DES and DAPT Strategy for Elderly Patients

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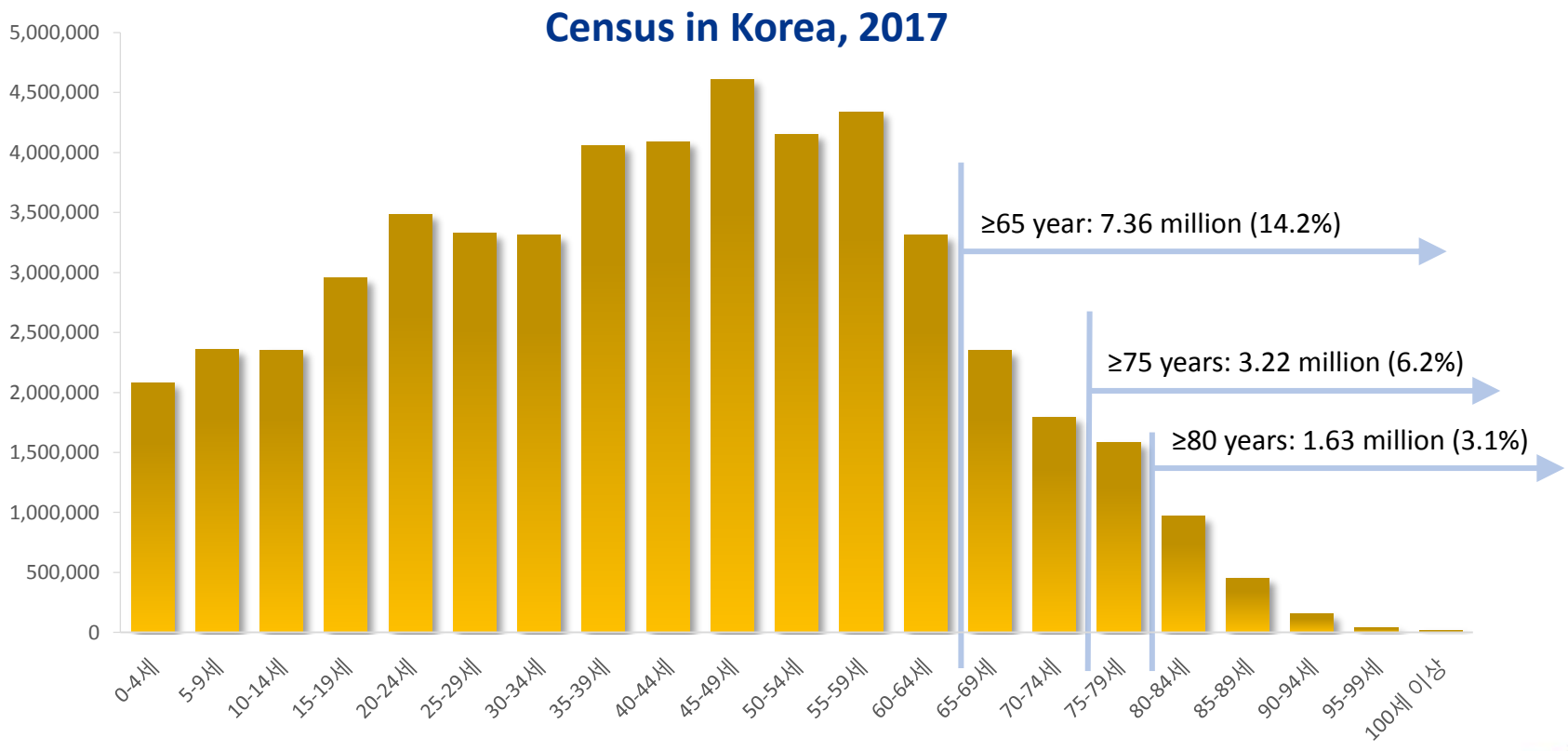
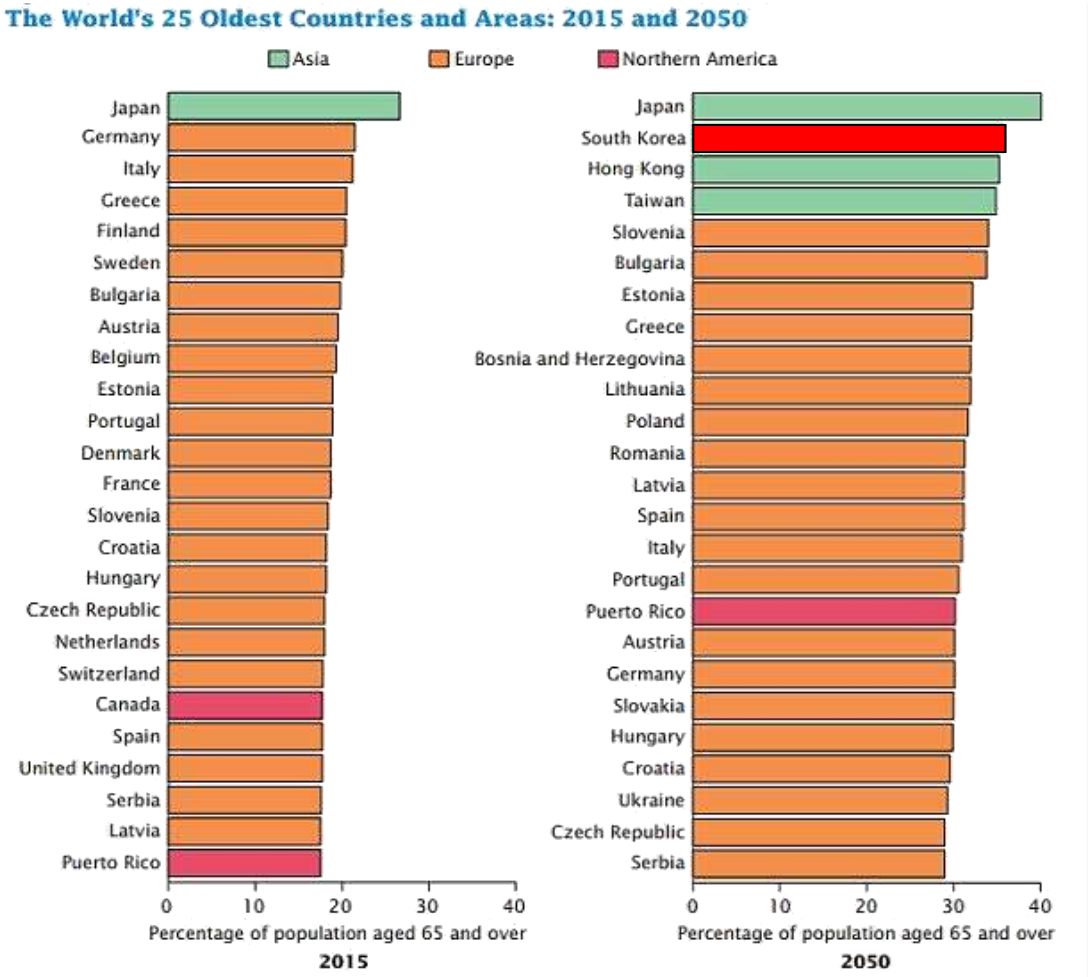
Korea faces rapidly aging population

- Elderly (≥65 years) in 1980: 3.8%
- Reached an aging society in 2000 (elderly ≥7%)
- Reached an aged society in 2017 (elderly ≥14%)



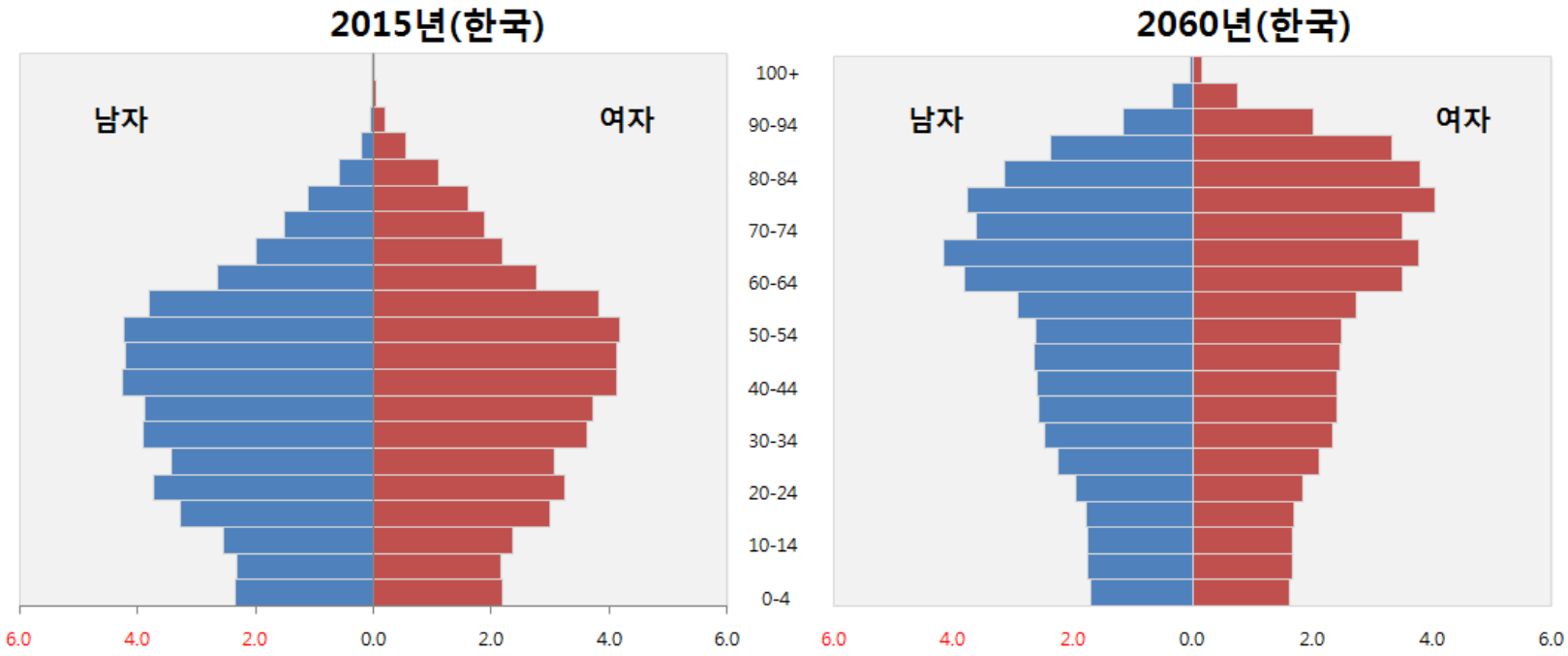
Ministry of the Interior and Safety, Korea. http://www.mois.go.kr

South Korea is aging faster than any other developed country



Reuters

Population Pyramid in Korea



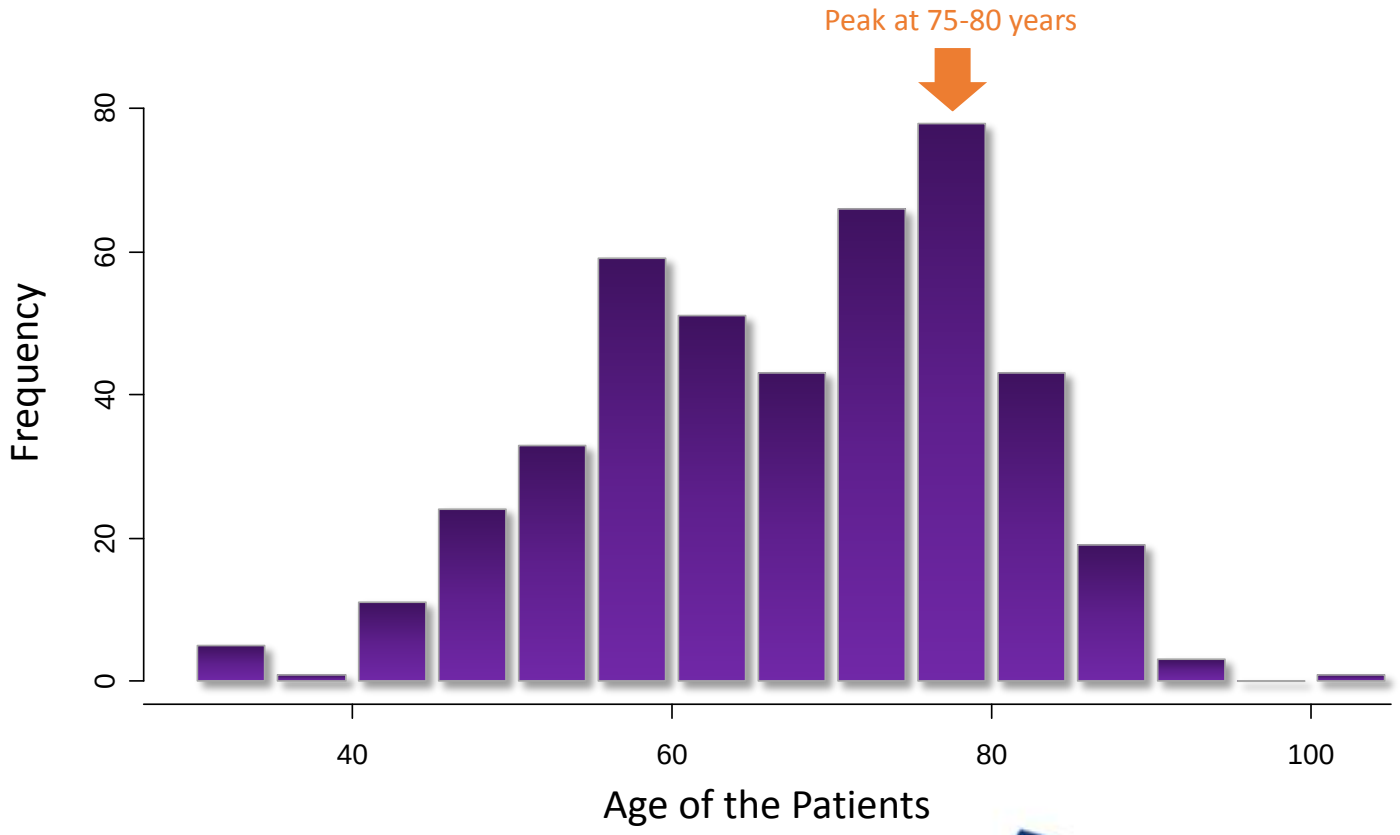
Ministry of the Interior and Safety, Korea. http://www.mois.go.kr

Life Expectancy by Age

보건복지부 http://www.index.go.kr

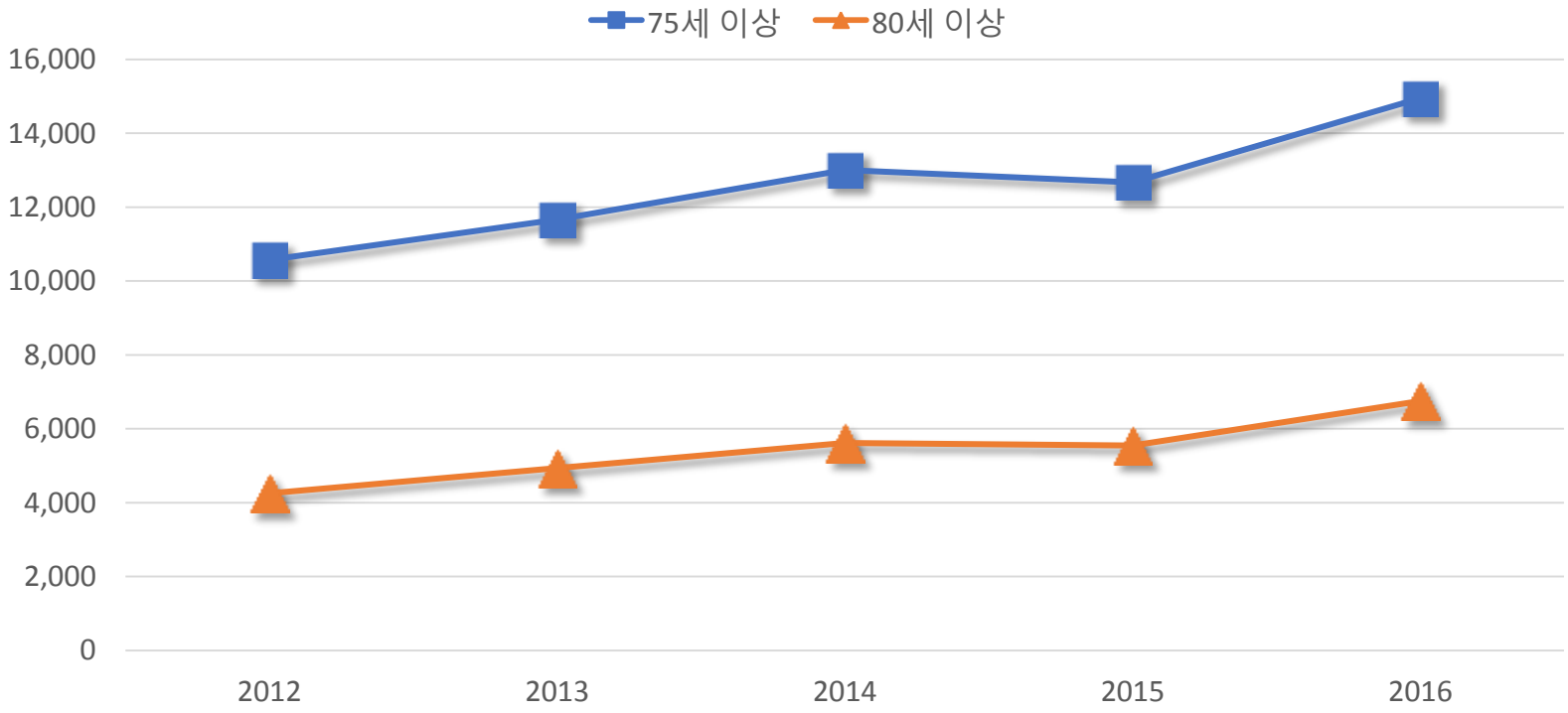
My Experience (PCI Patients)

- From 2016 to 2017
- Median (IQR): 69.0 (57.8 – 77.2) years
- Aged ≥75 years: 33.0%
- Aged ≥80 years: 15.1%



“Olds” receiving PCI in Korea

- ≥75 years: 10,574 (2012) → 14,949 (2016)
- Increasing by 7.2% yearly



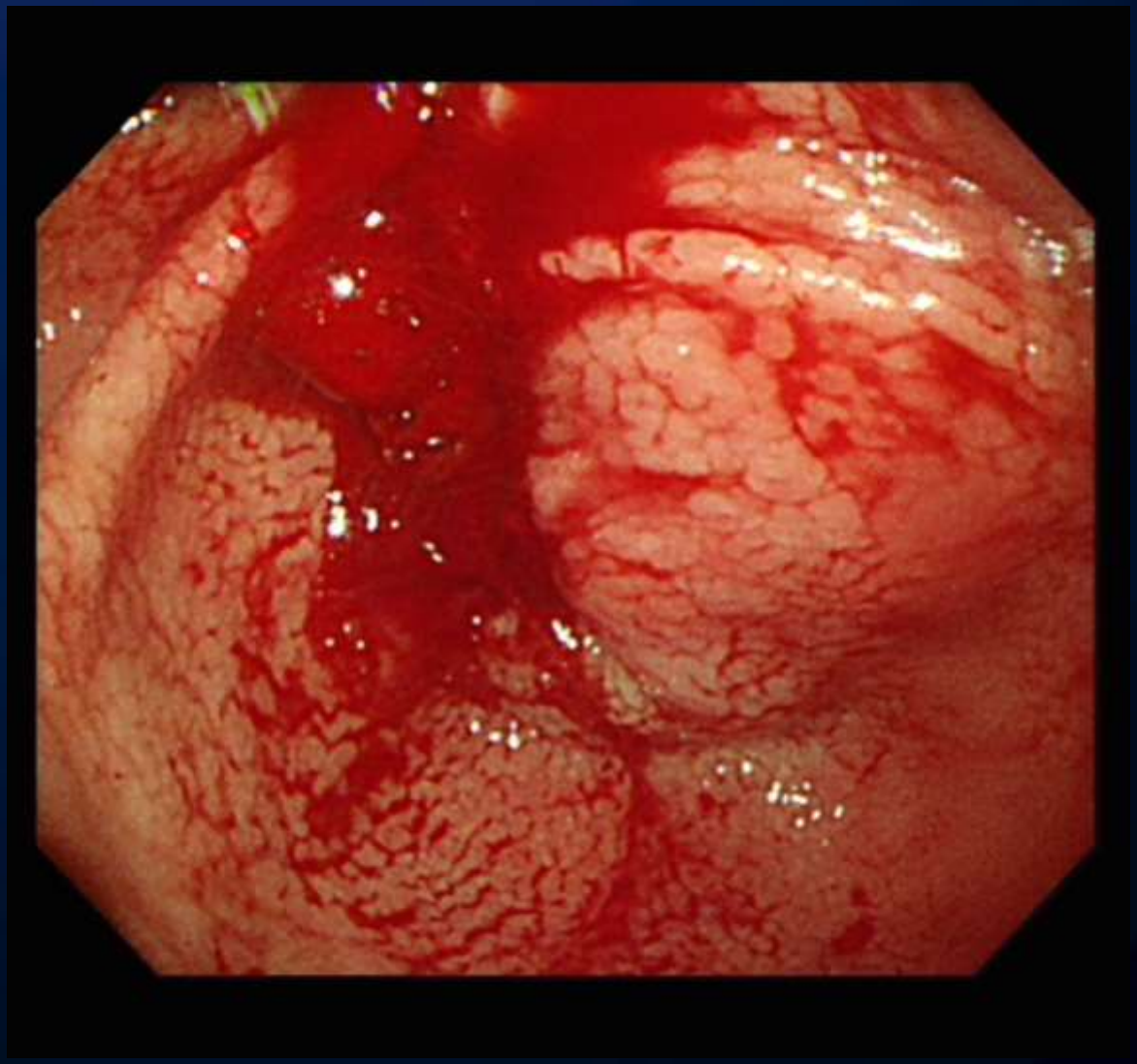
HEALTH INSURANCE REVIEW & ASSESSMENT SERVICE.

Duodenal Ulcer Bleeding (F/81)

cc: hematemesis

Failed both endoscopic hemostasis and angiographic embolization

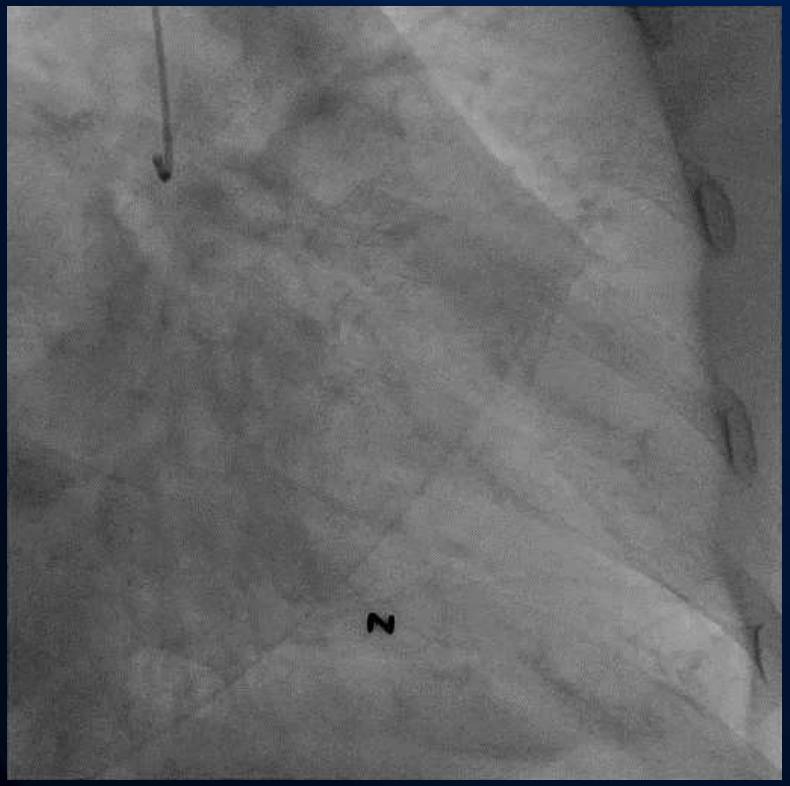
→ Medically treated



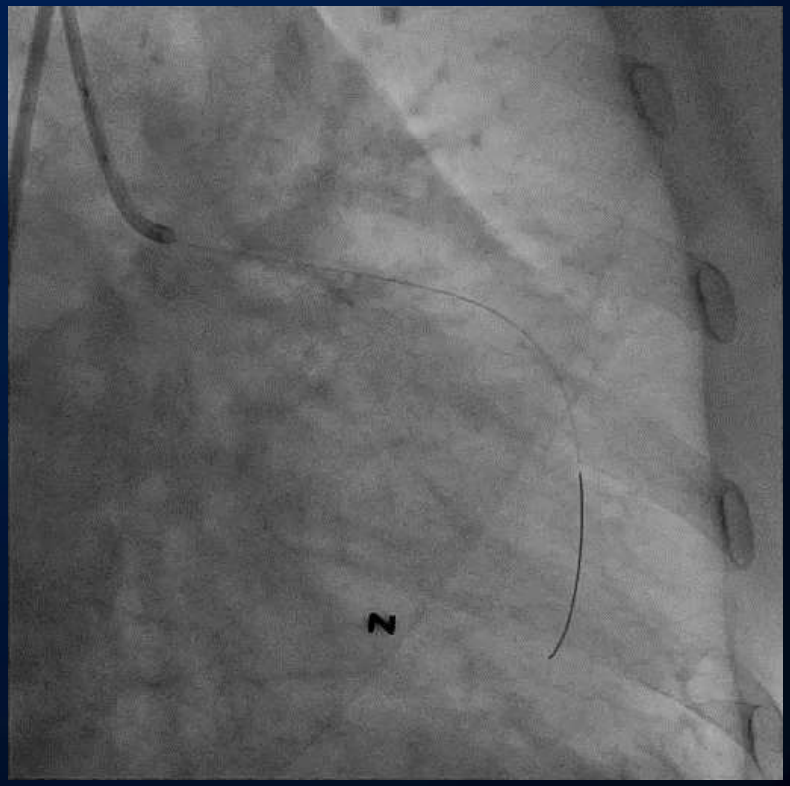
NSTEMI (F/81)

- Syncope during hospitalization
- Chest pain developed while going to the toilet → syncope → persistent chest pain

pLAD total occlusion



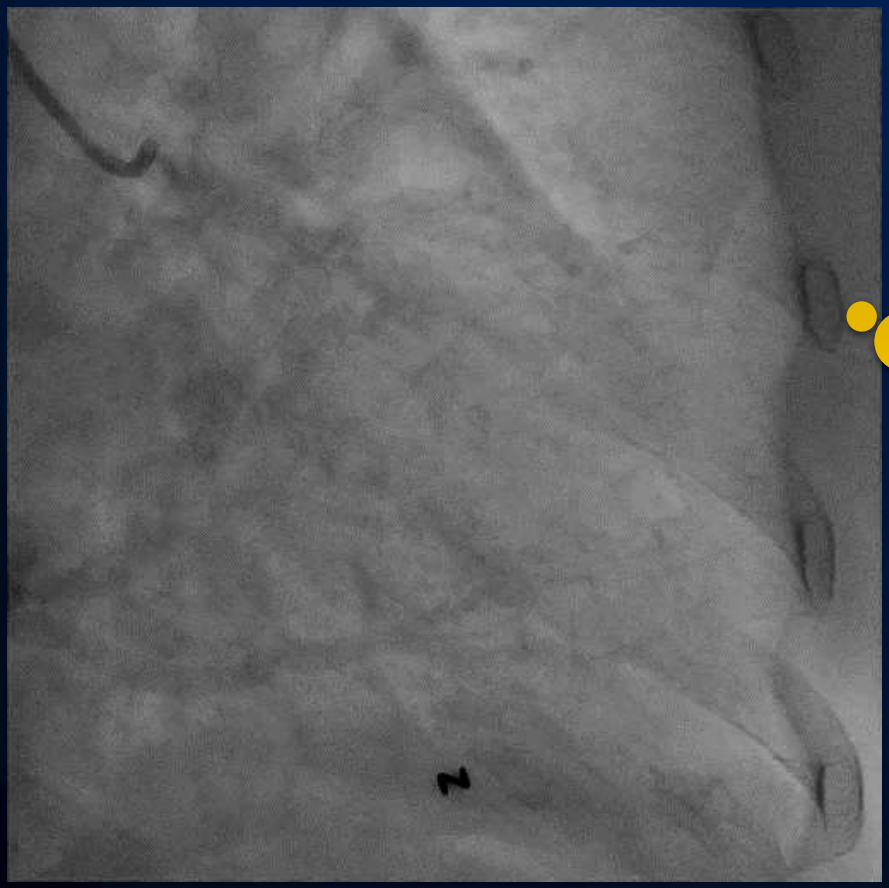
Successful PCI with ***BMS***



P> BMS implantation and short-term DAPT

Recurrent GI bleeding (F/81)

- DAPT for 1 month → Plavix single
- recurrent GI bleeding post-PCI 5 months(ΔHb=3.9 g/dL)
- CAG + OCT to decide whether or not stop antiplatelet agent



Diffuse in-stent restenosis

→ Recommend bypass surgery

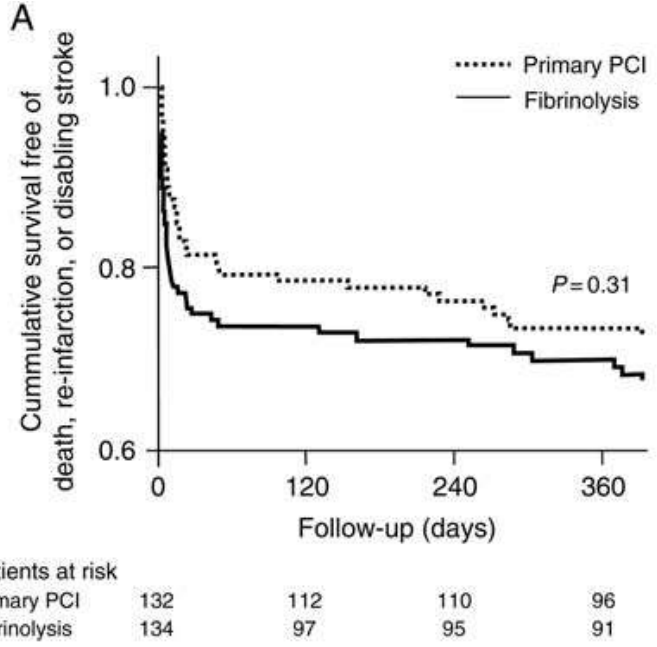
What if treated
with DES
in the first hand

Q1 Is PCI suitable for the old?

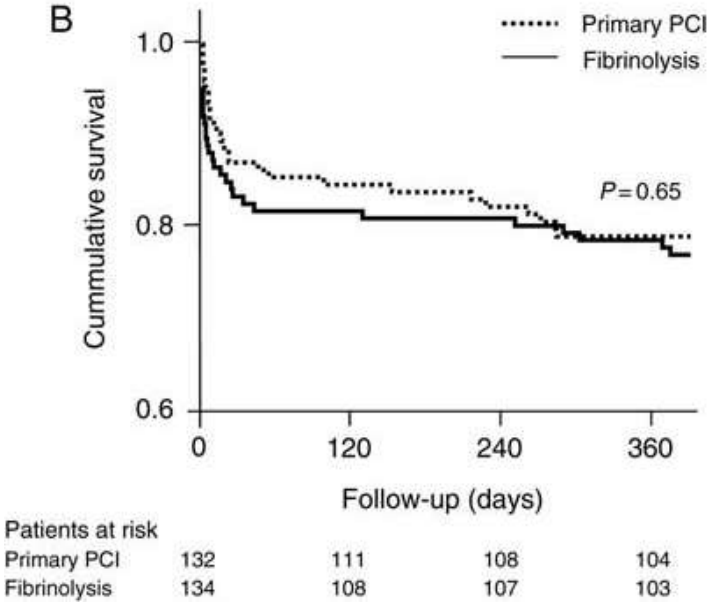
TRIANA trial

- STEMI patients with ≥75 years old
- Primary PCI (n=134) vs. fibrinolysis (n=132)

Primary endpoints



All-cause mortality

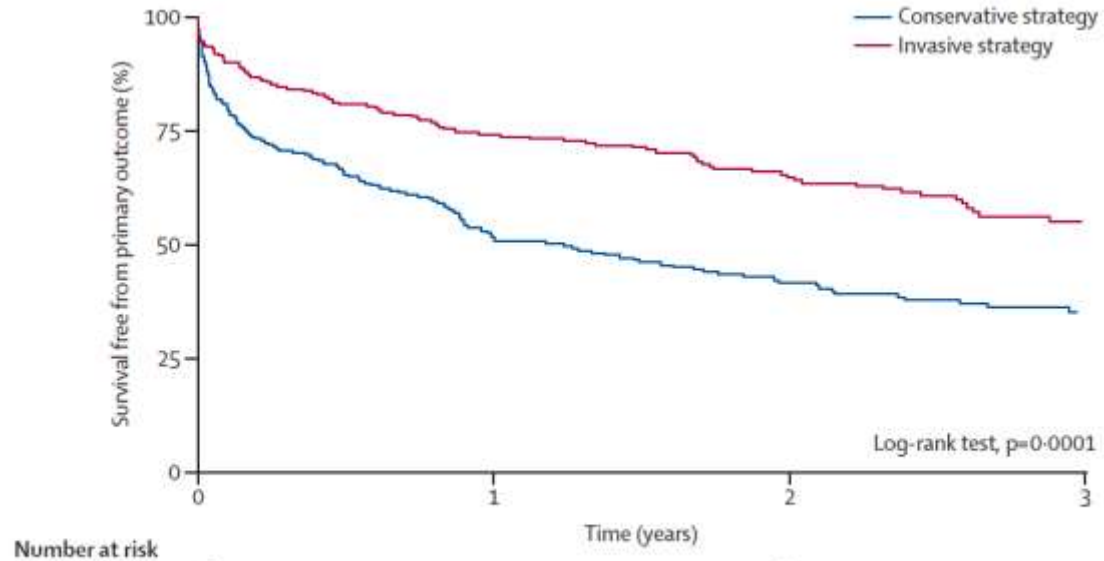


Bueno et al. EHJ 2011

Q1 Is PCI suitable for the old?

After Eighty study

- NSTEMI patients with ≥80 years old
- Invasive strategy (n=229) vs. conservative strategy (n=228)



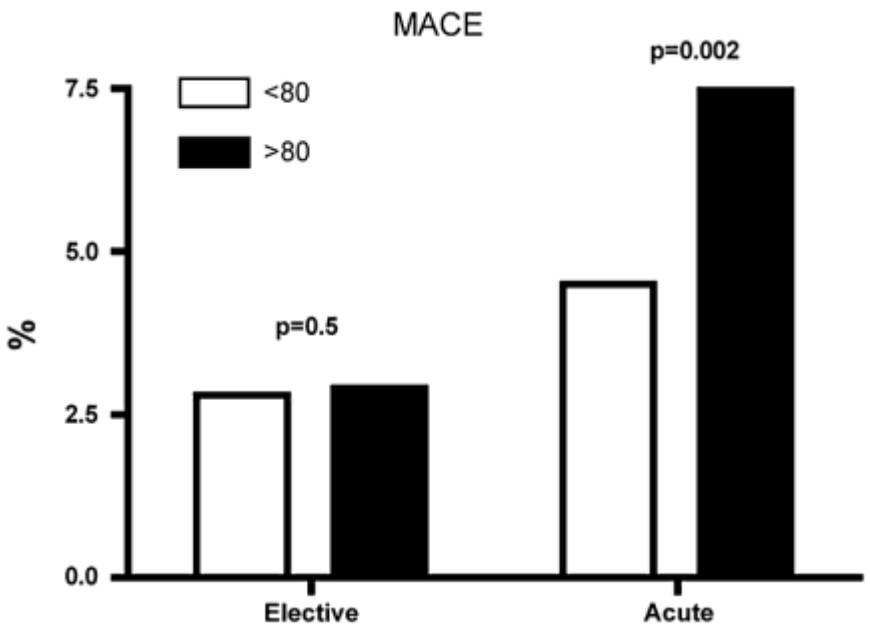
Number at risk				
Conservative strategy	228	111	69	32
Invasive strategy	229	164	108	43

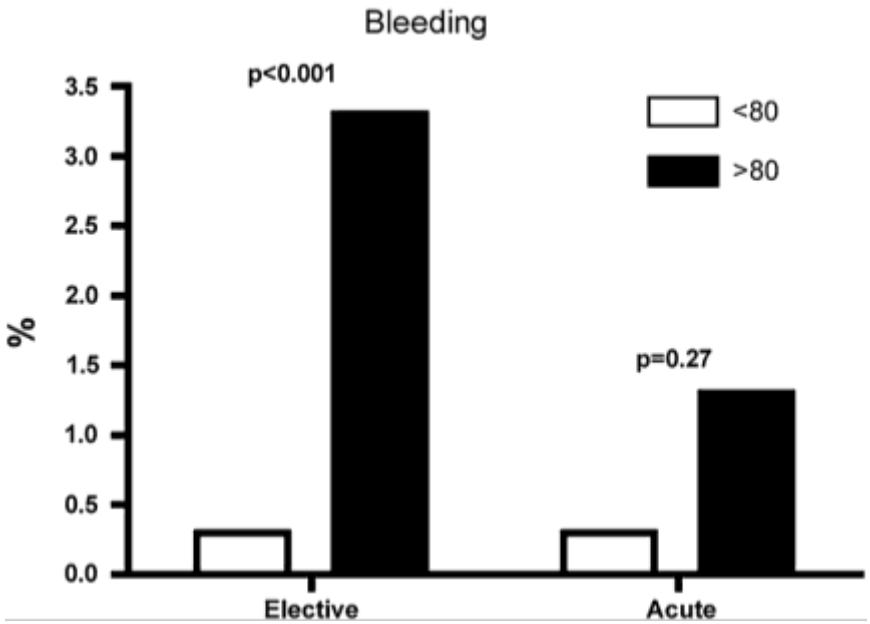
Tegn et al. Lancet 2016

Q1 Bleeding risk is high among the old

A single center experience: St. Thomas Hospital

- 514/7,570 patients undergoing PCI ≥80 years old





Lockie et al. Heart 2010

Q2 Is DES safe for the olds?

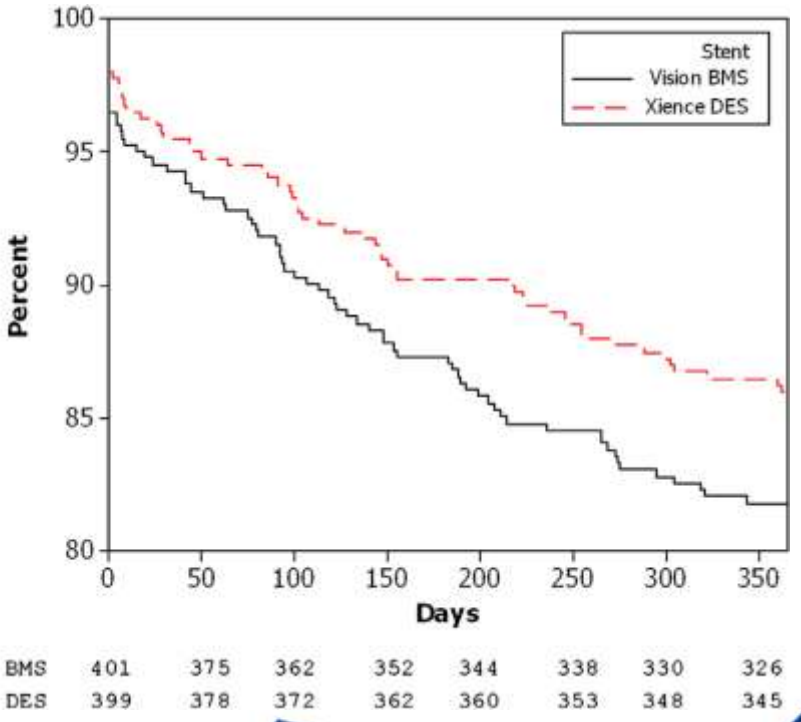
XIMA trial (Xience or Vision Stents for the Management of Angina in the Elderly)

- Patients undergoing PCI with ≥80 years old (NSTEMI, UA, stable angina)
- Lesion length ≥15 mm; lesion diameter <3 mm
- DES (n=399) vs. BMS (n=401)

Table 1 Demographic Data Comparing the Patients Randomized to BMS or DES

	BMS (n = 401)	DES (n = 399)	p Value
Age (yrs)	83.4 ± 3.1 (80–99)	83.6 ± 3.2 (80–101)	0.35
Female	40.9	38.9	0.64
Diabetes	24.2	25.6	0.65
Hypertension	77.6	75.1	0.42
Hypercholesterolemia	52.9	57.6	0.17
Current smoker	4.0	5.0	0.49
Previous CVA/TIA	10.7	7.8	0.15
Peripheral vascular disease	12.5	10.3	0.33
Creatinine >200 μmol/l	7.0	6.0	0.57
Previous MI	21.5	29.8	0.007
Previous PCI	10.2	12.8	0.25
Previous CABG	4.2	7.0	0.088
Left ventricular function <40%	10.1	13.5	0.21
On warfarin pre-PCI	1.3	2.8	0.12

Death, MI, CVA, TVR, or major hemorrhage



de Belder et al. JACC 2013

Q2 Is DES safe for the olds?

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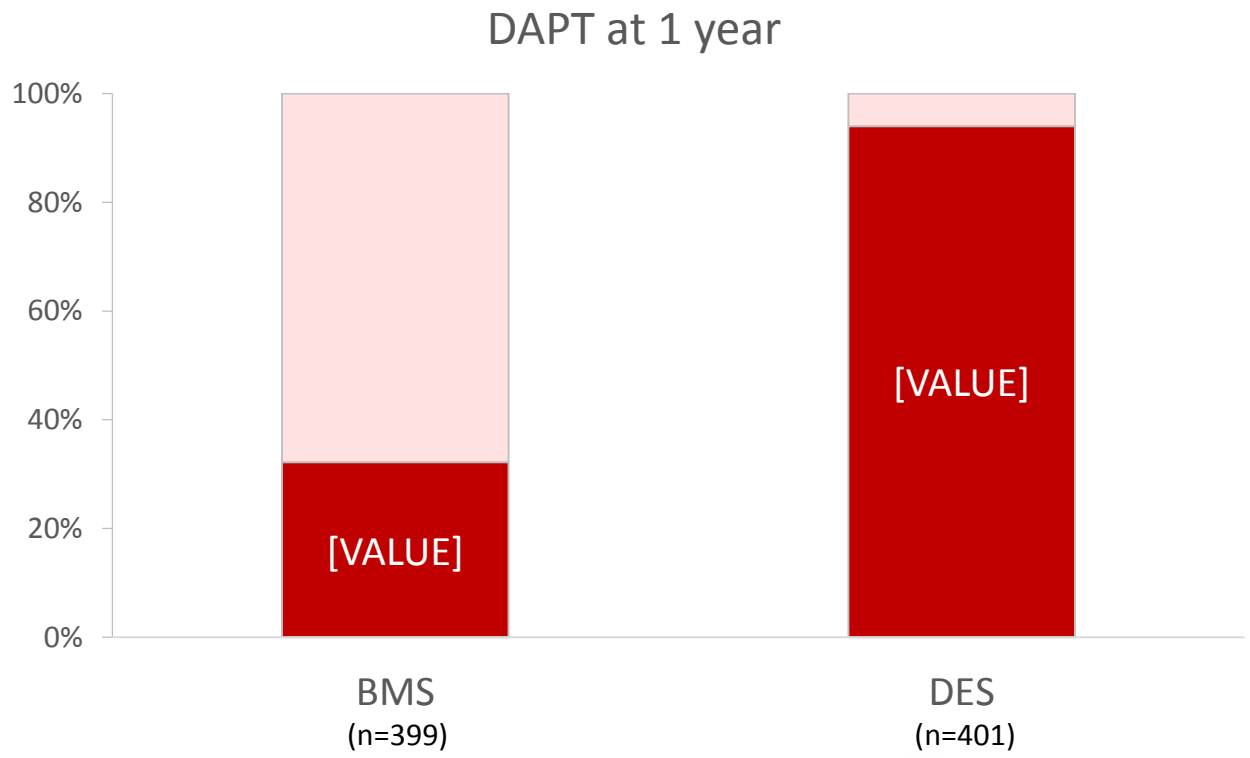
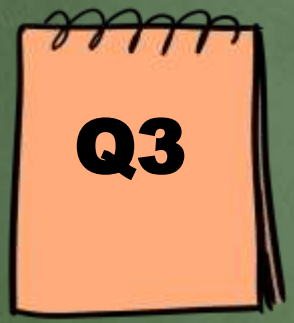


de Belder et al. JACC 2013



How long would I give DAPT for the old?

2017 ESC Focused Update on Dual Antiplatelet Therapy in Coronary Artery Disease developed in collaboration with the EACTS*

*: European Association for Cardio-Thoracic Surgery

ESC
European Society of Cardiology

What is new in the 2017 ESC focussed update on DAPT?

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Change in recommendations

Before → 2017

- Pretreatment with $P2Y_{12}$ inhibitors when PCI is planned
- Liberal use of PPI to mitigate GI bleeding risk
- Elective surgery requiring discontinuation of the P2Y12 inhibitor after 1 month
- Ticagrelor interruption of 3 days prior elective surgery
- Dual therapy as an alternative to triple therapy when bleeding risk outweighs the ischaemic risk
- Discontinuation of antiplatelet treatment in patients treated with OAC should be considered at 12 months.
- Routine platelet function testing to adjust therapy

New recommendations 2017

- The occurrence of actionable bleeding while on DAPT should prompt reconsideration of type and duration of DAPT regimen.
- The decision for DAPT duration should be dynamic and reassessed during the course of the initially selected DAPT regimen.
- Discontinuation of $P2Y_{12}$ inhibitor therapy after 6 months when stenting ACS patients with PRECISE-DAPT ≥ 25
- 6-month DAPT regimen in patients with SCAD treated with drug-coated balloon
- Early administration of ticagrelor/ clopidogrel in NSTE-ACS with invasive approach
- Ticagrelor 60 mg b.i.d preferred over other oral P2Y12 inhibitors for DAPT continuation >12 months in post-MI

I IIA IIB III

New/revised concepts

Metallic stent and DAPT duration

Switch between $P2Y_{12}$ inhibitors

Risk scores to guide DAPT duration
- PRECISE DAPT score
- DAPT score

Specific profiling
- Definition of complex PCI
- Unfavourable profile for OAC and APT

Gender considerations and special populations

DAPT duration without stenting
- Medical management
- CABG or cardiac surgery

Anticoagulation and DAPT
- Acute and chronic setting
- Dosing regimen

www.escardio.org/guidelines

2017 ESC Focused Update on DAPT in Coronary Artery Disease, developed in collaboration with EACTS (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx419)

DAPT duration by clinical situation irrespective of stent types

Measures to minimize bleeding while on dual antiplatelet therapy

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Recommendations	Class	Level
Radial over femoral access is recommended for coronary angiography and PCI if performed by an expert radial operator.	I	A
In patients treated with DAPT, a daily aspirin dose of 75–100 mg is recommended.	I	A
A PPI in combination with DAPT is recommended.	I	B
Routine platelet function testing to adjust antiplatelet therapy before or after elective stenting is not recommended.	III	A

2017 ESC Focused Update on DAPT in Coronary Artery Disease, developed in collaboration with EACTS (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx419)

Dual antiplatelet therapy duration and related stent choices in patients with stable coronary artery disease treated with percutaneous coronary intervention

ESC European Society of Cardiology

Recommendations	Class	Level
In patients with stable CAD treated with coronary stent implantation, DAPT consisting of clopidogrel in addition to aspirin is generally recommended for 6 months, irrespective of the stent type.	I	A
Irrespective of the intended DAPT duration, DES is the preferred treatment option.	I	A
In patients with stable CAD considered at high bleeding risk (e.g. PRECISE-DAPT ≥25), DAPT for 3 months should be considered*.	IIa	B
In patients with stable CAD treated with drug-coated balloon, DAPT for 6 months should be considered.	IIa	B

*:The evidence supporting this recommendation comes from two studies where zotarolimus-eluting Endeavour sprint stent has been investigated in conjunction with a 3-month DAPT regimen.

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2017 ESC Focused Update on DAPT in Coronary Artery Disease, developed in collaboration with EACTS (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx419)

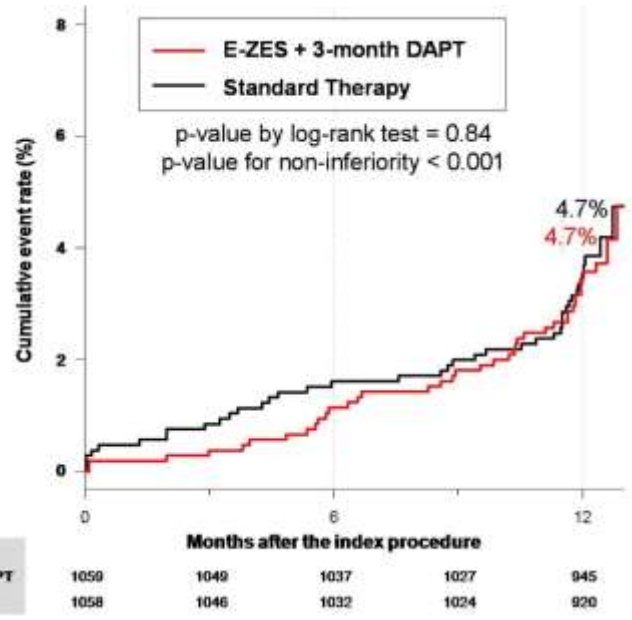
3-month DAPT in stable angina

RESET trial

Patient	2,117 patients with coronary artery disease (angina + AMI)
Intervention	3-month DAPT (n=1,059) vs. 12-month DAPT (n=1,058)
Treatment	Endeavor ZES
Outcomes	Cardiovascular death, MI, ST, TVR, or bleeding) at 1 year

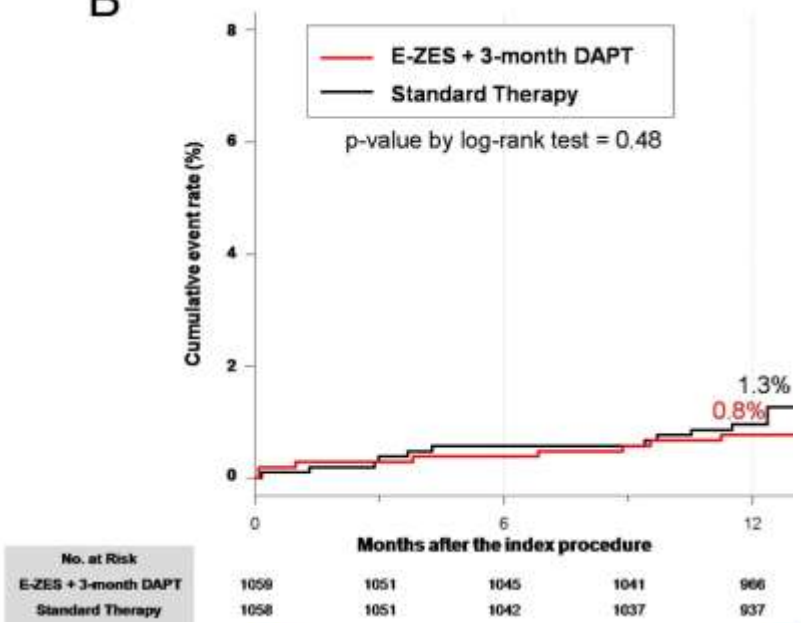
Primary Endpoint
(cardiovascular death, MI, ST, TVR, or bleeding)

A



Composite of all-cause death, MI, ST

B



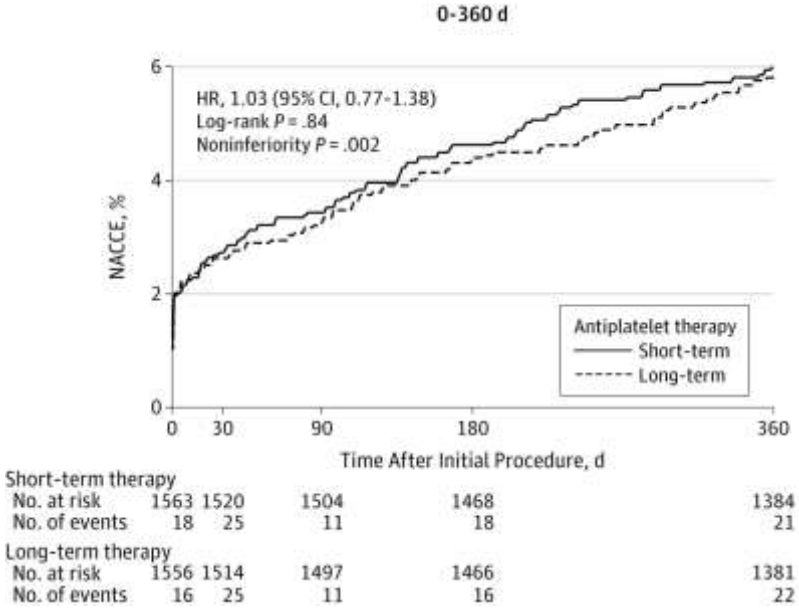
Kim et al. JACC 2012

3-month DAPT in stable angina

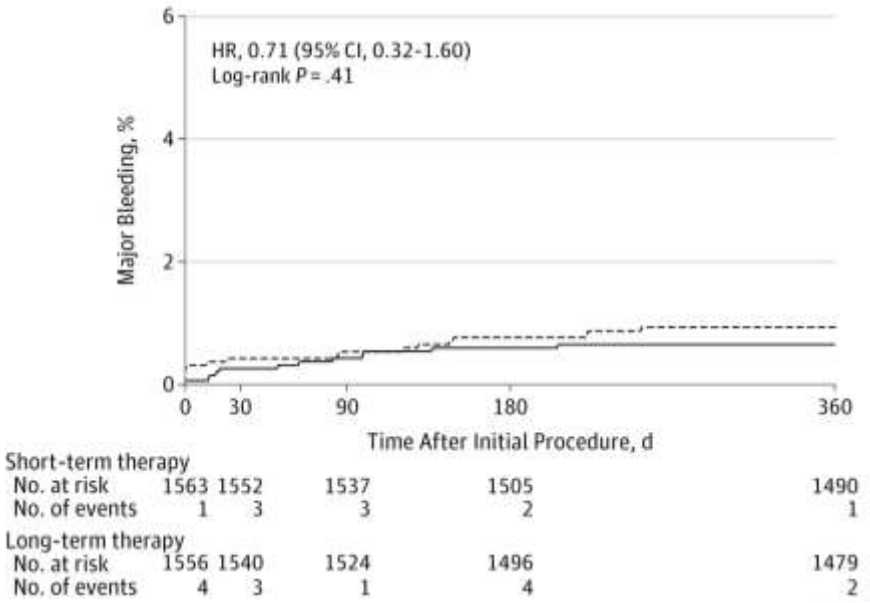
OPTIMIZE trial

Patient	3,119 patients with stable angina or low-risk ACS
Intervention	3-month DAPT (n=1,563) vs. 12-month DAPT (n=1,556)
Treatment	Endeavor ZES
Outcomes	All-cause death, MI, stroke, or major bleeding at 1 year

Primary Endpoint: NACCE
(all-cause death, [MI], stroke, or major bleeding)



Bleeding



Feres et al. JAMA 2013

Shorter duration of DAPT

Stent thrombosis

Study	No of events/total: Short term	No of events/total: 12 month	Odds ratio (95% CI) M-H, fixed	Weight (%)	Odds ratio (95% CI) M-H, fixed
Definite or probable stent thrombosis					
EXCELLENT[22]	6/722	1/721		3.1	6.03 (0.72 to 50.24)
ISAR-SAFE[23]	5/1998	4/2007		12.4	1.26 (0.34 to 4.69)
ITALIC[28]	3/926	0/924		1.6	7.01 (0.36 to 135.85)
OPTIMIZE[24]	13/1605	12/1606		37.0	1.08 (0.49 to 2.38)
PRODIGY[7,26]	10/983	9/987		27.6	1.12 (0.45 to 2.76)
RESET[27]	2/1059	3/1058		9.3	0.67 (0.11 to 3.99)
SECURITY[8]	3/682	3/717		9.1	1.05 (0.21 to 5.23)
Total (95% CI)	42/7975	32/8020		100.0	1.32 (0.83 to 2.08)
Test for heterogeneity: χ^2=4.20, df=6, P=0.65, I^2=0%					
Test for overall effect: z=1.18, P=0.24					

Major bleeding

Study	No of events/total: Short term	No of events/total: 12 month	Odds ratio (95% CI) M-H, fixed	Weight (%)	Odds ratio (95% CI) M-H, fixed
EXCELLENT[22]	2/722	4/721		8.1	0.50 (0.09 to 2.73)
ISAR-SAFE[23]	4/1998	5/2007		10.2	0.80 (0.22 to 3.00)
ITALIC[28]	0/926	3/924		7.1	0.14 (0.01 to 2.75)
OPTIMIZE[24]	10/1605	14/1606		28.4	0.71 (0.32 to 1.61)
PRODIGY[7,26]	5/983	9/987		18.2	0.56 (0.19 to 1.66)
RESET[27]	2/1059	6/1058		12.2	0.33 (0.07 to 1.65)
SECURITY[8]	5/682	8/717		15.8	0.65 (0.21 to 2.01)
Total (95% CI)	28/7975	49/8020		100.0	0.58 (0.36 to 0.92)
Test for heterogeneity: χ^2=1.90, df=6, P=0.93, I^2=0%					
Test for overall effect: z=2.21, P=0.02					

Navarese et al. BMJ 2015

Dual antiplatelet therapy duration and related stent choices in patients with stable coronary artery disease treated with percutaneous coronary intervention *(continued)*

ESC European Society of Cardiology

Recommendations	Class	Level
In patients with stable CAD treated with bioresorbable vascular scaffolds, DAPT for at least 12 months should be considered.	IIa	C
In patients with stable CAD who have tolerated DAPT without a bleeding complication and who are at low bleeding but high thrombotic risk, continuation of DAPT with clopidogrel for >6 months and ≤30 months may be considered.	IIb	A
In patients with stable CAD in whom 3-month DAPT poses safety concerns, DAPT for 1 month may be considered*.	IIb	C

*;1-month DAPT after implantation of zotarolimus-eluting Endeavour sprint stent or drug coated stent reduced risks of reintervention, myocardial infarction and inconsistently of stent thrombosis compared to bare-metal stent under similar DAPT duration. It is unclear if this evidence applies to other contemporary DES.

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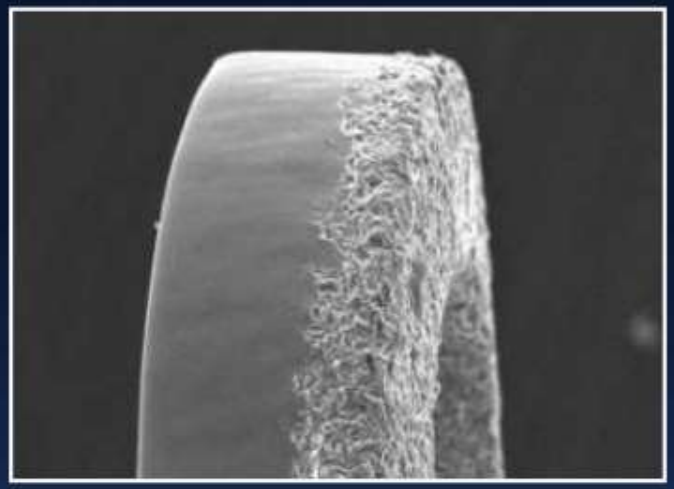
2017 ESC Focused Update on DAPT in Coronary Artery Disease, developed in collaboration with EACTS (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx419)

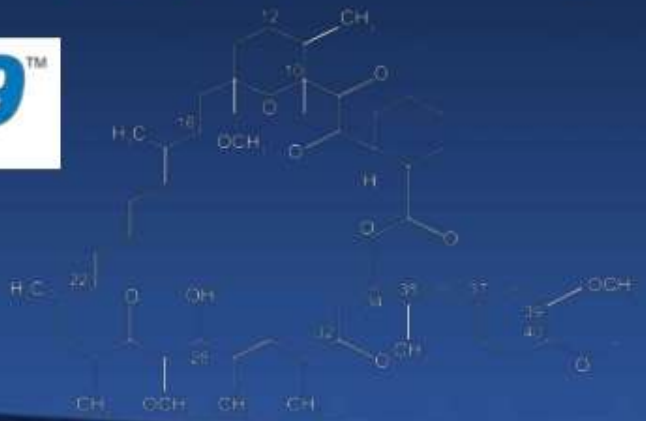
BioFreedom™

Selectively micro-structured surface holds drug in abluminal surface structures



Proprietary Highly Lipophilic Limus drug

BA9™



Hypothesis: Polymer-free drug release via porous-eluting stents may reduce late events caused by polymer stent coatings.

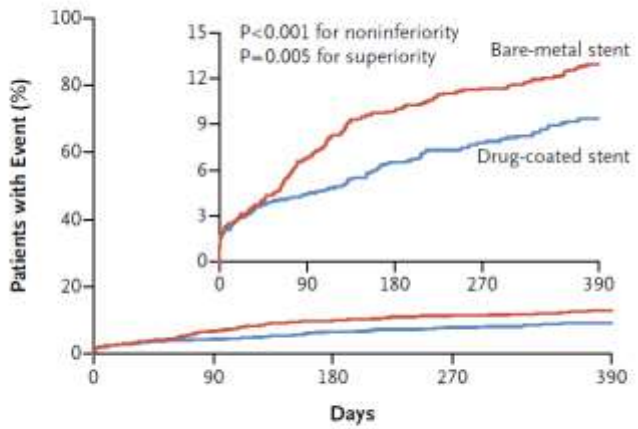
Potential advantage

- Avoid long term late adverse effects that might be attributable to the polymer
- Improved surface integrity since there is no polymer to be sheared or peeled away from the stent struts
- Possible shorter need of dual antiplatelet therapy

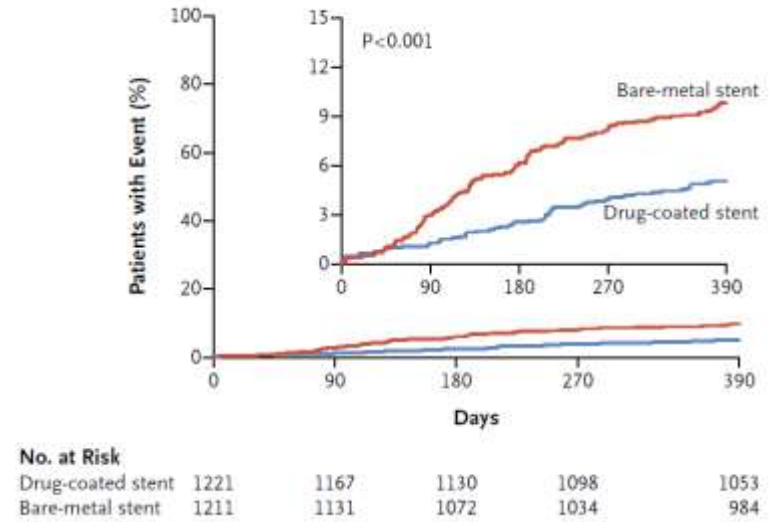
Polymer-free Biolimus-coated stent for patients with high bleeding risk

Patient	2,466 patients with high risk of bleeding
Intervention	BIOFREEDOM vs. BMS
Treatment	1-month DAPT
Outcomes	composite of cardiac death, myocardial infarction, or stent thrombosis

Primary Safety Endpoint (Death, MI, ST)



Primary Efficacy Endpoint (clinically-driven TLR)



Bhatt et al. NEJM 2015

Table 2. Primary and Secondary End Points.*

End Point	Drug-Coated Stent (N=1221)	Bare-Metal Stent (N=1211)	Hazard Ratio (95% CI)	P Value
	no. of events (% of patients)			
Primary safety end point: cardiac death, myocardial infarction, or stent thrombosis	112 (9.4)	(12.9)		
Primary efficacy end point: clinically driven TLR	59 (5.1)			
Death				
From any cause	97 (			
From cardiac causes	50 (			
Myocardial infarction‡				
Any	72 (6			
Q-wave infarction	6 (0.5)			
Non–Q-wave infarction	57 (4.8)			0.04
Undetermined type	10 (0.8)	25 (2.1)	0.39 (0.19–0.82)	0.01
Stent thrombosis‡				
Definite or probable	24 (2.0)	26 (2.2)	0.91 (0.53–1.59)	0.75
Definite	16 (1.3)	17 (1.4)	0.93 (0.47–1.84)	0.84
Probable	8 (0.7)	9 (0.8)	0.88 (0.34–2.28)	0.80
Possible	25 (2.2)	27 (2.3)	0.91 (0.53–1.57)	0.74
Acute	5 (0.4)	5 (0.4)	0.99 (0.29–3.43)	0.99
Subacute	7 (0.6)	10 (0.8)	0.69 (0.26–1.82)	0.45
Early: acute + subacute	12 (1.0)	15 (1.2)	0.79 (0.37–1.70)	0.55
Late	13 (1.1)	11 (1.0)	1.17 (0.52–2.61)	0.70

"It is unclear if this evidence applies to other contemporary DES."

- 2017 ESC guideline

Bhatt et al. NEJM 2015

Dual antiplatelet therapy duration in patients with acute coronary syndrome treated with percutaneous coronary intervention

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Recommendations	Class	Level
In patients with ACS treated with coronary stent implantation, DAPT with a $P2Y_{12}$ inhibitor on top of aspirin is recommended for 12 months unless there are contra-indications such as excessive risk of bleeding (e.g. PRECISE-DAPT ≥25).	I	A
In patients with ACS and stent implantation who are at high-risk of bleeding (e.g. PRECISE-DAPT ≥25), discontinuation of $P2Y_{12}$ inhibitor therapy after 6 months should be considered.	IIa	B
In patients with ACS treated with bioresorbable vascular scaffolds, DAPT for at least 12 months should be considered.	IIa	C

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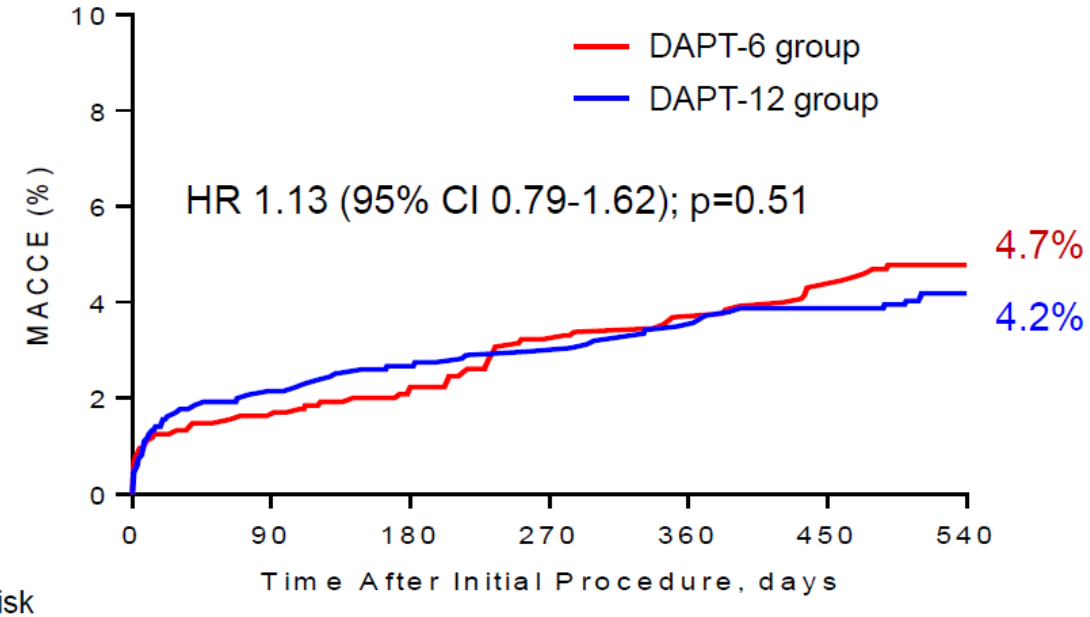
2017 ESC Focused Update on DAPT in Coronary Artery Disease, developed in collaboration with EACTS (European Heart Journal 2017 - doi:10.1093/eurheartj/ehx419)

SMART-DATE trial

Safety of 6-Month Duration of Dual Antiplatelet Therapy After PCI in Patients With ACS

Patient	2,712 patients with acute coronary syndrome (UA, NSTEMI, STEMI)
Intervention	6-month vs. 12-month DAPT
Outcomes	a composite of all-cause death, myocardial infarction, or stroke at 18 months



No. at risk							
Long-term	1355	1312	1299	1290	1283	1278	1043
Short-term	1357	1318	1296	1271	1264	1255	1032

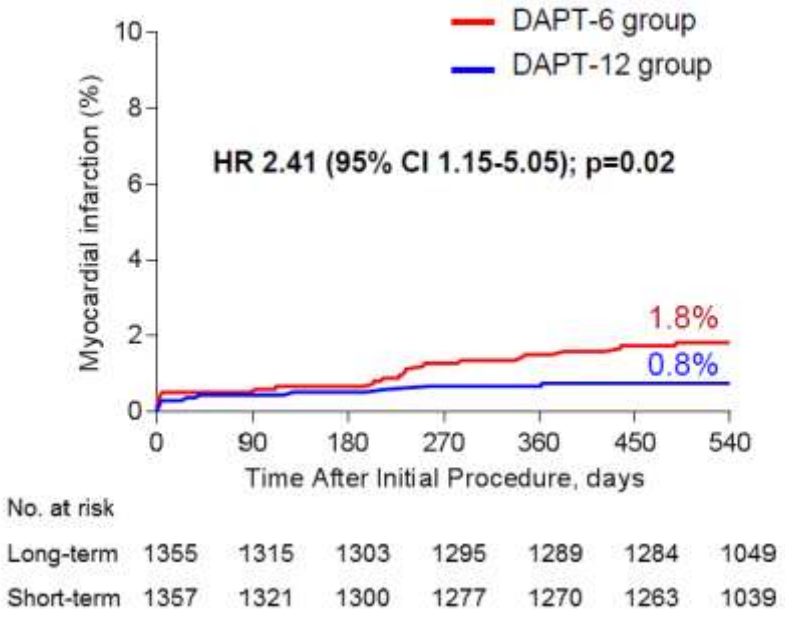
Hahn et al. Lancet 2018

SMART-DATE trial

Safety of 6-Month Duration of Dual Antiplatelet Therapy After PCI in Patients With ACS

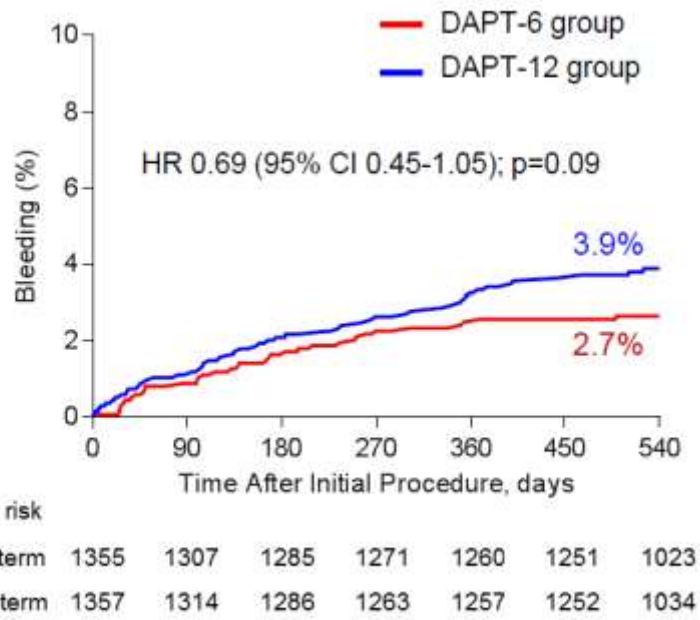
Secondary Endpoints

Myocardial Infarction



No. at risk							
Long-term	1355	1315	1303	1295	1289	1284	1049
Short-term	1357	1321	1300	1277	1270	1263	1039

BARC 2-5 bleeding

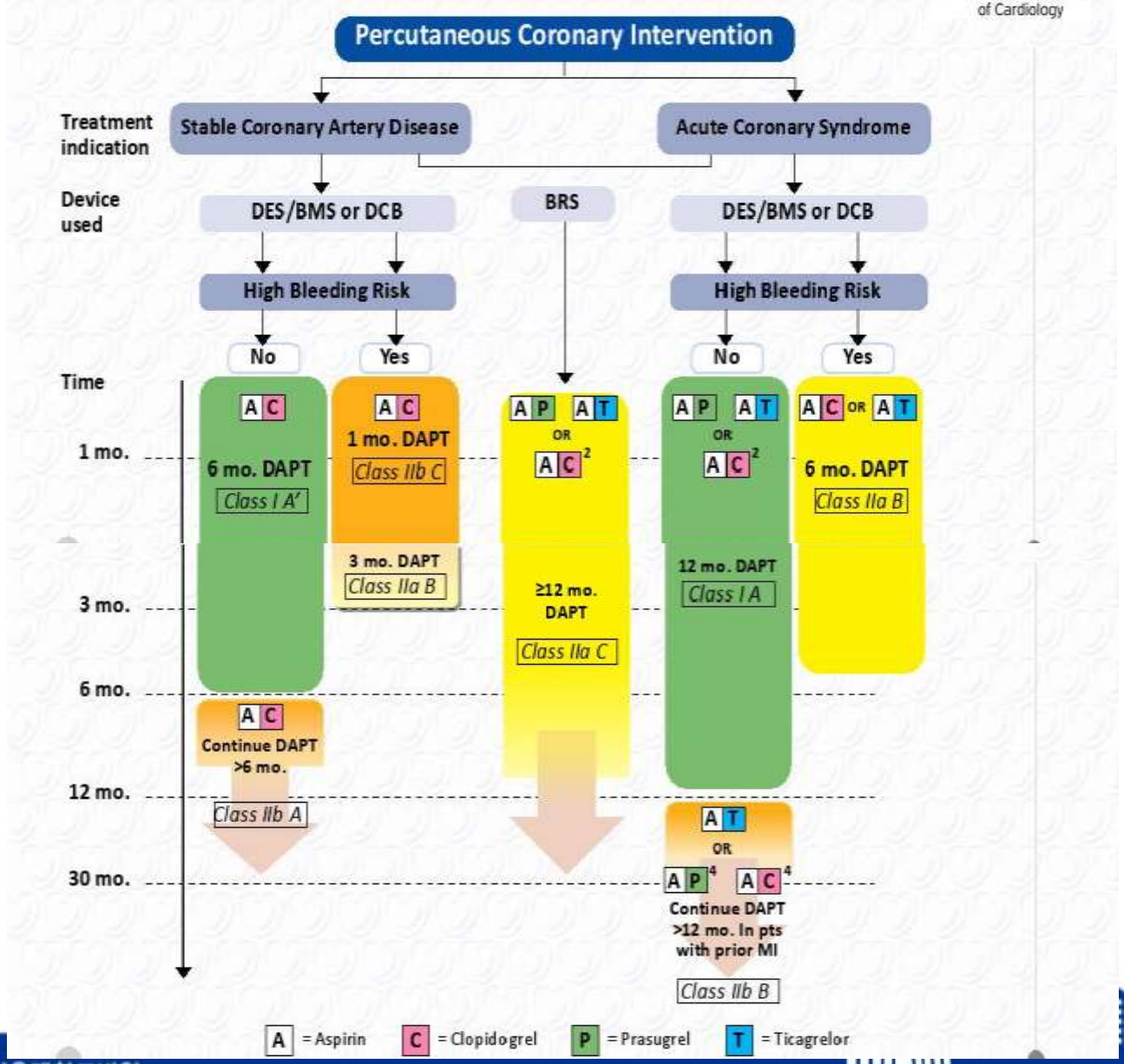


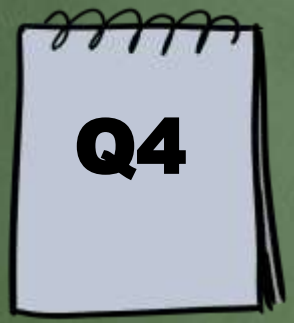
No. at risk							
Long-term	1355	1307	1285	1271	1260	1251	1023
Short-term	1357	1314	1286	1263	1257	1252	1034

Hahn et al. Lancet 2018

Algorithm for dual antiplatelet therapy (DAPT) in patients treated with percutaneous coronary intervention

ESC European Society of Cardiology





PCI strategy

when planning short-term DAPT

SENIOR

A Randomized Trial of a Bioabsorbable Polymer-Based Metallic DES vs. a BMS with Short DAPT in Patients with Coronary Artery Disease Older than 75 Years. The SENIOR Trial

O. Varenne, S. Cook, G. Sideris, S. Kedev, T. Cuisset, D. Carrié, T. Hovasse, P. Garot, R. El Mahmoud, C. Spaulding, G. Helft, J. Diaz Fernandez, S. Brugaletta, E. Pinar Bermudez, J. Mauri Ferre, P. Commeau, E. Teiger,

K. Bogearts, M. Sabate, M-C. Morice and P. Sinnaeve,

for the SENIOR investigators.

Varenne et al. Lancet 2017

Elderly PCI patients

- CAD is highly prevalent: complex, severe, and diffuse
- In US national registries in 2016[1]: *25% of PCI in patients ≥75y*
- Poorly represented in prior studies on DES and DAPT duration
- No clear recommendation for PCI and DAPT strategies

Often treated with BMS and short DAPT*, as a strategy to limit bleeding complications[2]

(*) Short DAPT: 1mo in stable patients, ≥6mo in unstable patients (per ESC guidelines)

SENIOR Study Objective and Hypothesis

Objective: To evaluate outcomes with a thin-strut, bioabsorbable polymer DES vs. BMS in elderly patients treated with short DAPT

Hypothesis is that DES have:

- **a lower rate of MACCE at 1 year vs. BMS (efficacy)**
- **a similar risk of bleeding at 1 year vs. BMS (safety)**
- **a similar risk of stent thrombosis at 1 year vs. BMS (safety)**

SENIOR Trial design

Randomized (1:1), single blind trial
1,200 patients aged 75 years and above

Tailored DAPT: 1 mo in stable and 6 mo in ACS pts
Prespecified by the investigator prior to randomization

DES Vs. **BMS**

Primary End Point 1y: all-cause mortality, non-fatal MI, stroke, IDTLR
Secondary End Points 1y: Bleeding BARC 2-5/3-5, stent thrombosis

www.ClinicalTrial.gov: NCT NCT02099617

Key Inclusion Criteria

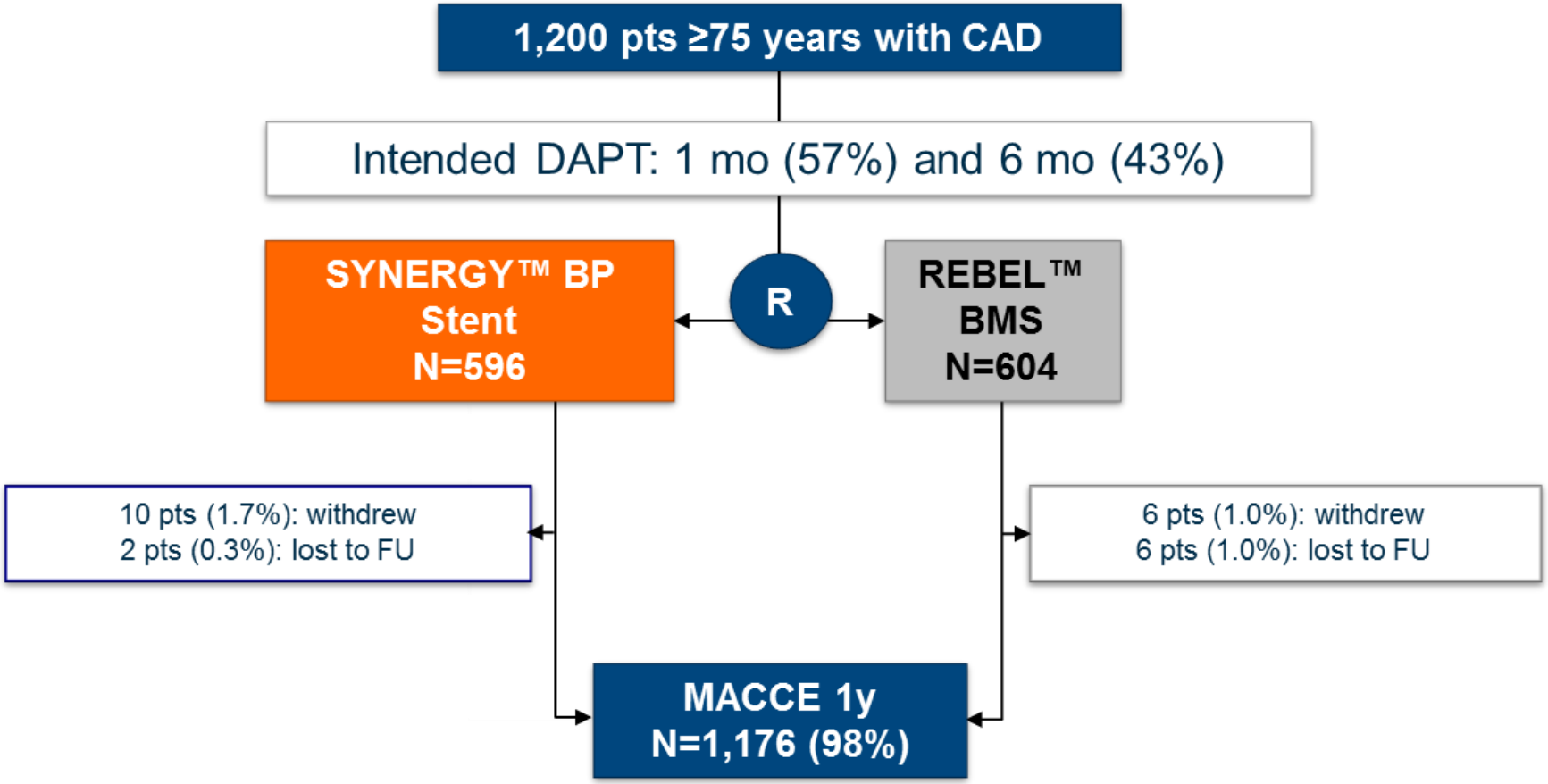
- **Patients are 75 years old or above**
  and
- **Presence of ≥1 stenosis (≥70%) in any coronary (or LM ≥50%)**
  and

  - Stable angina
  or
  - Silent ischemia
  or
  - Acute coronary syndrome

Key Exclusion Criteria

- Unable to comply with DAPT for
  - at least one month (stable angina or silent ischemia) or
  - at least six months (acute coronary syndrome)
- Planned surgery within one month
- Life expectancy less than 1 year
- Prior hemorrhagic stroke
- Indication for surgical myocardial revascularization
- Known allergy to aspirin or any $P2Y_{12}$ inhibitor

SENIOR Trial
Design



Varenne, Olivier, MD, et al. (2017). Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. The Lancet.

SENIOR Trial

Baseline Clinical Information

Boston Scientific
Advancing science for life™

Baseline Characteristics

	SYNERGY™ BP Stent N=596	REBEL™ BMS N=604
Age, y	81.4±4.3	81.4±4.2
Male sex, %	61.7	62.7
BMI, kg/m^2	26.3±4.3	25.9±3.9
Diabetes mellitus, %	26.6	26.0
Hypercholesterolemia, %	52.2	53.0
Hypertension*, %	71.6	80.8
Previous MI*, %	18.3	13.3
PVD*, (%)	14.7	21.0
Atrial fibrillation, %	17.3	17.9
Anemia, %	13.8	15.0
*P <0.05		

Angiography

	SYNERGY BP Stent N=596	BMS N=604
Transradial approach, %	79.8	81.3
Multiple vessel disease, %	34.0	30.6
Lesion location, %		
LM*	3.9	1.3
LAD	54.0	52.3
LCx	29.8	26.5
RCA	35.9	37.9
Stents implanted per patient	1.7±1.0	1.6±1.0
Stent diameter per lesion (mm)	3.0±0.5	3.0±0.5
Total stent length per patient (mm)	32.6±20.8	30.3±20.3
*P <0.05		

Varenne, Olivier, MD, et al. (2017). Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. The Lancet.

SENIOR Trial

Clinical Presentation

Boston Scientific
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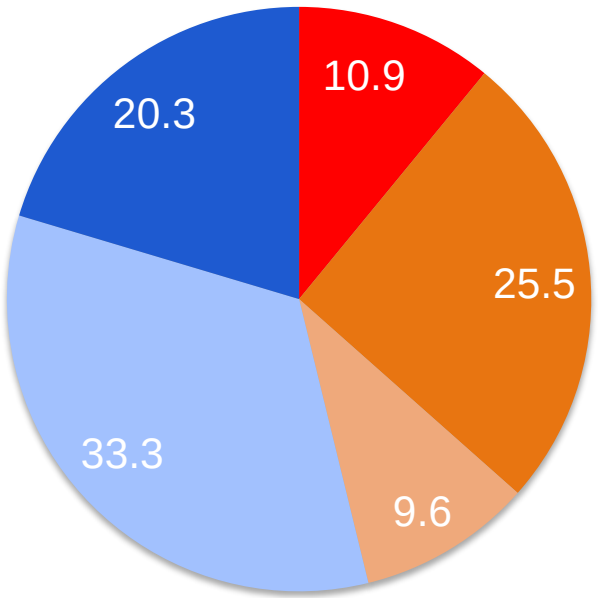
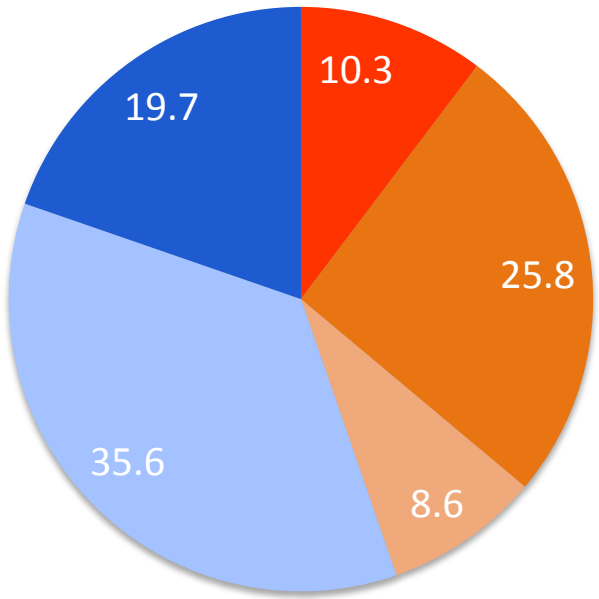
SYNERGY™ BP Stent



REBEL™ BMS



Stable angina | Silent Ischemia | STEMI | NSTEMI | UA

Varenne, Olivier, MD, et al. (2017). Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. The Lancet.

SENIOR Trial

DAPT Duration

Boston Scientific
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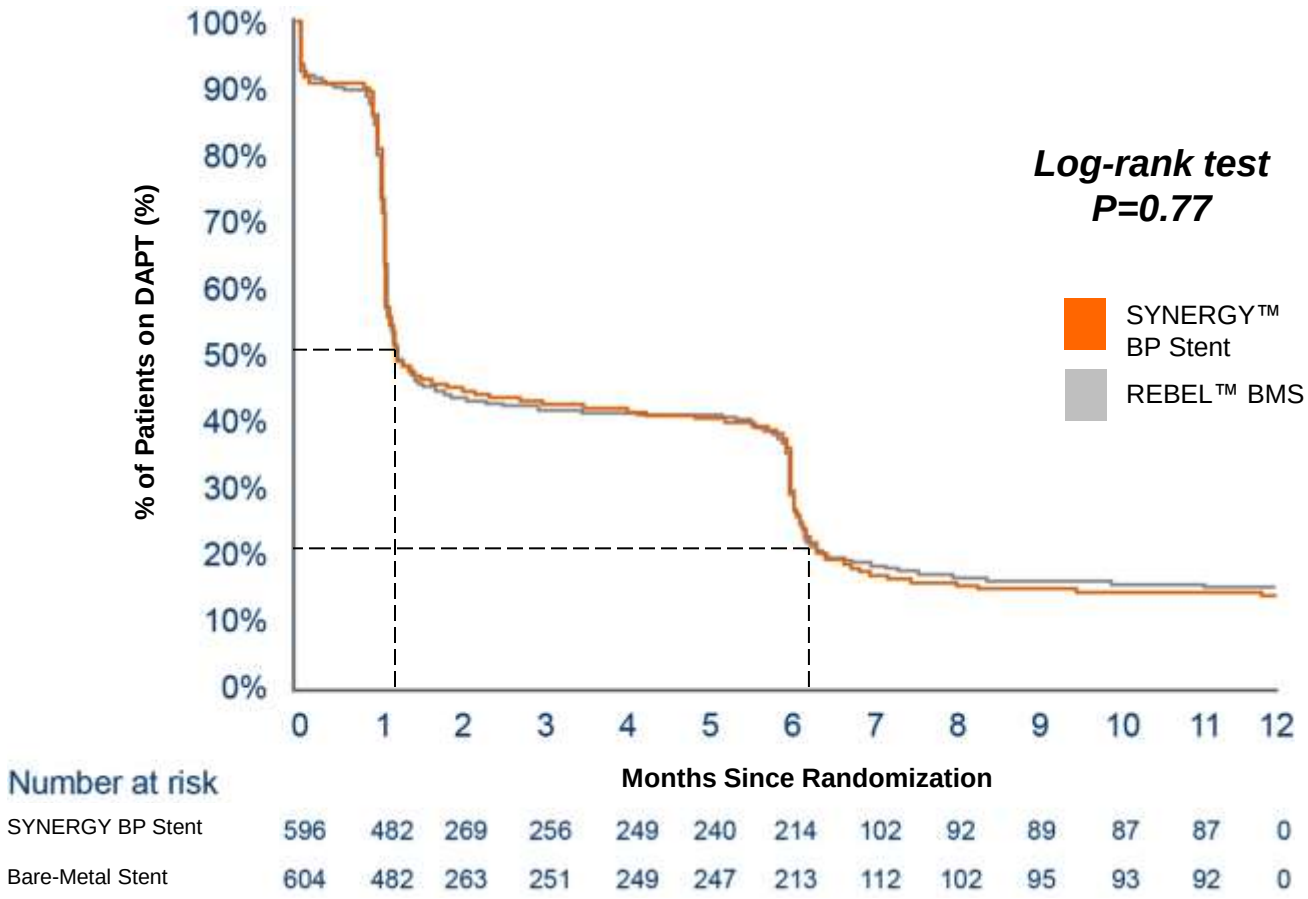
DAPT Therapy for patients with SYNERGY™ BP Stent or BMS was the same*



Varenne, Olivier, MD, et al. (2017). Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. The Lancet.

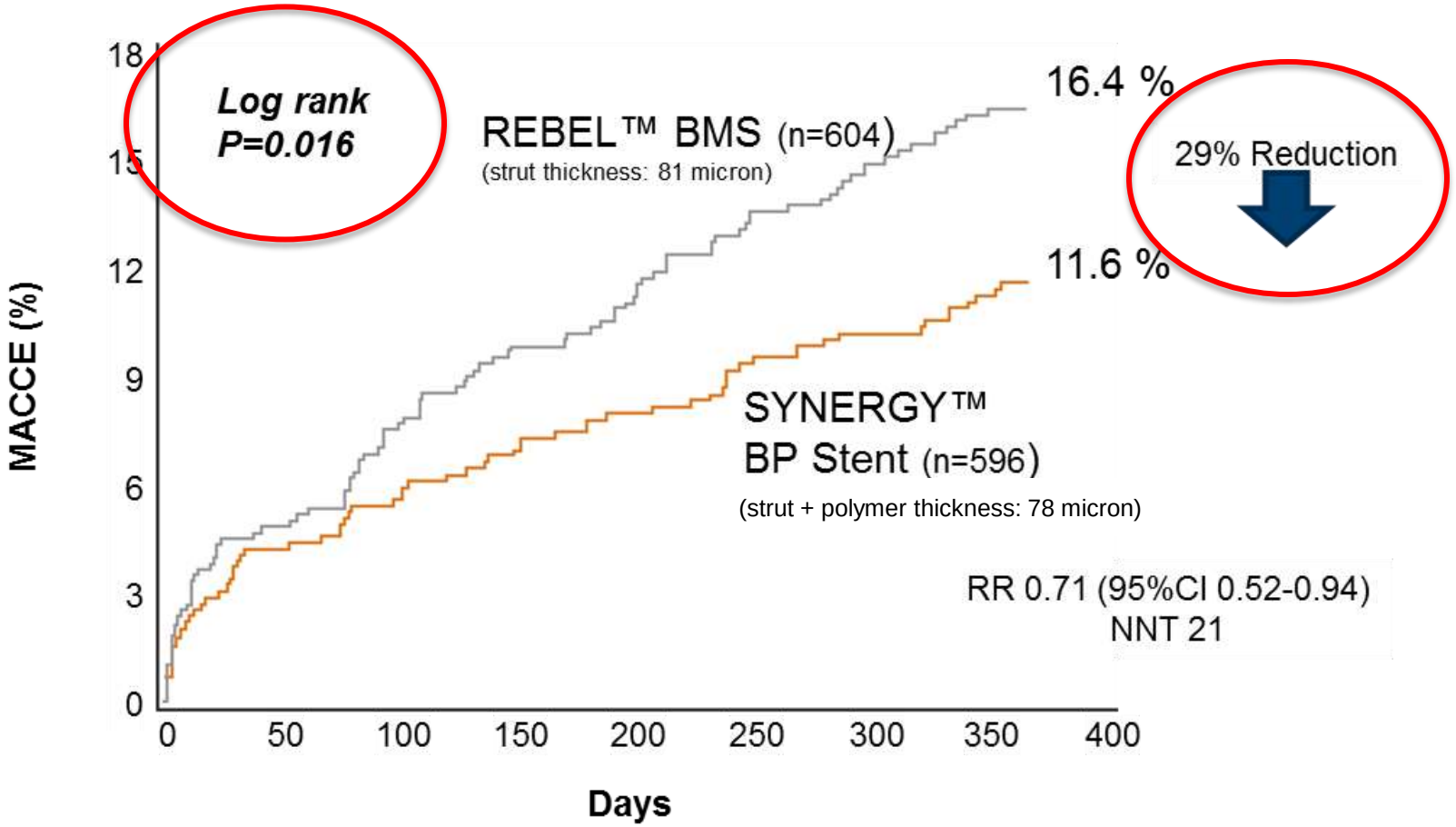
* Please review SYNERGY DFU for full instructions on DAPT.

SENIOR Trial Primary Endpoint: MACCE

All-cause mortality, MI, stroke, ischemia-driven TLR

Boston Scientific
Advancing science for life™

SYNERGY™ BP Stent Showed Superior Results versus BMS in Elderly Patients that Received a Shortened DAPT* Regimen



Varenne, Olivier, MD, et al. (2017). Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. The Lancet.

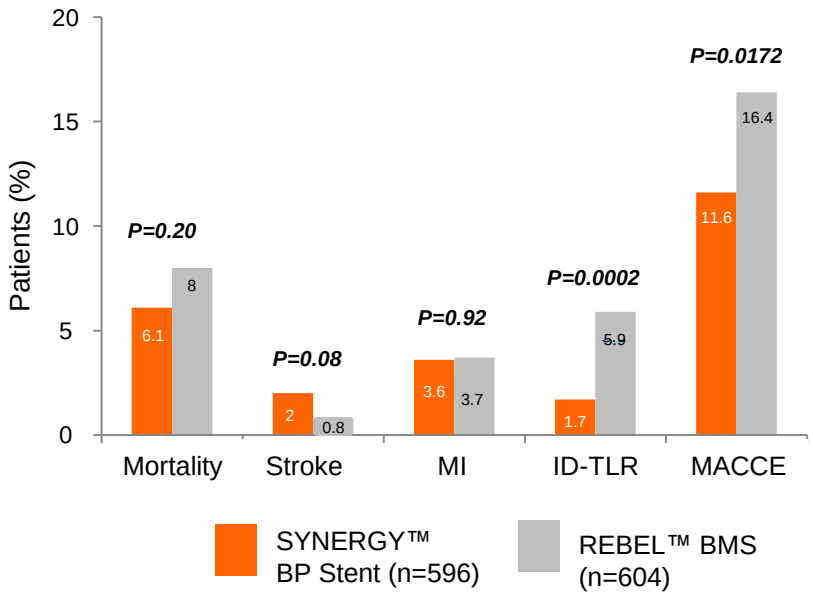
* Please review SYNERGY DFU for full instructions on DAPT.

SENIOR Trial: 12-month Clinical Outcomes

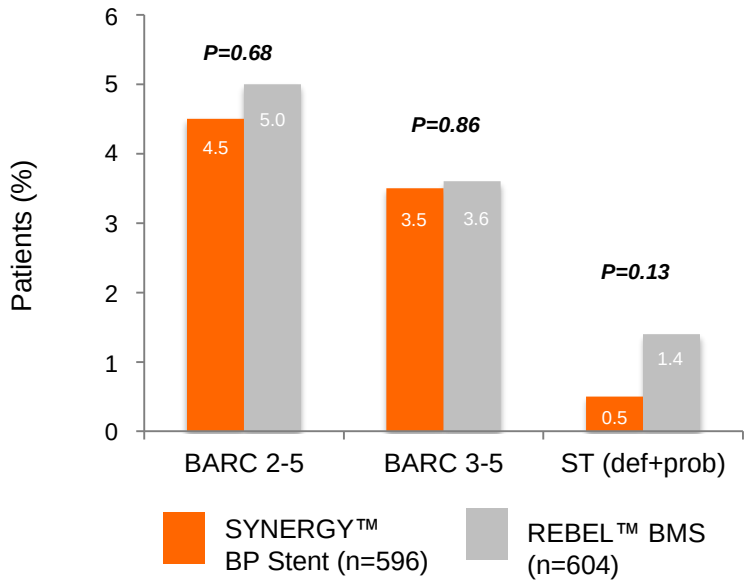
Boston Scientific
Advancing science for life™

SYNERGY™ BP Stent showed a 3x reduction in ID-TLR and exceptionally low ARC Def/Prob stent thrombosis

MACCE Components



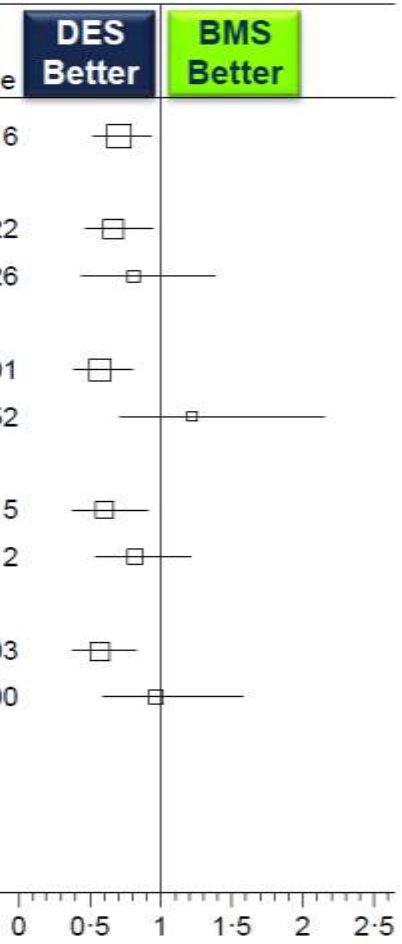
Safety Endpoints



Varenne, Olivier, MD, et al. (2017). Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. The Lancet.

Subgroup Analyses (primary end point)

All-cause mortality, MI, stroke, ischaemia-driven TLR at 1 year	DES (N=596)	BMS (N=604)	Relative Risk (95% CI)	P-value
Overall event rate	68/545 (11·6%)	98/568 (16·4%)	0·7 (0·5, 0·9)	0·016
Age [years] (Interaction: p=0·587)				
<85	48/419 (10·5%)	71/429 (15·7%)	0·7 (0·5, 0·9)	0·022
>= 85	20/126 (15·1%)	27/139 (18·7%)	0·8 (0·4, 1·4)	0·426
Atrial fibrillation (Interaction: p=0·025)				
No	44/448 (9·1%)	77/466 (15·8%)	0·6 (0·4, 0·8)	0·001
Yes	24/ 95 (23·8%)	21/101 (19·5%)	1·2 (0·7, 2·1)	0·452
Acute coronary syndrome (Interaction: p=0·315)				
No	30/297 (9·4%)	52/312 (15·7%)	0·6 (0·4, 0·9)	0·015
Yes	38/248 (14·1%)	46/256 (17·3%)	0·8 (0·5, 1·2)	0·312
Sex (Interaction: p=0·105)				
Male	38/341 (10·4%)	67/357 (17·9%)	0·6 (0·4, 0·8)	0·003
Female	30/204 (13·4%)	31/211 (13·8%)	1·0 (0·6, 1·6)	0·900



Percentages are Kaplan-Meier estimates·

SENIOR Trial

1-Year Results Summary

Boston Scientific
Advancing science for life™

Short DAPT Trial with SYNERGY™ BP Stent: SUPERIOR Outcomes in Elderly Patients

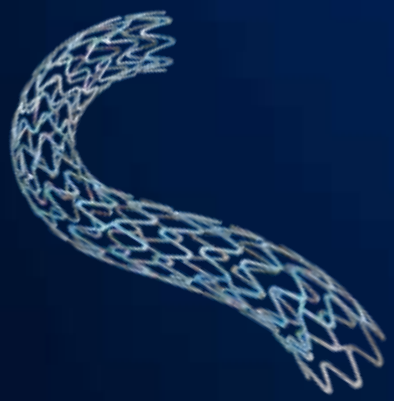
- 1,200 patients that were all 75 years of age or older were studied
- DAPT protocol: 1-month for stable patients; 6 months for unstable patients
- 57% of patients discontinued DAPT at 1-month
- SYNERGY BP Stent showed superior results†:
  - 29% reduction in primary endpoint MACCE; BMS reported 16.4%; SYNERGY reported 11.6%, statistically significant with a p-value of 0.016
- SYNERGY BP Stent showed exceptionally low ST rate nearly 1/3 of the BMS rate
- **There was ZERO def/prob ST after early DAPT discontinuation post PCI with SYNERGY in elderly patients in this trial at 1 year**

The SYNERGY BP Stent was intentionally designed to enable shortened DAPT* and is being evaluated in additional clinical trials such as EVOLVE Short DAPT, POEM and IDEAL LM Trials. We look forward to these trial results.

†Varenne, Olivier, MD, et al. (2017). Drug-eluting stents in elderly patients with coronary artery disease (SENIOR): a randomised single-blind trial. The Lancet.

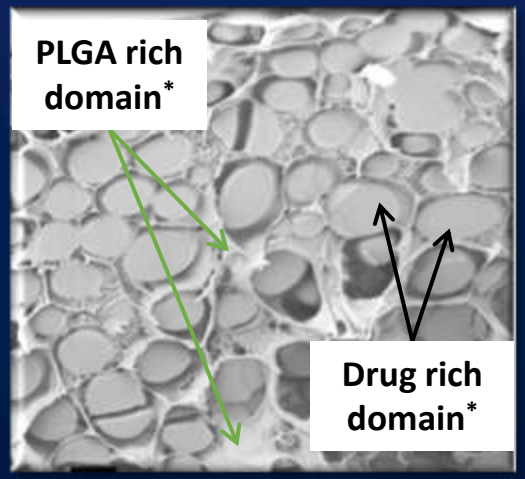
* Please review SYNERGY DFU for full instructions on DAPT.

The SYNERGY Stent



Platinum Chromium Platform

- 74µm (0.0029in) strut thickness
- ↑ Visibility
- ↑ Strength
- ↑ Flexibility
- ↑ Conformability
- ↓ Recoil



Everolimus-Eluting

- 100µg/cm^2
- 3 month release time
- 45% / 55% mix of drug and polymer

Ultrathin Abluminal Coating

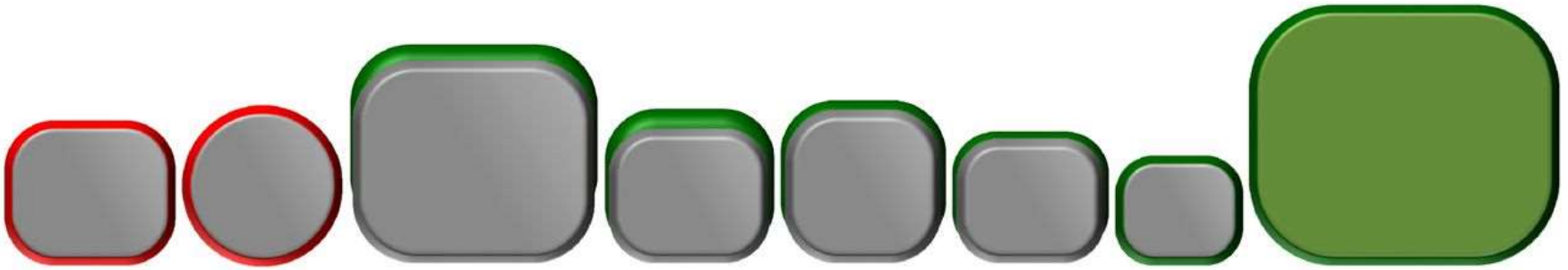
Bioabsorbable Polymer Coating (PLGA)

- Abluminal
- 4µm thick
- 85:15 ratio
- <4 month absorption time

Adapted from Boston Scientific

Thin Struts

Durable polymer-coated stent		Biodegradable polymer-coated stent					Bioresorbable drug-eluting stent
Abbott/ Boston	Medtronic	Biosensors	Terumo	Translumina	Boston	Biotronik	Abbott
Xience/ Promus	Resolute	BioMatrix	Ultimaster	Yukon Choice PC	Synergy	Orsiro	ABSORB
CoCr/PtCr-EES	CoNi-ZES	316L-BES	CoCr-SES	316L-SES	PtCr-EES	CoCr-SES	PLLA-EES



Strut thickness

81 µm	91 µm	120 µm	80 µm	87 µm	74 µm	60 µm	150 µm

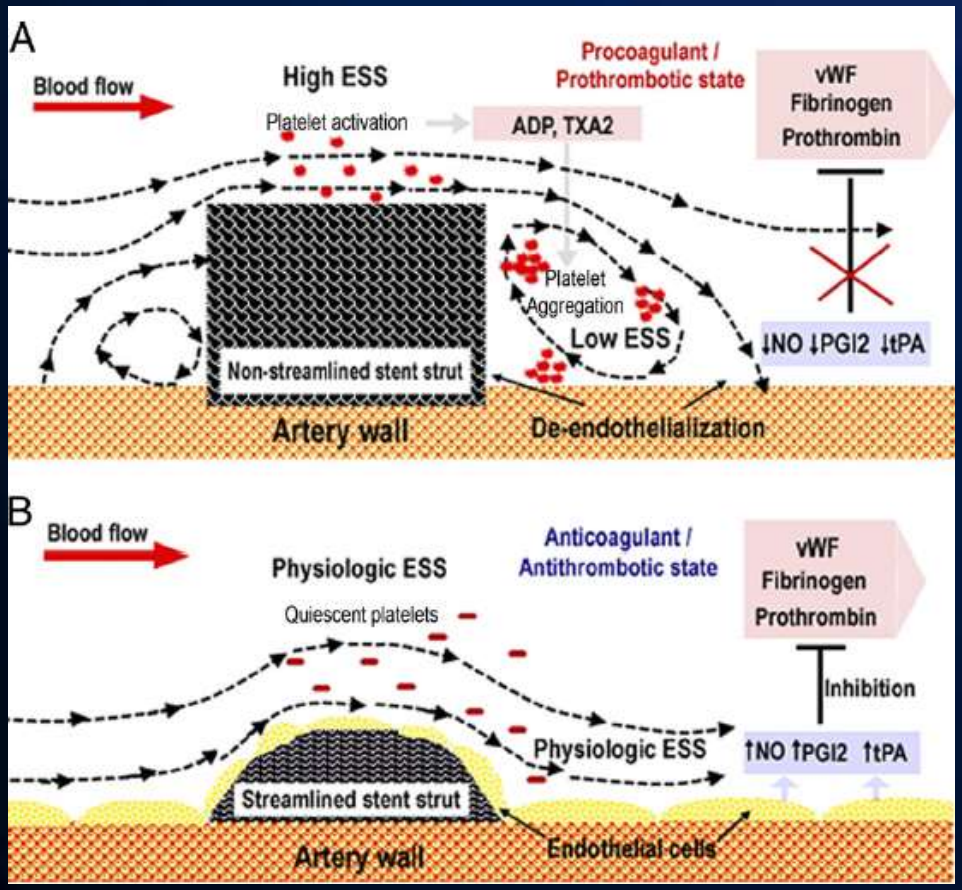
Polymer coating

Circumferential	Abluminal	Circumferential

Byrne et al. Eur Heart J 2015

Shear Stress Impacts ST Risk

Strut Design and Stent Thrombogenicity



Thick, rectangular struts promote stent thrombogenicity.

- High ESS (on top of struts)
  → platelet activatation
  → ADP release
- Low ESS (downstream of the strut) → activated platelets ↑
  re-endothelialization ↓
  natural anticoagulant production ↓

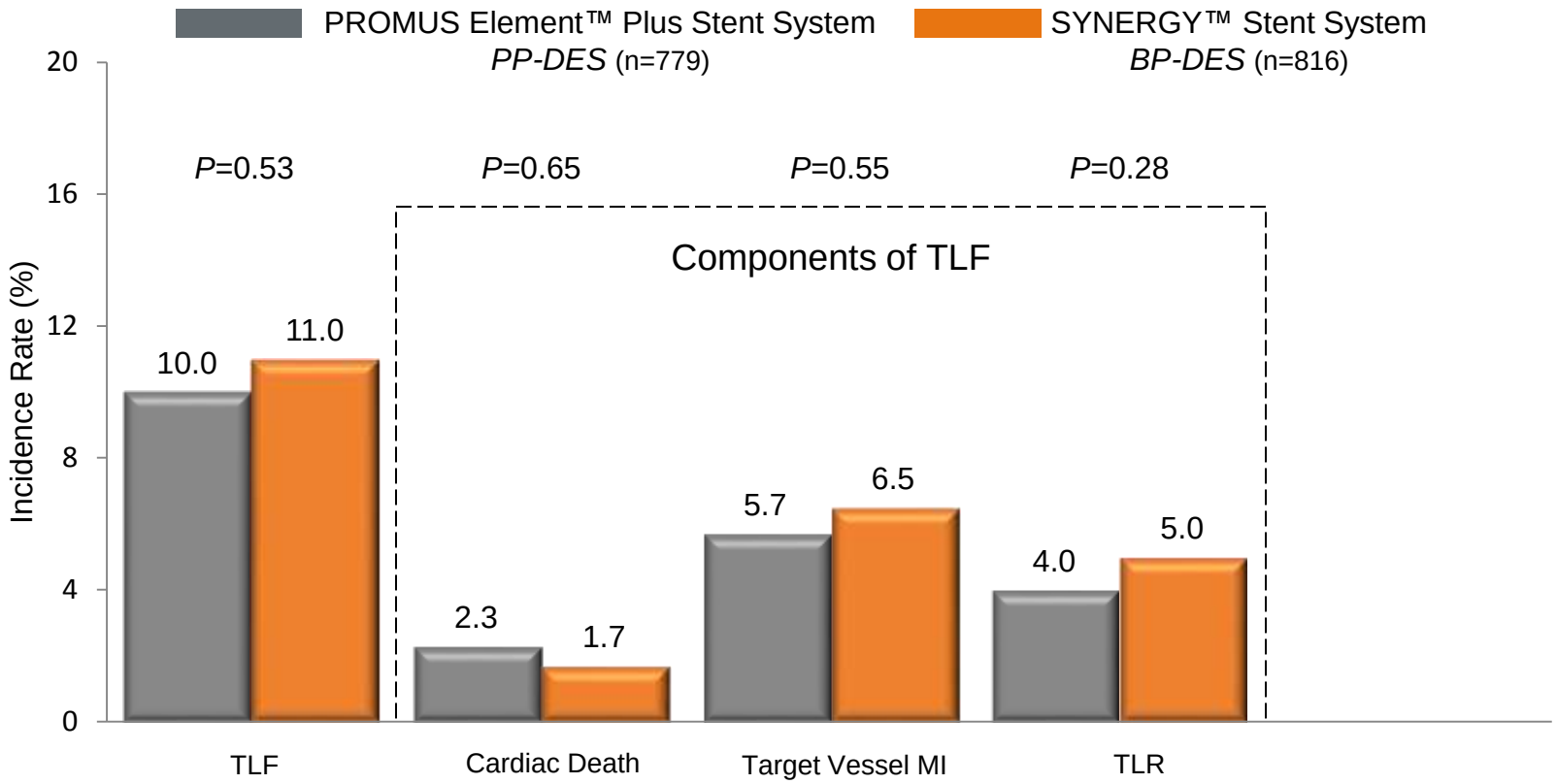
Thin, circular struts retain physiologic ESS, which favors platelet quiescence on top of struts and enhances re-endothelialization and production of antithrombotic factors downstream of struts

Koskinas et al. JACC 2012

EVOLVE II Clinical Trial

3-Year Results

Primary Endpoint of Target Lesion Failure (TLF) Met

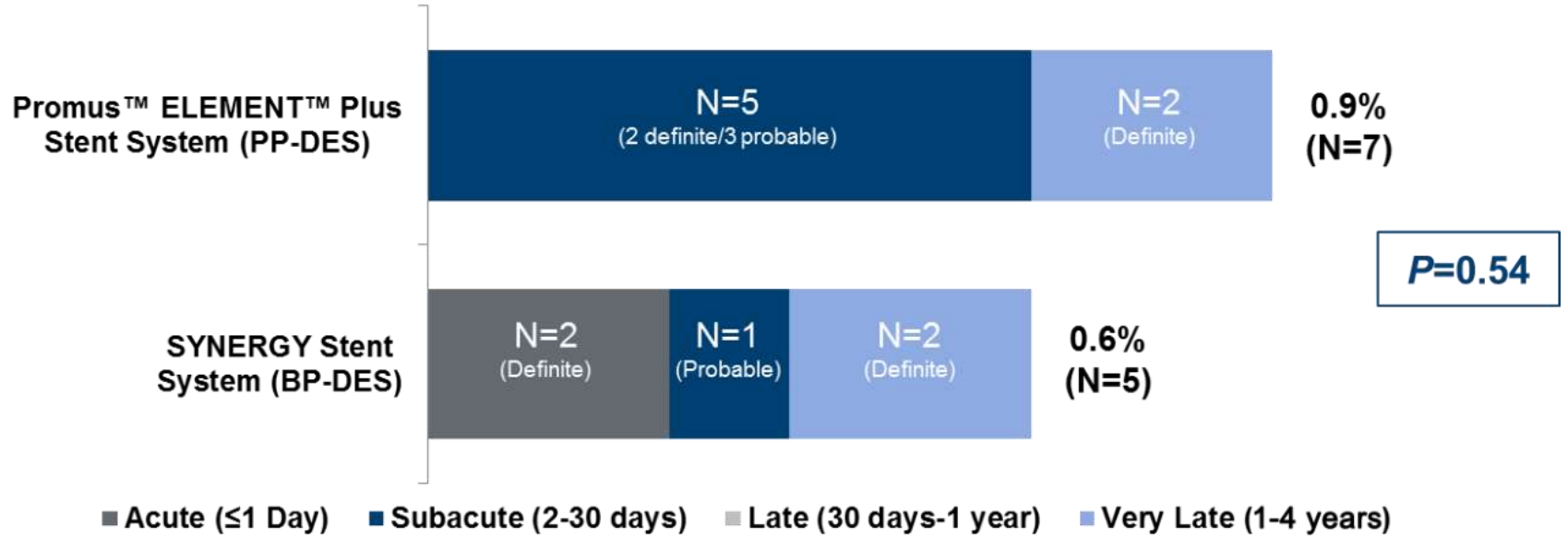


Presented by D. Kereiakes, MD at ACC 2017

ITT Population; Patients who did not receive a study stent were censored at 1 year; KM Event Rates; Per protocol spontaneous MI is defined as rise and/or fall of cardiac biomarkers with ≥1 value >99th percentile of the URL + evidence of myocardial ischemia. Peri-PCI MI is defined as ≥1 of the following: i) biomarker elevations within 48 hours of PCI (based on CK-MB >3X URL), ii) new pathological Q waves, or iii) autopsy evidence of acute MI

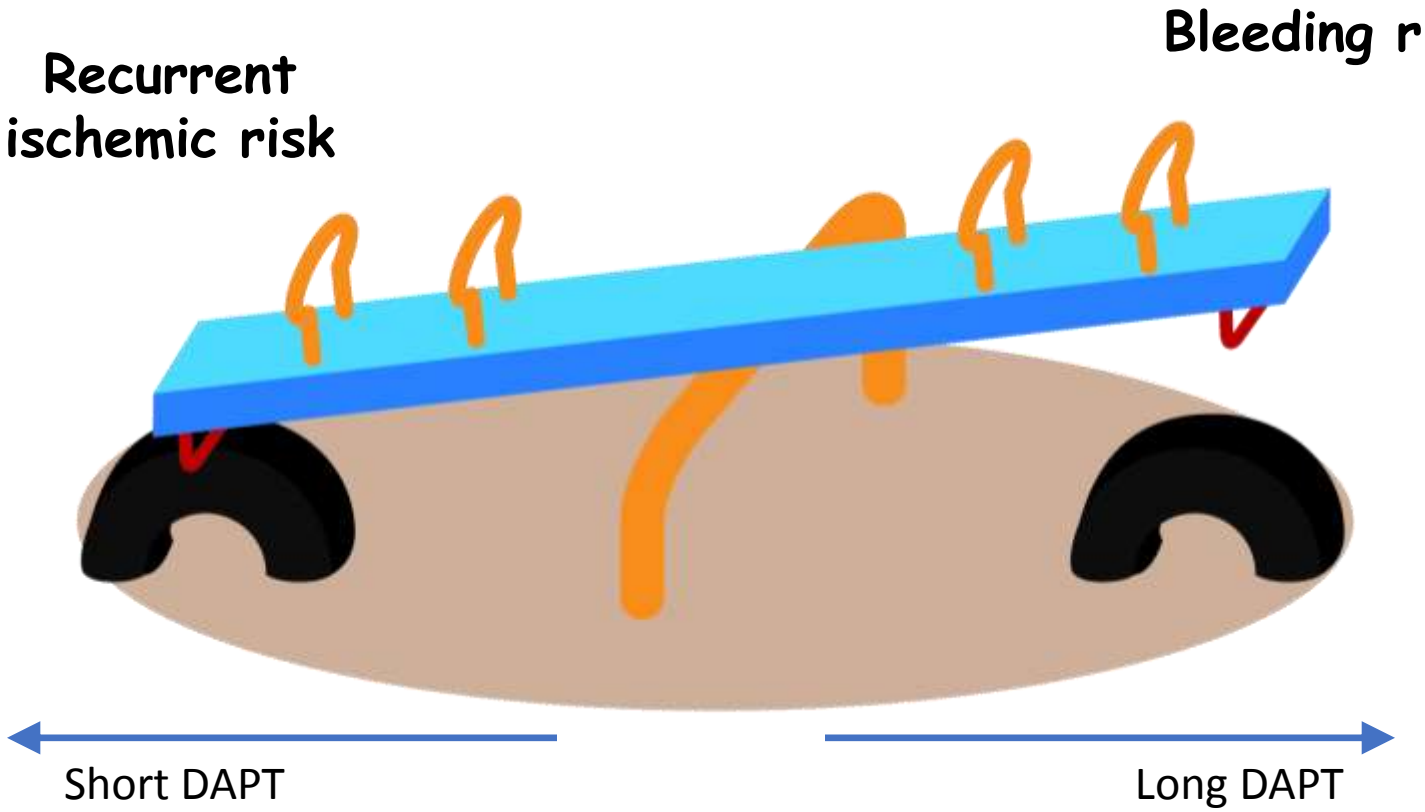
EVOLVE II Clinical Trial
4-Year Results

ARC Definite/Probable Stent Thrombosis



Presented by R. Lee Jobe, MD at ACC 2018

ITT Population; Patients who did not receive a study stent were censored at 1 year; KM Event Rates; Per protocol spontaneous MI is defined as rise and/or fall of cardiac biomarkers with ≥1 value >99th percentile of the URL + evidence of myocardial ischemia. Peri-PCI MI is defined as ≥1 of the following: i) biomarker elevations within 48 hours of PCI (based on CK-MB >3X URL), ii) new pathological Q waves, or iii) autopsy evidence of acute MI



Newer generation DES with improved safety profile have made "short-term DAPT" strategy safer than before!

JACC: CARDIOVASCULAR INTERVENTIONS

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CLINICAL RESEARCH

CORONARY

Stent Thrombosis With Drug-Eluting Stents and Bioresorbable Scaffolds

Evidence From a Network Meta-Analysis of 147 Trials

Si-Hyuck Kang, MD,[a] In-Ho Chae, MD, PhD,[a] Jin-Joo Park, MD, PhD,[a] Hak Seung Lee, MD,[b] Do-Yoon Kang, MD,[c] Seung-Sik Hwang, MD, PhD,[d] Tae-Jin Youn, MD, PhD,[a] Hyo-Soo Kim, MD, PhD[b]

ABSTRACT

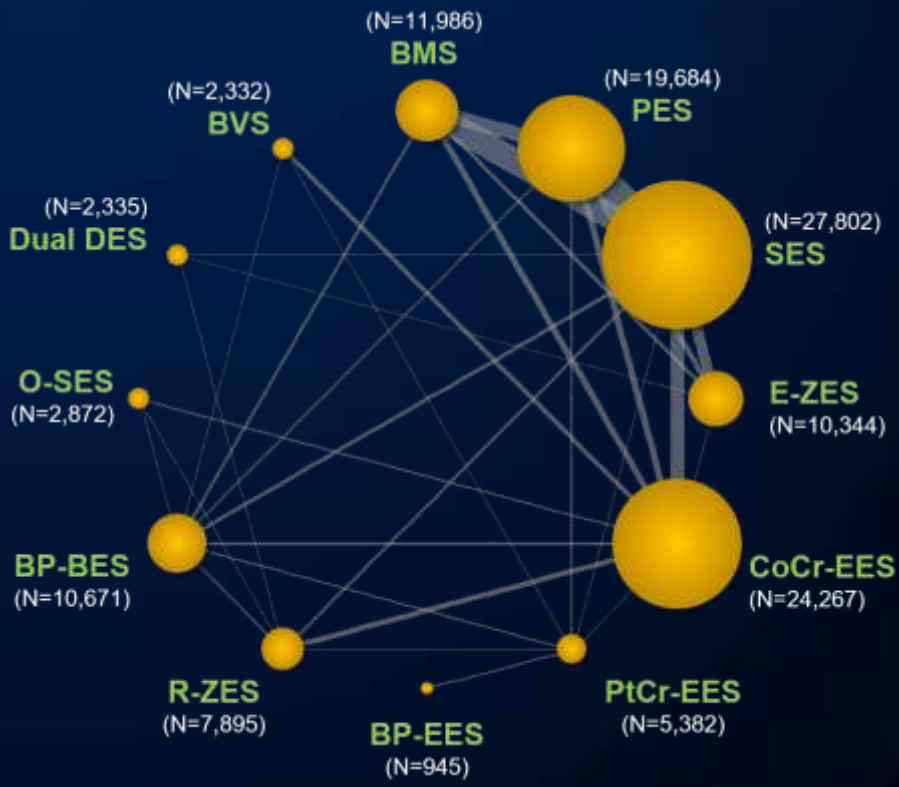
OBJECTIVES This study sought to perform a systematic review and network meta-analysis to compare the relative safety and efficacy of contemporary DES and BVS.

BACKGROUND To improve outcomes of patients undergoing percutaneous coronary revascularization, there have been advances in the design of drug-eluting stents (DES), including the development of drug-eluting bioresorbable vascular scaffolds (BVS).

METHODS Prospective, randomized, controlled trials comparing bare-metal stents (BMS), paclitaxel-eluting stents (PES), sirolimus-eluting stents (SES), Endeavor zotarolimus-eluting stents (E-ZES), cobalt-chromium (CoCr) everolimus-eluting stents (EES), platinum-chromium (PtCr)-EES, biodegradable polymer (BP)-EES, Resolute zotarolimus-eluting stents (R-ZES), BP biolimus-eluting stents (BP-BES), hybrid sirolimus-eluting stents (H [Orsiro]-SES), polymer-free sirolimus- and probucol-eluting stents, or BVS were searched in online databases. The primary endpoint was definite or probable stent thrombosis at 1 year.

Study Aim

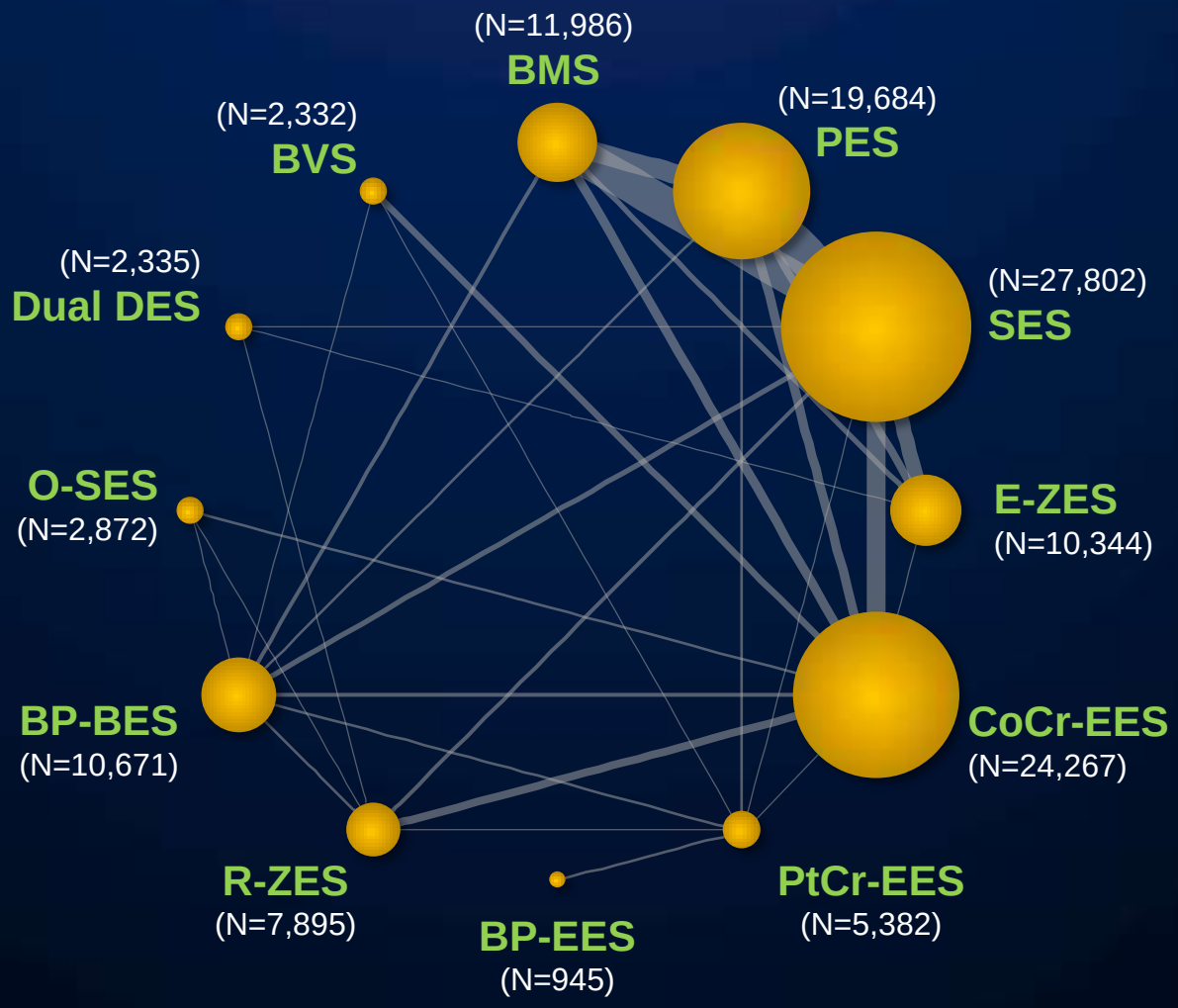
- To compare the safety of contemporary DES including BVS in terms of the risk of stent thrombosis (ST) or device thrombosis.
- We performed a systematic literature review of randomized controlled trials and updated a multiple-treatment network meta-analysis using a Bayesian framework.



Kang SH, Chae IH, Youn TJ et al. JACC Intv 2016

Network Plot of Included Trials

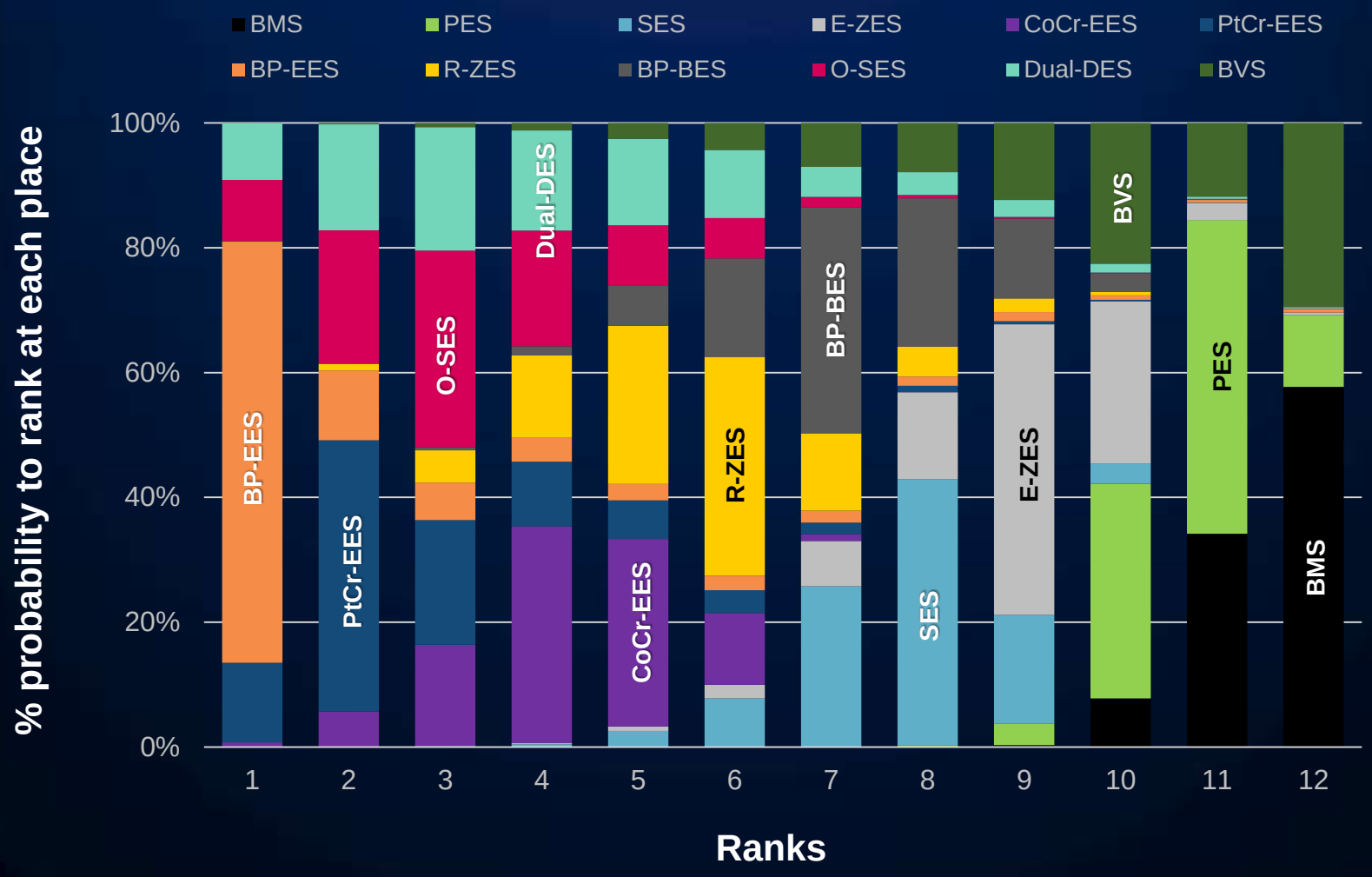
147 trials with 126,526 patients



Kang SH, Chae IH, Youn TJ et al. JACC Intv 2016

Rankogram

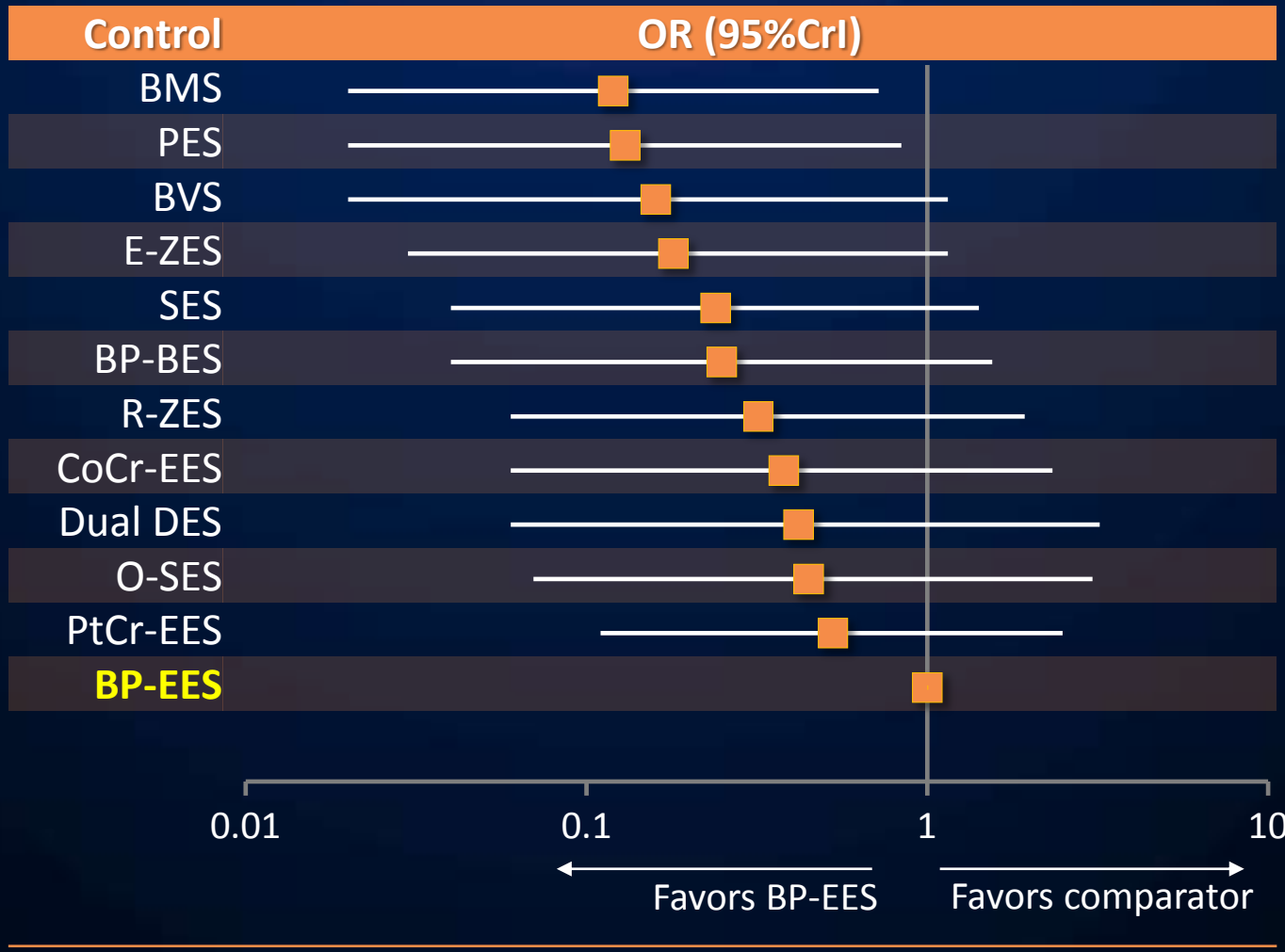
definite or probable ST at 1 year



Kang SH, Chae IH, Youn TJ et al. JACC Intv 2016

Stent Thrombosis

definite or probable ST at 1 year



Kang SH, Chae IH, Youn TJ et al. JACC Intv 2016

EuroIntervention 2018;13:1904-1913 published online Jan december 2017

Long-term safety of bioresorbable scaffolds: insights from a network meta-analysis including 91 trials

Si-Hyuck Kang[1], MD; Bill D. Gogas[2], MD, PhD; Ki-Hyun Jeon[3], MD; Jie-Suck Park[3], MD; Wonjae Lee[1], MD, MBA; Chang-Hwan Yoon[1], MD, PhD; Jung-Won Suh[1], MD, PhD; Seung-Sik Hwang[4], MD, PhD; Tae-Jin Youn[1]*, MD, PhD; In-Ho Chae[1], MD, PhD; Hyo-Soo Kim[5], MD, PhD

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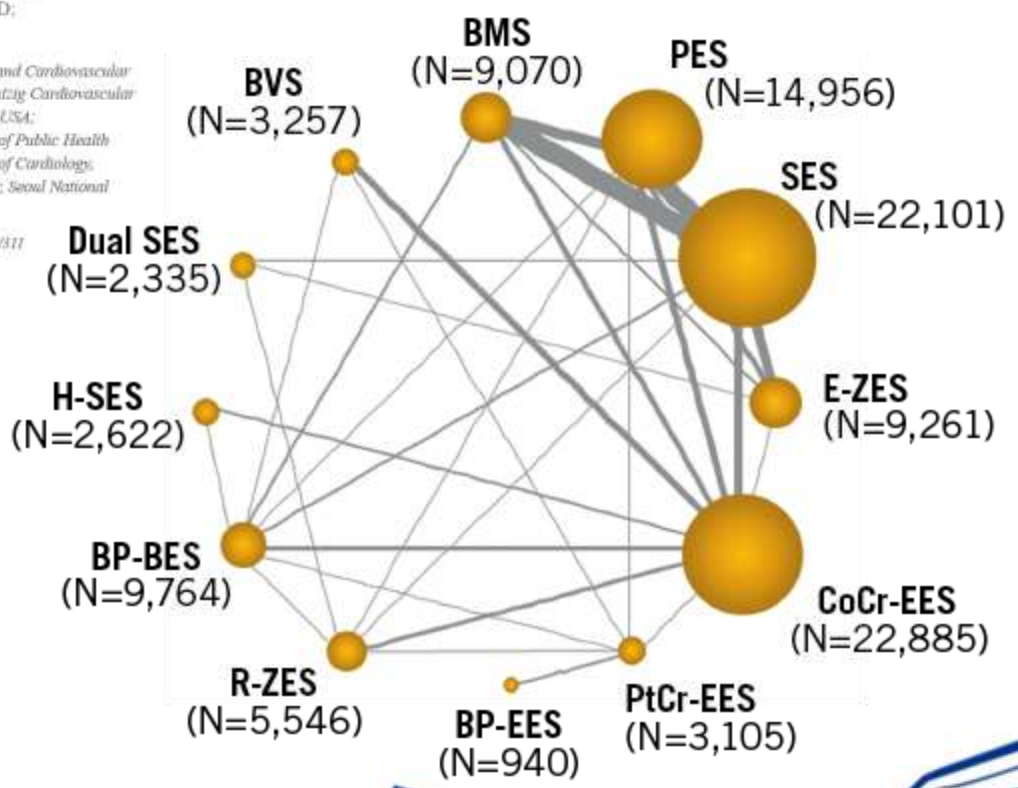
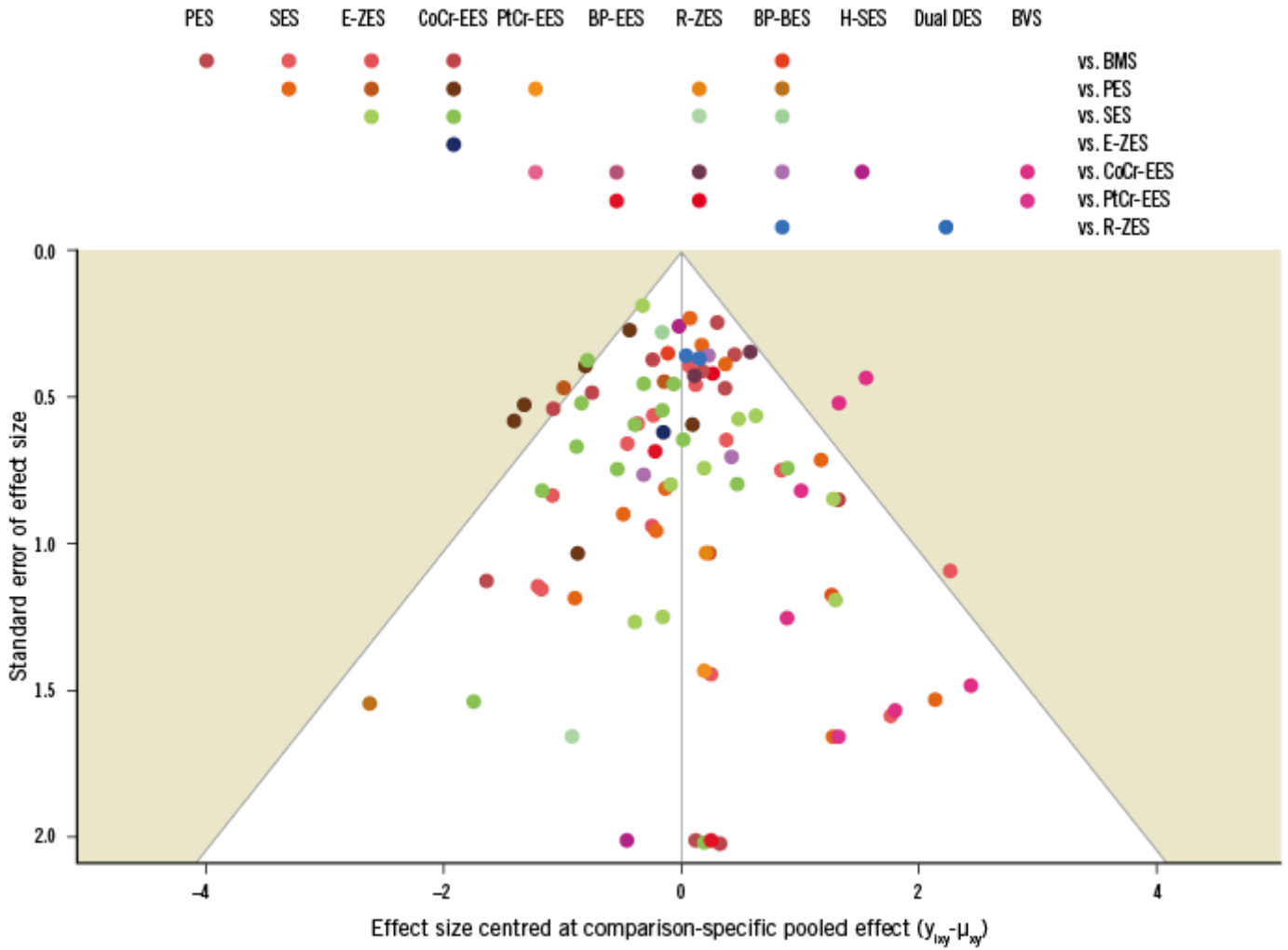
This paper also includes supplementary data published online at: http://www.pcronline.com/eurointervention/131st_issue/311



- 91 trials
- 105,842 patients
- Mean F/U duration: 3.7 years
- **Primary endpoint:** long-term definite or probable ST (ScT) (≥2 years)

Kang SH et al. Eurointervention 2018

Comparison-adjusted funnel plot



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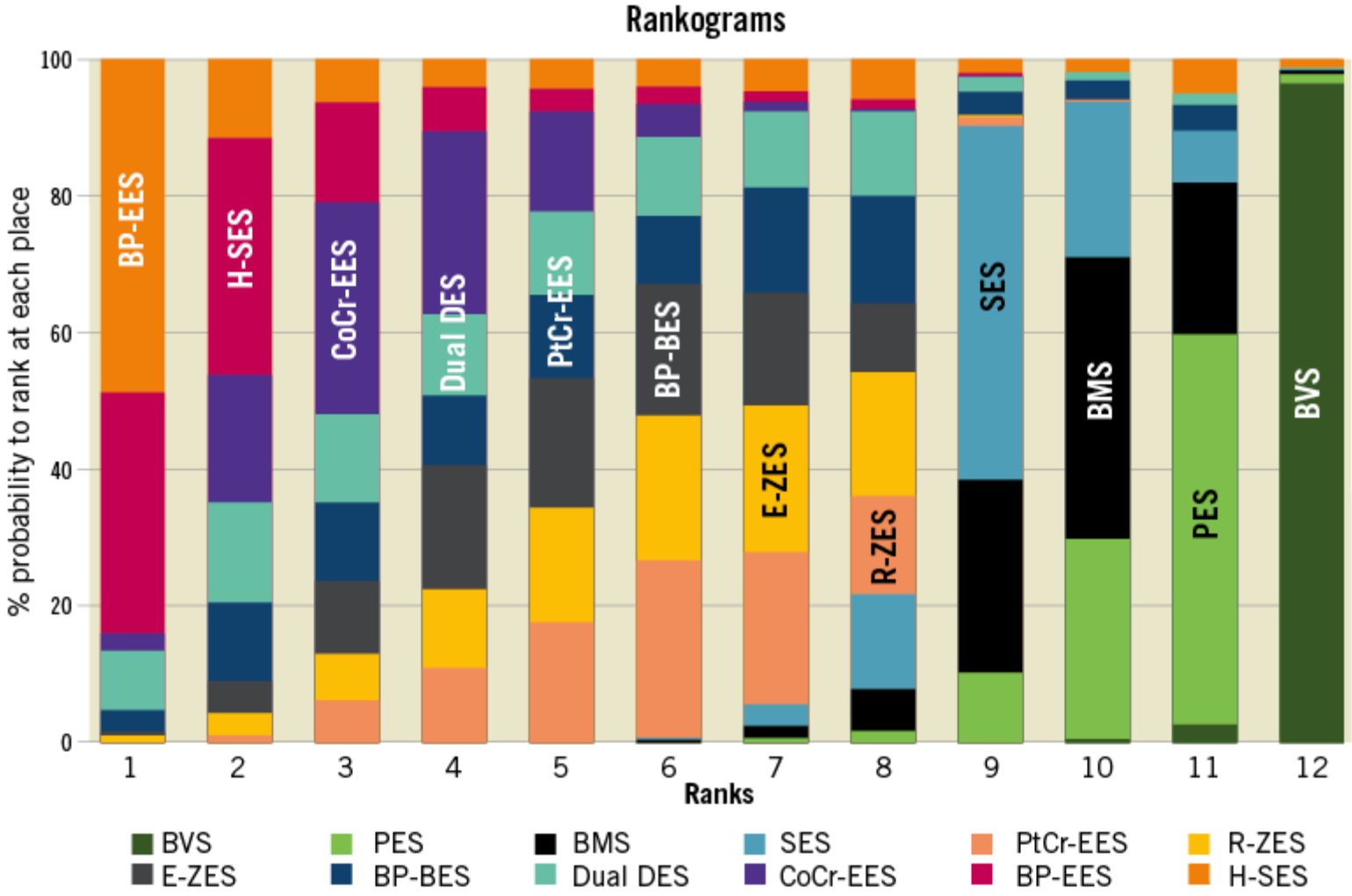
Long-term Device Thrombosis



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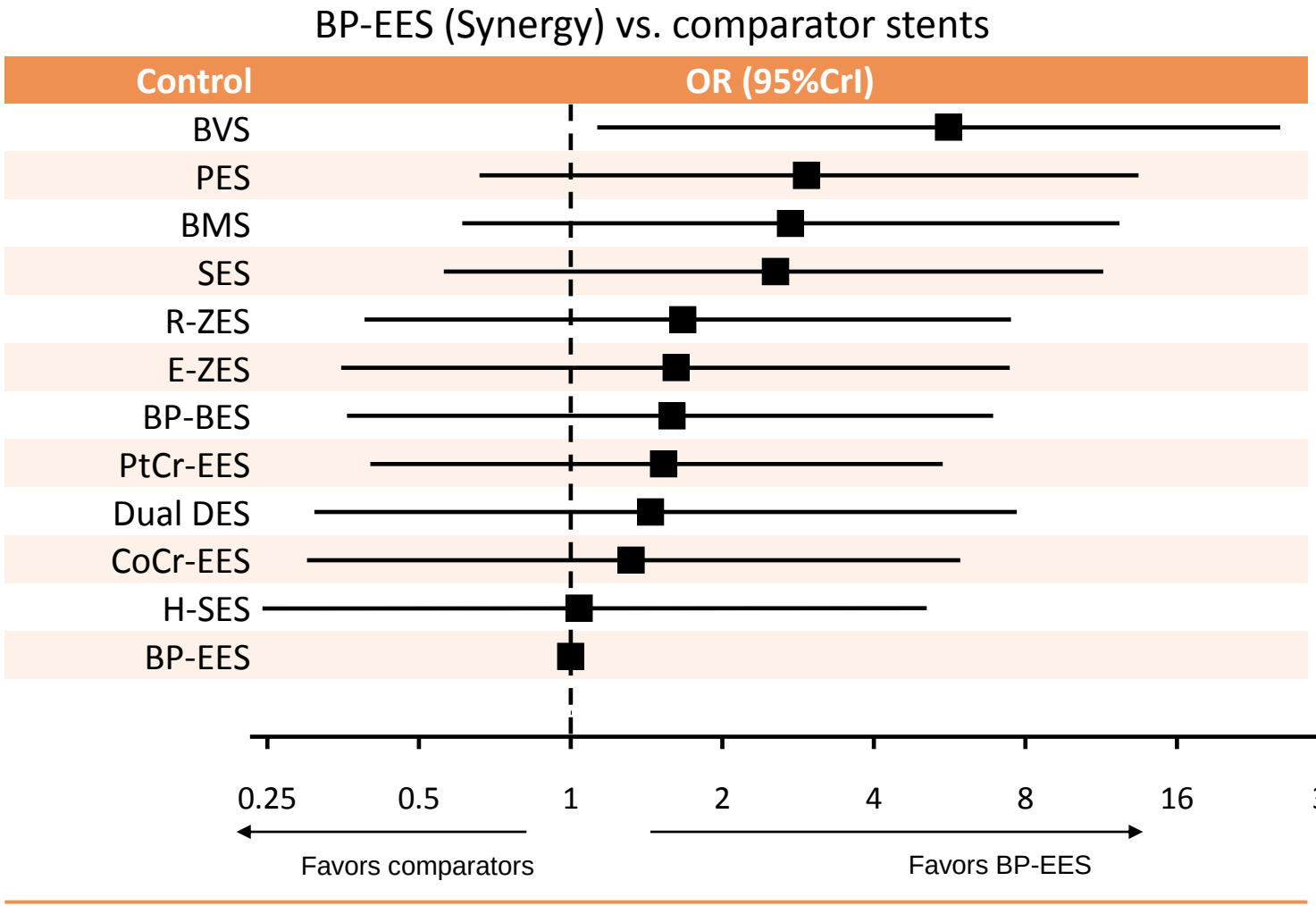
Long-term Device Thrombosis



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My viewpoint

01 Bleeding risk should be considered for elderly patients receiving PCI.

02 2017 ESC guideline recommends 6-month DAPT for stable CHD.
If bleeding is high, 3-month (IIa) or 1-month (IIb) can be considered

03 12-month DAPT is recommended for ACS.
If bleeding is high 6-month DAPT can be considered.

04 Evidence supports the efficacy and safety of short-term DAPT strategy after implantation of SYNERGY biodegradable polymer DES.


HEAL
WITH CONFIDENCE