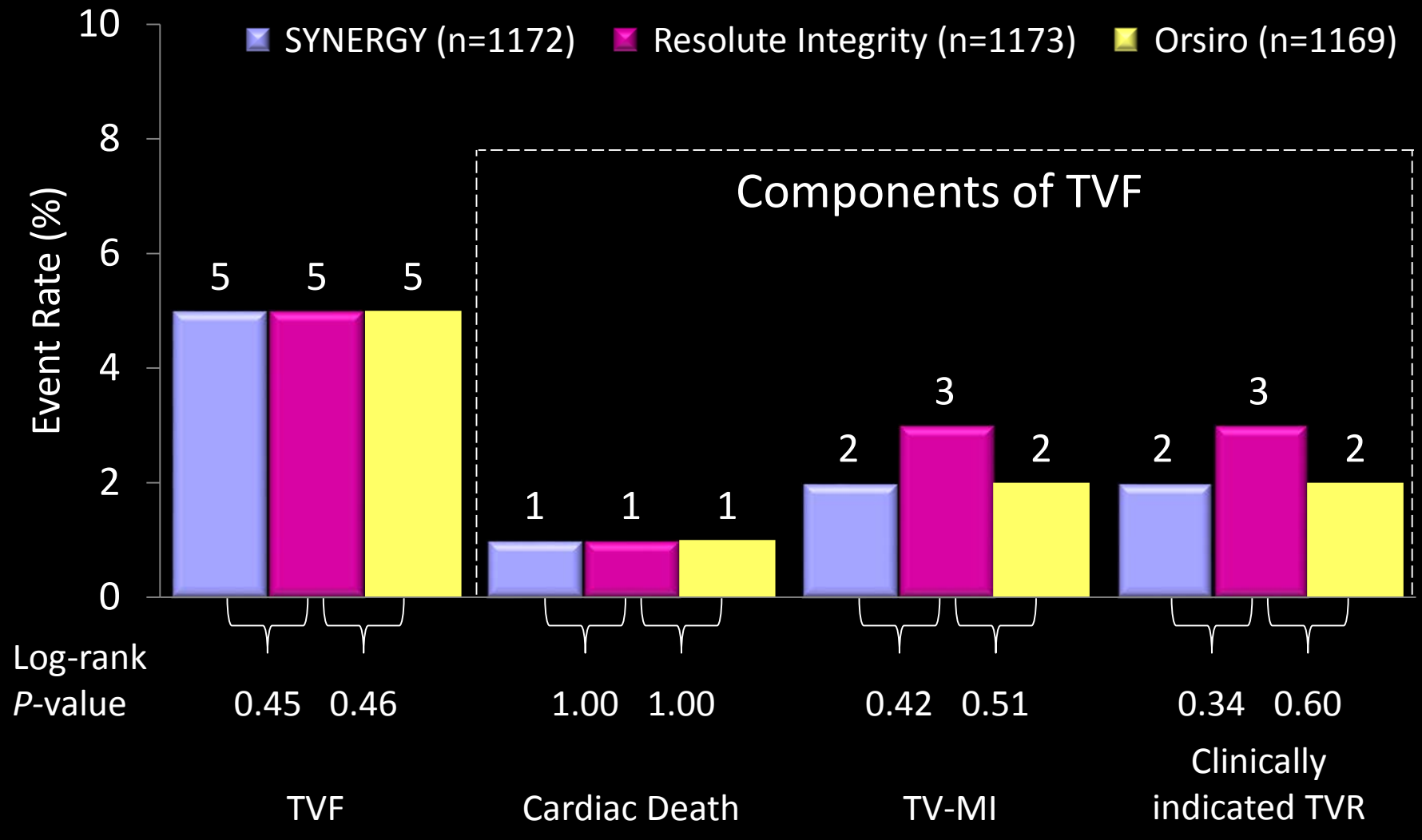
SYNERGY Not Inferior to Permanent Polymer DES Resolute Integrity



von Birgelen, C., et al. Lancet 2016

BIO-RESORT Trial

Components of Primary Non-inferiority Endpoint: 1-Year TVF



Von Birgelen, C., et al. Lancet 2016

European Heart Journal
doi:10.1093/eurheartj/ehv203

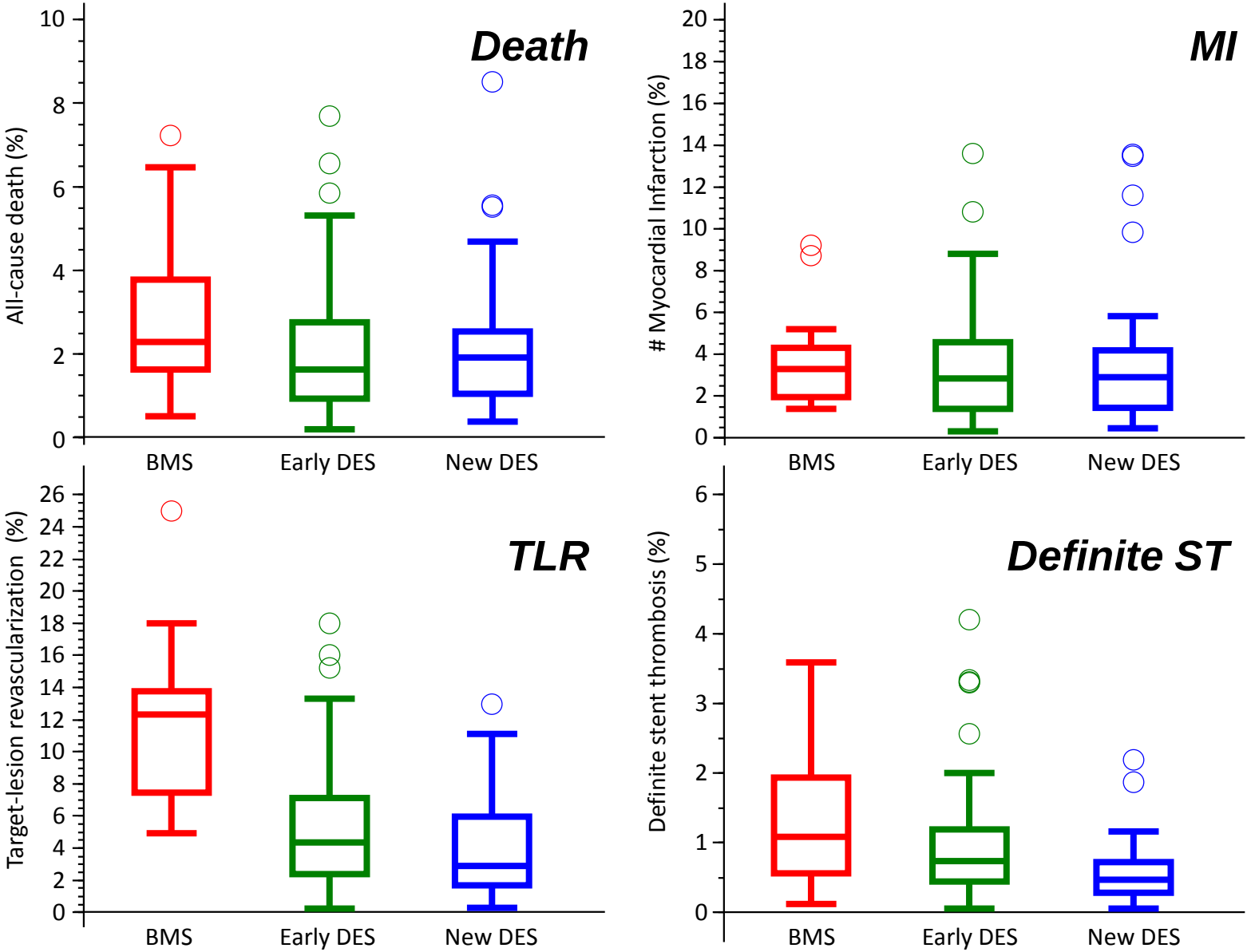
SPECIAL ARTICLE

Report of a European Society of Cardiology-European Association of Percutaneous Cardiovascular Interventions task force on the evaluation of coronary stents in Europe: executive summary

Robert A. Byrne[1], Patrick W. Serruys[2], Andreas Baumbach[3], Javier Escaned[4], Jean Fajadet[5], Stefan James[6], Michael Joner[7], Semih Oktay[8], Peter Jüni[9], Adnan Kastrati[1], George Sianos[10], Giulio G. Stefanini[11], William Wijns[12], and Stephan Windecker[11]*

Impact of Stent Iterations on Safety & Efficacy

ESC-EAPCI Stent Task Force | *Eur Heart J* 2015



CONCLUSIONS

- Thin-strut DES with bioabsorbable polymer coatings have similar safety and efficacy profiles as the current benchmark of fluoropolymer coated EES

- Theoretical advantages of bioasborbable polymer coatings may translate in marginal long-term benefits that need to be confirmed in large scale trials

- Contemporary metallic DES with durable or bioabsorbable polymer coatings represent a mature technology providing optimal safety and efficacy outcomes

BIOABSORBABLE POLYMER STENTS: IS THE FUTURE?

Stefanini, Taniwaki, Windecker. *Heart.* 2014; 100(13):1051-61

Novel DES Are Based on Bioabsorbable Polymer Coatings!

BioMatrix Nobori	Endeavor	Yukon PC	Xience Promus	Resolute	Synergy	Orsiro	DESyne	Combo	Mistent	Ultimaster
SS	CoCr	SS	CoCr PtCr	CoCr	PtCr	CoCr	CoCr	SS	CoCr	CoCr
120	91	87	81	91	74	60	81	100	64	80
Biodegradable	Durable	Biodegradable	Durable	Durable	Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable	Biodegradable
PDLLA	MPC/LMA/HPMA/ 3-MPMA	PDLLA	PBMA/PVDF-HFP	PBMA/PHMA/ PVP/PVA	PLGA	PLLA	PLLA	PDLLA/PLGA	PLGA	PDLLA-PCL
Abluminal	Circumferential	Circumferential	Circumferential	Circumferential	Abluminal	Circumferential	Circumferential	Abluminal	Circumferential	Abluminal
10	6	5	8	6	4	7	<3	5	10	15
-	-	-	-	-	-	Silicon carbide	-	Anti-CD34 Antibodies	-	-
Biolimus	Zotarolimus	Sirolimus	Everolimus	Zotarolimus	Everolimus	Sirolimus	Novolimus	Sirolimus	Sirolimus	Sirolimus

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THANKS FOR YOUR KIND ATTENTION !

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